

**Supplemental Table 2. Intron derived RapiRNA and NRapiRNA expressions.****RapiRNA**

| Ensembl ID         | Normalized counts |        |         | Gene symbol   | Vega Biotype                     |
|--------------------|-------------------|--------|---------|---------------|----------------------------------|
|                    | oocyte            | zygote | sperm   |               |                                  |
| ENSMUST00000164179 | 270223            | 86958  | 279948  | Fcgr3         | protein_coding                   |
| ENSMUST00000139064 | 270033            | 86700  | 275659  | Pou6f2        | protein_coding                   |
| ENSMUST00000154152 | 238423            | 113450 | 505067  | Trim2         | protein_coding                   |
| ENSMUST00000061552 | 38734             | 15940  | 234971  | Peak1         | protein_coding                   |
| ENSMUST00000156907 | 32147             | 16562  | 1342235 | Galnt7        | protein_coding                   |
| ENSMUST00000043760 | 28516             | 45446  | 3347    | Mvk           | protein_coding                   |
| ENSMUST00000103076 | 28327             | 45389  | 3285    | Spata32       | protein_coding                   |
| ENSMUST00000128635 | 28237             | 45314  | 3285    | Acpp          | protein_coding                   |
| ENSMUST00000153590 | 20607             | 19602  | 2004    | Rpl5          | protein_coding                   |
| ENSMUST00000022169 | 18882             | 6947   | 149175  | Hexb          | protein_coding                   |
| ENSMUST00000151037 | 17739             | 16543  | 190     | Atg16l1       | protein_coding                   |
| ENSMUST00000034033 | 16172             | 7101   | 9880    | 1700007B14Rik | protein_coding                   |
| ENSMUST00000159114 | 14181             | 18089  | 365     | C130026I21Rik | protein_coding                   |
| ENSMUST00000037397 | 13165             | 4577   | 87053   | AK129341      | protein_coding                   |
| ENSMUST00000176921 | 12584             | 3505   | 20889   | Rab26os       | antisense                        |
| ENSMUST00000080598 | 7087              | 2080   | 8603    | Bre           | protein_coding                   |
| ENSMUST00000180927 | 6961              | 1995   | 3721    | Gm26689       | lincRNA                          |
| ENSMUST00000181531 | 6961              | 1995   | 3721    | Gm26553       | lincRNA                          |
| ENSMUST00000114641 | 6924              | 7315   | 460     | Cntnap2       | protein_coding                   |
| ENSMUST00000044749 | 6654              | 8924   | 8795    | Myo3a         | protein_coding                   |
| ENSMUST00000123210 | 6423              | 2064   | 18399   | 4930555B11Rik | processed_transcript             |
| ENSMUST00000114371 | 6300              | 3093   | 6196    | Cmss1         | protein_coding                   |
| ENSMUST00000156483 | 6229              | 7262   | 5958    | Tex14         | protein_coding                   |
| ENSMUST00000037912 | 5532              | 2010   | 866     | Ssh2          | protein_coding                   |
| ENSMUST00000084149 | 5494              | 6162   | 105     | Gm13139       | protein_coding                   |
| ENSMUST00000144458 | 5428              | 6242   | 3123    | Usp10         | protein_coding                   |
| ENSMUST00000161652 | 5304              | 4136   | 11864   | Cdk8          | protein_coding                   |
| ENSMUST00000159373 | 5204              | 3695   | 12626   | Nop56         | protein_coding                   |
| ENSMUST00000097864 | 5147              | 4301   | 1027    | Pum1          | protein_coding                   |
| ENSMUST00000055820 | 4915              | 5277   | 14      | Gm9531        | transcribed_processed_pseudogene |
| ENSMUST00000115519 | 4830              | 3953   | 68041   | Ica1          | protein_coding                   |
| ENSMUST00000070733 | 4826              | 1378   | 985     | Ptprn2        | protein_coding                   |
| ENSMUST00000094783 | 4802              | 3079   | 15606   | Pcdh7         | protein_coding                   |
| ENSMUST00000064460 | 4680              | 996    | 1259    | St6galnac3    | protein_coding                   |
| ENSMUST00000181441 | 4672              | 5415   | 944     | Gm26567       | lincRNA                          |
| ENSMUST00000148233 | 4474              | 5182   | 22      | Mitf          | protein_coding                   |
| ENSMUST00000094609 | 4312              | 439    | 416     | Nckap5        | protein_coding                   |
| ENSMUST00000042167 | 4298              | 4842   | 113     | Cpq           | protein_coding                   |
| ENSMUST00000098550 | 4273              | 2998   | 47340   | Zfp791        | protein_coding                   |
| ENSMUST00000030971 | 4076              | 407    | 807     | Gpr125        | protein_coding                   |
| ENSMUST00000040131 | 4005              | 1519   | 20977   | Elf1          | protein_coding                   |
| ENSMUST00000065425 | 4000              | 4566   | 174     | Spag16        | protein_coding                   |
| ENSMUST00000107359 | 3997              | 479    | 728     | Megf9         | protein_coding                   |
| ENSMUST00000166429 | 3950              | 455    | 771     | Sipa111       | protein_coding                   |
| ENSMUST00000004985 | 3901              | 368    | 722     | Brpf3         | protein_coding                   |
| ENSMUST00000180391 | 3888              | 391    | 724     | 4933406C10Rik | lincRNA                          |
| ENSMUST00000153847 | 3870              | 2401   | 12183   | Hspa8         | protein_coding                   |
| ENSMUST00000166731 | 3757              | 4594   | 6       | Cd200r3       | protein_coding                   |
| ENSMUST00000112542 | 3688              | 4049   | 404     | Gm15155       | protein_coding                   |
| ENSMUST00000181224 | 3636              | 4021   | 30      | AU020206      | lincRNA                          |
| ENSMUST00000123398 | 3626              | 4076   | 289     | Pcdh15        | protein_coding                   |
| ENSMUST00000136978 | 3470              | 1257   | 9749    | Trim14        | protein_coding                   |
| ENSMUST00000180819 | 3375              | 3055   | 2082    | Snhg1         | lincRNA                          |
| ENSMUST00000148982 | 3352              | 1603   | 7124    | Nfib          | protein_coding                   |
| ENSMUST00000131787 | 3230              | 2652   | 7391    | 2410006H16Rik | processed_transcript             |
| ENSMUST00000094559 | 3048              | 3630   | 123     | Arhgap24      | protein_coding                   |
| ENSMUST00000095725 | 2980              | 2689   | 32      | Pdss2         | protein_coding                   |
| ENSMUST00000114610 | 2911              | 3366   | 226     | Etl4          | protein_coding                   |
| ENSMUST00000153153 | 2901              | 3136   | 59      | Gm12068       | lincRNA                          |
| ENSMUST00000110388 | 2891              | 1833   | 5365    | Gphn          | protein_coding                   |
| ENSMUST00000144412 | 2822              | 3231   | 262     | Gm14643       | processed_transcript             |
| ENSMUST00000168779 | 2812              | 3104   | 4988    | 2210408I21Rik | protein_coding                   |
| ENSMUST00000077282 | 2743              | 3184   | 101     | Atrnl1        | protein_coding                   |

|                    |      |      |                    |                                    |
|--------------------|------|------|--------------------|------------------------------------|
| ENSMUST00000027226 | 2742 | 3203 | 325 Khdrbs2        | protein_coding                     |
| ENSMUST00000044009 | 2740 | 2024 | 5244 Camk1d        | protein_coding                     |
| ENSMUST00000122041 | 2705 | 3046 | 502 Pde4d          | protein_coding                     |
| ENSMUST00000182617 | 2657 | 2450 | 4 Arhgap42         | protein_coding                     |
| ENSMUST00000159984 | 2645 | 3067 | 18 Ano2            | protein_coding                     |
| ENSMUST00000122987 | 2637 | 453  | 141 Gm16365        | antisense                          |
| ENSMUST00000115733 | 2633 | 2814 | 149 Gucy1a2        | protein_coding                     |
| ENSMUST00000075447 | 2614 | 752  | 5980 Pvr12         | protein_coding                     |
| ENSMUST00000023849 | 2611 | 2554 | 30 Ccrn4l          | protein_coding                     |
| ENSMUST00000162124 | 2501 | 3487 | 258 Fgd4           | protein_coding                     |
| ENSMUST00000152693 | 2489 | 2849 | 20 Oca2            | protein_coding                     |
| ENSMUST00000023393 | 2471 | 2684 | 54 Gbe1            | protein_coding                     |
| ENSMUST00000105440 | 2426 | 2688 | 169 Ctnna3         | protein_coding                     |
| ENSMUST00000040500 | 2424 | 2670 | 204 Dgkb           | protein_coding                     |
| ENSMUST00000031122 | 2377 | 2687 | 145 Gabrb1         | protein_coding                     |
| ENSMUST00000069293 | 2377 | 2400 | 139 Dnah7b         | protein_coding                     |
| ENSMUST00000097920 | 2323 | 2334 | 224 Agbl4          | protein_coding                     |
| ENSMUST00000126564 | 2307 | 2684 | 79 Fam110b         | protein_coding                     |
| ENSMUST00000156959 | 2303 | 2353 | 4 Tktl1            | protein_coding                     |
| ENSMUST00000132121 | 2298 | 2444 | 355 Immp2l         | protein_coding                     |
| ENSMUST00000115397 | 2298 | 2350 | 8 Vps8             | protein_coding                     |
| ENSMUST00000164538 | 2296 | 2347 | 4 Otog             | protein_coding                     |
| ENSMUST00000022707 | 2272 | 2691 | 270 Gpc5           | protein_coding                     |
| ENSMUST00000132026 | 2270 | 2603 | 141 Itgbl1         | protein_coding                     |
| ENSMUST00000063642 | 2260 | 2864 | 3993 Ccdc30        | protein_coding                     |
| ENSMUST00000180878 | 2251 | 2413 | 149 9530036O11Rik  | lincRNA                            |
| ENSMUST00000114000 | 2227 | 2428 | 291 Dmd            | protein_coding                     |
| ENSMUST00000161105 | 2181 | 2469 | 137 Grid2          | protein_coding                     |
| ENSMUST00000181199 | 2158 | 2525 | 165 Gm26573        | lincRNA                            |
| ENSMUST00000143514 | 2140 | 2529 | 176 Arfp1          | protein_coding                     |
| ENSMUST00000139528 | 2138 | 2507 | 22 Igsf8           | protein_coding                     |
| ENSMUST00000180807 | 2123 | 2239 | 167 Gm26861        | antisense                          |
| ENSMUST00000181752 | 2112 | 2482 | 65 C230088H06Rik   | lincRNA                            |
| ENSMUST00000081650 | 2109 | 2213 | 2387 Rpl3          | protein_coding                     |
| ENSMUST00000175960 | 2087 | 2466 | 0 Cyp2c53-ps       | transcribed_unprocessed_pseudogene |
| ENSMUST00000148743 | 2074 | 1220 | 100735 Gm11335     | processed_transcript               |
| ENSMUST00000119260 | 2064 | 2382 | 464 Fgfr2          | protein_coding                     |
| ENSMUST00000045376 | 2056 | 2388 | 121 Adk            | protein_coding                     |
| ENSMUST00000153328 | 2053 | 2480 | 59 Gm13849         | lincRNA                            |
| ENSMUST00000114912 | 2053 | 1202 | 99946 Enox2        | protein_coding                     |
| ENSMUST00000156962 | 2043 | 106  | 161 Col26a1        | protein_coding                     |
| ENSMUST00000138700 | 2018 | 2501 | 113 Lrp1b          | protein_coding                     |
| ENSMUST00000076038 | 2018 | 2291 | 218 Cntnap5c       | protein_coding                     |
| ENSMUST00000184359 | 1980 | 2185 | 12 Gm27164         | lincRNA                            |
| ENSMUST00000090302 | 1978 | 2117 | 234 Erc2           | protein_coding                     |
| ENSMUST00000137824 | 1973 | 2023 | 141 A830018L16Rik  | protein_coding                     |
| ENSMUST00000093360 | 1970 | 317  | 2123 Tnpo2         | protein_coding                     |
| ENSMUST00000133363 | 1965 | 2194 | 176 Gm11867        | processed_transcript               |
| ENSMUST00000075132 | 1961 | 2040 | 220 Cdh12          | protein_coding                     |
| ENSMUST00000025217 | 1957 | 1176 | 256 Hspa9          | protein_coding                     |
| ENSMUST00000124792 | 1954 | 2139 | 63 Gm11906         | processed_transcript               |
| ENSMUST00000180741 | 1954 | 1007 | 14400 Gm16630      | lincRNA                            |
| ENSMUST00000128757 | 1947 | 2169 | 0 Mpv17l           | protein_coding                     |
| ENSMUST00000148038 | 1929 | 2190 | 95 Agbl4           | protein_coding                     |
| ENSMUST00000113063 | 1915 | 2079 | 198 Il1rapl2       | protein_coding                     |
| ENSMUST00000112843 | 1904 | 2155 | 198 Zcchc16        | protein_coding                     |
| ENSMUST00000086639 | 1879 | 2141 | 81 Alk             | protein_coding                     |
| ENSMUST00000088448 | 1864 | 1852 | 77 Pkhd1           | protein_coding                     |
| ENSMUST00000182426 | 1834 | 2265 | 69 Pclo            | protein_coding                     |
| ENSMUST00000150123 | 1830 | 1845 | 194 Zc3h12b        | protein_coding                     |
| ENSMUST00000106239 | 1820 | 1908 | 127 Stpg2          | protein_coding                     |
| ENSMUST00000048665 | 1816 | 1627 | 7116 Chd9          | protein_coding                     |
| ENSMUST00000070724 | 1805 | 2030 | 46 Plcb1           | protein_coding                     |
| ENSMUST00000162289 | 1802 | 1425 | 1090 Gas5          | processed_transcript               |
| ENSMUST00000003705 | 1788 | 2079 | 32 Aven            | protein_coding                     |
| ENSMUST00000180837 | 1779 | 727  | 3735 9330185C12Rik | lincRNA                            |
| ENSMUST00000045909 | 1769 | 1609 | 202 Zbed3          | protein_coding                     |
| ENSMUST00000163361 | 1763 | 2046 | 284 Cdh18          | protein_coding                     |

|                     |      |      |                   |                      |
|---------------------|------|------|-------------------|----------------------|
| ENSMUST00000110258  | 1750 | 2007 | 151 March1        | protein_coding       |
| ENSMUST00000076541  | 1740 | 1955 | 686 Cdk5rap2      | protein_coding       |
| ENSMUST00000043349  | 1725 | 1851 | 307 Grid1         | protein_coding       |
| ENSMUST00000173845  | 1715 | 1853 | 161 Sox2ot        | sense_overlapping    |
| ENSMUST00000173845  | 1715 | 1853 | 161 Sox2ot        | sense_overlapping    |
| ENSMUST00000115243  | 1711 | 2059 | 147 Opcml         | protein_coding       |
| ENSMUST00000062306  | 1690 | 1882 | 111 Stpg2         | protein_coding       |
| ENSMUST00000034801  | 1671 | 1935 | 22 Bckdhh         | protein_coding       |
| ENSMUST00000055156  | 1665 | 1691 | 99 Catsperb       | protein_coding       |
| ENSMUST00000181422  | 1662 | 917  | 864 Snhg1         | lincRNA              |
| ENSMUST00000162807  | 1655 | 1708 | 311 Lrrc4c        | protein_coding       |
| ENSMUST00000143668  | 1646 | 1731 | 171 Diap2         | protein_coding       |
| ENSMUST00000113783  | 1643 | 1764 | 111 Eda           | protein_coding       |
| ENSMUST00000075775  | 1642 | 1859 | 26 Rex2           | protein_coding       |
| ENSMUST00000183156  | 1637 | 1829 | 157 Anks1b        | protein_coding       |
| ENSMUST00000161179  | 1635 | 1785 | 73 Fhit           | protein_coding       |
| ENSMUST00000062041  | 1631 | 1822 | 59 Ispd           | protein_coding       |
| ENSMUST00000055349  | 1630 | 1922 | 4 Zfp943          | protein_coding       |
| ENSMUST00000113955  | 1629 | 1767 | 46 Mageb18        | protein_coding       |
| ENSMUST00000133298  | 1625 | 1829 | 89 Dlgap2         | protein_coding       |
| ENSMUST00000088516  | 1623 | 1814 | 274 Magi2         | protein_coding       |
| ENSMUST00000022871  | 1617 | 1884 | 26 Sdc2           | protein_coding       |
| ENSMUST00000135764  | 1616 | 1643 | 313 Sgcz          | protein_coding       |
| ENSMUST00000066890  | 1605 | 1818 | 123 Kcnn2         | protein_coding       |
| ENSMUST00000174840  | 1602 | 1790 | 4 Tnfsf10         | protein_coding       |
| ENSMUST00000072521  | 1597 | 1783 | 141 Lphn3         | protein_coding       |
| ENSMUST00000092750  | 1595 | 1825 | 26 Zfp600         | protein_coding       |
| ENSMUST00000073527  | 1590 | 1683 | 123 Thsd7b        | protein_coding       |
| ENSMUST00000039695  | 1587 | 1756 | 36 Frem3          | protein_coding       |
| ENSMUST00000068595  | 1579 | 1631 | 103 Galnt13       | protein_coding       |
| ENSMUST00000125209  | 1576 | 1646 | 169 Mctp1         | protein_coding       |
| ENSMUST000000099113 | 1562 | 1769 | 0 Sirpa           | protein_coding       |
| ENSMUST00000143707  | 1559 | 2070 | 28 Ahcyl2         | protein_coding       |
| ENSMUST00000176672  | 1554 | 1762 | 42 Ube2e2         | protein_coding       |
| ENSMUST00000029822  | 1549 | 1660 | 56 Tacr3          | protein_coding       |
| ENSMUST00000039177  | 1544 | 1673 | 238 Dpyd          | protein_coding       |
| ENSMUST00000131512  | 1543 | 2234 | 0 Gm13962         | antisense            |
| ENSMUST00000082373  | 1542 | 1674 | 228 Luzp2         | protein_coding       |
| ENSMUST00000124279  | 1540 | 1668 | 61 Nhs12          | protein_coding       |
| ENSMUST00000109108  | 1540 | 1892 | 178 Wwox          | protein_coding       |
| ENSMUST00000140079  | 1537 | 1754 | 135 St18          | protein_coding       |
| ENSMUST00000156144  | 1532 | 1949 | 16 Gm12718        | lincRNA              |
| ENSMUST00000137180  | 1524 | 1844 | 20 BC039771       | processed_transcript |
| ENSMUST00000133391  | 1521 | 1829 | 2 Gm13327         | antisense            |
| ENSMUST000000094621 | 1519 | 1677 | 153 Cntnap5a      | protein_coding       |
| ENSMUST000000094621 | 1519 | 1677 | 153 Cntnap5a      | protein_coding       |
| ENSMUST00000081840  | 1511 | 1697 | 97 Rpl32          | protein_coding       |
| ENSMUST00000168572  | 1503 | 1776 | 14 Hs3st5         | protein_coding       |
| ENSMUST00000137954  | 1500 | 1670 | 42 Lhfp           | protein_coding       |
| ENSMUST00000181374  | 1500 | 1643 | 161 6030443J06Rik | lincRNA              |
| ENSMUST00000141038  | 1497 | 1688 | 24 Eltd1          | protein_coding       |
| ENSMUST00000051756  | 1495 | 567  | 1600 Ii31ra       | protein_coding       |
| ENSMUST00000023330  | 1491 | 1809 | 57 Morc1          | protein_coding       |
| ENSMUST00000068545  | 1481 | 1589 | 167 Sugct         | protein_coding       |
| ENSMUST00000140221  | 1468 | 1731 | 2 Mertk           | protein_coding       |
| ENSMUST00000069334  | 1466 | 114  | 202 Dach1         | protein_coding       |
| ENSMUST00000134285  | 1459 | 1605 | 119 Gm12239       | antisense            |
| ENSMUST00000174018  | 1457 | 1618 | 171 Grm7          | protein_coding       |
| ENSMUST00000161763  | 1456 | 1922 | 6 Gm10552         | antisense            |
| ENSMUST00000119598  | 1449 | 1501 | 192 Egfem1        | protein_coding       |
| ENSMUST00000133416  | 1446 | 1681 | 24 Mmp16          | protein_coding       |
| ENSMUST00000169960  | 1422 | 1694 | 57 Dip2c          | protein_coding       |
| ENSMUST00000168707  | 1422 | 1661 | 18 Yes1           | protein_coding       |
| ENSMUST00000172951  | 1421 | 1440 | 91 Grm7           | protein_coding       |
| ENSMUST00000081872  | 1419 | 1621 | 121 Nell1         | protein_coding       |
| ENSMUST00000129376  | 1414 | 1629 | 44 2700049A03Rik  | protein_coding       |
| ENSMUST00000085774  | 1409 | 1476 | 438 Sdk1          | protein_coding       |
| ENSMUST00000078880  | 1405 | 1471 | 69 Sorcs3         | protein_coding       |

|                     |      |      |      |               |                        |
|---------------------|------|------|------|---------------|------------------------|
| ENSMUST00000149239  | 1399 | 1490 | 34   | 4930412B13Rik | lincRNA                |
| ENSMUST00000027231  | 1394 | 1620 | 10   | Slc9a2        | protein_coding         |
| ENSMUST00000160995  | 1388 | 1594 | 30   | Me3           | protein_coding         |
| ENSMUST00000021757  | 1377 | 1476 | 30   | Aoah          | protein_coding         |
| ENSMUST00000089950  | 1372 | 749  | 601  | Rabgggtb      | protein_coding         |
| ENSMUST00000047005  | 1372 | 1515 | 169  | Spata16       | protein_coding         |
| ENSMUST00000081728  | 1368 | 1474 | 242  | Ctnnd2        | protein_coding         |
| ENSMUST00000070323  | 1364 | 1588 | 83   | Synpr         | protein_coding         |
| ENSMUST00000073104  | 1363 | 1670 | 0    | Ppp4r1        | protein_coding         |
| ENSMUST00000035657  | 1358 | 1603 | 87   | Tssc1         | protein_coding         |
| ENSMUST00000115824  | 1352 | 1620 | 2    | Clec16a       | protein_coding         |
| ENSMUST00000050433  | 1346 | 1415 | 26   | Trpc6         | protein_coding         |
| ENSMUST000000161461 | 1344 | 1359 | 979  | Gas5          | processed_transcript   |
| ENSMUST00000045281  | 1342 | 409  | 3097 | Smg6          | protein_coding         |
| ENSMUST000000125435 | 1335 | 1559 | 83   | Gpc6          | protein_coding         |
| ENSMUST00000022567  | 1333 | 1522 | 236  | Cacna2d3      | protein_coding         |
| ENSMUST00000099576  | 1329 | 1546 | 8    | Fmn1          | protein_coding         |
| ENSMUST00000048646  | 1322 | 1389 | 232  | Vps13b        | protein_coding         |
| ENSMUST00000029346  | 1319 | 1461 | 119  | Schip1        | protein_coding         |
| ENSMUST000000105589 | 1315 | 1462 | 52   | Esr1          | protein_coding         |
| ENSMUST000000125074 | 1313 | 144  | 387  | Rpl13a        | protein_coding         |
| ENSMUST000000153366 | 1309 | 1558 | 109  | A330008L17Rik | protein_coding         |
| ENSMUST00000061318  | 1289 | 1466 | 32   | Adamts12      | protein_coding         |
| ENSMUST000000163307 | 1288 | 1052 | 20   | Depdc1b       | protein_coding         |
| ENSMUST000000180743 | 1288 | 970  | 2326 | Gm26561       | lincRNA                |
| ENSMUST000000126187 | 1286 | 1374 | 48   | Gm11751       | lincRNA                |
| ENSMUST00000065074  | 1281 | 1447 | 137  | Rsrc1         | protein_coding         |
| ENSMUST000000155663 | 1279 | 1469 | 18   | Nsdhl         | protein_coding         |
| ENSMUST00000040990  | 1274 | 1477 | 95   | Vwa8          | protein_coding         |
| ENSMUST00000027241  | 1269 | 1498 | 14   | Il1r1         | protein_coding         |
| ENSMUST00000076758  | 1266 | 1456 | 0    | Olf1343-ps1   | unprocessed_pseudogene |
| ENSMUST00000076758  | 1266 | 1456 | 0    | Olf1343-ps1   | unprocessed_pseudogene |
| ENSMUST00000039725  | 1259 | 1413 | 65   | Exo1          | protein_coding         |
| ENSMUST00000066412  | 1258 | 1483 | 6    | Agtr1a        | protein_coding         |
| ENSMUST000000148836 | 1252 | 1471 | 8    | Cdh13         | protein_coding         |
| ENSMUST000000125681 | 1252 | 1498 | 36   | Gm16083       | antisense              |
| ENSMUST000000126399 | 1246 | 1374 | 171  | Lrrtm4        | protein_coding         |
| ENSMUST00000088761  | 1239 | 1441 | 56   | Adam22        | protein_coding         |
| ENSMUST000000113380 | 1239 | 1314 | 97   | Dach2         | protein_coding         |
| ENSMUST00000093007  | 1236 | 1377 | 75   | L3mbtl4       | protein_coding         |
| ENSMUST00000071500  | 1235 | 1327 | 192  | Dpp6          | protein_coding         |
| ENSMUST000000123048 | 1227 | 1398 | 36   | Gm14149       | lincRNA                |
| ENSMUST00000066804  | 1220 | 1356 | 2    | Sirt5         | protein_coding         |
| ENSMUST000000119864 | 1219 | 1356 | 0    | Gm2420        | unprocessed_pseudogene |
| ENSMUST00000095852  | 1216 | 1312 | 155  | Grid2         | protein_coding         |
| ENSMUST000000169849 | 1215 | 1344 | 107  | 1700113H08Rik | protein_coding         |
| ENSMUST00000036862  | 1205 | 2214 | 69   | Cog5          | protein_coding         |
| ENSMUST000000160956 | 1196 | 1354 | 129  | Fhit          | protein_coding         |
| ENSMUST00000068860  | 1190 | 1285 | 143  | Epha6         | protein_coding         |
| ENSMUST000000113261 | 1190 | 1279 | 107  | Cntn4         | protein_coding         |
| ENSMUST00000030043  | 1189 | 1396 | 26   | Zfp618        | protein_coding         |
| ENSMUST000000102891 | 1187 | 1380 | 2    | Adamts13      | protein_coding         |
| ENSMUST000000126977 | 1178 | 148  | 355  | Svil          | protein_coding         |
| ENSMUST00000096273  | 1174 | 1223 | 12   | Snx29         | protein_coding         |
| ENSMUST00000099931  | 1173 | 1352 | 20   | Sesn1         | protein_coding         |
| ENSMUST000000173517 | 1169 | 1355 | 20   | Ak9           | protein_coding         |
| ENSMUST00000022589  | 1167 | 1368 | 107  | Enox1         | protein_coding         |
| ENSMUST00000052266  | 1167 | 1338 | 119  | Exoc4         | protein_coding         |
| ENSMUST000000125691 | 1167 | 1304 | 77   | Dlgap1        | protein_coding         |
| ENSMUST000000140295 | 1159 | 1179 | 97   | Sntg1         | protein_coding         |
| ENSMUST000000173900 | 1153 | 1375 | 59   | A930015D03Rik | antisense              |
| ENSMUST00000087204  | 1152 | 1337 | 184  | Fry           | protein_coding         |
| ENSMUST000000161249 | 1142 | 1327 | 236  | 1700112E06Rik | protein_coding         |
| ENSMUST00000093100  | 1134 | 1616 | 48   | Dnaaf1        | protein_coding         |
| ENSMUST00000023828  | 1133 | 1276 | 26   | Rttn          | protein_coding         |
| ENSMUST000000166277 | 1132 | 1223 | 10   | 4932443I19Rik | protein_coding         |
| ENSMUST00000070533  | 1132 | 1183 | 67   | Xkr4          | protein_coding         |
| ENSMUST00000047370  | 1130 | 1285 | 4    | Sptlc3        | protein_coding         |

|                     |      |      |                  |                        |
|---------------------|------|------|------------------|------------------------|
| ENSMUST00000034879  | 1130 | 1216 | 143 Hmg20a       | protein_coding         |
| ENSMUST00000181001  | 1127 | 1199 | 105 Obox1        | protein_coding         |
| ENSMUST00000030568  | 1124 | 1296 | 6 Sema3c         | protein_coding         |
| ENSMUST00000115580  | 1123 | 697  | 1332 Arhgap26    | protein_coding         |
| ENSMUST00000165540  | 1121 | 1230 | 12 Casq2         | protein_coding         |
| ENSMUST00000178227  | 1120 | 1117 | 57 Gm21847       | protein_coding         |
| ENSMUST00000106827  | 1118 | 1235 | 202 Dab1         | protein_coding         |
| ENSMUST00000139959  | 1116 | 289  | 145 Gnb2l1       | protein_coding         |
| ENSMUST00000120396  | 1108 | 1342 | 4 Gm14331        | processed_pseudogene   |
| ENSMUST00000102696  | 1107 | 1346 | 1217 Rps8        | protein_coding         |
| ENSMUST00000181724  | 1103 | 1330 | 61 4930467D21Rik | lincRNA                |
| ENSMUST00000165127  | 1100 | 1141 | 428 Hsp90ab1     | protein_coding         |
| ENSMUST00000026410  | 1095 | 1184 | 2 Dnajc14        | protein_coding         |
| ENSMUST00000172359  | 1093 | 1258 | 12 Vmn2r91       | protein_coding         |
| ENSMUST00000087332  | 1093 | 1220 | 65 Gm16223       | protein_coding         |
| ENSMUST00000043342  | 1085 | 1128 | 101 Dph5         | protein_coding         |
| ENSMUST00000102999  | 1084 | 1275 | 65 Cngb3         | protein_coding         |
| ENSMUST00000067786  | 1081 | 1262 | 22 Slc20a2       | protein_coding         |
| ENSMUST00000115148  | 1079 | 1217 | 56 Kirrel3       | protein_coding         |
| ENSMUST00000067886  | 1073 | 1217 | 12 Slc2a9        | protein_coding         |
| ENSMUST00000041110  | 1069 | 1050 | 67 Ttc7          | protein_coding         |
| ENSMUST00000046687  | 1068 | 1320 | 95 Spon1         | protein_coding         |
| ENSMUST00000137509  | 1061 | 1226 | 20 Gm12649       | lincRNA                |
| ENSMUST00000144066  | 1061 | 1203 | 2 Cfap61         | protein_coding         |
| ENSMUST00000042868  | 1056 | 1189 | 50 Camk4         | protein_coding         |
| ENSMUST00000116469  | 1056 | 1235 | 2 Gm13768        | unprocessed_pseudogene |
| ENSMUST00000105441  | 1053 | 1108 | 210 Ctnna3       | protein_coding         |
| ENSMUST00000111808  | 1050 | 1306 | 22 Neur11a       | protein_coding         |
| ENSMUST00000161981  | 1050 | 1241 | 8 Gm16004        | antisense              |
| ENSMUST00000088483  | 1050 | 1169 | 159 Gpc6         | protein_coding         |
| ENSMUST00000113966  | 1050 | 1126 | 165 Il1rap1      | protein_coding         |
| ENSMUST00000067754  | 1048 | 1142 | 59 Rab37         | protein_coding         |
| ENSMUST00000137007  | 1047 | 1057 | 93 Upp2          | protein_coding         |
| ENSMUST00000004622  | 1044 | 1222 | 81 Gab2          | protein_coding         |
| ENSMUST00000086738  | 1037 | 1101 | 212 Cntnap5b     | protein_coding         |
| ENSMUST00000119374  | 1035 | 1088 | 1414 Nkain3      | protein_coding         |
| ENSMUST00000155760  | 1034 | 1061 | 135 Gpr158       | protein_coding         |
| ENSMUST00000045522  | 1033 | 1020 | 244 Ccser1       | protein_coding         |
| ENSMUST00000166447  | 1029 | 1248 | 42 Vmn2r60       | protein_coding         |
| ENSMUST00000068911  | 1026 | 1129 | 117 Gabrg3       | protein_coding         |
| ENSMUST00000162998  | 1023 | 1069 | 155 Gm7247       | protein_coding         |
| ENSMUST00000033721  | 1021 | 1195 | 165 Arhgap6      | protein_coding         |
| ENSMUST00000097535  | 1018 | 1189 | 0 E330020D12Rik  | processed_transcript   |
| ENSMUST00000173841  | 1018 | 1079 | 4 Olfr138        | protein_coding         |
| ENSMUST00000113358  | 1012 | 1136 | 56 Pcdh11x       | protein_coding         |
| ENSMUST00000094964  | 1010 | 1272 | 46 Dnah7a        | protein_coding         |
| ENSMUST00000088463  | 1009 | 1048 | 0 Defb41         | protein_coding         |
| ENSMUST00000098441  | 1006 | 547  | 1697 Col6a6      | protein_coding         |
| ENSMUST00000138966  | 1005 | 1017 | 63 Skint6        | protein_coding         |
| ENSMUST00000028580  | 1001 | 1057 | 73 Ccdc34        | protein_coding         |
| ENSMUST00000144417  | 1001 | 373  | 59 1190005I06Rik | protein_coding         |
| ENSMUST00000090601  | 987  | 136  | 157 Ctnnbp2      | protein_coding         |
| ENSMUST00000147635  | 985  | 97   | 256 Ogt          | protein_coding         |
| ENSMUST00000038831  | 981  | 1133 | 2 Hexdc          | protein_coding         |
| ENSMUST00000063542  | 973  | 1120 | 6 Naa50          | protein_coding         |
| ENSMUST00000087576  | 973  | 527  | 3688 Trpm3       | protein_coding         |
| ENSMUST00000047888  | 971  | 1155 | 8 Mmp1b          | protein_coding         |
| ENSMUST000000095762 | 970  | 1019 | 135 Trdn         | protein_coding         |
| ENSMUST00000065904  | 967  | 1026 | 278 Hs6st3       | protein_coding         |
| ENSMUST00000163134  | 965  | 1029 | 200 Nrnx3        | protein_coding         |
| ENSMUST00000181301  | 964  | 1159 | 478 Gm26904      | lincRNA                |
| ENSMUST00000052907  | 956  | 1066 | 129 Adamts19     | protein_coding         |
| ENSMUST00000050744  | 947  | 1060 | 91 6030498E09Rik | protein_coding         |
| ENSMUST00000028080  | 936  | 1163 | 18 Neb1          | protein_coding         |
| ENSMUST00000087234  | 936  | 1101 | 34 Cyp2c66       | protein_coding         |
| ENSMUST00000050239  | 927  | 1041 | 111 Pcdh11x      | protein_coding         |
| ENSMUST00000080210  | 927  | 450  | 1102 Slc1a2      | protein_coding         |
| ENSMUST00000139308  | 921  | 1052 | 2 Fkbp15         | protein_coding         |

|                    |     |      |      |               |                      |
|--------------------|-----|------|------|---------------|----------------------|
| ENSMUST00000121983 | 920 | 1063 | 99   | 1700007B14Rik | protein_coding       |
| ENSMUST00000126711 | 920 | 954  | 57   | Gm14553       | lincRNA              |
| ENSMUST00000180968 | 913 | 988  | 32   | Gm26763       | lincRNA              |
| ENSMUST00000102898 | 909 | 102  | 0    | Rpl7a         | protein_coding       |
| ENSMUST00000144344 | 905 | 952  | 38   | Ndst4         | protein_coding       |
| ENSMUST00000138485 | 903 | 979  | 135  | Macrod2       | protein_coding       |
| ENSMUST00000135574 | 902 | 1061 | 18   | Adarb2        | protein_coding       |
| ENSMUST00000130945 | 901 | 996  | 186  | Gm12132       | lincRNA              |
| ENSMUST00000026820 | 896 | 1088 | 63   | Slc28a1       | protein_coding       |
| ENSMUST00000078873 | 894 | 1023 | 111  | Lsamp         | protein_coding       |
| ENSMUST00000125673 | 890 | 1083 | 18   | St7           | protein_coding       |
| ENSMUST00000102765 | 887 | 1078 | 117  | Col23a1       | protein_coding       |
| ENSMUST00000097413 | 884 | 945  | 20   | Park2         | protein_coding       |
| ENSMUST00000067307 | 882 | 1037 | 48   | Ccser1        | protein_coding       |
| ENSMUST00000065870 | 882 | 927  | 4    | Rgs3          | protein_coding       |
| ENSMUST00000168272 | 879 | 918  | 10   | Dcpp2         | protein_coding       |
| ENSMUST00000136269 | 879 | 791  | 369  | Rpl7a         | protein_coding       |
| ENSMUST00000055946 | 878 | 917  | 44   | Gpr158        | protein_coding       |
| ENSMUST00000175665 | 876 | 998  | 69   | Gpc5          | protein_coding       |
| ENSMUST00000159342 | 875 | 902  | 50   | Focad         | protein_coding       |
| ENSMUST00000110064 | 870 | 936  | 81   | Macrod2       | protein_coding       |
| ENSMUST00000105720 | 866 | 965  | 2    | 2610305D13Rik | protein_coding       |
| ENSMUST00000081542 | 865 | 967  | 54   | Kcnd2         | protein_coding       |
| ENSMUST00000045041 | 862 | 1077 | 2    | Galnt12       | protein_coding       |
| ENSMUST00000020339 | 862 | 700  | 2    | Tbc1d15       | protein_coding       |
| ENSMUST00000076922 | 860 | 981  | 18   | Trim30a       | protein_coding       |
| ENSMUST00000134965 | 860 | 941  | 28   | Immp2l        | protein_coding       |
| ENSMUST00000021343 | 858 | 897  | 52   | Tshr          | protein_coding       |
| ENSMUST00000173811 | 856 | 177  | 2395 | 1110038B12Rik | processed_transcript |
| ENSMUST00000075471 | 855 | 990  | 125  | Il1rapl2      | protein_coding       |
| ENSMUST00000156751 | 855 | 986  | 42   | Mgat4c        | protein_coding       |
| ENSMUST00000023629 | 853 | 1023 | 30   | Pros1         | protein_coding       |
| ENSMUST00000110969 | 852 | 947  | 56   | Fam155a       | protein_coding       |
| ENSMUST00000023390 | 851 | 979  | 42   | Drd3          | protein_coding       |
| ENSMUST00000166468 | 842 | 1006 | 69   | Ptpk          | protein_coding       |
| ENSMUST00000092175 | 842 | 927  | 28   | Kcnc2         | protein_coding       |
| ENSMUST00000136703 | 842 | 517  | 1523 | Gnb211        | protein_coding       |
| ENSMUST00000095760 | 831 | 918  | 2    | Lsmem1        | protein_coding       |
| ENSMUST00000166100 | 830 | 924  | 10   | Serpinh3b     | protein_coding       |
| ENSMUST00000133787 | 825 | 876  | 24   | Npsr1         | protein_coding       |
| ENSMUST00000097495 | 822 | 859  | 71   | Dok6          | protein_coding       |
| ENSMUST00000081769 | 805 | 818  | 18   | Edil3         | protein_coding       |
| ENSMUST00000162149 | 803 | 870  | 38   | AW554918      | protein_coding       |
| ENSMUST00000069292 | 802 | 937  | 4    | Zfp248        | protein_coding       |
| ENSMUST00000123824 | 796 | 914  | 0    | Aen           | protein_coding       |
| ENSMUST00000110680 | 793 | 931  | 22   | Slc25a21      | protein_coding       |
| ENSMUST00000099428 | 793 | 874  | 87   | Hpse2         | protein_coding       |
| ENSMUST00000132064 | 793 | 912  | 6    | Sntg1         | protein_coding       |
| ENSMUST00000059484 | 791 | 875  | 2    | 9930021J03Rik | protein_coding       |
| ENSMUST00000059484 | 791 | 875  | 2    | 9930021J03Rik | protein_coding       |
| ENSMUST00000043456 | 788 | 885  | 8    | Akap2         | protein_coding       |
| ENSMUST00000137170 | 784 | 905  | 24   | Lin52         | protein_coding       |
| ENSMUST00000107635 | 782 | 776  | 180  | Lrba          | protein_coding       |
| ENSMUST00000020939 | 780 | 842  | 30   | Nrcam         | protein_coding       |
| ENSMUST00000182936 | 776 | 851  | 44   | Anks1b        | protein_coding       |
| ENSMUST00000149692 | 771 | 865  | 20   | Dyx1c1Ccpg1   | protein_coding       |
| ENSMUST00000142919 | 766 | 721  | 4    | Gm14664       | lincRNA              |
| ENSMUST00000040248 | 762 | 844  | 36   | Spidr         | protein_coding       |
| ENSMUST00000075374 | 762 | 902  | 81   | Pard3b        | protein_coding       |
| ENSMUST00000077447 | 760 | 812  | 57   | GalntI6       | protein_coding       |
| ENSMUST00000005066 | 757 | 925  | 20   | Map2k1        | protein_coding       |
| ENSMUST00000042953 | 757 | 833  | 79   | Nbas          | protein_coding       |
| ENSMUST00000182729 | 756 | 880  | 4    | Cep112        | protein_coding       |
| ENSMUST00000177312 | 756 | 740  | 141  | Pcca          | protein_coding       |
| ENSMUST00000137636 | 751 | 747  | 10   | Rrm2b         | protein_coding       |
| ENSMUST00000028905 | 750 | 831  | 83   | Pcsk2         | protein_coding       |
| ENSMUST00000166615 | 750 | 154  | 155  | Wwp2          | protein_coding       |
| ENSMUST00000147740 | 747 | 856  | 103  | Dmd           | protein_coding       |

|                    |     |      |      |               |                        |
|--------------------|-----|------|------|---------------|------------------------|
| ENSMUST00000004850 | 745 | 675  | 95   | Emr1          | protein_coding         |
| ENSMUST00000138829 | 741 | 719  | 73   | Apba2         | protein_coding         |
| ENSMUST00000135034 | 741 | 321  | 1162 | Kcnp1         | protein_coding         |
| ENSMUST00000127009 | 740 | 933  | 16   | Pla2g4e       | protein_coding         |
| ENSMUST00000180105 | 739 | 841  | 44   | Gm21798       | protein_coding         |
| ENSMUST00000028081 | 739 | 747  | 147  | Plxdc2        | protein_coding         |
| ENSMUST00000075099 | 736 | 823  | 163  | Ctnna3        | protein_coding         |
| ENSMUST00000109647 | 736 | 776  | 30   | Vstm2a        | protein_coding         |
| ENSMUST00000041983 | 735 | 444  | 4    | Farp2         | protein_coding         |
| ENSMUST00000041983 | 735 | 444  | 4    | Farp2         | protein_coding         |
| ENSMUST00000111868 | 734 | 866  | 26   | Pik3c2g       | protein_coding         |
| ENSMUST00000081321 | 731 | 732  | 22   | Poteg         | protein_coding         |
| ENSMUST00000164216 | 730 | 815  | 38   | Gm17359       | protein_coding         |
| ENSMUST00000150312 | 729 | 786  | 4    | 9130204K15Rik | lincRNA                |
| ENSMUST00000179191 | 729 | 723  | 0    | Lmbr1         | protein_coding         |
| ENSMUST00000039366 | 726 | 782  | 67   | Kcnh8         | protein_coding         |
| ENSMUST00000162145 | 725 | 883  | 24   | Me3           | protein_coding         |
| ENSMUST00000138557 | 722 | 814  | 0    | Trim5         | protein_coding         |
| ENSMUST00000124335 | 721 | 2615 | 56   | Sat1          | protein_coding         |
| ENSMUST00000155804 | 720 | 783  | 147  | March1        | protein_coding         |
| ENSMUST00000050516 | 719 | 558  | 57   | Ascc1         | protein_coding         |
| ENSMUST00000153002 | 717 | 851  | 101  | Myo3a         | protein_coding         |
| ENSMUST00000163257 | 715 | 720  | 69   | Fam172a       | protein_coding         |
| ENSMUST00000074613 | 714 | 468  | 4003 | Acyp2         | protein_coding         |
| ENSMUST00000114795 | 710 | 812  | 0    | Il1r1         | protein_coding         |
| ENSMUST00000065496 | 708 | 773  | 0    | Arhgap20      | protein_coding         |
| ENSMUST00000107263 | 707 | 795  | 107  | Grm5          | protein_coding         |
| ENSMUST00000178202 | 702 | 903  | 299  | Epn2          | protein_coding         |
| ENSMUST00000149838 | 702 | 706  | 12   | Tulp4         | protein_coding         |
| ENSMUST00000022666 | 701 | 856  | 65   | Klhl1         | protein_coding         |
| ENSMUST00000074133 | 700 | 753  | 28   | Cntn5         | protein_coding         |
| ENSMUST00000161895 | 700 | 183  | 20   | Fhit          | protein_coding         |
| ENSMUST00000110116 | 699 | 685  | 67   | Plcb1         | protein_coding         |
| ENSMUST00000127604 | 697 | 832  | 0    | Gm12146       | antisense              |
| ENSMUST00000106484 | 696 | 738  | 4    | Mast2         | protein_coding         |
| ENSMUST00000070797 | 695 | 661  | 169  | PCDHA9        | protein_coding         |
| ENSMUST00000042954 | 694 | 809  | 2    | Poln          | protein_coding         |
| ENSMUST00000063076 | 693 | 732  | 18   | Htr1f         | protein_coding         |
| ENSMUST00000031488 | 691 | 749  | 89   | Gm6605        | unprocessed_pseudogene |
| ENSMUST00000169683 | 690 | 680  | 0    | Vmn2r35       | protein_coding         |
| ENSMUST00000174114 | 688 | 806  | 0    | Gm20514       | lincRNA                |
| ENSMUST00000081880 | 685 | 513  | 8    | Lamp3         | protein_coding         |
| ENSMUST00000145856 | 683 | 715  | 172  | 1700123O12Rik | lincRNA                |
| ENSMUST00000000201 | 680 | 794  | 155  | Nalcn         | protein_coding         |
| ENSMUST00000176912 | 679 | 744  | 109  | Gpc5          | protein_coding         |
| ENSMUST00000042740 | 677 | 711  | 81   | Abca13        | protein_coding         |
| ENSMUST00000175925 | 677 | 763  | 48   | Zeb1          | protein_coding         |
| ENSMUST00000170476 | 676 | 862  | 254  | Usp20         | protein_coding         |
| ENSMUST00000175681 | 675 | 738  | 143  | Kcnb2         | protein_coding         |
| ENSMUST00000099358 | 675 | 726  | 63   | Fam172a       | protein_coding         |
| ENSMUST00000133929 | 674 | 791  | 204  | Pde4d         | protein_coding         |
| ENSMUST00000139888 | 674 | 838  | 0    | Tacc3         | protein_coding         |
| ENSMUST00000095529 | 672 | 737  | 192  | Fgf14         | protein_coding         |
| ENSMUST00000130775 | 672 | 339  | 751  | Eif4a2        | protein_coding         |
| ENSMUST00000166924 | 670 | 677  | 71   | Kcnp4         | protein_coding         |
| ENSMUST00000018739 | 668 | 758  | 0    | Gira4         | protein_coding         |
| ENSMUST00000055815 | 667 | 692  | 101  | Lrfrn5        | protein_coding         |
| ENSMUST00000166190 | 666 | 722  | 163  | Agbl1         | protein_coding         |
| ENSMUST00000166190 | 666 | 722  | 163  | Agbl1         | protein_coding         |
| ENSMUST00000107521 | 666 | 629  | 50   | Mup6          | protein_coding         |
| ENSMUST00000108122 | 665 | 664  | 59   | Lingo2        | protein_coding         |
| ENSMUST00000172778 | 665 | 820  | 18   | Zfp943        | protein_coding         |
| ENSMUST00000139438 | 662 | 716  | 85   | Adarb2        | protein_coding         |
| ENSMUST00000133269 | 654 | 738  | 87   | Lipo1         | protein_coding         |
| ENSMUST00000131639 | 654 | 703  | 18   | Gm11884       | lincRNA                |
| ENSMUST00000080333 | 651 | 687  | 91   | 1700007G11Rik | protein_coding         |
| ENSMUST00000115319 | 651 | 553  | 0    | Klhl13        | protein_coding         |
| ENSMUST00000075080 | 649 | 663  | 48   | Fam19a1       | protein_coding         |

|                    |     |      |                    |                      |
|--------------------|-----|------|--------------------|----------------------|
| ENSMUST00000029777 | 647 | 313  | 1047 Tmem56        | protein_coding       |
| ENSMUST00000094626 | 646 | 641  | 2 Cdh19            | protein_coding       |
| ENSMUST00000137809 | 645 | 656  | 137 Frmd4a         | protein_coding       |
| ENSMUST00000168733 | 645 | 715  | 57 Gm3468          | protein_coding       |
| ENSMUST00000127295 | 641 | 705  | 135 Dmd            | protein_coding       |
| ENSMUST00000141429 | 640 | 711  | 75 Cep128          | protein_coding       |
| ENSMUST00000033025 | 639 | 675  | 14 Lcmt1           | protein_coding       |
| ENSMUST00000075069 | 637 | 749  | 32 Ntm             | protein_coding       |
| ENSMUST00000134801 | 637 | 702  | 12 Gm14066         | processed_transcript |
| ENSMUST00000036796 | 637 | 720  | 59 Fstl4           | protein_coding       |
| ENSMUST00000129771 | 637 | 693  | 4 Nmnat3           | protein_coding       |
| ENSMUST00000163153 | 637 | 64   | 414 Rdx            | protein_coding       |
| ENSMUST00000161345 | 634 | 832  | 20 Themis          | protein_coding       |
| ENSMUST00000032633 | 634 | 647  | 22 Oca2            | protein_coding       |
| ENSMUST00000137784 | 632 | 719  | 38 Mllt4           | protein_coding       |
| ENSMUST00000106591 | 631 | 679  | 34 Agbl4           | protein_coding       |
| ENSMUST00000162872 | 629 | 650  | 210 Cntn6          | protein_coding       |
| ENSMUST00000033532 | 626 | 762  | 85 Aff2            | protein_coding       |
| ENSMUST00000050178 | 626 | 690  | 28 Ccdc60          | protein_coding       |
| ENSMUST00000141964 | 625 | 882  | 6 Gm14024          | antisense            |
| ENSMUST00000184666 | 625 | 710  | 59 Unc13c          | protein_coding       |
| ENSMUST00000154632 | 625 | 764  | 2 BC046251         | processed_transcript |
| ENSMUST00000145731 | 624 | 675  | 24 Phf20           | protein_coding       |
| ENSMUST00000124575 | 622 | 701  | 0 4930528G23Rik    | lincRNA              |
| ENSMUST00000181973 | 621 | 654  | 3652 D230017M19Rik | lincRNA              |
| ENSMUST00000147218 | 620 | 590  | 0 Elk4             | protein_coding       |
| ENSMUST00000125009 | 620 | 634  | 24 Grm5            | protein_coding       |
| ENSMUST00000101355 | 618 | 650  | 30 Gm5570          | lincRNA              |
| ENSMUST00000152484 | 617 | 1002 | 5423 Rdm1          | protein_coding       |
| ENSMUST00000087183 | 616 | 709  | 12 Stk36           | protein_coding       |
| ENSMUST00000112104 | 613 | 638  | 38 Mid1            | protein_coding       |
| ENSMUST00000115537 | 611 | 664  | 18 Col28a1         | protein_coding       |
| ENSMUST00000061620 | 611 | 644  | 91 Unc80           | protein_coding       |
| ENSMUST00000025160 | 610 | 726  | 42 Ccdc178         | protein_coding       |
| ENSMUST00000029875 | 610 | 646  | 10 Tmem55a         | protein_coding       |
| ENSMUST00000166814 | 608 | 641  | 119 Brinp3         | protein_coding       |
| ENSMUST00000155020 | 606 | 675  | 26 RP24-426M1.3    | protein_coding       |
| ENSMUST00000180834 | 605 | 684  | 30 Gm26758         | lincRNA              |
| ENSMUST00000168237 | 605 | 579  | 54 Dis3l2          | protein_coding       |
| ENSMUST00000073581 | 604 | 684  | 202 Prkg1          | protein_coding       |
| ENSMUST00000181660 | 603 | 696  | 6 Pantr1           | lincRNA              |
| ENSMUST00000024866 | 603 | 560  | 0 Xdh              | protein_coding       |
| ENSMUST00000173492 | 603 | 453  | 8 Kifc1            | protein_coding       |
| ENSMUST00000021390 | 601 | 745  | 10 Galc            | protein_coding       |
| ENSMUST00000033463 | 601 | 613  | 81 Slc9a9          | protein_coding       |
| ENSMUST00000073781 | 600 | 649  | 4 E2f7             | protein_coding       |
| ENSMUST00000079716 | 600 | 429  | 2587 Rpl17         | protein_coding       |
| ENSMUST00000108516 | 600 | 437  | 0 Nlrp1b           | protein_coding       |
| ENSMUST00000142025 | 598 | 659  | 117 Gm9750         | processed_transcript |
| ENSMUST00000126354 | 598 | 601  | 171 Zbtb20         | protein_coding       |
| ENSMUST00000140887 | 597 | 523  | 63 1700008F21Rik   | protein_coding       |
| ENSMUST00000160158 | 597 | 648  | 2 Agmo             | protein_coding       |
| ENSMUST00000032443 | 596 | 642  | 48 Far2            | protein_coding       |
| ENSMUST00000123040 | 594 | 597  | 73 2810403D21Rik   | processed_transcript |
| ENSMUST00000152095 | 592 | 598  | 50 9330182L06Rik   | protein_coding       |
| ENSMUST00000107196 | 591 | 682  | 83 Dlg2            | protein_coding       |
| ENSMUST00000138009 | 591 | 646  | 22 Adamts17        | protein_coding       |
| ENSMUST00000120594 | 591 | 567  | 101 Cadm2          | protein_coding       |
| ENSMUST00000159199 | 590 | 673  | 30 Xrcc4           | protein_coding       |
| ENSMUST00000117377 | 586 | 595  | 75 Spock3          | protein_coding       |
| ENSMUST00000127775 | 586 | 577  | 8 4931428L18Rik    | protein_coding       |
| ENSMUST00000161793 | 584 | 642  | 56 Gulp1           | protein_coding       |
| ENSMUST00000105473 | 584 | 580  | 182 Slc35f1        | protein_coding       |
| ENSMUST00000079915 | 584 | 564  | 73 Skint11         | protein_coding       |
| ENSMUST00000177290 | 581 | 684  | 4 Corin            | protein_coding       |
| ENSMUST00000143967 | 581 | 676  | 4 Gm12973          | lincRNA              |
| ENSMUST00000002926 | 580 | 657  | 0 Pla1a            | protein_coding       |
| ENSMUST00000112842 | 578 | 653  | 4 Gin1             | protein_coding       |



|                    |     |     |      |               |                |
|--------------------|-----|-----|------|---------------|----------------|
| ENSMUST00000056042 | 578 | 595 | 42   | Abca16        | protein_coding |
| ENSMUST00000135631 | 577 | 710 | 2    | Nudcd3        | protein_coding |
| ENSMUST00000150920 | 577 | 256 | 1477 | Klhl32        | protein_coding |
| ENSMUST00000161310 | 577 | 647 | 50   | Spag16        | protein_coding |
| ENSMUST00000166156 | 576 | 617 | 4    | Pkd2l2        | protein_coding |
| ENSMUST00000128567 | 576 | 580 | 93   | Foxp2         | protein_coding |
| ENSMUST00000117645 | 575 | 642 | 18   | Slc17a5       | protein_coding |
| ENSMUST00000126314 | 574 | 554 | 46   | Gm12381       | lincRNA        |
| ENSMUST00000153946 | 573 | 709 | 46   | 3110007F17Rik | protein_coding |
| ENSMUST00000080141 | 573 | 539 | 133  | Tmem117       | protein_coding |
| ENSMUST00000128496 | 572 | 672 | 28   | Ankrd6        | protein_coding |
| ENSMUST00000098006 | 572 | 586 | 14   | Frmf3         | protein_coding |
| ENSMUST00000032541 | 571 | 673 | 12   | 2900092C05Rik | protein_coding |
| ENSMUST00000165559 | 570 | 625 | 24   | Ctlf          | protein_coding |
| ENSMUST00000118112 | 569 | 642 | 2    | Ankrd36       | protein_coding |
| ENSMUST00000176157 | 569 | 550 | 97   | Gm20629       | antisense      |
| ENSMUST00000159229 | 568 | 585 | 18   | Gm6619        | protein_coding |
| ENSMUST00000152023 | 568 | 470 | 48   | Nfia          | protein_coding |
| ENSMUST00000086122 | 567 | 606 | 12   | Obox3         | protein_coding |
| ENSMUST00000057634 | 566 | 624 | 67   | Nrxn3         | protein_coding |
| ENSMUST00000004120 | 566 | 567 | 40   | Fanc1         | protein_coding |
| ENSMUST00000151721 | 565 | 524 | 196  | Nell1         | protein_coding |
| ENSMUST00000183356 | 563 | 694 | 113  | Cphx2         | protein_coding |
| ENSMUST00000102905 | 563 | 649 | 34   | Palm2         | protein_coding |
| ENSMUST00000172729 | 562 | 654 | 4    | Kdm2b         | protein_coding |
| ENSMUST00000108276 | 561 | 640 | 24   | Lrrc69        | protein_coding |
| ENSMUST00000081777 | 558 | 554 | 75   | Mug2          | protein_coding |
| ENSMUST00000170105 | 557 | 598 | 40   | Skint5        | protein_coding |
| ENSMUST00000153432 | 556 | 529 | 75   | ErbB4         | protein_coding |
| ENSMUST00000166968 | 555 | 650 | 61   | Nrg3          | protein_coding |
| ENSMUST00000056781 | 555 | 22  | 32   | Ccdc57        | protein_coding |
| ENSMUST00000145613 | 554 | 718 | 12   | A830082K12Rik | antisense      |
| ENSMUST00000100271 | 554 | 641 | 6    | D030018L15Rik | lincRNA        |
| ENSMUST00000182580 | 554 | 560 | 113  | Snhg6         | lincRNA        |
| ENSMUST00000114871 | 554 | 661 | 57   | Hs6st2        | protein_coding |
| ENSMUST00000107193 | 554 | 659 | 293  | Dlg2          | protein_coding |
| ENSMUST00000025215 | 549 | 643 | 18   | Sil1          | protein_coding |
| ENSMUST00000114723 | 548 | 588 | 103  | Cacnb2        | protein_coding |
| ENSMUST00000078027 | 547 | 560 | 119  | Macrod2       | protein_coding |
| ENSMUST00000095208 | 546 | 654 | 10   | Capn13        | protein_coding |
| ENSMUST00000148572 | 546 | 608 | 111  | Pcdh15        | protein_coding |
| ENSMUST00000180764 | 546 | 585 | 34   | Gm26820       | lincRNA        |
| ENSMUST00000106044 | 546 | 578 | 26   | Lrrc7         | protein_coding |
| ENSMUST00000120259 | 546 | 551 | 276  | Map3k5        | protein_coding |
| ENSMUST00000078568 | 546 | 604 | 4    | Slc9b1        | protein_coding |
| ENSMUST00000130553 | 544 | 640 | 46   | Chst9         | protein_coding |
| ENSMUST00000126254 | 543 | 592 | 46   | Dpyd          | protein_coding |
| ENSMUST00000161801 | 543 | 625 | 141  | Rgs6          | protein_coding |
| ENSMUST00000126214 | 543 | 496 | 115  | Ccser1        | protein_coding |
| ENSMUST00000042986 | 542 | 558 | 115  | Plcl1         | protein_coding |
| ENSMUST00000167286 | 540 | 624 | 18   | Rhobtb1       | protein_coding |
| ENSMUST00000147653 | 540 | 592 | 2    | Gm15398       | lincRNA        |
| ENSMUST00000069005 | 539 | 629 | 12   | Fam49a        | protein_coding |
| ENSMUST00000170803 | 535 | 35  | 393  | Etv5          | protein_coding |
| ENSMUST00000122902 | 534 | 585 | 42   | Pnpla8        | protein_coding |
| ENSMUST00000021523 | 534 | 562 | 65   | Mnat1         | protein_coding |
| ENSMUST00000079924 | 531 | 645 | 22   | Btbd9         | protein_coding |
| ENSMUST00000038364 | 531 | 531 | 56   | Fstl5         | protein_coding |
| ENSMUST00000100660 | 531 | 483 | 77   | Deptor        | protein_coding |
| ENSMUST00000023006 | 530 | 603 | 6    | Lrrc6         | protein_coding |
| ENSMUST00000099582 | 529 | 644 | 40   | Fars2         | protein_coding |
| ENSMUST00000051416 | 528 | 556 | 34   | Hnmt          | protein_coding |
| ENSMUST00000109645 | 525 | 715 | 14   | Vstm2a        | protein_coding |
| ENSMUST00000167946 | 525 | 577 | 81   | Cacna2d1      | protein_coding |
| ENSMUST00000047704 | 524 | 679 | 2    | Cep78         | protein_coding |
| ENSMUST00000169134 | 523 | 629 | 36   | Fbxl17        | protein_coding |
| ENSMUST00000064166 | 523 | 582 | 4    | Gpr20         | protein_coding |
| ENSMUST00000154424 | 523 | 576 | 34   | Reps2         | protein_coding |

|                    |     |     |      |               |                                    |
|--------------------|-----|-----|------|---------------|------------------------------------|
| ENSMUST00000177691 | 520 | 681 | 20   | Gm9285        | unprocessed_pseudogene             |
| ENSMUST00000135431 | 520 | 592 | 135  | Lrrc4c        | protein_coding                     |
| ENSMUST00000075054 | 520 | 559 | 59   | Nlgn1         | protein_coding                     |
| ENSMUST00000137947 | 520 | 541 | 36   | Csmd1         | protein_coding                     |
| ENSMUST00000027056 | 518 | 601 | 46   | Prex2         | protein_coding                     |
| ENSMUST00000060479 | 518 | 564 | 315  | Ush2a         | protein_coding                     |
| ENSMUST00000035577 | 517 | 766 | 28   | Cpa6          | protein_coding                     |
| ENSMUST00000099028 | 517 | 575 | 2    | Gm14391       | protein_coding                     |
| ENSMUST00000086148 | 517 | 559 | 14   | Sult2a2       | protein_coding                     |
| ENSMUST00000016294 | 517 | 558 | 34   | Tenm1         | protein_coding                     |
| ENSMUST00000037408 | 517 | 561 | 85   | Scaper        | protein_coding                     |
| ENSMUST00000176654 | 515 | 522 | 24   | Gm20685       | lincRNA                            |
| ENSMUST00000087400 | 514 | 585 | 10   | Rbm41         | protein_coding                     |
| ENSMUST00000140614 | 514 | 548 | 32   | Gm3677        | lincRNA                            |
| ENSMUST00000097992 | 514 | 514 | 6    | Focad         | protein_coding                     |
| ENSMUST00000003345 | 514 | 596 | 79   | Amph          | protein_coding                     |
| ENSMUST00000181645 | 514 | 543 | 59   | Raet1e        | protein_coding                     |
| ENSMUST00000156269 | 513 | 583 | 14   | Gm14410       | protein_coding                     |
| ENSMUST00000112244 | 512 | 606 | 12   | Ntf3          | protein_coding                     |
| ENSMUST00000130416 | 512 | 572 | 14   | Gm13936       | antisense                          |
| ENSMUST00000146498 | 512 | 547 | 2    | Fpgs          | protein_coding                     |
| ENSMUST00000089948 | 511 | 671 | 59   | Slc44a5       | protein_coding                     |
| ENSMUST00000122120 | 511 | 516 | 226  | Fam19a1       | protein_coding                     |
| ENSMUST00000100211 | 510 | 590 | 0    | 4930562C15Rik | protein_coding                     |
| ENSMUST00000159686 | 504 | 594 | 54   | Fstl5         | protein_coding                     |
| ENSMUST00000084496 | 503 | 619 | 63   | Astrn2        | protein_coding                     |
| ENSMUST00000067529 | 503 | 558 | 71   | Syt15         | protein_coding                     |
| ENSMUST00000149994 | 500 | 531 | 42   | Gm2309        | lincRNA                            |
| ENSMUST00000153784 | 499 | 503 | 18   | Gpr112        | protein_coding                     |
| ENSMUST00000110083 | 498 | 573 | 12   | Sptlc3        | protein_coding                     |
| ENSMUST00000110451 | 498 | 571 | 95   | Syt16         | protein_coding                     |
| ENSMUST00000134982 | 497 | 535 | 2    | Gm14296       | protein_coding                     |
| ENSMUST00000184377 | 495 | 533 | 0    | 4931440P22Rik | transcribed_unprocessed_pseudogene |
| ENSMUST00000097477 | 493 | 625 | 8    | AA792892      | protein_coding                     |
| ENSMUST00000079978 | 493 | 537 | 28   | Unc13b        | protein_coding                     |
| ENSMUST00000058902 | 493 | 523 | 46   | Eml6          | protein_coding                     |
| ENSMUST00000112822 | 492 | 544 | 59   | Arhgap15      | protein_coding                     |
| ENSMUST00000162037 | 491 | 579 | 20   | Tnik          | protein_coding                     |
| ENSMUST00000114554 | 491 | 548 | 12   | Gabra3        | protein_coding                     |
| ENSMUST00000068214 | 491 | 540 | 75   | Astrn2        | protein_coding                     |
| ENSMUST00000045766 | 490 | 483 | 16   | Wdr70         | protein_coding                     |
| ENSMUST00000139383 | 490 | 474 | 113  | L3mbtl4       | protein_coding                     |
| ENSMUST00000136060 | 489 | 577 | 99   | Csgalnact1    | protein_coding                     |
| ENSMUST00000146331 | 489 | 544 | 38   | Dmd           | protein_coding                     |
| ENSMUST00000180887 | 489 | 486 | 95   | B3gal1        | protein_coding                     |
| ENSMUST00000141512 | 487 | 544 | 32   | A830018L16Rik | protein_coding                     |
| ENSMUST00000111439 | 487 | 530 | 6    | Adcy10        | protein_coding                     |
| ENSMUST00000040311 | 486 | 495 | 85   | Thsd7b        | protein_coding                     |
| ENSMUST00000169004 | 485 | 539 | 18   | Chrm2         | protein_coding                     |
| ENSMUST00000128259 | 485 | 504 | 22   | 4932414N04Rik | protein_coding                     |
| ENSMUST00000160207 | 485 | 411 | 4    | Egflam        | protein_coding                     |
| ENSMUST00000180427 | 484 | 502 | 59   | Gm6999        | lincRNA                            |
| ENSMUST00000181358 | 484 | 499 | 77   | 1700034P13Rik | antisense                          |
| ENSMUST00000137309 | 483 | 558 | 16   | Pate2         | protein_coding                     |
| ENSMUST00000180164 | 483 | 517 | 2    | Fsd1l         | protein_coding                     |
| ENSMUST00000034831 | 481 | 212 | 111  | Nr2e3         | protein_coding                     |
| ENSMUST00000141219 | 480 | 294 | 1935 | Rps8          | protein_coding                     |
| ENSMUST00000163309 | 480 | 564 | 26   | Gria4         | protein_coding                     |
| ENSMUST00000033991 | 479 | 520 | 20   | Wrn           | protein_coding                     |
| ENSMUST00000167191 | 477 | 579 | 85   | Hs3st5        | protein_coding                     |
| ENSMUST00000152216 | 477 | 529 | 0    | Rnf38         | protein_coding                     |
| ENSMUST00000067048 | 476 | 468 | 115  | Dnah5         | protein_coding                     |
| ENSMUST00000058476 | 472 | 581 | 63   | Otd7a         | protein_coding                     |
| ENSMUST00000100330 | 471 | 536 | 34   | Tanc2         | protein_coding                     |
| ENSMUST00000105718 | 470 | 553 | 2    | Zfp933        | protein_coding                     |
| ENSMUST00000129550 | 470 | 528 | 50   | Ptprd         | protein_coding                     |
| ENSMUST00000029374 | 469 | 497 | 46   | Nbea          | protein_coding                     |
| ENSMUST00000153249 | 469 | 158 | 515  | Slc24a3       | protein_coding                     |

|                    |     |     |       |               |                                    |
|--------------------|-----|-----|-------|---------------|------------------------------------|
| ENSMUST00000060072 | 468 | 495 | 50    | Dlgap1        | protein_coding                     |
| ENSMUST00000066197 | 467 | 531 | 101   | Asic2         | protein_coding                     |
| ENSMUST00000044789 | 466 | 494 | 12    | Srpx          | protein_coding                     |
| ENSMUST00000181694 | 466 | 336 | 52    | 4930593A02Rik | antisense                          |
| ENSMUST00000046627 | 465 | 513 | 42    | Osbpl10       | protein_coding                     |
| ENSMUST00000118731 | 464 | 525 | 46    | Edil3         | protein_coding                     |
| ENSMUST00000066658 | 464 | 491 | 91    | Park2         | protein_coding                     |
| ENSMUST00000176647 | 463 | 537 | 77    | Gm20663       | processed_transcript               |
| ENSMUST00000030561 | 463 | 292 | 10655 | Gnat3         | protein_coding                     |
| ENSMUST00000040826 | 462 | 485 | 75    | Acn9          | protein_coding                     |
| ENSMUST00000142129 | 461 | 651 | 65    | Cdh8          | protein_coding                     |
| ENSMUST00000088649 | 460 | 594 | 4     | Cpne8         | protein_coding                     |
| ENSMUST00000178599 | 459 | 547 | 22    | Gm21440       | protein_coding                     |
| ENSMUST00000035606 | 458 | 504 | 69    | Ascc3         | protein_coding                     |
| ENSMUST00000092639 | 458 | 500 | 67    | Lama2         | protein_coding                     |
| ENSMUST00000031817 | 458 | 409 | 75    | Herc6         | protein_coding                     |
| ENSMUST00000053467 | 457 | 559 | 728   | Zfpm2         | protein_coding                     |
| ENSMUST00000168889 | 457 | 529 | 50    | Diap3         | protein_coding                     |
| ENSMUST00000169280 | 456 | 468 | 2     | Wiz           | protein_coding                     |
| ENSMUST00000106281 | 455 | 531 | 2     | Zfp69         | protein_coding                     |
| ENSMUST00000126339 | 454 | 594 | 10    | C330013F16Rik | processed_transcript               |
| ENSMUST00000108528 | 454 | 560 | 8     | Pla2g4c       | protein_coding                     |
| ENSMUST00000182386 | 454 | 522 | 0     | Sept14        | protein_coding                     |
| ENSMUST00000178359 | 454 | 499 | 12    | Slco6b1       | transcribed_unprocessed_pseudogene |
| ENSMUST00000030201 | 453 | 514 | 2     | Gne           | protein_coding                     |
| ENSMUST00000130887 | 452 | 511 | 44    | Lrfr5         | protein_coding                     |
| ENSMUST00000149320 | 452 | 502 | 0     | Stau2         | protein_coding                     |
| ENSMUST00000112363 | 452 | 274 | 11848 | Eml4          | protein_coding                     |
| ENSMUST00000040149 | 451 | 548 | 6     | Atp8b4        | protein_coding                     |
| ENSMUST00000149280 | 451 | 460 | 28    | Lphn3         | protein_coding                     |
| ENSMUST00000118602 | 450 | 517 | 26    | Rhoj          | protein_coding                     |
| ENSMUST00000159626 | 449 | 537 | 20    | Ctnna2        | protein_coding                     |
| ENSMUST00000066905 | 448 | 523 | 1774  | Chl1          | protein_coding                     |
| ENSMUST00000179318 | 448 | 479 | 18    | Sh3gl3        | protein_coding                     |
| ENSMUST00000020551 | 448 | 469 | 59    | Asb3          | protein_coding                     |
| ENSMUST00000084640 | 448 | 456 | 85    | Abca14        | protein_coding                     |
| ENSMUST00000065857 | 448 | 45  | 282   | Mbtps2        | protein_coding                     |
| ENSMUST00000088392 | 446 | 497 | 2     | Srpk2         | protein_coding                     |
| ENSMUST00000076349 | 446 | 497 | 16    | Gria3         | protein_coding                     |
| ENSMUST00000119026 | 446 | 453 | 57    | Tmem132c      | protein_coding                     |
| ENSMUST00000181536 | 446 | 208 | 708   | Snhg18        | lincRNA                            |
| ENSMUST00000143721 | 446 | 108 | 63    | Pdgfc         | protein_coding                     |
| ENSMUST00000172167 | 444 | 502 | 95    | Inpp4b        | protein_coding                     |
| ENSMUST00000140278 | 444 | 448 | 48    | Cdkal1        | protein_coding                     |
| ENSMUST00000042529 | 444 | 433 | 14    | Inpp4b        | protein_coding                     |
| ENSMUST00000065766 | 443 | 453 | 28    | Adams6        | protein_coding                     |
| ENSMUST00000172955 | 442 | 470 | 8     | Grxcr1        | protein_coding                     |
| ENSMUST00000042943 | 440 | 489 | 69    | Car10         | protein_coding                     |
| ENSMUST00000041962 | 437 | 502 | 143   | Grip1         | protein_coding                     |
| ENSMUST00000128191 | 437 | 466 | 50    | Gm2101        | lincRNA                            |
| ENSMUST00000028045 | 437 | 400 | 52    | Mrc1          | protein_coding                     |
| ENSMUST00000108932 | 436 | 481 | 12    | Gm14326       | protein_coding                     |
| ENSMUST00000155337 | 436 | 458 | 48    | Gm2165        | lincRNA                            |
| ENSMUST00000110030 | 435 | 433 | 2272  | Snx5          | protein_coding                     |
| ENSMUST00000153137 | 432 | 489 | 8     | Mipol1        | protein_coding                     |
| ENSMUST00000142032 | 432 | 468 | 50    | Gm2117        | lincRNA                            |
| ENSMUST00000027585 | 432 | 511 | 6     | Tmem163       | protein_coding                     |
| ENSMUST00000060208 | 431 | 471 | 81    | Myo3b         | protein_coding                     |
| ENSMUST00000131006 | 431 | 401 | 280   | Gm15218       | lincRNA                            |
| ENSMUST00000115835 | 430 | 527 | 10    | Grin2a        | protein_coding                     |
| ENSMUST00000027128 | 429 | 505 | 2     | Ccdc150       | protein_coding                     |
| ENSMUST00000115715 | 429 | 495 | 42    | Pde10a        | protein_coding                     |
| ENSMUST00000124814 | 429 | 476 | 50    | Gm2200        | lincRNA                            |
| ENSMUST00000127757 | 429 | 403 | 113   | Gm11033       | lincRNA                            |
| ENSMUST00000128578 | 428 | 555 | 0     | 3110009E18Rik | protein_coding                     |
| ENSMUST00000112146 | 428 | 474 | 59    | Frmpd4        | protein_coding                     |
| ENSMUST00000072685 | 427 | 518 | 89    | Sorcs1        | protein_coding                     |
| ENSMUST00000175658 | 427 | 514 | 77    | Popdc3        | protein_coding                     |

|                     |     |     |      |               |                      |
|---------------------|-----|-----|------|---------------|----------------------|
| ENSMUST00000156697  | 427 | 512 | 30   | Htr2c         | protein_coding       |
| ENSMUST00000110679  | 427 | 173 | 5950 | Ggact         | protein_coding       |
| ENSMUST00000036019  | 426 | 455 | 61   | Fras1         | protein_coding       |
| ENSMUST00000113379  | 426 | 541 | 48   | Dach2         | protein_coding       |
| ENSMUST00000022303  | 426 | 482 | 54   | Thrb          | protein_coding       |
| ENSMUST00000021607  | 426 | 478 | 0    | Lgmn          | protein_coding       |
| ENSMUST00000132423  | 425 | 442 | 95   | Ncald         | protein_coding       |
| ENSMUST00000074015  | 425 | 434 | 42   | Negr1         | protein_coding       |
| ENSMUST00000046864  | 424 | 491 | 48   | Vav3          | protein_coding       |
| ENSMUST00000119826  | 424 | 450 | 61   | Large         | protein_coding       |
| ENSMUST00000048121  | 424 | 107 | 105  | Myrip         | protein_coding       |
| ENSMUST00000183354  | 423 | 619 | 48   | Kcnq3         | protein_coding       |
| ENSMUST00000044500  | 423 | 497 | 32   | Gm4117        | processed_transcript |
| ENSMUST00000154578  | 423 | 463 | 30   | Sgcd          | protein_coding       |
| ENSMUST00000021911  | 421 | 497 | 61   | 2010111I01Rik | protein_coding       |
| ENSMUST00000171349  | 420 | 500 | 10   | C2cd5         | protein_coding       |
| ENSMUST00000106560  | 420 | 460 | 12   | Skint2        | protein_coding       |
| ENSMUST00000164539  | 419 | 417 | 539  | Spag17        | protein_coding       |
| ENSMUST00000137594  | 418 | 443 | 2    | Ehbp1         | protein_coding       |
| ENSMUST00000064162  | 417 | 460 | 63   | 1700024B05Rik | protein_coding       |
| ENSMUST00000137990  | 417 | 455 | 4    | Rtn1          | protein_coding       |
| ENSMUST00000184476  | 416 | 451 | 18   | Gm27166       | lincRNA              |
| ENSMUST00000129030  | 416 | 409 | 18   | Pard3b        | protein_coding       |
| ENSMUST00000041865  | 415 | 477 | 38   | Nostrin       | protein_coding       |
| ENSMUST000000095188 | 415 | 458 | 127  | Camkmt        | protein_coding       |
| ENSMUST00000137764  | 415 | 378 | 458  | Slc22a22      | protein_coding       |
| ENSMUST00000180465  | 415 | 463 | 32   | 4930480K23Rik | lincRNA              |
| ENSMUST00000175773  | 414 | 459 | 48   | Negr1         | protein_coding       |
| ENSMUST00000181764  | 412 | 500 | 2    | 6030443J06Rik | lincRNA              |
| ENSMUST00000078525  | 412 | 420 | 325  | Rnf150        | protein_coding       |
| ENSMUST00000173734  | 412 | 400 | 4    | Khd3          | protein_coding       |
| ENSMUST00000181052  | 412 | 278 | 389  | Gm26848       | lincRNA              |
| ENSMUST00000144853  | 410 | 504 | 0    | C230004F18Rik | processed_transcript |
| ENSMUST00000184730  | 410 | 482 | 4    | Wnk3          | protein_coding       |
| ENSMUST00000052837  | 409 | 465 | 42   | Ar            | protein_coding       |
| ENSMUST00000110067  | 409 | 468 | 169  | Macrod2       | protein_coding       |
| ENSMUST00000112635  | 409 | 443 | 6    | Galnt13       | protein_coding       |
| ENSMUST00000135581  | 408 | 434 | 38   | Dlg2          | protein_coding       |
| ENSMUST00000024005  | 407 | 464 | 0    | Scg5          | protein_coding       |
| ENSMUST00000087689  | 406 | 488 | 52   | Prune2        | protein_coding       |
| ENSMUST00000050756  | 406 | 487 | 218  | Fam19a2       | protein_coding       |
| ENSMUST00000107188  | 406 | 479 | 139  | Sh3gl2        | protein_coding       |
| ENSMUST00000180604  | 405 | 504 | 40   | 4930556M19Rik | lincRNA              |
| ENSMUST00000040791  | 405 | 425 | 2    | Nipal2        | protein_coding       |
| ENSMUST00000139671  | 404 | 478 | 14   | Dync2h1       | protein_coding       |
| ENSMUST00000142270  | 404 | 462 | 10   | 4932412D23Rik | processed_transcript |
| ENSMUST00000029404  | 404 | 390 | 8    | Ppfia2        | protein_coding       |
| ENSMUST00000023600  | 403 | 447 | 71   | Robo1         | protein_coding       |
| ENSMUST00000172490  | 403 | 437 | 50   | Adamtsl3      | protein_coding       |
| ENSMUST00000055725  | 403 | 412 | 46   | Spink10       | protein_coding       |
| ENSMUST00000061601  | 403 | 397 | 42   | Ust           | protein_coding       |
| ENSMUST00000143830  | 402 | 461 | 0    | Col25a1       | protein_coding       |
| ENSMUST00000040110  | 401 | 830 | 2472 | Chst11        | protein_coding       |
| ENSMUST00000130674  | 401 | 642 | 910  | Spata5        | protein_coding       |
| ENSMUST00000145111  | 401 | 420 | 4    | 9130019P16Rik | lincRNA              |
| ENSMUST00000114521  | 400 | 436 | 26   | Xlr5a         | protein_coding       |
| ENSMUST00000162646  | 400 | 436 | 20   | Nckap5        | protein_coding       |
| ENSMUST00000046121  | 400 | 412 | 59   | Thsd7a        | protein_coding       |
| ENSMUST00000094273  | 400 | 401 | 69   | Gm16432       | protein_coding       |
| ENSMUST00000099569  | 399 | 381 | 139  | Trpm3         | protein_coding       |
| ENSMUST00000160645  | 399 | 11  | 12   | Fam20c        | protein_coding       |
| ENSMUST00000142617  | 397 | 492 | 12   | Ptprr         | protein_coding       |
| ENSMUST00000095737  | 397 | 384 | 121  | Akap6         | protein_coding       |
| ENSMUST00000146199  | 397 | 404 | 0    | Gm15494       | antisense            |
| ENSMUST00000099739  | 396 | 433 | 24   | Tbc1d32       | protein_coding       |
| ENSMUST00000102960  | 396 | 416 | 117  | Stam          | protein_coding       |
| ENSMUST00000025004  | 395 | 485 | 67   | Emr4          | protein_coding       |
| ENSMUST00000043725  | 395 | 460 | 99   | Cntnap5a      | protein_coding       |

|                    |     |     |                  |                        |
|--------------------|-----|-----|------------------|------------------------|
| ENSMUST00000018476 | 395 | 409 | 8 Stk3           | protein_coding         |
| ENSMUST00000177146 | 395 | 510 | 65 Gm26939       | processed_transcript   |
| ENSMUST00000152669 | 395 | 393 | 99 Gm14661       | antisense              |
| ENSMUST00000161532 | 395 | 275 | 105 Grhl2        | protein_coding         |
| ENSMUST00000026624 | 394 | 68  | 18 Tm9sf2        | protein_coding         |
| ENSMUST00000133201 | 392 | 466 | 8 Slco5a1        | protein_coding         |
| ENSMUST00000159584 | 392 | 432 | 34 Nwd2          | protein_coding         |
| ENSMUST00000167204 | 391 | 411 | 54 Dclk1         | protein_coding         |
| ENSMUST00000082054 | 391 | 407 | 163 Rims2        | protein_coding         |
| ENSMUST00000001079 | 391 | 377 | 22 Sec24b        | protein_coding         |
| ENSMUST00000136300 | 391 | 34  | 446 Slc25a53     | protein_coding         |
| ENSMUST00000027020 | 390 | 460 | 4 Gria4          | protein_coding         |
| ENSMUST00000152320 | 390 | 395 | 50 March1        | protein_coding         |
| ENSMUST00000091459 | 390 | 394 | 81 Fam172a       | protein_coding         |
| ENSMUST00000053771 | 390 | 379 | 30 Phkb          | protein_coding         |
| ENSMUST00000180089 | 389 | 462 | 12 Gm20474       | unprocessed_pseudogene |
| ENSMUST00000037097 | 389 | 418 | 46 Fhod3         | protein_coding         |
| ENSMUST00000144541 | 389 | 440 | 4 Gm11376        | lincRNA                |
| ENSMUST00000148240 | 388 | 583 | 12 Trpc5         | protein_coding         |
| ENSMUST00000059091 | 386 | 473 | 14 Clca1         | protein_coding         |
| ENSMUST00000168630 | 386 | 464 | 79 Unc5d         | protein_coding         |
| ENSMUST00000173213 | 386 | 459 | 8 Gm10476        | unprocessed_pseudogene |
| ENSMUST00000055224 | 386 | 458 | 22 Magi1         | protein_coding         |
| ENSMUST00000039229 | 386 | 452 | 6 Cdcp1          | protein_coding         |
| ENSMUST00000020270 | 386 | 403 | 2 Ddx50          | protein_coding         |
| ENSMUST00000114796 | 386 | 379 | 52 Pter          | protein_coding         |
| ENSMUST00000164495 | 386 | 449 | 0 Kcns3          | protein_coding         |
| ENSMUST00000142368 | 386 | 427 | 14 Mrvi1         | protein_coding         |
| ENSMUST00000076670 | 385 | 404 | 2 Lppr1          | protein_coding         |
| ENSMUST00000163277 | 385 | 388 | 8 RHBG           | protein_coding         |
| ENSMUST00000077642 | 384 | 465 | 8 Kifap3         | protein_coding         |
| ENSMUST00000164997 | 384 | 409 | 2 Gm14594        | unprocessed_pseudogene |
| ENSMUST00000164997 | 384 | 409 | 2 Gm14594        | unprocessed_pseudogene |
| ENSMUST00000047527 | 384 | 394 | 16 Zfp804a       | protein_coding         |
| ENSMUST00000113838 | 383 | 413 | 56 Heph          | protein_coding         |
| ENSMUST00000180708 | 383 | 398 | 30 4932441J04Rik | antisense              |
| ENSMUST00000183955 | 383 | 342 | 18 Mlip          | protein_coding         |
| ENSMUST00000128415 | 383 | 409 | 6 Gm15619        | antisense              |
| ENSMUST00000136084 | 383 | 380 | 105 Bbs9         | protein_coding         |
| ENSMUST00000185098 | 382 | 427 | 18 Dph5          | protein_coding         |
| ENSMUST00000143875 | 382 | 420 | 79 Oprm1         | protein_coding         |
| ENSMUST00000052550 | 380 | 458 | 87 Lrp1b         | protein_coding         |
| ENSMUST00000161619 | 380 | 432 | 4 Ano2           | protein_coding         |
| ENSMUST00000159555 | 380 | 429 | 50 Gulp1         | protein_coding         |
| ENSMUST00000156744 | 379 | 439 | 44 Gm7437        | lincRNA                |
| ENSMUST00000100780 | 379 | 419 | 0 Mansc4         | protein_coding         |
| ENSMUST00000134022 | 378 | 483 | 22 Bai3          | protein_coding         |
| ENSMUST00000129314 | 377 | 495 | 2 Ski            | protein_coding         |
| ENSMUST00000107004 | 377 | 395 | 4 Alg6           | protein_coding         |
| ENSMUST00000108985 | 377 | 383 | 6 Gm14306        | protein_coding         |
| ENSMUST00000112634 | 375 | 416 | 34 Galnt13       | protein_coding         |
| ENSMUST00000175852 | 375 | 414 | 0 Pkib           | protein_coding         |
| ENSMUST00000140506 | 375 | 374 | 30 Gm15668       | lincRNA                |
| ENSMUST00000151019 | 375 | 29  | 204 Tdp1         | protein_coding         |
| ENSMUST00000137663 | 375 | 376 | 46 Syt9          | protein_coding         |
| ENSMUST00000118003 | 374 | 414 | 75 Spock3        | protein_coding         |
| ENSMUST00000053748 | 373 | 437 | 42 Epb4.1l2      | protein_coding         |
| ENSMUST00000117598 | 373 | 374 | 2 Vps8           | protein_coding         |
| ENSMUST00000157013 | 372 | 494 | 2 Ube2l3         | protein_coding         |
| ENSMUST00000151199 | 372 | 431 | 75 Sema6d        | protein_coding         |
| ENSMUST00000115383 | 372 | 407 | 12 Cped1         | protein_coding         |
| ENSMUST00000040427 | 371 | 403 | 63 Cdh18         | protein_coding         |
| ENSMUST00000155416 | 371 | 396 | 52 Unc5c         | protein_coding         |
| ENSMUST00000090127 | 371 | 351 | 16 Gbp5          | protein_coding         |
| ENSMUST00000180608 | 371 | 331 | 2 Gm26858        | lincRNA                |
| ENSMUST00000022787 | 370 | 435 | 6 Slc7a8         | protein_coding         |
| ENSMUST00000052441 | 370 | 409 | 0 Slc17a5        | protein_coding         |
| ENSMUST00000049126 | 370 | 403 | 38 Dner          | protein_coding         |

|                    |     |     |      |               |                                    |
|--------------------|-----|-----|------|---------------|------------------------------------|
| ENSMUST00000021802 | 370 | 348 | 10   | Cap2          | protein_coding                     |
| ENSMUST00000131578 | 370 | 85  | 26   | Recql5        | protein_coding                     |
| ENSMUST00000149982 | 369 | 427 | 69   | Tspan7        | protein_coding                     |
| ENSMUST00000089185 | 369 | 413 | 26   | Zdhhc14       | protein_coding                     |
| ENSMUST00000163812 | 369 | 692 | 0    | Prc1          | protein_coding                     |
| ENSMUST00000053414 | 369 | 394 | 65   | Ccdc171       | protein_coding                     |
| ENSMUST00000024761 | 368 | 502 | 16   | Fbxl17        | protein_coding                     |
| ENSMUST00000024572 | 366 | 504 | 40   | Rsph3b        | protein_coding                     |
| ENSMUST00000056879 | 366 | 441 | 34   | C230029F24Rik | lincRNA                            |
| ENSMUST00000028049 | 366 | 374 | 79   | Rabgap1l      | protein_coding                     |
| ENSMUST00000032309 | 365 | 537 | 2    | Ybx3          | protein_coding                     |
| ENSMUST00000161534 | 365 | 352 | 8    | Lekr1         | protein_coding                     |
| ENSMUST00000178623 | 364 | 460 | 0    | Gm10338       | protein_coding                     |
| ENSMUST00000040182 | 363 | 462 | 12   | Ccdc88a       | protein_coding                     |
| ENSMUST00000108554 | 363 | 445 | 0    | Vmn2r38       | protein_coding                     |
| ENSMUST00000068992 | 363 | 387 | 194  | Pcdh9         | protein_coding                     |
| ENSMUST00000128840 | 363 | 185 | 230  | Eif4g1        | protein_coding                     |
| ENSMUST00000141222 | 363 | 398 | 14   | Gm13180       | lincRNA                            |
| ENSMUST00000000275 | 363 | 396 | 10   | Gla3          | protein_coding                     |
| ENSMUST00000172459 | 362 | 469 | 0    | Stk31         | protein_coding                     |
| ENSMUST00000094228 | 362 | 421 | 38   | 4930449A18Rik | transcribed_unprocessed_pseudogene |
| ENSMUST00000112544 | 362 | 407 | 12   | Gm15446       | protein_coding                     |
| ENSMUST00000171770 | 362 | 397 | 59   | Fut8          | protein_coding                     |
| ENSMUST00000107824 | 361 | 462 | 18   | Zcchc7        | protein_coding                     |
| ENSMUST00000069106 | 360 | 391 | 137  | Epm2a         | protein_coding                     |
| ENSMUST00000027812 | 358 | 378 | 42   | Rgs7          | protein_coding                     |
| ENSMUST00000119133 | 358 | 556 | 3920 | 1700064H15Rik | protein_coding                     |
| ENSMUST00000112632 | 358 | 434 | 28   | Kcnj3         | protein_coding                     |
| ENSMUST00000024882 | 358 | 376 | 85   | Ttc27         | protein_coding                     |
| ENSMUST00000167824 | 358 | 368 | 14   | Rab3c         | protein_coding                     |
| ENSMUST00000119475 | 357 | 351 | 4    | Emcn          | protein_coding                     |
| ENSMUST00000133937 | 357 | 307 | 57   | Zhx3          | protein_coding                     |
| ENSMUST00000075838 | 356 | 432 | 73   | A1cf          | protein_coding                     |
| ENSMUST00000081752 | 356 | 386 | 40   | Olfm3         | protein_coding                     |
| ENSMUST00000000129 | 356 | 386 | 38   | Fer           | protein_coding                     |
| ENSMUST00000138955 | 355 | 372 | 69   | Ptprd         | protein_coding                     |
| ENSMUST00000108387 | 355 | 322 | 4    | Nlrp9a        | protein_coding                     |
| ENSMUST00000036576 | 353 | 432 | 36   | Ccdc138       | protein_coding                     |
| ENSMUST00000113258 | 353 | 420 | 32   | Cntn4         | protein_coding                     |
| ENSMUST00000114537 | 352 | 419 | 6    | Myo1b         | protein_coding                     |
| ENSMUST00000029845 | 352 | 400 | 36   | Ddah1         | protein_coding                     |
| ENSMUST00000162758 | 352 | 393 | 18   | Pdss2         | protein_coding                     |
| ENSMUST00000107148 | 351 | 424 | 2    | Focad         | protein_coding                     |
| ENSMUST00000172939 | 350 | 324 | 85   | Ttc6          | protein_coding                     |
| ENSMUST00000162484 | 350 | 296 | 9021 | Cntn5         | protein_coding                     |
| ENSMUST00000182124 | 349 | 393 | 85   | 6530403H02Rik | lincRNA                            |
| ENSMUST00000056740 | 349 | 384 | 18   | Gldn          | protein_coding                     |
| ENSMUST00000127709 | 349 | 341 | 38   | Gm12478       | lincRNA                            |
| ENSMUST00000156107 | 348 | 392 | 10   | Dmd           | protein_coding                     |
| ENSMUST00000142161 | 348 | 328 | 52   | Itgbl1        | protein_coding                     |
| ENSMUST00000063562 | 347 | 414 | 32   | Mipep         | protein_coding                     |
| ENSMUST00000057067 | 346 | 386 | 50   | Mei4          | protein_coding                     |
| ENSMUST00000003313 | 346 | 363 | 52   | Grk5          | protein_coding                     |
| ENSMUST00000070663 | 345 | 363 | 38   | Ppp1r12a      | protein_coding                     |
| ENSMUST00000115267 | 344 | 410 | 75   | Magi2         | protein_coding                     |
| ENSMUST00000109442 | 344 | 374 | 16   | Ptprt         | protein_coding                     |
| ENSMUST00000058747 | 344 | 351 | 48   | Mettl24       | protein_coding                     |
| ENSMUST00000182037 | 344 | 303 | 34   | Cellf2        | protein_coding                     |
| ENSMUST00000162291 | 343 | 411 | 0    | Nbeal1        | protein_coding                     |
| ENSMUST00000138768 | 343 | 381 | 57   | Pard3b        | protein_coding                     |
| ENSMUST00000058884 | 343 | 317 | 4    | Parn          | protein_coding                     |
| ENSMUST00000126415 | 342 | 403 | 12   | Cfap61        | protein_coding                     |
| ENSMUST00000132842 | 342 | 384 | 12   | Exoc4         | protein_coding                     |
| ENSMUST00000168945 | 341 | 424 | 10   | Gm8871        | protein_coding                     |
| ENSMUST00000180792 | 341 | 355 | 85   | Snx29         | protein_coding                     |
| ENSMUST00000130332 | 341 | 343 | 56   | Plcx3         | protein_coding                     |
| ENSMUST00000047368 | 340 | 445 | 2    | Mnd1          | protein_coding                     |
| ENSMUST00000058942 | 339 | 329 | 87   | 4930533K18Rik | protein_coding                     |

|                    |     |     |                    |                      |
|--------------------|-----|-----|--------------------|----------------------|
| ENSMUST00000176801 | 338 | 298 | 14 Cdh10           | protein_coding       |
| ENSMUST00000181045 | 338 | 51  | 305 4933404O12Rik  | lincRNA              |
| ENSMUST00000041183 | 336 | 384 | 65 Meox2           | protein_coding       |
| ENSMUST00000094836 | 336 | 362 | 42 Stk32b          | protein_coding       |
| ENSMUST00000091554 | 335 | 454 | 22 Cntnap3         | protein_coding       |
| ENSMUST00000109822 | 334 | 445 | 0 Gck              | protein_coding       |
| ENSMUST00000147225 | 333 | 368 | 4 Cdip1            | protein_coding       |
| ENSMUST00000159998 | 332 | 411 | 32 Agmo            | protein_coding       |
| ENSMUST00000079416 | 332 | 393 | 26 Cntn4           | protein_coding       |
| ENSMUST00000127672 | 332 | 378 | 50 Gm13481         | lincRNA              |
| ENSMUST00000107162 | 331 | 267 | 121 Tenm4          | protein_coding       |
| ENSMUST00000082104 | 330 | 345 | 61 Csm1            | protein_coding       |
| ENSMUST00000087324 | 329 | 399 | 8 Pgm1             | protein_coding       |
| ENSMUST00000167941 | 329 | 369 | 0 Slc15a2          | protein_coding       |
| ENSMUST00000023352 | 329 | 344 | 77 Prkdc           | protein_coding       |
| ENSMUST00000102805 | 329 | 342 | 20 Cd200r2         | protein_coding       |
| ENSMUST00000113964 | 329 | 338 | 36 Il1rapl1        | protein_coding       |
| ENSMUST00000179282 | 329 | 323 | 16 Olfr56          | protein_coding       |
| ENSMUST00000164037 | 329 | 352 | 93 Pde1c           | protein_coding       |
| ENSMUST00000045356 | 329 | 307 | 46 Rpl37           | protein_coding       |
| ENSMUST00000114585 | 328 | 401 | 24 Gm609           | protein_coding       |
| ENSMUST00000097643 | 328 | 354 | 8 AW554918         | protein_coding       |
| ENSMUST00000045396 | 327 | 502 | 3474 9130011E15Rik | protein_coding       |
| ENSMUST00000032879 | 327 | 370 | 50 Rab30           | protein_coding       |
| ENSMUST00000183117 | 327 | 312 | 14 4921515E04Rik   | lincRNA              |
| ENSMUST00000040860 | 326 | 382 | 2 Psma8            | protein_coding       |
| ENSMUST00000098375 | 326 | 375 | 2 Pkd1l2           | protein_coding       |
| ENSMUST00000160216 | 326 | 365 | 10 Cntn5           | protein_coding       |
| ENSMUST00000054260 | 326 | 343 | 6 Lipk             | protein_coding       |
| ENSMUST00000081349 | 326 | 319 | 56 FMN1            | protein_coding       |
| ENSMUST00000110510 | 326 | 380 | 0 Gli3             | protein_coding       |
| ENSMUST00000020568 | 326 | 338 | 26 Wdpcp           | protein_coding       |
| ENSMUST00000144728 | 325 | 351 | 87 4930440I19Rik   | lincRNA              |
| ENSMUST00000167053 | 325 | 284 | 24 Dock3           | protein_coding       |
| ENSMUST00000177959 | 323 | 434 | 0 Dpf3             | protein_coding       |
| ENSMUST00000180409 | 323 | 428 | 46 9330111N05Rik   | lincRNA              |
| ENSMUST00000112745 | 323 | 357 | 12 Mbd5            | protein_coding       |
| ENSMUST00000115028 | 323 | 393 | 30 Itgb5           | protein_coding       |
| ENSMUST00000029824 | 323 | 370 | 14 Rpe65           | protein_coding       |
| ENSMUST00000097651 | 323 | 354 | 50 Nol4            | protein_coding       |
| ENSMUST00000046955 | 323 | 82  | 476 Wdr92          | protein_coding       |
| ENSMUST00000163295 | 323 | 29  | 977 Apc            | protein_coding       |
| ENSMUST00000073094 | 322 | 352 | 30 Sh3kbp1         | protein_coding       |
| ENSMUST00000098433 | 322 | 340 | 0 Mrgprx2          | protein_coding       |
| ENSMUST00000124074 | 321 | 410 | 0 Gm13767          | processed_pseudogene |
| ENSMUST00000179153 | 321 | 344 | 32 1700110I01Rik   | lincRNA              |
| ENSMUST00000119310 | 321 | 376 | 69 Kcnmb2          | protein_coding       |
| ENSMUST00000033539 | 321 | 365 | 18 F8              | protein_coding       |
| ENSMUST00000080726 | 320 | 346 | 0 Gm10040          | pseudogene           |
| ENSMUST00000136479 | 320 | 334 | 12 Cd84            | protein_coding       |
| ENSMUST00000022036 | 319 | 394 | 4 Slc28a3          | protein_coding       |
| ENSMUST00000179734 | 318 | 294 | 442 Gm2163         | protein_coding       |
| ENSMUST00000109583 | 318 | 305 | 73 Mctp1           | protein_coding       |
| ENSMUST00000032238 | 317 | 366 | 10 Vmn2r26         | protein_coding       |
| ENSMUST00000127586 | 317 | 338 | 54 Colgalt2        | protein_coding       |
| ENSMUST00000098751 | 316 | 327 | 48 Lrif1           | protein_coding       |
| ENSMUST00000047023 | 315 | 308 | 14 Cntln           | protein_coding       |
| ENSMUST00000173042 | 315 | 382 | 12 Fam13c          | protein_coding       |
| ENSMUST00000111827 | 314 | 343 | 36 Slco1a6         | protein_coding       |
| ENSMUST00000105280 | 314 | 336 | 10 Lin7a           | protein_coding       |
| ENSMUST00000040647 | 314 | 264 | 791 Fgf1           | protein_coding       |
| ENSMUST00000169303 | 313 | 413 | 111 Ppfia2         | protein_coding       |
| ENSMUST00000148750 | 313 | 345 | 38 Slc4a4          | protein_coding       |
| ENSMUST00000163996 | 313 | 305 | 22 4933406I18Rik   | lincRNA              |
| ENSMUST00000181137 | 312 | 303 | 97 4930526L06Rik   | antisense            |
| ENSMUST00000041767 | 312 | 23  | 87 Tbc1d2b         | protein_coding       |
| ENSMUST00000030868 | 312 | 355 | 71 Sema3d          | protein_coding       |
| ENSMUST00000097948 | 312 | 336 | 48 Sgip1           | protein_coding       |

|                    |     |     |                  |                        |
|--------------------|-----|-----|------------------|------------------------|
| ENSMUST00000130623 | 311 | 375 | 16 Supt3         | protein_coding         |
| ENSMUST00000160658 | 311 | 343 | 36 Csmc3         | protein_coding         |
| ENSMUST00000175799 | 311 | 336 | 85 Asap1         | protein_coding         |
| ENSMUST00000111706 | 310 | 422 | 2 Lmtd1          | protein_coding         |
| ENSMUST00000125237 | 310 | 383 | 57 Gm12811       | processed_transcript   |
| ENSMUST00000044503 | 310 | 319 | 2 Rftn1          | protein_coding         |
| ENSMUST00000177482 | 309 | 319 | 0 Gm20618        | lincRNA                |
| ENSMUST00000168759 | 309 | 357 | 10 Dock3         | protein_coding         |
| ENSMUST00000130856 | 309 | 322 | 12 Slx4ip        | protein_coding         |
| ENSMUST00000071652 | 309 | 295 | 18 Mthfd2l       | protein_coding         |
| ENSMUST00000181225 | 307 | 386 | 63 1110019D14Rik | lincRNA                |
| ENSMUST00000022220 | 307 | 342 | 2 Msh3           | protein_coding         |
| ENSMUST00000181184 | 306 | 350 | 18 4930544I03Rik | lincRNA                |
| ENSMUST00000128794 | 305 | 340 | 12 Wdpcp         | protein_coding         |
| ENSMUST00000130082 | 305 | 319 | 0 2310016D23Rik  | lincRNA                |
| ENSMUST00000021005 | 304 | 317 | 6 Tpo            | protein_coding         |
| ENSMUST00000113550 | 304 | 227 | 14 Chchd6        | protein_coding         |
| ENSMUST00000062122 | 303 | 441 | 10 Cmya5         | protein_coding         |
| ENSMUST00000114515 | 303 | 391 | 57 Bre           | protein_coding         |
| ENSMUST00000110559 | 303 | 365 | 52 Lyst          | protein_coding         |
| ENSMUST00000182441 | 302 | 405 | 0 Gm27013        | unprocessed_pseudogene |
| ENSMUST00000072018 | 302 | 375 | 30 Alms1         | protein_coding         |
| ENSMUST00000110036 | 302 | 297 | 36 Ptk2          | protein_coding         |
| ENSMUST00000160197 | 301 | 327 | 18 Exoc6b        | protein_coding         |
| ENSMUST00000139892 | 301 | 349 | 14 Megf10        | protein_coding         |
| ENSMUST00000114640 | 301 | 314 | 145 Armc3        | protein_coding         |
| ENSMUST00000042103 | 301 | 308 | 107 Myo16        | protein_coding         |
| ENSMUST00000180437 | 301 | 231 | 650 Gm17575      | lincRNA                |
| ENSMUST00000184878 | 300 | 234 | 4 Kbtbd12        | protein_coding         |
| ENSMUST00000040876 | 299 | 244 | 81 Ak7           | protein_coding         |
| ENSMUST00000019859 | 299 | 106 | 99 Gle1          | protein_coding         |
| ENSMUST00000109441 | 298 | 326 | 28 Ptptr         | protein_coding         |
| ENSMUST00000025421 | 298 | 173 | 1493 Seh1l       | protein_coding         |
| ENSMUST00000138182 | 297 | 344 | 28 Ugt1a10       | protein_coding         |
| ENSMUST00000166766 | 296 | 399 | 0 Rrp7a          | protein_coding         |
| ENSMUST00000149336 | 295 | 378 | 77 Mtus2         | protein_coding         |
| ENSMUST00000041860 | 295 | 371 | 18 Gdpd4         | protein_coding         |
| ENSMUST00000155816 | 295 | 78  | 4175 Snhg3       | processed_transcript   |
| ENSMUST00000146205 | 295 | 286 | 34 Malrd1        | protein_coding         |
| ENSMUST00000169525 | 294 | 373 | 0 Speer5-ps1     | unprocessed_pseudogene |
| ENSMUST00000177861 | 294 | 359 | 6 Sncaip         | protein_coding         |
| ENSMUST00000168452 | 294 | 349 | 0 Gm5916         | protein_coding         |
| ENSMUST00000110221 | 294 | 303 | 24 Col14a1       | protein_coding         |
| ENSMUST00000138055 | 294 | 254 | 48 4930516K23Rik | protein_coding         |
| ENSMUST00000131135 | 293 | 315 | 28 Wdpcp         | protein_coding         |
| ENSMUST00000106410 | 293 | 291 | 14 St3gal3       | protein_coding         |
| ENSMUST00000174862 | 293 | 234 | 28 Vmn1r-ps29    | unprocessed_pseudogene |
| ENSMUST00000160045 | 292 | 403 | 4 Gm3259         | protein_coding         |
| ENSMUST00000075619 | 292 | 296 | 59 Slc22a27      | protein_coding         |
| ENSMUST00000125230 | 292 | 416 | 0 Gm13789        | processed_transcript   |
| ENSMUST00000015391 | 290 | 394 | 0 Nipsnap3b      | protein_coding         |
| ENSMUST00000112606 | 290 | 320 | 28 Dpp10         | protein_coding         |
| ENSMUST00000178646 | 289 | 363 | 4 Gm6367         | protein_coding         |
| ENSMUST00000031539 | 289 | 345 | 8 Snx8           | protein_coding         |
| ENSMUST00000149675 | 288 | 350 | 0 Peli1          | protein_coding         |
| ENSMUST00000159304 | 288 | 284 | 230 Drg1         | protein_coding         |
| ENSMUST00000119581 | 287 | 336 | 12 Thsd7a        | protein_coding         |
| ENSMUST00000151122 | 287 | 328 | 50 A530072M11Rik | processed_transcript   |
| ENSMUST00000131335 | 287 | 319 | 0 Lclat1         | protein_coding         |
| ENSMUST00000162036 | 287 | 267 | 12 Rsrc1         | protein_coding         |
| ENSMUST00000183368 | 286 | 309 | 95 Col25a1       | protein_coding         |
| ENSMUST00000181416 | 286 | 231 | 22 Pvt1          | lincRNA                |
| ENSMUST00000048691 | 285 | 321 | 44 Ptchd4        | protein_coding         |
| ENSMUST00000181248 | 285 | 302 | 286 Gm26804      | lincRNA                |
| ENSMUST00000031235 | 285 | 286 | 30 Gbp8          | protein_coding         |
| ENSMUST00000091927 | 283 | 357 | 97 Kctd16        | protein_coding         |
| ENSMUST00000039769 | 283 | 310 | 8 Sntb1          | protein_coding         |
| ENSMUST00000183345 | 283 | 307 | 28 Triqk         | protein_coding         |



|                    |     |     |      |               |                      |
|--------------------|-----|-----|------|---------------|----------------------|
| ENSMUST00000147055 | 283 | 324 | 95   | Mbd5          | protein_coding       |
| ENSMUST00000121673 | 283 | 315 | 12   | Lonp2         | protein_coding       |
| ENSMUST00000085724 | 282 | 288 | 10   | Susd4         | protein_coding       |
| ENSMUST00000099311 | 281 | 290 | 26   | Slx4ip        | protein_coding       |
| ENSMUST00000160300 | 281 | 308 | 93   | Nxph1         | protein_coding       |
| ENSMUST00000048557 | 281 | 235 | 430  | Npffr2        | protein_coding       |
| ENSMUST00000151692 | 280 | 310 | 48   | Lppr1         | protein_coding       |
| ENSMUST00000124999 | 280 | 307 | 165  | Lingo2        | protein_coding       |
| ENSMUST00000105588 | 280 | 297 | 32   | Esr1          | protein_coding       |
| ENSMUST00000037044 | 280 | 271 | 16   | Hace1         | protein_coding       |
| ENSMUST00000036340 | 279 | 363 | 18   | Fancd2        | protein_coding       |
| ENSMUST00000122940 | 279 | 326 | 75   | 4930586N03Rik | processed_transcript |
| ENSMUST00000019913 | 279 | 281 | 71   | Frk           | protein_coding       |
| ENSMUST00000041178 | 278 | 240 | 8    | 1700006J14Rik | processed_transcript |
| ENSMUST00000111190 | 278 | 87  | 1207 | Cd44          | protein_coding       |
| ENSMUST00000101269 | 278 | 249 | 18   | Cpxcr1        | protein_coding       |
| ENSMUST00000130296 | 277 | 260 | 50   | Gm16090       | antisense            |
| ENSMUST00000063551 | 277 | 238 | 0    | Rgs7bp        | protein_coding       |
| ENSMUST00000172369 | 276 | 321 | 14   | Gm7271        | lincRNA              |
| ENSMUST00000020413 | 276 | 290 | 123  | Zpbp          | protein_coding       |
| ENSMUST00000123302 | 275 | 317 | 52   | Stag1         | protein_coding       |
| ENSMUST00000092821 | 275 | 222 | 42   | Bcas3         | protein_coding       |
| ENSMUST00000037785 | 274 | 298 | 87   | Ncam2         | protein_coding       |
| ENSMUST00000030010 | 274 | 282 | 0    | Abca1         | protein_coding       |
| ENSMUST00000167111 | 274 | 178 | 188  | Rabggtb       | protein_coding       |
| ENSMUST00000068156 | 273 | 338 | 16   | Vps13a        | protein_coding       |
| ENSMUST00000128558 | 273 | 307 | 48   | Sgcd          | protein_coding       |
| ENSMUST00000161923 | 273 | 286 | 46   | Gm16025       | lincRNA              |
| ENSMUST00000146830 | 273 | 259 | 30   | Vsig4         | protein_coding       |
| ENSMUST00000155129 | 272 | 72  | 4481 | Rcc1          | protein_coding       |
| ENSMUST00000071399 | 272 | 271 | 40   | Psg16         | protein_coding       |
| ENSMUST00000067458 | 272 | 268 | 95   | Sema5a        | protein_coding       |
| ENSMUST00000100670 | 272 | 257 | 50   | Csmd3         | protein_coding       |
| ENSMUST00000129059 | 272 | 250 | 38   | 2610206C17Rik | processed_transcript |
| ENSMUST00000074273 | 271 | 341 | 54   | Dlg2          | protein_coding       |
| ENSMUST00000118171 | 271 | 303 | 109  | Cntnap4       | protein_coding       |
| ENSMUST00000124351 | 270 | 324 | 4    | Lym7          | protein_coding       |
| ENSMUST00000006137 | 269 | 368 | 14   | Trap1         | protein_coding       |
| ENSMUST00000139692 | 269 | 301 | 2    | Mgat4d        | protein_coding       |
| ENSMUST00000144368 | 269 | 284 | 67   | Gm13974       | lincRNA              |
| ENSMUST00000006856 | 269 | 305 | 40   | Pola1         | protein_coding       |
| ENSMUST00000065956 | 268 | 336 | 12   | Gm5444        | protein_coding       |
| ENSMUST00000178756 | 268 | 313 | 0    | Dpf3          | protein_coding       |
| ENSMUST00000033473 | 268 | 295 | 24   | Fgf13         | protein_coding       |
| ENSMUST00000047677 | 267 | 312 | 44   | Ccdc18        | protein_coding       |
| ENSMUST00000004497 | 267 | 304 | 40   | Large         | protein_coding       |
| ENSMUST00000178060 | 267 | 283 | 93   | Gm3005        | protein_coding       |
| ENSMUST00000179210 | 266 | 353 | 688  | Itpk1         | protein_coding       |
| ENSMUST00000090512 | 266 | 352 | 67   | Grm8          | protein_coding       |
| ENSMUST00000016143 | 266 | 340 | 0    | Wasf3         | protein_coding       |
| ENSMUST00000183662 | 266 | 309 | 10   | Mmp16         | protein_coding       |
| ENSMUST00000043938 | 266 | 290 | 325  | Plcl2         | protein_coding       |
| ENSMUST00000059003 | 266 | 281 | 71   | Hsf3          | protein_coding       |
| ENSMUST00000141619 | 266 | 309 | 10   | Dync1i2       | protein_coding       |
| ENSMUST00000027027 | 266 | 305 | 12   | Cwf19l2       | protein_coding       |
| ENSMUST00000025064 | 265 | 301 | 4    | 2610034M16Rik | protein_coding       |
| ENSMUST00000115058 | 265 | 263 | 12   | Tenm1         | protein_coding       |
| ENSMUST00000135976 | 265 | 221 | 2    | Acnat1        | protein_coding       |
| ENSMUST00000153044 | 264 | 348 | 10   | March3        | protein_coding       |
| ENSMUST00000164935 | 264 | 274 | 4    | Gm17673       | protein_coding       |
| ENSMUST00000141918 | 264 | 269 | 8    | AU040320      | protein_coding       |
| ENSMUST00000162224 | 264 | 240 | 14   | E330034G19Rik | protein_coding       |
| ENSMUST00000115869 | 264 | 309 | 34   | Mpp7          | protein_coding       |
| ENSMUST00000071204 | 264 | 290 | 10   | Ppef1         | protein_coding       |
| ENSMUST00000134710 | 264 | 266 | 57   | Ccser1        | protein_coding       |
| ENSMUST00000112931 | 264 | 259 | 69   | Col4a5        | protein_coding       |
| ENSMUST00000037275 | 263 | 325 | 24   | Ccdc15        | protein_coding       |
| ENSMUST00000123966 | 263 | 285 | 14   | 4931422A03Rik | protein_coding       |

|                     |     |     |                  |                      |
|---------------------|-----|-----|------------------|----------------------|
| ENSMUST00000110516  | 263 | 250 | 24 Hecw1         | protein_coding       |
| ENSMUST00000168866  | 262 | 281 | 69 Gm3164        | protein_coding       |
| ENSMUST00000152306  | 262 | 229 | 42 Gm11924       | lincRNA              |
| ENSMUST00000045664  | 262 | 229 | 10 Atad2b        | protein_coding       |
| ENSMUST00000047753  | 261 | 259 | 32 Abcb1a        | protein_coding       |
| ENSMUST00000125924  | 261 | 241 | 24 Fam120c       | protein_coding       |
| ENSMUST00000040802  | 261 | 321 | 2 Zfp957         | protein_coding       |
| ENSMUST00000076810  | 260 | 342 | 0 Kalrn          | protein_coding       |
| ENSMUST00000115808  | 260 | 306 | 57 Ammecr1l      | protein_coding       |
| ENSMUST00000175889  | 259 | 263 | 8 Ppp1r9a        | protein_coding       |
| ENSMUST00000126270  | 258 | 310 | 34318 Gm12648    | lincRNA              |
| ENSMUST00000006991  | 258 | 297 | 89 Hcn1          | protein_coding       |
| ENSMUST00000143097  | 258 | 278 | 34 Aff2          | protein_coding       |
| ENSMUST00000168470  | 258 | 227 | 36 Gm17233       | processed_transcript |
| ENSMUST00000031628  | 258 | 339 | 6 Ptdc1          | protein_coding       |
| ENSMUST00000128656  | 257 | 325 | 75 Btbd3         | protein_coding       |
| ENSMUST00000147737  | 256 | 385 | 0 Mphosph9       | protein_coding       |
| ENSMUST00000159883  | 256 | 341 | 0 Atxn3          | protein_coding       |
| ENSMUST00000044901  | 256 | 305 | 16 Rbms3         | protein_coding       |
| ENSMUST00000146393  | 255 | 357 | 2 Atp10d         | processed_transcript |
| ENSMUST00000131060  | 255 | 203 | 22 Them7         | protein_coding       |
| ENSMUST00000049681  | 255 | 291 | 0 Itgbl1         | protein_coding       |
| ENSMUST00000140528  | 255 | 288 | 14 Arhgap15      | protein_coding       |
| ENSMUST00000114229  | 255 | 267 | 2 Cxadr          | protein_coding       |
| ENSMUST00000114366  | 255 | 263 | 59 Aox2          | protein_coding       |
| ENSMUST00000138979  | 255 | 261 | 2 Vma21          | protein_coding       |
| ENSMUST00000032159  | 255 | 245 | 40 Cntn3         | protein_coding       |
| ENSMUST00000072451  | 255 | 234 | 26 Slc9a7        | protein_coding       |
| ENSMUST00000041606  | 254 | 265 | 38 Necab1        | protein_coding       |
| ENSMUST00000179766  | 253 | 295 | 22 Gpr45         | protein_coding       |
| ENSMUST00000112184  | 253 | 245 | 12 Sfmbt1        | protein_coding       |
| ENSMUST000000027974 | 253 | 222 | 34 Atf6          | protein_coding       |
| ENSMUST00000045312  | 252 | 336 | 0 Smc1a          | protein_coding       |
| ENSMUST00000180749  | 252 | 326 | 6 Gm26903        | antisense            |
| ENSMUST00000128247  | 252 | 325 | 46 Gm28046       | protein_coding       |
| ENSMUST00000162534  | 252 | 307 | 4 Ermp1          | protein_coding       |
| ENSMUST00000073957  | 252 | 278 | 36 Sema3e        | protein_coding       |
| ENSMUST00000048147  | 252 | 224 | 71 Anapc10       | protein_coding       |
| ENSMUST00000159663  | 252 | 110 | 313 Gas5         | processed_transcript |
| ENSMUST00000056725  | 252 | 372 | 2 Ccnb3          | protein_coding       |
| ENSMUST00000058692  | 251 | 303 | 38 Pdgfd         | protein_coding       |
| ENSMUST00000163871  | 251 | 244 | 26 Cadps2        | protein_coding       |
| ENSMUST00000000254  | 251 | 223 | 10 Clec2g        | protein_coding       |
| ENSMUST000000099718 | 250 | 257 | 7861 Gm16976     | processed_transcript |
| ENSMUST00000105276  | 250 | 246 | 14 Syt1          | protein_coding       |
| ENSMUST00000137459  | 250 | 232 | 93 Tcte2         | protein_coding       |
| ENSMUST00000029311  | 249 | 369 | 8 Trpc4          | protein_coding       |
| ENSMUST00000181327  | 249 | 292 | 20 4930554H23Rik | lincRNA              |
| ENSMUST00000144503  | 249 | 286 | 0 5730522E02Rik  | protein_coding       |
| ENSMUST00000027066  | 249 | 290 | 8 Eya1           | protein_coding       |
| ENSMUST00000026062  | 249 | 287 | 2 Casp7          | protein_coding       |
| ENSMUST00000133933  | 249 | 282 | 40 Csmc1         | protein_coding       |
| ENSMUST00000096171  | 249 | 219 | 34 Gm3383        | protein_coding       |
| ENSMUST00000172559  | 248 | 312 | 14 Mrgpra2b      | protein_coding       |
| ENSMUST00000029885  | 247 | 277 | 0 Cpne3          | protein_coding       |
| ENSMUST00000070748  | 247 | 270 | 28 Ldb2          | protein_coding       |
| ENSMUST00000136755  | 246 | 296 | 10 BC067074      | protein_coding       |
| ENSMUST00000155032  | 246 | 282 | 77 A230004M16Rik | processed_transcript |
| ENSMUST00000178256  | 246 | 274 | 71 Gm3002        | protein_coding       |
| ENSMUST00000155169  | 245 | 296 | 2 Socs6          | protein_coding       |
| ENSMUST00000167270  | 245 | 258 | 81 Lrp1b         | protein_coding       |
| ENSMUST00000041768  | 245 | 227 | 36 Akr1c14       | protein_coding       |
| ENSMUST00000138112  | 244 | 315 | 69 Ccdc170       | protein_coding       |
| ENSMUST00000174530  | 244 | 304 | 40 Gm21989       | processed_transcript |
| ENSMUST00000181901  | 244 | 280 | 2 Gm26760        | lincRNA              |
| ENSMUST00000089295  | 244 | 263 | 48 Fam19a4       | protein_coding       |
| ENSMUST00000086829  | 244 | 215 | 38 Bicc1         | protein_coding       |
| ENSMUST00000180821  | 244 | 359 | 6 Gm26837        | lincRNA              |

|                    |     |     |      |               |                        |
|--------------------|-----|-----|------|---------------|------------------------|
| ENSMUST00000098816 | 244 | 255 | 44   | Slc7a2        | protein_coding         |
| ENSMUST00000129345 | 243 | 28  | 226  | 1110004E09Rik | protein_coding         |
| ENSMUST00000050309 | 242 | 239 | 2    | F830045P16Rik | protein_coding         |
| ENSMUST00000107663 | 242 | 211 | 8    | Skap1         | protein_coding         |
| ENSMUST00000097423 | 241 | 360 | 36   | Rsph3a        | protein_coding         |
| ENSMUST00000136451 | 241 | 270 | 18   | Araf          | protein_coding         |
| ENSMUST00000164848 | 241 | 265 | 26   | Siah3         | protein_coding         |
| ENSMUST00000180456 | 241 | 210 | 2    | Gm26740       | antisense              |
| ENSMUST00000119973 | 241 | 154 | 93   | Xkr6          | protein_coding         |
| ENSMUST00000148401 | 241 | 363 | 4    | Dnajc1        | protein_coding         |
| ENSMUST00000162111 | 241 | 268 | 73   | Nubpl         | protein_coding         |
| ENSMUST00000050300 | 241 | 248 | 8    | Adam5         | protein_coding         |
| ENSMUST00000117601 | 241 | 236 | 14   | Limch1        | protein_coding         |
| ENSMUST00000029722 | 241 | 213 | 1374 | Rps3a1        | protein_coding         |
| ENSMUST00000027438 | 241 | 207 | 180  | Ncl           | protein_coding         |
| ENSMUST00000141082 | 240 | 288 | 6    | E230016K23Rik | processed_transcript   |
| ENSMUST00000039608 | 240 | 239 | 56   | Dym           | protein_coding         |
| ENSMUST00000136835 | 239 | 273 | 0    | Micu3         | protein_coding         |
| ENSMUST00000161790 | 239 | 100 | 452  | Eif4g2        | protein_coding         |
| ENSMUST00000108372 | 238 | 227 | 81   | Raly1         | protein_coding         |
| ENSMUST00000181827 | 238 | 275 | 0    | Gm26713       | lincRNA                |
| ENSMUST00000178270 | 238 | 261 | 0    | Wdr49         | protein_coding         |
| ENSMUST00000178270 | 238 | 261 | 0    | Wdr49         | protein_coding         |
| ENSMUST00000168680 | 238 | 259 | 59   | Myh15         | protein_coding         |
| ENSMUST00000154155 | 238 | 254 | 63   | Vwc2          | protein_coding         |
| ENSMUST00000153774 | 237 | 398 | 0    | Gm15389       | lincRNA                |
| ENSMUST00000147376 | 237 | 283 | 6    | Mettl15       | protein_coding         |
| ENSMUST00000131410 | 237 | 227 | 105  | Zmat4         | protein_coding         |
| ENSMUST00000150382 | 236 | 242 | 12   | C030047K22Rik | processed_transcript   |
| ENSMUST00000037302 | 236 | 238 | 174  | Tbc1d12       | protein_coding         |
| ENSMUST00000078459 | 235 | 271 | 16   | Memo1         | protein_coding         |
| ENSMUST00000053484 | 235 | 250 | 8    | Eea1          | protein_coding         |
| ENSMUST00000091471 | 235 | 241 | 10   | Thrb          | protein_coding         |
| ENSMUST00000109220 | 235 | 225 | 24   | Sgcd          | protein_coding         |
| ENSMUST00000176866 | 235 | 215 | 14   | Wdr17         | protein_coding         |
| ENSMUST00000146592 | 235 | 263 | 113  | Bai3          | protein_coding         |
| ENSMUST00000173160 | 235 | 237 | 0    | Vmn2r-ps49    | unprocessed_pseudogene |
| ENSMUST00000112589 | 235 | 221 | 46   | Gm11099       | protein_coding         |
| ENSMUST00000044972 | 235 | 203 | 26   | Fkbp6         | protein_coding         |
| ENSMUST00000149983 | 234 | 264 | 0    | Gclm          | protein_coding         |
| ENSMUST00000146933 | 234 | 261 | 0    | Phyh          | protein_coding         |
| ENSMUST00000048967 | 234 | 253 | 2    | Cpe           | protein_coding         |
| ENSMUST00000038463 | 234 | 230 | 0    | Raver2        | protein_coding         |
| ENSMUST00000101141 | 234 | 181 | 6    | Shroom2       | protein_coding         |
| ENSMUST00000048519 | 233 | 234 | 20   | Snx13         | protein_coding         |
| ENSMUST00000166723 | 232 | 250 | 26   | Cox16         | protein_coding         |
| ENSMUST00000020547 | 232 | 248 | 2    | Vmn2r81       | protein_coding         |
| ENSMUST00000141811 | 232 | 238 | 0    | Gm15404       | lincRNA                |
| ENSMUST00000034060 | 232 | 336 | 46   | Sh3rf1        | protein_coding         |
| ENSMUST00000095797 | 232 | 243 | 4    | Spin1         | protein_coding         |
| ENSMUST00000100584 | 231 | 255 | 16   | Hhla1         | protein_coding         |
| ENSMUST00000081851 | 231 | 250 | 18   | Tmeff2        | protein_coding         |
| ENSMUST00000148411 | 231 | 234 | 4    | Gm5724        | protein_coding         |
| ENSMUST00000122303 | 230 | 247 | 30   | Magi3         | protein_coding         |
| ENSMUST00000173382 | 230 | 221 | 14   | Vmn2r-ps69    | unprocessed_pseudogene |
| ENSMUST00000028859 | 229 | 318 | 18   | Acox1         | protein_coding         |
| ENSMUST00000180886 | 229 | 282 | 121  | Tmem178b      | protein_coding         |
| ENSMUST00000076226 | 229 | 230 | 97   | Herc2         | protein_coding         |
| ENSMUST00000133824 | 229 | 229 | 28   | Gm15514       | lincRNA                |
| ENSMUST00000020399 | 229 | 148 | 24   | Cpm           | protein_coding         |
| ENSMUST00000135877 | 229 | 381 | 230  | Eef1b2        | protein_coding         |
| ENSMUST00000119256 | 229 | 246 | 34   | Rgs20         | protein_coding         |
| ENSMUST00000048921 | 229 | 244 | 567  | 4930433N12Rik | lincRNA                |
| ENSMUST00000059428 | 228 | 227 | 2    | Ccdc149       | protein_coding         |
| ENSMUST00000095062 | 227 | 286 | 34   | Lmbd1         | protein_coding         |
| ENSMUST00000114791 | 227 | 280 | 4    | Rsu1          | protein_coding         |
| ENSMUST00000171000 | 227 | 194 | 10   | Abi3bp        | protein_coding         |
| ENSMUST00000112908 | 226 | 287 | 6    | Hpse          | protein_coding         |

|                    |     |     |                 |                                    |
|--------------------|-----|-----|-----------------|------------------------------------|
| ENSMUST00000106571 | 226 | 252 | 26 Ntng1        | protein_coding                     |
| ENSMUST00000136775 | 226 | 248 | 6 EphA5         | protein_coding                     |
| ENSMUST00000105271 | 226 | 225 | 36 Ptprr        | protein_coding                     |
| ENSMUST00000070699 | 226 | 213 | 34 Pign         | protein_coding                     |
| ENSMUST00000128131 | 226 | 450 | 1334 Snhg12     | lincRNA                            |
| ENSMUST00000048180 | 226 | 322 | 234 Plekha1     | protein_coding                     |
| ENSMUST00000085299 | 226 | 304 | 32 Daam1        | protein_coding                     |
| ENSMUST00000148113 | 226 | 261 | 44 Ptprg        | protein_coding                     |
| ENSMUST00000049230 | 226 | 252 | 77 Kcnab1       | protein_coding                     |
| ENSMUST00000145049 | 226 | 203 | 2 Gas2          | protein_coding                     |
| ENSMUST00000100067 | 225 | 299 | 4 Scn2a1        | protein_coding                     |
| ENSMUST00000160802 | 225 | 288 | 0 Gm6264        | transcribed_unprocessed_pseudogene |
| ENSMUST00000161358 | 225 | 266 | 22 EphA6        | protein_coding                     |
| ENSMUST00000112740 | 225 | 266 | 4 Gm15091       | protein_coding                     |
| ENSMUST00000169699 | 225 | 257 | 36 Ccdc129      | protein_coding                     |
| ENSMUST00000169631 | 225 | 252 | 2 Skint5        | protein_coding                     |
| ENSMUST00000143074 | 225 | 196 | 0 A830010M20Rik | protein_coding                     |
| ENSMUST00000125077 | 225 | 155 | 61 Ccdc171      | protein_coding                     |
| ENSMUST00000081275 | 224 | 225 | 40 Armc4        | protein_coding                     |
| ENSMUST00000034787 | 224 | 50  | 139 Phip        | protein_coding                     |
| ENSMUST00000115073 | 224 | 41  | 52 Stag2        | protein_coding                     |
| ENSMUST00000128619 | 224 | 299 | 10 Hhat         | protein_coding                     |
| ENSMUST00000068071 | 224 | 242 | 2 Elp6          | protein_coding                     |
| ENSMUST00000113800 | 223 | 280 | 48 B3galt5      | protein_coding                     |
| ENSMUST00000060526 | 223 | 259 | 14 Gm5087       | lincRNA                            |
| ENSMUST00000125887 | 222 | 247 | 6 Pde1a         | protein_coding                     |
| ENSMUST00000091556 | 222 | 240 | 56 Btbd3        | protein_coding                     |
| ENSMUST00000162825 | 222 | 42  | 26 Fndc3a       | protein_coding                     |
| ENSMUST00000098713 | 221 | 253 | 4 BC030870      | lincRNA                            |
| ENSMUST00000036031 | 221 | 248 | 12 Gsap         | protein_coding                     |
| ENSMUST00000094569 | 221 | 245 | 0 Nfasc         | protein_coding                     |
| ENSMUST00000101432 | 221 | 244 | 151 Npas3       | protein_coding                     |
| ENSMUST00000035488 | 221 | 236 | 10 Cyp2c38      | protein_coding                     |
| ENSMUST00000046110 | 221 | 222 | 48 Astn1        | protein_coding                     |
| ENSMUST00000139320 | 221 | 275 | 6 Tmem135       | protein_coding                     |
| ENSMUST00000175810 | 221 | 252 | 4 Ccdc122       | protein_coding                     |
| ENSMUST00000046305 | 221 | 236 | 14 Arid4a       | protein_coding                     |
| ENSMUST00000062580 | 221 | 233 | 34 Itsn2        | protein_coding                     |
| ENSMUST00000109443 | 221 | 194 | 28 Ptprr        | protein_coding                     |
| ENSMUST00000160010 | 220 | 254 | 0 Gm7281        | unprocessed_pseudogene             |
| ENSMUST00000112707 | 220 | 250 | 16 Lrrc8b       | protein_coding                     |
| ENSMUST00000178713 | 220 | 237 | 0 Gm3623        | unprocessed_pseudogene             |
| ENSMUST00000178713 | 220 | 237 | 0 Gm3623        | unprocessed_pseudogene             |
| ENSMUST00000062528 | 220 | 230 | 61 Cdh20        | protein_coding                     |
| ENSMUST00000052472 | 219 | 263 | 26 Gphn         | protein_coding                     |
| ENSMUST00000107861 | 219 | 262 | 56 Car10        | protein_coding                     |
| ENSMUST00000023206 | 219 | 228 | 6 Ercc4         | protein_coding                     |
| ENSMUST00000103241 | 219 | 227 | 59 Sema6d       | protein_coding                     |
| ENSMUST00000096114 | 219 | 225 | 36 Rnls         | protein_coding                     |
| ENSMUST00000176822 | 218 | 254 | 18 Pid1         | protein_coding                     |
| ENSMUST00000120449 | 218 | 241 | 0 Gm15225       | processed_pseudogene               |
| ENSMUST00000140946 | 218 | 238 | 32 Gm3669       | lincRNA                            |
| ENSMUST00000146230 | 218 | 231 | 52 Mgat4c       | protein_coding                     |
| ENSMUST00000174296 | 218 | 224 | 171 Rora        | protein_coding                     |
| ENSMUST00000147144 | 218 | 211 | 30 Gm14697      | antisense                          |
| ENSMUST00000107202 | 218 | 164 | 36 Ccdc171      | protein_coding                     |
| ENSMUST00000099396 | 217 | 273 | 16 Nt5dc3       | protein_coding                     |
| ENSMUST00000086896 | 217 | 253 | 10 Ipcef1       | protein_coding                     |
| ENSMUST00000133478 | 217 | 249 | 10 Ccser1       | protein_coding                     |
| ENSMUST00000126906 | 217 | 232 | 32 Gm14552      | lincRNA                            |
| ENSMUST00000143896 | 217 | 194 | 32 Cfap61       | protein_coding                     |
| ENSMUST00000136379 | 217 | 40  | 14 Ttrap        | protein_coding                     |
| ENSMUST00000134226 | 216 | 308 | 0 Gm12590       | lincRNA                            |
| ENSMUST00000156541 | 216 | 283 | 10 Gm13912      | lincRNA                            |
| ENSMUST00000113218 | 216 | 267 | 54 Slc4a4       | protein_coding                     |
| ENSMUST00000122297 | 216 | 226 | 2 Gm12755       | unprocessed_pseudogene             |
| ENSMUST00000040084 | 216 | 192 | 8821 Lhfpl1     | protein_coding                     |
| ENSMUST00000037488 | 215 | 298 | 87 Dock4        | protein_coding                     |

|                    |     |     |                  |                      |
|--------------------|-----|-----|------------------|----------------------|
| ENSMUST00000136063 | 215 | 242 | 4 Csnk2a1        | protein_coding       |
| ENSMUST00000071982 | 215 | 219 | 107 Bmper        | protein_coding       |
| ENSMUST00000179089 | 215 | 198 | 44 A830018L16Rik | protein_coding       |
| ENSMUST00000116586 | 215 | 256 | 6 Robo2          | protein_coding       |
| ENSMUST00000169401 | 215 | 246 | 50 Ttc39c        | protein_coding       |
| ENSMUST00000139112 | 215 | 232 | 32 Gm14974       | lincRNA              |
| ENSMUST00000133776 | 214 | 238 | 54 Phf14         | protein_coding       |
| ENSMUST00000161772 | 214 | 223 | 0 Cd46           | protein_coding       |
| ENSMUST00000142521 | 214 | 219 | 28 4930405D11Rik | lincRNA              |
| ENSMUST00000115384 | 214 | 197 | 30 Jade3         | protein_coding       |
| ENSMUST00000053950 | 213 | 399 | 20 Lrrc28        | protein_coding       |
| ENSMUST00000170704 | 213 | 246 | 6 Dthd1          | protein_coding       |
| ENSMUST00000142454 | 213 | 53  | 46 Mlt3          | protein_coding       |
| ENSMUST00000174266 | 213 | 31  | 6 Ugg1           | protein_coding       |
| ENSMUST00000107029 | 212 | 234 | 87 Inadl         | protein_coding       |
| ENSMUST00000173058 | 212 | 111 | 38 Kcnq5         | protein_coding       |
| ENSMUST00000170201 | 212 | 85  | 248 Lrch3        | protein_coding       |
| ENSMUST00000072726 | 212 | 261 | 36 Wdr7          | protein_coding       |
| ENSMUST00000061632 | 212 | 193 | 632 Trhde        | protein_coding       |
| ENSMUST00000051064 | 211 | 275 | 0 Zc2hc1a        | protein_coding       |
| ENSMUST00000127355 | 211 | 271 | 8 Cc2d2a         | protein_coding       |
| ENSMUST00000144705 | 211 | 269 | 549 Snhg12       | lincRNA              |
| ENSMUST00000133352 | 211 | 224 | 18 C130060K24Rik | protein_coding       |
| ENSMUST00000124295 | 210 | 278 | 4 Hykk           | protein_coding       |
| ENSMUST00000040668 | 209 | 333 | 0 Osbpl2         | protein_coding       |
| ENSMUST00000124487 | 209 | 288 | 34 Stag1         | protein_coding       |
| ENSMUST00000160149 | 209 | 263 | 4 Fhito5         | antisense            |
| ENSMUST00000179049 | 209 | 261 | 18 Cntn5         | protein_coding       |
| ENSMUST00000040820 | 209 | 231 | 6 Maob           | protein_coding       |
| ENSMUST00000175892 | 209 | 227 | 22 Ros1          | protein_coding       |
| ENSMUST00000003544 | 209 | 207 | 8 Bcd1           | protein_coding       |
| ENSMUST00000119366 | 209 | 200 | 0 Ms4a4c         | protein_coding       |
| ENSMUST00000159533 | 209 | 215 | 8 Clvs2          | protein_coding       |
| ENSMUST00000115452 | 209 | 196 | 6 Cdk14          | protein_coding       |
| ENSMUST00000126260 | 209 | 190 | 8 4930554G24Rik  | lincRNA              |
| ENSMUST00000114730 | 209 | 155 | 1685 RbmX        | protein_coding       |
| ENSMUST00000136118 | 208 | 235 | 30 Ppp2r2b       | protein_coding       |
| ENSMUST00000174552 | 208 | 234 | 22 Dip2c         | protein_coding       |
| ENSMUST00000086029 | 207 | 225 | 40 Caln1         | protein_coding       |
| ENSMUST00000092070 | 207 | 218 | 50 Lama3         | protein_coding       |
| ENSMUST00000106065 | 207 | 206 | 174 Negr1        | protein_coding       |
| ENSMUST00000063775 | 207 | 278 | 69 Ldlrad4       | protein_coding       |
| ENSMUST00000075317 | 207 | 269 | 30 Pdzd2         | protein_coding       |
| ENSMUST00000068110 | 207 | 236 | 28 Pcdh7         | protein_coding       |
| ENSMUST00000079379 | 206 | 227 | 28 Clec4a4       | protein_coding       |
| ENSMUST00000131498 | 205 | 202 | 30 A830012C17Rik | processed_transcript |
| ENSMUST00000121426 | 205 | 202 | 0 Cul4a          | protein_coding       |
| ENSMUST00000105484 | 204 | 246 | 6 Grik2          | protein_coding       |
| ENSMUST00000141983 | 204 | 213 | 2 Cers6          | protein_coding       |
| ENSMUST00000030039 | 204 | 208 | 67 Fmn2          | protein_coding       |
| ENSMUST00000110583 | 204 | 202 | 42 Ccdc82        | protein_coding       |
| ENSMUST00000137780 | 204 | 199 | 22 Cnbd1         | protein_coding       |
| ENSMUST00000178224 | 204 | 236 | 0 D430019H16Rik  | protein_coding       |
| ENSMUST00000143324 | 204 | 220 | 10 Gm10649       | processed_transcript |
| ENSMUST00000068004 | 203 | 269 | 34 Pcx           | protein_coding       |
| ENSMUST00000148285 | 203 | 249 | 12 Cdan1         | protein_coding       |
| ENSMUST00000177530 | 203 | 238 | 0 Zfp169         | protein_coding       |
| ENSMUST00000147649 | 203 | 214 | 34 Rbm46os       | antisense            |
| ENSMUST00000103199 | 203 | 123 | 252 Snrpb        | protein_coding       |
| ENSMUST00000029132 | 202 | 223 | 34 Dnajc5b       | protein_coding       |
| ENSMUST00000138528 | 202 | 201 | 63 Gm13483       | processed_transcript |
| ENSMUST00000141573 | 202 | 197 | 26 Mapk10        | protein_coding       |
| ENSMUST00000022954 | 202 | 193 | 50 Khdrbs3       | protein_coding       |
| ENSMUST00000073926 | 201 | 261 | 872 Rps12        | protein_coding       |
| ENSMUST00000030765 | 201 | 248 | 24 Padi2         | protein_coding       |
| ENSMUST00000106854 | 201 | 240 | 54 Trim34a       | protein_coding       |
| ENSMUST00000106437 | 201 | 225 | 65 Hs3st4        | protein_coding       |
| ENSMUST00000060402 | 201 | 204 | 10 Tmprss15      | protein_coding       |

|                    |     |     |     |               |                      |
|--------------------|-----|-----|-----|---------------|----------------------|
| ENSMUST00000037739 | 201 | 35  | 26  | Gnl3          | protein_coding       |
| ENSMUST00000084806 | 201 | 244 | 16  | Dnah11        | protein_coding       |
| ENSMUST00000097655 | 201 | 236 | 14  | Asxl3         | protein_coding       |
| ENSMUST00000065545 | 201 | 217 | 18  | Zfy1          | protein_coding       |
| ENSMUST00000004076 | 201 | 212 | 26  | Grm3          | protein_coding       |
| ENSMUST00000108075 | 201 | 198 | 16  | Usp32         | protein_coding       |
| ENSMUST00000102945 | 201 | 196 | 38  | Nxph2         | protein_coding       |
| ENSMUST00000143641 | 201 | 171 | 34  | Shroom4       | protein_coding       |
| ENSMUST00000094532 | 200 | 290 | 22  | Gm20449       | protein_coding       |
| ENSMUST00000022264 | 200 | 241 | 32  | Ptprg         | protein_coding       |
| ENSMUST00000153634 | 200 | 224 | 4   | Cpne1         | protein_coding       |
| ENSMUST00000094887 | 200 | 218 | 4   | Cyp4a12b      | protein_coding       |
| ENSMUST00000145096 | 200 | 205 | 83  | Nell1         | protein_coding       |
| ENSMUST00000135878 | 200 | 188 | 18  | Myo5b         | protein_coding       |
| ENSMUST00000132799 | 199 | 217 | 16  | Srpr          | protein_coding       |
| ENSMUST00000176396 | 199 | 204 | 8   | Gm20647       | processed_transcript |
| ENSMUST00000123343 | 199 | 200 | 0   | Pir           | protein_coding       |
| ENSMUST00000139628 | 198 | 251 | 20  | Atg16l1       | protein_coding       |
| ENSMUST00000164020 | 198 | 187 | 8   | Gira3         | protein_coding       |
| ENSMUST00000025541 | 198 | 228 | 16  | Gnaq          | protein_coding       |
| ENSMUST00000103005 | 198 | 212 | 69  | Shroom4       | protein_coding       |
| ENSMUST00000087654 | 197 | 231 | 0   | Zfp763        | protein_coding       |
| ENSMUST00000080368 | 197 | 229 | 10  | Atp8a2        | protein_coding       |
| ENSMUST00000123760 | 196 | 254 | 16  | 2310045N01Rik | protein_coding       |
| ENSMUST00000159508 | 196 | 215 | 12  | Ghr           | protein_coding       |
| ENSMUST00000130515 | 196 | 206 | 38  | Cep112        | protein_coding       |
| ENSMUST00000163312 | 196 | 205 | 0   | Arhgap8       | protein_coding       |
| ENSMUST00000109913 | 196 | 200 | 32  | Nr3c2         | protein_coding       |
| ENSMUST00000034499 | 195 | 217 | 22  | Dcun1d5       | protein_coding       |
| ENSMUST00000065694 | 195 | 203 | 36  | Dis3l2        | protein_coding       |
| ENSMUST00000035701 | 195 | 183 | 36  | Fshr          | protein_coding       |
| ENSMUST00000037728 | 195 | 237 | 69  | Nlrp4c        | protein_coding       |
| ENSMUST00000119068 | 195 | 230 | 14  | Spock3        | protein_coding       |
| ENSMUST00000181262 | 195 | 217 | 61  | Gm26551       | lincRNA              |
| ENSMUST00000123262 | 194 | 208 | 0   | Snapc3        | protein_coding       |
| ENSMUST00000114546 | 194 | 123 | 184 | Zfp185        | protein_coding       |
| ENSMUST00000166055 | 193 | 271 | 14  | Neu2          | protein_coding       |
| ENSMUST00000143415 | 193 | 248 | 20  | Cep128        | protein_coding       |
| ENSMUST00000020856 | 193 | 239 | 2   | Bzw2          | protein_coding       |
| ENSMUST00000166957 | 193 | 219 | 20  | Pkhd1l1       | protein_coding       |
| ENSMUST00000100024 | 193 | 211 | 20  | Fgf12         | protein_coding       |
| ENSMUST00000152652 | 193 | 199 | 30  | Dlgap2        | protein_coding       |
| ENSMUST00000166080 | 193 | 194 | 2   | Gm28041       | protein_coding       |
| ENSMUST00000144122 | 193 | 175 | 30  | Abca16        | protein_coding       |
| ENSMUST00000027581 | 192 | 261 | 12  | Gpr39         | protein_coding       |
| ENSMUST00000099992 | 192 | 184 | 8   | Pde11a        | protein_coding       |
| ENSMUST00000127328 | 192 | 176 | 2   | Gm16070       | antisense            |
| ENSMUST00000099272 | 192 | 29  | 91  | Rpl21         | protein_coding       |
| ENSMUST00000112303 | 192 | 269 | 22  | Ctps2         | protein_coding       |
| ENSMUST00000132390 | 192 | 249 | 16  | Cdk14         | protein_coding       |
| ENSMUST00000029448 | 192 | 213 | 40  | Sycp1         | protein_coding       |
| ENSMUST00000132059 | 192 | 207 | 57  | Samd12        | protein_coding       |
| ENSMUST00000168110 | 192 | 192 | 12  | Cfap54        | protein_coding       |
| ENSMUST00000041845 | 192 | 146 | 16  | Nlrp9c        | protein_coding       |
| ENSMUST00000133305 | 191 | 248 | 0   | Sdccag8       | protein_coding       |
| ENSMUST00000113718 | 191 | 179 | 2   | Tex11         | protein_coding       |
| ENSMUST00000091188 | 190 | 223 | 20  | Usp9y         | protein_coding       |
| ENSMUST00000101558 | 190 | 206 | 40  | Magi2         | protein_coding       |
| ENSMUST00000033665 | 190 | 185 | 93  | Map3k15       | protein_coding       |
| ENSMUST00000107178 | 189 | 228 | 20  | Adamtsl1      | protein_coding       |
| ENSMUST00000043551 | 189 | 210 | 6   | Ankib1        | protein_coding       |
| ENSMUST00000131304 | 189 | 188 | 18  | Tex16         | protein_coding       |
| ENSMUST00000056715 | 189 | 215 | 10  | Mkl2          | protein_coding       |
| ENSMUST00000159567 | 189 | 208 | 40  | Nubpl         | protein_coding       |
| ENSMUST00000161356 | 189 | 208 | 30  | Reln          | protein_coding       |
| ENSMUST00000184994 | 189 | 203 | 274 | A330093E20Rik | antisense            |
| ENSMUST00000022921 | 189 | 194 | 14  | Angpt1        | protein_coding       |
| ENSMUST00000084488 | 189 | 183 | 63  | Dock1         | protein_coding       |

|                     |     |     |      |               |                                    |
|---------------------|-----|-----|------|---------------|------------------------------------|
| ENSMUST00000160756  | 189 | 177 | 28   | Gm15939       | antisense                          |
| ENSMUST00000072519  | 189 | 164 | 59   | Elmo1         | protein_coding                     |
| ENSMUST00000183331  | 188 | 235 | 0    | Dst           | protein_coding                     |
| ENSMUST00000170156  | 188 | 218 | 32   | Ryr2          | protein_coding                     |
| ENSMUST00000068394  | 188 | 217 | 2    | Gabrg3        | protein_coding                     |
| ENSMUST00000130991  | 188 | 217 | 20   | Gtdc1         | protein_coding                     |
| ENSMUST00000044083  | 188 | 216 | 137  | Dapk1         | protein_coding                     |
| ENSMUST00000114895  | 188 | 215 | 28   | Cfap53        | protein_coding                     |
| ENSMUST00000033695  | 188 | 204 | 24   | Abcb7         | protein_coding                     |
| ENSMUST00000073379  | 188 | 198 | 54   | Dcc           | protein_coding                     |
| ENSMUST00000174304  | 188 | 186 | 2    | Gm5977        | transcribed_unprocessed_pseudogene |
| ENSMUST00000044895  | 188 | 183 | 69   | Rcan2         | protein_coding                     |
| ENSMUST00000037974  | 188 | 181 | 73   | Ptprm         | protein_coding                     |
| ENSMUST00000055966  | 188 | 173 | 44   | Gabra3        | protein_coding                     |
| ENSMUST00000100026  | 187 | 229 | 0    | Ccdc50        | protein_coding                     |
| ENSMUST00000047485  | 187 | 227 | 26   | Rundc3b       | protein_coding                     |
| ENSMUST00000113030  | 187 | 227 | 6    | D330045A20Rik | protein_coding                     |
| ENSMUST00000108041  | 187 | 206 | 20   | Il11ra1       | protein_coding                     |
| ENSMUST00000145383  | 187 | 180 | 52   | Gm14505       | lincRNA                            |
| ENSMUST00000142834  | 187 | 166 | 472  | 1810032O08Rik | protein_coding                     |
| ENSMUST00000133010  | 187 | 208 | 18   | Dpy19l2       | protein_coding                     |
| ENSMUST00000063263  | 187 | 200 | 22   | lqcj          | protein_coding                     |
| ENSMUST00000050702  | 187 | 198 | 16   | Ptprq         | protein_coding                     |
| ENSMUST00000022013  | 187 | 191 | 18   | Adcy2         | protein_coding                     |
| ENSMUST00000042792  | 187 | 177 | 16   | Scn7a         | protein_coding                     |
| ENSMUST00000060201  | 187 | 168 | 2    | Kcnt2         | protein_coding                     |
| ENSMUST00000060201  | 187 | 168 | 2    | Kcnt2         | protein_coding                     |
| ENSMUST00000076470  | 187 | 152 | 30   | Nlrp4e        | protein_coding                     |
| ENSMUST00000181553  | 186 | 223 | 8    | 4930544M13Rik | lincRNA                            |
| ENSMUST00000107720  | 186 | 217 | 0    | Stx17         | protein_coding                     |
| ENSMUST00000162585  | 186 | 200 | 52   | C6            | protein_coding                     |
| ENSMUST00000065422  | 186 | 98  | 26   | Rpap2         | protein_coding                     |
| ENSMUST00000160152  | 186 | 30  | 79   | Gas5          | processed_transcript               |
| ENSMUST00000141213  | 185 | 225 | 32   | Sft2d1        | protein_coding                     |
| ENSMUST00000109916  | 185 | 200 | 22   | Zfp442        | protein_coding                     |
| ENSMUST00000112796  | 185 | 194 | 12   | Gm15107       | protein_coding                     |
| ENSMUST00000080721  | 185 | 179 | 69   | Chsy3         | protein_coding                     |
| ENSMUST00000056502  | 184 | 212 | 12   | C77370        | protein_coding                     |
| ENSMUST00000130734  | 184 | 197 | 12   | Gm4409        | antisense                          |
| ENSMUST00000126161  | 184 | 194 | 6    | Tenm1         | protein_coding                     |
| ENSMUST00000074449  | 184 | 160 | 10   | Sprr2a1       | protein_coding                     |
| ENSMUST00000033030  | 184 | 205 | 50   | Parva         | protein_coding                     |
| ENSMUST00000106921  | 184 | 204 | 36   | Lepr          | protein_coding                     |
| ENSMUST00000101078  | 184 | 196 | 0    | Serpina3m     | protein_coding                     |
| ENSMUST00000148051  | 184 | 186 | 52   | Thsd7b        | protein_coding                     |
| ENSMUST00000111769  | 183 | 213 | 8    | Zcwpw2        | transcribed_unprocessed_pseudogene |
| ENSMUST00000079828  | 183 | 211 | 79   | Ntrk2         | protein_coding                     |
| ENSMUST00000101296  | 183 | 178 | 26   | Gm5127        | protein_coding                     |
| ENSMUST00000169371  | 183 | 172 | 85   | Cntln         | protein_coding                     |
| ENSMUST00000085886  | 183 | 171 | 85   | Smok3a        | protein_coding                     |
| ENSMUST00000164225  | 183 | 171 | 56   | Med12l        | protein_coding                     |
| ENSMUST00000119497  | 182 | 240 | 2    | Gm13683       | processed_pseudogene               |
| ENSMUST00000164302  | 182 | 210 | 22   | Spats2l       | protein_coding                     |
| ENSMUST00000054871  | 182 | 207 | 52   | Fpr3          | protein_coding                     |
| ENSMUST00000154153  | 182 | 196 | 8    | Pkd1l1        | protein_coding                     |
| ENSMUST00000173858  | 182 | 192 | 2    | Efr3a         | protein_coding                     |
| ENSMUST00000145182  | 182 | 183 | 28   | Gm12023       | lincRNA                            |
| ENSMUST000000031229 | 182 | 175 | 61   | Rufy3         | protein_coding                     |
| ENSMUST00000114240  | 181 | 200 | 18   | Samsn1        | protein_coding                     |
| ENSMUST00000138164  | 181 | 193 | 12   | Gm12082       | lincRNA                            |
| ENSMUST000000094715 | 181 | 191 | 22   | Grxcr1        | protein_coding                     |
| ENSMUST00000084479  | 181 | 145 | 32   | Gm11238       | protein_coding                     |
| ENSMUST00000082070  | 181 | 246 | 12   | Rit2          | protein_coding                     |
| ENSMUST00000144267  | 181 | 231 | 0    | Nox4          | protein_coding                     |
| ENSMUST00000150594  | 181 | 222 | 18   | 1700057G04Rik | protein_coding                     |
| ENSMUST00000033919  | 181 | 216 | 28   | Vegfc         | protein_coding                     |
| ENSMUST00000162599  | 181 | 214 | 4237 | Arhgef4       | protein_coding                     |
| ENSMUST00000171706  | 181 | 211 | 32   | Gm3629        | protein_coding                     |

|                    |     |     |                   |                        |
|--------------------|-----|-----|-------------------|------------------------|
| ENSMUST00000111929 | 181 | 208 | 16 Osbp16         | protein_coding         |
| ENSMUST00000033598 | 181 | 196 | 28 Sh3bgrl        | protein_coding         |
| ENSMUST00000174568 | 181 | 178 | 0 9130230N09Rik   | processed_transcript   |
| ENSMUST00000071535 | 180 | 244 | 52 Mgam           | protein_coding         |
| ENSMUST00000144922 | 180 | 242 | 22 Gm12296        | processed_transcript   |
| ENSMUST00000028139 | 180 | 219 | 2 Med27           | protein_coding         |
| ENSMUST00000168810 | 180 | 216 | 38 Nrg3           | protein_coding         |
| ENSMUST00000161913 | 180 | 188 | 2 Gfm2            | protein_coding         |
| ENSMUST00000134229 | 180 | 174 | 20 Gm16332        | unprocessed_pseudogene |
| ENSMUST00000130214 | 180 | 169 | 12 Csgalnact1     | protein_coding         |
| ENSMUST00000183507 | 179 | 215 | 71 Gm27211        | lincRNA                |
| ENSMUST00000059204 | 179 | 213 | 18 Fbx17          | protein_coding         |
| ENSMUST00000134708 | 179 | 204 | 8 Ccdc148         | protein_coding         |
| ENSMUST00000025109 | 179 | 189 | 16 Sap130         | protein_coding         |
| ENSMUST00000041231 | 179 | 162 | 44 Psme4          | protein_coding         |
| ENSMUST00000164260 | 178 | 217 | 8 lars            | protein_coding         |
| ENSMUST00000124367 | 178 | 200 | 46 Tanc2          | protein_coding         |
| ENSMUST00000070330 | 178 | 175 | 34 Dnm3           | protein_coding         |
| ENSMUST00000167269 | 178 | 231 | 6 Olfr631         | protein_coding         |
| ENSMUST00000167269 | 178 | 231 | 6 Olfr631         | protein_coding         |
| ENSMUST00000043313 | 178 | 179 | 79 Nmnat2         | protein_coding         |
| ENSMUST00000179929 | 177 | 220 | 54 Mgat4c         | protein_coding         |
| ENSMUST00000046542 | 177 | 205 | 30 Rsrc1          | protein_coding         |
| ENSMUST00000171042 | 177 | 192 | 8 Wac             | protein_coding         |
| ENSMUST00000113108 | 177 | 173 | 38 Kir3dl2        | protein_coding         |
| ENSMUST00000051565 | 176 | 189 | 4 Ulk4            | protein_coding         |
| ENSMUST00000089874 | 176 | 179 | 38 Mcc            | protein_coding         |
| ENSMUST00000112668 | 176 | 175 | 6 Phf8            | protein_coding         |
| ENSMUST00000170214 | 175 | 201 | 12 Gm17200        | processed_transcript   |
| ENSMUST00000073939 | 175 | 190 | 32 Tek            | protein_coding         |
| ENSMUST00000065067 | 175 | 179 | 50 Prkg1          | protein_coding         |
| ENSMUST00000181952 | 175 | 169 | 14 Gm26691        | lincRNA                |
| ENSMUST00000091319 | 175 | 158 | 30 Sirpb1b        | protein_coding         |
| ENSMUST00000122367 | 175 | 229 | 10 Sel1l2         | protein_coding         |
| ENSMUST00000145894 | 175 | 207 | 0 Gm14703         | antisense              |
| ENSMUST00000031446 | 175 | 199 | 44 Tmem132b       | protein_coding         |
| ENSMUST00000082365 | 175 | 198 | 0 Sult4a1         | protein_coding         |
| ENSMUST00000100131 | 175 | 193 | 2 AW554918        | protein_coding         |
| ENSMUST00000101297 | 175 | 182 | 26 Gm5127         | protein_coding         |
| ENSMUST00000037649 | 174 | 234 | 28 Rab3gap1       | protein_coding         |
| ENSMUST00000081747 | 174 | 216 | 48 0610040J01Rik  | protein_coding         |
| ENSMUST00000049463 | 174 | 214 | 0 Prl3a1          | protein_coding         |
| ENSMUST00000166207 | 174 | 179 | 34 Sox6           | protein_coding         |
| ENSMUST00000133236 | 174 | 158 | 14 Ino80d         | protein_coding         |
| ENSMUST00000133983 | 174 | 150 | 75 Dlgap1         | protein_coding         |
| ENSMUST00000148459 | 173 | 205 | 2 Fam189a1        | protein_coding         |
| ENSMUST00000034004 | 173 | 179 | 26 Pdgfrl         | protein_coding         |
| ENSMUST00000066594 | 173 | 173 | 22 Sh2d4a         | protein_coding         |
| ENSMUST00000147058 | 173 | 139 | 22 St8sia1        | protein_coding         |
| ENSMUST00000112741 | 172 | 206 | 6 Gm15097         | protein_coding         |
| ENSMUST00000040787 | 172 | 206 | 2 Ankrd13c        | protein_coding         |
| ENSMUST00000097588 | 172 | 189 | 16 Srgap2         | protein_coding         |
| ENSMUST00000138348 | 172 | 175 | 24 Csmc1          | protein_coding         |
| ENSMUST00000159352 | 172 | 167 | 46 Hibch          | protein_coding         |
| ENSMUST00000180952 | 172 | 243 | 10 Carf           | protein_coding         |
| ENSMUST00000112603 | 172 | 210 | 65 Dpp10          | protein_coding         |
| ENSMUST00000102724 | 172 | 202 | 54 Faf1           | protein_coding         |
| ENSMUST00000111377 | 172 | 190 | 56 Lmx1a          | protein_coding         |
| ENSMUST00000159963 | 172 | 174 | 10 Chit1          | protein_coding         |
| ENSMUST00000172031 | 172 | 164 | 57 Inpp4b         | protein_coding         |
| ENSMUST00000141679 | 171 | 212 | 10 1700023L04Rik  | lincRNA                |
| ENSMUST00000126807 | 171 | 194 | 14 Gm14308        | protein_coding         |
| ENSMUST00000127404 | 171 | 192 | 2 Tmsb15l         | protein_coding         |
| ENSMUST00000064405 | 171 | 181 | 18 EphA3          | protein_coding         |
| ENSMUST00000155432 | 171 | 176 | 886 4930557F10Rik | lincRNA                |
| ENSMUST00000130582 | 171 | 172 | 12 Gm11823        | lincRNA                |
| ENSMUST00000109563 | 171 | 164 | 42 Ehbp1          | protein_coding         |
| ENSMUST00000168710 | 171 | 161 | 2 Vmn2r97         | protein_coding         |



|                    |     |     |                   |                                    |
|--------------------|-----|-----|-------------------|------------------------------------|
| ENSMUST00000022369 | 170 | 208 | 61 Vcl            | protein_coding                     |
| ENSMUST00000115052 | 170 | 203 | 32 Fam107b        | protein_coding                     |
| ENSMUST00000105721 | 170 | 199 | 20 Gm13152        | protein_coding                     |
| ENSMUST00000148101 | 170 | 185 | 20 Dcdc5          | unitary_pseudogene                 |
| ENSMUST00000001112 | 170 | 184 | 46 Grk4           | protein_coding                     |
| ENSMUST00000176493 | 170 | 161 | 32 Cyp2c53-ps     | transcribed_unprocessed_pseudogene |
| ENSMUST00000117244 | 170 | 199 | 38 Gm12057        | processed_pseudogene               |
| ENSMUST00000093253 | 170 | 192 | 6 Ccdc85a         | protein_coding                     |
| ENSMUST00000027877 | 170 | 174 | 40 Kifap3         | protein_coding                     |
| ENSMUST00000093219 | 170 | 157 | 4 Nsg2            | protein_coding                     |
| ENSMUST00000086473 | 170 | 154 | 10 Olfr18         | protein_coding                     |
| ENSMUST00000141030 | 170 | 146 | 16 Gm11234        | lincRNA                            |
| ENSMUST00000034966 | 169 | 247 | 533 Rpl4          | protein_coding                     |
| ENSMUST00000161058 | 169 | 213 | 8 Focad           | protein_coding                     |
| ENSMUST00000033700 | 169 | 200 | 4 Mtm1            | protein_coding                     |
| ENSMUST00000040117 | 169 | 190 | 2 Secisbp2        | protein_coding                     |
| ENSMUST00000128925 | 169 | 180 | 40 4930556G01Rik  | lincRNA                            |
| ENSMUST00000180798 | 169 | 175 | 12 Gm26905        | lincRNA                            |
| ENSMUST00000174523 | 169 | 171 | 2 Gm20413         | processed_pseudogene               |
| ENSMUST00000179180 | 169 | 168 | 26 5730522E02Rik  | protein_coding                     |
| ENSMUST00000184416 | 169 | 163 | 34 Tcf12          | protein_coding                     |
| ENSMUST00000112824 | 169 | 157 | 69 Arhgap15       | protein_coding                     |
| ENSMUST00000066728 | 168 | 237 | 20 Pde5a          | protein_coding                     |
| ENSMUST00000099304 | 168 | 181 | 16 Tasp1          | protein_coding                     |
| ENSMUST00000028737 | 168 | 175 | 0 Slx4ip          | protein_coding                     |
| ENSMUST00000092404 | 168 | 28  | 59 Srsf2          | protein_coding                     |
| ENSMUST00000125976 | 167 | 171 | 38 Cntnap4        | protein_coding                     |
| ENSMUST00000054635 | 167 | 167 | 10 Ofcc1          | protein_coding                     |
| ENSMUST00000137197 | 167 | 151 | 16 Hmcn1          | protein_coding                     |
| ENSMUST00000098443 | 167 | 175 | 42 Cpne4          | protein_coding                     |
| ENSMUST00000120813 | 167 | 171 | 71 Cyp4a30-ps     | unprocessed_pseudogene             |
| ENSMUST00000154459 | 167 | 171 | 0 4930548K13Rik   | lincRNA                            |
| ENSMUST00000155084 | 167 | 15  | 494 Obsl1         | protein_coding                     |
| ENSMUST00000032157 | 166 | 226 | 73 Gxylt2         | protein_coding                     |
| ENSMUST00000101205 | 166 | 206 | 20 Col4a6         | protein_coding                     |
| ENSMUST00000117413 | 166 | 202 | 14 Nlrp4b         | protein_coding                     |
| ENSMUST00000052500 | 166 | 195 | 2 4930412D23Rik   | protein_coding                     |
| ENSMUST00000103201 | 166 | 181 | 16 Acaca          | protein_coding                     |
| ENSMUST00000131257 | 166 | 162 | 14 Stau2          | protein_coding                     |
| ENSMUST00000165148 | 166 | 151 | 30 Ccdc62         | protein_coding                     |
| ENSMUST00000115059 | 165 | 206 | 10 Tenm1          | protein_coding                     |
| ENSMUST00000054484 | 165 | 176 | 1739 Slc4a10      | protein_coding                     |
| ENSMUST00000053969 | 165 | 173 | 2 Sipai11         | protein_coding                     |
| ENSMUST00000063021 | 165 | 143 | 0 Luzp1           | protein_coding                     |
| ENSMUST00000125365 | 164 | 233 | 14 A230004M16Rik  | processed_transcript               |
| ENSMUST00000181343 | 164 | 210 | 6 Gm20619         | lincRNA                            |
| ENSMUST00000134584 | 164 | 192 | 2 Nell1os         | antisense                          |
| ENSMUST00000169114 | 164 | 166 | 20 Erap1          | protein_coding                     |
| ENSMUST00000133643 | 164 | 260 | 10 AV039307       | processed_transcript               |
| ENSMUST00000170049 | 164 | 208 | 18 Gdpd4          | protein_coding                     |
| ENSMUST00000084343 | 164 | 156 | 20 Cyp4a12a       | protein_coding                     |
| ENSMUST00000110411 | 163 | 213 | 10 Adam34         | protein_coding                     |
| ENSMUST00000146993 | 163 | 208 | 6 Mov10l1         | protein_coding                     |
| ENSMUST00000134358 | 163 | 198 | 14 Ryr3           | protein_coding                     |
| ENSMUST00000110446 | 163 | 169 | 46 Fam227b        | protein_coding                     |
| ENSMUST00000182460 | 163 | 154 | 280 1700018B08Rik | protein_coding                     |
| ENSMUST00000134494 | 162 | 211 | 24 Gm12823        | antisense                          |
| ENSMUST00000026635 | 162 | 210 | 184 Farp1         | protein_coding                     |
| ENSMUST00000035960 | 162 | 197 | 2 Haus8           | protein_coding                     |
| ENSMUST00000130879 | 161 | 212 | 10 Il1rapl2       | protein_coding                     |
| ENSMUST00000117909 | 161 | 200 | 54 Nlrp9b         | protein_coding                     |
| ENSMUST00000114471 | 161 | 139 | 46 Cblb           | protein_coding                     |
| ENSMUST00000020258 | 161 | 87  | 613 Herc4         | protein_coding                     |
| ENSMUST00000146694 | 161 | 190 | 22 Gtdc1          | protein_coding                     |
| ENSMUST00000077962 | 161 | 181 | 8 Kcng2           | protein_coding                     |
| ENSMUST00000112493 | 161 | 167 | 46 Rps6ka3        | protein_coding                     |
| ENSMUST00000038382 | 161 | 152 | 6 Jph1            | protein_coding                     |
| ENSMUST00000113917 | 160 | 281 | 0 Pigp            | protein_coding                     |

|                    |     |     |      |               |                        |
|--------------------|-----|-----|------|---------------|------------------------|
| ENSMUST00000167619 | 160 | 228 | 22   | Diap2         | protein_coding         |
| ENSMUST00000107533 | 160 | 198 | 28   | A230006K03Rik | lincRNA                |
| ENSMUST00000171492 | 160 | 166 | 2    | Gm6289        | protein_coding         |
| ENSMUST00000147499 | 160 | 160 | 34   | Gm13364       | lincRNA                |
| ENSMUST00000147499 | 160 | 160 | 34   | Gm13364       | lincRNA                |
| ENSMUST00000142345 | 160 | 148 | 1301 | Mrp133        | protein_coding         |
| ENSMUST00000122388 | 160 | 143 | 24   | Dcdc5         | unitary_pseudogene     |
| ENSMUST00000102589 | 159 | 239 | 321  | Eif4a1        | protein_coding         |
| ENSMUST00000182127 | 159 | 211 | 14   | Gm4258        | processed_transcript   |
| ENSMUST00000065573 | 159 | 184 | 6    | Gpatch2       | protein_coding         |
| ENSMUST00000077946 | 159 | 179 | 10   | Dock10        | protein_coding         |
| ENSMUST00000144814 | 159 | 176 | 0    | Gm8289        | unprocessed_pseudogene |
| ENSMUST00000121421 | 159 | 173 | 2    | Gm15439       | unprocessed_pseudogene |
| ENSMUST00000115323 | 159 | 162 | 38   | Grm8          | protein_coding         |
| ENSMUST00000088940 | 159 | 161 | 0    | Tmem181a      | protein_coding         |
| ENSMUST00000161653 | 159 | 158 | 2    | Csmd3         | protein_coding         |
| ENSMUST00000099278 | 159 | 143 | 10   | Kiz           | protein_coding         |
| ENSMUST00000076316 | 158 | 182 | 26   | Arhgap10      | protein_coding         |
| ENSMUST00000035399 | 158 | 176 | 30   | Pdzrn4        | protein_coding         |
| ENSMUST00000107287 | 158 | 171 | 48   | Ptprd         | protein_coding         |
| ENSMUST00000166170 | 158 | 164 | 8    | Nell2         | protein_coding         |
| ENSMUST00000044466 | 158 | 162 | 24   | Nars2         | protein_coding         |
| ENSMUST00000049400 | 158 | 102 | 101  | Kank1         | protein_coding         |
| ENSMUST00000127798 | 158 | 173 | 30   | Supt3         | protein_coding         |
| ENSMUST00000058644 | 158 | 169 | 57   | Tmem196       | protein_coding         |
| ENSMUST00000124809 | 158 | 168 | 28   | Egfm1         | protein_coding         |
| ENSMUST00000169819 | 158 | 156 | 26   | Clnk          | protein_coding         |
| ENSMUST00000041463 | 157 | 177 | 4    | Pacrg         | protein_coding         |
| ENSMUST00000033749 | 157 | 171 | 30   | Pir           | protein_coding         |
| ENSMUST00000115244 | 157 | 169 | 20   | Col19a1       | protein_coding         |
| ENSMUST00000161017 | 157 | 167 | 105  | Kif26b        | protein_coding         |
| ENSMUST00000040489 | 157 | 167 | 40   | Trpm6         | protein_coding         |
| ENSMUST00000168989 | 157 | 162 | 178  | Kctd1         | protein_coding         |
| ENSMUST00000025831 | 157 | 154 | 48   | Dock8         | protein_coding         |
| ENSMUST00000079945 | 157 | 147 | 30   | Phex          | protein_coding         |
| ENSMUST00000054095 | 156 | 198 | 4    | Kctd8         | protein_coding         |
| ENSMUST00000041639 | 156 | 194 | 30   | Syne1         | protein_coding         |
| ENSMUST00000127518 | 156 | 169 | 40   | Spag17        | protein_coding         |
| ENSMUST00000097557 | 156 | 156 | 18   | Spink13       | protein_coding         |
| ENSMUST00000161921 | 156 | 155 | 10   | Gm10125       | processed_transcript   |
| ENSMUST00000044492 | 156 | 137 | 36   | Akap9         | protein_coding         |
| ENSMUST00000135010 | 155 | 221 | 6    | Farp1         | protein_coding         |
| ENSMUST00000111756 | 155 | 201 | 73   | Sorcs1        | protein_coding         |
| ENSMUST00000129179 | 155 | 191 | 10   | Ranbp17       | protein_coding         |
| ENSMUST00000071804 | 155 | 178 | 0    | AI987944      | protein_coding         |
| ENSMUST00000127083 | 155 | 166 | 4    | Ptk2b         | protein_coding         |
| ENSMUST00000112249 | 155 | 150 | 38   | Cacna1d       | protein_coding         |
| ENSMUST00000074945 | 155 | 196 | 36   | Agap1         | protein_coding         |
| ENSMUST00000132778 | 155 | 166 | 10   | AU022252      | protein_coding         |
| ENSMUST00000037181 | 155 | 154 | 3087 | Mdga2         | protein_coding         |
| ENSMUST00000027312 | 155 | 123 | 85   | Prim2         | protein_coding         |
| ENSMUST00000071087 | 154 | 233 | 20   | Cspp1         | protein_coding         |
| ENSMUST00000044423 | 154 | 213 | 28   | Brip1         | protein_coding         |
| ENSMUST00000111773 | 154 | 208 | 16   | Rbms3         | protein_coding         |
| ENSMUST00000107468 | 154 | 198 | 44   | Slc31a2       | protein_coding         |
| ENSMUST00000021689 | 154 | 120 | 50   | Evl           | protein_coding         |
| ENSMUST00000042148 | 153 | 265 | 26   | Mrps28        | protein_coding         |
| ENSMUST00000168593 | 153 | 192 | 28   | Park2         | protein_coding         |
| ENSMUST00000156301 | 153 | 185 | 38   | Nr6a1         | protein_coding         |
| ENSMUST00000182008 | 153 | 184 | 87   | Ank2          | protein_coding         |
| ENSMUST00000126742 | 153 | 163 | 63   | Celf2         | protein_coding         |
| ENSMUST00000123409 | 153 | 156 | 26   | Sdccag8       | protein_coding         |
| ENSMUST00000170406 | 153 | 147 | 18   | Ulk4          | protein_coding         |
| ENSMUST00000022433 | 153 | 143 | 36   | Dnah12        | protein_coding         |
| ENSMUST00000122171 | 152 | 198 | 34   | Dpp6          | protein_coding         |
| ENSMUST00000167746 | 152 | 197 | 30   | Cmah          | protein_coding         |
| ENSMUST00000027856 | 152 | 181 | 32   | Dcaf6         | protein_coding         |
| ENSMUST00000036274 | 152 | 168 | 0    | Spcs2         | protein_coding         |

|                     |     |     |       |               |                                    |
|---------------------|-----|-----|-------|---------------|------------------------------------|
| ENSMUST00000128450  | 152 | 167 | 4     | Prlr          | protein_coding                     |
| ENSMUST00000047061  | 152 | 162 | 157   | Ank3          | protein_coding                     |
| ENSMUST00000162710  | 152 | 161 | 16    | Srgap1        | protein_coding                     |
| ENSMUST00000046005  | 152 | 158 | 40    | Glis1         | protein_coding                     |
| ENSMUST00000141700  | 152 | 135 | 4     | Gm15987       | antisense                          |
| ENSMUST00000109486  | 152 | 51  | 81    | Ralgapb       | protein_coding                     |
| ENSMUST00000049209  | 152 | 202 | 0     | Gc            | protein_coding                     |
| ENSMUST00000160611  | 152 | 185 | 24    | Phkb          | protein_coding                     |
| ENSMUST00000038080  | 152 | 185 | 20    | Fer           | protein_coding                     |
| ENSMUST00000164018  | 152 | 181 | 129   | Rbms3         | protein_coding                     |
| ENSMUST00000120834  | 152 | 177 | 36    | Pld1          | protein_coding                     |
| ENSMUST00000172838  | 152 | 141 | 8     | Gm4425        | lincRNA                            |
| ENSMUST00000106822  | 151 | 254 | 8     | Bcl2l15       | protein_coding                     |
| ENSMUST00000138927  | 151 | 190 | 6     | Oxct1         | protein_coding                     |
| ENSMUST00000079009  | 151 | 187 | 69    | Tdrd9         | protein_coding                     |
| ENSMUST00000137765  | 151 | 179 | 2     | Gm14936       | lincRNA                            |
| ENSMUST00000152352  | 151 | 169 | 14    | 4930515L19Rik | antisense                          |
| ENSMUST00000146060  | 151 | 156 | 2     | Gm14223       | lincRNA                            |
| ENSMUST00000053017  | 151 | 148 | 6     | Chst9         | protein_coding                     |
| ENSMUST00000034731  | 151 | 143 | 16    | Lipc          | protein_coding                     |
| ENSMUST00000045802  | 151 | 12  | 406   | 2810417H13Rik | protein_coding                     |
| ENSMUST00000066379  | 150 | 174 | 0     | Chchd3        | protein_coding                     |
| ENSMUST00000019843  | 150 | 164 | 12    | Akt3          | protein_coding                     |
| ENSMUST00000143964  | 150 | 156 | 4     | AU019990      | lincRNA                            |
| ENSMUST00000073364  | 150 | 156 | 2     | Fam120c       | protein_coding                     |
| ENSMUST00000180658  | 150 | 143 | 20    | Gm16531       | unprocessed_pseudogene             |
| ENSMUST00000036737  | 150 | 137 | 42    | Colec10       | protein_coding                     |
| ENSMUST00000027775  | 150 | 205 | 6     | Efcab2        | protein_coding                     |
| ENSMUST00000068449  | 150 | 187 | 20    | Rab39         | protein_coding                     |
| ENSMUST00000115299  | 150 | 165 | 20    | Kcnq5         | protein_coding                     |
| ENSMUST00000113826  | 150 | 160 | 14    | Ophn1         | protein_coding                     |
| ENSMUST000000121189 | 150 | 135 | 14    | Ube2cbp       | protein_coding                     |
| ENSMUST00000056096  | 150 | 117 | 32    | Zfp697        | protein_coding                     |
| ENSMUST00000035813  | 149 | 185 | 0     | Ppp1r9a       | protein_coding                     |
| ENSMUST00000053094  | 149 | 155 | 22    | Fam188b       | protein_coding                     |
| ENSMUST00000031859  | 149 | 107 | 12    | Trim24        | protein_coding                     |
| ENSMUST00000088970  | 148 | 202 | 16    | Lrch1         | protein_coding                     |
| ENSMUST00000080673  | 148 | 171 | 26    | Ryr3          | protein_coding                     |
| ENSMUST00000081219  | 148 | 159 | 18    | Prdm5         | protein_coding                     |
| ENSMUST00000076817  | 148 | 158 | 56    | Utrn          | protein_coding                     |
| ENSMUST00000160496  | 148 | 154 | 14418 | Ano2          | protein_coding                     |
| ENSMUST00000167717  | 148 | 148 | 0     | Tmem181b-ps   | transcribed_unprocessed_pseudogene |
| ENSMUST00000126368  | 148 | 118 | 0     | Nrg4          | protein_coding                     |
| ENSMUST00000129643  | 147 | 181 | 16    | A630010A05Rik | protein_coding                     |
| ENSMUST00000184582  | 147 | 164 | 0     | Fbxl4         | protein_coding                     |
| ENSMUST00000110521  | 147 | 162 | 20    | Gm14085       | protein_coding                     |
| ENSMUST00000124270  | 147 | 148 | 26    | Nebi          | protein_coding                     |
| ENSMUST00000137884  | 147 | 146 | 32    | Lppr1         | protein_coding                     |
| ENSMUST00000125674  | 147 | 92  | 1233  | 1500012F01Rik | protein_coding                     |
| ENSMUST00000038558  | 147 | 12  | 10    | Klf16         | protein_coding                     |
| ENSMUST00000045737  | 147 | 249 | 28    | Galnt11       | protein_coding                     |
| ENSMUST00000030143  | 147 | 177 | 14    | Ubap2         | protein_coding                     |
| ENSMUST00000164454  | 147 | 169 | 12    | Serpina1b     | protein_coding                     |
| ENSMUST00000173592  | 147 | 164 | 57    | Ptprd         | protein_coding                     |
| ENSMUST00000169862  | 147 | 164 | 6     | Taf4b         | protein_coding                     |
| ENSMUST00000155219  | 147 | 159 | 28    | Slc4a10       | protein_coding                     |
| ENSMUST00000171164  | 147 | 156 | 20    | Creb1         | protein_coding                     |
| ENSMUST00000124269  | 147 | 150 | 2     | Nox4          | protein_coding                     |
| ENSMUST00000075220  | 147 | 148 | 105   | Cdyl          | protein_coding                     |
| ENSMUST00000108347  | 147 | 129 | 10    | Gm5150        | protein_coding                     |
| ENSMUST00000091190  | 146 | 201 | 0     | Ddx3y         | protein_coding                     |
| ENSMUST00000029419  | 146 | 191 | 10    | Veph1         | protein_coding                     |
| ENSMUST00000114913  | 146 | 181 | 18    | Adcy5         | protein_coding                     |
| ENSMUST00000017832  | 146 | 181 | 26    | Hnf4g         | protein_coding                     |
| ENSMUST00000017832  | 146 | 181 | 26    | Hnf4g         | protein_coding                     |
| ENSMUST00000107645  | 146 | 165 | 10    | Slc44a1       | protein_coding                     |
| ENSMUST00000033560  | 146 | 143 | 16    | Ophn1         | protein_coding                     |
| ENSMUST00000114137  | 146 | 143 | 6     | Grik1         | protein_coding                     |

|                    |     |     |      |               |                        |
|--------------------|-----|-----|------|---------------|------------------------|
| ENSMUST00000110297 | 146 | 141 | 61   | Oxr1          | protein_coding         |
| ENSMUST00000005490 | 146 | 132 | 52   | Slc1a6        | protein_coding         |
| ENSMUST00000111895 | 146 | 129 | 85   | Wapal         | protein_coding         |
| ENSMUST00000020101 | 146 | 114 | 44   | Rhobtb1       | protein_coding         |
| ENSMUST00000022953 | 145 | 194 | 26   | Fam135b       | protein_coding         |
| ENSMUST00000031281 | 145 | 175 | 811  | Antxr2        | protein_coding         |
| ENSMUST00000134593 | 145 | 158 | 0    | Nudt7         | protein_coding         |
| ENSMUST00000124729 | 145 | 131 | 0    | Cyp2j8        | protein_coding         |
| ENSMUST00000031175 | 144 | 190 | 36   | Tmprss11d     | protein_coding         |
| ENSMUST00000106911 | 144 | 160 | 79   | Pde4b         | protein_coding         |
| ENSMUST00000088585 | 144 | 160 | 0    | Sulf1         | protein_coding         |
| ENSMUST00000026912 | 144 | 158 | 0    | 1700008F21Rik | protein_coding         |
| ENSMUST00000113494 | 144 | 131 | 54   | Nyap2         | protein_coding         |
| ENSMUST00000099761 | 144 | 131 | 4    | Lsamp         | protein_coding         |
| ENSMUST00000118883 | 144 | 95  | 0    | Gm14359       | processed_pseudogene   |
| ENSMUST00000116639 | 144 | 176 | 48   | Prr16         | protein_coding         |
| ENSMUST00000148587 | 144 | 154 | 10   | Gm13986       | processed_transcript   |
| ENSMUST00000102975 | 144 | 150 | 46   | Mob3b         | protein_coding         |
| ENSMUST00000160530 | 144 | 145 | 8    | AW554918      | protein_coding         |
| ENSMUST00000176624 | 144 | 137 | 4    | Cyp2c29       | protein_coding         |
| ENSMUST00000108515 | 144 | 132 | 16   | Nlrp1b        | protein_coding         |
| ENSMUST00000172743 | 144 | 128 | 10   | Vmn2r55       | protein_coding         |
| ENSMUST00000051089 | 143 | 286 | 4    | Hist2h2bb     | protein_coding         |
| ENSMUST00000161731 | 143 | 185 | 54   | Fmn1          | protein_coding         |
| ENSMUST00000027985 | 143 | 172 | 34   | Ddr2          | protein_coding         |
| ENSMUST00000109518 | 143 | 160 | 6    | Rprd1b        | protein_coding         |
| ENSMUST00000113460 | 143 | 159 | 40   | Nr2c2         | protein_coding         |
| ENSMUST00000145908 | 143 | 148 | 22   | Sdk1          | protein_coding         |
| ENSMUST00000049038 | 143 | 142 | 54   | Sox30         | protein_coding         |
| ENSMUST00000066852 | 143 | 134 | 32   | Ostn          | protein_coding         |
| ENSMUST00000164751 | 143 | 134 | 28   | Cep290        | protein_coding         |
| ENSMUST00000031773 | 143 | 131 | 6    | Pon3          | protein_coding         |
| ENSMUST00000176024 | 143 | 97  | 18   | Abr           | protein_coding         |
| ENSMUST00000120580 | 143 | 83  | 408  | Prpf39        | protein_coding         |
| ENSMUST00000177639 | 142 | 162 | 6    | Gm20831       | protein_coding         |
| ENSMUST00000101181 | 142 | 162 | 12   | Gm10439       | protein_coding         |
| ENSMUST00000118725 | 142 | 159 | 16   | Gm15385       | unprocessed_pseudogene |
| ENSMUST00000112147 | 142 | 156 | 12   | Frmpd4        | protein_coding         |
| ENSMUST00000100681 | 142 | 149 | 2    | 1700125H20Rik | protein_coding         |
| ENSMUST00000024717 | 142 | 146 | 89   | Tbc1d5        | protein_coding         |
| ENSMUST00000111986 | 142 | 143 | 18   | Gm4788        | protein_coding         |
| ENSMUST00000077200 | 142 | 141 | 10   | Pak7          | protein_coding         |
| ENSMUST00000040368 | 142 | 131 | 26   | Rmdn2         | protein_coding         |
| ENSMUST00000147525 | 141 | 181 | 1751 | 6430573F11Rik | protein_coding         |
| ENSMUST00000024959 | 141 | 178 | 0    | Cript         | protein_coding         |
| ENSMUST00000170085 | 141 | 177 | 4    | 4930445B16Rik | lincRNA                |
| ENSMUST00000014290 | 141 | 163 | 2    | Apbb1ip       | protein_coding         |
| ENSMUST00000085240 | 141 | 162 | 20   | Gabrb3        | protein_coding         |
| ENSMUST00000020190 | 141 | 160 | 2    | Vnn3          | protein_coding         |
| ENSMUST00000116594 | 141 | 145 | 61   | Sfmbt2        | protein_coding         |
| ENSMUST00000174023 | 141 | 138 | 14   | Ptprd         | protein_coding         |
| ENSMUST00000141723 | 141 | 125 | 0    | Gm12521       | antisense              |
| ENSMUST00000109911 | 141 | 125 | 24   | Nr3c2         | protein_coding         |
| ENSMUST00000120898 | 141 | 106 | 12   | Cadm2         | protein_coding         |
| ENSMUST00000166971 | 141 | 178 | 2    | 6530401F13Rik | processed_transcript   |
| ENSMUST00000162391 | 141 | 164 | 0    | Far2os1       | antisense              |
| ENSMUST00000152703 | 141 | 156 | 0    | Tnfrsf23      | protein_coding         |
| ENSMUST00000032457 | 141 | 152 | 46   | Atg7          | protein_coding         |
| ENSMUST00000095793 | 141 | 151 | 20   | Rnf17         | protein_coding         |
| ENSMUST00000068975 | 141 | 137 | 4    | Zfp180        | protein_coding         |
| ENSMUST00000091565 | 141 | 135 | 167  | Zfp652        | protein_coding         |
| ENSMUST00000004172 | 140 | 190 | 22   | Hmox2         | protein_coding         |
| ENSMUST00000079869 | 140 | 167 | 2    | Znrf2         | protein_coding         |
| ENSMUST00000106601 | 140 | 163 | 4    | Elavl4        | protein_coding         |
| ENSMUST00000151196 | 140 | 146 | 8    | Kpna7         | protein_coding         |
| ENSMUST00000174403 | 140 | 145 | 10   | Gm20472       | unprocessed_pseudogene |
| ENSMUST00000095950 | 140 | 141 | 85   | Vti1a         | protein_coding         |
| ENSMUST00000163339 | 140 | 133 | 22   | Rcbtb2        | protein_coding         |

|                    |     |     |                  |                        |
|--------------------|-----|-----|------------------|------------------------|
| ENSMUST00000044441 | 140 | 119 | 113 Tmem132d     | protein_coding         |
| ENSMUST00000134930 | 139 | 211 | 0 Mgat4c         | protein_coding         |
| ENSMUST00000162273 | 139 | 193 | 14 Ctnna2        | protein_coding         |
| ENSMUST00000041577 | 139 | 175 | 12 Bank1         | protein_coding         |
| ENSMUST00000087435 | 139 | 168 | 42 Bmpr2         | protein_coding         |
| ENSMUST00000028838 | 139 | 137 | 26 Hdc           | protein_coding         |
| ENSMUST00000182575 | 139 | 136 | 2 Auts2          | protein_coding         |
| ENSMUST00000054322 | 139 | 134 | 18 Gm15163       | processed_pseudogene   |
| ENSMUST00000054322 | 139 | 134 | 18 Gm15163       | processed_pseudogene   |
| ENSMUST00000178385 | 139 | 129 | 10 Zfand6        | protein_coding         |
| ENSMUST00000111037 | 138 | 173 | 16 Lgr4          | protein_coding         |
| ENSMUST00000048977 | 138 | 166 | 81 Greb1l        | protein_coding         |
| ENSMUST00000116553 | 138 | 164 | 44 Tmprss11f     | protein_coding         |
| ENSMUST00000169579 | 138 | 156 | 56 Snd1          | protein_coding         |
| ENSMUST00000184749 | 138 | 154 | 6 Gm27224        | lincRNA                |
| ENSMUST00000179394 | 138 | 151 | 2 Fhit           | protein_coding         |
| ENSMUST00000020858 | 138 | 132 | 89 Stxbp4        | protein_coding         |
| ENSMUST00000130895 | 138 | 179 | 0 4930423M02Rik  | lincRNA                |
| ENSMUST00000054145 | 138 | 169 | 36 Dcaf5         | protein_coding         |
| ENSMUST00000159887 | 138 | 164 | 18 Ankrd22       | protein_coding         |
| ENSMUST00000143829 | 138 | 156 | 0 Slain2         | protein_coding         |
| ENSMUST00000114021 | 138 | 155 | 2 Gm8787         | protein_coding         |
| ENSMUST00000025685 | 138 | 154 | 4 Lipm           | protein_coding         |
| ENSMUST00000021734 | 138 | 150 | 4 Gng4           | protein_coding         |
| ENSMUST00000035076 | 138 | 148 | 26 Lrrc2         | protein_coding         |
| ENSMUST00000161028 | 138 | 140 | 28 Fer1l6        | protein_coding         |
| ENSMUST00000056045 | 138 | 138 | 2 Fam185a        | protein_coding         |
| ENSMUST00000119649 | 138 | 133 | 0 Gm14525        | protein_coding         |
| ENSMUST00000074622 | 138 | 132 | 24 Brnp3         | protein_coding         |
| ENSMUST00000160665 | 138 | 125 | 2 Dnm3           | protein_coding         |
| ENSMUST00000159319 | 138 | 125 | 30 Grid2         | protein_coding         |
| ENSMUST00000169805 | 138 | 125 | 4 Vmn2r90        | protein_coding         |
| ENSMUST00000029833 | 138 | 123 | 40 Lrriq3        | protein_coding         |
| ENSMUST00000123045 | 137 | 187 | 16 Itgb3bp       | protein_coding         |
| ENSMUST00000130270 | 137 | 156 | 44 Bicd1         | protein_coding         |
| ENSMUST00000023917 | 137 | 146 | 16 Lrrc69        | protein_coding         |
| ENSMUST00000122965 | 137 | 145 | 20 Elp4          | protein_coding         |
| ENSMUST00000123745 | 137 | 127 | 2 Sh3bp4         | protein_coding         |
| ENSMUST00000056102 | 137 | 125 | 63 Dscam         | protein_coding         |
| ENSMUST00000029405 | 136 | 163 | 34 Gmps          | protein_coding         |
| ENSMUST00000176979 | 136 | 160 | 10 Vmn2r-ps133   | unprocessed_pseudogene |
| ENSMUST00000134959 | 136 | 157 | 6 Cdc42bpa       | protein_coding         |
| ENSMUST00000114565 | 136 | 152 | 26 Tmeff2        | protein_coding         |
| ENSMUST00000136160 | 136 | 149 | 14 Pde10a        | protein_coding         |
| ENSMUST00000133235 | 135 | 164 | 22 Gm10130       | protein_coding         |
| ENSMUST00000114725 | 135 | 139 | 42 Gm364         | protein_coding         |
| ENSMUST00000027393 | 135 | 126 | 10 Bard1         | protein_coding         |
| ENSMUST00000142239 | 135 | 93  | 2274 Rpl13a      | protein_coding         |
| ENSMUST00000159438 | 135 | 259 | 26 Gas5          | processed_transcript   |
| ENSMUST00000166240 | 135 | 173 | 2 Lrriq1         | protein_coding         |
| ENSMUST00000042530 | 135 | 155 | 20 Gucy2f        | protein_coding         |
| ENSMUST00000024639 | 135 | 145 | 57 Map2          | protein_coding         |
| ENSMUST00000169242 | 135 | 144 | 248 Gm17167      | processed_transcript   |
| ENSMUST00000106490 | 135 | 141 | 6 Pik3r3         | protein_coding         |
| ENSMUST00000169172 | 135 | 138 | 18 Tbck          | protein_coding         |
| ENSMUST00000168722 | 135 | 137 | 81 Nsmce2        | protein_coding         |
| ENSMUST00000173503 | 135 | 135 | 4 Gsdmc          | protein_coding         |
| ENSMUST00000032192 | 135 | 133 | 121 Itpr1        | protein_coding         |
| ENSMUST00000115837 | 135 | 114 | 6 Ccdc178        | protein_coding         |
| ENSMUST00000182733 | 135 | 114 | 59 Gm26973       | antisense              |
| ENSMUST00000180868 | 134 | 164 | 8591 Gm26694     | lincRNA                |
| ENSMUST00000125350 | 134 | 164 | 0 Cadps2         | protein_coding         |
| ENSMUST00000045903 | 134 | 160 | 10 Trak1         | protein_coding         |
| ENSMUST00000108305 | 134 | 158 | 2 Spata16        | protein_coding         |
| ENSMUST00000095536 | 134 | 156 | 4 Ttll5          | protein_coding         |
| ENSMUST00000034189 | 134 | 141 | 10 Ces1c         | protein_coding         |
| ENSMUST00000071267 | 134 | 140 | 18 Pcgf5         | protein_coding         |
| ENSMUST00000180524 | 134 | 139 | 65 D030068K23Rik | lincRNA                |

|                     |     |     |      |               |                                    |
|---------------------|-----|-----|------|---------------|------------------------------------|
| ENSMUST00000115356  | 134 | 139 | 0    | Cadps2        | protein_coding                     |
| ENSMUST00000171063  | 134 | 137 | 8    | Zfp385b       | protein_coding                     |
| ENSMUST00000113457  | 134 | 136 | 75   | Col4a3        | protein_coding                     |
| ENSMUST00000080995  | 134 | 132 | 26   | Tmem26        | protein_coding                     |
| ENSMUST00000117776  | 134 | 125 | 12   | Cyp2j14-ps    | unprocessed_pseudogene             |
| ENSMUST00000143919  | 134 | 124 | 32   | 4930404A10Rik | protein_coding                     |
| ENSMUST00000121160  | 133 | 175 | 34   | C530008M17Rik | protein_coding                     |
| ENSMUST00000173836  | 133 | 165 | 0    | Jakmip1       | protein_coding                     |
| ENSMUST00000135046  | 133 | 148 | 4    | Sntg1         | protein_coding                     |
| ENSMUST00000127129  | 133 | 148 | 0    | 3110056K07Rik | antisense                          |
| ENSMUST00000165180  | 133 | 135 | 36   | Vmn2r16       | protein_coding                     |
| ENSMUST00000124543  | 133 | 134 | 18   | L3mbtl4       | protein_coding                     |
| ENSMUST00000105738  | 133 | 125 | 4    | Gm13242       | protein_coding                     |
| ENSMUST00000025666  | 133 | 118 | 0    | Slc22a19      | protein_coding                     |
| ENSMUST00000124912  | 133 | 72  | 2213 | Gm11280       | antisense                          |
| ENSMUST00000134388  | 132 | 172 | 59   | Arhgap26      | protein_coding                     |
| ENSMUST00000117537  | 132 | 164 | 0    | Fbxl2         | protein_coding                     |
| ENSMUST00000049509  | 132 | 141 | 52   | Vat1l         | protein_coding                     |
| ENSMUST00000133275  | 132 | 141 | 63   | Osbpl6        | protein_coding                     |
| ENSMUST00000106766  | 132 | 139 | 6    | Gm4070        | protein_coding                     |
| ENSMUST00000141479  | 132 | 137 | 38   | Fam110b       | protein_coding                     |
| ENSMUST00000092215  | 132 | 1   | 2    | Ccdc38        | protein_coding                     |
| ENSMUST00000101206  | 132 | 156 | 26   | Rapgef6       | protein_coding                     |
| ENSMUST00000120801  | 132 | 146 | 6    | Slc7a12       | protein_coding                     |
| ENSMUST00000040090  | 132 | 137 | 30   | Nubpl         | protein_coding                     |
| ENSMUST00000006667  | 132 | 135 | 6    | Gvin1         | protein_coding                     |
| ENSMUST00000171224  | 132 | 129 | 14   | Skint6        | protein_coding                     |
| ENSMUST00000042917  | 132 | 124 | 6    | Rims2         | protein_coding                     |
| ENSMUST00000127917  | 132 | 118 | 12   | 3110053B16Rik | transcribed_unprocessed_pseudogene |
| ENSMUST00000148115  | 132 | 110 | 12   | Nsun2         | protein_coding                     |
| ENSMUST00000002765  | 131 | 142 | 75   | Prkd1         | protein_coding                     |
| ENSMUST000000039431 | 131 | 139 | 48   | Ntrk3         | protein_coding                     |
| ENSMUST00000075540  | 130 | 187 | 2    | Mcm9          | protein_coding                     |
| ENSMUST00000150708  | 130 | 155 | 8    | Sppl3         | protein_coding                     |
| ENSMUST00000173586  | 130 | 148 | 20   | Gm9286        | unprocessed_pseudogene             |
| ENSMUST00000146492  | 130 | 143 | 16   | Rasgrf2       | protein_coding                     |
| ENSMUST00000174422  | 130 | 116 | 6    | Pkn2          | protein_coding                     |
| ENSMUST00000164462  | 130 | 194 | 6    | Vmn2r79       | protein_coding                     |
| ENSMUST00000140914  | 130 | 149 | 10   | Ift57         | protein_coding                     |
| ENSMUST00000155976  | 130 | 141 | 73   | Gm15614       | antisense                          |
| ENSMUST00000045388  | 130 | 138 | 2    | Lyplal1       | protein_coding                     |
| ENSMUST00000115533  | 130 | 138 | 0    | Rpgr          | protein_coding                     |
| ENSMUST00000161400  | 130 | 130 | 54   | Gm16039       | protein_coding                     |
| ENSMUST00000005669  | 130 | 128 | 12   | Cyp2b13       | protein_coding                     |
| ENSMUST000000079751 | 130 | 112 | 14   | Grik2         | protein_coding                     |
| ENSMUST00000140552  | 129 | 160 | 32   | Dennd1a       | protein_coding                     |
| ENSMUST00000027189  | 129 | 158 | 46   | Casp8         | protein_coding                     |
| ENSMUST00000061047  | 129 | 151 | 57   | Phlpp1        | protein_coding                     |
| ENSMUST00000022553  | 129 | 150 | 10   | Cab39l        | protein_coding                     |
| ENSMUST00000033842  | 129 | 144 | 28   | Myom2         | protein_coding                     |
| ENSMUST00000137437  | 129 | 135 | 59   | Cped1         | protein_coding                     |
| ENSMUST00000062804  | 129 | 125 | 40   | Fut8          | protein_coding                     |
| ENSMUST00000090043  | 129 | 125 | 0    | Gm9864        | pseudogene                         |
| ENSMUST00000065651  | 129 | 123 | 14   | Slc22a28      | protein_coding                     |
| ENSMUST00000134787  | 129 | 123 | 8    | 2610307P16Rik | processed_transcript               |
| ENSMUST00000174639  | 128 | 188 | 50   | Dtnb          | protein_coding                     |
| ENSMUST00000150247  | 128 | 182 | 20   | Dlgap2        | protein_coding                     |
| ENSMUST00000151764  | 128 | 155 | 8    | Ccdc73        | protein_coding                     |
| ENSMUST00000144543  | 128 | 149 | 0    | Plekhg1       | protein_coding                     |
| ENSMUST00000031477  | 128 | 146 | 14   | Golga3        | protein_coding                     |
| ENSMUST00000178040  | 128 | 133 | 2    | Mup-ps11      | unprocessed_pseudogene             |
| ENSMUST00000163663  | 128 | 127 | 8    | Dlc1          | protein_coding                     |
| ENSMUST00000034521  | 128 | 112 | 2    | 4931429I11Rik | protein_coding                     |
| ENSMUST00000139230  | 127 | 159 | 40   | Tmcc3         | protein_coding                     |
| ENSMUST00000108078  | 127 | 155 | 75   | 3110057O12Rik | protein_coding                     |
| ENSMUST00000030148  | 127 | 154 | 8    | Kif24         | protein_coding                     |
| ENSMUST00000063886  | 127 | 153 | 26   | Acvr2a        | protein_coding                     |
| ENSMUST00000131995  | 127 | 141 | 10   | Bre           | protein_coding                     |

|                    |     |     |                  |                                    |
|--------------------|-----|-----|------------------|------------------------------------|
| ENSMUST00000154449 | 127 | 139 | 12 Tmem53        | protein_coding                     |
| ENSMUST00000048677 | 127 | 120 | 139 Tbc1d22b     | protein_coding                     |
| ENSMUST00000023068 | 127 | 120 | 12 Smc1b         | protein_coding                     |
| ENSMUST00000004094 | 127 | 118 | 52 Ssbp2         | protein_coding                     |
| ENSMUST00000031121 | 127 | 118 | 14 Gabra4        | protein_coding                     |
| ENSMUST00000168617 | 127 | 118 | 4 Cfap54         | protein_coding                     |
| ENSMUST00000124256 | 127 | 117 | 18 Fam110b       | protein_coding                     |
| ENSMUST00000037840 | 127 | 115 | 18 Cfap221       | protein_coding                     |
| ENSMUST00000160652 | 127 | 58  | 9580 Zfp949      | protein_coding                     |
| ENSMUST00000159861 | 127 | 190 | 28 Pappa2        | protein_coding                     |
| ENSMUST00000049255 | 127 | 158 | 12 Armc3         | protein_coding                     |
| ENSMUST00000168529 | 127 | 145 | 2 Cyb5r4         | protein_coding                     |
| ENSMUST00000030243 | 127 | 130 | 6 Prkaa2         | protein_coding                     |
| ENSMUST00000122989 | 127 | 127 | 32 Strada        | protein_coding                     |
| ENSMUST00000091201 | 127 | 123 | 91 Arl15         | protein_coding                     |
| ENSMUST00000110542 | 127 | 113 | 2 Agxt2          | protein_coding                     |
| ENSMUST00000033433 | 127 | 112 | 32 RbmX2         | protein_coding                     |
| ENSMUST00000160328 | 127 | 101 | 20 Dok6          | protein_coding                     |
| ENSMUST00000135425 | 127 | 79  | 30 Cbs           | protein_coding                     |
| ENSMUST00000154929 | 126 | 143 | 14 Stx18         | protein_coding                     |
| ENSMUST00000141448 | 126 | 141 | 34 Hook1         | protein_coding                     |
| ENSMUST00000144473 | 126 | 139 | 2 Nup85          | protein_coding                     |
| ENSMUST00000035342 | 126 | 135 | 6 Adamts20       | protein_coding                     |
| ENSMUST00000004214 | 126 | 133 | 12 Cacna1e       | protein_coding                     |
| ENSMUST00000114719 | 126 | 127 | 2 Cacnb2         | protein_coding                     |
| ENSMUST00000122223 | 126 | 125 | 0 Gm12819        | unprocessed_pseudogene             |
| ENSMUST00000035982 | 126 | 125 | 0 Wwp1           | protein_coding                     |
| ENSMUST00000022599 | 126 | 123 | 28 Diap3         | protein_coding                     |
| ENSMUST00000091900 | 126 | 121 | 32 Prdm6         | protein_coding                     |
| ENSMUST00000030102 | 126 | 118 | 2 Kdm4c          | protein_coding                     |
| ENSMUST00000049016 | 125 | 152 | 16 Zfp532        | protein_coding                     |
| ENSMUST00000034065 | 125 | 144 | 18 Nek1          | protein_coding                     |
| ENSMUST00000041168 | 125 | 140 | 2 Gpr126         | protein_coding                     |
| ENSMUST00000169499 | 125 | 139 | 30 Gm14569       | protein_coding                     |
| ENSMUST00000048962 | 125 | 137 | 1955 Kif4        | protein_coding                     |
| ENSMUST00000117160 | 125 | 136 | 182 Cdh13        | protein_coding                     |
| ENSMUST00000091403 | 125 | 131 | 85 Arsb          | protein_coding                     |
| ENSMUST00000119854 | 125 | 127 | 95 Limch1        | protein_coding                     |
| ENSMUST00000181047 | 125 | 118 | 20 2610316D01Rik | lincRNA                            |
| ENSMUST00000069652 | 125 | 112 | 10 Rab3gap2      | protein_coding                     |
| ENSMUST00000043259 | 125 | 110 | 79 Pde3a         | protein_coding                     |
| ENSMUST00000034483 | 125 | 110 | 38 1700128F08Rik | protein_coding                     |
| ENSMUST00000025968 | 125 | 97  | 38 Cyp2c39       | protein_coding                     |
| ENSMUST00000176012 | 124 | 163 | 0 Foxj3          | protein_coding                     |
| ENSMUST00000071069 | 124 | 154 | 10 Trim30d       | protein_coding                     |
| ENSMUST00000126305 | 124 | 148 | 6 Ankrd42        | protein_coding                     |
| ENSMUST00000163130 | 124 | 146 | 10 Dnajc1        | protein_coding                     |
| ENSMUST00000087541 | 124 | 139 | 0 Trmt2b         | protein_coding                     |
| ENSMUST00000095817 | 124 | 136 | 1211 Ect2l       | protein_coding                     |
| ENSMUST00000171967 | 124 | 136 | 10 Gm7995        | protein_coding                     |
| ENSMUST00000049389 | 124 | 134 | 10 Zdhhc2        | protein_coding                     |
| ENSMUST00000125471 | 124 | 126 | 40 Fto           | protein_coding                     |
| ENSMUST00000117883 | 124 | 120 | 2 Asb3           | protein_coding                     |
| ENSMUST00000040275 | 124 | 120 | 6 Sobp           | protein_coding                     |
| ENSMUST00000099078 | 124 | 146 | 16 Arfgef2       | protein_coding                     |
| ENSMUST00000118360 | 124 | 146 | 71 Kcnd3         | protein_coding                     |
| ENSMUST00000173899 | 124 | 143 | 34 Mecom         | protein_coding                     |
| ENSMUST00000066582 | 124 | 139 | 85 Srcap         | protein_coding                     |
| ENSMUST00000162896 | 124 | 132 | 24 Gm6264        | transcribed_unprocessed_pseudogene |
| ENSMUST00000108361 | 124 | 122 | 8 Gm9733         | protein_coding                     |
| ENSMUST00000156547 | 124 | 120 | 16 Ssbp2         | protein_coding                     |
| ENSMUST00000036439 | 124 | 113 | 12 Cdh6          | protein_coding                     |
| ENSMUST00000162113 | 124 | 104 | 42 Speer7-ps1    | processed_transcript               |
| ENSMUST00000037370 | 124 | 47  | 623 Sorcs2       | protein_coding                     |
| ENSMUST00000098858 | 123 | 169 | 71 Kcnu1         | protein_coding                     |
| ENSMUST00000109554 | 123 | 164 | 52 Zc3h7b        | protein_coding                     |
| ENSMUST00000029603 | 123 | 154 | 48 Prss12        | protein_coding                     |
| ENSMUST00000179777 | 123 | 148 | 10 Gm19965       | protein_coding                     |

|                     |     |     |      |               |                        |
|---------------------|-----|-----|------|---------------|------------------------|
| ENSMUST00000178065  | 123 | 135 | 14   | Gm4791        | protein_coding         |
| ENSMUST00000022228  | 123 | 122 | 22   | Cwc27         | protein_coding         |
| ENSMUST00000177770  | 123 | 118 | 34   | Gm21965       | unprocessed_pseudogene |
| ENSMUST00000112891  | 123 | 109 | 34   | Tmem164       | protein_coding         |
| ENSMUST000000093193 | 122 | 165 | 12   | Dock2         | protein_coding         |
| ENSMUST00000026227  | 122 | 154 | 0    | Peo1          | protein_coding         |
| ENSMUST00000048613  | 122 | 150 | 20   | A830018L16Rik | protein_coding         |
| ENSMUST00000143842  | 122 | 148 | 16   | Gpatch8       | protein_coding         |
| ENSMUST00000121069  | 122 | 137 | 2    | Gm14957       | unprocessed_pseudogene |
| ENSMUST00000133670  | 122 | 137 | 0    | Cep112        | protein_coding         |
| ENSMUST00000170386  | 122 | 135 | 10   | Wdr27         | protein_coding         |
| ENSMUST00000066875  | 122 | 127 | 0    | 6030452D12Rik | protein_coding         |
| ENSMUST00000034054  | 122 | 126 | 14   | Anxa10        | protein_coding         |
| ENSMUST00000136989  | 122 | 120 | 77   | Akap13        | protein_coding         |
| ENSMUST00000137127  | 122 | 112 | 26   | Dennd1b       | processed_transcript   |
| ENSMUST00000137127  | 122 | 112 | 26   | Dennd1b       | processed_transcript   |
| ENSMUST00000179717  | 122 | 104 | 34   | Gmds          | protein_coding         |
| ENSMUST00000142914  | 121 | 199 | 12   | 4930571N24Rik | processed_transcript   |
| ENSMUST00000144629  | 121 | 158 | 2    | Adad1         | protein_coding         |
| ENSMUST00000169942  | 121 | 135 | 52   | Pdzrn4        | protein_coding         |
| ENSMUST00000147016  | 121 | 133 | 16   | Ndst4         | protein_coding         |
| ENSMUST00000081121  | 121 | 131 | 22   | Slc24a3       | protein_coding         |
| ENSMUST00000030029  | 121 | 112 | 12   | Invs          | protein_coding         |
| ENSMUST00000181632  | 121 | 101 | 59   | 4930455D15Rik | lincRNA                |
| ENSMUST00000086464  | 121 | 19  | 742  | Vsig10        | protein_coding         |
| ENSMUST00000081907  | 121 | 173 | 6    | Ceacam5       | protein_coding         |
| ENSMUST00000162564  | 121 | 162 | 34   | Gm16039       | protein_coding         |
| ENSMUST00000159855  | 121 | 143 | 56   | Mycbp2        | protein_coding         |
| ENSMUST00000146925  | 121 | 141 | 0    | Clec2g        | protein_coding         |
| ENSMUST00000077194  | 121 | 133 | 28   | Tpte          | protein_coding         |
| ENSMUST00000085109  | 121 | 112 | 26   | Ttc8          | protein_coding         |
| ENSMUST00000069749  | 121 | 110 | 4    | Rab27b        | protein_coding         |
| ENSMUST00000122452  | 121 | 108 | 0    | Mylk3         | protein_coding         |
| ENSMUST00000153031  | 120 | 161 | 494  | Sh3rf3        | protein_coding         |
| ENSMUST00000029909  | 120 | 146 | 12   | Coq3          | protein_coding         |
| ENSMUST00000121395  | 120 | 135 | 0    | Olf268-ps1    | processed_pseudogene   |
| ENSMUST00000178315  | 120 | 131 | 0    | Mup-ps3       | unprocessed_pseudogene |
| ENSMUST00000030763  | 120 | 129 | 24   | Cdk14         | protein_coding         |
| ENSMUST00000140062  | 120 | 123 | 20   | Robo2         | protein_coding         |
| ENSMUST00000153402  | 120 | 118 | 10   | 9630028H03Rik | antisense              |
| ENSMUST00000168527  | 119 | 142 | 30   | Dennd1b       | protein_coding         |
| ENSMUST00000147638  | 119 | 137 | 42   | Gm15943       | processed_transcript   |
| ENSMUST00000147213  | 119 | 126 | 14   | Abcg2         | protein_coding         |
| ENSMUST00000041815  | 118 | 164 | 6    | Tsga10        | protein_coding         |
| ENSMUST00000028633  | 118 | 146 | 6    | Fbn1          | protein_coding         |
| ENSMUST00000060389  | 118 | 140 | 32   | Rspry1        | protein_coding         |
| ENSMUST00000153780  | 118 | 139 | 50   | Tceal3        | protein_coding         |
| ENSMUST00000172032  | 118 | 130 | 6    | Ces2h         | protein_coding         |
| ENSMUST00000097331  | 118 | 120 | 14   | Gm6034        | protein_coding         |
| ENSMUST00000069782  | 118 | 117 | 71   | 9030617O03Rik | protein_coding         |
| ENSMUST00000082094  | 118 | 114 | 305  | Ptcd3         | protein_coding         |
| ENSMUST00000119138  | 118 | 112 | 6    | Gm6664        | unprocessed_pseudogene |
| ENSMUST00000140466  | 118 | 78  | 8    | Dync2h1       | protein_coding         |
| ENSMUST00000084696  | 118 | 179 | 22   | Spon1         | protein_coding         |
| ENSMUST00000154262  | 118 | 153 | 26   | Phlpp2        | protein_coding         |
| ENSMUST00000095969  | 118 | 148 | 54   | Rbm20         | protein_coding         |
| ENSMUST00000107651  | 118 | 147 | 0    | Slc44a1       | protein_coding         |
| ENSMUST00000063414  | 118 | 137 | 65   | Tbc1d22a      | protein_coding         |
| ENSMUST00000028110  | 118 | 136 | 12   | Spopl         | protein_coding         |
| ENSMUST00000112831  | 118 | 125 | 6    | Htr2c         | protein_coding         |
| ENSMUST00000036540  | 118 | 122 | 12   | Fam117b       | protein_coding         |
| ENSMUST00000049260  | 118 | 117 | 8    | Garem         | protein_coding         |
| ENSMUST00000182815  | 118 | 115 | 12   | Veph1         | protein_coding         |
| ENSMUST00000118019  | 118 | 108 | 2    | Gm11393       | unprocessed_pseudogene |
| ENSMUST00000147651  | 118 | 58  | 4558 | 1110001J03Rik | protein_coding         |
| ENSMUST00000143791  | 117 | 172 | 59   | Bicc1         | protein_coding         |
| ENSMUST00000130524  | 117 | 171 | 10   | Plcb1         | protein_coding         |
| ENSMUST00000070189  | 117 | 164 | 14   | Lrguk         | protein_coding         |



|                     |     |     |                   |                                    |
|---------------------|-----|-----|-------------------|------------------------------------|
| ENSMUST00000037142  | 117 | 158 | 2 Cd226           | protein_coding                     |
| ENSMUST00000134476  | 117 | 144 | 2 Gm13599         | antisense                          |
| ENSMUST00000181682  | 117 | 136 | 204 9530059O14Rik | lincRNA                            |
| ENSMUST00000154361  | 117 | 127 | 0 Tmem132cos      | antisense                          |
| ENSMUST00000075052  | 117 | 125 | 0 Kcnh7           | protein_coding                     |
| ENSMUST00000135168  | 117 | 121 | 488 5730522E02Rik | protein_coding                     |
| ENSMUST00000022962  | 117 | 120 | 28 Emc2           | protein_coding                     |
| ENSMUST00000043148  | 117 | 118 | 34 Gng12          | protein_coding                     |
| ENSMUST00000027817  | 117 | 104 | 6 Spta1           | protein_coding                     |
| ENSMUST00000182404  | 117 | 87  | 632 Celf2         | protein_coding                     |
| ENSMUST00000081896  | 116 | 139 | 8 4930512M02Rik   | protein_coding                     |
| ENSMUST00000179489  | 116 | 127 | 26 Eftud1         | protein_coding                     |
| ENSMUST00000038407  | 116 | 127 | 12 Larp6          | protein_coding                     |
| ENSMUST00000112788  | 116 | 126 | 2 Gm15114         | protein_coding                     |
| ENSMUST00000120071  | 116 | 125 | 0 Psd3            | protein_coding                     |
| ENSMUST00000058605  | 116 | 112 | 54 Skint9         | protein_coding                     |
| ENSMUST00000047568  | 116 | 111 | 54 Havcr1         | protein_coding                     |
| ENSMUST00000106565  | 116 | 110 | 32 Skint4         | protein_coding                     |
| ENSMUST00000114731  | 116 | 104 | 24 Slc39a12       | protein_coding                     |
| ENSMUST00000159161  | 115 | 160 | 34 Leprel1        | protein_coding                     |
| ENSMUST00000159957  | 115 | 148 | 0 Ercc6l2         | protein_coding                     |
| ENSMUST00000032774  | 115 | 135 | 14 Ttc23          | protein_coding                     |
| ENSMUST00000105561  | 115 | 126 | 48 Grm1           | protein_coding                     |
| ENSMUST00000150051  | 115 | 124 | 450 6820431F20Rik | transcribed_unprocessed_pseudogene |
| ENSMUST00000160834  | 115 | 114 | 24 Nbeal1         | protein_coding                     |
| ENSMUST00000139998  | 115 | 110 | 26 Dmd            | protein_coding                     |
| ENSMUST00000082214  | 115 | 104 | 67 Cyp2b9         | protein_coding                     |
| ENSMUST00000133931  | 115 | 95  | 4 Aknad1          | protein_coding                     |
| ENSMUST00000125583  | 115 | 145 | 16 Rptor          | protein_coding                     |
| ENSMUST00000060531  | 115 | 137 | 8 Lrrc8d          | protein_coding                     |
| ENSMUST00000161309  | 115 | 123 | 18 Pole4          | protein_coding                     |
| ENSMUST00000045029  | 115 | 116 | 36 Pigk           | protein_coding                     |
| ENSMUST00000149424  | 115 | 112 | 4 Tpk1            | protein_coding                     |
| ENSMUST00000147759  | 115 | 111 | 14 Abcc1          | protein_coding                     |
| ENSMUST00000069692  | 114 | 157 | 24 Zfp277         | protein_coding                     |
| ENSMUST00000097514  | 114 | 143 | 0 Gm10530         | processed_transcript               |
| ENSMUST00000144935  | 114 | 142 | 2 Clec10a         | protein_coding                     |
| ENSMUST00000153695  | 114 | 137 | 12 Cpa6           | protein_coding                     |
| ENSMUST00000053308  | 114 | 136 | 36 Ranbp3l        | protein_coding                     |
| ENSMUST00000025357  | 114 | 135 | 36 Ap3s1          | protein_coding                     |
| ENSMUST00000072481  | 114 | 133 | 12 Sgip1          | protein_coding                     |
| ENSMUST00000050129  | 114 | 131 | 16 Cox7b2         | protein_coding                     |
| ENSMUST00000178169  | 114 | 129 | 2 Gm15085         | protein_coding                     |
| ENSMUST00000062161  | 114 | 126 | 26 Tmem232        | protein_coding                     |
| ENSMUST000000052124 | 114 | 125 | 8 Nlrc4           | protein_coding                     |
| ENSMUST00000101313  | 114 | 123 | 8 Slc38a6         | protein_coding                     |
| ENSMUST00000033553  | 114 | 123 | 22 Heph           | protein_coding                     |
| ENSMUST00000044977  | 114 | 123 | 10 Slc25a16       | protein_coding                     |
| ENSMUST00000097633  | 114 | 110 | 44 D2hgdh         | protein_coding                     |
| ENSMUST00000180138  | 114 | 108 | 20 Gm10410        | unprocessed_pseudogene             |
| ENSMUST00000112777  | 113 | 157 | 14 Dcp1b          | protein_coding                     |
| ENSMUST00000120133  | 113 | 139 | 4 Sel1l2          | protein_coding                     |
| ENSMUST00000135069  | 113 | 131 | 6 Gm4954          | processed_pseudogene               |
| ENSMUST00000179021  | 113 | 131 | 2 Gm15093         | protein_coding                     |
| ENSMUST00000133085  | 113 | 129 | 6 Gm15109         | unprocessed_pseudogene             |
| ENSMUST00000026602  | 113 | 128 | 2 2010106E10Rik   | protein_coding                     |
| ENSMUST00000047322  | 113 | 123 | 22 Rbbp8          | protein_coding                     |
| ENSMUST00000150529  | 113 | 121 | 109 Gm13227       | processed_transcript               |
| ENSMUST00000118575  | 113 | 120 | 38 Gm16066        | processed_transcript               |
| ENSMUST00000141105  | 113 | 120 | 6 Necab1          | protein_coding                     |
| ENSMUST00000150339  | 113 | 118 | 0 Pgm5            | protein_coding                     |
| ENSMUST00000039961  | 113 | 117 | 10 6820408C15Rik  | protein_coding                     |
| ENSMUST00000074368  | 113 | 116 | 34 Slc35f4        | protein_coding                     |
| ENSMUST00000049404  | 113 | 112 | 36 Clasp1         | protein_coding                     |
| ENSMUST00000134310  | 113 | 108 | 0 Plcb4           | protein_coding                     |
| ENSMUST00000040325  | 113 | 106 | 18 Med12l         | protein_coding                     |
| ENSMUST00000139497  | 113 | 99  | 2 Gm13497         | lincRNA                            |
| ENSMUST00000172991  | 113 | 87  | 668 Kpna1         | protein_coding                     |

|                     |     |     |     |               |                        |
|---------------------|-----|-----|-----|---------------|------------------------|
| ENSMUST00000031574  | 113 | 187 | 6   | 4933411G11Rik | protein_coding         |
| ENSMUST00000097288  | 113 | 141 | 36  | Dlgap1        | protein_coding         |
| ENSMUST00000089360  | 113 | 141 | 4   | Senp7         | protein_coding         |
| ENSMUST00000066452  | 113 | 133 | 4   | Camk2d        | protein_coding         |
| ENSMUST00000147108  | 113 | 131 | 10  | Gm12374       | lincRNA                |
| ENSMUST00000101527  | 113 | 122 | 32  | Atp11c        | protein_coding         |
| ENSMUST00000075282  | 113 | 118 | 18  | Unc5c         | protein_coding         |
| ENSMUST00000144755  | 113 | 109 | 12  | Ugt3a2        | protein_coding         |
| ENSMUST00000145601  | 113 | 90  | 8   | Cdh8          | protein_coding         |
| ENSMUST00000114644  | 113 | 86  | 24  | Tpk1          | protein_coding         |
| ENSMUST00000151918  | 112 | 212 | 454 | Trpc7         | protein_coding         |
| ENSMUST00000117661  | 112 | 137 | 34  | Stim2         | protein_coding         |
| ENSMUST00000132302  | 112 | 133 | 6   | Smad5         | protein_coding         |
| ENSMUST00000114243  | 112 | 129 | 87  | Gm973         | protein_coding         |
| ENSMUST00000112804  | 112 | 126 | 0   | Gm15080       | protein_coding         |
| ENSMUST00000113933  | 112 | 124 | 46  | Pcyt1b        | protein_coding         |
| ENSMUST00000028123  | 112 | 123 | 38  | Gad2          | protein_coding         |
| ENSMUST00000124672  | 112 | 114 | 36  | Pstk          | protein_coding         |
| ENSMUST00000102777  | 112 | 102 | 22  | Lepr          | protein_coding         |
| ENSMUST00000181678  | 112 | 97  | 26  | Gm26898       | unprocessed_pseudogene |
| ENSMUST00000073350  | 111 | 205 | 16  | Ctse          | protein_coding         |
| ENSMUST00000046673  | 111 | 151 | 89  | Pard3b        | protein_coding         |
| ENSMUST00000026432  | 111 | 151 | 36  | Cdh9          | protein_coding         |
| ENSMUST00000075363  | 111 | 150 | 12  | Acot7         | protein_coding         |
| ENSMUST00000130116  | 111 | 143 | 8   | Sema3e        | protein_coding         |
| ENSMUST00000037315  | 111 | 139 | 38  | Abhd2         | protein_coding         |
| ENSMUST00000142292  | 111 | 131 | 40  | Junos         | antisense              |
| ENSMUST00000030257  | 111 | 131 | 44  | Cachd1        | protein_coding         |
| ENSMUST00000077918  | 111 | 128 | 14  | Cfi           | protein_coding         |
| ENSMUST00000169656  | 111 | 125 | 14  | Fbxo16        | protein_coding         |
| ENSMUST00000145602  | 111 | 118 | 18  | Dtd1          | protein_coding         |
| ENSMUST00000109934  | 111 | 115 | 14  | Syndig1       | protein_coding         |
| ENSMUST00000114943  | 111 | 114 | 14  | Dcc           | protein_coding         |
| ENSMUST00000129342  | 111 | 99  | 12  | Khdrbs1       | protein_coding         |
| ENSMUST00000176107  | 111 | 83  | 8   | Vmn2r99       | protein_coding         |
| ENSMUST00000131608  | 110 | 190 | 32  | 2900011O08Rik | protein_coding         |
| ENSMUST00000183274  | 110 | 141 | 8   | Xpnpep1       | protein_coding         |
| ENSMUST00000055930  | 110 | 125 | 0   | 4932414N04Rik | protein_coding         |
| ENSMUST00000167505  | 110 | 123 | 2   | Tmem255b      | protein_coding         |
| ENSMUST00000092123  | 110 | 109 | 34  | Epc2          | protein_coding         |
| ENSMUST00000163852  | 110 | 106 | 28  | Vmn2r56       | protein_coding         |
| ENSMUST00000110695  | 110 | 106 | 34  | Bri3          | protein_coding         |
| ENSMUST00000097772  | 110 | 97  | 20  | Il1rl1        | protein_coding         |
| ENSMUST00000115454  | 110 | 97  | 0   | Cav1          | protein_coding         |
| ENSMUST00000110844  | 110 | 154 | 28  | Kcnh1         | protein_coding         |
| ENSMUST00000164529  | 110 | 137 | 34  | Lifr          | protein_coding         |
| ENSMUST00000092629  | 110 | 134 | 16  | Soga3         | protein_coding         |
| ENSMUST00000171970  | 110 | 129 | 34  | Bmp6          | protein_coding         |
| ENSMUST00000057897  | 110 | 125 | 73  | Zfand3        | protein_coding         |
| ENSMUST00000168489  | 110 | 118 | 16  | Vmn2r59       | protein_coding         |
| ENSMUST00000170013  | 110 | 106 | 26  | Caps2         | protein_coding         |
| ENSMUST00000129578  | 110 | 105 | 22  | Gm15496       | antisense              |
| ENSMUST00000087043  | 110 | 104 | 0   | Smr2          | protein_coding         |
| ENSMUST00000075632  | 110 | 102 | 8   | BC030307      | protein_coding         |
| ENSMUST00000022610  | 110 | 100 | 71  | Scara5        | protein_coding         |
| ENSMUST00000163280  | 110 | 99  | 6   | Eci2          | protein_coding         |
| ENSMUST00000110378  | 110 | 93  | 4   | Snx25         | protein_coding         |
| ENSMUST000000091790 | 110 | 88  | 4   | Atp9b         | protein_coding         |
| ENSMUST00000075340  | 109 | 183 | 69  | Ctnna2        | protein_coding         |
| ENSMUST00000160151  | 109 | 160 | 32  | Fancc         | protein_coding         |
| ENSMUST00000051153  | 109 | 154 | 4   | 3300002I08Rik | protein_coding         |
| ENSMUST00000038053  | 109 | 141 | 44  | Lpp           | protein_coding         |
| ENSMUST00000155016  | 109 | 131 | 52  | Dlgap1        | protein_coding         |
| ENSMUST00000135042  | 109 | 122 | 65  | 8030451A03Rik | processed_transcript   |
| ENSMUST00000136621  | 109 | 122 | 36  | Nop56         | protein_coding         |
| ENSMUST00000169345  | 109 | 120 | 26  | Syn2          | protein_coding         |
| ENSMUST00000110113  | 109 | 114 | 28  | Kcnk10        | protein_coding         |
| ENSMUST00000129416  | 109 | 105 | 59  | Supt3         | protein_coding         |

|                     |     |     |                  |                                    |
|---------------------|-----|-----|------------------|------------------------------------|
| ENSMUST00000143779  | 109 | 79  | 42 Mrap2         | protein_coding                     |
| ENSMUST00000143779  | 109 | 79  | 42 Mrap2         | protein_coding                     |
| ENSMUST00000097275  | 108 | 165 | 85 Prkce         | protein_coding                     |
| ENSMUST00000035170  | 108 | 151 | 12 Dnajc13       | protein_coding                     |
| ENSMUST00000123460  | 108 | 147 | 16 Gm13235       | protein_coding                     |
| ENSMUST00000181286  | 108 | 137 | 2 Gm16685        | antisense                          |
| ENSMUST00000114914  | 108 | 133 | 10 Enox2         | protein_coding                     |
| ENSMUST00000136038  | 108 | 128 | 8 8430429K09Rik  | processed_transcript               |
| ENSMUST00000033640  | 108 | 126 | 52 Pak3          | protein_coding                     |
| ENSMUST00000002064  | 108 | 126 | 16 Blvra         | protein_coding                     |
| ENSMUST00000046515  | 108 | 115 | 16 Nceh1         | protein_coding                     |
| ENSMUST00000149800  | 108 | 102 | 18 Ephb1         | protein_coding                     |
| ENSMUST00000022119  | 108 | 101 | 16 Atg10         | protein_coding                     |
| ENSMUST00000163590  | 108 | 97  | 6 Dtwd2          | protein_coding                     |
| ENSMUST00000114782  | 108 | 94  | 10 Stxbp5l       | protein_coding                     |
| ENSMUST00000096269  | 108 | 85  | 6 Slc22a30       | protein_coding                     |
| ENSMUST00000181023  | 107 | 134 | 30 Nufip2        | protein_coding                     |
| ENSMUST00000168747  | 107 | 134 | 24 Atp10a        | protein_coding                     |
| ENSMUST000000061753 | 107 | 133 | 14 Wdfy4         | protein_coding                     |
| ENSMUST00000042261  | 107 | 131 | 28 Slc2a12       | protein_coding                     |
| ENSMUST00000087657  | 107 | 130 | 36 Pik3c2g       | protein_coding                     |
| ENSMUST00000108916  | 107 | 129 | 24 Phactr3       | protein_coding                     |
| ENSMUST00000180785  | 107 | 120 | 0 Gm26612        | lincRNA                            |
| ENSMUST00000062060  | 107 | 119 | 8 4921504E06Rik  | protein_coding                     |
| ENSMUST00000136104  | 107 | 116 | 28 Lphn3         | protein_coding                     |
| ENSMUST00000135421  | 107 | 110 | 75 2410018L13Rik | lincRNA                            |
| ENSMUST00000077879  | 107 | 93  | 24 Vps13c        | protein_coding                     |
| ENSMUST00000106955  | 107 | 131 | 2 Raver2         | protein_coding                     |
| ENSMUST00000077659  | 107 | 127 | 10 Atp10b        | protein_coding                     |
| ENSMUST00000055032  | 107 | 121 | 26 Kdm5d         | protein_coding                     |
| ENSMUST00000115382  | 107 | 118 | 4 Cped1          | protein_coding                     |
| ENSMUST000000067086 | 107 | 118 | 0 Esr1           | protein_coding                     |
| ENSMUST00000137908  | 107 | 112 | 24 Slc24a3       | protein_coding                     |
| ENSMUST00000143034  | 107 | 112 | 32 Gprasp1       | protein_coding                     |
| ENSMUST00000135526  | 107 | 103 | 38 Sh3rf3        | protein_coding                     |
| ENSMUST00000142600  | 107 | 103 | 34 Wdr44         | protein_coding                     |
| ENSMUST00000026220  | 107 | 102 | 10 Scd3          | protein_coding                     |
| ENSMUST00000170074  | 107 | 101 | 12 Gm17215       | lincRNA                            |
| ENSMUST00000133383  | 107 | 95  | 12 Apoh          | protein_coding                     |
| ENSMUST00000122900  | 107 | 93  | 28 Cstf3         | protein_coding                     |
| ENSMUST00000113794  | 107 | 92  | 48 Igsf5         | protein_coding                     |
| ENSMUST00000004203  | 107 | 16  | 972 Ppan         | protein_coding                     |
| ENSMUST00000046993  | 106 | 152 | 6 Dnah3          | protein_coding                     |
| ENSMUST00000140940  | 106 | 131 | 10 Cflar         | protein_coding                     |
| ENSMUST00000029369  | 106 | 128 | 14 Sohlh2        | protein_coding                     |
| ENSMUST000000084763 | 106 | 116 | 0 Nlrp14         | protein_coding                     |
| ENSMUST00000113179  | 106 | 115 | 14 Afm           | protein_coding                     |
| ENSMUST00000134066  | 106 | 113 | 6 BC065397       | processed_transcript               |
| ENSMUST00000112711  | 106 | 99  | 89 Ninj2         | protein_coding                     |
| ENSMUST00000127263  | 106 | 87  | 26 2610035D17Rik | lincRNA                            |
| ENSMUST00000009814  | 106 | 83  | 10 Tex11         | protein_coding                     |
| ENSMUST00000178400  | 105 | 139 | 8 2610015P09Rik  | protein_coding                     |
| ENSMUST00000037353  | 105 | 139 | 0 Eda2r          | protein_coding                     |
| ENSMUST00000091466  | 105 | 133 | 8 Ttc37          | protein_coding                     |
| ENSMUST00000162830  | 105 | 130 | 14 Csmd3         | protein_coding                     |
| ENSMUST00000155907  | 105 | 126 | 0 Adamts20       | protein_coding                     |
| ENSMUST00000090381  | 105 | 118 | 0 Exoc4          | protein_coding                     |
| ENSMUST00000037294  | 105 | 111 | 34 Tfap2d        | protein_coding                     |
| ENSMUST00000112814  | 105 | 110 | 10 Gm15128       | protein_coding                     |
| ENSMUST00000181438  | 105 | 109 | 30 4930534D22Rik | lincRNA                            |
| ENSMUST00000047660  | 105 | 96  | 12 Pglyrp3       | protein_coding                     |
| ENSMUST00000150147  | 105 | 95  | 6 Vmn2r-ps54     | transcribed_unprocessed_pseudogene |
| ENSMUST00000022913  | 104 | 126 | 0 Dcstamp        | protein_coding                     |
| ENSMUST00000109272  | 104 | 124 | 8 Mier3          | protein_coding                     |
| ENSMUST00000164223  | 104 | 121 | 46 Stard6        | protein_coding                     |
| ENSMUST00000059930  | 104 | 116 | 115 Gm12185      | protein_coding                     |
| ENSMUST00000144424  | 104 | 116 | 6 2900079G21Rik  | lincRNA                            |
| ENSMUST00000182624  | 104 | 112 | 12 Ano4          | protein_coding                     |

|                    |     |     |                   |                        |
|--------------------|-----|-----|-------------------|------------------------|
| ENSMUST00000177481 | 104 | 109 | 16 Vmn2r-ps119    | unprocessed_pseudogene |
| ENSMUST00000040576 | 104 | 108 | 2 Parm1           | protein_coding         |
| ENSMUST00000128446 | 104 | 107 | 8 Slco1a5         | protein_coding         |
| ENSMUST00000131300 | 104 | 103 | 10 Ppp1cb         | protein_coding         |
| ENSMUST00000173226 | 104 | 102 | 0 Gm7029          | unprocessed_pseudogene |
| ENSMUST00000112480 | 104 | 93  | 52 Slc4a10        | protein_coding         |
| ENSMUST00000171914 | 104 | 82  | 2 Vmn2r101        | protein_coding         |
| ENSMUST00000112357 | 104 | 148 | 40 Lemd1          | protein_coding         |
| ENSMUST00000089759 | 104 | 131 | 12 Bdh1           | protein_coding         |
| ENSMUST00000049242 | 104 | 129 | 40 Lrrc20         | protein_coding         |
| ENSMUST00000101513 | 104 | 129 | 12 Fam126a        | protein_coding         |
| ENSMUST00000135096 | 104 | 120 | 0 BC067074        | protein_coding         |
| ENSMUST00000144177 | 104 | 116 | 0 Adhfe1          | protein_coding         |
| ENSMUST00000152881 | 104 | 111 | 26 4932438A13Rik  | protein_coding         |
| ENSMUST00000027009 | 104 | 109 | 14 Casp12         | protein_coding         |
| ENSMUST00000077666 | 104 | 106 | 30 Cnnm2          | protein_coding         |
| ENSMUST00000156166 | 104 | 101 | 8 Agbl1           | protein_coding         |
| ENSMUST00000171841 | 104 | 97  | 24 Vmn2r17        | protein_coding         |
| ENSMUST00000042360 | 104 | 94  | 34 Capsl          | protein_coding         |
| ENSMUST00000169423 | 104 | 82  | 24 Camta1         | protein_coding         |
| ENSMUST00000035220 | 103 | 145 | 83 Prkar2a        | protein_coding         |
| ENSMUST00000112238 | 103 | 139 | 0 Foxn2           | protein_coding         |
| ENSMUST00000107837 | 103 | 123 | 16 Veph1          | protein_coding         |
| ENSMUST00000102713 | 103 | 116 | 4 4933409G03Rik   | protein_coding         |
| ENSMUST00000112454 | 103 | 106 | 506 Kcnh7         | protein_coding         |
| ENSMUST00000044823 | 103 | 106 | 57 Zswim5         | protein_coding         |
| ENSMUST00000114777 | 103 | 102 | 40 Pias2          | protein_coding         |
| ENSMUST00000053922 | 103 | 100 | 28 Vwc2l          | protein_coding         |
| ENSMUST00000180757 | 103 | 93  | 0 Gm26853         | lincRNA                |
| ENSMUST00000139496 | 103 | 89  | 26 Phka2          | protein_coding         |
| ENSMUST00000110967 | 103 | 73  | 18 Smok3c         | protein_coding         |
| ENSMUST00000118458 | 103 | 45  | 2 Gm14358         | processed_pseudogene   |
| ENSMUST00000086474 | 102 | 142 | 18 Olfr872        | protein_coding         |
| ENSMUST00000029196 | 102 | 134 | 0 Slc2a10         | protein_coding         |
| ENSMUST00000127713 | 102 | 117 | 16 Spop           | protein_coding         |
| ENSMUST00000082170 | 102 | 116 | 22 Fat3           | protein_coding         |
| ENSMUST00000088468 | 102 | 116 | 12 Clec4a3        | protein_coding         |
| ENSMUST00000031161 | 102 | 114 | 10 1700023E05Rik  | protein_coding         |
| ENSMUST00000086023 | 102 | 113 | 89 Wbscr17        | protein_coding         |
| ENSMUST00000112979 | 102 | 108 | 20 Catsperd       | protein_coding         |
| ENSMUST00000154966 | 102 | 105 | 20 Kcnt2          | retained_intron        |
| ENSMUST00000154966 | 102 | 105 | 20 Kcnt2          | retained_intron        |
| ENSMUST00000054324 | 102 | 101 | 0 Nod2            | protein_coding         |
| ENSMUST00000181931 | 101 | 225 | 46 Gm10524        | TEC                    |
| ENSMUST00000176290 | 101 | 142 | 6 4930533I22Rik   | antisense              |
| ENSMUST00000125167 | 101 | 139 | 8 Tbcd            | protein_coding         |
| ENSMUST00000161979 | 101 | 127 | 10 Kcnab1         | protein_coding         |
| ENSMUST00000152958 | 101 | 123 | 14 Apoh           | protein_coding         |
| ENSMUST00000151481 | 101 | 120 | 24 Fam154a        | protein_coding         |
| ENSMUST00000058997 | 101 | 117 | 48 Zbtb7c         | protein_coding         |
| ENSMUST00000131334 | 101 | 117 | 14 Gm15581        | antisense              |
| ENSMUST00000105483 | 101 | 115 | 26 Grik2          | protein_coding         |
| ENSMUST00000023538 | 101 | 114 | 87 Mylk           | protein_coding         |
| ENSMUST00000079223 | 101 | 114 | 24 Fggy           | protein_coding         |
| ENSMUST00000137738 | 101 | 107 | 2829 Gm11205      | lincRNA                |
| ENSMUST00000022976 | 101 | 104 | 2 E430025E21Rik   | protein_coding         |
| ENSMUST00000171627 | 101 | 93  | 30 Skint5         | protein_coding         |
| ENSMUST00000180508 | 101 | 92  | 171 4933406F09Rik | processed_transcript   |
| ENSMUST00000109211 | 101 | 91  | 0 Spata2          | protein_coding         |
| ENSMUST00000143914 | 101 | 89  | 2 Zpld1           | protein_coding         |
| ENSMUST00000040271 | 101 | 176 | 4 Cep85           | protein_coding         |
| ENSMUST00000147632 | 101 | 135 | 12 Psmg4          | protein_coding         |
| ENSMUST00000177173 | 101 | 132 | 52 Cdhr4          | protein_coding         |
| ENSMUST00000147119 | 101 | 131 | 14 1700001G01Rik  | lincRNA                |
| ENSMUST00000162427 | 101 | 125 | 2 Reln            | protein_coding         |
| ENSMUST00000105734 | 101 | 123 | 6 Gm13157         | protein_coding         |
| ENSMUST00000163607 | 101 | 114 | 2 Vmn2r21         | protein_coding         |
| ENSMUST00000121378 | 101 | 114 | 22 Stk33          | protein_coding         |

|                     |     |     |                  |                                    |
|---------------------|-----|-----|------------------|------------------------------------|
| ENSMUST00000148575  | 101 | 113 | 16 Serf2         | protein_coding                     |
| ENSMUST00000032892  | 101 | 107 | 16 Xylt1         | protein_coding                     |
| ENSMUST00000054245  | 101 | 102 | 16 Tmem132e      | protein_coding                     |
| ENSMUST00000141452  | 101 | 100 | 4 C630028M04Rik  | lincRNA                            |
| ENSMUST00000112636  | 101 | 97  | 18 Galnt13       | protein_coding                     |
| ENSMUST00000140021  | 101 | 95  | 6 Gm14565        | lincRNA                            |
| ENSMUST00000120734  | 100 | 186 | 2 Gm5934         | protein_coding                     |
| ENSMUST00000127676  | 100 | 171 | 26 Mettl4-ps1    | transcribed_unprocessed_pseudogene |
| ENSMUST00000032732  | 100 | 137 | 20 Apba2         | protein_coding                     |
| ENSMUST00000144914  | 100 | 134 | 0 Gm281          | protein_coding                     |
| ENSMUST00000055296  | 100 | 133 | 8 Polr1a         | protein_coding                     |
| ENSMUST00000070997  | 100 | 128 | 32 Myo1d         | protein_coding                     |
| ENSMUST00000174171  | 100 | 112 | 50 Il1rap        | protein_coding                     |
| ENSMUST00000168824  | 100 | 107 | 0 Slc6a20b       | protein_coding                     |
| ENSMUST00000162383  | 100 | 106 | 24 Glcci1        | protein_coding                     |
| ENSMUST00000165032  | 100 | 105 | 36 Snx24         | protein_coding                     |
| ENSMUST00000111114  | 100 | 102 | 4 Ccdc73         | protein_coding                     |
| ENSMUST00000034057  | 100 | 100 | 10 Palld         | protein_coding                     |
| ENSMUST00000124829  | 100 | 89  | 20 8430437L04Rik | lincRNA                            |
| ENSMUST00000030676  | 100 | 89  | 46 Grik3         | protein_coding                     |
| ENSMUST00000182513  | 100 | 85  | 6 DST            | protein_coding                     |
| ENSMUST00000123755  | 99  | 152 | 54 Htt           | protein_coding                     |
| ENSMUST00000025833  | 99  | 140 | 22 Papss2        | protein_coding                     |
| ENSMUST00000077791  | 99  | 123 | 0 Zfp1           | protein_coding                     |
| ENSMUST00000159659  | 99  | 118 | 0 Hddc2          | protein_coding                     |
| ENSMUST00000160932  | 99  | 104 | 79 Airn          | antisense                          |
| ENSMUST00000099638  | 99  | 102 | 6 Dcdc5          | unitary_pseudogene                 |
| ENSMUST00000099638  | 99  | 102 | 6 Dcdc5          | unitary_pseudogene                 |
| ENSMUST00000102698  | 99  | 97  | 30 Rapgef4       | protein_coding                     |
| ENSMUST00000161365  | 99  | 97  | 8 Clec4a2        | protein_coding                     |
| ENSMUST00000162853  | 99  | 97  | 8 Ppm1h          | protein_coding                     |
| ENSMUST00000115706  | 98  | 151 | 4 Ydjc           | protein_coding                     |
| ENSMUST00000128127  | 98  | 141 | 0 Hltf           | protein_coding                     |
| ENSMUST00000022945  | 98  | 120 | 32 Shcbp1        | protein_coding                     |
| ENSMUST00000119711  | 98  | 116 | 0 Lair1          | protein_coding                     |
| ENSMUST00000184063  | 98  | 114 | 73 Csmd2         | protein_coding                     |
| ENSMUST00000037964  | 98  | 110 | 20 Txlnb         | protein_coding                     |
| ENSMUST00000106572  | 98  | 110 | 28 Skint8        | protein_coding                     |
| ENSMUST00000041826  | 98  | 109 | 12 Rnf13         | protein_coding                     |
| ENSMUST00000118072  | 98  | 108 | 26 Simc1         | protein_coding                     |
| ENSMUST00000177879  | 98  | 104 | 20 Gm5709        | unprocessed_pseudogene             |
| ENSMUST00000094894  | 98  | 103 | 20 Trabd2b       | protein_coding                     |
| ENSMUST00000063989  | 98  | 102 | 10 Zfp438        | protein_coding                     |
| ENSMUST00000173203  | 98  | 101 | 0 Vmn2r-ps66     | unprocessed_pseudogene             |
| ENSMUST000000033419 | 98  | 97  | 24 Dock11        | protein_coding                     |
| ENSMUST00000080361  | 98  | 95  | 4 Akr1c20        | protein_coding                     |
| ENSMUST00000095450  | 98  | 94  | 2 Serpina1b      | protein_coding                     |
| ENSMUST00000155588  | 98  | 83  | 2 Gm16070        | antisense                          |
| ENSMUST00000045607  | 98  | 82  | 34 Melk          | protein_coding                     |
| ENSMUST00000182886  | 98  | 57  | 109 Sec31a       | protein_coding                     |
| ENSMUST00000163159  | 98  | 135 | 4 Adamts3        | protein_coding                     |
| ENSMUST00000072312  | 98  | 117 | 16 Usp13         | protein_coding                     |
| ENSMUST00000053364  | 98  | 116 | 0 Aspm           | protein_coding                     |
| ENSMUST00000098757  | 98  | 114 | 8 Galnt16        | protein_coding                     |
| ENSMUST00000132165  | 98  | 111 | 32 Eps15         | protein_coding                     |
| ENSMUST00000087675  | 98  | 111 | 4 Dera           | protein_coding                     |
| ENSMUST00000142070  | 98  | 110 | 18 Prnp          | protein_coding                     |
| ENSMUST00000160272  | 98  | 108 | 56 Pard3         | protein_coding                     |
| ENSMUST00000106636  | 98  | 105 | 14 Kcnj16        | protein_coding                     |
| ENSMUST00000119142  | 98  | 103 | 4 Erbb4          | protein_coding                     |
| ENSMUST00000038890  | 98  | 101 | 38 Dennd4a       | protein_coding                     |
| ENSMUST00000029871  | 98  | 99  | 8 Cdh17          | protein_coding                     |
| ENSMUST00000181173  | 98  | 95  | 0 Gm3839         | protein_coding                     |
| ENSMUST00000171591  | 98  | 93  | 34 Gm2895        | processed_transcript               |
| ENSMUST00000138863  | 98  | 91  | 20 Myo3a         | protein_coding                     |
| ENSMUST00000095625  | 98  | 76  | 18 Ccdc122       | protein_coding                     |
| ENSMUST00000171671  | 98  | 73  | 6 Vmn2r58        | protein_coding                     |
| ENSMUST00000181574  | 97  | 150 | 18 2700038G22Rik | lincRNA                            |

|                     |    |     |                  |                      |
|---------------------|----|-----|------------------|----------------------|
| ENSMUST00000133500  | 97 | 150 | 12 Ccdc114       | protein_coding       |
| ENSMUST00000071106  | 97 | 140 | 26 Gpatch2l      | protein_coding       |
| ENSMUST00000126340  | 97 | 133 | 8 Dcdc5          | unitary_pseudogene   |
| ENSMUST00000038900  | 97 | 133 | 34 Pds5b         | protein_coding       |
| ENSMUST00000137002  | 97 | 130 | 16 F630206G17Rik | processed_transcript |
| ENSMUST00000154177  | 97 | 126 | 0 Gm12678        | lincRNA              |
| ENSMUST00000068079  | 97 | 120 | 14 Zfp560        | protein_coding       |
| ENSMUST00000139592  | 97 | 113 | 10 Scpep1os      | antisense            |
| ENSMUST00000033957  | 97 | 111 | 6 Adam18         | protein_coding       |
| ENSMUST00000170808  | 97 | 106 | 0 Vmn2r22        | protein_coding       |
| ENSMUST00000133447  | 97 | 97  | 36 Khlh4         | protein_coding       |
| ENSMUST00000020212  | 97 | 90  | 8 Cep83          | protein_coding       |
| ENSMUST00000150203  | 97 | 89  | 28 Gm11210       | lincRNA              |
| ENSMUST00000139850  | 97 | 88  | 0 Slc28a2        | protein_coding       |
| ENSMUST00000126173  | 97 | 85  | 67 Plxdc2        | protein_coding       |
| ENSMUST00000037499  | 97 | 85  | 26 Immp1l        | protein_coding       |
| ENSMUST00000130794  | 97 | 85  | 6 Gm15169        | antisense            |
| ENSMUST00000068094  | 97 | 74  | 32 Cyp2c50       | protein_coding       |
| ENSMUST00000109159  | 96 | 149 | 77 Tshz2         | protein_coding       |
| ENSMUST00000036503  | 96 | 147 | 40 Zfand4        | protein_coding       |
| ENSMUST00000029726  | 96 | 134 | 16 Gatb          | protein_coding       |
| ENSMUST00000031866  | 96 | 132 | 2 Mtpn           | protein_coding       |
| ENSMUST00000143796  | 96 | 126 | 2 Gm11228        | lincRNA              |
| ENSMUST00000180759  | 96 | 118 | 34 Gm5432        | lincRNA              |
| ENSMUST00000100526  | 96 | 116 | 38 Gm10874       | protein_coding       |
| ENSMUST00000042812  | 96 | 102 | 8 Slco1b2        | protein_coding       |
| ENSMUST00000172203  | 96 | 91  | 4 Vmn2r103       | protein_coding       |
| ENSMUST00000177824  | 96 | 77  | 83 Axdnd1        | protein_coding       |
| ENSMUST00000145305  | 96 | 38  | 0 Gm14368        | processed_pseudogene |
| ENSMUST00000027174  | 95 | 156 | 89 Nop58         | protein_coding       |
| ENSMUST00000020706  | 95 | 131 | 28 Adcy1         | protein_coding       |
| ENSMUST00000078616  | 95 | 124 | 0 Gpsm1          | protein_coding       |
| ENSMUST00000145003  | 95 | 123 | 63 Mipol1        | protein_coding       |
| ENSMUST00000153746  | 95 | 118 | 8 Spata6         | protein_coding       |
| ENSMUST00000072167  | 95 | 113 | 65 Rhox2e        | protein_coding       |
| ENSMUST00000160472  | 95 | 104 | 22 Ccdc150       | protein_coding       |
| ENSMUST00000069936  | 95 | 103 | 20 Impg2         | protein_coding       |
| ENSMUST00000040677  | 95 | 100 | 54 Eepd1         | protein_coding       |
| ENSMUST00000067821  | 95 | 100 | 2 Ercc6l2        | protein_coding       |
| ENSMUST00000076052  | 95 | 96  | 42 Prcp          | protein_coding       |
| ENSMUST00000175695  | 95 | 95  | 34 Ugt3a1        | protein_coding       |
| ENSMUST00000151747  | 95 | 94  | 8 Lace1          | protein_coding       |
| ENSMUST00000094050  | 95 | 89  | 0 Hsd3b3         | protein_coding       |
| ENSMUST00000042070  | 95 | 86  | 38 Zdhhc15       | protein_coding       |
| ENSMUST00000120990  | 95 | 83  | 4 Olfm1          | protein_coding       |
| ENSMUST00000084770  | 95 | 81  | 10 Fut9          | protein_coding       |
| ENSMUST00000139833  | 95 | 133 | 101 Fam46c       | protein_coding       |
| ENSMUST00000114085  | 95 | 121 | 10 F8            | protein_coding       |
| ENSMUST00000128812  | 95 | 120 | 2 Bbs9           | protein_coding       |
| ENSMUST00000021818  | 95 | 114 | 22 Cenpp         | protein_coding       |
| ENSMUST00000074546  | 95 | 111 | 36 Sdk1          | protein_coding       |
| ENSMUST00000149561  | 95 | 111 | 0 Trim24         | protein_coding       |
| ENSMUST00000089469  | 95 | 110 | 4 Apol7b         | protein_coding       |
| ENSMUST00000134455  | 95 | 108 | 0 Gm498          | protein_coding       |
| ENSMUST00000127899  | 95 | 101 | 12 Rptor         | protein_coding       |
| ENSMUST00000124910  | 95 | 99  | 6 Mcph1          | protein_coding       |
| ENSMUST00000077968  | 95 | 96  | 54 Fam71d        | protein_coding       |
| ENSMUST000000097739 | 95 | 94  | 10 Pgap1         | protein_coding       |
| ENSMUST00000079472  | 95 | 88  | 10 Aadat         | protein_coding       |
| ENSMUST00000072311  | 95 | 85  | 24 Yes1          | protein_coding       |
| ENSMUST00000096608  | 95 | 79  | 2 Mroh9          | protein_coding       |
| ENSMUST00000153323  | 95 | 58  | 10 Grk4          | protein_coding       |
| ENSMUST00000039655  | 94 | 139 | 6 Tulp4          | protein_coding       |
| ENSMUST00000001412  | 94 | 137 | 8 Ccdc132        | protein_coding       |
| ENSMUST00000132833  | 94 | 114 | 32 Cd28          | protein_coding       |
| ENSMUST00000182586  | 94 | 107 | 26 A930001A20Rik | lincRNA              |
| ENSMUST00000173827  | 94 | 106 | 56 Mecomos       | antisense            |
| ENSMUST00000031538  | 94 | 105 | 0 2210016L21Rik  | protein_coding       |

|                     |    |     |                  |                                  |
|---------------------|----|-----|------------------|----------------------------------|
| ENSMUST00000022078  | 94 | 101 | 24 Rhobtb3       | protein_coding                   |
| ENSMUST00000159580  | 94 | 99  | 4 Lama4          | protein_coding                   |
| ENSMUST00000027517  | 94 | 96  | 10 Dgkd          | protein_coding                   |
| ENSMUST00000048214  | 94 | 94  | 6 Oosp1          | protein_coding                   |
| ENSMUST00000111623  | 94 | 93  | 20 Ppfibp1       | protein_coding                   |
| ENSMUST00000183276  | 94 | 93  | 16 6530403H02Rik | lincRNA                          |
| ENSMUST00000112727  | 94 | 84  | 16 Apex2         | protein_coding                   |
| ENSMUST00000028829  | 93 | 145 | 14 Spred1        | protein_coding                   |
| ENSMUST00000114873  | 93 | 137 | 36 Paccin1       | protein_coding                   |
| ENSMUST00000028640  | 93 | 116 | 4 Dph6           | protein_coding                   |
| ENSMUST00000177898  | 93 | 109 | 0 Gm13377        | unprocessed_pseudogene           |
| ENSMUST00000177898  | 93 | 109 | 0 Gm13377        | unprocessed_pseudogene           |
| ENSMUST00000149133  | 93 | 105 | 34 Pax6os1       | antisense                        |
| ENSMUST00000069994  | 93 | 105 | 8 St3gal5        | protein_coding                   |
| ENSMUST00000039269  | 93 | 99  | 10 Zbbx          | protein_coding                   |
| ENSMUST00000027988  | 93 | 92  | 30 Ccdc3         | protein_coding                   |
| ENSMUST00000176108  | 93 | 91  | 6 A330044P14Rik  | lincRNA                          |
| ENSMUST00000155560  | 93 | 89  | 0 Gm13857        | transcribed_processed_pseudogene |
| ENSMUST00000151232  | 93 | 87  | 6 Asph           | protein_coding                   |
| ENSMUST00000035854  | 93 | 82  | 24 Cdrt4         | protein_coding                   |
| ENSMUST00000029126  | 93 | 79  | 30 Itch          | protein_coding                   |
| ENSMUST00000110894  | 93 | 70  | 755 Tpt1         | protein_coding                   |
| ENSMUST00000127311  | 93 | 133 | 57 Ppp5c         | protein_coding                   |
| ENSMUST00000024650  | 93 | 130 | 24 1700010I14Rik | protein_coding                   |
| ENSMUST00000150783  | 93 | 122 | 0 Pfkfb1         | protein_coding                   |
| ENSMUST00000059882  | 93 | 116 | 22 5830411N06Rik | protein_coding                   |
| ENSMUST00000131709  | 93 | 114 | 0 Gm15249        | processed_pseudogene             |
| ENSMUST00000142758  | 93 | 108 | 266 Rnf157       | protein_coding                   |
| ENSMUST00000067947  | 93 | 106 | 147 Rock1        | protein_coding                   |
| ENSMUST00000031040  | 93 | 104 | 26 Cwh43         | protein_coding                   |
| ENSMUST00000031984  | 93 | 102 | 52 Smarcd1       | protein_coding                   |
| ENSMUST00000001965  | 93 | 102 | 0 Kcnh6          | protein_coding                   |
| ENSMUST00000163338  | 93 | 99  | 4 Luzp4          | protein_coding                   |
| ENSMUST00000015368  | 93 | 99  | 0 Cyp2j11        | protein_coding                   |
| ENSMUST00000159713  | 93 | 99  | 0 Ccdc79         | protein_coding                   |
| ENSMUST00000064921  | 93 | 98  | 34 Prkcb         | protein_coding                   |
| ENSMUST00000169351  | 93 | 97  | 0 Vmn2r-ps56     | unprocessed_pseudogene           |
| ENSMUST00000169351  | 93 | 97  | 0 Vmn2r-ps56     | unprocessed_pseudogene           |
| ENSMUST00000039286  | 93 | 95  | 56 Atg5          | protein_coding                   |
| ENSMUST00000099472  | 93 | 95  | 10 Cyp2c68       | protein_coding                   |
| ENSMUST00000161776  | 93 | 91  | 6 Serpini1       | protein_coding                   |
| ENSMUST00000153845  | 93 | 89  | 2 Abca16         | protein_coding                   |
| ENSMUST00000170608  | 93 | 85  | 0 C130060K24Rik  | protein_coding                   |
| ENSMUST00000125619  | 93 | 75  | 218 Rc3h2        | protein_coding                   |
| ENSMUST00000020173  | 92 | 129 | 4 Map7           | protein_coding                   |
| ENSMUST00000141758  | 92 | 129 | 10 Gm11588       | lincRNA                          |
| ENSMUST00000078961  | 92 | 127 | 24 Kifc5b        | protein_coding                   |
| ENSMUST00000036570  | 92 | 125 | 4 Appl1          | protein_coding                   |
| ENSMUST00000147445  | 92 | 120 | 2 A830035A12Rik  | processed_transcript             |
| ENSMUST00000126680  | 92 | 113 | 10 Gm5834        | unprocessed_pseudogene           |
| ENSMUST00000063492  | 92 | 112 | 24 Rspo2         | protein_coding                   |
| ENSMUST00000035930  | 92 | 112 | 6 Zfp800         | protein_coding                   |
| ENSMUST00000030552  | 92 | 110 | 10 Ccdc146       | protein_coding                   |
| ENSMUST00000111019  | 92 | 104 | 14 Ano3          | protein_coding                   |
| ENSMUST00000177554  | 92 | 102 | 2 Ott            | protein_coding                   |
| ENSMUST00000149593  | 92 | 102 | 0 Enpp6          | protein_coding                   |
| ENSMUST00000143949  | 92 | 99  | 0 4921518K17Rik  | antisense                        |
| ENSMUST000000044190 | 92 | 95  | 10 Hhat          | protein_coding                   |
| ENSMUST00000042299  | 92 | 95  | 30 Kcnh5         | protein_coding                   |
| ENSMUST00000162691  | 92 | 95  | 28 Sucla2        | protein_coding                   |
| ENSMUST00000122117  | 92 | 93  | 6 Amy2-ps1       | unprocessed_pseudogene           |
| ENSMUST00000161108  | 92 | 91  | 14 Aut2          | protein_coding                   |
| ENSMUST00000136639  | 92 | 89  | 40 E330010L02Rik | lincRNA                          |
| ENSMUST00000171939  | 92 | 85  | 18 Wdr64         | protein_coding                   |
| ENSMUST00000141405  | 92 | 85  | 0 Al838599       | lincRNA                          |
| ENSMUST00000145127  | 92 | 83  | 4 Gm12069        | lincRNA                          |
| ENSMUST00000176386  | 92 | 81  | 12 Hmbx1         | protein_coding                   |
| ENSMUST00000160894  | 92 | 80  | 30 Ctnna2        | protein_coding                   |

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|--------------------|----|-----|------------------|------------------------|
| ENSMUST00000039564 | 92 | 76  | 26 Lppr5         | protein_coding         |
| ENSMUST00000144098 | 92 | 76  | 14 Gm10057       | protein_coding         |
| ENSMUST00000129132 | 92 | 66  | 59 Wdr17         | protein_coding         |
| ENSMUST00000091628 | 92 | 55  | 109 Atxn1        | protein_coding         |
| ENSMUST00000070198 | 92 | 32  | 63 Ppp3ca        | protein_coding         |
| ENSMUST00000152576 | 91 | 134 | 10 Gm11944       | processed_transcript   |
| ENSMUST00000043336 | 91 | 124 | 2 St8sia4        | protein_coding         |
| ENSMUST00000025505 | 91 | 120 | 0 Dctn4          | protein_coding         |
| ENSMUST00000054565 | 91 | 118 | 32 Ifit43        | protein_coding         |
| ENSMUST00000061118 | 91 | 112 | 10 Slc25a26      | protein_coding         |
| ENSMUST00000124507 | 91 | 106 | 2 Tsc1           | protein_coding         |
| ENSMUST00000111908 | 91 | 102 | 2 Mmrn2          | protein_coding         |
| ENSMUST00000060148 | 91 | 101 | 44 Hivep1        | protein_coding         |
| ENSMUST00000025393 | 91 | 100 | 0 Smad4          | protein_coding         |
| ENSMUST00000141984 | 91 | 98  | 149 Ipmk         | protein_coding         |
| ENSMUST00000171130 | 91 | 95  | 42 1700082M22Rik | antisense              |
| ENSMUST00000035148 | 91 | 94  | 67 Slco2a1       | protein_coding         |
| ENSMUST00000137752 | 91 | 94  | 4 Gm16023        | processed_transcript   |
| ENSMUST00000031104 | 91 | 93  | 18 Pds5a         | protein_coding         |
| ENSMUST00000128141 | 91 | 93  | 8 Ube2h          | protein_coding         |
| ENSMUST00000125698 | 91 | 92  | 24 Gpr98         | protein_coding         |
| ENSMUST00000093142 | 91 | 89  | 16 Rasgef1c      | protein_coding         |
| ENSMUST00000178342 | 91 | 76  | 14 Samt1         | protein_coding         |
| ENSMUST00000101186 | 90 | 123 | 2 Gm15127        | protein_coding         |
| ENSMUST00000075806 | 90 | 122 | 16 Atp13a5       | protein_coding         |
| ENSMUST00000035849 | 90 | 112 | 2 1700028P14Rik  | protein_coding         |
| ENSMUST00000055776 | 90 | 110 | 81 Arhgap15      | protein_coding         |
| ENSMUST00000005671 | 90 | 106 | 10 Igf1r         | protein_coding         |
| ENSMUST00000086722 | 90 | 104 | 81 Tmem232       | protein_coding         |
| ENSMUST00000089017 | 90 | 104 | 8 Fndc3a         | protein_coding         |
| ENSMUST00000087050 | 90 | 102 | 14 Col4a4        | protein_coding         |
| ENSMUST00000021800 | 90 | 99  | 2 Mcur1          | protein_coding         |
| ENSMUST00000177115 | 90 | 99  | 12 Vmn2r-ps21    | unprocessed_pseudogene |
| ENSMUST00000122435 | 90 | 95  | 30 Gm14903       | processed_pseudogene   |
| ENSMUST00000027559 | 90 | 94  | 44 Tnfrsf11a     | protein_coding         |
| ENSMUST00000020071 | 90 | 92  | 12 Sim1          | protein_coding         |
| ENSMUST00000181089 | 90 | 91  | 65 Gm26655       | processed_transcript   |
| ENSMUST00000069395 | 90 | 91  | 0 Zzef1          | protein_coding         |
| ENSMUST00000159945 | 90 | 86  | 20 Slc9c1        | protein_coding         |
| ENSMUST00000179369 | 90 | 76  | 12 4921511M17Rik | protein_coding         |
| ENSMUST00000181839 | 90 | 75  | 32 2310069G16Rik | lincRNA                |
| ENSMUST00000180387 | 90 | 68  | 18 Gm2115        | lincRNA                |
| ENSMUST00000114505 | 90 | 58  | 18 4931423N10Rik | protein_coding         |
| ENSMUST00000051358 | 90 | 57  | 14 Fbxl13        | protein_coding         |
| ENSMUST00000129746 | 90 | 142 | 0 Hirip3         | protein_coding         |
| ENSMUST00000144212 | 90 | 121 | 0 Gm12962        | lincRNA                |
| ENSMUST00000173791 | 90 | 120 | 0 Plcg1          | protein_coding         |
| ENSMUST00000087212 | 90 | 117 | 0 Nipal1         | protein_coding         |
| ENSMUST00000149237 | 90 | 108 | 12 Gldnos        | antisense              |
| ENSMUST00000105779 | 90 | 101 | 12 Fhad1         | protein_coding         |
| ENSMUST00000133154 | 90 | 100 | 8 Fnip2          | protein_coding         |
| ENSMUST00000043914 | 90 | 97  | 34 Ints9         | protein_coding         |
| ENSMUST00000047923 | 90 | 95  | 18 Sec24d        | protein_coding         |
| ENSMUST00000067033 | 90 | 95  | 12 Stk3          | protein_coding         |
| ENSMUST00000022535 | 90 | 94  | 0 Dcp1a          | protein_coding         |
| ENSMUST00000066679 | 90 | 86  | 38 Shisa6        | protein_coding         |
| ENSMUST00000114370 | 90 | 83  | 14 Zfyve28       | protein_coding         |
| ENSMUST00000112565 | 90 | 74  | 14 Gm15140       | protein_coding         |
| ENSMUST00000146708 | 90 | 56  | 38 Zbtb20        | protein_coding         |
| ENSMUST00000139377 | 89 | 118 | 16 Gm13713       | antisense              |
| ENSMUST00000110161 | 89 | 114 | 44 Phactr1       | protein_coding         |
| ENSMUST00000016023 | 89 | 110 | 10 Fam184b       | protein_coding         |
| ENSMUST00000136971 | 89 | 104 | 4 Specc1         | protein_coding         |
| ENSMUST00000181022 | 89 | 101 | 89 Gm26745       | lincRNA                |
| ENSMUST00000164297 | 89 | 99  | 2 Skint11        | protein_coding         |
| ENSMUST00000150890 | 89 | 97  | 8 Il2ra          | protein_coding         |
| ENSMUST00000172831 | 89 | 96  | 18 Rgs22         | protein_coding         |
| ENSMUST00000069477 | 89 | 91  | 20 Magea2        | protein_coding         |



|                    |    |     |                  |                      |
|--------------------|----|-----|------------------|----------------------|
| ENSMUST00000161637 | 89 | 90  | 67 Nr1h3         | protein_coding       |
| ENSMUST00000165561 | 89 | 88  | 2 Smim13         | protein_coding       |
| ENSMUST00000029002 | 89 | 87  | 10 Stmn2         | protein_coding       |
| ENSMUST00000026014 | 89 | 85  | 4 Efhc2          | protein_coding       |
| ENSMUST00000097959 | 89 | 82  | 2 Efcab7         | protein_coding       |
| ENSMUST00000088455 | 89 | 81  | 8 Clec4b2        | protein_coding       |
| ENSMUST00000183522 | 89 | 79  | 20 Otx2os1       | lincRNA              |
| ENSMUST00000128437 | 89 | 63  | 0 Gga3           | protein_coding       |
| ENSMUST00000131730 | 88 | 114 | 2 Ptpla          | protein_coding       |
| ENSMUST00000170160 | 88 | 112 | 40 Inpp4b        | protein_coding       |
| ENSMUST00000172391 | 88 | 112 | 24 Vmn2r23       | protein_coding       |
| ENSMUST00000100683 | 88 | 106 | 6 Gm10373        | lincRNA              |
| ENSMUST00000084474 | 88 | 102 | 18 Frmd3         | protein_coding       |
| ENSMUST00000153221 | 88 | 102 | 24 Pfkfb1        | protein_coding       |
| ENSMUST00000032776 | 88 | 102 | 8 Mef2a          | protein_coding       |
| ENSMUST00000176060 | 88 | 99  | 10 Arhgap18      | protein_coding       |
| ENSMUST00000090568 | 88 | 97  | 16 Ptpbz1        | protein_coding       |
| ENSMUST00000134833 | 88 | 96  | 28 Gm14064       | lincRNA              |
| ENSMUST00000114109 | 88 | 95  | 18 Gab3          | protein_coding       |
| ENSMUST00000128883 | 88 | 93  | 12 Ctdspl2       | protein_coding       |
| ENSMUST00000039630 | 88 | 90  | 16 Ror1          | protein_coding       |
| ENSMUST00000070150 | 88 | 89  | 56 E130308A19Rik | protein_coding       |
| ENSMUST00000181787 | 88 | 88  | 218 Gm26680      | processed_transcript |
| ENSMUST00000112630 | 88 | 75  | 20 Nek10         | protein_coding       |
| ENSMUST00000042012 | 87 | 250 | 254 Sfb3         | protein_coding       |
| ENSMUST00000053821 | 87 | 120 | 16 AY358078      | protein_coding       |
| ENSMUST00000002176 | 87 | 118 | 22 Celf2         | protein_coding       |
| ENSMUST00000170464 | 87 | 115 | 4 Gbe1           | protein_coding       |
| ENSMUST00000025482 | 87 | 112 | 26 Atp8b1        | protein_coding       |
| ENSMUST00000075941 | 87 | 112 | 24 Ppp2r3a       | protein_coding       |
| ENSMUST00000149233 | 87 | 97  | 2 Abca3          | protein_coding       |
| ENSMUST00000042092 | 87 | 93  | 24 Cdh26         | protein_coding       |
| ENSMUST00000057495 | 87 | 93  | 22 Tmem161b      | protein_coding       |
| ENSMUST00000027267 | 87 | 88  | 0 Pms1           | protein_coding       |
| ENSMUST00000148952 | 87 | 88  | 0 Kihl20         | protein_coding       |
| ENSMUST00000077190 | 87 | 83  | 50 Cpne4         | protein_coding       |
| ENSMUST00000022242 | 87 | 64  | 28 Emb           | protein_coding       |
| ENSMUST00000139853 | 87 | 134 | 0 Rnf10          | protein_coding       |
| ENSMUST00000021044 | 87 | 123 | 10 5530401A14Rik | protein_coding       |
| ENSMUST00000115841 | 87 | 112 | 192 Rbfox1       | protein_coding       |
| ENSMUST00000136082 | 87 | 111 | 0 Laptm5         | protein_coding       |
| ENSMUST00000028612 | 87 | 110 | 22 Pamr1         | protein_coding       |
| ENSMUST00000032747 | 87 | 109 | 0 Hddc3          | protein_coding       |
| ENSMUST00000105902 | 87 | 106 | 50 Shank2        | protein_coding       |
| ENSMUST00000087916 | 87 | 105 | 20 Hdac8         | protein_coding       |
| ENSMUST00000082290 | 87 | 104 | 8 Slc39a12       | protein_coding       |
| ENSMUST00000071168 | 87 | 102 | 34 Tek           | protein_coding       |
| ENSMUST00000142636 | 87 | 93  | 4 4930430A15Rik  | protein_coding       |
| ENSMUST00000023467 | 87 | 93  | 52 Pak2          | protein_coding       |
| ENSMUST00000164787 | 87 | 91  | 28 Cdh18         | protein_coding       |
| ENSMUST00000093853 | 87 | 91  | 12 Nxpe4         | protein_coding       |
| ENSMUST00000160273 | 87 | 90  | 0 Egflam         | protein_coding       |
| ENSMUST00000127140 | 87 | 85  | 24 Itgb3         | protein_coding       |
| ENSMUST00000097079 | 87 | 85  | 22 Klf12         | protein_coding       |
| ENSMUST00000160953 | 87 | 85  | 12 Sphkap        | protein_coding       |
| ENSMUST00000062542 | 87 | 79  | 2 4930550L24Rik  | protein_coding       |
| ENSMUST00000134929 | 87 | 70  | 0 Mmd            | protein_coding       |
| ENSMUST00000141943 | 87 | 66  | 99 Sdk2          | protein_coding       |
| ENSMUST00000137376 | 86 | 205 | 210 Rpl7a        | protein_coding       |
| ENSMUST00000114186 | 86 | 142 | 12 Smyd1         | protein_coding       |
| ENSMUST00000164759 | 86 | 125 | 14 Sbf2          | protein_coding       |
| ENSMUST00000143588 | 86 | 123 | 0 Gnb4           | protein_coding       |
| ENSMUST00000047954 | 86 | 117 | 14 Dtna          | protein_coding       |
| ENSMUST00000052277 | 86 | 112 | 16 Iqub          | protein_coding       |
| ENSMUST00000101237 | 86 | 112 | 4 Bst1           | protein_coding       |
| ENSMUST00000156656 | 86 | 96  | 22 Ptprd         | protein_coding       |
| ENSMUST00000037375 | 86 | 84  | 6 Eps8l3         | protein_coding       |
| ENSMUST00000100191 | 86 | 83  | 8 Atf7ip2        | protein_coding       |

|                     |    |     |     |               |                        |
|---------------------|----|-----|-----|---------------|------------------------|
| ENSMUST00000182249  | 86 | 82  | 22  | Cep112        | protein_coding         |
| ENSMUST00000025930  | 86 | 81  | 8   | Smc3          | protein_coding         |
| ENSMUST00000155912  | 86 | 61  | 4   | 4930511O05Rik | lincRNA                |
| ENSMUST00000150385  | 86 | 55  | 54  | Gm16036       | antisense              |
| ENSMUST00000025786  | 85 | 119 | 54  | Pacs1         | protein_coding         |
| ENSMUST00000020165  | 85 | 106 | 14  | Pde7b         | protein_coding         |
| ENSMUST00000044970  | 85 | 104 | 10  | Mgat3         | protein_coding         |
| ENSMUST00000093494  | 85 | 102 | 16  | Gm10283       | protein_coding         |
| ENSMUST00000029571  | 85 | 102 | 26  | Sass6         | protein_coding         |
| ENSMUST00000091560  | 85 | 100 | 12  | 2010111I01Rik | protein_coding         |
| ENSMUST00000180848  | 85 | 96  | 26  | Gm26629       | lincRNA                |
| ENSMUST00000174120  | 85 | 96  | 10  | Trak2         | protein_coding         |
| ENSMUST00000166928  | 85 | 85  | 22  | Gm3115        | protein_coding         |
| ENSMUST00000149815  | 85 | 85  | 2   | Far2os2       | antisense              |
| ENSMUST00000171996  | 85 | 79  | 2   | Vmn2r117      | protein_coding         |
| ENSMUST00000002259  | 85 | 78  | 18  | Clgn          | protein_coding         |
| ENSMUST00000166458  | 85 | 77  | 0   | Cadps2        | protein_coding         |
| ENSMUST00000176925  | 85 | 76  | 32  | Gm20656       | unprocessed_pseudogene |
| ENSMUST00000143812  | 85 | 66  | 12  | Zfp85os       | antisense              |
| ENSMUST00000181846  | 85 | 66  | 0   | 1500012K07Rik | lincRNA                |
| ENSMUST00000085554  | 84 | 126 | 2   | Mtus2         | protein_coding         |
| ENSMUST00000044505  | 84 | 120 | 4   | Pde1c         | protein_coding         |
| ENSMUST00000066439  | 84 | 116 | 10  | Exoc6         | protein_coding         |
| ENSMUST00000144420  | 84 | 113 | 0   | Gm16252       | antisense              |
| ENSMUST00000000305  | 84 | 103 | 34  | Tpd52l1       | protein_coding         |
| ENSMUST00000081510  | 84 | 97  | 0   | Mgmt          | protein_coding         |
| ENSMUST00000112863  | 84 | 93  | 12  | Pak3          | protein_coding         |
| ENSMUST00000060989  | 84 | 91  | 12  | Sorl1         | protein_coding         |
| ENSMUST00000130362  | 84 | 85  | 0   | Gm12295       | lincRNA                |
| ENSMUST00000173018  | 84 | 84  | 0   | Rgs22         | protein_coding         |
| ENSMUST00000114054  | 84 | 83  | 14  | 4930468A15Rik | protein_coding         |
| ENSMUST000000094179 | 84 | 78  | 44  | Gria1         | protein_coding         |
| ENSMUST00000113542  | 84 | 77  | 14  | Scfd2         | protein_coding         |
| ENSMUST00000131716  | 84 | 75  | 4   | Gm1305        | protein_coding         |
| ENSMUST00000152798  | 84 | 68  | 71  | Mboat1        | protein_coding         |
| ENSMUST00000101442  | 84 | 61  | 61  | Dpysl5        | protein_coding         |
| ENSMUST00000140840  | 84 | 47  | 6   | March11       | protein_coding         |
| ENSMUST00000145897  | 84 | 231 | 40  | 2310040G07Rik | antisense              |
| ENSMUST00000146591  | 84 | 154 | 14  | Tgfbfr3       | protein_coding         |
| ENSMUST00000160236  | 84 | 120 | 26  | Spef2         | protein_coding         |
| ENSMUST00000090726  | 84 | 113 | 0   | Slc43a3       | protein_coding         |
| ENSMUST00000061578  | 84 | 112 | 40  | Setx          | protein_coding         |
| ENSMUST00000143266  | 84 | 109 | 0   | Gm15674       | antisense              |
| ENSMUST00000097929  | 84 | 105 | 34  | Shank2        | protein_coding         |
| ENSMUST00000162906  | 84 | 105 | 16  | Cdk15         | protein_coding         |
| ENSMUST00000075159  | 84 | 104 | 8   | Clock         | protein_coding         |
| ENSMUST00000123698  | 84 | 102 | 46  | Hivep3        | protein_coding         |
| ENSMUST00000164052  | 84 | 101 | 22  | Ccdc132       | protein_coding         |
| ENSMUST00000110523  | 84 | 98  | 0   | C1qtnf3       | protein_coding         |
| ENSMUST00000091818  | 84 | 95  | 10  | Ryr3          | protein_coding         |
| ENSMUST00000175700  | 84 | 91  | 6   | Cyyr1         | protein_coding         |
| ENSMUST00000166407  | 84 | 89  | 10  | Ubxn1         | protein_coding         |
| ENSMUST00000032468  | 84 | 85  | 4   | Efcab12       | protein_coding         |
| ENSMUST00000117676  | 84 | 80  | 16  | Rgs17         | protein_coding         |
| ENSMUST00000080036  | 84 | 79  | 24  | Htt           | protein_coding         |
| ENSMUST00000113775  | 84 | 76  | 32  | Eda           | protein_coding         |
| ENSMUST00000131778  | 84 | 74  | 46  | Csmd1         | protein_coding         |
| ENSMUST00000153098  | 84 | 74  | 42  | Slit3         | protein_coding         |
| ENSMUST00000147292  | 83 | 124 | 0   | Pik3r3        | protein_coding         |
| ENSMUST00000034023  | 83 | 114 | 8   | Scrg1         | protein_coding         |
| ENSMUST00000151522  | 83 | 111 | 8   | Abca13        | protein_coding         |
| ENSMUST00000180046  | 83 | 110 | 2   | Usp34         | protein_coding         |
| ENSMUST00000035625  | 83 | 101 | 69  | Cyp7b1        | protein_coding         |
| ENSMUST00000042824  | 83 | 100 | 24  | Herc1         | protein_coding         |
| ENSMUST00000117237  | 83 | 99  | 18  | Qser1         | protein_coding         |
| ENSMUST00000150573  | 83 | 97  | 12  | L3mbtl4       | protein_coding         |
| ENSMUST00000042546  | 83 | 96  | 6   | Ano10         | protein_coding         |
| ENSMUST00000145453  | 83 | 91  | 184 | 4930578G10Rik | protein_coding         |

|                    |    |     |                  |                        |
|--------------------|----|-----|------------------|------------------------|
| ENSMUST00000022115 | 83 | 91  | 2 Xrcc4          | protein_coding         |
| ENSMUST00000040695 | 83 | 89  | 0 Sbspon         | protein_coding         |
| ENSMUST00000053265 | 83 | 87  | 4 Lyrn4          | protein_coding         |
| ENSMUST00000168431 | 83 | 79  | 2 Map4k4         | protein_coding         |
| ENSMUST00000086444 | 83 | 76  | 8 Ppp1r12b       | protein_coding         |
| ENSMUST00000138230 | 83 | 76  | 2 Lrp2bp         | protein_coding         |
| ENSMUST00000051017 | 83 | 74  | 2 Defb1          | protein_coding         |
| ENSMUST00000039442 | 83 | 58  | 268 Alg14        | protein_coding         |
| ENSMUST00000139934 | 83 | 43  | 44 1810032O08Rik | protein_coding         |
| ENSMUST00000095775 | 82 | 125 | 4 Setdb2         | protein_coding         |
| ENSMUST00000034912 | 82 | 122 | 28 Rasgrf1       | protein_coding         |
| ENSMUST00000177280 | 82 | 112 | 0 Atpaf1         | protein_coding         |
| ENSMUST00000176695 | 82 | 104 | 169 Ttl5         | protein_coding         |
| ENSMUST00000142681 | 82 | 99  | 0 Atp13a5        | protein_coding         |
| ENSMUST00000111178 | 82 | 97  | 8 Efr3b          | protein_coding         |
| ENSMUST00000164422 | 82 | 95  | 24 Gm4884        | protein_coding         |
| ENSMUST00000125551 | 82 | 90  | 0 Csmc1          | protein_coding         |
| ENSMUST00000043944 | 82 | 88  | 4 Ano5           | protein_coding         |
| ENSMUST00000046485 | 82 | 86  | 6 Efcab11        | protein_coding         |
| ENSMUST00000176078 | 82 | 83  | 10 Vipr2         | protein_coding         |
| ENSMUST00000174205 | 82 | 80  | 34 Mtmr7         | protein_coding         |
| ENSMUST00000079847 | 82 | 77  | 32 Suclg2        | protein_coding         |
| ENSMUST00000096012 | 82 | 62  | 28 Abi3bp        | protein_coding         |
| ENSMUST00000031119 | 82 | 62  | 18 Gabrg1        | protein_coding         |
| ENSMUST00000025444 | 82 | 55  | 38 Cxxc1         | protein_coding         |
| ENSMUST00000130910 | 82 | 13  | 16 Tsr1          | protein_coding         |
| ENSMUST00000140000 | 81 | 155 | 8 Gm15983        | processed_transcript   |
| ENSMUST00000068856 | 81 | 112 | 16 Snupn         | protein_coding         |
| ENSMUST00000030478 | 81 | 109 | 22 Atpaf1        | protein_coding         |
| ENSMUST00000030478 | 81 | 109 | 22 Atpaf1        | protein_coding         |
| ENSMUST00000143622 | 81 | 97  | 14 Gm14951       | lincRNA                |
| ENSMUST00000170805 | 81 | 96  | 38 Fetub         | protein_coding         |
| ENSMUST00000135659 | 81 | 96  | 0 4930443O20Rik  | processed_transcript   |
| ENSMUST00000109867 | 81 | 93  | 30 Znrf3         | protein_coding         |
| ENSMUST00000037763 | 81 | 87  | 0 Ythdc2         | protein_coding         |
| ENSMUST00000178833 | 81 | 87  | 0 Gm15128        | protein_coding         |
| ENSMUST00000120638 | 81 | 85  | 91 Syn3          | protein_coding         |
| ENSMUST00000126030 | 81 | 85  | 34 Dcc           | protein_coding         |
| ENSMUST00000004829 | 81 | 85  | 0 Cd244          | protein_coding         |
| ENSMUST00000149488 | 81 | 84  | 14 B630019A10Rik | processed_transcript   |
| ENSMUST00000179758 | 81 | 83  | 4 Adtrp          | protein_coding         |
| ENSMUST00000094018 | 81 | 83  | 2 Ppapdc1a       | protein_coding         |
| ENSMUST00000170465 | 81 | 79  | 16 Gm3636        | protein_coding         |
| ENSMUST00000170465 | 81 | 79  | 16 Gm3636        | protein_coding         |
| ENSMUST00000146396 | 81 | 78  | 34 A930011G23Rik | protein_coding         |
| ENSMUST00000135491 | 81 | 77  | 0 Gm15015        | processed_transcript   |
| ENSMUST00000161581 | 81 | 76  | 4 Gm1992         | antisense              |
| ENSMUST00000029666 | 81 | 73  | 18 Papss1        | protein_coding         |
| ENSMUST00000115405 | 81 | 72  | 6 Cfr            | protein_coding         |
| ENSMUST00000138925 | 81 | 71  | 0 Gm14371        | unprocessed_pseudogene |
| ENSMUST00000020381 | 81 | 51  | 34 Frs2          | protein_coding         |
| ENSMUST00000174268 | 81 | 123 | 0 Mocs1          | protein_coding         |
| ENSMUST00000057598 | 81 | 118 | 10 Mblac2        | protein_coding         |
| ENSMUST00000139994 | 81 | 102 | 0 Cad            | protein_coding         |
| ENSMUST00000127024 | 81 | 99  | 4 Gab3           | protein_coding         |
| ENSMUST00000043141 | 81 | 97  | 69 Hydin         | protein_coding         |
| ENSMUST00000151661 | 81 | 97  | 12 Cpeb1         | protein_coding         |
| ENSMUST00000146865 | 81 | 97  | 8 Prkar2b        | protein_coding         |
| ENSMUST00000065629 | 81 | 91  | 16 Cast          | protein_coding         |
| ENSMUST00000156290 | 81 | 90  | 57 Ttc28         | protein_coding         |
| ENSMUST00000025602 | 81 | 89  | 67 Gna14         | protein_coding         |
| ENSMUST00000171791 | 81 | 89  | 20 Mast4         | protein_coding         |
| ENSMUST00000064948 | 81 | 87  | 26 Dnah6         | protein_coding         |
| ENSMUST00000039803 | 81 | 87  | 14 Ubac2         | protein_coding         |
| ENSMUST00000171532 | 81 | 87  | 18 Snd1          | protein_coding         |
| ENSMUST00000028999 | 81 | 87  | 14 Pkia          | protein_coding         |
| ENSMUST00000156886 | 81 | 86  | 34 Oca2          | protein_coding         |
| ENSMUST00000069538 | 81 | 84  | 18 9330182L06Rik | protein_coding         |

|                     |    |     |                  |                        |
|---------------------|----|-----|------------------|------------------------|
| ENSMUST00000172220  | 81 | 79  | 18 Zzef1         | protein_coding         |
| ENSMUST00000140392  | 81 | 39  | 0 Surf6          | protein_coding         |
| ENSMUST00000173605  | 80 | 166 | 6 Gm15564        | antisense              |
| ENSMUST00000016383  | 80 | 125 | 0 Lonrf3         | protein_coding         |
| ENSMUST000000163600 | 80 | 119 | 0 Ccnh           | protein_coding         |
| ENSMUST000000031689 | 80 | 111 | 0 Hyal5          | protein_coding         |
| ENSMUST000000163516 | 80 | 108 | 565 Nedd4l       | protein_coding         |
| ENSMUST000000155156 | 80 | 107 | 24 Gm11846       | lincRNA                |
| ENSMUST000000026547 | 80 | 104 | 24 Tubgcp2       | protein_coding         |
| ENSMUST000000043616 | 80 | 102 | 20 Zyg11b        | protein_coding         |
| ENSMUST000000143592 | 80 | 102 | 2 Efcab6         | protein_coding         |
| ENSMUST000000166497 | 80 | 94  | 182 Abhd6        | protein_coding         |
| ENSMUST000000032736 | 80 | 93  | 30 Mtmr10        | protein_coding         |
| ENSMUST000000151309 | 80 | 93  | 20 Bai3          | protein_coding         |
| ENSMUST000000149395 | 80 | 89  | 20 Lair1         | protein_coding         |
| ENSMUST000000141778 | 80 | 88  | 2 Dmd            | protein_coding         |
| ENSMUST000000042344 | 80 | 87  | 16 4930556J24Rik | protein_coding         |
| ENSMUST000000184688 | 80 | 84  | 14 Rhox2c        | protein_coding         |
| ENSMUST000000075504 | 80 | 83  | 2 Deffb39        | protein_coding         |
| ENSMUST000000170945 | 80 | 83  | 40 Skint3        | protein_coding         |
| ENSMUST000000160796 | 80 | 82  | 48 Slco6d1       | protein_coding         |
| ENSMUST000000084354 | 80 | 81  | 4 Spata6         | protein_coding         |
| ENSMUST000000129908 | 80 | 81  | 0 Gm12609        | processed_transcript   |
| ENSMUST000000049430 | 80 | 77  | 2 Galnt18        | protein_coding         |
| ENSMUST000000122219 | 80 | 76  | 18 Klra17        | protein_coding         |
| ENSMUST000000015866 | 80 | 76  | 8 Nlrp5          | protein_coding         |
| ENSMUST000000000572 | 80 | 74  | 69 Gabra2        | protein_coding         |
| ENSMUST000000182900 | 80 | 60  | 303 Snhg5        | processed_transcript   |
| ENSMUST000000077709 | 79 | 99  | 4 6330416G13Rik  | protein_coding         |
| ENSMUST000000179709 | 79 | 97  | 12 Micu1         | protein_coding         |
| ENSMUST000000164784 | 79 | 89  | 12 Zfp804b       | protein_coding         |
| ENSMUST000000091569 | 79 | 89  | 34 4930486L24Rik | protein_coding         |
| ENSMUST000000095012 | 79 | 87  | 8 Sema3a         | protein_coding         |
| ENSMUST000000046860 | 79 | 84  | 6 Piezo2         | protein_coding         |
| ENSMUST000000178438 | 79 | 72  | 50 Gm21119       | protein_coding         |
| ENSMUST000000037240 | 79 | 72  | 20 Slc30a8       | protein_coding         |
| ENSMUST000000132654 | 79 | 63  | 0 Rcan3          | protein_coding         |
| ENSMUST000000178353 | 79 | 41  | 30 Gm21992       | protein_coding         |
| ENSMUST000000020268 | 79 | 30  | 0 Ccar1          | protein_coding         |
| ENSMUST000000182397 | 78 | 112 | 0 Gm20997        | unprocessed_pseudogene |
| ENSMUST000000172598 | 78 | 110 | 42 Dtnb          | protein_coding         |
| ENSMUST000000040069 | 78 | 98  | 22 Colec12       | protein_coding         |
| ENSMUST000000165834 | 78 | 98  | 2 Vmn2r80        | protein_coding         |
| ENSMUST000000138345 | 78 | 98  | 0 Tcte2          | protein_coding         |
| ENSMUST000000133086 | 78 | 97  | 8 Capn9          | protein_coding         |
| ENSMUST000000121925 | 78 | 96  | 12 Slc12a8       | protein_coding         |
| ENSMUST000000144535 | 78 | 91  | 12 Fam189a1      | protein_coding         |
| ENSMUST000000176711 | 78 | 85  | 24 Vmn2r-ps126   | unprocessed_pseudogene |
| ENSMUST000000099091 | 78 | 79  | 4 Ankub1         | protein_coding         |
| ENSMUST000000115236 | 78 | 78  | 4 Ntm            | protein_coding         |
| ENSMUST000000162735 | 78 | 77  | 6 Tc2n           | protein_coding         |
| ENSMUST000000060805 | 78 | 74  | 20 Fam120a       | protein_coding         |
| ENSMUST000000120520 | 78 | 72  | 8 Acer3          | protein_coding         |
| ENSMUST000000099449 | 78 | 120 | 20 Zfp808        | protein_coding         |
| ENSMUST000000086876 | 78 | 94  | 28 Pot1b         | protein_coding         |
| ENSMUST000000068243 | 78 | 93  | 8 Fam73a         | protein_coding         |
| ENSMUST000000146783 | 78 | 93  | 0 1700123O12Rik  | lincRNA                |
| ENSMUST000000023165 | 78 | 88  | 14 Crebbp        | protein_coding         |
| ENSMUST000000113371 | 78 | 85  | 6 Khlh4          | protein_coding         |
| ENSMUST000000161605 | 78 | 83  | 8 Echdc1         | protein_coding         |
| ENSMUST000000140004 | 78 | 83  | 32 Fcgbp         | protein_coding         |
| ENSMUST000000161539 | 78 | 83  | 16 Dnm3          | protein_coding         |
| ENSMUST000000159989 | 78 | 81  | 16 Clca4         | protein_coding         |
| ENSMUST000000084628 | 78 | 73  | 24 Hs3st2        | protein_coding         |
| ENSMUST000000143315 | 78 | 72  | 10 D830044D21Rik | lincRNA                |
| ENSMUST000000174558 | 78 | 71  | 4 Gm2381         | protein_coding         |
| ENSMUST000000182150 | 78 | 68  | 4 Gm5210         | processed_pseudogene   |
| ENSMUST000000112576 | 78 | 65  | 8 Pdcd1lg2       | protein_coding         |

|                    |    |     |     |               |                        |
|--------------------|----|-----|-----|---------------|------------------------|
| ENSMUST00000152507 | 78 | 55  | 123 | Gfra1         | protein_coding         |
| ENSMUST00000108850 | 78 | 55  | 0   | Fam114a2      | protein_coding         |
| ENSMUST00000025618 | 78 | 51  | 34  | Pcsk5         | protein_coding         |
| ENSMUST00000161553 | 77 | 128 | 38  | Parp4         | protein_coding         |
| ENSMUST00000126915 | 77 | 120 | 8   | Gm20422       | protein_coding         |
| ENSMUST00000023007 | 77 | 114 | 12  | Adcy8         | protein_coding         |
| ENSMUST00000065335 | 77 | 101 | 2   | Gpr141        | protein_coding         |
| ENSMUST00000159746 | 77 | 96  | 8   | Arhgef26      | protein_coding         |
| ENSMUST00000049263 | 77 | 92  | 123 | Sltm          | protein_coding         |
| ENSMUST00000114806 | 77 | 85  | 10  | Fbxo40        | protein_coding         |
| ENSMUST00000074802 | 77 | 85  | 0   | Scml2         | protein_coding         |
| ENSMUST00000172300 | 77 | 84  | 0   | Gm8895        | unprocessed_pseudogene |
| ENSMUST00000053917 | 77 | 83  | 24  | Ccny          | protein_coding         |
| ENSMUST00000159004 | 77 | 83  | 16  | Mrgpra2a      | protein_coding         |
| ENSMUST00000127251 | 77 | 80  | 0   | Gm14443       | protein_coding         |
| ENSMUST00000184693 | 77 | 71  | 6   | Gfral         | protein_coding         |
| ENSMUST00000115601 | 77 | 68  | 81  | Gnb1l         | protein_coding         |
| ENSMUST00000125200 | 77 | 45  | 4   | Stxbp5        | protein_coding         |
| ENSMUST00000040219 | 77 | 28  | 59  | L3mbtl3       | protein_coding         |
| ENSMUST00000035105 | 77 | 18  | 153 | Rpsa          | protein_coding         |
| ENSMUST00000159816 | 77 | 13  | 2   | Filip1l       | protein_coding         |
| ENSMUST00000060835 | 76 | 116 | 353 | Tex14         | protein_coding         |
| ENSMUST00000135086 | 76 | 113 | 0   | Gm1720        | lincRNA                |
| ENSMUST00000124362 | 76 | 108 | 0   | Arid1b        | protein_coding         |
| ENSMUST00000151897 | 76 | 99  | 6   | Pcgf3         | protein_coding         |
| ENSMUST00000034140 | 76 | 98  | 18  | Itfg1         | protein_coding         |
| ENSMUST00000022788 | 76 | 94  | 0   | C6            | protein_coding         |
| ENSMUST00000067708 | 76 | 91  | 6   | Pla2r1        | protein_coding         |
| ENSMUST00000102621 | 76 | 89  | 2   | Stxbp3a       | protein_coding         |
| ENSMUST00000097741 | 76 | 83  | 28  | Hecw2         | protein_coding         |
| ENSMUST00000165288 | 76 | 82  | 6   | Gria3         | protein_coding         |
| ENSMUST00000117834 | 76 | 79  | 0   | Gm12859       | processed_pseudogene   |
| ENSMUST00000030279 | 76 | 77  | 6   | Atg4c         | protein_coding         |
| ENSMUST00000167976 | 76 | 75  | 4   | Vmn2r83       | protein_coding         |
| ENSMUST00000152719 | 76 | 74  | 18  | Bbs9          | protein_coding         |
| ENSMUST00000108490 | 76 | 74  | 8   | Gm5155        | protein_coding         |
| ENSMUST00000108490 | 76 | 74  | 8   | Gm5155        | protein_coding         |
| ENSMUST00000164862 | 76 | 72  | 0   | 2010015L04Rik | protein_coding         |
| ENSMUST00000164862 | 76 | 72  | 0   | 2010015L04Rik | protein_coding         |
| ENSMUST00000183690 | 76 | 72  | 87  | Strbp         | protein_coding         |
| ENSMUST00000147770 | 75 | 97  | 20  | Mettl15       | protein_coding         |
| ENSMUST00000134214 | 75 | 95  | 0   | Tuba1a        | protein_coding         |
| ENSMUST00000153775 | 75 | 95  | 6   | Ncald         | protein_coding         |
| ENSMUST00000155633 | 75 | 88  | 4   | Clec16a       | protein_coding         |
| ENSMUST00000051344 | 75 | 85  | 10  | Col19a1       | protein_coding         |
| ENSMUST00000080665 | 75 | 84  | 32  | Dnah9         | protein_coding         |
| ENSMUST00000086635 | 75 | 83  | 50  | Pitpnb        | protein_coding         |
| ENSMUST00000135785 | 75 | 82  | 0   | Fam229b       | protein_coding         |
| ENSMUST00000161846 | 75 | 79  | 16  | Ctnna2        | protein_coding         |
| ENSMUST00000180799 | 75 | 77  | 14  | Gm20033       | processed_transcript   |
| ENSMUST00000110148 | 75 | 75  | 28  | Gm2046        | protein_coding         |
| ENSMUST00000151006 | 75 | 70  | 46  | Gpr63         | protein_coding         |
| ENSMUST00000028917 | 75 | 68  | 36  | Dtd1          | protein_coding         |
| ENSMUST00000179483 | 75 | 68  | 4   | Erdr1         | protein_coding         |
| ENSMUST00000131603 | 75 | 60  | 56  | Gm14051       | antisense              |
| ENSMUST00000149137 | 75 | 104 | 12  | Gm13270       | processed_transcript   |
| ENSMUST00000125731 | 75 | 103 | 12  | Dnajc17       | protein_coding         |
| ENSMUST00000138288 | 75 | 95  | 2   | Gm14455       | processed_transcript   |
| ENSMUST00000109426 | 75 | 92  | 20  | Arhgef28      | protein_coding         |
| ENSMUST00000039928 | 75 | 88  | 18  | Plekhh1       | protein_coding         |
| ENSMUST00000026043 | 75 | 87  | 8   | Slk           | protein_coding         |
| ENSMUST00000140574 | 75 | 83  | 12  | Sntb1         | protein_coding         |
| ENSMUST00000174319 | 75 | 81  | 0   | Pax5          | protein_coding         |
| ENSMUST00000115484 | 75 | 74  | 14  | Sntg1         | protein_coding         |
| ENSMUST00000141649 | 75 | 74  | 16  | Gm13211       | lincRNA                |
| ENSMUST00000162457 | 75 | 74  | 10  | Gm15716       | antisense              |
| ENSMUST00000149903 | 75 | 73  | 38  | E230008N13Rik | protein_coding         |
| ENSMUST00000107537 | 75 | 70  | 54  | Ube3a         | protein_coding         |

|                    |    |     |      |               |                      |
|--------------------|----|-----|------|---------------|----------------------|
| ENSMUST00000130405 | 75 | 65  | 4    | Arhgap20      | protein_coding       |
| ENSMUST00000077605 | 75 | 49  | 117  | Eif4a2        | protein_coding       |
| ENSMUST00000029444 | 75 | 14  | 6    | Trim33        | protein_coding       |
| ENSMUST00000170430 | 74 | 95  | 42   | Pik3c2a       | protein_coding       |
| ENSMUST00000068456 | 74 | 87  | 6    | Gabra5        | protein_coding       |
| ENSMUST00000027642 | 74 | 83  | 6    | Nek7          | protein_coding       |
| ENSMUST00000021494 | 74 | 82  | 16   | Ccdc175       | protein_coding       |
| ENSMUST00000036938 | 74 | 82  | 12   | Slc7a15       | protein_coding       |
| ENSMUST00000073302 | 74 | 81  | 2    | Arhgap24      | protein_coding       |
| ENSMUST00000082024 | 74 | 78  | 18   | Mpp5          | protein_coding       |
| ENSMUST00000022650 | 74 | 76  | 103  | Pibf1         | protein_coding       |
| ENSMUST00000034739 | 74 | 76  | 8    | Rnf111        | protein_coding       |
| ENSMUST00000108981 | 74 | 75  | 2    | Gm14305       | protein_coding       |
| ENSMUST00000100968 | 74 | 68  | 32   | Vmn2r27       | protein_coding       |
| ENSMUST00000031547 | 74 | 68  | 24   | 4930519G04Rik | protein_coding       |
| ENSMUST00000020090 | 74 | 66  | 40   | 2310015B20Rik | processed_transcript |
| ENSMUST00000133469 | 74 | 66  | 26   | Chm           | protein_coding       |
| ENSMUST00000080394 | 74 | 65  | 0    | Sh3kbp1       | protein_coding       |
| ENSMUST00000170988 | 74 | 64  | 4    | Cyp39a1       | protein_coding       |
| ENSMUST00000077228 | 74 | 60  | 42   | Clec4b1       | protein_coding       |
| ENSMUST00000159551 | 74 | 59  | 1765 | Wtap          | protein_coding       |
| ENSMUST00000022820 | 73 | 95  | 8    | Dhrs2         | protein_coding       |
| ENSMUST00000162471 | 73 | 91  | 26   | Fstl5         | protein_coding       |
| ENSMUST00000080860 | 73 | 88  | 0    | Ccdc28a       | protein_coding       |
| ENSMUST00000180497 | 73 | 88  | 0    | Gm6634        | lincRNA              |
| ENSMUST00000136744 | 73 | 84  | 12   | 1600002D24Rik | lincRNA              |
| ENSMUST00000067997 | 73 | 80  | 26   | Lcorl         | protein_coding       |
| ENSMUST00000152981 | 73 | 76  | 6    | Pip4k2a       | protein_coding       |
| ENSMUST00000020103 | 73 | 74  | 8    | 1700040L02Rik | protein_coding       |
| ENSMUST00000180874 | 73 | 74  | 6    | C030034L19Rik | lincRNA              |
| ENSMUST00000098674 | 73 | 72  | 26   | Rec114        | protein_coding       |
| ENSMUST00000134175 | 73 | 71  | 4    | Dpp6          | protein_coding       |
| ENSMUST00000053253 | 73 | 69  | 36   | Vmn2r13       | protein_coding       |
| ENSMUST00000136740 | 73 | 68  | 59   | Myo9a         | protein_coding       |
| ENSMUST00000093976 | 73 | 64  | 42   | Arsj          | protein_coding       |
| ENSMUST00000147805 | 73 | 62  | 8    | Ophn1         | protein_coding       |
| ENSMUST00000159778 | 73 | 108 | 10   | Nrxn1         | protein_coding       |
| ENSMUST00000053245 | 73 | 91  | 2    | Card14        | protein_coding       |
| ENSMUST00000155708 | 73 | 88  | 48   | Mapre2        | protein_coding       |
| ENSMUST00000175641 | 73 | 85  | 8    | Zfx4          | protein_coding       |
| ENSMUST00000060930 | 73 | 82  | 10   | Ccdc158       | protein_coding       |
| ENSMUST00000180558 | 73 | 79  | 32   | F630040K05Rik | lincRNA              |
| ENSMUST00000090096 | 73 | 77  | 8    | Oxr1          | protein_coding       |
| ENSMUST00000020094 | 73 | 74  | 12   | Epyc          | protein_coding       |
| ENSMUST00000156210 | 73 | 72  | 12   | Gm15246       | processed_transcript |
| ENSMUST00000162514 | 73 | 68  | 10   | Cyp2j7        | protein_coding       |
| ENSMUST00000029069 | 73 | 66  | 4    | E2f5          | protein_coding       |
| ENSMUST00000053407 | 73 | 65  | 36   | Alkbh8        | protein_coding       |
| ENSMUST00000068952 | 73 | 64  | 59   | Wls           | protein_coding       |
| ENSMUST00000112347 | 73 | 62  | 28   | Xirp2         | protein_coding       |
| ENSMUST00000074371 | 73 | 53  | 105  | Pdcd4         | protein_coding       |
| ENSMUST00000111829 | 72 | 128 | 10   | Zfp385b       | protein_coding       |
| ENSMUST00000105497 | 72 | 120 | 857  | Ostm1         | protein_coding       |
| ENSMUST00000110617 | 72 | 107 | 38   | 2410089E03Rik | protein_coding       |
| ENSMUST00000164227 | 72 | 100 | 10   | Vmn2r87       | protein_coding       |
| ENSMUST00000183807 | 72 | 97  | 186  | Nipal3        | protein_coding       |
| ENSMUST00000151132 | 72 | 95  | 30   | Spag6         | protein_coding       |
| ENSMUST00000075245 | 72 | 90  | 8    | Unc13c        | protein_coding       |
| ENSMUST00000151524 | 72 | 87  | 397  | Ankrd32       | protein_coding       |
| ENSMUST00000055879 | 72 | 85  | 12   | Wdr72         | protein_coding       |
| ENSMUST00000051454 | 72 | 80  | 14   | Fam171b       | protein_coding       |
| ENSMUST00000035083 | 72 | 79  | 4    | Stac          | protein_coding       |
| ENSMUST00000034829 | 72 | 75  | 34   | Thsd4         | protein_coding       |
| ENSMUST00000129603 | 72 | 75  | 12   | Mmrn1         | protein_coding       |
| ENSMUST00000177981 | 72 | 75  | 2    | Gm2007        | protein_coding       |
| ENSMUST00000027560 | 72 | 72  | 6    | Htr4          | protein_coding       |
| ENSMUST00000024118 | 72 | 70  | 18   | Clec4n        | protein_coding       |
| ENSMUST00000061008 | 72 | 70  | 18   | Cfap69        | protein_coding       |

|                    |    |     |      |               |                        |
|--------------------|----|-----|------|---------------|------------------------|
| ENSMUST00000151152 | 72 | 60  | 256  | Kcnh1         | protein_coding         |
| ENSMUST00000098909 | 72 | 59  | 48   | 4930467E23Rik | protein_coding         |
| ENSMUST00000023532 | 72 | 58  | 10   | Ccdc14        | protein_coding         |
| ENSMUST00000178814 | 72 | 56  | 10   | Mdga2         | protein_coding         |
| ENSMUST00000129883 | 72 | 26  | 0    | Mtmr14        | protein_coding         |
| ENSMUST00000025293 | 72 | 6   | 71   | Ndfip1        | protein_coding         |
| ENSMUST00000019615 | 72 | 6   | 14   | Cdc37         | protein_coding         |
| ENSMUST00000111296 | 71 | 114 | 0    | Nit1          | protein_coding         |
| ENSMUST00000132379 | 71 | 110 | 0    | Mapk8         | protein_coding         |
| ENSMUST00000164727 | 71 | 101 | 12   | F13a1         | protein_coding         |
| ENSMUST00000091429 | 71 | 101 | 2    | Ptpla         | protein_coding         |
| ENSMUST00000029740 | 71 | 93  | 12   | Rnf115        | protein_coding         |
| ENSMUST00000182907 | 71 | 91  | 12   | Anks1b        | protein_coding         |
| ENSMUST00000023431 | 71 | 91  | 4    | Tbc1d23       | protein_coding         |
| ENSMUST00000103141 | 71 | 87  | 48   | Ikzf3         | protein_coding         |
| ENSMUST00000137049 | 71 | 87  | 34   | Abl1          | processed_transcript   |
| ENSMUST00000137049 | 71 | 87  | 34   | Abl1          | processed_transcript   |
| ENSMUST00000113763 | 71 | 85  | 10   | Odf2          | protein_coding         |
| ENSMUST00000118050 | 71 | 83  | 18   | Gm15264       | unprocessed_pseudogene |
| ENSMUST00000061890 | 71 | 81  | 0    | Zfp282        | protein_coding         |
| ENSMUST00000079738 | 71 | 78  | 40   | 1700011103Rik | protein_coding         |
| ENSMUST00000140786 | 71 | 76  | 36   | Slc25a24      | protein_coding         |
| ENSMUST00000102830 | 71 | 70  | 20   | Mpdz          | protein_coding         |
| ENSMUST00000068316 | 71 | 67  | 6    | Agtr1b        | protein_coding         |
| ENSMUST00000180783 | 71 | 62  | 171  | 9330159M07Rik | processed_transcript   |
| ENSMUST00000114647 | 71 | 52  | 16   | Fmr1nb        | protein_coding         |
| ENSMUST00000031489 | 70 | 116 | 2    | Ankrd7        | protein_coding         |
| ENSMUST00000072769 | 70 | 108 | 4844 | Gm17494       | antisense              |
| ENSMUST00000160285 | 70 | 89  | 24   | Wdr63         | protein_coding         |
| ENSMUST00000126475 | 70 | 88  | 18   | Itgam         | protein_coding         |
| ENSMUST00000101113 | 70 | 87  | 26   | Scml2         | protein_coding         |
| ENSMUST00000145992 | 70 | 86  | 16   | Fam198b       | protein_coding         |
| ENSMUST00000119432 | 70 | 83  | 8    | Daf2          | protein_coding         |
| ENSMUST00000022590 | 70 | 81  | 12   | Dnajc15       | protein_coding         |
| ENSMUST00000049453 | 70 | 80  | 44   | Ube3c         | protein_coding         |
| ENSMUST00000182956 | 70 | 79  | 38   | Pvt1          | lincRNA                |
| ENSMUST00000031805 | 70 | 70  | 18   | Avl9          | protein_coding         |
| ENSMUST00000005493 | 70 | 69  | 10   | Slc1a3        | protein_coding         |
| ENSMUST00000182947 | 70 | 69  | 0    | Mtnr1b        | protein_coding         |
| ENSMUST00000140566 | 70 | 62  | 6    | Xxylt1        | protein_coding         |
| ENSMUST00000138135 | 70 | 60  | 10   | Prlr          | protein_coding         |
| ENSMUST00000152136 | 70 | 105 | 18   | lqck          | protein_coding         |
| ENSMUST00000137871 | 70 | 86  | 22   | Vav3          | protein_coding         |
| ENSMUST00000126549 | 70 | 79  | 20   | BB557941      | processed_transcript   |
| ENSMUST00000029948 | 70 | 79  | 24   | Bmpr1b        | protein_coding         |
| ENSMUST00000182506 | 70 | 79  | 24   | Ccnd3         | protein_coding         |
| ENSMUST00000171088 | 70 | 77  | 36   | Prr5l         | protein_coding         |
| ENSMUST00000041317 | 70 | 76  | 20   | Ammecr1       | protein_coding         |
| ENSMUST00000093811 | 70 | 76  | 16   | Filip1        | protein_coding         |
| ENSMUST00000093292 | 70 | 74  | 50   | Sertad2       | protein_coding         |
| ENSMUST00000098906 | 70 | 72  | 24   | Pate2         | protein_coding         |
| ENSMUST00000023454 | 70 | 70  | 6    | Dlg1          | protein_coding         |
| ENSMUST00000173668 | 70 | 65  | 14   | Vmn1r139      | protein_coding         |
| ENSMUST00000054661 | 70 | 63  | 32   | Adra1a        | protein_coding         |
| ENSMUST00000163623 | 70 | 63  | 16   | Nedd9         | protein_coding         |
| ENSMUST00000138498 | 70 | 62  | 6    | Bud13         | protein_coding         |
| ENSMUST00000058535 | 70 | 62  | 40   | Gpr149        | protein_coding         |
| ENSMUST00000015499 | 69 | 107 | 14   | Cd48          | protein_coding         |
| ENSMUST00000048455 | 69 | 93  | 4    | Ntng2         | protein_coding         |
| ENSMUST00000022497 | 69 | 87  | 22   | Spryd7        | protein_coding         |
| ENSMUST00000179054 | 69 | 83  | 8    | E030030I06Rik | protein_coding         |
| ENSMUST00000022197 | 69 | 83  | 4    | Scamp1        | protein_coding         |
| ENSMUST00000043589 | 69 | 82  | 38   | Kif16b        | protein_coding         |
| ENSMUST00000054096 | 69 | 78  | 6    | Man1c1        | protein_coding         |
| ENSMUST00000028665 | 69 | 76  | 0    | Patl2         | protein_coding         |
| ENSMUST00000183358 | 69 | 76  | 0    | Asb4          | protein_coding         |
| ENSMUST00000034653 | 69 | 75  | 0    | Muc16         | protein_coding         |
| ENSMUST00000123412 | 69 | 75  | 0    | Zmat4         | protein_coding         |

|                     |    |     |                  |                      |
|---------------------|----|-----|------------------|----------------------|
| ENSMUST00000072465  | 69 | 74  | 20 Zfp809        | protein_coding       |
| ENSMUST00000092415  | 69 | 71  | 20 Specc1        | protein_coding       |
| ENSMUST00000155885  | 69 | 71  | 0 Gm14146        | antisense            |
| ENSMUST00000026865  | 69 | 70  | 103 Jade1        | protein_coding       |
| ENSMUST000000097414 | 69 | 70  | 14 Qk            | protein_coding       |
| ENSMUST000000069284 | 69 | 70  | 4 Fgd4           | protein_coding       |
| ENSMUST00000177442  | 69 | 65  | 8 Bola1          | protein_coding       |
| ENSMUST00000060210  | 69 | 64  | 16 Gpm6b         | protein_coding       |
| ENSMUST00000074694  | 69 | 62  | 20 Gnai1         | protein_coding       |
| ENSMUST00000022196  | 69 | 62  | 22 Ap3b1         | protein_coding       |
| ENSMUST00000161263  | 69 | 57  | 10 Sv2c          | protein_coding       |
| ENSMUST00000063470  | 69 | 52  | 10 Ptprr         | protein_coding       |
| ENSMUST00000048518  | 69 | 50  | 6 Parpbp         | protein_coding       |
| ENSMUST00000110344  | 68 | 120 | 8 Acox1          | protein_coding       |
| ENSMUST00000033241  | 68 | 100 | 18 Lhpp          | protein_coding       |
| ENSMUST00000107184  | 68 | 100 | 16 Sh3gl2        | protein_coding       |
| ENSMUST00000092167  | 68 | 91  | 14 Ptprb         | protein_coding       |
| ENSMUST00000029400  | 68 | 87  | 46 Mme           | protein_coding       |
| ENSMUST00000031549  | 68 | 83  | 0 Gm4951         | protein_coding       |
| ENSMUST00000124951  | 68 | 81  | 2 Th             | protein_coding       |
| ENSMUST00000160599  | 68 | 79  | 14 Pacrg         | protein_coding       |
| ENSMUST00000032909  | 68 | 79  | 10 Pde3b         | protein_coding       |
| ENSMUST00000026013  | 68 | 76  | 20 Maa           | protein_coding       |
| ENSMUST00000021630  | 68 | 76  | 4 Akr1c6         | protein_coding       |
| ENSMUST00000041124  | 68 | 74  | 16 Zfp704        | protein_coding       |
| ENSMUST00000133752  | 68 | 71  | 20 4930512H18Rik | antisense            |
| ENSMUST00000105512  | 68 | 70  | 12 Nt5dc1        | protein_coding       |
| ENSMUST00000046212  | 68 | 70  | 0 Slc16a1        | protein_coding       |
| ENSMUST00000148622  | 68 | 69  | 8 Phf8           | protein_coding       |
| ENSMUST00000057742  | 68 | 66  | 46 Cpne4         | protein_coding       |
| ENSMUST00000043599  | 68 | 65  | 6 Rps6ka5        | protein_coding       |
| ENSMUST00000125112  | 68 | 63  | 12 Ccdc7         | protein_coding       |
| ENSMUST00000054128  | 68 | 62  | 0 Dsg1c          | protein_coding       |
| ENSMUST00000118117  | 68 | 57  | 38 Syt6          | protein_coding       |
| ENSMUST00000057561  | 68 | 47  | 38 Wwc2          | protein_coding       |
| ENSMUST00000072156  | 68 | 26  | 151 Tiam2        | protein_coding       |
| ENSMUST00000170881  | 67 | 129 | 4 4933413J09Rik  | lincRNA              |
| ENSMUST00000122227  | 67 | 95  | 0 Rdh12          | protein_coding       |
| ENSMUST00000124119  | 67 | 90  | 4 Ntm            | protein_coding       |
| ENSMUST00000112338  | 67 | 85  | 10 Rai2          | protein_coding       |
| ENSMUST00000090300  | 67 | 81  | 8 Marf1          | protein_coding       |
| ENSMUST00000181451  | 67 | 74  | 0 Gm8941         | processed_pseudogene |
| ENSMUST00000176251  | 67 | 72  | 36 Eps15         | protein_coding       |
| ENSMUST00000132513  | 67 | 72  | 6 Cyp2j13        | protein_coding       |
| ENSMUST00000151575  | 67 | 71  | 2 Drr1           | lincRNA              |
| ENSMUST00000109008  | 67 | 70  | 2 Gm2026         | protein_coding       |
| ENSMUST00000020843  | 67 | 66  | 10 Acaca         | protein_coding       |
| ENSMUST00000120709  | 67 | 65  | 4 Kcnt2          | protein_coding       |
| ENSMUST00000020378  | 67 | 63  | 83 Best3         | protein_coding       |
| ENSMUST00000027783  | 67 | 62  | 56 Desi2         | protein_coding       |
| ENSMUST00000148997  | 67 | 61  | 0 Al847159       | antisense            |
| ENSMUST00000016344  | 67 | 53  | 16 Syt14         | protein_coding       |
| ENSMUST00000180806  | 67 | 52  | 0 Gm2694         | lincRNA              |
| ENSMUST00000099742  | 67 | 112 | 12 Cfap44        | protein_coding       |
| ENSMUST00000173372  | 67 | 100 | 14 Myo1f         | protein_coding       |
| ENSMUST00000015138  | 67 | 99  | 2 Eln            | protein_coding       |
| ENSMUST00000152718  | 67 | 95  | 2 4930505A04Rik  | protein_coding       |
| ENSMUST00000060642  | 67 | 90  | 24 Lrrk2         | protein_coding       |
| ENSMUST00000081154  | 67 | 86  | 18 Pikfyve       | protein_coding       |
| ENSMUST00000106892  | 67 | 86  | 0 Usp17lc        | protein_coding       |
| ENSMUST00000069637  | 67 | 85  | 0 Zfp277         | protein_coding       |
| ENSMUST00000125023  | 67 | 82  | 4 Mpped2         | protein_coding       |
| ENSMUST00000084207  | 67 | 81  | 2 Arhgef10       | protein_coding       |
| ENSMUST00000166131  | 67 | 80  | 24 Vmn2r61       | protein_coding       |
| ENSMUST00000113250  | 67 | 79  | 4 Impg1          | protein_coding       |
| ENSMUST00000036225  | 67 | 78  | 14 Mpp6          | protein_coding       |
| ENSMUST00000135298  | 67 | 76  | 16 Myo9a         | protein_coding       |
| ENSMUST00000162295  | 67 | 75  | 57 Clstn2        | protein_coding       |



|                    |    |     |                  |                                  |
|--------------------|----|-----|------------------|----------------------------------|
| ENSMUST00000145554 | 67 | 75  | 4 Ccser1         | protein_coding                   |
| ENSMUST00000181015 | 67 | 72  | 224 Gm26630      | processed_transcript             |
| ENSMUST00000161681 | 67 | 72  | 0 Gm15758        | lincRNA                          |
| ENSMUST00000021453 | 67 | 70  | 14 Tex21         | protein_coding                   |
| ENSMUST00000120294 | 67 | 70  | 4 Gm11371        | processed_pseudogene             |
| ENSMUST00000114627 | 67 | 69  | 59 Etl4          | protein_coding                   |
| ENSMUST00000156264 | 67 | 68  | 10 Vrk2          | protein_coding                   |
| ENSMUST00000109353 | 67 | 68  | 0 Tubgcp6        | protein_coding                   |
| ENSMUST00000027277 | 67 | 66  | 24 Stat4         | protein_coding                   |
| ENSMUST00000167525 | 67 | 66  | 0 Scoc           | protein_coding                   |
| ENSMUST00000181145 | 67 | 64  | 52 9530026P05Rik | lincRNA                          |
| ENSMUST00000007959 | 67 | 59  | 34 Rhoa          | protein_coding                   |
| ENSMUST00000122369 | 67 | 55  | 4 Thsd7a         | protein_coding                   |
| ENSMUST00000099564 | 66 | 111 | 791 Trpm3        | protein_coding                   |
| ENSMUST00000151822 | 66 | 93  | 4 Sgms1          | protein_coding                   |
| ENSMUST00000176311 | 66 | 83  | 2 Foxn3          | protein_coding                   |
| ENSMUST00000132628 | 66 | 81  | 18 Phax          | protein_coding                   |
| ENSMUST00000127705 | 66 | 79  | 6 Hmnr           | protein_coding                   |
| ENSMUST00000102837 | 66 | 79  | 2 Rasef          | protein_coding                   |
| ENSMUST00000045736 | 66 | 76  | 10 Mroh2b        | protein_coding                   |
| ENSMUST00000149140 | 66 | 73  | 0 Wnk3           | protein_coding                   |
| ENSMUST00000093852 | 66 | 69  | 10 Zbtb16        | protein_coding                   |
| ENSMUST00000177700 | 66 | 69  | 2 Gm11007        | protein_coding                   |
| ENSMUST00000153196 | 66 | 66  | 10 Rit2          | protein_coding                   |
| ENSMUST00000043082 | 66 | 66  | 8 Pnpla8         | protein_coding                   |
| ENSMUST00000027569 | 66 | 62  | 0 Slco6c1        | protein_coding                   |
| ENSMUST00000004133 | 66 | 62  | 26 Brnp2         | protein_coding                   |
| ENSMUST00000109431 | 66 | 61  | 30 Lincenc1      | lincRNA                          |
| ENSMUST00000163209 | 65 | 87  | 0 Cfap54         | protein_coding                   |
| ENSMUST00000121869 | 65 | 85  | 8 Dzip3          | protein_coding                   |
| ENSMUST00000122267 | 65 | 83  | 14 Cyp2j15-ps    | unprocessed_pseudogene           |
| ENSMUST00000115261 | 65 | 81  | 2 Gm1110         | protein_coding                   |
| ENSMUST00000152855 | 65 | 79  | 4 Nhej1          | protein_coding                   |
| ENSMUST00000147576 | 65 | 73  | 10 Ccser1        | protein_coding                   |
| ENSMUST00000065630 | 65 | 68  | 14 Ddx10         | protein_coding                   |
| ENSMUST00000180062 | 65 | 68  | 0 Sulf1          | protein_coding                   |
| ENSMUST00000125341 | 65 | 66  | 22 B4galnt3      | protein_coding                   |
| ENSMUST00000021860 | 65 | 64  | 30 Ly86          | protein_coding                   |
| ENSMUST00000108153 | 65 | 64  | 12 Rngtt         | protein_coding                   |
| ENSMUST00000060092 | 65 | 62  | 30 Upf2          | protein_coding                   |
| ENSMUST00000126238 | 65 | 60  | 14 Gm16759       | processed_transcript             |
| ENSMUST00000029922 | 65 | 55  | 2 Fhl5           | protein_coding                   |
| ENSMUST00000124671 | 65 | 26  | 627 Dsn1         | protein_coding                   |
| ENSMUST00000159347 | 64 | 108 | 24 4930519F09Rik | transcribed_processed_pseudogene |
| ENSMUST00000094942 | 64 | 83  | 2 Ccdc173        | protein_coding                   |
| ENSMUST00000041282 | 64 | 80  | 73 Trim37        | protein_coding                   |
| ENSMUST00000126875 | 64 | 72  | 0 Wars2          | protein_coding                   |
| ENSMUST00000172564 | 64 | 64  | 38 Rbms3         | protein_coding                   |
| ENSMUST00000130501 | 64 | 62  | 14 Gm12637       | lincRNA                          |
| ENSMUST00000142435 | 64 | 57  | 2 Myo3a          | protein_coding                   |
| ENSMUST00000029257 | 64 | 56  | 2 Atp11b         | protein_coding                   |
| ENSMUST00000028102 | 64 | 55  | 30 Kif5c         | protein_coding                   |
| ENSMUST00000179200 | 64 | 97  | 6 Ear1           | protein_coding                   |
| ENSMUST00000127130 | 64 | 82  | 4 1700011I03Rik  | protein_coding                   |
| ENSMUST00000108911 | 64 | 79  | 0 Cdh4           | protein_coding                   |
| ENSMUST00000044352 | 64 | 78  | 2 Pcnx14         | protein_coding                   |
| ENSMUST00000146953 | 64 | 75  | 20 Fryl          | protein_coding                   |
| ENSMUST00000183871 | 64 | 75  | 4 Ripk2          | protein_coding                   |
| ENSMUST00000082026 | 64 | 74  | 6 Dennd4c        | protein_coding                   |
| ENSMUST00000107749 | 64 | 73  | 34 Gabbr2        | protein_coding                   |
| ENSMUST00000142516 | 64 | 69  | 14 Pex1          | protein_coding                   |
| ENSMUST00000170104 | 64 | 69  | 14 Gm3411        | protein_coding                   |
| ENSMUST00000113895 | 64 | 68  | 4 Apoo           | protein_coding                   |
| ENSMUST00000057207 | 64 | 68  | 81 Tenm2         | protein_coding                   |
| ENSMUST00000166545 | 64 | 66  | 12 Cpvl          | protein_coding                   |
| ENSMUST00000154589 | 64 | 64  | 48 Csnk1g1       | protein_coding                   |
| ENSMUST00000155076 | 64 | 64  | 0 Gm16340        | unprocessed_pseudogene           |
| ENSMUST00000147622 | 64 | 62  | 4 1110046J04Rik  | antisense                        |

|                    |    |     |     |               |                        |
|--------------------|----|-----|-----|---------------|------------------------|
| ENSMUST00000138390 | 64 | 58  | 8   | 4930412C18Rik | processed_transcript   |
| ENSMUST00000099944 | 64 | 55  | 20  | Calcr1        | protein_coding         |
| ENSMUST00000028223 | 64 | 53  | 4   | Kynu          | protein_coding         |
| ENSMUST00000022699 | 64 | 52  | 0   | Gfra2         | protein_coding         |
| ENSMUST00000102823 | 64 | 47  | 0   | Ttc39b        | protein_coding         |
| ENSMUST00000079533 | 64 | 47  | 40  | Rad51b        | protein_coding         |
| ENSMUST00000101471 | 64 | 46  | 4   | Dpp6          | protein_coding         |
| ENSMUST00000117291 | 64 | 45  | 87  | Mthfd1l       | protein_coding         |
| ENSMUST00000043169 | 64 | 45  | 36  | Arel1         | protein_coding         |
| ENSMUST00000118356 | 63 | 98  | 0   | Gm13085       | processed_pseudogene   |
| ENSMUST00000121636 | 63 | 95  | 0   | Gm12451       | unprocessed_pseudogene |
| ENSMUST00000115622 | 63 | 83  | 2   | Calcr         | protein_coding         |
| ENSMUST00000152934 | 63 | 73  | 4   | Dync2h1       | protein_coding         |
| ENSMUST00000113445 | 63 | 70  | 4   | Prickle2      | protein_coding         |
| ENSMUST00000029548 | 63 | 70  | 69  | Nup210l       | protein_coding         |
| ENSMUST00000021898 | 63 | 64  | 16  | Shc3          | protein_coding         |
| ENSMUST00000038648 | 63 | 62  | 14  | Nek11         | protein_coding         |
| ENSMUST00000133144 | 63 | 58  | 18  | Fam150a       | protein_coding         |
| ENSMUST00000109686 | 63 | 51  | 22  | Neto2         | protein_coding         |
| ENSMUST00000032371 | 63 | 51  | 10  | Gys2          | protein_coding         |
| ENSMUST00000058429 | 63 | 49  | 30  | Il27          | protein_coding         |
| ENSMUST00000107232 | 63 | 37  | 50  | Pip5k1a       | protein_coding         |
| ENSMUST00000123225 | 63 | 6   | 121 | Plekhm3       | protein_coding         |
| ENSMUST00000161795 | 62 | 837 | 236 | Cep295        | protein_coding         |
| ENSMUST00000140444 | 62 | 102 | 2   | Nek1          | protein_coding         |
| ENSMUST00000111780 | 62 | 80  | 42  | Ppp1r1c       | protein_coding         |
| ENSMUST00000129994 | 62 | 79  | 4   | Gm13335       | antisense              |
| ENSMUST00000072612 | 62 | 71  | 22  | 4921528I07Rik | protein_coding         |
| ENSMUST00000001027 | 62 | 68  | 6   | Aox1          | protein_coding         |
| ENSMUST00000022496 | 62 | 66  | 18  | Kpna3         | protein_coding         |
| ENSMUST00000166472 | 62 | 66  | 10  | BC052040      | protein_coding         |
| ENSMUST00000139163 | 62 | 63  | 52  | Gm14634       | processed_transcript   |
| ENSMUST00000114214 | 62 | 62  | 0   | Igkv13-87     | protein_coding         |
| ENSMUST00000136173 | 62 | 61  | 10  | Socs6         | protein_coding         |
| ENSMUST00000101585 | 62 | 59  | 2   | Camk2b        | protein_coding         |
| ENSMUST00000042101 | 62 | 58  | 0   | Agr3          | protein_coding         |
| ENSMUST00000096547 | 62 | 51  | 22  | Loxhd1        | protein_coding         |
| ENSMUST00000124450 | 62 | 46  | 2   | Chn1          | protein_coding         |
| ENSMUST00000149367 | 62 | 42  | 18  | Gm12694       | antisense              |
| ENSMUST00000024595 | 61 | 93  | 0   | Slc22a3       | protein_coding         |
| ENSMUST00000102576 | 61 | 85  | 6   | Matn1         | protein_coding         |
| ENSMUST00000170718 | 61 | 79  | 44  | Astn1         | protein_coding         |
| ENSMUST00000166820 | 61 | 78  | 32  | R3hdm2        | protein_coding         |
| ENSMUST00000154662 | 61 | 72  | 0   | 9330182L06Rik | protein_coding         |
| ENSMUST00000146613 | 61 | 69  | 10  | Etl4          | protein_coding         |
| ENSMUST00000163093 | 61 | 69  | 4   | Rnls          | protein_coding         |
| ENSMUST00000105307 | 61 | 68  | 69  | Btbd11        | protein_coding         |
| ENSMUST00000143870 | 61 | 67  | 10  | Gm13490       | lincRNA                |
| ENSMUST00000108384 | 61 | 65  | 4   | Pag1          | protein_coding         |
| ENSMUST00000147868 | 61 | 64  | 0   | Gm14097       | antisense              |
| ENSMUST00000139492 | 61 | 59  | 2   | Gm13710       | lincRNA                |
| ENSMUST00000172095 | 61 | 58  | 141 | Myof          | protein_coding         |
| ENSMUST00000177814 | 61 | 58  | 16  | Cadps         | protein_coding         |
| ENSMUST00000084342 | 61 | 49  | 2   | Cyp4a32       | protein_coding         |
| ENSMUST00000084030 | 61 | 46  | 2   | Tacc1         | protein_coding         |
| ENSMUST00000111844 | 61 | 97  | 0   | Gm11077       | protein_coding         |
| ENSMUST00000022310 | 61 | 87  | 26  | Ngly1         | protein_coding         |
| ENSMUST00000119988 | 61 | 85  | 6   | Gm12873       | unprocessed_pseudogene |
| ENSMUST00000174657 | 61 | 76  | 0   | Gm4011        | unprocessed_pseudogene |
| ENSMUST00000112371 | 61 | 76  | 20  | Scn1a         | protein_coding         |
| ENSMUST00000015100 | 61 | 73  | 2   | Ppp1cb        | protein_coding         |
| ENSMUST00000161577 | 61 | 71  | 16  | Gstcd         | protein_coding         |
| ENSMUST00000038223 | 61 | 71  | 2   | Zswim2        | protein_coding         |
| ENSMUST00000023138 | 61 | 70  | 40  | Shisa9        | protein_coding         |
| ENSMUST00000118556 | 61 | 69  | 6   | Ano1          | protein_coding         |
| ENSMUST00000146815 | 61 | 68  | 10  | Slc24a2       | protein_coding         |
| ENSMUST00000151408 | 61 | 68  | 0   | Rasgrf2       | protein_coding         |
| ENSMUST00000112864 | 61 | 66  | 2   | Pak3          | protein_coding         |

|                    |    |     |     |               |                |
|--------------------|----|-----|-----|---------------|----------------|
| ENSMUST00000048359 | 61 | 66  | 113 | Tango6        | protein_coding |
| ENSMUST00000150912 | 61 | 65  | 18  | Stard9        | protein_coding |
| ENSMUST00000112616 | 61 | 64  | 0   | Galnt5        | protein_coding |
| ENSMUST00000044234 | 61 | 63  | 2   | Tgfb1         | protein_coding |
| ENSMUST00000042658 | 61 | 63  | 0   | Echdc3        | protein_coding |
| ENSMUST00000113716 | 61 | 60  | 2   | Tex11         | protein_coding |
| ENSMUST00000073150 | 61 | 58  | 24  | Peli2         | protein_coding |
| ENSMUST00000156311 | 61 | 57  | 0   | Gm12484       | lincRNA        |
| ENSMUST00000171447 | 61 | 55  | 0   | Dusp12        | protein_coding |
| ENSMUST00000056773 | 61 | 51  | 26  | Sdccag8       | protein_coding |
| ENSMUST00000072767 | 61 | 49  | 24  | Arhgef12      | protein_coding |
| ENSMUST00000129188 | 61 | 39  | 56  | Rere          | protein_coding |
| ENSMUST00000156473 | 61 | 38  | 22  | Snx12         | protein_coding |
| ENSMUST00000069817 | 61 | 34  | 50  | Prrc2b        | protein_coding |
| ENSMUST00000137551 | 61 | 33  | 44  | Prrc2b        | protein_coding |
| ENSMUST00000137551 | 61 | 33  | 44  | Prrc2b        | protein_coding |
| ENSMUST00000048453 | 61 | 26  | 40  | Btbd16        | protein_coding |
| ENSMUST00000103068 | 61 | 16  | 77  | Cep95         | protein_coding |
| ENSMUST00000058865 | 60 | 87  | 6   | Pdzk1         | protein_coding |
| ENSMUST00000024905 | 60 | 75  | 8   | Ralbp1        | protein_coding |
| ENSMUST00000127430 | 60 | 74  | 10  | Smchd1        | protein_coding |
| ENSMUST00000106237 | 60 | 73  | 2   | Itgad         | protein_coding |
| ENSMUST00000149451 | 60 | 66  | 67  | Sox5          | protein_coding |
| ENSMUST00000176128 | 60 | 64  | 6   | Hmbox1        | protein_coding |
| ENSMUST00000033289 | 60 | 61  | 40  | Stim1         | protein_coding |
| ENSMUST00000063663 | 60 | 60  | 20  | B3gat2        | protein_coding |
| ENSMUST00000033652 | 60 | 60  | 4   | Phka2         | protein_coding |
| ENSMUST00000139290 | 60 | 60  | 0   | Polg          | protein_coding |
| ENSMUST00000029507 | 60 | 55  | 10  | Dram2         | protein_coding |
| ENSMUST00000069074 | 60 | 55  | 6   | Cadps2        | protein_coding |
| ENSMUST00000149863 | 60 | 28  | 456 | Mtcp1         | protein_coding |
| ENSMUST00000112435 | 59 | 142 | 12  | Ep400         | protein_coding |
| ENSMUST00000002275 | 59 | 93  | 0   | Vrk3          | protein_coding |
| ENSMUST00000167549 | 59 | 81  | 4   | Endod1        | protein_coding |
| ENSMUST00000176736 | 59 | 77  | 4   | Arhgap39      | protein_coding |
| ENSMUST00000124440 | 59 | 76  | 22  | Faxc          | protein_coding |
| ENSMUST00000140081 | 59 | 70  | 20  | Lrrc8d        | protein_coding |
| ENSMUST00000105257 | 59 | 70  | 8   | Slc16a7       | protein_coding |
| ENSMUST00000098402 | 59 | 66  | 6   | Snrpn         | protein_coding |
| ENSMUST00000176838 | 59 | 64  | 6   | Vmn1r4        | protein_coding |
| ENSMUST00000001148 | 59 | 63  | 6   | Pcbp3         | protein_coding |
| ENSMUST00000143329 | 59 | 62  | 12  | Pak7          | protein_coding |
| ENSMUST00000126403 | 59 | 56  | 0   | Sqrdl         | protein_coding |
| ENSMUST00000113398 | 59 | 55  | 8   | Epha5         | protein_coding |
| ENSMUST00000107498 | 59 | 52  | 40  | Gon4l         | protein_coding |
| ENSMUST00000160693 | 59 | 51  | 24  | Nckap5        | protein_coding |
| ENSMUST00000143260 | 59 | 48  | 0   | Gm5665        | lincRNA        |
| ENSMUST00000065537 | 59 | 43  | 2   | Jmy           | protein_coding |
| ENSMUST00000144134 | 59 | 20  | 525 | Gm15564       | antisense      |
| ENSMUST00000091798 | 58 | 96  | 2   | Pqlc1         | protein_coding |
| ENSMUST00000128896 | 58 | 89  | 36  | Hnf4aos       | antisense      |
| ENSMUST00000151782 | 58 | 77  | 30  | A230108P19Rik | antisense      |
| ENSMUST00000023435 | 58 | 75  | 10  | Tmem45a       | protein_coding |
| ENSMUST00000102693 | 58 | 71  | 16  | Pemt          | protein_coding |
| ENSMUST00000028362 | 58 | 69  | 2   | Ly75          | protein_coding |
| ENSMUST00000067491 | 58 | 66  | 16  | Cadps         | protein_coding |
| ENSMUST00000161244 | 58 | 66  | 4   | Gm15679       | antisense      |
| ENSMUST00000180557 | 58 | 66  | 4   | 4933405D12Rik | lincRNA        |
| ENSMUST00000165167 | 58 | 65  | 18  | Sult2a4       | protein_coding |
| ENSMUST00000039862 | 58 | 64  | 32  | Zp3r          | protein_coding |
| ENSMUST00000098371 | 58 | 63  | 12  | Slco3a1       | protein_coding |
| ENSMUST00000107992 | 58 | 63  | 2   | Gm5595        | protein_coding |
| ENSMUST00000167002 | 58 | 63  | 2   | Ptpro         | protein_coding |
| ENSMUST00000079698 | 58 | 62  | 87  | Phactr2       | protein_coding |
| ENSMUST00000128717 | 58 | 62  | 14  | Ankfn1        | protein_coding |
| ENSMUST00000044634 | 58 | 60  | 26  | Slc25a21      | protein_coding |
| ENSMUST00000114526 | 58 | 57  | 18  | Acbd5         | protein_coding |
| ENSMUST00000101102 | 58 | 57  | 6   | Reps2         | protein_coding |

|                    |    |    |                  |                      |
|--------------------|----|----|------------------|----------------------|
| ENSMUST00000033990 | 58 | 55 | 2 Wrn            | protein_coding       |
| ENSMUST00000136294 | 58 | 55 | 4 Gm15415        | antisense            |
| ENSMUST00000154638 | 58 | 54 | 8 Hccs           | protein_coding       |
| ENSMUST00000059946 | 58 | 49 | 30 Henmt1        | protein_coding       |
| ENSMUST00000067479 | 58 | 49 | 8 Cyp3a44        | protein_coding       |
| ENSMUST00000084298 | 58 | 48 | 22 Gm1976        | lincRNA              |
| ENSMUST00000131099 | 58 | 48 | 6 Gm12436        | lincRNA              |
| ENSMUST00000164754 | 58 | 18 | 67 Arpp21        | protein_coding       |
| ENSMUST00000090858 | 58 | 79 | 26 Ppig          | protein_coding       |
| ENSMUST00000124397 | 58 | 79 | 0 C030039L03Rik  | protein_coding       |
| ENSMUST00000156096 | 58 | 74 | 0 Cask           | protein_coding       |
| ENSMUST00000024032 | 58 | 72 | 0 9530002B09Rik  | protein_coding       |
| ENSMUST00000125512 | 58 | 65 | 4 Svii           | protein_coding       |
| ENSMUST00000021918 | 58 | 62 | 18 Ror2          | protein_coding       |
| ENSMUST00000027337 | 58 | 62 | 16 Fam135a       | protein_coding       |
| ENSMUST00000092603 | 58 | 61 | 0 Nkain2         | protein_coding       |
| ENSMUST00000027612 | 58 | 59 | 2 Gm4788         | protein_coding       |
| ENSMUST00000161810 | 58 | 57 | 2 Boll           | protein_coding       |
| ENSMUST00000110997 | 58 | 55 | 0 Tlr5           | protein_coding       |
| ENSMUST00000101538 | 58 | 55 | 52 9030624G23Rik | protein_coding       |
| ENSMUST00000044806 | 58 | 54 | 2 E230019M04Rik  | protein_coding       |
| ENSMUST00000147545 | 58 | 51 | 38 Ccdc6         | protein_coding       |
| ENSMUST00000093775 | 58 | 51 | 28 Slc22a14      | protein_coding       |
| ENSMUST00000127969 | 58 | 50 | 26 Shisa5        | protein_coding       |
| ENSMUST00000127969 | 58 | 50 | 26 Shisa5        | protein_coding       |
| ENSMUST00000127420 | 58 | 46 | 2 Stau2          | protein_coding       |
| ENSMUST00000166591 | 58 | 44 | 317 Loh12cr1     | protein_coding       |
| ENSMUST00000161449 | 57 | 74 | 20 Gm16092       | lincRNA              |
| ENSMUST00000140450 | 57 | 73 | 0 Gm14717        | antisense            |
| ENSMUST00000144761 | 57 | 72 | 22 Gm14858       | processed_transcript |
| ENSMUST00000058652 | 57 | 69 | 6 Hs3st3a1       | protein_coding       |
| ENSMUST00000115559 | 57 | 68 | 42 Dync1i1       | protein_coding       |
| ENSMUST00000098926 | 57 | 67 | 6 Gm10701        | antisense            |
| ENSMUST00000130696 | 57 | 65 | 2 4930511M06Rik  | processed_transcript |
| ENSMUST00000166219 | 57 | 60 | 157 Hsbp1l1      | protein_coding       |
| ENSMUST00000077115 | 57 | 60 | 22 Ptpro         | protein_coding       |
| ENSMUST00000022816 | 57 | 60 | 16 Sub1          | protein_coding       |
| ENSMUST00000168440 | 57 | 60 | 8 Vmn2r118       | protein_coding       |
| ENSMUST00000156636 | 57 | 58 | 18 Map2          | protein_coding       |
| ENSMUST00000045652 | 57 | 58 | 6 Btbd7          | protein_coding       |
| ENSMUST00000101581 | 57 | 58 | 4 Cacna2d1       | protein_coding       |
| ENSMUST00000108934 | 57 | 55 | 26 C330013J21Rik | protein_coding       |
| ENSMUST00000044829 | 57 | 53 | 20 4921524L21Rik | protein_coding       |
| ENSMUST00000159786 | 57 | 51 | 34 Apbb2         | protein_coding       |
| ENSMUST00000044220 | 57 | 49 | 10 Cmc1          | protein_coding       |
| ENSMUST00000046656 | 57 | 49 | 8 Tasp1          | protein_coding       |
| ENSMUST00000089519 | 57 | 47 | 79 Aak1          | protein_coding       |
| ENSMUST00000148739 | 57 | 47 | 365 Lmntd1       | protein_coding       |
| ENSMUST00000074541 | 57 | 45 | 14 Jazf1         | protein_coding       |
| ENSMUST00000154976 | 57 | 39 | 2 Ttc19          | protein_coding       |
| ENSMUST00000139582 | 57 | 17 | 0 Usp35          | protein_coding       |
| ENSMUST00000112902 | 56 | 83 | 4 Nek6           | protein_coding       |
| ENSMUST00000155301 | 56 | 83 | 4 Fbxl12         | protein_coding       |
| ENSMUST00000025073 | 56 | 82 | 10 Cul2          | protein_coding       |
| ENSMUST00000041047 | 56 | 70 | 16 Lnpep         | protein_coding       |
| ENSMUST00000106134 | 56 | 70 | 8 Ttil7          | protein_coding       |
| ENSMUST00000031314 | 56 | 70 | 0 Alb            | protein_coding       |
| ENSMUST00000038361 | 56 | 68 | 30 Mgat5         | protein_coding       |
| ENSMUST00000041859 | 56 | 68 | 18 Gmds          | protein_coding       |
| ENSMUST00000171132 | 56 | 62 | 10 Gbe1          | protein_coding       |
| ENSMUST00000064937 | 56 | 62 | 4 Nrk            | protein_coding       |
| ENSMUST00000075992 | 56 | 61 | 16 Pkib          | protein_coding       |
| ENSMUST0000009003  | 56 | 60 | 32 Rala          | protein_coding       |
| ENSMUST00000038447 | 56 | 59 | 16 Efhc1         | protein_coding       |
| ENSMUST00000169796 | 56 | 59 | 0 Ulbp1          | protein_coding       |
| ENSMUST00000164491 | 56 | 58 | 14 Gm765         | protein_coding       |
| ENSMUST00000181507 | 56 | 58 | 4 Gm7976         | lincRNA              |
| ENSMUST00000143410 | 56 | 56 | 2 Tnni3k         | protein_coding       |

|                    |    |    |     |               |                                  |
|--------------------|----|----|-----|---------------|----------------------------------|
| ENSMUST00000067545 | 56 | 56 | 0   | Lclat1        | protein_coding                   |
| ENSMUST00000129408 | 56 | 55 | 8   | Gm16178       | antisense                        |
| ENSMUST00000061074 | 56 | 53 | 0   | Vmn2r68       | protein_coding                   |
| ENSMUST00000123567 | 56 | 53 | 20  | Cdh13         | protein_coding                   |
| ENSMUST00000024967 | 56 | 52 | 28  | Msh2          | protein_coding                   |
| ENSMUST00000177708 | 56 | 49 | 24  | Gm1647        | protein_coding                   |
| ENSMUST00000162485 | 56 | 46 | 0   | Tnik          | protein_coding                   |
| ENSMUST00000023437 | 56 | 87 | 12  | Gpr128        | protein_coding                   |
| ENSMUST00000053910 | 56 | 86 | 12  | Csrnp3        | protein_coding                   |
| ENSMUST00000142762 | 56 | 74 | 0   | Unc5c         | protein_coding                   |
| ENSMUST00000183192 | 56 | 69 | 16  | Zfp229        | protein_coding                   |
| ENSMUST00000086210 | 56 | 68 | 0   | Vmn2r54       | protein_coding                   |
| ENSMUST00000156423 | 56 | 68 | 14  | Gm10653       | transcribed_processed_pseudogene |
| ENSMUST00000182601 | 56 | 66 | 48  | Mir99ahg      | processed_transcript             |
| ENSMUST00000109986 | 56 | 66 | 8   | Ralgapa2      | protein_coding                   |
| ENSMUST0000014218  | 56 | 66 | 44  | Rnf168        | protein_coding                   |
| ENSMUST00000089058 | 56 | 64 | 8   | Map3k4        | protein_coding                   |
| ENSMUST00000134899 | 56 | 60 | 6   | Gm14818       | antisense                        |
| ENSMUST00000093485 | 56 | 58 | 34  | Ddx60         | protein_coding                   |
| ENSMUST00000110477 | 56 | 58 | 6   | Shc4          | protein_coding                   |
| ENSMUST00000161047 | 56 | 57 | 2   | Nxpe5         | protein_coding                   |
| ENSMUST00000092566 | 56 | 56 | 4   | Slc16a10      | protein_coding                   |
| ENSMUST00000168730 | 56 | 53 | 0   | Vmn2r67       | protein_coding                   |
| ENSMUST00000134504 | 56 | 49 | 16  | Adam12        | protein_coding                   |
| ENSMUST00000137984 | 56 | 48 | 18  | Gm13377       | unprocessed_pseudogene           |
| ENSMUST00000163281 | 56 | 48 | 0   | Skint7        | protein_coding                   |
| ENSMUST00000096358 | 55 | 99 | 0   | Apol7e        | protein_coding                   |
| ENSMUST00000037416 | 55 | 83 | 12  | Bach2         | protein_coding                   |
| ENSMUST00000022508 | 55 | 72 | 0   | Ptpn20        | protein_coding                   |
| ENSMUST00000023036 | 55 | 69 | 4   | Rbx1          | protein_coding                   |
| ENSMUST00000105290 | 55 | 69 | 0   | Nr2c1         | protein_coding                   |
| ENSMUST00000139750 | 55 | 68 | 0   | Stxbp6        | protein_coding                   |
| ENSMUST00000181304 | 55 | 68 | 16  | A430010J10Rik | lincRNA                          |
| ENSMUST00000120540 | 55 | 67 | 6   | Slc22a30      | protein_coding                   |
| ENSMUST00000169825 | 55 | 66 | 12  | Cntn1         | protein_coding                   |
| ENSMUST00000171353 | 55 | 63 | 0   | Lrrc4         | protein_coding                   |
| ENSMUST00000094004 | 55 | 62 | 20  | Abhd15        | protein_coding                   |
| ENSMUST00000044094 | 55 | 62 | 0   | Hsd3b5        | protein_coding                   |
| ENSMUST00000143228 | 55 | 61 | 44  | Cdkl3         | protein_coding                   |
| ENSMUST00000136908 | 55 | 61 | 0   | Gm15270       | processed_transcript             |
| ENSMUST00000053543 | 55 | 60 | 0   | Tecrl         | protein_coding                   |
| ENSMUST00000181884 | 55 | 60 | 6   | G730013B05Rik | lincRNA                          |
| ENSMUST00000025425 | 55 | 60 | 0   | Cep192        | protein_coding                   |
| ENSMUST00000173757 | 55 | 59 | 38  | Tbc1d14       | protein_coding                   |
| ENSMUST00000034111 | 55 | 57 | 38  | Slc10a7       | protein_coding                   |
| ENSMUST00000039798 | 55 | 57 | 18  | Bbs9          | protein_coding                   |
| ENSMUST00000044828 | 55 | 57 | 2   | Lgr6          | protein_coding                   |
| ENSMUST00000023100 | 55 | 56 | 85  | Srebf2        | protein_coding                   |
| ENSMUST00000117310 | 55 | 55 | 4   | Gpr174        | protein_coding                   |
| ENSMUST00000131464 | 55 | 55 | 14  | Cdh7          | protein_coding                   |
| ENSMUST00000182573 | 55 | 55 | 10  | Atp13a4       | protein_coding                   |
| ENSMUST00000095806 | 55 | 54 | 10  | Map3k5        | protein_coding                   |
| ENSMUST00000062721 | 55 | 53 | 6   | Lipi          | protein_coding                   |
| ENSMUST00000063750 | 55 | 51 | 0   | Rarb          | protein_coding                   |
| ENSMUST00000145577 | 55 | 51 | 2   | 4930456L15Rik | lincRNA                          |
| ENSMUST00000042090 | 55 | 49 | 22  | Vmn2r107      | protein_coding                   |
| ENSMUST00000172522 | 55 | 48 | 101 | Gm20319       | processed_transcript             |
| ENSMUST00000035890 | 55 | 48 | 4   | Slc7a13       | protein_coding                   |
| ENSMUST00000026504 | 55 | 45 | 12  | Xrcc6bp1      | protein_coding                   |
| ENSMUST00000168048 | 55 | 45 | 6   | Gm17171       | antisense                        |
| ENSMUST00000177114 | 55 | 44 | 4   | Ttll5         | protein_coding                   |
| ENSMUST00000153726 | 55 | 42 | 6   | Gm13972       | processed_transcript             |
| ENSMUST00000176763 | 55 | 41 | 0   | Vmn2r-ps123   | unprocessed_pseudogene           |
| ENSMUST00000166847 | 55 | 39 | 10  | Rsph10b       | protein_coding                   |
| ENSMUST00000165460 | 54 | 85 | 4   | Whamm         | protein_coding                   |
| ENSMUST00000050586 | 54 | 84 | 18  | 5430419D17Rik | protein_coding                   |
| ENSMUST00000129092 | 54 | 78 | 40  | Mtus2         | protein_coding                   |
| ENSMUST00000078626 | 54 | 77 | 198 | Trank1        | protein_coding                   |

|                    |    |    |                   |                                    |
|--------------------|----|----|-------------------|------------------------------------|
| ENSMUST00000026922 | 54 | 74 | 8 Homer2          | protein_coding                     |
| ENSMUST00000067410 | 54 | 72 | 14 Dgkk           | protein_coding                     |
| ENSMUST00000126879 | 54 | 72 | 14 Zfp369         | protein_coding                     |
| ENSMUST00000087268 | 54 | 71 | 16 Abca12         | protein_coding                     |
| ENSMUST00000043848 | 54 | 69 | 56 Ncapd2         | protein_coding                     |
| ENSMUST00000181886 | 54 | 69 | 16 Gm26862        | lincRNA                            |
| ENSMUST00000088867 | 54 | 66 | 10 Klra2          | protein_coding                     |
| ENSMUST00000005798 | 54 | 62 | 12 Snx6           | protein_coding                     |
| ENSMUST00000126209 | 54 | 62 | 4 Prrg1           | protein_coding                     |
| ENSMUST00000081541 | 54 | 59 | 4 Acnat2          | protein_coding                     |
| ENSMUST00000164582 | 54 | 58 | 16 Ankrd13c       | protein_coding                     |
| ENSMUST00000109504 | 54 | 58 | 2 Vrk2            | protein_coding                     |
| ENSMUST00000019920 | 54 | 53 | 6 Clvs2           | protein_coding                     |
| ENSMUST00000029355 | 54 | 53 | 32 Ppm1l          | protein_coding                     |
| ENSMUST00000029641 | 54 | 53 | 0 Asic5           | protein_coding                     |
| ENSMUST00000141967 | 54 | 50 | 8 Asb13           | protein_coding                     |
| ENSMUST00000051504 | 54 | 49 | 2 Ecm2            | protein_coding                     |
| ENSMUST00000042329 | 54 | 49 | 2 Nxt2            | protein_coding                     |
| ENSMUST00000184980 | 54 | 45 | 20 1110008L16Rik  | protein_coding                     |
| ENSMUST00000166384 | 54 | 43 | 20 Sgk3           | protein_coding                     |
| ENSMUST00000119888 | 54 | 41 | 6 Ptpg            | protein_coding                     |
| ENSMUST00000101295 | 54 | 38 | 16 9930111J21Rik2 | protein_coding                     |
| ENSMUST00000032335 | 54 | 32 | 38 Atf7ip         | protein_coding                     |
| ENSMUST00000140721 | 54 | 16 | 180 Slc5a11       | protein_coding                     |
| ENSMUST00000180679 | 53 | 85 | 137 Gm26816       | lincRNA                            |
| ENSMUST00000117944 | 53 | 83 | 14 Hs3st1         | protein_coding                     |
| ENSMUST00000145668 | 53 | 78 | 18 Eya3           | protein_coding                     |
| ENSMUST00000138234 | 53 | 75 | 20 Mprp           | protein_coding                     |
| ENSMUST00000043108 | 53 | 72 | 54 Zgrf1          | protein_coding                     |
| ENSMUST00000156182 | 53 | 72 | 0 Nsf11c          | protein_coding                     |
| ENSMUST00000082121 | 53 | 70 | 0 Glimn           | protein_coding                     |
| ENSMUST00000139414 | 53 | 64 | 2 Tbcd            | protein_coding                     |
| ENSMUST00000053498 | 53 | 62 | 40 Rnf216         | protein_coding                     |
| ENSMUST00000020107 | 53 | 62 | 30 Atp2b1         | protein_coding                     |
| ENSMUST00000121273 | 53 | 62 | 0 Gm10639         | protein_coding                     |
| ENSMUST00000065523 | 53 | 61 | 22 Trp63          | protein_coding                     |
| ENSMUST00000132470 | 53 | 61 | 0 Gm11261         | lincRNA                            |
| ENSMUST00000106724 | 53 | 60 | 174 Cep112        | protein_coding                     |
| ENSMUST00000170596 | 53 | 60 | 6 Vmn2r82         | protein_coding                     |
| ENSMUST00000177440 | 53 | 59 | 4 2700069L18Rik   | antisense                          |
| ENSMUST00000080407 | 53 | 58 | 8 Zfp735          | protein_coding                     |
| ENSMUST00000155927 | 53 | 57 | 16 Camk1d         | protein_coding                     |
| ENSMUST00000130574 | 53 | 55 | 10 Lclat1         | protein_coding                     |
| ENSMUST00000161465 | 53 | 54 | 73 Setbp1         | protein_coding                     |
| ENSMUST00000044564 | 53 | 54 | 10 Foxj3          | protein_coding                     |
| ENSMUST00000099991 | 53 | 54 | 2 Nrros           | protein_coding                     |
| ENSMUST00000134692 | 53 | 53 | 14 Gm15818        | antisense                          |
| ENSMUST00000105400 | 53 | 53 | 18 Trpm2          | protein_coding                     |
| ENSMUST00000097811 | 53 | 53 | 14 Rims1          | protein_coding                     |
| ENSMUST00000095158 | 53 | 50 | 8 Ccdc7           | protein_coding                     |
| ENSMUST00000044165 | 53 | 49 | 12 Itga9          | protein_coding                     |
| ENSMUST00000118879 | 53 | 48 | 0 Gm15854         | unprocessed_pseudogene             |
| ENSMUST00000112655 | 53 | 46 | 8 Rpap2           | protein_coding                     |
| ENSMUST00000074156 | 53 | 20 | 93 Ak8            | protein_coding                     |
| ENSMUST00000090756 | 53 | 86 | 0 Pde1a           | protein_coding                     |
| ENSMUST00000022918 | 53 | 83 | 2 Oxr1            | protein_coding                     |
| ENSMUST00000177608 | 53 | 80 | 30 Sulf1          | protein_coding                     |
| ENSMUST00000153172 | 53 | 72 | 8 Fam69a          | protein_coding                     |
| ENSMUST00000141477 | 53 | 70 | 4 Itga8           | protein_coding                     |
| ENSMUST00000129918 | 53 | 68 | 18 Cyp4a32        | protein_coding                     |
| ENSMUST00000053819 | 53 | 67 | 6 Srsf4           | protein_coding                     |
| ENSMUST00000176568 | 53 | 57 | 8 Vmn2r-ps11      | transcribed_unprocessed_pseudogene |
| ENSMUST00000165341 | 53 | 56 | 16 Otogl          | protein_coding                     |
| ENSMUST00000123724 | 53 | 55 | 16 Gtsf1          | protein_coding                     |
| ENSMUST00000139869 | 53 | 53 | 14 Sorbs2         | protein_coding                     |
| ENSMUST00000108264 | 53 | 51 | 32 Ksr1           | protein_coding                     |
| ENSMUST00000137306 | 53 | 51 | 6 Asb3            | protein_coding                     |
| ENSMUST00000183775 | 53 | 49 | 0 Pde1a           | protein_coding                     |

|                    |    |     |     |           |                                    |
|--------------------|----|-----|-----|-----------|------------------------------------|
| ENSMUST00000146121 | 53 | 45  | 882 | Gm11292   | processed_transcript               |
| ENSMUST00000126048 | 53 | 41  | 2   | Cep128    | protein_coding                     |
| ENSMUST00000039340 | 53 | 37  | 24  | Nme8      | protein_coding                     |
| ENSMUST00000060004 | 53 | 25  | 69  | Tmem116   | protein_coding                     |
| ENSMUST00000068681 | 52 | 120 | 4   | Ngef      | protein_coding                     |
| ENSMUST00000087085 | 52 | 102 | 26  | Nhs       | protein_coding                     |
| ENSMUST00000141341 | 52 | 101 | 20  | Gm13814   | lincRNA                            |
| ENSMUST00000022124 | 52 | 73  | 2   | Cd180     | protein_coding                     |
| ENSMUST00000019876 | 52 | 69  | 2   | Calr3     | protein_coding                     |
| ENSMUST00000052347 | 52 | 69  | 2   | Mc2r      | protein_coding                     |
| ENSMUST00000112608 | 52 | 68  | 10  | Acvr1c    | protein_coding                     |
| ENSMUST00000145422 | 52 | 67  | 12  | Setx      | protein_coding                     |
| ENSMUST00000144024 | 52 | 67  | 12  | Gm12147   | antisense                          |
| ENSMUST00000143012 | 52 | 66  | 2   | Plcd3     | protein_coding                     |
| ENSMUST00000077672 | 52 | 65  | 28  | Col4a3bp  | protein_coding                     |
| ENSMUST00000078095 | 52 | 64  | 20  | Gucy2c    | protein_coding                     |
| ENSMUST00000091137 | 52 | 63  | 4   | Frem2     | protein_coding                     |
| ENSMUST00000153099 | 52 | 62  | 22  | Scmh1     | protein_coding                     |
| ENSMUST00000173165 | 52 | 59  | 20  | Gm20528   | processed_transcript               |
| ENSMUST00000009689 | 52 | 58  | 61  | Kcnq1     | protein_coding                     |
| ENSMUST00000184725 | 52 | 57  | 6   | Wdr72     | protein_coding                     |
| ENSMUST00000071076 | 52 | 56  | 69  | Grm7      | protein_coding                     |
| ENSMUST00000139695 | 52 | 55  | 18  | Gm14798   | antisense                          |
| ENSMUST00000052332 | 52 | 53  | 32  | Abi2      | protein_coding                     |
| ENSMUST00000181192 | 52 | 51  | 2   | Gm20619   | lincRNA                            |
| ENSMUST00000034987 | 52 | 50  | 2   | Dopey1    | protein_coding                     |
| ENSMUST00000090277 | 52 | 48  | 4   | Efcab1    | protein_coding                     |
| ENSMUST00000105765 | 52 | 45  | 36  | BC080695  | protein_coding                     |
| ENSMUST00000025601 | 52 | 45  | 20  | Lpxn      | protein_coding                     |
| ENSMUST00000167992 | 52 | 43  | 56  | Tusc3     | protein_coding                     |
| ENSMUST00000147193 | 52 | 39  | 0   | Dync2h1   | protein_coding                     |
| ENSMUST00000116492 | 52 | 23  | 0   | Ubp1      | protein_coding                     |
| ENSMUST00000129557 | 51 | 76  | 2   | Med1      | protein_coding                     |
| ENSMUST00000130153 | 51 | 74  | 6   | Gm15046   | lincRNA                            |
| ENSMUST00000142875 | 51 | 72  | 147 | Aff3      | nonsense_mediated_decay            |
| ENSMUST00000142875 | 51 | 72  | 147 | Aff3      | nonsense_mediated_decay            |
| ENSMUST00000111316 | 51 | 71  | 97  | Ambra1    | protein_coding                     |
| ENSMUST00000094933 | 51 | 70  | 12  | Usp24     | protein_coding                     |
| ENSMUST00000145864 | 51 | 62  | 4   | Syn3      | protein_coding                     |
| ENSMUST00000105579 | 51 | 61  | 6   | Sdf4      | protein_coding                     |
| ENSMUST00000159439 | 51 | 58  | 2   | Gm10319   | transcribed_unprocessed_pseudogene |
| ENSMUST00000135050 | 51 | 57  | 6   | Paqr5     | protein_coding                     |
| ENSMUST00000061156 | 51 | 56  | 54  | Ptplb     | protein_coding                     |
| ENSMUST00000030299 | 51 | 56  | 0   | Cyp2j5    | protein_coding                     |
| ENSMUST00000019992 | 51 | 55  | 26  | Lama4     | protein_coding                     |
| ENSMUST00000110320 | 51 | 55  | 2   | Zc3h6     | protein_coding                     |
| ENSMUST00000139694 | 51 | 54  | 6   | Fam154a   | protein_coding                     |
| ENSMUST00000183289 | 51 | 54  | 2   | Slc6a16   | lincRNA                            |
| ENSMUST00000112380 | 51 | 51  | 46  | Phka2     | protein_coding                     |
| ENSMUST00000059286 | 51 | 51  | 6   | Irak2     | protein_coding                     |
| ENSMUST00000044003 | 51 | 51  | 4   | Abca6     | protein_coding                     |
| ENSMUST00000172905 | 51 | 49  | 4   | Nlrp1c-ps | transcribed_unprocessed_pseudogene |
| ENSMUST00000172905 | 51 | 49  | 4   | Nlrp1c-ps | transcribed_unprocessed_pseudogene |
| ENSMUST00000149613 | 51 | 48  | 38  | Gm13847   | lincRNA                            |
| ENSMUST00000045262 | 51 | 47  | 28  | Ak5       | protein_coding                     |
| ENSMUST00000135810 | 51 | 47  | 22  | Phlpp1    | protein_coding                     |
| ENSMUST00000094489 | 51 | 45  | 6   | Cfhr2     | protein_coding                     |
| ENSMUST00000049388 | 51 | 45  | 26  | Comm10    | protein_coding                     |
| ENSMUST00000076894 | 51 | 43  | 6   | Rfwd2     | protein_coding                     |
| ENSMUST00000148504 | 51 | 42  | 26  | Gm12153   | lincRNA                            |
| ENSMUST00000056336 | 51 | 37  | 184 | Oprd1     | protein_coding                     |
| ENSMUST00000022450 | 51 | 32  | 4   | Fam208a   | protein_coding                     |
| ENSMUST00000161487 | 51 | 30  | 38  | Ppm1h     | protein_coding                     |
| ENSMUST00000140797 | 51 | 28  | 65  | Tmtc1     | protein_coding                     |
| ENSMUST00000003035 | 50 | 93  | 0   | Disp1     | protein_coding                     |
| ENSMUST00000126962 | 50 | 92  | 0   | Cab39     | protein_coding                     |
| ENSMUST00000110191 | 50 | 81  | 28  | Gcnt2     | protein_coding                     |
| ENSMUST00000071650 | 50 | 76  | 0   | Idua      | protein_coding                     |

|                    |    |     |     |               |                                  |
|--------------------|----|-----|-----|---------------|----------------------------------|
| ENSMUST00000098005 | 50 | 72  | 0   | Ptprd         | protein_coding                   |
| ENSMUST00000098065 | 50 | 70  | 46  | Akap2         | protein_coding                   |
| ENSMUST00000107096 | 50 | 69  | 276 | Rps3          | protein_coding                   |
| ENSMUST00000106830 | 50 | 66  | 44  | Dab1          | protein_coding                   |
| ENSMUST00000085385 | 50 | 64  | 14  | Ralgapa1      | protein_coding                   |
| ENSMUST00000057241 | 50 | 58  | 0   | Zfp874a       | protein_coding                   |
| ENSMUST00000114514 | 50 | 55  | 38  | Bre           | protein_coding                   |
| ENSMUST00000046663 | 50 | 55  | 22  | Dcbld2        | protein_coding                   |
| ENSMUST00000131972 | 50 | 55  | 8   | Fbxl4         | protein_coding                   |
| ENSMUST00000067173 | 50 | 53  | 71  | Tmem45a2      | protein_coding                   |
| ENSMUST00000027592 | 50 | 53  | 75  | Ubxn4         | protein_coding                   |
| ENSMUST00000111130 | 50 | 50  | 2   | Cd59b         | protein_coding                   |
| ENSMUST00000135115 | 50 | 48  | 2   | Kantr         | lincRNA                          |
| ENSMUST00000143755 | 50 | 47  | 10  | Gm11264       | lincRNA                          |
| ENSMUST00000076325 | 50 | 46  | 30  | Mef2a         | protein_coding                   |
| ENSMUST00000172532 | 50 | 46  | 20  | Greb1l        | protein_coding                   |
| ENSMUST00000112574 | 50 | 45  | 24  | Klf8          | protein_coding                   |
| ENSMUST00000135906 | 50 | 43  | 14  | Orc5          | protein_coding                   |
| ENSMUST00000048409 | 50 | 42  | 12  | Elmod1        | protein_coding                   |
| ENSMUST00000172184 | 50 | 39  | 6   | Serpib6c      | protein_coding                   |
| ENSMUST00000098938 | 50 | 38  | 0   | Arhgef7       | protein_coding                   |
| ENSMUST00000130117 | 50 | 35  | 2   | Gm11842       | antisense                        |
| ENSMUST00000167676 | 50 | 21  | 65  | Gm4776        | transcribed_processed_pseudogene |
| ENSMUST00000143587 | 50 | 100 | 119 | 1500012F01Rik | protein_coding                   |
| ENSMUST00000172171 | 50 | 91  | 0   | Naalad2       | protein_coding                   |
| ENSMUST00000166542 | 50 | 77  | 103 | Hivep3        | protein_coding                   |
| ENSMUST00000062755 | 50 | 74  | 26  | Loh12cr1      | protein_coding                   |
| ENSMUST00000093859 | 50 | 71  | 48  | Grin3a        | protein_coding                   |
| ENSMUST00000109532 | 50 | 69  | 2   | 0610010F05Rik | protein_coding                   |
| ENSMUST00000027921 | 50 | 64  | 4   | Iars2         | protein_coding                   |
| ENSMUST00000183819 | 50 | 63  | 20  | Spata17       | protein_coding                   |
| ENSMUST00000174368 | 50 | 62  | 0   | Vmn2r30       | protein_coding                   |
| ENSMUST00000119870 | 50 | 59  | 0   | Cngb1         | protein_coding                   |
| ENSMUST00000118509 | 50 | 59  | 0   | Gm13755       | processed_pseudogene             |
| ENSMUST00000185104 | 50 | 58  | 44  | Tmem132b      | protein_coding                   |
| ENSMUST00000161342 | 50 | 57  | 18  | Pkp2          | protein_coding                   |
| ENSMUST00000112471 | 50 | 56  | 202 | Map7d2        | protein_coding                   |
| ENSMUST00000006061 | 50 | 54  | 24  | Pex1          | protein_coding                   |
| ENSMUST00000114297 | 50 | 54  | 2   | Vopp1         | protein_coding                   |
| ENSMUST00000147041 | 50 | 50  | 2   | Arhgef38      | protein_coding                   |
| ENSMUST00000080936 | 50 | 49  | 12  | Med15         | protein_coding                   |
| ENSMUST00000099326 | 50 | 49  | 4   | Rasgrf2       | protein_coding                   |
| ENSMUST00000034592 | 50 | 46  | 75  | Dscaml1       | protein_coding                   |
| ENSMUST00000154998 | 50 | 45  | 4   | Ipcef1        | protein_coding                   |
| ENSMUST00000109478 | 50 | 45  | 6   | Dhx35         | protein_coding                   |
| ENSMUST00000127972 | 50 | 43  | 20  | Cpped1        | protein_coding                   |
| ENSMUST00000021029 | 50 | 41  | 16  | Efcab3        | protein_coding                   |
| ENSMUST00000162772 | 50 | 41  | 12  | Lmo3          | protein_coding                   |
| ENSMUST00000169838 | 50 | 39  | 14  | Tiam2         | protein_coding                   |
| ENSMUST00000142414 | 50 | 23  | 12  | Wipf2         | protein_coding                   |
| ENSMUST00000120145 | 49 | 79  | 0   | Mup-ps18      | unprocessed_pseudogene           |
| ENSMUST00000106774 | 49 | 72  | 2   | Mov10         | protein_coding                   |
| ENSMUST00000143318 | 49 | 70  | 18  | Csrp2bp       | protein_coding                   |
| ENSMUST00000122328 | 49 | 66  | 6   | Pxdn          | protein_coding                   |
| ENSMUST00000106941 | 49 | 64  | 2   | Tlk2          | protein_coding                   |
| ENSMUST00000037607 | 49 | 62  | 34  | Map3k7        | protein_coding                   |
| ENSMUST00000110939 | 49 | 61  | 109 | Esrrg         | protein_coding                   |
| ENSMUST00000132743 | 49 | 61  | 6   | Tmcc3         | protein_coding                   |
| ENSMUST00000170441 | 49 | 60  | 8   | Cfhr3         | unprocessed_pseudogene           |
| ENSMUST00000059595 | 49 | 60  | 77  | Prkca         | protein_coding                   |
| ENSMUST00000156272 | 49 | 60  | 10  | Slc2a9        | protein_coding                   |
| ENSMUST00000057944 | 49 | 59  | 20  | Ugt8a         | protein_coding                   |
| ENSMUST00000134681 | 49 | 54  | 2   | Col5a2        | protein_coding                   |
| ENSMUST00000058762 | 49 | 53  | 40  | Pam           | protein_coding                   |
| ENSMUST00000106247 | 49 | 51  | 2   | Adh6a         | protein_coding                   |
| ENSMUST00000035264 | 49 | 51  | 0   | Pak7          | protein_coding                   |
| ENSMUST00000153548 | 49 | 50  | 12  | Smarca1       | protein_coding                   |
| ENSMUST00000152847 | 49 | 50  | 0   | Tacc3         | protein_coding                   |



|                    |    |    |                 |                                    |
|--------------------|----|----|-----------------|------------------------------------|
| ENSMUST00000118955 | 49 | 37 | 1396 Bcl11a     | protein_coding                     |
| ENSMUST00000133178 | 49 | 32 | 0 Oma1          | protein_coding                     |
| ENSMUST00000121805 | 49 | 18 | 149 Dpysl3      | protein_coding                     |
| ENSMUST00000122383 | 49 | 6  | 113 Gk5         | protein_coding                     |
| ENSMUST00000164713 | 48 | 70 | 8 Ston2         | protein_coding                     |
| ENSMUST00000148946 | 48 | 68 | 0 Fcgbp         | protein_coding                     |
| ENSMUST00000066674 | 48 | 68 | 8 Car8          | protein_coding                     |
| ENSMUST00000170106 | 48 | 64 | 0 Otoa          | protein_coding                     |
| ENSMUST00000022142 | 48 | 63 | 30 Naip1        | protein_coding                     |
| ENSMUST00000099201 | 48 | 63 | 26 Sirpb1a      | protein_coding                     |
| ENSMUST00000118043 | 48 | 61 | 6 Dpysl3        | protein_coding                     |
| ENSMUST00000120206 | 48 | 58 | 2 Gm14687       | processed_pseudogene               |
| ENSMUST00000084513 | 48 | 56 | 54 Tacc2        | protein_coding                     |
| ENSMUST00000039500 | 48 | 55 | 24 Tmc1         | protein_coding                     |
| ENSMUST00000168423 | 48 | 55 | 24 Smad2        | protein_coding                     |
| ENSMUST00000115379 | 48 | 55 | 8 Igf2bp2       | protein_coding                     |
| ENSMUST00000036554 | 48 | 55 | 2 Abcc4         | protein_coding                     |
| ENSMUST00000141312 | 48 | 55 | 0 1700123O12Rik | lincRNA                            |
| ENSMUST00000102710 | 48 | 52 | 6 Abcb11        | protein_coding                     |
| ENSMUST00000118574 | 48 | 51 | 24 Naip6        | protein_coding                     |
| ENSMUST00000136998 | 48 | 51 | 63 Nkx2-2os     | antisense                          |
| ENSMUST00000095585 | 48 | 47 | 2 Gpr98         | protein_coding                     |
| ENSMUST00000105461 | 48 | 46 | 20 Cdh23        | protein_coding                     |
| ENSMUST00000049788 | 48 | 44 | 42 Kcnk13       | protein_coding                     |
| ENSMUST00000135518 | 48 | 40 | 8 Bai3          | protein_coding                     |
| ENSMUST00000108325 | 48 | 37 | 0 Cp            | protein_coding                     |
| ENSMUST00000065438 | 48 | 21 | 226 Cdh22       | protein_coding                     |
| ENSMUST00000118856 | 47 | 79 | 0 4930432K21Rik | protein_coding                     |
| ENSMUST00000181378 | 47 | 75 | 0 Gm26665       | lincRNA                            |
| ENSMUST00000138786 | 47 | 74 | 18 Macrod2      | protein_coding                     |
| ENSMUST00000052965 | 47 | 64 | 1929 Nipbl      | protein_coding                     |
| ENSMUST00000148366 | 47 | 64 | 4 Dnajc25       | protein_coding                     |
| ENSMUST00000031158 | 47 | 62 | 0 Ppat          | protein_coding                     |
| ENSMUST00000060327 | 47 | 61 | 2 Skint10       | protein_coding                     |
| ENSMUST00000167250 | 47 | 61 | 0 Lppr3         | protein_coding                     |
| ENSMUST00000137798 | 47 | 58 | 52 Sema3a       | protein_coding                     |
| ENSMUST00000049501 | 47 | 56 | 22 Ofd1         | protein_coding                     |
| ENSMUST00000183996 | 47 | 55 | 18 Spata17      | protein_coding                     |
| ENSMUST00000160804 | 47 | 51 | 2 Nfya          | protein_coding                     |
| ENSMUST00000060551 | 47 | 49 | 0 Apol10a       | protein_coding                     |
| ENSMUST00000022696 | 47 | 47 | 24 Xpo7         | protein_coding                     |
| ENSMUST00000172154 | 47 | 46 | 32 Atf1         | protein_coding                     |
| ENSMUST00000044683 | 47 | 43 | 2 Nlrp5-ps      | transcribed_unprocessed_pseudogene |
| ENSMUST00000139965 | 47 | 41 | 34 Gria3        | protein_coding                     |
| ENSMUST00000145160 | 47 | 41 | 0 Ms4a4b        | protein_coding                     |
| ENSMUST00000151772 | 47 | 39 | 10 F8           | protein_coding                     |
| ENSMUST00000091436 | 47 | 39 | 6 Cubn          | protein_coding                     |
| ENSMUST00000171482 | 47 | 35 | 4 Gm8439        | protein_coding                     |
| ENSMUST00000142046 | 47 | 33 | 22 Sntg2        | protein_coding                     |
| ENSMUST00000028119 | 47 | 24 | 0 Mastl         | protein_coding                     |
| ENSMUST00000140522 | 47 | 18 | 59 Zfp868       | protein_coding                     |
| ENSMUST00000143539 | 47 | 7  | 65 Lcp1         | protein_coding                     |
| ENSMUST00000137916 | 47 | 3  | 65 Slc25a12     | protein_coding                     |
| ENSMUST00000048966 | 47 | 67 | 1782 Tcf20      | protein_coding                     |
| ENSMUST00000182996 | 47 | 64 | 119 Kat6b       | protein_coding                     |
| ENSMUST00000028740 | 47 | 61 | 8 Ttbk2         | protein_coding                     |
| ENSMUST00000176321 | 47 | 60 | 4 Cd200r4       | protein_coding                     |
| ENSMUST00000079323 | 47 | 59 | 14 Mctp2        | protein_coding                     |
| ENSMUST00000108354 | 47 | 56 | 22 Sirpb1c      | protein_coding                     |
| ENSMUST00000034911 | 47 | 55 | 32 Tinag        | protein_coding                     |
| ENSMUST00000085164 | 47 | 54 | 12 Sv2b         | protein_coding                     |
| ENSMUST00000049324 | 47 | 53 | 44 Flt3         | protein_coding                     |
| ENSMUST00000173861 | 47 | 53 | 6 Vmn2r-ps57    | unprocessed_pseudogene             |
| ENSMUST00000087236 | 47 | 53 | 4 Cyp2c65       | protein_coding                     |
| ENSMUST00000182786 | 47 | 51 | 54 Anks1b       | protein_coding                     |
| ENSMUST00000117694 | 47 | 51 | 10 Oacyl        | protein_coding                     |
| ENSMUST00000077175 | 47 | 50 | 14 Polr3b       | protein_coding                     |
| ENSMUST00000115797 | 47 | 50 | 0 Arid1b        | protein_coding                     |

|                     |    |    |                  |                      |
|---------------------|----|----|------------------|----------------------|
| ENSMUST00000171109  | 47 | 49 | 16 Cables1       | protein_coding       |
| ENSMUST00000141889  | 47 | 45 | 44 Adamtsl1      | protein_coding       |
| ENSMUST00000131199  | 47 | 45 | 18 4921504E06Rik | protein_coding       |
| ENSMUST00000172732  | 47 | 43 | 6 Rfc1           | protein_coding       |
| ENSMUST00000168664  | 47 | 41 | 18 4921539E11Rik | protein_coding       |
| ENSMUST00000020759  | 47 | 41 | 12 Efemp1        | protein_coding       |
| ENSMUST00000067252  | 47 | 39 | 10 Piezo1        | protein_coding       |
| ENSMUST00000028233  | 47 | 26 | 0 Hc             | protein_coding       |
| ENSMUST00000124516  | 47 | 3  | 59 Myh1          | protein_coding       |
| ENSMUST00000123947  | 47 | 3  | 57 Rmnd5a        | protein_coding       |
| ENSMUST00000034053  | 46 | 81 | 16 Pdlim3        | protein_coding       |
| ENSMUST00000109856  | 46 | 76 | 30 Ankrd36       | protein_coding       |
| ENSMUST00000169116  | 46 | 76 | 2 Inpp4b         | protein_coding       |
| ENSMUST00000180410  | 46 | 72 | 59 Gm26786       | lincRNA              |
| ENSMUST00000021338  | 46 | 72 | 44 Ap4s1         | protein_coding       |
| ENSMUST00000101114  | 46 | 67 | 8 Rin3           | protein_coding       |
| ENSMUST00000051720  | 46 | 66 | 8 Sh3tc2         | protein_coding       |
| ENSMUST00000008573  | 46 | 66 | 8 Herpud2        | protein_coding       |
| ENSMUST00000171980  | 46 | 64 | 0 Gm17631        | protein_coding       |
| ENSMUST00000120112  | 46 | 62 | 0 Tmem30c        | protein_coding       |
| ENSMUST00000101195  | 46 | 62 | 67 Tbc1d1        | protein_coding       |
| ENSMUST00000080723  | 46 | 59 | 2 Tax1bp1        | protein_coding       |
| ENSMUST00000138850  | 46 | 58 | 4 Myo3a          | protein_coding       |
| ENSMUST00000169748  | 46 | 56 | 6 Kifc3          | protein_coding       |
| ENSMUST00000056010  | 46 | 54 | 18 Atp8b5        | protein_coding       |
| ENSMUST00000154206  | 46 | 53 | 6 Pcca           | protein_coding       |
| ENSMUST00000126664  | 46 | 51 | 24 Atp10d        | processed_transcript |
| ENSMUST00000132660  | 46 | 51 | 50 AU040320      | protein_coding       |
| ENSMUST00000028921  | 46 | 51 | 2 Xrn2           | protein_coding       |
| ENSMUST00000029510  | 46 | 49 | 4 Chil6          | protein_coding       |
| ENSMUST00000171654  | 46 | 48 | 38 Thsd4         | protein_coding       |
| ENSMUST000000099202 | 46 | 48 | 12 Mast4         | protein_coding       |
| ENSMUST00000115573  | 46 | 48 | 2 Gm14459        | protein_coding       |
| ENSMUST00000139006  | 46 | 47 | 14 4930412F09Rik | processed_transcript |
| ENSMUST00000097809  | 46 | 44 | 59 Rims1         | protein_coding       |
| ENSMUST00000117588  | 46 | 44 | 12 Hfm1          | protein_coding       |
| ENSMUST00000150455  | 46 | 43 | 20 Gm12514       | lincRNA              |
| ENSMUST00000037337  | 46 | 41 | 22 Tbc1d19       | protein_coding       |
| ENSMUST00000031045  | 46 | 40 | 18 Yipf7         | protein_coding       |
| ENSMUST00000072386  | 46 | 37 | 4 Mill2          | protein_coding       |
| ENSMUST00000182414  | 46 | 35 | 4 Gm27008        | antisense            |
| ENSMUST00000160056  | 46 | 33 | 26 Zbtb37        | protein_coding       |
| ENSMUST00000040987  | 46 | 32 | 0 Akr1d1         | protein_coding       |
| ENSMUST00000026866  | 46 | 31 | 0 Sclt1          | protein_coding       |
| ENSMUST00000114869  | 46 | 23 | 0 Usp26          | protein_coding       |
| ENSMUST00000108488  | 45 | 72 | 0 Ceacam13       | protein_coding       |
| ENSMUST00000140020  | 45 | 66 | 14 Rhbdd1        | protein_coding       |
| ENSMUST00000109930  | 45 | 62 | 0 Ascc2          | protein_coding       |
| ENSMUST00000129932  | 45 | 60 | 0 5430427M07Rik  | antisense            |
| ENSMUST00000114964  | 45 | 60 | 20 Kalrn         | protein_coding       |
| ENSMUST00000098382  | 45 | 58 | 20 Adamts17      | protein_coding       |
| ENSMUST00000143203  | 45 | 57 | 0 Stxbp4         | protein_coding       |
| ENSMUST00000001059  | 45 | 56 | 18 Ern1          | protein_coding       |
| ENSMUST00000055922  | 45 | 55 | 6 Lurap1l        | protein_coding       |
| ENSMUST00000046049  | 45 | 55 | 2 Fmo1           | protein_coding       |
| ENSMUST00000180852  | 45 | 53 | 18 2610037D02Rik | lincRNA              |
| ENSMUST00000103212  | 45 | 53 | 16 Ube4b         | protein_coding       |
| ENSMUST000000017629 | 45 | 53 | 10 Top2b         | protein_coding       |
| ENSMUST00000044532  | 45 | 53 | 18 Dock3         | protein_coding       |
| ENSMUST00000086831  | 45 | 51 | 42 Pkd2          | protein_coding       |
| ENSMUST00000134877  | 45 | 51 | 0 Hk1            | protein_coding       |
| ENSMUST00000098359  | 45 | 51 | 4 Fbxw18         | protein_coding       |
| ENSMUST00000121733  | 45 | 51 | 0 Papln          | protein_coding       |
| ENSMUST00000058796  | 45 | 50 | 0 Kdm4d          | protein_coding       |
| ENSMUST00000123282  | 45 | 49 | 2 Arsk           | protein_coding       |
| ENSMUST00000162467  | 45 | 49 | 0 Unc5cl         | protein_coding       |
| ENSMUST00000114040  | 45 | 49 | 18 Dnah6         | protein_coding       |
| ENSMUST00000181558  | 45 | 49 | 18 Gm6225        | lincRNA              |

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| ENSMUST00000022744 | 45 | 47 | 2 Gdnf           | protein_coding         |
| ENSMUST00000126444 | 45 | 45 | 52 Gpr98         | protein_coding         |
| ENSMUST00000073792 | 45 | 45 | 16 Mon2          | protein_coding         |
| ENSMUST00000003710 | 45 | 44 | 109 Aak1         | protein_coding         |
| ENSMUST00000080050 | 45 | 44 | 8 Ccdc68         | protein_coding         |
| ENSMUST00000145916 | 45 | 41 | 0 Gm15298        | lincRNA                |
| ENSMUST00000175877 | 45 | 40 | 0 Ctage5         | protein_coding         |
| ENSMUST00000115698 | 45 | 39 | 24 Hic2          | protein_coding         |
| ENSMUST00000128402 | 45 | 39 | 18 Kif26a        | protein_coding         |
| ENSMUST00000132626 | 45 | 39 | 2 Gm15104        | lincRNA                |
| ENSMUST00000131414 | 45 | 38 | 22 Foxp2         | protein_coding         |
| ENSMUST00000139977 | 45 | 35 | 8 Aff2           | protein_coding         |
| ENSMUST00000147024 | 45 | 35 | 2 A630010A05Rik  | protein_coding         |
| ENSMUST00000135784 | 45 | 33 | 8 Susd3          | protein_coding         |
| ENSMUST00000139470 | 45 | 30 | 10 Rasal2        | protein_coding         |
| ENSMUST00000139470 | 45 | 30 | 10 Rasal2        | protein_coding         |
| ENSMUST00000137410 | 45 | 27 | 0 Neb            | protein_coding         |
| ENSMUST00000132123 | 45 | 25 | 0 Ago3           | protein_coding         |
| ENSMUST00000149259 | 45 | 12 | 234 Mier1        | protein_coding         |
| ENSMUST00000044158 | 44 | 78 | 1275 Gltsr2      | protein_coding         |
| ENSMUST00000132240 | 44 | 69 | 6 Cask           | protein_coding         |
| ENSMUST00000183695 | 44 | 65 | 12 Gm28049       | protein_coding         |
| ENSMUST00000085077 | 44 | 64 | 44 Arnt2         | protein_coding         |
| ENSMUST00000039412 | 44 | 63 | 30 Mcph1         | protein_coding         |
| ENSMUST00000081799 | 44 | 60 | 20 Sgsm2         | protein_coding         |
| ENSMUST00000130244 | 44 | 60 | 4 Gm15845        | antisense              |
| ENSMUST00000128592 | 44 | 59 | 16 Dlg2          | protein_coding         |
| ENSMUST00000027785 | 44 | 58 | 16 Sdccag8       | protein_coding         |
| ENSMUST00000119615 | 44 | 55 | 10 Gm12813       | unprocessed_pseudogene |
| ENSMUST00000170919 | 44 | 55 | 4 Gm6763         | protein_coding         |
| ENSMUST00000177080 | 44 | 53 | 2008 Pknx2       | protein_coding         |
| ENSMUST00000127979 | 44 | 53 | 8 Zfp65          | protein_coding         |
| ENSMUST00000112263 | 44 | 53 | 0 Bmx            | protein_coding         |
| ENSMUST00000178904 | 44 | 50 | 18 A830019P07Rik | lincRNA                |
| ENSMUST00000164104 | 44 | 50 | 6 Gm3294         | lincRNA                |
| ENSMUST00000178538 | 44 | 49 | 4 Nek10          | protein_coding         |
| ENSMUST00000178538 | 44 | 49 | 4 Nek10          | protein_coding         |
| ENSMUST00000110813 | 44 | 48 | 20 Erich1        | protein_coding         |
| ENSMUST00000089860 | 44 | 47 | 4 Fam13a         | protein_coding         |
| ENSMUST00000117166 | 44 | 47 | 0 Gm13384        | processed_pseudogene   |
| ENSMUST00000082152 | 44 | 47 | 6 Ube2o          | protein_coding         |
| ENSMUST00000167260 | 44 | 47 | 0 Serpinb6a      | protein_coding         |
| ENSMUST00000108514 | 44 | 43 | 0 Nlrp1b         | protein_coding         |
| ENSMUST00000156177 | 44 | 42 | 0 Ntng1          | protein_coding         |
| ENSMUST00000038863 | 44 | 41 | 12 Lars2         | protein_coding         |
| ENSMUST00000022881 | 44 | 39 | 22 Fam134b       | protein_coding         |
| ENSMUST00000181509 | 44 | 39 | 12 Gm10339       | protein_coding         |
| ENSMUST00000084501 | 44 | 38 | 54 Pappa         | protein_coding         |
| ENSMUST00000110748 | 44 | 34 | 20 Nrcam         | protein_coding         |
| ENSMUST00000043961 | 44 | 32 | 0 Abca5          | protein_coding         |
| ENSMUST00000146108 | 44 | 29 | 14 Wdr31         | protein_coding         |
| ENSMUST00000031171 | 44 | 29 | 4 Stap1          | protein_coding         |
| ENSMUST00000155923 | 44 | 79 | 2 Gm14061        | lincRNA                |
| ENSMUST00000048959 | 44 | 66 | 2 Cyp2c54        | protein_coding         |
| ENSMUST00000098809 | 44 | 65 | 16 Sult2a3       | protein_coding         |
| ENSMUST00000109547 | 44 | 65 | 16 Nup93         | protein_coding         |
| ENSMUST00000071814 | 44 | 57 | 6 Zfp711         | protein_coding         |
| ENSMUST00000015645 | 44 | 56 | 26 Hivep2        | protein_coding         |
| ENSMUST00000079132 | 44 | 56 | 12 Chia1         | protein_coding         |
| ENSMUST00000121438 | 44 | 55 | 12 Adam32        | protein_coding         |
| ENSMUST00000110267 | 44 | 55 | 6 Sybu           | protein_coding         |
| ENSMUST00000155859 | 44 | 55 | 0 Dpys           | protein_coding         |
| ENSMUST00000042025 | 44 | 55 | 44 Antxr1        | protein_coding         |
| ENSMUST00000146459 | 44 | 53 | 12 Mapre3        | protein_coding         |
| ENSMUST00000073691 | 44 | 52 | 22 Lima1         | protein_coding         |
| ENSMUST00000169861 | 44 | 51 | 10 Shoc2         | protein_coding         |
| ENSMUST00000135324 | 44 | 49 | 30 Sorcs2        | protein_coding         |
| ENSMUST00000106658 | 44 | 49 | 24 Zfyve9        | protein_coding         |

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| ENSMUST00000138157 | 44 | 48 | 50 Frmd5         | protein_coding       |
| ENSMUST00000182177 | 44 | 48 | 20 Piezo2        | protein_coding       |
| ENSMUST00000169997 | 44 | 47 | 6 Cnga1          | protein_coding       |
| ENSMUST00000145632 | 44 | 47 | 2 Tank           | protein_coding       |
| ENSMUST00000159087 | 44 | 45 | 4 A530040E14Rik  | antisense            |
| ENSMUST00000154004 | 44 | 44 | 14 Uty           | protein_coding       |
| ENSMUST00000115891 | 44 | 44 | 6 Zfy2           | protein_coding       |
| ENSMUST00000067689 | 44 | 43 | 127 Tnrc6b       | protein_coding       |
| ENSMUST00000122927 | 44 | 43 | 8 5830428H23Rik  | processed_transcript |
| ENSMUST00000033267 | 44 | 41 | 10 Pdilt         | protein_coding       |
| ENSMUST00000108590 | 44 | 41 | 0 Gp6            | protein_coding       |
| ENSMUST00000114993 | 44 | 40 | 14 Cnot4         | protein_coding       |
| ENSMUST00000182462 | 44 | 40 | 12 Ano4          | protein_coding       |
| ENSMUST00000093469 | 44 | 40 | 4 Psd3           | protein_coding       |
| ENSMUST00000047086 | 44 | 39 | 1449 Wdr43       | protein_coding       |
| ENSMUST00000141869 | 44 | 39 | 4 Gm13266        | processed_transcript |
| ENSMUST00000129940 | 44 | 38 | 32 Gramd1b       | protein_coding       |
| ENSMUST00000137777 | 44 | 37 | 10 Mrpl48        | protein_coding       |
| ENSMUST00000056149 | 44 | 33 | 6 Abhd12         | protein_coding       |
| ENSMUST00000034910 | 44 | 30 | 4 Mlip           | protein_coding       |
| ENSMUST00000060871 | 44 | 28 | 2 Mapk10         | protein_coding       |
| ENSMUST00000046463 | 44 | 28 | 133 Gtpbp1       | protein_coding       |
| ENSMUST00000054925 | 43 | 90 | 2 Fbxw21         | protein_coding       |
| ENSMUST00000111131 | 43 | 79 | 12 Cd59b         | protein_coding       |
| ENSMUST00000177268 | 43 | 74 | 16 Gm20631       | antisense            |
| ENSMUST00000098457 | 43 | 67 | 2 Mical3         | protein_coding       |
| ENSMUST00000090746 | 43 | 65 | 12 Hmgcs2        | protein_coding       |
| ENSMUST00000160261 | 43 | 64 | 8 Fstl5          | protein_coding       |
| ENSMUST00000105739 | 43 | 56 | 0 Gm13212        | protein_coding       |
| ENSMUST00000100831 | 43 | 55 | 24 Kcnma1        | protein_coding       |
| ENSMUST00000159891 | 43 | 55 | 4 Clec4a2        | protein_coding       |
| ENSMUST00000059555 | 43 | 54 | 6 Ube2q2         | protein_coding       |
| ENSMUST00000039540 | 43 | 54 | 2 March1         | protein_coding       |
| ENSMUST00000099577 | 43 | 53 | 87 Gm5134        | protein_coding       |
| ENSMUST00000102521 | 43 | 52 | 26 Rap1gap2      | protein_coding       |
| ENSMUST00000026550 | 43 | 52 | 22 Inpp5a        | protein_coding       |
| ENSMUST00000088987 | 43 | 51 | 4 Hrh1           | protein_coding       |
| ENSMUST00000147758 | 43 | 51 | 14 Mfsd6         | protein_coding       |
| ENSMUST00000040437 | 43 | 51 | 12 Spaca5        | protein_coding       |
| ENSMUST00000023312 | 43 | 51 | 8 Alcam          | protein_coding       |
| ENSMUST00000154827 | 43 | 51 | 0 Alg13          | protein_coding       |
| ENSMUST00000005630 | 43 | 50 | 22 Msh4          | protein_coding       |
| ENSMUST00000139252 | 43 | 49 | 10 Chn1          | protein_coding       |
| ENSMUST00000113359 | 43 | 49 | 24 Frmd4b        | protein_coding       |
| ENSMUST00000181349 | 43 | 49 | 4 Semp1          | protein_coding       |
| ENSMUST00000078505 | 43 | 48 | 12 Rtn1          | protein_coding       |
| ENSMUST00000096119 | 43 | 48 | 8 Asah2          | protein_coding       |
| ENSMUST00000064862 | 43 | 47 | 0 Ceacam2        | protein_coding       |
| ENSMUST00000177379 | 43 | 47 | 14 Gm13547       | protein_coding       |
| ENSMUST00000067386 | 43 | 43 | 24 2310022A10Rik | protein_coding       |
| ENSMUST00000066558 | 43 | 42 | 8 Gm5142         | protein_coding       |
| ENSMUST00000044668 | 43 | 41 | 10 Acss3         | protein_coding       |
| ENSMUST00000036104 | 43 | 41 | 0 Dlc1           | protein_coding       |
| ENSMUST00000114850 | 43 | 39 | 8 BC117090       | protein_coding       |
| ENSMUST00000142486 | 43 | 39 | 8 4933424L21Rik  | antisense            |
| ENSMUST00000165999 | 43 | 35 | 2 Cyp4f17        | protein_coding       |
| ENSMUST00000064330 | 43 | 11 | 14 Tmem209       | protein_coding       |
| ENSMUST00000180659 | 43 | 4  | 117 Snhg7        | lincRNA              |
| ENSMUST00000090292 | 42 | 79 | 4 Drosha         | protein_coding       |
| ENSMUST00000165269 | 42 | 74 | 52 Dnah12        | protein_coding       |
| ENSMUST00000042075 | 42 | 62 | 8 Dgki           | protein_coding       |
| ENSMUST00000054274 | 42 | 59 | 2 Lhfpl2         | protein_coding       |
| ENSMUST00000059433 | 42 | 57 | 73 Pced1b        | protein_coding       |
| ENSMUST00000123827 | 42 | 54 | 91 Iffo2         | protein_coding       |
| ENSMUST00000040583 | 42 | 53 | 10 Heatr5a       | protein_coding       |
| ENSMUST00000144298 | 42 | 49 | 36 Csmd2         | protein_coding       |
| ENSMUST00000073793 | 42 | 47 | 0 Mrgpra6        | protein_coding       |
| ENSMUST00000018122 | 42 | 47 | 16 Cadps2        | protein_coding       |

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|--------------------|----|-----|------|---------------|----------------------|
| ENSMUST00000069763 | 42 | 46  | 4    | Lanc13        | protein_coding       |
| ENSMUST00000042586 | 42 | 45  | 8    | Tespa1        | protein_coding       |
| ENSMUST00000079855 | 42 | 43  | 0    | Gm8369        | protein_coding       |
| ENSMUST00000122064 | 42 | 41  | 18   | Emcn          | protein_coding       |
| ENSMUST00000137377 | 42 | 40  | 10   | Tmx4          | protein_coding       |
| ENSMUST00000101535 | 42 | 39  | 12   | 9330158H04Rik | processed_transcript |
| ENSMUST00000095691 | 42 | 34  | 54   | Cep85l        | protein_coding       |
| ENSMUST00000174173 | 42 | 29  | 18   | 1110038B12Rik | processed_transcript |
| ENSMUST00000073948 | 42 | 27  | 2    | Vmn2r19       | protein_coding       |
| ENSMUST00000130825 | 42 | 25  | 2    | Gm13248       | protein_coding       |
| ENSMUST00000147526 | 42 | 16  | 0    | Eps8          | protein_coding       |
| ENSMUST00000182946 | 41 | 129 | 0    | Polq          | protein_coding       |
| ENSMUST00000102483 | 41 | 93  | 248  | Rpl23a        | protein_coding       |
| ENSMUST00000115576 | 41 | 62  | 30   | Lix1          | protein_coding       |
| ENSMUST00000073878 | 41 | 60  | 0    | Dhcr7         | protein_coding       |
| ENSMUST00000127716 | 41 | 59  | 8    | St8sia3os     | antisense            |
| ENSMUST00000105230 | 41 | 54  | 65   | Samp          | protein_coding       |
| ENSMUST00000145661 | 41 | 53  | 1935 | Srek1ip1      | protein_coding       |
| ENSMUST00000022286 | 41 | 53  | 0    | Ndufs4        | protein_coding       |
| ENSMUST00000181068 | 41 | 51  | 8    | Gm26675       | lincRNA              |
| ENSMUST00000123820 | 41 | 51  | 2    | Arhgap26      | protein_coding       |
| ENSMUST00000053441 | 41 | 49  | 2    | Adam29        | protein_coding       |
| ENSMUST00000169225 | 41 | 47  | 8    | Gm6288        | antisense            |
| ENSMUST00000151938 | 41 | 47  | 2    | Brcc3         | protein_coding       |
| ENSMUST00000113940 | 41 | 45  | 22   | Spag16        | protein_coding       |
| ENSMUST00000168029 | 41 | 45  | 0    | Serhl         | protein_coding       |
| ENSMUST00000101073 | 41 | 44  | 18   | Tmprss11a     | protein_coding       |
| ENSMUST00000123231 | 41 | 43  | 0    | Gm15584       | antisense            |
| ENSMUST00000033478 | 41 | 43  | 4    | Mcf2          | protein_coding       |
| ENSMUST00000114787 | 41 | 43  | 0    | Stxbp5l       | protein_coding       |
| ENSMUST00000142159 | 41 | 42  | 14   | Ush2a         | protein_coding       |
| ENSMUST00000128797 | 41 | 42  | 2    | Adams20       | protein_coding       |
| ENSMUST00000125771 | 41 | 41  | 61   | Akap13        | protein_coding       |
| ENSMUST00000122168 | 41 | 40  | 6    | Snx29         | protein_coding       |
| ENSMUST00000044729 | 41 | 39  | 8    | Ccdc129       | protein_coding       |
| ENSMUST00000176034 | 41 | 39  | 8    | Tox3          | protein_coding       |
| ENSMUST00000019927 | 41 | 37  | 4    | Trmt11        | protein_coding       |
| ENSMUST00000173151 | 41 | 37  | 12   | Zfp101        | protein_coding       |
| ENSMUST00000027049 | 41 | 36  | 4    | Ppp1r42       | protein_coding       |
| ENSMUST00000163022 | 41 | 36  | 2    | Pag1          | protein_coding       |
| ENSMUST00000107745 | 41 | 35  | 22   | Gria2         | protein_coding       |
| ENSMUST00000167334 | 41 | 35  | 8    | Sis           | protein_coding       |
| ENSMUST00000110689 | 41 | 35  | 30   | C7            | protein_coding       |
| ENSMUST00000070639 | 41 | 35  | 14   | Gm14548       | protein_coding       |
| ENSMUST00000141149 | 41 | 32  | 6    | Gm13629       | antisense            |
| ENSMUST00000032306 | 41 | 29  | 2    | Klra2         | protein_coding       |
| ENSMUST00000155578 | 41 | 29  | 0    | Gm11817       | antisense            |
| ENSMUST00000105525 | 41 | 28  | 30   | Ahi1          | protein_coding       |
| ENSMUST00000133362 | 41 | 21  | 14   | Ext1          | protein_coding       |
| ENSMUST00000144743 | 41 | 62  | 2    | St7           | protein_coding       |
| ENSMUST00000135292 | 41 | 60  | 0    | Ndufa12       | protein_coding       |
| ENSMUST00000114739 | 41 | 56  | 2    | Popdc2        | protein_coding       |
| ENSMUST00000093956 | 41 | 53  | 48   | Hsf5          | protein_coding       |
| ENSMUST00000167708 | 41 | 53  | 16   | Atxn1         | protein_coding       |
| ENSMUST00000139924 | 41 | 51  | 8    | Rit2          | protein_coding       |
| ENSMUST00000077221 | 41 | 50  | 12   | Sgcd          | protein_coding       |
| ENSMUST00000171741 | 41 | 48  | 2    | Vmn2r102      | protein_coding       |
| ENSMUST00000115791 | 41 | 47  | 2    | Synj2         | protein_coding       |
| ENSMUST00000136002 | 41 | 47  | 0    | Kit           | protein_coding       |
| ENSMUST00000120068 | 41 | 45  | 2    | Cnpy1         | protein_coding       |
| ENSMUST00000144444 | 41 | 45  | 2    | Abat          | protein_coding       |
| ENSMUST00000127742 | 41 | 45  | 0    | Ttll11        | protein_coding       |
| ENSMUST00000162618 | 41 | 45  | 0    | Apaf1         | protein_coding       |
| ENSMUST00000120951 | 41 | 44  | 0    | Lrrc18        | protein_coding       |
| ENSMUST00000124937 | 41 | 44  | 0    | Cpeb1         | protein_coding       |
| ENSMUST00000028426 | 41 | 43  | 4    | Cers6         | protein_coding       |
| ENSMUST00000166163 | 41 | 43  | 18   | Jakmip3       | protein_coding       |
| ENSMUST00000165232 | 41 | 43  | 12   | Cd36          | protein_coding       |

|                    |    |    |      |               |                      |
|--------------------|----|----|------|---------------|----------------------|
| ENSMUST00000100996 | 41 | 41 | 48   | Kdm5a         | protein_coding       |
| ENSMUST00000172326 | 41 | 41 | 44   | Spock1        | protein_coding       |
| ENSMUST00000181554 | 41 | 41 | 2    | Gm26901       | lincRNA              |
| ENSMUST00000109852 | 41 | 41 | 4    | Inpp4b        | protein_coding       |
| ENSMUST00000168787 | 41 | 40 | 24   | Btdb9         | protein_coding       |
| ENSMUST00000173376 | 41 | 40 | 20   | Ptprd         | protein_coding       |
| ENSMUST00000164648 | 41 | 40 | 4    | Etv6          | protein_coding       |
| ENSMUST00000144243 | 41 | 39 | 12   | Crisp2        | protein_coding       |
| ENSMUST00000172199 | 41 | 39 | 2    | Vmn2r20       | protein_coding       |
| ENSMUST00000093157 | 41 | 38 | 460  | Ap1g1         | protein_coding       |
| ENSMUST00000028103 | 41 | 38 | 8    | Lypd6b        | protein_coding       |
| ENSMUST00000183026 | 41 | 38 | 0    | Rian          | processed_transcript |
| ENSMUST00000117801 | 41 | 37 | 10   | Adcy9         | protein_coding       |
| ENSMUST00000035515 | 41 | 36 | 20   | Abcb5         | protein_coding       |
| ENSMUST00000032931 | 41 | 36 | 6    | Fchsd2        | protein_coding       |
| ENSMUST00000162432 | 41 | 36 | 0    | Gm16169       | processed_transcript |
| ENSMUST00000025402 | 41 | 35 | 38   | Gnal          | protein_coding       |
| ENSMUST00000125901 | 41 | 35 | 8    | Lrrc16a       | protein_coding       |
| ENSMUST00000063858 | 41 | 35 | 0    | Gm9869        | protein_coding       |
| ENSMUST00000115245 | 41 | 34 | 2    | Ccdc146       | protein_coding       |
| ENSMUST00000117194 | 41 | 32 | 0    | Cep164        | protein_coding       |
| ENSMUST00000160751 | 41 | 32 | 40   | Ccdc162       | protein_coding       |
| ENSMUST00000171737 | 41 | 31 | 14   | Odc1          | protein_coding       |
| ENSMUST00000121900 | 41 | 30 | 10   | Gm2012        | protein_coding       |
| ENSMUST00000047864 | 41 | 29 | 682  | Eef2          | protein_coding       |
| ENSMUST00000025234 | 41 | 26 | 12   | Epb4.1l4a     | protein_coding       |
| ENSMUST00000143675 | 41 | 26 | 2    | 4932438A13Rik | protein_coding       |
| ENSMUST00000131931 | 41 | 1  | 6    | Bcas1os2      | antisense            |
| ENSMUST00000170412 | 40 | 66 | 14   | Vmn2r53       | protein_coding       |
| ENSMUST00000160707 | 40 | 66 | 0    | Reln          | protein_coding       |
| ENSMUST00000143531 | 40 | 62 | 0    | Tspan12       | protein_coding       |
| ENSMUST00000139041 | 40 | 58 | 0    | Elmod2        | protein_coding       |
| ENSMUST00000113510 | 40 | 54 | 8    | Wdfy1         | protein_coding       |
| ENSMUST00000133959 | 40 | 54 | 6    | Dnajc11       | protein_coding       |
| ENSMUST00000181123 | 40 | 52 | 0    | Gm26618       | sense_overlapping    |
| ENSMUST00000144770 | 40 | 51 | 1814 | Gm11337       | antisense            |
| ENSMUST00000162046 | 40 | 51 | 2    | Vmn2r25       | protein_coding       |
| ENSMUST00000097373 | 40 | 48 | 4    | Tsc2          | protein_coding       |
| ENSMUST00000085814 | 40 | 47 | 91   | Ncoa1         | protein_coding       |
| ENSMUST00000127615 | 40 | 47 | 6    | Gnptab        | protein_coding       |
| ENSMUST00000146071 | 40 | 46 | 6    | Ptpn22        | protein_coding       |
| ENSMUST00000152599 | 40 | 45 | 8    | Gm13219       | lincRNA              |
| ENSMUST00000143564 | 40 | 44 | 2    | 5830418P13Rik | processed_transcript |
| ENSMUST00000099277 | 40 | 43 | 8    | Fcho2         | protein_coding       |
| ENSMUST00000128319 | 40 | 41 | 14   | Cicn5         | protein_coding       |
| ENSMUST00000131401 | 40 | 41 | 12   | Gm14243       | lincRNA              |
| ENSMUST00000058033 | 40 | 41 | 0    | Acap2         | protein_coding       |
| ENSMUST00000059112 | 40 | 38 | 8    | Asb8          | protein_coding       |
| ENSMUST00000032228 | 40 | 37 | 0    | Mug1          | protein_coding       |
| ENSMUST00000107221 | 40 | 37 | 0    | Ccdc83        | protein_coding       |
| ENSMUST00000147921 | 40 | 36 | 87   | Mkl1          | protein_coding       |
| ENSMUST00000167058 | 40 | 35 | 117  | Mast4         | protein_coding       |
| ENSMUST00000125022 | 40 | 35 | 0    | BC065397      | processed_transcript |
| ENSMUST00000159453 | 40 | 33 | 0    | Fbxo9         | protein_coding       |
| ENSMUST00000075896 | 40 | 32 | 0    | Tsnax         | protein_coding       |
| ENSMUST00000156496 | 40 | 28 | 101  | Ambra1        | protein_coding       |
| ENSMUST00000095784 | 40 | 28 | 20   | Moxd1         | protein_coding       |
| ENSMUST00000045022 | 40 | 20 | 12   | Nlrp2         | protein_coding       |
| ENSMUST00000114606 | 39 | 76 | 8    | Etl4          | protein_coding       |
| ENSMUST00000181994 | 39 | 75 | 28   | Plce1         | protein_coding       |
| ENSMUST00000055535 | 39 | 62 | 85   | Prtg          | protein_coding       |
| ENSMUST00000147191 | 39 | 58 | 0    | Aqr           | protein_coding       |
| ENSMUST00000018522 | 39 | 55 | 2    | Cuedc1        | protein_coding       |
| ENSMUST00000156823 | 39 | 55 | 4    | Gm14715       | lincRNA              |
| ENSMUST00000023614 | 39 | 53 | 46   | Dyrk1a        | protein_coding       |
| ENSMUST00000094681 | 39 | 53 | 2    | Wipf1         | protein_coding       |
| ENSMUST00000127352 | 39 | 52 | 20   | Fbxl2         | protein_coding       |
| ENSMUST00000128564 | 39 | 52 | 0    | Ninl          | protein_coding       |

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| ENSMUST00000139365 | 39 | 51 | 18 Uty            | protein_coding                   |
| ENSMUST00000043374 | 39 | 50 | 16 Ppp1r14c       | protein_coding                   |
| ENSMUST00000161457 | 39 | 49 | 2 Tmem167         | protein_coding                   |
| ENSMUST00000130159 | 39 | 49 | 2 Gm16462         | lincRNA                          |
| ENSMUST00000022749 | 39 | 49 | 20 C9             | protein_coding                   |
| ENSMUST00000046157 | 39 | 49 | 12 Fndc3b         | protein_coding                   |
| ENSMUST00000176491 | 39 | 49 | 2 Sik2            | protein_coding                   |
| ENSMUST00000168000 | 39 | 49 | 2 Gm17173         | antisense                        |
| ENSMUST00000037968 | 39 | 48 | 28 Uvrag          | protein_coding                   |
| ENSMUST00000168429 | 39 | 48 | 18 Ptpn4          | protein_coding                   |
| ENSMUST00000102996 | 39 | 48 | 16 4930452B06Rik  | protein_coding                   |
| ENSMUST00000002145 | 39 | 47 | 8 Hsf2bp          | protein_coding                   |
| ENSMUST00000147139 | 39 | 45 | 12 Lhfp           | protein_coding                   |
| ENSMUST00000073127 | 39 | 44 | 8 Ncapd3          | protein_coding                   |
| ENSMUST00000076272 | 39 | 44 | 2 Abca15          | protein_coding                   |
| ENSMUST00000111656 | 39 | 43 | 16 Tcf7l2         | protein_coding                   |
| ENSMUST00000022821 | 39 | 43 | 0 Dhrrs4          | protein_coding                   |
| ENSMUST00000154644 | 39 | 43 | 10 Npsr1          | protein_coding                   |
| ENSMUST00000055341 | 39 | 43 | 6 Gfod1           | protein_coding                   |
| ENSMUST00000154624 | 39 | 43 | 6 Spag6           | protein_coding                   |
| ENSMUST00000148834 | 39 | 42 | 32 Agbl3          | protein_coding                   |
| ENSMUST00000167201 | 39 | 42 | 24 Snd1           | protein_coding                   |
| ENSMUST00000148434 | 39 | 42 | 12 Aatf           | protein_coding                   |
| ENSMUST00000140700 | 39 | 42 | 6 Nudcd3          | protein_coding                   |
| ENSMUST00000112550 | 39 | 41 | 34 Baz2b          | protein_coding                   |
| ENSMUST00000005406 | 39 | 41 | 36 App            | protein_coding                   |
| ENSMUST00000150169 | 39 | 39 | 4 Psd3            | protein_coding                   |
| ENSMUST00000022039 | 39 | 39 | 0 Golm1           | protein_coding                   |
| ENSMUST00000180577 | 39 | 37 | 28 Snrnp40        | protein_coding                   |
| ENSMUST00000126240 | 39 | 37 | 10 Gm13613        | antisense                        |
| ENSMUST00000161336 | 39 | 34 | 10 Agl            | protein_coding                   |
| ENSMUST00000137183 | 39 | 33 | 8 Nlrp9b          | protein_coding                   |
| ENSMUST00000117369 | 39 | 33 | 2 Gm12619         | unprocessed_pseudogene           |
| ENSMUST00000130065 | 39 | 31 | 16 Gli3           | protein_coding                   |
| ENSMUST00000126656 | 39 | 31 | 4 Efcab8          | protein_coding                   |
| ENSMUST00000131504 | 39 | 30 | 20 Gm15645        | transcribed_processed_pseudogene |
| ENSMUST00000160586 | 39 | 30 | 20 Alpk1          | protein_coding                   |
| ENSMUST00000137933 | 39 | 30 | 6 Ankrd36         | protein_coding                   |
| ENSMUST00000169329 | 39 | 28 | 2 Fam220a         | protein_coding                   |
| ENSMUST00000102518 | 39 | 24 | 79 Ece1           | protein_coding                   |
| ENSMUST00000136447 | 38 | 57 | 4 A230072C01Rik   | processed_transcript             |
| ENSMUST00000136626 | 38 | 52 | 14 Asz1           | protein_coding                   |
| ENSMUST00000107097 | 38 | 52 | 10 Eqtn           | protein_coding                   |
| ENSMUST00000100046 | 38 | 52 | 6 Kng2            | protein_coding                   |
| ENSMUST00000029662 | 38 | 52 | 0 Alpk1           | protein_coding                   |
| ENSMUST00000133927 | 38 | 51 | 0 Vta1            | protein_coding                   |
| ENSMUST00000030687 | 38 | 51 | 10 Rspo1          | protein_coding                   |
| ENSMUST00000135668 | 38 | 47 | 16 Fstl1          | protein_coding                   |
| ENSMUST00000150848 | 38 | 47 | 4 Mllt4           | protein_coding                   |
| ENSMUST00000166813 | 38 | 47 | 0 Gm10044         | processed_transcript             |
| ENSMUST00000144297 | 38 | 45 | 8 Col19a1         | protein_coding                   |
| ENSMUST00000041065 | 38 | 44 | 6 Myo1d           | protein_coding                   |
| ENSMUST00000027338 | 38 | 43 | 0 1110058L19Rik   | protein_coding                   |
| ENSMUST00000123116 | 38 | 43 | 0 Tspan12         | protein_coding                   |
| ENSMUST00000150863 | 38 | 42 | 0 Cep112          | protein_coding                   |
| ENSMUST00000011058 | 38 | 41 | 0 Pdhx            | protein_coding                   |
| ENSMUST00000151256 | 38 | 41 | 30 Akr1d1         | protein_coding                   |
| ENSMUST00000127840 | 38 | 39 | 30 Ccdc73         | protein_coding                   |
| ENSMUST00000093046 | 38 | 38 | 24 Tom1l2         | protein_coding                   |
| ENSMUST00000111976 | 38 | 38 | 0 Cfh             | protein_coding                   |
| ENSMUST00000173053 | 38 | 37 | 6 Obox5           | protein_coding                   |
| ENSMUST00000183057 | 38 | 36 | 28 Plekha7        | protein_coding                   |
| ENSMUST00000143483 | 38 | 36 | 24 Egfem1         | protein_coding                   |
| ENSMUST00000174103 | 38 | 35 | 79 Wdfy3          | protein_coding                   |
| ENSMUST00000131378 | 38 | 35 | 6 4930486F22Rik   | antisense                        |
| ENSMUST00000002305 | 38 | 32 | 12 Kdm7a          | protein_coding                   |
| ENSMUST00000173494 | 38 | 32 | 42 Ak9            | protein_coding                   |
| ENSMUST00000180723 | 38 | 30 | 123 9430037G07Rik | lincRNA                          |

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|---------------------|----|----|------------------|------------------------|
| ENSMUST00000064407  | 38 | 30 | 2 Ikbkg          | protein_coding         |
| ENSMUST00000088896  | 38 | 30 | 16 Tmcc1         | protein_coding         |
| ENSMUST00000026625  | 38 | 66 | 157 Clybl        | protein_coding         |
| ENSMUST00000184034  | 38 | 59 | 4 Gm27177        | antisense              |
| ENSMUST00000134963  | 38 | 58 | 0 Aff3           | protein_coding         |
| ENSMUST00000113027  | 38 | 55 | 18 Rnf128        | protein_coding         |
| ENSMUST00000072896  | 38 | 54 | 2 Armc10         | protein_coding         |
| ENSMUST00000180430  | 38 | 53 | 77 Ksr2          | protein_coding         |
| ENSMUST00000155576  | 38 | 53 | 22 Arhgap26      | protein_coding         |
| ENSMUST00000181868  | 38 | 51 | 0 Gm4952         | protein_coding         |
| ENSMUST00000002756  | 38 | 50 | 0 Med6           | protein_coding         |
| ENSMUST00000021066  | 38 | 47 | 4 Cacng4         | protein_coding         |
| ENSMUST00000056087  | 38 | 45 | 6 Tprg           | protein_coding         |
| ENSMUST00000168362  | 38 | 45 | 4 Snd1           | protein_coding         |
| ENSMUST00000180376  | 38 | 43 | 10 Fam193a       | protein_coding         |
| ENSMUST00000069760  | 38 | 43 | 0 Oosp3          | protein_coding         |
| ENSMUST00000056176  | 38 | 42 | 0 Vav2           | protein_coding         |
| ENSMUST00000156932  | 38 | 42 | 0 Zbtb4          | protein_coding         |
| ENSMUST00000008995  | 38 | 41 | 18 Hdac4         | protein_coding         |
| ENSMUST00000177593  | 38 | 40 | 6 Gm13767        | processed_pseudogene   |
| ENSMUST00000177593  | 38 | 40 | 6 Gm13767        | processed_pseudogene   |
| ENSMUST00000097281  | 38 | 39 | 14 Heatr5b       | protein_coding         |
| ENSMUST00000062117  | 38 | 39 | 8 Rap2a          | protein_coding         |
| ENSMUST00000135683  | 38 | 37 | 2 Acsm1          | protein_coding         |
| ENSMUST00000170779  | 38 | 37 | 0 Zfp422-rs1     | unprocessed_pseudogene |
| ENSMUST00000170779  | 38 | 37 | 0 Zfp422-rs1     | unprocessed_pseudogene |
| ENSMUST00000167830  | 38 | 36 | 0 Vmn2r75        | protein_coding         |
| ENSMUST00000052725  | 38 | 35 | 44 Sc5d          | protein_coding         |
| ENSMUST00000022222  | 38 | 35 | 6 Erbb2ip        | protein_coding         |
| ENSMUST00000112726  | 38 | 34 | 16 Gm3618        | protein_coding         |
| ENSMUST00000130657  | 38 | 33 | 2 E230016M11Rik  | processed_transcript   |
| ENSMUST00000120341  | 38 | 33 | 0 Gm12897        | unprocessed_pseudogene |
| ENSMUST00000119118  | 38 | 32 | 14 Fam189a1      | protein_coding         |
| ENSMUST00000027886  | 38 | 32 | 4 Ralgps2        | protein_coding         |
| ENSMUST00000108112  | 38 | 32 | 12 Spata5        | protein_coding         |
| ENSMUST00000167582  | 38 | 31 | 24 Ptp4a3        | protein_coding         |
| ENSMUST00000153937  | 38 | 31 | 22 4933431K23Rik | processed_transcript   |
| ENSMUST00000124095  | 38 | 29 | 10 4921508D12Rik | lincRNA                |
| ENSMUST00000133935  | 38 | 28 | 20 Pvr13         | protein_coding         |
| ENSMUST00000150781  | 38 | 28 | 18 St8sia6       | protein_coding         |
| ENSMUST00000078272  | 38 | 28 | 2 Cacna2d1       | protein_coding         |
| ENSMUST00000171075  | 38 | 28 | 4 Raly1          | protein_coding         |
| ENSMUST00000043610  | 38 | 28 | 0 Ric1           | protein_coding         |
| ENSMUST00000174387  | 38 | 23 | 6 Usp3           | protein_coding         |
| ENSMUST000000088132 | 37 | 64 | 40 Eya2          | protein_coding         |
| ENSMUST00000125381  | 37 | 56 | 6 Plxna2         | protein_coding         |
| ENSMUST00000022977  | 37 | 53 | 28 Sqle          | protein_coding         |
| ENSMUST00000110155  | 37 | 52 | 8 Tatdn1         | protein_coding         |
| ENSMUST00000019987  | 37 | 51 | 6 Traf3ip2       | protein_coding         |
| ENSMUST00000031011  | 37 | 49 | 6 Rab28          | protein_coding         |
| ENSMUST00000047480  | 37 | 48 | 12 Piezo2        | protein_coding         |
| ENSMUST00000155685  | 37 | 47 | 18 Camta1        | protein_coding         |
| ENSMUST00000145814  | 37 | 45 | 20 Dtd1          | protein_coding         |
| ENSMUST00000090569  | 37 | 45 | 16 Psma5         | protein_coding         |
| ENSMUST00000039338  | 37 | 45 | 12 Kng2          | protein_coding         |
| ENSMUST00000027760  | 37 | 44 | 12 Rgl1          | protein_coding         |
| ENSMUST000000086545 | 37 | 44 | 6 Cdkl4          | protein_coding         |
| ENSMUST00000121694  | 37 | 43 | 4 Cyp2j12        | protein_coding         |
| ENSMUST00000050567  | 37 | 41 | 44 1700019D03Rik | protein_coding         |
| ENSMUST00000080208  | 37 | 41 | 105 Epb4.1l3     | protein_coding         |
| ENSMUST00000116595  | 37 | 41 | 4 Skp1a          | protein_coding         |
| ENSMUST00000101127  | 37 | 40 | 8 Fryl           | protein_coding         |
| ENSMUST00000143237  | 37 | 40 | 0 Cyp4b1         | protein_coding         |
| ENSMUST00000139140  | 37 | 39 | 18 4933431K23Rik | processed_transcript   |
| ENSMUST00000029780  | 37 | 39 | 2 Ptpb2          | protein_coding         |
| ENSMUST00000028704  | 37 | 39 | 16 Hao1          | protein_coding         |
| ENSMUST00000168361  | 37 | 39 | 0 Pum2           | protein_coding         |
| ENSMUST00000147480  | 37 | 38 | 0 Pkhd1          | protein_coding         |



|                    |    |    |                  |                        |
|--------------------|----|----|------------------|------------------------|
| ENSMUST00000180960 | 37 | 37 | 10 Zfp850        | processed_transcript   |
| ENSMUST00000180960 | 37 | 37 | 10 Zfp850        | processed_transcript   |
| ENSMUST00000122463 | 37 | 37 | 0 Gm8089         | unprocessed_pseudogene |
| ENSMUST00000037644 | 37 | 35 | 48 Cbl           | protein_coding         |
| ENSMUST00000160655 | 37 | 34 | 36 Csmc3         | protein_coding         |
| ENSMUST00000129271 | 37 | 34 | 12 Xpr1          | protein_coding         |
| ENSMUST00000165904 | 37 | 32 | 4 Gm4794         | protein_coding         |
| ENSMUST00000149357 | 37 | 31 | 10 Mltt3         | protein_coding         |
| ENSMUST00000038116 | 37 | 29 | 12 Ankrd12       | protein_coding         |
| ENSMUST00000117805 | 37 | 24 | 0 Gng7           | protein_coding         |
| ENSMUST00000182210 | 37 | 22 | 12 Gm6600        | unprocessed_pseudogene |
| ENSMUST00000156294 | 37 | 16 | 12 Cyb5d2        | protein_coding         |
| ENSMUST00000027929 | 36 | 97 | 10 Mark1         | protein_coding         |
| ENSMUST00000086723 | 36 | 66 | 262 Man2a1       | protein_coding         |
| ENSMUST00000087360 | 36 | 55 | 50 Rbpj          | protein_coding         |
| ENSMUST00000022656 | 36 | 55 | 0 Bora           | protein_coding         |
| ENSMUST00000030993 | 36 | 53 | 4 Nelfa          | protein_coding         |
| ENSMUST00000137404 | 36 | 50 | 0 Ndst3          | protein_coding         |
| ENSMUST00000181125 | 36 | 49 | 69 Gm26668       | lincRNA                |
| ENSMUST00000030311 | 36 | 49 | 12 lft74         | protein_coding         |
| ENSMUST00000054167 | 36 | 47 | 4 Ank3           | protein_coding         |
| ENSMUST00000100816 | 36 | 46 | 87 Med13l        | protein_coding         |
| ENSMUST00000148289 | 36 | 45 | 2 Cdk5rap1       | protein_coding         |
| ENSMUST00000065204 | 36 | 45 | 0 Kcnk18         | protein_coding         |
| ENSMUST00000132176 | 36 | 44 | 6 Dlg1           | protein_coding         |
| ENSMUST00000020174 | 36 | 44 | 2 Stx7           | protein_coding         |
| ENSMUST00000164661 | 36 | 43 | 20 Trim43a       | protein_coding         |
| ENSMUST00000085108 | 36 | 43 | 6 Foxn3          | protein_coding         |
| ENSMUST00000092165 | 36 | 43 | 0 Gm10271        | protein_coding         |
| ENSMUST00000166646 | 36 | 43 | 12 Abcc4         | protein_coding         |
| ENSMUST00000080626 | 36 | 42 | 28 Fbxw22        | protein_coding         |
| ENSMUST00000180751 | 36 | 41 | 0 4732463B04Rik  | lincRNA                |
| ENSMUST00000125429 | 36 | 41 | 8 Mrap           | protein_coding         |
| ENSMUST00000026459 | 36 | 40 | 87 Atp5b         | protein_coding         |
| ENSMUST00000023601 | 36 | 39 | 12 St6gal1       | protein_coding         |
| ENSMUST00000132573 | 36 | 37 | 40 Adgb          | protein_coding         |
| ENSMUST00000138569 | 36 | 37 | 2 Atp11c         | protein_coding         |
| ENSMUST00000108419 | 36 | 37 | 20 Vps53         | protein_coding         |
| ENSMUST00000182356 | 36 | 35 | 24 Anks1b        | protein_coding         |
| ENSMUST00000160436 | 36 | 35 | 2 Tcerg1l        | protein_coding         |
| ENSMUST00000091514 | 36 | 34 | 0 Srd5a1         | protein_coding         |
| ENSMUST00000034041 | 36 | 33 | 34 Irf2          | protein_coding         |
| ENSMUST00000066849 | 36 | 33 | 24 Lef1          | protein_coding         |
| ENSMUST00000111288 | 36 | 32 | 85 Caln1         | protein_coding         |
| ENSMUST00000150227 | 36 | 32 | 0 Adarb1         | protein_coding         |
| ENSMUST00000180241 | 36 | 32 | 6 4932411N23Rik  | protein_coding         |
| ENSMUST00000180241 | 36 | 32 | 6 4932411N23Rik  | protein_coding         |
| ENSMUST00000167262 | 36 | 30 | 18 Gm884         | protein_coding         |
| ENSMUST00000182101 | 36 | 30 | 6 Arhgap12       | protein_coding         |
| ENSMUST00000028619 | 36 | 30 | 2 Hsd17b12       | protein_coding         |
| ENSMUST00000130799 | 36 | 30 | 0 Zfp369         | protein_coding         |
| ENSMUST00000099623 | 36 | 29 | 4 Ano3           | protein_coding         |
| ENSMUST00000114041 | 36 | 29 | 0 Pbsn           | protein_coding         |
| ENSMUST00000063117 | 36 | 28 | 93 Gatz1         | protein_coding         |
| ENSMUST00000072551 | 36 | 26 | 8 Clrn1          | protein_coding         |
| ENSMUST00000066984 | 36 | 26 | 0 Gtf2h2         | protein_coding         |
| ENSMUST00000068158 | 36 | 24 | 46 4930578G10Rik | protein_coding         |
| ENSMUST00000022993 | 36 | 7  | 6 Derl1          | protein_coding         |
| ENSMUST00000149168 | 36 | 81 | 0 Slc6a9         | protein_coding         |
| ENSMUST00000100023 | 36 | 64 | 2 Mb21d2         | protein_coding         |
| ENSMUST00000065486 | 36 | 58 | 8 Cib4           | protein_coding         |
| ENSMUST00000161026 | 36 | 52 | 111 Glis3        | protein_coding         |
| ENSMUST00000139973 | 36 | 51 | 12 1700046C09Rik | lincRNA                |
| ENSMUST00000140790 | 36 | 51 | 14 Imp2l         | protein_coding         |
| ENSMUST00000159111 | 36 | 49 | 4 Ano2           | protein_coding         |
| ENSMUST00000163718 | 36 | 47 | 2 Gm4907         | protein_coding         |
| ENSMUST00000025120 | 36 | 47 | 8 Elp2           | protein_coding         |
| ENSMUST00000133477 | 36 | 45 | 12 Al182371      | protein_coding         |

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|--------------------|----|----|-----|---------------|------------------------|
| ENSMUST00000047749 | 36 | 45 | 6   | 4921524J17Rik | protein_coding         |
| ENSMUST00000162491 | 36 | 44 | 54  | Trmu          | protein_coding         |
| ENSMUST00000120796 | 36 | 44 | 22  | Kcnt2         | protein_coding         |
| ENSMUST00000097718 | 36 | 43 | 2   | Ino80d        | protein_coding         |
| ENSMUST00000081569 | 36 | 43 | 12  | Nhs           | protein_coding         |
| ENSMUST00000064476 | 36 | 42 | 0   | Arl13a        | protein_coding         |
| ENSMUST00000075756 | 36 | 41 | 0   | Olfir212      | protein_coding         |
| ENSMUST00000072961 | 36 | 41 | 506 | Vps41         | protein_coding         |
| ENSMUST00000151846 | 36 | 41 | 4   | Rbms1         | protein_coding         |
| ENSMUST00000098811 | 36 | 40 | 0   | Bsph1         | protein_coding         |
| ENSMUST00000144691 | 36 | 40 | 0   | Tiam1         | protein_coding         |
| ENSMUST00000125267 | 36 | 39 | 339 | Cux2          | protein_coding         |
| ENSMUST00000124708 | 36 | 39 | 121 | Cdh4          | protein_coding         |
| ENSMUST00000131706 | 36 | 38 | 8   | Sfmbt1        | protein_coding         |
| ENSMUST00000037718 | 36 | 37 | 16  | Fbxo15        | protein_coding         |
| ENSMUST00000180995 | 36 | 37 | 4   | RP24-192L21.1 | lincRNA                |
| ENSMUST00000047413 | 36 | 37 | 0   | Mbd5          | protein_coding         |
| ENSMUST00000162833 | 36 | 37 | 32  | Nox1          | protein_coding         |
| ENSMUST00000159187 | 36 | 36 | 2   | Med6          | protein_coding         |
| ENSMUST00000118532 | 36 | 35 | 2   | Gm156         | protein_coding         |
| ENSMUST00000134798 | 36 | 35 | 2   | Galk2         | protein_coding         |
| ENSMUST00000024854 | 36 | 34 | 12  | Clip4         | protein_coding         |
| ENSMUST00000159206 | 36 | 34 | 4   | Rb1cc1        | protein_coding         |
| ENSMUST00000038118 | 36 | 34 | 0   | Atp2c1        | protein_coding         |
| ENSMUST00000020478 | 36 | 30 | 32  | Hcfc2         | protein_coding         |
| ENSMUST00000174138 | 36 | 29 | 30  | Vmn2r-ps45    | unprocessed_pseudogene |
| ENSMUST00000027237 | 36 | 29 | 8   | Il18rap       | protein_coding         |
| ENSMUST00000106928 | 36 | 28 | 22  | Slc22a15      | protein_coding         |
| ENSMUST00000108522 | 36 | 28 | 4   | Sult2a1       | protein_coding         |
| ENSMUST00000174694 | 36 | 28 | 0   | Lats2         | protein_coding         |
| ENSMUST00000144099 | 36 | 28 | 16  | Cdk5rap2      | protein_coding         |
| ENSMUST00000109691 | 36 | 27 | 18  | Rapgef5       | protein_coding         |
| ENSMUST00000055673 | 36 | 25 | 192 | Kcns3         | protein_coding         |
| ENSMUST00000134280 | 36 | 24 | 24  | Frmpd1        | protein_coding         |
| ENSMUST00000160385 | 36 | 24 | 4   | 4833422C13Rik | antisense              |
| ENSMUST00000066773 | 36 | 20 | 2   | Ppp2r3a       | protein_coding         |
| ENSMUST00000182413 | 36 | 19 | 8   | Osbpl10       | protein_coding         |
| ENSMUST00000130279 | 36 | 15 | 34  | Phb2          | protein_coding         |
| ENSMUST00000022550 | 36 | 9  | 139 | Extl3         | protein_coding         |
| ENSMUST00000182088 | 36 | 0  | 0   | Rian          | processed_transcript   |
| ENSMUST00000110095 | 35 | 62 | 6   | Pde4c         | protein_coding         |
| ENSMUST00000167887 | 35 | 57 | 42  | Nrxn3         | protein_coding         |
| ENSMUST00000175737 | 35 | 56 | 0   | Syngn2        | protein_coding         |
| ENSMUST00000019986 | 35 | 55 | 8   | Rev3l         | protein_coding         |
| ENSMUST00000153232 | 35 | 55 | 0   | Gm12472       | antisense              |
| ENSMUST00000061274 | 35 | 54 | 30  | Gpr156        | protein_coding         |
| ENSMUST00000019130 | 35 | 53 | 36  | Slnf3         | protein_coding         |
| ENSMUST00000137043 | 35 | 53 | 6   | Exoc4         | protein_coding         |
| ENSMUST00000131660 | 35 | 53 | 4   | Ccdc141       | protein_coding         |
| ENSMUST00000164677 | 35 | 53 | 2   | Gm6871        | protein_coding         |
| ENSMUST00000106128 | 35 | 51 | 4   | Lphn2         | protein_coding         |
| ENSMUST00000021001 | 35 | 51 | 22  | Rab10         | protein_coding         |
| ENSMUST00000128056 | 35 | 51 | 14  | 1700045H11Rik | antisense              |
| ENSMUST00000150128 | 35 | 50 | 4   | Cmc2          | protein_coding         |
| ENSMUST00000143046 | 35 | 50 | 2   | Dgki          | protein_coding         |
| ENSMUST00000138374 | 35 | 49 | 0   | Gm12498       | lincRNA                |
| ENSMUST00000012186 | 35 | 46 | 2   | 4930579F01Rik | protein_coding         |
| ENSMUST00000045730 | 35 | 45 | 48  | Akap12        | protein_coding         |
| ENSMUST00000021486 | 35 | 43 | 8   | Timm9         | protein_coding         |
| ENSMUST00000167113 | 35 | 43 | 4   | Trim43b       | protein_coding         |
| ENSMUST00000068058 | 35 | 43 | 0   | Usp46         | protein_coding         |
| ENSMUST00000117355 | 35 | 43 | 0   | Psmd4         | protein_coding         |
| ENSMUST00000150506 | 35 | 41 | 36  | Gm8091        | unprocessed_pseudogene |
| ENSMUST00000000430 | 35 | 41 | 12  | Galnt1        | protein_coding         |
| ENSMUST00000152890 | 35 | 41 | 0   | Hus1          | protein_coding         |
| ENSMUST00000048514 | 35 | 40 | 6   | Nlrp1a        | protein_coding         |
| ENSMUST00000020106 | 35 | 39 | 38  | Arid5b        | protein_coding         |
| ENSMUST00000124816 | 35 | 39 | 28  | Ctla4         | protein_coding         |

|                    |    |    |                  |                         |
|--------------------|----|----|------------------|-------------------------|
| ENSMUST00000140176 | 35 | 39 | 14 Snx27         | nonsense_mediated_decay |
| ENSMUST00000140176 | 35 | 39 | 14 Snx27         | nonsense_mediated_decay |
| ENSMUST00000070673 | 35 | 38 | 26 Rab31         | protein_coding          |
| ENSMUST00000096332 | 35 | 38 | 8 Gm382          | protein_coding          |
| ENSMUST00000115800 | 35 | 38 | 0 Nox3           | protein_coding          |
| ENSMUST00000160495 | 35 | 37 | 10 Mettl11b      | protein_coding          |
| ENSMUST00000132219 | 35 | 37 | 0 Gm11851        | lincRNA                 |
| ENSMUST00000075764 | 35 | 36 | 52 Drd2          | protein_coding          |
| ENSMUST00000072971 | 35 | 35 | 0 Atp8a1         | protein_coding          |
| ENSMUST00000034982 | 35 | 35 | 59 Tfdp2         | protein_coding          |
| ENSMUST00000111346 | 35 | 35 | 22 Rimbp2        | protein_coding          |
| ENSMUST00000160906 | 35 | 33 | 8 Ttl11          | protein_coding          |
| ENSMUST00000099505 | 35 | 32 | 8 Htr7           | protein_coding          |
| ENSMUST00000149671 | 35 | 32 | 16 1700026D08Rik | protein_coding          |
| ENSMUST00000064032 | 35 | 32 | 8 Smim4          | protein_coding          |
| ENSMUST00000074679 | 35 | 32 | 0 Sh3rf2         | protein_coding          |
| ENSMUST00000157072 | 35 | 30 | 8 Eaf2           | protein_coding          |
| ENSMUST00000156413 | 35 | 28 | 4 Fam227b        | protein_coding          |
| ENSMUST00000183112 | 35 | 22 | 2 Polq           | protein_coding          |
| ENSMUST00000180360 | 35 | 22 | 0 Ehbp1          | protein_coding          |
| ENSMUST00000068664 | 35 | 21 | 28 Neo1          | protein_coding          |
| ENSMUST00000035058 | 34 | 64 | 16 Cspg5         | protein_coding          |
| ENSMUST00000115314 | 34 | 54 | 6 Lpp            | protein_coding          |
| ENSMUST00000009727 | 34 | 52 | 8 Syngn1         | protein_coding          |
| ENSMUST00000146618 | 34 | 51 | 26 Syt1          | protein_coding          |
| ENSMUST00000167656 | 34 | 47 | 12 Gnaq          | protein_coding          |
| ENSMUST00000046206 | 34 | 47 | 2 Rprd1a         | protein_coding          |
| ENSMUST00000168033 | 34 | 45 | 2 Vmn2r114       | protein_coding          |
| ENSMUST00000155992 | 34 | 45 | 0 Gm16081        | lincRNA                 |
| ENSMUST00000023562 | 34 | 44 | 4 Tmem41a        | protein_coding          |
| ENSMUST00000022459 | 34 | 44 | 0 Phf7           | protein_coding          |
| ENSMUST00000012281 | 34 | 43 | 12 Bmp5          | protein_coding          |
| ENSMUST00000023550 | 34 | 43 | 24 Pdia5         | protein_coding          |
| ENSMUST00000031096 | 34 | 43 | 2 Klb            | protein_coding          |
| ENSMUST00000004428 | 34 | 42 | 2 Clcn5          | protein_coding          |
| ENSMUST00000087216 | 34 | 41 | 12 Nfxl1         | protein_coding          |
| ENSMUST00000074465 | 34 | 41 | 6 Aqp9           | protein_coding          |
| ENSMUST00000030286 | 34 | 41 | 2 Dock7          | protein_coding          |
| ENSMUST00000162630 | 34 | 41 | 0 Cyp2c40        | protein_coding          |
| ENSMUST00000028377 | 34 | 41 | 56 Scn2a1        | protein_coding          |
| ENSMUST00000160970 | 34 | 40 | 16 Cfap43        | protein_coding          |
| ENSMUST00000164730 | 34 | 40 | 10 Adora3        | protein_coding          |
| ENSMUST00000126168 | 34 | 39 | 0 Uspl1          | protein_coding          |
| ENSMUST00000177450 | 34 | 38 | 2 Erg            | protein_coding          |
| ENSMUST00000146546 | 34 | 37 | 36 Gm13832       | antisense               |
| ENSMUST00000135656 | 34 | 37 | 10 Gm11375       | lincRNA                 |
| ENSMUST00000119443 | 34 | 37 | 2 Thsd7a         | protein_coding          |
| ENSMUST00000002310 | 34 | 37 | 0 Prr27          | protein_coding          |
| ENSMUST00000095313 | 34 | 37 | 10 Pawr          | protein_coding          |
| ENSMUST00000074813 | 34 | 37 | 8 Zfp616         | protein_coding          |
| ENSMUST00000028034 | 34 | 35 | 26 Nsun6         | protein_coding          |
| ENSMUST00000076321 | 34 | 35 | 8 C87414         | protein_coding          |
| ENSMUST00000025856 | 34 | 35 | 2 Lrp5           | protein_coding          |
| ENSMUST00000105610 | 34 | 34 | 22 Gm17106       | processed_transcript    |
| ENSMUST00000031633 | 34 | 33 | 6 Cyp3a16        | protein_coding          |
| ENSMUST00000121473 | 34 | 32 | 6 Erbb4          | protein_coding          |
| ENSMUST00000108824 | 34 | 32 | 0 Olfr328        | protein_coding          |
| ENSMUST00000036584 | 34 | 31 | 2 Pank1          | protein_coding          |
| ENSMUST00000076734 | 34 | 31 | 0 Scaf8          | protein_coding          |
| ENSMUST00000108339 | 34 | 30 | 14 Asph          | protein_coding          |
| ENSMUST00000021794 | 34 | 30 | 2 Nedd9          | protein_coding          |
| ENSMUST00000185143 | 34 | 28 | 12 Erc1          | protein_coding          |
| ENSMUST00000144029 | 34 | 28 | 2 Gm12371        | lincRNA                 |
| ENSMUST00000043596 | 34 | 27 | 6 Phka1          | protein_coding          |
| ENSMUST00000094538 | 34 | 27 | 4 Zfp120         | protein_coding          |
| ENSMUST00000000793 | 34 | 25 | 597 Polr3d       | protein_coding          |
| ENSMUST00000141919 | 34 | 25 | 0 Dixdc1         | protein_coding          |
| ENSMUST00000153560 | 34 | 24 | 12 Il16          | protein_coding          |

|                    |    |    |                  |                                    |
|--------------------|----|----|------------------|------------------------------------|
| ENSMUST00000125450 | 34 | 23 | 32 Zfp407        | protein_coding                     |
| ENSMUST00000151031 | 34 | 19 | 157 Fank1        | protein_coding                     |
| ENSMUST00000042141 | 34 | 12 | 2 Dhx9           | protein_coding                     |
| ENSMUST00000133942 | 33 | 69 | 0 Donson         | protein_coding                     |
| ENSMUST00000125479 | 33 | 61 | 6 Gsta2          | protein_coding                     |
| ENSMUST00000137138 | 33 | 60 | 4 Ston1          | protein_coding                     |
| ENSMUST00000052283 | 33 | 58 | 0 Mageb16        | protein_coding                     |
| ENSMUST00000176344 | 33 | 57 | 12 Gm20713       | processed_transcript               |
| ENSMUST00000037850 | 33 | 51 | 24 Snx2          | protein_coding                     |
| ENSMUST00000112170 | 33 | 51 | 12 Tlr8          | protein_coding                     |
| ENSMUST00000029881 | 33 | 49 | 0 Mmp16          | protein_coding                     |
| ENSMUST00000027467 | 33 | 47 | 0 Serpine2       | protein_coding                     |
| ENSMUST00000115554 | 33 | 46 | 12 Dync1i1       | protein_coding                     |
| ENSMUST00000023501 | 33 | 45 | 6 Maats1         | protein_coding                     |
| ENSMUST00000141642 | 33 | 45 | 4 Zcwpw1         | protein_coding                     |
| ENSMUST00000087525 | 33 | 43 | 8 Dmrt1          | protein_coding                     |
| ENSMUST00000040184 | 33 | 43 | 30 Trpc5         | protein_coding                     |
| ENSMUST00000111210 | 33 | 43 | 0 Mndal          | protein_coding                     |
| ENSMUST00000027575 | 33 | 42 | 12 Slco6d1       | protein_coding                     |
| ENSMUST00000074157 | 33 | 40 | 28 Myo5b         | protein_coding                     |
| ENSMUST00000029942 | 33 | 40 | 20 Rngtt         | protein_coding                     |
| ENSMUST00000131183 | 33 | 40 | 6 Uevld          | protein_coding                     |
| ENSMUST00000176134 | 33 | 40 | 6 5430405H02Rik  | processed_transcript               |
| ENSMUST00000161127 | 33 | 39 | 6 Ppp4r1         | protein_coding                     |
| ENSMUST00000046384 | 33 | 39 | 0 C1qb           | protein_coding                     |
| ENSMUST00000105747 | 33 | 39 | 4 Gm436          | protein_coding                     |
| ENSMUST00000182999 | 33 | 38 | 24 Plce1         | protein_coding                     |
| ENSMUST00000171179 | 33 | 38 | 8 Fryl           | protein_coding                     |
| ENSMUST00000171179 | 33 | 38 | 8 Fryl           | protein_coding                     |
| ENSMUST00000001826 | 33 | 38 | 8 Naalad2        | protein_coding                     |
| ENSMUST00000176918 | 33 | 38 | 0 Nrnx1          | protein_coding                     |
| ENSMUST00000171807 | 33 | 37 | 18 Fam184a       | protein_coding                     |
| ENSMUST00000034980 | 33 | 37 | 34 Atr           | protein_coding                     |
| ENSMUST00000131784 | 33 | 37 | 32 Zfp866        | protein_coding                     |
| ENSMUST00000111952 | 33 | 37 | 18 Agps          | protein_coding                     |
| ENSMUST00000172647 | 33 | 37 | 16 Xpo4          | protein_coding                     |
| ENSMUST00000048188 | 33 | 37 | 8 Phf20l1        | protein_coding                     |
| ENSMUST00000053458 | 33 | 36 | 24 Fam228b       | protein_coding                     |
| ENSMUST00000016172 | 33 | 36 | 16 Celsr1        | protein_coding                     |
| ENSMUST00000179300 | 33 | 36 | 6 Gm14527        | unprocessed_pseudogene             |
| ENSMUST00000173895 | 33 | 35 | 24 Naa25         | protein_coding                     |
| ENSMUST00000108180 | 33 | 34 | 18 Bach2         | protein_coding                     |
| ENSMUST00000094227 | 33 | 34 | 6 Gm9696         | transcribed_unprocessed_pseudogene |
| ENSMUST00000027885 | 33 | 33 | 4 Angptl1        | protein_coding                     |
| ENSMUST00000174168 | 33 | 33 | 4 Gm20429        | processed_transcript               |
| ENSMUST00000163333 | 33 | 33 | 2 Mtdh           | protein_coding                     |
| ENSMUST00000129974 | 33 | 33 | 0 Lrp1b          | protein_coding                     |
| ENSMUST00000023336 | 33 | 31 | 8 Cd96           | protein_coding                     |
| ENSMUST00000182643 | 33 | 31 | 8 Gm26919        | protein_coding                     |
| ENSMUST00000059226 | 33 | 31 | 6 Ifi205         | protein_coding                     |
| ENSMUST00000139970 | 33 | 31 | 4 Ncoa2          | protein_coding                     |
| ENSMUST00000063192 | 33 | 30 | 6 Tmem150c       | protein_coding                     |
| ENSMUST00000154119 | 33 | 30 | 4 Samd12         | protein_coding                     |
| ENSMUST00000120794 | 33 | 30 | 0 Cpsf3l         | protein_coding                     |
| ENSMUST00000094541 | 33 | 29 | 12 Btbd8         | protein_coding                     |
| ENSMUST00000125291 | 33 | 29 | 8 Ms4a6d         | protein_coding                     |
| ENSMUST00000110062 | 33 | 27 | 2 Macroduct      | protein_coding                     |
| ENSMUST00000048565 | 33 | 26 | 6 Trim60         | protein_coding                     |
| ENSMUST00000044231 | 33 | 24 | 4 Serpina10      | protein_coding                     |
| ENSMUST00000132859 | 33 | 24 | 0 2610015P09Rik  | protein_coding                     |
| ENSMUST00000041759 | 33 | 22 | 8 Hmgxb4         | protein_coding                     |
| ENSMUST00000138630 | 33 | 47 | 6 BC048403       | protein_coding                     |
| ENSMUST00000068452 | 33 | 46 | 20 Cnot1         | protein_coding                     |
| ENSMUST00000171804 | 33 | 45 | 6 Slc15a5        | protein_coding                     |
| ENSMUST00000080083 | 33 | 44 | 16 4930595M18Rik | protein_coding                     |
| ENSMUST00000181555 | 33 | 43 | 0 1700028E10Rik  | processed_transcript               |
| ENSMUST00000049714 | 33 | 42 | 0 Synrg          | protein_coding                     |
| ENSMUST00000172585 | 33 | 41 | 14 Svopl         | protein_coding                     |

|                    |    |    |                  |                        |
|--------------------|----|----|------------------|------------------------|
| ENSMUST00000053273 | 33 | 41 | 6 Itpr2          | protein_coding         |
| ENSMUST00000177805 | 33 | 41 | 0 Slc25a13       | protein_coding         |
| ENSMUST00000063988 | 33 | 40 | 20 Tbl1xr1       | protein_coding         |
| ENSMUST00000163058 | 33 | 39 | 6 Als2           | protein_coding         |
| ENSMUST00000078139 | 33 | 39 | 2 Asph           | protein_coding         |
| ENSMUST00000122434 | 33 | 39 | 0 Gm13437        | processed_pseudogene   |
| ENSMUST00000163409 | 33 | 38 | 2 Kihl7          | protein_coding         |
| ENSMUST00000162162 | 33 | 37 | 34 Fut10         | protein_coding         |
| ENSMUST00000121884 | 33 | 37 | 4 Cyp4a28-ps     | unprocessed_pseudogene |
| ENSMUST00000110920 | 33 | 36 | 8 Kcnk2          | protein_coding         |
| ENSMUST00000126082 | 33 | 35 | 18 lvd           | protein_coding         |
| ENSMUST00000071533 | 33 | 35 | 8 Dach1          | protein_coding         |
| ENSMUST00000092058 | 33 | 35 | 0 BC089597       | protein_coding         |
| ENSMUST00000115713 | 33 | 35 | 48 Nrg2          | protein_coding         |
| ENSMUST00000174147 | 33 | 35 | 14 Amy1          | protein_coding         |
| ENSMUST00000152386 | 33 | 34 | 2 Dnah9          | protein_coding         |
| ENSMUST00000140709 | 33 | 33 | 8 Gm4876         | antisense              |
| ENSMUST00000023491 | 33 | 32 | 32 Lrch3         | protein_coding         |
| ENSMUST00000165928 | 33 | 32 | 2 Vmn2r18        | protein_coding         |
| ENSMUST00000138787 | 33 | 31 | 121 Tm4sf20      | protein_coding         |
| ENSMUST00000057344 | 33 | 30 | 26 Pkd1l3        | protein_coding         |
| ENSMUST00000101379 | 33 | 30 | 2 Mdga2          | protein_coding         |
| ENSMUST00000176974 | 33 | 30 | 38 Corin         | protein_coding         |
| ENSMUST00000108340 | 33 | 29 | 10 Asph          | protein_coding         |
| ENSMUST00000122235 | 33 | 28 | 18 Vps8          | protein_coding         |
| ENSMUST00000112027 | 33 | 28 | 10 Colq          | protein_coding         |
| ENSMUST00000076219 | 33 | 27 | 12 D19Bwg1357e   | protein_coding         |
| ENSMUST00000089362 | 33 | 27 | 8 Senp7          | protein_coding         |
| ENSMUST00000034148 | 33 | 27 | 2 Il15           | protein_coding         |
| ENSMUST00000128375 | 33 | 27 | 2 Nfrkb          | protein_coding         |
| ENSMUST00000025486 | 33 | 26 | 0 Lmnbl1         | protein_coding         |
| ENSMUST00000175703 | 33 | 20 | 10 Pou6f2        | protein_coding         |
| ENSMUST00000149576 | 32 | 54 | 0 Gm14233        | processed_transcript   |
| ENSMUST00000095729 | 32 | 51 | 0 Armc2          | protein_coding         |
| ENSMUST00000100986 | 32 | 47 | 28 Esyt2         | protein_coding         |
| ENSMUST00000023561 | 32 | 45 | 14 Senp2         | protein_coding         |
| ENSMUST00000170939 | 32 | 44 | 30 Ptk2          | protein_coding         |
| ENSMUST00000117279 | 32 | 44 | 0 Olfr260-ps1    | unprocessed_pseudogene |
| ENSMUST00000120274 | 32 | 43 | 2 Plekhg1        | protein_coding         |
| ENSMUST00000089174 | 32 | 43 | 12 Ccdc134       | protein_coding         |
| ENSMUST00000027961 | 32 | 42 | 0 Hspa14         | protein_coding         |
| ENSMUST00000144910 | 32 | 41 | 0 Arl4a          | protein_coding         |
| ENSMUST00000176346 | 32 | 41 | 22 Bnc2          | protein_coding         |
| ENSMUST00000072329 | 32 | 40 | 0 Dtnbp1         | protein_coding         |
| ENSMUST00000108525 | 32 | 39 | 8 Sult2a5        | protein_coding         |
| ENSMUST00000141159 | 32 | 38 | 10 D430041D05Rik | protein_coding         |
| ENSMUST00000020185 | 32 | 37 | 28 Il20ra        | protein_coding         |
| ENSMUST00000148684 | 32 | 37 | 8 Slc16a2        | protein_coding         |
| ENSMUST00000112877 | 32 | 37 | 4 Nr6a1          | protein_coding         |
| ENSMUST00000101531 | 32 | 36 | 12 Mcf2          | protein_coding         |
| ENSMUST00000065436 | 32 | 36 | 2 Daw1           | protein_coding         |
| ENSMUST00000108126 | 32 | 36 | 2 3110043O21Rik  | protein_coding         |
| ENSMUST00000027146 | 32 | 35 | 8 Ikzf2          | protein_coding         |
| ENSMUST00000128642 | 32 | 35 | 6 Cpeb3          | protein_coding         |
| ENSMUST00000035164 | 32 | 34 | 10 Topbp1        | protein_coding         |
| ENSMUST00000019354 | 32 | 34 | 2 Atp6v1e1       | protein_coding         |
| ENSMUST00000128722 | 32 | 34 | 0 Sumf2          | protein_coding         |
| ENSMUST00000176263 | 32 | 33 | 301 Ppp1r9a      | protein_coding         |
| ENSMUST00000141897 | 32 | 32 | 2 Oprm1          | protein_coding         |
| ENSMUST00000047008 | 32 | 32 | 0 Cst10          | protein_coding         |
| ENSMUST00000062560 | 32 | 32 | 10 Lgsn          | protein_coding         |
| ENSMUST00000156300 | 32 | 31 | 30 Ctnnbl1       | protein_coding         |
| ENSMUST00000165771 | 32 | 31 | 2 Vmn2r76        | protein_coding         |
| ENSMUST00000033915 | 32 | 30 | 16 Gpm6a         | protein_coding         |
| ENSMUST00000020057 | 32 | 30 | 16 Lin7a         | protein_coding         |
| ENSMUST00000089215 | 32 | 30 | 4 Cntn6          | protein_coding         |
| ENSMUST00000047431 | 32 | 29 | 32 AU040320      | protein_coding         |
| ENSMUST00000099170 | 32 | 29 | 12 Gm1527        | protein_coding         |

|                     |    |    |     |               |                        |
|---------------------|----|----|-----|---------------|------------------------|
| ENSMUST00000182477  | 32 | 29 | 2   | Gm17750       | lincRNA                |
| ENSMUST00000041370  | 32 | 28 | 14  | Txlng         | protein_coding         |
| ENSMUST00000022038  | 32 | 28 | 0   | Naa35         | protein_coding         |
| ENSMUST00000060095  | 32 | 28 | 0   | Tmtc1         | protein_coding         |
| ENSMUST00000019951  | 32 | 28 | 480 | Cep5711       | protein_coding         |
| ENSMUST00000139732  | 32 | 28 | 0   | Itpr2         | protein_coding         |
| ENSMUST00000154853  | 32 | 27 | 28  | Aamdc         | protein_coding         |
| ENSMUST00000107527  | 32 | 24 | 6   | Trpm1         | protein_coding         |
| ENSMUST00000122408  | 32 | 24 | 2   | Ankrd29       | protein_coding         |
| ENSMUST00000107104  | 32 | 24 | 0   | Ift74         | protein_coding         |
| ENSMUST00000180462  | 32 | 22 | 0   | Gm26630       | processed_transcript   |
| ENSMUST00000181013  | 32 | 22 | 0   | Gm26680       | processed_transcript   |
| ENSMUST00000183175  | 32 | 18 | 12  | Nucb2         | protein_coding         |
| ENSMUST00000020157  | 32 | 14 | 2   | Apaf1         | protein_coding         |
| ENSMUST00000156807  | 31 | 72 | 10  | Pabpc4        | protein_coding         |
| ENSMUST00000120143  | 31 | 62 | 8   | Tpd52         | protein_coding         |
| ENSMUST00000173536  | 31 | 56 | 0   | Gm8018        | unprocessed_pseudogene |
| ENSMUST00000118769  | 31 | 52 | 12  | Zar1l         | protein_coding         |
| ENSMUST00000182033  | 31 | 51 | 8   | Rmst          | lincRNA                |
| ENSMUST00000019290  | 31 | 50 | 18  | Cacng2        | protein_coding         |
| ENSMUST00000169865  | 31 | 50 | 2   | Dhtkd1        | protein_coding         |
| ENSMUST00000169865  | 31 | 50 | 2   | Dhtkd1        | protein_coding         |
| ENSMUST00000033715  | 31 | 49 | 0   | Nsdhl         | protein_coding         |
| ENSMUST00000138247  | 31 | 48 | 26  | Ube2g1        | protein_coding         |
| ENSMUST00000056815  | 31 | 47 | 44  | Npas2         | protein_coding         |
| ENSMUST00000106653  | 31 | 45 | 36  | Usp47         | protein_coding         |
| ENSMUST00000058787  | 31 | 45 | 4   | Gira2         | protein_coding         |
| ENSMUST00000160266  | 31 | 44 | 14  | Ube2e1        | protein_coding         |
| ENSMUST00000102821  | 31 | 43 | 91  | Stk10         | protein_coding         |
| ENSMUST00000137629  | 31 | 43 | 16  | Gm14342       | lincRNA                |
| ENSMUST00000096000  | 31 | 43 | 0   | Sh2d4b        | protein_coding         |
| ENSMUST00000140054  | 31 | 43 | 0   | Gimap1        | protein_coding         |
| ENSMUST00000081028  | 31 | 42 | 12  | Etv6          | protein_coding         |
| ENSMUST00000025986  | 31 | 41 | 18  | Tll2          | protein_coding         |
| ENSMUST00000167338  | 31 | 41 | 0   | Sumf1         | protein_coding         |
| ENSMUST00000118778  | 31 | 41 | 4   | Gm4732        | unprocessed_pseudogene |
| ENSMUST00000021670  | 31 | 39 | 10  | Ylpm1         | protein_coding         |
| ENSMUST00000074913  | 31 | 38 | 6   | Lamp2         | protein_coding         |
| ENSMUST00000144179  | 31 | 38 | 6   | Syndig1       | protein_coding         |
| ENSMUST00000023457  | 31 | 37 | 30  | Senp5         | protein_coding         |
| ENSMUST00000025830  | 31 | 37 | 10  | Apba1         | protein_coding         |
| ENSMUST00000107758  | 31 | 35 | 6   | Tulp2         | protein_coding         |
| ENSMUST00000149700  | 31 | 35 | 0   | Plin2         | protein_coding         |
| ENSMUST00000126871  | 31 | 34 | 2   | Defb44-ps     | unprocessed_pseudogene |
| ENSMUST00000024873  | 31 | 34 | 0   | Yipf4         | protein_coding         |
| ENSMUST00000129410  | 31 | 33 | 12  | Gm15245       | lincRNA                |
| ENSMUST00000092466  | 31 | 33 | 4   | Cd300c        | protein_coding         |
| ENSMUST00000101185  | 31 | 32 | 10  | Luzp4         | protein_coding         |
| ENSMUST00000000266  | 31 | 32 | 4   | Ifi202b       | protein_coding         |
| ENSMUST00000027623  | 31 | 32 | 0   | Tsn           | protein_coding         |
| ENSMUST00000113611  | 31 | 32 | 2   | Phka1         | protein_coding         |
| ENSMUST00000076737  | 31 | 32 | 0   | Dsg1b         | protein_coding         |
| ENSMUST00000069597  | 31 | 30 | 22  | Csnk1g3       | protein_coding         |
| ENSMUST00000141831  | 31 | 30 | 4   | Zfp946        | protein_coding         |
| ENSMUST00000040562  | 31 | 30 | 0   | Cdh10         | protein_coding         |
| ENSMUST00000145890  | 31 | 30 | 6   | Gucd1         | protein_coding         |
| ENSMUST00000181873  | 31 | 29 | 34  | 5430416N02Rik | lincRNA                |
| ENSMUST000000095187 | 31 | 29 | 4   | Srbd1         | protein_coding         |
| ENSMUST00000134728  | 31 | 28 | 14  | Ebf4          | protein_coding         |
| ENSMUST00000157030  | 31 | 28 | 8   | Tenm2         | protein_coding         |
| ENSMUST00000033040  | 31 | 28 | 0   | Pak1          | protein_coding         |
| ENSMUST00000137066  | 31 | 27 | 6   | Cnot6l        | protein_coding         |
| ENSMUST00000162184  | 31 | 27 | 6   | Ric1          | protein_coding         |
| ENSMUST00000021567  | 31 | 26 | 34  | Pcnx          | protein_coding         |
| ENSMUST00000123620  | 31 | 24 | 6   | Gm12506       | lincRNA                |
| ENSMUST00000163303  | 31 | 24 | 0   | 4933406F09Rik | processed_transcript   |
| ENSMUST00000143819  | 31 | 22 | 321 | Brip1os       | antisense              |
| ENSMUST00000160661  | 31 | 22 | 4   | 4933413J09Rik | lincRNA                |

|                    |    |    |                  |                        |
|--------------------|----|----|------------------|------------------------|
| ENSMUST00000107766 | 31 | 18 | 135 Gys1         | protein_coding         |
| ENSMUST00000183767 | 30 | 59 | 24 Fli1          | protein_coding         |
| ENSMUST00000030691 | 30 | 55 | 4 Pclo           | protein_coding         |
| ENSMUST00000176586 | 30 | 50 | 2 Mlx            | protein_coding         |
| ENSMUST00000088310 | 30 | 49 | 24 Phf3          | protein_coding         |
| ENSMUST00000123815 | 30 | 45 | 0 Fignl1         | protein_coding         |
| ENSMUST00000147865 | 30 | 44 | 4 Grm4           | protein_coding         |
| ENSMUST00000034465 | 30 | 43 | 4 2810004N23Rik  | protein_coding         |
| ENSMUST00000156063 | 30 | 43 | 14 Rad18         | protein_coding         |
| ENSMUST00000081333 | 30 | 43 | 2 Fxn            | protein_coding         |
| ENSMUST00000172762 | 30 | 43 | 2 Serpinb10      | polymorphic_pseudogene |
| ENSMUST00000038856 | 30 | 42 | 2 Trhr           | protein_coding         |
| ENSMUST00000126408 | 30 | 41 | 42 Churc1        | protein_coding         |
| ENSMUST00000123783 | 30 | 41 | 2 Syn3           | protein_coding         |
| ENSMUST00000181816 | 30 | 41 | 8 Gm26659        | lincRNA                |
| ENSMUST00000172766 | 30 | 40 | 4 Ppp1r3g        | protein_coding         |
| ENSMUST00000183255 | 30 | 39 | 0 Slc22a15       | protein_coding         |
| ENSMUST00000006704 | 30 | 39 | 0 Itih1          | protein_coding         |
| ENSMUST00000150228 | 30 | 39 | 0 Acsm2          | protein_coding         |
| ENSMUST00000174724 | 30 | 39 | 0 Cyb5r4         | protein_coding         |
| ENSMUST00000078021 | 30 | 38 | 6 Glmn           | protein_coding         |
| ENSMUST00000113094 | 30 | 37 | 8 Iqca           | protein_coding         |
| ENSMUST00000116522 | 30 | 37 | 8 Nck1           | protein_coding         |
| ENSMUST00000159882 | 30 | 35 | 14 Phkb          | protein_coding         |
| ENSMUST00000053729 | 30 | 35 | 4 Pdss1          | protein_coding         |
| ENSMUST00000128007 | 30 | 35 | 0 Spocd1         | protein_coding         |
| ENSMUST00000183294 | 30 | 35 | 0 Gm27016        | lincRNA                |
| ENSMUST00000067107 | 30 | 35 | 26 Sorbs2        | protein_coding         |
| ENSMUST00000170835 | 30 | 35 | 8 Vmn2r78        | protein_coding         |
| ENSMUST00000033927 | 30 | 34 | 10 Eri1          | protein_coding         |
| ENSMUST00000154364 | 30 | 34 | 4 Pi4ka          | protein_coding         |
| ENSMUST00000133398 | 30 | 33 | 8 Smap1          | protein_coding         |
| ENSMUST00000100662 | 30 | 33 | 0 Tyw1           | protein_coding         |
| ENSMUST00000029084 | 30 | 32 | 22 Ntsr1         | protein_coding         |
| ENSMUST00000001927 | 30 | 32 | 20 Ltbp1         | protein_coding         |
| ENSMUST00000106427 | 30 | 32 | 14 Synpo2        | protein_coding         |
| ENSMUST00000178992 | 30 | 32 | 26 3110021N24Rik | protein_coding         |
| ENSMUST00000161794 | 30 | 32 | 8 Lekr1          | protein_coding         |
| ENSMUST00000150570 | 30 | 32 | 4 Enpp1          | protein_coding         |
| ENSMUST00000028527 | 30 | 31 | 4 Kif18a         | protein_coding         |
| ENSMUST00000169064 | 30 | 31 | 0 Ift80          | protein_coding         |
| ENSMUST00000064187 | 30 | 30 | 20 Thra          | protein_coding         |
| ENSMUST00000028059 | 30 | 30 | 6 Rsu1           | protein_coding         |
| ENSMUST00000003038 | 30 | 30 | 4 Ap2a2          | protein_coding         |
| ENSMUST00000172190 | 30 | 30 | 0 Vmn2r94        | protein_coding         |
| ENSMUST00000095147 | 30 | 30 | 16 Dhtkd1        | protein_coding         |
| ENSMUST00000141224 | 30 | 30 | 2 Sema6a         | protein_coding         |
| ENSMUST00000138396 | 30 | 29 | 4 Phex           | protein_coding         |
| ENSMUST00000044369 | 30 | 28 | 8 Atp6v1h        | protein_coding         |
| ENSMUST00000031838 | 30 | 27 | 54 Igf2bp3       | protein_coding         |
| ENSMUST00000102649 | 30 | 27 | 14 Trit1         | protein_coding         |
| ENSMUST00000128522 | 30 | 27 | 4 5430419D17Rik  | protein_coding         |
| ENSMUST00000038841 | 30 | 26 | 0 Clvs1          | protein_coding         |
| ENSMUST00000037666 | 30 | 26 | 6 Mfhas1         | protein_coding         |
| ENSMUST00000129527 | 30 | 26 | 2 Gm12606        | lincRNA                |
| ENSMUST00000181947 | 30 | 25 | 2 A330023F24Rik  | lincRNA                |
| ENSMUST00000114960 | 30 | 21 | 10 Kalrn         | protein_coding         |
| ENSMUST00000127524 | 30 | 16 | 6 Adam12         | protein_coding         |
| ENSMUST00000038343 | 30 | 51 | 10 B4galnt2      | protein_coding         |
| ENSMUST00000130316 | 30 | 48 | 2 Glt6d1         | protein_coding         |
| ENSMUST00000032322 | 30 | 45 | 6 Lrp6           | protein_coding         |
| ENSMUST00000030078 | 30 | 44 | 20 Hsd12         | protein_coding         |
| ENSMUST00000095758 | 30 | 43 | 38 Trappc3l      | protein_coding         |
| ENSMUST00000114853 | 30 | 43 | 4 Prkcq          | protein_coding         |
| ENSMUST00000106377 | 30 | 43 | 2 Gm11735        | unprocessed_pseudogene |
| ENSMUST00000094713 | 30 | 41 | 12 Zmym6         | protein_coding         |
| ENSMUST00000090933 | 30 | 41 | 24 Ash1l         | protein_coding         |
| ENSMUST00000152649 | 30 | 41 | 6 Nipa2          | protein_coding         |

|                     |    |    |                  |                        |
|---------------------|----|----|------------------|------------------------|
| ENSMUST00000089303  | 30 | 41 | 4 AY512915       | antisense              |
| ENSMUST00000124968  | 30 | 40 | 22 Pcbd2         | protein_coding         |
| ENSMUST00000028509  | 30 | 39 | 0 Gorasp2        | protein_coding         |
| ENSMUST00000176559  | 30 | 39 | 24 Pid1          | protein_coding         |
| ENSMUST00000183612  | 30 | 39 | 18 1700027124Rik | lincRNA                |
| ENSMUST00000024840  | 30 | 39 | 0 Arhgap28       | protein_coding         |
| ENSMUST00000166445  | 30 | 39 | 0 Pot1a          | protein_coding         |
| ENSMUST00000032719  | 30 | 38 | 16 Nav3          | protein_coding         |
| ENSMUST00000021466  | 30 | 37 | 36 At11          | protein_coding         |
| ENSMUST00000041055  | 30 | 37 | 10 Atg2b         | protein_coding         |
| ENSMUST00000021572  | 30 | 36 | 4 Wdr37          | protein_coding         |
| ENSMUST00000050511  | 30 | 35 | 6 Kynu           | protein_coding         |
| ENSMUST00000053880  | 30 | 35 | 22 Grin2b        | protein_coding         |
| ENSMUST00000165971  | 30 | 34 | 4 Sept10         | protein_coding         |
| ENSMUST00000156559  | 30 | 34 | 0 C2cd3          | protein_coding         |
| ENSMUST00000035078  | 30 | 33 | 14 Lrrfp2        | protein_coding         |
| ENSMUST00000049789  | 30 | 33 | 8 Naip5          | protein_coding         |
| ENSMUST00000169834  | 30 | 30 | 24 Nek5          | protein_coding         |
| ENSMUST00000162492  | 30 | 30 | 14 Ric1          | protein_coding         |
| ENSMUST00000021438  | 30 | 30 | 0 Nova1          | protein_coding         |
| ENSMUST00000120325  | 30 | 29 | 0 Gm7916         | unprocessed_pseudogene |
| ENSMUST00000102798  | 30 | 28 | 14 Tek           | protein_coding         |
| ENSMUST00000129067  | 30 | 28 | 2 Gm14120        | lincRNA                |
| ENSMUST00000061937  | 30 | 28 | 0 Ctbs           | protein_coding         |
| ENSMUST00000176030  | 30 | 28 | 0 Smarca2        | protein_coding         |
| ENSMUST00000045291  | 30 | 28 | 4 Kmt2c          | protein_coding         |
| ENSMUST00000176792  | 30 | 28 | 0 Gm4073         | unprocessed_pseudogene |
| ENSMUST00000062893  | 30 | 27 | 4 Cenpe          | protein_coding         |
| ENSMUST00000113976  | 30 | 27 | 2 5430427O19Rik  | protein_coding         |
| ENSMUST00000003687  | 30 | 27 | 0 Tgfb3          | protein_coding         |
| ENSMUST00000170131  | 30 | 26 | 0 Vmn2r47        | protein_coding         |
| ENSMUST00000149633  | 30 | 26 | 14 Slc26a7       | protein_coding         |
| ENSMUST00000070193  | 30 | 26 | 10 Mak           | protein_coding         |
| ENSMUST00000024721  | 30 | 23 | 18 Rhag          | protein_coding         |
| ENSMUST00000133895  | 30 | 23 | 16 Zfp462        | protein_coding         |
| ENSMUST00000033826  | 30 | 22 | 2 Atp4b          | protein_coding         |
| ENSMUST00000033825  | 30 | 22 | 0 Adprhl1        | protein_coding         |
| ENSMUST00000172330  | 30 | 22 | 2 Pak3           | protein_coding         |
| ENSMUST00000160297  | 30 | 18 | 728 Tbc1d4       | protein_coding         |
| ENSMUST00000139839  | 30 | 17 | 12 Dusp10        | protein_coding         |
| ENSMUST00000111117  | 30 | 16 | 0 Cdc42bpa       | protein_coding         |
| ENSMUST00000163193  | 29 | 51 | 67 Hlcs          | protein_coding         |
| ENSMUST00000064091  | 29 | 51 | 8 Ptpn4          | protein_coding         |
| ENSMUST00000159145  | 29 | 50 | 40 Ttc26         | protein_coding         |
| ENSMUST00000070531  | 29 | 49 | 6 Uts2b          | protein_coding         |
| ENSMUST00000033999  | 29 | 48 | 0 Frg1           | protein_coding         |
| ENSMUST00000111846  | 29 | 43 | 18 Ttn           | protein_coding         |
| ENSMUST00000112513  | 29 | 43 | 0 Cnksr2         | protein_coding         |
| ENSMUST00000069614  | 29 | 43 | 8 Dcdc2a         | protein_coding         |
| ENSMUST00000064062  | 29 | 42 | 22 Immt          | protein_coding         |
| ENSMUST00000166793  | 29 | 41 | 6 Matr3          | protein_coding         |
| ENSMUST00000111495  | 29 | 40 | 12 Ptpnj         | protein_coding         |
| ENSMUST00000162045  | 29 | 40 | 0 Fgd4           | protein_coding         |
| ENSMUST00000057167  | 29 | 38 | 0 Slc34a1        | protein_coding         |
| ENSMUST00000107462  | 29 | 38 | 0 Dpm3           | protein_coding         |
| ENSMUST00000084289  | 29 | 37 | 4 Ago4           | protein_coding         |
| ENSMUST00000118066  | 29 | 37 | 4 Gm15931        | unprocessed_pseudogene |
| ENSMUST000000077687 | 29 | 35 | 24 Ccdc148       | protein_coding         |
| ENSMUST00000182398  | 29 | 35 | 2 Mir99ahg       | processed_transcript   |
| ENSMUST00000177637  | 29 | 35 | 30 Cx3cr1        | protein_coding         |
| ENSMUST00000118485  | 29 | 35 | 18 Megf11        | protein_coding         |
| ENSMUST00000150897  | 29 | 35 | 4 Nuggc          | protein_coding         |
| ENSMUST00000171975  | 29 | 34 | 85 Arih1         | protein_coding         |
| ENSMUST00000095922  | 29 | 34 | 0 Vmn2r12        | protein_coding         |
| ENSMUST00000106651  | 29 | 34 | 0 Rab3b          | protein_coding         |
| ENSMUST00000021605  | 29 | 33 | 12 Trip11        | protein_coding         |
| ENSMUST00000077816  | 29 | 32 | 10 Ces5a         | protein_coding         |
| ENSMUST00000067680  | 29 | 32 | 0 Adam12         | protein_coding         |



|                    |    |     |      |               |                        |
|--------------------|----|-----|------|---------------|------------------------|
| ENSMUST00000137333 | 29 | 32  | 36   | a             | protein_coding         |
| ENSMUST00000178142 | 29 | 31  | 12   | Nim1k         | protein_coding         |
| ENSMUST00000184480 | 29 | 31  | 4    | Myo6          | protein_coding         |
| ENSMUST00000079206 | 29 | 31  | 0    | Vmn2r93       | protein_coding         |
| ENSMUST00000181620 | 29 | 30  | 22   | D930016D06Rik | lincRNA                |
| ENSMUST00000153878 | 29 | 29  | 12   | Pcsk2os2      | antisense              |
| ENSMUST00000151478 | 29 | 29  | 0    | Snx29         | protein_coding         |
| ENSMUST00000046959 | 29 | 28  | 119  | Slc22a2       | protein_coding         |
| ENSMUST00000175904 | 29 | 28  | 0    | Gm3675        | unprocessed_pseudogene |
| ENSMUST00000054072 | 29 | 27  | 14   | Zfp81         | protein_coding         |
| ENSMUST00000174433 | 29 | 27  | 0    | Gm10302       | protein_coding         |
| ENSMUST00000161040 | 29 | 26  | 155  | Dab2          | protein_coding         |
| ENSMUST00000161582 | 29 | 26  | 4    | Nav3          | protein_coding         |
| ENSMUST00000160130 | 29 | 26  | 2    | Kctd18        | protein_coding         |
| ENSMUST00000035773 | 29 | 25  | 8    | Sos2          | protein_coding         |
| ENSMUST00000176860 | 29 | 25  | 8    | Bco1          | protein_coding         |
| ENSMUST00000129144 | 29 | 25  | 0    | Rgs10         | protein_coding         |
| ENSMUST00000110100 | 29 | 24  | 2    | Gm21961       | protein_coding         |
| ENSMUST00000114744 | 29 | 23  | 20   | Nck2          | protein_coding         |
| ENSMUST00000178961 | 29 | 22  | 4    | Prp2          | protein_coding         |
| ENSMUST00000065976 | 29 | 19  | 4    | Rps6ka6       | protein_coding         |
| ENSMUST00000148563 | 29 | 18  | 4    | Mug1          | protein_coding         |
| ENSMUST00000084891 | 29 | 16  | 321  | Pacs2         | protein_coding         |
| ENSMUST00000063307 | 29 | 16  | 24   | Ppargc1b      | protein_coding         |
| ENSMUST00000144745 | 29 | 15  | 1368 | Gm10069       | lincRNA                |
| ENSMUST00000021411 | 28 | 108 | 8    | 1110008L16Rik | protein_coding         |
| ENSMUST00000049484 | 28 | 55  | 0    | Gxylt1        | protein_coding         |
| ENSMUST00000023566 | 28 | 51  | 12   | Tmprss15      | protein_coding         |
| ENSMUST00000128196 | 28 | 48  | 0    | Slc5a10       | protein_coding         |
| ENSMUST00000148082 | 28 | 45  | 63   | Gm16599       | antisense              |
| ENSMUST00000170234 | 28 | 45  | 50   | Nup205        | protein_coding         |
| ENSMUST00000038006 | 28 | 43  | 8    | Acmsd         | protein_coding         |
| ENSMUST00000170035 | 28 | 42  | 14   | Alcam         | protein_coding         |
| ENSMUST00000054471 | 28 | 41  | 0    | 4930430F08Rik | protein_coding         |
| ENSMUST00000094753 | 28 | 38  | 28   | Ceacam20      | protein_coding         |
| ENSMUST00000169686 | 28 | 38  | 6    | Vmn2r92       | protein_coding         |
| ENSMUST00000038893 | 28 | 37  | 0    | Rcc2          | protein_coding         |
| ENSMUST00000164471 | 28 | 37  | 0    | Gm17660       | protein_coding         |
| ENSMUST00000170846 | 28 | 37  | 77   | Fam214a       | protein_coding         |
| ENSMUST00000182820 | 28 | 37  | 14   | Mir99ahg      | processed_transcript   |
| ENSMUST00000027852 | 28 | 36  | 12   | Adcy10        | protein_coding         |
| ENSMUST00000123353 | 28 | 36  | 12   | Rhobtb3       | protein_coding         |
| ENSMUST00000077951 | 28 | 35  | 46   | Trerf1        | processed_transcript   |
| ENSMUST00000181939 | 28 | 34  | 20   | Gm26559       | lincRNA                |
| ENSMUST00000115817 | 28 | 34  | 10   | Tpgs2         | protein_coding         |
| ENSMUST00000161494 | 28 | 34  | 2    | Glcci1        | protein_coding         |
| ENSMUST00000160164 | 28 | 34  | 0    | Gm16108       | antisense              |
| ENSMUST00000071591 | 28 | 33  | 40   | Auts2         | protein_coding         |
| ENSMUST00000117282 | 28 | 33  | 6    | Scaf1         | protein_coding         |
| ENSMUST00000073617 | 28 | 33  | 2    | Glpr111       | protein_coding         |
| ENSMUST00000116584 | 28 | 33  | 0    | Mrpl39        | protein_coding         |
| ENSMUST00000148954 | 28 | 32  | 28   | Grip1         | protein_coding         |
| ENSMUST00000046908 | 28 | 32  | 8    | Oser1         | protein_coding         |
| ENSMUST00000022706 | 28 | 32  | 6    | Sucla2        | protein_coding         |
| ENSMUST00000063216 | 28 | 32  | 4    | 5730507C01Rik | protein_coding         |
| ENSMUST00000121875 | 28 | 31  | 26   | Myo5b         | protein_coding         |
| ENSMUST00000044583 | 28 | 31  | 12   | Vmn2r65       | protein_coding         |
| ENSMUST00000160352 | 28 | 30  | 12   | Tmem33        | protein_coding         |
| ENSMUST00000153145 | 28 | 30  | 8    | Rabgap1       | protein_coding         |
| ENSMUST00000067927 | 28 | 30  | 44   | Msra          | protein_coding         |
| ENSMUST00000022081 | 28 | 30  | 4    | Spata9        | protein_coding         |
| ENSMUST00000025562 | 28 | 30  | 0    | Incenp        | protein_coding         |
| ENSMUST00000111956 | 28 | 29  | 40   | Arhgap22      | protein_coding         |
| ENSMUST00000016681 | 28 | 29  | 4    | Cul4b         | protein_coding         |
| ENSMUST00000113298 | 28 | 29  | 4    | Slc22a29      | protein_coding         |
| ENSMUST00000041804 | 28 | 28  | 44   | Lmtk2         | protein_coding         |
| ENSMUST00000170865 | 28 | 28  | 71   | Tdrd3         | protein_coding         |
| ENSMUST00000130773 | 28 | 28  | 6    | Gm13479       | lincRNA                |

|                    |    |    |                  |                                    |
|--------------------|----|----|------------------|------------------------------------|
| ENSMUST00000143327 | 28 | 28 | 0 Tex30          | protein_coding                     |
| ENSMUST00000048417 | 28 | 25 | 0 Dync2h1        | protein_coding                     |
| ENSMUST00000110942 | 28 | 24 | 22 Mboat2        | protein_coding                     |
| ENSMUST00000172848 | 28 | 24 | 4 Gm20287        | unprocessed_pseudogene             |
| ENSMUST00000127115 | 28 | 23 | 0 Gm15518        | antisense                          |
| ENSMUST00000121592 | 28 | 22 | 24 Hmgcll1       | protein_coding                     |
| ENSMUST00000118082 | 28 | 22 | 4 Naip3          | unprocessed_pseudogene             |
| ENSMUST00000154813 | 28 | 22 | 4 Gm11917        | lincRNA                            |
| ENSMUST00000153133 | 28 | 22 | 2 Mcph1          | protein_coding                     |
| ENSMUST00000110888 | 28 | 22 | 0 Tsc22d1        | protein_coding                     |
| ENSMUST00000161423 | 28 | 22 | 0 Tnik           | protein_coding                     |
| ENSMUST00000036876 | 28 | 19 | 2 Gm13178        | protein_coding                     |
| ENSMUST00000047873 | 28 | 19 | 0 Arhgef1        | protein_coding                     |
| ENSMUST00000179956 | 28 | 18 | 0 Adgb           | protein_coding                     |
| ENSMUST00000111062 | 27 | 47 | 16 Gm21451       | transcribed_unprocessed_pseudogene |
| ENSMUST00000120301 | 27 | 44 | 16 Farp2         | protein_coding                     |
| ENSMUST00000097774 | 27 | 43 | 121 Camta1       | protein_coding                     |
| ENSMUST00000145395 | 27 | 43 | 18 Gm12861       | processed_transcript               |
| ENSMUST00000060972 | 27 | 42 | 12 Kcna5         | protein_coding                     |
| ENSMUST00000029664 | 27 | 39 | 8 Tbck           | protein_coding                     |
| ENSMUST00000126447 | 27 | 38 | 4 Gm15762        | lincRNA                            |
| ENSMUST00000054815 | 27 | 37 | 22 Ppp1r13b      | protein_coding                     |
| ENSMUST00000170885 | 27 | 37 | 2 Cybb           | protein_coding                     |
| ENSMUST00000132395 | 27 | 36 | 24 Cntn4         | protein_coding                     |
| ENSMUST00000006570 | 27 | 35 | 0 Adamts4        | protein_coding                     |
| ENSMUST00000006570 | 27 | 35 | 0 Adamts4        | protein_coding                     |
| ENSMUST00000140377 | 27 | 35 | 44 Tvp23b        | protein_coding                     |
| ENSMUST00000044620 | 27 | 35 | 20 Brca2         | protein_coding                     |
| ENSMUST00000042766 | 27 | 35 | 2 Ppm1k          | protein_coding                     |
| ENSMUST00000022239 | 27 | 34 | 30 Parp8         | protein_coding                     |
| ENSMUST00000106916 | 27 | 34 | 8 Gm12790        | protein_coding                     |
| ENSMUST00000183110 | 27 | 33 | 0 Gm27027        | protein_coding                     |
| ENSMUST00000176407 | 27 | 32 | 52 Suv420h1      | protein_coding                     |
| ENSMUST00000033688 | 27 | 32 | 12 4930519F16Rik | unitary_pseudogene                 |
| ENSMUST00000115528 | 27 | 32 | 4 Otc            | protein_coding                     |
| ENSMUST00000094028 | 27 | 32 | 2 Capza1         | protein_coding                     |
| ENSMUST00000166422 | 27 | 31 | 10 Ptpn4         | protein_coding                     |
| ENSMUST00000048774 | 27 | 31 | 2 Copg2          | protein_coding                     |
| ENSMUST00000109241 | 27 | 31 | 0 Snx18          | protein_coding                     |
| ENSMUST00000163242 | 27 | 30 | 48 Atxn10        | protein_coding                     |
| ENSMUST00000129898 | 27 | 30 | 22 Abcc12        | protein_coding                     |
| ENSMUST00000132744 | 27 | 30 | 4 D930020B18Rik  | protein_coding                     |
| ENSMUST00000089120 | 27 | 30 | 0 Gm1604b        | protein_coding                     |
| ENSMUST00000070328 | 27 | 30 | 4 Sh2d4b         | protein_coding                     |
| ENSMUST00000138232 | 27 | 30 | 0 Adam18         | protein_coding                     |
| ENSMUST00000167152 | 27 | 29 | 2 Mas1           | protein_coding                     |
| ENSMUST00000161737 | 27 | 29 | 0 Hsd11b1        | protein_coding                     |
| ENSMUST00000027057 | 27 | 26 | 10 Terf1         | protein_coding                     |
| ENSMUST00000059424 | 27 | 26 | 22 Tmprss11c     | protein_coding                     |
| ENSMUST00000037096 | 27 | 26 | 12 Cnbd2         | protein_coding                     |
| ENSMUST00000117117 | 27 | 26 | 6 Gm14622        | unprocessed_pseudogene             |
| ENSMUST00000177801 | 27 | 25 | 28 Dpf3          | protein_coding                     |
| ENSMUST00000071546 | 27 | 24 | 10 Cldn10        | protein_coding                     |
| ENSMUST00000175839 | 27 | 24 | 4 Gm20345        | unprocessed_pseudogene             |
| ENSMUST00000088086 | 27 | 24 | 10 Sulf2         | protein_coding                     |
| ENSMUST00000141704 | 27 | 24 | 0 Cep89          | protein_coding                     |
| ENSMUST00000170435 | 27 | 23 | 38 Sardhos       | antisense                          |
| ENSMUST00000132427 | 27 | 23 | 4 Pop1           | protein_coding                     |
| ENSMUST00000052556 | 27 | 23 | 0 Abhd17b        | protein_coding                     |
| ENSMUST00000059672 | 27 | 22 | 4 Pik3ap1        | protein_coding                     |
| ENSMUST00000100237 | 27 | 22 | 4 Ttf1           | protein_coding                     |
| ENSMUST00000154352 | 27 | 22 | 14 Gm12602       | processed_transcript               |
| ENSMUST00000122015 | 27 | 22 | 10 Gm6325        | unprocessed_pseudogene             |
| ENSMUST00000072125 | 27 | 21 | 0 Kir3dl2        | protein_coding                     |
| ENSMUST00000153518 | 27 | 20 | 2 Iqck           | protein_coding                     |
| ENSMUST00000111857 | 27 | 20 | 18 Rgl1          | protein_coding                     |
| ENSMUST00000164882 | 27 | 19 | 4 Gm3956         | unprocessed_pseudogene             |
| ENSMUST00000115498 | 27 | 19 | 2 Myot           | protein_coding                     |

|                    |    |     |     |               |                        |
|--------------------|----|-----|-----|---------------|------------------------|
| ENSMUST00000145411 | 27 | 17  | 2   | Gm12703       | processed_transcript   |
| ENSMUST00000119706 | 27 | 15  | 4   | Plekha8       | protein_coding         |
| ENSMUST00000072299 | 27 | 14  | 8   | Vsnl1         | protein_coding         |
| ENSMUST00000128160 | 27 | 14  | 0   | 4930481B07Rik | processed_transcript   |
| ENSMUST00000113523 | 27 | 12  | 214 | Tmem63b       | protein_coding         |
| ENSMUST00000143257 | 27 | 59  | 0   | Abca14        | protein_coding         |
| ENSMUST00000049537 | 27 | 58  | 12  | Picalm        | protein_coding         |
| ENSMUST00000124546 | 27 | 48  | 0   | Glmn          | protein_coding         |
| ENSMUST00000044622 | 27 | 44  | 18  | Epg5          | protein_coding         |
| ENSMUST00000172530 | 27 | 41  | 14  | Adgb          | protein_coding         |
| ENSMUST00000143540 | 27 | 41  | 10  | Dock2         | protein_coding         |
| ENSMUST00000138134 | 27 | 41  | 4   | Gramd4        | protein_coding         |
| ENSMUST00000122837 | 27 | 40  | 18  | Gm11520       | antisense              |
| ENSMUST00000113164 | 27 | 39  | 4   | Ralgps1       | protein_coding         |
| ENSMUST00000069451 | 27 | 38  | 0   | Ghr           | protein_coding         |
| ENSMUST00000182514 | 27 | 37  | 0   | Gm9568        | processed_pseudogene   |
| ENSMUST00000128302 | 27 | 37  | 18  | Smyd3         | protein_coding         |
| ENSMUST00000162751 | 27 | 36  | 16  | Stau2         | protein_coding         |
| ENSMUST00000174063 | 27 | 36  | 12  | H2-T24        | protein_coding         |
| ENSMUST00000026897 | 27 | 35  | 14  | Slco3a1       | protein_coding         |
| ENSMUST00000172626 | 27 | 35  | 2   | Kmt2c         | protein_coding         |
| ENSMUST00000182605 | 27 | 33  | 12  | 4930519F16Rik | unitary_pseudogene     |
| ENSMUST00000069004 | 27 | 32  | 222 | Dcbld1        | protein_coding         |
| ENSMUST00000115447 | 27 | 32  | 8   | 1700015F17Rik | protein_coding         |
| ENSMUST00000108619 | 27 | 32  | 0   | Gm15448       | protein_coding         |
| ENSMUST00000022511 | 27 | 30  | 20  | Zmym2         | protein_coding         |
| ENSMUST00000150119 | 27 | 30  | 8   | Gm13632       | lincRNA                |
| ENSMUST00000147142 | 27 | 30  | 0   | Gm15020       | processed_transcript   |
| ENSMUST00000133055 | 27 | 29  | 14  | Ak4           | protein_coding         |
| ENSMUST00000097541 | 27 | 29  | 12  | Fam129a       | protein_coding         |
| ENSMUST00000150273 | 27 | 29  | 8   | 1700120G11Rik | lincRNA                |
| ENSMUST00000098986 | 27 | 29  | 0   | Pgr           | protein_coding         |
| ENSMUST00000028636 | 27 | 28  | 14  | Galk2         | protein_coding         |
| ENSMUST00000109968 | 27 | 28  | 18  | Pax1          | protein_coding         |
| ENSMUST00000142727 | 27 | 28  | 4   | Fchsd2        | protein_coding         |
| ENSMUST00000048229 | 27 | 27  | 12  | Myrf1         | protein_coding         |
| ENSMUST00000108263 | 27 | 27  | 0   | Lrrc31        | protein_coding         |
| ENSMUST00000033929 | 27 | 26  | 10  | Tnks          | protein_coding         |
| ENSMUST00000069837 | 27 | 25  | 26  | Slit3         | protein_coding         |
| ENSMUST00000181625 | 27 | 24  | 147 | D930032P07Rik | lincRNA                |
| ENSMUST00000039271 | 27 | 24  | 6   | 2610008E11Rik | protein_coding         |
| ENSMUST00000174053 | 27 | 24  | 0   | Vmn2r-ps44    | unprocessed_pseudogene |
| ENSMUST00000113105 | 27 | 24  | 0   | Kir3dl1       | protein_coding         |
| ENSMUST00000055221 | 27 | 23  | 16  | Kcnk12        | protein_coding         |
| ENSMUST00000145763 | 27 | 23  | 16  | Mmrn1         | protein_coding         |
| ENSMUST00000038584 | 27 | 22  | 2   | Tlk1          | protein_coding         |
| ENSMUST00000103075 | 27 | 22  | 16  | Nsf           | protein_coding         |
| ENSMUST00000181720 | 27 | 21  | 8   | C430014B12Rik | processed_transcript   |
| ENSMUST00000033121 | 27 | 19  | 2   | Nomo1         | protein_coding         |
| ENSMUST00000184752 | 27 | 19  | 0   | Ccdc132       | protein_coding         |
| ENSMUST00000030288 | 27 | 17  | 4   | Osbp19        | protein_coding         |
| ENSMUST00000156837 | 27 | 0   | 42  | Cops3         | protein_coding         |
| ENSMUST00000180959 | 26 | 136 | 0   | Gm26799       | lincRNA                |
| ENSMUST00000060232 | 26 | 41  | 22  | Rab2a         | protein_coding         |
| ENSMUST00000119422 | 26 | 40  | 26  | 4930402H24Rik | protein_coding         |
| ENSMUST00000151350 | 26 | 40  | 0   | Capn11        | protein_coding         |
| ENSMUST00000098603 | 26 | 39  | 6   | Tet2          | protein_coding         |
| ENSMUST00000067888 | 26 | 39  | 4   | Tpk1          | protein_coding         |
| ENSMUST00000032495 | 26 | 37  | 8   | Dyrk4         | protein_coding         |
| ENSMUST00000077489 | 26 | 37  | 6   | Scn1a         | protein_coding         |
| ENSMUST00000130379 | 26 | 37  | 6   | Fbxo11        | protein_coding         |
| ENSMUST00000095171 | 26 | 35  | 12  | Atp2c2        | protein_coding         |
| ENSMUST00000114268 | 26 | 35  | 2   | Snca          | protein_coding         |
| ENSMUST00000091563 | 26 | 35  | 0   | 6720489N17Rik | protein_coding         |
| ENSMUST00000060468 | 26 | 34  | 14  | Rfpl3s        | protein_coding         |
| ENSMUST00000139385 | 26 | 34  | 0   | Dpy19l4       | protein_coding         |
| ENSMUST00000090952 | 26 | 33  | 57  | Fmnl2         | protein_coding         |
| ENSMUST00000057659 | 26 | 33  | 16  | Gcc2          | protein_coding         |

|                     |    |    |                 |                        |
|---------------------|----|----|-----------------|------------------------|
| ENSMUST00000009877  | 26 | 33 | 8 Tfcp2         | protein_coding         |
| ENSMUST00000133480  | 26 | 33 | 0 Psmd1         | protein_coding         |
| ENSMUST00000018485  | 26 | 32 | 4 Ii12rb2       | protein_coding         |
| ENSMUST000000082367 | 26 | 32 | 2 Cd36          | protein_coding         |
| ENSMUST000000031377 | 26 | 32 | 20 Scarb2       | protein_coding         |
| ENSMUST000000049113 | 26 | 32 | 8 Ptprh         | protein_coding         |
| ENSMUST000000099747 | 26 | 32 | 8 B3galnt2      | protein_coding         |
| ENSMUST000000054674 | 26 | 32 | 2 Hjurp         | protein_coding         |
| ENSMUST00000148947  | 26 | 32 | 2 Erp44         | protein_coding         |
| ENSMUST000000081374 | 26 | 32 | 0 Plac8l1       | protein_coding         |
| ENSMUST00000138456  | 26 | 31 | 32 Eml1         | protein_coding         |
| ENSMUST000000058716 | 26 | 31 | 4 Sun1          | protein_coding         |
| ENSMUST00000107158  | 26 | 31 | 0 Slc24a2       | protein_coding         |
| ENSMUST000000053326 | 26 | 30 | 0 Gm5612        | protein_coding         |
| ENSMUST00000154378  | 26 | 30 | 0 Apool         | protein_coding         |
| ENSMUST00000079390  | 26 | 30 | 6 Lin28b        | protein_coding         |
| ENSMUST00000123974  | 26 | 30 | 6 Dach2         | protein_coding         |
| ENSMUST00000150876  | 26 | 30 | 2 Cdc123        | protein_coding         |
| ENSMUST00000108218  | 26 | 29 | 10 Khlh32       | protein_coding         |
| ENSMUST00000132977  | 26 | 28 | 46 Mapt         | protein_coding         |
| ENSMUST00000112751  | 26 | 28 | 16 Bcl2         | protein_coding         |
| ENSMUST00000184731  | 26 | 28 | 0 Sult2a6       | protein_coding         |
| ENSMUST000000065716 | 26 | 28 | 12 Eml5         | protein_coding         |
| ENSMUST00000131670  | 26 | 28 | 10 Atp8a2       | protein_coding         |
| ENSMUST000000058292 | 26 | 28 | 6 Rasef         | protein_coding         |
| ENSMUST00000127027  | 26 | 27 | 6 Zfp960        | protein_coding         |
| ENSMUST00000173277  | 26 | 26 | 20 Tnxa         | unprocessed_pseudogene |
| ENSMUST000000026270 | 26 | 26 | 10 Sacm1l       | protein_coding         |
| ENSMUST000000047429 | 26 | 26 | 184 Mrps6       | protein_coding         |
| ENSMUST00000180780  | 26 | 25 | 2 Gm16897       | antisense              |
| ENSMUST00000183333  | 26 | 24 | 77 Mir99ahg     | processed_transcript   |
| ENSMUST00000135246  | 26 | 24 | 38 Pms1         | protein_coding         |
| ENSMUST00000121010  | 26 | 24 | 4 Jakmip1       | protein_coding         |
| ENSMUST00000078470  | 26 | 24 | 2 Kcnh1         | protein_coding         |
| ENSMUST00000177534  | 26 | 24 | 8 Otud7a        | protein_coding         |
| ENSMUST00000169406  | 26 | 24 | 0 Gm1818        | protein_coding         |
| ENSMUST00000162347  | 26 | 21 | 4 Gm16028       | antisense              |
| ENSMUST00000138960  | 26 | 21 | 2 Wdr78         | protein_coding         |
| ENSMUST00000172589  | 26 | 20 | 0 Vmn2r-ps36    | unprocessed_pseudogene |
| ENSMUST000000025585 | 26 | 20 | 0 Gif           | protein_coding         |
| ENSMUST000000049675 | 26 | 20 | 0 Crbn          | protein_coding         |
| ENSMUST00000180637  | 26 | 20 | 0 Gm17580       | lincRNA                |
| ENSMUST000000047524 | 26 | 19 | 63 Thada        | protein_coding         |
| ENSMUST00000174420  | 26 | 18 | 2 Rfx3          | protein_coding         |
| ENSMUST00000132564  | 26 | 18 | 0 Gm15287       | antisense              |
| ENSMUST000000040846 | 26 | 17 | 20 Med12l       | protein_coding         |
| ENSMUST000000032518 | 26 | 13 | 0 Clec2h        | protein_coding         |
| ENSMUST00000118990  | 26 | 13 | 0 Stard4        | protein_coding         |
| ENSMUST000000023150 | 26 | 12 | 0 1810013L24Rik | protein_coding         |
| ENSMUST000000020821 | 26 | 3  | 16 Tubd1        | protein_coding         |
| ENSMUST000000027233 | 25 | 43 | 6 Slc9a4        | protein_coding         |
| ENSMUST00000149387  | 25 | 43 | 0 4930570G19Rik | processed_transcript   |
| ENSMUST00000106230  | 25 | 41 | 0 Bmpr1b        | protein_coding         |
| ENSMUST000000038551 | 25 | 40 | 40 Ppp1r21      | protein_coding         |
| ENSMUST00000169387  | 25 | 40 | 20 Inpp4b       | protein_coding         |
| ENSMUST00000113224  | 25 | 40 | 0 Drp2          | protein_coding         |
| ENSMUST00000137470  | 25 | 39 | 22 Gm14720      | processed_transcript   |
| ENSMUST00000165611  | 25 | 39 | 0 Vmn2r48       | protein_coding         |
| ENSMUST000000037998 | 25 | 39 | 16 Tram2        | protein_coding         |
| ENSMUST00000153805  | 25 | 38 | 0 Fam169b       | lincRNA                |
| ENSMUST000000040025 | 25 | 37 | 44 Tln2         | protein_coding         |
| ENSMUST000000065601 | 25 | 37 | 12 Btrc         | protein_coding         |
| ENSMUST00000134413  | 25 | 37 | 0 Abcc5         | protein_coding         |
| ENSMUST00000156236  | 25 | 36 | 16 Gm15286      | processed_transcript   |
| ENSMUST000000027502 | 25 | 36 | 6 Atg4b         | protein_coding         |
| ENSMUST000000065530 | 25 | 36 | 0 Nsun7         | protein_coding         |
| ENSMUST000000046233 | 25 | 35 | 6 Bbox1         | protein_coding         |
| ENSMUST00000108348  | 25 | 35 | 0 Clvs1         | protein_coding         |

|                    |    |     |                  |                        |
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| ENSMUST00000169033 | 25 | 34  | 4 Atf7           | protein_coding         |
| ENSMUST00000028361 | 25 | 33  | 10 Il1f6         | protein_coding         |
| ENSMUST00000168878 | 25 | 32  | 32 Shroom3       | protein_coding         |
| ENSMUST00000176146 | 25 | 32  | 0 Cdh10          | protein_coding         |
| ENSMUST00000106566 | 25 | 32  | 12 Skint4        | protein_coding         |
| ENSMUST00000079491 | 25 | 32  | 10 Sez6l         | protein_coding         |
| ENSMUST00000041987 | 25 | 32  | 8 Dicer1         | protein_coding         |
| ENSMUST00000112352 | 25 | 31  | 16 Mta3          | protein_coding         |
| ENSMUST00000179705 | 25 | 30  | 56 1700001L05Rik | lincRNA                |
| ENSMUST00000124914 | 25 | 30  | 10 Gm15860       | antisense              |
| ENSMUST00000061569 | 25 | 30  | 8 BC034902       | protein_coding         |
| ENSMUST00000061569 | 25 | 30  | 8 BC034902       | protein_coding         |
| ENSMUST00000054588 | 25 | 30  | 4 Col9a1         | protein_coding         |
| ENSMUST00000118174 | 25 | 30  | 4 Phtf2          | protein_coding         |
| ENSMUST00000078308 | 25 | 30  | 2 Rasal2         | protein_coding         |
| ENSMUST00000112516 | 25 | 30  | 2 Ltbp1          | protein_coding         |
| ENSMUST00000166179 | 25 | 30  | 2 Mb             | protein_coding         |
| ENSMUST00000033899 | 25 | 28  | 36 Col4a2        | protein_coding         |
| ENSMUST00000081232 | 25 | 28  | 6 Plcg2          | protein_coding         |
| ENSMUST00000137141 | 25 | 27  | 0 Piezo2         | protein_coding         |
| ENSMUST00000115281 | 25 | 26  | 6 Cacna2d1       | protein_coding         |
| ENSMUST00000109432 | 25 | 26  | 4 Fbln1          | protein_coding         |
| ENSMUST00000129878 | 25 | 26  | 2 Ifnar1         | protein_coding         |
| ENSMUST00000044530 | 25 | 26  | 34 Smyd4         | protein_coding         |
| ENSMUST00000087104 | 25 | 26  | 20 Cdkl5         | protein_coding         |
| ENSMUST00000160830 | 25 | 26  | 4 Tc2n           | protein_coding         |
| ENSMUST00000117695 | 25 | 24  | 0 Blnk           | protein_coding         |
| ENSMUST00000171437 | 25 | 24  | 2 Pcbp3          | protein_coding         |
| ENSMUST00000050897 | 25 | 24  | 0 Spice1         | protein_coding         |
| ENSMUST00000122967 | 25 | 24  | 0 Gprc5c         | protein_coding         |
| ENSMUST00000124862 | 25 | 23  | 2 Skint8         | protein_coding         |
| ENSMUST00000110109 | 25 | 22  | 16 Plcb4         | protein_coding         |
| ENSMUST00000044039 | 25 | 22  | 6 Lrrd1          | protein_coding         |
| ENSMUST00000178324 | 25 | 22  | 4 Nek3           | protein_coding         |
| ENSMUST00000059986 | 25 | 22  | 20 Rnf182        | protein_coding         |
| ENSMUST00000115474 | 25 | 22  | 20 Foxp2         | protein_coding         |
| ENSMUST00000136115 | 25 | 20  | 2 Gm12828        | antisense              |
| ENSMUST00000164752 | 25 | 18  | 0 Pde1c          | protein_coding         |
| ENSMUST00000067880 | 25 | 18  | 24 Adam10        | protein_coding         |
| ENSMUST00000003843 | 25 | 17  | 0 Man1a          | protein_coding         |
| ENSMUST00000179097 | 25 | 16  | 16 Kcnma1        | protein_coding         |
| ENSMUST00000176481 | 25 | 14  | 4 Vmn2r6         | protein_coding         |
| ENSMUST00000088931 | 25 | 13  | 38 Gramd4        | protein_coding         |
| ENSMUST00000035724 | 25 | 4   | 24 Akna          | protein_coding         |
| ENSMUST00000169439 | 25 | 4   | 24 7420461P10Rik | protein_coding         |
| ENSMUST00000117136 | 25 | 4   | 0 Mzt2           | protein_coding         |
| ENSMUST00000108661 | 25 | 0   | 0 Chd3           | protein_coding         |
| ENSMUST00000025300 | 24 | 114 | 10 Nr3c1         | protein_coding         |
| ENSMUST00000071826 | 24 | 66  | 6 Crb3           | protein_coding         |
| ENSMUST00000140291 | 24 | 51  | 0 Rbbp4          | protein_coding         |
| ENSMUST00000176924 | 24 | 45  | 12 Mettl25       | protein_coding         |
| ENSMUST00000134909 | 24 | 44  | 4 Rnf135         | protein_coding         |
| ENSMUST00000164372 | 24 | 43  | 10 Gm2244        | protein_coding         |
| ENSMUST00000066778 | 24 | 43  | 32 Pi4k2a        | protein_coding         |
| ENSMUST00000023089 | 24 | 39  | 4 Wbp2nl         | protein_coding         |
| ENSMUST00000132664 | 24 | 37  | 0 Btk            | protein_coding         |
| ENSMUST00000177034 | 24 | 36  | 12 Mtlc1         | protein_coding         |
| ENSMUST00000173960 | 24 | 36  | 8 Gm3972         | unprocessed_pseudogene |
| ENSMUST00000106129 | 24 | 35  | 4 D7Ert443e      | protein_coding         |
| ENSMUST00000129363 | 24 | 35  | 8 Nt5dc1         | protein_coding         |
| ENSMUST00000181404 | 24 | 35  | 0 Gm26544        | lincRNA                |
| ENSMUST00000106704 | 24 | 34  | 0 Rgs9           | protein_coding         |
| ENSMUST00000102776 | 24 | 33  | 16 Rnf130        | protein_coding         |
| ENSMUST00000121674 | 24 | 33  | 10 Poli          | protein_coding         |
| ENSMUST00000114928 | 24 | 32  | 10 Gm595         | protein_coding         |
| ENSMUST00000143433 | 24 | 32  | 30 Invs          | protein_coding         |
| ENSMUST00000147283 | 24 | 32  | 12 Smpx          | protein_coding         |
| ENSMUST00000108228 | 24 | 32  | 6 Usp13          | protein_coding         |

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| ENSMUST00000032728 | 24 | 32 | 4 Tarsl2         | protein_coding       |
| ENSMUST00000024880 | 24 | 31 | 20 Vit           | protein_coding       |
| ENSMUST00000080797 | 24 | 30 | 36 Cdh3          | protein_coding       |
| ENSMUST00000174598 | 24 | 30 | 2 Wdfy3          | protein_coding       |
| ENSMUST00000054220 | 24 | 30 | 30 Rpl18a        | protein_coding       |
| ENSMUST00000022207 | 24 | 30 | 20 Elovl7        | protein_coding       |
| ENSMUST00000092491 | 24 | 29 | 0 Vmn2r111       | protein_coding       |
| ENSMUST00000110347 | 24 | 29 | 0 Smoc1          | protein_coding       |
| ENSMUST00000084937 | 24 | 28 | 61 2410002F23Rik | protein_coding       |
| ENSMUST00000098760 | 24 | 28 | 6 Tnfaip8l3      | protein_coding       |
| ENSMUST00000178543 | 24 | 28 | 0 Mapk9          | protein_coding       |
| ENSMUST00000060650 | 24 | 27 | 14 Frmd7         | protein_coding       |
| ENSMUST00000097450 | 24 | 27 | 6 Cdc42bpa       | protein_coding       |
| ENSMUST00000147630 | 24 | 26 | 6 Zfp97          | protein_coding       |
| ENSMUST00000105306 | 24 | 26 | 0 Btbd11         | protein_coding       |
| ENSMUST00000154182 | 24 | 26 | 26 Cald1         | protein_coding       |
| ENSMUST00000133590 | 24 | 26 | 4 Sigmar1        | protein_coding       |
| ENSMUST00000085803 | 24 | 25 | 28 Lin9          | protein_coding       |
| ENSMUST00000130086 | 24 | 25 | 16 Arhgap20os    | antisense            |
| ENSMUST00000030524 | 24 | 24 | 12 Pla2g5        | protein_coding       |
| ENSMUST00000118278 | 24 | 24 | 4 Cyp4a29        | protein_coding       |
| ENSMUST00000003717 | 24 | 24 | 8 Abcb4          | protein_coding       |
| ENSMUST00000140652 | 24 | 24 | 2 Khlh32         | protein_coding       |
| ENSMUST00000114897 | 24 | 24 | 0 Atp5c1         | protein_coding       |
| ENSMUST00000022059 | 24 | 23 | 6 Ahrr           | protein_coding       |
| ENSMUST00000146114 | 24 | 23 | 2 Chn2           | protein_coding       |
| ENSMUST00000025691 | 24 | 22 | 14 Fas           | protein_coding       |
| ENSMUST00000136517 | 24 | 22 | 12 Lrrc16a       | protein_coding       |
| ENSMUST00000042365 | 24 | 22 | 4 Cdk13          | protein_coding       |
| ENSMUST00000153545 | 24 | 21 | 16 Tnfaip8       | protein_coding       |
| ENSMUST00000145244 | 24 | 21 | 4 Crb1           | protein_coding       |
| ENSMUST00000145244 | 24 | 21 | 4 Crb1           | protein_coding       |
| ENSMUST00000144939 | 24 | 21 | 2 Nrg4           | protein_coding       |
| ENSMUST00000021750 | 24 | 20 | 22 Ryr2          | protein_coding       |
| ENSMUST00000029602 | 24 | 20 | 2 Ndst3          | protein_coding       |
| ENSMUST00000088476 | 24 | 19 | 8 Pi15           | protein_coding       |
| ENSMUST00000084787 | 24 | 18 | 6 Scn10a         | protein_coding       |
| ENSMUST00000170402 | 24 | 18 | 4 Vmn2r36        | protein_coding       |
| ENSMUST00000112110 | 24 | 16 | 2 Klrb1          | protein_coding       |
| ENSMUST00000126937 | 24 | 15 | 0 Gm773          | protein_coding       |
| ENSMUST00000037484 | 24 | 14 | 0 Senp6          | protein_coding       |
| ENSMUST00000061740 | 24 | 12 | 32 Tmem178b      | protein_coding       |
| ENSMUST00000111337 | 24 | 6  | 6 Ckap5          | protein_coding       |
| ENSMUST00000159993 | 24 | 3  | 6 Col22a1        | protein_coding       |
| ENSMUST00000020285 | 24 | 1  | 12 Sar1a         | protein_coding       |
| ENSMUST00000115480 | 24 | 47 | 4 2610203C22Rik  | processed_transcript |
| ENSMUST00000110820 | 24 | 45 | 0 Ppp1r14d       | protein_coding       |
| ENSMUST00000029559 | 24 | 40 | 0 Il6ra          | protein_coding       |
| ENSMUST00000163834 | 24 | 37 | 18 9330158H04Rik | processed_transcript |
| ENSMUST00000107456 | 24 | 35 | 4 Fam174b        | protein_coding       |
| ENSMUST00000102800 | 24 | 35 | 2 Gapvd1         | protein_coding       |
| ENSMUST00000122115 | 24 | 35 | 2 Lrrc72         | protein_coding       |
| ENSMUST00000147677 | 24 | 34 | 40 Synpr         | protein_coding       |
| ENSMUST00000134903 | 24 | 34 | 18 Cyb5d1        | protein_coding       |
| ENSMUST00000180479 | 24 | 34 | 10 Gm26776       | lincRNA              |
| ENSMUST00000140871 | 24 | 34 | 0 Gatad1         | protein_coding       |
| ENSMUST00000107846 | 24 | 33 | 2 Cita           | protein_coding       |
| ENSMUST00000141250 | 24 | 33 | 0 Alpk2          | protein_coding       |
| ENSMUST00000115799 | 24 | 32 | 14 Arid1b        | protein_coding       |
| ENSMUST00000095020 | 24 | 32 | 18 Il1rl2        | protein_coding       |
| ENSMUST00000176410 | 24 | 32 | 8 Snx25          | protein_coding       |
| ENSMUST00000124731 | 24 | 31 | 6 Wdr47          | protein_coding       |
| ENSMUST00000099716 | 24 | 31 | 4 Ckap5          | protein_coding       |
| ENSMUST00000026498 | 24 | 31 | 2 Crisp1         | protein_coding       |
| ENSMUST00000119015 | 24 | 30 | 8 Pptc7          | protein_coding       |
| ENSMUST00000032441 | 24 | 30 | 6 Ccdc91         | protein_coding       |
| ENSMUST00000172806 | 24 | 30 | 26 Lgr5          | protein_coding       |
| ENSMUST00000119254 | 24 | 29 | 8 Zfp827         | protein_coding       |

|                    |    |    |                  |                      |
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| ENSMUST00000107262 | 24 | 29 | 4 Mpdz           | protein_coding       |
| ENSMUST00000136077 | 24 | 28 | 10 Susd1         | protein_coding       |
| ENSMUST00000138762 | 24 | 28 | 4 Cep350         | protein_coding       |
| ENSMUST00000118968 | 24 | 26 | 14 Dnajc5b       | protein_coding       |
| ENSMUST00000182627 | 24 | 26 | 6 Atp13a4        | protein_coding       |
| ENSMUST00000028106 | 24 | 26 | 16 Itga8         | protein_coding       |
| ENSMUST00000045513 | 24 | 26 | 14 Ccdc67        | protein_coding       |
| ENSMUST00000143885 | 24 | 26 | 4 Gm13154        | protein_coding       |
| ENSMUST00000101282 | 24 | 26 | 0 Cylc1          | protein_coding       |
| ENSMUST00000023555 | 24 | 25 | 18 Hspbp1        | protein_coding       |
| ENSMUST00000108518 | 24 | 24 | 8 Nlrp1a         | protein_coding       |
| ENSMUST00000157071 | 24 | 24 | 6 Scml4          | protein_coding       |
| ENSMUST00000022218 | 24 | 24 | 2 Dhfr           | protein_coding       |
| ENSMUST00000079300 | 24 | 23 | 8 Arhgef26       | protein_coding       |
| ENSMUST00000152764 | 24 | 23 | 0 Acad9          | retained_intron      |
| ENSMUST00000152764 | 24 | 23 | 0 Acad9          | retained_intron      |
| ENSMUST00000048402 | 24 | 23 | 0 Spata7         | protein_coding       |
| ENSMUST00000022257 | 24 | 22 | 30 Atxn7         | protein_coding       |
| ENSMUST00000138943 | 24 | 22 | 8 4933407K13Rik  | processed_transcript |
| ENSMUST00000108680 | 24 | 22 | 2 Gas7           | protein_coding       |
| ENSMUST00000112131 | 24 | 22 | 0 Arhgap6        | protein_coding       |
| ENSMUST00000145640 | 24 | 22 | 0 Taok3          | protein_coding       |
| ENSMUST00000043368 | 24 | 22 | 14 Zcchc11       | protein_coding       |
| ENSMUST00000027754 | 24 | 22 | 10 Ncf2          | protein_coding       |
| ENSMUST00000120904 | 24 | 22 | 4 Hecw2          | protein_coding       |
| ENSMUST00000107211 | 24 | 22 | 0 Sytl2          | protein_coding       |
| ENSMUST00000136485 | 24 | 21 | 8 Gorasp2        | protein_coding       |
| ENSMUST00000163885 | 24 | 21 | 2 Gm3248         | protein_coding       |
| ENSMUST00000031324 | 24 | 20 | 14 Ereg          | protein_coding       |
| ENSMUST00000125626 | 24 | 20 | 10 E230016K23Rik | processed_transcript |
| ENSMUST00000124572 | 24 | 20 | 4 AV064505       | antisense            |
| ENSMUST00000146372 | 24 | 20 | 18 Gm12160       | lincRNA              |
| ENSMUST00000144931 | 24 | 20 | 6 Plcb4          | protein_coding       |
| ENSMUST00000038090 | 24 | 17 | 10 Ttlf7         | protein_coding       |
| ENSMUST00000038874 | 24 | 17 | 6 Scai           | protein_coding       |
| ENSMUST00000032710 | 24 | 16 | 24 Slc17a6       | protein_coding       |
| ENSMUST00000094649 | 24 | 16 | 2 Ugt2b36        | protein_coding       |
| ENSMUST00000009321 | 24 | 16 | 0 Dgcr8          | protein_coding       |
| ENSMUST00000105470 | 24 | 16 | 0 Man1a          | protein_coding       |
| ENSMUST00000147751 | 24 | 12 | 65 Ranbp17       | protein_coding       |
| ENSMUST00000100784 | 24 | 12 | 14 Flot2         | protein_coding       |
| ENSMUST00000171683 | 24 | 12 | 8 Cdadc1         | protein_coding       |
| ENSMUST00000110687 | 24 | 12 | 6 Ralgapa1       | protein_coding       |
| ENSMUST00000139123 | 24 | 4  | 14 Kif1b         | protein_coding       |
| ENSMUST00000067563 | 24 | 1  | 0 Wdyhvf1        | protein_coding       |
| ENSMUST00000088454 | 23 | 46 | 0 Slc38a1        | protein_coding       |
| ENSMUST00000046856 | 23 | 40 | 20 Chn2          | protein_coding       |
| ENSMUST00000061925 | 23 | 39 | 8 Plcxd3         | protein_coding       |
| ENSMUST00000165067 | 23 | 38 | 6 Acss3          | protein_coding       |
| ENSMUST00000105733 | 23 | 34 | 12 Gm13251       | protein_coding       |
| ENSMUST00000106869 | 23 | 34 | 2 Insl5          | protein_coding       |
| ENSMUST00000082034 | 23 | 33 | 12 Rps6ka6       | protein_coding       |
| ENSMUST00000028683 | 23 | 33 | 8 Pdia3          | protein_coding       |
| ENSMUST00000114877 | 23 | 32 | 6 Parp9          | protein_coding       |
| ENSMUST00000105439 | 23 | 32 | 10 Lrrtm3        | protein_coding       |
| ENSMUST00000169347 | 23 | 31 | 38 Myo1h         | protein_coding       |
| ENSMUST00000072008 | 23 | 30 | 20 Sh3rf2        | protein_coding       |
| ENSMUST00000105735 | 23 | 30 | 12 Gm13247       | protein_coding       |
| ENSMUST00000147657 | 23 | 30 | 12 Tox           | protein_coding       |
| ENSMUST00000071564 | 23 | 30 | 0 Fbxo18         | protein_coding       |
| ENSMUST00000028549 | 23 | 29 | 16 Slc12a6       | protein_coding       |
| ENSMUST00000180945 | 23 | 29 | 6 Gm26883        | lincRNA              |
| ENSMUST00000181284 | 23 | 29 | 0 1700025F22Rik  | protein_coding       |
| ENSMUST00000166750 | 23 | 28 | 36 Cmip          | protein_coding       |
| ENSMUST00000141137 | 23 | 28 | 28 Dnah10        | protein_coding       |
| ENSMUST00000027083 | 23 | 28 | 2 Pth2r          | protein_coding       |
| ENSMUST00000068797 | 23 | 28 | 2 C1s2           | protein_coding       |
| ENSMUST00000152547 | 23 | 27 | 10 Cul1          | protein_coding       |

|                    |    |    |                  |                      |
|--------------------|----|----|------------------|----------------------|
| ENSMUST00000074729 | 23 | 27 | 4 Dgkh           | protein_coding       |
| ENSMUST00000148225 | 23 | 27 | 0 Cfh            | protein_coding       |
| ENSMUST00000163070 | 23 | 27 | 0 Psma6          | protein_coding       |
| ENSMUST00000177048 | 23 | 27 | 0 4931403E22Rik  | processed_transcript |
| ENSMUST00000047321 | 23 | 26 | 26 Arntl         | protein_coding       |
| ENSMUST00000183729 | 23 | 26 | 0 Ccdc171        | protein_coding       |
| ENSMUST00000032122 | 23 | 25 | 22 Tacr1         | protein_coding       |
| ENSMUST00000045450 | 23 | 25 | 20 Ints7         | protein_coding       |
| ENSMUST00000144340 | 23 | 25 | 10 Pld5          | protein_coding       |
| ENSMUST00000048544 | 23 | 24 | 10 Bcd2          | protein_coding       |
| ENSMUST00000162930 | 23 | 24 | 6 Mob4           | protein_coding       |
| ENSMUST00000048001 | 23 | 24 | 24 Dmgdh         | protein_coding       |
| ENSMUST00000156153 | 23 | 24 | 0 Tmem135        | protein_coding       |
| ENSMUST00000146669 | 23 | 23 | 10 Tecr1         | protein_coding       |
| ENSMUST00000022600 | 23 | 23 | 2 Mtrf1          | protein_coding       |
| ENSMUST00000165538 | 23 | 22 | 18 Kcnj6         | protein_coding       |
| ENSMUST00000041284 | 23 | 22 | 0 Inadl          | protein_coding       |
| ENSMUST00000065494 | 23 | 22 | 0 Omd            | protein_coding       |
| ENSMUST00000159312 | 23 | 21 | 0 Ap1s3          | protein_coding       |
| ENSMUST00000171405 | 23 | 20 | 10 Mgat5         | protein_coding       |
| ENSMUST00000099548 | 23 | 20 | 0 Eva1c          | protein_coding       |
| ENSMUST00000071101 | 23 | 20 | 287 Gm10010      | protein_coding       |
| ENSMUST00000031422 | 23 | 20 | 0 Anapc7         | protein_coding       |
| ENSMUST00000114775 | 23 | 18 | 2 Stxbp5l        | protein_coding       |
| ENSMUST00000153990 | 23 | 18 | 0 Stradb         | protein_coding       |
| ENSMUST00000110602 | 23 | 17 | 6 Wdr76          | protein_coding       |
| ENSMUST00000159110 | 23 | 17 | 4 Apaf1          | protein_coding       |
| ENSMUST00000024766 | 23 | 17 | 0 Rrp36          | protein_coding       |
| ENSMUST00000168837 | 23 | 16 | 20 4933427D06Rik | protein_coding       |
| ENSMUST00000029139 | 23 | 16 | 10 Trim55        | protein_coding       |
| ENSMUST00000159781 | 23 | 16 | 4 4933411G11Rik  | protein_coding       |
| ENSMUST00000160817 | 23 | 16 | 0 Cd46           | protein_coding       |
| ENSMUST00000160817 | 23 | 16 | 0 Cd46           | protein_coding       |
| ENSMUST00000021345 | 23 | 14 | 8 Gtf2a1         | protein_coding       |
| ENSMUST00000159157 | 23 | 14 | 26 Gas5          | processed_transcript |
| ENSMUST00000128484 | 23 | 11 | 4 Txndc16        | protein_coding       |
| ENSMUST00000081553 | 23 | 11 | 0 Gm1330         | protein_coding       |
| ENSMUST00000114765 | 23 | 9  | 2 Tmem182        | protein_coding       |
| ENSMUST00000144905 | 23 | 7  | 28 2410002F23Rik | protein_coding       |
| ENSMUST00000029429 | 23 | 7  | 238 Wnt2b        | protein_coding       |
| ENSMUST00000142620 | 23 | 3  | 10 Lca5l         | protein_coding       |
| ENSMUST00000115274 | 22 | 66 | 32 Pdgfrb        | protein_coding       |
| ENSMUST00000043624 | 22 | 49 | 297 Med13        | protein_coding       |
| ENSMUST00000009058 | 22 | 39 | 4 Abcb1b         | protein_coding       |
| ENSMUST00000048129 | 22 | 38 | 12 Piwil2        | protein_coding       |
| ENSMUST00000111118 | 22 | 37 | 0 Tcp1l11        | protein_coding       |
| ENSMUST00000146425 | 22 | 37 | 0 Mtus2          | protein_coding       |
| ENSMUST00000162777 | 22 | 34 | 0 Tnik           | protein_coding       |
| ENSMUST00000165178 | 22 | 32 | 178 Gm17188      | processed_transcript |
| ENSMUST00000166650 | 22 | 32 | 0 Ptprh          | protein_coding       |
| ENSMUST00000174331 | 22 | 32 | 2 Nrxa1          | protein_coding       |
| ENSMUST00000096040 | 22 | 31 | 6 Svopl          | protein_coding       |
| ENSMUST00000134921 | 22 | 30 | 2 C230014O12Rik  | lincRNA              |
| ENSMUST00000047013 | 22 | 30 | 6 Cmtm8          | protein_coding       |
| ENSMUST00000019572 | 22 | 30 | 0 Zfp874b        | protein_coding       |
| ENSMUST00000140333 | 22 | 28 | 79 Abcb7         | protein_coding       |
| ENSMUST00000134552 | 22 | 28 | 0 Gm15751        | processed_transcript |
| ENSMUST00000154316 | 22 | 28 | 12 Brd3          | protein_coding       |
| ENSMUST00000179348 | 22 | 28 | 4 Ott            | protein_coding       |
| ENSMUST00000110610 | 22 | 28 | 0 Ash2l          | protein_coding       |
| ENSMUST00000139573 | 22 | 28 | 0 Mecer          | protein_coding       |
| ENSMUST00000143626 | 22 | 27 | 24 Gabrb2        | protein_coding       |
| ENSMUST00000094835 | 22 | 27 | 20 1110051M20Rik | protein_coding       |
| ENSMUST00000002911 | 22 | 27 | 14 Hdgfrp2       | protein_coding       |
| ENSMUST00000140781 | 22 | 27 | 14 Blmh          | protein_coding       |
| ENSMUST00000072476 | 22 | 27 | 0 Oas1h          | protein_coding       |
| ENSMUST00000171061 | 22 | 26 | 0 Ulk4           | protein_coding       |
| ENSMUST00000022909 | 22 | 26 | 18 Dcaf13        | protein_coding       |



|                    |    |    |     |               |                                    |
|--------------------|----|----|-----|---------------|------------------------------------|
| ENSMUST00000088922 | 22 | 25 | 6   | Gtf2f2        | protein_coding                     |
| ENSMUST00000166837 | 22 | 25 | 4   | Gm17067       | protein_coding                     |
| ENSMUST00000181986 | 22 | 25 | 4   | Rbm6          | protein_coding                     |
| ENSMUST00000170023 | 22 | 25 | 2   | Apc           | protein_coding                     |
| ENSMUST00000179006 | 22 | 25 | 0   | Gm5559        | pseudogene                         |
| ENSMUST00000179006 | 22 | 25 | 0   | Gm5559        | pseudogene                         |
| ENSMUST00000030510 | 22 | 24 | 0   | Tas1r2        | protein_coding                     |
| ENSMUST00000170651 | 22 | 24 | 188 | Dnah8         | protein_coding                     |
| ENSMUST00000156676 | 22 | 24 | 4   | Nsun3         | protein_coding                     |
| ENSMUST00000077851 | 22 | 23 | 42  | Kdm4c         | protein_coding                     |
| ENSMUST00000048947 | 22 | 23 | 16  | C8a           | protein_coding                     |
| ENSMUST00000019975 | 22 | 23 | 0   | Wasf1         | protein_coding                     |
| ENSMUST00000026096 | 22 | 22 | 228 | Bnc1          | protein_coding                     |
| ENSMUST00000131829 | 22 | 22 | 8   | Nrk           | protein_coding                     |
| ENSMUST00000136826 | 22 | 22 | 4   | Nek10         | protein_coding                     |
| ENSMUST00000182568 | 22 | 22 | 0   | 1700029N11Rik | lincRNA                            |
| ENSMUST00000077569 | 22 | 22 | 4   | Smarca1       | protein_coding                     |
| ENSMUST00000121265 | 22 | 22 | 4   | Abca15        | protein_coding                     |
| ENSMUST00000161509 | 22 | 22 | 0   | 4930486I03Rik | antisense                          |
| ENSMUST00000066296 | 22 | 21 | 30  | Fam179b       | protein_coding                     |
| ENSMUST00000145988 | 22 | 21 | 8   | Dnhd1         | protein_coding                     |
| ENSMUST00000020003 | 22 | 20 | 0   | Fam184a       | protein_coding                     |
| ENSMUST00000102744 | 22 | 20 | 0   | Orc1          | protein_coding                     |
| ENSMUST00000109284 | 22 | 20 | 0   | CN725425      | protein_coding                     |
| ENSMUST00000178464 | 22 | 20 | 0   | Gm10125       | processed_transcript               |
| ENSMUST00000109579 | 22 | 20 | 10  | Mkl1          | protein_coding                     |
| ENSMUST00000118544 | 22 | 20 | 10  | 1700052N19Rik | protein_coding                     |
| ENSMUST00000172615 | 22 | 19 | 32  | Psmc11        | protein_coding                     |
| ENSMUST00000059279 | 22 | 18 | 6   | Gm884         | protein_coding                     |
| ENSMUST00000102942 | 22 | 18 | 4   | Psd4          | protein_coding                     |
| ENSMUST00000114236 | 22 | 17 | 8   | Tnip3         | protein_coding                     |
| ENSMUST00000086430 | 22 | 17 | 6   | Col5a2        | protein_coding                     |
| ENSMUST00000051810 | 22 | 16 | 8   | Plekha4       | protein_coding                     |
| ENSMUST00000142301 | 22 | 16 | 4   | Eya3          | protein_coding                     |
| ENSMUST00000152014 | 22 | 16 | 18  | Gm15787       | processed_transcript               |
| ENSMUST00000143108 | 22 | 16 | 4   | Chpt1         | protein_coding                     |
| ENSMUST00000125194 | 22 | 16 | 0   | Gm12092       | lincRNA                            |
| ENSMUST00000163895 | 22 | 12 | 2   | Clasp2        | protein_coding                     |
| ENSMUST00000056146 | 22 | 12 | 0   | 1810024B03Rik | protein_coding                     |
| ENSMUST00000177141 | 22 | 11 | 10  | Nrg3os        | antisense                          |
| ENSMUST00000045096 | 22 | 11 | 0   | Ppp1r3a       | protein_coding                     |
| ENSMUST00000153494 | 21 | 40 | 0   | Zfp385c       | protein_coding                     |
| ENSMUST00000172289 | 21 | 35 | 12  | Sned1         | protein_coding                     |
| ENSMUST00000031355 | 21 | 34 | 24  | Uso1          | protein_coding                     |
| ENSMUST00000035560 | 21 | 34 | 22  | Acbd6         | protein_coding                     |
| ENSMUST00000109283 | 21 | 32 | 18  | Slc2a13       | protein_coding                     |
| ENSMUST00000110533 | 21 | 32 | 42  | Arid4b        | protein_coding                     |
| ENSMUST00000180823 | 21 | 31 | 0   | Gm8705        | lincRNA                            |
| ENSMUST00000153974 | 21 | 30 | 6   | Edil3         | protein_coding                     |
| ENSMUST00000162652 | 21 | 30 | 8   | Gm16026       | transcribed_unprocessed_pseudogene |
| ENSMUST00000164273 | 21 | 29 | 2   | Panx1         | protein_coding                     |
| ENSMUST00000069660 | 21 | 28 | 34  | D430042O09Rik | protein_coding                     |
| ENSMUST00000129513 | 21 | 28 | 18  | Gm15457       | antisense                          |
| ENSMUST00000022120 | 21 | 28 | 2   | Acot12        | protein_coding                     |
| ENSMUST00000109046 | 21 | 28 | 2   | Gm4724        | protein_coding                     |
| ENSMUST00000127774 | 21 | 28 | 0   | Chmp3         | protein_coding                     |
| ENSMUST00000182870 | 21 | 27 | 22  | Gm20757       | lincRNA                            |
| ENSMUST00000109832 | 21 | 27 | 6   | Ppp2r5c       | protein_coding                     |
| ENSMUST00000020695 | 21 | 26 | 54  | Tns3          | protein_coding                     |
| ENSMUST00000182613 | 21 | 26 | 12  | Ano4          | protein_coding                     |
| ENSMUST00000066652 | 21 | 26 | 8   | Kidins220     | protein_coding                     |
| ENSMUST00000120521 | 21 | 26 | 4   | Gm14434       | protein_coding                     |
| ENSMUST00000143551 | 21 | 26 | 12  | 6530409C15Rik | protein_coding                     |
| ENSMUST00000179788 | 21 | 26 | 8   | Chdc2         | protein_coding                     |
| ENSMUST00000120383 | 21 | 26 | 0   | Gm12877       | unprocessed_pseudogene             |
| ENSMUST00000034064 | 21 | 24 | 2   | F11           | protein_coding                     |
| ENSMUST00000037115 | 21 | 24 | 2   | Med30         | protein_coding                     |
| ENSMUST00000023924 | 21 | 24 | 0   | Rpp14         | protein_coding                     |

|                     |    |    |                 |                |
|---------------------|----|----|-----------------|----------------|
| ENSMUST00000079881  | 21 | 24 | 16 Zfp398       | protein_coding |
| ENSMUST00000114104  | 21 | 24 | 0 Gab3          | protein_coding |
| ENSMUST00000063517  | 21 | 23 | 63 Spats2       | protein_coding |
| ENSMUST00000025656  | 21 | 23 | 4 Aldh1a7       | protein_coding |
| ENSMUST00000041723  | 21 | 23 | 0 Zdhhc17       | protein_coding |
| ENSMUST00000154698  | 21 | 23 | 0 Strap         | protein_coding |
| ENSMUST00000069245  | 21 | 22 | 18 Spink5       | protein_coding |
| ENSMUST00000089184  | 21 | 22 | 18 Kcnj12       | protein_coding |
| ENSMUST00000145083  | 21 | 22 | 4 Lyn           | protein_coding |
| ENSMUST00000115097  | 21 | 22 | 0 Oacyl         | protein_coding |
| ENSMUST00000036288  | 21 | 21 | 57 R3hdm1       | protein_coding |
| ENSMUST00000071563  | 21 | 20 | 12 Cracr2a      | protein_coding |
| ENSMUST00000126198  | 21 | 20 | 18 Fam78b       | protein_coding |
| ENSMUST00000064076  | 21 | 20 | 8 Tnni3k        | protein_coding |
| ENSMUST00000093427  | 21 | 20 | 4 Nwd1          | protein_coding |
| ENSMUST00000084828  | 21 | 20 | 2 Ncapg2        | protein_coding |
| ENSMUST00000026472  | 21 | 20 | 0 Inhbc         | protein_coding |
| ENSMUST00000074366  | 21 | 19 | 4 Eya4          | protein_coding |
| ENSMUST00000146763  | 21 | 19 | 2 Slco5a1       | protein_coding |
| ENSMUST00000172537  | 21 | 19 | 0 Ndst3         | protein_coding |
| ENSMUST00000181656  | 21 | 18 | 0 Gm26579       | lincRNA        |
| ENSMUST00000027797  | 21 | 18 | 18 Nvl          | protein_coding |
| ENSMUST00000160279  | 21 | 18 | 6 4933417A18Rik | protein_coding |
| ENSMUST00000037526  | 21 | 18 | 0 Tanc1         | protein_coding |
| ENSMUST00000134458  | 21 | 16 | 8 Macf1         | protein_coding |
| ENSMUST00000159564  | 21 | 16 | 0 Boll          | protein_coding |
| ENSMUST00000040789  | 21 | 15 | 107 Qpct        | protein_coding |
| ENSMUST00000150821  | 21 | 15 | 4 Uhmk1         | protein_coding |
| ENSMUST00000023504  | 21 | 14 | 6 Nr1i2         | protein_coding |
| ENSMUST00000107389  | 21 | 14 | 0 Acly          | protein_coding |
| ENSMUST00000052708  | 21 | 14 | 10 Ckap2l       | protein_coding |
| ENSMUST00000040430  | 21 | 9  | 946 Vat1        | protein_coding |
| ENSMUST00000018871  | 21 | 6  | 0 Cpsf4l        | protein_coding |
| ENSMUST00000100185  | 21 | 0  | 0 Pgs1          | protein_coding |
| ENSMUST00000109838  | 21 | 60 | 16 Ntrk2        | protein_coding |
| ENSMUST00000029274  | 21 | 51 | 4 Adad1         | protein_coding |
| ENSMUST00000100070  | 21 | 46 | 0 Samd5         | protein_coding |
| ENSMUST00000155448  | 21 | 43 | 4 Tllf5         | protein_coding |
| ENSMUST00000106746  | 21 | 41 | 10 Helz         | protein_coding |
| ENSMUST00000178935  | 21 | 38 | 8 Ankrd44       | protein_coding |
| ENSMUST00000020316  | 21 | 38 | 0 Tbk1          | protein_coding |
| ENSMUST00000022660  | 21 | 37 | 10 Loxl2        | protein_coding |
| ENSMUST00000179636  | 21 | 37 | 4 Slc6a15       | protein_coding |
| ENSMUST00000122181  | 21 | 37 | 2 1700074P13Rik | protein_coding |
| ENSMUST00000045004  | 21 | 34 | 395 Dopey2      | protein_coding |
| ENSMUST00000015277  | 21 | 34 | 14 Lrrk1        | protein_coding |
| ENSMUST00000029147  | 21 | 34 | 0 Nfs1          | protein_coding |
| ENSMUST00000173860  | 21 | 33 | 0 Rab11b        | protein_coding |
| ENSMUST00000102815  | 21 | 32 | 8 Ranbp17       | protein_coding |
| ENSMUST00000182915  | 21 | 32 | 4 Pclo          | protein_coding |
| ENSMUST00000071874  | 21 | 32 | 73 Ano6         | protein_coding |
| ENSMUST00000066308  | 21 | 30 | 22 Cfap58       | protein_coding |
| ENSMUST00000115277  | 21 | 30 | 2 Dpy19l1       | protein_coding |
| ENSMUST00000177161  | 21 | 29 | 2 Gm20618       | lincRNA        |
| ENSMUST00000182095  | 21 | 28 | 20 Cacng3       | protein_coding |
| ENSMUST00000076333  | 21 | 28 | 8 Phldb2        | protein_coding |
| ENSMUST00000119149  | 21 | 28 | 2 Gm14308       | protein_coding |
| ENSMUST000000099241 | 21 | 27 | 2 Ccl28         | protein_coding |
| ENSMUST00000143922  | 21 | 27 | 0 Gm4846        | protein_coding |
| ENSMUST00000065987  | 21 | 26 | 34 Abat         | protein_coding |
| ENSMUST00000172791  | 21 | 26 | 10 Itga8        | protein_coding |
| ENSMUST00000025966  | 21 | 26 | 6 Cyp2c55       | protein_coding |
| ENSMUST00000121393  | 21 | 26 | 4 Gm4631        | protein_coding |
| ENSMUST00000161485  | 21 | 26 | 28 Nos1ap       | protein_coding |
| ENSMUST00000064391  | 21 | 26 | 8 Cpne8         | protein_coding |
| ENSMUST00000170757  | 21 | 26 | 8 C2cd2         | protein_coding |
| ENSMUST00000125125  | 21 | 26 | 6 Arid4a        | protein_coding |
| ENSMUST00000102840  | 21 | 26 | 2 Ass1          | protein_coding |

|                    |    |    |     |               |                        |
|--------------------|----|----|-----|---------------|------------------------|
| ENSMUST00000170792 | 21 | 24 | 0   | Mapk10        | protein_coding         |
| ENSMUST00000050004 | 21 | 24 | 18  | Rnf125        | protein_coding         |
| ENSMUST00000028646 | 21 | 24 | 10  | Tspan18       | protein_coding         |
| ENSMUST00000026126 | 21 | 23 | 16  | Ints4         | protein_coding         |
| ENSMUST00000091014 | 21 | 23 | 0   | Map9          | protein_coding         |
| ENSMUST00000022217 | 21 | 22 | 2   | Zfyve16       | protein_coding         |
| ENSMUST00000112685 | 21 | 22 | 10  | Fgd1          | protein_coding         |
| ENSMUST00000136381 | 21 | 22 | 2   | Sidt1         | protein_coding         |
| ENSMUST00000020109 | 21 | 21 | 12  | Actr6         | protein_coding         |
| ENSMUST00000115205 | 21 | 21 | 10  | Dlg1          | protein_coding         |
| ENSMUST00000073380 | 21 | 21 | 2   | Ms4a13        | protein_coding         |
| ENSMUST00000033127 | 21 | 21 | 0   | Sergef        | protein_coding         |
| ENSMUST00000038845 | 21 | 21 | 0   | Cd53          | protein_coding         |
| ENSMUST00000071973 | 21 | 20 | 6   | Ero1lb        | protein_coding         |
| ENSMUST00000023672 | 21 | 20 | 4   | Rcan1         | protein_coding         |
| ENSMUST00000165614 | 21 | 20 | 4   | Cdh18         | protein_coding         |
| ENSMUST00000070877 | 21 | 20 | 0   | Amacr         | protein_coding         |
| ENSMUST00000156122 | 21 | 20 | 6   | Peli1         | protein_coding         |
| ENSMUST00000109937 | 21 | 19 | 4   | Clnn          | protein_coding         |
| ENSMUST00000100235 | 21 | 19 | 2   | Tmem104       | protein_coding         |
| ENSMUST00000148271 | 21 | 18 | 16  | 1110034G24Rik | protein_coding         |
| ENSMUST00000004343 | 21 | 18 | 12  | Wars2         | protein_coding         |
| ENSMUST00000164512 | 21 | 18 | 2   | Gm2974        | protein_coding         |
| ENSMUST00000159927 | 21 | 18 | 6   | Themis        | protein_coding         |
| ENSMUST00000066328 | 21 | 18 | 0   | Spinkl        | protein_coding         |
| ENSMUST00000053594 | 21 | 17 | 127 | Cradd         | protein_coding         |
| ENSMUST00000110992 | 21 | 17 | 0   | Marc1         | protein_coding         |
| ENSMUST00000154434 | 21 | 16 | 2   | Tmem135       | protein_coding         |
| ENSMUST00000149377 | 21 | 16 | 2   | Gm14618       | lincRNA                |
| ENSMUST00000180481 | 21 | 16 | 0   | A330076H08Rik | lincRNA                |
| ENSMUST00000043578 | 21 | 15 | 0   | St18          | protein_coding         |
| ENSMUST00000123166 | 21 | 15 | 0   | Loxhd1        | protein_coding         |
| ENSMUST00000144247 | 21 | 14 | 22  | Asxl2         | protein_coding         |
| ENSMUST00000107547 | 21 | 14 | 16  | Al481877      | protein_coding         |
| ENSMUST00000159498 | 21 | 14 | 8   | Alms1-ps1     | unprocessed_pseudogene |
| ENSMUST00000172481 | 21 | 12 | 0   | Usp13         | protein_coding         |
| ENSMUST00000146326 | 21 | 5  | 2   | Gm15587       | antisense              |
| ENSMUST00000114276 | 21 | 1  | 0   | Rcn2          | protein_coding         |
| ENSMUST00000107899 | 21 | 0  | 291 | Myh14         | protein_coding         |
| ENSMUST00000114066 | 21 | 0  | 0   | Cpeb2         | protein_coding         |
| ENSMUST00000031333 | 20 | 37 | 0   | Gtf2h3        | protein_coding         |
| ENSMUST00000030771 | 20 | 35 | 0   | Dnajc2        | protein_coding         |
| ENSMUST00000148442 | 20 | 34 | 91  | Zfp568        | protein_coding         |
| ENSMUST00000156203 | 20 | 33 | 2   | Uggt2         | protein_coding         |
| ENSMUST00000023774 | 20 | 32 | 0   | Slc11a2       | protein_coding         |
| ENSMUST00000038388 | 20 | 30 | 44  | A230046K03Rik | protein_coding         |
| ENSMUST00000093299 | 20 | 30 | 34  | Spred2        | protein_coding         |
| ENSMUST00000079441 | 20 | 30 | 20  | Zbtb20        | protein_coding         |
| ENSMUST00000137213 | 20 | 29 | 0   | Bmp5          | protein_coding         |
| ENSMUST00000051704 | 20 | 28 | 14  | Cit           | protein_coding         |
| ENSMUST00000131496 | 20 | 28 | 0   | Zfp707        | protein_coding         |
| ENSMUST00000067602 | 20 | 28 | 16  | Ncam2         | protein_coding         |
| ENSMUST00000162300 | 20 | 28 | 2   | Grip2         | protein_coding         |
| ENSMUST00000022232 | 20 | 28 | 0   | 4933425L06Rik | protein_coding         |
| ENSMUST00000135443 | 20 | 27 | 0   | Neil3         | protein_coding         |
| ENSMUST00000033756 | 20 | 26 | 8   | Asb9          | protein_coding         |
| ENSMUST00000108917 | 20 | 26 | 0   | Phactr3       | protein_coding         |
| ENSMUST00000121034 | 20 | 26 | 0   | Dram2         | protein_coding         |
| ENSMUST00000123161 | 20 | 26 | 0   | Cep128        | protein_coding         |
| ENSMUST00000161587 | 20 | 26 | 12  | Unc5cl        | protein_coding         |
| ENSMUST00000059145 | 20 | 26 | 10  | Tacc2         | protein_coding         |
| ENSMUST00000022053 | 20 | 26 | 4   | Trip13        | protein_coding         |
| ENSMUST00000098534 | 20 | 25 | 2   | Znhit6        | protein_coding         |
| ENSMUST00000107662 | 20 | 24 | 79  | Skap1         | protein_coding         |
| ENSMUST00000093795 | 20 | 24 | 20  | Cep70         | protein_coding         |
| ENSMUST00000139270 | 20 | 24 | 14  | Fam111a       | protein_coding         |
| ENSMUST00000054530 | 20 | 24 | 12  | Vwde          | protein_coding         |
| ENSMUST00000033012 | 20 | 24 | 6   | Copb1         | protein_coding         |

|                    |    |    |                  |                                    |
|--------------------|----|----|------------------|------------------------------------|
| ENSMUST00000071391 | 20 | 24 | 2 Klrb1-ps1      | transcribed_unprocessed_pseudogene |
| ENSMUST00000071391 | 20 | 24 | 2 Klrb1-ps1      | transcribed_unprocessed_pseudogene |
| ENSMUST00000030784 | 20 | 24 | 2 Prkag2         | protein_coding                     |
| ENSMUST00000128112 | 20 | 24 | 14 C530008M17Rik | protein_coding                     |
| ENSMUST00000033770 | 20 | 24 | 4 Mecp2          | protein_coding                     |
| ENSMUST00000133758 | 20 | 24 | 0 2610020H08Rik  | protein_coding                     |
| ENSMUST00000097955 | 20 | 23 | 28 Cachd1        | protein_coding                     |
| ENSMUST00000133876 | 20 | 23 | 26 Ric3          | protein_coding                     |
| ENSMUST00000148431 | 20 | 22 | 4 C2             | protein_coding                     |
| ENSMUST00000180858 | 20 | 22 | 0 D630011A20Rik  | protein_coding                     |
| ENSMUST00000045110 | 20 | 22 | 16 Dsty1         | protein_coding                     |
| ENSMUST00000180720 | 20 | 22 | 4 Gm2539         | transcribed_unprocessed_pseudogene |
| ENSMUST00000129488 | 20 | 21 | 8 Arid4b         | protein_coding                     |
| ENSMUST00000179996 | 20 | 21 | 4 Gm4944         | protein_coding                     |
| ENSMUST00000147771 | 20 | 21 | 0 Gm12051        | lincRNA                            |
| ENSMUST00000030897 | 20 | 20 | 8 Megf6          | protein_coding                     |
| ENSMUST00000119096 | 20 | 20 | 6 Klra4          | protein_coding                     |
| ENSMUST00000135815 | 20 | 20 | 6 Gm12216        | protein_coding                     |
| ENSMUST00000047698 | 20 | 20 | 0 Stx3           | protein_coding                     |
| ENSMUST00000064725 | 20 | 20 | 0 Serpinc1       | protein_coding                     |
| ENSMUST00000168381 | 20 | 20 | 16 Ppp1r12b      | protein_coding                     |
| ENSMUST00000023056 | 20 | 20 | 14 Deptor        | protein_coding                     |
| ENSMUST00000140964 | 20 | 20 | 0 Zfp788         | protein_coding                     |
| ENSMUST00000031863 | 20 | 19 | 40 1700111E14Rik | antisense                          |
| ENSMUST00000163820 | 20 | 19 | 12 Calm14        | protein_coding                     |
| ENSMUST00000113978 | 20 | 18 | 4 Gyk            | protein_coding                     |
| ENSMUST00000163050 | 20 | 18 | 2 Rnf32          | protein_coding                     |
| ENSMUST00000028410 | 20 | 18 | 0 Xirp2          | protein_coding                     |
| ENSMUST00000054280 | 20 | 18 | 0 Eno4           | protein_coding                     |
| ENSMUST00000143643 | 20 | 18 | 0 Gm12055        | lincRNA                            |
| ENSMUST00000167522 | 20 | 18 | 12 C1qtnf7       | protein_coding                     |
| ENSMUST00000116506 | 20 | 17 | 14 Cep55         | protein_coding                     |
| ENSMUST00000136448 | 20 | 17 | 8 Ift80          | protein_coding                     |
| ENSMUST00000028014 | 20 | 17 | 6 Fmo4           | protein_coding                     |
| ENSMUST00000037127 | 20 | 17 | 0 Eri3           | protein_coding                     |
| ENSMUST00000166982 | 20 | 17 | 0 Gm5535         | lincRNA                            |
| ENSMUST00000129448 | 20 | 16 | 0 Cyp51          | protein_coding                     |
| ENSMUST00000170207 | 20 | 16 | 0 Gm8108         | protein_coding                     |
| ENSMUST00000072838 | 20 | 16 | 22 Hsf1          | protein_coding                     |
| ENSMUST00000172907 | 20 | 16 | 0 Rfx3           | protein_coding                     |
| ENSMUST00000000388 | 20 | 15 | 52 Ccm2          | protein_coding                     |
| ENSMUST00000184968 | 20 | 15 | 6 Zfp280d        | protein_coding                     |
| ENSMUST00000156384 | 20 | 15 | 2 Cylc2          | protein_coding                     |
| ENSMUST00000012873 | 20 | 14 | 2 AA987161       | protein_coding                     |
| ENSMUST00000114617 | 20 | 13 | 0 Mtm1           | protein_coding                     |
| ENSMUST00000182289 | 20 | 12 | 4 Sv2c           | protein_coding                     |
| ENSMUST00000044781 | 20 | 12 | 964 Ccdc30       | protein_coding                     |
| ENSMUST00000119595 | 20 | 11 | 1207 Slc29a3     | protein_coding                     |
| ENSMUST00000047349 | 20 | 11 | 10 Usp28         | protein_coding                     |
| ENSMUST00000109914 | 20 | 11 | 0 Zfp345         | protein_coding                     |
| ENSMUST00000028983 | 20 | 9  | 14 Bpifb2        | protein_coding                     |
| ENSMUST00000163246 | 20 | 9  | 0 Slc25a3        | protein_coding                     |
| ENSMUST00000167462 | 20 | 0  | 0 Mast4          | protein_coding                     |
| ENSMUST00000094120 | 19 | 32 | 0 Trrap          | protein_coding                     |
| ENSMUST00000163324 | 19 | 32 | 20 Fbxo34        | protein_coding                     |
| ENSMUST00000079573 | 19 | 32 | 14 Itpr2         | protein_coding                     |
| ENSMUST00000107778 | 19 | 30 | 4 Zbbx           | protein_coding                     |
| ENSMUST00000023449 | 19 | 30 | 26 Snap29        | protein_coding                     |
| ENSMUST00000031347 | 19 | 30 | 18 Rilp12        | protein_coding                     |
| ENSMUST00000163495 | 19 | 29 | 0 Tg             | protein_coding                     |
| ENSMUST00000024725 | 19 | 28 | 28 Efhd          | protein_coding                     |
| ENSMUST00000039922 | 19 | 27 | 20 Sufu          | protein_coding                     |
| ENSMUST00000128371 | 19 | 27 | 12 Ikbip         | protein_coding                     |
| ENSMUST00000135014 | 19 | 27 | 12 A830018L16Rik | protein_coding                     |
| ENSMUST00000028588 | 19 | 27 | 6 Elp4           | protein_coding                     |
| ENSMUST00000115357 | 19 | 27 | 2 Cadps2         | protein_coding                     |
| ENSMUST00000097650 | 19 | 27 | 0 Lrrfip1        | protein_coding                     |
| ENSMUST00000146150 | 19 | 26 | 10 Gpr137c       | protein_coding                     |

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| ENSMUST00000090227 | 19 | 26 | 6 March6         | protein_coding                     |
| ENSMUST00000100473 | 19 | 25 | 75 Kif13b        | protein_coding                     |
| ENSMUST00000164390 | 19 | 25 | 32 Kat2b         | protein_coding                     |
| ENSMUST00000020963 | 19 | 24 | 16 Dcdc2c        | protein_coding                     |
| ENSMUST00000142942 | 19 | 24 | 0 2210015D19Rik  | transcribed_unprocessed_pseudogene |
| ENSMUST00000040308 | 19 | 24 | 16 Sh2b3         | protein_coding                     |
| ENSMUST00000124025 | 19 | 24 | 6 Gm16342        | unitary_pseudogene                 |
| ENSMUST00000169941 | 19 | 24 | 4 Tll2           | protein_coding                     |
| ENSMUST00000078521 | 19 | 24 | 0 Dyrk4          | protein_coding                     |
| ENSMUST00000139098 | 19 | 24 | 0 Depdc5         | protein_coding                     |
| ENSMUST00000161119 | 19 | 23 | 379 Slc1a1       | protein_coding                     |
| ENSMUST00000085558 | 19 | 23 | 75 Mtus2         | protein_coding                     |
| ENSMUST00000140238 | 19 | 23 | 4 Gm13919        | antisense                          |
| ENSMUST00000018012 | 19 | 23 | 0 Sgk2           | protein_coding                     |
| ENSMUST00000138710 | 19 | 22 | 42 Fgf2          | protein_coding                     |
| ENSMUST00000045748 | 19 | 22 | 6 Pdk3           | protein_coding                     |
| ENSMUST00000173045 | 19 | 22 | 2 Vmn2r-ps53     | unprocessed_pseudogene             |
| ENSMUST00000107159 | 19 | 22 | 0 Nars2          | protein_coding                     |
| ENSMUST00000076623 | 19 | 22 | 2 Arap2          | protein_coding                     |
| ENSMUST00000107817 | 19 | 22 | 2 Zbtb5          | protein_coding                     |
| ENSMUST00000035128 | 19 | 21 | 10 Abhd5         | protein_coding                     |
| ENSMUST00000115829 | 19 | 21 | 2 Zscan30        | protein_coding                     |
| ENSMUST00000084820 | 19 | 20 | 0 Golga4         | protein_coding                     |
| ENSMUST00000156160 | 19 | 20 | 0 Smarce1        | protein_coding                     |
| ENSMUST00000122842 | 19 | 20 | 48 Rreb1         | protein_coding                     |
| ENSMUST00000113055 | 19 | 20 | 12 Shroom3       | protein_coding                     |
| ENSMUST00000111416 | 19 | 20 | 6 Ildr2          | protein_coding                     |
| ENSMUST00000151080 | 19 | 20 | 6 Pgr            | protein_coding                     |
| ENSMUST00000147939 | 19 | 20 | 6 Gm13598        | lincRNA                            |
| ENSMUST00000124091 | 19 | 20 | 0 Nod2           | protein_coding                     |
| ENSMUST00000161312 | 19 | 20 | 0 Adh4           | protein_coding                     |
| ENSMUST00000181867 | 19 | 20 | 0 Gm26851        | lincRNA                            |
| ENSMUST00000052716 | 19 | 19 | 6 Zfp759         | protein_coding                     |
| ENSMUST00000096184 | 19 | 19 | 0 Gm5796         | protein_coding                     |
| ENSMUST00000132647 | 19 | 18 | 4 Pkhd1          | protein_coding                     |
| ENSMUST00000102826 | 19 | 18 | 18 Ifit2         | protein_coding                     |
| ENSMUST00000108246 | 19 | 18 | 8 Wwp1           | protein_coding                     |
| ENSMUST00000117992 | 19 | 18 | 4 Ros1           | protein_coding                     |
| ENSMUST00000031170 | 19 | 18 | 2 Cenpc1         | protein_coding                     |
| ENSMUST00000084535 | 19 | 18 | 2 Amer1          | protein_coding                     |
| ENSMUST00000150033 | 19 | 18 | 0 Fam53a         | protein_coding                     |
| ENSMUST00000161515 | 19 | 18 | 0 Cnot11         | protein_coding                     |
| ENSMUST00000176944 | 19 | 17 | 18 Ap2b1         | protein_coding                     |
| ENSMUST00000179828 | 19 | 17 | 18 Cxcr5         | protein_coding                     |
| ENSMUST00000071985 | 19 | 17 | 4 Slco4c1        | protein_coding                     |
| ENSMUST00000015386 | 19 | 17 | 0 Nipsnap3a      | protein_coding                     |
| ENSMUST00000121193 | 19 | 16 | 14 Gm16428       | unprocessed_pseudogene             |
| ENSMUST00000168191 | 19 | 16 | 2 Trappc9        | protein_coding                     |
| ENSMUST00000079421 | 19 | 16 | 0 Daxx           | protein_coding                     |
| ENSMUST00000043126 | 19 | 15 | 2 Ncoa6          | protein_coding                     |
| ENSMUST00000099490 | 19 | 14 | 111 Nsd1         | protein_coding                     |
| ENSMUST00000032179 | 19 | 14 | 6 Nup210         | protein_coding                     |
| ENSMUST00000044359 | 19 | 13 | 2 Ankrd44        | protein_coding                     |
| ENSMUST00000130587 | 19 | 12 | 2 Arhgef18       | protein_coding                     |
| ENSMUST00000142890 | 19 | 12 | 4 Tspan5         | protein_coding                     |
| ENSMUST00000112064 | 19 | 11 | 198 Cacna1s      | protein_coding                     |
| ENSMUST00000181497 | 19 | 10 | 113 Gm26886      | processed_transcript               |
| ENSMUST00000115365 | 19 | 7  | 32 Tmem243       | protein_coding                     |
| ENSMUST00000164430 | 19 | 5  | 6 Nfkb1          | protein_coding                     |
| ENSMUST00000156986 | 19 | 0  | 0 Cadps2         | protein_coding                     |
| ENSMUST00000112993 | 19 | 43 | 8 Mid2           | protein_coding                     |
| ENSMUST00000027380 | 19 | 41 | 18 Tmem169       | protein_coding                     |
| ENSMUST00000112936 | 19 | 35 | 0 Rc3h2          | protein_coding                     |
| ENSMUST00000168740 | 19 | 32 | 2 Slc16a6        | protein_coding                     |
| ENSMUST00000151921 | 19 | 32 | 18 E130307A14Rik | processed_transcript               |
| ENSMUST00000111819 | 19 | 32 | 0 Cwc22          | protein_coding                     |
| ENSMUST00000127823 | 19 | 31 | 0 Camsap1        | protein_coding                     |
| ENSMUST00000047816 | 19 | 30 | 4 Pla2g6         | protein_coding                     |

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|--------------------|----|----|------------------|------------------------|
| ENSMUST00000140299 | 19 | 30 | 0 Tmem5          | protein_coding         |
| ENSMUST00000027012 | 19 | 30 | 2 Casp4          | protein_coding         |
| ENSMUST00000066023 | 19 | 29 | 0 Gm4759         | unprocessed_pseudogene |
| ENSMUST00000066023 | 19 | 29 | 0 Gm4759         | unprocessed_pseudogene |
| ENSMUST00000183940 | 19 | 28 | 16 Pabpc4        | protein_coding         |
| ENSMUST00000097216 | 19 | 26 | 12 Tead2         | protein_coding         |
| ENSMUST00000115850 | 19 | 26 | 10 Cdh2          | protein_coding         |
| ENSMUST00000146285 | 19 | 26 | 8 Sfpq           | protein_coding         |
| ENSMUST00000165956 | 19 | 26 | 0 D3Ertd254e     | protein_coding         |
| ENSMUST00000183297 | 19 | 26 | 14 Pvt1          | lincRNA                |
| ENSMUST00000100337 | 19 | 25 | 274 Lmo7         | protein_coding         |
| ENSMUST00000068603 | 19 | 25 | 34 Iqgap2        | protein_coding         |
| ENSMUST00000107365 | 19 | 25 | 12 Tlr4          | protein_coding         |
| ENSMUST00000078695 | 19 | 25 | 2 Gm13078        | protein_coding         |
| ENSMUST00000053499 | 19 | 24 | 8 Ankar          | protein_coding         |
| ENSMUST00000181454 | 19 | 24 | 8 2310002F09Rik  | lincRNA                |
| ENSMUST00000140588 | 19 | 24 | 0 4930515B02Rik  | lincRNA                |
| ENSMUST00000070949 | 19 | 24 | 6 Preliid2       | protein_coding         |
| ENSMUST00000161659 | 19 | 24 | 4 Slc33a1        | protein_coding         |
| ENSMUST00000056919 | 19 | 24 | 2 Csnk2a2        | protein_coding         |
| ENSMUST00000107033 | 19 | 23 | 28 Inadl         | protein_coding         |
| ENSMUST00000098407 | 19 | 23 | 2 Jam2           | protein_coding         |
| ENSMUST00000021938 | 19 | 23 | 0 Aaed1          | protein_coding         |
| ENSMUST00000099384 | 19 | 23 | 0 Brd9           | protein_coding         |
| ENSMUST00000124495 | 19 | 23 | 0 Cep350         | protein_coding         |
| ENSMUST00000101123 | 19 | 22 | 6 Mitf           | protein_coding         |
| ENSMUST00000129641 | 19 | 22 | 0 Anapc15        | protein_coding         |
| ENSMUST00000137254 | 19 | 22 | 0 Gpr146         | protein_coding         |
| ENSMUST00000159390 | 19 | 22 | 0 Zeb1           | protein_coding         |
| ENSMUST00000049031 | 19 | 22 | 16 Fam63b        | protein_coding         |
| ENSMUST00000027290 | 19 | 22 | 8 Tmem131        | protein_coding         |
| ENSMUST00000157039 | 19 | 21 | 10 Haus8         | protein_coding         |
| ENSMUST00000129284 | 19 | 21 | 2 Mtx2           | protein_coding         |
| ENSMUST00000108759 | 19 | 20 | 26 Slc35f3       | protein_coding         |
| ENSMUST00000111978 | 19 | 20 | 77 Taok3         | protein_coding         |
| ENSMUST00000146850 | 19 | 19 | 50 Hecw2         | protein_coding         |
| ENSMUST00000102761 | 19 | 19 | 6 Cacnb4         | protein_coding         |
| ENSMUST00000170640 | 19 | 19 | 0 Ergic1         | protein_coding         |
| ENSMUST00000172057 | 19 | 19 | 0 Ralgps2        | protein_coding         |
| ENSMUST00000098966 | 19 | 18 | 10 A430078G23Rik | protein_coding         |
| ENSMUST00000040971 | 19 | 18 | 0 Capn5          | protein_coding         |
| ENSMUST00000069965 | 19 | 18 | 22 Cdk17         | protein_coding         |
| ENSMUST00000034339 | 19 | 18 | 12 Cdh5          | protein_coding         |
| ENSMUST00000177786 | 19 | 18 | 0 Gm2956         | protein_coding         |
| ENSMUST00000173358 | 19 | 18 | 0 Gm20396        | processed_pseudogene   |
| ENSMUST00000174068 | 19 | 17 | 456 Jarid2       | protein_coding         |
| ENSMUST00000161402 | 19 | 17 | 10 Nrnx1         | protein_coding         |
| ENSMUST00000030303 | 19 | 17 | 6 Cyp2j6         | protein_coding         |
| ENSMUST00000136779 | 19 | 17 | 2 Gm15261        | antisense              |
| ENSMUST00000167093 | 19 | 17 | 0 Vmn2r109       | protein_coding         |
| ENSMUST00000154592 | 19 | 17 | 0 Gm13166        | lincRNA                |
| ENSMUST00000151391 | 19 | 17 | 0 Gm13990        | antisense              |
| ENSMUST00000028769 | 19 | 16 | 40 Ptpra         | protein_coding         |
| ENSMUST00000182554 | 19 | 16 | 12 Ube2w         | protein_coding         |
| ENSMUST00000025500 | 19 | 16 | 10 Slc27a6       | protein_coding         |
| ENSMUST00000155433 | 19 | 16 | 6 Lonp2          | protein_coding         |
| ENSMUST00000165619 | 19 | 16 | 4 Gm3252         | protein_coding         |
| ENSMUST00000145643 | 19 | 16 | 2 Crebl2         | protein_coding         |
| ENSMUST00000154863 | 19 | 16 | 0 Heg1           | protein_coding         |
| ENSMUST00000131357 | 19 | 16 | 0 1700026J12Rik  | lincRNA                |
| ENSMUST00000112612 | 19 | 16 | 4 Glis3          | protein_coding         |
| ENSMUST00000026876 | 19 | 16 | 0 Crisp4         | protein_coding         |
| ENSMUST00000026009 | 19 | 15 | 24 Arl3          | protein_coding         |
| ENSMUST00000153191 | 19 | 15 | 14 Chid1         | protein_coding         |
| ENSMUST00000051091 | 19 | 15 | 6 Hist1h2be      | protein_coding         |
| ENSMUST00000177595 | 19 | 15 | 6 Fut8           | protein_coding         |
| ENSMUST00000161504 | 19 | 15 | 4 Exoc5          | protein_coding         |
| ENSMUST00000178457 | 19 | 15 | 2 Gm6604         | protein_coding         |

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|---------------------|----|----|------------------|----------------------|
| ENSMUST00000015796  | 19 | 15 | 0 Steap1         | protein_coding       |
| ENSMUST00000001126  | 19 | 14 | 38 Slc46a1       | protein_coding       |
| ENSMUST000000176850 | 19 | 14 | 12 Foxp1         | protein_coding       |
| ENSMUST000000169881 | 19 | 14 | 0 Gm17094        | antisense            |
| ENSMUST000000112825 | 19 | 14 | 8 Cacna1c        | protein_coding       |
| ENSMUST000000024798 | 19 | 13 | 32 Kif6          | protein_coding       |
| ENSMUST000000044068 | 19 | 13 | 32 Morc3         | protein_coding       |
| ENSMUST000000024575 | 19 | 13 | 22 Rps6ka2       | protein_coding       |
| ENSMUST000000053681 | 19 | 12 | 0 Frrs1l         | protein_coding       |
| ENSMUST00000005532  | 19 | 12 | 22 Nid1          | protein_coding       |
| ENSMUST000000047275 | 19 | 12 | 4 Bace2          | protein_coding       |
| ENSMUST000000132676 | 19 | 10 | 0 Pgs1           | protein_coding       |
| ENSMUST000000024707 | 19 | 9  | 6 Mep1a          | protein_coding       |
| ENSMUST000000027149 | 19 | 4  | 0 Lanc1          | protein_coding       |
| ENSMUST000000155811 | 19 | 2  | 0 Dnajc24        | protein_coding       |
| ENSMUST000000125318 | 19 | 0  | 16 Gm28496       | processed_transcript |
| ENSMUST000000144204 | 19 | 0  | 2 Ttc7           | protein_coding       |
| ENSMUST000000039047 | 19 | 0  | 0 Serpini2       | protein_coding       |
| ENSMUST000000066049 | 18 | 57 | 14 Tmem200a      | protein_coding       |
| ENSMUST000000159645 | 18 | 35 | 16 Vprbp         | protein_coding       |
| ENSMUST000000029848 | 18 | 33 | 38 Col24a1       | protein_coding       |
| ENSMUST000000111524 | 18 | 33 | 0 Ablim1         | protein_coding       |
| ENSMUST000000094604 | 18 | 28 | 6 Galk2          | protein_coding       |
| ENSMUST000000023507 | 18 | 28 | 4 Gsk3b          | protein_coding       |
| ENSMUST000000164647 | 18 | 27 | 127 Arhgap28     | protein_coding       |
| ENSMUST000000153125 | 18 | 27 | 16 Gucd1         | protein_coding       |
| ENSMUST000000138111 | 18 | 26 | 24 Evi5          | protein_coding       |
| ENSMUST000000086721 | 18 | 26 | 4 2310035C23Rik  | protein_coding       |
| ENSMUST000000131998 | 18 | 26 | 22 BC051142      | protein_coding       |
| ENSMUST000000149024 | 18 | 26 | 0 Snx10          | protein_coding       |
| ENSMUST000000169094 | 18 | 26 | 0 G3bp2          | protein_coding       |
| ENSMUST000000035780 | 18 | 25 | 6 Oma1           | protein_coding       |
| ENSMUST000000156818 | 18 | 25 | 0 Gm8975         | protein_coding       |
| ENSMUST000000133301 | 18 | 24 | 2 Gm14410        | protein_coding       |
| ENSMUST000000162611 | 18 | 24 | 2 Atxn2          | protein_coding       |
| ENSMUST000000022204 | 18 | 24 | 0 Kif2a          | protein_coding       |
| ENSMUST000000088542 | 18 | 24 | 0 Xkr9           | protein_coding       |
| ENSMUST000000094452 | 18 | 24 | 0 Wscd2          | protein_coding       |
| ENSMUST000000114703 | 18 | 23 | 0 Plxdc2         | protein_coding       |
| ENSMUST000000121564 | 18 | 22 | 2 Fam118b        | protein_coding       |
| ENSMUST000000109102 | 18 | 22 | 52 Cdy12         | protein_coding       |
| ENSMUST000000037879 | 18 | 22 | 2 Heca           | protein_coding       |
| ENSMUST000000003436 | 18 | 22 | 0 Abhd17a        | protein_coding       |
| ENSMUST000000041587 | 18 | 22 | 0 Gga1           | protein_coding       |
| ENSMUST000000038237 | 18 | 21 | 0 Thoc5          | protein_coding       |
| ENSMUST000000129619 | 18 | 20 | 40 Csm2          | protein_coding       |
| ENSMUST000000071539 | 18 | 20 | 6 Slc39a11       | protein_coding       |
| ENSMUST000000152730 | 18 | 20 | 6 Rhox13         | protein_coding       |
| ENSMUST000000098057 | 18 | 20 | 4 Musk           | protein_coding       |
| ENSMUST000000119035 | 18 | 20 | 2 Hsf3           | protein_coding       |
| ENSMUST000000182532 | 18 | 20 | 16 Schip1        | protein_coding       |
| ENSMUST00000015791  | 18 | 19 | 14 Lama5         | protein_coding       |
| ENSMUST000000119958 | 18 | 19 | 14 Cyp4a30b      | protein_coding       |
| ENSMUST000000167705 | 18 | 19 | 12 Lrrk1         | protein_coding       |
| ENSMUST000000035222 | 18 | 19 | 10 Slc25a20      | protein_coding       |
| ENSMUST000000037029 | 18 | 19 | 10 9430020K01Rik | protein_coding       |
| ENSMUST000000117658 | 18 | 19 | 6 Disc1          | protein_coding       |
| ENSMUST000000150671 | 18 | 19 | 4 2010204K13Rik  | processed_transcript |
| ENSMUST000000044332 | 18 | 18 | 20 CerK          | protein_coding       |
| ENSMUST000000035033 | 18 | 18 | 0 Copb2          | protein_coding       |
| ENSMUST000000130664 | 18 | 18 | 0 2810474O19Rik  | protein_coding       |
| ENSMUST000000152827 | 18 | 18 | 0 4930406D18Rik  | lincRNA              |
| ENSMUST000000144461 | 18 | 18 | 65 Donson        | protein_coding       |
| ENSMUST000000166811 | 18 | 18 | 34 Ncam1         | protein_coding       |
| ENSMUST000000136286 | 18 | 18 | 20 Cpeb3         | protein_coding       |
| ENSMUST000000115776 | 18 | 18 | 6 Ube2v2         | protein_coding       |
| ENSMUST000000165963 | 18 | 18 | 6 Fam196b        | protein_coding       |
| ENSMUST000000092926 | 18 | 18 | 0 Spata22        | protein_coding       |

|                     |    |    |     |               |                      |
|---------------------|----|----|-----|---------------|----------------------|
| ENSMUST00000121173  | 18 | 18 | 0   | Gm11765       | processed_pseudogene |
| ENSMUST00000088811  | 18 | 17 | 4   | Zfp160        | protein_coding       |
| ENSMUST00000029651  | 18 | 17 | 0   | Gstcd         | protein_coding       |
| ENSMUST00000069686  | 18 | 16 | 14  | Rnf180        | protein_coding       |
| ENSMUST00000070522  | 18 | 16 | 14  | Plod2         | protein_coding       |
| ENSMUST00000030296  | 18 | 16 | 12  | Txndc12       | protein_coding       |
| ENSMUST00000065143  | 18 | 16 | 10  | Bcor          | protein_coding       |
| ENSMUST00000134543  | 18 | 16 | 6   | Rasal2        | protein_coding       |
| ENSMUST00000159787  | 18 | 16 | 4   | Hgd           | protein_coding       |
| ENSMUST00000079964  | 18 | 16 | 0   | 4930473A02Rik | processed_transcript |
| ENSMUST00000137698  | 18 | 16 | 40  | Chrac1        | protein_coding       |
| ENSMUST00000015628  | 18 | 16 | 14  | Fam163a       | protein_coding       |
| ENSMUST00000073089  | 18 | 16 | 4   | Fam73a        | protein_coding       |
| ENSMUST00000109578  | 18 | 16 | 2   | Vps54         | protein_coding       |
| ENSMUST00000069097  | 18 | 15 | 30  | Ago3          | protein_coding       |
| ENSMUST00000124352  | 18 | 15 | 0   | Rad50         | protein_coding       |
| ENSMUST00000168907  | 18 | 14 | 8   | Sgk3          | protein_coding       |
| ENSMUST00000125904  | 18 | 14 | 0   | Cntn4         | protein_coding       |
| ENSMUST00000110097  | 18 | 12 | 0   | Wnk2          | protein_coding       |
| ENSMUST00000176191  | 18 | 12 | 0   | Kcnip4        | protein_coding       |
| ENSMUST00000072955  | 18 | 12 | 12  | Fam171a1      | protein_coding       |
| ENSMUST00000143064  | 18 | 11 | 50  | 1700047F07Rik | lincRNA              |
| ENSMUST00000141404  | 18 | 11 | 0   | Tfg           | protein_coding       |
| ENSMUST00000164856  | 18 | 10 | 2   | Vmn2r116      | protein_coding       |
| ENSMUST00000174696  | 18 | 10 | 0   | Cyp3a57       | protein_coding       |
| ENSMUST00000111134  | 18 | 9  | 10  | Smyd3         | protein_coding       |
| ENSMUST00000009354  | 18 | 9  | 0   | 2310007L24Rik | protein_coding       |
| ENSMUST00000039331  | 18 | 8  | 48  | Igsf21        | protein_coding       |
| ENSMUST00000073782  | 18 | 8  | 4   | Zfp937        | protein_coding       |
| ENSMUST00000075767  | 18 | 6  | 204 | Frmd4a        | protein_coding       |
| ENSMUST00000115411  | 18 | 5  | 0   | Pdpk1         | protein_coding       |
| ENSMUST000000094593 | 18 | 5  | 2   | D5Erttd577e   | protein_coding       |
| ENSMUST00000146679  | 18 | 3  | 22  | Gm12930       | antisense            |
| ENSMUST00000023631  | 18 | 1  | 0   | Brwd1         | protein_coding       |
| ENSMUST00000107950  | 18 | 0  | 46  | 2410002F23Rik | protein_coding       |
| ENSMUST00000133493  | 17 | 44 | 12  | Ube2u         | protein_coding       |
| ENSMUST00000059844  | 17 | 31 | 4   | Cnpy3         | protein_coding       |
| ENSMUST00000185068  | 17 | 30 | 6   | Impg1         | protein_coding       |
| ENSMUST00000132550  | 17 | 28 | 4   | Tle1          | protein_coding       |
| ENSMUST00000069345  | 17 | 28 | 0   | Itgb5         | protein_coding       |
| ENSMUST00000024738  | 17 | 28 | 2   | Sult1c1       | protein_coding       |
| ENSMUST00000031172  | 17 | 28 | 0   | Gnrhr         | protein_coding       |
| ENSMUST00000127015  | 17 | 27 | 0   | Gm12367       | processed_transcript |
| ENSMUST00000040912  | 17 | 26 | 12  | Anln          | protein_coding       |
| ENSMUST00000106241  | 17 | 26 | 4   | Pabpc4        | protein_coding       |
| ENSMUST00000105534  | 17 | 26 | 2   | Aig1          | protein_coding       |
| ENSMUST00000006544  | 17 | 25 | 4   | Gcat          | protein_coding       |
| ENSMUST00000066134  | 17 | 25 | 0   | Rpia          | protein_coding       |
| ENSMUST00000115330  | 17 | 24 | 8   | Pot1a         | protein_coding       |
| ENSMUST00000114328  | 17 | 24 | 0   | Tex28         | protein_coding       |
| ENSMUST00000183752  | 17 | 24 | 0   | Gm27167       | lincRNA              |
| ENSMUST00000039449  | 17 | 24 | 10  | Ltn1          | protein_coding       |
| ENSMUST00000171176  | 17 | 24 | 2   | Trpm8         | protein_coding       |
| ENSMUST00000023072  | 17 | 23 | 56  | Parvb         | protein_coding       |
| ENSMUST00000155466  | 17 | 23 | 48  | Gm20696       | protein_coding       |
| ENSMUST00000114769  | 17 | 23 | 8   | Fhl1          | protein_coding       |
| ENSMUST00000033900  | 17 | 23 | 2   | Rab20         | protein_coding       |
| ENSMUST00000029907  | 17 | 22 | 16  | Ubxn2b        | protein_coding       |
| ENSMUST00000125685  | 17 | 22 | 14  | Fam169b       | lincRNA              |
| ENSMUST00000115386  | 17 | 22 | 6   | Adam22        | protein_coding       |
| ENSMUST00000176692  | 17 | 22 | 4   | Slc13a1       | protein_coding       |
| ENSMUST00000044138  | 17 | 22 | 0   | Chst7         | protein_coding       |
| ENSMUST00000110763  | 17 | 22 | 0   | Defb5         | protein_coding       |
| ENSMUST00000146040  | 17 | 21 | 30  | Atxn711       | protein_coding       |
| ENSMUST00000162877  | 17 | 21 | 18  | Nckap5        | protein_coding       |
| ENSMUST00000161753  | 17 | 21 | 16  | Wwox          | protein_coding       |
| ENSMUST00000047194  | 17 | 21 | 0   | Igsf6         | protein_coding       |
| ENSMUST00000093812  | 17 | 20 | 18  | Cd109         | protein_coding       |



|                    |    |    |                 |                        |
|--------------------|----|----|-----------------|------------------------|
| ENSMUST00000123859 | 17 | 20 | 2 Cerkl         | protein_coding         |
| ENSMUST00000125664 | 17 | 20 | 2 Lppr4         | protein_coding         |
| ENSMUST00000162610 | 17 | 20 | 2 Aig1          | protein_coding         |
| ENSMUST00000160035 | 17 | 20 | 28 Xylt1        | protein_coding         |
| ENSMUST00000022322 | 17 | 20 | 2 Glud1         | protein_coding         |
| ENSMUST00000040128 | 17 | 19 | 0 Atp8b4        | protein_coding         |
| ENSMUST00000087933 | 17 | 19 | 0 Tpp2          | protein_coding         |
| ENSMUST00000148702 | 17 | 18 | 57 Uimc1        | protein_coding         |
| ENSMUST00000042158 | 17 | 18 | 22 Esyt3        | protein_coding         |
| ENSMUST00000002436 | 17 | 18 | 20 Snx9         | protein_coding         |
| ENSMUST00000117828 | 17 | 18 | 12 Abhd3        | protein_coding         |
| ENSMUST00000098817 | 17 | 18 | 8 Vps37a        | protein_coding         |
| ENSMUST00000151067 | 17 | 18 | 8 Tmem29        | protein_coding         |
| ENSMUST00000105778 | 17 | 18 | 0 Prdm2         | protein_coding         |
| ENSMUST00000032594 | 17 | 18 | 172 Ttyh1       | protein_coding         |
| ENSMUST00000035237 | 17 | 18 | 46 Usp4         | protein_coding         |
| ENSMUST00000136671 | 17 | 18 | 14 Plekhg1      | protein_coding         |
| ENSMUST00000145245 | 17 | 18 | 14 Dlc1         | protein_coding         |
| ENSMUST00000159176 | 17 | 18 | 6 Fam20c        | protein_coding         |
| ENSMUST00000178589 | 17 | 18 | 2 Gm7398        | unprocessed_pseudogene |
| ENSMUST00000133966 | 17 | 18 | 0 Ptger4        | protein_coding         |
| ENSMUST00000137671 | 17 | 18 | 0 AA415398      | protein_coding         |
| ENSMUST00000131103 | 17 | 17 | 22 Actg1        | protein_coding         |
| ENSMUST00000109565 | 17 | 17 | 2 Gpr98         | protein_coding         |
| ENSMUST00000020012 | 17 | 17 | 0 Qrs1          | protein_coding         |
| ENSMUST00000044060 | 17 | 16 | 2 Cd209c        | protein_coding         |
| ENSMUST00000054684 | 17 | 16 | 0 Rnf130        | protein_coding         |
| ENSMUST00000111159 | 17 | 16 | 0 Akt3          | protein_coding         |
| ENSMUST00000163719 | 17 | 16 | 0 Gm8281        | protein_coding         |
| ENSMUST00000181562 | 17 | 16 | 0 Gm3488        | protein_coding         |
| ENSMUST00000092990 | 17 | 16 | 44 Agpat9       | protein_coding         |
| ENSMUST00000032376 | 17 | 16 | 8 Lmcd1         | protein_coding         |
| ENSMUST00000176018 | 17 | 16 | 8 Cers6         | protein_coding         |
| ENSMUST00000127146 | 17 | 16 | 4 Ccdc77        | protein_coding         |
| ENSMUST00000090379 | 17 | 15 | 14 Usp53        | protein_coding         |
| ENSMUST00000181598 | 17 | 15 | 2 1500026H17Rik | lincRNA                |
| ENSMUST00000005503 | 17 | 15 | 0 Msh6          | protein_coding         |
| ENSMUST00000029178 | 17 | 15 | 0 Ctnnbl1       | protein_coding         |
| ENSMUST00000130785 | 17 | 14 | 6 4933413G19Rik | protein_coding         |
| ENSMUST00000155355 | 17 | 14 | 2 Cercam        | protein_coding         |
| ENSMUST00000051065 | 17 | 14 | 0 Gprin3        | protein_coding         |
| ENSMUST00000130472 | 17 | 14 | 0 Dennd1a       | protein_coding         |
| ENSMUST00000051239 | 17 | 14 | 8 Sptssb        | protein_coding         |
| ENSMUST00000110536 | 17 | 14 | 4 Arid4b        | protein_coding         |
| ENSMUST00000170480 | 17 | 14 | 2 Gm3002        | protein_coding         |
| ENSMUST00000167432 | 17 | 13 | 22 Slc26a3      | protein_coding         |
| ENSMUST00000014691 | 17 | 13 | 14 Wdfy2        | protein_coding         |
| ENSMUST00000024869 | 17 | 12 | 22 Spast        | protein_coding         |
| ENSMUST00000177492 | 17 | 12 | 2 Gm20611       | lincRNA                |
| ENSMUST00000101492 | 17 | 12 | 0 E330009J07Rik | protein_coding         |
| ENSMUST00000053568 | 17 | 12 | 36 Lingo1       | protein_coding         |
| ENSMUST00000043094 | 17 | 12 | 2 Itln1         | protein_coding         |
| ENSMUST00000043675 | 17 | 12 | 2 Atp5l         | protein_coding         |
| ENSMUST00000078404 | 17 | 10 | 0 Pcbp2         | protein_coding         |
| ENSMUST00000182702 | 17 | 5  | 12 Sipal1l3     | protein_coding         |
| ENSMUST00000140497 | 17 | 1  | 8 Zdhhc3        | protein_coding         |
| ENSMUST00000159228 | 17 | 0  | 6 Poc1b         | protein_coding         |
| ENSMUST00000102709 | 16 | 41 | 8 Abcb11        | protein_coding         |
| ENSMUST00000175990 | 16 | 40 | 0 Zfp597        | protein_coding         |
| ENSMUST00000037478 | 16 | 34 | 0 Slc18a1       | protein_coding         |
| ENSMUST00000096575 | 16 | 33 | 12 Map3k2       | protein_coding         |
| ENSMUST00000110383 | 16 | 32 | 32 Fam65b       | protein_coding         |
| ENSMUST00000091879 | 16 | 28 | 2 Zfp942        | protein_coding         |
| ENSMUST00000109678 | 16 | 28 | 4 4930415F15Rik | protein_coding         |
| ENSMUST00000178092 | 16 | 26 | 10 Pnp          | protein_coding         |
| ENSMUST00000182944 | 16 | 26 | 14 Birc6        | protein_coding         |
| ENSMUST00000112680 | 16 | 26 | 0 Epb4.1l3      | protein_coding         |
| ENSMUST00000045540 | 16 | 24 | 6 Socs7         | protein_coding         |

|                     |    |    |     |               |                                    |
|---------------------|----|----|-----|---------------|------------------------------------|
| ENSMUST00000152065  | 16 | 24 | 6   | Adcy3         | protein_coding                     |
| ENSMUST00000023143  | 16 | 24 | 232 | Litaf         | protein_coding                     |
| ENSMUST00000171604  | 16 | 23 | 2   | Cyp2c70       | protein_coding                     |
| ENSMUST00000071325  | 16 | 22 | 28  | Nf1           | protein_coding                     |
| ENSMUST00000148267  | 16 | 22 | 4   | Sh3rf3        | protein_coding                     |
| ENSMUST00000093290  | 16 | 22 | 0   | Peli1         | protein_coding                     |
| ENSMUST00000138659  | 16 | 22 | 8   | Gnao1         | protein_coding                     |
| ENSMUST00000136879  | 16 | 22 | 6   | Gm13561       | antisense                          |
| ENSMUST00000138611  | 16 | 21 | 30  | Ino80dos      | lincRNA                            |
| ENSMUST00000133642  | 16 | 21 | 6   | Man1a2        | protein_coding                     |
| ENSMUST00000167914  | 16 | 21 | 0   | Gm26965       | protein_coding                     |
| ENSMUST00000142551  | 16 | 20 | 56  | Cdh13         | protein_coding                     |
| ENSMUST00000034964  | 16 | 20 | 24  | Tipin         | protein_coding                     |
| ENSMUST00000144236  | 16 | 20 | 20  | Mcfd2         | protein_coding                     |
| ENSMUST00000114676  | 16 | 20 | 6   | Mbp           | protein_coding                     |
| ENSMUST00000029927  | 16 | 20 | 2   | Spaca1        | protein_coding                     |
| ENSMUST00000147223  | 16 | 20 | 0   | Entpd6        | protein_coding                     |
| ENSMUST00000114706  | 16 | 20 | 16  | Igsf11        | protein_coding                     |
| ENSMUST00000139643  | 16 | 20 | 6   | Pnpla7        | protein_coding                     |
| ENSMUST00000097023  | 16 | 20 | 0   | Trim6         | protein_coding                     |
| ENSMUST00000180611  | 16 | 20 | 0   | Dmxl1         | protein_coding                     |
| ENSMUST00000058868  | 16 | 19 | 20  | 9530077C05Rik | protein_coding                     |
| ENSMUST00000140890  | 16 | 19 | 10  | Sft2d1        | protein_coding                     |
| ENSMUST00000048274  | 16 | 19 | 6   | Ttc39b        | protein_coding                     |
| ENSMUST00000160854  | 16 | 19 | 0   | Gulp1         | protein_coding                     |
| ENSMUST00000026886  | 16 | 18 | 24  | Itih5         | protein_coding                     |
| ENSMUST00000110835  | 16 | 18 | 24  | Elf1          | protein_coding                     |
| ENSMUST00000019118  | 16 | 18 | 14  | Sart3         | protein_coding                     |
| ENSMUST00000056978  | 16 | 18 | 14  | Kif13a        | protein_coding                     |
| ENSMUST00000031533  | 16 | 18 | 8   | Tfec          | protein_coding                     |
| ENSMUST00000034448  | 16 | 18 | 8   | Glb1l3        | protein_coding                     |
| ENSMUST000000091184 | 16 | 18 | 2   | Slc25a31      | protein_coding                     |
| ENSMUST00000028076  | 16 | 18 | 0   | Mlt10         | protein_coding                     |
| ENSMUST00000134384  | 16 | 18 | 20  | Lypla1        | protein_coding                     |
| ENSMUST00000115209  | 16 | 18 | 12  | Nrf1          | protein_coding                     |
| ENSMUST00000115272  | 16 | 18 | 4   | Sept7         | protein_coding                     |
| ENSMUST00000174200  | 16 | 18 | 0   | Gm20543       | processed_pseudogene               |
| ENSMUST00000096347  | 16 | 17 | 8   | Enthd1        | protein_coding                     |
| ENSMUST00000065967  | 16 | 17 | 4   | Pld5          | protein_coding                     |
| ENSMUST00000102701  | 16 | 17 | 4   | Dcaf17        | protein_coding                     |
| ENSMUST00000110346  | 16 | 17 | 2   | Tenm3         | protein_coding                     |
| ENSMUST00000068355  | 16 | 16 | 2   | Opn5          | protein_coding                     |
| ENSMUST00000163677  | 16 | 16 | 2   | Snx13         | protein_coding                     |
| ENSMUST00000163705  | 16 | 16 | 2   | Al317395      | protein_coding                     |
| ENSMUST00000132669  | 16 | 16 | 20  | Ppp4r1l-ps    | transcribed_unprocessed_pseudogene |
| ENSMUST00000156092  | 16 | 16 | 8   | Spta1         | protein_coding                     |
| ENSMUST00000180686  | 16 | 16 | 8   | Gm26839       | lincRNA                            |
| ENSMUST00000088291  | 16 | 16 | 6   | Stk4          | protein_coding                     |
| ENSMUST00000120457  | 16 | 16 | 2   | Adat1         | protein_coding                     |
| ENSMUST00000134099  | 16 | 16 | 2   | Gm12519       | lincRNA                            |
| ENSMUST00000139013  | 16 | 16 | 0   | Abcg1         | protein_coding                     |
| ENSMUST00000145853  | 16 | 15 | 22  | Hltf          | protein_coding                     |
| ENSMUST00000029380  | 16 | 15 | 6   | Wwtr1         | protein_coding                     |
| ENSMUST00000135919  | 16 | 15 | 6   | Itga4         | protein_coding                     |
| ENSMUST00000173023  | 16 | 15 | 4   | Aim2          | protein_coding                     |
| ENSMUST00000112334  | 16 | 15 | 0   | Reps2         | protein_coding                     |
| ENSMUST00000126311  | 16 | 14 | 48  | Col26a1       | protein_coding                     |
| ENSMUST00000112778  | 16 | 14 | 0   | 2610042L04Rik | protein_coding                     |
| ENSMUST00000130716  | 16 | 14 | 38  | Mtmr3         | protein_coding                     |
| ENSMUST00000113387  | 16 | 14 | 6   | Eogt          | protein_coding                     |
| ENSMUST00000144339  | 16 | 14 | 0   | Gm16041       | antisense                          |
| ENSMUST00000120555  | 16 | 13 | 4   | Dpp6          | protein_coding                     |
| ENSMUST00000103223  | 16 | 13 | 0   | Spaca3        | protein_coding                     |
| ENSMUST00000123128  | 16 | 12 | 44  | Myo5a         | protein_coding                     |
| ENSMUST00000180750  | 16 | 12 | 18  | 9530052E02Rik | lincRNA                            |
| ENSMUST00000038665  | 16 | 12 | 0   | Ptchd1        | protein_coding                     |
| ENSMUST00000124316  | 16 | 12 | 14  | Myo1h         | protein_coding                     |
| ENSMUST00000089616  | 16 | 12 | 0   | Actg1         | protein_coding                     |

|                    |    |    |     |               |                        |
|--------------------|----|----|-----|---------------|------------------------|
| ENSMUST00000114415 | 16 | 11 | 14  | Satb2         | protein_coding         |
| ENSMUST00000130601 | 16 | 11 | 8   | Rabgap1       | protein_coding         |
| ENSMUST00000022998 | 16 | 11 | 0   | Mtbp          | protein_coding         |
| ENSMUST00000113495 | 16 | 10 | 4   | Taf9b         | protein_coding         |
| ENSMUST00000073392 | 16 | 10 | 2   | Rpgr          | protein_coding         |
| ENSMUST00000120929 | 16 | 10 | 0   | Tsks          | protein_coding         |
| ENSMUST00000021004 | 16 | 9  | 0   | Sntg2         | protein_coding         |
| ENSMUST00000181157 | 16 | 9  | 113 | Gm26650       | processed_transcript   |
| ENSMUST00000040518 | 16 | 9  | 18  | Eif3l         | protein_coding         |
| ENSMUST00000176114 | 16 | 9  | 8   | Zfp536        | protein_coding         |
| ENSMUST00000140446 | 16 | 9  | 0   | Chchd3        | protein_coding         |
| ENSMUST00000171155 | 16 | 7  | 4   | Klhl25        | protein_coding         |
| ENSMUST00000106059 | 16 | 6  | 6   | S100pbb       | protein_coding         |
| ENSMUST00000041984 | 16 | 6  | 4   | Akap7         | protein_coding         |
| ENSMUST00000112467 | 16 | 5  | 0   | Gm14446       | protein_coding         |
| ENSMUST00000064054 | 16 | 3  | 4   | Syt1          | protein_coding         |
| ENSMUST00000141387 | 16 | 2  | 18  | Syp12         | protein_coding         |
| ENSMUST00000037708 | 16 | 1  | 557 | Asic4         | protein_coding         |
| ENSMUST00000130766 | 16 | 1  | 0   | Rbm17         | processed_transcript   |
| ENSMUST00000130766 | 16 | 1  | 0   | Rbm17         | processed_transcript   |
| ENSMUST00000155805 | 16 | 0  | 32  | Rps16         | protein_coding         |
| ENSMUST00000147460 | 16 | 37 | 0   | Oraov1        | protein_coding         |
| ENSMUST00000176948 | 16 | 37 | 0   | Pon3          | protein_coding         |
| ENSMUST00000090826 | 16 | 33 | 26  | Rapgef4       | protein_coding         |
| ENSMUST00000062654 | 16 | 31 | 0   | B3gnt11       | protein_coding         |
| ENSMUST00000150915 | 16 | 30 | 85  | Ssbp3         | protein_coding         |
| ENSMUST00000146119 | 16 | 27 | 6   | Gm7546        | antisense              |
| ENSMUST00000047666 | 16 | 26 | 6   | Pgm5          | protein_coding         |
| ENSMUST00000169667 | 16 | 26 | 0   | Mtbp          | protein_coding         |
| ENSMUST00000169713 | 16 | 26 | 38  | Plce1         | protein_coding         |
| ENSMUST00000135913 | 16 | 26 | 22  | 5830417110Rik | unprocessed_pseudogene |
| ENSMUST00000120509 | 16 | 25 | 20  | Sgk1          | protein_coding         |
| ENSMUST00000177284 | 16 | 24 | 0   | Gm20643       | antisense              |
| ENSMUST00000171813 | 16 | 24 | 8   | Esp8          | protein_coding         |
| ENSMUST00000140699 | 16 | 23 | 67  | Tshz2         | protein_coding         |
| ENSMUST00000038719 | 16 | 23 | 0   | Nudcd1        | protein_coding         |
| ENSMUST00000180042 | 16 | 23 | 0   | Muc19         | processed_transcript   |
| ENSMUST00000142363 | 16 | 22 | 0   | Dnhd1         | protein_coding         |
| ENSMUST00000182823 | 16 | 22 | 10  | Pcmt1         | protein_coding         |
| ENSMUST00000126010 | 16 | 22 | 8   | Kpna6         | protein_coding         |
| ENSMUST00000087341 | 16 | 22 | 2   | Kif20b        | protein_coding         |
| ENSMUST00000105705 | 16 | 22 | 0   | Fbxo44        | protein_coding         |
| ENSMUST00000111825 | 16 | 22 | 0   | Slco1a5       | protein_coding         |
| ENSMUST00000114423 | 16 | 22 | 0   | Boll          | protein_coding         |
| ENSMUST00000163455 | 16 | 21 | 20  | Matn2         | protein_coding         |
| ENSMUST00000115313 | 16 | 21 | 2   | Klhl13        | protein_coding         |
| ENSMUST00000015486 | 16 | 21 | 0   | Xk            | protein_coding         |
| ENSMUST00000181387 | 16 | 20 | 14  | Gm26749       | lincRNA                |
| ENSMUST00000147337 | 16 | 20 | 4   | Mapkap1       | protein_coding         |
| ENSMUST00000124141 | 16 | 19 | 10  | Shroom2       | protein_coding         |
| ENSMUST00000125163 | 16 | 19 | 0   | Rdh16         | protein_coding         |
| ENSMUST00000145066 | 16 | 19 | 0   | Trmt2b        | protein_coding         |
| ENSMUST00000109473 | 16 | 18 | 8   | Gm14221       | protein_coding         |
| ENSMUST00000183714 | 16 | 18 | 0   | Synrg         | protein_coding         |
| ENSMUST00000113980 | 16 | 18 | 44  | M1ap          | protein_coding         |
| ENSMUST00000026700 | 16 | 18 | 8   | Map3k7cl      | protein_coding         |
| ENSMUST00000113720 | 16 | 18 | 0   | Nsun7         | protein_coding         |
| ENSMUST00000027322 | 16 | 17 | 8   | Rhbdd1        | protein_coding         |
| ENSMUST00000180109 | 16 | 17 | 0   | Gm14598       | unprocessed_pseudogene |
| ENSMUST00000101326 | 16 | 16 | 83  | Ebf1          | protein_coding         |
| ENSMUST00000034162 | 16 | 16 | 18  | Pmfbp1        | protein_coding         |
| ENSMUST00000115017 | 16 | 16 | 6   | Agbl3         | protein_coding         |
| ENSMUST00000028118 | 16 | 16 | 4   | Prkcq         | protein_coding         |
| ENSMUST00000175821 | 16 | 16 | 4   | Zfp738        | protein_coding         |
| ENSMUST00000073962 | 16 | 16 | 0   | Fbxw24        | protein_coding         |
| ENSMUST00000165400 | 16 | 16 | 0   | AW554918      | protein_coding         |
| ENSMUST00000134770 | 16 | 16 | 0   | Alkbh5        | protein_coding         |
| ENSMUST00000162298 | 16 | 16 | 0   | Btd8          | protein_coding         |

|                    |    |    |      |               |                        |
|--------------------|----|----|------|---------------|------------------------|
| ENSMUST00000167460 | 16 | 16 | 0    | Corin         | protein_coding         |
| ENSMUST00000068378 | 16 | 15 | 6    | Cntn1         | protein_coding         |
| ENSMUST00000030984 | 16 | 15 | 4    | Rgs12         | protein_coding         |
| ENSMUST00000051137 | 16 | 15 | 4    | E030002O03Rik | protein_coding         |
| ENSMUST00000001036 | 16 | 15 | 2    | Tyk2          | protein_coding         |
| ENSMUST00000098098 | 16 | 15 | 2    | Rnf38         | protein_coding         |
| ENSMUST00000147853 | 16 | 15 | 2    | Txndc16       | protein_coding         |
| ENSMUST00000140910 | 16 | 15 | 0    | Slc22a29      | protein_coding         |
| ENSMUST00000013759 | 16 | 14 | 8    | Fnbp4         | protein_coding         |
| ENSMUST00000102843 | 16 | 14 | 6    | Rtn4          | protein_coding         |
| ENSMUST00000159999 | 16 | 14 | 2    | Cfap43        | protein_coding         |
| ENSMUST00000177285 | 16 | 14 | 0    | Gm20679       | unprocessed_pseudogene |
| ENSMUST00000166367 | 16 | 14 | 0    | Cul5          | protein_coding         |
| ENSMUST00000162645 | 16 | 14 | 28   | Zmiz1         | protein_coding         |
| ENSMUST00000048885 | 16 | 14 | 4    | Adamtsl1      | protein_coding         |
| ENSMUST00000088904 | 16 | 14 | 0    | Espnl         | protein_coding         |
| ENSMUST00000181033 | 16 | 13 | 115  | Gm26552       | processed_transcript   |
| ENSMUST00000107100 | 16 | 13 | 8    | Map6          | protein_coding         |
| ENSMUST00000046807 | 16 | 13 | 6    | Slc16a9       | protein_coding         |
| ENSMUST00000041641 | 16 | 13 | 4    | Capn15        | protein_coding         |
| ENSMUST00000127724 | 16 | 13 | 4    | Slc23a2       | protein_coding         |
| ENSMUST00000182726 | 16 | 13 | 4    | Ank2          | protein_coding         |
| ENSMUST00000039153 | 16 | 13 | 0    | Cept1         | protein_coding         |
| ENSMUST00000146554 | 16 | 12 | 16   | 2810471M01Rik | lincRNA                |
| ENSMUST00000166494 | 16 | 12 | 2    | Gm2897        | protein_coding         |
| ENSMUST00000069360 | 16 | 12 | 63   | Gpc3          | protein_coding         |
| ENSMUST00000110600 | 16 | 12 | 32   | Wasf3         | protein_coding         |
| ENSMUST00000017751 | 16 | 12 | 4    | Tns4          | protein_coding         |
| ENSMUST00000016673 | 16 | 12 | 0    | Il10          | protein_coding         |
| ENSMUST00000113333 | 16 | 12 | 0    | Ugt2b34       | protein_coding         |
| ENSMUST00000151788 | 16 | 12 | 0    | Casp12        | protein_coding         |
| ENSMUST00000152838 | 16 | 12 | 0    | Lrch2         | protein_coding         |
| ENSMUST00000033865 | 16 | 11 | 2    | Nek3          | protein_coding         |
| ENSMUST00000120239 | 16 | 11 | 2    | Sirt1         | protein_coding         |
| ENSMUST00000149876 | 16 | 11 | 0    | Dhx32         | protein_coding         |
| ENSMUST00000113104 | 16 | 10 | 2    | Kir3dl1       | protein_coding         |
| ENSMUST00000160604 | 16 | 10 | 2    | Gm15689       | antisense              |
| ENSMUST00000145595 | 16 | 10 | 0    | Psd3          | protein_coding         |
| ENSMUST00000058829 | 16 | 9  | 18   | Neto1         | protein_coding         |
| ENSMUST00000075693 | 16 | 9  | 12   | Yipf1         | protein_coding         |
| ENSMUST00000180428 | 16 | 9  | 4    | Gm26692       | lincRNA                |
| ENSMUST00000015256 | 16 | 9  | 2    | Slc25a13      | protein_coding         |
| ENSMUST00000180615 | 16 | 9  | 0    | Gm26655       | processed_transcript   |
| ENSMUST00000180965 | 16 | 9  | 0    | Gm26893       | processed_transcript   |
| ENSMUST00000181772 | 16 | 9  | 0    | Gm26886       | processed_transcript   |
| ENSMUST00000174328 | 16 | 9  | 2    | Gm5583        | unprocessed_pseudogene |
| ENSMUST00000046901 | 16 | 7  | 1009 | Pdgfa         | protein_coding         |
| ENSMUST00000038336 | 16 | 7  | 6    | Pkhd1l1       | protein_coding         |
| ENSMUST00000049836 | 16 | 6  | 16   | Specc1        | protein_coding         |
| ENSMUST00000102694 | 16 | 5  | 0    | Ptgfrn        | protein_coding         |
| ENSMUST00000166772 | 16 | 4  | 0    | Vrtn          | protein_coding         |
| ENSMUST00000148083 | 16 | 3  | 6    | Gca           | protein_coding         |
| ENSMUST00000071182 | 16 | 3  | 0    | E330014E10Rik | protein_coding         |
| ENSMUST00000017859 | 16 | 1  | 0    | Pgs1          | protein_coding         |
| ENSMUST00000046972 | 15 | 34 | 0    | Rbm27         | protein_coding         |
| ENSMUST00000103181 | 15 | 32 | 4    | Cds2          | protein_coding         |
| ENSMUST00000045296 | 15 | 30 | 0    | Siah1a        | protein_coding         |
| ENSMUST00000115467 | 15 | 27 | 28   | Tes           | protein_coding         |
| ENSMUST00000154040 | 15 | 27 | 10   | Cfap97        | protein_coding         |
| ENSMUST00000049393 | 15 | 27 | 0    | Zfp113        | protein_coding         |
| ENSMUST00000047357 | 15 | 26 | 24   | Cpsf2         | protein_coding         |
| ENSMUST00000165242 | 15 | 25 | 24   | Eefsec        | protein_coding         |
| ENSMUST00000143254 | 15 | 25 | 16   | Svil          | protein_coding         |
| ENSMUST00000161540 | 15 | 24 | 12   | Gm17017       | antisense              |
| ENSMUST00000027287 | 15 | 24 | 20   | Inpp4a        | protein_coding         |
| ENSMUST00000180395 | 15 | 23 | 2    | Gm26719       | lincRNA                |
| ENSMUST00000127429 | 15 | 23 | 0    | Gm10371       | antisense              |
| ENSMUST00000108744 | 15 | 22 | 16   | 170008F21Rik  | protein_coding         |

|                    |    |    |      |               |                                    |
|--------------------|----|----|------|---------------|------------------------------------|
| ENSMUST00000179404 | 15 | 22 | 16   | Gm10256       | protein_coding                     |
| ENSMUST00000153348 | 15 | 22 | 0    | Susd4         | protein_coding                     |
| ENSMUST00000128120 | 15 | 21 | 6    | Gpr98         | protein_coding                     |
| ENSMUST00000162863 | 15 | 21 | 6    | Mapk4         | protein_coding                     |
| ENSMUST00000112706 | 15 | 21 | 0    | Serpina8      | protein_coding                     |
| ENSMUST00000161303 | 15 | 21 | 0    | Lama4         | protein_coding                     |
| ENSMUST00000125245 | 15 | 20 | 52   | Eftud1        | protein_coding                     |
| ENSMUST00000024112 | 15 | 20 | 20   | Mx2           | polymorphic_pseudogene             |
| ENSMUST00000177414 | 15 | 20 | 8    | Cux1          | retained_intron                    |
| ENSMUST00000177414 | 15 | 20 | 8    | Cux1          | retained_intron                    |
| ENSMUST00000168165 | 15 | 20 | 6    | Gm8104        | protein_coding                     |
| ENSMUST00000159484 | 15 | 20 | 4    | Tbc1d4        | protein_coding                     |
| ENSMUST00000167704 | 15 | 20 | 4    | 1700112D23Rik | antisense                          |
| ENSMUST00000127020 | 15 | 20 | 7873 | Gm14152       | lincRNA                            |
| ENSMUST00000061201 | 15 | 20 | 2    | Zfp939        | transcribed_unprocessed_pseudogene |
| ENSMUST00000091321 | 15 | 20 | 2    | Smn1          | protein_coding                     |
| ENSMUST00000169154 | 15 | 20 | 0    | Gm7714        | protein_coding                     |
| ENSMUST00000026266 | 15 | 19 | 0    | Adpgk         | protein_coding                     |
| ENSMUST00000040999 | 15 | 18 | 22   | Aox3          | protein_coding                     |
| ENSMUST00000111528 | 15 | 18 | 4    | Ablim1        | protein_coding                     |
| ENSMUST00000100126 | 15 | 18 | 2    | Sectm1a       | protein_coding                     |
| ENSMUST00000143516 | 15 | 18 | 2    | Ankrd12       | protein_coding                     |
| ENSMUST00000022544 | 15 | 18 | 0    | Hmbox1        | protein_coding                     |
| ENSMUST00000033917 | 15 | 18 | 0    | Spata4        | protein_coding                     |
| ENSMUST00000135864 | 15 | 18 | 0    | Clvs1         | protein_coding                     |
| ENSMUST00000160457 | 15 | 18 | 0    | Zfp945        | protein_coding                     |
| ENSMUST00000099558 | 15 | 18 | 26   | Tjp2          | protein_coding                     |
| ENSMUST00000172865 | 15 | 18 | 14   | 4922501L14Rik | protein_coding                     |
| ENSMUST00000172865 | 15 | 18 | 14   | 4922501L14Rik | protein_coding                     |
| ENSMUST00000164863 | 15 | 18 | 14   | Gm20458       | protein_coding                     |
| ENSMUST00000167986 | 15 | 18 | 12   | Naip2         | protein_coding                     |
| ENSMUST00000058472 | 15 | 18 | 6    | Svop          | protein_coding                     |
| ENSMUST00000022227 | 15 | 18 | 2    | Cenpk         | protein_coding                     |
| ENSMUST00000131153 | 15 | 18 | 2    | Psg16         | protein_coding                     |
| ENSMUST00000105596 | 15 | 18 | 0    | Gm10945       | protein_coding                     |
| ENSMUST00000115234 | 15 | 18 | 0    | Fbxl13        | protein_coding                     |
| ENSMUST00000177672 | 15 | 17 | 32   | Krtap10-10    | protein_coding                     |
| ENSMUST00000177672 | 15 | 17 | 32   | Krtap10-10    | protein_coding                     |
| ENSMUST00000097587 | 15 | 17 | 0    | Spink11       | protein_coding                     |
| ENSMUST00000148538 | 15 | 16 | 30   | Adams17       | protein_coding                     |
| ENSMUST00000112394 | 15 | 16 | 18   | Csrnp3        | protein_coding                     |
| ENSMUST00000040844 | 15 | 16 | 14   | Ankrd27       | protein_coding                     |
| ENSMUST00000098134 | 15 | 16 | 0    | Ppfbp2        | protein_coding                     |
| ENSMUST00000110305 | 15 | 16 | 0    | Lrp12         | protein_coding                     |
| ENSMUST00000112631 | 15 | 16 | 0    | Nek10         | protein_coding                     |
| ENSMUST00000147604 | 15 | 16 | 196  | Aim2          | protein_coding                     |
| ENSMUST00000146494 | 15 | 16 | 46   | Cyp2c66       | protein_coding                     |
| ENSMUST00000106609 | 15 | 16 | 20   | Clcc1         | protein_coding                     |
| ENSMUST00000123619 | 15 | 16 | 8    | Col11a1       | protein_coding                     |
| ENSMUST00000064473 | 15 | 16 | 6    | Adarb2        | protein_coding                     |
| ENSMUST00000027249 | 15 | 16 | 4    | Chst10        | protein_coding                     |
| ENSMUST00000182341 | 15 | 16 | 2    | Ano4          | protein_coding                     |
| ENSMUST00000130914 | 15 | 16 | 0    | Ube2e3        | protein_coding                     |
| ENSMUST00000085614 | 15 | 15 | 20   | Usp12         | protein_coding                     |
| ENSMUST00000047115 | 15 | 15 | 16   | Wdr25         | protein_coding                     |
| ENSMUST00000100772 | 15 | 15 | 0    | Tmtc1         | protein_coding                     |
| ENSMUST00000128814 | 15 | 15 | 0    | Sh3yl1        | protein_coding                     |
| ENSMUST00000153930 | 15 | 15 | 0    | Gtsf1         | protein_coding                     |
| ENSMUST00000098334 | 15 | 14 | 12   | Ankrd11       | protein_coding                     |
| ENSMUST00000084749 | 15 | 14 | 10   | Ankrd6        | protein_coding                     |
| ENSMUST00000022618 | 15 | 14 | 8    | Adam2         | protein_coding                     |
| ENSMUST00000065562 | 15 | 14 | 0    | Socs4         | protein_coding                     |
| ENSMUST00000123512 | 15 | 14 | 0    | Thoc2         | protein_coding                     |
| ENSMUST00000134880 | 15 | 14 | 0    | Ppara         | protein_coding                     |
| ENSMUST00000155897 | 15 | 14 | 0    | Evi5          | protein_coding                     |
| ENSMUST00000167430 | 15 | 14 | 0    | Gm3020        | protein_coding                     |
| ENSMUST00000023502 | 15 | 14 | 44   | Snx4          | protein_coding                     |
| ENSMUST00000030323 | 15 | 14 | 28   | 1700012P22Rik | protein_coding                     |

|                    |    |    |                 |                      |
|--------------------|----|----|-----------------|----------------------|
| ENSMUST00000093800 | 15 | 14 | 10 Pls1         | protein_coding       |
| ENSMUST00000022099 | 15 | 14 | 0 Lpcat1        | protein_coding       |
| ENSMUST00000170123 | 15 | 14 | 0 Gm10409       | protein_coding       |
| ENSMUST00000162854 | 15 | 13 | 67 Kif6         | protein_coding       |
| ENSMUST00000107544 | 15 | 13 | 4 Susd1         | protein_coding       |
| ENSMUST00000048382 | 15 | 13 | 0 1600014K23Rik | protein_coding       |
| ENSMUST00000065778 | 15 | 13 | 0 Pik3r4        | protein_coding       |
| ENSMUST00000181472 | 15 | 12 | 115 Gm26893     | processed_transcript |
| ENSMUST00000131346 | 15 | 12 | 4 Gm10714       | antisense            |
| ENSMUST00000111554 | 15 | 12 | 0 Olfr1223      | protein_coding       |
| ENSMUST00000111554 | 15 | 12 | 0 Olfr1223      | protein_coding       |
| ENSMUST00000067940 | 15 | 12 | 0 1700013H16Rik | protein_coding       |
| ENSMUST00000095328 | 15 | 12 | 0 Cyp4v3        | protein_coding       |
| ENSMUST00000152594 | 15 | 12 | 0 Zbtb38        | protein_coding       |
| ENSMUST00000179367 | 15 | 12 | 0 Gm8674        | protein_coding       |
| ENSMUST00000059515 | 15 | 12 | 30 Gdi2         | protein_coding       |
| ENSMUST00000035548 | 15 | 12 | 20 Alpk2        | protein_coding       |
| ENSMUST00000065291 | 15 | 12 | 8 9230110C19Rik | protein_coding       |
| ENSMUST00000034190 | 15 | 12 | 2 Vac14         | protein_coding       |
| ENSMUST00000026795 | 15 | 12 | 0 Alox5         | protein_coding       |
| ENSMUST00000058534 | 15 | 12 | 0 Med26         | protein_coding       |
| ENSMUST00000162671 | 15 | 12 | 0 Fgd4          | protein_coding       |
| ENSMUST00000178148 | 15 | 12 | 0 Gm5167        | protein_coding       |
| ENSMUST00000154766 | 15 | 12 | 0 Gm11339       | antisense            |
| ENSMUST00000141354 | 15 | 11 | 14 Sh3kbp1      | protein_coding       |
| ENSMUST00000131586 | 15 | 11 | 0 Crb1          | protein_coding       |
| ENSMUST00000131586 | 15 | 11 | 0 Crb1          | protein_coding       |
| ENSMUST00000028113 | 15 | 11 | 0 4931423N10Rik | protein_coding       |
| ENSMUST00000030882 | 15 | 11 | 0 Pmpcb         | protein_coding       |
| ENSMUST00000160534 | 15 | 11 | 0 Gm4477        | protein_coding       |
| ENSMUST00000166940 | 15 | 10 | 18 Adck1        | protein_coding       |
| ENSMUST00000078214 | 15 | 9  | 42 Skap2        | protein_coding       |
| ENSMUST00000118078 | 15 | 9  | 2 Lphn3         | protein_coding       |
| ENSMUST00000180980 | 15 | 9  | 0 Gm26552       | processed_transcript |
| ENSMUST00000025515 | 15 | 9  | 14 Tmx3         | protein_coding       |
| ENSMUST00000110340 | 15 | 9  | 10 Cox16        | protein_coding       |
| ENSMUST00000172875 | 15 | 9  | 0 Baz1a         | protein_coding       |
| ENSMUST00000020329 | 15 | 8  | 18 Egfr         | protein_coding       |
| ENSMUST00000068031 | 15 | 6  | 6 Top2a         | protein_coding       |
| ENSMUST00000048941 | 15 | 5  | 34 Capn8        | protein_coding       |
| ENSMUST00000166938 | 15 | 4  | 4 Immt          | protein_coding       |
| ENSMUST00000156561 | 15 | 1  | 0 D230025D16Rik | protein_coding       |
| ENSMUST00000170068 | 15 | 0  | 0 Sirt2         | protein_coding       |
| ENSMUST00000072804 | 14 | 66 | 26 Sox6         | protein_coding       |
| ENSMUST00000117054 | 14 | 37 | 34 Nphp3        | protein_coding       |
| ENSMUST00000117054 | 14 | 37 | 34 Nphp3        | protein_coding       |
| ENSMUST00000085556 | 14 | 27 | 8 Rhpn2         | protein_coding       |
| ENSMUST00000010279 | 14 | 25 | 0 Adora3        | protein_coding       |
| ENSMUST00000131722 | 14 | 24 | 0 Zfp563        | protein_coding       |
| ENSMUST00000146730 | 14 | 24 | 71 Dlgap1       | protein_coding       |
| ENSMUST00000153134 | 14 | 23 | 8 Glul          | protein_coding       |
| ENSMUST00000153278 | 14 | 22 | 2 Pbx3          | protein_coding       |
| ENSMUST00000135325 | 14 | 22 | 0 Coil          | protein_coding       |
| ENSMUST00000156864 | 14 | 22 | 83 Amn1         | protein_coding       |
| ENSMUST00000172104 | 14 | 22 | 34 Pde8b        | protein_coding       |
| ENSMUST00000032336 | 14 | 22 | 8 Plbd1         | protein_coding       |
| ENSMUST00000096313 | 14 | 22 | 0 Tbc1d8b       | protein_coding       |
| ENSMUST00000120252 | 14 | 22 | 0 Gm7571        | processed_pseudogene |
| ENSMUST00000013995 | 14 | 21 | 38 Abca4        | protein_coding       |
| ENSMUST00000142534 | 14 | 21 | 6 Phka1         | protein_coding       |
| ENSMUST00000140947 | 14 | 21 | 2 Tgm6          | protein_coding       |
| ENSMUST00000173010 | 14 | 21 | 0 Atf2          | protein_coding       |
| ENSMUST00000062957 | 14 | 20 | 2159 Ttc7b      | protein_coding       |
| ENSMUST00000020204 | 14 | 20 | 12 Ntn4         | protein_coding       |
| ENSMUST00000120531 | 14 | 20 | 4 Stxbp6        | protein_coding       |
| ENSMUST00000067744 | 14 | 20 | 54 Cggbp1       | protein_coding       |
| ENSMUST00000175883 | 14 | 20 | 12 Ryk          | protein_coding       |
| ENSMUST00000143663 | 14 | 19 | 6 Mroh8         | protein_coding       |

|                    |    |    |                  |                        |
|--------------------|----|----|------------------|------------------------|
| ENSMUST00000068946 | 14 | 19 | 0 Rnf212         | protein_coding         |
| ENSMUST00000092368 | 14 | 18 | 24 Tspear        | protein_coding         |
| ENSMUST00000105421 | 14 | 18 | 8 Specc1l        | protein_coding         |
| ENSMUST00000112008 | 14 | 18 | 0 Cit            | protein_coding         |
| ENSMUST00000178129 | 14 | 18 | 12 Gm21971       | processed_transcript   |
| ENSMUST00000176980 | 14 | 18 | 4 Gm18294        | unprocessed_pseudogene |
| ENSMUST00000024970 | 14 | 18 | 2 Gtf2a1l        | protein_coding         |
| ENSMUST00000148264 | 14 | 18 | 0 Rabgef1        | protein_coding         |
| ENSMUST00000162168 | 14 | 17 | 67 Zkscan5       | protein_coding         |
| ENSMUST00000143593 | 14 | 17 | 6 Gm12002        | antisense              |
| ENSMUST00000169611 | 14 | 17 | 0 Mut            | protein_coding         |
| ENSMUST00000168631 | 14 | 16 | 6 Pkp4           | protein_coding         |
| ENSMUST00000143464 | 14 | 16 | 0 Myoz2          | protein_coding         |
| ENSMUST00000181742 | 14 | 16 | 0 Gm807          | lincRNA                |
| ENSMUST00000023758 | 14 | 16 | 36 Asic1         | protein_coding         |
| ENSMUST00000044260 | 14 | 16 | 30 Usp37         | protein_coding         |
| ENSMUST00000110929 | 14 | 16 | 0 Nxpe5          | protein_coding         |
| ENSMUST00000169635 | 14 | 16 | 0 T2             | processed_transcript   |
| ENSMUST00000167377 | 14 | 15 | 34 Iqgap1        | protein_coding         |
| ENSMUST00000164426 | 14 | 15 | 0 Kif5b          | protein_coding         |
| ENSMUST00000120670 | 14 | 15 | 0 Gm14360        | processed_pseudogene   |
| ENSMUST00000120843 | 14 | 15 | 0 Nlk-ps1        | processed_pseudogene   |
| ENSMUST00000181921 | 14 | 15 | 0 B230217O12Rik  | lincRNA                |
| ENSMUST00000145829 | 14 | 14 | 30 Pip5k1b       | protein_coding         |
| ENSMUST00000166327 | 14 | 14 | 6 Vmn2r95        | protein_coding         |
| ENSMUST00000173433 | 14 | 14 | 2 Baz1a          | protein_coding         |
| ENSMUST00000034955 | 14 | 14 | 0 Spg21          | protein_coding         |
| ENSMUST00000110708 | 14 | 14 | 24 Srp54b        | protein_coding         |
| ENSMUST00000170248 | 14 | 14 | 4 Frem1          | protein_coding         |
| ENSMUST00000133032 | 14 | 13 | 54 Luc7l         | protein_coding         |
| ENSMUST00000021135 | 14 | 13 | 14 1200014J11Rik | protein_coding         |
| ENSMUST00000002640 | 14 | 13 | 8 Scin           | protein_coding         |
| ENSMUST00000143911 | 14 | 13 | 8 Hnf4a          | protein_coding         |
| ENSMUST00000079625 | 14 | 13 | 0 Tor3a          | protein_coding         |
| ENSMUST00000080817 | 14 | 13 | 0 Rnf169         | protein_coding         |
| ENSMUST00000084949 | 14 | 13 | 0 Impad1         | protein_coding         |
| ENSMUST00000090824 | 14 | 13 | 0 Zak            | protein_coding         |
| ENSMUST00000132734 | 14 | 13 | 0 Ppargc1a       | protein_coding         |
| ENSMUST00000057438 | 14 | 12 | 14 Vcpi1         | protein_coding         |
| ENSMUST00000055100 | 14 | 12 | 2 Gng2           | protein_coding         |
| ENSMUST00000124680 | 14 | 12 | 2 Rint1          | protein_coding         |
| ENSMUST00000126959 | 14 | 12 | 2 Srrm4os        | antisense              |
| ENSMUST00000113428 | 14 | 12 | 0 Rps6ka6        | protein_coding         |
| ENSMUST00000163329 | 14 | 12 | 38 Ubl7          | protein_coding         |
| ENSMUST00000067328 | 14 | 12 | 8 Cyp2c67        | protein_coding         |
| ENSMUST00000144505 | 14 | 12 | 6 Pdzn3          | protein_coding         |
| ENSMUST00000097453 | 14 | 12 | 4 Cdc42bpa       | protein_coding         |
| ENSMUST00000085876 | 14 | 12 | 2 Pydc3          | protein_coding         |
| ENSMUST00000148390 | 14 | 11 | 12 Slc22a23      | protein_coding         |
| ENSMUST00000140301 | 14 | 11 | 4 Map2k4         | protein_coding         |
| ENSMUST00000159236 | 14 | 11 | 0 Tnik           | protein_coding         |
| ENSMUST00000176745 | 14 | 10 | 48 Cux1          | protein_coding         |
| ENSMUST00000139786 | 14 | 10 | 10 Mbtps2        | protein_coding         |
| ENSMUST00000107032 | 14 | 10 | 8 Arhgef17       | protein_coding         |
| ENSMUST00000030769 | 14 | 9  | 8 Psmc2          | protein_coding         |
| ENSMUST00000094505 | 14 | 9  | 4 Dennd1b        | protein_coding         |
| ENSMUST00000008907 | 14 | 9  | 2 Man1a2         | protein_coding         |
| ENSMUST00000053075 | 14 | 9  | 2 Sphkap         | protein_coding         |
| ENSMUST00000056117 | 14 | 9  | 2 Itga2          | protein_coding         |
| ENSMUST00000093940 | 14 | 9  | 2 Arhgap23       | protein_coding         |
| ENSMUST00000125021 | 14 | 9  | 2 Itga9          | protein_coding         |
| ENSMUST00000168807 | 14 | 9  | 0 Vmn2r41        | protein_coding         |
| ENSMUST00000171942 | 14 | 9  | 0 Vmn2r40        | protein_coding         |
| ENSMUST00000131568 | 14 | 8  | 2 Hace1          | protein_coding         |
| ENSMUST00000181881 | 14 | 8  | 0 Gm26650        | processed_transcript   |
| ENSMUST00000085238 | 14 | 7  | 6 Slc8a3         | protein_coding         |
| ENSMUST00000142888 | 14 | 7  | 6 Slc26a5        | protein_coding         |
| ENSMUST00000121338 | 14 | 7  | 4 Gm14638        | unprocessed_pseudogene |

|                     |    |    |     |               |                        |
|---------------------|----|----|-----|---------------|------------------------|
| ENSMUST00000026845  | 14 | 7  | 0   | Il6           | protein_coding         |
| ENSMUST00000036759  | 14 | 7  | 28  | Fam21         | protein_coding         |
| ENSMUST00000032222  | 14 | 7  | 18  | Tmcc1         | protein_coding         |
| ENSMUST000000109355 | 14 | 7  | 10  | Lrrc36        | protein_coding         |
| ENSMUST000000095076 | 14 | 7  | 0   | Epb4.114b     | protein_coding         |
| ENSMUST000000033723 | 14 | 5  | 28  | Syap1         | protein_coding         |
| ENSMUST000000128581 | 14 | 4  | 0   | Rpl24         | protein_coding         |
| ENSMUST000000143026 | 14 | 3  | 40  | Cadm1         | protein_coding         |
| ENSMUST00000034226  | 14 | 3  | 0   | Fam192a       | protein_coding         |
| ENSMUST00000045793  | 14 | 1  | 2   | Rnf38         | protein_coding         |
| ENSMUST00000002087  | 14 | 0  | 34  | Pnck          | protein_coding         |
| ENSMUST000000111754 | 14 | 0  | 16  | Tor1aip2      | protein_coding         |
| ENSMUST00000026048  | 13 | 36 | 30  | Cfap43        | protein_coding         |
| ENSMUST000000127841 | 13 | 34 | 24  | Slc18b1       | protein_coding         |
| ENSMUST00000035055  | 13 | 30 | 22  | Map4          | protein_coding         |
| ENSMUST000000161272 | 13 | 28 | 0   | Manf          | protein_coding         |
| ENSMUST00000043056  | 13 | 28 | 4   | Baat          | protein_coding         |
| ENSMUST000000155689 | 13 | 28 | 0   | Rft1          | protein_coding         |
| ENSMUST000000131992 | 13 | 26 | 4   | Pus7          | protein_coding         |
| ENSMUST000000141000 | 13 | 26 | 0   | 9530026F06Rik | lincRNA                |
| ENSMUST000000180908 | 13 | 26 | 0   | 9430065F17Rik | lincRNA                |
| ENSMUST000000119610 | 13 | 26 | 8   | Rerg          | protein_coding         |
| ENSMUST000000139477 | 13 | 25 | 12  | Gid4          | protein_coding         |
| ENSMUST000000135625 | 13 | 24 | 8   | Zfp106        | protein_coding         |
| ENSMUST000000035471 | 13 | 24 | 228 | Lama1         | protein_coding         |
| ENSMUST000000114477 | 13 | 24 | 8   | Bbx           | protein_coding         |
| ENSMUST000000067976 | 13 | 23 | 8   | Ppp2r5a       | protein_coding         |
| ENSMUST000000069226 | 13 | 23 | 4   | Scara5        | protein_coding         |
| ENSMUST000000184392 | 13 | 22 | 16  | Wnk3          | protein_coding         |
| ENSMUST000000181912 | 13 | 22 | 6   | 4930525G20Rik | antisense              |
| ENSMUST000000066431 | 13 | 22 | 4   | Camk2b        | protein_coding         |
| ENSMUST000000119667 | 13 | 22 | 0   | Gm9440        | unprocessed_pseudogene |
| ENSMUST000000065916 | 13 | 21 | 14  | Tg            | protein_coding         |
| ENSMUST000000088796 | 13 | 21 | 0   | 4921511H03Rik | protein_coding         |
| ENSMUST00000036932  | 13 | 20 | 26  | Dcdc2a        | protein_coding         |
| ENSMUST00000040924  | 13 | 20 | 129 | Ss18          | protein_coding         |
| ENSMUST000000142226 | 13 | 20 | 14  | Ppard         | protein_coding         |
| ENSMUST000000121198 | 13 | 20 | 8   | Magi3         | protein_coding         |
| ENSMUST000000160080 | 13 | 19 | 6   | Gm16559       | antisense              |
| ENSMUST000000101670 | 13 | 19 | 4   | Wdr44         | protein_coding         |
| ENSMUST00000076677  | 13 | 19 | 0   | Psg20         | protein_coding         |
| ENSMUST000000114458 | 13 | 19 | 0   | Nfkbiz        | protein_coding         |
| ENSMUST00000049488  | 13 | 18 | 54  | Serinc5       | protein_coding         |
| ENSMUST000000035010 | 13 | 18 | 18  | Stt3b         | protein_coding         |
| ENSMUST000000160755 | 13 | 18 | 0   | Greb1         | protein_coding         |
| ENSMUST000000035497 | 13 | 18 | 50  | Oscp1         | protein_coding         |
| ENSMUST000000115222 | 13 | 18 | 14  | Zbtb44        | protein_coding         |
| ENSMUST000000165125 | 13 | 18 | 8   | Tmem9         | protein_coding         |
| ENSMUST00000070219  | 13 | 18 | 4   | Pard6g        | protein_coding         |
| ENSMUST000000100063 | 13 | 18 | 4   | Scn9a         | protein_coding         |
| ENSMUST000000164039 | 13 | 18 | 4   | Sorcs1        | protein_coding         |
| ENSMUST000000143975 | 13 | 18 | 0   | Fam46d        | protein_coding         |
| ENSMUST000000034981 | 13 | 17 | 28  | Xrn1          | protein_coding         |
| ENSMUST000000054462 | 13 | 17 | 24  | Tbc1d8        | protein_coding         |
| ENSMUST00000077772  | 13 | 17 | 18  | Sag           | protein_coding         |
| ENSMUST000000127393 | 13 | 17 | 18  | Zranb3        | protein_coding         |
| ENSMUST000000171583 | 13 | 17 | 8   | Galnt1        | protein_coding         |
| ENSMUST000000179232 | 13 | 17 | 4   | Gm7375        | unprocessed_pseudogene |
| ENSMUST000000101647 | 13 | 17 | 4   | Gm10486       | protein_coding         |
| ENSMUST000000103186 | 13 | 17 | 0   | Cltc          | protein_coding         |
| ENSMUST000000170628 | 13 | 17 | 0   | Serpina3g     | protein_coding         |
| ENSMUST000000160041 | 13 | 16 | 16  | Fez1          | protein_coding         |
| ENSMUST000000021843 | 13 | 16 | 10  | Nqo2          | protein_coding         |
| ENSMUST000000153338 | 13 | 16 | 2   | Tbpl2         | protein_coding         |
| ENSMUST000000004715 | 13 | 16 | 0   | Mospd2        | protein_coding         |
| ENSMUST000000092888 | 13 | 16 | 0   | Fbp1          | protein_coding         |
| ENSMUST000000169104 | 13 | 16 | 16  | 1110057K04Rik | protein_coding         |
| ENSMUST000000124436 | 13 | 16 | 8   | Chchd3        | protein_coding         |



|                     |    |    |     |               |                      |
|---------------------|----|----|-----|---------------|----------------------|
| ENSMUST00000153279  | 13 | 15 | 103 | Mllt10        | protein_coding       |
| ENSMUST00000140919  | 13 | 15 | 8   | 8030443G20Rik | antisense            |
| ENSMUST00000131145  | 13 | 15 | 0   | Tmem67        | protein_coding       |
| ENSMUST00000138106  | 13 | 15 | 0   | Dph6          | protein_coding       |
| ENSMUST00000161912  | 13 | 15 | 0   | Rsu1          | protein_coding       |
| ENSMUST00000156237  | 13 | 14 | 28  | Eepd1         | protein_coding       |
| ENSMUST00000115096  | 13 | 14 | 14  | Plxna4        | protein_coding       |
| ENSMUST00000028661  | 13 | 14 | 4   | 4933406J08Rik | protein_coding       |
| ENSMUST00000144787  | 13 | 14 | 2   | Alox8         | protein_coding       |
| ENSMUST00000161022  | 13 | 14 | 2   | Arhgef38      | protein_coding       |
| ENSMUST00000141024  | 13 | 14 | 0   | Ercc4         | protein_coding       |
| ENSMUST00000081989  | 13 | 14 | 38  | Rnf217        | protein_coding       |
| ENSMUST00000171238  | 13 | 14 | 12  | Zfp516        | protein_coding       |
| ENSMUST00000039132  | 13 | 14 | 8   | Zfp472        | protein_coding       |
| ENSMUST00000102817  | 13 | 14 | 8   | Gap43         | protein_coding       |
| ENSMUST00000169256  | 13 | 14 | 8   | D630045J12Rik | protein_coding       |
| ENSMUST00000171937  | 13 | 14 | 6   | Arhgap35      | protein_coding       |
| ENSMUST00000029482  | 13 | 14 | 2   | Gpsm2         | protein_coding       |
| ENSMUST00000063380  | 13 | 14 | 2   | Agfg1         | protein_coding       |
| ENSMUST00000100314  | 13 | 14 | 0   | Cldn10        | protein_coding       |
| ENSMUST00000135382  | 13 | 13 | 26  | Cacna1a       | protein_coding       |
| ENSMUST00000165777  | 13 | 13 | 16  | Xrcc6         | protein_coding       |
| ENSMUST00000149353  | 13 | 13 | 10  | Mmp16         | protein_coding       |
| ENSMUST00000054955  | 13 | 13 | 0   | Eml1          | protein_coding       |
| ENSMUST00000145789  | 13 | 13 | 0   | Gm11999       | processed_transcript |
| ENSMUST00000119892  | 13 | 12 | 26  | Gm15800       | protein_coding       |
| ENSMUST00000105494  | 13 | 12 | 6   | Scml4         | protein_coding       |
| ENSMUST00000181058  | 13 | 12 | 4   | Gm5106        | lincRNA              |
| ENSMUST00000145319  | 13 | 12 | 0   | Kif4          | protein_coding       |
| ENSMUST00000052806  | 13 | 12 | 6   | 9230106D20Rik | protein_coding       |
| ENSMUST00000108345  | 13 | 12 | 6   | Ythdf3        | protein_coding       |
| ENSMUST00000022292  | 13 | 12 | 2   | Samd8         | protein_coding       |
| ENSMUST00000174264  | 13 | 12 | 2   | Rnf169        | protein_coding       |
| ENSMUST00000049055  | 13 | 12 | 0   | Lysmd3        | protein_coding       |
| ENSMUST00000140670  | 13 | 12 | 0   | Rchy1         | protein_coding       |
| ENSMUST00000057015  | 13 | 11 | 30  | Slc4a7        | protein_coding       |
| ENSMUST00000073961  | 13 | 11 | 30  | Ptpr          | protein_coding       |
| ENSMUST00000142088  | 13 | 11 | 6   | Pah           | protein_coding       |
| ENSMUST00000178654  | 13 | 11 | 4   | Esp34         | protein_coding       |
| ENSMUST00000051531  | 13 | 11 | 2   | Exoc6b        | protein_coding       |
| ENSMUST00000166877  | 13 | 11 | 0   | Sox6          | protein_coding       |
| ENSMUST00000107042  | 13 | 10 | 12  | Fam168a       | protein_coding       |
| ENSMUST00000029303  | 13 | 10 | 8   | Naa15         | protein_coding       |
| ENSMUST00000029441  | 13 | 10 | 8   | Syt10         | protein_coding       |
| ENSMUST000000072753 | 13 | 10 | 0   | Ssbp3         | protein_coding       |
| ENSMUST00000140448  | 13 | 10 | 0   | Svil          | protein_coding       |
| ENSMUST00000023276  | 13 | 9  | 42  | Trappc9       | protein_coding       |
| ENSMUST00000067795  | 13 | 9  | 32  | Lcor          | protein_coding       |
| ENSMUST00000128492  | 13 | 9  | 10  | Dennd1a       | protein_coding       |
| ENSMUST00000065167  | 13 | 9  | 6   | Adrbk2        | protein_coding       |
| ENSMUST00000059692  | 13 | 9  | 0   | Triml1        | protein_coding       |
| ENSMUST00000099414  | 13 | 9  | 0   | Zfp955b       | protein_coding       |
| ENSMUST00000095873  | 13 | 9  | 14  | Kcnj6         | protein_coding       |
| ENSMUST00000031542  | 13 | 9  | 6   | Oasl2         | protein_coding       |
| ENSMUST00000146404  | 13 | 9  | 2   | Gm13589       | lincRNA              |
| ENSMUST00000101587  | 13 | 9  | 0   | Phf6          | protein_coding       |
| ENSMUST00000115436  | 13 | 9  | 0   | Cask          | protein_coding       |
| ENSMUST00000178644  | 13 | 8  | 6   | Gm21969       | protein_coding       |
| ENSMUST00000065588  | 13 | 8  | 2   | Gbp6          | protein_coding       |
| ENSMUST00000027564  | 13 | 8  | 0   | Serpib13      | protein_coding       |
| ENSMUST00000182981  | 13 | 8  | 0   | Rian          | processed_transcript |
| ENSMUST00000020231  | 13 | 7  | 10  | Btbd11        | protein_coding       |
| ENSMUST00000029915  | 13 | 7  | 8   | Tstd3         | protein_coding       |
| ENSMUST00000154148  | 13 | 7  | 0   | RP24-559D1.1  | protein_coding       |
| ENSMUST00000166592  | 13 | 5  | 222 | Tnpo2         | protein_coding       |
| ENSMUST00000145627  | 13 | 5  | 12  | Tnk2          | protein_coding       |
| ENSMUST00000036541  | 13 | 5  | 0   | Arl5a         | protein_coding       |
| ENSMUST00000151789  | 13 | 2  | 14  | Ccdc176       | protein_coding       |

|                    |    |    |                 |                        |
|--------------------|----|----|-----------------|------------------------|
| ENSMUST00000126805 | 13 | 0  | 0 Pradc1        | protein_coding         |
| ENSMUST00000172837 | 13 | 0  | 0 Lig3          | protein_coding         |
| ENSMUST00000149146 | 13 | 27 | 40 EphA10       | protein_coding         |
| ENSMUST00000138415 | 13 | 27 | 2 Tpra1         | protein_coding         |
| ENSMUST00000040523 | 13 | 26 | 131 Adamts2     | protein_coding         |
| ENSMUST00000046011 | 13 | 26 | 10 Nol10        | protein_coding         |
| ENSMUST00000112243 | 13 | 25 | 20 Myo3b        | protein_coding         |
| ENSMUST00000052712 | 13 | 24 | 0 Tgs1          | protein_coding         |
| ENSMUST00000155534 | 13 | 24 | 0 Muc5ac        | protein_coding         |
| ENSMUST00000164192 | 13 | 24 | 14 Rasgrp3      | protein_coding         |
| ENSMUST00000092143 | 13 | 24 | 2 Msrb3         | protein_coding         |
| ENSMUST00000133433 | 13 | 23 | 12 Cfap61       | protein_coding         |
| ENSMUST00000049051 | 13 | 23 | 0 Gtdc1         | protein_coding         |
| ENSMUST00000162925 | 13 | 23 | 0 Sp140         | protein_coding         |
| ENSMUST00000121398 | 13 | 22 | 0 Gm14623       | unprocessed_pseudogene |
| ENSMUST00000111350 | 13 | 22 | 0 Uap1          | protein_coding         |
| ENSMUST00000170633 | 13 | 22 | 14 Trappc9      | protein_coding         |
| ENSMUST00000108435 | 13 | 22 | 0 Tlcd2         | protein_coding         |
| ENSMUST00000035266 | 13 | 21 | 0 Igtp          | protein_coding         |
| ENSMUST00000183659 | 13 | 20 | 73 Nav2         | protein_coding         |
| ENSMUST00000093113 | 13 | 20 | 52 Adamts18     | protein_coding         |
| ENSMUST00000026893 | 13 | 20 | 0 Tgm4          | protein_coding         |
| ENSMUST00000137500 | 13 | 20 | 30 Acaca        | protein_coding         |
| ENSMUST00000163147 | 13 | 20 | 12 Epb4.115     | protein_coding         |
| ENSMUST00000039956 | 13 | 20 | 6 Slc41a2       | protein_coding         |
| ENSMUST00000078825 | 13 | 19 | 91 Fcgr4        | protein_coding         |
| ENSMUST00000072857 | 13 | 19 | 4 Scfd2         | protein_coding         |
| ENSMUST00000169396 | 13 | 19 | 4 Gm14819       | protein_coding         |
| ENSMUST00000128805 | 13 | 19 | 2 Prr14         | protein_coding         |
| ENSMUST00000159294 | 13 | 19 | 2 Maml2         | protein_coding         |
| ENSMUST00000174314 | 13 | 19 | 2 Arhgap32      | protein_coding         |
| ENSMUST00000022875 | 13 | 18 | 26 Ank          | protein_coding         |
| ENSMUST00000178014 | 13 | 18 | 4 Gm7408        | unprocessed_pseudogene |
| ENSMUST00000184809 | 13 | 18 | 0 Nav2          | protein_coding         |
| ENSMUST00000054791 | 13 | 18 | 52 Vtn1         | protein_coding         |
| ENSMUST00000122059 | 13 | 18 | 14 Pik3cd       | protein_coding         |
| ENSMUST00000125337 | 13 | 18 | 0 Echs1         | protein_coding         |
| ENSMUST00000040056 | 13 | 17 | 54 Ppfibp2      | protein_coding         |
| ENSMUST00000137405 | 13 | 17 | 6 2410152P15Rik | processed_transcript   |
| ENSMUST00000098151 | 13 | 17 | 4 Lingo2        | protein_coding         |
| ENSMUST00000160400 | 13 | 17 | 0 Sdha          | protein_coding         |
| ENSMUST00000166708 | 13 | 17 | 0 Mroh3         | protein_coding         |
| ENSMUST00000073447 | 13 | 16 | 52 PCDHGB6      | protein_coding         |
| ENSMUST00000073942 | 13 | 16 | 6 Cnbd2         | protein_coding         |
| ENSMUST00000178020 | 13 | 16 | 4 Gm7386        | unprocessed_pseudogene |
| ENSMUST00000137117 | 13 | 16 | 4 4933409G03Rik | protein_coding         |
| ENSMUST00000074510 | 13 | 16 | 89 Prdm10       | protein_coding         |
| ENSMUST00000162073 | 13 | 16 | 52 Alg9         | protein_coding         |
| ENSMUST00000069651 | 13 | 16 | 20 Gadl1        | protein_coding         |
| ENSMUST00000063433 | 13 | 16 | 14 Eya2         | protein_coding         |
| ENSMUST00000164195 | 13 | 16 | 12 Pde7b        | protein_coding         |
| ENSMUST00000113422 | 13 | 16 | 2 Hdx           | protein_coding         |
| ENSMUST00000129817 | 13 | 16 | 2 Phc3          | protein_coding         |
| ENSMUST00000068273 | 13 | 16 | 0 Jakmip3       | protein_coding         |
| ENSMUST00000068273 | 13 | 16 | 0 Jakmip3       | protein_coding         |
| ENSMUST00000109728 | 13 | 16 | 0 Snta1         | protein_coding         |
| ENSMUST00000051014 | 13 | 15 | 63 Exph5        | protein_coding         |
| ENSMUST00000149299 | 13 | 15 | 34 Ror2         | protein_coding         |
| ENSMUST00000005400 | 13 | 15 | 30 Prrr         | protein_coding         |
| ENSMUST00000113557 | 13 | 15 | 14 Atp7a        | protein_coding         |
| ENSMUST00000163605 | 13 | 15 | 12 Ddx11        | protein_coding         |
| ENSMUST00000169464 | 13 | 15 | 6 Dlgap4        | protein_coding         |
| ENSMUST00000160338 | 13 | 15 | 4 Mcoln1        | protein_coding         |
| ENSMUST00000170496 | 13 | 15 | 2 Slc25a40      | protein_coding         |
| ENSMUST00000170747 | 13 | 15 | 2 Gm16984       | lincRNA                |
| ENSMUST00000040111 | 13 | 14 | 20 Ttc28        | protein_coding         |
| ENSMUST00000056344 | 13 | 14 | 14 Vwc2         | protein_coding         |
| ENSMUST00000134012 | 13 | 14 | 10 Fggy         | protein_coding         |

|                    |    |    |                  |                                    |
|--------------------|----|----|------------------|------------------------------------|
| ENSMUST00000054553 | 13 | 14 | 4 Zfp384         | protein_coding                     |
| ENSMUST00000056107 | 13 | 14 | 0 Zfp677         | protein_coding                     |
| ENSMUST00000173252 | 13 | 14 | 0 Rasgrp1        | protein_coding                     |
| ENSMUST00000053426 | 13 | 14 | 26 Pptc7         | protein_coding                     |
| ENSMUST00000057272 | 13 | 14 | 26 4932438A13Rik | protein_coding                     |
| ENSMUST00000095743 | 13 | 14 | 26 Cdk19         | protein_coding                     |
| ENSMUST00000035889 | 13 | 14 | 4 Myo6           | protein_coding                     |
| ENSMUST00000131176 | 13 | 14 | 2 BC064078       | transcribed_unprocessed_pseudogene |
| ENSMUST00000098163 | 13 | 14 | 0 Zfp292         | protein_coding                     |
| ENSMUST00000163782 | 13 | 14 | 0 Catsperg1      | protein_coding                     |
| ENSMUST00000170133 | 13 | 14 | 0 Gm17231        | protein_coding                     |
| ENSMUST00000025089 | 13 | 13 | 20 Map4k3        | protein_coding                     |
| ENSMUST00000102632 | 13 | 13 | 16 Sort1         | protein_coding                     |
| ENSMUST00000160990 | 13 | 13 | 14 Zhx2          | protein_coding                     |
| ENSMUST00000053434 | 13 | 13 | 6 Trim26         | protein_coding                     |
| ENSMUST00000102939 | 13 | 13 | 4 Cacna1b        | protein_coding                     |
| ENSMUST00000144110 | 13 | 13 | 4 Trim44         | protein_coding                     |
| ENSMUST00000027162 | 13 | 13 | 2 Icos           | protein_coding                     |
| ENSMUST00000168515 | 13 | 13 | 0 Ppfia4         | protein_coding                     |
| ENSMUST00000089915 | 13 | 12 | 22 Casc4         | protein_coding                     |
| ENSMUST00000037585 | 13 | 12 | 16 Dennd6a       | protein_coding                     |
| ENSMUST00000111822 | 13 | 12 | 12 Slco1a5       | protein_coding                     |
| ENSMUST00000173050 | 13 | 12 | 4 Npas2          | protein_coding                     |
| ENSMUST00000111097 | 13 | 12 | 2 Fis1           | protein_coding                     |
| ENSMUST00000178255 | 13 | 12 | 0 Gm7958         | unprocessed_pseudogene             |
| ENSMUST00000127918 | 13 | 12 | 0 Gm13941        | protein_coding                     |
| ENSMUST00000098651 | 13 | 12 | 16 Pias1         | protein_coding                     |
| ENSMUST00000122022 | 13 | 12 | 10 Phka1         | protein_coding                     |
| ENSMUST00000109670 | 13 | 12 | 8 Ncoa6          | protein_coding                     |
| ENSMUST00000066374 | 13 | 12 | 6 Mpp4           | protein_coding                     |
| ENSMUST00000159299 | 13 | 12 | 6 Nhs1           | protein_coding                     |
| ENSMUST00000038472 | 13 | 12 | 2 Hdx            | protein_coding                     |
| ENSMUST00000042065 | 13 | 12 | 2 Map3k13        | protein_coding                     |
| ENSMUST00000101433 | 13 | 12 | 2 Smim9          | protein_coding                     |
| ENSMUST00000118052 | 13 | 12 | 0 Gm14594        | unprocessed_pseudogene             |
| ENSMUST00000110738 | 13 | 12 | 0 Atp7b          | protein_coding                     |
| ENSMUST00000132493 | 13 | 12 | 0 Ptplad2        | protein_coding                     |
| ENSMUST00000134124 | 13 | 12 | 0 Rab15          | protein_coding                     |
| ENSMUST00000166776 | 13 | 12 | 0 Gm3264         | protein_coding                     |
| ENSMUST00000147813 | 13 | 11 | 73 Sec11a        | protein_coding                     |
| ENSMUST00000142917 | 13 | 11 | 24 Ptrpg         | protein_coding                     |
| ENSMUST00000042657 | 13 | 11 | 12 Slc39a11      | protein_coding                     |
| ENSMUST00000162349 | 13 | 11 | 10 Apbb2         | protein_coding                     |
| ENSMUST00000146848 | 13 | 11 | 6 Mroh8          | protein_coding                     |
| ENSMUST00000029995 | 13 | 11 | 4 Toporsl        | protein_coding                     |
| ENSMUST00000180335 | 13 | 11 | 0 Gm14595        | unprocessed_pseudogene             |
| ENSMUST00000088740 | 13 | 11 | 0 Sixl1          | protein_coding                     |
| ENSMUST00000161911 | 13 | 11 | 0 Arap2          | protein_coding                     |
| ENSMUST00000109035 | 13 | 10 | 10 Cers5         | protein_coding                     |
| ENSMUST00000084026 | 13 | 10 | 4 Whsc111        | protein_coding                     |
| ENSMUST00000152835 | 13 | 10 | 0 Exoc4          | protein_coding                     |
| ENSMUST00000129988 | 13 | 10 | 0 8430436N08Rik  | lincRNA                            |
| ENSMUST00000020112 | 13 | 9  | 56 Uhrf1bp1l     | protein_coding                     |
| ENSMUST00000126610 | 13 | 9  | 32 Rpl12         | protein_coding                     |
| ENSMUST00000142799 | 13 | 9  | 20 Arhgef11      | protein_coding                     |
| ENSMUST00000015667 | 13 | 9  | 14 Ctss          | protein_coding                     |
| ENSMUST00000001460 | 13 | 9  | 4 Snd1           | protein_coding                     |
| ENSMUST00000166406 | 13 | 9  | 4 Chrdl1         | protein_coding                     |
| ENSMUST00000176907 | 13 | 9  | 0 Vmn2r-ps134    | unprocessed_pseudogene             |
| ENSMUST00000048655 | 13 | 9  | 0 Dusp10         | protein_coding                     |
| ENSMUST00000052012 | 13 | 9  | 0 Phka1          | protein_coding                     |
| ENSMUST00000072818 | 13 | 9  | 0 Ugt2b38        | protein_coding                     |
| ENSMUST00000110380 | 13 | 9  | 18 Lrp2bp        | protein_coding                     |
| ENSMUST00000162793 | 13 | 9  | 12 Phyhipl       | protein_coding                     |
| ENSMUST00000184221 | 13 | 9  | 2 Cd40           | protein_coding                     |
| ENSMUST00000165134 | 13 | 8  | 2 Sec23a         | protein_coding                     |
| ENSMUST00000046383 | 13 | 8  | 0 Tnfsf10        | protein_coding                     |
| ENSMUST00000145085 | 13 | 7  | 30 Gm16741       | processed_transcript               |

|                    |    |    |                  |                        |
|--------------------|----|----|------------------|------------------------|
| ENSMUST00000165046 | 13 | 7  | 4 Skint8         | protein_coding         |
| ENSMUST00000123941 | 13 | 7  | 321 Gtf2ird2     | protein_coding         |
| ENSMUST00000022678 | 13 | 7  | 52 Pebp4         | protein_coding         |
| ENSMUST00000037502 | 13 | 7  | 16 Fam117a       | protein_coding         |
| ENSMUST00000055355 | 13 | 7  | 2 Rassf9         | protein_coding         |
| ENSMUST00000050092 | 13 | 7  | 0 Zfp518a        | protein_coding         |
| ENSMUST00000106592 | 13 | 6  | 40 Agbl4         | protein_coding         |
| ENSMUST00000126943 | 13 | 6  | 8 Numb           | protein_coding         |
| ENSMUST00000177704 | 13 | 6  | 0 Ankrd44        | protein_coding         |
| ENSMUST00000149150 | 13 | 5  | 22 Itga9         | protein_coding         |
| ENSMUST00000103070 | 13 | 5  | 8 Tex2           | protein_coding         |
| ENSMUST00000172350 | 13 | 5  | 2 Lrriq4         | protein_coding         |
| ENSMUST00000143652 | 13 | 5  | 8 Gm16086        | lincRNA                |
| ENSMUST00000093171 | 13 | 4  | 38 Abi1          | protein_coding         |
| ENSMUST00000141572 | 13 | 4  | 2 D130043K22Rik  | protein_coding         |
| ENSMUST00000180634 | 13 | 4  | 0 4930467D21Rik  | lincRNA                |
| ENSMUST00000076124 | 13 | 3  | 6 Srrm4          | protein_coding         |
| ENSMUST00000138697 | 13 | 3  | 0 Gm12962        | lincRNA                |
| ENSMUST00000035987 | 13 | 3  | 0 Map3k9         | protein_coding         |
| ENSMUST00000028408 | 13 | 2  | 12 Hat1          | protein_coding         |
| ENSMUST00000091237 | 13 | 1  | 16 Atp11a        | protein_coding         |
| ENSMUST00000122847 | 13 | 1  | 0 Pum1           | protein_coding         |
| ENSMUST00000149468 | 13 | 0  | 32 2610002J02Rik | protein_coding         |
| ENSMUST00000123552 | 12 | 28 | 0 Adamts16       | protein_coding         |
| ENSMUST00000113388 | 12 | 26 | 50 Chm           | protein_coding         |
| ENSMUST00000174421 | 12 | 26 | 0 Slit2          | protein_coding         |
| ENSMUST00000023048 | 12 | 24 | 4 Mief1          | protein_coding         |
| ENSMUST00000030032 | 12 | 24 | 6 Tmeff1         | protein_coding         |
| ENSMUST00000160177 | 12 | 24 | 2 E430024P14Rik  | antisense              |
| ENSMUST00000139764 | 12 | 23 | 0 Usp9x          | protein_coding         |
| ENSMUST00000111968 | 12 | 22 | 10 Smarcc1       | protein_coding         |
| ENSMUST00000111968 | 12 | 22 | 10 Smarcc1       | protein_coding         |
| ENSMUST00000144653 | 12 | 22 | 2 Ttc33          | protein_coding         |
| ENSMUST00000109224 | 12 | 22 | 0 Havcr1         | protein_coding         |
| ENSMUST00000180846 | 12 | 20 | 97 Gm26733       | lincRNA                |
| ENSMUST00000160690 | 12 | 20 | 24 Hs2st1        | protein_coding         |
| ENSMUST00000092033 | 12 | 20 | 2 Rbms2          | protein_coding         |
| ENSMUST00000142870 | 12 | 20 | 0 Xxylt1         | protein_coding         |
| ENSMUST00000041106 | 12 | 19 | 16 Trim67        | protein_coding         |
| ENSMUST00000117454 | 12 | 19 | 2 Gm16431        | unprocessed_pseudogene |
| ENSMUST00000121063 | 12 | 19 | 2 Gm6591         | unprocessed_pseudogene |
| ENSMUST00000136758 | 12 | 19 | 0 Sugp2          | protein_coding         |
| ENSMUST00000084968 | 12 | 18 | 18 Rcor1         | protein_coding         |
| ENSMUST00000101654 | 12 | 18 | 4 Gm14632        | protein_coding         |
| ENSMUST00000080437 | 12 | 18 | 0 Dennd5a        | protein_coding         |
| ENSMUST00000097527 | 12 | 18 | 0 Tor1aip1       | protein_coding         |
| ENSMUST00000027528 | 12 | 18 | 4 Mlph           | protein_coding         |
| ENSMUST00000117154 | 12 | 18 | 2 Gm7974         | unprocessed_pseudogene |
| ENSMUST00000174742 | 12 | 18 | 0 Esp31          | protein_coding         |
| ENSMUST00000150798 | 12 | 17 | 2 Dlgap1         | protein_coding         |
| ENSMUST00000021384 | 12 | 17 | 0 Mia2           | protein_coding         |
| ENSMUST00000168838 | 12 | 17 | 0 Cyp2c69        | protein_coding         |
| ENSMUST00000101657 | 12 | 16 | 4 Gm10488        | protein_coding         |
| ENSMUST00000105393 | 12 | 16 | 0 Icosl          | protein_coding         |
| ENSMUST00000126887 | 12 | 16 | 0 Nox4           | protein_coding         |
| ENSMUST00000105682 | 12 | 16 | 36 Rere          | protein_coding         |
| ENSMUST00000031447 | 12 | 16 | 8 Anxa3          | protein_coding         |
| ENSMUST00000090178 | 12 | 16 | 6 Dnajb14        | protein_coding         |
| ENSMUST00000173740 | 12 | 16 | 6 Lgr5           | protein_coding         |
| ENSMUST00000096469 | 12 | 16 | 2 Gm5169         | protein_coding         |
| ENSMUST00000025358 | 12 | 15 | 71 4833403115Rik | protein_coding         |
| ENSMUST00000044478 | 12 | 15 | 22 Hibch         | protein_coding         |
| ENSMUST00000046290 | 12 | 15 | 6 Lpcat2         | protein_coding         |
| ENSMUST00000135341 | 12 | 15 | 2 Il15ra         | protein_coding         |
| ENSMUST00000040106 | 12 | 15 | 0 Fam151b        | protein_coding         |
| ENSMUST00000052011 | 12 | 15 | 0 Tle4           | protein_coding         |
| ENSMUST00000100619 | 12 | 15 | 0 Gm525          | protein_coding         |
| ENSMUST00000138950 | 12 | 15 | 0 4932438A13Rik  | protein_coding         |

|                    |    |    |    |                |                        |
|--------------------|----|----|----|----------------|------------------------|
| ENSMUST00000032272 | 12 | 14 | 16 | Adipor2        | protein_coding         |
| ENSMUST00000070200 | 12 | 14 | 8  | Pla2g4a        | protein_coding         |
| ENSMUST00000100209 | 12 | 14 | 2  | Fam186a        | protein_coding         |
| ENSMUST00000148768 | 12 | 14 | 0  | C87436         | protein_coding         |
| ENSMUST00000161351 | 12 | 14 | 0  | Fbxo33         | protein_coding         |
| ENSMUST00000109725 | 12 | 14 | 42 | Cbfa2t2        | protein_coding         |
| ENSMUST00000137353 | 12 | 14 | 10 | Gm12865        | lincRNA                |
| ENSMUST00000079618 | 12 | 14 | 6  | St8sia5        | protein_coding         |
| ENSMUST00000110357 | 12 | 14 | 0  | Nphp1          | protein_coding         |
| ENSMUST00000135994 | 12 | 14 | 0  | Oosp2          | protein_coding         |
| ENSMUST00000099494 | 12 | 13 | 61 | Btaf1          | protein_coding         |
| ENSMUST00000039733 | 12 | 13 | 38 | Osbpl11        | protein_coding         |
| ENSMUST00000117455 | 12 | 13 | 8  | Sult1b1        | protein_coding         |
| ENSMUST00000042026 | 12 | 13 | 2  | Pkd2l1         | protein_coding         |
| ENSMUST00000032364 | 12 | 13 | 0  | Slco1a4        | protein_coding         |
| ENSMUST00000074144 | 12 | 13 | 0  | Dcaf8          | protein_coding         |
| ENSMUST00000036653 | 12 | 12 | 24 | Htr2a          | protein_coding         |
| ENSMUST00000097274 | 12 | 12 | 16 | Prkce          | protein_coding         |
| ENSMUST00000049699 | 12 | 12 | 10 | Pskh1          | protein_coding         |
| ENSMUST00000167459 | 12 | 12 | 6  | Mbnl2          | protein_coding         |
| ENSMUST00000112839 | 12 | 12 | 4  | Fbxl17         | protein_coding         |
| ENSMUST00000121808 | 12 | 12 | 0  | Osbpl1a        | protein_coding         |
| ENSMUST00000162363 | 12 | 12 | 0  | Alg9           | protein_coding         |
| ENSMUST00000041772 | 12 | 12 | 26 | Dmxl1          | protein_coding         |
| ENSMUST00000029446 | 12 | 12 | 22 | Csde1          | protein_coding         |
| ENSMUST00000054956 | 12 | 12 | 16 | Stambpl1       | protein_coding         |
| ENSMUST00000177029 | 12 | 12 | 6  | Nek11          | protein_coding         |
| ENSMUST00000118364 | 12 | 12 | 4  | Il23r          | protein_coding         |
| ENSMUST00000153273 | 12 | 12 | 4  | Lrrc37a        | protein_coding         |
| ENSMUST00000140734 | 12 | 12 | 2  | Lrrk2          | protein_coding         |
| ENSMUST00000179633 | 12 | 12 | 0  | Gm7950         | unprocessed_pseudogene |
| ENSMUST00000131523 | 12 | 11 | 14 | Ganc           | protein_coding         |
| ENSMUST00000181362 | 12 | 11 | 10 | Gm26704        | lincRNA                |
| ENSMUST00000160244 | 12 | 11 | 4  | Etv1           | protein_coding         |
| ENSMUST00000038782 | 12 | 11 | 0  | Mael           | protein_coding         |
| ENSMUST00000128667 | 12 | 11 | 0  | Fktn           | protein_coding         |
| ENSMUST00000159574 | 12 | 11 | 0  | Sgtb           | protein_coding         |
| ENSMUST00000068519 | 12 | 10 | 30 | 4933426M11Rik  | protein_coding         |
| ENSMUST00000022543 | 12 | 10 | 22 | Micu2          | protein_coding         |
| ENSMUST00000086538 | 12 | 10 | 8  | Slc8a1         | protein_coding         |
| ENSMUST00000001187 | 12 | 10 | 4  | Anxa4          | protein_coding         |
| ENSMUST00000177739 | 12 | 10 | 0  | Gm16404        | unprocessed_pseudogene |
| ENSMUST00000107030 | 12 | 10 | 0  | Inadl          | protein_coding         |
| ENSMUST00000093893 | 12 | 9  | 20 | Arhgap42       | protein_coding         |
| ENSMUST00000156660 | 12 | 9  | 12 | Cdk14          | protein_coding         |
| ENSMUST00000152776 | 12 | 9  | 8  | Dcdc5          | unitary_pseudogene     |
| ENSMUST00000164774 | 12 | 9  | 2  | Tubgcp3        | protein_coding         |
| ENSMUST00000125909 | 12 | 9  | 0  | 4930480G23Rik  | antisense              |
| ENSMUST00000010940 | 12 | 9  | 6  | Asz1           | protein_coding         |
| ENSMUST00000154173 | 12 | 9  | 6  | Gm14005        | processed_transcript   |
| ENSMUST00000036355 | 12 | 9  | 4  | Phldb2         | protein_coding         |
| ENSMUST00000093152 | 12 | 9  | 0  | 9930111J21Rik2 | protein_coding         |
| ENSMUST00000152128 | 12 | 9  | 0  | Gm16080        | lincRNA                |
| ENSMUST00000154744 | 12 | 8  | 10 | Gtdc1          | protein_coding         |
| ENSMUST00000157048 | 12 | 8  | 4  | 1700101E01Rik  | protein_coding         |
| ENSMUST00000138393 | 12 | 8  | 0  | Tspan13        | protein_coding         |
| ENSMUST00000150328 | 12 | 8  | 0  | Dazap1         | protein_coding         |
| ENSMUST00000106459 | 12 | 7  | 24 | Tesk2          | protein_coding         |
| ENSMUST00000034145 | 12 | 7  | 6  | Tbc1d9         | protein_coding         |
| ENSMUST00000132594 | 12 | 7  | 6  | Osbpl1a        | protein_coding         |
| ENSMUST00000121024 | 12 | 7  | 0  | Gm6792         | protein_coding         |
| ENSMUST00000048670 | 12 | 7  | 16 | Slc35f2        | protein_coding         |
| ENSMUST00000119593 | 12 | 7  | 6  | Gm11251        | processed_pseudogene   |
| ENSMUST00000117245 | 12 | 7  | 0  | Trp53bp2       | protein_coding         |
| ENSMUST00000031280 | 12 | 6  | 59 | Fgf5           | protein_coding         |
| ENSMUST00000176824 | 12 | 6  | 2  | Sik2           | protein_coding         |
| ENSMUST00000119965 | 12 | 6  | 0  | Rhox3g         | protein_coding         |
| ENSMUST00000098574 | 12 | 5  | 6  | Rap1gds1       | protein_coding         |

|                    |    |    |     |               |                        |
|--------------------|----|----|-----|---------------|------------------------|
| ENSMUST00000178661 | 12 | 5  | 0   | Dlgap5        | protein_coding         |
| ENSMUST00000039577 | 12 | 5  | 0   | Zfp51         | protein_coding         |
| ENSMUST00000155564 | 12 | 4  | 34  | Fgfr1         | protein_coding         |
| ENSMUST00000028511 | 12 | 1  | 0   | Mtx2          | protein_coding         |
| ENSMUST00000129571 | 12 | 1  | 30  | Tcp11l1       | protein_coding         |
| ENSMUST00000087638 | 12 | 1  | 6   | Aldh1a1       | protein_coding         |
| ENSMUST00000150976 | 12 | 0  | 6   | Eva1a         | protein_coding         |
| ENSMUST00000038692 | 11 | 49 | 0   | Mgat4d        | protein_coding         |
| ENSMUST00000150745 | 11 | 32 | 107 | Nop56         | protein_coding         |
| ENSMUST00000113901 | 11 | 26 | 6   | Zcchc4        | protein_coding         |
| ENSMUST00000112401 | 11 | 26 | 2   | Gpr64         | protein_coding         |
| ENSMUST00000097967 | 11 | 26 | 0   | Paox          | protein_coding         |
| ENSMUST00000153188 | 11 | 22 | 56  | 4921531C22Rik | processed_transcript   |
| ENSMUST00000107717 | 11 | 22 | 28  | Zfp652        | protein_coding         |
| ENSMUST00000059825 | 11 | 22 | 6   | Crb1          | protein_coding         |
| ENSMUST00000144335 | 11 | 22 | 6   | Emc1          | protein_coding         |
| ENSMUST00000130179 | 11 | 22 | 0   | Mtmr1         | protein_coding         |
| ENSMUST00000135704 | 11 | 22 | 0   | Pbrm1         | protein_coding         |
| ENSMUST00000139577 | 11 | 21 | 30  | Clmp          | protein_coding         |
| ENSMUST00000040001 | 11 | 21 | 14  | Galnt9        | protein_coding         |
| ENSMUST00000034944 | 11 | 20 | 16  | Dapk2         | protein_coding         |
| ENSMUST00000068175 | 11 | 20 | 8   | Arhgef33      | protein_coding         |
| ENSMUST00000004222 | 11 | 20 | 0   | Hira          | protein_coding         |
| ENSMUST00000068880 | 11 | 19 | 0   | Paqr8         | protein_coding         |
| ENSMUST00000126380 | 11 | 18 | 339 | Snhg12        | lincRNA                |
| ENSMUST00000114741 | 11 | 18 | 115 | Pstpip2       | protein_coding         |
| ENSMUST00000099705 | 11 | 18 | 46  | Nxpe3         | protein_coding         |
| ENSMUST00000000087 | 11 | 18 | 6   | Scmh1         | protein_coding         |
| ENSMUST00000097422 | 11 | 18 | 0   | Gm1604A       | protein_coding         |
| ENSMUST00000141102 | 11 | 18 | 6   | Sox5          | protein_coding         |
| ENSMUST00000181121 | 11 | 17 | 46  | 9530026P05Rik | lincRNA                |
| ENSMUST00000140407 | 11 | 17 | 6   | Cfr           | protein_coding         |
| ENSMUST00000184086 | 11 | 17 | 6   | Cyb561        | protein_coding         |
| ENSMUST00000048471 | 11 | 17 | 4   | Abi3bp        | protein_coding         |
| ENSMUST00000132017 | 11 | 16 | 14  | Vps54         | protein_coding         |
| ENSMUST00000135338 | 11 | 16 | 2   | Susd5         | protein_coding         |
| ENSMUST00000007757 | 11 | 16 | 0   | Tgfb1         | protein_coding         |
| ENSMUST00000156637 | 11 | 16 | 12  | Pak1          | protein_coding         |
| ENSMUST00000148179 | 11 | 16 | 8   | Sfxn5         | protein_coding         |
| ENSMUST00000143242 | 11 | 16 | 2   | Junos         | antisense              |
| ENSMUST00000042724 | 11 | 16 | 0   | Usp38         | protein_coding         |
| ENSMUST00000110217 | 11 | 16 | 0   | Col14a1       | protein_coding         |
| ENSMUST00000118064 | 11 | 16 | 0   | Smim11        | protein_coding         |
| ENSMUST00000162555 | 11 | 16 | 0   | Tepp          | protein_coding         |
| ENSMUST00000182066 | 11 | 16 | 0   | Arhgap12      | protein_coding         |
| ENSMUST00000146553 | 11 | 15 | 73  | 4930500J02Rik | processed_transcript   |
| ENSMUST00000062519 | 11 | 15 | 18  | Crebrf        | protein_coding         |
| ENSMUST00000125486 | 11 | 15 | 16  | Snap25        | protein_coding         |
| ENSMUST00000169503 | 11 | 15 | 16  | Strn3         | protein_coding         |
| ENSMUST00000022574 | 11 | 15 | 12  | Lrrc63        | protein_coding         |
| ENSMUST00000112971 | 11 | 15 | 8   | Atg4a         | protein_coding         |
| ENSMUST00000019999 | 11 | 15 | 4   | D10Bwg1379e   | protein_coding         |
| ENSMUST00000068593 | 11 | 15 | 4   | C1ra          | protein_coding         |
| ENSMUST00000070892 | 11 | 15 | 4   | Dsg3          | protein_coding         |
| ENSMUST00000049452 | 11 | 14 | 40  | Tmem108       | protein_coding         |
| ENSMUST00000049251 | 11 | 14 | 8   | Cpa4          | protein_coding         |
| ENSMUST00000067429 | 11 | 14 | 6   | Mdm4          | protein_coding         |
| ENSMUST00000120238 | 11 | 14 | 2   | Trim24        | protein_coding         |
| ENSMUST00000154271 | 11 | 14 | 0   | Pdf           | protein_coding         |
| ENSMUST00000113532 | 11 | 14 | 24  | Hmcn2         | protein_coding         |
| ENSMUST00000136316 | 11 | 14 | 18  | Zfp239        | protein_coding         |
| ENSMUST00000021426 | 11 | 14 | 8   | Vipas39       | protein_coding         |
| ENSMUST00000108060 | 11 | 14 | 8   | Ubap1         | protein_coding         |
| ENSMUST00000066166 | 11 | 14 | 6   | Tll1          | protein_coding         |
| ENSMUST00000121475 | 11 | 14 | 2   | Gm12399       | unprocessed_pseudogene |
| ENSMUST00000094840 | 11 | 14 | 0   | Gm1043        | protein_coding         |
| ENSMUST00000115055 | 11 | 14 | 0   | Fam107b       | protein_coding         |
| ENSMUST00000118089 | 11 | 14 | 0   | Gm8036        | processed_pseudogene   |

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| ENSMUST00000169935 | 11 | 13 | 32 A330050F15Rik | protein_coding         |
| ENSMUST00000115832 | 11 | 13 | 22 Dtna          | protein_coding         |
| ENSMUST00000133124 | 11 | 13 | 12 Itga6         | protein_coding         |
| ENSMUST00000039887 | 11 | 13 | 10 Pof1b         | protein_coding         |
| ENSMUST00000028252 | 11 | 13 | 8 Grb14          | protein_coding         |
| ENSMUST00000172040 | 11 | 13 | 4 Papola         | protein_coding         |
| ENSMUST00000119996 | 11 | 13 | 2 Gm14490        | unprocessed_pseudogene |
| ENSMUST00000117592 | 11 | 13 | 2 4930455H04Rik  | protein_coding         |
| ENSMUST00000114487 | 11 | 13 | 0 Il1rn          | protein_coding         |
| ENSMUST00000133608 | 11 | 12 | 212 Bbox1        | protein_coding         |
| ENSMUST00000070181 | 11 | 12 | 42 Itpkb         | protein_coding         |
| ENSMUST00000106972 | 11 | 12 | 28 Kansl1        | protein_coding         |
| ENSMUST00000074262 | 11 | 12 | 8 Calclrl        | protein_coding         |
| ENSMUST00000132987 | 11 | 12 | 6 Dapk2          | protein_coding         |
| ENSMUST00000067485 | 11 | 12 | 4 Slc30a7        | protein_coding         |
| ENSMUST00000153399 | 11 | 12 | 4 Tmem120a       | protein_coding         |
| ENSMUST00000014640 | 11 | 12 | 0 Ankrd28        | protein_coding         |
| ENSMUST00000106868 | 11 | 12 | 0 Wdr78          | protein_coding         |
| ENSMUST00000115039 | 11 | 12 | 89 Frmd4a        | protein_coding         |
| ENSMUST00000153672 | 11 | 12 | 16 Gm11638       | processed_transcript   |
| ENSMUST00000114248 | 11 | 12 | 14 Cdk15         | protein_coding         |
| ENSMUST00000047206 | 11 | 12 | 12 Plekhh2       | protein_coding         |
| ENSMUST00000079817 | 11 | 12 | 12 Stk24         | protein_coding         |
| ENSMUST00000021929 | 11 | 12 | 4 Habbp4         | protein_coding         |
| ENSMUST00000102838 | 11 | 12 | 0 Sptbn1         | protein_coding         |
| ENSMUST00000127348 | 11 | 12 | 0 Gatb           | protein_coding         |
| ENSMUST00000147952 | 11 | 12 | 0 Vrk3           | protein_coding         |
| ENSMUST00000178145 | 11 | 12 | 0 Gm16430        | protein_coding         |
| ENSMUST00000118237 | 11 | 12 | 0 Gm11500        | processed_pseudogene   |
| ENSMUST00000077626 | 11 | 11 | 24 Pigu          | protein_coding         |
| ENSMUST00000060894 | 11 | 11 | 14 Erich5        | protein_coding         |
| ENSMUST00000090314 | 11 | 11 | 8 Dgki           | protein_coding         |
| ENSMUST00000164072 | 11 | 11 | 6 Nrnx3          | protein_coding         |
| ENSMUST00000066475 | 11 | 11 | 2 Cers3          | protein_coding         |
| ENSMUST00000027339 | 11 | 11 | 0 Smap1          | protein_coding         |
| ENSMUST00000105714 | 11 | 11 | 0 Mfn2           | protein_coding         |
| ENSMUST00000164178 | 11 | 11 | 0 Zan            | protein_coding         |
| ENSMUST00000160980 | 11 | 10 | 26 Nbeal1        | protein_coding         |
| ENSMUST00000109655 | 11 | 10 | 12 Zfp423        | protein_coding         |
| ENSMUST00000119123 | 11 | 10 | 10 Brd4          | protein_coding         |
| ENSMUST00000030714 | 11 | 10 | 2 Sema3a         | protein_coding         |
| ENSMUST00000034947 | 11 | 10 | 2 Ppib           | protein_coding         |
| ENSMUST00000049705 | 11 | 10 | 2 Zfp457         | protein_coding         |
| ENSMUST00000077853 | 11 | 9  | 22 Prpf4b        | protein_coding         |
| ENSMUST00000030731 | 11 | 9  | 12 Taf12         | protein_coding         |
| ENSMUST00000088373 | 11 | 9  | 12 Srgap3        | protein_coding         |
| ENSMUST00000101014 | 11 | 9  | 8 Rpl26          | protein_coding         |
| ENSMUST00000034600 | 11 | 9  | 2 Mpzl2          | protein_coding         |
| ENSMUST00000165687 | 11 | 9  | 0 Tmem207        | protein_coding         |
| ENSMUST00000106113 | 11 | 9  | 20 Foxk2         | protein_coding         |
| ENSMUST00000121979 | 11 | 9  | 10 Cep135        | protein_coding         |
| ENSMUST00000111997 | 11 | 9  | 6 Tmem233        | protein_coding         |
| ENSMUST00000168156 | 11 | 9  | 6 Gm5538         | protein_coding         |
| ENSMUST00000123542 | 11 | 9  | 4 Cenpv          | protein_coding         |
| ENSMUST00000021913 | 11 | 9  | 2 Auh            | protein_coding         |
| ENSMUST00000024724 | 11 | 9  | 2 Crisp2         | protein_coding         |
| ENSMUST00000031254 | 11 | 9  | 0 Khlh8          | protein_coding         |
| ENSMUST00000176802 | 11 | 9  | 0 Vmn2r124       | protein_coding         |
| ENSMUST00000169504 | 11 | 8  | 6 Tdrd3          | protein_coding         |
| ENSMUST00000039135 | 11 | 8  | 4 Dock5          | protein_coding         |
| ENSMUST00000136549 | 11 | 8  | 4 Cobl           | protein_coding         |
| ENSMUST00000087527 | 11 | 8  | 2 Abcc9          | protein_coding         |
| ENSMUST00000131237 | 11 | 7  | 12 Zfp961        | protein_coding         |
| ENSMUST00000142624 | 11 | 7  | 4 Ddx26b         | protein_coding         |
| ENSMUST00000162782 | 11 | 7  | 2 Slco6d1        | protein_coding         |
| ENSMUST00000166315 | 11 | 7  | 30 Akap13        | protein_coding         |
| ENSMUST00000110157 | 11 | 7  | 14 Prokr2        | protein_coding         |
| ENSMUST00000031322 | 11 | 7  | 0 Cxcl15         | protein_coding         |

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|--------------------|----|----|------------------|------------------------|
| ENSMUST00000151315 | 11 | 7  | 0 Cped1          | protein_coding         |
| ENSMUST00000066863 | 11 | 5  | 30 Pfkfb2        | protein_coding         |
| ENSMUST00000009256 | 11 | 5  | 12 Bcl2l13       | protein_coding         |
| ENSMUST00000133597 | 11 | 5  | 0 Ccnc           | protein_coding         |
| ENSMUST00000142248 | 11 | 5  | 26 Luzp1         | protein_coding         |
| ENSMUST00000167390 | 11 | 5  | 6 Slc39a8        | protein_coding         |
| ENSMUST00000171904 | 11 | 4  | 16 Kcnn4         | protein_coding         |
| ENSMUST00000162161 | 11 | 4  | 6 Srgn           | protein_coding         |
| ENSMUST00000085079 | 11 | 3  | 57 Unc79         | protein_coding         |
| ENSMUST00000147127 | 11 | 3  | 2 Plxnb3         | protein_coding         |
| ENSMUST00000023359 | 11 | 3  | 0 Nde1           | protein_coding         |
| ENSMUST00000169914 | 11 | 3  | 0 9130221H12Rik  | antisense              |
| ENSMUST00000078605 | 11 | 1  | 6 1700008I05Rik  | protein_coding         |
| ENSMUST00000138579 | 11 | 1  | 38 Nos1          | protein_coding         |
| ENSMUST00000096751 | 11 | 1  | 0 Ttc9c          | protein_coding         |
| ENSMUST00000172186 | 11 | 0  | 500 Srsf1        | protein_coding         |
| ENSMUST00000163666 | 11 | 0  | 24 Eif4a1        | protein_coding         |
| ENSMUST00000150675 | 11 | 0  | 4 Uqcr2          | protein_coding         |
| ENSMUST00000122945 | 11 | 0  | 0 Sept4          | protein_coding         |
| ENSMUST00000124939 | 10 | 30 | 0 Zbtb49         | protein_coding         |
| ENSMUST00000100993 | 10 | 26 | 44 Cccr2         | protein_coding         |
| ENSMUST00000137064 | 10 | 25 | 0 Auh            | protein_coding         |
| ENSMUST00000142898 | 10 | 22 | 12 Dus2          | protein_coding         |
| ENSMUST00000171277 | 10 | 21 | 6 BC049352       | protein_coding         |
| ENSMUST00000169583 | 10 | 20 | 4 Gm8257         | protein_coding         |
| ENSMUST00000095132 | 10 | 20 | 2 BC061194       | protein_coding         |
| ENSMUST00000089178 | 10 | 19 | 22 Mei1          | protein_coding         |
| ENSMUST00000086074 | 10 | 19 | 6 Dnm3           | protein_coding         |
| ENSMUST00000025635 | 10 | 19 | 4 1700017D01Rik  | protein_coding         |
| ENSMUST00000041362 | 10 | 19 | 0 Mavs           | protein_coding         |
| ENSMUST00000048706 | 10 | 19 | 0 Orc3           | protein_coding         |
| ENSMUST00000006701 | 10 | 18 | 1822 Tmem110     | protein_coding         |
| ENSMUST00000114874 | 10 | 18 | 4 Clec2l         | protein_coding         |
| ENSMUST00000023727 | 10 | 18 | 0 Kansl2         | protein_coding         |
| ENSMUST00000043707 | 10 | 18 | 0 Rhbdd2         | protein_coding         |
| ENSMUST00000106126 | 10 | 18 | 4 Ptgfr          | protein_coding         |
| ENSMUST00000106697 | 10 | 18 | 4 Arsg           | protein_coding         |
| ENSMUST00000155214 | 10 | 17 | 28 Cfap61        | protein_coding         |
| ENSMUST00000154954 | 10 | 17 | 8 Mkin1          | protein_coding         |
| ENSMUST00000073935 | 10 | 17 | 2 Gsg1l          | protein_coding         |
| ENSMUST00000027434 | 10 | 17 | 0 Armc9          | protein_coding         |
| ENSMUST00000107461 | 10 | 17 | 0 Fkbp15         | protein_coding         |
| ENSMUST00000144843 | 10 | 16 | 2 Slain2         | protein_coding         |
| ENSMUST00000162112 | 10 | 16 | 2 Greb1          | protein_coding         |
| ENSMUST00000061165 | 10 | 16 | 0 Pla2g12a       | protein_coding         |
| ENSMUST00000086167 | 10 | 16 | 0 Nfrkb          | protein_coding         |
| ENSMUST00000159860 | 10 | 16 | 0 Pappa2         | protein_coding         |
| ENSMUST00000180921 | 10 | 16 | 18 A330033J07Rik | lincRNA                |
| ENSMUST00000146981 | 10 | 16 | 2 4930599N23Rik  | antisense              |
| ENSMUST00000174528 | 10 | 16 | 0 Gm20548        | processed_transcript   |
| ENSMUST00000135439 | 10 | 15 | 16 Palld         | protein_coding         |
| ENSMUST00000178680 | 10 | 15 | 4 Gm7391         | unprocessed_pseudogene |
| ENSMUST00000026710 | 10 | 15 | 2 Usp16          | protein_coding         |
| ENSMUST00000047970 | 10 | 15 | 2 Abcc10         | protein_coding         |
| ENSMUST00000003413 | 10 | 15 | 0 Cyp4f39        | protein_coding         |
| ENSMUST00000155378 | 10 | 15 | 0 Thumpd3        | protein_coding         |
| ENSMUST00000181391 | 10 | 15 | 0 Zfp273         | protein_coding         |
| ENSMUST00000030627 | 10 | 14 | 46 Rhd           | protein_coding         |
| ENSMUST00000114053 | 10 | 14 | 34 Tcf7l1        | protein_coding         |
| ENSMUST00000031788 | 10 | 14 | 8 Hibadh         | protein_coding         |
| ENSMUST00000077988 | 10 | 14 | 8 Tmc2           | protein_coding         |
| ENSMUST00000152791 | 10 | 14 | 8 Nup214         | protein_coding         |
| ENSMUST00000178205 | 10 | 14 | 6 Gm7415         | unprocessed_pseudogene |
| ENSMUST00000177664 | 10 | 14 | 4 Gm7438         | unprocessed_pseudogene |
| ENSMUST00000046030 | 10 | 14 | 2 Esf1           | protein_coding         |
| ENSMUST00000046276 | 10 | 14 | 2 Mturn          | protein_coding         |
| ENSMUST00000151913 | 10 | 14 | 0 Rfx8           | protein_coding         |
| ENSMUST00000165249 | 10 | 14 | 71 Elmo1         | protein_coding         |



|                    |    |    |                  |                        |
|--------------------|----|----|------------------|------------------------|
| ENSMUST00000165249 | 10 | 14 | 71 Elmo1         | protein_coding         |
| ENSMUST00000076212 | 10 | 14 | 20 Abtb2         | protein_coding         |
| ENSMUST00000146565 | 10 | 14 | 12 Galnt14       | protein_coding         |
| ENSMUST00000074572 | 10 | 14 | 8 Scimp          | protein_coding         |
| ENSMUST00000156282 | 10 | 14 | 6 1700015F17Rik  | protein_coding         |
| ENSMUST00000132403 | 10 | 14 | 4 Atm            | protein_coding         |
| ENSMUST00000113573 | 10 | 14 | 2 Atrx           | protein_coding         |
| ENSMUST00000156803 | 10 | 14 | 2 Gm15608        | antisense              |
| ENSMUST00000141052 | 10 | 14 | 0 Foxn2          | protein_coding         |
| ENSMUST00000040008 | 10 | 13 | 48 Ube2r2        | protein_coding         |
| ENSMUST00000181330 | 10 | 13 | 10 4930432B10Rik | lincRNA                |
| ENSMUST00000169533 | 10 | 13 | 6 Mcoln2         | protein_coding         |
| ENSMUST00000127610 | 10 | 12 | 22 Ankfy1        | protein_coding         |
| ENSMUST00000175965 | 10 | 12 | 14 Onecut2       | protein_coding         |
| ENSMUST00000096386 | 10 | 12 | 6 Rnf41          | protein_coding         |
| ENSMUST00000097925 | 10 | 12 | 2 Zcchc11        | protein_coding         |
| ENSMUST00000033909 | 10 | 12 | 0 Tex29          | protein_coding         |
| ENSMUST00000041208 | 10 | 12 | 0 Aaas           | protein_coding         |
| ENSMUST00000065625 | 10 | 12 | 44 Trmt11        | protein_coding         |
| ENSMUST00000123488 | 10 | 12 | 36 Minos1        | protein_coding         |
| ENSMUST00000070424 | 10 | 12 | 4 Gm5409         | unprocessed_pseudogene |
| ENSMUST00000070424 | 10 | 12 | 4 Gm5409         | unprocessed_pseudogene |
| ENSMUST00000035925 | 10 | 12 | 4 Slc7a6os       | protein_coding         |
| ENSMUST00000034131 | 10 | 12 | 2 Vps35          | protein_coding         |
| ENSMUST00000118934 | 10 | 12 | 0 Gm14590        | unprocessed_pseudogene |
| ENSMUST00000023339 | 10 | 12 | 0 Gcsam          | protein_coding         |
| ENSMUST00000038389 | 10 | 12 | 0 Strc           | protein_coding         |
| ENSMUST00000046770 | 10 | 12 | 0 Nenf           | protein_coding         |
| ENSMUST00000107543 | 10 | 12 | 0 Bglap3         | protein_coding         |
| ENSMUST00000125633 | 10 | 12 | 0 Pex26          | protein_coding         |
| ENSMUST00000177604 | 10 | 12 | 0 Ska1           | protein_coding         |
| ENSMUST00000180150 | 10 | 12 | 0 Gm16405        | protein_coding         |
| ENSMUST00000047328 | 10 | 11 | 28 Igfbp2        | protein_coding         |
| ENSMUST00000152740 | 10 | 11 | 24 Gm13629       | antisense              |
| ENSMUST00000121440 | 10 | 11 | 16 Maml3         | protein_coding         |
| ENSMUST00000009789 | 10 | 11 | 0 P4ha1          | protein_coding         |
| ENSMUST00000031059 | 10 | 11 | 0 Ppargc1a       | protein_coding         |
| ENSMUST00000032842 | 10 | 11 | 0 Ccdc90b        | protein_coding         |
| ENSMUST00000095430 | 10 | 11 | 0 Gm6040         | protein_coding         |
| ENSMUST00000173506 | 10 | 10 | 42 Znrf1         | protein_coding         |
| ENSMUST00000152103 | 10 | 10 | 18 Iqsec3        | protein_coding         |
| ENSMUST00000033720 | 10 | 10 | 14 Rbbp7         | protein_coding         |
| ENSMUST00000033739 | 10 | 10 | 10 Car5b         | protein_coding         |
| ENSMUST00000050132 | 10 | 10 | 4 Slc15a5        | protein_coding         |
| ENSMUST00000115560 | 10 | 10 | 2 Yeats2         | protein_coding         |
| ENSMUST00000019977 | 10 | 10 | 0 Ddo            | protein_coding         |
| ENSMUST00000053336 | 10 | 10 | 0 2510009E07Rik  | protein_coding         |
| ENSMUST00000053716 | 10 | 10 | 0 Clrn3          | protein_coding         |
| ENSMUST00000175868 | 10 | 9  | 44 Gbf1          | protein_coding         |
| ENSMUST00000162837 | 10 | 9  | 30 Gm16271       | antisense              |
| ENSMUST00000179196 | 10 | 9  | 14 Tspan8        | protein_coding         |
| ENSMUST00000111581 | 10 | 9  | 10 Rbfox2        | protein_coding         |
| ENSMUST00000026750 | 10 | 9  | 2 Cnksr2         | protein_coding         |
| ENSMUST00000111941 | 10 | 9  | 2 Rgs13          | protein_coding         |
| ENSMUST00000117556 | 10 | 9  | 2 D630045J12Rik  | protein_coding         |
| ENSMUST00000140578 | 10 | 9  | 2 Gm15477        | processed_transcript   |
| ENSMUST00000159627 | 10 | 9  | 0 Gm16582        | processed_transcript   |
| ENSMUST00000117218 | 10 | 9  | 0 Gm6912         | processed_pseudogene   |
| ENSMUST00000156169 | 10 | 9  | 0 Gm14507        | antisense              |
| ENSMUST00000149301 | 10 | 9  | 30 Al314180      | protein_coding         |
| ENSMUST00000111835 | 10 | 9  | 22 Styx          | protein_coding         |
| ENSMUST00000061506 | 10 | 9  | 14 Tmtc2         | protein_coding         |
| ENSMUST00000108219 | 10 | 9  | 8 Pex5l          | protein_coding         |
| ENSMUST00000173069 | 10 | 9  | 4 Adam32         | protein_coding         |
| ENSMUST00000164875 | 10 | 9  | 2 Vmn2r11        | protein_coding         |
| ENSMUST00000179301 | 10 | 9  | 2 Tnpo1          | protein_coding         |
| ENSMUST00000017316 | 10 | 9  | 0 Aoc3           | protein_coding         |
| ENSMUST00000121044 | 10 | 9  | 0 Btc            | protein_coding         |

|                    |    |    |                  |                        |
|--------------------|----|----|------------------|------------------------|
| ENSMUST00000139115 | 10 | 9  | 0 Dync2h1        | protein_coding         |
| ENSMUST00000175643 | 10 | 9  | 0 Ube2e2         | protein_coding         |
| ENSMUST00000095576 | 10 | 8  | 16 Scel          | protein_coding         |
| ENSMUST00000021288 | 10 | 8  | 14 Usp43         | protein_coding         |
| ENSMUST00000144185 | 10 | 8  | 14 Alg13         | protein_coding         |
| ENSMUST00000122037 | 10 | 8  | 10 Lphn3         | protein_coding         |
| ENSMUST00000135859 | 10 | 8  | 8 Styk1          | protein_coding         |
| ENSMUST00000107554 | 10 | 8  | 4 Zkscan16       | protein_coding         |
| ENSMUST00000125755 | 10 | 8  | 4 Tmem161a       | protein_coding         |
| ENSMUST00000035129 | 10 | 8  | 2 Ephb1          | protein_coding         |
| ENSMUST00000069218 | 10 | 8  | 2 Mbd311         | protein_coding         |
| ENSMUST00000028243 | 10 | 8  | 0 4930568D16Rik  | protein_coding         |
| ENSMUST00000038455 | 10 | 8  | 0 Skint3         | protein_coding         |
| ENSMUST00000118303 | 10 | 8  | 0 Gm14658        | processed_pseudogene   |
| ENSMUST00000139214 | 10 | 8  | 0 4930430E12Rik  | antisense              |
| ENSMUST00000171723 | 10 | 8  | 0 Gm17202        | antisense              |
| ENSMUST00000180733 | 10 | 7  | 46 5730422E09Rik | lincRNA                |
| ENSMUST00000123530 | 10 | 7  | 34 1300017J02Rik | protein_coding         |
| ENSMUST00000030313 | 10 | 7  | 2 Caap1          | protein_coding         |
| ENSMUST00000156725 | 10 | 7  | 2 Fbxl18         | protein_coding         |
| ENSMUST00000026693 | 10 | 7  | 0 Zfp202         | protein_coding         |
| ENSMUST00000064595 | 10 | 7  | 0 Asap2          | protein_coding         |
| ENSMUST00000137172 | 10 | 7  | 0 Sema6d         | protein_coding         |
| ENSMUST00000143764 | 10 | 7  | 0 Fsip2          | protein_coding         |
| ENSMUST00000156363 | 10 | 7  | 0 Ythdc1         | protein_coding         |
| ENSMUST00000101453 | 10 | 7  | 61 Naalad2       | protein_coding         |
| ENSMUST00000021335 | 10 | 7  | 18 Scfd1         | protein_coding         |
| ENSMUST00000155268 | 10 | 7  | 14 Mylk          | protein_coding         |
| ENSMUST00000095580 | 10 | 7  | 10 Mypn          | protein_coding         |
| ENSMUST00000121428 | 10 | 7  | 2 Gm16458        | unprocessed_pseudogene |
| ENSMUST00000033908 | 10 | 7  | 2 Arhgef7        | protein_coding         |
| ENSMUST00000092665 | 10 | 7  | 2 Eya4           | protein_coding         |
| ENSMUST00000102946 | 10 | 7  | 2 Exoc2          | protein_coding         |
| ENSMUST00000181266 | 10 | 7  | 0 Gm26728        | lincRNA                |
| ENSMUST00000181266 | 10 | 7  | 0 Gm26728        | lincRNA                |
| ENSMUST00000065125 | 10 | 7  | 0 Lrrc74b        | protein_coding         |
| ENSMUST00000162655 | 10 | 7  | 0 Cep63          | protein_coding         |
| ENSMUST00000032257 | 10 | 6  | 18 Klrb1f        | protein_coding         |
| ENSMUST00000165165 | 10 | 6  | 16 Col6a5        | protein_coding         |
| ENSMUST00000068457 | 10 | 6  | 14 Pphln1        | protein_coding         |
| ENSMUST00000119055 | 10 | 6  | 0 Rab3d          | protein_coding         |
| ENSMUST00000156038 | 10 | 6  | 0 Ankrd50        | protein_coding         |
| ENSMUST00000117217 | 10 | 5  | 2 Numb           | protein_coding         |
| ENSMUST00000148849 | 10 | 5  | 0 Ccdc137        | protein_coding         |
| ENSMUST00000121404 | 10 | 5  | 22 Adtrp         | protein_coding         |
| ENSMUST00000042221 | 10 | 5  | 10 Slc26a7       | protein_coding         |
| ENSMUST00000144893 | 10 | 5  | 4 Baz2b          | protein_coding         |
| ENSMUST00000151381 | 10 | 5  | 2 Gm11732        | processed_transcript   |
| ENSMUST00000129297 | 10 | 5  | 0 Thap7          | protein_coding         |
| ENSMUST00000140276 | 10 | 4  | 20 Fto           | protein_coding         |
| ENSMUST00000180987 | 10 | 4  | 4 6230400D17Rik  | lincRNA                |
| ENSMUST00000002678 | 10 | 3  | 20 Tgfb1         | protein_coding         |
| ENSMUST00000159444 | 10 | 3  | 4 Arpp21         | protein_coding         |
| ENSMUST00000127574 | 10 | 3  | 2 Ermap          | protein_coding         |
| ENSMUST00000132611 | 10 | 3  | 0 Sycp2          | protein_coding         |
| ENSMUST00000030915 | 10 | 2  | 10 Morn1         | protein_coding         |
| ENSMUST00000163013 | 10 | 2  | 2 Fn timers3a    | protein_coding         |
| ENSMUST00000118157 | 10 | 1  | 2 Ankrd42        | protein_coding         |
| ENSMUST00000110677 | 10 | 0  | 2 Smurf1         | protein_coding         |
| ENSMUST00000100251 | 10 | 0  | 0 Rxra           | protein_coding         |
| ENSMUST00000125624 | 10 | 0  | 0 Ino80e         | protein_coding         |
| ENSMUST00000180222 | 10 | 0  | 0 Zbtb46         | protein_coding         |
| ENSMUST00000113385 | 10 | 30 | 2 Sp140          | protein_coding         |
| ENSMUST00000090586 | 10 | 29 | 20 Phf21a        | protein_coding         |
| ENSMUST00000023387 | 10 | 29 | 8 Qtrtd1         | protein_coding         |
| ENSMUST00000048630 | 10 | 28 | 4 Crtac1         | protein_coding         |
| ENSMUST00000109949 | 10 | 23 | 2 Hormad2        | protein_coding         |
| ENSMUST00000095715 | 10 | 22 | 4 Bves           | protein_coding         |

|                    |    |    |                   |                      |
|--------------------|----|----|-------------------|----------------------|
| ENSMUST00000094782 | 10 | 22 | 24 Inpp5b         | protein_coding       |
| ENSMUST00000122300 | 10 | 22 | 8 Klc1            | protein_coding       |
| ENSMUST00000159139 | 10 | 20 | 30 Pdss2          | protein_coding       |
| ENSMUST00000094815 | 10 | 20 | 24 Sae1           | protein_coding       |
| ENSMUST00000125395 | 10 | 19 | 38 Cnbd2          | protein_coding       |
| ENSMUST00000091920 | 10 | 19 | 22 Rbm27          | protein_coding       |
| ENSMUST00000160807 | 10 | 18 | 8 Wbscr17         | protein_coding       |
| ENSMUST00000118942 | 10 | 18 | 2 Disc1           | protein_coding       |
| ENSMUST00000094610 | 10 | 18 | 0 Nckap5          | protein_coding       |
| ENSMUST00000140459 | 10 | 18 | 0 Abca15          | protein_coding       |
| ENSMUST00000048418 | 10 | 17 | 44 Ipo8           | protein_coding       |
| ENSMUST00000039447 | 10 | 17 | 4 Fndc3c1         | protein_coding       |
| ENSMUST00000013458 | 10 | 17 | 0 Adh4            | protein_coding       |
| ENSMUST00000051526 | 10 | 17 | 0 Pxt1            | protein_coding       |
| ENSMUST00000062658 | 10 | 16 | 24 Zmynd11        | protein_coding       |
| ENSMUST00000035155 | 10 | 16 | 16 Rab6b          | protein_coding       |
| ENSMUST00000141233 | 10 | 16 | 10 Abca13         | protein_coding       |
| ENSMUST00000012587 | 10 | 16 | 8 Kif11           | protein_coding       |
| ENSMUST00000139917 | 10 | 16 | 0 Engase          | protein_coding       |
| ENSMUST00000034745 | 10 | 16 | 73 Myo1e          | protein_coding       |
| ENSMUST00000169900 | 10 | 16 | 16 Scn9a          | protein_coding       |
| ENSMUST00000052249 | 10 | 16 | 6 Mrps27          | protein_coding       |
| ENSMUST00000058682 | 10 | 16 | 2 Ano7            | protein_coding       |
| ENSMUST00000143365 | 10 | 16 | 0 Akap9           | protein_coding       |
| ENSMUST00000161202 | 10 | 16 | 0 Snx31           | protein_coding       |
| ENSMUST00000184130 | 10 | 16 | 0 Gnb4            | protein_coding       |
| ENSMUST00000020608 | 10 | 15 | 32 Ppp2ca         | protein_coding       |
| ENSMUST00000132079 | 10 | 15 | 14 Spag9          | protein_coding       |
| ENSMUST00000089473 | 10 | 15 | 4 Zdhhc20         | protein_coding       |
| ENSMUST00000038229 | 10 | 15 | 0 Neil2           | protein_coding       |
| ENSMUST00000032451 | 10 | 14 | 611 Slc6a11       | protein_coding       |
| ENSMUST00000106527 | 10 | 14 | 2 Acsm3           | protein_coding       |
| ENSMUST00000074056 | 10 | 14 | 0 Kira6           | protein_coding       |
| ENSMUST00000134063 | 10 | 14 | 38 Entpd1         | protein_coding       |
| ENSMUST00000137788 | 10 | 14 | 14 Fbxl13         | protein_coding       |
| ENSMUST00000031072 | 10 | 14 | 6 Anapc4          | protein_coding       |
| ENSMUST00000109304 | 10 | 14 | 0 1700025C18Rik   | protein_coding       |
| ENSMUST00000120837 | 10 | 14 | 0 Lyzl1           | protein_coding       |
| ENSMUST00000142864 | 10 | 14 | 0 Syne2           | protein_coding       |
| ENSMUST00000149051 | 10 | 14 | 0 Arnt            | protein_coding       |
| ENSMUST00000152702 | 10 | 13 | 6 Trhde           | protein_coding       |
| ENSMUST00000034452 | 10 | 13 | 4 Ccsap           | protein_coding       |
| ENSMUST00000180740 | 10 | 13 | 4 Gm26608         | lincRNA              |
| ENSMUST00000021662 | 10 | 13 | 0 Entpd5          | protein_coding       |
| ENSMUST00000167382 | 10 | 13 | 0 Vmn2r105        | protein_coding       |
| ENSMUST00000174811 | 10 | 13 | 0 Gm20539         | processed_transcript |
| ENSMUST00000033331 | 10 | 12 | 36 Nrip3          | protein_coding       |
| ENSMUST00000164107 | 10 | 12 | 30 Bcr            | protein_coding       |
| ENSMUST00000105495 | 10 | 12 | 10 Scml4          | protein_coding       |
| ENSMUST00000138977 | 10 | 12 | 10 March10        | protein_coding       |
| ENSMUST00000159566 | 10 | 12 | 4 Akr1cl          | protein_coding       |
| ENSMUST00000050148 | 10 | 12 | 0 Cdc3711         | protein_coding       |
| ENSMUST00000109651 | 10 | 12 | 0 Cobl            | protein_coding       |
| ENSMUST00000117798 | 10 | 12 | 0 Zfr2            | protein_coding       |
| ENSMUST00000156935 | 10 | 12 | 0 Dazap1          | protein_coding       |
| ENSMUST00000176778 | 10 | 12 | 0 Cux1            | protein_coding       |
| ENSMUST00000125967 | 10 | 12 | 192 C030037D09Rik | lincRNA              |
| ENSMUST00000153765 | 10 | 12 | 87 Tmem260        | protein_coding       |
| ENSMUST00000029696 | 10 | 12 | 24 2810403A07Rik  | protein_coding       |
| ENSMUST00000111969 | 10 | 12 | 22 Smarcc1        | protein_coding       |
| ENSMUST00000111969 | 10 | 12 | 22 Smarcc1        | protein_coding       |
| ENSMUST00000108298 | 10 | 12 | 22 Ect2           | protein_coding       |
| ENSMUST00000141468 | 10 | 12 | 10 Atp11b         | protein_coding       |
| ENSMUST00000141468 | 10 | 12 | 10 Atp11b         | protein_coding       |
| ENSMUST00000137899 | 10 | 12 | 8 Acer3           | protein_coding       |
| ENSMUST00000038280 | 10 | 12 | 2 Fermt1          | protein_coding       |
| ENSMUST00000028858 | 10 | 12 | 0 Bub1            | protein_coding       |
| ENSMUST00000097788 | 10 | 12 | 0 Mthfr           | protein_coding       |

|                    |    |    |    |               |                      |
|--------------------|----|----|----|---------------|----------------------|
| ENSMUST00000129769 | 10 | 12 | 0  | Gm14597       | protein_coding       |
| ENSMUST00000165449 | 10 | 12 | 0  | Sbf2          | protein_coding       |
| ENSMUST00000173397 | 10 | 12 | 0  | Dnm2          | protein_coding       |
| ENSMUST00000183014 | 10 | 11 | 57 | Ccnd3         | protein_coding       |
| ENSMUST00000114784 | 10 | 11 | 28 | Slc9a6        | protein_coding       |
| ENSMUST00000146458 | 10 | 11 | 14 | Ep400         | protein_coding       |
| ENSMUST00000094053 | 10 | 11 | 10 | Tnrc6a        | protein_coding       |
| ENSMUST00000184006 | 10 | 11 | 2  | Mlip          | protein_coding       |
| ENSMUST00000090052 | 10 | 11 | 0  | Yeats2        | protein_coding       |
| ENSMUST00000136120 | 10 | 11 | 0  | Fmo1          | protein_coding       |
| ENSMUST00000133196 | 10 | 11 | 0  | Gm13049       | lincRNA              |
| ENSMUST00000139864 | 10 | 11 | 0  | 4933408N05Rik | antisense            |
| ENSMUST00000184492 | 10 | 11 | 0  | Gm27153       | antisense            |
| ENSMUST00000025288 | 10 | 10 | 85 | Zfp521        | protein_coding       |
| ENSMUST00000108681 | 10 | 10 | 28 | Gas7          | protein_coding       |
| ENSMUST00000151346 | 10 | 10 | 16 | Macf1         | protein_coding       |
| ENSMUST00000144206 | 10 | 10 | 14 | Strbp         | protein_coding       |
| ENSMUST00000037491 | 10 | 10 | 10 | F13a1         | protein_coding       |
| ENSMUST00000164114 | 10 | 10 | 10 | Ccdc141       | protein_coding       |
| ENSMUST00000163865 | 10 | 10 | 8  | Arhgap28      | protein_coding       |
| ENSMUST00000156101 | 10 | 10 | 6  | Plek          | protein_coding       |
| ENSMUST00000123952 | 10 | 10 | 4  | C030017K20Rik | protein_coding       |
| ENSMUST00000144501 | 10 | 10 | 4  | 1700026D11Rik | antisense            |
| ENSMUST00000163419 | 10 | 10 | 0  | Scaf4         | protein_coding       |
| ENSMUST00000169597 | 10 | 9  | 28 | Tecpr2        | protein_coding       |
| ENSMUST00000055758 | 10 | 9  | 16 | Ubr3          | protein_coding       |
| ENSMUST00000030747 | 10 | 9  | 12 | Casp9         | protein_coding       |
| ENSMUST00000029386 | 10 | 9  | 8  | Etfdh         | protein_coding       |
| ENSMUST00000090678 | 10 | 9  | 6  | Rap1a         | protein_coding       |
| ENSMUST00000118419 | 10 | 9  | 6  | Adam5         | protein_coding       |
| ENSMUST00000131195 | 10 | 9  | 4  | Apbb1ip       | protein_coding       |
| ENSMUST00000143264 | 10 | 9  | 4  | 5830428H23Rik | processed_transcript |
| ENSMUST00000021514 | 10 | 9  | 2  | Ppm1a         | protein_coding       |
| ENSMUST00000070890 | 10 | 9  | 2  | Chst13        | protein_coding       |
| ENSMUST00000164269 | 10 | 9  | 2  | Ptpn4         | protein_coding       |
| ENSMUST00000002885 | 10 | 9  | 0  | Epdr1         | protein_coding       |
| ENSMUST00000071103 | 10 | 9  | 0  | Ddx1          | protein_coding       |
| ENSMUST00000132487 | 10 | 9  | 0  | Gm11190       | lincRNA              |
| ENSMUST00000129137 | 10 | 9  | 83 | Raly          | protein_coding       |
| ENSMUST00000120463 | 10 | 9  | 28 | Sik3          | protein_coding       |
| ENSMUST00000067646 | 10 | 9  | 20 | Ilf3          | protein_coding       |
| ENSMUST00000028743 | 10 | 9  | 4  | Snap23        | protein_coding       |
| ENSMUST00000028955 | 10 | 9  | 2  | Angpt4        | protein_coding       |
| ENSMUST00000178614 | 10 | 9  | 2  | Gm1045        | protein_coding       |
| ENSMUST00000019405 | 10 | 9  | 0  | Map1s         | protein_coding       |
| ENSMUST00000047257 | 10 | 8  | 18 | Katnal1       | protein_coding       |
| ENSMUST00000025862 | 10 | 8  | 12 | Smarca2       | protein_coding       |
| ENSMUST00000095027 | 10 | 8  | 10 | Aff3          | protein_coding       |
| ENSMUST00000107773 | 10 | 8  | 8  | Tmod1         | protein_coding       |
| ENSMUST00000095075 | 10 | 8  | 4  | Crispld1      | protein_coding       |
| ENSMUST00000161975 | 10 | 8  | 4  | 4930473D10Rik | antisense            |
| ENSMUST00000038188 | 10 | 8  | 2  | Limch1        | protein_coding       |
| ENSMUST00000024954 | 10 | 8  | 0  | Epas1         | protein_coding       |
| ENSMUST00000066921 | 10 | 8  | 0  | Slc25a40      | protein_coding       |
| ENSMUST00000075995 | 10 | 8  | 0  | Cand2         | protein_coding       |
| ENSMUST00000098754 | 10 | 8  | 0  | Relb          | protein_coding       |
| ENSMUST00000108166 | 10 | 8  | 0  | Ankrd6        | protein_coding       |
| ENSMUST00000111584 | 10 | 8  | 0  | Afap112       | protein_coding       |
| ENSMUST00000153377 | 10 | 8  | 0  | Mesdc2        | protein_coding       |
| ENSMUST00000162922 | 10 | 8  | 0  | Fndc3a        | protein_coding       |
| ENSMUST00000148610 | 10 | 8  | 0  | Gm10660       | lincRNA              |
| ENSMUST00000108674 | 10 | 7  | 87 | Ntn1          | protein_coding       |
| ENSMUST00000112498 | 10 | 7  | 30 | Crim1         | protein_coding       |
| ENSMUST00000159113 | 10 | 7  | 12 | Dlx6os1       | antisense            |
| ENSMUST00000159113 | 10 | 7  | 12 | Dlx6os1       | antisense            |
| ENSMUST00000147907 | 10 | 7  | 8  | Rorb          | protein_coding       |
| ENSMUST00000160859 | 10 | 7  | 2  | Ocln          | protein_coding       |
| ENSMUST00000029478 | 10 | 7  | 0  | Slc25a54      | protein_coding       |

|                      |    |    |              |                         |
|----------------------|----|----|--------------|-------------------------|
| ENSMUST00000088046   | 10 | 7  | 0 Klri1      | protein_coding          |
| ENSMUST00000067918   | 10 | 7  | 14 Ppm1h     | protein_coding          |
| ENSMUST00000002080   | 10 | 7  | 12 Pdzd4     | protein_coding          |
| ENSMUST000000156238  | 10 | 7  | 8 Slc4a4     | protein_coding          |
| ENSMUST000000081022  | 10 | 7  | 6 Zfp28      | protein_coding          |
| ENSMUST000000025519  | 10 | 7  | 4 Camk2a     | protein_coding          |
| ENSMUST000000172969  | 10 | 7  | 2 Vmn2r-ps46 | unprocessed_pseudogene  |
| ENSMUST000000028279  | 10 | 7  | 2 Strbp      | protein_coding          |
| ENSMUST000000112470  | 10 | 7  | 2 Map7d2     | protein_coding          |
| ENSMUST000000133450  | 10 | 7  | 0 Ccdc144b   | nonsense_mediated_decay |
| ENSMUST000000133450  | 10 | 7  | 0 Ccdc144b   | nonsense_mediated_decay |
| ENSMUST000000054730  | 10 | 7  | 0 Hiatl1     | protein_coding          |
| ENSMUST000000177946  | 10 | 7  | 0 Prom1      | protein_coding          |
| ENSMUST000000111936  | 10 | 6  | 38 Btrc      | protein_coding          |
| ENSMUST000000134589  | 10 | 6  | 22 Zbtb34    | protein_coding          |
| ENSMUST000000159926  | 10 | 6  | 10 Slc25a54  | protein_coding          |
| ENSMUST000000050686  | 10 | 6  | 0 Tmem67     | protein_coding          |
| ENSMUST000000125203  | 10 | 6  | 0 Optn       | protein_coding          |
| ENSMUST000000161266  | 10 | 6  | 0 Cct5       | protein_coding          |
| ENSMUST000000168269  | 10 | 6  | 0 Ii7        | protein_coding          |
| ENSMUST000000172055  | 10 | 6  | 0 Gm17188    | processed_transcript    |
| ENSMUST000000111167  | 10 | 5  | 20 Pld5      | protein_coding          |
| ENSMUST000000102549  | 10 | 5  | 12 Nipal3    | protein_coding          |
| ENSMUST000000151999  | 10 | 5  | 10 Mroh5     | protein_coding          |
| ENSMUST000000086130  | 10 | 5  | 4 Sec16b     | protein_coding          |
| ENSMUST000000029805  | 10 | 5  | 2 Mtpt       | protein_coding          |
| ENSMUST000000170861  | 10 | 5  | 2 Trat1      | protein_coding          |
| ENSMUST000000165061  | 10 | 5  | 0 Cyp4f40    | protein_coding          |
| ENSMUST000000181048  | 10 | 5  | 0 Gm26718    | lincRNA                 |
| ENSMUST000000108360  | 10 | 5  | 32 Phf12     | protein_coding          |
| ENSMUST000000072727  | 10 | 5  | 28 Nap114    | protein_coding          |
| ENSMUST000000105500  | 10 | 5  | 24 Snx3      | protein_coding          |
| ENSMUST000000168302  | 10 | 5  | 6 Stat4      | protein_coding          |
| ENSMUST000000150737  | 10 | 5  | 0 Cntnap2    | protein_coding          |
| ENSMUST000000167210  | 10 | 5  | 0 Gm14569    | protein_coding          |
| ENSMUST000000002549  | 10 | 4  | 0 Abhd3      | protein_coding          |
| ENSMUST000000005053  | 10 | 4  | 0 Tmem242    | protein_coding          |
| ENSMUST000000130881  | 10 | 3  | 36 Gss       | protein_coding          |
| ENSMUST000000071095  | 10 | 3  | 4 Setd3      | protein_coding          |
| ENSMUST000000024916  | 10 | 3  | 0 Lhcgr      | protein_coding          |
| ENSMUST000000032998  | 10 | 3  | 20 Rps3      | protein_coding          |
| ENSMUST000000089394  | 10 | 2  | 42 Sacs      | protein_coding          |
| ENSMUST000000111883  | 10 | 1  | 34 Swt1      | protein_coding          |
| ENSMUST000000055688  | 10 | 1  | 12 Phf13     | protein_coding          |
| ENSMUST0000000044113 | 10 | 0  | 10 Ago2      | protein_coding          |
| ENSMUST000000023525  | 10 | 0  | 0 Gtf2e1     | protein_coding          |
| ENSMUST000000105365  | 10 | 0  | 0 Cirbp      | protein_coding          |
| ENSMUST000000050993  | 9  | 49 | 103 Eif5     | protein_coding          |
| ENSMUST000000098473  | 9  | 31 | 2 Cnot1      | protein_coding          |
| ENSMUST000000112392  | 9  | 23 | 0 Chd4       | protein_coding          |
| ENSMUST000000121330  | 9  | 20 | 10 Scfd2     | protein_coding          |
| ENSMUST000000087622  | 9  | 20 | 121 Plekha5  | protein_coding          |
| ENSMUST000000050826  | 9  | 18 | 24 Tet1      | protein_coding          |
| ENSMUST000000021458  | 9  | 18 | 8 Sptb       | protein_coding          |
| ENSMUST000000176826  | 9  | 18 | 0 Osmr       | protein_coding          |
| ENSMUST000000107230  | 9  | 18 | 4 Frem1      | protein_coding          |
| ENSMUST000000107071  | 9  | 17 | 6 Gm12695    | protein_coding          |
| ENSMUST0000000047697 | 9  | 17 | 0 Trim17     | protein_coding          |
| ENSMUST000000129182  | 9  | 16 | 0 Fat4       | protein_coding          |
| ENSMUST000000042345  | 9  | 16 | 18 Ctnna1    | protein_coding          |
| ENSMUST000000133257  | 9  | 15 | 79 Ggnbp1    | protein_coding          |
| ENSMUST000000107166  | 9  | 15 | 26 Tenm4     | protein_coding          |
| ENSMUST000000180772  | 9  | 15 | 0 Gm26773    | lincRNA                 |
| ENSMUST000000136992  | 9  | 15 | 0 Gm11837    | antisense               |
| ENSMUST000000046514  | 9  | 14 | 44 Eprs      | protein_coding          |
| ENSMUST000000103010  | 9  | 14 | 18 Lyn       | protein_coding          |
| ENSMUST000000135447  | 9  | 14 | 16 Ltbp1     | protein_coding          |
| ENSMUST000000151952  | 9  | 14 | 10 Mgat4a    | protein_coding          |

|                     |   |    |                  |                      |
|---------------------|---|----|------------------|----------------------|
| ENSMUST00000047450  | 9 | 14 | 8 Creb5          | protein_coding       |
| ENSMUST00000034832  | 9 | 14 | 109 Ptpn9        | protein_coding       |
| ENSMUST00000036555  | 9 | 14 | 36 Myo5c         | protein_coding       |
| ENSMUST000000134725 | 9 | 14 | 16 Prkca         | protein_coding       |
| ENSMUST000000145491 | 9 | 14 | 14 Podn          | protein_coding       |
| ENSMUST000000145515 | 9 | 14 | 8 3010001F23Rik  | processed_transcript |
| ENSMUST00000020315  | 9 | 14 | 4 Cand1          | protein_coding       |
| ENSMUST00000089959  | 9 | 14 | 0 Gch1           | protein_coding       |
| ENSMUST00000097458  | 9 | 14 | 0 Kmo            | protein_coding       |
| ENSMUST000000126836 | 9 | 13 | 56 Lrp6          | protein_coding       |
| ENSMUST000000148688 | 9 | 13 | 12 Acot11        | protein_coding       |
| ENSMUST000000182739 | 9 | 13 | 2 1700018B08Rik  | protein_coding       |
| ENSMUST000000125941 | 9 | 13 | 0 2810007J24Rik  | protein_coding       |
| ENSMUST000000148450 | 9 | 13 | 0 Vezt           | protein_coding       |
| ENSMUST000000100203 | 9 | 12 | 54 Dip2b         | protein_coding       |
| ENSMUST000000061103 | 9 | 12 | 28 Ccbe1         | protein_coding       |
| ENSMUST000000065917 | 9 | 12 | 18 Nap111        | protein_coding       |
| ENSMUST000000096430 | 9 | 12 | 16 Zhx2          | protein_coding       |
| ENSMUST000000025827 | 9 | 12 | 6 Minpp1         | protein_coding       |
| ENSMUST000000041048 | 9 | 12 | 2 Orai2          | protein_coding       |
| ENSMUST000000135193 | 9 | 12 | 0 Lrch3          | protein_coding       |
| ENSMUST000000122018 | 9 | 12 | 0 Gm13719        | processed_pseudogene |
| ENSMUST000000155611 | 9 | 12 | 30 Dgcr2         | protein_coding       |
| ENSMUST00000015987  | 9 | 12 | 4 Rxrg           | protein_coding       |
| ENSMUST000000022791 | 9 | 12 | 2 Fbxo4          | protein_coding       |
| ENSMUST000000046426 | 9 | 12 | 2 Tpcn1          | protein_coding       |
| ENSMUST000000149186 | 9 | 12 | 2 BC028471       | processed_transcript |
| ENSMUST000000115195 | 9 | 12 | 0 Dnajc2         | protein_coding       |
| ENSMUST000000129992 | 9 | 11 | 24 Stx8          | protein_coding       |
| ENSMUST000000162490 | 9 | 11 | 24 Mrf1          | protein_coding       |
| ENSMUST000000022786 | 9 | 11 | 8 4931414P19Rik  | protein_coding       |
| ENSMUST000000181418 | 9 | 11 | 6 D930016D06Rik  | lincRNA              |
| ENSMUST000000085096 | 9 | 11 | 4 Ccdc88c        | protein_coding       |
| ENSMUST000000022580 | 9 | 11 | 0 Slc25a30       | protein_coding       |
| ENSMUST000000064129 | 9 | 11 | 0 Ttc39a         | protein_coding       |
| ENSMUST000000106638 | 9 | 11 | 0 Tead1          | protein_coding       |
| ENSMUST000000106663 | 9 | 11 | 0 Galnt18        | protein_coding       |
| ENSMUST000000164655 | 9 | 11 | 0 Hnrmpc         | protein_coding       |
| ENSMUST000000168175 | 9 | 11 | 0 Vmn2r115       | protein_coding       |
| ENSMUST000000095617 | 9 | 11 | 0 1700086L19Rik  | lincRNA              |
| ENSMUST000000177185 | 9 | 11 | 0 Gm20642        | antisense            |
| ENSMUST000000025468 | 9 | 10 | 30 Pde6a         | protein_coding       |
| ENSMUST000000150138 | 9 | 10 | 16 1500017E21Rik | processed_transcript |
| ENSMUST000000031534 | 9 | 10 | 12 Mad111        | protein_coding       |
| ENSMUST000000084599 | 9 | 10 | 12 Rhbdd2        | protein_coding       |
| ENSMUST000000024849 | 9 | 10 | 6 Emilin2        | protein_coding       |
| ENSMUST000000067258 | 9 | 10 | 6 Adra1b         | protein_coding       |
| ENSMUST000000130481 | 9 | 10 | 2 Plcx2          | protein_coding       |
| ENSMUST000000173193 | 9 | 10 | 2 Fam13a         | protein_coding       |
| ENSMUST000000086123 | 9 | 10 | 0 Pitpnm2        | protein_coding       |
| ENSMUST000000126206 | 9 | 10 | 0 Trpm2          | protein_coding       |
| ENSMUST000000133540 | 9 | 10 | 0 Pkd2           | protein_coding       |
| ENSMUST000000153225 | 9 | 10 | 0 Rcbtb1         | protein_coding       |
| ENSMUST000000178084 | 9 | 10 | 0 Zcchc9         | protein_coding       |
| ENSMUST000000173162 | 9 | 10 | 0 Gm20483        | antisense            |
| ENSMUST000000146384 | 9 | 9  | 38 Eri3          | protein_coding       |
| ENSMUST000000123490 | 9 | 9  | 16 Teddm2        | protein_coding       |
| ENSMUST000000029406 | 9 | 9  | 12 Vmn2r1        | protein_coding       |
| ENSMUST000000068567 | 9 | 9  | 12 Ncoa7         | protein_coding       |
| ENSMUST000000143691 | 9 | 9  | 2 Tmtc2          | protein_coding       |
| ENSMUST000000066465 | 9 | 9  | 0 Acsm5          | protein_coding       |
| ENSMUST000000067103 | 9 | 9  | 0 Taf8           | protein_coding       |
| ENSMUST000000082120 | 9 | 9  | 0 Zfp42          | protein_coding       |
| ENSMUST000000108223 | 9 | 9  | 0 Zfp940         | protein_coding       |
| ENSMUST000000124201 | 9 | 9  | 0 Mis18bp1       | protein_coding       |
| ENSMUST000000130755 | 9 | 9  | 0 Trpc4ap        | protein_coding       |
| ENSMUST000000139698 | 9 | 9  | 0 Prkag2         | protein_coding       |
| ENSMUST000000147734 | 9 | 9  | 0 Uba6           | protein_coding       |

|                     |   |   |                 |                                    |
|---------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000022517  | 9 | 9 | 34 Cryl1        | protein_coding                     |
| ENSMUST00000111230  | 9 | 9 | 26 Tagln2       | protein_coding                     |
| ENSMUST00000147039  | 9 | 9 | 8 4930578C19Rik | protein_coding                     |
| ENSMUST00000109541  | 9 | 9 | 4 Atp6ap1l      | protein_coding                     |
| ENSMUST00000021550  | 9 | 9 | 0 Arg2          | protein_coding                     |
| ENSMUST00000027512  | 9 | 9 | 0 Atg16l1       | protein_coding                     |
| ENSMUST00000114587  | 9 | 9 | 0 Cd99l2        | protein_coding                     |
| ENSMUST00000111544  | 9 | 8 | 6 Ablim1        | protein_coding                     |
| ENSMUST00000114884  | 9 | 8 | 6 Rbm33         | protein_coding                     |
| ENSMUST00000099930  | 9 | 8 | 2 Lrrc55        | protein_coding                     |
| ENSMUST00000134179  | 9 | 8 | 2 Tmprss11g     | protein_coding                     |
| ENSMUST00000144459  | 9 | 8 | 2 Slc25a16      | protein_coding                     |
| ENSMUST00000027102  | 9 | 8 | 0 4933402D24Rik | protein_coding                     |
| ENSMUST00000030400  | 9 | 8 | 0 Mycbp         | protein_coding                     |
| ENSMUST00000034437  | 9 | 8 | 0 Wdr59         | protein_coding                     |
| ENSMUST00000128534  | 9 | 8 | 0 Creb3l2       | protein_coding                     |
| ENSMUST00000133963  | 9 | 8 | 0 Gm15491       | antisense                          |
| ENSMUST00000111740  | 9 | 7 | 222 Itgav       | protein_coding                     |
| ENSMUST00000028689  | 9 | 7 | 10 Lrp4         | protein_coding                     |
| ENSMUST00000135788  | 9 | 7 | 8 Zmpste24      | protein_coding                     |
| ENSMUST00000041400  | 9 | 7 | 2 Ranbp10       | protein_coding                     |
| ENSMUST00000062056  | 9 | 7 | 0 Ccdc144b      | protein_coding                     |
| ENSMUST00000062056  | 9 | 7 | 0 Ccdc144b      | protein_coding                     |
| ENSMUST00000020397  | 9 | 7 | 0 Snrpd3        | protein_coding                     |
| ENSMUST00000120223  | 9 | 7 | 0 Asxl3         | protein_coding                     |
| ENSMUST00000139897  | 9 | 7 | 0 Ybx1          | protein_coding                     |
| ENSMUST00000184678  | 9 | 7 | 0 1500015A07Rik | antisense                          |
| ENSMUST00000148562  | 9 | 7 | 24 Ropn1        | protein_coding                     |
| ENSMUST00000033161  | 9 | 7 | 12 Scnn1b       | protein_coding                     |
| ENSMUST00000006949  | 9 | 7 | 6 Tph2          | protein_coding                     |
| ENSMUST00000026667  | 9 | 7 | 2 Eif4a3        | protein_coding                     |
| ENSMUST000000092551 | 9 | 7 | 2 Lrp2          | protein_coding                     |
| ENSMUST00000107664  | 9 | 7 | 0 Sh3d19        | protein_coding                     |
| ENSMUST00000026672  | 9 | 6 | 16 Pde8a        | protein_coding                     |
| ENSMUST00000141316  | 9 | 6 | 4 Xiap          | protein_coding                     |
| ENSMUST00000176369  | 9 | 6 | 4 Mrgpra3       | protein_coding                     |
| ENSMUST00000109288  | 9 | 6 | 2 Kif21a        | protein_coding                     |
| ENSMUST00000042852  | 9 | 6 | 0 Fam210a       | protein_coding                     |
| ENSMUST00000140619  | 9 | 6 | 0 Setd4         | protein_coding                     |
| ENSMUST00000159601  | 9 | 5 | 44 Gm7592       | transcribed_unprocessed_pseudogene |
| ENSMUST00000159601  | 9 | 5 | 44 Gm7592       | transcribed_unprocessed_pseudogene |
| ENSMUST00000014505  | 9 | 5 | 34 Mertk        | protein_coding                     |
| ENSMUST00000095410  | 9 | 5 | 30 Wdr20        | protein_coding                     |
| ENSMUST00000088217  | 9 | 5 | 18 Tbl1x        | protein_coding                     |
| ENSMUST00000118428  | 9 | 5 | 8 Brcc3         | protein_coding                     |
| ENSMUST00000129113  | 9 | 5 | 8 Arhgef11      | protein_coding                     |
| ENSMUST00000156677  | 9 | 5 | 2 Ahdc1         | protein_coding                     |
| ENSMUST00000156773  | 9 | 5 | 2 Brinp1        | protein_coding                     |
| ENSMUST00000165492  | 9 | 5 | 2 Ezh2          | protein_coding                     |
| ENSMUST00000119623  | 9 | 5 | 0 Gm2318        | unprocessed_pseudogene             |
| ENSMUST00000179940  | 9 | 5 | 0 Gm3681        | unprocessed_pseudogene             |
| ENSMUST00000150664  | 9 | 5 | 0 Tmem246       | protein_coding                     |
| ENSMUST00000181969  | 9 | 5 | 18 Ndfip2       | protein_coding                     |
| ENSMUST00000072235  | 9 | 5 | 6 1700019A02Rik | protein_coding                     |
| ENSMUST00000090313  | 9 | 5 | 4 Dytn          | protein_coding                     |
| ENSMUST00000106041  | 9 | 5 | 2 Depdc1a       | protein_coding                     |
| ENSMUST00000037726  | 9 | 5 | 0 Tmtc4         | protein_coding                     |
| ENSMUST00000171629  | 9 | 4 | 8 Arhgef37      | protein_coding                     |
| ENSMUST00000068693  | 9 | 4 | 4 Wdr86         | protein_coding                     |
| ENSMUST00000128463  | 9 | 4 | 2 Reck          | protein_coding                     |
| ENSMUST00000127891  | 9 | 3 | 69 Rsf1         | protein_coding                     |
| ENSMUST00000162521  | 9 | 3 | 42 Tbxas1       | protein_coding                     |
| ENSMUST00000113601  | 9 | 3 | 38 Ppp2r4       | protein_coding                     |
| ENSMUST00000090027  | 9 | 3 | 22 Wapal        | protein_coding                     |
| ENSMUST00000182100  | 9 | 3 | 0 Rian          | processed_transcript               |
| ENSMUST00000077271  | 9 | 2 | 0 Gfm1          | protein_coding                     |
| ENSMUST00000118835  | 9 | 1 | 20 Mtus1        | protein_coding                     |
| ENSMUST00000114666  | 9 | 1 | 12 Atp6v1a      | protein_coding                     |

|                    |   |    |     |               |                        |
|--------------------|---|----|-----|---------------|------------------------|
| ENSMUST00000141665 | 9 | 1  | 0   | Arl13b        | protein_coding         |
| ENSMUST00000172523 | 9 | 0  | 208 | Lsm2          | protein_coding         |
| ENSMUST00000094077 | 9 | 0  | 20  | Kdm6b         | protein_coding         |
| ENSMUST00000058109 | 9 | 0  | 0   | Mrps7         | protein_coding         |
| ENSMUST00000122809 | 9 | 0  | 0   | Rps2          | protein_coding         |
| ENSMUST00000137931 | 9 | 0  | 0   | Arfp2         | protein_coding         |
| ENSMUST00000149568 | 9 | 0  | 0   | Fam63a        | protein_coding         |
| ENSMUST00000113753 | 8 | 22 | 0   | Tprkb         | protein_coding         |
| ENSMUST00000102541 | 8 | 21 | 2   | Gale          | protein_coding         |
| ENSMUST00000148341 | 8 | 18 | 38  | Loxhd1        | protein_coding         |
| ENSMUST00000177811 | 8 | 17 | 48  | Enah          | protein_coding         |
| ENSMUST00000071402 | 8 | 17 | 20  | Elovl6        | protein_coding         |
| ENSMUST00000111636 | 8 | 17 | 8   | Arntl2        | protein_coding         |
| ENSMUST00000034866 | 8 | 17 | 6   | Etfa          | protein_coding         |
| ENSMUST00000060330 | 8 | 17 | 2   | 1700012B09Rik | protein_coding         |
| ENSMUST00000032715 | 8 | 16 | 10  | Prmt3         | protein_coding         |
| ENSMUST00000154433 | 8 | 16 | 6   | Tenm1         | protein_coding         |
| ENSMUST00000068702 | 8 | 16 | 325 | Phf21a        | protein_coding         |
| ENSMUST00000154384 | 8 | 16 | 2   | 4930451E10Rik | antisense              |
| ENSMUST00000001652 | 8 | 16 | 0   | Bdkrb2        | protein_coding         |
| ENSMUST00000111338 | 8 | 15 | 44  | Ckap5         | protein_coding         |
| ENSMUST00000002487 | 8 | 15 | 16  | Braf          | protein_coding         |
| ENSMUST00000020753 | 8 | 15 | 2   | Clhc1         | protein_coding         |
| ENSMUST00000128994 | 8 | 14 | 10  | Vps16         | protein_coding         |
| ENSMUST00000036682 | 8 | 14 | 6   | Pxx           | protein_coding         |
| ENSMUST00000117595 | 8 | 14 | 2   | Rhox7-ps      | unprocessed_pseudogene |
| ENSMUST00000045959 | 8 | 14 | 2   | Bpifb5        | protein_coding         |
| ENSMUST00000029652 | 8 | 14 | 10  | Pdgfc         | protein_coding         |
| ENSMUST00000112271 | 8 | 14 | 8   | Ace2          | protein_coding         |
| ENSMUST00000147898 | 8 | 14 | 0   | Psmc11        | protein_coding         |
| ENSMUST00000163401 | 8 | 13 | 42  | Rfx7          | protein_coding         |
| ENSMUST00000140593 | 8 | 13 | 8   | Dhx32         | protein_coding         |
| ENSMUST00000030121 | 8 | 13 | 2   | B4galt1       | protein_coding         |
| ENSMUST00000037609 | 8 | 13 | 2   | Hgsnat        | protein_coding         |
| ENSMUST00000155284 | 8 | 12 | 20  | Reps1         | protein_coding         |
| ENSMUST00000027725 | 8 | 12 | 18  | Klhl12        | protein_coding         |
| ENSMUST00000032503 | 8 | 12 | 12  | Tspan9        | protein_coding         |
| ENSMUST00000184077 | 8 | 12 | 8   | Atf7          | protein_coding         |
| ENSMUST00000031678 | 8 | 12 | 0   | Tspan12       | protein_coding         |
| ENSMUST00000032338 | 8 | 12 | 0   | Gucy2c        | protein_coding         |
| ENSMUST00000120698 | 8 | 12 | 0   | Gm13079       | processed_pseudogene   |
| ENSMUST00000105680 | 8 | 12 | 67  | Rere          | protein_coding         |
| ENSMUST00000143065 | 8 | 12 | 38  | Gm14005       | processed_transcript   |
| ENSMUST00000047399 | 8 | 12 | 28  | Gpr110        | protein_coding         |
| ENSMUST00000171332 | 8 | 12 | 24  | Hspg2         | protein_coding         |
| ENSMUST00000129487 | 8 | 12 | 18  | Taf1          | protein_coding         |
| ENSMUST00000092096 | 8 | 12 | 12  | Usp14         | protein_coding         |
| ENSMUST00000125609 | 8 | 12 | 6   | Eif2c5        | lincRNA                |
| ENSMUST00000075452 | 8 | 12 | 4   | Chic2         | protein_coding         |
| ENSMUST00000172412 | 8 | 12 | 4   | Gm2832        | protein_coding         |
| ENSMUST00000031795 | 8 | 12 | 0   | Fkbp9         | protein_coding         |
| ENSMUST00000155491 | 8 | 11 | 97  | Bri3          | protein_coding         |
| ENSMUST00000113126 | 8 | 11 | 63  | Mapkap1       | protein_coding         |
| ENSMUST00000108074 | 8 | 11 | 14  | 4931406P16Rik | protein_coding         |
| ENSMUST00000032738 | 8 | 11 | 4   | Chma7         | protein_coding         |
| ENSMUST00000028721 | 8 | 11 | 2   | Tgm5          | protein_coding         |
| ENSMUST00000161557 | 8 | 11 | 2   | Nwd1          | protein_coding         |
| ENSMUST00000045235 | 8 | 11 | 0   | B630005N14Rik | protein_coding         |
| ENSMUST00000139661 | 8 | 11 | 0   | Nlrp5         | protein_coding         |
| ENSMUST00000131509 | 8 | 11 | 0   | 4930529I22Rik | lincRNA                |
| ENSMUST00000108813 | 8 | 10 | 10  | Cbx5          | protein_coding         |
| ENSMUST00000140905 | 8 | 10 | 10  | Klhl20        | protein_coding         |
| ENSMUST00000111026 | 8 | 10 | 8   | Slc5a12       | protein_coding         |
| ENSMUST00000101509 | 8 | 10 | 4   | Ids           | protein_coding         |
| ENSMUST00000176901 | 8 | 10 | 2   | Vmn1r-ps18    | unprocessed_pseudogene |
| ENSMUST00000022353 | 8 | 10 | 2   | Mss51         | protein_coding         |
| ENSMUST00000181756 | 8 | 10 | 2   | Gm16894       | antisense              |
| ENSMUST00000030905 | 8 | 10 | 0   | Ssu72         | protein_coding         |



|                    |   |    |                  |                      |
|--------------------|---|----|------------------|----------------------|
| ENSMUST00000035571 | 8 | 10 | 0 Cyp3a59        | protein_coding       |
| ENSMUST00000117365 | 8 | 10 | 0 Gm4784         | processed_pseudogene |
| ENSMUST00000144439 | 8 | 10 | 0 Gm15221        | lincRNA              |
| ENSMUST00000169887 | 8 | 10 | 0 Gm17057        | antisense            |
| ENSMUST00000109111 | 8 | 9  | 18 Clk4          | protein_coding       |
| ENSMUST00000141473 | 8 | 9  | 12 Smc2os        | antisense            |
| ENSMUST00000075603 | 8 | 9  | 6 Glra1          | protein_coding       |
| ENSMUST00000112200 | 8 | 9  | 6 Dntt           | protein_coding       |
| ENSMUST00000090750 | 8 | 9  | 4 Pde4dip        | protein_coding       |
| ENSMUST00000022784 | 8 | 9  | 2 Haus4          | protein_coding       |
| ENSMUST00000136669 | 8 | 9  | 2 Plaa           | protein_coding       |
| ENSMUST00000155517 | 8 | 9  | 2 Arl6ip6        | protein_coding       |
| ENSMUST00000150354 | 8 | 9  | 0 Trap1          | protein_coding       |
| ENSMUST00000121469 | 8 | 9  | 34 Reep1         | protein_coding       |
| ENSMUST00000108239 | 8 | 9  | 24 Atad5         | protein_coding       |
| ENSMUST00000136396 | 8 | 9  | 16 Gpr112        | protein_coding       |
| ENSMUST00000093454 | 8 | 9  | 14 Ell           | protein_coding       |
| ENSMUST00000111741 | 8 | 9  | 10 Add3          | protein_coding       |
| ENSMUST00000108229 | 8 | 9  | 0 Pnlsr          | protein_coding       |
| ENSMUST00000124976 | 8 | 9  | 0 Gm16234        | antisense            |
| ENSMUST00000090791 | 8 | 8  | 12 Rprd2         | protein_coding       |
| ENSMUST00000174062 | 8 | 8  | 12 Jmjd1c        | protein_coding       |
| ENSMUST00000029719 | 8 | 8  | 10 Dclk2         | protein_coding       |
| ENSMUST00000039610 | 8 | 8  | 10 Xylb          | protein_coding       |
| ENSMUST00000032093 | 8 | 8  | 6 Prickle2       | protein_coding       |
| ENSMUST00000048194 | 8 | 8  | 6 Tfp2e          | protein_coding       |
| ENSMUST00000099105 | 8 | 8  | 4 Pkig           | protein_coding       |
| ENSMUST00000156894 | 8 | 8  | 4 Cpne2          | protein_coding       |
| ENSMUST00000163279 | 8 | 8  | 2 Sh3glb1        | protein_coding       |
| ENSMUST00000044166 | 8 | 8  | 0 Cdc40          | protein_coding       |
| ENSMUST00000070741 | 8 | 8  | 0 Arhgef38       | protein_coding       |
| ENSMUST00000144169 | 8 | 8  | 0 Efcab6         | protein_coding       |
| ENSMUST00000150804 | 8 | 8  | 0 Dhodh          | protein_coding       |
| ENSMUST00000178540 | 8 | 8  | 0 170002816Rik   | lincRNA              |
| ENSMUST00000127199 | 8 | 7  | 40 Aldh1l1       | protein_coding       |
| ENSMUST00000026208 | 8 | 7  | 22 Abcc2         | protein_coding       |
| ENSMUST00000026723 | 8 | 7  | 18 Hpvt          | protein_coding       |
| ENSMUST00000164283 | 8 | 7  | 16 Glg1          | protein_coding       |
| ENSMUST00000114865 | 8 | 7  | 14 Grik4         | protein_coding       |
| ENSMUST00000026698 | 8 | 7  | 10 Podxl         | protein_coding       |
| ENSMUST00000115870 | 8 | 7  | 10 Epc1          | protein_coding       |
| ENSMUST00000144314 | 8 | 7  | 6 Entpd7         | protein_coding       |
| ENSMUST00000121951 | 8 | 7  | 4 Pde7a          | protein_coding       |
| ENSMUST00000141056 | 8 | 7  | 0 Col9a3         | protein_coding       |
| ENSMUST00000146947 | 8 | 7  | 0 Hook1          | protein_coding       |
| ENSMUST00000163779 | 8 | 7  | 0 Snca           | protein_coding       |
| ENSMUST00000183611 | 8 | 7  | 0 Gm27246        | lincRNA              |
| ENSMUST00000181794 | 8 | 7  | 0 Gm26907        | antisense            |
| ENSMUST00000048957 | 8 | 7  | 61 Ptpn13        | protein_coding       |
| ENSMUST00000066345 | 8 | 7  | 50 Clec16a       | protein_coding       |
| ENSMUST00000180790 | 8 | 7  | 20 2810425M01Rik | lincRNA              |
| ENSMUST00000006912 | 8 | 7  | 6 Pip4k2a        | protein_coding       |
| ENSMUST00000129609 | 8 | 7  | 4 Hnf1aos1       | antisense            |
| ENSMUST00000034803 | 8 | 7  | 2 Zw10           | protein_coding       |
| ENSMUST00000137634 | 8 | 7  | 2 Ppp1r1b        | protein_coding       |
| ENSMUST00000032517 | 8 | 7  | 0 Clec2j         | protein_coding       |
| ENSMUST00000079776 | 8 | 7  | 0 Oc90           | protein_coding       |
| ENSMUST00000101017 | 8 | 7  | 0 Ndel1          | protein_coding       |
| ENSMUST00000111566 | 8 | 7  | 0 Clip1          | protein_coding       |
| ENSMUST00000144660 | 8 | 7  | 0 Gm28551        | protein_coding       |
| ENSMUST00000160030 | 8 | 7  | 0 Gm16043        | antisense            |
| ENSMUST00000070166 | 8 | 6  | 44 Gramd3        | protein_coding       |
| ENSMUST00000025137 | 8 | 6  | 14 Thoc1         | protein_coding       |
| ENSMUST00000144120 | 8 | 6  | 14 Ttl           | protein_coding       |
| ENSMUST00000138760 | 8 | 6  | 12 Tenm4         | protein_coding       |
| ENSMUST00000022501 | 8 | 6  | 4 Gucy1b2        | protein_coding       |
| ENSMUST00000082321 | 8 | 6  | 2 Cr2            | protein_coding       |
| ENSMUST00000176549 | 8 | 6  | 2 Gm9320         | antisense            |

|                    |   |    |    |               |                      |
|--------------------|---|----|----|---------------|----------------------|
| ENSMUST00000020552 | 8 | 6  | 0  | Tpgs1         | protein_coding       |
| ENSMUST00000028257 | 8 | 6  | 0  | Gca           | protein_coding       |
| ENSMUST00000053733 | 8 | 6  | 0  | Epha5         | protein_coding       |
| ENSMUST00000053902 | 8 | 6  | 0  | Elmod2        | protein_coding       |
| ENSMUST00000124012 | 8 | 6  | 0  | Sgms1         | protein_coding       |
| ENSMUST00000153685 | 8 | 5  | 14 | A730081D07Rik | processed_transcript |
| ENSMUST00000048993 | 8 | 5  | 2  | Polr3g        | protein_coding       |
| ENSMUST00000182562 | 8 | 5  | 2  | Arhgef9       | protein_coding       |
| ENSMUST00000027601 | 8 | 5  | 0  | Mcm6          | protein_coding       |
| ENSMUST00000041364 | 8 | 5  | 0  | Nop14         | protein_coding       |
| ENSMUST00000097973 | 8 | 5  | 0  | Cyp2j13       | protein_coding       |
| ENSMUST00000112903 | 8 | 5  | 0  | Acsl4         | protein_coding       |
| ENSMUST00000114201 | 8 | 5  | 0  | Synj2bp       | protein_coding       |
| ENSMUST00000170438 | 8 | 5  | 0  | Celf2         | protein_coding       |
| ENSMUST00000172140 | 8 | 5  | 0  | Vmn2r8        | protein_coding       |
| ENSMUST00000152002 | 8 | 5  | 14 | Uchl1os       | antisense            |
| ENSMUST00000098007 | 8 | 5  | 8  | Inpp5f        | protein_coding       |
| ENSMUST00000147773 | 8 | 5  | 6  | Adad1         | protein_coding       |
| ENSMUST00000030248 | 8 | 5  | 4  | Tctex1d1      | protein_coding       |
| ENSMUST00000037953 | 8 | 5  | 4  | 2810032G03Rik | lincRNA              |
| ENSMUST00000029297 | 8 | 5  | 2  | Slc7a11       | protein_coding       |
| ENSMUST00000105851 | 8 | 5  | 2  | Pithd1        | protein_coding       |
| ENSMUST00000048880 | 8 | 5  | 0  | Macc1         | protein_coding       |
| ENSMUST00000061497 | 8 | 5  | 0  | Cryga         | protein_coding       |
| ENSMUST00000148816 | 8 | 5  | 0  | Adgb          | protein_coding       |
| ENSMUST00000159224 | 8 | 5  | 0  | Ncor1         | protein_coding       |
| ENSMUST00000146624 | 8 | 5  | 0  | Tspan2os      | antisense            |
| ENSMUST00000159624 | 8 | 4  | 24 | Rps6kc1       | protein_coding       |
| ENSMUST00000077954 | 8 | 4  | 22 | Sgcg          | protein_coding       |
| ENSMUST00000110673 | 8 | 4  | 4  | Kpna7         | protein_coding       |
| ENSMUST00000183251 | 8 | 4  | 4  | Samd15        | protein_coding       |
| ENSMUST00000030047 | 8 | 4  | 0  | Tnfsf8        | protein_coding       |
| ENSMUST00000117173 | 8 | 4  | 0  | Clec4a3       | protein_coding       |
| ENSMUST00000139386 | 8 | 4  | 0  | Huwe1         | protein_coding       |
| ENSMUST00000176463 | 8 | 4  | 0  | Knstrn        | protein_coding       |
| ENSMUST00000073490 | 8 | 3  | 79 | Lct           | protein_coding       |
| ENSMUST00000117270 | 8 | 3  | 26 | Ank1          | protein_coding       |
| ENSMUST00000148322 | 8 | 3  | 16 | Fgfr1         | protein_coding       |
| ENSMUST00000102888 | 8 | 3  | 10 | Camk2a        | protein_coding       |
| ENSMUST00000117361 | 8 | 3  | 8  | Osbpl1a       | protein_coding       |
| ENSMUST00000175749 | 8 | 3  | 4  | Arhgef2       | protein_coding       |
| ENSMUST00000030076 | 8 | 3  | 0  | Ptbp3         | protein_coding       |
| ENSMUST00000143050 | 8 | 3  | 0  | Spag17        | protein_coding       |
| ENSMUST00000135564 | 8 | 3  | 0  | Gm16157       | lincRNA              |
| ENSMUST00000078839 | 8 | 3  | 22 | EfnA5         | protein_coding       |
| ENSMUST00000043775 | 8 | 3  | 18 | Kdm3b         | protein_coding       |
| ENSMUST00000103233 | 8 | 3  | 12 | Crlf3         | protein_coding       |
| ENSMUST00000171474 | 8 | 3  | 2  | Rnf168        | protein_coding       |
| ENSMUST00000076617 | 8 | 3  | 0  | Fbxw19        | protein_coding       |
| ENSMUST00000180252 | 8 | 3  | 0  | Tmem151b      | protein_coding       |
| ENSMUST00000112830 | 8 | 2  | 2  | Ankrd26       | protein_coding       |
| ENSMUST00000033157 | 8 | 2  | 0  | Ndufab1       | protein_coding       |
| ENSMUST00000160242 | 8 | 2  | 0  | Muc19         | processed_transcript |
| ENSMUST00000161451 | 8 | 1  | 8  | Gli2          | protein_coding       |
| ENSMUST00000152415 | 8 | 1  | 4  | Olfm1         | protein_coding       |
| ENSMUST00000032141 | 8 | 1  | 2  | Hmces         | protein_coding       |
| ENSMUST00000180500 | 8 | 1  | 0  | Rpgrip1       | protein_coding       |
| ENSMUST00000126865 | 8 | 1  | 10 | Sik3          | protein_coding       |
| ENSMUST00000042732 | 8 | 0  | 26 | Fbxo45        | protein_coding       |
| ENSMUST00000139585 | 8 | 0  | 8  | Wt1           | protein_coding       |
| ENSMUST00000030018 | 8 | 0  | 0  | Nans          | protein_coding       |
| ENSMUST00000162429 | 8 | 0  | 0  | Pttg1ip       | protein_coding       |
| ENSMUST00000171597 | 7 | 19 | 14 | Nif3l1        | protein_coding       |
| ENSMUST00000060311 | 7 | 18 | 38 | Hip1          | protein_coding       |
| ENSMUST00000044672 | 7 | 18 | 8  | Cdk19         | protein_coding       |
| ENSMUST00000120719 | 7 | 18 | 6  | Gm14752       | processed_pseudogene |
| ENSMUST00000068023 | 7 | 17 | 6  | Cadm4         | protein_coding       |
| ENSMUST00000139772 | 7 | 16 | 8  | Orc1          | protein_coding       |

|                    |   |    |                  |                        |
|--------------------|---|----|------------------|------------------------|
| ENSMUST00000147179 | 7 | 16 | 8 Fam126a        | protein_coding         |
| ENSMUST00000118163 | 7 | 16 | 6 Dmxl2          | protein_coding         |
| ENSMUST00000152203 | 7 | 16 | 0 Arhgap20os     | antisense              |
| ENSMUST00000182969 | 7 | 15 | 40 Sh3d19        | protein_coding         |
| ENSMUST00000050997 | 7 | 15 | 0 Rfesd          | protein_coding         |
| ENSMUST00000088257 | 7 | 15 | 0 Trmt112        | protein_coding         |
| ENSMUST00000124949 | 7 | 15 | 0 Tasp1          | protein_coding         |
| ENSMUST00000150495 | 7 | 15 | 0 Cemip          | protein_coding         |
| ENSMUST00000059138 | 7 | 14 | 0 Prr15          | protein_coding         |
| ENSMUST00000098842 | 7 | 14 | 30 Tti2          | protein_coding         |
| ENSMUST00000027542 | 7 | 14 | 6 Cdh7           | protein_coding         |
| ENSMUST00000053766 | 7 | 14 | 6 Amfr           | protein_coding         |
| ENSMUST00000073860 | 7 | 14 | 2 Ang4           | protein_coding         |
| ENSMUST00000137015 | 7 | 14 | 0 2610020H08Rik  | protein_coding         |
| ENSMUST00000155863 | 7 | 14 | 0 Reps2          | protein_coding         |
| ENSMUST00000162570 | 7 | 14 | 0 Abhd12b        | protein_coding         |
| ENSMUST00000093205 | 7 | 13 | 54 Fbxw11        | protein_coding         |
| ENSMUST00000025417 | 7 | 13 | 46 Snx24         | protein_coding         |
| ENSMUST00000049053 | 7 | 13 | 32 Fam168a       | protein_coding         |
| ENSMUST00000057859 | 7 | 13 | 22 Frmd6         | protein_coding         |
| ENSMUST00000169851 | 7 | 13 | 20 Map4          | protein_coding         |
| ENSMUST00000096250 | 7 | 13 | 16 Arid2         | protein_coding         |
| ENSMUST00000159793 | 7 | 13 | 12 D6Ert474e     | lincRNA                |
| ENSMUST00000029252 | 7 | 13 | 8 Lrrc34         | protein_coding         |
| ENSMUST00000127608 | 7 | 13 | 0 Gpn3           | protein_coding         |
| ENSMUST00000159041 | 7 | 12 | 14 Pam           | protein_coding         |
| ENSMUST00000021930 | 7 | 12 | 2 Sfxn1          | protein_coding         |
| ENSMUST00000039191 | 7 | 12 | 2 1810011H11Rik  | protein_coding         |
| ENSMUST00000134315 | 7 | 12 | 2 Mkl1           | protein_coding         |
| ENSMUST00000076532 | 7 | 12 | 0 Serpinb6a      | protein_coding         |
| ENSMUST00000161996 | 7 | 12 | 0 Srgap1         | protein_coding         |
| ENSMUST00000026658 | 7 | 12 | 32 Tnrc6c        | protein_coding         |
| ENSMUST00000185128 | 7 | 12 | 22 5330417C22Rik | protein_coding         |
| ENSMUST00000049152 | 7 | 12 | 18 Snx10         | protein_coding         |
| ENSMUST00000046750 | 7 | 12 | 16 Tspan33       | protein_coding         |
| ENSMUST00000138115 | 7 | 12 | 16 Zzz3          | protein_coding         |
| ENSMUST00000032555 | 7 | 12 | 12 Tomm40        | protein_coding         |
| ENSMUST00000085017 | 7 | 12 | 8 Ccdc90b        | protein_coding         |
| ENSMUST00000152831 | 7 | 12 | 8 Atp2b2         | protein_coding         |
| ENSMUST00000120759 | 7 | 12 | 6 Gm2005         | unprocessed_pseudogene |
| ENSMUST00000036972 | 7 | 12 | 6 3632451O06Rik  | protein_coding         |
| ENSMUST00000089230 | 7 | 12 | 6 Ppp2r2a        | protein_coding         |
| ENSMUST00000173725 | 7 | 12 | 4 Zfp423         | protein_coding         |
| ENSMUST00000120120 | 7 | 12 | 2 Slc35a3        | protein_coding         |
| ENSMUST00000146414 | 7 | 12 | 2 Satb1          | protein_coding         |
| ENSMUST00000181529 | 7 | 12 | 2 Gm26610        | lincRNA                |
| ENSMUST00000113506 | 7 | 12 | 0 Srd5a3         | protein_coding         |
| ENSMUST00000136617 | 7 | 12 | 0 Trp53bp1       | protein_coding         |
| ENSMUST00000162746 | 7 | 11 | 32 Selp          | protein_coding         |
| ENSMUST00000178636 | 7 | 11 | 16 Larp1         | protein_coding         |
| ENSMUST00000026093 | 7 | 11 | 6 Btd1           | protein_coding         |
| ENSMUST00000107281 | 7 | 11 | 4 Snx27          | protein_coding         |
| ENSMUST00000107281 | 7 | 11 | 4 Snx27          | protein_coding         |
| ENSMUST00000152275 | 7 | 11 | 4 Rapgef2        | protein_coding         |
| ENSMUST00000173230 | 7 | 11 | 2 Mapk6          | protein_coding         |
| ENSMUST00000044705 | 7 | 11 | 0 Vstm2b         | protein_coding         |
| ENSMUST00000181734 | 7 | 11 | 0 Casd1          | protein_coding         |
| ENSMUST00000140509 | 7 | 11 | 0 1810019D21Rik  | processed_transcript   |
| ENSMUST00000071917 | 7 | 10 | 18 Fbxw26        | protein_coding         |
| ENSMUST00000103067 | 7 | 10 | 12 Smurf2        | protein_coding         |
| ENSMUST00000080744 | 7 | 10 | 8 Agbl4          | protein_coding         |
| ENSMUST00000110534 | 7 | 10 | 2 Arid4b         | protein_coding         |
| ENSMUST00000030734 | 7 | 10 | 0 Sf3a3          | protein_coding         |
| ENSMUST00000105600 | 7 | 10 | 0 Cdk11b         | protein_coding         |
| ENSMUST00000127787 | 7 | 10 | 0 Grip1          | protein_coding         |
| ENSMUST00000146125 | 7 | 10 | 0 Sclt1          | protein_coding         |
| ENSMUST00000160836 | 7 | 10 | 0 Aebp2          | protein_coding         |
| ENSMUST00000107060 | 7 | 9  | 28 Eftud2        | protein_coding         |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUST00000035288 | 7 | 9 | 14 Stab2         | protein_coding       |
| ENSMUST00000111738 | 7 | 9 | 14 Tctn1         | protein_coding       |
| ENSMUST00000173079 | 7 | 9 | 12 Mms22l        | protein_coding       |
| ENSMUST00000111669 | 7 | 9 | 10 Tnr           | protein_coding       |
| ENSMUST00000051482 | 7 | 9 | 8 Kcng3          | protein_coding       |
| ENSMUST00000114341 | 7 | 9 | 6 Gabrr3         | protein_coding       |
| ENSMUST00000181523 | 7 | 9 | 6 Gm26889        | lincRNA              |
| ENSMUST00000041905 | 7 | 9 | 4 Nupl1          | protein_coding       |
| ENSMUST00000115555 | 7 | 9 | 4 Dync1i1        | protein_coding       |
| ENSMUST00000119103 | 7 | 9 | 4 Bco2           | protein_coding       |
| ENSMUST00000031713 | 7 | 9 | 2 Slc13a1        | protein_coding       |
| ENSMUST00000046962 | 7 | 9 | 2 Phf8           | protein_coding       |
| ENSMUST00000132214 | 7 | 9 | 2 Ccdc38         | protein_coding       |
| ENSMUST00000178226 | 7 | 9 | 2 Ankrd44        | protein_coding       |
| ENSMUST00000184951 | 7 | 9 | 2 Mphosph9       | protein_coding       |
| ENSMUST00000033730 | 7 | 9 | 0 Grpr           | protein_coding       |
| ENSMUST00000102637 | 7 | 9 | 0 Ampd2          | protein_coding       |
| ENSMUST00000112650 | 7 | 9 | 0 Rpap2          | protein_coding       |
| ENSMUST00000130978 | 7 | 9 | 0 Kdm6a          | protein_coding       |
| ENSMUST00000140913 | 7 | 9 | 0 Abca4          | protein_coding       |
| ENSMUST00000127576 | 7 | 9 | 0 4930483K19Rik  | antisense            |
| ENSMUST00000148019 | 7 | 9 | 0 Ccdc42os       | antisense            |
| ENSMUST00000031583 | 7 | 9 | 44 Acacb         | protein_coding       |
| ENSMUST00000134525 | 7 | 9 | 30 Pde9a         | protein_coding       |
| ENSMUST00000125249 | 7 | 9 | 14 Isoc2a        | protein_coding       |
| ENSMUST00000031167 | 7 | 9 | 12 Polr2b        | protein_coding       |
| ENSMUST00000040925 | 7 | 9 | 8 Sdr16c5        | protein_coding       |
| ENSMUST00000149297 | 7 | 9 | 8 Jak1           | protein_coding       |
| ENSMUST00000005477 | 7 | 9 | 6 Cyp2b10        | protein_coding       |
| ENSMUST00000072232 | 7 | 9 | 6 Tmod3          | protein_coding       |
| ENSMUST00000084838 | 7 | 9 | 6 Cd47           | protein_coding       |
| ENSMUST00000113821 | 7 | 9 | 6 Dysf           | protein_coding       |
| ENSMUST00000076228 | 7 | 9 | 4 Wbscr16        | protein_coding       |
| ENSMUST00000110856 | 7 | 9 | 4 Lpgat1         | protein_coding       |
| ENSMUST00000121161 | 7 | 9 | 2 Igf1           | protein_coding       |
| ENSMUST00000149182 | 7 | 9 | 0 Slc22a29       | protein_coding       |
| ENSMUST00000155579 | 7 | 9 | 0 Sertad4        | protein_coding       |
| ENSMUST00000168522 | 7 | 9 | 0 Sla            | protein_coding       |
| ENSMUST00000130088 | 7 | 9 | 0 Gm12729        | lincRNA              |
| ENSMUST00000171747 | 7 | 8 | 32 Gm9929        | processed_transcript |
| ENSMUST00000128103 | 7 | 8 | 16 Fgf10         | protein_coding       |
| ENSMUST00000039205 | 7 | 8 | 10 Galm          | protein_coding       |
| ENSMUST00000117551 | 7 | 8 | 8 Rasa3          | protein_coding       |
| ENSMUST00000099667 | 7 | 8 | 6 Filip1l        | protein_coding       |
| ENSMUST00000166299 | 7 | 8 | 6 Dip2c          | protein_coding       |
| ENSMUST00000135212 | 7 | 8 | 4 Heph           | protein_coding       |
| ENSMUST00000178539 | 7 | 8 | 4 Gm5627         | protein_coding       |
| ENSMUST00000182183 | 7 | 8 | 4 Ccdc53         | protein_coding       |
| ENSMUST00000024797 | 7 | 8 | 2 Mocs1          | protein_coding       |
| ENSMUST00000068999 | 7 | 8 | 2 Micu3          | protein_coding       |
| ENSMUST00000177726 | 7 | 8 | 0 Lins           | protein_coding       |
| ENSMUST00000177726 | 7 | 8 | 0 Lins           | protein_coding       |
| ENSMUST00000019862 | 7 | 8 | 0 L3hypdh        | protein_coding       |
| ENSMUST00000036872 | 7 | 8 | 0 Wipi2          | protein_coding       |
| ENSMUST00000087031 | 7 | 8 | 0 Xpo5           | protein_coding       |
| ENSMUST00000109552 | 7 | 8 | 0 Rasa1          | protein_coding       |
| ENSMUST00000109743 | 7 | 8 | 0 Gm28557        | protein_coding       |
| ENSMUST00000142546 | 7 | 8 | 0 Lrp1b          | protein_coding       |
| ENSMUST00000149737 | 7 | 8 | 0 Smap1          | protein_coding       |
| ENSMUST00000040531 | 7 | 7 | 178 Pak4         | protein_coding       |
| ENSMUST00000022213 | 7 | 7 | 99 Thbs4         | protein_coding       |
| ENSMUST00000115151 | 7 | 7 | 52 Ubxn7         | protein_coding       |
| ENSMUST00000125358 | 7 | 7 | 38 2610307P16Rik | processed_transcript |
| ENSMUST00000077517 | 7 | 7 | 22 Tmem236       | protein_coding       |
| ENSMUST00000149999 | 7 | 7 | 10 Stard8        | protein_coding       |
| ENSMUST00000148138 | 7 | 7 | 6 Trpm8          | protein_coding       |
| ENSMUST00000143100 | 7 | 7 | 4 Irak3          | protein_coding       |
| ENSMUST00000034430 | 7 | 7 | 2 Chst5          | protein_coding       |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000102683 | 7 | 7 | 2 Tom1l2        | protein_coding         |
| ENSMUST00000133889 | 7 | 7 | 2 Mbd2          | protein_coding         |
| ENSMUST00000174831 | 7 | 7 | 2 Ptpd          | protein_coding         |
| ENSMUST0000010280  | 7 | 7 | 0 Pifo          | protein_coding         |
| ENSMUST00000124677 | 7 | 7 | 0 Speer3        | protein_coding         |
| ENSMUST00000141414 | 7 | 7 | 0 Stag2         | protein_coding         |
| ENSMUST00000134966 | 7 | 7 | 0 Gm12668       | lincRNA                |
| ENSMUST00000153577 | 7 | 7 | 0 Gm15339       | lincRNA                |
| ENSMUST00000153083 | 7 | 7 | 0 Gm12426       | antisense              |
| ENSMUST00000161900 | 7 | 7 | 111 Pepd        | protein_coding         |
| ENSMUST00000170373 | 7 | 7 | 46 Ati3         | protein_coding         |
| ENSMUST00000073705 | 7 | 7 | 38 Fam222b      | protein_coding         |
| ENSMUST00000027475 | 7 | 7 | 32 Gityf2       | protein_coding         |
| ENSMUST00000022108 | 7 | 7 | 20 Hapln1       | protein_coding         |
| ENSMUST00000069107 | 7 | 7 | 14 Mapk1        | protein_coding         |
| ENSMUST00000080001 | 7 | 7 | 10 Ufc1         | protein_coding         |
| ENSMUST00000146110 | 7 | 7 | 10 Gm13939      | processed_transcript   |
| ENSMUST00000047334 | 7 | 7 | 4 Kcnj1         | protein_coding         |
| ENSMUST00000160893 | 7 | 7 | 4 R3hcc1l       | protein_coding         |
| ENSMUST00000063654 | 7 | 7 | 2 Btla          | protein_coding         |
| ENSMUST00000156187 | 7 | 7 | 2 Efcab6        | protein_coding         |
| ENSMUST00000009522 | 7 | 7 | 0 Slc16a12      | protein_coding         |
| ENSMUST00000017443 | 7 | 7 | 0 Dnttip1       | protein_coding         |
| ENSMUST00000063782 | 7 | 7 | 0 Fam118b       | protein_coding         |
| ENSMUST00000115821 | 7 | 7 | 0 Gm10563       | protein_coding         |
| ENSMUST00000123196 | 7 | 7 | 0 Ifnar1        | protein_coding         |
| ENSMUST00000137526 | 7 | 7 | 0 Cbfa2t2       | protein_coding         |
| ENSMUST00000144789 | 7 | 7 | 0 Uros          | protein_coding         |
| ENSMUST00000180221 | 7 | 7 | 0 Gm3898        | protein_coding         |
| ENSMUST00000119241 | 7 | 7 | 0 Gm15753       | processed_pseudogene   |
| ENSMUST00000145584 | 7 | 7 | 0 Gm12154       | lincRNA                |
| ENSMUST00000067005 | 7 | 6 | 22 Syne3        | protein_coding         |
| ENSMUST00000142837 | 7 | 6 | 16 Dennd4c      | protein_coding         |
| ENSMUST00000159169 | 7 | 6 | 14 Spata13      | protein_coding         |
| ENSMUST00000005452 | 7 | 6 | 8 Fgfr4         | protein_coding         |
| ENSMUST00000010434 | 7 | 6 | 6 Al597479      | protein_coding         |
| ENSMUST00000156774 | 7 | 6 | 6 Gm15997       | processed_transcript   |
| ENSMUST00000048197 | 7 | 6 | 2 Rhod          | protein_coding         |
| ENSMUST00000102597 | 7 | 6 | 2 Hdac1         | protein_coding         |
| ENSMUST00000102611 | 7 | 6 | 2 Myh10         | protein_coding         |
| ENSMUST00000148465 | 7 | 6 | 2 Dcun1d1       | protein_coding         |
| ENSMUST00000183277 | 7 | 6 | 2 Sos2          | protein_coding         |
| ENSMUST00000180319 | 7 | 6 | 0 Gm6113        | unprocessed_pseudogene |
| ENSMUST00000025379 | 7 | 6 | 0 Dpysl3        | protein_coding         |
| ENSMUST00000029741 | 7 | 6 | 0 Polr3c        | protein_coding         |
| ENSMUST00000030003 | 7 | 6 | 0 Exosc3        | protein_coding         |
| ENSMUST00000062355 | 7 | 6 | 0 4930470P17Rik | protein_coding         |
| ENSMUST00000065703 | 7 | 6 | 0 Tarm1         | protein_coding         |
| ENSMUST00000113421 | 7 | 6 | 0 Lrrc1         | protein_coding         |
| ENSMUST00000123561 | 7 | 6 | 0 Ccdc88a       | protein_coding         |
| ENSMUST00000125938 | 7 | 6 | 0 Ice2          | protein_coding         |
| ENSMUST00000150429 | 7 | 6 | 0 Sdccag8       | protein_coding         |
| ENSMUST00000166527 | 7 | 6 | 0 Gm10378       | protein_coding         |
| ENSMUST00000168972 | 7 | 6 | 0 1700024B05Rik | protein_coding         |
| ENSMUST00000171313 | 7 | 6 | 0 Rrh           | protein_coding         |
| ENSMUST00000122304 | 7 | 6 | 0 Gm14363       | processed_pseudogene   |
| ENSMUST00000171600 | 7 | 5 | 30 Bach2        | protein_coding         |
| ENSMUST00000049863 | 7 | 5 | 16 Pofut1       | protein_coding         |
| ENSMUST00000024709 | 7 | 5 | 14 Cd2ap        | protein_coding         |
| ENSMUST00000045866 | 7 | 5 | 6 Ddx21         | protein_coding         |
| ENSMUST00000114057 | 7 | 5 | 6 Pls3          | protein_coding         |
| ENSMUST00000105698 | 7 | 5 | 4 Gm572         | protein_coding         |
| ENSMUST00000107605 | 7 | 5 | 4 Slc6a5        | protein_coding         |
| ENSMUST00000021770 | 7 | 5 | 2 Scgn          | protein_coding         |
| ENSMUST00000115861 | 7 | 5 | 2 Rbbp8         | protein_coding         |
| ENSMUST00000129625 | 7 | 5 | 2 Dnajc12       | protein_coding         |
| ENSMUST00000133690 | 7 | 5 | 2 Bche          | protein_coding         |
| ENSMUST00000147091 | 7 | 5 | 2 BC017158      | protein_coding         |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000165781 | 7 | 5 | 2 Vmn2r120      | protein_coding         |
| ENSMUST00000049648 | 7 | 5 | 0 Kbtbd3        | protein_coding         |
| ENSMUST00000113516 | 7 | 5 | 0 Kdr           | protein_coding         |
| ENSMUST00000125404 | 7 | 5 | 0 Pld5          | protein_coding         |
| ENSMUST00000142628 | 7 | 5 | 0 3110043O21Rik | protein_coding         |
| ENSMUST00000155664 | 7 | 5 | 0 Nek1          | protein_coding         |
| ENSMUST00000174768 | 7 | 5 | 0 Gm20465       | lincRNA                |
| ENSMUST00000000349 | 7 | 5 | 14 Dbt          | protein_coding         |
| ENSMUST00000021631 | 7 | 5 | 14 Ppp4r4       | protein_coding         |
| ENSMUST00000107048 | 7 | 5 | 12 Rab6a        | protein_coding         |
| ENSMUST00000180811 | 7 | 5 | 8 9330179D12Rik | lincRNA                |
| ENSMUST00000111121 | 7 | 5 | 6 Ptk2b         | protein_coding         |
| ENSMUST00000003444 | 7 | 5 | 4 Ccdc65        | protein_coding         |
| ENSMUST00000153635 | 7 | 5 | 4 Tmc7          | protein_coding         |
| ENSMUST00000136607 | 7 | 5 | 2 Slc44a1       | protein_coding         |
| ENSMUST00000073109 | 7 | 5 | 0 Ctdspl        | protein_coding         |
| ENSMUST00000161856 | 7 | 5 | 0 Rbm20         | protein_coding         |
| ENSMUST00000172906 | 7 | 5 | 0 Ankrd11       | protein_coding         |
| ENSMUST00000127913 | 7 | 5 | 0 1700057H15Rik | lincRNA                |
| ENSMUST00000096053 | 7 | 4 | 54 Fam178a      | protein_coding         |
| ENSMUST00000068877 | 7 | 4 | 12 Timd4        | protein_coding         |
| ENSMUST00000149497 | 7 | 4 | 2 Camk1         | protein_coding         |
| ENSMUST00000167009 | 7 | 4 | 2 Gm17135       | antisense              |
| ENSMUST00000171982 | 7 | 4 | 0 Gm8584        | unprocessed_pseudogene |
| ENSMUST00000098376 | 7 | 4 | 0 Slc26a6       | protein_coding         |
| ENSMUST00000108232 | 7 | 4 | 0 Usp45         | protein_coding         |
| ENSMUST00000118144 | 7 | 4 | 0 Vwa5a         | protein_coding         |
| ENSMUST00000121759 | 7 | 4 | 0 Synj1         | protein_coding         |
| ENSMUST00000144888 | 7 | 4 | 0 Hat1          | protein_coding         |
| ENSMUST00000159819 | 7 | 4 | 0 Hspa4l        | protein_coding         |
| ENSMUST00000183878 | 7 | 4 | 0 5730403I07Rik | lincRNA                |
| ENSMUST00000018727 | 7 | 3 | 16 G3bp1        | protein_coding         |
| ENSMUST00000040783 | 7 | 3 | 8 Usp40         | protein_coding         |
| ENSMUST00000036557 | 7 | 3 | 6 Wdr78         | protein_coding         |
| ENSMUST00000147621 | 7 | 3 | 6 Osbp13        | protein_coding         |
| ENSMUST00000025264 | 7 | 3 | 4 Wdr33         | protein_coding         |
| ENSMUST00000065302 | 7 | 3 | 2 Cenpj         | protein_coding         |
| ENSMUST00000081978 | 7 | 3 | 2 Slc39a8       | protein_coding         |
| ENSMUST00000085715 | 7 | 3 | 2 Mark4         | protein_coding         |
| ENSMUST00000040134 | 7 | 3 | 0 Ndp           | protein_coding         |
| ENSMUST00000040259 | 7 | 3 | 0 Atp6v0a4      | protein_coding         |
| ENSMUST00000050455 | 7 | 3 | 0 Rfx6          | protein_coding         |
| ENSMUST00000096013 | 7 | 3 | 0 Abi3bp        | protein_coding         |
| ENSMUST00000160067 | 7 | 3 | 0 Leprel1       | protein_coding         |
| ENSMUST00000132811 | 7 | 3 | 0 Gm15489       | antisense              |
| ENSMUST00000019901 | 7 | 3 | 12 Ccdc170      | protein_coding         |
| ENSMUST00000030879 | 7 | 3 | 12 Clcn6        | protein_coding         |
| ENSMUST00000138255 | 7 | 3 | 10 Scamp1       | protein_coding         |
| ENSMUST00000049942 | 7 | 3 | 6 Crem          | protein_coding         |
| ENSMUST00000051572 | 7 | 3 | 6 Sdpr          | protein_coding         |
| ENSMUST00000152116 | 7 | 3 | 4 Gm15866       | antisense              |
| ENSMUST00000142867 | 7 | 3 | 0 Ubxn2a        | protein_coding         |
| ENSMUST00000180953 | 7 | 3 | 0 5330439K02Rik | lincRNA                |
| ENSMUST00000167877 | 7 | 2 | 8 Snx7          | protein_coding         |
| ENSMUST00000154203 | 7 | 2 | 4 Hhat          | protein_coding         |
| ENSMUST00000038537 | 7 | 2 | 0 Wtip          | protein_coding         |
| ENSMUST00000160243 | 7 | 1 | 6 Kng2          | protein_coding         |
| ENSMUST00000098979 | 7 | 1 | 2 Cep295        | protein_coding         |
| ENSMUST00000180942 | 7 | 1 | 2 Gm26791       | lincRNA                |
| ENSMUST00000162506 | 7 | 1 | 0 Gm16108       | antisense              |
| ENSMUST00000131272 | 7 | 0 | 16 Mina         | protein_coding         |
| ENSMUST00000110048 | 7 | 0 | 14 Eif4enif1    | protein_coding         |
| ENSMUST00000113066 | 7 | 0 | 0 Esx1          | protein_coding         |
| ENSMUST00000129021 | 7 | 0 | 0 Aptx          | protein_coding         |
| ENSMUST00000142524 | 7 | 0 | 0 Ahdc1         | protein_coding         |
| ENSMUST00000142672 | 7 | 0 | 0 Smad4         | protein_coding         |
| ENSMUST00000147397 | 7 | 0 | 0 Ears2         | protein_coding         |
| ENSMUST00000181149 | 7 | 0 | 0 B230354K17Rik | lincRNA                |

|                     |   |    |              |                        |
|---------------------|---|----|--------------|------------------------|
| ENSMUST00000010049  | 7 | 19 | 2 Kdsr       | protein_coding         |
| ENSMUST00000166577  | 7 | 18 | 22 Ankrd52   | protein_coding         |
| ENSMUST00000042450  | 7 | 18 | 8 Rmi1       | protein_coding         |
| ENSMUST00000134802  | 7 | 17 | 4 Phldb2     | protein_coding         |
| ENSMUST00000074246  | 7 | 17 | 0 Birc2      | protein_coding         |
| ENSMUST00000181563  | 7 | 17 | 0 Gm10561    | antisense              |
| ENSMUST00000042352  | 7 | 16 | 34 Zmat4     | protein_coding         |
| ENSMUST00000159747  | 7 | 16 | 6 Arhgef4    | protein_coding         |
| ENSMUST00000033965  | 7 | 16 | 2 Tenm3      | protein_coding         |
| ENSMUST00000047786  | 7 | 15 | 10 March4    | protein_coding         |
| ENSMUST00000071169  | 7 | 15 | 2 Rcc2       | protein_coding         |
| ENSMUST00000045224  | 7 | 14 | 42 Acer2     | protein_coding         |
| ENSMUST00000141235  | 7 | 14 | 10 Zbtb8os   | protein_coding         |
| ENSMUST00000094898  | 7 | 14 | 4 Ccnyl1     | protein_coding         |
| ENSMUST00000131027  | 7 | 14 | 0 Ntng1      | protein_coding         |
| ENSMUST00000160821  | 7 | 14 | 0 Atxn2      | protein_coding         |
| ENSMUST00000142395  | 7 | 14 | 4 Whsc1l1    | protein_coding         |
| ENSMUST00000033313  | 7 | 14 | 2 Atp6ap2    | protein_coding         |
| ENSMUST000000066257 | 7 | 13 | 22 Khdrbs1   | protein_coding         |
| ENSMUST00000038185  | 7 | 13 | 18 Exd2      | protein_coding         |
| ENSMUST00000114776  | 7 | 13 | 18 Pias2     | protein_coding         |
| ENSMUST00000068439  | 7 | 13 | 0 Pdlim1     | protein_coding         |
| ENSMUST00000156848  | 7 | 13 | 0 Pon3       | protein_coding         |
| ENSMUST00000086555  | 7 | 12 | 10 Dhx57     | protein_coding         |
| ENSMUST00000110889  | 7 | 12 | 2 Prkar1b    | protein_coding         |
| ENSMUST00000173591  | 7 | 12 | 0 Gm8868     | unprocessed_pseudogene |
| ENSMUST00000028981  | 7 | 12 | 0 Mapre1     | protein_coding         |
| ENSMUST00000109831  | 7 | 12 | 0 Clgn       | protein_coding         |
| ENSMUST00000131351  | 7 | 12 | 0 AU019823   | protein_coding         |
| ENSMUST00000172950  | 7 | 12 | 0 Usp32      | protein_coding         |
| ENSMUST00000127900  | 7 | 12 | 26 Gnao1     | protein_coding         |
| ENSMUST00000161405  | 7 | 12 | 6 Grhl2      | protein_coding         |
| ENSMUST00000013220  | 7 | 12 | 2 Amotl1     | protein_coding         |
| ENSMUST00000081362  | 7 | 11 | 20 Rabep1    | protein_coding         |
| ENSMUST00000095310  | 7 | 11 | 20 Osbpl8    | protein_coding         |
| ENSMUST00000033691  | 7 | 11 | 12 Tsx       | protein_coding         |
| ENSMUST00000111398  | 7 | 11 | 6 Ncor2      | protein_coding         |
| ENSMUST00000025198  | 7 | 11 | 4 Btl2       | protein_coding         |
| ENSMUST00000176655  | 7 | 11 | 2 Scnn1a     | protein_coding         |
| ENSMUST00000027252  | 7 | 11 | 0 Eif5b      | protein_coding         |
| ENSMUST00000033800  | 7 | 11 | 0 Plp1       | protein_coding         |
| ENSMUST00000161744  | 7 | 11 | 0 Lamc1      | protein_coding         |
| ENSMUST00000165607  | 7 | 11 | 0 Senp6      | protein_coding         |
| ENSMUST00000109896  | 7 | 10 | 22 Nlnl      | protein_coding         |
| ENSMUST00000030127  | 7 | 10 | 18 Tmem38b   | protein_coding         |
| ENSMUST00000114034  | 7 | 10 | 12 Lrrc49    | protein_coding         |
| ENSMUST00000177236  | 7 | 10 | 12 Rnf141    | protein_coding         |
| ENSMUST00000009344  | 7 | 10 | 2 Xpo6       | protein_coding         |
| ENSMUST00000023524  | 7 | 10 | 0 Rabl3      | protein_coding         |
| ENSMUST00000060513  | 7 | 10 | 0 Acad8      | protein_coding         |
| ENSMUST00000114220  | 7 | 10 | 0 D16Ert472e | protein_coding         |
| ENSMUST00000164175  | 7 | 10 | 0 Cmtm1      | protein_coding         |
| ENSMUST00000089024  | 7 | 9  | 14 Tcp1      | protein_coding         |
| ENSMUST00000174407  | 7 | 9  | 10 Zfp141    | protein_coding         |
| ENSMUST00000165978  | 7 | 9  | 8 Tecpr2     | protein_coding         |
| ENSMUST00000098828  | 7 | 9  | 8 Gm5544     | lincRNA                |
| ENSMUST00000095014  | 7 | 9  | 6 Tgfbra1    | protein_coding         |
| ENSMUST00000089332  | 7 | 9  | 4 Col8a1     | protein_coding         |
| ENSMUST00000157069  | 7 | 9  | 2 Glyat      | protein_coding         |
| ENSMUST00000033866  | 7 | 9  | 0 Vps36      | protein_coding         |
| ENSMUST00000119161  | 7 | 9  | 0 Tpr        | protein_coding         |
| ENSMUST00000145838  | 7 | 9  | 0 Ext2       | protein_coding         |
| ENSMUST00000163241  | 7 | 9  | 0 Gm5549     | protein_coding         |
| ENSMUST00000169812  | 7 | 9  | 0 Snx7       | protein_coding         |
| ENSMUST00000122189  | 7 | 9  | 0 Gm5392     | processed_pseudogene   |
| ENSMUST00000136919  | 7 | 9  | 0 Gm15407    | lincRNA                |
| ENSMUST00000165709  | 7 | 9  | 34 Usp24     | protein_coding         |
| ENSMUST00000176482  | 7 | 9  | 30 Pbx1      | protein_coding         |

|                     |   |   |                  |                        |
|---------------------|---|---|------------------|------------------------|
| ENSMUST00000068697  | 7 | 9 | 18 Kcmf1         | protein_coding         |
| ENSMUST00000071213  | 7 | 9 | 16 Polr2a        | protein_coding         |
| ENSMUST00000072886  | 7 | 9 | 6 Sctr           | protein_coding         |
| ENSMUST000000159329 | 7 | 9 | 6 Slc24a4        | protein_coding         |
| ENSMUST00000021685  | 7 | 9 | 4 Hhip1          | protein_coding         |
| ENSMUST00000058163  | 7 | 9 | 4 Pus10          | protein_coding         |
| ENSMUST000000107038 | 7 | 9 | 4 Pde4dip        | protein_coding         |
| ENSMUST000000111945 | 7 | 9 | 4 Mapk8          | protein_coding         |
| ENSMUST00000021844  | 7 | 9 | 0 Ripk1          | protein_coding         |
| ENSMUST00000038477  | 7 | 9 | 0 Fam65b         | protein_coding         |
| ENSMUST000000108155 | 7 | 9 | 0 Bbs7           | protein_coding         |
| ENSMUST000000181906 | 7 | 9 | 0 Cep83os        | lincRNA                |
| ENSMUST000000175942 | 7 | 9 | 0 A230072E10Rik  | antisense              |
| ENSMUST000000165418 | 7 | 8 | 59 Zfp148        | protein_coding         |
| ENSMUST000000102514 | 7 | 8 | 40 Rtn4rl1       | protein_coding         |
| ENSMUST000000115605 | 7 | 8 | 30 Txnrd2        | protein_coding         |
| ENSMUST000000160582 | 7 | 8 | 18 Luc7l2        | protein_coding         |
| ENSMUST000000145495 | 7 | 8 | 16 Acvr1         | protein_coding         |
| ENSMUST00000040599  | 7 | 8 | 10 Nav1          | protein_coding         |
| ENSMUST00000041968  | 7 | 8 | 4 Tmem135        | protein_coding         |
| ENSMUST00000022915  | 7 | 8 | 2 Dpys           | protein_coding         |
| ENSMUST00000037991  | 7 | 8 | 2 Mical2         | protein_coding         |
| ENSMUST000000128595 | 7 | 8 | 2 Tprg           | protein_coding         |
| ENSMUST000000160490 | 7 | 8 | 2 Gm16553        | antisense              |
| ENSMUST00000031845  | 7 | 8 | 0 Dfna5          | protein_coding         |
| ENSMUST00000032406  | 7 | 8 | 0 Ogg1           | protein_coding         |
| ENSMUST00000076786  | 7 | 8 | 0 Defb35         | protein_coding         |
| ENSMUST00000086421  | 7 | 8 | 0 Nck2           | protein_coding         |
| ENSMUST000000140417 | 7 | 8 | 0 Ido2           | protein_coding         |
| ENSMUST000000167406 | 7 | 8 | 0 Ube2d2a        | protein_coding         |
| ENSMUST000000171291 | 7 | 8 | 0 Wdr4           | protein_coding         |
| ENSMUST000000109392 | 7 | 7 | 113 Cbfb         | protein_coding         |
| ENSMUST000000138740 | 7 | 7 | 34 Asxl2         | protein_coding         |
| ENSMUST00000043605  | 7 | 7 | 26 Kif27         | protein_coding         |
| ENSMUST00000092891  | 7 | 7 | 22 Cacng7        | protein_coding         |
| ENSMUST000000109024 | 7 | 7 | 20 Lima1         | protein_coding         |
| ENSMUST00000030683  | 7 | 7 | 16 Hgf           | protein_coding         |
| ENSMUST000000101192 | 7 | 7 | 16 Khlh5         | protein_coding         |
| ENSMUST000000180896 | 7 | 7 | 10 1600020E01Rik | lincRNA                |
| ENSMUST00000050228  | 7 | 7 | 8 Tmem241        | protein_coding         |
| ENSMUST000000172851 | 7 | 7 | 6 Gm6838         | unprocessed_pseudogene |
| ENSMUST00000030533  | 7 | 7 | 6 Vwa5b1         | protein_coding         |
| ENSMUST00000074204  | 7 | 7 | 6 Slc6a15        | protein_coding         |
| ENSMUST00000022315  | 7 | 7 | 4 Dydc1          | protein_coding         |
| ENSMUST00000043884  | 7 | 7 | 4 Lrrn3          | protein_coding         |
| ENSMUST00000047620  | 7 | 7 | 4 Fam151a        | protein_coding         |
| ENSMUST000000124466 | 7 | 7 | 4 Dock7          | protein_coding         |
| ENSMUST00000096494  | 7 | 7 | 2 Egflam         | protein_coding         |
| ENSMUST000000102728 | 7 | 7 | 2 Fign           | protein_coding         |
| ENSMUST000000178015 | 7 | 7 | 2 Pum2           | protein_coding         |
| ENSMUST00000040519  | 7 | 7 | 0 Apopt1         | protein_coding         |
| ENSMUST000000101436 | 7 | 7 | 0 Lrrc61         | protein_coding         |
| ENSMUST000000121872 | 7 | 7 | 0 C1qtnf7        | protein_coding         |
| ENSMUST000000173653 | 7 | 7 | 0 Opn1sw         | protein_coding         |
| ENSMUST000000159562 | 7 | 7 | 0 4930428N03Rik  | lincRNA                |
| ENSMUST000000134776 | 7 | 7 | 40 Abcc1         | protein_coding         |
| ENSMUST00000099498  | 7 | 7 | 38 Ccdc80        | protein_coding         |
| ENSMUST00000049308  | 7 | 7 | 28 Itpr3         | protein_coding         |
| ENSMUST00000001963  | 7 | 7 | 18 Ace           | protein_coding         |
| ENSMUST00000072228  | 7 | 7 | 18 Gckr          | protein_coding         |
| ENSMUST000000107700 | 7 | 7 | 16 Snf8          | protein_coding         |
| ENSMUST000000105686 | 7 | 7 | 14 Slc25a33      | protein_coding         |
| ENSMUST00000046924  | 7 | 7 | 10 Fam102b       | protein_coding         |
| ENSMUST000000131213 | 7 | 7 | 6 Gpatch1        | protein_coding         |
| ENSMUST00000031239  | 7 | 7 | 4 Abcg3          | protein_coding         |
| ENSMUST00000056177  | 7 | 7 | 4 Pacsin2        | protein_coding         |
| ENSMUST00000025929  | 7 | 7 | 2 Hrasls5        | protein_coding         |
| ENSMUST000000100795 | 7 | 7 | 2 Myo18a         | protein_coding         |



|                     |   |   |     |               |                      |
|---------------------|---|---|-----|---------------|----------------------|
| ENSMUST00000049411  | 7 | 7 | 0   | Apex1         | protein_coding       |
| ENSMUST00000165212  | 7 | 7 | 0   | Sorbs1        | protein_coding       |
| ENSMUST00000172534  | 7 | 7 | 0   | Kpna1         | protein_coding       |
| ENSMUST00000015346  | 7 | 6 | 89  | Cnksr3        | protein_coding       |
| ENSMUST000000167190 | 7 | 6 | 63  | Mdga1         | protein_coding       |
| ENSMUST000000181112 | 7 | 6 | 24  | Gm26549       | lincRNA              |
| ENSMUST00000005509  | 7 | 6 | 12  | Stx1a         | protein_coding       |
| ENSMUST000000141755 | 7 | 6 | 10  | Mettl16       | protein_coding       |
| ENSMUST00000036805  | 7 | 6 | 8   | Plekhj1       | protein_coding       |
| ENSMUST000000167200 | 7 | 6 | 8   | Fcrl1         | protein_coding       |
| ENSMUST00000039734  | 7 | 6 | 2   | Unkl          | protein_coding       |
| ENSMUST00000096913  | 7 | 6 | 2   | Slx           | protein_coding       |
| ENSMUST00000099441  | 7 | 6 | 2   | Slc35d2       | protein_coding       |
| ENSMUST000000142820 | 7 | 6 | 2   | Rab22a        | protein_coding       |
| ENSMUST000000150230 | 7 | 6 | 2   | Kif1b         | protein_coding       |
| ENSMUST00000029078  | 7 | 6 | 0   | Car2          | protein_coding       |
| ENSMUST00000033466  | 7 | 6 | 0   | Cd40lg        | protein_coding       |
| ENSMUST00000089776  | 7 | 6 | 0   | Cep152        | protein_coding       |
| ENSMUST000000162041 | 7 | 6 | 0   | Gcc2          | protein_coding       |
| ENSMUST000000142407 | 7 | 5 | 42  | Ube2k         | protein_coding       |
| ENSMUST00000022391  | 7 | 5 | 24  | Ktn1          | protein_coding       |
| ENSMUST00000098250  | 7 | 5 | 24  | Fchsd2        | protein_coding       |
| ENSMUST000000169390 | 7 | 5 | 20  | Enoph1        | protein_coding       |
| ENSMUST00000021204  | 7 | 5 | 14  | Nxn           | protein_coding       |
| ENSMUST000000167766 | 7 | 5 | 10  | Zdhhc2        | protein_coding       |
| ENSMUST00000078079  | 7 | 5 | 8   | Eif1a         | protein_coding       |
| ENSMUST000000081544 | 7 | 5 | 8   | Rims1         | protein_coding       |
| ENSMUST000000171962 | 7 | 5 | 6   | Camsap3       | protein_coding       |
| ENSMUST000000133715 | 7 | 5 | 4   | Clint1        | protein_coding       |
| ENSMUST000000149359 | 7 | 5 | 4   | Mkl2          | protein_coding       |
| ENSMUST00000032419  | 7 | 5 | 2   | Cmas          | protein_coding       |
| ENSMUST00000020227  | 7 | 5 | 0   | Cry1          | protein_coding       |
| ENSMUST00000028935  | 7 | 5 | 0   | Cst9          | protein_coding       |
| ENSMUST000000117396 | 7 | 5 | 0   | Ncapg         | protein_coding       |
| ENSMUST000000125407 | 7 | 5 | 0   | Ext2          | protein_coding       |
| ENSMUST000000129860 | 7 | 5 | 0   | Msl3          | protein_coding       |
| ENSMUST000000138385 | 7 | 5 | 0   | Atp6v0a4      | protein_coding       |
| ENSMUST000000184611 | 7 | 5 | 0   | A630095E13Rik | protein_coding       |
| ENSMUST000000153600 | 7 | 5 | 0   | Gm13402       | antisense            |
| ENSMUST000000139715 | 7 | 5 | 24  | Psmc1         | protein_coding       |
| ENSMUST000000165166 | 7 | 5 | 14  | Phc3          | processed_transcript |
| ENSMUST000000165166 | 7 | 5 | 14  | Phc3          | processed_transcript |
| ENSMUST00000030778  | 7 | 5 | 10  | Galnt15       | protein_coding       |
| ENSMUST000000109315 | 7 | 5 | 10  | Nln           | protein_coding       |
| ENSMUST00000026322  | 7 | 5 | 4   | Polr3a        | protein_coding       |
| ENSMUST00000045114  | 7 | 5 | 4   | Rpf2          | protein_coding       |
| ENSMUST00000057428  | 7 | 5 | 4   | Mylk4         | protein_coding       |
| ENSMUST00000067437  | 7 | 5 | 4   | Lmo3          | protein_coding       |
| ENSMUST00000033000  | 7 | 5 | 2   | Ii21r         | protein_coding       |
| ENSMUST000000162014 | 7 | 5 | 2   | Ccdc79        | protein_coding       |
| ENSMUST00000000137  | 7 | 5 | 0   | Actr2         | protein_coding       |
| ENSMUST00000021467  | 7 | 5 | 0   | Sav1          | protein_coding       |
| ENSMUST00000085513  | 7 | 5 | 0   | Uri1          | protein_coding       |
| ENSMUST000000105566 | 7 | 5 | 0   | Runx1t1       | protein_coding       |
| ENSMUST000000113604 | 7 | 5 | 0   | Txk           | protein_coding       |
| ENSMUST000000159378 | 7 | 5 | 0   | Gm16039       | protein_coding       |
| ENSMUST000000172005 | 7 | 5 | 0   | Cdh7          | protein_coding       |
| ENSMUST000000180955 | 7 | 5 | 0   | Gm2824        | lincRNA              |
| ENSMUST00000048309  | 7 | 4 | 145 | Camsap2       | protein_coding       |
| ENSMUST00000082209  | 7 | 4 | 48  | Scn8a         | protein_coding       |
| ENSMUST000000160290 | 7 | 4 | 34  | BC035044      | protein_coding       |
| ENSMUST000000144879 | 7 | 4 | 22  | Cacna1a       | protein_coding       |
| ENSMUST000000166294 | 7 | 4 | 12  | Ii1rap        | protein_coding       |
| ENSMUST00000021536  | 7 | 4 | 8   | Atp6v1d       | protein_coding       |
| ENSMUST000000184996 | 7 | 4 | 8   | Golga1        | protein_coding       |
| ENSMUST00000027719  | 7 | 4 | 6   | 2010107G23Rik | protein_coding       |
| ENSMUST000000126546 | 7 | 4 | 6   | Trmt13        | protein_coding       |
| ENSMUST00000020023  | 7 | 4 | 2   | Reep3         | protein_coding       |

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUST00000065111 | 7 | 4  | 2 Usp45         | protein_coding       |
| ENSMUST00000112754 | 7 | 4  | 2 Mbd5          | protein_coding       |
| ENSMUST00000115784 | 7 | 4  | 2 Synj2         | protein_coding       |
| ENSMUST00000136924 | 7 | 4  | 2 Ugg2          | protein_coding       |
| ENSMUST00000089726 | 7 | 4  | 0 D430041D05Rik | protein_coding       |
| ENSMUST00000112682 | 7 | 4  | 0 Slc25a18      | protein_coding       |
| ENSMUST00000112724 | 7 | 4  | 0 Serpinb12     | protein_coding       |
| ENSMUST00000122956 | 7 | 4  | 0 Ppp1r15b      | protein_coding       |
| ENSMUST00000126421 | 7 | 4  | 0 Zfp341        | protein_coding       |
| ENSMUST00000137381 | 7 | 4  | 0 Gnl3          | protein_coding       |
| ENSMUST00000165569 | 7 | 4  | 0 Spert         | protein_coding       |
| ENSMUST00000176675 | 7 | 4  | 0 Appl2         | protein_coding       |
| ENSMUST00000029075 | 7 | 3  | 18 Dok5         | protein_coding       |
| ENSMUST00000138064 | 7 | 3  | 10 Eva1c        | protein_coding       |
| ENSMUST00000037011 | 7 | 3  | 4 Trim36        | protein_coding       |
| ENSMUST00000105287 | 7 | 3  | 4 Dcn           | protein_coding       |
| ENSMUST00000125895 | 7 | 3  | 4 Zfp644        | protein_coding       |
| ENSMUST00000134466 | 7 | 3  | 4 Camk2d        | protein_coding       |
| ENSMUST00000107076 | 7 | 3  | 0 Pias3         | protein_coding       |
| ENSMUST00000118717 | 7 | 3  | 0 Akr1c14       | protein_coding       |
| ENSMUST00000036069 | 7 | 3  | 228 Mamdc2      | protein_coding       |
| ENSMUST00000154447 | 7 | 3  | 101 Srsf10      | protein_coding       |
| ENSMUST00000138828 | 7 | 3  | 59 Esr1         | protein_coding       |
| ENSMUST00000113836 | 7 | 3  | 32 Zfml         | protein_coding       |
| ENSMUST00000114385 | 7 | 3  | 18 Hnrmpm       | protein_coding       |
| ENSMUST00000043814 | 7 | 3  | 16 Fig4         | protein_coding       |
| ENSMUST00000030535 | 7 | 3  | 14 Cda          | protein_coding       |
| ENSMUST00000086278 | 7 | 3  | 6 Zfp810        | protein_coding       |
| ENSMUST00000098031 | 7 | 3  | 6 Rgs3          | protein_coding       |
| ENSMUST00000112265 | 7 | 3  | 6 Bmx           | protein_coding       |
| ENSMUST00000021359 | 7 | 3  | 4 Pole2         | protein_coding       |
| ENSMUST00000055313 | 7 | 3  | 2 Als2cr12      | protein_coding       |
| ENSMUST00000110448 | 7 | 3  | 0 Fam227b       | protein_coding       |
| ENSMUST00000141711 | 7 | 3  | 0 Cbx3          | protein_coding       |
| ENSMUST00000161898 | 7 | 3  | 0 Fgfr1op       | protein_coding       |
| ENSMUST00000099084 | 7 | 2  | 4 Zmynd8        | protein_coding       |
| ENSMUST00000105617 | 7 | 2  | 2 Ipcef1        | protein_coding       |
| ENSMUST00000108531 | 7 | 2  | 0 Nup88         | protein_coding       |
| ENSMUST00000043896 | 7 | 1  | 30 Zfx3         | protein_coding       |
| ENSMUST00000173750 | 7 | 1  | 28 Hnrnpl       | protein_coding       |
| ENSMUST00000124621 | 7 | 1  | 26 Zfr          | protein_coding       |
| ENSMUST00000154209 | 7 | 1  | 8 Cdkal1        | protein_coding       |
| ENSMUST00000155562 | 7 | 1  | 4 Sox5os4       | antisense            |
| ENSMUST00000137100 | 7 | 1  | 6 Rqcd1         | protein_coding       |
| ENSMUST00000123980 | 7 | 1  | 0 Hadhb         | protein_coding       |
| ENSMUST00000015498 | 7 | 0  | 28 Pcolce2      | protein_coding       |
| ENSMUST00000025646 | 7 | 0  | 10 Slc15a3      | protein_coding       |
| ENSMUST00000065072 | 7 | 0  | 4 C8b           | protein_coding       |
| ENSMUST00000019464 | 7 | 0  | 0 Noxo1         | protein_coding       |
| ENSMUST00000046839 | 7 | 0  | 0 Gfer          | protein_coding       |
| ENSMUST00000057578 | 7 | 0  | 0 Trmt1         | protein_coding       |
| ENSMUST00000112932 | 7 | 0  | 0 Zbtb6         | protein_coding       |
| ENSMUST00000124143 | 7 | 0  | 0 Vat1l         | protein_coding       |
| ENSMUST00000133594 | 7 | 0  | 0 Usp14         | protein_coding       |
| ENSMUST00000145965 | 7 | 0  | 0 Mapk3         | protein_coding       |
| ENSMUST00000160378 | 7 | 0  | 0 Acat3         | protein_coding       |
| ENSMUST00000033058 | 6 | 20 | 0 Sbf2          | protein_coding       |
| ENSMUST00000022857 | 6 | 19 | 4 Ttc23l        | protein_coding       |
| ENSMUST00000135978 | 6 | 18 | 4 Bre           | protein_coding       |
| ENSMUST00000135986 | 6 | 17 | 87 Ccdc13       | protein_coding       |
| ENSMUST00000153479 | 6 | 16 | 16 Gm15958      | processed_transcript |
| ENSMUST00000121634 | 6 | 16 | 6 Dixdc1        | protein_coding       |
| ENSMUST00000154308 | 6 | 16 | 0 Ide           | protein_coding       |
| ENSMUST00000047817 | 6 | 15 | 20 Kif14        | protein_coding       |
| ENSMUST00000156124 | 6 | 15 | 6 2610301B20Rik | protein_coding       |
| ENSMUST00000100378 | 6 | 14 | 28 Gm1564       | protein_coding       |
| ENSMUST00000177358 | 6 | 14 | 20 Pou2f1       | protein_coding       |
| ENSMUST00000120384 | 6 | 14 | 8 Rpl7a-ps12    | processed_pseudogene |

|                     |   |    |                 |                        |
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| ENSMUST00000092155  | 6 | 14 | 4 Col11a1       | protein_coding         |
| ENSMUST00000029941  | 6 | 14 | 0 Pdlim5        | protein_coding         |
| ENSMUST00000045477  | 6 | 14 | 16 Stk32a       | protein_coding         |
| ENSMUST00000017783  | 6 | 13 | 12 Rab11fip4    | protein_coding         |
| ENSMUST000000149892 | 6 | 13 | 12 Dirc2        | protein_coding         |
| ENSMUST000000168134 | 6 | 13 | 12 Ppfia1       | protein_coding         |
| ENSMUST000000147290 | 6 | 13 | 10 Dusp19       | protein_coding         |
| ENSMUST000000115358 | 6 | 13 | 4 Cadps2        | protein_coding         |
| ENSMUST000000140802 | 6 | 13 | 0 D930020B18Rik | protein_coding         |
| ENSMUST000000179619 | 6 | 13 | 0 Gpr56         | protein_coding         |
| ENSMUST000000176499 | 6 | 12 | 22 Cdca7l       | protein_coding         |
| ENSMUST000000079659 | 6 | 12 | 10 U2surp       | protein_coding         |
| ENSMUST000000119386 | 6 | 12 | 8 Nlrp4a        | protein_coding         |
| ENSMUST000000130541 | 6 | 12 | 8 Fggy          | protein_coding         |
| ENSMUST000000129747 | 6 | 12 | 2 Mad1l1        | protein_coding         |
| ENSMUST000000023867 | 6 | 12 | 0 Rfc2          | protein_coding         |
| ENSMUST000000144628 | 6 | 12 | 0 Ube2v1        | protein_coding         |
| ENSMUST000000182669 | 6 | 12 | 0 Cyp2ab1       | protein_coding         |
| ENSMUST000000143147 | 6 | 12 | 63 Sgsm3        | protein_coding         |
| ENSMUST000000124093 | 6 | 12 | 28 Sycp2l       | protein_coding         |
| ENSMUST000000125505 | 6 | 12 | 10 Glt8d2       | protein_coding         |
| ENSMUST000000021817 | 6 | 12 | 8 Ippk          | protein_coding         |
| ENSMUST000000123845 | 6 | 12 | 2 Far1          | protein_coding         |
| ENSMUST000000029464 | 6 | 12 | 0 Hao2          | protein_coding         |
| ENSMUST000000114058 | 6 | 12 | 0 Pls3          | protein_coding         |
| ENSMUST000000049117 | 6 | 12 | 0 Gm5830        | processed_pseudogene   |
| ENSMUST000000141503 | 6 | 11 | 10 Hectd2       | protein_coding         |
| ENSMUST000000175885 | 6 | 11 | 4 Ncaph         | protein_coding         |
| ENSMUST000000121081 | 6 | 11 | 0 Gm5397        | unprocessed_pseudogene |
| ENSMUST000000035785 | 6 | 11 | 0 Ssr2          | protein_coding         |
| ENSMUST000000100287 | 6 | 11 | 0 Abca8a        | protein_coding         |
| ENSMUST000000139831 | 6 | 10 | 16 Rap1gap      | protein_coding         |
| ENSMUST000000042553 | 6 | 10 | 10 A4gnt        | protein_coding         |
| ENSMUST000000146448 | 6 | 10 | 6 Sync          | protein_coding         |
| ENSMUST000000154032 | 6 | 10 | 6 Spryd3        | protein_coding         |
| ENSMUST00000014812  | 6 | 10 | 2 Chfr          | protein_coding         |
| ENSMUST000000119941 | 6 | 10 | 0 Pvr13         | protein_coding         |
| ENSMUST000000162966 | 6 | 10 | 0 Wbscr17       | protein_coding         |
| ENSMUST000000180140 | 6 | 10 | 0 Hcfc1r1       | protein_coding         |
| ENSMUST000000117315 | 6 | 10 | 0 Gm13925       | processed_pseudogene   |
| ENSMUST000000160992 | 6 | 10 | 0 Gm16541       | antisense              |
| ENSMUST000000021610 | 6 | 9  | 75 Chga         | protein_coding         |
| ENSMUST000000027451 | 6 | 9  | 40 EphA4        | protein_coding         |
| ENSMUST000000125993 | 6 | 9  | 16 Crxos        | protein_coding         |
| ENSMUST000000114924 | 6 | 9  | 6 Celf2         | protein_coding         |
| ENSMUST000000039991 | 6 | 9  | 2 Slc12a9       | protein_coding         |
| ENSMUST000000161175 | 6 | 9  | 0 Gm16290       | unprocessed_pseudogene |
| ENSMUST000000107405 | 6 | 9  | 0 Adar          | protein_coding         |
| ENSMUST000000130618 | 6 | 9  | 0 Gad1          | protein_coding         |
| ENSMUST000000136789 | 6 | 9  | 0 Lrch2         | protein_coding         |
| ENSMUST000000143486 | 6 | 9  | 0 Cenpl         | protein_coding         |
| ENSMUST000000108709 | 6 | 9  | 38 Specc1       | protein_coding         |
| ENSMUST000000128969 | 6 | 9  | 38 Tmtc4        | protein_coding         |
| ENSMUST000000137823 | 6 | 9  | 26 Usp34        | protein_coding         |
| ENSMUST000000105691 | 6 | 9  | 16 Clstn1       | protein_coding         |
| ENSMUST000000184450 | 6 | 9  | 14 Nedd4        | protein_coding         |
| ENSMUST000000141724 | 6 | 9  | 6 2010107G23Rik | protein_coding         |
| ENSMUST000000055884 | 6 | 9  | 4 Htr5b         | protein_coding         |
| ENSMUST000000048375 | 6 | 9  | 0 Fam102a       | protein_coding         |
| ENSMUST000000106986 | 6 | 9  | 0 Folr1         | protein_coding         |
| ENSMUST000000172973 | 6 | 9  | 0 Filip1        | protein_coding         |
| ENSMUST000000176242 | 6 | 9  | 0 Ect2          | protein_coding         |
| ENSMUST000000030198 | 6 | 8  | 28 Reck         | protein_coding         |
| ENSMUST000000034091 | 6 | 8  | 26 Rbl2         | protein_coding         |
| ENSMUST000000173287 | 6 | 8  | 22 Adamtsl3     | protein_coding         |
| ENSMUST000000109468 | 6 | 8  | 18 Top1         | protein_coding         |
| ENSMUST000000121096 | 6 | 8  | 16 Art3         | protein_coding         |
| ENSMUST000000143674 | 6 | 8  | 6 Pde6d         | protein_coding         |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000050183 | 6 | 8 | 4 Uaca          | protein_coding       |
| ENSMUST00000110880 | 6 | 8 | 4 Sh3yl1        | protein_coding       |
| ENSMUST00000170237 | 6 | 8 | 2 Ulk4          | protein_coding       |
| ENSMUST00000130240 | 6 | 8 | 2 3100003L05Rik | processed_transcript |
| ENSMUST00000181771 | 6 | 8 | 0 4930593A02Rik | lincRNA              |
| ENSMUST00000181771 | 6 | 8 | 0 4930593A02Rik | lincRNA              |
| ENSMUST00000022614 | 6 | 8 | 0 Ccdc25        | protein_coding       |
| ENSMUST00000028951 | 6 | 8 | 0 Snph          | protein_coding       |
| ENSMUST00000039612 | 6 | 8 | 0 Lonrf2        | protein_coding       |
| ENSMUST00000041008 | 6 | 8 | 0 Fntb          | protein_coding       |
| ENSMUST00000060108 | 6 | 8 | 0 1810030O07Rik | protein_coding       |
| ENSMUST00000110865 | 6 | 8 | 0 Adap1         | protein_coding       |
| ENSMUST00000114294 | 6 | 8 | 0 Abcg2         | protein_coding       |
| ENSMUST00000127599 | 6 | 8 | 0 Cpeb2         | protein_coding       |
| ENSMUST00000131768 | 6 | 8 | 0 Sgms1         | protein_coding       |
| ENSMUST00000135166 | 6 | 8 | 0 Lgals8        | protein_coding       |
| ENSMUST00000144144 | 6 | 8 | 0 Ugt2a1        | protein_coding       |
| ENSMUST00000167106 | 6 | 8 | 0 Tlr3          | protein_coding       |
| ENSMUST00000170255 | 6 | 8 | 0 Cyp2d11       | protein_coding       |
| ENSMUST00000163421 | 6 | 7 | 83 Axin1        | protein_coding       |
| ENSMUST00000183104 | 6 | 7 | 59 Osbpl10      | protein_coding       |
| ENSMUST00000143711 | 6 | 7 | 52 Dnal1        | protein_coding       |
| ENSMUST00000031696 | 6 | 7 | 44 Asb15        | protein_coding       |
| ENSMUST00000140196 | 6 | 7 | 42 Gm12724      | processed_transcript |
| ENSMUST00000040717 | 6 | 7 | 26 Kif15        | protein_coding       |
| ENSMUST00000073242 | 6 | 7 | 20 Cdh23        | protein_coding       |
| ENSMUST00000120977 | 6 | 7 | 16 Wwtr1        | protein_coding       |
| ENSMUST00000011607 | 6 | 7 | 10 Cpb1         | protein_coding       |
| ENSMUST00000169382 | 6 | 7 | 10 Gm21704      | protein_coding       |
| ENSMUST00000093844 | 6 | 7 | 6 Chrna5        | protein_coding       |
| ENSMUST00000129915 | 6 | 7 | 6 Thoc2         | protein_coding       |
| ENSMUST00000025989 | 6 | 7 | 4 Tm9sf3        | protein_coding       |
| ENSMUST00000065487 | 6 | 7 | 4 Prx           | protein_coding       |
| ENSMUST00000016637 | 6 | 7 | 2 Cd46          | protein_coding       |
| ENSMUST00000016637 | 6 | 7 | 2 Cd46          | protein_coding       |
| ENSMUST00000144137 | 6 | 7 | 2 Cep162        | protein_coding       |
| ENSMUST00000028155 | 6 | 7 | 0 Tsc1          | protein_coding       |
| ENSMUST00000121109 | 6 | 7 | 0 Gm13125       | protein_coding       |
| ENSMUST00000135469 | 6 | 7 | 0 Zak           | protein_coding       |
| ENSMUST00000152437 | 6 | 7 | 0 Ganc          | protein_coding       |
| ENSMUST00000162371 | 6 | 7 | 0 Tsen15        | protein_coding       |
| ENSMUST00000092956 | 6 | 7 | 147 Ahnak       | protein_coding       |
| ENSMUST00000140298 | 6 | 7 | 99 Gm12766      | lincRNA              |
| ENSMUST00000103116 | 6 | 7 | 28 Ppp1r16b     | protein_coding       |
| ENSMUST00000159109 | 6 | 7 | 26 Zfp609       | protein_coding       |
| ENSMUST00000029667 | 6 | 7 | 18 Kcnq5        | protein_coding       |
| ENSMUST00000112889 | 6 | 7 | 14 Tmem164      | protein_coding       |
| ENSMUST00000023270 | 6 | 7 | 12 Cep97        | protein_coding       |
| ENSMUST00000116257 | 6 | 7 | 10 Tnfrsf9      | protein_coding       |
| ENSMUST00000166734 | 6 | 7 | 10 Clasp2       | protein_coding       |
| ENSMUST00000060673 | 6 | 7 | 8 Liph          | protein_coding       |
| ENSMUST00000183727 | 6 | 7 | 6 Atf7          | protein_coding       |
| ENSMUST00000162350 | 6 | 7 | 4 C6            | protein_coding       |
| ENSMUST00000163648 | 6 | 7 | 4 Kat2b         | protein_coding       |
| ENSMUST00000072772 | 6 | 7 | 2 Map4          | protein_coding       |
| ENSMUST00000072772 | 6 | 7 | 2 Map4          | protein_coding       |
| ENSMUST00000022591 | 6 | 7 | 2 Epsti1        | protein_coding       |
| ENSMUST00000030787 | 6 | 7 | 2 Rheb          | protein_coding       |
| ENSMUST00000117849 | 6 | 7 | 2 Csnk1g1       | protein_coding       |
| ENSMUST00000145910 | 6 | 7 | 2 Strn          | protein_coding       |
| ENSMUST00000047768 | 6 | 7 | 0 Neil3         | protein_coding       |
| ENSMUST00000125645 | 6 | 7 | 0 Nrd1          | protein_coding       |
| ENSMUST00000129725 | 6 | 7 | 0 Gpr98         | protein_coding       |
| ENSMUST00000141659 | 6 | 7 | 0 Trmt10b       | protein_coding       |
| ENSMUST00000163558 | 6 | 7 | 0 Ndufaf2       | protein_coding       |
| ENSMUST00000134944 | 6 | 7 | 0 D630024D03Rik | lincRNA              |
| ENSMUST00000161091 | 6 | 7 | 0 Gm16168       | antisense            |
| ENSMUST00000034197 | 6 | 6 | 71 St3gal2      | protein_coding       |

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| ENSMUST00000121370  | 6 | 6 | 57 Tbc1d1        | protein_coding         |
| ENSMUST00000048976  | 6 | 6 | 22 Gucy1a3       | protein_coding         |
| ENSMUST00000105661  | 6 | 6 | 16 Plekhg5       | protein_coding         |
| ENSMUST00000023487  | 6 | 6 | 14 Arhgap31      | protein_coding         |
| ENSMUST00000029060  | 6 | 6 | 12 Atp9a         | protein_coding         |
| ENSMUST00000132101  | 6 | 6 | 12 Gm3985        | lincRNA                |
| ENSMUST00000140765  | 6 | 6 | 10 Ogdh          | protein_coding         |
| ENSMUST00000173216  | 6 | 6 | 10 Calu          | protein_coding         |
| ENSMUST00000027688  | 6 | 6 | 8 Rassf5         | protein_coding         |
| ENSMUST00000080953  | 6 | 6 | 8 Lrp2           | protein_coding         |
| ENSMUST00000168058  | 6 | 6 | 8 Ankrd17        | protein_coding         |
| ENSMUST00000002891  | 6 | 6 | 6 Top3a          | protein_coding         |
| ENSMUST00000043150  | 6 | 6 | 4 Acsf5          | protein_coding         |
| ENSMUST00000081618  | 6 | 6 | 4 Zfp780b        | protein_coding         |
| ENSMUST00000182530  | 6 | 6 | 4 Cul9           | protein_coding         |
| ENSMUST00000112094  | 6 | 6 | 2 Pbrm1          | protein_coding         |
| ENSMUST00000123932  | 6 | 6 | 2 Samhd1         | protein_coding         |
| ENSMUST00000039581  | 6 | 6 | 0 Tmem106a       | protein_coding         |
| ENSMUST00000049169  | 6 | 6 | 0 Sin3a          | protein_coding         |
| ENSMUST00000100181  | 6 | 6 | 0 Cyth1          | protein_coding         |
| ENSMUST00000107942  | 6 | 6 | 0 Atp8b5         | protein_coding         |
| ENSMUST00000110442  | 6 | 6 | 0 Fgf7           | protein_coding         |
| ENSMUST00000133181  | 6 | 6 | 0 Cdc23          | protein_coding         |
| ENSMUST00000166081  | 6 | 6 | 0 Vmn2r100       | protein_coding         |
| ENSMUST00000118505  | 6 | 6 | 0 Gm6645         | processed_pseudogene   |
| ENSMUST00000100404  | 6 | 5 | 52 B3glct        | protein_coding         |
| ENSMUST00000040706  | 6 | 5 | 50 Cnst          | protein_coding         |
| ENSMUST00000075249  | 6 | 5 | 30 Plekhg3       | protein_coding         |
| ENSMUST00000160998  | 6 | 5 | 22 Coq9          | protein_coding         |
| ENSMUST00000040380  | 6 | 5 | 20 Pitpnc1       | protein_coding         |
| ENSMUST00000118411  | 6 | 5 | 14 Mab21l3       | protein_coding         |
| ENSMUST00000118075  | 6 | 5 | 12 Maml3         | protein_coding         |
| ENSMUST00000149744  | 6 | 5 | 12 Col18a1       | protein_coding         |
| ENSMUST00000039373  | 6 | 5 | 10 Uba6          | protein_coding         |
| ENSMUST00000165000  | 6 | 5 | 10 Ankrd65       | protein_coding         |
| ENSMUST00000148202  | 6 | 5 | 8 Gm14133        | lincRNA                |
| ENSMUST00000038172  | 6 | 5 | 2 Mtmr12         | protein_coding         |
| ENSMUST00000142342  | 6 | 5 | 2 Ttc4           | protein_coding         |
| ENSMUST00000165951  | 6 | 5 | 2 Mgl2           | protein_coding         |
| ENSMUST00000166624  | 6 | 5 | 2 Ptpn4          | protein_coding         |
| ENSMUST00000172622  | 6 | 5 | 2 Mms22l         | protein_coding         |
| ENSMUST00000119635  | 6 | 5 | 0 Gm15266        | unprocessed_pseudogene |
| ENSMUST00000021596  | 6 | 5 | 0 Nrde2          | protein_coding         |
| ENSMUST00000024696  | 6 | 5 | 0 Mmp25          | protein_coding         |
| ENSMUST000000063816 | 6 | 5 | 0 D630039A03Rik  | protein_coding         |
| ENSMUST00000084830  | 6 | 5 | 0 Chrna10        | protein_coding         |
| ENSMUST00000112325  | 6 | 5 | 0 Sgsm1          | protein_coding         |
| ENSMUST00000119430  | 6 | 5 | 0 Samd8          | protein_coding         |
| ENSMUST00000119590  | 6 | 5 | 0 Gm2030         | protein_coding         |
| ENSMUST00000129774  | 6 | 5 | 0 Gk5            | protein_coding         |
| ENSMUST00000140396  | 6 | 5 | 0 Wdr5           | protein_coding         |
| ENSMUST00000144711  | 6 | 5 | 0 Wdr17          | protein_coding         |
| ENSMUST00000155038  | 6 | 5 | 0 Gfod2          | protein_coding         |
| ENSMUST00000159221  | 6 | 5 | 0 Grhl2          | protein_coding         |
| ENSMUST00000163499  | 6 | 5 | 0 Rbm26          | protein_coding         |
| ENSMUST00000165780  | 6 | 5 | 0 Clcn1          | protein_coding         |
| ENSMUST00000174143  | 6 | 5 | 0 Gm11128        | protein_coding         |
| ENSMUST00000035565  | 6 | 5 | 46 Pkd1          | protein_coding         |
| ENSMUST00000058440  | 6 | 5 | 36 Dnah10        | protein_coding         |
| ENSMUST00000142433  | 6 | 5 | 34 C920021L13Rik | protein_coding         |
| ENSMUST00000049395  | 6 | 5 | 32 Ttc29         | protein_coding         |
| ENSMUST00000146447  | 6 | 5 | 32 E130114P18Rik | protein_coding         |
| ENSMUST00000180598  | 6 | 5 | 26 Gm10516       | antisense              |
| ENSMUST00000162409  | 6 | 5 | 18 Fnbp1l        | protein_coding         |
| ENSMUST00000165519  | 6 | 5 | 16 Zc3h12c       | protein_coding         |
| ENSMUST00000151358  | 6 | 5 | 14 Pdk1          | protein_coding         |
| ENSMUST00000056900  | 6 | 5 | 12 Tanc1         | protein_coding         |
| ENSMUST00000162732  | 6 | 5 | 10 4930453N24Rik | protein_coding         |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUST00000142284 | 6 | 5 | 8 Arhgap18       | protein_coding         |
| ENSMUST00000030036 | 6 | 5 | 6 Brinp1         | protein_coding         |
| ENSMUST00000078687 | 6 | 5 | 4 Gid8           | protein_coding         |
| ENSMUST00000073687 | 6 | 5 | 2 Dlg5           | protein_coding         |
| ENSMUST00000121425 | 6 | 5 | 0 Gm12783        | unprocessed_pseudogene |
| ENSMUST00000168952 | 6 | 5 | 0 Gm8540         | unprocessed_pseudogene |
| ENSMUST00000039309 | 6 | 5 | 0 Sectm1b        | protein_coding         |
| ENSMUST00000055819 | 6 | 5 | 0 Tollip         | protein_coding         |
| ENSMUST00000092597 | 6 | 5 | 0 Sult3a1        | protein_coding         |
| ENSMUST00000112188 | 6 | 5 | 0 Tceanc         | protein_coding         |
| ENSMUST00000117172 | 6 | 5 | 0 Vwa3b          | protein_coding         |
| ENSMUST00000117268 | 6 | 5 | 0 Otud6b         | protein_coding         |
| ENSMUST00000129074 | 6 | 5 | 0 Tns3           | protein_coding         |
| ENSMUST00000143006 | 6 | 5 | 0 Chaf1b         | protein_coding         |
| ENSMUST00000163057 | 6 | 5 | 0 Il18rap        | protein_coding         |
| ENSMUST00000183682 | 6 | 5 | 0 Tfpi2          | protein_coding         |
| ENSMUST00000119319 | 6 | 5 | 0 Gm6987         | processed_pseudogene   |
| ENSMUST00000109207 | 6 | 4 | 14 Ube2v1        | protein_coding         |
| ENSMUST00000066052 | 6 | 4 | 10 3110082117Rik | protein_coding         |
| ENSMUST00000129762 | 6 | 4 | 8 Crybg3         | protein_coding         |
| ENSMUST00000112197 | 6 | 4 | 6 Kdm5b          | protein_coding         |
| ENSMUST00000125185 | 6 | 4 | 6 Gm13860        | lincRNA                |
| ENSMUST00000112248 | 6 | 4 | 4 Mospd2         | protein_coding         |
| ENSMUST00000149228 | 6 | 4 | 4 Zfp287         | protein_coding         |
| ENSMUST00000022148 | 6 | 4 | 2 Mccc2          | protein_coding         |
| ENSMUST00000079797 | 6 | 4 | 2 Gm10058        | protein_coding         |
| ENSMUST00000127371 | 6 | 4 | 2 Osbp2          | protein_coding         |
| ENSMUST00000180207 | 6 | 4 | 2 Gm10096        | protein_coding         |
| ENSMUST00000118537 | 6 | 4 | 0 Gm2003         | unprocessed_pseudogene |
| ENSMUST00000007296 | 6 | 4 | 0 Pole           | protein_coding         |
| ENSMUST00000057257 | 6 | 4 | 0 Jkamp          | protein_coding         |
| ENSMUST00000143737 | 6 | 4 | 0 Wdr75          | protein_coding         |
| ENSMUST00000144512 | 6 | 4 | 0 Al314180       | protein_coding         |
| ENSMUST00000148124 | 6 | 4 | 0 Btg3           | protein_coding         |
| ENSMUST00000148309 | 6 | 4 | 0 Gm14262        | lincRNA                |
| ENSMUST00000151344 | 6 | 4 | 0 Gm12763        | lincRNA                |
| ENSMUST00000070165 | 6 | 3 | 24 Nup98         | protein_coding         |
| ENSMUST00000159541 | 6 | 3 | 20 Shprh         | protein_coding         |
| ENSMUST00000000314 | 6 | 3 | 6 Cdh4           | protein_coding         |
| ENSMUST00000098580 | 6 | 3 | 6 Mttp           | protein_coding         |
| ENSMUST00000144326 | 6 | 3 | 6 Ranbp9         | protein_coding         |
| ENSMUST00000030280 | 6 | 3 | 2 Angptl3        | protein_coding         |
| ENSMUST00000037783 | 6 | 3 | 0 Ccdc174        | protein_coding         |
| ENSMUST00000041840 | 6 | 3 | 0 Spef2          | protein_coding         |
| ENSMUST00000069507 | 6 | 3 | 0 C4b            | protein_coding         |
| ENSMUST00000109136 | 6 | 3 | 0 Cass4          | protein_coding         |
| ENSMUST00000111729 | 6 | 3 | 0 Vps29          | protein_coding         |
| ENSMUST00000112024 | 6 | 3 | 0 Chn1           | protein_coding         |
| ENSMUST00000133105 | 6 | 3 | 0 Manea          | protein_coding         |
| ENSMUST00000161315 | 6 | 3 | 0 Zfp346         | protein_coding         |
| ENSMUST00000178789 | 6 | 3 | 0 Gm21887        | protein_coding         |
| ENSMUST00000132057 | 6 | 3 | 18 Gsk3b         | protein_coding         |
| ENSMUST00000097648 | 6 | 3 | 16 Ramp1         | protein_coding         |
| ENSMUST00000176557 | 6 | 3 | 16 Nptn          | protein_coding         |
| ENSMUST00000152616 | 6 | 3 | 12 Aff4          | protein_coding         |
| ENSMUST00000035569 | 6 | 3 | 10 Nbeal1        | protein_coding         |
| ENSMUST00000087409 | 6 | 3 | 8 Zbtb46         | protein_coding         |
| ENSMUST00000139113 | 6 | 3 | 8 Rpgrip1l       | protein_coding         |
| ENSMUST00000163210 | 6 | 3 | 8 Kif5b          | protein_coding         |
| ENSMUST00000056820 | 6 | 3 | 6 Cyth2          | protein_coding         |
| ENSMUST00000164479 | 6 | 3 | 6 Stard10        | protein_coding         |
| ENSMUST00000164660 | 6 | 3 | 6 Samd3          | protein_coding         |
| ENSMUST00000030030 | 6 | 3 | 0 Tex10          | protein_coding         |
| ENSMUST00000039535 | 6 | 3 | 0 Wdr38          | protein_coding         |
| ENSMUST00000114940 | 6 | 3 | 0 Zfp280c        | protein_coding         |
| ENSMUST00000131835 | 6 | 3 | 0 Srgap3         | protein_coding         |
| ENSMUST00000162812 | 6 | 3 | 0 Pitpnm2        | protein_coding         |
| ENSMUST00000117227 | 6 | 2 | 24 Fanci         | protein_coding         |

|                    |   |    |                  |                                  |
|--------------------|---|----|------------------|----------------------------------|
| ENSMUST00000183897 | 6 | 2  | 16 Kcnn2         | protein_coding                   |
| ENSMUST00000103197 | 6 | 2  | 8 Nol9           | protein_coding                   |
| ENSMUST00000144202 | 6 | 2  | 6 Gm13830        | processed_transcript             |
| ENSMUST00000130817 | 6 | 2  | 4 Ldhb           | protein_coding                   |
| ENSMUST00000139080 | 6 | 2  | 0 F13b           | processed_transcript             |
| ENSMUST00000139080 | 6 | 2  | 0 F13b           | processed_transcript             |
| ENSMUST00000177626 | 6 | 2  | 0 Gm20794        | unprocessed_pseudogene           |
| ENSMUST00000129288 | 6 | 2  | 0 G6pc2          | protein_coding                   |
| ENSMUST00000170511 | 6 | 2  | 0 BC035947       | protein_coding                   |
| ENSMUST00000177456 | 6 | 2  | 0 Ppp1r9a        | protein_coding                   |
| ENSMUST00000179330 | 6 | 2  | 0 Gm21170        | protein_coding                   |
| ENSMUST00000133648 | 6 | 2  | 0 Gm13977        | antisense                        |
| ENSMUST00000068233 | 6 | 1  | 42 Kcnmb4        | protein_coding                   |
| ENSMUST00000159704 | 6 | 1  | 26 2510003E04Rik | protein_coding                   |
| ENSMUST00000041175 | 6 | 1  | 14 Ptger3        | protein_coding                   |
| ENSMUST00000125763 | 6 | 1  | 2 Zfp407         | protein_coding                   |
| ENSMUST00000181729 | 6 | 1  | 2 A830052D11Rik  | lincRNA                          |
| ENSMUST00000182652 | 6 | 1  | 0 Gm5946         | transcribed_processed_pseudogene |
| ENSMUST00000030583 | 6 | 1  | 0 Ak2            | protein_coding                   |
| ENSMUST00000097547 | 6 | 1  | 0 BC003331       | protein_coding                   |
| ENSMUST00000122897 | 6 | 1  | 0 Slc4a5         | protein_coding                   |
| ENSMUST00000131690 | 6 | 1  | 0 Gm14616        | lincRNA                          |
| ENSMUST00000032500 | 6 | 1  | 14 Prmt8         | protein_coding                   |
| ENSMUST00000031359 | 6 | 1  | 10 Ppef2         | protein_coding                   |
| ENSMUST00000173107 | 6 | 1  | 8 Slit2          | protein_coding                   |
| ENSMUST00000127488 | 6 | 1  | 6 Gm11973        | antisense                        |
| ENSMUST00000173446 | 6 | 1  | 0 Zfp419         | unprocessed_pseudogene           |
| ENSMUST00000117513 | 6 | 1  | 0 Slc29a3        | protein_coding                   |
| ENSMUST00000161154 | 6 | 0  | 30 Wars          | protein_coding                   |
| ENSMUST00000125568 | 6 | 0  | 26 Pla2g1b       | protein_coding                   |
| ENSMUST00000149822 | 6 | 0  | 14 2810008D09Rik | lincRNA                          |
| ENSMUST00000166191 | 6 | 0  | 8 Syt12          | protein_coding                   |
| ENSMUST00000000901 | 6 | 0  | 2 Dlg3           | protein_coding                   |
| ENSMUST00000047300 | 6 | 0  | 0 Gm9774         | protein_coding                   |
| ENSMUST00000070607 | 6 | 0  | 0 Haus6          | protein_coding                   |
| ENSMUST00000095144 | 6 | 0  | 0 Pdp1           | protein_coding                   |
| ENSMUST00000120705 | 6 | 0  | 0 Tbc1d10b       | protein_coding                   |
| ENSMUST00000128029 | 6 | 0  | 0 Adrm1          | protein_coding                   |
| ENSMUST00000128162 | 6 | 0  | 0 Acot4          | protein_coding                   |
| ENSMUST00000140376 | 6 | 0  | 0 Dnajb6         | protein_coding                   |
| ENSMUST00000144153 | 6 | 0  | 0 Usp36          | protein_coding                   |
| ENSMUST00000144624 | 6 | 0  | 0 Dgkq           | protein_coding                   |
| ENSMUST00000148749 | 6 | 0  | 0 Slc23a2        | protein_coding                   |
| ENSMUST00000154293 | 6 | 0  | 0 Pdcd2          | protein_coding                   |
| ENSMUST00000162916 | 6 | 0  | 0 Hnrmpu         | protein_coding                   |
| ENSMUST00000169480 | 6 | 0  | 0 Satb1          | protein_coding                   |
| ENSMUST00000162334 | 5 | 29 | 0 4930524O07Rik  | antisense                        |
| ENSMUST00000040261 | 5 | 17 | 24 Macrod1       | protein_coding                   |
| ENSMUST00000178901 | 5 | 17 | 6 Zfp872         | protein_coding                   |
| ENSMUST00000025204 | 5 | 17 | 4 Pfdn1          | protein_coding                   |
| ENSMUST00000004646 | 5 | 15 | 14 Coro1c        | protein_coding                   |
| ENSMUST00000125150 | 5 | 15 | 4 Ophn1          | protein_coding                   |
| ENSMUST00000141428 | 5 | 15 | 4 8030451A03Rik  | processed_transcript             |
| ENSMUST00000041003 | 5 | 14 | 2 Tfb1m          | protein_coding                   |
| ENSMUST00000159644 | 5 | 14 | 61 Hsd11b1       | protein_coding                   |
| ENSMUST00000047425 | 5 | 14 | 56 Sntb2         | protein_coding                   |
| ENSMUST00000154064 | 5 | 14 | 6 Sec22a         | protein_coding                   |
| ENSMUST00000025000 | 5 | 14 | 4 St6gal2        | protein_coding                   |
| ENSMUST00000035027 | 5 | 14 | 4 Clstn2         | protein_coding                   |
| ENSMUST00000044581 | 5 | 13 | 20 1700025G04Rik | protein_coding                   |
| ENSMUST00000068829 | 5 | 13 | 4 Nox4           | protein_coding                   |
| ENSMUST00000146173 | 5 | 13 | 4 Dnajc22        | protein_coding                   |
| ENSMUST00000152247 | 5 | 13 | 0 Tnrc18         | protein_coding                   |
| ENSMUST00000163263 | 5 | 13 | 0 Gm2012         | protein_coding                   |
| ENSMUST00000162412 | 5 | 12 | 4 Pde8b          | protein_coding                   |
| ENSMUST00000130145 | 5 | 12 | 22 Smg6          | protein_coding                   |
| ENSMUST00000165870 | 5 | 12 | 12 Stk32c        | protein_coding                   |
| ENSMUST00000063509 | 5 | 12 | 0 2810007J24Rik  | protein_coding                   |

|                    |   |    |                  |                                    |
|--------------------|---|----|------------------|------------------------------------|
| ENSMUST00000140328 | 5 | 12 | 0 Mfn1           | protein_coding                     |
| ENSMUST00000037401 | 5 | 11 | 20 Phf20         | protein_coding                     |
| ENSMUST00000151853 | 5 | 11 | 2 Mmp27          | protein_coding                     |
| ENSMUST00000024884 | 5 | 11 | 0 Eif2ak2        | protein_coding                     |
| ENSMUST00000109626 | 5 | 11 | 0 Cylid          | protein_coding                     |
| ENSMUST00000172733 | 5 | 11 | 0 Pja2           | protein_coding                     |
| ENSMUST00000138289 | 5 | 10 | 12 Lrp8os2       | antisense                          |
| ENSMUST00000076846 | 5 | 10 | 10 Ii34          | protein_coding                     |
| ENSMUST00000091387 | 5 | 10 | 0 Polk           | protein_coding                     |
| ENSMUST00000151035 | 5 | 10 | 0 Itgb6          | protein_coding                     |
| ENSMUST00000015146 | 5 | 9  | 85 Efr3a         | protein_coding                     |
| ENSMUST00000135674 | 5 | 9  | 38 1700084C06Rik | antisense                          |
| ENSMUST00000102792 | 5 | 9  | 26 Inadl         | protein_coding                     |
| ENSMUST00000178164 | 5 | 9  | 26 Sap130        | protein_coding                     |
| ENSMUST00000006293 | 5 | 9  | 16 Crkl          | protein_coding                     |
| ENSMUST00000045905 | 5 | 9  | 8 Fermt2         | protein_coding                     |
| ENSMUST00000112622 | 5 | 9  | 8 Huwe1          | protein_coding                     |
| ENSMUST00000170695 | 5 | 9  | 6 Pcdh10         | protein_coding                     |
| ENSMUST00000036412 | 5 | 9  | 4 Zpld1          | protein_coding                     |
| ENSMUST00000140113 | 5 | 9  | 4 Gm13026        | lincRNA                            |
| ENSMUST00000115438 | 5 | 9  | 2 Cask           | protein_coding                     |
| ENSMUST00000118160 | 5 | 9  | 2 Rtkn2          | protein_coding                     |
| ENSMUST00000171587 | 5 | 9  | 2 Gbp11          | polymorphic_pseudogene             |
| ENSMUST00000022470 | 5 | 9  | 0 Parg           | protein_coding                     |
| ENSMUST00000047883 | 5 | 9  | 0 Tspan15        | protein_coding                     |
| ENSMUST00000062684 | 5 | 9  | 0 Tmem64         | protein_coding                     |
| ENSMUST00000113992 | 5 | 9  | 0 Dmd            | protein_coding                     |
| ENSMUST00000160941 | 5 | 9  | 0 Slc9b1         | protein_coding                     |
| ENSMUST00000117259 | 5 | 9  | 0 Prdx2-rs3      | processed_pseudogene               |
| ENSMUST00000065398 | 5 | 9  | 56 Nup214        | protein_coding                     |
| ENSMUST00000125007 | 5 | 9  | 42 Pxn           | protein_coding                     |
| ENSMUST00000146626 | 5 | 9  | 14 Ttl9          | protein_coding                     |
| ENSMUST00000021379 | 5 | 9  | 12 Gemin2        | protein_coding                     |
| ENSMUST00000040166 | 5 | 9  | 12 Susd1         | protein_coding                     |
| ENSMUST00000023526 | 5 | 9  | 4 Stxbp5l        | protein_coding                     |
| ENSMUST00000043813 | 5 | 9  | 4 Nudt15         | protein_coding                     |
| ENSMUST00000177542 | 5 | 9  | 2 Foxo3          | protein_coding                     |
| ENSMUST00000021659 | 5 | 9  | 0 Fam161b        | protein_coding                     |
| ENSMUST00000065297 | 5 | 9  | 0 Lonrf1         | protein_coding                     |
| ENSMUST00000160232 | 5 | 9  | 0 Xrcc4          | protein_coding                     |
| ENSMUST00000173910 | 5 | 9  | 0 Mterf3         | protein_coding                     |
| ENSMUST00000138831 | 5 | 8  | 44 Wasf2         | protein_coding                     |
| ENSMUST00000028781 | 5 | 8  | 32 Atrn          | protein_coding                     |
| ENSMUST00000020078 | 5 | 8  | 24 Lims1         | protein_coding                     |
| ENSMUST00000041874 | 5 | 8  | 22 Npl           | protein_coding                     |
| ENSMUST00000150450 | 5 | 8  | 22 Gm13883       | antisense                          |
| ENSMUST00000024727 | 5 | 8  | 10 Cdc5l         | protein_coding                     |
| ENSMUST00000090500 | 5 | 8  | 10 Srl           | protein_coding                     |
| ENSMUST00000159292 | 5 | 8  | 8 Osgep          | protein_coding                     |
| ENSMUST00000079758 | 5 | 8  | 6 Aplp2          | protein_coding                     |
| ENSMUST00000043138 | 5 | 8  | 4 Inpp5f         | protein_coding                     |
| ENSMUST00000108797 | 5 | 8  | 4 Dnajc5         | protein_coding                     |
| ENSMUST00000151475 | 5 | 8  | 4 Rsg1           | protein_coding                     |
| ENSMUST00000123483 | 5 | 8  | 4 Gm13387        | lincRNA                            |
| ENSMUST00000023128 | 5 | 8  | 2 Itga5          | protein_coding                     |
| ENSMUST00000115264 | 5 | 8  | 2 Dock11         | protein_coding                     |
| ENSMUST00000155348 | 5 | 8  | 2 Pi16           | protein_coding                     |
| ENSMUST00000026094 | 5 | 8  | 0 Hdgfrp3        | protein_coding                     |
| ENSMUST00000046651 | 5 | 8  | 0 Oard1          | protein_coding                     |
| ENSMUST00000151362 | 5 | 8  | 0 Gzf1           | protein_coding                     |
| ENSMUST00000172281 | 5 | 8  | 0 Gpaa1          | protein_coding                     |
| ENSMUST00000175871 | 5 | 8  | 0 Gm20658        | processed_transcript               |
| ENSMUST00000147177 | 5 | 8  | 0 Pard3bos3      | antisense                          |
| ENSMUST00000097590 | 5 | 7  | 161 Lars         | protein_coding                     |
| ENSMUST00000182313 | 5 | 7  | 34 2700099C18Rik | transcribed_unprocessed_pseudogene |
| ENSMUST00000182427 | 5 | 7  | 30 Anks1b        | protein_coding                     |
| ENSMUST00000125401 | 5 | 7  | 30 Has2os        | processed_transcript               |
| ENSMUST00000127401 | 5 | 7  | 16 Slc1a5        | protein_coding                     |



|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUST00000143031 | 5 | 7 | 14 Syne2         | protein_coding         |
| ENSMUST00000034487 | 5 | 7 | 10 Mmp20         | protein_coding         |
| ENSMUST00000042498 | 5 | 7 | 10 Hdlbp         | protein_coding         |
| ENSMUST00000087947 | 5 | 7 | 10 A430093F15Rik | protein_coding         |
| ENSMUST00000184991 | 5 | 7 | 10 1190002F15Rik | lincRNA                |
| ENSMUST00000089595 | 5 | 7 | 6 Dysf           | protein_coding         |
| ENSMUST00000136202 | 5 | 7 | 6 Fsip2          | protein_coding         |
| ENSMUST00000167664 | 5 | 7 | 6 Morc4          | protein_coding         |
| ENSMUST00000084219 | 5 | 7 | 4 Hnmpr          | protein_coding         |
| ENSMUST00000139021 | 5 | 7 | 4 Sestd1         | protein_coding         |
| ENSMUST00000099452 | 5 | 7 | 2 Ctxn2          | protein_coding         |
| ENSMUST00000000925 | 5 | 7 | 0 Smarcb1        | protein_coding         |
| ENSMUST00000078527 | 5 | 7 | 0 Rxfp1          | protein_coding         |
| ENSMUST00000100790 | 5 | 7 | 0 Nadk2          | protein_coding         |
| ENSMUST00000108303 | 5 | 7 | 0 Cdh17          | protein_coding         |
| ENSMUST00000124618 | 5 | 7 | 0 Zbbx           | protein_coding         |
| ENSMUST00000134668 | 5 | 7 | 0 Rbm18          | protein_coding         |
| ENSMUST00000154445 | 5 | 7 | 0 Lca5l          | protein_coding         |
| ENSMUST00000159936 | 5 | 7 | 0 Luc7l2         | protein_coding         |
| ENSMUST00000160484 | 5 | 7 | 0 Agl            | protein_coding         |
| ENSMUST00000160368 | 5 | 7 | 0 Gm16337        | lincRNA                |
| ENSMUST00000072206 | 5 | 7 | 26 Poc1a         | protein_coding         |
| ENSMUST00000072847 | 5 | 7 | 26 Rnf138        | protein_coding         |
| ENSMUST00000088027 | 5 | 7 | 26 Anks1         | protein_coding         |
| ENSMUST00000094853 | 5 | 7 | 24 Rnf220        | protein_coding         |
| ENSMUST00000124628 | 5 | 7 | 22 Ccdc163       | protein_coding         |
| ENSMUST00000005889 | 5 | 7 | 12 Vav1          | protein_coding         |
| ENSMUST00000121226 | 5 | 7 | 12 Abca17        | protein_coding         |
| ENSMUST00000123880 | 5 | 7 | 8 Nphs1          | protein_coding         |
| ENSMUST00000141655 | 5 | 7 | 8 Sgms1          | protein_coding         |
| ENSMUST00000167571 | 5 | 7 | 8 Gspt1          | protein_coding         |
| ENSMUST00000181200 | 5 | 7 | 6 Gm26815        | lincRNA                |
| ENSMUST00000059270 | 5 | 7 | 4 Heatr1         | protein_coding         |
| ENSMUST00000086835 | 5 | 7 | 4 Kdm4b          | protein_coding         |
| ENSMUST00000124688 | 5 | 7 | 4 Csnk1g1        | protein_coding         |
| ENSMUST00000179059 | 5 | 7 | 4 Prom1          | protein_coding         |
| ENSMUST00000020045 | 5 | 7 | 2 Ros1           | protein_coding         |
| ENSMUST00000051396 | 5 | 7 | 2 Soat1          | protein_coding         |
| ENSMUST00000120695 | 5 | 7 | 0 Defa-ps13      | unprocessed_pseudogene |
| ENSMUST00000045931 | 5 | 7 | 0 Zfp410         | protein_coding         |
| ENSMUST00000051809 | 5 | 7 | 0 Myct1          | protein_coding         |
| ENSMUST00000060522 | 5 | 7 | 0 Oc90           | protein_coding         |
| ENSMUST00000066617 | 5 | 7 | 0 Zkscan1        | protein_coding         |
| ENSMUST00000074040 | 5 | 7 | 0 Cxcl17         | protein_coding         |
| ENSMUST00000086674 | 5 | 7 | 0 Ankle2         | protein_coding         |
| ENSMUST00000110325 | 5 | 7 | 0 Tmem87b        | protein_coding         |
| ENSMUST00000114340 | 5 | 7 | 0 Add1           | protein_coding         |
| ENSMUST00000118828 | 5 | 7 | 0 Rab11fip3      | protein_coding         |
| ENSMUST00000138093 | 5 | 7 | 0 Map2k4         | protein_coding         |
| ENSMUST00000155977 | 5 | 7 | 0 Dhtkd1         | protein_coding         |
| ENSMUST00000161808 | 5 | 7 | 0 Adss           | protein_coding         |
| ENSMUST00000167891 | 5 | 7 | 0 Esrrb          | protein_coding         |
| ENSMUST00000175724 | 5 | 7 | 0 Vmn2r4         | protein_coding         |
| ENSMUST00000141536 | 5 | 6 | 139 Gpd2         | protein_coding         |
| ENSMUST00000126335 | 5 | 6 | 57 Aff1          | protein_coding         |
| ENSMUST00000149399 | 5 | 6 | 32 Tex15         | protein_coding         |
| ENSMUST00000177939 | 5 | 6 | 32 Fkbp5         | protein_coding         |
| ENSMUST00000164243 | 5 | 6 | 30 Srp54b        | protein_coding         |
| ENSMUST00000069747 | 5 | 6 | 26 Emc7          | protein_coding         |
| ENSMUST00000080204 | 5 | 6 | 24 Sp140         | protein_coding         |
| ENSMUST00000024972 | 5 | 6 | 22 Meiob         | protein_coding         |
| ENSMUST00000107703 | 5 | 6 | 20 Tmeff1        | protein_coding         |
| ENSMUST00000107703 | 5 | 6 | 20 Tmeff1        | protein_coding         |
| ENSMUST00000036315 | 5 | 6 | 20 Gria1         | protein_coding         |
| ENSMUST00000143692 | 5 | 6 | 16 Prkcb         | protein_coding         |
| ENSMUST00000054908 | 5 | 6 | 12 Sugt1         | protein_coding         |
| ENSMUST00000070989 | 5 | 6 | 12 Clasp1        | protein_coding         |
| ENSMUST00000162222 | 5 | 6 | 10 Tcerg1l       | protein_coding         |

|                     |   |   |                  |                        |
|---------------------|---|---|------------------|------------------------|
| ENSMUST00000020420  | 5 | 6 | 8 Ap3d1          | protein_coding         |
| ENSMUST00000155998  | 5 | 6 | 8 Ankfy1         | protein_coding         |
| ENSMUST00000166318  | 5 | 6 | 8 Mpp6           | protein_coding         |
| ENSMUST00000068507  | 5 | 6 | 8 A630012P03Rik  | antisense              |
| ENSMUST00000003509  | 5 | 6 | 6 St8sia6        | protein_coding         |
| ENSMUST00000032413  | 5 | 6 | 6 Etnk1          | protein_coding         |
| ENSMUST00000047095  | 5 | 6 | 6 Mbl1           | protein_coding         |
| ENSMUST00000011450  | 5 | 6 | 4 Sugp1          | protein_coding         |
| ENSMUST00000019978  | 5 | 6 | 4 Slc22a16       | protein_coding         |
| ENSMUST00000155844  | 5 | 6 | 4 Mtx2           | protein_coding         |
| ENSMUST00000036615  | 5 | 6 | 2 Ptplad1        | protein_coding         |
| ENSMUST00000100420  | 5 | 6 | 2 Loxl2          | protein_coding         |
| ENSMUST00000177082  | 5 | 6 | 2 Gm20617        | lincRNA                |
| ENSMUST00000041676  | 5 | 6 | 0 Hrh4           | protein_coding         |
| ENSMUST00000068397  | 5 | 6 | 0 Gm9961         | protein_coding         |
| ENSMUST00000071419  | 5 | 6 | 0 Mroh5          | protein_coding         |
| ENSMUST00000095932  | 5 | 6 | 0 Ccnb1ip1       | protein_coding         |
| ENSMUST00000100688  | 5 | 6 | 0 4930503E14Rik  | protein_coding         |
| ENSMUST00000111429  | 5 | 6 | 0 Pou2f1         | protein_coding         |
| ENSMUST00000113509  | 5 | 6 | 0 Nup210         | protein_coding         |
| ENSMUST00000137913  | 5 | 6 | 0 Pnpla7         | protein_coding         |
| ENSMUST00000155861  | 5 | 6 | 0 Whsc111        | protein_coding         |
| ENSMUST00000173073  | 5 | 6 | 0 Kmt2c          | protein_coding         |
| ENSMUST00000182286  | 5 | 6 | 0 Dleu2          | processed_transcript   |
| ENSMUST00000141571  | 5 | 6 | 0 Gm11861        | lincRNA                |
| ENSMUST00000150705  | 5 | 6 | 0 Gm13703        | antisense              |
| ENSMUST00000103064  | 5 | 5 | 38 Pitpnc1       | protein_coding         |
| ENSMUST00000006851  | 5 | 5 | 22 Qrich1        | protein_coding         |
| ENSMUST00000180443  | 5 | 5 | 22 Gm26542       | lincRNA                |
| ENSMUST00000111222  | 5 | 5 | 12 Ldlrad3       | protein_coding         |
| ENSMUST00000052342  | 5 | 5 | 10 D930015E06Rik | protein_coding         |
| ENSMUST00000045289  | 5 | 5 | 8 Pnpla3         | protein_coding         |
| ENSMUST00000086040  | 5 | 5 | 8 F5             | protein_coding         |
| ENSMUST00000125223  | 5 | 5 | 8 Cfap61         | protein_coding         |
| ENSMUST00000006205  | 5 | 5 | 6 Ankhd1         | protein_coding         |
| ENSMUST00000110819  | 5 | 5 | 6 Hdac9          | protein_coding         |
| ENSMUST00000107210  | 5 | 5 | 4 Sytl2          | protein_coding         |
| ENSMUST00000110696  | 5 | 5 | 4 Kat6a          | protein_coding         |
| ENSMUST00000181405  | 5 | 5 | 4 4930509E16Rik  | lincRNA                |
| ENSMUST00000035850  | 5 | 5 | 2 Npat           | protein_coding         |
| ENSMUST00000089883  | 5 | 5 | 2 Masp1          | protein_coding         |
| ENSMUST00000168438  | 5 | 5 | 2 Pde4dip        | protein_coding         |
| ENSMUST00000178170  | 5 | 5 | 0 Gm3657         | unprocessed_pseudogene |
| ENSMUST00000021339  | 5 | 5 | 0 Dtd2           | protein_coding         |
| ENSMUST000000027947 | 5 | 5 | 0 Angel2         | protein_coding         |
| ENSMUST00000028577  | 5 | 5 | 0 4930430A15Rik  | protein_coding         |
| ENSMUST00000033935  | 5 | 5 | 0 Smim19         | protein_coding         |
| ENSMUST00000094787  | 5 | 5 | 0 Slc34a2        | protein_coding         |
| ENSMUST00000094868  | 5 | 5 | 0 Zfyve28        | protein_coding         |
| ENSMUST00000099073  | 5 | 5 | 0 Fam65c         | protein_coding         |
| ENSMUST00000118539  | 5 | 5 | 0 Cth            | protein_coding         |
| ENSMUST00000170322  | 5 | 5 | 0 Vmn2r113       | protein_coding         |
| ENSMUST00000152637  | 5 | 5 | 59 Trim37        | protein_coding         |
| ENSMUST00000160405  | 5 | 5 | 36 Usp7          | protein_coding         |
| ENSMUST00000106344  | 5 | 5 | 28 Tnrc6c        | protein_coding         |
| ENSMUST00000015509  | 5 | 5 | 22 Mov10l1       | protein_coding         |
| ENSMUST00000106860  | 5 | 5 | 22 Trim33        | protein_coding         |
| ENSMUST00000032476  | 5 | 5 | 20 Slc2a3        | protein_coding         |
| ENSMUST00000039987  | 5 | 5 | 20 Tox           | protein_coding         |
| ENSMUST00000044324  | 5 | 5 | 20 Ankrd33b      | protein_coding         |
| ENSMUST00000026888  | 5 | 5 | 18 Taf3          | protein_coding         |
| ENSMUST00000154149  | 5 | 5 | 18 Dennd2a       | protein_coding         |
| ENSMUST00000049703  | 5 | 5 | 16 4930503B20Rik | protein_coding         |
| ENSMUST00000058159  | 5 | 5 | 14 Cnrip1        | protein_coding         |
| ENSMUST00000131691  | 5 | 5 | 14 Cmah          | protein_coding         |
| ENSMUST00000002044  | 5 | 5 | 12 Map3k3        | protein_coding         |
| ENSMUST00000027896  | 5 | 5 | 8 Nphs2          | protein_coding         |
| ENSMUST00000021362  | 5 | 5 | 6 Klhdc2         | protein_coding         |

|                    |   |   |                 |                        |
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| ENSMUST00000047025 | 5 | 5 | 6 Otoa          | protein_coding         |
| ENSMUST00000022104 | 5 | 5 | 4 Tert          | protein_coding         |
| ENSMUST00000047404 | 5 | 5 | 2 Dync1li1      | protein_coding         |
| ENSMUST00000120268 | 5 | 5 | 2 Gm1993        | protein_coding         |
| ENSMUST00000148797 | 5 | 5 | 2 Rhbdl2        | protein_coding         |
| ENSMUST00000178757 | 5 | 5 | 2 Gm9994        | protein_coding         |
| ENSMUST00000025224 | 5 | 5 | 0 Gfra3         | protein_coding         |
| ENSMUST00000056113 | 5 | 5 | 0 Acer1         | protein_coding         |
| ENSMUST00000062372 | 5 | 5 | 0 Reln          | protein_coding         |
| ENSMUST00000082306 | 5 | 5 | 0 4930522H14Rik | protein_coding         |
| ENSMUST00000108055 | 5 | 5 | 0 Kif24         | protein_coding         |
| ENSMUST00000110376 | 5 | 5 | 0 Cfap97        | protein_coding         |
| ENSMUST00000137054 | 5 | 5 | 0 Ints8         | protein_coding         |
| ENSMUST00000155278 | 5 | 5 | 0 Cpeb4         | protein_coding         |
| ENSMUST00000161728 | 5 | 5 | 0 Prrt2         | protein_coding         |
| ENSMUST00000129780 | 5 | 5 | 0 C130046K22Rik | processed_transcript   |
| ENSMUST00000120224 | 5 | 5 | 0 Gm15193       | processed_pseudogene   |
| ENSMUST00000179074 | 5 | 4 | 34 Slc30a6      | protein_coding         |
| ENSMUST00000124063 | 5 | 4 | 22 Pml          | protein_coding         |
| ENSMUST00000100299 | 5 | 4 | 18 Dock9        | protein_coding         |
| ENSMUST00000167899 | 5 | 4 | 18 Gm17484      | protein_coding         |
| ENSMUST00000105970 | 5 | 4 | 14 Epb4.1       | protein_coding         |
| ENSMUST00000128081 | 5 | 4 | 14 Fto          | protein_coding         |
| ENSMUST00000167499 | 5 | 4 | 12 Arhgap8      | protein_coding         |
| ENSMUST00000030360 | 5 | 4 | 10 Lrrc42       | protein_coding         |
| ENSMUST00000055102 | 5 | 4 | 8 Timd2         | protein_coding         |
| ENSMUST00000122174 | 5 | 4 | 6 Qrfpr         | protein_coding         |
| ENSMUST00000122174 | 5 | 4 | 6 Qrfpr         | protein_coding         |
| ENSMUST00000181500 | 5 | 4 | 4 Gm2716        | lincRNA                |
| ENSMUST00000120964 | 5 | 4 | 2 Gm7350        | unprocessed_pseudogene |
| ENSMUST00000178887 | 5 | 4 | 2 Gm2092        | unprocessed_pseudogene |
| ENSMUST00000179938 | 5 | 4 | 2 Gm2759        | unprocessed_pseudogene |
| ENSMUST00000089165 | 5 | 4 | 2 Gm5168        | protein_coding         |
| ENSMUST00000113956 | 5 | 4 | 2 Runx1         | protein_coding         |
| ENSMUST00000178745 | 5 | 4 | 2 Gm10230       | protein_coding         |
| ENSMUST00000179874 | 5 | 4 | 2 Gm4836        | protein_coding         |
| ENSMUST00000180344 | 5 | 4 | 2 Gm10487       | protein_coding         |
| ENSMUST00000005073 | 5 | 4 | 0 Zp3           | protein_coding         |
| ENSMUST00000016631 | 5 | 4 | 0 Ppfbp1        | protein_coding         |
| ENSMUST00000031211 | 5 | 4 | 0 Smr3a         | protein_coding         |
| ENSMUST00000066432 | 5 | 4 | 0 Scn3a         | protein_coding         |
| ENSMUST00000081893 | 5 | 4 | 0 Syn1          | protein_coding         |
| ENSMUST00000090632 | 5 | 4 | 0 Phf14         | protein_coding         |
| ENSMUST00000106240 | 5 | 4 | 0 Itgam         | protein_coding         |
| ENSMUST00000113768 | 5 | 4 | 0 Mx1           | protein_coding         |
| ENSMUST00000143135 | 5 | 4 | 0 Gm15592       | antisense              |
| ENSMUST00000105964 | 5 | 3 | 59 Gmeb1        | protein_coding         |
| ENSMUST00000108400 | 5 | 3 | 57 Efcab5       | protein_coding         |
| ENSMUST00000025835 | 5 | 3 | 52 Cpt1a        | protein_coding         |
| ENSMUST00000030461 | 5 | 3 | 36 lpp          | protein_coding         |
| ENSMUST00000152231 | 5 | 3 | 36 Ccdc101      | protein_coding         |
| ENSMUST00000023580 | 5 | 3 | 30 Usp25        | protein_coding         |
| ENSMUST00000024944 | 5 | 3 | 30 Slc3a1       | protein_coding         |
| ENSMUST00000034984 | 5 | 3 | 26 Rasa2        | protein_coding         |
| ENSMUST00000027629 | 5 | 3 | 18 Tfcp2l1      | protein_coding         |
| ENSMUST00000103221 | 5 | 3 | 14 Mtor         | protein_coding         |
| ENSMUST00000081688 | 5 | 3 | 12 Srgap1       | protein_coding         |
| ENSMUST00000018333 | 5 | 3 | 10 Uchl5        | protein_coding         |
| ENSMUST00000106080 | 5 | 3 | 8 Phc2          | protein_coding         |
| ENSMUST00000034469 | 5 | 3 | 6 EglN1         | protein_coding         |
| ENSMUST00000161250 | 5 | 3 | 6 Tmbim6        | protein_coding         |
| ENSMUST00000169845 | 5 | 3 | 6 Sptlc2        | protein_coding         |
| ENSMUST00000173036 | 5 | 3 | 4 Gm7648        | unprocessed_pseudogene |
| ENSMUST00000074468 | 5 | 3 | 4 Snap91        | protein_coding         |
| ENSMUST00000049948 | 5 | 3 | 2 Asrgl1        | protein_coding         |
| ENSMUST00000110128 | 5 | 3 | 2 Dtnbp1        | protein_coding         |
| ENSMUST00000160753 | 5 | 3 | 2 Mgst2         | protein_coding         |
| ENSMUST00000164614 | 5 | 3 | 2 A4galt        | protein_coding         |

|                    |   |   |     |               |                        |
|--------------------|---|---|-----|---------------|------------------------|
| ENSMUST00000075496 | 5 | 3 | 0   | C1ca6         | protein_coding         |
| ENSMUST00000075845 | 5 | 3 | 0   | Arhgap35      | protein_coding         |
| ENSMUST00000086599 | 5 | 3 | 0   | Dao           | protein_coding         |
| ENSMUST00000111861 | 5 | 3 | 0   | Pdcd6ip       | protein_coding         |
| ENSMUST00000113069 | 5 | 3 | 0   | Slc25a53      | protein_coding         |
| ENSMUST00000123061 | 5 | 3 | 0   | Manba         | protein_coding         |
| ENSMUST00000138465 | 5 | 3 | 0   | P4ha3         | protein_coding         |
| ENSMUST00000144862 | 5 | 3 | 0   | Scmh1         | protein_coding         |
| ENSMUST00000162008 | 5 | 3 | 0   | Pdss2         | protein_coding         |
| ENSMUST00000136319 | 5 | 3 | 18  | Usp50         | protein_coding         |
| ENSMUST00000112122 | 5 | 3 | 16  | Hat1          | protein_coding         |
| ENSMUST00000029754 | 5 | 3 | 14  | Hormad1       | protein_coding         |
| ENSMUST00000110874 | 5 | 3 | 14  | Eif2ak4       | protein_coding         |
| ENSMUST00000123256 | 5 | 3 | 10  | Mmab          | protein_coding         |
| ENSMUST00000125733 | 5 | 3 | 10  | Ism2          | protein_coding         |
| ENSMUST00000111613 | 5 | 3 | 8   | P2rx3         | protein_coding         |
| ENSMUST00000028250 | 5 | 3 | 6   | Mrrf          | protein_coding         |
| ENSMUST00000102760 | 5 | 3 | 6   | Cacnb4        | protein_coding         |
| ENSMUST00000120270 | 5 | 3 | 4   | Phka1         | protein_coding         |
| ENSMUST00000134018 | 5 | 3 | 4   | Parp11        | protein_coding         |
| ENSMUST00000163275 | 5 | 3 | 4   | Otoa          | protein_coding         |
| ENSMUST00000114781 | 5 | 3 | 2   | Stxbp5l       | protein_coding         |
| ENSMUST00000117192 | 5 | 3 | 2   | Klhl22        | protein_coding         |
| ENSMUST00000142684 | 5 | 3 | 2   | Rgs3          | protein_coding         |
| ENSMUST00000140569 | 5 | 3 | 2   | Gm16267       | lincRNA                |
| ENSMUST00000180058 | 5 | 3 | 0   | Gm21729       | unprocessed_pseudogene |
| ENSMUST00000180177 | 5 | 3 | 0   | Gm20901       | unprocessed_pseudogene |
| ENSMUST00000101055 | 5 | 3 | 0   | Ccnk          | protein_coding         |
| ENSMUST00000128208 | 5 | 3 | 0   | Pla2r1        | protein_coding         |
| ENSMUST00000156396 | 5 | 3 | 0   | Adamts17      | protein_coding         |
| ENSMUST00000168944 | 5 | 3 | 0   | Pde1c         | protein_coding         |
| ENSMUST00000160351 | 5 | 3 | 0   | Gm16243       | antisense              |
| ENSMUST00000045091 | 5 | 2 | 32  | Kirrel3       | protein_coding         |
| ENSMUST00000018311 | 5 | 2 | 14  | Stard3        | protein_coding         |
| ENSMUST00000174362 | 5 | 2 | 10  | Olfir301      | protein_coding         |
| ENSMUST00000121963 | 5 | 2 | 6   | Col6a4        | protein_coding         |
| ENSMUST00000164251 | 5 | 2 | 6   | Hagh          | protein_coding         |
| ENSMUST00000073156 | 5 | 2 | 4   | BEGAIN        | protein_coding         |
| ENSMUST00000149428 | 5 | 2 | 4   | C330019F10Rik | lincRNA                |
| ENSMUST00000022601 | 5 | 2 | 2   | Wbp4          | protein_coding         |
| ENSMUST00000166278 | 5 | 2 | 2   | Gpr160        | protein_coding         |
| ENSMUST00000176106 | 5 | 2 | 2   | Serpina11     | processed_transcript   |
| ENSMUST00000034632 | 5 | 2 | 0   | Tmem218       | protein_coding         |
| ENSMUST00000106478 | 5 | 2 | 0   | Tmem69        | protein_coding         |
| ENSMUST00000137812 | 5 | 2 | 0   | Msrb2         | protein_coding         |
| ENSMUST00000173195 | 5 | 2 | 0   | D7Ert443e     | protein_coding         |
| ENSMUST00000124137 | 5 | 1 | 16  | Fam122c       | protein_coding         |
| ENSMUST00000128389 | 5 | 1 | 16  | Mfng          | protein_coding         |
| ENSMUST00000176171 | 5 | 1 | 12  | Gm7120        | protein_coding         |
| ENSMUST00000129169 | 5 | 1 | 8   | Spata3        | protein_coding         |
| ENSMUST00000177754 | 5 | 1 | 4   | Dnmt1         | protein_coding         |
| ENSMUST00000038913 | 5 | 1 | 0   | Cnot3         | protein_coding         |
| ENSMUST00000160304 | 5 | 1 | 0   | Tbce          | protein_coding         |
| ENSMUST00000032196 | 5 | 1 | 412 | Arl8b         | protein_coding         |
| ENSMUST00000096441 | 5 | 1 | 12  | Morc2a        | protein_coding         |
| ENSMUST00000179308 | 5 | 1 | 12  | Edaradd       | protein_coding         |
| ENSMUST00000139234 | 5 | 1 | 8   | Lin54         | protein_coding         |
| ENSMUST00000164259 | 5 | 1 | 8   | Os9           | protein_coding         |
| ENSMUST00000121677 | 5 | 1 | 6   | Ube2q2        | protein_coding         |
| ENSMUST00000170269 | 5 | 1 | 6   | Nab1          | protein_coding         |
| ENSMUST00000125033 | 5 | 1 | 0   | Dusp19        | protein_coding         |
| ENSMUST00000155094 | 5 | 1 | 0   | Sp100         | protein_coding         |
| ENSMUST00000160860 | 5 | 1 | 0   | Klhl3         | protein_coding         |
| ENSMUST00000172748 | 5 | 1 | 0   | L3mbtl2       | protein_coding         |
| ENSMUST00000153851 | 5 | 0 | 32  | Ddx3x         | protein_coding         |
| ENSMUST00000064763 | 5 | 0 | 16  | Zfp608        | protein_coding         |
| ENSMUST00000152358 | 5 | 0 | 10  | Cask          | protein_coding         |
| ENSMUST00000028021 | 5 | 0 | 8   | Pigc          | protein_coding         |

|                    |   |    |                 |                                    |
|--------------------|---|----|-----------------|------------------------------------|
| ENSMUST00000096243 | 5 | 0  | 6 B3gat3        | protein_coding                     |
| ENSMUST00000041391 | 5 | 0  | 2 Psd           | protein_coding                     |
| ENSMUST00000042647 | 5 | 0  | 2 Plekhg6       | protein_coding                     |
| ENSMUST00000023750 | 5 | 0  | 0 Faim2         | protein_coding                     |
| ENSMUST00000030154 | 5 | 0  | 0 Nudt2         | protein_coding                     |
| ENSMUST00000031749 | 5 | 0  | 0 Nobox         | protein_coding                     |
| ENSMUST00000032469 | 5 | 0  | 0 Mbd4          | protein_coding                     |
| ENSMUST00000103060 | 5 | 0  | 0 Wipi1         | protein_coding                     |
| ENSMUST00000106483 | 5 | 0  | 0 Polr3e        | protein_coding                     |
| ENSMUST00000108952 | 5 | 0  | 0 Gm14420       | protein_coding                     |
| ENSMUST00000132726 | 5 | 0  | 0 Mepce         | protein_coding                     |
| ENSMUST00000135422 | 5 | 0  | 0 Dvl2          | protein_coding                     |
| ENSMUST00000145788 | 5 | 0  | 0 Adck2         | protein_coding                     |
| ENSMUST00000151156 | 5 | 0  | 0 Coro7         | protein_coding                     |
| ENSMUST00000153907 | 5 | 0  | 0 Phka2         | protein_coding                     |
| ENSMUST00000161286 | 5 | 0  | 0 Tra2b         | protein_coding                     |
| ENSMUST00000171912 | 5 | 0  | 0 U2af114       | protein_coding                     |
| ENSMUST00000172908 | 5 | 0  | 0 Naa25         | protein_coding                     |
| ENSMUST00000172913 | 5 | 0  | 0 Dnmt3a        | protein_coding                     |
| ENSMUST00000174555 | 5 | 0  | 0 Ppp2r1b       | protein_coding                     |
| ENSMUST00000176286 | 5 | 0  | 0 Dbndd1        | protein_coding                     |
| ENSMUST00000178075 | 5 | 0  | 0 Usp19         | protein_coding                     |
| ENSMUST00000110002 | 4 | 20 | 2 Zfp882        | protein_coding                     |
| ENSMUST00000020958 | 4 | 18 | 18 Khlh29       | protein_coding                     |
| ENSMUST00000177709 | 4 | 16 | 59 Gsdmcl2      | transcribed_unprocessed_pseudogene |
| ENSMUST00000038091 | 4 | 15 | 28 Sde2         | protein_coding                     |
| ENSMUST00000114361 | 4 | 14 | 0 Kifc1         | protein_coding                     |
| ENSMUST00000161077 | 4 | 14 | 24 Zfp346       | protein_coding                     |
| ENSMUST00000125355 | 4 | 14 | 4 Gm14372       | antisense                          |
| ENSMUST00000108441 | 4 | 12 | 0 Nlrp5         | protein_coding                     |
| ENSMUST00000107478 | 4 | 12 | 30 Adamts17     | protein_coding                     |
| ENSMUST00000026917 | 4 | 12 | 24 Nrp1         | protein_coding                     |
| ENSMUST00000143107 | 4 | 12 | 18 Rpl27a       | protein_coding                     |
| ENSMUST00000131890 | 4 | 12 | 0 Itpr2         | protein_coding                     |
| ENSMUST00000134615 | 4 | 12 | 0 4930566F21Rik | processed_transcript               |
| ENSMUST00000029353 | 4 | 11 | 155 Kpna4       | protein_coding                     |
| ENSMUST00000020886 | 4 | 11 | 26 Nampt        | protein_coding                     |
| ENSMUST00000178076 | 4 | 11 | 22 Unc79        | protein_coding                     |
| ENSMUST00000182666 | 4 | 11 | 14 Sh3d19       | protein_coding                     |
| ENSMUST00000137601 | 4 | 11 | 10 Myo10        | protein_coding                     |
| ENSMUST00000001002 | 4 | 11 | 6 Heatr6        | protein_coding                     |
| ENSMUST00000117171 | 4 | 11 | 0 Wnt5b         | protein_coding                     |
| ENSMUST00000127485 | 4 | 11 | 0 Vopp1         | protein_coding                     |
| ENSMUST00000031388 | 4 | 10 | 6 Vps33a        | protein_coding                     |
| ENSMUST00000119173 | 4 | 10 | 2 Slc12a8       | protein_coding                     |
| ENSMUST00000098549 | 4 | 10 | 0 Al747448      | protein_coding                     |
| ENSMUST00000108086 | 4 | 10 | 0 Hspa4l        | protein_coding                     |
| ENSMUST00000113995 | 4 | 10 | 0 Rpe           | protein_coding                     |
| ENSMUST00000050171 | 4 | 9  | 20 Nek4         | protein_coding                     |
| ENSMUST00000112701 | 4 | 9  | 8 Cdh7          | protein_coding                     |
| ENSMUST00000070653 | 4 | 9  | 4 Slc16a3       | protein_coding                     |
| ENSMUST00000075117 | 4 | 9  | 2 Zxdc          | protein_coding                     |
| ENSMUST00000161781 | 4 | 9  | 2 Tbxas1        | protein_coding                     |
| ENSMUST00000123709 | 4 | 9  | 0 Dmxl2         | protein_coding                     |
| ENSMUST00000178474 | 4 | 9  | 0 Actr3         | protein_coding                     |
| ENSMUST00000171691 | 4 | 9  | 46 Mdga1        | protein_coding                     |
| ENSMUST00000127323 | 4 | 9  | 28 Chn2         | protein_coding                     |
| ENSMUST00000128727 | 4 | 9  | 22 Actr3b       | protein_coding                     |
| ENSMUST00000039662 | 4 | 9  | 16 Tln2         | protein_coding                     |
| ENSMUST00000155068 | 4 | 9  | 12 Zcchc11      | protein_coding                     |
| ENSMUST00000124231 | 4 | 9  | 10 Sptbn1       | protein_coding                     |
| ENSMUST00000060574 | 4 | 9  | 4 BC048546      | protein_coding                     |
| ENSMUST00000138670 | 4 | 9  | 4 Gm15083       | lincRNA                            |
| ENSMUST00000160639 | 4 | 9  | 2 Slc14a1       | protein_coding                     |
| ENSMUST00000030122 | 4 | 9  | 0 Spink4        | protein_coding                     |
| ENSMUST00000040260 | 4 | 9  | 0 Frs1          | protein_coding                     |
| ENSMUST00000046765 | 4 | 9  | 0 Kcnk1         | protein_coding                     |
| ENSMUST00000101410 | 4 | 9  | 0 Gm7173        | protein_coding                     |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUST00000113312 | 4 | 9 | 0 Shq1           | protein_coding         |
| ENSMUST00000075190 | 4 | 8 | 40 Cdh11         | protein_coding         |
| ENSMUST00000097672 | 4 | 8 | 32 Fbxo36        | protein_coding         |
| ENSMUST00000111704 | 4 | 8 | 20 Rassf8        | protein_coding         |
| ENSMUST00000147487 | 4 | 8 | 20 B130055M24Rik | processed_transcript   |
| ENSMUST00000107526 | 4 | 8 | 14 Inip          | protein_coding         |
| ENSMUST00000062315 | 4 | 8 | 8 Tlr6           | protein_coding         |
| ENSMUST00000085585 | 4 | 8 | 8 Lsm14a         | protein_coding         |
| ENSMUST00000071233 | 4 | 8 | 6 Zfp516         | protein_coding         |
| ENSMUST00000027251 | 4 | 8 | 4 Rev1           | protein_coding         |
| ENSMUST00000030696 | 4 | 8 | 2 Fam76a         | protein_coding         |
| ENSMUST00000040461 | 4 | 8 | 2 Mfsd7c         | protein_coding         |
| ENSMUST00000078856 | 4 | 8 | 2 Kl             | protein_coding         |
| ENSMUST00000146664 | 4 | 8 | 2 Slc5a12        | protein_coding         |
| ENSMUST00000019917 | 4 | 8 | 0 Rwd1           | protein_coding         |
| ENSMUST00000027494 | 4 | 8 | 0 Ppp1r7         | protein_coding         |
| ENSMUST00000102872 | 4 | 7 | 24 Rapgef1       | protein_coding         |
| ENSMUST00000077451 | 4 | 7 | 22 Rhot1         | protein_coding         |
| ENSMUST00000084650 | 4 | 7 | 14 Gpr139        | protein_coding         |
| ENSMUST00000137053 | 4 | 7 | 8 Aim1l          | protein_coding         |
| ENSMUST00000163765 | 4 | 7 | 8 Nup155         | protein_coding         |
| ENSMUST00000058728 | 4 | 7 | 6 Gm10681        | protein_coding         |
| ENSMUST00000064571 | 4 | 7 | 4 Afap1          | protein_coding         |
| ENSMUST00000070257 | 4 | 7 | 4 Ascc2          | protein_coding         |
| ENSMUST00000066277 | 4 | 7 | 2 Aldh3a2        | protein_coding         |
| ENSMUST00000091284 | 4 | 7 | 2 Nceh1          | protein_coding         |
| ENSMUST00000000127 | 4 | 7 | 0 Wnt3           | protein_coding         |
| ENSMUST00000021201 | 4 | 7 | 0 Cpd            | protein_coding         |
| ENSMUST00000027878 | 4 | 7 | 0 Prrx1          | protein_coding         |
| ENSMUST00000028378 | 4 | 7 | 0 Galnt3         | protein_coding         |
| ENSMUST00000033609 | 4 | 7 | 0 Cstf2          | protein_coding         |
| ENSMUST00000086690 | 4 | 7 | 0 Serpinb7       | protein_coding         |
| ENSMUST00000106152 | 4 | 7 | 0 Eva1b          | protein_coding         |
| ENSMUST00000114754 | 4 | 7 | 0 Mapk14         | protein_coding         |
| ENSMUST00000115167 | 4 | 7 | 0 Zfp451         | protein_coding         |
| ENSMUST00000163061 | 4 | 7 | 0 Kctd18         | protein_coding         |
| ENSMUST00000184169 | 4 | 7 | 0 Slc25a12       | protein_coding         |
| ENSMUST00000079961 | 4 | 7 | 22 Nup93         | protein_coding         |
| ENSMUST00000021009 | 4 | 7 | 20 Myt1l         | protein_coding         |
| ENSMUST00000138291 | 4 | 7 | 20 Gm12968       | lincRNA                |
| ENSMUST00000136802 | 4 | 7 | 10 Fto           | protein_coding         |
| ENSMUST00000050536 | 4 | 7 | 8 Gpr1           | protein_coding         |
| ENSMUST00000147348 | 4 | 7 | 8 Tbc1d1         | protein_coding         |
| ENSMUST00000133179 | 4 | 7 | 6 Gm17077        | antisense              |
| ENSMUST00000021532 | 4 | 7 | 4 Snapc1         | protein_coding         |
| ENSMUST00000077773 | 4 | 7 | 4 Erg            | protein_coding         |
| ENSMUST00000110298 | 4 | 7 | 4 Numb           | protein_coding         |
| ENSMUST00000126410 | 4 | 7 | 4 Acox1          | protein_coding         |
| ENSMUST00000169385 | 4 | 7 | 4 Rai14          | protein_coding         |
| ENSMUST00000025060 | 4 | 7 | 2 Armc12         | protein_coding         |
| ENSMUST00000159108 | 4 | 7 | 2 Gm15825        | antisense              |
| ENSMUST00000178112 | 4 | 7 | 0 Gm21737        | unprocessed_pseudogene |
| ENSMUST00000034304 | 4 | 7 | 0 Hsd17b2        | protein_coding         |
| ENSMUST00000038193 | 4 | 7 | 0 Wdr59          | protein_coding         |
| ENSMUST00000040833 | 4 | 7 | 0 Edem2          | protein_coding         |
| ENSMUST00000050077 | 4 | 7 | 0 Lanc12         | protein_coding         |
| ENSMUST00000110306 | 4 | 7 | 0 Dpys           | protein_coding         |
| ENSMUST00000110502 | 4 | 7 | 0 Wdr95          | protein_coding         |
| ENSMUST00000115101 | 4 | 7 | 0 Nupl2          | protein_coding         |
| ENSMUST00000166021 | 4 | 7 | 0 Gpatch4        | protein_coding         |
| ENSMUST00000143989 | 4 | 6 | 24 Rxfp2         | protein_coding         |
| ENSMUST00000159318 | 4 | 6 | 18 Smim17        | protein_coding         |
| ENSMUST00000159990 | 4 | 6 | 18 Poc1b         | protein_coding         |
| ENSMUST00000031426 | 4 | 6 | 14 Ift81         | protein_coding         |
| ENSMUST00000127084 | 4 | 6 | 14 Hsd17b12      | protein_coding         |
| ENSMUST00000041139 | 4 | 6 | 12 Rab8b         | protein_coding         |
| ENSMUST00000130243 | 4 | 6 | 12 Huwe1         | protein_coding         |
| ENSMUST00000134847 | 4 | 6 | 12 Mro           | protein_coding         |

|                    |   |   |                  |                        |
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| ENSMUST00000151330 | 4 | 6 | 8 Asb18          | protein_coding         |
| ENSMUST00000159844 | 4 | 6 | 8 Kcnab2         | protein_coding         |
| ENSMUST00000162359 | 4 | 6 | 6 Hipk2          | protein_coding         |
| ENSMUST00000056521 | 4 | 6 | 4 2900011O08Rik  | protein_coding         |
| ENSMUST00000113614 | 4 | 6 | 4 Gpr111         | protein_coding         |
| ENSMUST00000040609 | 4 | 6 | 2 1700011E24Rik  | protein_coding         |
| ENSMUST00000069937 | 4 | 6 | 2 Cdkl2          | protein_coding         |
| ENSMUST00000106026 | 4 | 6 | 2 2210404O09Rik  | protein_coding         |
| ENSMUST00000113110 | 4 | 6 | 2 Mthfsl         | protein_coding         |
| ENSMUST00000146480 | 4 | 6 | 2 Psd3           | protein_coding         |
| ENSMUST00000178380 | 4 | 6 | 0 Gm21756        | unprocessed_pseudogene |
| ENSMUST00000178403 | 4 | 6 | 0 Gm21744        | unprocessed_pseudogene |
| ENSMUST00000055018 | 4 | 6 | 0 Lpar1          | protein_coding         |
| ENSMUST00000064916 | 4 | 6 | 0 Serpinb2       | protein_coding         |
| ENSMUST00000076622 | 4 | 6 | 0 Stmnd1         | protein_coding         |
| ENSMUST00000086686 | 4 | 6 | 0 Zfp605         | protein_coding         |
| ENSMUST00000118663 | 4 | 6 | 0 Akr1c19        | protein_coding         |
| ENSMUST00000124647 | 4 | 6 | 0 Rapgef2        | protein_coding         |
| ENSMUST00000132004 | 4 | 6 | 0 Fbxl3          | protein_coding         |
| ENSMUST00000137638 | 4 | 6 | 0 Atg16l1        | protein_coding         |
| ENSMUST00000156757 | 4 | 6 | 0 Ryr3           | protein_coding         |
| ENSMUST00000170051 | 4 | 6 | 0 Cd36           | protein_coding         |
| ENSMUST00000172402 | 4 | 6 | 0 Depdc1b        | protein_coding         |
| ENSMUST00000135738 | 4 | 6 | 0 4930552N02Rik  | processed_transcript   |
| ENSMUST00000135741 | 4 | 5 | 79 Dab2ip        | protein_coding         |
| ENSMUST00000098088 | 4 | 5 | 44 Tmc5          | protein_coding         |
| ENSMUST00000151538 | 4 | 5 | 42 Macrod2os1    | antisense              |
| ENSMUST00000001326 | 4 | 5 | 20 Sp1           | protein_coding         |
| ENSMUST00000163884 | 4 | 5 | 20 Tmem39a       | protein_coding         |
| ENSMUST00000031003 | 4 | 5 | 16 Ppp2r2c       | protein_coding         |
| ENSMUST00000057324 | 4 | 5 | 12 Flrt2         | protein_coding         |
| ENSMUST00000151841 | 4 | 5 | 10 9230020A06Rik | lincRNA                |
| ENSMUST00000096363 | 4 | 5 | 8 Tmem28         | protein_coding         |
| ENSMUST00000021018 | 4 | 5 | 6 Taf15          | protein_coding         |
| ENSMUST00000034109 | 4 | 5 | 6 1700011L22Rik  | protein_coding         |
| ENSMUST00000108249 | 4 | 5 | 6 Prkci          | protein_coding         |
| ENSMUST00000113146 | 4 | 5 | 4 Mtmr14         | protein_coding         |
| ENSMUST00000126244 | 4 | 5 | 2 Gm1989         | unprocessed_pseudogene |
| ENSMUST00000034567 | 4 | 5 | 2 Dlat           | protein_coding         |
| ENSMUST00000091325 | 4 | 5 | 2 Lrrcc1         | protein_coding         |
| ENSMUST00000093001 | 4 | 5 | 2 Arhgap44       | protein_coding         |
| ENSMUST00000136749 | 4 | 5 | 2 Gm1698         | lincRNA                |
| ENSMUST00000141543 | 4 | 5 | 2 C230035I16Rik  | lincRNA                |
| ENSMUST00000097554 | 4 | 5 | 0 Aspm           | protein_coding         |
| ENSMUST00000097554 | 4 | 5 | 0 Aspm           | protein_coding         |
| ENSMUST00000179024 | 4 | 5 | 0 Gm21405        | unprocessed_pseudogene |
| ENSMUST00000180071 | 4 | 5 | 0 Gm21853        | unprocessed_pseudogene |
| ENSMUST00000040790 | 4 | 5 | 0 Slx4           | protein_coding         |
| ENSMUST00000046520 | 4 | 5 | 0 Fkbp14         | protein_coding         |
| ENSMUST00000047852 | 4 | 5 | 0 Fam199x        | protein_coding         |
| ENSMUST00000054252 | 4 | 5 | 0 Mrpl10         | protein_coding         |
| ENSMUST00000069772 | 4 | 5 | 0 Tmem143        | protein_coding         |
| ENSMUST00000080861 | 4 | 5 | 0 Rpl35          | protein_coding         |
| ENSMUST00000105244 | 4 | 5 | 0 Timeless       | protein_coding         |
| ENSMUST00000105753 | 4 | 5 | 0 C87977         | protein_coding         |
| ENSMUST00000130652 | 4 | 5 | 0 Atp8a1         | protein_coding         |
| ENSMUST00000132942 | 4 | 5 | 0 Nelfa          | protein_coding         |
| ENSMUST00000139989 | 4 | 5 | 0 Crybg3         | protein_coding         |
| ENSMUST00000149739 | 4 | 5 | 0 Gm13023        | protein_coding         |
| ENSMUST00000167635 | 4 | 5 | 0 Serhl          | protein_coding         |
| ENSMUST00000171343 | 4 | 5 | 0 Bmpr1a         | protein_coding         |
| ENSMUST00000180269 | 4 | 5 | 0 Carkd          | protein_coding         |
| ENSMUST00000139825 | 4 | 5 | 0 Gm15834        | lincRNA                |
| ENSMUST00000147420 | 4 | 5 | 0 Chn1os3        | antisense              |
| ENSMUST00000069794 | 4 | 5 | 40 Rif1          | protein_coding         |
| ENSMUST00000046502 | 4 | 5 | 30 Rad54l2       | protein_coding         |
| ENSMUST00000151982 | 4 | 5 | 28 Sez6          | protein_coding         |
| ENSMUST00000119761 | 4 | 5 | 20 Fabp12        | protein_coding         |

|                    |   |   |                 |                        |
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| ENSMUST00000131873 | 4 | 5 | 14 Ube2k        | protein_coding         |
| ENSMUST00000112254 | 4 | 5 | 12 Vwf          | protein_coding         |
| ENSMUST00000074173 | 4 | 5 | 8 Spatc1        | protein_coding         |
| ENSMUST00000078902 | 4 | 5 | 6 Mboat2        | protein_coding         |
| ENSMUST00000124287 | 4 | 5 | 6 Cdc123        | protein_coding         |
| ENSMUST00000135250 | 4 | 5 | 6 Osbp2         | protein_coding         |
| ENSMUST00000143373 | 4 | 5 | 6 Atp13a5       | protein_coding         |
| ENSMUST00000146684 | 4 | 5 | 6 Ing3          | protein_coding         |
| ENSMUST00000181417 | 4 | 5 | 6 4930448N21Rik | lincRNA                |
| ENSMUST00000103164 | 4 | 5 | 4 Acsf2         | protein_coding         |
| ENSMUST00000162468 | 4 | 5 | 4 Slco6d1       | protein_coding         |
| ENSMUST00000064503 | 4 | 5 | 2 Lnp           | protein_coding         |
| ENSMUST00000079896 | 4 | 5 | 2 Tmem192       | protein_coding         |
| ENSMUST00000163377 | 4 | 5 | 2 Wibg          | protein_coding         |
| ENSMUST00000164056 | 4 | 5 | 2 Zfp710        | protein_coding         |
| ENSMUST00000171796 | 4 | 5 | 2 Kif1a         | protein_coding         |
| ENSMUST00000173400 | 4 | 5 | 2 Katna1        | protein_coding         |
| ENSMUST00000140613 | 4 | 5 | 0 Ube2cbp       | processed_transcript   |
| ENSMUST00000140613 | 4 | 5 | 0 Ube2cbp       | processed_transcript   |
| ENSMUST00000177393 | 4 | 5 | 0 Vmn2r-ps115   | unprocessed_pseudogene |
| ENSMUST00000037481 | 4 | 5 | 0 Clec1a        | protein_coding         |
| ENSMUST00000040344 | 4 | 5 | 0 Gns           | protein_coding         |
| ENSMUST00000061444 | 4 | 5 | 0 Mrps16        | protein_coding         |
| ENSMUST00000102909 | 4 | 5 | 0 Sun3          | protein_coding         |
| ENSMUST00000120574 | 4 | 5 | 0 Supt7l        | protein_coding         |
| ENSMUST00000134265 | 4 | 5 | 0 Lrch2         | protein_coding         |
| ENSMUST00000136156 | 4 | 5 | 0 D430041D05Rik | protein_coding         |
| ENSMUST00000161770 | 4 | 5 | 0 Ghr           | protein_coding         |
| ENSMUST00000169863 | 4 | 4 | 67 Fam169a      | protein_coding         |
| ENSMUST00000161181 | 4 | 4 | 48 Cdk8         | protein_coding         |
| ENSMUST00000150069 | 4 | 4 | 44 Rnf103       | protein_coding         |
| ENSMUST00000035208 | 4 | 4 | 28 Bsn          | protein_coding         |
| ENSMUST00000102970 | 4 | 4 | 24 Prkcq        | protein_coding         |
| ENSMUST00000111917 | 4 | 4 | 24 Fam35a       | protein_coding         |
| ENSMUST00000107679 | 4 | 4 | 22 Fbxw7        | protein_coding         |
| ENSMUST00000131588 | 4 | 4 | 16 C79798       | antisense              |
| ENSMUST00000034017 | 4 | 4 | 14 Khlh2        | protein_coding         |
| ENSMUST00000064771 | 4 | 4 | 14 Swt1         | protein_coding         |
| ENSMUST00000070418 | 4 | 4 | 12 Dclk1        | protein_coding         |
| ENSMUST00000038073 | 4 | 4 | 10 Catsper2     | protein_coding         |
| ENSMUST00000170243 | 4 | 4 | 8 Galnt1        | protein_coding         |
| ENSMUST00000037064 | 4 | 4 | 6 Slc25a37      | protein_coding         |
| ENSMUST00000082254 | 4 | 4 | 6 Jakmip2       | protein_coding         |
| ENSMUST00000107376 | 4 | 4 | 6 Nkiras2       | protein_coding         |
| ENSMUST00000138257 | 4 | 4 | 6 Slc7a1        | protein_coding         |
| ENSMUST00000168012 | 4 | 4 | 6 1110002L01Rik | protein_coding         |
| ENSMUST00000048371 | 4 | 3 | 42 Tsc22d1      | protein_coding         |
| ENSMUST00000000412 | 4 | 3 | 34 Egfl6        | protein_coding         |
| ENSMUST00000113355 | 4 | 3 | 30 Frmd4b       | protein_coding         |
| ENSMUST00000022416 | 4 | 3 | 22 Anxa11       | protein_coding         |
| ENSMUST00000093902 | 4 | 3 | 22 Rnf213       | protein_coding         |
| ENSMUST00000068304 | 4 | 3 | 16 Ncoa2        | protein_coding         |
| ENSMUST00000174032 | 4 | 3 | 16 Gm20404      | processed_transcript   |
| ENSMUST00000061673 | 4 | 3 | 14 Itga1        | protein_coding         |
| ENSMUST00000168093 | 4 | 3 | 14 Prkd2        | protein_coding         |
| ENSMUST00000068021 | 4 | 3 | 12 Pecam1       | protein_coding         |
| ENSMUST00000033727 | 4 | 3 | 10 Ctps2        | protein_coding         |
| ENSMUST00000040944 | 4 | 3 | 10 Cyp2g1       | protein_coding         |
| ENSMUST00000088644 | 4 | 3 | 10 Wnk1         | protein_coding         |
| ENSMUST00000126703 | 4 | 3 | 8 Tnip1         | protein_coding         |
| ENSMUST00000030862 | 4 | 3 | 6 Draxin        | protein_coding         |
| ENSMUST00000106282 | 4 | 3 | 6 Bcl7c         | protein_coding         |
| ENSMUST00000159320 | 4 | 3 | 6 A630001G21Rik | protein_coding         |
| ENSMUST00000177434 | 4 | 3 | 6 Lekr1         | protein_coding         |
| ENSMUST00000112541 | 4 | 3 | 4 Cd163         | protein_coding         |
| ENSMUST00000109162 | 4 | 3 | 59 Zfp64        | protein_coding         |
| ENSMUST00000072182 | 4 | 3 | 32 Sim2         | protein_coding         |
| ENSMUST00000068088 | 4 | 3 | 26 Fam19a5      | protein_coding         |



|                    |   |    |                  |                        |
|--------------------|---|----|------------------|------------------------|
| ENSMUST00000131309 | 4 | 3  | 22 Fzd3          | protein_coding         |
| ENSMUST00000126634 | 4 | 3  | 16 Copa          | protein_coding         |
| ENSMUST00000057892 | 4 | 3  | 10 Bptf          | protein_coding         |
| ENSMUST00000100857 | 4 | 3  | 10 Dusp16        | protein_coding         |
| ENSMUST00000171243 | 4 | 3  | 10 Iqch          | protein_coding         |
| ENSMUST00000037380 | 4 | 3  | 8 Atp8a1         | protein_coding         |
| ENSMUST00000132901 | 4 | 3  | 8 4930447C04Rik  | protein_coding         |
| ENSMUST00000155727 | 4 | 3  | 8 Ptprg          | protein_coding         |
| ENSMUST00000155896 | 4 | 3  | 8 Sema4d         | protein_coding         |
| ENSMUST00000144673 | 4 | 3  | 6 Gm20671        | protein_coding         |
| ENSMUST00000034774 | 4 | 2  | 36 Itga11        | protein_coding         |
| ENSMUST00000146938 | 4 | 2  | 28 Gm16124       | antisense              |
| ENSMUST00000045243 | 4 | 2  | 14 Pde4dip       | protein_coding         |
| ENSMUST00000126637 | 4 | 2  | 12 Wipf3         | protein_coding         |
| ENSMUST00000106657 | 4 | 2  | 8 Zfyve9         | protein_coding         |
| ENSMUST00000136807 | 4 | 2  | 6 6430710C18Rik  | lincRNA                |
| ENSMUST00000051846 | 4 | 1  | 89 Cyp2c70       | protein_coding         |
| ENSMUST00000149379 | 4 | 1  | 59 Urm1          | protein_coding         |
| ENSMUST00000142501 | 4 | 1  | 32 D930020B18Rik | protein_coding         |
| ENSMUST00000183129 | 4 | 1  | 14 Gm26996       | unprocessed_pseudogene |
| ENSMUST00000131967 | 4 | 1  | 14 Foxp1         | protein_coding         |
| ENSMUST00000043716 | 4 | 1  | 12 Cinp          | protein_coding         |
| ENSMUST00000075316 | 4 | 1  | 10 Gria2         | protein_coding         |
| ENSMUST00000096164 | 4 | 1  | 10 Fam189a2      | protein_coding         |
| ENSMUST00000100491 | 4 | 1  | 10 Defb43        | protein_coding         |
| ENSMUST00000114033 | 4 | 1  | 10 Ehmt2         | protein_coding         |
| ENSMUST00000125883 | 4 | 1  | 10 Exosc2        | protein_coding         |
| ENSMUST00000167232 | 4 | 1  | 10 Pla2g4c       | protein_coding         |
| ENSMUST00000003655 | 4 | 1  | 6 As3mt          | protein_coding         |
| ENSMUST00000181791 | 4 | 1  | 6 Gm6614         | protein_coding         |
| ENSMUST00000129088 | 4 | 1  | 24 Stard13       | protein_coding         |
| ENSMUST00000111244 | 4 | 1  | 18 Gtf2ird1      | protein_coding         |
| ENSMUST00000110249 | 4 | 1  | 16 Prox2         | protein_coding         |
| ENSMUST00000164363 | 4 | 1  | 16 Tead1         | protein_coding         |
| ENSMUST00000025439 | 4 | 1  | 10 Me2           | protein_coding         |
| ENSMUST00000134865 | 4 | 1  | 10 Pde6b         | protein_coding         |
| ENSMUST00000141574 | 4 | 1  | 10 Trpm1         | protein_coding         |
| ENSMUST00000026210 | 4 | 1  | 6 Cpn1           | protein_coding         |
| ENSMUST00000102746 | 4 | 1  | 6 Uba2           | protein_coding         |
| ENSMUST00000146295 | 4 | 1  | 6 Add1           | protein_coding         |
| ENSMUST00000162963 | 4 | 0  | 270 Wdr26        | protein_coding         |
| ENSMUST00000182520 | 4 | 0  | 89 Gm26917       | processed_transcript   |
| ENSMUST00000110115 | 4 | 0  | 81 Asap1         | protein_coding         |
| ENSMUST00000174808 | 4 | 0  | 69 Malat1        | lincRNA                |
| ENSMUST00000177533 | 4 | 0  | 67 AA465934      | processed_transcript   |
| ENSMUST00000137345 | 4 | 0  | 42 Mrpl23        | protein_coding         |
| ENSMUST00000127973 | 4 | 0  | 28 Bfar          | protein_coding         |
| ENSMUST00000176216 | 4 | 0  | 24 Cux1          | protein_coding         |
| ENSMUST00000113641 | 4 | 0  | 20 Kat5          | protein_coding         |
| ENSMUST00000153013 | 4 | 0  | 18 Gm14820       | antisense              |
| ENSMUST00000134791 | 4 | 0  | 14 Prdm2         | protein_coding         |
| ENSMUST00000090942 | 4 | 0  | 10 Gon4l         | protein_coding         |
| ENSMUST00000140866 | 4 | 0  | 10 Irf1          | protein_coding         |
| ENSMUST00000161596 | 4 | 0  | 10 Pigk          | protein_coding         |
| ENSMUST00000143386 | 4 | 0  | 8 Grb10          | protein_coding         |
| ENSMUST00000075084 | 4 | 25 | 8 Trim58         | protein_coding         |
| ENSMUST00000162593 | 4 | 17 | 38 Ubn2          | protein_coding         |
| ENSMUST00000140752 | 4 | 14 | 6 Serinc4        | protein_coding         |
| ENSMUST00000049206 | 4 | 14 | 107 Arhgef3      | protein_coding         |
| ENSMUST00000091291 | 4 | 11 | 2 Insr           | protein_coding         |
| ENSMUST00000112673 | 4 | 11 | 0 Pip5k1b        | protein_coding         |
| ENSMUST00000159966 | 4 | 11 | 0 Tbce           | protein_coding         |
| ENSMUST00000177679 | 4 | 11 | 0 Ankrd44        | protein_coding         |
| ENSMUST00000025166 | 4 | 9  | 36 Cdh2          | protein_coding         |
| ENSMUST00000133811 | 4 | 9  | 38 Acaca         | protein_coding         |
| ENSMUST00000132581 | 4 | 9  | 16 Klhdc10       | protein_coding         |
| ENSMUST00000034989 | 4 | 9  | 12 Me1           | protein_coding         |
| ENSMUST00000121618 | 4 | 9  | 0 Lhfpl2         | protein_coding         |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUST00000099856 | 4 | 8 | 262 Mtr          | protein_coding         |
| ENSMUST00000049382 | 4 | 8 | 32 Gatad2b       | protein_coding         |
| ENSMUST00000161998 | 4 | 8 | 24 Greb1         | protein_coding         |
| ENSMUST00000138292 | 4 | 8 | 18 Hells         | protein_coding         |
| ENSMUST00000127790 | 4 | 8 | 16 Lrrc4b        | protein_coding         |
| ENSMUST00000107678 | 4 | 8 | 12 Fbxw7         | protein_coding         |
| ENSMUST00000128959 | 4 | 8 | 10 Tbccl         | protein_coding         |
| ENSMUST00000130732 | 4 | 8 | 8 Col4a5         | protein_coding         |
| ENSMUST00000084853 | 4 | 8 | 6 Gpd1l          | protein_coding         |
| ENSMUST00000039043 | 4 | 8 | 4 Cd6            | protein_coding         |
| ENSMUST00000144618 | 4 | 8 | 2 Aqp9           | protein_coding         |
| ENSMUST00000163937 | 4 | 8 | 2 Lrrc3b         | protein_coding         |
| ENSMUST00000027897 | 4 | 8 | 0 Smyd2          | protein_coding         |
| ENSMUST00000124558 | 4 | 8 | 0 Rgs1           | protein_coding         |
| ENSMUST00000151738 | 4 | 7 | 22 Strip2        | protein_coding         |
| ENSMUST00000050625 | 4 | 7 | 14 Sema5b        | protein_coding         |
| ENSMUST00000005826 | 4 | 7 | 12 Cs            | protein_coding         |
| ENSMUST00000034515 | 4 | 7 | 12 Grik4         | protein_coding         |
| ENSMUST00000052678 | 4 | 7 | 10 Flnb          | protein_coding         |
| ENSMUST00000033326 | 4 | 7 | 8 Wee1           | protein_coding         |
| ENSMUST00000173271 | 4 | 7 | 8 Usp32          | protein_coding         |
| ENSMUST00000115249 | 4 | 7 | 4 C330007P06Rik  | protein_coding         |
| ENSMUST00000161125 | 4 | 7 | 4 Hibch          | protein_coding         |
| ENSMUST00000146232 | 4 | 7 | 4 Gm21982        | processed_transcript   |
| ENSMUST00000002710 | 4 | 7 | 2 Pdcd2l         | protein_coding         |
| ENSMUST00000050544 | 4 | 7 | 2 Has2           | protein_coding         |
| ENSMUST00000150248 | 4 | 7 | 2 Samsn1         | protein_coding         |
| ENSMUST00000174581 | 4 | 7 | 2 Lrrc71         | protein_coding         |
| ENSMUST00000004576 | 4 | 7 | 0 Tbccd1         | protein_coding         |
| ENSMUST00000126501 | 4 | 7 | 0 Serpinb1c      | protein_coding         |
| ENSMUST00000129368 | 4 | 7 | 0 Usp34          | protein_coding         |
| ENSMUST00000179618 | 4 | 7 | 0 Astl           | protein_coding         |
| ENSMUST00000064395 | 4 | 7 | 61 Nav2          | protein_coding         |
| ENSMUST00000025847 | 4 | 7 | 48 Fibp          | protein_coding         |
| ENSMUST00000125966 | 4 | 7 | 36 Utp14a        | protein_coding         |
| ENSMUST00000069553 | 4 | 7 | 26 A230083G16Rik | protein_coding         |
| ENSMUST00000058030 | 4 | 7 | 24 Mtap          | protein_coding         |
| ENSMUST00000087226 | 4 | 7 | 24 Pnkd          | protein_coding         |
| ENSMUST00000005841 | 4 | 7 | 20 Ctcf          | protein_coding         |
| ENSMUST00000101251 | 4 | 7 | 18 Cenpi         | protein_coding         |
| ENSMUST00000079600 | 4 | 7 | 16 Ece2          | protein_coding         |
| ENSMUST00000123497 | 4 | 7 | 16 Itch          | protein_coding         |
| ENSMUST00000156589 | 4 | 7 | 16 Usp45         | protein_coding         |
| ENSMUST00000034432 | 4 | 7 | 14 Cfdp1         | protein_coding         |
| ENSMUST00000067618 | 4 | 7 | 14 Gm14461       | lincRNA                |
| ENSMUST00000136258 | 4 | 7 | 12 Gda           | protein_coding         |
| ENSMUST00000171692 | 4 | 7 | 10 Serpine3      | protein_coding         |
| ENSMUST00000062264 | 4 | 7 | 4 Nucks1         | protein_coding         |
| ENSMUST00000123214 | 4 | 7 | 2 Ankef1         | protein_coding         |
| ENSMUST00000165117 | 4 | 7 | 2 Cdk6           | protein_coding         |
| ENSMUST00000179551 | 4 | 7 | 0 Gm21241        | unprocessed_pseudogene |
| ENSMUST00000021443 | 4 | 7 | 0 Mthfd1         | protein_coding         |
| ENSMUST00000101534 | 4 | 7 | 0 Ptn            | protein_coding         |
| ENSMUST00000120933 | 4 | 7 | 0 Kbtbd12        | protein_coding         |
| ENSMUST00000123152 | 4 | 7 | 0 Stard7         | protein_coding         |
| ENSMUST00000124221 | 4 | 7 | 0 Slc22a21       | protein_coding         |
| ENSMUST00000156105 | 4 | 7 | 0 Srek1ip1       | protein_coding         |
| ENSMUST00000163839 | 4 | 7 | 0 Fbxw25         | protein_coding         |
| ENSMUST00000090804 | 4 | 6 | 54 Arnt          | protein_coding         |
| ENSMUST00000140681 | 4 | 6 | 32 Slc9a1        | protein_coding         |
| ENSMUST00000022867 | 4 | 6 | 26 Laptm4b       | protein_coding         |
| ENSMUST00000113824 | 4 | 6 | 24 Clpx          | protein_coding         |
| ENSMUST00000031653 | 4 | 6 | 20 Fit1          | protein_coding         |
| ENSMUST00000105662 | 4 | 6 | 20 Plekhg5       | protein_coding         |
| ENSMUST00000142664 | 4 | 6 | 16 P2rx4         | protein_coding         |
| ENSMUST00000181274 | 4 | 6 | 16 Gm16880       | lincRNA                |
| ENSMUST00000021447 | 4 | 6 | 14 Ppp2r5e       | protein_coding         |
| ENSMUST00000061618 | 4 | 6 | 14 Patl1         | protein_coding         |

|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUST00000121020 | 4 | 6 | 12 Gm13284       | unprocessed_pseudogene             |
| ENSMUST00000031249 | 4 | 6 | 10 Sparcl1       | protein_coding                     |
| ENSMUST00000133285 | 4 | 6 | 10 Prim1         | protein_coding                     |
| ENSMUST00000034793 | 4 | 6 | 6 Lca5           | protein_coding                     |
| ENSMUST00000035336 | 4 | 6 | 6 Il17rd         | protein_coding                     |
| ENSMUST00000111668 | 4 | 6 | 4 Camkk2         | protein_coding                     |
| ENSMUST00000161443 | 4 | 6 | 4 Exoc6b         | protein_coding                     |
| ENSMUST00000033458 | 4 | 6 | 2 3830403N18Rik  | protein_coding                     |
| ENSMUST00000042122 | 4 | 6 | 2 Ssbp2          | protein_coding                     |
| ENSMUST00000042322 | 4 | 6 | 2 Iqch           | protein_coding                     |
| ENSMUST00000046945 | 4 | 6 | 2 Palm           | protein_coding                     |
| ENSMUST00000111072 | 4 | 6 | 2 Adam28         | protein_coding                     |
| ENSMUST00000142347 | 4 | 6 | 2 Sys1           | protein_coding                     |
| ENSMUST00000146385 | 4 | 6 | 2 Ccdc85a        | protein_coding                     |
| ENSMUST00000150404 | 4 | 6 | 2 Egfl7          | protein_coding                     |
| ENSMUST00000086269 | 4 | 6 | 0 Nlrp4d         | transcribed_unprocessed_pseudogene |
| ENSMUST00000086269 | 4 | 6 | 0 Nlrp4d         | transcribed_unprocessed_pseudogene |
| ENSMUST00000120391 | 4 | 6 | 0 Gm13506        | unprocessed_pseudogene             |
| ENSMUST00000029649 | 4 | 6 | 0 Ctso           | protein_coding                     |
| ENSMUST00000042662 | 4 | 6 | 0 Mzt1           | protein_coding                     |
| ENSMUST00000109910 | 4 | 6 | 0 Nf2            | protein_coding                     |
| ENSMUST00000123930 | 4 | 6 | 0 Bcat1          | protein_coding                     |
| ENSMUST00000124518 | 4 | 6 | 0 Rbl1           | protein_coding                     |
| ENSMUST00000140635 | 4 | 6 | 0 Rabl6          | protein_coding                     |
| ENSMUST00000160959 | 4 | 6 | 0 Commd2         | protein_coding                     |
| ENSMUST00000182642 | 4 | 6 | 0 Adam23         | protein_coding                     |
| ENSMUST00000152086 | 4 | 6 | 0 Gm12753        | lincRNA                            |
| ENSMUST00000070610 | 4 | 5 | 81 Eif2b3        | protein_coding                     |
| ENSMUST00000098948 | 4 | 5 | 28 Smarca4       | protein_coding                     |
| ENSMUST00000119042 | 4 | 5 | 20 Gm14018       | unprocessed_pseudogene             |
| ENSMUST00000069000 | 4 | 5 | 20 Parp16        | protein_coding                     |
| ENSMUST00000074653 | 4 | 5 | 20 8030462N17Rik | protein_coding                     |
| ENSMUST00000033098 | 4 | 5 | 18 Bcat2         | protein_coding                     |
| ENSMUST00000055941 | 4 | 5 | 18 Atp7a         | protein_coding                     |
| ENSMUST00000180309 | 4 | 5 | 18 Gm21917       | antisense                          |
| ENSMUST00000167773 | 4 | 5 | 16 Dpp8          | protein_coding                     |
| ENSMUST00000013771 | 4 | 5 | 14 Trim54        | protein_coding                     |
| ENSMUST00000125491 | 4 | 5 | 12 Nusap1        | protein_coding                     |
| ENSMUST00000176213 | 4 | 5 | 12 Pbx3          | protein_coding                     |
| ENSMUST00000132333 | 4 | 5 | 10 Dmd           | protein_coding                     |
| ENSMUST00000127006 | 4 | 5 | 10 Gm11476       | processed_transcript               |
| ENSMUST00000118745 | 4 | 5 | 8 Gm12875        | unprocessed_pseudogene             |
| ENSMUST00000064740 | 4 | 5 | 8 Suclg1         | protein_coding                     |
| ENSMUST00000111390 | 4 | 5 | 8 Scarb1         | protein_coding                     |
| ENSMUST00000131956 | 4 | 5 | 8 Slc9a8         | protein_coding                     |
| ENSMUST00000034707 | 4 | 5 | 6 Smarca4        | protein_coding                     |
| ENSMUST00000128321 | 4 | 5 | 6 Hira           | protein_coding                     |
| ENSMUST00000152796 | 4 | 5 | 4 Ythdf2         | protein_coding                     |
| ENSMUST00000168005 | 4 | 5 | 4 St5            | protein_coding                     |
| ENSMUST00000085241 | 4 | 5 | 4 Gm9962         | antisense                          |
| ENSMUST00000128984 | 4 | 5 | 2 Nme6           | processed_transcript               |
| ENSMUST00000128984 | 4 | 5 | 2 Nme6           | processed_transcript               |
| ENSMUST00000020689 | 4 | 5 | 2 Hormad2        | protein_coding                     |
| ENSMUST00000044382 | 4 | 5 | 2 Zc4h2          | protein_coding                     |
| ENSMUST00000131553 | 4 | 5 | 2 Ubr3           | protein_coding                     |
| ENSMUST00000131610 | 4 | 5 | 2 Manba          | protein_coding                     |
| ENSMUST00000183731 | 4 | 5 | 2 Actr5          | protein_coding                     |
| ENSMUST00000005504 | 4 | 5 | 0 Fbxo11         | protein_coding                     |
| ENSMUST00000025488 | 4 | 5 | 0 C330018D20Rik  | protein_coding                     |
| ENSMUST00000114455 | 4 | 5 | 0 Pglyrp2        | protein_coding                     |
| ENSMUST00000140219 | 4 | 5 | 0 Ggt1           | protein_coding                     |
| ENSMUST00000142064 | 4 | 5 | 0 Dpy19l1        | protein_coding                     |
| ENSMUST00000166033 | 4 | 5 | 0 Ube2d3         | protein_coding                     |
| ENSMUST00000130089 | 4 | 5 | 0 4930405A21Rik  | processed_transcript               |
| ENSMUST00000161849 | 4 | 5 | 0 Rpl29-ps1      | processed_pseudogene               |
| ENSMUST00000134409 | 4 | 5 | 0 1700128E19Rik  | lincRNA                            |
| ENSMUST00000147847 | 4 | 5 | 0 Gm12227        | antisense                          |
| ENSMUST00000151101 | 4 | 5 | 0 Gm15243        | antisense                          |

|                     |   |   |    |               |                      |
|---------------------|---|---|----|---------------|----------------------|
| ENSMUST00000134949  | 4 | 5 | 63 | Snrk          | protein_coding       |
| ENSMUST00000125323  | 4 | 5 | 36 | Mdn1          | protein_coding       |
| ENSMUST00000128807  | 4 | 5 | 34 | Gm16145       | lincRNA              |
| ENSMUST00000184159  | 4 | 5 | 32 | Dmtf1         | protein_coding       |
| ENSMUST00000153500  | 4 | 5 | 28 | Por           | protein_coding       |
| ENSMUST00000042125  | 4 | 5 | 20 | Ttll4         | protein_coding       |
| ENSMUST00000085786  | 4 | 5 | 20 | Card11        | protein_coding       |
| ENSMUST00000159525  | 4 | 5 | 18 | Kcnab1        | protein_coding       |
| ENSMUST00000033828  | 4 | 5 | 14 | Gas6          | protein_coding       |
| ENSMUST00000098679  | 4 | 5 | 8  | Pou2f2        | protein_coding       |
| ENSMUST00000166774  | 4 | 5 | 8  | Tmc2          | protein_coding       |
| ENSMUST00000102880  | 4 | 5 | 6  | Ppp3r1        | protein_coding       |
| ENSMUST00000170295  | 4 | 5 | 6  | Fam178b       | protein_coding       |
| ENSMUST00000034699  | 4 | 5 | 4  | Scg3          | protein_coding       |
| ENSMUST00000097717  | 4 | 5 | 4  | Adam23        | protein_coding       |
| ENSMUST00000107574  | 4 | 5 | 4  | Lpar1         | protein_coding       |
| ENSMUST00000173002  | 4 | 5 | 4  | C1qtnf2       | protein_coding       |
| ENSMUST00000027839  | 4 | 5 | 2  | Uck2          | protein_coding       |
| ENSMUST00000046371  | 4 | 5 | 2  | Lppr2         | protein_coding       |
| ENSMUST00000064762  | 4 | 5 | 2  | Map1b         | protein_coding       |
| ENSMUST00000090057  | 4 | 5 | 2  | Sybu          | protein_coding       |
| ENSMUST00000090834  | 4 | 5 | 2  | Asap2         | protein_coding       |
| ENSMUST00000110647  | 4 | 5 | 2  | Trp53bp1      | protein_coding       |
| ENSMUST00000120432  | 4 | 5 | 2  | Mkl1          | protein_coding       |
| ENSMUST00000169142  | 4 | 5 | 2  | Zfp595        | protein_coding       |
| ENSMUST00000171284  | 4 | 5 | 2  | Mettl4        | protein_coding       |
| ENSMUST00000178063  | 4 | 5 | 2  | Gm20916       | protein_coding       |
| ENSMUST00000025993  | 4 | 5 | 0  | Slit1         | protein_coding       |
| ENSMUST00000033898  | 4 | 5 | 0  | Col4a1        | protein_coding       |
| ENSMUST00000048698  | 4 | 5 | 0  | Taf6          | protein_coding       |
| ENSMUST00000049105  | 4 | 5 | 0  | Klhl14        | protein_coding       |
| ENSMUST00000080065  | 4 | 5 | 0  | Slc27a4       | protein_coding       |
| ENSMUST00000092840  | 4 | 5 | 0  | Sifn9         | protein_coding       |
| ENSMUST00000110884  | 4 | 5 | 0  | Sun1          | protein_coding       |
| ENSMUST00000113745  | 4 | 5 | 0  | Plcd4         | protein_coding       |
| ENSMUST00000113896  | 4 | 5 | 0  | Apoo          | protein_coding       |
| ENSMUST00000114709  | 4 | 5 | 0  | Bivm          | protein_coding       |
| ENSMUST00000115184  | 4 | 5 | 0  | Zc3hc1        | protein_coding       |
| ENSMUST00000124936  | 4 | 5 | 0  | Ssbp3         | protein_coding       |
| ENSMUST00000125642  | 4 | 5 | 0  | Ube4a         | protein_coding       |
| ENSMUST00000142742  | 4 | 5 | 0  | Nos1          | protein_coding       |
| ENSMUST00000149802  | 4 | 5 | 0  | Poldip3       | protein_coding       |
| ENSMUST00000164123  | 4 | 5 | 0  | Casq2         | protein_coding       |
| ENSMUST00000171543  | 4 | 5 | 0  | Prom1         | protein_coding       |
| ENSMUST00000133449  | 4 | 5 | 0  | 9430008C03Rik | processed_transcript |
| ENSMUST00000154030  | 4 | 5 | 0  | 9430008C03Rik | processed_transcript |
| ENSMUST00000133599  | 4 | 5 | 0  | Gm12130       | lincRNA              |
| ENSMUST00000144579  | 4 | 5 | 0  | 4933438A12Rik | lincRNA              |
| ENSMUST00000010597  | 4 | 4 | 50 | Kansl3        | protein_coding       |
| ENSMUST00000084301  | 4 | 4 | 48 | Macf1         | protein_coding       |
| ENSMUST00000063042  | 4 | 4 | 34 | Glb1          | protein_coding       |
| ENSMUST00000181590  | 4 | 4 | 22 | 4930547M16Rik | lincRNA              |
| ENSMUST00000025497  | 4 | 4 | 20 | Fbn2          | protein_coding       |
| ENSMUST00000033963  | 4 | 4 | 20 | 4930555F03Rik | protein_coding       |
| ENSMUST00000020169  | 4 | 4 | 16 | Enpp3         | protein_coding       |
| ENSMUST00000023497  | 4 | 4 | 16 | Lmln          | protein_coding       |
| ENSMUST00000174285  | 4 | 4 | 16 | 2210019I11Rik | antisense            |
| ENSMUST000000031667 | 4 | 4 | 14 | Tex26         | protein_coding       |
| ENSMUST000000051950 | 4 | 4 | 14 | Atxn2         | protein_coding       |
| ENSMUST000000061826 | 4 | 4 | 12 | B3galnt1      | protein_coding       |
| ENSMUST00000150042  | 4 | 4 | 10 | Mrpl48        | protein_coding       |
| ENSMUST00000026881  | 4 | 4 | 8  | Ly96          | protein_coding       |
| ENSMUST00000027602  | 4 | 4 | 8  | Dars          | protein_coding       |
| ENSMUST00000040506  | 4 | 4 | 8  | Fam13b        | protein_coding       |
| ENSMUST00000133295  | 4 | 4 | 8  | Atp11c        | protein_coding       |
| ENSMUST00000154939  | 4 | 4 | 8  | Gm13051       | protein_coding       |
| ENSMUST00000159561  | 4 | 4 | 8  | Grid2         | protein_coding       |
| ENSMUST00000022316  | 4 | 4 | 6  | Dydc2         | protein_coding       |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000023520 | 4 | 4 | 6 Muc13         | protein_coding       |
| ENSMUST00000169886 | 4 | 4 | 6 Mum1l1        | protein_coding       |
| ENSMUST00000029837 | 4 | 4 | 4 Uox           | protein_coding       |
| ENSMUST00000123440 | 4 | 4 | 4 Rap1gap2      | protein_coding       |
| ENSMUST00000180690 | 4 | 4 | 4 2500002B13Rik | lincRNA              |
| ENSMUST00000029804 | 4 | 4 | 2 Metap1        | protein_coding       |
| ENSMUST00000033892 | 4 | 4 | 2 Tnfsf13b      | protein_coding       |
| ENSMUST00000092486 | 4 | 4 | 2 Adamts14      | protein_coding       |
| ENSMUST00000128047 | 4 | 4 | 2 Rbks          | protein_coding       |
| ENSMUST00000128246 | 4 | 4 | 2 Art3          | protein_coding       |
| ENSMUST00000129865 | 4 | 4 | 2 Cep350        | protein_coding       |
| ENSMUST00000171644 | 4 | 4 | 2 Pparg         | protein_coding       |
| ENSMUST00000177592 | 4 | 4 | 2 Ddi2          | protein_coding       |
| ENSMUST00000180249 | 4 | 4 | 2 Gm20931       | protein_coding       |
| ENSMUST00000183548 | 4 | 4 | 2 Acaca         | protein_coding       |
| ENSMUST00000021790 | 4 | 4 | 0 Tmem14c       | protein_coding       |
| ENSMUST00000037615 | 4 | 4 | 0 Aldh5a1       | protein_coding       |
| ENSMUST00000067205 | 4 | 4 | 0 Kif21a        | protein_coding       |
| ENSMUST00000072662 | 4 | 4 | 0 Zscan5b       | protein_coding       |
| ENSMUST00000076661 | 4 | 4 | 0 Etaa1         | protein_coding       |
| ENSMUST00000079545 | 4 | 4 | 0 St6galnac2    | protein_coding       |
| ENSMUST00000095349 | 4 | 4 | 0 Ubxn8         | protein_coding       |
| ENSMUST00000107482 | 4 | 4 | 0 Pklr          | protein_coding       |
| ENSMUST00000109379 | 4 | 4 | 0 Bdp1          | protein_coding       |
| ENSMUST00000111564 | 4 | 4 | 0 Clip1         | protein_coding       |
| ENSMUST00000111569 | 4 | 4 | 0 Caprin2       | protein_coding       |
| ENSMUST00000119800 | 4 | 4 | 0 Zfp740        | protein_coding       |
| ENSMUST00000131284 | 4 | 4 | 0 Zgpat         | protein_coding       |
| ENSMUST00000131556 | 4 | 4 | 0 Arfgef1       | protein_coding       |
| ENSMUST00000139342 | 4 | 4 | 0 Etfa          | protein_coding       |
| ENSMUST00000145727 | 4 | 4 | 0 Phtf1         | protein_coding       |
| ENSMUST00000153927 | 4 | 4 | 0 Ppil2         | protein_coding       |
| ENSMUST00000179360 | 4 | 4 | 0 Snrpn         | protein_coding       |
| ENSMUST00000184239 | 4 | 4 | 0 Synrg         | protein_coding       |
| ENSMUST00000122042 | 4 | 4 | 0 Gm4996        | processed_pseudogene |
| ENSMUST00000034086 | 4 | 3 | 65 Nkd1         | protein_coding       |
| ENSMUST00000105821 | 4 | 3 | 56 Kif17        | protein_coding       |
| ENSMUST00000019803 | 4 | 3 | 50 Ccdc12       | protein_coding       |
| ENSMUST00000161289 | 4 | 3 | 36 Ces4a        | protein_coding       |
| ENSMUST00000066160 | 4 | 3 | 30 Chek2        | protein_coding       |
| ENSMUST00000063976 | 4 | 3 | 28 Opa3         | protein_coding       |
| ENSMUST00000039538 | 4 | 3 | 24 Arid4b       | protein_coding       |
| ENSMUST00000123175 | 4 | 3 | 22 Clhc1        | protein_coding       |
| ENSMUST00000066003 | 4 | 3 | 20 Sp3          | protein_coding       |
| ENSMUST00000135850 | 4 | 3 | 20 Tcte2        | protein_coding       |
| ENSMUST00000039925 | 4 | 3 | 18 Upb1         | protein_coding       |
| ENSMUST00000153422 | 4 | 3 | 18 Lypd6b       | protein_coding       |
| ENSMUST00000034960 | 4 | 3 | 16 Dpp8         | protein_coding       |
| ENSMUST00000140190 | 4 | 3 | 16 Pth2r        | protein_coding       |
| ENSMUST00000027973 | 4 | 3 | 14 Sephs1       | protein_coding       |
| ENSMUST00000086617 | 4 | 3 | 14 Myo18b       | protein_coding       |
| ENSMUST00000097935 | 4 | 3 | 14 Gm6471       | protein_coding       |
| ENSMUST00000033265 | 4 | 3 | 12 Zranb1       | protein_coding       |
| ENSMUST00000107750 | 4 | 3 | 12 Tbc1d2       | protein_coding       |
| ENSMUST00000160071 | 4 | 3 | 12 Auts2        | protein_coding       |
| ENSMUST00000184851 | 4 | 3 | 12 Rfx7         | protein_coding       |
| ENSMUST00000147781 | 4 | 3 | 10 Rptor        | protein_coding       |
| ENSMUST00000020343 | 4 | 3 | 8 Rab21         | protein_coding       |
| ENSMUST00000028970 | 4 | 3 | 8 Mylk2         | protein_coding       |
| ENSMUST00000082235 | 4 | 3 | 8 Mep1b         | protein_coding       |
| ENSMUST00000017561 | 4 | 3 | 6 Plxdc1        | protein_coding       |
| ENSMUST00000044271 | 4 | 3 | 6 Nploc4        | protein_coding       |
| ENSMUST00000070125 | 4 | 3 | 6 Chat          | protein_coding       |
| ENSMUST00000099858 | 4 | 3 | 6 Prep          | protein_coding       |
| ENSMUST00000112365 | 4 | 3 | 6 Mfsd4         | protein_coding       |
| ENSMUST00000134745 | 4 | 3 | 6 Ywhae         | protein_coding       |
| ENSMUST00000174545 | 4 | 3 | 6 Xpo4          | protein_coding       |
| ENSMUST00000067414 | 4 | 3 | 4 Nav1          | protein_coding       |

|                     |   |   |                  |                                  |
|---------------------|---|---|------------------|----------------------------------|
| ENSMUST00000029049  | 4 | 3 | 2 Chmp4c         | protein_coding                   |
| ENSMUST00000031018  | 4 | 3 | 2 Rbks           | protein_coding                   |
| ENSMUST00000096272  | 4 | 3 | 2 Cpped1         | protein_coding                   |
| ENSMUST00000130643  | 4 | 3 | 2 Srpk1          | protein_coding                   |
| ENSMUST00000137841  | 4 | 3 | 2 Sumo3          | protein_coding                   |
| ENSMUST00000140996  | 4 | 3 | 2 Brap           | protein_coding                   |
| ENSMUST00000168193  | 4 | 3 | 2 Actn2          | protein_coding                   |
| ENSMUST00000178115  | 4 | 3 | 2 Gm21518        | protein_coding                   |
| ENSMUST00000178556  | 4 | 3 | 2 Gm21209        | protein_coding                   |
| ENSMUST00000179811  | 4 | 3 | 2 Gm21760        | protein_coding                   |
| ENSMUST00000123258  | 4 | 3 | 2 Gm12702        | lincRNA                          |
| ENSMUST00000005964  | 4 | 3 | 0 Adh5           | protein_coding                   |
| ENSMUST00000031399  | 4 | 3 | 0 Psph           | protein_coding                   |
| ENSMUST00000033918  | 4 | 3 | 0 Asb5           | protein_coding                   |
| ENSMUST00000044200  | 4 | 3 | 0 Nop2           | protein_coding                   |
| ENSMUST00000050556  | 4 | 3 | 0 Bod1l          | protein_coding                   |
| ENSMUST00000065692  | 4 | 3 | 0 Ap2b1          | protein_coding                   |
| ENSMUST00000074300  | 4 | 3 | 0 Cd300lb        | protein_coding                   |
| ENSMUST00000079451  | 4 | 3 | 0 Kcnk2          | protein_coding                   |
| ENSMUST00000087441  | 4 | 3 | 0 Prom1          | protein_coding                   |
| ENSMUST00000099355  | 4 | 3 | 0 Tmpo           | protein_coding                   |
| ENSMUST00000106520  | 4 | 3 | 0 2610020H08Rik  | protein_coding                   |
| ENSMUST00000110272  | 4 | 3 | 0 Entpd5         | protein_coding                   |
| ENSMUST00000111606  | 4 | 3 | 0 Tdrd1          | protein_coding                   |
| ENSMUST00000129195  | 4 | 3 | 0 Adamts20       | protein_coding                   |
| ENSMUST00000135578  | 4 | 3 | 0 Pcca           | protein_coding                   |
| ENSMUST00000147918  | 4 | 3 | 0 Pigl           | protein_coding                   |
| ENSMUST00000154031  | 4 | 3 | 0 Setd8          | protein_coding                   |
| ENSMUST00000170836  | 4 | 3 | 0 Psma2          | protein_coding                   |
| ENSMUST00000183120  | 4 | 3 | 0 Ntn5           | protein_coding                   |
| ENSMUST00000122400  | 4 | 3 | 0 Gm12010        | processed_pseudogene             |
| ENSMUST00000131919  | 4 | 3 | 105 Tnn          | protein_coding                   |
| ENSMUST00000064989  | 4 | 3 | 69 Prkcb         | protein_coding                   |
| ENSMUST00000045791  | 4 | 3 | 48 Scamp2        | protein_coding                   |
| ENSMUST00000152310  | 4 | 3 | 40 Stx4a         | protein_coding                   |
| ENSMUST00000165766  | 4 | 3 | 32 Dnm2          | protein_coding                   |
| ENSMUST0000014389   | 4 | 3 | 28 Pigl          | protein_coding                   |
| ENSMUST00000027356  | 4 | 3 | 28 Cyp27a1       | protein_coding                   |
| ENSMUST00000038295  | 4 | 3 | 16 Plekha6       | protein_coding                   |
| ENSMUST00000177130  | 4 | 3 | 16 4932443L11Rik | processed_transcript             |
| ENSMUST00000163334  | 4 | 3 | 10 5830417I10Rik | unprocessed_pseudogene           |
| ENSMUST00000163334  | 4 | 3 | 10 5830417I10Rik | unprocessed_pseudogene           |
| ENSMUST00000044766  | 4 | 3 | 10 4930402H24Rik | protein_coding                   |
| ENSMUST00000106633  | 4 | 3 | 10 Slc39a11      | protein_coding                   |
| ENSMUST000000000811 | 4 | 3 | 8 Kcnn3          | protein_coding                   |
| ENSMUST00000126979  | 4 | 3 | 8 Stox1          | protein_coding                   |
| ENSMUST00000110079  | 4 | 3 | 6 Tasp1          | protein_coding                   |
| ENSMUST00000131662  | 4 | 3 | 6 Asun           | protein_coding                   |
| ENSMUST00000162151  | 4 | 3 | 6 Slc9c1         | protein_coding                   |
| ENSMUST00000164246  | 4 | 3 | 6 Coro2b         | protein_coding                   |
| ENSMUST00000146581  | 4 | 3 | 6 Igf1os         | antisense                        |
| ENSMUST00000100847  | 4 | 3 | 4 Rpl37rt        | transcribed_processed_pseudogene |
| ENSMUST00000041024  | 4 | 3 | 4 Lace1          | protein_coding                   |
| ENSMUST00000168855  | 4 | 3 | 4 Hmgcr          | protein_coding                   |
| ENSMUST00000160698  | 4 | 3 | 4 Gm2245         | antisense                        |
| ENSMUST00000179631  | 4 | 3 | 2 Gm21894        | unprocessed_pseudogene           |
| ENSMUST00000088788  | 4 | 3 | 2 Ppp6r2         | protein_coding                   |
| ENSMUST00000091314  | 4 | 3 | 2 Pde7a          | protein_coding                   |
| ENSMUST00000106250  | 4 | 3 | 2 Card14         | protein_coding                   |
| ENSMUST00000110621  | 4 | 3 | 2 Lrr1           | protein_coding                   |
| ENSMUST00000111977  | 4 | 3 | 2 Cfh            | protein_coding                   |
| ENSMUST00000112055  | 4 | 3 | 2 Ola1           | protein_coding                   |
| ENSMUST00000161964  | 4 | 3 | 2 Tnik           | protein_coding                   |
| ENSMUST00000177775  | 4 | 3 | 2 Gm21095        | protein_coding                   |
| ENSMUST00000178934  | 4 | 3 | 2 Gm20888        | protein_coding                   |
| ENSMUST00000179073  | 4 | 3 | 2 Gm21650        | protein_coding                   |
| ENSMUST00000181628  | 4 | 3 | 2 Gm6614         | protein_coding                   |
| ENSMUST00000155799  | 4 | 3 | 2 Gm5893         | processed_transcript             |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000152412 | 4 | 3 | 2 G630016G05Rik | lincRNA                |
| ENSMUST00000183928 | 4 | 3 | 0 2810039B14Rik | unitary_pseudogene     |
| ENSMUST00000026924 | 4 | 3 | 0 Dhtkd1        | protein_coding         |
| ENSMUST00000029438 | 4 | 3 | 0 Hipk1         | protein_coding         |
| ENSMUST00000033480 | 4 | 3 | 0 Atp11c        | protein_coding         |
| ENSMUST00000047226 | 4 | 3 | 0 Lonp1         | protein_coding         |
| ENSMUST00000060484 | 4 | 3 | 0 Clec4a1       | protein_coding         |
| ENSMUST00000064614 | 4 | 3 | 0 4930504O13Rik | protein_coding         |
| ENSMUST00000096066 | 4 | 3 | 0 Cpa2          | protein_coding         |
| ENSMUST00000107872 | 4 | 3 | 0 Stxbp4        | protein_coding         |
| ENSMUST00000112330 | 4 | 3 | 0 Slmap         | protein_coding         |
| ENSMUST00000112359 | 4 | 3 | 0 Hps4          | protein_coding         |
| ENSMUST00000114044 | 4 | 3 | 0 Prkx          | protein_coding         |
| ENSMUST00000137533 | 4 | 3 | 0 Mfsd8         | protein_coding         |
| ENSMUST00000143768 | 4 | 3 | 0 Zmpste24      | protein_coding         |
| ENSMUST00000156779 | 4 | 3 | 0 Nadsyn1       | protein_coding         |
| ENSMUST00000159996 | 4 | 3 | 0 Mpnd          | protein_coding         |
| ENSMUST00000160336 | 4 | 3 | 0 Fancg         | protein_coding         |
| ENSMUST00000166312 | 4 | 3 | 0 Luc7l3        | protein_coding         |
| ENSMUST00000168967 | 4 | 3 | 0 Pdlim5        | protein_coding         |
| ENSMUST00000171664 | 4 | 3 | 0 4930433111Rik | protein_coding         |
| ENSMUST00000176575 | 4 | 3 | 0 Wdr90         | protein_coding         |
| ENSMUST00000179131 | 4 | 3 | 0 D13Ert608e    | protein_coding         |
| ENSMUST00000118588 | 4 | 3 | 0 Gm14668       | processed_pseudogene   |
| ENSMUST00000118714 | 4 | 3 | 0 Gm13535       | processed_pseudogene   |
| ENSMUST00000181704 | 4 | 3 | 0 Gm26684       | lincRNA                |
| ENSMUST00000182509 | 4 | 3 | 0 Miat          | lincRNA                |
| ENSMUST00000111588 | 4 | 3 | 0 4933413L06Rik | antisense              |
| ENSMUST00000092955 | 4 | 2 | 36 Ahnak        | protein_coding         |
| ENSMUST00000060175 | 4 | 2 | 34 BC030336     | protein_coding         |
| ENSMUST00000110731 | 4 | 2 | 30 Kdelr2       | protein_coding         |
| ENSMUST00000132391 | 4 | 2 | 28 Usp6nl       | protein_coding         |
| ENSMUST00000030939 | 4 | 2 | 24 Nadk         | protein_coding         |
| ENSMUST00000122375 | 4 | 2 | 24 Golga7b      | protein_coding         |
| ENSMUST00000093829 | 4 | 2 | 22 Megf11       | protein_coding         |
| ENSMUST00000179971 | 4 | 2 | 22 Rfpl4        | protein_coding         |
| ENSMUST00000053737 | 4 | 2 | 20 Sfswap       | protein_coding         |
| ENSMUST00000170054 | 4 | 2 | 18 Baz2a        | protein_coding         |
| ENSMUST00000128041 | 4 | 2 | 12 Tmem180      | protein_coding         |
| ENSMUST00000036328 | 4 | 2 | 10 Zfhx2        | protein_coding         |
| ENSMUST00000066368 | 4 | 2 | 10 Mdfi         | protein_coding         |
| ENSMUST00000093939 | 4 | 2 | 10 Fbxo47       | protein_coding         |
| ENSMUST00000117263 | 4 | 2 | 10 Rad9b        | protein_coding         |
| ENSMUST00000181920 | 4 | 2 | 10 Gm26885      | lincRNA                |
| ENSMUST00000055576 | 4 | 2 | 8 Pcsk6         | protein_coding         |
| ENSMUST00000123844 | 4 | 2 | 8 Rnf38         | protein_coding         |
| ENSMUST00000044850 | 4 | 2 | 6 Abca9         | protein_coding         |
| ENSMUST00000061193 | 4 | 2 | 6 Catsperg2     | protein_coding         |
| ENSMUST00000102645 | 4 | 2 | 6 Med19         | protein_coding         |
| ENSMUST00000140893 | 4 | 2 | 6 Manba         | protein_coding         |
| ENSMUST00000021803 | 4 | 2 | 4 Nup153        | protein_coding         |
| ENSMUST00000048687 | 4 | 2 | 4 Wbp5          | protein_coding         |
| ENSMUST00000079788 | 4 | 2 | 4 Mxx           | protein_coding         |
| ENSMUST00000079812 | 4 | 2 | 4 Notch2        | protein_coding         |
| ENSMUST00000093769 | 4 | 2 | 4 Magi1         | protein_coding         |
| ENSMUST00000181731 | 4 | 2 | 4 C130060C02Rik | lincRNA                |
| ENSMUST00000178213 | 4 | 2 | 2 Gm21815       | unprocessed_pseudogene |
| ENSMUST00000179473 | 4 | 2 | 2 Gm21638       | unprocessed_pseudogene |
| ENSMUST00000036934 | 4 | 2 | 2 Neb           | protein_coding         |
| ENSMUST00000095666 | 4 | 2 | 2 Nin           | protein_coding         |
| ENSMUST00000119229 | 4 | 2 | 2 Phka1         | protein_coding         |
| ENSMUST00000153124 | 4 | 2 | 2 Napsa         | protein_coding         |
| ENSMUST00000180133 | 4 | 2 | 2 Gm21117       | protein_coding         |
| ENSMUST00000033673 | 4 | 2 | 0 Nono          | protein_coding         |
| ENSMUST00000036049 | 4 | 2 | 0 Hsd1l         | protein_coding         |
| ENSMUST00000037383 | 4 | 2 | 0 1110057K04Rik | protein_coding         |
| ENSMUST00000068505 | 4 | 2 | 0 Capn2         | protein_coding         |
| ENSMUST00000079163 | 4 | 2 | 0 Vmn2r10       | protein_coding         |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUST00000096570 | 4 | 2 | 0 Gm94           | protein_coding         |
| ENSMUST00000097381 | 4 | 2 | 0 Vmn2r112       | protein_coding         |
| ENSMUST00000105453 | 4 | 2 | 0 Col13a1        | protein_coding         |
| ENSMUST00000106312 | 4 | 2 | 0 Zfp553         | protein_coding         |
| ENSMUST00000107486 | 4 | 2 | 0 Gm10974        | protein_coding         |
| ENSMUST00000110047 | 4 | 2 | 0 Tc2n           | protein_coding         |
| ENSMUST00000114447 | 4 | 2 | 0 Cacna1b        | protein_coding         |
| ENSMUST00000120573 | 4 | 2 | 0 Arsk           | protein_coding         |
| ENSMUST00000121085 | 4 | 2 | 0 Plekhg2        | protein_coding         |
| ENSMUST00000130835 | 4 | 2 | 0 Prpsap1        | protein_coding         |
| ENSMUST00000144361 | 4 | 2 | 0 Aacs           | protein_coding         |
| ENSMUST00000159899 | 4 | 2 | 0 Pigk           | protein_coding         |
| ENSMUST00000160758 | 4 | 2 | 0 Mycbp2         | protein_coding         |
| ENSMUST00000119331 | 4 | 2 | 0 Gm12375        | processed_pseudogene   |
| ENSMUST00000181308 | 4 | 2 | 0 Ptgs2os2       | lincRNA                |
| ENSMUST00000180488 | 4 | 1 | 52 B230323A14Rik | lincRNA                |
| ENSMUST00000034513 | 4 | 1 | 24 Pou2f3        | protein_coding         |
| ENSMUST00000088292 | 4 | 1 | 20 Lpar5         | protein_coding         |
| ENSMUST00000141168 | 4 | 1 | 20 Gm16156       | antisense              |
| ENSMUST00000035852 | 4 | 1 | 18 Zcwpw1        | protein_coding         |
| ENSMUST00000049122 | 4 | 1 | 18 Pphln1        | protein_coding         |
| ENSMUST00000107539 | 4 | 1 | 18 Cdk12         | protein_coding         |
| ENSMUST00000027144 | 4 | 1 | 16 Cps1          | protein_coding         |
| ENSMUST00000029135 | 4 | 1 | 16 Acss2         | protein_coding         |
| ENSMUST00000115128 | 4 | 1 | 16 Kmt2e         | protein_coding         |
| ENSMUST00000142739 | 4 | 1 | 16 Nlk           | protein_coding         |
| ENSMUST00000071617 | 4 | 1 | 12 Olfr943       | protein_coding         |
| ENSMUST00000109784 | 4 | 1 | 12 Nol4l         | protein_coding         |
| ENSMUST00000144654 | 4 | 1 | 12 Manba         | protein_coding         |
| ENSMUST00000116463 | 4 | 1 | 8 Gatad2a        | protein_coding         |
| ENSMUST00000178639 | 4 | 1 | 8 Gm21739        | protein_coding         |
| ENSMUST00000107356 | 4 | 1 | 6 Stat5a         | protein_coding         |
| ENSMUST00000133102 | 4 | 1 | 6 Gipc2          | protein_coding         |
| ENSMUST00000141708 | 4 | 1 | 6 Plxdc1         | protein_coding         |
| ENSMUST00000154666 | 4 | 1 | 6 Uty            | protein_coding         |
| ENSMUST00000112103 | 4 | 1 | 6 Nav1           | lincRNA                |
| ENSMUST00000048012 | 4 | 1 | 4 5330417C22Rik  | protein_coding         |
| ENSMUST00000075657 | 4 | 1 | 4 Ap3s2          | protein_coding         |
| ENSMUST00000127044 | 4 | 1 | 4 Plcb4          | protein_coding         |
| ENSMUST00000129544 | 4 | 1 | 4 Setx           | protein_coding         |
| ENSMUST00000179424 | 4 | 1 | 2 Gm20923        | unprocessed_pseudogene |
| ENSMUST00000180048 | 4 | 1 | 2 Gm21171        | unprocessed_pseudogene |
| ENSMUST00000053034 | 4 | 1 | 2 BC068281       | protein_coding         |
| ENSMUST00000084881 | 4 | 1 | 2 Crtap          | protein_coding         |
| ENSMUST00000108191 | 4 | 1 | 2 Epha7          | protein_coding         |
| ENSMUST00000113480 | 4 | 1 | 2 Cysltr1        | protein_coding         |
| ENSMUST00000178505 | 4 | 1 | 2 Gm20843        | protein_coding         |
| ENSMUST00000179480 | 4 | 1 | 2 Gm21861        | protein_coding         |
| ENSMUST00000179884 | 4 | 1 | 2 Gm20838        | protein_coding         |
| ENSMUST00000180373 | 4 | 1 | 2 Gm21679        | protein_coding         |
| ENSMUST00000021262 | 4 | 1 | 0 Alox8          | protein_coding         |
| ENSMUST00000022075 | 4 | 1 | 0 Pcsk1          | protein_coding         |
| ENSMUST00000050067 | 4 | 1 | 0 Hectd3         | protein_coding         |
| ENSMUST00000080135 | 4 | 1 | 0 Adam26b        | protein_coding         |
| ENSMUST00000082093 | 4 | 1 | 0 Gzmd           | protein_coding         |
| ENSMUST00000108148 | 4 | 1 | 0 Spaca1         | protein_coding         |
| ENSMUST00000110634 | 4 | 1 | 0 Zmynd11        | protein_coding         |
| ENSMUST00000110991 | 4 | 1 | 0 Slc12a6        | protein_coding         |
| ENSMUST00000111742 | 4 | 1 | 0 Bcat1          | protein_coding         |
| ENSMUST00000119647 | 4 | 1 | 0 C2cd3          | protein_coding         |
| ENSMUST00000121920 | 4 | 1 | 0 Mrpl24         | protein_coding         |
| ENSMUST00000124240 | 4 | 1 | 0 Tbc1d10b       | protein_coding         |
| ENSMUST00000127471 | 4 | 1 | 0 Ncor1          | protein_coding         |
| ENSMUST00000167203 | 4 | 1 | 0 Bdp1           | protein_coding         |
| ENSMUST00000180170 | 4 | 1 | 0 Gm20855        | protein_coding         |
| ENSMUST00000180329 | 4 | 1 | 0 Gm20937        | protein_coding         |
| ENSMUST00000180332 | 4 | 1 | 0 Gm20896        | protein_coding         |
| ENSMUST00000034150 | 4 | 1 | 52 Gab1          | protein_coding         |



|                    |   |    |                  |                      |
|--------------------|---|----|------------------|----------------------|
| ENSMUST00000025117 | 4 | 1  | 30 Celf4         | protein_coding       |
| ENSMUST00000105283 | 4 | 1  | 24 Kitl          | protein_coding       |
| ENSMUST00000026461 | 4 | 1  | 16 Prim1         | protein_coding       |
| ENSMUST00000134215 | 4 | 1  | 14 Numb1         | protein_coding       |
| ENSMUST00000143778 | 4 | 1  | 14 1700066B19Rik | protein_coding       |
| ENSMUST00000160975 | 4 | 1  | 12 Zbed4         | protein_coding       |
| ENSMUST00000024914 | 4 | 1  | 8 Themis3        | protein_coding       |
| ENSMUST00000050937 | 4 | 1  | 8 BC053393       | protein_coding       |
| ENSMUST00000071543 | 4 | 1  | 8 Upp2           | protein_coding       |
| ENSMUST00000021406 | 4 | 1  | 6 2700097O09Rik  | protein_coding       |
| ENSMUST00000038959 | 4 | 1  | 6 Psd3           | protein_coding       |
| ENSMUST00000029271 | 4 | 1  | 4 Trpc3          | protein_coding       |
| ENSMUST00000036125 | 4 | 1  | 4 Eif4h          | protein_coding       |
| ENSMUST00000048138 | 4 | 1  | 4 S100a13        | protein_coding       |
| ENSMUST00000175699 | 4 | 1  | 4 Gm20732        | lincRNA              |
| ENSMUST00000037528 | 4 | 1  | 2 Gdpd5          | protein_coding       |
| ENSMUST00000103177 | 4 | 1  | 2 Lpo            | protein_coding       |
| ENSMUST00000024881 | 4 | 1  | 2 Strn           | protein_coding       |
| ENSMUST00000034045 | 4 | 1  | 0 Cenpu          | protein_coding       |
| ENSMUST00000046351 | 4 | 1  | 0 Lrfr3          | protein_coding       |
| ENSMUST00000096045 | 4 | 1  | 0 Dppa4          | protein_coding       |
| ENSMUST00000105476 | 4 | 1  | 0 Dcbld1         | protein_coding       |
| ENSMUST00000110120 | 4 | 1  | 0 Tmx4           | protein_coding       |
| ENSMUST00000124888 | 4 | 1  | 0 Lgals8         | protein_coding       |
| ENSMUST00000126090 | 4 | 1  | 0 Rbm43          | protein_coding       |
| ENSMUST00000130506 | 4 | 1  | 0 Ttf1           | protein_coding       |
| ENSMUST00000135690 | 4 | 1  | 0 Rpl10          | protein_coding       |
| ENSMUST00000174202 | 4 | 1  | 0 Il1rap         | protein_coding       |
| ENSMUST00000136578 | 4 | 1  | 0 Gm13715        | lincRNA              |
| ENSMUST00000112686 | 4 | 0  | 32 Cacr2         | protein_coding       |
| ENSMUST00000108243 | 4 | 0  | 20 Pik3ca        | protein_coding       |
| ENSMUST00000005279 | 4 | 0  | 16 Klf5          | protein_coding       |
| ENSMUST00000134663 | 4 | 0  | 16 Myo7b         | protein_coding       |
| ENSMUST00000086502 | 4 | 0  | 14 Tnnt1         | protein_coding       |
| ENSMUST00000117971 | 4 | 0  | 8 Bcl7a          | protein_coding       |
| ENSMUST00000026254 | 4 | 0  | 2 Gbf1           | protein_coding       |
| ENSMUST00000111089 | 4 | 0  | 2 Nefm           | protein_coding       |
| ENSMUST00000127152 | 4 | 0  | 2 Anxa4          | protein_coding       |
| ENSMUST00000020153 | 4 | 0  | 0 Hbs1l          | protein_coding       |
| ENSMUST00000031977 | 4 | 0  | 0 Agk            | protein_coding       |
| ENSMUST00000077128 | 4 | 0  | 0 Arhgap12       | protein_coding       |
| ENSMUST00000099473 | 4 | 0  | 0 Wdr76          | protein_coding       |
| ENSMUST00000150829 | 4 | 0  | 0 Exoc1          | protein_coding       |
| ENSMUST00000156436 | 4 | 0  | 0 Ctf            | protein_coding       |
| ENSMUST00000163100 | 4 | 0  | 0 Caca2          | protein_coding       |
| ENSMUST00000149687 | 4 | 0  | 0 2210406O10Rik  | processed_transcript |
| ENSMUST00000138638 | 3 | 13 | 16 Med20         | protein_coding       |
| ENSMUST00000178134 | 3 | 12 | 0 Mdn1           | protein_coding       |
| ENSMUST00000016144 | 3 | 11 | 56 Ppap2a        | protein_coding       |
| ENSMUST00000141592 | 3 | 11 | 12 Mtf2          | protein_coding       |
| ENSMUST00000021558 | 3 | 10 | 10 Galnt16       | protein_coding       |
| ENSMUST00000167662 | 3 | 10 | 10 Ergic1        | protein_coding       |
| ENSMUST00000112250 | 3 | 10 | 4 Cacna1d        | protein_coding       |
| ENSMUST00000118362 | 3 | 10 | 4 Txndc11        | protein_coding       |
| ENSMUST00000076306 | 3 | 10 | 2 Prkag2         | protein_coding       |
| ENSMUST00000183437 | 3 | 10 | 2 Fam83b         | protein_coding       |
| ENSMUST00000121874 | 3 | 10 | 0 Gm4886         | processed_pseudogene |
| ENSMUST00000001599 | 3 | 9  | 34 Khl10         | protein_coding       |
| ENSMUST00000121750 | 3 | 9  | 2 Cpped1         | protein_coding       |
| ENSMUST00000151671 | 3 | 9  | 2 Clec12a        | protein_coding       |
| ENSMUST00000113997 | 3 | 9  | 24 Ppp6r3        | protein_coding       |
| ENSMUST00000059973 | 3 | 9  | 16 Plch1         | protein_coding       |
| ENSMUST00000171010 | 3 | 9  | 14 Gtf2e2        | protein_coding       |
| ENSMUST00000002839 | 3 | 9  | 0 Ppp2r5d        | protein_coding       |
| ENSMUST00000128048 | 3 | 9  | 0 Prmt2          | protein_coding       |
| ENSMUST00000118789 | 3 | 9  | 0 Gm6322         | processed_pseudogene |
| ENSMUST00000142109 | 3 | 9  | 0 5330434G04Rik  | lincRNA              |
| ENSMUST00000110367 | 3 | 8  | 139 Stox2        | protein_coding       |

|                     |   |   |                  |                      |
|---------------------|---|---|------------------|----------------------|
| ENSMUST00000027172  | 3 | 8 | 32 Ica1l         | protein_coding       |
| ENSMUST00000130152  | 3 | 8 | 18 Aff4          | protein_coding       |
| ENSMUST00000001611  | 3 | 8 | 16 Nom1          | protein_coding       |
| ENSMUST00000181721  | 3 | 8 | 16 Rmi2          | protein_coding       |
| ENSMUST00000111607  | 3 | 8 | 14 Far2          | protein_coding       |
| ENSMUST00000166229  | 3 | 8 | 8 Gm9725         | lincRNA              |
| ENSMUST00000137580  | 3 | 8 | 4 Rpl11          | protein_coding       |
| ENSMUST00000177696  | 3 | 8 | 4 Gm960          | protein_coding       |
| ENSMUST00000060992  | 3 | 8 | 0 Rtn4           | protein_coding       |
| ENSMUST00000125627  | 3 | 8 | 0 Hook1          | protein_coding       |
| ENSMUST00000127933  | 3 | 8 | 0 Myo9a          | protein_coding       |
| ENSMUST00000140534  | 3 | 8 | 0 Fam168b        | protein_coding       |
| ENSMUST00000163643  | 3 | 7 | 36 Eps15l1       | protein_coding       |
| ENSMUST00000030464  | 3 | 7 | 24 Pik3r3        | protein_coding       |
| ENSMUST00000042402  | 3 | 7 | 4 Pogz           | protein_coding       |
| ENSMUST00000049527  | 3 | 7 | 4 Prkar1a        | protein_coding       |
| ENSMUST00000039913  | 3 | 7 | 2 9630033F20Rik  | protein_coding       |
| ENSMUST00000166234  | 3 | 7 | 2 Rit1           | protein_coding       |
| ENSMUST00000040148  | 3 | 7 | 0 Bbs7           | protein_coding       |
| ENSMUST00000069620  | 3 | 7 | 0 Per2           | protein_coding       |
| ENSMUST00000148752  | 3 | 7 | 0 Wdr11          | protein_coding       |
| ENSMUST00000174105  | 3 | 7 | 0 Chek1          | protein_coding       |
| ENSMUST00000181907  | 3 | 7 | 0 Dmxl1          | protein_coding       |
| ENSMUST00000121859  | 3 | 7 | 0 Gm13935        | processed_pseudogene |
| ENSMUST00000030816  | 3 | 7 | 59 Dffa          | protein_coding       |
| ENSMUST00000056482  | 3 | 7 | 56 Itsn1         | protein_coding       |
| ENSMUST00000056617  | 3 | 7 | 30 Gpr133        | protein_coding       |
| ENSMUST00000156242  | 3 | 7 | 28 Gm10785       | processed_transcript |
| ENSMUST00000002825  | 3 | 7 | 24 Baz1b         | protein_coding       |
| ENSMUST00000134740  | 3 | 7 | 14 Ide           | protein_coding       |
| ENSMUST00000167816  | 3 | 7 | 12 Wdr25         | protein_coding       |
| ENSMUST000000089302 | 3 | 7 | 10 Usp9x         | protein_coding       |
| ENSMUST00000180898  | 3 | 7 | 10 Gm26697       | lincRNA              |
| ENSMUST00000118282  | 3 | 7 | 4 Atm            | protein_coding       |
| ENSMUST00000140857  | 3 | 7 | 2 Plekhm3        | protein_coding       |
| ENSMUST00000167679  | 3 | 7 | 2 Ptpro          | protein_coding       |
| ENSMUST00000041195  | 3 | 7 | 0 Ccdc81         | protein_coding       |
| ENSMUST00000108491  | 3 | 7 | 0 Ceacam3        | protein_coding       |
| ENSMUST00000115752  | 3 | 7 | 0 Ccnb3          | protein_coding       |
| ENSMUST00000182102  | 3 | 7 | 0 Slc22a27       | protein_coding       |
| ENSMUST00000129661  | 3 | 7 | 0 E530001K10Rik  | lincRNA              |
| ENSMUST00000150604  | 3 | 7 | 0 5330434G04Rik  | lincRNA              |
| ENSMUST00000163998  | 3 | 6 | 103 Gcom1        | protein_coding       |
| ENSMUST00000127573  | 3 | 6 | 67 Raph1         | protein_coding       |
| ENSMUST00000156953  | 3 | 6 | 65 Sntg2         | protein_coding       |
| ENSMUST00000068891  | 3 | 6 | 42 Rnf144b       | protein_coding       |
| ENSMUST00000184945  | 3 | 6 | 34 Nav2          | protein_coding       |
| ENSMUST00000145048  | 3 | 6 | 30 Tik2          | protein_coding       |
| ENSMUST00000092003  | 3 | 6 | 24 Asxl2         | protein_coding       |
| ENSMUST00000165096  | 3 | 6 | 24 Mvp           | protein_coding       |
| ENSMUST00000113698  | 3 | 6 | 22 C87436        | protein_coding       |
| ENSMUST00000128801  | 3 | 6 | 22 Rpl23         | protein_coding       |
| ENSMUST00000115675  | 3 | 6 | 20 Gripap1       | protein_coding       |
| ENSMUST00000006893  | 3 | 6 | 16 D130043K22Rik | protein_coding       |
| ENSMUST00000153838  | 3 | 6 | 10 Setd2         | protein_coding       |
| ENSMUST00000020223  | 3 | 6 | 8 Tcp1l12        | protein_coding       |
| ENSMUST00000034992  | 3 | 6 | 6 Nt5e           | protein_coding       |
| ENSMUST00000115266  | 3 | 6 | 6 Dock11         | protein_coding       |
| ENSMUST00000069180  | 3 | 6 | 4 Zcchc24        | protein_coding       |
| ENSMUST00000091504  | 3 | 6 | 4 Nmt2           | protein_coding       |
| ENSMUST00000123457  | 3 | 6 | 4 Hk1os          | antisense            |
| ENSMUST00000033671  | 3 | 6 | 2 Rps6ka3        | protein_coding       |
| ENSMUST00000110114  | 3 | 6 | 2 Asap1          | protein_coding       |
| ENSMUST00000028228  | 3 | 6 | 0 Cutal          | protein_coding       |
| ENSMUST00000034507  | 3 | 6 | 0 Sesn3          | protein_coding       |
| ENSMUST00000098639  | 3 | 6 | 0 1700049G17Rik  | protein_coding       |
| ENSMUST00000108856  | 3 | 6 | 0 Col20a1        | protein_coding       |
| ENSMUST00000112400  | 3 | 6 | 0 Gpr64          | protein_coding       |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000137542 | 3 | 6 | 0 Snx1          | protein_coding       |
| ENSMUST00000156731 | 3 | 6 | 0 Cerkl         | protein_coding       |
| ENSMUST00000166644 | 3 | 6 | 0 Ccdc144b      | protein_coding       |
| ENSMUST00000139144 | 3 | 6 | 0 0610009E02Rik | processed_transcript |
| ENSMUST00000127174 | 3 | 6 | 0 Gm12606       | lincRNA              |
| ENSMUST00000181864 | 3 | 6 | 0 Gm26843       | lincRNA              |
| ENSMUST00000138275 | 3 | 6 | 0 Gm14546       | antisense            |
| ENSMUST00000154848 | 3 | 6 | 0 Parvaos       | antisense            |
| ENSMUST00000007797 | 3 | 5 | 42 Gabrb2       | protein_coding       |
| ENSMUST00000032926 | 3 | 5 | 32 Tmem219      | protein_coding       |
| ENSMUST00000135169 | 3 | 5 | 24 Tnfrsf9      | protein_coding       |
| ENSMUST00000057632 | 3 | 5 | 22 Larp4        | protein_coding       |
| ENSMUST00000001583 | 3 | 5 | 20 Eli2         | protein_coding       |
| ENSMUST00000107804 | 3 | 5 | 18 Frmpd1       | protein_coding       |
| ENSMUST00000026577 | 3 | 5 | 14 Eps8l2       | protein_coding       |
| ENSMUST00000049721 | 3 | 5 | 10 Fam3b        | protein_coding       |
| ENSMUST00000120902 | 3 | 5 | 10 Depdc5       | protein_coding       |
| ENSMUST00000032510 | 3 | 5 | 6 Pzp           | protein_coding       |
| ENSMUST00000095456 | 3 | 5 | 6 Mcf2l         | protein_coding       |
| ENSMUST00000107284 | 3 | 5 | 6 Ezh1          | protein_coding       |
| ENSMUST00000124812 | 3 | 5 | 6 6430550D23Rik | protein_coding       |
| ENSMUST00000036136 | 3 | 5 | 2 Colec11       | protein_coding       |
| ENSMUST00000058615 | 3 | 5 | 2 Cir1          | protein_coding       |
| ENSMUST00000081710 | 3 | 5 | 2 Dync1i2       | protein_coding       |
| ENSMUST00000121108 | 3 | 5 | 2 Wdr95         | protein_coding       |
| ENSMUST00000125913 | 3 | 5 | 2 Ndufaf5       | protein_coding       |
| ENSMUST00000126663 | 3 | 5 | 2 Stk39         | protein_coding       |
| ENSMUST00000162372 | 3 | 5 | 2 Slc30a9       | protein_coding       |
| ENSMUST00000068411 | 3 | 5 | 0 Ccdc88c       | protein_coding       |
| ENSMUST00000096554 | 3 | 5 | 0 Apccd1        | protein_coding       |
| ENSMUST00000106650 | 3 | 5 | 0 Rab3b         | protein_coding       |
| ENSMUST00000108331 | 3 | 5 | 0 Zfp59         | protein_coding       |
| ENSMUST00000111161 | 3 | 5 | 0 Styxl1        | protein_coding       |
| ENSMUST00000142376 | 3 | 5 | 0 Osbpl2        | protein_coding       |
| ENSMUST00000152860 | 3 | 5 | 0 Ddx42         | protein_coding       |
| ENSMUST00000179429 | 3 | 5 | 0 Hsd3b4        | protein_coding       |
| ENSMUST00000180220 | 3 | 5 | 0 Gm3985        | lincRNA              |
| ENSMUST00000138503 | 3 | 5 | 105 Fgf13       | protein_coding       |
| ENSMUST00000039213 | 3 | 5 | 91 Iltk         | protein_coding       |
| ENSMUST00000051758 | 3 | 5 | 44 Vkorc111     | protein_coding       |
| ENSMUST00000115781 | 3 | 5 | 36 Apc          | protein_coding       |
| ENSMUST00000135803 | 3 | 5 | 28 Ralgds       | protein_coding       |
| ENSMUST00000036172 | 3 | 5 | 26 Sgpp2        | protein_coding       |
| ENSMUST00000021609 | 3 | 5 | 24 Golga5       | protein_coding       |
| ENSMUST00000036884 | 3 | 5 | 22 Klf9         | protein_coding       |
| ENSMUST00000114878 | 3 | 5 | 22 Parp9        | protein_coding       |
| ENSMUST00000027940 | 3 | 5 | 20 Tmem206      | protein_coding       |
| ENSMUST00000032191 | 3 | 5 | 20 Sumf1        | protein_coding       |
| ENSMUST00000165876 | 3 | 5 | 18 Map4         | protein_coding       |
| ENSMUST00000069066 | 3 | 5 | 14 Fam49a       | protein_coding       |
| ENSMUST00000058496 | 3 | 5 | 12 Taok1        | protein_coding       |
| ENSMUST00000184978 | 3 | 5 | 12 Col11a1      | protein_coding       |
| ENSMUST00000169003 | 3 | 5 | 10 Rbpms2       | protein_coding       |
| ENSMUST00000100403 | 3 | 5 | 8 Tmem106a      | protein_coding       |
| ENSMUST00000114541 | 3 | 5 | 8 Myo1b         | protein_coding       |
| ENSMUST00000129821 | 3 | 5 | 8 Tenm3         | protein_coding       |
| ENSMUST00000141722 | 3 | 5 | 8 Stxbp5        | protein_coding       |
| ENSMUST00000034775 | 3 | 5 | 6 Fem1b         | protein_coding       |
| ENSMUST00000066529 | 3 | 5 | 6 Npr3          | protein_coding       |
| ENSMUST00000076887 | 3 | 5 | 6 Rsph6a        | protein_coding       |
| ENSMUST00000107348 | 3 | 5 | 6 Alpk3         | protein_coding       |
| ENSMUST00000178561 | 3 | 5 | 6 E230008N13Rik | protein_coding       |
| ENSMUST00000020904 | 3 | 5 | 4 Rock2         | protein_coding       |
| ENSMUST00000047363 | 3 | 5 | 4 Iars          | protein_coding       |
| ENSMUST00000074248 | 3 | 5 | 4 Sh2d3c        | protein_coding       |
| ENSMUST00000136601 | 3 | 5 | 4 B230118H07Rik | protein_coding       |
| ENSMUST00000159684 | 3 | 5 | 4 Grip2         | protein_coding       |
| ENSMUST00000081574 | 3 | 5 | 2 Syt17         | protein_coding       |

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| ENSMUST00000126992  | 3 | 5 | 2 Rbm39           | protein_coding                     |
| ENSMUST00000181602  | 3 | 5 | 2 Gm26535         | lincRNA                            |
| ENSMUST00000022576  | 3 | 5 | 0 Cpb2            | protein_coding                     |
| ENSMUST00000024957  | 3 | 5 | 0 Pigf            | protein_coding                     |
| ENSMUST00000029850  | 3 | 5 | 0 Cryz            | protein_coding                     |
| ENSMUST00000048937  | 3 | 5 | 0 Leo1            | protein_coding                     |
| ENSMUST00000110203  | 3 | 5 | 0 Esrrb           | protein_coding                     |
| ENSMUST00000114766  | 3 | 5 | 0 Mtap7d3         | protein_coding                     |
| ENSMUST00000150826  | 3 | 5 | 0 Ccpg1           | protein_coding                     |
| ENSMUST00000155108  | 3 | 5 | 0 Stag1           | protein_coding                     |
| ENSMUST00000155666  | 3 | 5 | 0 Tbcd            | protein_coding                     |
| ENSMUST00000181316  | 3 | 4 | 176 1010001N08Rik | lincRNA                            |
| ENSMUST00000121782  | 3 | 4 | 24 Rnf43          | protein_coding                     |
| ENSMUST00000166172  | 3 | 4 | 24 Abl2           | protein_coding                     |
| ENSMUST00000115201  | 3 | 4 | 22 Dlg1           | protein_coding                     |
| ENSMUST00000032066  | 3 | 4 | 20 Tgfa           | protein_coding                     |
| ENSMUST00000113599  | 3 | 4 | 20 Gpr116         | protein_coding                     |
| ENSMUST00000022275  | 3 | 4 | 18 Ankrd55        | protein_coding                     |
| ENSMUST00000110725  | 3 | 4 | 16 Arhgap5        | protein_coding                     |
| ENSMUST00000177079  | 3 | 4 | 14 Gm20657        | unprocessed_pseudogene             |
| ENSMUST00000052135  | 3 | 4 | 14 Rbbp6          | protein_coding                     |
| ENSMUST00000092406  | 3 | 4 | 14 2610028H24Rik  | protein_coding                     |
| ENSMUST00000108695  | 3 | 4 | 14 Myocd          | protein_coding                     |
| ENSMUST00000109252  | 3 | 4 | 14 Ncoa3          | protein_coding                     |
| ENSMUST00000137570  | 3 | 4 | 14 Gm12830        | protein_coding                     |
| ENSMUST00000072237  | 3 | 4 | 12 Mink1          | protein_coding                     |
| ENSMUST00000089293  | 3 | 4 | 10 Cbx7           | protein_coding                     |
| ENSMUST00000113592  | 3 | 4 | 10 Prrx2          | protein_coding                     |
| ENSMUST00000028761  | 3 | 4 | 8 Ubox5           | protein_coding                     |
| ENSMUST00000034121  | 3 | 4 | 8 Man2b1          | protein_coding                     |
| ENSMUST00000100064  | 3 | 4 | 8 Scn9a           | protein_coding                     |
| ENSMUST00000101197  | 3 | 4 | 8 Arhgap25        | protein_coding                     |
| ENSMUST00000181963  | 3 | 4 | 8 Gm26899         | lincRNA                            |
| ENSMUST00000124532  | 3 | 4 | 6 Cdkal1          | protein_coding                     |
| ENSMUST00000144925  | 3 | 4 | 6 Prss32          | protein_coding                     |
| ENSMUST00000154755  | 3 | 4 | 6 Hhat            | protein_coding                     |
| ENSMUST00000130218  | 3 | 4 | 4 Mettl4-ps1      | transcribed_unprocessed_pseudogene |
| ENSMUST00000017851  | 3 | 4 | 4 Serinc3         | protein_coding                     |
| ENSMUST00000121153  | 3 | 4 | 4 Rlim            | protein_coding                     |
| ENSMUST00000137446  | 3 | 4 | 4 Tm9sf4          | protein_coding                     |
| ENSMUST00000164007  | 3 | 4 | 4 Cd200r3         | protein_coding                     |
| ENSMUST00000168743  | 3 | 4 | 4 Npepps          | protein_coding                     |
| ENSMUST00000172964  | 3 | 4 | 4 Ggyf2           | protein_coding                     |
| ENSMUST00000026599  | 3 | 4 | 2 Apool           | protein_coding                     |
| ENSMUST00000044387  | 3 | 4 | 2 2010107G12Rik   | protein_coding                     |
| ENSMUST00000060077  | 3 | 4 | 2 Cpox            | protein_coding                     |
| ENSMUST00000079391  | 3 | 4 | 2 Cald1           | protein_coding                     |
| ENSMUST00000081551  | 3 | 4 | 2 Tcea1           | protein_coding                     |
| ENSMUST00000109854  | 3 | 4 | 2 Evl             | protein_coding                     |
| ENSMUST00000139099  | 3 | 4 | 2 Ccdc157         | protein_coding                     |
| ENSMUST00000178198  | 3 | 4 | 2 Gm20736         | protein_coding                     |
| ENSMUST00000178673  | 3 | 4 | 2 Gm21258         | protein_coding                     |
| ENSMUST00000008582  | 3 | 4 | 0 Adam21          | protein_coding                     |
| ENSMUST00000022226  | 3 | 4 | 0 Ppwd1           | protein_coding                     |
| ENSMUST00000031090  | 3 | 4 | 0 Sel1l3          | protein_coding                     |
| ENSMUST00000032723  | 3 | 4 | 0 Snrpa1          | protein_coding                     |
| ENSMUST00000057977  | 3 | 4 | 0 A730049H05Rik   | protein_coding                     |
| ENSMUST000000094499 | 3 | 4 | 0 Kif1c           | protein_coding                     |
| ENSMUST00000098614  | 3 | 4 | 0 Zfp827          | protein_coding                     |
| ENSMUST00000102582  | 3 | 4 | 0 Acacb           | protein_coding                     |
| ENSMUST00000112091  | 3 | 4 | 0 Rab9            | protein_coding                     |
| ENSMUST00000125218  | 3 | 4 | 0 Orc3            | protein_coding                     |
| ENSMUST00000141397  | 3 | 4 | 0 4930558K02Rik   | protein_coding                     |
| ENSMUST00000144346  | 3 | 4 | 0 Gm609           | protein_coding                     |
| ENSMUST00000151020  | 3 | 4 | 0 Dlg3            | protein_coding                     |
| ENSMUST00000163925  | 3 | 4 | 0 4930555F03Rik   | protein_coding                     |
| ENSMUST00000164342  | 3 | 4 | 0 Tjap1           | protein_coding                     |
| ENSMUST00000177648  | 3 | 4 | 0 Cldn14          | protein_coding                     |

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| ENSMUST00000001812 | 3 | 3 | 1414 Smo         | protein_coding       |
| ENSMUST00000044524 | 3 | 3 | 71 Dap           | protein_coding       |
| ENSMUST00000101448 | 3 | 3 | 50 Drc1          | protein_coding       |
| ENSMUST00000003017 | 3 | 3 | 48 Tbxas1        | protein_coding       |
| ENSMUST00000174681 | 3 | 3 | 34 Pax7          | protein_coding       |
| ENSMUST00000063854 | 3 | 3 | 30 Ppp4r2        | protein_coding       |
| ENSMUST00000134150 | 3 | 3 | 28 Batf2         | protein_coding       |
| ENSMUST00000171410 | 3 | 3 | 28 Cse1l         | protein_coding       |
| ENSMUST00000181538 | 3 | 3 | 28 Gm4221        | lincRNA              |
| ENSMUST00000124648 | 3 | 3 | 26 Tesc          | protein_coding       |
| ENSMUST00000022136 | 3 | 3 | 24 Rad17         | protein_coding       |
| ENSMUST00000105840 | 3 | 3 | 22 Usp48         | protein_coding       |
| ENSMUST00000131501 | 3 | 3 | 22 D030028A08Rik | processed_transcript |
| ENSMUST00000033158 | 3 | 3 | 20 Ubfd1         | protein_coding       |
| ENSMUST00000038369 | 3 | 3 | 20 Cipc          | protein_coding       |
| ENSMUST00000055438 | 3 | 3 | 16 Ppm1e         | protein_coding       |
| ENSMUST00000070000 | 3 | 3 | 16 Arhgap24      | protein_coding       |
| ENSMUST00000119341 | 3 | 3 | 16 Cap2          | protein_coding       |
| ENSMUST00000152564 | 3 | 3 | 16 4932438A13Rik | protein_coding       |
| ENSMUST00000176454 | 3 | 3 | 16 Gm20662       | protein_coding       |
| ENSMUST00000027706 | 3 | 3 | 14 Lrrn2         | protein_coding       |
| ENSMUST00000128291 | 3 | 3 | 14 Hormad1       | protein_coding       |
| ENSMUST00000028648 | 3 | 3 | 8 Syt13          | protein_coding       |
| ENSMUST00000076270 | 3 | 3 | 8 Rabep1         | protein_coding       |
| ENSMUST00000109702 | 3 | 3 | 8 Zfp341         | protein_coding       |
| ENSMUST00000114653 | 3 | 3 | 8 Fmr1           | protein_coding       |
| ENSMUST00000065900 | 3 | 3 | 6 Hhip12         | protein_coding       |
| ENSMUST00000111290 | 3 | 3 | 6 Phf21a         | protein_coding       |
| ENSMUST00000163701 | 3 | 3 | 6 Dzank1         | protein_coding       |
| ENSMUST00000145801 | 3 | 3 | 6 A330102I10Rik  | lincRNA              |
| ENSMUST00000126286 | 3 | 3 | 6 Gm14820        | antisense            |
| ENSMUST00000035057 | 3 | 3 | 4 Smarcc1        | protein_coding       |
| ENSMUST00000035057 | 3 | 3 | 4 Smarcc1        | protein_coding       |
| ENSMUST00000033321 | 3 | 3 | 4 Cask           | protein_coding       |
| ENSMUST00000033339 | 3 | 3 | 4 Trim66         | protein_coding       |
| ENSMUST00000060397 | 3 | 3 | 4 Rfx4           | protein_coding       |
| ENSMUST00000070659 | 3 | 3 | 4 1700001K19Rik  | protein_coding       |
| ENSMUST00000088041 | 3 | 3 | 4 Ptgis          | protein_coding       |
| ENSMUST00000167925 | 3 | 3 | 4 Il5ra          | protein_coding       |
| ENSMUST00000169978 | 3 | 3 | 4 Epsti1         | protein_coding       |
| ENSMUST00000177094 | 3 | 3 | 4 Gnb1           | protein_coding       |
| ENSMUST00000182597 | 3 | 3 | 4 Birc6          | protein_coding       |
| ENSMUST00000023364 | 3 | 3 | 2 Pla2g10        | protein_coding       |
| ENSMUST00000035918 | 3 | 3 | 2 Cyp3a11        | protein_coding       |
| ENSMUST00000086199 | 3 | 3 | 2 Glul           | protein_coding       |
| ENSMUST00000096194 | 3 | 3 | 2 Tmem2          | protein_coding       |
| ENSMUST00000106908 | 3 | 3 | 2 Pde4b          | protein_coding       |
| ENSMUST00000114202 | 3 | 3 | 2 Cyp20a1        | protein_coding       |
| ENSMUST00000114764 | 3 | 3 | 2 Slc26a8        | protein_coding       |
| ENSMUST00000117785 | 3 | 3 | 2 Robo2          | protein_coding       |
| ENSMUST00000152288 | 3 | 3 | 2 Emd            | protein_coding       |
| ENSMUST00000172431 | 3 | 3 | 2 Gm3512         | protein_coding       |
| ENSMUST00000179970 | 3 | 3 | 2 Gm21477        | protein_coding       |
| ENSMUST00000016026 | 3 | 3 | 0 Lcorl          | protein_coding       |
| ENSMUST00000018988 | 3 | 3 | 0 Fndc8          | protein_coding       |
| ENSMUST00000020485 | 3 | 3 | 0 Glt8d2         | protein_coding       |
| ENSMUST00000021603 | 3 | 3 | 0 Fbln5          | protein_coding       |
| ENSMUST00000027859 | 3 | 3 | 0 Tbx19          | protein_coding       |
| ENSMUST00000041551 | 3 | 3 | 0 Aagab          | protein_coding       |
| ENSMUST00000054098 | 3 | 3 | 0 Slc35g1        | protein_coding       |
| ENSMUST00000057194 | 3 | 3 | 0 Lrrc75a        | protein_coding       |
| ENSMUST00000068437 | 3 | 3 | 0 Smyd3          | protein_coding       |
| ENSMUST00000068879 | 3 | 3 | 0 Rsbn1          | protein_coding       |
| ENSMUST00000070515 | 3 | 3 | 0 Ephx2          | protein_coding       |
| ENSMUST00000077741 | 3 | 3 | 0 Slc9a6         | protein_coding       |
| ENSMUST00000079020 | 3 | 3 | 0 Slc24a4        | protein_coding       |
| ENSMUST00000094917 | 3 | 3 | 0 Tmem237        | protein_coding       |
| ENSMUST00000100001 | 3 | 3 | 0 Dlg1           | protein_coding       |

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| ENSMUST00000102718 | 3 | 3 | 0 Ttc21b         | protein_coding                   |
| ENSMUST00000111017 | 3 | 3 | 0 Muc15          | protein_coding                   |
| ENSMUST00000117200 | 3 | 3 | 0 Robo2          | protein_coding                   |
| ENSMUST00000141693 | 3 | 3 | 0 Itga3          | protein_coding                   |
| ENSMUST00000143280 | 3 | 3 | 0 Smg8           | protein_coding                   |
| ENSMUST00000146526 | 3 | 3 | 0 Gins2          | protein_coding                   |
| ENSMUST00000153047 | 3 | 3 | 0 Slc25a14       | protein_coding                   |
| ENSMUST00000156665 | 3 | 3 | 0 Fam179a        | protein_coding                   |
| ENSMUST00000160638 | 3 | 3 | 0 Plch1          | protein_coding                   |
| ENSMUST00000170819 | 3 | 3 | 0 Rab11fip2      | protein_coding                   |
| ENSMUST00000176343 | 3 | 3 | 0 Sqrdl          | protein_coding                   |
| ENSMUST00000177834 | 3 | 3 | 0 Gm21858        | protein_coding                   |
| ENSMUST00000180518 | 3 | 3 | 0 Gm2093         | lincRNA                          |
| ENSMUST00000180585 | 3 | 3 | 0 Gm17473        | lincRNA                          |
| ENSMUST00000130699 | 3 | 3 | 0 Pard3bos1      | antisense                        |
| ENSMUST00000135902 | 3 | 3 | 0 Gm12910        | antisense                        |
| ENSMUST00000183244 | 3 | 3 | 0 Gm4665         | antisense                        |
| ENSMUST00000069449 | 3 | 3 | 147 Rras2        | protein_coding                   |
| ENSMUST00000040077 | 3 | 3 | 63 Polr2f        | protein_coding                   |
| ENSMUST00000119633 | 3 | 3 | 63 Fam45a        | protein_coding                   |
| ENSMUST00000129362 | 3 | 3 | 34 Smoc1         | protein_coding                   |
| ENSMUST00000120757 | 3 | 3 | 32 Slc5a4b       | protein_coding                   |
| ENSMUST00000103013 | 3 | 3 | 30 Tbcd          | protein_coding                   |
| ENSMUST00000119092 | 3 | 3 | 30 Prkch         | protein_coding                   |
| ENSMUST00000090938 | 3 | 3 | 28 Dap3          | protein_coding                   |
| ENSMUST00000146038 | 3 | 3 | 28 Srrm3         | protein_coding                   |
| ENSMUST00000032359 | 3 | 3 | 26 Aebp2         | protein_coding                   |
| ENSMUST00000113726 | 3 | 3 | 26 Rbm47         | protein_coding                   |
| ENSMUST00000172422 | 3 | 3 | 24 Gpr107        | protein_coding                   |
| ENSMUST00000023728 | 3 | 3 | 22 4930415O20Rik | protein_coding                   |
| ENSMUST00000070117 | 3 | 3 | 20 Cnot10        | protein_coding                   |
| ENSMUST00000105854 | 3 | 3 | 16 Myom3         | protein_coding                   |
| ENSMUST00000112389 | 3 | 3 | 16 Map4k3        | protein_coding                   |
| ENSMUST00000129349 | 3 | 3 | 16 Tsc22d4       | protein_coding                   |
| ENSMUST00000170489 | 3 | 3 | 16 Ddx6          | protein_coding                   |
| ENSMUST00000155074 | 3 | 3 | 16 Rsf1os2       | processed_transcript             |
| ENSMUST00000021907 | 3 | 3 | 14 Fbp2          | protein_coding                   |
| ENSMUST00000042275 | 3 | 3 | 12 Inpp5d        | protein_coding                   |
| ENSMUST00000095778 | 3 | 3 | 12 Rcbtb1        | protein_coding                   |
| ENSMUST00000153203 | 3 | 3 | 12 Stoml2        | protein_coding                   |
| ENSMUST00000163313 | 3 | 3 | 12 Baalc         | protein_coding                   |
| ENSMUST00000006444 | 3 | 3 | 10 Tep1          | protein_coding                   |
| ENSMUST00000040179 | 3 | 3 | 10 Ttlf5         | protein_coding                   |
| ENSMUST00000069828 | 3 | 3 | 10 Thsd1         | protein_coding                   |
| ENSMUST00000107803 | 3 | 3 | 10 Smc4          | protein_coding                   |
| ENSMUST00000112308 | 3 | 3 | 10 Lrpprc        | protein_coding                   |
| ENSMUST00000155880 | 3 | 3 | 10 Whsc1         | protein_coding                   |
| ENSMUST00000129337 | 3 | 3 | 10 Gm11508       | antisense                        |
| ENSMUST00000059190 | 3 | 3 | 8 6330549D23Rik  | transcribed_processed_pseudogene |
| ENSMUST00000179893 | 3 | 3 | 8 Ryr1           | protein_coding                   |
| ENSMUST00000013304 | 3 | 3 | 6 Atp6v0d1       | protein_coding                   |
| ENSMUST00000106138 | 3 | 3 | 6 Prkacb         | protein_coding                   |
| ENSMUST00000155488 | 3 | 3 | 6 Fanca          | protein_coding                   |
| ENSMUST00000013294 | 3 | 3 | 4 Gfod2          | protein_coding                   |
| ENSMUST00000109703 | 3 | 3 | 4 Pxmp4          | protein_coding                   |
| ENSMUST00000115700 | 3 | 3 | 4 Ube2l3         | protein_coding                   |
| ENSMUST00000136892 | 3 | 3 | 4 Pgbd5          | protein_coding                   |
| ENSMUST00000148949 | 3 | 3 | 4 Ctps2          | protein_coding                   |
| ENSMUST00000155139 | 3 | 3 | 4 Dcps           | protein_coding                   |
| ENSMUST00000171409 | 3 | 3 | 4 Micu1          | protein_coding                   |
| ENSMUST00000011526 | 3 | 3 | 2 Dhdh           | protein_coding                   |
| ENSMUST00000027966 | 3 | 3 | 2 Fcgr2b         | protein_coding                   |
| ENSMUST00000047714 | 3 | 3 | 2 Kdm5b          | protein_coding                   |
| ENSMUST00000079594 | 3 | 3 | 2 Abca3          | protein_coding                   |
| ENSMUST00000090461 | 3 | 3 | 2 Fyb            | protein_coding                   |
| ENSMUST00000093342 | 3 | 3 | 2 4933402J07Rik  | protein_coding                   |
| ENSMUST00000108433 | 3 | 3 | 2 Slc43a2        | protein_coding                   |
| ENSMUST00000123049 | 3 | 3 | 2 4930402H24Rik  | protein_coding                   |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000149037 | 3 | 3 | 2 Agbl2         | protein_coding       |
| ENSMUST00000152929 | 3 | 3 | 2 Trim44        | protein_coding       |
| ENSMUST00000170046 | 3 | 3 | 2 Mtbp          | protein_coding       |
| ENSMUST00000177536 | 3 | 3 | 2 Trip11        | protein_coding       |
| ENSMUST00000123581 | 3 | 3 | 2 A430035B10Rik | processed_transcript |
| ENSMUST00000125494 | 3 | 3 | 2 4930419G24Rik | antisense            |
| ENSMUST00000016768 | 3 | 3 | 0 Phf21b        | protein_coding       |
| ENSMUST00000020662 | 3 | 3 | 0 Kremen1       | protein_coding       |
| ENSMUST00000036074 | 3 | 3 | 0 Gmip          | protein_coding       |
| ENSMUST00000038446 | 3 | 3 | 0 Myl12b        | protein_coding       |
| ENSMUST00000047045 | 3 | 3 | 0 Acsm4         | protein_coding       |
| ENSMUST00000049577 | 3 | 3 | 0 Adam26a       | protein_coding       |
| ENSMUST00000063838 | 3 | 3 | 0 Fam49b        | protein_coding       |
| ENSMUST00000065785 | 3 | 3 | 0 Trim50        | protein_coding       |
| ENSMUST00000071104 | 3 | 3 | 0 Krt72         | protein_coding       |
| ENSMUST00000087867 | 3 | 3 | 0 Uppt          | protein_coding       |
| ENSMUST00000089906 | 3 | 3 | 0 Zfp951        | protein_coding       |
| ENSMUST00000110350 | 3 | 3 | 0 Prl8a8        | protein_coding       |
| ENSMUST00000111481 | 3 | 3 | 0 Agbl2         | protein_coding       |
| ENSMUST00000112198 | 3 | 3 | 0 Kdm5b         | protein_coding       |
| ENSMUST00000114357 | 3 | 3 | 0 St3gal6       | protein_coding       |
| ENSMUST00000120087 | 3 | 3 | 0 Samd9l        | protein_coding       |
| ENSMUST00000130356 | 3 | 3 | 0 Usp50         | protein_coding       |
| ENSMUST00000133180 | 3 | 3 | 0 Tmem50b       | protein_coding       |
| ENSMUST00000133392 | 3 | 3 | 0 Nlrp4e        | protein_coding       |
| ENSMUST00000135742 | 3 | 3 | 0 Xlr5b         | protein_coding       |
| ENSMUST00000138504 | 3 | 3 | 0 Pramel6       | protein_coding       |
| ENSMUST00000139605 | 3 | 3 | 0 Fxr2          | protein_coding       |
| ENSMUST00000142949 | 3 | 3 | 0 Ufl1          | protein_coding       |
| ENSMUST00000143055 | 3 | 3 | 0 Tnfrsf1b      | protein_coding       |
| ENSMUST00000159725 | 3 | 3 | 0 Inpp1         | protein_coding       |
| ENSMUST00000162032 | 3 | 3 | 0 Adh1          | protein_coding       |
| ENSMUST00000163783 | 3 | 3 | 0 Cdh16         | protein_coding       |
| ENSMUST00000169496 | 3 | 3 | 0 Usf2          | protein_coding       |
| ENSMUST00000169668 | 3 | 3 | 0 Man2a1        | protein_coding       |
| ENSMUST00000172429 | 3 | 3 | 0 Prr3          | protein_coding       |
| ENSMUST00000181690 | 3 | 3 | 0 Gm26844       | lincRNA              |
| ENSMUST00000152069 | 3 | 3 | 0 Gm12446       | antisense            |
| ENSMUST00000152570 | 3 | 3 | 0 Gm15511       | antisense            |
| ENSMUST00000155017 | 3 | 2 | 44 Gm28053      | protein_coding       |
| ENSMUST00000013615 | 3 | 2 | 34 Srrm3        | protein_coding       |
| ENSMUST00000085420 | 3 | 2 | 32 Car12        | protein_coding       |
| ENSMUST00000182310 | 3 | 2 | 28 Arhgap32     | protein_coding       |
| ENSMUST00000026269 | 3 | 2 | 22 Limd1        | protein_coding       |
| ENSMUST00000066748 | 3 | 2 | 22 Papd5        | protein_coding       |
| ENSMUST00000034692 | 3 | 2 | 16 Olfm2        | protein_coding       |
| ENSMUST00000107798 | 3 | 2 | 16 Dcaf10       | protein_coding       |
| ENSMUST00000156172 | 3 | 2 | 16 Map7d2       | protein_coding       |
| ENSMUST00000159012 | 3 | 2 | 16 Itga11       | protein_coding       |
| ENSMUST00000134718 | 3 | 2 | 14 Arid4a       | protein_coding       |
| ENSMUST00000127134 | 3 | 2 | 12 Ruffy4       | protein_coding       |
| ENSMUST00000171330 | 3 | 2 | 12 Slamf6       | protein_coding       |
| ENSMUST00000031189 | 3 | 2 | 10 Pigg         | protein_coding       |
| ENSMUST00000049091 | 3 | 2 | 10 Cox10        | protein_coding       |
| ENSMUST00000113915 | 3 | 2 | 10 Kihl15       | protein_coding       |
| ENSMUST00000130454 | 3 | 2 | 10 Tead4        | protein_coding       |
| ENSMUST00000174881 | 3 | 2 | 10 Rgs22        | protein_coding       |
| ENSMUST00000023147 | 3 | 2 | 8 Ciita         | protein_coding       |
| ENSMUST00000032203 | 3 | 2 | 8 A2m           | protein_coding       |
| ENSMUST00000126341 | 3 | 2 | 8 Pafah1b1      | protein_coding       |
| ENSMUST00000169617 | 3 | 2 | 8 Atp10d        | processed_transcript |
| ENSMUST00000097707 | 3 | 2 | 6 Pikfyve       | protein_coding       |
| ENSMUST00000100721 | 3 | 2 | 6 Vstm4         | protein_coding       |
| ENSMUST00000101281 | 3 | 2 | 6 Gm10451       | protein_coding       |
| ENSMUST00000126533 | 3 | 2 | 6 Armc7         | protein_coding       |
| ENSMUST00000035540 | 3 | 2 | 4 Phf2          | protein_coding       |
| ENSMUST00000086801 | 3 | 2 | 4 Rfx2          | protein_coding       |
| ENSMUST00000090247 | 3 | 2 | 4 Trio          | protein_coding       |

|                     |   |   |                 |                                    |
|---------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000133381  | 3 | 2 | 4 Dok7          | protein_coding                     |
| ENSMUST00000150988  | 3 | 2 | 4 Abca6         | protein_coding                     |
| ENSMUST00000183048  | 3 | 2 | 4 Zfp236        | protein_coding                     |
| ENSMUST00000147411  | 3 | 2 | 4 A530058N18Rik | processed_transcript               |
| ENSMUST00000177106  | 3 | 2 | 2 Gm20614       | unitary_pseudogene                 |
| ENSMUST00000020941  | 3 | 2 | 2 1700012B07Rik | protein_coding                     |
| ENSMUST00000025411  | 3 | 2 | 2 Slmo1         | protein_coding                     |
| ENSMUST00000035037  | 3 | 2 | 2 Pik3cb        | protein_coding                     |
| ENSMUST00000039827  | 3 | 2 | 2 Aff3          | protein_coding                     |
| ENSMUST00000056237  | 3 | 2 | 2 Prmt10        | protein_coding                     |
| ENSMUST00000086878  | 3 | 2 | 2 St6gal2       | protein_coding                     |
| ENSMUST00000106426  | 3 | 2 | 2 Synpo2        | protein_coding                     |
| ENSMUST00000111394  | 3 | 2 | 2 Ncor2         | protein_coding                     |
| ENSMUST00000125409  | 3 | 2 | 2 Dhx8          | protein_coding                     |
| ENSMUST00000136059  | 3 | 2 | 2 Cdc42se2      | protein_coding                     |
| ENSMUST00000136348  | 3 | 2 | 2 Bcorl1        | protein_coding                     |
| ENSMUST00000141933  | 3 | 2 | 2 Stil          | protein_coding                     |
| ENSMUST00000160776  | 3 | 2 | 2 Tbce          | protein_coding                     |
| ENSMUST00000173345  | 3 | 2 | 2 Unc13d        | protein_coding                     |
| ENSMUST00000180213  | 3 | 2 | 0 Muc19         | protein_coding                     |
| ENSMUST00000180213  | 3 | 2 | 0 Muc19         | protein_coding                     |
| ENSMUST00000056767  | 3 | 2 | 0 Gm9244        | unprocessed_pseudogene             |
| ENSMUST00000121631  | 3 | 2 | 0 Gm5843        | unprocessed_pseudogene             |
| ENSMUST00000167383  | 3 | 2 | 0 Slco6b1       | transcribed_unprocessed_pseudogene |
| ENSMUST00000000687  | 3 | 2 | 0 Haao          | protein_coding                     |
| ENSMUST00000014686  | 3 | 2 | 0 Clec4f        | protein_coding                     |
| ENSMUST00000016672  | 3 | 2 | 0 Mapkapk2      | protein_coding                     |
| ENSMUST00000025490  | 3 | 2 | 0 Prrc1         | protein_coding                     |
| ENSMUST00000035112  | 3 | 2 | 0 Nktr          | protein_coding                     |
| ENSMUST00000051803  | 3 | 2 | 0 Aldh3b1       | protein_coding                     |
| ENSMUST00000053699  | 3 | 2 | 0 Secisbp2l     | protein_coding                     |
| ENSMUST000000063112 | 3 | 2 | 0 Defb6         | protein_coding                     |
| ENSMUST00000069456  | 3 | 2 | 0 Ncor1         | protein_coding                     |
| ENSMUST00000094365  | 3 | 2 | 0 Car1          | protein_coding                     |
| ENSMUST00000106919  | 3 | 2 | 0 B020004J07Rik | protein_coding                     |
| ENSMUST00000107952  | 3 | 2 | 0 Unc13b        | protein_coding                     |
| ENSMUST00000112487  | 3 | 2 | 0 Fez2          | protein_coding                     |
| ENSMUST00000116614  | 3 | 2 | 0 Gm4907        | protein_coding                     |
| ENSMUST00000121083  | 3 | 2 | 0 Fam115a       | protein_coding                     |
| ENSMUST00000124565  | 3 | 2 | 0 Ccpg1os       | protein_coding                     |
| ENSMUST00000125547  | 3 | 2 | 0 Oas1c         | protein_coding                     |
| ENSMUST00000142315  | 3 | 2 | 0 Sfi1          | protein_coding                     |
| ENSMUST00000147077  | 3 | 2 | 0 Ppih          | protein_coding                     |
| ENSMUST00000160468  | 3 | 2 | 0 Il18rap       | protein_coding                     |
| ENSMUST00000167707  | 3 | 2 | 0 Lppr3         | protein_coding                     |
| ENSMUST00000170790  | 3 | 2 | 0 Gm10340       | protein_coding                     |
| ENSMUST00000170862  | 3 | 2 | 0 Csnk1a1       | protein_coding                     |
| ENSMUST00000174588  | 3 | 2 | 0 Vps52         | protein_coding                     |
| ENSMUST00000178728  | 3 | 2 | 0 Gm3005        | protein_coding                     |
| ENSMUST00000180787  | 3 | 2 | 0 Gm18336       | processed_pseudogene               |
| ENSMUST00000129933  | 3 | 2 | 0 Gm15199       | antisense                          |
| ENSMUST00000152925  | 3 | 2 | 0 Gm11651       | antisense                          |
| ENSMUST00000183674  | 3 | 1 | 75 Zfp572       | transcribed_processed_pseudogene   |
| ENSMUST00000160483  | 3 | 1 | 73 Sytl3        | protein_coding                     |
| ENSMUST00000025668  | 3 | 1 | 65 Ati3         | protein_coding                     |
| ENSMUST00000074733  | 3 | 1 | 57 Sept11       | protein_coding                     |
| ENSMUST00000109485  | 3 | 1 | 42 Ralgapb      | protein_coding                     |
| ENSMUST000000034163 | 3 | 1 | 38 Zfp821       | protein_coding                     |
| ENSMUST00000035539  | 3 | 1 | 34 Dnah2        | protein_coding                     |
| ENSMUST00000105235  | 3 | 1 | 28 Smarcc2      | protein_coding                     |
| ENSMUST00000145368  | 3 | 1 | 26 Capzb        | protein_coding                     |
| ENSMUST00000105238  | 3 | 1 | 22 Stat2        | protein_coding                     |
| ENSMUST00000028024  | 3 | 1 | 20 Tnfsf4       | protein_coding                     |
| ENSMUST00000111287  | 3 | 1 | 20 Caln1        | protein_coding                     |
| ENSMUST00000002063  | 3 | 1 | 18 Ap4e1        | protein_coding                     |
| ENSMUST00000029839  | 3 | 1 | 18 Spata1       | protein_coding                     |
| ENSMUST00000094294  | 3 | 1 | 18 Pwwp2a       | protein_coding                     |
| ENSMUST00000127066  | 3 | 1 | 18 Spag9        | protein_coding                     |



|                     |   |   |                  |                        |
|---------------------|---|---|------------------|------------------------|
| ENSMUST00000026506  | 3 | 1 | 16 Clns1a        | protein_coding         |
| ENSMUST00000160139  | 3 | 1 | 16 Gfm2          | protein_coding         |
| ENSMUST00000098226  | 3 | 1 | 16 1700026J12Rik | lincRNA                |
| ENSMUST00000068994  | 3 | 1 | 14 Rtkn2         | protein_coding         |
| ENSMUST00000148464  | 3 | 1 | 14 Gm16191       | antisense              |
| ENSMUST00000023732  | 3 | 1 | 12 Wnt10b        | protein_coding         |
| ENSMUST00000125652  | 3 | 1 | 12 Diablo        | protein_coding         |
| ENSMUST00000175866  | 3 | 1 | 12 Zfhx4         | protein_coding         |
| ENSMUST00000129696  | 3 | 1 | 12 Gm16151       | antisense              |
| ENSMUST00000016640  | 3 | 1 | 10 Cd274         | protein_coding         |
| ENSMUST00000049005  | 3 | 1 | 10 Bmpr1a        | protein_coding         |
| ENSMUST00000178704  | 3 | 1 | 10 Ddc           | protein_coding         |
| ENSMUST00000137598  | 3 | 1 | 10 Gm11614       | antisense              |
| ENSMUST00000018625  | 3 | 1 | 8 Appbp2         | protein_coding         |
| ENSMUST00000037788  | 3 | 1 | 8 Pomt2          | protein_coding         |
| ENSMUST00000076730  | 3 | 1 | 8 Gm1123         | protein_coding         |
| ENSMUST00000109213  | 3 | 1 | 8 Trim7          | protein_coding         |
| ENSMUST00000125187  | 3 | 1 | 8 Gap43          | protein_coding         |
| ENSMUST00000177738  | 3 | 1 | 8 Rbm10          | protein_coding         |
| ENSMUST00000177891  | 3 | 1 | 8 Gm5108         | protein_coding         |
| ENSMUST00000182987  | 3 | 1 | 8 Rbpms          | protein_coding         |
| ENSMUST00000034941  | 3 | 1 | 6 Plscr4         | protein_coding         |
| ENSMUST00000049811  | 3 | 1 | 6 Cep120         | protein_coding         |
| ENSMUST00000094632  | 3 | 1 | 6 Sars2          | protein_coding         |
| ENSMUST00000095914  | 3 | 1 | 6 Dusp22         | protein_coding         |
| ENSMUST00000101341  | 3 | 1 | 6 Taf1           | protein_coding         |
| ENSMUST00000112568  | 3 | 1 | 6 Tanc1          | protein_coding         |
| ENSMUST00000124784  | 3 | 1 | 6 Pbld1          | protein_coding         |
| ENSMUST00000138363  | 3 | 1 | 6 Adam12         | protein_coding         |
| ENSMUST00000027736  | 3 | 1 | 4 Zc3h11a        | protein_coding         |
| ENSMUST00000087313  | 3 | 1 | 4 Dcx            | protein_coding         |
| ENSMUST00000106236  | 3 | 1 | 4 Unc5c          | protein_coding         |
| ENSMUST00000113627  | 3 | 1 | 4 Pin4           | protein_coding         |
| ENSMUST00000153799  | 3 | 1 | 4 Sox13          | protein_coding         |
| ENSMUST00000168615  | 3 | 1 | 4 Rlf            | protein_coding         |
| ENSMUST00000168588  | 3 | 1 | 2 Gm14625        | unprocessed_pseudogene |
| ENSMUST00000168588  | 3 | 1 | 2 Gm14625        | unprocessed_pseudogene |
| ENSMUST00000119548  | 3 | 1 | 2 Gm14554        | unprocessed_pseudogene |
| ENSMUST00000017384  | 3 | 1 | 2 Casc3          | protein_coding         |
| ENSMUST00000045105  | 3 | 1 | 2 Spire1         | protein_coding         |
| ENSMUST00000073884  | 3 | 1 | 2 Nrg1           | protein_coding         |
| ENSMUST00000084116  | 3 | 1 | 2 Nol9           | protein_coding         |
| ENSMUST00000098950  | 3 | 1 | 2 Elavl1         | protein_coding         |
| ENSMUST00000108971  | 3 | 1 | 2 Dip2b          | protein_coding         |
| ENSMUST00000117164  | 3 | 1 | 2 Npnt           | protein_coding         |
| ENSMUST00000139966  | 3 | 1 | 2 Whsc111        | protein_coding         |
| ENSMUST00000151991  | 3 | 1 | 2 Gpr107         | protein_coding         |
| ENSMUST00000177842  | 3 | 1 | 2 Gm21094        | protein_coding         |
| ENSMUST00000184014  | 3 | 1 | 2 1500004A13Rik  | processed_transcript   |
| ENSMUST00000152542  | 3 | 1 | 2 A530006G24Rik  | lincRNA                |
| ENSMUST00000098788  | 3 | 1 | 0 Sorbs2         | protein_coding         |
| ENSMUST00000098788  | 3 | 1 | 0 Sorbs2         | protein_coding         |
| ENSMUST00000178356  | 3 | 1 | 0 Gm20874        | unprocessed_pseudogene |
| ENSMUST00000015712  | 3 | 1 | 0 Lpl            | protein_coding         |
| ENSMUST00000022716  | 3 | 1 | 0 Rnf219         | protein_coding         |
| ENSMUST00000026500  | 3 | 1 | 0 Avil           | protein_coding         |
| ENSMUST00000034497  | 3 | 1 | 0 Mmp3           | protein_coding         |
| ENSMUST000000054310 | 3 | 1 | 0 Coa4           | protein_coding         |
| ENSMUST00000056071  | 3 | 1 | 0 Pyhin1         | protein_coding         |
| ENSMUST00000066719  | 3 | 1 | 0 Ang5           | protein_coding         |
| ENSMUST00000078239  | 3 | 1 | 0 Akr1c20        | protein_coding         |
| ENSMUST00000081819  | 3 | 1 | 0 Havcr1         | protein_coding         |
| ENSMUST00000084509  | 3 | 1 | 0 Dmbt1          | protein_coding         |
| ENSMUST00000084526  | 3 | 1 | 0 Slc31a1        | protein_coding         |
| ENSMUST00000097632  | 3 | 1 | 0 Gm6086         | protein_coding         |
| ENSMUST00000097810  | 3 | 1 | 0 Rims1          | protein_coding         |
| ENSMUST00000105492  | 3 | 1 | 0 Rtn4ip1        | protein_coding         |
| ENSMUST00000106956  | 3 | 1 | 0 Myl4           | protein_coding         |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUST00000109100 | 3 | 1 | 0 Fam186b        | protein_coding       |
| ENSMUST00000111506 | 3 | 1 | 0 Olfr140        | protein_coding       |
| ENSMUST00000120336 | 3 | 1 | 0 Adamts14       | protein_coding       |
| ENSMUST00000126014 | 3 | 1 | 0 Cep85          | protein_coding       |
| ENSMUST00000131411 | 3 | 1 | 0 Tle2           | protein_coding       |
| ENSMUST00000134394 | 3 | 1 | 0 Coa7           | protein_coding       |
| ENSMUST00000135003 | 3 | 1 | 0 Zmym4          | protein_coding       |
| ENSMUST00000138049 | 3 | 1 | 0 Sorbs2         | protein_coding       |
| ENSMUST00000138540 | 3 | 1 | 0 Kynu           | protein_coding       |
| ENSMUST00000147216 | 3 | 1 | 0 Adamts13       | protein_coding       |
| ENSMUST00000150107 | 3 | 1 | 0 Setd5          | protein_coding       |
| ENSMUST00000162292 | 3 | 1 | 0 Pde8b          | protein_coding       |
| ENSMUST00000169638 | 3 | 1 | 0 Zfp143         | protein_coding       |
| ENSMUST00000170845 | 3 | 1 | 0 Bai1           | protein_coding       |
| ENSMUST00000174734 | 3 | 1 | 0 Kmt2c          | protein_coding       |
| ENSMUST00000091023 | 3 | 1 | 0 4930589L23Rik  | lincRNA              |
| ENSMUST00000127483 | 3 | 1 | 0 Gm12050        | lincRNA              |
| ENSMUST00000141088 | 3 | 1 | 0 4932435O22Rik  | lincRNA              |
| ENSMUST00000046316 | 3 | 1 | 46 Lrig2         | protein_coding       |
| ENSMUST00000059498 | 3 | 1 | 46 Edem3         | protein_coding       |
| ENSMUST00000084852 | 3 | 1 | 46 Numa1         | protein_coding       |
| ENSMUST00000147896 | 3 | 1 | 40 Gm12114       | lincRNA              |
| ENSMUST00000108030 | 3 | 1 | 38 Tubd1         | protein_coding       |
| ENSMUST00000063138 | 3 | 1 | 30 Msl3l2        | protein_coding       |
| ENSMUST00000023065 | 3 | 1 | 28 Dmc1          | protein_coding       |
| ENSMUST00000110855 | 3 | 1 | 26 Lpgat1        | protein_coding       |
| ENSMUST00000142027 | 3 | 1 | 26 Nphp4         | protein_coding       |
| ENSMUST00000022947 | 3 | 1 | 24 Matn2         | protein_coding       |
| ENSMUST00000109093 | 3 | 1 | 20 Pkd1l2        | protein_coding       |
| ENSMUST00000033163 | 3 | 1 | 18 Mettl9        | protein_coding       |
| ENSMUST00000169230 | 3 | 1 | 18 Slc44a4       | protein_coding       |
| ENSMUST00000038161 | 3 | 1 | 16 Agmat         | protein_coding       |
| ENSMUST00000025778 | 3 | 1 | 14 Gldc          | protein_coding       |
| ENSMUST00000038234 | 3 | 1 | 14 Ifit122       | protein_coding       |
| ENSMUST00000054197 | 3 | 1 | 14 S1pr2         | protein_coding       |
| ENSMUST00000105876 | 3 | 1 | 14 Pdik1l        | protein_coding       |
| ENSMUST00000036977 | 3 | 1 | 12 Mtg1          | protein_coding       |
| ENSMUST00000109736 | 3 | 1 | 12 Rnaseh2a      | protein_coding       |
| ENSMUST00000068714 | 3 | 1 | 10 Sos1          | protein_coding       |
| ENSMUST00000136026 | 3 | 1 | 10 Syce2         | protein_coding       |
| ENSMUST00000159620 | 3 | 1 | 10 Manf          | protein_coding       |
| ENSMUST00000127673 | 3 | 1 | 10 9530051G07Rik | processed_transcript |
| ENSMUST00000028807 | 3 | 1 | 8 Ivd            | protein_coding       |
| ENSMUST00000034763 | 3 | 1 | 8 Rp9            | protein_coding       |
| ENSMUST00000091579 | 3 | 1 | 8 Gkap1          | protein_coding       |
| ENSMUST00000136720 | 3 | 1 | 8 2310067B10Rik  | protein_coding       |
| ENSMUST00000114736 | 3 | 1 | 6 Arhgef6        | protein_coding       |
| ENSMUST00000114736 | 3 | 1 | 6 Arhgef6        | protein_coding       |
| ENSMUST00000088716 | 3 | 1 | 6 Smarcc1        | protein_coding       |
| ENSMUST00000139900 | 3 | 1 | 6 Lrrc36         | protein_coding       |
| ENSMUST00000143376 | 3 | 1 | 6 Stxbp6         | protein_coding       |
| ENSMUST00000153931 | 3 | 1 | 6 Abi1           | protein_coding       |
| ENSMUST00000000939 | 3 | 1 | 4 Hip1r          | protein_coding       |
| ENSMUST00000041806 | 3 | 1 | 4 Psen1          | protein_coding       |
| ENSMUST00000167130 | 3 | 1 | 4 Acat1          | protein_coding       |
| ENSMUST00000086614 | 3 | 1 | 2 Zranb3         | protein_coding       |
| ENSMUST00000114594 | 3 | 1 | 2 Arhgap21       | protein_coding       |
| ENSMUST00000133043 | 3 | 1 | 2 Ezh2           | protein_coding       |
| ENSMUST00000141824 | 3 | 1 | 2 Afap1          | protein_coding       |
| ENSMUST00000135363 | 3 | 1 | 2 8030453O22Rik  | antisense            |
| ENSMUST00000154147 | 3 | 1 | 2 Gm11634        | antisense            |
| ENSMUST00000021853 | 3 | 1 | 0 Eci3           | protein_coding       |
| ENSMUST00000021959 | 3 | 1 | 0 Txndc15        | protein_coding       |
| ENSMUST00000031899 | 3 | 1 | 0 Kel            | protein_coding       |
| ENSMUST00000033035 | 3 | 1 | 0 Slc5a11        | protein_coding       |
| ENSMUST00000035495 | 3 | 1 | 0 Fanca          | protein_coding       |
| ENSMUST00000038379 | 3 | 1 | 0 Cpsf7          | protein_coding       |
| ENSMUST00000039672 | 3 | 1 | 0 Mfsd9          | protein_coding       |

|                    |   |    |       |               |                |
|--------------------|---|----|-------|---------------|----------------|
| ENSMUST00000047393 | 3 | 1  | 0     | Ctf1          | protein_coding |
| ENSMUST00000047665 | 3 | 1  | 0     | Dapk3         | protein_coding |
| ENSMUST00000051784 | 3 | 1  | 0     | Fastkd3       | protein_coding |
| ENSMUST00000074216 | 3 | 1  | 0     | Tle1          | protein_coding |
| ENSMUST00000075012 | 3 | 1  | 0     | Helz          | protein_coding |
| ENSMUST00000094408 | 3 | 1  | 0     | C030017K20Rik | protein_coding |
| ENSMUST00000103094 | 3 | 1  | 0     | Acot8         | protein_coding |
| ENSMUST00000105598 | 3 | 1  | 0     | Cdk11b        | protein_coding |
| ENSMUST00000109690 | 3 | 1  | 0     | Triobp        | protein_coding |
| ENSMUST00000110196 | 3 | 1  | 0     | Slc22a22      | protein_coding |
| ENSMUST00000119129 | 3 | 1  | 0     | Cdon          | protein_coding |
| ENSMUST00000155527 | 3 | 1  | 0     | Cdh8          | protein_coding |
| ENSMUST00000159246 | 3 | 1  | 0     | Arpp21        | protein_coding |
| ENSMUST00000169399 | 3 | 1  | 0     | Rsl24d1       | protein_coding |
| ENSMUST00000169901 | 3 | 1  | 0     | Klra5         | protein_coding |
| ENSMUST00000155504 | 3 | 1  | 0     | 4930505K14Rik | lincRNA        |
| ENSMUST00000134436 | 3 | 1  | 0     | Gm11525       | antisense      |
| ENSMUST00000099684 | 3 | 0  | 53486 | Gm10801       | protein_coding |
| ENSMUST00000141403 | 3 | 0  | 22    | Mpp3          | protein_coding |
| ENSMUST00000107777 | 3 | 0  | 12    | Tdrd7         | protein_coding |
| ENSMUST00000162870 | 3 | 0  | 12    | Slc9a9        | protein_coding |
| ENSMUST00000016072 | 3 | 0  | 10    | Rrbp1         | protein_coding |
| ENSMUST00000149427 | 3 | 0  | 10    | Alg13         | protein_coding |
| ENSMUST00000042842 | 3 | 0  | 8     | Cdon          | protein_coding |
| ENSMUST00000148447 | 3 | 0  | 6     | Ggt1          | protein_coding |
| ENSMUST00000075829 | 3 | 0  | 4     | Mrpl42        | protein_coding |
| ENSMUST00000020271 | 3 | 0  | 2     | Srgn          | protein_coding |
| ENSMUST00000021738 | 3 | 0  | 2     | Gpr137b       | protein_coding |
| ENSMUST00000096065 | 3 | 0  | 2     | Tigit         | protein_coding |
| ENSMUST00000001347 | 3 | 0  | 0     | Rnd2          | protein_coding |
| ENSMUST00000019220 | 3 | 0  | 0     | Strn4         | protein_coding |
| ENSMUST00000075853 | 3 | 0  | 0     | Cks2          | protein_coding |
| ENSMUST00000099362 | 3 | 0  | 0     | Slc4a11       | protein_coding |
| ENSMUST00000111985 | 3 | 0  | 0     | Sec31b        | protein_coding |
| ENSMUST00000113117 | 3 | 0  | 0     | Brpf1         | protein_coding |
| ENSMUST00000119570 | 3 | 0  | 0     | Tpm3          | protein_coding |
| ENSMUST00000124887 | 3 | 0  | 0     | Bud13         | protein_coding |
| ENSMUST00000136577 | 3 | 0  | 0     | Nox4          | protein_coding |
| ENSMUST00000144890 | 3 | 0  | 0     | Ddx49         | protein_coding |
| ENSMUST00000147931 | 3 | 0  | 0     | Fam20b        | protein_coding |
| ENSMUST00000153926 | 3 | 0  | 0     | Ptpn3         | protein_coding |
| ENSMUST00000170584 | 3 | 0  | 0     | Card10        | protein_coding |
| ENSMUST00000173913 | 3 | 0  | 0     | Pkn2          | protein_coding |
| ENSMUST00000130679 | 3 | 0  | 0     | A530013C23Rik | lincRNA        |
| ENSMUST00000135147 | 3 | 0  | 0     | Gm15486       | antisense      |
| ENSMUST00000119369 | 2 | 28 | 10    | Wnt5b         | protein_coding |
| ENSMUST00000066987 | 2 | 13 | 48    | Galnt10       | protein_coding |
| ENSMUST00000129687 | 2 | 12 | 2     | Gm13465       | lincRNA        |
| ENSMUST00000042614 | 2 | 11 | 32    | Gm15800       | protein_coding |
| ENSMUST00000179939 | 2 | 11 | 2     | Atp2a2        | protein_coding |
| ENSMUST00000025872 | 2 | 11 | 0     | 4430402I18Rik | protein_coding |
| ENSMUST00000026267 | 2 | 11 | 0     | Parp6         | protein_coding |
| ENSMUST00000112990 | 2 | 10 | 16    | Mid2          | protein_coding |
| ENSMUST00000051431 | 2 | 9  | 6     | Fbxo28        | protein_coding |
| ENSMUST00000152327 | 2 | 9  | 2     | Rad51         | protein_coding |
| ENSMUST00000144141 | 2 | 9  | 0     | Fbxl3         | protein_coding |
| ENSMUST00000143525 | 2 | 9  | 0     | Gm13963       | antisense      |
| ENSMUST00000124443 | 2 | 9  | 2     | Mapkap1       | protein_coding |
| ENSMUST00000126999 | 2 | 9  | 2     | Gm12298       | antisense      |
| ENSMUST00000166749 | 2 | 9  | 0     | Cylc2         | protein_coding |
| ENSMUST00000075836 | 2 | 8  | 20    | Dock7         | protein_coding |
| ENSMUST00000165258 | 2 | 8  | 2     | Xpnpep3       | protein_coding |
| ENSMUST00000111915 | 2 | 8  | 0     | 8430419L09Rik | protein_coding |
| ENSMUST00000184757 | 2 | 8  | 0     | Hcfr2         | protein_coding |
| ENSMUST00000057341 | 2 | 7  | 93    | 1700020N01Rik | protein_coding |
| ENSMUST00000032331 | 2 | 7  | 6     | Grin2a        | protein_coding |
| ENSMUST00000129906 | 2 | 7  | 6     | Ubash3b       | protein_coding |
| ENSMUST00000036174 | 2 | 7  | 2     | Gramd1c       | protein_coding |

|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUST00000130968 | 2 | 7 | 2 Kynu           | protein_coding                     |
| ENSMUST00000026032 | 2 | 7 | 0 Pcgf6          | protein_coding                     |
| ENSMUST00000038383 | 2 | 7 | 0 Akr1b10        | protein_coding                     |
| ENSMUST00000104902 | 2 | 7 | 0 Ablim1         | protein_coding                     |
| ENSMUST00000113373 | 2 | 7 | 0 Uba6           | protein_coding                     |
| ENSMUST00000155765 | 2 | 7 | 0 Myh10          | protein_coding                     |
| ENSMUST00000168755 | 2 | 7 | 0 Slc25a44       | protein_coding                     |
| ENSMUST00000084214 | 2 | 7 | 57 Eif4g3        | protein_coding                     |
| ENSMUST00000177577 | 2 | 7 | 26 1110059E24Rik | protein_coding                     |
| ENSMUST00000048604 | 2 | 7 | 24 Msantd2       | protein_coding                     |
| ENSMUST00000106690 | 2 | 7 | 22 Zyg11a        | protein_coding                     |
| ENSMUST00000123120 | 2 | 7 | 12 Gm6787        | processed_transcript               |
| ENSMUST00000130765 | 2 | 7 | 4 Slc45a4        | protein_coding                     |
| ENSMUST00000160137 | 2 | 7 | 4 A730090N16Rik  | antisense                          |
| ENSMUST00000165806 | 2 | 7 | 2 Katna1         | protein_coding                     |
| ENSMUST00000055539 | 2 | 7 | 0 Timeless       | protein_coding                     |
| ENSMUST00000148022 | 2 | 7 | 0 Ugg2           | protein_coding                     |
| ENSMUST00000105831 | 2 | 6 | 65 Eif4g3        | protein_coding                     |
| ENSMUST00000130627 | 2 | 6 | 22 Myo18a        | protein_coding                     |
| ENSMUST00000117746 | 2 | 6 | 18 Gm14624       | unprocessed_pseudogene             |
| ENSMUST00000084953 | 2 | 6 | 18 Mark3         | protein_coding                     |
| ENSMUST00000101640 | 2 | 6 | 14 Limk2         | protein_coding                     |
| ENSMUST00000023040 | 2 | 6 | 10 Slc25a17      | protein_coding                     |
| ENSMUST00000030709 | 2 | 6 | 10 Smpdl3b       | protein_coding                     |
| ENSMUST00000047526 | 2 | 6 | 10 Asap3         | protein_coding                     |
| ENSMUST00000025632 | 2 | 6 | 8 2410127L17Rik  | protein_coding                     |
| ENSMUST00000078314 | 2 | 6 | 0 Slc22a16       | protein_coding                     |
| ENSMUST00000078362 | 2 | 6 | 0 Vrk2           | protein_coding                     |
| ENSMUST00000087161 | 2 | 6 | 0 Lnx1           | protein_coding                     |
| ENSMUST00000111831 | 2 | 6 | 0 Zfp385b        | protein_coding                     |
| ENSMUST00000142247 | 2 | 5 | 139 Zfp91        | protein_coding                     |
| ENSMUST00000090380 | 2 | 5 | 44 Lmbrd2        | protein_coding                     |
| ENSMUST00000111967 | 2 | 5 | 26 Vsig10        | protein_coding                     |
| ENSMUST00000160550 | 2 | 5 | 20 Pdxk-ps       | transcribed_unprocessed_pseudogene |
| ENSMUST00000135353 | 2 | 5 | 18 Slc9a8        | protein_coding                     |
| ENSMUST00000025375 | 2 | 5 | 16 Tcerg1        | protein_coding                     |
| ENSMUST00000057279 | 2 | 5 | 14 Olfml2a       | protein_coding                     |
| ENSMUST00000136836 | 2 | 5 | 14 Skap1         | protein_coding                     |
| ENSMUST00000026021 | 2 | 5 | 6 Msr1           | protein_coding                     |
| ENSMUST00000130055 | 2 | 5 | 6 1700041M05Rik  | lincRNA                            |
| ENSMUST00000022640 | 2 | 5 | 4 Adam7          | protein_coding                     |
| ENSMUST00000031719 | 2 | 5 | 4 Fscn3          | protein_coding                     |
| ENSMUST00000087556 | 2 | 5 | 4 Smc5           | protein_coding                     |
| ENSMUST00000105314 | 2 | 5 | 4 AU041133       | protein_coding                     |
| ENSMUST00000113878 | 2 | 5 | 4 Arhgef9        | protein_coding                     |
| ENSMUST00000139488 | 2 | 5 | 4 1700061H18Rik  | antisense                          |
| ENSMUST00000090543 | 2 | 5 | 2 Nr1d2          | protein_coding                     |
| ENSMUST00000102689 | 2 | 5 | 2 Sp3            | protein_coding                     |
| ENSMUST00000170941 | 2 | 5 | 2 Trem12         | protein_coding                     |
| ENSMUST00000178898 | 2 | 5 | 2 Gm21830        | protein_coding                     |
| ENSMUST00000180728 | 2 | 5 | 2 Gm26877        | lincRNA                            |
| ENSMUST00000003550 | 2 | 5 | 0 Ncstn          | protein_coding                     |
| ENSMUST00000106370 | 2 | 5 | 0 Mettl23        | protein_coding                     |
| ENSMUST00000131513 | 2 | 5 | 0 Rac1           | protein_coding                     |
| ENSMUST00000178717 | 2 | 5 | 0 Dlc1           | protein_coding                     |
| ENSMUST00000180154 | 2 | 5 | 0 Plscr2         | protein_coding                     |
| ENSMUST00000033372 | 2 | 5 | 67 Rp2h          | protein_coding                     |
| ENSMUST00000049618 | 2 | 5 | 52 Gm13          | protein_coding                     |
| ENSMUST00000141047 | 2 | 5 | 38 Gm21985       | protein_coding                     |
| ENSMUST00000105866 | 2 | 5 | 32 Aunip         | protein_coding                     |
| ENSMUST00000150207 | 2 | 5 | 22 Dnajc8        | protein_coding                     |
| ENSMUST00000172701 | 2 | 5 | 22 Wt1os         | antisense                          |
| ENSMUST00000087181 | 2 | 5 | 18 Dcun1d4       | protein_coding                     |
| ENSMUST00000018315 | 2 | 5 | 16 Vmp1          | protein_coding                     |
| ENSMUST00000178679 | 2 | 5 | 16 Topaz1        | protein_coding                     |
| ENSMUST00000042665 | 2 | 5 | 14 Parp14        | protein_coding                     |
| ENSMUST00000105616 | 2 | 5 | 14 Gnb1          | protein_coding                     |
| ENSMUST00000140570 | 2 | 5 | 14 Ctdspl2       | protein_coding                     |

|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000115104 | 2 | 5 | 12 Dst          | protein_coding                     |
| ENSMUST00000133852 | 2 | 5 | 12 Wnk3         | protein_coding                     |
| ENSMUST00000006853 | 2 | 5 | 10 P4htm        | protein_coding                     |
| ENSMUST00000149769 | 2 | 5 | 10 Bcat1        | protein_coding                     |
| ENSMUST00000021564 | 2 | 5 | 8 Smoc1         | protein_coding                     |
| ENSMUST00000047615 | 2 | 5 | 8 Smarcal1      | protein_coding                     |
| ENSMUST00000181911 | 2 | 5 | 8 Gm26827       | lincRNA                            |
| ENSMUST00000181968 | 2 | 5 | 8 Gm26569       | lincRNA                            |
| ENSMUST00000019026 | 2 | 5 | 6 Mrpl45        | protein_coding                     |
| ENSMUST00000038570 | 2 | 5 | 6 Nipsnap1      | protein_coding                     |
| ENSMUST00000113969 | 2 | 5 | 6 Mageb4        | protein_coding                     |
| ENSMUST00000131106 | 2 | 5 | 6 Pld3          | protein_coding                     |
| ENSMUST00000131268 | 2 | 5 | 6 Afdid         | protein_coding                     |
| ENSMUST00000134360 | 2 | 5 | 6 Pip5k1b       | protein_coding                     |
| ENSMUST00000169922 | 2 | 5 | 6 Chd2          | protein_coding                     |
| ENSMUST00000111352 | 2 | 5 | 2 Ddb2          | protein_coding                     |
| ENSMUST00000120935 | 2 | 5 | 2 Zfp819        | protein_coding                     |
| ENSMUST00000177509 | 2 | 5 | 0 Vmn2r-ps129   | unprocessed_pseudogene             |
| ENSMUST00000002280 | 2 | 5 | 0 Smg9          | protein_coding                     |
| ENSMUST00000008830 | 2 | 5 | 0 Zfp955a       | protein_coding                     |
| ENSMUST00000034610 | 2 | 5 | 0 Pate4         | protein_coding                     |
| ENSMUST00000035346 | 2 | 5 | 0 Nol4l         | protein_coding                     |
| ENSMUST00000041401 | 2 | 5 | 0 Herc3         | protein_coding                     |
| ENSMUST00000101146 | 2 | 5 | 0 Spata7        | protein_coding                     |
| ENSMUST00000101292 | 2 | 5 | 0 Fam46d        | protein_coding                     |
| ENSMUST00000134977 | 2 | 5 | 0 Atp8b4        | protein_coding                     |
| ENSMUST00000137938 | 2 | 5 | 0 Itpr2         | protein_coding                     |
| ENSMUST00000164954 | 2 | 5 | 0 Kcnmb3        | protein_coding                     |
| ENSMUST00000165029 | 2 | 5 | 0 Vmn2r57       | protein_coding                     |
| ENSMUST00000165605 | 2 | 5 | 0 Grtp1         | protein_coding                     |
| ENSMUST00000165692 | 2 | 5 | 0 Vmn2r96       | protein_coding                     |
| ENSMUST00000167753 | 2 | 5 | 0 Gm4450        | protein_coding                     |
| ENSMUST00000174189 | 2 | 5 | 0 Tet1          | protein_coding                     |
| ENSMUST00000183913 | 2 | 5 | 0 Col27a1       | protein_coding                     |
| ENSMUST00000144591 | 2 | 5 | 0 4933431E20Rik | processed_transcript               |
| ENSMUST00000121970 | 2 | 5 | 0 Gm14366       | processed_pseudogene               |
| ENSMUST00000180403 | 2 | 5 | 0 Gm26754       | lincRNA                            |
| ENSMUST00000135295 | 2 | 4 | 65 Chst8        | protein_coding                     |
| ENSMUST00000161660 | 2 | 4 | 57 Tmem120b     | protein_coding                     |
| ENSMUST00000031530 | 2 | 4 | 50 Sppl3        | protein_coding                     |
| ENSMUST00000174408 | 2 | 4 | 46 Jmjd1c       | protein_coding                     |
| ENSMUST00000064770 | 2 | 4 | 44 Nfib         | protein_coding                     |
| ENSMUST00000182974 | 2 | 4 | 44 Aut52        | protein_coding                     |
| ENSMUST00000003964 | 2 | 4 | 40 Gys1         | protein_coding                     |
| ENSMUST00000143277 | 2 | 4 | 40 Pum1         | protein_coding                     |
| ENSMUST00000112986 | 2 | 4 | 32 Dab2ip       | protein_coding                     |
| ENSMUST00000144815 | 2 | 4 | 32 Dnaja3       | protein_coding                     |
| ENSMUST00000118797 | 2 | 4 | 26 Gpr144-ps    | transcribed_unprocessed_pseudogene |
| ENSMUST00000034722 | 2 | 4 | 24 Rab27a       | protein_coding                     |
| ENSMUST00000055190 | 2 | 4 | 22 Baiap211     | protein_coding                     |
| ENSMUST00000122941 | 2 | 4 | 20 Zfr          | protein_coding                     |
| ENSMUST00000138469 | 2 | 4 | 20 Tgfb3        | protein_coding                     |
| ENSMUST00000147239 | 2 | 4 | 18 Nbr1         | protein_coding                     |
| ENSMUST00000133699 | 2 | 4 | 16 Slc25a43     | protein_coding                     |
| ENSMUST00000125631 | 2 | 4 | 16 Gm14266      | lincRNA                            |
| ENSMUST00000041965 | 2 | 4 | 10 Cdc42bpb     | protein_coding                     |
| ENSMUST00000071488 | 2 | 4 | 10 Ints3        | protein_coding                     |
| ENSMUST00000119944 | 2 | 4 | 10 Lemd3        | protein_coding                     |
| ENSMUST00000108653 | 2 | 4 | 8 Nlrp12        | protein_coding                     |
| ENSMUST00000116388 | 2 | 4 | 8 Rcor1         | protein_coding                     |
| ENSMUST00000137589 | 2 | 4 | 8 Pnrc1         | protein_coding                     |
| ENSMUST00000075095 | 2 | 4 | 6 Vmn2r24       | protein_coding                     |
| ENSMUST00000113926 | 2 | 4 | 6 Zfx           | protein_coding                     |
| ENSMUST00000179013 | 2 | 4 | 6 D630033O11Rik | protein_coding                     |
| ENSMUST00000005722 | 2 | 4 | 4 Mef2c         | protein_coding                     |
| ENSMUST00000027649 | 2 | 4 | 4 Nr5a2         | protein_coding                     |
| ENSMUST00000034717 | 2 | 4 | 4 Kank2         | protein_coding                     |
| ENSMUST00000067215 | 2 | 4 | 4 Arfgap3       | protein_coding                     |

|                    |   |   |                   |                      |
|--------------------|---|---|-------------------|----------------------|
| ENSMUST00000114025 | 2 | 4 | 4 Prrg1           | protein_coding       |
| ENSMUST00000114523 | 2 | 4 | 4 Acbd5           | protein_coding       |
| ENSMUST00000128067 | 2 | 4 | 4 Pex14           | protein_coding       |
| ENSMUST00000134159 | 2 | 4 | 4 Zcchc17         | protein_coding       |
| ENSMUST00000143262 | 2 | 4 | 4 Lrrc75a         | protein_coding       |
| ENSMUST00000144228 | 2 | 4 | 4 Sec63           | protein_coding       |
| ENSMUST00000147433 | 2 | 4 | 4 Scai            | protein_coding       |
| ENSMUST00000003312 | 2 | 4 | 2 Edar            | protein_coding       |
| ENSMUST00000031690 | 2 | 4 | 2 Hyal6           | protein_coding       |
| ENSMUST00000059037 | 2 | 4 | 2 Trim12c         | protein_coding       |
| ENSMUST00000070968 | 2 | 4 | 2 Stat1           | protein_coding       |
| ENSMUST00000107646 | 2 | 4 | 2 Slc44a1         | protein_coding       |
| ENSMUST00000141135 | 2 | 4 | 2 Abca4           | protein_coding       |
| ENSMUST00000142759 | 2 | 4 | 2 Fmo3            | protein_coding       |
| ENSMUST00000155277 | 2 | 4 | 2 Ddx47           | protein_coding       |
| ENSMUST00000163957 | 2 | 4 | 2 Parg            | protein_coding       |
| ENSMUST00000120486 | 2 | 4 | 0 Gm13754         | unitary_pseudogene   |
| ENSMUST00000023468 | 2 | 4 | 0 Spag6           | protein_coding       |
| ENSMUST00000041264 | 2 | 4 | 0 Zfp938          | protein_coding       |
| ENSMUST00000145571 | 2 | 4 | 0 Glrx2           | protein_coding       |
| ENSMUST00000150300 | 2 | 4 | 0 Dgki            | protein_coding       |
| ENSMUST00000154538 | 2 | 4 | 0 Serpinb7        | protein_coding       |
| ENSMUST00000161248 | 2 | 4 | 0 Zfp26           | protein_coding       |
| ENSMUST00000161452 | 2 | 4 | 0 Ephx4           | protein_coding       |
| ENSMUST00000165884 | 2 | 4 | 0 Slc2a3          | protein_coding       |
| ENSMUST00000166873 | 2 | 4 | 0 Cdh10           | protein_coding       |
| ENSMUST00000081331 | 2 | 4 | 0 Gm10044         | processed_transcript |
| ENSMUST00000149873 | 2 | 4 | 0 Gm15246         | processed_transcript |
| ENSMUST00000135792 | 2 | 4 | 0 1700092C17Rik   | lincRNA              |
| ENSMUST00000181397 | 2 | 4 | 0 Gm16386         | lincRNA              |
| ENSMUST00000030469 | 2 | 3 | 95 Lurap1         | protein_coding       |
| ENSMUST00000099337 | 2 | 3 | 93 Plxnc1         | protein_coding       |
| ENSMUST00000137543 | 2 | 3 | 52 Samd4          | protein_coding       |
| ENSMUST00000020835 | 2 | 3 | 40 Ppm1d          | protein_coding       |
| ENSMUST00000031434 | 2 | 3 | 36 Rnf34          | protein_coding       |
| ENSMUST00000048250 | 2 | 3 | 30 Tab3           | protein_coding       |
| ENSMUST00000171233 | 2 | 3 | 30 Slc37a1        | protein_coding       |
| ENSMUST00000181695 | 2 | 3 | 30 Gm26892        | lincRNA              |
| ENSMUST00000051479 | 2 | 3 | 26 Ulk4           | protein_coding       |
| ENSMUST00000112251 | 2 | 3 | 20 Ubr3           | protein_coding       |
| ENSMUST00000163296 | 2 | 3 | 20 Xpnpep3        | protein_coding       |
| ENSMUST00000026170 | 2 | 3 | 18 Ubtd1          | protein_coding       |
| ENSMUST00000027780 | 2 | 3 | 18 Acbd3          | protein_coding       |
| ENSMUST00000027421 | 2 | 3 | 16 Trip12         | protein_coding       |
| ENSMUST00000048162 | 2 | 3 | 16 Bsdc1          | protein_coding       |
| ENSMUST00000106803 | 2 | 3 | 16 1700024P16Rik  | protein_coding       |
| ENSMUST00000115705 | 2 | 3 | 16 Nrg2           | protein_coding       |
| ENSMUST00000129025 | 2 | 3 | 16 Ulk2           | protein_coding       |
| ENSMUST00000035911 | 2 | 3 | 14 Rc3h1          | protein_coding       |
| ENSMUST00000059893 | 2 | 3 | 14 Slc2a7         | protein_coding       |
| ENSMUST00000019942 | 2 | 3 | 12 Aig1           | protein_coding       |
| ENSMUST00000057725 | 2 | 3 | 12 Samhd1         | protein_coding       |
| ENSMUST00000071812 | 2 | 3 | 12 Iqgap3         | protein_coding       |
| ENSMUST00000161609 | 2 | 3 | 12 Rc3h1          | protein_coding       |
| ENSMUST00000080795 | 2 | 3 | 10 Gm5607         | sense_overlapping    |
| ENSMUST00000023535 | 2 | 3 | 10 Iqcb1          | protein_coding       |
| ENSMUST00000144804 | 2 | 3 | 10 Bfar           | protein_coding       |
| ENSMUST00000175929 | 2 | 3 | 10 Mettl7a2Higd1c | protein_coding       |
| ENSMUST00000016279 | 2 | 3 | 8 N4bp2l1         | protein_coding       |
| ENSMUST00000107538 | 2 | 3 | 8 Cdk12           | protein_coding       |
| ENSMUST00000017692 | 2 | 3 | 6 Suz12           | protein_coding       |
| ENSMUST00000100951 | 2 | 3 | 6 A830010M20Rik   | protein_coding       |
| ENSMUST00000109244 | 2 | 3 | 6 Cdc20b          | protein_coding       |
| ENSMUST00000120512 | 2 | 3 | 6 Mdfic           | protein_coding       |
| ENSMUST00000154745 | 2 | 3 | 6 Gsr             | protein_coding       |
| ENSMUST00000132211 | 2 | 3 | 6 Gm13187         | processed_transcript |
| ENSMUST00000078070 | 2 | 3 | 4 Ipcef1          | protein_coding       |
| ENSMUST00000105336 | 2 | 3 | 4 Dot1l           | protein_coding       |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUST00000119299 | 2 | 3 | 4 Ogt            | protein_coding       |
| ENSMUST00000144324 | 2 | 3 | 4 Aco2           | protein_coding       |
| ENSMUST00000119218 | 2 | 3 | 4 Gm13231        | processed_pseudogene |
| ENSMUST00000129501 | 2 | 3 | 4 Gm11715        | antisense            |
| ENSMUST00000024035 | 2 | 3 | 2 Gabrr2         | protein_coding       |
| ENSMUST00000048372 | 2 | 3 | 2 Tmem71         | protein_coding       |
| ENSMUST00000075275 | 2 | 3 | 2 Nell2          | protein_coding       |
| ENSMUST00000088615 | 2 | 3 | 2 Arfgef1        | protein_coding       |
| ENSMUST00000113444 | 2 | 3 | 2 Agfg1          | protein_coding       |
| ENSMUST00000149007 | 2 | 3 | 2 Gpr149         | protein_coding       |
| ENSMUST00000164484 | 2 | 3 | 2 Gm8237         | protein_coding       |
| ENSMUST00000179574 | 2 | 3 | 2 Prss35         | protein_coding       |
| ENSMUST00000115691 | 2 | 3 | 0 Map3k4         | protein_coding       |
| ENSMUST00000115691 | 2 | 3 | 0 Map3k4         | protein_coding       |
| ENSMUST00000004389 | 2 | 3 | 0 Grcc10         | protein_coding       |
| ENSMUST00000026411 | 2 | 3 | 0 Mmp19          | protein_coding       |
| ENSMUST00000029344 | 2 | 3 | 0 Mfsd1          | protein_coding       |
| ENSMUST00000038676 | 2 | 3 | 0 Cpz            | protein_coding       |
| ENSMUST00000043493 | 2 | 3 | 0 Ice1           | protein_coding       |
| ENSMUST00000044556 | 2 | 3 | 0 Tbc1d13        | protein_coding       |
| ENSMUST00000045288 | 2 | 3 | 0 Tgfb2          | protein_coding       |
| ENSMUST00000047875 | 2 | 3 | 0 Eef2k          | protein_coding       |
| ENSMUST00000048545 | 2 | 3 | 0 Arglu1         | protein_coding       |
| ENSMUST00000056073 | 2 | 3 | 0 Cfap70         | protein_coding       |
| ENSMUST00000061091 | 2 | 3 | 0 Synj2          | protein_coding       |
| ENSMUST00000061099 | 2 | 3 | 0 Ccdc169        | protein_coding       |
| ENSMUST00000066559 | 2 | 3 | 0 Mcm8           | protein_coding       |
| ENSMUST00000075076 | 2 | 3 | 0 D17Wsu92e      | protein_coding       |
| ENSMUST00000103225 | 2 | 3 | 0 5730455P16Rik  | protein_coding       |
| ENSMUST00000109227 | 2 | 3 | 0 Dppa1          | protein_coding       |
| ENSMUST00000109428 | 2 | 3 | 0 Tox2           | protein_coding       |
| ENSMUST00000115239 | 2 | 3 | 0 Sept6          | protein_coding       |
| ENSMUST00000120420 | 2 | 3 | 0 Scn5a          | protein_coding       |
| ENSMUST00000123283 | 2 | 3 | 0 Arhgap4        | protein_coding       |
| ENSMUST00000127442 | 2 | 3 | 0 Ppp1r18        | protein_coding       |
| ENSMUST00000131291 | 2 | 3 | 0 Mtf2           | protein_coding       |
| ENSMUST00000132104 | 2 | 3 | 0 Zfyve28        | protein_coding       |
| ENSMUST00000136498 | 2 | 3 | 0 Smarcal1       | protein_coding       |
| ENSMUST00000137703 | 2 | 3 | 0 Melk           | protein_coding       |
| ENSMUST00000151189 | 2 | 3 | 0 Tmed7          | protein_coding       |
| ENSMUST00000152243 | 2 | 3 | 0 Kctd9          | protein_coding       |
| ENSMUST00000153488 | 2 | 3 | 0 Naa30          | protein_coding       |
| ENSMUST00000162851 | 2 | 3 | 0 Psma3          | protein_coding       |
| ENSMUST00000167547 | 2 | 3 | 0 Tubgcp3        | protein_coding       |
| ENSMUST00000172835 | 2 | 3 | 0 Nova2          | protein_coding       |
| ENSMUST00000175777 | 2 | 3 | 0 Kdm2a          | protein_coding       |
| ENSMUST00000175853 | 2 | 3 | 0 Vmn2r-ps130    | protein_coding       |
| ENSMUST00000130639 | 2 | 3 | 0 4930506C21Rik  | processed_transcript |
| ENSMUST00000121269 | 2 | 3 | 0 Gm14749        | processed_pseudogene |
| ENSMUST00000130251 | 2 | 3 | 0 Gm7598         | lincRNA              |
| ENSMUST00000132262 | 2 | 3 | 0 Gm16194        | lincRNA              |
| ENSMUST00000131516 | 2 | 3 | 0 0610025J13Rik  | antisense            |
| ENSMUST00000133527 | 2 | 3 | 61 Fance         | protein_coding       |
| ENSMUST00000072837 | 2 | 3 | 42 Foxk1         | protein_coding       |
| ENSMUST00000147560 | 2 | 3 | 34 Tbcd          | protein_coding       |
| ENSMUST00000173677 | 2 | 3 | 32 4930556N13Rik | antisense            |
| ENSMUST00000146417 | 2 | 3 | 30 Fam47e        | protein_coding       |
| ENSMUST00000140013 | 2 | 3 | 28 Eif2ak1       | protein_coding       |
| ENSMUST00000036161 | 2 | 3 | 24 Pi4ka         | protein_coding       |
| ENSMUST00000123491 | 2 | 3 | 24 Dnal1         | protein_coding       |
| ENSMUST00000119058 | 2 | 3 | 18 Zfp133-ps     | unitary_pseudogene   |
| ENSMUST00000011178 | 2 | 3 | 18 Slc5a1        | protein_coding       |
| ENSMUST00000020287 | 2 | 3 | 18 Npffr1        | protein_coding       |
| ENSMUST00000094536 | 2 | 3 | 18 Rapgef6       | protein_coding       |
| ENSMUST00000122143 | 2 | 3 | 18 Phrf1         | protein_coding       |
| ENSMUST00000001792 | 2 | 3 | 16 Il16          | protein_coding       |
| ENSMUST00000067715 | 2 | 3 | 16 Pabpc1l       | protein_coding       |
| ENSMUST00000135079 | 2 | 3 | 16 Pdla3         | protein_coding       |

|                     |   |   |                 |                                  |
|---------------------|---|---|-----------------|----------------------------------|
| ENSMUST00000159714  | 2 | 3 | 16 Fyb          | protein_coding                   |
| ENSMUST00000169201  | 2 | 3 | 16 Ankfn1       | protein_coding                   |
| ENSMUST00000141697  | 2 | 3 | 16 Gm14582      | antisense                        |
| ENSMUST00000028111  | 2 | 3 | 14 Il2ra        | protein_coding                   |
| ENSMUST00000036116  | 2 | 3 | 14 Ttc9         | protein_coding                   |
| ENSMUST00000064495  | 2 | 3 | 14 Hook2        | protein_coding                   |
| ENSMUST00000069311  | 2 | 3 | 14 Wdr66        | protein_coding                   |
| ENSMUST00000022429  | 2 | 3 | 12 Arf4         | protein_coding                   |
| ENSMUST00000027580  | 2 | 3 | 12 Slc35f5      | protein_coding                   |
| ENSMUST00000032915  | 2 | 3 | 12 Kif22        | protein_coding                   |
| ENSMUST00000041761  | 2 | 3 | 12 Prss23       | protein_coding                   |
| ENSMUST00000122063  | 2 | 3 | 12 Ifit88       | protein_coding                   |
| ENSMUST00000125514  | 2 | 3 | 12 Cul4a        | protein_coding                   |
| ENSMUST00000024104  | 2 | 3 | 10 Gcm1         | protein_coding                   |
| ENSMUST00000134947  | 2 | 3 | 10 Mogat1       | protein_coding                   |
| ENSMUST00000149023  | 2 | 3 | 10 Eva1a        | protein_coding                   |
| ENSMUST00000169534  | 2 | 3 | 10 Txk          | protein_coding                   |
| ENSMUST00000184679  | 2 | 3 | 10 Hrk          | protein_coding                   |
| ENSMUST00000036572  | 2 | 3 | 8 Tmem51        | protein_coding                   |
| ENSMUST00000098521  | 2 | 3 | 8 Adcy7         | protein_coding                   |
| ENSMUST00000109729  | 2 | 3 | 8 Tex22         | protein_coding                   |
| ENSMUST00000143165  | 2 | 3 | 8 Bbs5          | protein_coding                   |
| ENSMUST00000147323  | 2 | 3 | 8 Nt5c1b        | protein_coding                   |
| ENSMUST00000166143  | 2 | 3 | 8 Dennd2c       | protein_coding                   |
| ENSMUST00000146744  | 2 | 3 | 8 Tmcc3os       | antisense                        |
| ENSMUST00000149452  | 2 | 3 | 8 Gm16279       | antisense                        |
| ENSMUST00000001595  | 2 | 3 | 6 Fkbp10        | protein_coding                   |
| ENSMUST00000029462  | 2 | 3 | 6 Tbx15         | protein_coding                   |
| ENSMUST00000036450  | 2 | 3 | 6 Spg11         | protein_coding                   |
| ENSMUST00000114094  | 2 | 3 | 6 Mdh1b         | protein_coding                   |
| ENSMUST00000153671  | 2 | 3 | 6 Pik3r6        | protein_coding                   |
| ENSMUST00000154248  | 2 | 3 | 6 Sgsm1         | protein_coding                   |
| ENSMUST00000157077  | 2 | 3 | 6 Bccip         | protein_coding                   |
| ENSMUST00000170947  | 2 | 3 | 6 4833427G06Rik | protein_coding                   |
| ENSMUST00000026383  | 2 | 3 | 4 Gpr143        | protein_coding                   |
| ENSMUST00000040065  | 2 | 3 | 4 Tlr13         | protein_coding                   |
| ENSMUST00000051377  | 2 | 3 | 4 Dpy19l3       | protein_coding                   |
| ENSMUST00000071044  | 2 | 3 | 4 Capg          | protein_coding                   |
| ENSMUST00000072602  | 2 | 3 | 4 Hvcn1         | protein_coding                   |
| ENSMUST00000113979  | 2 | 3 | 4 Lancl1        | protein_coding                   |
| ENSMUST00000144805  | 2 | 3 | 4 Alg6          | protein_coding                   |
| ENSMUST00000147125  | 2 | 3 | 4 Zscan2        | protein_coding                   |
| ENSMUST00000182481  | 2 | 3 | 4 Plce1         | protein_coding                   |
| ENSMUST00000122963  | 2 | 3 | 2 4933427G23Rik | transcribed_processed_pseudogene |
| ENSMUST00000015998  | 2 | 3 | 2 Cd5l          | protein_coding                   |
| ENSMUST00000043650  | 2 | 3 | 2 Fam222a       | protein_coding                   |
| ENSMUST00000050990  | 2 | 3 | 2 Asap2         | protein_coding                   |
| ENSMUST00000067872  | 2 | 3 | 2 Slc2a9        | protein_coding                   |
| ENSMUST00000077705  | 2 | 3 | 2 Cyp26b1       | protein_coding                   |
| ENSMUST00000102883  | 2 | 3 | 2 Ptbp3         | protein_coding                   |
| ENSMUST00000112904  | 2 | 3 | 2 Acsl4         | protein_coding                   |
| ENSMUST00000115072  | 2 | 3 | 2 Stag2         | protein_coding                   |
| ENSMUST00000115667  | 2 | 3 | 2 Otud5         | protein_coding                   |
| ENSMUST00000118076  | 2 | 3 | 2 Urgcp         | protein_coding                   |
| ENSMUST00000148602  | 2 | 3 | 2 Ctnbp2        | protein_coding                   |
| ENSMUST00000168566  | 2 | 3 | 2 Zmat3         | protein_coding                   |
| ENSMUST00000176341  | 2 | 3 | 0 Vmn2r-ps120   | unprocessed_pseudogene           |
| ENSMUST000000001179 | 2 | 3 | 0 Pcnt          | protein_coding                   |
| ENSMUST00000005003  | 2 | 3 | 0 Lbr           | protein_coding                   |
| ENSMUST00000008517  | 2 | 3 | 0 Prpf31        | protein_coding                   |
| ENSMUST00000015003  | 2 | 3 | 0 E2f4          | protein_coding                   |
| ENSMUST00000022480  | 2 | 3 | 0 Ogdhl         | protein_coding                   |
| ENSMUST00000031251  | 2 | 3 | 0 Hsd17b11      | protein_coding                   |
| ENSMUST00000038069  | 2 | 3 | 0 Ceacam10      | protein_coding                   |
| ENSMUST00000038650  | 2 | 3 | 0 Ccp110        | protein_coding                   |
| ENSMUST00000052458  | 2 | 3 | 0 Lrrc38        | protein_coding                   |
| ENSMUST00000057256  | 2 | 3 | 0 6030458C11Rik | protein_coding                   |
| ENSMUST00000080884  | 2 | 3 | 0 Pfkfb1        | protein_coding                   |



|                    |   |   |             |                                    |
|--------------------|---|---|-------------|------------------------------------|
| ENSMUST00000085793 | 2 | 3 | 0 BC068281  | protein_coding                     |
| ENSMUST00000092646 | 2 | 3 | 0 Med23     | protein_coding                     |
| ENSMUST00000098538 | 2 | 3 | 0 Odf2l     | protein_coding                     |
| ENSMUST00000108300 | 2 | 3 | 0 Ect2      | protein_coding                     |
| ENSMUST00000109533 | 2 | 3 | 0 Src       | protein_coding                     |
| ENSMUST00000110706 | 2 | 3 | 0 Haus2     | protein_coding                     |
| ENSMUST00000111154 | 2 | 3 | 0 Fam228a   | protein_coding                     |
| ENSMUST00000112020 | 2 | 3 | 0 Klra10    | protein_coding                     |
| ENSMUST00000115016 | 2 | 3 | 0 Agbl3     | protein_coding                     |
| ENSMUST00000115317 | 2 | 3 | 0 Klhl13    | protein_coding                     |
| ENSMUST00000115393 | 2 | 3 | 0 Slc9a7    | protein_coding                     |
| ENSMUST00000127099 | 2 | 3 | 0 Esco1     | protein_coding                     |
| ENSMUST00000137050 | 2 | 3 | 0 Nat10     | protein_coding                     |
| ENSMUST00000144892 | 2 | 3 | 0 Pde11a    | protein_coding                     |
| ENSMUST00000151042 | 2 | 3 | 0 Lancl2    | protein_coding                     |
| ENSMUST00000152532 | 2 | 3 | 0 Mtmr2     | protein_coding                     |
| ENSMUST00000164532 | 2 | 3 | 0 Fam49b    | protein_coding                     |
| ENSMUST00000166496 | 2 | 3 | 0 Slit1     | protein_coding                     |
| ENSMUST00000176102 | 2 | 3 | 0 Zbtb25    | protein_coding                     |
| ENSMUST00000119013 | 2 | 3 | 0 Gm15425   | processed_pseudogene               |
| ENSMUST00000092938 | 2 | 2 | 141 P2rx1   | protein_coding                     |
| ENSMUST00000053668 | 2 | 2 | 95 Gpr68    | protein_coding                     |
| ENSMUST00000121390 | 2 | 2 | 54 Cacna1a  | protein_coding                     |
| ENSMUST00000045229 | 2 | 2 | 46 Tmco3    | protein_coding                     |
| ENSMUST00000023486 | 2 | 2 | 34 Tfrc     | protein_coding                     |
| ENSMUST00000144096 | 2 | 2 | 32 Gm11755  | lincRNA                            |
| ENSMUST00000107373 | 2 | 2 | 26 Rab13    | protein_coding                     |
| ENSMUST00000021407 | 2 | 2 | 24 Srp54a   | protein_coding                     |
| ENSMUST00000113597 | 2 | 2 | 22 Rab7     | protein_coding                     |
| ENSMUST00000024731 | 2 | 2 | 20 Spats1   | protein_coding                     |
| ENSMUST00000099147 | 2 | 2 | 20 Gm7120   | protein_coding                     |
| ENSMUST00000138179 | 2 | 2 | 20 Fgr      | protein_coding                     |
| ENSMUST00000127365 | 2 | 2 | 18 Dpysl5   | protein_coding                     |
| ENSMUST00000141119 | 2 | 2 | 18 Ttl4     | protein_coding                     |
| ENSMUST00000164996 | 2 | 2 | 18 Vmn2r77  | protein_coding                     |
| ENSMUST00000176066 | 2 | 2 | 18 Ddx27    | protein_coding                     |
| ENSMUST00000040340 | 2 | 2 | 16 Fcho2    | protein_coding                     |
| ENSMUST00000084892 | 2 | 2 | 16 Dpy194   | protein_coding                     |
| ENSMUST00000114961 | 2 | 2 | 16 Kalrn    | protein_coding                     |
| ENSMUST00000016897 | 2 | 2 | 14 Ttl1     | protein_coding                     |
| ENSMUST00000118382 | 2 | 2 | 14 Gm12604  | processed_pseudogene               |
| ENSMUST00000067268 | 2 | 2 | 12 Pxn      | protein_coding                     |
| ENSMUST00000075770 | 2 | 2 | 12 Megf10   | protein_coding                     |
| ENSMUST00000111838 | 2 | 2 | 12 Clasp2   | protein_coding                     |
| ENSMUST00000135312 | 2 | 2 | 12 Arhgap30 | protein_coding                     |
| ENSMUST00000137852 | 2 | 2 | 12 Tbc1d9b  | protein_coding                     |
| ENSMUST00000170667 | 2 | 2 | 12 Shq1     | protein_coding                     |
| ENSMUST00000022057 | 2 | 2 | 10 Tppp     | protein_coding                     |
| ENSMUST00000031445 | 2 | 2 | 10 Aacs     | protein_coding                     |
| ENSMUST00000103015 | 2 | 2 | 10 Narf     | protein_coding                     |
| ENSMUST00000120854 | 2 | 2 | 10 Acad11   | protein_coding                     |
| ENSMUST00000126972 | 2 | 2 | 10 Trmt10b  | protein_coding                     |
| ENSMUST00000181337 | 2 | 2 | 10 Gm6410   | lincRNA                            |
| ENSMUST00000036126 | 2 | 2 | 8 Parp2     | protein_coding                     |
| ENSMUST00000046929 | 2 | 2 | 8 Usp31     | protein_coding                     |
| ENSMUST00000048377 | 2 | 2 | 8 Suco      | protein_coding                     |
| ENSMUST00000084418 | 2 | 2 | 8 Mob2      | protein_coding                     |
| ENSMUST00000088429 | 2 | 2 | 8 Atp2b3    | protein_coding                     |
| ENSMUST00000106072 | 2 | 2 | 8 Zfp362    | protein_coding                     |
| ENSMUST00000134057 | 2 | 2 | 8 Phrf1     | protein_coding                     |
| ENSMUST00000161861 | 2 | 2 | 8 Fgd4      | protein_coding                     |
| ENSMUST00000166135 | 2 | 2 | 8 Slc2a3    | protein_coding                     |
| ENSMUST00000145639 | 2 | 2 | 6 Itih5l-ps | transcribed_unprocessed_pseudogene |
| ENSMUST00000028356 | 2 | 2 | 6 Cd302     | protein_coding                     |
| ENSMUST00000035935 | 2 | 2 | 6 Ccdc40    | protein_coding                     |
| ENSMUST00000039160 | 2 | 2 | 6 Gpr176    | protein_coding                     |
| ENSMUST00000046743 | 2 | 2 | 6 BC026585  | protein_coding                     |
| ENSMUST00000071848 | 2 | 2 | 6 Fmr1nb    | protein_coding                     |

|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000080299 | 2 | 2 | 6 Yaf2          | protein_coding                     |
| ENSMUST00000102568 | 2 | 2 | 6 Phactr4       | protein_coding                     |
| ENSMUST00000102869 | 2 | 2 | 6 Xpo1          | protein_coding                     |
| ENSMUST00000110520 | 2 | 2 | 6 Trim9         | protein_coding                     |
| ENSMUST00000117399 | 2 | 2 | 6 Msn           | protein_coding                     |
| ENSMUST00000119185 | 2 | 2 | 6 Mybpc1        | protein_coding                     |
| ENSMUST00000125965 | 2 | 2 | 6 Samd13        | protein_coding                     |
| ENSMUST00000029459 | 2 | 2 | 4 Gdap2         | protein_coding                     |
| ENSMUST00000038546 | 2 | 2 | 4 Tex16         | protein_coding                     |
| ENSMUST00000053785 | 2 | 2 | 4 Trpc1         | protein_coding                     |
| ENSMUST00000089200 | 2 | 2 | 4 Cst7          | protein_coding                     |
| ENSMUST00000102526 | 2 | 2 | 4 Trpv1         | protein_coding                     |
| ENSMUST00000123951 | 2 | 2 | 4 Rps6ka6       | protein_coding                     |
| ENSMUST00000126045 | 2 | 2 | 4 Knstrn        | protein_coding                     |
| ENSMUST00000127689 | 2 | 2 | 4 Phyhd1        | protein_coding                     |
| ENSMUST00000131360 | 2 | 2 | 4 Qtrtd1        | protein_coding                     |
| ENSMUST00000135388 | 2 | 2 | 4 Ppp1r16a      | protein_coding                     |
| ENSMUST00000146409 | 2 | 2 | 4 Slc26a2       | protein_coding                     |
| ENSMUST00000150059 | 2 | 2 | 4 Armc9         | protein_coding                     |
| ENSMUST00000152040 | 2 | 2 | 4 Atp13a5       | protein_coding                     |
| ENSMUST00000174698 | 2 | 2 | 4 Wdfy3         | protein_coding                     |
| ENSMUST00000160445 | 2 | 2 | 4 Gm16549       | antisense                          |
| ENSMUST00000179459 | 2 | 2 | 2 AB124611      | protein_coding                     |
| ENSMUST00000179459 | 2 | 2 | 2 AB124611      | protein_coding                     |
| ENSMUST00000118085 | 2 | 2 | 2 Gm15320       | unprocessed_pseudogene             |
| ENSMUST00000025918 | 2 | 2 | 2 Stip1         | protein_coding                     |
| ENSMUST00000048134 | 2 | 2 | 2 Plch1         | protein_coding                     |
| ENSMUST00000064924 | 2 | 2 | 2 Espl1         | protein_coding                     |
| ENSMUST00000068853 | 2 | 2 | 2 Fat2          | protein_coding                     |
| ENSMUST00000072940 | 2 | 2 | 2 Gm5581        | protein_coding                     |
| ENSMUST00000109525 | 2 | 2 | 2 Pus10         | protein_coding                     |
| ENSMUST00000113999 | 2 | 2 | 2 Itsn1         | protein_coding                     |
| ENSMUST00000125490 | 2 | 2 | 2 Adamts9       | protein_coding                     |
| ENSMUST00000133603 | 2 | 2 | 2 Nup188        | protein_coding                     |
| ENSMUST00000140141 | 2 | 2 | 2 Gfra1         | protein_coding                     |
| ENSMUST00000147210 | 2 | 2 | 2 Ptpn1         | protein_coding                     |
| ENSMUST00000165744 | 2 | 2 | 2 Gm3739        | protein_coding                     |
| ENSMUST00000170077 | 2 | 2 | 2 Ston2         | protein_coding                     |
| ENSMUST00000172536 | 2 | 2 | 2 Msh5          | protein_coding                     |
| ENSMUST00000127456 | 2 | 2 | 2 Gm12580       | lincRNA                            |
| ENSMUST00000156149 | 2 | 2 | 2 Gm15892       | lincRNA                            |
| ENSMUST00000181388 | 2 | 2 | 2 B230110C06Rik | lincRNA                            |
| ENSMUST00000147130 | 2 | 2 | 2 Gm14764       | antisense                          |
| ENSMUST00000121721 | 2 | 2 | 0 Gm14695       | unprocessed_pseudogene             |
| ENSMUST00000146087 | 2 | 2 | 0 Vmn2r-ps54    | transcribed_unprocessed_pseudogene |
| ENSMUST00000005829 | 2 | 2 | 0 Ampd3         | protein_coding                     |
| ENSMUST00000007131 | 2 | 2 | 0 Acly          | protein_coding                     |
| ENSMUST00000021161 | 2 | 2 | 0 Slc13a5       | protein_coding                     |
| ENSMUST00000022592 | 2 | 2 | 0 Tnfsf11       | protein_coding                     |
| ENSMUST00000026839 | 2 | 2 | 0 Prps2         | protein_coding                     |
| ENSMUST00000031879 | 2 | 2 | 0 Fam115c       | protein_coding                     |
| ENSMUST00000038743 | 2 | 2 | 0 Tmc4          | protein_coding                     |
| ENSMUST00000039998 | 2 | 2 | 0 Fbxo27        | protein_coding                     |
| ENSMUST00000041640 | 2 | 2 | 0 Ankmy2        | protein_coding                     |
| ENSMUST00000042594 | 2 | 2 | 0 Mlc1          | protein_coding                     |
| ENSMUST00000052107 | 2 | 2 | 0 Zswim3        | protein_coding                     |
| ENSMUST00000053959 | 2 | 2 | 0 Ints6         | protein_coding                     |
| ENSMUST00000056442 | 2 | 2 | 0 Slc6a5        | protein_coding                     |
| ENSMUST00000061850 | 2 | 2 | 0 Pomk          | protein_coding                     |
| ENSMUST00000067521 | 2 | 2 | 0 Zcchc7        | protein_coding                     |
| ENSMUST00000082337 | 2 | 2 | 0 Mdc1          | protein_coding                     |
| ENSMUST00000086763 | 2 | 2 | 0 Emr1          | protein_coding                     |
| ENSMUST00000087210 | 2 | 2 | 0 Ppp1r10       | protein_coding                     |
| ENSMUST00000097043 | 2 | 2 | 0 Taf1a         | protein_coding                     |
| ENSMUST00000097420 | 2 | 2 | 0 Rnaset2a      | protein_coding                     |
| ENSMUST00000106479 | 2 | 2 | 0 lpp           | protein_coding                     |
| ENSMUST00000108691 | 2 | 2 | 0 Dnah9         | protein_coding                     |
| ENSMUST00000112669 | 2 | 2 | 0 3830406C13Rik | protein_coding                     |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUST00000131445 | 2 | 2 | 0 Bicc1          | protein_coding       |
| ENSMUST00000134866 | 2 | 2 | 0 Nek10          | protein_coding       |
| ENSMUST00000138293 | 2 | 2 | 0 Pramel7        | protein_coding       |
| ENSMUST00000138746 | 2 | 2 | 0 Pold1          | protein_coding       |
| ENSMUST00000144315 | 2 | 2 | 0 Wdr5           | protein_coding       |
| ENSMUST00000149864 | 2 | 2 | 0 Aass           | protein_coding       |
| ENSMUST00000153886 | 2 | 2 | 0 Slc25a25       | protein_coding       |
| ENSMUST00000160425 | 2 | 2 | 0 Phf11d         | protein_coding       |
| ENSMUST00000160704 | 2 | 2 | 0 Pianp          | protein_coding       |
| ENSMUST00000164147 | 2 | 2 | 0 Rbms1          | protein_coding       |
| ENSMUST00000169794 | 2 | 2 | 0 Aadacl2        | protein_coding       |
| ENSMUST00000171172 | 2 | 2 | 0 Mad2l1bp       | protein_coding       |
| ENSMUST00000171811 | 2 | 2 | 0 Vmn2r85        | protein_coding       |
| ENSMUST00000179728 | 2 | 2 | 0 Rnaset2b       | protein_coding       |
| ENSMUST00000180143 | 2 | 2 | 0 Gm3194         | protein_coding       |
| ENSMUST00000181059 | 2 | 2 | 0 Gm21304        | protein_coding       |
| ENSMUST00000181179 | 2 | 2 | 0 Gm8764         | protein_coding       |
| ENSMUST00000181634 | 2 | 2 | 0 Gm6763         | protein_coding       |
| ENSMUST00000181703 | 2 | 2 | 0 Gm20765        | protein_coding       |
| ENSMUST00000182994 | 2 | 2 | 0 Ank2           | protein_coding       |
| ENSMUST00000184431 | 2 | 2 | 0 Gm27235        | protein_coding       |
| ENSMUST00000122362 | 2 | 2 | 0 Gm14713        | processed_pseudogene |
| ENSMUST00000139190 | 2 | 2 | 0 E330017L17Rik  | lincRNA              |
| ENSMUST00000149696 | 2 | 2 | 0 Gm15585        | antisense            |
| ENSMUST00000033906 | 2 | 1 | 97 1700016D06Rik | protein_coding       |
| ENSMUST00000028135 | 2 | 1 | 63 Fam129b       | protein_coding       |
| ENSMUST00000162926 | 2 | 1 | 52 Gstcd         | protein_coding       |
| ENSMUST00000123522 | 2 | 1 | 36 Med27         | protein_coding       |
| ENSMUST00000180738 | 2 | 1 | 32 Gm17529       | lincRNA              |
| ENSMUST00000168162 | 2 | 1 | 30 Pdgfra        | protein_coding       |
| ENSMUST00000168414 | 2 | 1 | 28 Hoga1         | protein_coding       |
| ENSMUST00000146145 | 2 | 1 | 28 2310014F06Rik | processed_transcript |
| ENSMUST00000097649 | 2 | 1 | 26 Lrrfp1        | protein_coding       |
| ENSMUST00000122053 | 2 | 1 | 26 Cacna1a       | protein_coding       |
| ENSMUST00000162708 | 2 | 1 | 26 Unc93b1       | protein_coding       |
| ENSMUST00000034815 | 2 | 1 | 22 Kif23         | protein_coding       |
| ENSMUST00000035622 | 2 | 1 | 22 Wdr93         | protein_coding       |
| ENSMUST00000059826 | 2 | 1 | 22 Kcnb1         | protein_coding       |
| ENSMUST00000108061 | 2 | 1 | 22 Bcas3         | protein_coding       |
| ENSMUST00000137111 | 2 | 1 | 22 Plekhg1       | protein_coding       |
| ENSMUST00000022680 | 2 | 1 | 20 Bin3          | protein_coding       |
| ENSMUST00000035501 | 2 | 1 | 20 Loxhd1        | protein_coding       |
| ENSMUST00000049138 | 2 | 1 | 20 2410131K14Rik | protein_coding       |
| ENSMUST00000092777 | 2 | 1 | 18 Spag9         | protein_coding       |
| ENSMUST00000115628 | 2 | 1 | 18 Tango2        | protein_coding       |
| ENSMUST00000133149 | 2 | 1 | 18 Cuedc1        | protein_coding       |
| ENSMUST00000151229 | 2 | 1 | 18 Nr6a1os       | antisense            |
| ENSMUST00000028392 | 2 | 1 | 16 Dnajc10       | protein_coding       |
| ENSMUST00000030610 | 2 | 1 | 16 Zbtb8a        | protein_coding       |
| ENSMUST00000184105 | 2 | 1 | 16 Pank2         | protein_coding       |
| ENSMUST00000004920 | 2 | 1 | 14 Ulk2          | protein_coding       |
| ENSMUST00000025177 | 2 | 1 | 14 Trappc8       | protein_coding       |
| ENSMUST00000087659 | 2 | 1 | 14 Hecw2         | protein_coding       |
| ENSMUST00000111905 | 2 | 1 | 14 Grin2b        | protein_coding       |
| ENSMUST00000138859 | 2 | 1 | 14 Usp8          | protein_coding       |
| ENSMUST00000145090 | 2 | 1 | 14 Arhgap26      | protein_coding       |
| ENSMUST00000148634 | 2 | 1 | 14 Cog7          | protein_coding       |
| ENSMUST00000109646 | 2 | 1 | 12 Fam227a       | protein_coding       |
| ENSMUST00000118341 | 2 | 1 | 12 Adar          | protein_coding       |
| ENSMUST00000136376 | 2 | 1 | 12 Fbxl12os      | antisense            |
| ENSMUST00000067582 | 2 | 1 | 10 Tmem62        | protein_coding       |
| ENSMUST00000097820 | 2 | 1 | 10 Arhgef10l     | protein_coding       |
| ENSMUST00000111875 | 2 | 1 | 10 Fam129a       | protein_coding       |
| ENSMUST00000113169 | 2 | 1 | 10 Srgap3        | protein_coding       |
| ENSMUST00000144100 | 2 | 1 | 10 Nfat5         | protein_coding       |
| ENSMUST00000166879 | 2 | 1 | 10 Rnaseh2b      | protein_coding       |
| ENSMUST00000174518 | 2 | 1 | 10 Aldh7a1       | protein_coding       |
| ENSMUST00000032269 | 2 | 1 | 8 Rad52          | protein_coding       |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000040881 | 2 | 1 | 8 Cluap1        | protein_coding         |
| ENSMUST00000088233 | 2 | 1 | 8 Fmn13         | protein_coding         |
| ENSMUST00000111782 | 2 | 1 | 8 Mapkapk5      | protein_coding         |
| ENSMUST00000114849 | 2 | 1 | 8 Uhrf1bp1      | protein_coding         |
| ENSMUST00000134767 | 2 | 1 | 8 Synj2         | protein_coding         |
| ENSMUST00000135508 | 2 | 1 | 8 Ruffy1        | protein_coding         |
| ENSMUST00000136812 | 2 | 1 | 8 Tcea3         | protein_coding         |
| ENSMUST00000141814 | 2 | 1 | 8 Prr5l         | protein_coding         |
| ENSMUST00000166825 | 2 | 1 | 8 Naalad2       | protein_coding         |
| ENSMUST00000182919 | 2 | 1 | 8 Zfp82         | protein_coding         |
| ENSMUST00000151038 | 2 | 1 | 8 Gm5860        | lincRNA                |
| ENSMUST00000021574 | 2 | 1 | 6 Gtpbp4        | protein_coding         |
| ENSMUST00000036467 | 2 | 1 | 6 Asb16         | protein_coding         |
| ENSMUST00000037145 | 2 | 1 | 6 Cdhr2         | protein_coding         |
| ENSMUST00000037246 | 2 | 1 | 6 Ccs           | protein_coding         |
| ENSMUST00000076091 | 2 | 1 | 6 Ctf2          | protein_coding         |
| ENSMUST00000080919 | 2 | 1 | 6 Thrap3        | protein_coding         |
| ENSMUST00000110882 | 2 | 1 | 6 Sun1          | protein_coding         |
| ENSMUST00000127042 | 2 | 1 | 6 Aatf          | protein_coding         |
| ENSMUST00000150788 | 2 | 1 | 6 Kcnt1         | protein_coding         |
| ENSMUST00000159430 | 2 | 1 | 6 Zfat          | protein_coding         |
| ENSMUST00000144178 | 2 | 1 | 6 Gm14023       | processed_transcript   |
| ENSMUST00000172588 | 2 | 1 | 6 Gm20536       | processed_transcript   |
| ENSMUST00000002112 | 2 | 1 | 4 Trappc6a      | protein_coding         |
| ENSMUST00000004681 | 2 | 1 | 4 Pnpla6        | protein_coding         |
| ENSMUST00000030910 | 2 | 1 | 4 4930584F24Rik | protein_coding         |
| ENSMUST00000032362 | 2 | 1 | 4 Slco1c1       | protein_coding         |
| ENSMUST00000034863 | 2 | 1 | 4 Csk           | protein_coding         |
| ENSMUST00000036155 | 2 | 1 | 4 Xrra1         | protein_coding         |
| ENSMUST00000086323 | 2 | 1 | 4 Zfp78         | protein_coding         |
| ENSMUST00000092462 | 2 | 1 | 4 Dna2          | protein_coding         |
| ENSMUST00000099307 | 2 | 1 | 4 lsm1          | protein_coding         |
| ENSMUST00000111722 | 2 | 1 | 4 Tfpi          | protein_coding         |
| ENSMUST00000127822 | 2 | 1 | 4 Slc5a12       | protein_coding         |
| ENSMUST00000132001 | 2 | 1 | 4 Cln8          | protein_coding         |
| ENSMUST00000134381 | 2 | 1 | 4 Atrx          | protein_coding         |
| ENSMUST00000137156 | 2 | 1 | 4 Exosc2        | protein_coding         |
| ENSMUST00000145839 | 2 | 1 | 4 Nf1           | protein_coding         |
| ENSMUST00000148943 | 2 | 1 | 4 Ptges3        | protein_coding         |
| ENSMUST00000149235 | 2 | 1 | 4 Phactr1       | protein_coding         |
| ENSMUST00000175660 | 2 | 1 | 4 Kcnip4        | protein_coding         |
| ENSMUST00000183115 | 2 | 1 | 4 Zfp82         | protein_coding         |
| ENSMUST00000180114 | 2 | 1 | 2 Gm16445       | unprocessed_pseudogene |
| ENSMUST00000180114 | 2 | 1 | 2 Gm16445       | unprocessed_pseudogene |
| ENSMUST00000028600 | 2 | 1 | 2 Hipk3         | protein_coding         |
| ENSMUST00000029919 | 2 | 1 | 2 Clca3         | protein_coding         |
| ENSMUST00000030163 | 2 | 1 | 2 1700022111Rik | protein_coding         |
| ENSMUST00000033973 | 2 | 1 | 2 Rwd4a         | protein_coding         |
| ENSMUST00000055244 | 2 | 1 | 2 Fubp3         | protein_coding         |
| ENSMUST00000068767 | 2 | 1 | 2 Nlrp4a        | protein_coding         |
| ENSMUST00000076435 | 2 | 1 | 2 Nsun6         | protein_coding         |
| ENSMUST00000092473 | 2 | 1 | 2 Vps26a        | protein_coding         |
| ENSMUST00000105546 | 2 | 1 | 2 Phactr2       | protein_coding         |
| ENSMUST00000106213 | 2 | 1 | 2 Macf1         | protein_coding         |
| ENSMUST00000107465 | 2 | 1 | 2 Tns4          | protein_coding         |
| ENSMUST00000107519 | 2 | 1 | 2 Trpm1         | protein_coding         |
| ENSMUST00000132696 | 2 | 1 | 2 Fam60a        | protein_coding         |
| ENSMUST00000138414 | 2 | 1 | 2 Mybl2         | protein_coding         |
| ENSMUST00000167214 | 2 | 1 | 2 Pla2g7        | protein_coding         |
| ENSMUST00000170800 | 2 | 1 | 2 Ddr2          | protein_coding         |
| ENSMUST00000172484 | 2 | 1 | 2 Slit2         | protein_coding         |
| ENSMUST00000172728 | 2 | 1 | 2 Fam92a        | protein_coding         |
| ENSMUST00000176523 | 2 | 1 | 2 Ap2b1         | protein_coding         |
| ENSMUST00000176769 | 2 | 1 | 2 Smarca2       | protein_coding         |
| ENSMUST00000177994 | 2 | 1 | 2 4921511M17Rik | protein_coding         |
| ENSMUST00000151159 | 2 | 1 | 2 Gm13832       | antisense              |
| ENSMUST00000153785 | 2 | 1 | 2 Fgf2os        | antisense              |
| ENSMUST00000099301 | 2 | 1 | 0 Flrt3         | protein_coding         |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000099301 | 2 | 1 | 0 Flrt3         | protein_coding       |
| ENSMUST00000017694 | 2 | 1 | 0 Atad5         | protein_coding       |
| ENSMUST00000022499 | 2 | 1 | 0 Rnaseh2b      | protein_coding       |
| ENSMUST00000022531 | 2 | 1 | 0 Lats2         | protein_coding       |
| ENSMUST00000022609 | 2 | 1 | 0 Elp3          | protein_coding       |
| ENSMUST00000022642 | 2 | 1 | 0 Adam28        | protein_coding       |
| ENSMUST00000022682 | 2 | 1 | 0 Sorbs3        | protein_coding       |
| ENSMUST00000024909 | 2 | 1 | 0 Ndufv2        | protein_coding       |
| ENSMUST00000029645 | 2 | 1 | 0 Tdo2          | protein_coding       |
| ENSMUST00000030901 | 2 | 1 | 0 Cpsf3l        | protein_coding       |
| ENSMUST00000032370 | 2 | 1 | 0 Recql         | protein_coding       |
| ENSMUST00000035721 | 2 | 1 | 0 Prpf18        | protein_coding       |
| ENSMUST00000041737 | 2 | 1 | 0 Wasl          | protein_coding       |
| ENSMUST00000049344 | 2 | 1 | 0 Csgalnact2    | protein_coding       |
| ENSMUST00000054536 | 2 | 1 | 0 Pqlc3         | protein_coding       |
| ENSMUST00000057180 | 2 | 1 | 0 A830080D01Rik | protein_coding       |
| ENSMUST00000063006 | 2 | 1 | 0 Ccdc42        | protein_coding       |
| ENSMUST00000063770 | 2 | 1 | 0 Acsm3         | protein_coding       |
| ENSMUST00000072916 | 2 | 1 | 0 Zswim7        | protein_coding       |
| ENSMUST00000079754 | 2 | 1 | 0 Cpeb3         | protein_coding       |
| ENSMUST00000084922 | 2 | 1 | 0 Rtp3          | protein_coding       |
| ENSMUST00000092537 | 2 | 1 | 0 Tik2          | protein_coding       |
| ENSMUST00000094897 | 2 | 1 | 0 Dnaaf3        | protein_coding       |
| ENSMUST00000101049 | 2 | 1 | 0 Elac2         | protein_coding       |
| ENSMUST00000102573 | 2 | 1 | 0 Trim44        | protein_coding       |
| ENSMUST00000109430 | 2 | 1 | 0 Gpr75         | protein_coding       |
| ENSMUST00000110118 | 2 | 1 | 0 Tpmt          | protein_coding       |
| ENSMUST00000113438 | 2 | 1 | 0 Adamts9       | protein_coding       |
| ENSMUST00000114829 | 2 | 1 | 0 Eaf2          | protein_coding       |
| ENSMUST00000119481 | 2 | 1 | 0 Lrfrn5        | protein_coding       |
| ENSMUST00000122088 | 2 | 1 | 0 S1pr5         | protein_coding       |
| ENSMUST00000122334 | 2 | 1 | 0 Ppa2          | protein_coding       |
| ENSMUST00000123364 | 2 | 1 | 0 Lrriq1        | protein_coding       |
| ENSMUST00000125502 | 2 | 1 | 0 Npepl1        | protein_coding       |
| ENSMUST00000128887 | 2 | 1 | 0 Gtpbp10       | protein_coding       |
| ENSMUST00000129178 | 2 | 1 | 0 Hsp90b1       | protein_coding       |
| ENSMUST00000130247 | 2 | 1 | 0 Tex16         | protein_coding       |
| ENSMUST00000130329 | 2 | 1 | 0 Ccne1         | protein_coding       |
| ENSMUST00000132132 | 2 | 1 | 0 Dnmt3b        | protein_coding       |
| ENSMUST00000132510 | 2 | 1 | 0 Cfap69        | protein_coding       |
| ENSMUST00000132606 | 2 | 1 | 0 Rbm47         | protein_coding       |
| ENSMUST00000137157 | 2 | 1 | 0 Glt1d1        | protein_coding       |
| ENSMUST00000141044 | 2 | 1 | 0 Mthfd2        | protein_coding       |
| ENSMUST00000142587 | 2 | 1 | 0 Etfa          | protein_coding       |
| ENSMUST00000144598 | 2 | 1 | 0 A830080D01Rik | protein_coding       |
| ENSMUST00000147469 | 2 | 1 | 0 Dpf3          | protein_coding       |
| ENSMUST00000151370 | 2 | 1 | 0 Gtf3c2        | protein_coding       |
| ENSMUST00000169782 | 2 | 1 | 0 Ankrd10       | protein_coding       |
| ENSMUST00000170840 | 2 | 1 | 0 Parg          | protein_coding       |
| ENSMUST00000171165 | 2 | 1 | 0 Ube2f         | protein_coding       |
| ENSMUST00000173248 | 2 | 1 | 0 Ank1          | protein_coding       |
| ENSMUST00000175806 | 2 | 1 | 0 Pknx1         | protein_coding       |
| ENSMUST00000176358 | 2 | 1 | 0 Asap1         | protein_coding       |
| ENSMUST00000177986 | 2 | 1 | 0 Gm3500        | protein_coding       |
| ENSMUST00000179433 | 2 | 1 | 0 1700055N04Rik | protein_coding       |
| ENSMUST00000180889 | 2 | 1 | 0 Gm21312       | protein_coding       |
| ENSMUST00000181615 | 2 | 1 | 0 Gm4340        | protein_coding       |
| ENSMUST00000183372 | 2 | 1 | 0 Rfx7          | protein_coding       |
| ENSMUST00000141989 | 2 | 1 | 0 Gm15017       | processed_transcript |
| ENSMUST00000156240 | 2 | 1 | 0 Ftx           | lincRNA              |
| ENSMUST00000181476 | 2 | 1 | 0 Gm16863       | lincRNA              |
| ENSMUST00000124435 | 2 | 1 | 0 Gm11457       | antisense            |
| ENSMUST00000139351 | 2 | 1 | 0 Sox5os3       | antisense            |
| ENSMUST00000145021 | 2 | 1 | 0 Gm12300       | antisense            |
| ENSMUST00000182590 | 2 | 1 | 0 Gm27003       | antisense            |
| ENSMUST00000097403 | 2 | 1 | 115 Tcp10c      | protein_coding       |
| ENSMUST00000173695 | 2 | 1 | 40 Gm20400      | processed_transcript |
| ENSMUST00000078757 | 2 | 1 | 36 Gal3st1      | protein_coding       |

|                     |   |   |                  |                      |
|---------------------|---|---|------------------|----------------------|
| ENSMUST00000004145  | 2 | 1 | 34 Stat5a        | protein_coding       |
| ENSMUST00000037813  | 2 | 1 | 34 Gnaz          | protein_coding       |
| ENSMUST00000020899  | 2 | 1 | 30 Matn3         | protein_coding       |
| ENSMUST000000139798 | 2 | 1 | 30 Zfp286        | protein_coding       |
| ENSMUST000000167213 | 2 | 1 | 30 Vwa3a         | protein_coding       |
| ENSMUST00000030317  | 2 | 1 | 26 Pdpn          | protein_coding       |
| ENSMUST000000110690 | 2 | 1 | 24 Oxct1         | protein_coding       |
| ENSMUST000000178451 | 2 | 1 | 22 Gm21092       | protein_coding       |
| ENSMUST00000001451  | 2 | 1 | 20 Smg5          | protein_coding       |
| ENSMUST00000001699  | 2 | 1 | 20 Hoxc10        | protein_coding       |
| ENSMUST000000152130 | 2 | 1 | 20 Pbk           | protein_coding       |
| ENSMUST000000018798 | 2 | 1 | 18 Ikzf1         | protein_coding       |
| ENSMUST000000076110 | 2 | 1 | 18 Rnf2          | protein_coding       |
| ENSMUST000000106522 | 2 | 1 | 18 Efcab14       | protein_coding       |
| ENSMUST000000114132 | 2 | 1 | 18 Zdbf2         | protein_coding       |
| ENSMUST000000093518 | 2 | 1 | 16 Cenpu         | protein_coding       |
| ENSMUST000000153914 | 2 | 1 | 16 Golga1        | protein_coding       |
| ENSMUST000000174174 | 2 | 1 | 16 Shmt1         | protein_coding       |
| ENSMUST000000151076 | 2 | 1 | 16 2210408F21Rik | processed_transcript |
| ENSMUST000000005262 | 2 | 1 | 14 4930550C14Rik | protein_coding       |
| ENSMUST00000030556  | 2 | 1 | 14 Ptpn12        | protein_coding       |
| ENSMUST000000106925 | 2 | 1 | 14 Ngf           | protein_coding       |
| ENSMUST000000156258 | 2 | 1 | 14 Zgpat         | protein_coding       |
| ENSMUST000000184399 | 2 | 1 | 14 Zfp280d       | protein_coding       |
| ENSMUST00000022831  | 2 | 1 | 12 Khnyn         | protein_coding       |
| ENSMUST00000028386  | 2 | 1 | 12 Nckap1        | protein_coding       |
| ENSMUST000000115527 | 2 | 1 | 12 Fam133b       | protein_coding       |
| ENSMUST000000141092 | 2 | 1 | 12 Rnpep         | protein_coding       |
| ENSMUST000000154839 | 2 | 1 | 12 Ech1          | protein_coding       |
| ENSMUST000000183375 | 2 | 1 | 12 Nedd4         | protein_coding       |
| ENSMUST00000025311  | 2 | 1 | 10 Pcdh12        | protein_coding       |
| ENSMUST000000030638 | 2 | 1 | 10 Trim63        | protein_coding       |
| ENSMUST000000130776 | 2 | 1 | 10 Scp2          | protein_coding       |
| ENSMUST000000134777 | 2 | 1 | 10 Pbx4          | protein_coding       |
| ENSMUST000000067692 | 2 | 1 | 8 Rad51c         | protein_coding       |
| ENSMUST000000071829 | 2 | 1 | 8 Pisd           | protein_coding       |
| ENSMUST000000106162 | 2 | 1 | 8 Csf3r          | protein_coding       |
| ENSMUST000000109640 | 2 | 1 | 8 Ahrr           | protein_coding       |
| ENSMUST000000167354 | 2 | 1 | 8 Fxr1           | protein_coding       |
| ENSMUST000000134624 | 2 | 1 | 8 2610307P16Rik  | processed_transcript |
| ENSMUST000000184871 | 2 | 1 | 6 Ace3           | protein_coding       |
| ENSMUST000000184871 | 2 | 1 | 6 Ace3           | protein_coding       |
| ENSMUST000000021482 | 2 | 1 | 6 Tomm20l        | protein_coding       |
| ENSMUST000000025050 | 2 | 1 | 6 Nudt3          | protein_coding       |
| ENSMUST000000045218 | 2 | 1 | 6 Pcm1           | protein_coding       |
| ENSMUST000000081202 | 2 | 1 | 6 Manbal         | protein_coding       |
| ENSMUST000000084170 | 2 | 1 | 6 Phactr4        | protein_coding       |
| ENSMUST000000107682 | 2 | 1 | 6 Tmem154        | protein_coding       |
| ENSMUST000000135934 | 2 | 1 | 6 Stt3a          | protein_coding       |
| ENSMUST000000166280 | 2 | 1 | 6 Dlk2           | protein_coding       |
| ENSMUST000000154703 | 2 | 1 | 6 1700092E19Rik  | lincRNA              |
| ENSMUST000000021039 | 2 | 1 | 4 Lig3           | protein_coding       |
| ENSMUST000000101042 | 2 | 1 | 4 Myocd          | protein_coding       |
| ENSMUST000000115404 | 2 | 1 | 4 Dnm2           | protein_coding       |
| ENSMUST000000117589 | 2 | 1 | 4 Sumo2          | protein_coding       |
| ENSMUST000000125459 | 2 | 1 | 4 2610507B11Rik  | protein_coding       |
| ENSMUST000000130274 | 2 | 1 | 4 Eps8           | protein_coding       |
| ENSMUST000000155229 | 2 | 1 | 4 Susd4          | protein_coding       |
| ENSMUST000000156097 | 2 | 1 | 4 Dram1          | protein_coding       |
| ENSMUST000000181815 | 2 | 1 | 4 Gm26834        | lincRNA              |
| ENSMUST000000020450 | 2 | 1 | 2 Slc5a4a        | protein_coding       |
| ENSMUST000000024734 | 2 | 1 | 2 Mrpl14         | protein_coding       |
| ENSMUST000000025696 | 2 | 1 | 2 Ak3            | protein_coding       |
| ENSMUST000000025925 | 2 | 1 | 2 Pla2g16        | protein_coding       |
| ENSMUST000000031729 | 2 | 1 | 2 Tfr2           | protein_coding       |
| ENSMUST000000050047 | 2 | 1 | 2 D630023F18Rik  | protein_coding       |
| ENSMUST000000057029 | 2 | 1 | 2 Zfp13          | protein_coding       |
| ENSMUST000000065865 | 2 | 1 | 2 Thoc7          | protein_coding       |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000075161 | 2 | 1 | 2 Actg2         | protein_coding         |
| ENSMUST00000077755 | 2 | 1 | 2 Arpc5         | protein_coding         |
| ENSMUST00000088786 | 2 | 1 | 2 Sri           | protein_coding         |
| ENSMUST00000112187 | 2 | 1 | 2 Tceanc        | protein_coding         |
| ENSMUST00000124651 | 2 | 1 | 2 Sidt1         | protein_coding         |
| ENSMUST00000128010 | 2 | 1 | 2 Akrl1a1       | protein_coding         |
| ENSMUST00000136760 | 2 | 1 | 2 Tiam1         | protein_coding         |
| ENSMUST00000142238 | 2 | 1 | 2 Hn1           | protein_coding         |
| ENSMUST00000145650 | 2 | 1 | 2 Wars2         | protein_coding         |
| ENSMUST00000148817 | 2 | 1 | 2 Fbxo4         | protein_coding         |
| ENSMUST00000163924 | 2 | 1 | 2 Pspc1         | protein_coding         |
| ENSMUST00000180278 | 2 | 1 | 2 Atg4c         | protein_coding         |
| ENSMUST00000119936 | 2 | 1 | 2 Gm13859       | processed_pseudogene   |
| ENSMUST00000180591 | 2 | 1 | 2 Gm26801       | antisense              |
| ENSMUST00000173251 | 2 | 1 | 0 Vmn2r-ps75    | unprocessed_pseudogene |
| ENSMUST00000006029 | 2 | 1 | 0 Arhgap8       | protein_coding         |
| ENSMUST00000020954 | 2 | 1 | 0 Trappc12      | protein_coding         |
| ENSMUST00000022964 | 2 | 1 | 0 Ebag9         | protein_coding         |
| ENSMUST00000023759 | 2 | 1 | 0 Smarcd1       | protein_coding         |
| ENSMUST00000028052 | 2 | 1 | 0 Rabgap1l      | protein_coding         |
| ENSMUST00000031797 | 2 | 1 | 0 Ssmem1        | protein_coding         |
| ENSMUST00000032201 | 2 | 1 | 0 Ret           | protein_coding         |
| ENSMUST00000034377 | 2 | 1 | 0 Pla2g15       | protein_coding         |
| ENSMUST00000035116 | 2 | 1 | 0 Pccb          | protein_coding         |
| ENSMUST00000039782 | 2 | 1 | 0 Chd6          | protein_coding         |
| ENSMUST00000040960 | 2 | 1 | 0 Slc6a20a      | protein_coding         |
| ENSMUST00000047405 | 2 | 1 | 0 Nckap1l       | protein_coding         |
| ENSMUST00000048731 | 2 | 1 | 0 2610034B18Rik | protein_coding         |
| ENSMUST00000055647 | 2 | 1 | 0 Kif1b         | protein_coding         |
| ENSMUST00000059580 | 2 | 1 | 0 Setd8         | protein_coding         |
| ENSMUST00000062904 | 2 | 1 | 0 Dnajc11       | protein_coding         |
| ENSMUST00000066740 | 2 | 1 | 0 A730045E13Rik | protein_coding         |
| ENSMUST00000068168 | 2 | 1 | 0 Kansl1l       | protein_coding         |
| ENSMUST00000072292 | 2 | 1 | 0 Zfp280c       | protein_coding         |
| ENSMUST00000080175 | 2 | 1 | 0 Zfp626        | protein_coding         |
| ENSMUST00000087164 | 2 | 1 | 0 Lcorl         | protein_coding         |
| ENSMUST00000091282 | 2 | 1 | 0 Fnd3c2        | protein_coding         |
| ENSMUST00000094156 | 2 | 1 | 0 Fam183b       | protein_coding         |
| ENSMUST00000098311 | 2 | 1 | 0 Disc1         | protein_coding         |
| ENSMUST00000101067 | 2 | 1 | 0 Ncor1         | protein_coding         |
| ENSMUST00000105675 | 2 | 1 | 0 Park7         | protein_coding         |
| ENSMUST00000106452 | 2 | 1 | 0 Unk           | protein_coding         |
| ENSMUST00000111171 | 2 | 1 | 0 Pom121        | protein_coding         |
| ENSMUST00000111702 | 2 | 1 | 0 Sspn          | protein_coding         |
| ENSMUST00000113165 | 2 | 1 | 0 Ralgps1       | protein_coding         |
| ENSMUST00000113738 | 2 | 1 | 0 N4bp2         | protein_coding         |
| ENSMUST00000115084 | 2 | 1 | 0 Meig1         | protein_coding         |
| ENSMUST00000123271 | 2 | 1 | 0 Orc4          | protein_coding         |
| ENSMUST00000125591 | 2 | 1 | 0 Psmd11        | protein_coding         |
| ENSMUST00000128293 | 2 | 1 | 0 Zfp324        | protein_coding         |
| ENSMUST00000128341 | 2 | 1 | 0 Myo9a         | protein_coding         |
| ENSMUST00000137185 | 2 | 1 | 0 Smim20        | protein_coding         |
| ENSMUST00000139104 | 2 | 1 | 0 Trpc2         | protein_coding         |
| ENSMUST00000140438 | 2 | 1 | 0 Mrps25        | protein_coding         |
| ENSMUST00000145514 | 2 | 1 | 0 Glis          | protein_coding         |
| ENSMUST00000148519 | 2 | 1 | 0 Rars2         | protein_coding         |
| ENSMUST00000148570 | 2 | 1 | 0 Rps6ka3       | protein_coding         |
| ENSMUST00000154955 | 2 | 1 | 0 Mtmr11        | protein_coding         |
| ENSMUST00000155226 | 2 | 1 | 0 Ets2          | protein_coding         |
| ENSMUST00000161284 | 2 | 1 | 0 Lrrc9         | protein_coding         |
| ENSMUST00000163319 | 2 | 1 | 0 Pln           | protein_coding         |
| ENSMUST00000167078 | 2 | 1 | 0 Golim4        | protein_coding         |
| ENSMUST00000168062 | 2 | 1 | 0 Cct3          | protein_coding         |
| ENSMUST00000168360 | 2 | 1 | 0 P4hb          | protein_coding         |
| ENSMUST00000168584 | 2 | 1 | 0 Glt8d1        | protein_coding         |
| ENSMUST00000171749 | 2 | 1 | 0 AU018091      | protein_coding         |
| ENSMUST00000181983 | 2 | 1 | 0 Rbm25         | protein_coding         |
| ENSMUST00000034550 | 2 | 1 | 0 4930510E17Rik | lincRNA                |

|                     |   |   |      |               |                        |
|---------------------|---|---|------|---------------|------------------------|
| ENSMUST00000132261  | 2 | 1 | 0    | Gm11734       | lincRNA                |
| ENSMUST00000140380  | 2 | 1 | 0    | Gm11672       | antisense              |
| ENSMUST00000161529  | 2 | 1 | 0    | Gm16537       | antisense              |
| ENSMUST00000137546  | 2 | 0 | 6525 | 1700121C08Rik | antisense              |
| ENSMUST00000039324  | 2 | 0 | 543  | Abca17        | protein_coding         |
| ENSMUST00000070132  | 2 | 0 | 30   | Col8a2        | protein_coding         |
| ENSMUST00000148320  | 2 | 0 | 30   | Gm13075       | antisense              |
| ENSMUST00000042944  | 2 | 0 | 24   | Arap3         | protein_coding         |
| ENSMUST00000122826  | 2 | 0 | 24   | Sumf2         | protein_coding         |
| ENSMUST00000169266  | 2 | 0 | 20   | Cic           | protein_coding         |
| ENSMUST00000048319  | 2 | 0 | 18   | Zfyve1        | protein_coding         |
| ENSMUST00000124780  | 2 | 0 | 18   | Depdc5        | protein_coding         |
| ENSMUST00000144311  | 2 | 0 | 18   | Pomgnt1       | protein_coding         |
| ENSMUST00000181623  | 2 | 0 | 18   | C330002G04Rik | lincRNA                |
| ENSMUST00000003898  | 2 | 0 | 16   | Ece2          | protein_coding         |
| ENSMUST00000011400  | 2 | 0 | 16   | Adam19        | protein_coding         |
| ENSMUST00000135963  | 2 | 0 | 16   | Rad51d        | protein_coding         |
| ENSMUST00000127481  | 2 | 0 | 14   | Ddx5          | protein_coding         |
| ENSMUST00000060807  | 2 | 0 | 12   | Fam83h        | protein_coding         |
| ENSMUST00000120934  | 2 | 0 | 12   | Ptpn2         | protein_coding         |
| ENSMUST00000139955  | 2 | 0 | 12   | Prpf6         | protein_coding         |
| ENSMUST00000172538  | 2 | 0 | 10   | C920025E04Rik | unprocessed_pseudogene |
| ENSMUST00000056290  | 2 | 0 | 10   | Nf2           | protein_coding         |
| ENSMUST00000114325  | 2 | 0 | 10   | Orc2          | protein_coding         |
| ENSMUST00000156870  | 2 | 0 | 10   | Cflar         | protein_coding         |
| ENSMUST00000145562  | 2 | 0 | 10   | 4930513N10Rik | processed_transcript   |
| ENSMUST00000005647  | 2 | 0 | 8    | Ndufs3        | protein_coding         |
| ENSMUST00000022890  | 2 | 0 | 8    | Rnf19a        | protein_coding         |
| ENSMUST00000023869  | 2 | 0 | 8    | Denr          | protein_coding         |
| ENSMUST00000108047  | 2 | 0 | 8    | Tbx4          | protein_coding         |
| ENSMUST00000115310  | 2 | 0 | 8    | Trp63         | protein_coding         |
| ENSMUST00000136088  | 2 | 0 | 8    | Actl6b        | protein_coding         |
| ENSMUST00000037391  | 2 | 0 | 6    | Cd99l2        | protein_coding         |
| ENSMUST00000039173  | 2 | 0 | 6    | 2310035C23Rik | protein_coding         |
| ENSMUST00000066981  | 2 | 0 | 6    | Umodl1        | protein_coding         |
| ENSMUST00000085819  | 2 | 0 | 6    | Catsperg1     | protein_coding         |
| ENSMUST00000119921  | 2 | 0 | 6    | Nmnat1        | protein_coding         |
| ENSMUST00000034287  | 2 | 0 | 4    | Klhl36        | protein_coding         |
| ENSMUST00000072460  | 2 | 0 | 4    | Mef2a         | protein_coding         |
| ENSMUST00000100375  | 2 | 0 | 4    | Poldip3       | protein_coding         |
| ENSMUST00000127260  | 2 | 0 | 4    | Mbd2          | protein_coding         |
| ENSMUST00000139172  | 2 | 0 | 4    | Fbxo17        | protein_coding         |
| ENSMUST00000150799  | 2 | 0 | 4    | Hira          | protein_coding         |
| ENSMUST00000017548  | 2 | 0 | 2    | Rpl19         | protein_coding         |
| ENSMUST000000021450 | 2 | 0 | 2    | Sgpp1         | protein_coding         |
| ENSMUST00000029447  | 2 | 0 | 2    | Sike1         | protein_coding         |
| ENSMUST00000030028  | 2 | 0 | 2    | Erp44         | protein_coding         |
| ENSMUST00000031840  | 2 | 0 | 2    | Gpnmb         | protein_coding         |
| ENSMUST00000032701  | 2 | 0 | 2    | Tdrd12        | protein_coding         |
| ENSMUST00000049295  | 2 | 0 | 2    | Ehbp111       | protein_coding         |
| ENSMUST00000050754  | 2 | 0 | 2    | A730018C14Rik | protein_coding         |
| ENSMUST00000057176  | 2 | 0 | 2    | Lrit2         | protein_coding         |
| ENSMUST00000078770  | 2 | 0 | 2    | 1700025F22Rik | protein_coding         |
| ENSMUST00000080335  | 2 | 0 | 2    | Col25a1       | protein_coding         |
| ENSMUST00000100305  | 2 | 0 | 2    | Helz          | protein_coding         |
| ENSMUST00000113140  | 2 | 0 | 2    | Cdkl2         | protein_coding         |
| ENSMUST00000124348  | 2 | 0 | 2    | Mier1         | protein_coding         |
| ENSMUST00000139382  | 2 | 0 | 2    | lqce          | protein_coding         |
| ENSMUST00000146307  | 2 | 0 | 2    | Ralgapa2      | protein_coding         |
| ENSMUST00000126063  | 2 | 0 | 2    | Gm12665       | lincRNA                |
| ENSMUST00000027645  | 2 | 0 | 0    | Ptprc         | protein_coding         |
| ENSMUST00000027645  | 2 | 0 | 0    | Ptprc         | protein_coding         |
| ENSMUST00000003561  | 2 | 0 | 0    | Phyhip        | protein_coding         |
| ENSMUST00000016638  | 2 | 0 | 0    | Cd34          | protein_coding         |
| ENSMUST00000021324  | 2 | 0 | 0    | Map3k14       | protein_coding         |
| ENSMUST00000021592  | 2 | 0 | 0    | Cdca7l        | protein_coding         |
| ENSMUST00000021628  | 2 | 0 | 0    | Akr1c21       | protein_coding         |
| ENSMUST00000023752  | 2 | 0 | 0    | Aqp2          | protein_coding         |



|                    |   |    |                 |                        |
|--------------------|---|----|-----------------|------------------------|
| ENSMUST00000025391 | 2 | 0  | 0 Mtm1          | protein_coding         |
| ENSMUST00000025406 | 2 | 0  | 0 Srfbp1        | protein_coding         |
| ENSMUST00000029183 | 2 | 0  | 0 Fam83d        | protein_coding         |
| ENSMUST00000034488 | 2 | 0  | 0 Mmp10         | protein_coding         |
| ENSMUST00000034905 | 2 | 0  | 0 Gclc          | protein_coding         |
| ENSMUST00000040402 | 2 | 0  | 0 Ppp1r11       | protein_coding         |
| ENSMUST00000041973 | 2 | 0  | 0 Cmtm2b        | protein_coding         |
| ENSMUST00000042185 | 2 | 0  | 0 Zfyve9        | protein_coding         |
| ENSMUST00000043815 | 2 | 0  | 0 Nup205        | protein_coding         |
| ENSMUST00000046977 | 2 | 0  | 0 Eltd1         | protein_coding         |
| ENSMUST00000056495 | 2 | 0  | 0 Dnmt3b        | protein_coding         |
| ENSMUST00000057627 | 2 | 0  | 0 Spata2        | protein_coding         |
| ENSMUST00000064798 | 2 | 0  | 0 Ndufv3        | protein_coding         |
| ENSMUST00000065539 | 2 | 0  | 0 Dand5         | protein_coding         |
| ENSMUST00000088174 | 2 | 0  | 0 Hs6st1        | protein_coding         |
| ENSMUST00000092614 | 2 | 0  | 0 Pcgf1         | protein_coding         |
| ENSMUST00000101137 | 2 | 0  | 0 Samt2         | protein_coding         |
| ENSMUST00000106118 | 2 | 0  | 0 Ebf3          | protein_coding         |
| ENSMUST00000106685 | 2 | 0  | 0 Gstm6         | protein_coding         |
| ENSMUST00000107107 | 2 | 0  | 0 Plaa          | protein_coding         |
| ENSMUST00000109103 | 2 | 0  | 0 Hnmpab        | protein_coding         |
| ENSMUST00000117410 | 2 | 0  | 0 Stard5        | protein_coding         |
| ENSMUST00000121493 | 2 | 0  | 0 Palld         | protein_coding         |
| ENSMUST00000123184 | 2 | 0  | 0 Atp5k         | protein_coding         |
| ENSMUST00000124791 | 2 | 0  | 0 Csnk2a1       | protein_coding         |
| ENSMUST00000125740 | 2 | 0  | 0 1700109H08Rik | protein_coding         |
| ENSMUST00000140239 | 2 | 0  | 0 Cers1         | protein_coding         |
| ENSMUST00000140264 | 2 | 0  | 0 Inpp4a        | protein_coding         |
| ENSMUST00000143758 | 2 | 0  | 0 Slc2a9        | protein_coding         |
| ENSMUST00000145126 | 2 | 0  | 0 Nsf           | protein_coding         |
| ENSMUST00000146752 | 2 | 0  | 0 Phka2         | protein_coding         |
| ENSMUST00000149533 | 2 | 0  | 0 Tec           | protein_coding         |
| ENSMUST00000149985 | 2 | 0  | 0 Msn           | protein_coding         |
| ENSMUST00000153877 | 2 | 0  | 0 Secisbp2      | protein_coding         |
| ENSMUST00000154405 | 2 | 0  | 0 Qrs1          | protein_coding         |
| ENSMUST00000160250 | 2 | 0  | 0 Pcmt1         | protein_coding         |
| ENSMUST00000168844 | 2 | 0  | 0 Dis3l         | protein_coding         |
| ENSMUST00000172902 | 2 | 0  | 0 Aldh7a1       | protein_coding         |
| ENSMUST00000179688 | 2 | 0  | 0 Scgb2b19      | protein_coding         |
| ENSMUST00000183015 | 2 | 0  | 0 Slc7a5        | protein_coding         |
| ENSMUST00000183034 | 2 | 0  | 0 AC123072.1    | protein_coding         |
| ENSMUST00000118270 | 2 | 0  | 0 Gm14923       | processed_pseudogene   |
| ENSMUST00000151599 | 2 | 0  | 0 Gm12315       | lincRNA                |
| ENSMUST00000114080 | 2 | 0  | 0 Clnkos        | antisense              |
| ENSMUST00000088018 | 1 | 13 | 0 Krt74         | protein_coding         |
| ENSMUST00000161155 | 1 | 12 | 0 Dnm3          | protein_coding         |
| ENSMUST00000021617 | 1 | 11 | 2 Asb2          | protein_coding         |
| ENSMUST00000022895 | 1 | 10 | 14 Grhl2        | protein_coding         |
| ENSMUST00000050519 | 1 | 9  | 28 Elfn1        | protein_coding         |
| ENSMUST00000122284 | 1 | 9  | 2 Dyrk1a        | protein_coding         |
| ENSMUST00000160616 | 1 | 9  | 0 Tmem163       | protein_coding         |
| ENSMUST00000048145 | 1 | 9  | 14 Rbfox2       | protein_coding         |
| ENSMUST00000174379 | 1 | 9  | 14 Dctd         | protein_coding         |
| ENSMUST00000097493 | 1 | 9  | 8 BC055324      | protein_coding         |
| ENSMUST00000101376 | 1 | 9  | 0 Plb1          | protein_coding         |
| ENSMUST00000109444 | 1 | 8  | 2139 Col4a3bp   | protein_coding         |
| ENSMUST00000109308 | 1 | 8  | 34 Nfatc3       | protein_coding         |
| ENSMUST00000034920 | 1 | 7  | 26 Map2k5       | protein_coding         |
| ENSMUST00000169786 | 1 | 7  | 8 Tns1          | protein_coding         |
| ENSMUST00000055518 | 1 | 7  | 2 Pik3r1        | protein_coding         |
| ENSMUST00000144146 | 1 | 7  | 0 Gm10693       | unprocessed_pseudogene |
| ENSMUST00000156603 | 1 | 7  | 0 Gm15930       | unprocessed_pseudogene |
| ENSMUST00000080766 | 1 | 7  | 0 Tpbpb         | protein_coding         |
| ENSMUST00000090243 | 1 | 7  | 0 Slc37a3       | protein_coding         |
| ENSMUST00000091641 | 1 | 7  | 0 Snrnp48       | protein_coding         |
| ENSMUST00000064793 | 1 | 7  | 32 R3hdm2       | protein_coding         |
| ENSMUST00000161337 | 1 | 7  | 24 Acot12       | protein_coding         |
| ENSMUST00000134687 | 1 | 7  | 16 Ncr3-ps      | unprocessed_pseudogene |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUST00000027657 | 1 | 7 | 8 C4bp           | protein_coding         |
| ENSMUST00000154461 | 1 | 7 | 6 Slc15a5        | protein_coding         |
| ENSMUST00000078061 | 1 | 7 | 0 Ehmt2          | protein_coding         |
| ENSMUST00000112528 | 1 | 7 | 0 Zfp605         | protein_coding         |
| ENSMUST00000141952 | 1 | 7 | 0 Nup210         | protein_coding         |
| ENSMUST00000127486 | 1 | 6 | 40 Myo10         | protein_coding         |
| ENSMUST00000019625 | 1 | 6 | 8 Myh8           | protein_coding         |
| ENSMUST00000049474 | 1 | 6 | 8 Fbxw8          | protein_coding         |
| ENSMUST00000160546 | 1 | 6 | 2 Fam126b        | protein_coding         |
| ENSMUST00000027131 | 1 | 6 | 0 Slc39a10       | protein_coding         |
| ENSMUST00000147349 | 1 | 6 | 0 F8             | protein_coding         |
| ENSMUST00000177929 | 1 | 6 | 0 Gm10610        | protein_coding         |
| ENSMUST00000159273 | 1 | 5 | 87 4930570N18Rik | antisense              |
| ENSMUST00000018851 | 1 | 5 | 44 Dync1h1       | protein_coding         |
| ENSMUST00000046704 | 1 | 5 | 18 Ifi47         | protein_coding         |
| ENSMUST00000046254 | 1 | 5 | 16 Lrfn2         | protein_coding         |
| ENSMUST00000097473 | 1 | 5 | 16 Tmco1         | protein_coding         |
| ENSMUST00000155544 | 1 | 5 | 16 Eml1          | protein_coding         |
| ENSMUST00000044217 | 1 | 5 | 12 Syne2         | protein_coding         |
| ENSMUST00000136305 | 1 | 5 | 10 Gm15942       | lincRNA                |
| ENSMUST00000109897 | 1 | 5 | 6 Ap1b1          | protein_coding         |
| ENSMUST00000021668 | 1 | 5 | 4 Npc2           | protein_coding         |
| ENSMUST00000119298 | 1 | 5 | 2 Gm7421         | unprocessed_pseudogene |
| ENSMUST00000120877 | 1 | 5 | 2 Gm7365         | unprocessed_pseudogene |
| ENSMUST00000179336 | 1 | 5 | 2 Gm21758        | unprocessed_pseudogene |
| ENSMUST00000022563 | 1 | 5 | 2 Mtmr6          | protein_coding         |
| ENSMUST00000051186 | 1 | 5 | 2 Prkaa1         | protein_coding         |
| ENSMUST00000067826 | 1 | 5 | 2 Mta3           | protein_coding         |
| ENSMUST00000115614 | 1 | 5 | 2 Arvcf          | protein_coding         |
| ENSMUST00000141713 | 1 | 5 | 2 4932431P20Rik  | protein_coding         |
| ENSMUST00000046891 | 1 | 5 | 0 Ptger2         | protein_coding         |
| ENSMUST00000072895 | 1 | 5 | 0 Gm14393        | protein_coding         |
| ENSMUST00000102783 | 1 | 5 | 0 Pgm2           | protein_coding         |
| ENSMUST00000120102 | 1 | 5 | 0 Dsg2           | protein_coding         |
| ENSMUST00000129458 | 1 | 5 | 0 Pocr           | protein_coding         |
| ENSMUST00000147339 | 1 | 5 | 0 Prdm11         | protein_coding         |
| ENSMUST00000173199 | 1 | 5 | 0 Dtnb           | protein_coding         |
| ENSMUST00000155185 | 1 | 5 | 0 C130080G10Rik  | antisense              |
| ENSMUST00000101465 | 1 | 5 | 48 Usp34         | protein_coding         |
| ENSMUST00000101465 | 1 | 5 | 48 Usp34         | protein_coding         |
| ENSMUST00000042410 | 1 | 5 | 20 Cdk6          | protein_coding         |
| ENSMUST00000029803 | 1 | 5 | 16 Eif4e         | protein_coding         |
| ENSMUST00000184062 | 1 | 5 | 16 Gm27247       | antisense              |
| ENSMUST00000021773 | 1 | 5 | 14 Gpld1         | protein_coding         |
| ENSMUST00000024660 | 1 | 5 | 14 Smoc2         | protein_coding         |
| ENSMUST00000101118 | 1 | 5 | 14 Rybp          | protein_coding         |
| ENSMUST00000109099 | 1 | 5 | 14 Atmin         | protein_coding         |
| ENSMUST00000162629 | 1 | 5 | 14 Runx2         | protein_coding         |
| ENSMUST00000047835 | 1 | 5 | 12 Scaf11        | protein_coding         |
| ENSMUST00000079012 | 1 | 5 | 12 March8        | protein_coding         |
| ENSMUST00000051907 | 1 | 5 | 10 Spata21       | protein_coding         |
| ENSMUST00000153607 | 1 | 5 | 10 Farp1         | protein_coding         |
| ENSMUST00000112345 | 1 | 5 | 6 Scml2          | protein_coding         |
| ENSMUST00000147552 | 1 | 5 | 6 Sp100          | protein_coding         |
| ENSMUST00000179944 | 1 | 5 | 6 Gm4975         | protein_coding         |
| ENSMUST00000038489 | 1 | 5 | 4 Pygo1          | protein_coding         |
| ENSMUST00000058351 | 1 | 5 | 4 Pgm2           | protein_coding         |
| ENSMUST00000119231 | 1 | 5 | 2 Gm6121         | protein_coding         |
| ENSMUST00000184995 | 1 | 5 | 2 Gm27207        | lincRNA                |
| ENSMUST00000176899 | 1 | 5 | 0 Vmn2r-ps117    | unprocessed_pseudogene |
| ENSMUST00000070116 | 1 | 5 | 0 Socs6          | protein_coding         |
| ENSMUST00000099888 | 1 | 5 | 0 F930017D23Rik  | protein_coding         |
| ENSMUST00000121736 | 1 | 5 | 0 Fbxl5          | protein_coding         |
| ENSMUST00000127286 | 1 | 5 | 0 Ndfip2         | protein_coding         |
| ENSMUST00000132684 | 1 | 5 | 0 Shkbp1         | protein_coding         |
| ENSMUST00000141410 | 1 | 5 | 0 Bad            | protein_coding         |
| ENSMUST00000146787 | 1 | 5 | 0 Smc2           | protein_coding         |
| ENSMUST00000182479 | 1 | 5 | 0 Milr1          | protein_coding         |

|                    |   |   |     |               |                      |
|--------------------|---|---|-----|---------------|----------------------|
| ENSMUST00000175736 | 1 | 5 | 0   | Gm18595       | processed_pseudogene |
| ENSMUST00000159445 | 1 | 5 | 0   | Gm16268       | antisense            |
| ENSMUST00000081525 | 1 | 4 | 50  | Paqr7         | protein_coding       |
| ENSMUST00000108533 | 1 | 4 | 40  | Rabep1        | protein_coding       |
| ENSMUST00000021479 | 1 | 4 | 28  | Actr10        | protein_coding       |
| ENSMUST00000090103 | 1 | 4 | 26  | Arvcf         | protein_coding       |
| ENSMUST00000049920 | 1 | 4 | 20  | Ino80         | protein_coding       |
| ENSMUST00000165024 | 1 | 4 | 18  | Spock2        | protein_coding       |
| ENSMUST00000027202 | 1 | 4 | 16  | Sgol2         | protein_coding       |
| ENSMUST00000115606 | 1 | 4 | 16  | Txnrd2        | protein_coding       |
| ENSMUST00000024708 | 1 | 4 | 14  | Tnfrsf21      | protein_coding       |
| ENSMUST00000134585 | 1 | 4 | 14  | Cbx1          | protein_coding       |
| ENSMUST00000159557 | 1 | 4 | 14  | Apopt1        | protein_coding       |
| ENSMUST00000029387 | 1 | 4 | 10  | Eif2a         | protein_coding       |
| ENSMUST00000030475 | 1 | 4 | 10  | Nsun4         | protein_coding       |
| ENSMUST00000069174 | 1 | 4 | 10  | Trim23        | protein_coding       |
| ENSMUST00000156455 | 1 | 4 | 10  | Atf2          | protein_coding       |
| ENSMUST00000151754 | 1 | 4 | 10  | Gm14317       | lincRNA              |
| ENSMUST00000112140 | 1 | 4 | 8   | Dync1i2       | protein_coding       |
| ENSMUST00000150459 | 1 | 4 | 8   | 1500009L16Rik | protein_coding       |
| ENSMUST00000162875 | 1 | 4 | 8   | 2010300C02Rik | protein_coding       |
| ENSMUST00000075571 | 1 | 4 | 6   | Sult2b1       | protein_coding       |
| ENSMUST00000086364 | 1 | 4 | 6   | Tmem150b      | protein_coding       |
| ENSMUST00000095527 | 1 | 4 | 6   | Lrrc74a       | protein_coding       |
| ENSMUST00000139366 | 1 | 4 | 6   | Fam114a1      | protein_coding       |
| ENSMUST00000160424 | 1 | 4 | 6   | Cacna1i       | protein_coding       |
| ENSMUST00000163954 | 1 | 4 | 6   | Stk31         | protein_coding       |
| ENSMUST00000167528 | 1 | 4 | 6   | Tdrd5         | protein_coding       |
| ENSMUST00000079414 | 1 | 4 | 4   | Cep89         | protein_coding       |
| ENSMUST00000108495 | 1 | 4 | 4   | Strn4         | protein_coding       |
| ENSMUST00000122833 | 1 | 4 | 4   | Copg2         | protein_coding       |
| ENSMUST00000130387 | 1 | 4 | 4   | Grip1         | protein_coding       |
| ENSMUST00000155206 | 1 | 4 | 4   | Trpc5os       | antisense            |
| ENSMUST00000020617 | 1 | 4 | 2   | Flt4          | protein_coding       |
| ENSMUST00000023363 | 1 | 4 | 2   | Rrn3          | protein_coding       |
| ENSMUST00000026262 | 1 | 4 | 2   | Hexa          | protein_coding       |
| ENSMUST00000032321 | 1 | 4 | 2   | Bcl2l14       | protein_coding       |
| ENSMUST00000069419 | 1 | 4 | 2   | Ccdc172       | protein_coding       |
| ENSMUST00000085169 | 1 | 4 | 2   | Ephb1         | protein_coding       |
| ENSMUST00000112437 | 1 | 4 | 2   | Ati2          | protein_coding       |
| ENSMUST00000116547 | 1 | 4 | 2   | Chic1         | protein_coding       |
| ENSMUST00000124600 | 1 | 4 | 2   | Col9a1        | protein_coding       |
| ENSMUST00000136778 | 1 | 4 | 2   | Kng1          | protein_coding       |
| ENSMUST00000150296 | 1 | 4 | 2   | Ift88         | protein_coding       |
| ENSMUST00000163790 | 1 | 4 | 2   | Gm3558        | protein_coding       |
| ENSMUST00000173954 | 1 | 4 | 2   | Zmym5         | protein_coding       |
| ENSMUST00000176233 | 1 | 4 | 2   | Gm20695       | protein_coding       |
| ENSMUST00000022063 | 1 | 4 | 0   | Ccdc127       | protein_coding       |
| ENSMUST00000026671 | 1 | 4 | 0   | Rptor         | protein_coding       |
| ENSMUST00000035604 | 1 | 4 | 0   | Gemin5        | protein_coding       |
| ENSMUST00000103066 | 1 | 4 | 0   | Phactr3       | protein_coding       |
| ENSMUST00000108251 | 1 | 4 | 0   | Nf1           | protein_coding       |
| ENSMUST00000111932 | 1 | 4 | 0   | Gpr19         | protein_coding       |
| ENSMUST00000125216 | 1 | 4 | 0   | Fam160a1      | protein_coding       |
| ENSMUST00000128158 | 1 | 4 | 0   | Ptgr2         | protein_coding       |
| ENSMUST00000128337 | 1 | 4 | 0   | Pms1          | protein_coding       |
| ENSMUST00000154922 | 1 | 4 | 0   | Tmem68        | protein_coding       |
| ENSMUST00000164366 | 1 | 4 | 0   | Gm3752        | protein_coding       |
| ENSMUST00000176003 | 1 | 4 | 0   | Zfp184        | protein_coding       |
| ENSMUST00000182065 | 1 | 4 | 0   | Rbm4b         | protein_coding       |
| ENSMUST00000140275 | 1 | 4 | 0   | 1700095J07Rik | processed_transcript |
| ENSMUST00000123463 | 1 | 4 | 0   | Gm15777       | antisense            |
| ENSMUST00000107981 | 1 | 3 | 335 | Gm12394       | protein_coding       |
| ENSMUST00000068237 | 1 | 3 | 115 | Mlxip         | protein_coding       |
| ENSMUST00000161126 | 1 | 3 | 113 | Gm15759       | antisense            |
| ENSMUST00000145302 | 1 | 3 | 93  | Dgkk          | protein_coding       |
| ENSMUST00000138435 | 1 | 3 | 83  | Rnf220        | protein_coding       |
| ENSMUST00000051053 | 1 | 3 | 63  | Ubtd2         | protein_coding       |

|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000114671 | 1 | 3 | 56 Mlt10        | protein_coding                     |
| ENSMUST00000123914 | 1 | 3 | 48 Gramd2       | protein_coding                     |
| ENSMUST00000168998 | 1 | 3 | 30 Ppp1r9a      | protein_coding                     |
| ENSMUST00000112597 | 1 | 3 | 28 Pcgf3        | protein_coding                     |
| ENSMUST00000118878 | 1 | 3 | 28 Taf1         | protein_coding                     |
| ENSMUST00000039318 | 1 | 3 | 26 Cdc14b       | protein_coding                     |
| ENSMUST00000060608 | 1 | 3 | 22 Cyp20a1      | protein_coding                     |
| ENSMUST00000147366 | 1 | 3 | 20 Slc26a11     | protein_coding                     |
| ENSMUST00000151668 | 1 | 3 | 20 Chmp4b       | protein_coding                     |
| ENSMUST00000154557 | 1 | 3 | 20 Prdm6        | protein_coding                     |
| ENSMUST00000171318 | 1 | 3 | 18 Tm9sf2       | protein_coding                     |
| ENSMUST00000040624 | 1 | 3 | 16 Gltscr1l     | protein_coding                     |
| ENSMUST00000021958 | 1 | 3 | 14 Pcbd2        | protein_coding                     |
| ENSMUST00000105507 | 1 | 3 | 14 Ppil6        | protein_coding                     |
| ENSMUST00000143533 | 1 | 3 | 14 Snapc3       | protein_coding                     |
| ENSMUST00000164300 | 1 | 3 | 14 Gbe1         | protein_coding                     |
| ENSMUST00000020312 | 1 | 3 | 12 Mcu          | protein_coding                     |
| ENSMUST00000022343 | 1 | 3 | 12 Nudt13       | protein_coding                     |
| ENSMUST00000148007 | 1 | 3 | 12 Gm11639      | protein_coding                     |
| ENSMUST00000154341 | 1 | 3 | 12 Zmat5        | protein_coding                     |
| ENSMUST00000159308 | 1 | 3 | 12 Tnik         | protein_coding                     |
| ENSMUST00000160446 | 1 | 3 | 12 Gm7568       | antisense                          |
| ENSMUST00000026414 | 1 | 3 | 10 Dgka         | protein_coding                     |
| ENSMUST00000043893 | 1 | 3 | 10 Tbc1d1       | protein_coding                     |
| ENSMUST00000180458 | 1 | 3 | 10 Tunar        | lincRNA                            |
| ENSMUST00000030460 | 1 | 3 | 8 Gpbp111       | protein_coding                     |
| ENSMUST00000057325 | 1 | 3 | 8 Ccdc125       | protein_coding                     |
| ENSMUST00000162049 | 1 | 3 | 8 Slc4a8        | protein_coding                     |
| ENSMUST00000023854 | 1 | 3 | 4 Fhl1          | protein_coding                     |
| ENSMUST00000027538 | 1 | 3 | 4 Asb1          | protein_coding                     |
| ENSMUST00000034904 | 1 | 3 | 4 Elovl5        | protein_coding                     |
| ENSMUST00000041892 | 1 | 3 | 4 Wdr19         | protein_coding                     |
| ENSMUST00000081828 | 1 | 3 | 4 Ccdc176       | protein_coding                     |
| ENSMUST00000108402 | 1 | 3 | 4 Slc6a4        | protein_coding                     |
| ENSMUST00000124773 | 1 | 3 | 4 Vmn2r66       | protein_coding                     |
| ENSMUST00000146863 | 1 | 3 | 4 2700029M09Rik | protein_coding                     |
| ENSMUST00000155204 | 1 | 3 | 4 Faf1          | protein_coding                     |
| ENSMUST00000162818 | 1 | 3 | 4 Slain1        | protein_coding                     |
| ENSMUST00000166049 | 1 | 3 | 4 Habp2         | protein_coding                     |
| ENSMUST00000174390 | 1 | 3 | 4 Plac1         | protein_coding                     |
| ENSMUST00000130745 | 1 | 3 | 4 Gm10863       | antisense                          |
| ENSMUST00000033846 | 1 | 3 | 2 Angpt2        | protein_coding                     |
| ENSMUST00000098796 | 1 | 3 | 2 Fat1          | protein_coding                     |
| ENSMUST00000108775 | 1 | 3 | 2 Sipal1l2      | protein_coding                     |
| ENSMUST00000112280 | 1 | 3 | 2 Tmem27        | protein_coding                     |
| ENSMUST00000125694 | 1 | 3 | 2 Vdac1         | protein_coding                     |
| ENSMUST00000126555 | 1 | 3 | 2 Kif19a        | protein_coding                     |
| ENSMUST00000128031 | 1 | 3 | 2 Hdac2         | protein_coding                     |
| ENSMUST00000181094 | 1 | 3 | 2 A930012L18Rik | lincRNA                            |
| ENSMUST00000179299 | 1 | 3 | 0 Gm21811       | protein_coding                     |
| ENSMUST00000179299 | 1 | 3 | 0 Gm21811       | protein_coding                     |
| ENSMUST00000116006 | 1 | 3 | 0 Gm12106       | unprocessed_pseudogene             |
| ENSMUST00000175808 | 1 | 3 | 0 Zfp783        | transcribed_unprocessed_pseudogene |
| ENSMUST00000021148 | 1 | 3 | 0 Ube2g1        | protein_coding                     |
| ENSMUST00000027114 | 1 | 3 | 0 9430016H08Rik | protein_coding                     |
| ENSMUST00000029240 | 1 | 3 | 0 Slc2a2        | protein_coding                     |
| ENSMUST00000030830 | 1 | 3 | 0 H6pd          | protein_coding                     |
| ENSMUST00000059056 | 1 | 3 | 0 Slc12a8       | protein_coding                     |
| ENSMUST00000064576 | 1 | 3 | 0 Ccdc79        | protein_coding                     |
| ENSMUST00000066780 | 1 | 3 | 0 Mill1         | protein_coding                     |
| ENSMUST00000080630 | 1 | 3 | 0 Tspan8        | protein_coding                     |
| ENSMUST00000081162 | 1 | 3 | 0 Homez         | protein_coding                     |
| ENSMUST00000105651 | 1 | 3 | 0 Gpr153        | protein_coding                     |
| ENSMUST00000108142 | 1 | 3 | 0 Orc3          | protein_coding                     |
| ENSMUST00000109851 | 1 | 3 | 0 Inpp4b        | protein_coding                     |
| ENSMUST00000113898 | 1 | 3 | 0 Apoo          | protein_coding                     |
| ENSMUST00000118600 | 1 | 3 | 0 Dmxl2         | protein_coding                     |
| ENSMUST00000119567 | 1 | 3 | 0 Rufy2         | protein_coding                     |

|                     |   |   |                  |                      |
|---------------------|---|---|------------------|----------------------|
| ENSMUST00000122922  | 1 | 3 | 0 Rfx6           | protein_coding       |
| ENSMUST00000129654  | 1 | 3 | 0 Chchd3         | protein_coding       |
| ENSMUST00000133712  | 1 | 3 | 0 Ccnc           | protein_coding       |
| ENSMUST00000135232  | 1 | 3 | 0 Faf2           | protein_coding       |
| ENSMUST00000144281  | 1 | 3 | 0 Mast2          | protein_coding       |
| ENSMUST00000149039  | 1 | 3 | 0 Bdh1           | protein_coding       |
| ENSMUST00000149528  | 1 | 3 | 0 Gsr            | protein_coding       |
| ENSMUST00000149791  | 1 | 3 | 0 Mgat4a         | protein_coding       |
| ENSMUST00000151874  | 1 | 3 | 0 Eif2d          | protein_coding       |
| ENSMUST00000152728  | 1 | 3 | 0 Rab1           | protein_coding       |
| ENSMUST00000154835  | 1 | 3 | 0 4930563I02Rik  | protein_coding       |
| ENSMUST00000160247  | 1 | 3 | 0 Cfap43         | protein_coding       |
| ENSMUST00000161217  | 1 | 3 | 0 Glcci1         | protein_coding       |
| ENSMUST00000169035  | 1 | 3 | 0 Cpeb2          | protein_coding       |
| ENSMUST00000173833  | 1 | 3 | 0 Adam18         | protein_coding       |
| ENSMUST00000178995  | 1 | 3 | 0 Gm21092        | protein_coding       |
| ENSMUST00000184139  | 1 | 3 | 0 Bend7          | protein_coding       |
| ENSMUST00000181889  | 1 | 3 | 0 Gm26726        | antisense            |
| ENSMUST00000080527  | 1 | 3 | 89 Iqch          | protein_coding       |
| ENSMUST00000109454  | 1 | 3 | 89 Emilin3       | protein_coding       |
| ENSMUST00000121799  | 1 | 3 | 87 Arhgap23      | protein_coding       |
| ENSMUST00000163854  | 1 | 3 | 83 Map4k4        | protein_coding       |
| ENSMUST00000139863  | 1 | 3 | 50 Tanc1         | protein_coding       |
| ENSMUST00000034740  | 1 | 3 | 48 Nedd4         | protein_coding       |
| ENSMUST00000112905  | 1 | 3 | 44 Thap4         | protein_coding       |
| ENSMUST00000003461  | 1 | 3 | 40 Ogdh          | protein_coding       |
| ENSMUST00000025729  | 1 | 3 | 40 Tnks2         | protein_coding       |
| ENSMUST00000023189  | 1 | 3 | 38 Gylr1         | protein_coding       |
| ENSMUST00000032992  | 1 | 3 | 36 Eif3c         | protein_coding       |
| ENSMUST00000043520  | 1 | 3 | 36 Fbxo25        | protein_coding       |
| ENSMUST00000126642  | 1 | 3 | 36 Myadml2os     | antisense            |
| ENSMUST00000130683  | 1 | 3 | 36 Kcnd3os       | antisense            |
| ENSMUST00000017836  | 1 | 3 | 30 Rhbdl3        | protein_coding       |
| ENSMUST00000160494  | 1 | 3 | 30 2410124H12Rik | protein_coding       |
| ENSMUST00000162950  | 1 | 3 | 26 Eif2ak3       | protein_coding       |
| ENSMUST00000034766  | 1 | 3 | 24 Rora          | protein_coding       |
| ENSMUST00000145926  | 1 | 3 | 24 4631405J19Rik | processed_transcript |
| ENSMUST00000019426  | 1 | 3 | 22 Dsg4          | protein_coding       |
| ENSMUST00000048155  | 1 | 3 | 22 Rbm25         | protein_coding       |
| ENSMUST00000084701  | 1 | 3 | 22 Cntfr         | protein_coding       |
| ENSMUST00000101121  | 1 | 3 | 22 Gm6116        | lincRNA              |
| ENSMUST00000135762  | 1 | 3 | 20 Atg4b         | protein_coding       |
| ENSMUST00000136876  | 1 | 3 | 20 Efcab3        | protein_coding       |
| ENSMUST00000102546  | 1 | 3 | 18 Il22ra1       | protein_coding       |
| ENSMUST00000113367  | 1 | 3 | 18 Ddx43         | protein_coding       |
| ENSMUST00000070402  | 1 | 3 | 16 Usp34         | protein_coding       |
| ENSMUST00000070402  | 1 | 3 | 16 Usp34         | protein_coding       |
| ENSMUST00000046470  | 1 | 3 | 16 Mettl22       | protein_coding       |
| ENSMUST00000123597  | 1 | 3 | 16 Zmym4         | protein_coding       |
| ENSMUST00000133158  | 1 | 3 | 16 Ttc38         | protein_coding       |
| ENSMUST00000077500  | 1 | 3 | 14 Gm1661        | protein_coding       |
| ENSMUST00000109242  | 1 | 3 | 14 Pkd1l3        | protein_coding       |
| ENSMUST00000136735  | 1 | 3 | 14 Mtmr2         | protein_coding       |
| ENSMUST00000145373  | 1 | 3 | 14 Prkcz         | protein_coding       |
| ENSMUST00000168839  | 1 | 3 | 14 Myo9b         | protein_coding       |
| ENSMUST00000073990  | 1 | 3 | 12 Gm12657       | processed_pseudogene |
| ENSMUST00000073990  | 1 | 3 | 12 Gm12657       | processed_pseudogene |
| ENSMUST000000060722 | 1 | 3 | 12 Cxxc5         | protein_coding       |
| ENSMUST00000116571  | 1 | 3 | 12 Kdm2a         | protein_coding       |
| ENSMUST00000102810  | 1 | 3 | 10 Gaml3         | protein_coding       |
| ENSMUST00000108343  | 1 | 3 | 10 Akt2          | protein_coding       |
| ENSMUST00000121902  | 1 | 3 | 10 1700030K09Rik | protein_coding       |
| ENSMUST00000128849  | 1 | 3 | 10 Mdfic         | protein_coding       |
| ENSMUST00000129032  | 1 | 3 | 10 Kazn          | protein_coding       |
| ENSMUST00000130104  | 1 | 3 | 10 Stau1         | protein_coding       |
| ENSMUST00000156094  | 1 | 3 | 10 Rftn1         | protein_coding       |
| ENSMUST00000161128  | 1 | 3 | 10 Pepd          | protein_coding       |
| ENSMUST00000030080  | 1 | 3 | 8 Snx30          | protein_coding       |

|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000112607 | 1 | 3 | 8 Acvr1c        | protein_coding                     |
| ENSMUST00000134701 | 1 | 3 | 8 Dnajb4        | protein_coding                     |
| ENSMUST00000140762 | 1 | 3 | 8 Ppapdc3       | protein_coding                     |
| ENSMUST00000155168 | 1 | 3 | 8 Armc9         | protein_coding                     |
| ENSMUST00000170863 | 1 | 3 | 8 5031439G07Rik | protein_coding                     |
| ENSMUST00000172239 | 1 | 3 | 8 Nt5c2         | protein_coding                     |
| ENSMUST00000126902 | 1 | 3 | 8 Rsf1os1       | antisense                          |
| ENSMUST00000025891 | 1 | 3 | 6 Capn1         | protein_coding                     |
| ENSMUST00000047110 | 1 | 3 | 6 1700003H04Rik | protein_coding                     |
| ENSMUST00000092674 | 1 | 3 | 6 Hbs1l         | protein_coding                     |
| ENSMUST00000105812 | 1 | 3 | 6 Vwa5b1        | protein_coding                     |
| ENSMUST00000110343 | 1 | 3 | 6 Tenm3         | protein_coding                     |
| ENSMUST00000147938 | 1 | 3 | 6 Tab2          | protein_coding                     |
| ENSMUST00000163220 | 1 | 3 | 6 Apopt1        | protein_coding                     |
| ENSMUST00000167264 | 1 | 3 | 6 Gtf2e2        | protein_coding                     |
| ENSMUST00000170517 | 1 | 3 | 6 Vwa9          | protein_coding                     |
| ENSMUST00000175663 | 1 | 3 | 6 Ap4e1         | protein_coding                     |
| ENSMUST00000181105 | 1 | 3 | 6 Gm26663       | lincRNA                            |
| ENSMUST00000047799 | 1 | 3 | 4 Acad11        | protein_coding                     |
| ENSMUST00000052125 | 1 | 3 | 4 Pard6b        | protein_coding                     |
| ENSMUST00000057174 | 1 | 3 | 4 Kctd20        | protein_coding                     |
| ENSMUST00000061799 | 1 | 3 | 4 Loxl1         | protein_coding                     |
| ENSMUST00000099972 | 1 | 3 | 4 Itga4         | protein_coding                     |
| ENSMUST00000139000 | 1 | 3 | 4 Ehmt1         | protein_coding                     |
| ENSMUST00000147030 | 1 | 3 | 4 Macf1         | protein_coding                     |
| ENSMUST00000174128 | 1 | 3 | 4 Abcf1         | protein_coding                     |
| ENSMUST00000176258 | 1 | 3 | 4 Akap7         | protein_coding                     |
| ENSMUST00000181339 | 1 | 3 | 4 Cckbr         | protein_coding                     |
| ENSMUST00000022967 | 1 | 3 | 2 Kcnv1         | protein_coding                     |
| ENSMUST00000027315 | 1 | 3 | 2 Zfp142        | protein_coding                     |
| ENSMUST00000100069 | 1 | 3 | 2 Scn3a         | protein_coding                     |
| ENSMUST00000109898 | 1 | 3 | 2 Catsper3      | protein_coding                     |
| ENSMUST00000113483 | 1 | 3 | 2 Pygm          | protein_coding                     |
| ENSMUST00000115333 | 1 | 3 | 2 Zfp182        | protein_coding                     |
| ENSMUST00000115488 | 1 | 3 | 2 Sntg1         | protein_coding                     |
| ENSMUST00000115777 | 1 | 3 | 2 Ube2v2        | protein_coding                     |
| ENSMUST00000140868 | 1 | 3 | 2 Snmp200       | protein_coding                     |
| ENSMUST00000144201 | 1 | 3 | 2 Aqp7          | protein_coding                     |
| ENSMUST00000144559 | 1 | 3 | 2 Gm355         | protein_coding                     |
| ENSMUST00000147749 | 1 | 3 | 2 Carm1         | protein_coding                     |
| ENSMUST00000147987 | 1 | 3 | 2 Dnajc2        | protein_coding                     |
| ENSMUST00000150717 | 1 | 3 | 2 Htra1         | protein_coding                     |
| ENSMUST00000152617 | 1 | 3 | 2 Phf20         | protein_coding                     |
| ENSMUST00000155037 | 1 | 3 | 2 Phf14         | protein_coding                     |
| ENSMUST00000162039 | 1 | 3 | 2 Focad         | protein_coding                     |
| ENSMUST00000162885 | 1 | 3 | 2 Skint1        | protein_coding                     |
| ENSMUST00000164050 | 1 | 3 | 2 Hcls1         | protein_coding                     |
| ENSMUST00000166273 | 1 | 3 | 2 Igdcc4        | protein_coding                     |
| ENSMUST00000146678 | 1 | 3 | 2 Gm12603       | lincRNA                            |
| ENSMUST00000183632 | 1 | 3 | 2 1110015O18Rik | lincRNA                            |
| ENSMUST00000125333 | 1 | 3 | 2 Man2c1os      | antisense                          |
| ENSMUST00000168173 | 1 | 3 | 0 Vmn2r-ps5     | unprocessed_pseudogene             |
| ENSMUST00000168173 | 1 | 3 | 0 Vmn2r-ps5     | unprocessed_pseudogene             |
| ENSMUST00000161983 | 1 | 3 | 0 Alms1-ps2     | transcribed_unprocessed_pseudogene |
| ENSMUST00000027286 | 1 | 3 | 0 Coa5          | protein_coding                     |
| ENSMUST00000028617 | 1 | 3 | 0 Api5          | protein_coding                     |
| ENSMUST00000029125 | 1 | 3 | 0 Armc1         | protein_coding                     |
| ENSMUST00000030399 | 1 | 3 | 0 Rragc         | protein_coding                     |
| ENSMUST00000036509 | 1 | 3 | 0 Ubac1         | protein_coding                     |
| ENSMUST00000049469 | 1 | 3 | 0 Exoc1         | protein_coding                     |
| ENSMUST00000070478 | 1 | 3 | 0 Sdc3          | protein_coding                     |
| ENSMUST00000076605 | 1 | 3 | 0 Gnal          | protein_coding                     |
| ENSMUST00000087169 | 1 | 3 | 0 Gemin8        | protein_coding                     |
| ENSMUST00000098519 | 1 | 3 | 0 Cylid         | protein_coding                     |
| ENSMUST00000100083 | 1 | 3 | 0 A930003A15Rik | protein_coding                     |
| ENSMUST00000106791 | 1 | 3 | 0 Trim3         | protein_coding                     |
| ENSMUST00000108328 | 1 | 3 | 0 Cp            | protein_coding                     |
| ENSMUST00000113182 | 1 | 3 | 0 Rad18         | protein_coding                     |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUST00000115823 | 1 | 3 | 0 Clec16a        | protein_coding       |
| ENSMUST00000116402 | 1 | 3 | 0 Esrrb          | protein_coding       |
| ENSMUST00000116468 | 1 | 3 | 0 Mphosph8       | protein_coding       |
| ENSMUST00000118833 | 1 | 3 | 0 Med28          | protein_coding       |
| ENSMUST00000120532 | 1 | 3 | 0 Hira           | protein_coding       |
| ENSMUST00000125018 | 1 | 3 | 0 Ankrd45        | protein_coding       |
| ENSMUST00000126561 | 1 | 3 | 0 Asah1          | protein_coding       |
| ENSMUST00000128590 | 1 | 3 | 0 Sppl3          | protein_coding       |
| ENSMUST00000143600 | 1 | 3 | 0 Sap18          | protein_coding       |
| ENSMUST00000145687 | 1 | 3 | 0 Mtrf1l         | protein_coding       |
| ENSMUST00000145780 | 1 | 3 | 0 Podxl2         | protein_coding       |
| ENSMUST00000145813 | 1 | 3 | 0 Saal1          | protein_coding       |
| ENSMUST00000147432 | 1 | 3 | 0 2610507B11Rik  | protein_coding       |
| ENSMUST00000147441 | 1 | 3 | 0 Cdk12          | protein_coding       |
| ENSMUST00000152520 | 1 | 3 | 0 Setd4          | protein_coding       |
| ENSMUST00000162991 | 1 | 3 | 0 Ctnna2         | protein_coding       |
| ENSMUST00000166397 | 1 | 3 | 0 Suds3          | protein_coding       |
| ENSMUST00000168171 | 1 | 3 | 0 Cyp4f15        | protein_coding       |
| ENSMUST00000168937 | 1 | 3 | 0 Mapk6          | protein_coding       |
| ENSMUST00000170141 | 1 | 3 | 0 Orc6           | protein_coding       |
| ENSMUST00000170723 | 1 | 3 | 0 Gpr115         | protein_coding       |
| ENSMUST00000171794 | 1 | 3 | 0 Gtf2ird1       | protein_coding       |
| ENSMUST00000172452 | 1 | 3 | 0 Upp1           | protein_coding       |
| ENSMUST00000176282 | 1 | 3 | 0 Ces1e          | protein_coding       |
| ENSMUST00000184332 | 1 | 3 | 0 Pkp4           | protein_coding       |
| ENSMUST00000184339 | 1 | 3 | 0 Mrpl20         | protein_coding       |
| ENSMUST00000152439 | 1 | 3 | 0 Gm14009        | lincRNA              |
| ENSMUST00000180546 | 1 | 3 | 0 Gm26633        | lincRNA              |
| ENSMUST00000138080 | 1 | 3 | 0 Gm14280        | antisense            |
| ENSMUST00000152143 | 1 | 3 | 0 Gm15417        | antisense            |
| ENSMUST00000042035 | 1 | 2 | 184 Bai1         | protein_coding       |
| ENSMUST00000119720 | 1 | 2 | 52 Adam32        | protein_coding       |
| ENSMUST00000155903 | 1 | 2 | 36 0610010F05Rik | protein_coding       |
| ENSMUST00000118022 | 1 | 2 | 34 Gata4         | protein_coding       |
| ENSMUST00000033166 | 1 | 2 | 32 4933427G17Rik | protein_coding       |
| ENSMUST00000177101 | 1 | 2 | 32 Cfap53        | protein_coding       |
| ENSMUST00000114680 | 1 | 2 | 30 Mllt10        | protein_coding       |
| ENSMUST00000003310 | 1 | 2 | 28 Ranbp2        | protein_coding       |
| ENSMUST00000028280 | 1 | 2 | 28 Col5a1        | protein_coding       |
| ENSMUST00000049784 | 1 | 2 | 28 Myt1l         | protein_coding       |
| ENSMUST00000072217 | 1 | 2 | 28 Ggt5          | protein_coding       |
| ENSMUST00000097442 | 1 | 2 | 28 Ptpn14        | protein_coding       |
| ENSMUST00000064797 | 1 | 2 | 26 Itsn1         | protein_coding       |
| ENSMUST00000138976 | 1 | 2 | 26 Spock2        | protein_coding       |
| ENSMUST00000108908 | 1 | 2 | 24 Scn8a         | protein_coding       |
| ENSMUST00000162233 | 1 | 2 | 24 Psat1         | protein_coding       |
| ENSMUST00000135990 | 1 | 2 | 24 Gm14104       | antisense            |
| ENSMUST00000036372 | 1 | 2 | 22 Chsy1         | protein_coding       |
| ENSMUST00000057979 | 1 | 2 | 22 Ppara         | protein_coding       |
| ENSMUST00000027952 | 1 | 2 | 20 Plxna2        | protein_coding       |
| ENSMUST00000033156 | 1 | 2 | 20 Dctn5         | protein_coding       |
| ENSMUST00000034522 | 1 | 2 | 20 Clmp          | protein_coding       |
| ENSMUST00000092794 | 1 | 2 | 20 Msi2          | protein_coding       |
| ENSMUST00000105331 | 1 | 2 | 20 Map2k2        | protein_coding       |
| ENSMUST00000108970 | 1 | 2 | 20 Gm14401       | protein_coding       |
| ENSMUST00000150355 | 1 | 2 | 20 Clpb          | protein_coding       |
| ENSMUST00000177390 | 1 | 2 | 20 Golph3l       | protein_coding       |
| ENSMUST00000131687 | 1 | 2 | 20 2410003L11Rik | processed_transcript |
| ENSMUST00000024879 | 1 | 2 | 18 Birc6         | protein_coding       |
| ENSMUST00000024879 | 1 | 2 | 18 Birc6         | protein_coding       |
| ENSMUST00000034400 | 1 | 2 | 18 Cyb5b         | protein_coding       |
| ENSMUST00000062153 | 1 | 2 | 18 Rilpl1        | protein_coding       |
| ENSMUST00000069503 | 1 | 2 | 18 Tubd1         | protein_coding       |
| ENSMUST00000155203 | 1 | 2 | 18 Zbtb10        | protein_coding       |
| ENSMUST00000002914 | 1 | 2 | 16 Chaf1a        | protein_coding       |
| ENSMUST00000026027 | 1 | 2 | 16 Taf5          | protein_coding       |
| ENSMUST00000027291 | 1 | 2 | 16 Zap70         | protein_coding       |
| ENSMUST00000150034 | 1 | 2 | 16 1700008O03Rik | protein_coding       |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUST00000152991 | 1 | 2 | 16 Gins1         | protein_coding       |
| ENSMUST00000179847 | 1 | 2 | 16 Smg1          | protein_coding       |
| ENSMUST00000181222 | 1 | 2 | 16 Gm16754       | lincRNA              |
| ENSMUST00000032627 | 1 | 2 | 14 Tubgcp5       | protein_coding       |
| ENSMUST00000068006 | 1 | 2 | 14 Mocos         | protein_coding       |
| ENSMUST00000070210 | 1 | 2 | 14 Atad1         | protein_coding       |
| ENSMUST00000135941 | 1 | 2 | 14 Pfdn2         | protein_coding       |
| ENSMUST00000139807 | 1 | 2 | 14 1110051M20Rik | protein_coding       |
| ENSMUST00000141220 | 1 | 2 | 14 Tm9sf4        | protein_coding       |
| ENSMUST00000145592 | 1 | 2 | 14 Iscu          | protein_coding       |
| ENSMUST00000174313 | 1 | 2 | 14 Slit2         | protein_coding       |
| ENSMUST00000024755 | 1 | 2 | 12 Clic5         | protein_coding       |
| ENSMUST00000037434 | 1 | 2 | 12 Cacna2d4      | protein_coding       |
| ENSMUST00000057653 | 1 | 2 | 12 Car5a         | protein_coding       |
| ENSMUST00000071083 | 1 | 2 | 12 Stim2         | protein_coding       |
| ENSMUST00000166897 | 1 | 2 | 12 Tomm70a       | protein_coding       |
| ENSMUST00000168106 | 1 | 2 | 12 Anp32e        | protein_coding       |
| ENSMUST00000003870 | 1 | 2 | 10 Mxi1          | protein_coding       |
| ENSMUST00000021063 | 1 | 2 | 10 Psmc12        | protein_coding       |
| ENSMUST00000044442 | 1 | 2 | 10 Ptk7          | protein_coding       |
| ENSMUST00000046709 | 1 | 2 | 10 Supt16        | protein_coding       |
| ENSMUST00000080856 | 1 | 2 | 10 Ipo11         | protein_coding       |
| ENSMUST00000111236 | 1 | 2 | 10 Tnfrsf19      | protein_coding       |
| ENSMUST00000142005 | 1 | 2 | 10 Dpy19l4       | protein_coding       |
| ENSMUST00000162616 | 1 | 2 | 10 Cmtm1         | protein_coding       |
| ENSMUST00000004990 | 1 | 2 | 8 Mapk14         | protein_coding       |
| ENSMUST00000017610 | 1 | 2 | 8 Timp2          | protein_coding       |
| ENSMUST00000045454 | 1 | 2 | 8 Fam207a        | protein_coding       |
| ENSMUST00000097975 | 1 | 2 | 8 Inpp5a         | protein_coding       |
| ENSMUST00000110384 | 1 | 2 | 8 Fam65b         | protein_coding       |
| ENSMUST00000132699 | 1 | 2 | 8 Rasal2         | protein_coding       |
| ENSMUST00000137934 | 1 | 2 | 8 Triobp         | protein_coding       |
| ENSMUST00000170518 | 1 | 2 | 8 Gm17296        | protein_coding       |
| ENSMUST00000117591 | 1 | 2 | 8 Gm13033        | processed_pseudogene |
| ENSMUST00000181344 | 1 | 2 | 8 4931440J10Rik  | lincRNA              |
| ENSMUST00000039013 | 1 | 2 | 6 Abca3          | protein_coding       |
| ENSMUST00000080145 | 1 | 2 | 6 Adamts16       | protein_coding       |
| ENSMUST00000090339 | 1 | 2 | 6 Rai14          | protein_coding       |
| ENSMUST00000091505 | 1 | 2 | 6 Fam171a1       | protein_coding       |
| ENSMUST00000094698 | 1 | 2 | 6 Rbm44          | protein_coding       |
| ENSMUST00000096241 | 1 | 2 | 6 Eml3           | protein_coding       |
| ENSMUST00000118728 | 1 | 2 | 6 Tmem194        | protein_coding       |
| ENSMUST00000121953 | 1 | 2 | 6 Disc1          | protein_coding       |
| ENSMUST00000131258 | 1 | 2 | 6 Ctdspl2        | protein_coding       |
| ENSMUST00000132688 | 1 | 2 | 6 Fxn            | protein_coding       |
| ENSMUST00000147578 | 1 | 2 | 6 Cemip          | protein_coding       |
| ENSMUST00000169398 | 1 | 2 | 6 Ubtfl1         | protein_coding       |
| ENSMUST00000171906 | 1 | 2 | 6 Gm3667         | protein_coding       |
| ENSMUST00000176357 | 1 | 2 | 6 Pan3           | protein_coding       |
| ENSMUST00000123707 | 1 | 2 | 6 Gm16189        | antisense            |
| ENSMUST00000017208 | 1 | 2 | 4 Prl5a1         | protein_coding       |
| ENSMUST00000021154 | 1 | 2 | 4 Spns3          | protein_coding       |
| ENSMUST00000025228 | 1 | 2 | 4 Cdc23          | protein_coding       |
| ENSMUST00000031108 | 1 | 2 | 4 Chrna9         | protein_coding       |
| ENSMUST00000039892 | 1 | 2 | 4 Tbc1d25        | protein_coding       |
| ENSMUST00000048603 | 1 | 2 | 4 Dnah1          | protein_coding       |
| ENSMUST00000089832 | 1 | 2 | 4 Gmnc           | protein_coding       |
| ENSMUST00000106643 | 1 | 2 | 4 Parva          | protein_coding       |
| ENSMUST00000106669 | 1 | 2 | 4 Abca8b         | protein_coding       |
| ENSMUST00000107733 | 1 | 2 | 4 Kat7           | protein_coding       |
| ENSMUST00000112292 | 1 | 2 | 4 Dao            | protein_coding       |
| ENSMUST00000127655 | 1 | 2 | 4 Slc5a11        | protein_coding       |
| ENSMUST00000138771 | 1 | 2 | 4 Sh3pxd2b       | protein_coding       |
| ENSMUST00000142327 | 1 | 2 | 4 Snrnp200       | protein_coding       |
| ENSMUST00000143051 | 1 | 2 | 4 Ttk2           | protein_coding       |
| ENSMUST00000177183 | 1 | 2 | 4 Trip11         | protein_coding       |
| ENSMUST00000172910 | 1 | 2 | 4 Gm9581         | processed_transcript |
| ENSMUST00000149308 | 1 | 2 | 4 2900079G21Rik  | lincRNA              |



|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000125759 | 1 | 2 | 2 Scap          | protein_coding         |
| ENSMUST00000125759 | 1 | 2 | 2 Scap          | protein_coding         |
| ENSMUST00000003370 | 1 | 2 | 2 Hck           | protein_coding         |
| ENSMUST00000006525 | 1 | 2 | 2 Cbfa2t3       | protein_coding         |
| ENSMUST00000010682 | 1 | 2 | 2 Tsacc         | protein_coding         |
| ENSMUST00000018066 | 1 | 2 | 2 Prl3c1        | protein_coding         |
| ENSMUST00000021050 | 1 | 2 | 2 Adap2         | protein_coding         |
| ENSMUST00000026073 | 1 | 2 | 2 Trub1         | protein_coding         |
| ENSMUST00000041558 | 1 | 2 | 2 Ep400         | protein_coding         |
| ENSMUST00000047486 | 1 | 2 | 2 C330007P06Rik | protein_coding         |
| ENSMUST00000047812 | 1 | 2 | 2 Dpp4          | protein_coding         |
| ENSMUST00000050483 | 1 | 2 | 2 Parp6         | protein_coding         |
| ENSMUST00000057243 | 1 | 2 | 2 Tmem252       | protein_coding         |
| ENSMUST00000071858 | 1 | 2 | 2 Hpcal1        | protein_coding         |
| ENSMUST00000086209 | 1 | 2 | 2 Rnasel        | protein_coding         |
| ENSMUST00000097424 | 1 | 2 | 2 Fndc1         | protein_coding         |
| ENSMUST00000100528 | 1 | 2 | 2 Ube2z         | protein_coding         |
| ENSMUST00000100982 | 1 | 2 | 2 Abcb5         | protein_coding         |
| ENSMUST00000107719 | 1 | 2 | 2 Kdelr1        | protein_coding         |
| ENSMUST00000108383 | 1 | 2 | 2 Sdr16c6       | protein_coding         |
| ENSMUST00000112591 | 1 | 2 | 2 Galnt14       | protein_coding         |
| ENSMUST00000112712 | 1 | 2 | 2 Lypd6         | protein_coding         |
| ENSMUST00000143018 | 1 | 2 | 2 Ptpns         | protein_coding         |
| ENSMUST00000155490 | 1 | 2 | 2 Dcakd         | protein_coding         |
| ENSMUST00000155555 | 1 | 2 | 2 Gabpb2        | protein_coding         |
| ENSMUST00000156814 | 1 | 2 | 2 Pip5k1b       | protein_coding         |
| ENSMUST00000165230 | 1 | 2 | 2 Zfp54         | protein_coding         |
| ENSMUST00000176939 | 1 | 2 | 2 Aldh18a1      | protein_coding         |
| ENSMUST00000177518 | 1 | 2 | 2 Ii33          | protein_coding         |
| ENSMUST00000142907 | 1 | 2 | 2 3632454L22Rik | processed_transcript   |
| ENSMUST00000150559 | 1 | 2 | 2 1700060C16Rik | lincRNA                |
| ENSMUST00000141275 | 1 | 2 | 2 Gm16322       | antisense              |
| ENSMUST00000120113 | 1 | 2 | 0 Gm6620        | unprocessed_pseudogene |
| ENSMUST00000003621 | 1 | 2 | 0 Dgcr14        | protein_coding         |
| ENSMUST00000006664 | 1 | 2 | 0 Prl8a1        | protein_coding         |
| ENSMUST00000010421 | 1 | 2 | 0 2610507B11Rik | protein_coding         |
| ENSMUST00000018429 | 1 | 2 | 0 Pld2          | protein_coding         |
| ENSMUST00000020884 | 1 | 2 | 0 Atp6v1c2      | protein_coding         |
| ENSMUST00000022062 | 1 | 2 | 0 Sdha          | protein_coding         |
| ENSMUST00000022663 | 1 | 2 | 0 Tnfrsf10b     | protein_coding         |
| ENSMUST00000022704 | 1 | 2 | 0 Itm2b         | protein_coding         |
| ENSMUST00000025595 | 1 | 2 | 0 Fam111a       | protein_coding         |
| ENSMUST00000025631 | 1 | 2 | 0 Ostf1         | protein_coding         |
| ENSMUST00000028098 | 1 | 2 | 0 Orc4          | protein_coding         |
| ENSMUST00000029269 | 1 | 2 | 0 Exosc9        | protein_coding         |
| ENSMUST00000029654 | 1 | 2 | 0 Glrb          | protein_coding         |
| ENSMUST00000030684 | 1 | 2 | 0 Gnl2          | protein_coding         |
| ENSMUST00000031226 | 1 | 2 | 0 Ambn          | protein_coding         |
| ENSMUST00000031835 | 1 | 2 | 0 Aoc1          | protein_coding         |
| ENSMUST00000032268 | 1 | 2 | 0 Klrd1         | protein_coding         |
| ENSMUST00000033961 | 1 | 2 | 0 Tm2d2         | protein_coding         |
| ENSMUST00000034607 | 1 | 2 | 0 Arcn1         | protein_coding         |
| ENSMUST00000034851 | 1 | 2 | 0 Chrna3        | protein_coding         |
| ENSMUST00000038228 | 1 | 2 | 0 Tmx4          | protein_coding         |
| ENSMUST00000044152 | 1 | 2 | 0 Hid1          | protein_coding         |
| ENSMUST00000047702 | 1 | 2 | 0 Cd160         | protein_coding         |
| ENSMUST00000052838 | 1 | 2 | 0 Mib1          | protein_coding         |
| ENSMUST00000058978 | 1 | 2 | 0 Nqo2          | protein_coding         |
| ENSMUST00000063278 | 1 | 2 | 0 Agt           | protein_coding         |
| ENSMUST00000066116 | 1 | 2 | 0 Fate1         | protein_coding         |
| ENSMUST00000070135 | 1 | 2 | 0 Pqlc1         | protein_coding         |
| ENSMUST00000071750 | 1 | 2 | 0 Col12a1       | protein_coding         |
| ENSMUST00000074983 | 1 | 2 | 0 Kcnma1        | protein_coding         |
| ENSMUST00000079496 | 1 | 2 | 0 Ube2s         | protein_coding         |
| ENSMUST00000080249 | 1 | 2 | 0 Zfp947        | protein_coding         |
| ENSMUST00000086496 | 1 | 2 | 0 Olfr831-ps1   | protein_coding         |
| ENSMUST00000091087 | 1 | 2 | 0 Dnm2          | protein_coding         |
| ENSMUST00000091903 | 1 | 2 | 0 Sh3bp5        | protein_coding         |

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| ENSMUST00000094761 | 1 | 2 | 0 Stk40          | protein_coding       |
| ENSMUST00000098458 | 1 | 2 | 0 Ii20rb         | protein_coding       |
| ENSMUST00000098644 | 1 | 2 | 0 Prx            | protein_coding       |
| ENSMUST00000098789 | 1 | 2 | 0 Zc3h4          | protein_coding       |
| ENSMUST00000101398 | 1 | 2 | 0 Ttc6           | protein_coding       |
| ENSMUST00000102495 | 1 | 2 | 0 Tmigd1         | protein_coding       |
| ENSMUST00000102510 | 1 | 2 | 0 Prpf8          | protein_coding       |
| ENSMUST00000106487 | 1 | 2 | 0 Eef2k          | protein_coding       |
| ENSMUST00000109745 | 1 | 2 | 0 Gcdh           | protein_coding       |
| ENSMUST00000112141 | 1 | 2 | 0 Itih3          | protein_coding       |
| ENSMUST00000112562 | 1 | 2 | 0 Magea6         | protein_coding       |
| ENSMUST00000113835 | 1 | 2 | 0 Zfml           | protein_coding       |
| ENSMUST00000113873 | 1 | 2 | 0 Arhgef9        | protein_coding       |
| ENSMUST00000117341 | 1 | 2 | 0 Spg20          | protein_coding       |
| ENSMUST00000118657 | 1 | 2 | 0 Nt5c1b         | protein_coding       |
| ENSMUST00000123727 | 1 | 2 | 0 Cpeb3          | protein_coding       |
| ENSMUST00000126366 | 1 | 2 | 0 Zfp473         | protein_coding       |
| ENSMUST00000127944 | 1 | 2 | 0 Dlgap4         | protein_coding       |
| ENSMUST00000129255 | 1 | 2 | 0 Tmem72         | protein_coding       |
| ENSMUST00000129753 | 1 | 2 | 0 Aldh2          | protein_coding       |
| ENSMUST00000134964 | 1 | 2 | 0 Atrn           | protein_coding       |
| ENSMUST00000137633 | 1 | 2 | 0 Sfi1           | protein_coding       |
| ENSMUST00000139204 | 1 | 2 | 0 Syne2          | protein_coding       |
| ENSMUST00000141003 | 1 | 2 | 0 Gmeb2          | protein_coding       |
| ENSMUST00000141896 | 1 | 2 | 0 Maats1         | protein_coding       |
| ENSMUST00000143412 | 1 | 2 | 0 Mtf2           | protein_coding       |
| ENSMUST00000147103 | 1 | 2 | 0 Awat2          | protein_coding       |
| ENSMUST00000147786 | 1 | 2 | 0 Fam175b        | protein_coding       |
| ENSMUST00000151333 | 1 | 2 | 0 Wbp11          | protein_coding       |
| ENSMUST00000152393 | 1 | 2 | 0 Nop14          | protein_coding       |
| ENSMUST00000159154 | 1 | 2 | 0 Lmo7           | protein_coding       |
| ENSMUST00000163688 | 1 | 2 | 0 Sned1          | protein_coding       |
| ENSMUST00000164893 | 1 | 2 | 0 Nol4           | protein_coding       |
| ENSMUST00000166063 | 1 | 2 | 0 Gspt1          | protein_coding       |
| ENSMUST00000166117 | 1 | 2 | 0 Gen1           | protein_coding       |
| ENSMUST00000167564 | 1 | 2 | 0 Ddit4l         | protein_coding       |
| ENSMUST00000168081 | 1 | 2 | 0 Eya1           | protein_coding       |
| ENSMUST00000168702 | 1 | 2 | 0 Gm6904         | protein_coding       |
| ENSMUST00000170629 | 1 | 2 | 0 Gtse1          | protein_coding       |
| ENSMUST00000171733 | 1 | 2 | 0 Myg1           | protein_coding       |
| ENSMUST00000173078 | 1 | 2 | 0 Otud4          | protein_coding       |
| ENSMUST00000174008 | 1 | 2 | 0 Smarca4        | protein_coding       |
| ENSMUST00000176476 | 1 | 2 | 0 Bnc2           | protein_coding       |
| ENSMUST00000178414 | 1 | 2 | 0 Gm3383         | protein_coding       |
| ENSMUST00000181464 | 1 | 2 | 0 Ccdc136        | protein_coding       |
| ENSMUST00000177015 | 1 | 2 | 0 A730085K08Rik  | processed_transcript |
| ENSMUST00000143391 | 1 | 2 | 0 Gm12714        | lincRNA              |
| ENSMUST00000181949 | 1 | 2 | 0 4930558J18Rik  | lincRNA              |
| ENSMUST00000125852 | 1 | 2 | 0 1700010K24Rik  | antisense            |
| ENSMUST00000143500 | 1 | 2 | 0 Il1bos         | antisense            |
| ENSMUST00000151652 | 1 | 2 | 0 Bcas3os1       | antisense            |
| ENSMUST00000154038 | 1 | 2 | 0 Gm27206        | antisense            |
| ENSMUST00000165885 | 1 | 2 | 0 Gm17023        | antisense            |
| ENSMUST00000054598 | 1 | 1 | 385 Ablim2       | protein_coding       |
| ENSMUST00000127186 | 1 | 1 | 313 Gm525        | protein_coding       |
| ENSMUST00000053208 | 1 | 1 | 139 Lypd6        | protein_coding       |
| ENSMUST00000173700 | 1 | 1 | 71 Dnmt3a        | protein_coding       |
| ENSMUST00000075837 | 1 | 1 | 56 Cyp3a41b      | protein_coding       |
| ENSMUST00000094111 | 1 | 1 | 56 Cyp3a41a      | protein_coding       |
| ENSMUST00000106307 | 1 | 1 | 42 Hivep3        | protein_coding       |
| ENSMUST00000137315 | 1 | 1 | 42 Gm15341       | antisense            |
| ENSMUST00000047232 | 1 | 1 | 40 Agps          | protein_coding       |
| ENSMUST00000099542 | 1 | 1 | 38 Casc5         | protein_coding       |
| ENSMUST00000138229 | 1 | 1 | 36 Ramp2         | protein_coding       |
| ENSMUST00000162977 | 1 | 1 | 36 Lamb3         | protein_coding       |
| ENSMUST00000039413 | 1 | 1 | 34 Pde4a         | protein_coding       |
| ENSMUST00000141344 | 1 | 1 | 30 D430001F17Rik | processed_transcript |
| ENSMUST00000000724 | 1 | 1 | 26 Kat2b         | protein_coding       |

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|--------------------|---|---|----|---------------|------------------------------------|
| ENSMUST00000105082 | 1 | 1 | 26 | Plekha6       | protein_coding                     |
| ENSMUST00000141796 | 1 | 1 | 24 | Inadl         | protein_coding                     |
| ENSMUST00000149947 | 1 | 1 | 22 | Ppp4r1l-ps    | transcribed_unprocessed_pseudogene |
| ENSMUST00000028668 | 1 | 1 | 22 | Eif3j1        | protein_coding                     |
| ENSMUST00000056365 | 1 | 1 | 22 | Evc2          | protein_coding                     |
| ENSMUST00000078717 | 1 | 1 | 22 | Lrrc58        | protein_coding                     |
| ENSMUST00000128014 | 1 | 1 | 22 | Btd           | protein_coding                     |
| ENSMUST00000162649 | 1 | 1 | 22 | Gm16251       | antisense                          |
| ENSMUST00000030290 | 1 | 1 | 20 | Inadl         | protein_coding                     |
| ENSMUST00000065304 | 1 | 1 | 20 | Rtn3          | protein_coding                     |
| ENSMUST00000116259 | 1 | 1 | 20 | Map7          | protein_coding                     |
| ENSMUST00000142977 | 1 | 1 | 20 | Ankhd1        | protein_coding                     |
| ENSMUST00000038341 | 1 | 1 | 18 | Bub1b         | protein_coding                     |
| ENSMUST00000105410 | 1 | 1 | 18 | Slc19a1       | protein_coding                     |
| ENSMUST00000106738 | 1 | 1 | 18 | Glis1         | protein_coding                     |
| ENSMUST00000115178 | 1 | 1 | 18 | Ncbp2         | protein_coding                     |
| ENSMUST00000151461 | 1 | 1 | 18 | Zmym6         | protein_coding                     |
| ENSMUST00000134238 | 1 | 1 | 16 | Cnga3         | protein_coding                     |
| ENSMUST00000134238 | 1 | 1 | 16 | Cnga3         | protein_coding                     |
| ENSMUST00000027881 | 1 | 1 | 16 | Sec16b        | protein_coding                     |
| ENSMUST00000085573 | 1 | 1 | 16 | Traf5         | protein_coding                     |
| ENSMUST00000102650 | 1 | 1 | 16 | Akap10        | protein_coding                     |
| ENSMUST00000105692 | 1 | 1 | 16 | Ctnnbip1      | protein_coding                     |
| ENSMUST00000121964 | 1 | 1 | 16 | Wdr66         | protein_coding                     |
| ENSMUST00000159128 | 1 | 1 | 16 | Ttc21a        | protein_coding                     |
| ENSMUST00000159226 | 1 | 1 | 16 | Tbxas1        | protein_coding                     |
| ENSMUST00000160783 | 1 | 1 | 16 | Exoc6b        | protein_coding                     |
| ENSMUST00000015449 | 1 | 1 | 14 | Sash1         | protein_coding                     |
| ENSMUST00000039152 | 1 | 1 | 14 | Dhx8          | protein_coding                     |
| ENSMUST00000051831 | 1 | 1 | 14 | Agbl2         | protein_coding                     |
| ENSMUST00000053317 | 1 | 1 | 14 | Bdnf          | protein_coding                     |
| ENSMUST00000073337 | 1 | 1 | 14 | Cramp1l       | protein_coding                     |
| ENSMUST00000084952 | 1 | 1 | 14 | Kif9          | protein_coding                     |
| ENSMUST00000108250 | 1 | 1 | 14 | Gm12353       | protein_coding                     |
| ENSMUST00000131573 | 1 | 1 | 14 | Gpatch8       | protein_coding                     |
| ENSMUST00000165234 | 1 | 1 | 14 | Pigu          | protein_coding                     |
| ENSMUST00000181411 | 1 | 1 | 14 | Gm26766       | lincRNA                            |
| ENSMUST00000039259 | 1 | 1 | 12 | Agap2         | protein_coding                     |
| ENSMUST00000042869 | 1 | 1 | 12 | Cep19         | protein_coding                     |
| ENSMUST00000047745 | 1 | 1 | 12 | Pglyrp4       | protein_coding                     |
| ENSMUST00000050962 | 1 | 1 | 12 | Cldn14        | protein_coding                     |
| ENSMUST00000088244 | 1 | 1 | 12 | Actr3b        | protein_coding                     |
| ENSMUST00000095385 | 1 | 1 | 12 | Ric8b         | protein_coding                     |
| ENSMUST00000109097 | 1 | 1 | 12 | Sec24a        | protein_coding                     |
| ENSMUST00000109126 | 1 | 1 | 12 | Spo11         | protein_coding                     |
| ENSMUST00000130982 | 1 | 1 | 12 | Ddx52         | protein_coding                     |
| ENSMUST00000134652 | 1 | 1 | 12 | Ttc39d        | protein_coding                     |
| ENSMUST00000137245 | 1 | 1 | 12 | Edc3          | protein_coding                     |
| ENSMUST00000156836 | 1 | 1 | 12 | Exo5          | protein_coding                     |
| ENSMUST00000165120 | 1 | 1 | 12 | Tfdp2         | protein_coding                     |
| ENSMUST00000130189 | 1 | 1 | 12 | A230056P14Rik | processed_transcript               |
| ENSMUST00000146576 | 1 | 1 | 12 | Gm12503       | processed_transcript               |
| ENSMUST00000181888 | 1 | 1 | 12 | Gm26835       | lincRNA                            |
| ENSMUST00000015171 | 1 | 1 | 10 | Galns         | protein_coding                     |
| ENSMUST00000021539 | 1 | 1 | 10 | Vrk1          | protein_coding                     |
| ENSMUST00000027743 | 1 | 1 | 10 | Stx6          | protein_coding                     |
| ENSMUST00000098087 | 1 | 1 | 10 | Iqck          | protein_coding                     |
| ENSMUST00000121357 | 1 | 1 | 10 | Gramd1b       | protein_coding                     |
| ENSMUST00000124438 | 1 | 1 | 10 | Slit3         | protein_coding                     |
| ENSMUST00000145070 | 1 | 1 | 10 | 4930444P10Rik | protein_coding                     |
| ENSMUST00000170693 | 1 | 1 | 10 | Ube2d2a       | protein_coding                     |
| ENSMUST00000181773 | 1 | 1 | 10 | Gm26759       | antisense                          |
| ENSMUST00000020804 | 1 | 1 | 8  | Gdpd1         | protein_coding                     |
| ENSMUST00000027111 | 1 | 1 | 8  | Ndufs1        | protein_coding                     |
| ENSMUST00000030117 | 1 | 1 | 8  | Smu1          | protein_coding                     |
| ENSMUST00000034441 | 1 | 1 | 8  | Aars          | protein_coding                     |
| ENSMUST00000036649 | 1 | 1 | 8  | Coil          | protein_coding                     |
| ENSMUST00000037048 | 1 | 1 | 8  | Mmd2          | protein_coding                     |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000040964 | 1 | 1 | 8 Ss18          | protein_coding |
| ENSMUST00000047419 | 1 | 1 | 8 Tspo          | protein_coding |
| ENSMUST00000048305 | 1 | 1 | 8 Smek1         | protein_coding |
| ENSMUST00000049239 | 1 | 1 | 8 Map4k5        | protein_coding |
| ENSMUST00000062370 | 1 | 1 | 8 Wdr89         | protein_coding |
| ENSMUST00000122070 | 1 | 1 | 8 Ncoa5         | protein_coding |
| ENSMUST00000123738 | 1 | 1 | 8 Fancd2        | protein_coding |
| ENSMUST00000134266 | 1 | 1 | 8 Kansl1        | protein_coding |
| ENSMUST00000136191 | 1 | 1 | 8 Ccl25         | protein_coding |
| ENSMUST00000146497 | 1 | 1 | 8 Sulf2         | protein_coding |
| ENSMUST00000156813 | 1 | 1 | 8 Lmo2          | protein_coding |
| ENSMUST00000167944 | 1 | 1 | 8 Pcdh19        | protein_coding |
| ENSMUST00000122898 | 1 | 1 | 8 Gm12474       | lincRNA        |
| ENSMUST00000144043 | 1 | 1 | 8 Gm13943       | lincRNA        |
| ENSMUST00000021785 | 1 | 1 | 6 Exoc2         | protein_coding |
| ENSMUST00000028916 | 1 | 1 | 6 Sec23b        | protein_coding |
| ENSMUST00000032770 | 1 | 1 | 6 Pgpep1l       | protein_coding |
| ENSMUST00000036329 | 1 | 1 | 6 Wdr26         | protein_coding |
| ENSMUST00000041093 | 1 | 1 | 6 Creb3l2       | protein_coding |
| ENSMUST00000043458 | 1 | 1 | 6 Srd5a2        | protein_coding |
| ENSMUST00000067426 | 1 | 1 | 6 Cdkn3         | protein_coding |
| ENSMUST00000107840 | 1 | 1 | 6 Prmt1         | protein_coding |
| ENSMUST00000107937 | 1 | 1 | 6 Atp8b5        | protein_coding |
| ENSMUST00000129354 | 1 | 1 | 6 Arf3          | protein_coding |
| ENSMUST00000138151 | 1 | 1 | 6 Ppil4         | protein_coding |
| ENSMUST00000144497 | 1 | 1 | 6 F11r          | protein_coding |
| ENSMUST00000150361 | 1 | 1 | 6 Oasl2         | protein_coding |
| ENSMUST00000153486 | 1 | 1 | 6 Trpv2         | protein_coding |
| ENSMUST00000159604 | 1 | 1 | 6 Fyb           | protein_coding |
| ENSMUST00000163092 | 1 | 1 | 6 Wdr66         | protein_coding |
| ENSMUST00000177857 | 1 | 1 | 6 Rcan2         | protein_coding |
| ENSMUST00000132826 | 1 | 1 | 6 Gm7580        | antisense      |
| ENSMUST00000031697 | 1 | 1 | 4 Cul1          | protein_coding |
| ENSMUST00000047627 | 1 | 1 | 4 Gbbp1         | protein_coding |
| ENSMUST00000068025 | 1 | 1 | 4 Klhl18        | protein_coding |
| ENSMUST00000080359 | 1 | 1 | 4 Rest          | protein_coding |
| ENSMUST00000082319 | 1 | 1 | 4 Wdr33         | protein_coding |
| ENSMUST00000093138 | 1 | 1 | 4 Tbc1d9b       | protein_coding |
| ENSMUST00000093517 | 1 | 1 | 4 Casp3         | protein_coding |
| ENSMUST00000102759 | 1 | 1 | 4 Stam2         | protein_coding |
| ENSMUST00000113099 | 1 | 1 | 4 Gapvd1        | protein_coding |
| ENSMUST00000126248 | 1 | 1 | 4 Rpn2          | protein_coding |
| ENSMUST00000126442 | 1 | 1 | 4 Zbtb43        | protein_coding |
| ENSMUST00000132386 | 1 | 1 | 4 Ptp4a2        | protein_coding |
| ENSMUST00000147926 | 1 | 1 | 4 Shb           | protein_coding |
| ENSMUST00000153664 | 1 | 1 | 4 Lrpap1        | protein_coding |
| ENSMUST00000154416 | 1 | 1 | 4 Fam92a        | protein_coding |
| ENSMUST00000154812 | 1 | 1 | 4 Cuedc1        | protein_coding |
| ENSMUST00000165017 | 1 | 1 | 4 Nolc1         | protein_coding |
| ENSMUST00000167706 | 1 | 1 | 4 Cnot2         | protein_coding |
| ENSMUST00000170424 | 1 | 1 | 4 Vmn2r98       | protein_coding |
| ENSMUST00000170960 | 1 | 1 | 4 Iqch          | protein_coding |
| ENSMUST00000173598 | 1 | 1 | 4 Chadl         | protein_coding |
| ENSMUST00000162458 | 1 | 1 | 4 Gm16280       | antisense      |
| ENSMUST00000001675 | 1 | 1 | 2 Stk38l        | protein_coding |
| ENSMUST00000020484 | 1 | 1 | 2 Txnrd1        | protein_coding |
| ENSMUST00000022665 | 1 | 1 | 2 Rhobtb2       | protein_coding |
| ENSMUST00000030336 | 1 | 1 | 2 Tnfrsf1b      | protein_coding |
| ENSMUST00000037709 | 1 | 1 | 2 Tm7sf3        | protein_coding |
| ENSMUST00000043923 | 1 | 1 | 2 Acat3         | protein_coding |
| ENSMUST00000056089 | 1 | 1 | 2 Tmem37        | protein_coding |
| ENSMUST00000073325 | 1 | 1 | 2 Phldb3        | protein_coding |
| ENSMUST00000101551 | 1 | 1 | 2 Adam17        | protein_coding |
| ENSMUST00000105975 | 1 | 1 | 2 Epb4.1        | protein_coding |
| ENSMUST00000107479 | 1 | 1 | 2 Rapgef1l      | protein_coding |
| ENSMUST00000108524 | 1 | 1 | 2 Sult2a7       | protein_coding |
| ENSMUST00000110746 | 1 | 1 | 2 3110039M20Rik | protein_coding |
| ENSMUST00000111024 | 1 | 1 | 2 Enah          | protein_coding |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000118027 | 1 | 1 | 2 Kdm2b         | protein_coding |
| ENSMUST00000122832 | 1 | 1 | 2 Al481877      | protein_coding |
| ENSMUST00000125548 | 1 | 1 | 2 Vps72         | protein_coding |
| ENSMUST00000126605 | 1 | 1 | 2 Las1l         | protein_coding |
| ENSMUST00000134408 | 1 | 1 | 2 Trpm7         | protein_coding |
| ENSMUST00000137386 | 1 | 1 | 2 Ifit40        | protein_coding |
| ENSMUST00000141380 | 1 | 1 | 2 Gm4969        | protein_coding |
| ENSMUST00000143726 | 1 | 1 | 2 Rufy2         | protein_coding |
| ENSMUST00000150396 | 1 | 1 | 2 Ifit52        | protein_coding |
| ENSMUST00000156801 | 1 | 1 | 2 Mtmr2         | protein_coding |
| ENSMUST00000160873 | 1 | 1 | 2 Wdr35         | protein_coding |
| ENSMUST00000170694 | 1 | 1 | 2 Gm2237        | protein_coding |
| ENSMUST00000179065 | 1 | 1 | 2 Tfdp2         | protein_coding |
| ENSMUST00000180009 | 1 | 1 | 2 Smg1          | protein_coding |
| ENSMUST00000180041 | 1 | 1 | 2 Stard9        | protein_coding |
| ENSMUST00000131029 | 1 | 1 | 2 Gm28050       | lincRNA        |
| ENSMUST00000135987 | 1 | 1 | 2 Gm12511       | lincRNA        |
| ENSMUST00000002084 | 1 | 1 | 0 Abcd1         | protein_coding |
| ENSMUST00000005751 | 1 | 1 | 0 Mrvi1         | protein_coding |
| ENSMUST00000010267 | 1 | 1 | 0 Slc47a1       | protein_coding |
| ENSMUST00000020220 | 1 | 1 | 0 Nuak1         | protein_coding |
| ENSMUST00000020248 | 1 | 1 | 0 Ccdc53        | protein_coding |
| ENSMUST00000021170 | 1 | 1 | 0 Mxra7         | protein_coding |
| ENSMUST00000021471 | 1 | 1 | 0 Tmx1          | protein_coding |
| ENSMUST00000022349 | 1 | 1 | 0 Cfap70        | protein_coding |
| ENSMUST00000022507 | 1 | 1 | 0 Pspc1         | protein_coding |
| ENSMUST00000027071 | 1 | 1 | 0 Lactb2        | protein_coding |
| ENSMUST00000029388 | 1 | 1 | 0 4930579G24Rik | protein_coding |
| ENSMUST00000033597 | 1 | 1 | 0 Hmgn5         | protein_coding |
| ENSMUST00000038720 | 1 | 1 | 0 Ccdc114       | protein_coding |
| ENSMUST00000039855 | 1 | 1 | 0 Golgb1        | protein_coding |
| ENSMUST00000042097 | 1 | 1 | 0 Stfa1         | protein_coding |
| ENSMUST00000042119 | 1 | 1 | 0 Slco1a1       | protein_coding |
| ENSMUST00000042683 | 1 | 1 | 0 Sult6b1       | protein_coding |
| ENSMUST00000042710 | 1 | 1 | 0 Smim3         | protein_coding |
| ENSMUST00000042779 | 1 | 1 | 0 Zbtb1         | protein_coding |
| ENSMUST00000051395 | 1 | 1 | 0 Prr11         | protein_coding |
| ENSMUST00000052865 | 1 | 1 | 0 Tmem123       | protein_coding |
| ENSMUST00000054289 | 1 | 1 | 0 Rps2          | protein_coding |
| ENSMUST00000065118 | 1 | 1 | 0 Ube2ql1       | protein_coding |
| ENSMUST00000066824 | 1 | 1 | 0 Sgip1         | protein_coding |
| ENSMUST00000070832 | 1 | 1 | 0 Wfdc21        | protein_coding |
| ENSMUST00000071280 | 1 | 1 | 0 Pex2          | protein_coding |
| ENSMUST00000071760 | 1 | 1 | 0 Gm14496       | protein_coding |
| ENSMUST00000074575 | 1 | 1 | 0 Snrnp70       | protein_coding |
| ENSMUST00000080664 | 1 | 1 | 0 Eya1          | protein_coding |
| ENSMUST00000088911 | 1 | 1 | 0 Brd1          | protein_coding |
| ENSMUST00000089208 | 1 | 1 | 0 Cntn4         | protein_coding |
| ENSMUST00000091967 | 1 | 1 | 0 Bin1          | protein_coding |
| ENSMUST00000092627 | 1 | 1 | 0 9330159F19Rik | protein_coding |
| ENSMUST00000093802 | 1 | 1 | 0 Cep162        | protein_coding |
| ENSMUST00000093911 | 1 | 1 | 0 Myo15b        | protein_coding |
| ENSMUST00000094141 | 1 | 1 | 0 Folr2         | protein_coding |
| ENSMUST00000094390 | 1 | 1 | 0 Mrgprx1       | protein_coding |
| ENSMUST00000096096 | 1 | 1 | 0 Cep55         | protein_coding |
| ENSMUST00000097934 | 1 | 1 | 0 Ssbp3         | protein_coding |
| ENSMUST00000098866 | 1 | 1 | 0 Plekha2       | protein_coding |
| ENSMUST00000099318 | 1 | 1 | 0 Tmtc3         | protein_coding |
| ENSMUST00000099506 | 1 | 1 | 0 Gprin1        | protein_coding |
| ENSMUST00000103091 | 1 | 1 | 0 Elmo2         | protein_coding |
| ENSMUST00000103209 | 1 | 1 | 0 Mmp28         | protein_coding |
| ENSMUST00000105748 | 1 | 1 | 0 Gm13124       | protein_coding |
| ENSMUST00000105847 | 1 | 1 | 0 Kdm1a         | protein_coding |
| ENSMUST00000106101 | 1 | 1 | 0 Zzz3          | protein_coding |
| ENSMUST00000108374 | 1 | 1 | 0 Sdcbp         | protein_coding |
| ENSMUST00000109860 | 1 | 1 | 0 Eml1          | protein_coding |
| ENSMUST00000110394 | 1 | 1 | 0 Ap4e1         | protein_coding |
| ENSMUST00000110749 | 1 | 1 | 0 Gm7861        | protein_coding |

|                    |   |   |    |               |                      |
|--------------------|---|---|----|---------------|----------------------|
| ENSMUST00000110752 | 1 | 1 | 0  | Gm7849        | protein_coding       |
| ENSMUST00000112429 | 1 | 1 | 0  | Cobll1        | protein_coding       |
| ENSMUST00000113406 | 1 | 1 | 0  | Epha5         | protein_coding       |
| ENSMUST00000115044 | 1 | 1 | 0  | Muc13         | protein_coding       |
| ENSMUST00000115487 | 1 | 1 | 0  | Raver1        | protein_coding       |
| ENSMUST00000115634 | 1 | 1 | 0  | Diap1         | protein_coding       |
| ENSMUST00000119823 | 1 | 1 | 0  | Gm10639       | protein_coding       |
| ENSMUST00000120247 | 1 | 1 | 0  | Sik3          | protein_coding       |
| ENSMUST00000120593 | 1 | 1 | 0  | Bcl7a         | protein_coding       |
| ENSMUST00000121927 | 1 | 1 | 0  | Nrip1         | protein_coding       |
| ENSMUST00000122960 | 1 | 1 | 0  | Ankrd35       | protein_coding       |
| ENSMUST00000125773 | 1 | 1 | 0  | 5730522E02Rik | protein_coding       |
| ENSMUST00000127086 | 1 | 1 | 0  | Wwc1          | protein_coding       |
| ENSMUST00000131158 | 1 | 1 | 0  | Parvb         | protein_coding       |
| ENSMUST00000132005 | 1 | 1 | 0  | Eif4e1b       | protein_coding       |
| ENSMUST00000132446 | 1 | 1 | 0  | Tbrg4         | protein_coding       |
| ENSMUST00000134614 | 1 | 1 | 0  | Gm14401       | protein_coding       |
| ENSMUST00000136558 | 1 | 1 | 0  | Zfp326        | protein_coding       |
| ENSMUST00000137626 | 1 | 1 | 0  | Mmp9          | protein_coding       |
| ENSMUST00000138635 | 1 | 1 | 0  | Rbm41         | protein_coding       |
| ENSMUST00000138854 | 1 | 1 | 0  | Vps39         | protein_coding       |
| ENSMUST00000140668 | 1 | 1 | 0  | Zfp846        | protein_coding       |
| ENSMUST00000141760 | 1 | 1 | 0  | Tdrd5         | protein_coding       |
| ENSMUST00000143799 | 1 | 1 | 0  | Fbxo3         | protein_coding       |
| ENSMUST00000144037 | 1 | 1 | 0  | Syf2          | protein_coding       |
| ENSMUST00000145600 | 1 | 1 | 0  | Atg2a         | protein_coding       |
| ENSMUST00000145723 | 1 | 1 | 0  | Gas2          | protein_coding       |
| ENSMUST00000146623 | 1 | 1 | 0  | Gpd1l         | protein_coding       |
| ENSMUST00000147279 | 1 | 1 | 0  | Clpx          | protein_coding       |
| ENSMUST00000147523 | 1 | 1 | 0  | Scly          | protein_coding       |
| ENSMUST00000149485 | 1 | 1 | 0  | Vta1          | protein_coding       |
| ENSMUST00000155267 | 1 | 1 | 0  | Hectd3        | protein_coding       |
| ENSMUST00000156877 | 1 | 1 | 0  | Tmbim4        | protein_coding       |
| ENSMUST00000159625 | 1 | 1 | 0  | Wdr26         | protein_coding       |
| ENSMUST00000160008 | 1 | 1 | 0  | Tstd2         | protein_coding       |
| ENSMUST00000161134 | 1 | 1 | 0  | Mios          | protein_coding       |
| ENSMUST00000161490 | 1 | 1 | 0  | Prkg2         | protein_coding       |
| ENSMUST00000162797 | 1 | 1 | 0  | Mcoln1        | protein_coding       |
| ENSMUST00000162960 | 1 | 1 | 0  | Cep63         | protein_coding       |
| ENSMUST00000163536 | 1 | 1 | 0  | Slc2a2        | protein_coding       |
| ENSMUST00000164777 | 1 | 1 | 0  | 4430402118Rik | protein_coding       |
| ENSMUST00000165616 | 1 | 1 | 0  | Lrch3         | protein_coding       |
| ENSMUST00000166223 | 1 | 1 | 0  | Slc38a4       | protein_coding       |
| ENSMUST00000167923 | 1 | 1 | 0  | Gm3696        | protein_coding       |
| ENSMUST00000168120 | 1 | 1 | 0  | Acot1         | protein_coding       |
| ENSMUST00000168533 | 1 | 1 | 0  | Tnxb          | protein_coding       |
| ENSMUST00000170521 | 1 | 1 | 0  | Gm2888        | protein_coding       |
| ENSMUST00000171929 | 1 | 1 | 0  | Cenpf         | protein_coding       |
| ENSMUST00000173375 | 1 | 1 | 0  | Tyw1          | protein_coding       |
| ENSMUST00000175844 | 1 | 1 | 0  | Ttll5         | protein_coding       |
| ENSMUST00000181945 | 1 | 1 | 0  | Jsrp1         | protein_coding       |
| ENSMUST00000149343 | 1 | 1 | 0  | 9430041J12Rik | processed_transcript |
| ENSMUST00000177059 | 1 | 1 | 0  | Gm20658       | processed_transcript |
| ENSMUST00000147704 | 1 | 1 | 0  | Gm11345       | lincRNA              |
| ENSMUST00000148637 | 1 | 1 | 0  | Gm13794       | lincRNA              |
| ENSMUST00000126936 | 1 | 1 | 0  | Pip5k1bos     | antisense            |
| ENSMUST00000153559 | 1 | 1 | 0  | Gm13449       | antisense            |
| ENSMUST00000100054 | 1 | 1 | 97 | Nhs1          | protein_coding       |
| ENSMUST00000136948 | 1 | 1 | 75 | 1500009C09Rik | protein_coding       |
| ENSMUST00000020949 | 1 | 1 | 54 | Map2k6        | protein_coding       |
| ENSMUST00000037210 | 1 | 1 | 50 | Metap1d       | protein_coding       |
| ENSMUST00000181206 | 1 | 1 | 50 | 4930509G22Rik | lincRNA              |
| ENSMUST00000130063 | 1 | 1 | 48 | Ftx           | lincRNA              |
| ENSMUST00000171802 | 1 | 1 | 46 | Mcmec2        | protein_coding       |
| ENSMUST00000181820 | 1 | 1 | 38 | 4930505N22Rik | lincRNA              |
| ENSMUST00000044278 | 1 | 1 | 32 | St6galnac5    | protein_coding       |
| ENSMUST00000144991 | 1 | 1 | 32 | Rsph6a        | protein_coding       |
| ENSMUST00000170767 | 1 | 1 | 28 | Gcc1          | protein_coding       |

|                    |   |   |    |               |                      |
|--------------------|---|---|----|---------------|----------------------|
| ENSMUST00000109248 | 1 | 1 | 26 | Irak4         | protein_coding       |
| ENSMUST00000129437 | 1 | 1 | 26 | Map3k5        | protein_coding       |
| ENSMUST00000027505 | 1 | 1 | 24 | Ing5          | protein_coding       |
| ENSMUST00000105900 | 1 | 1 | 24 | Shank2        | protein_coding       |
| ENSMUST00000166129 | 1 | 1 | 24 | Ccdc62        | protein_coding       |
| ENSMUST00000070481 | 1 | 1 | 22 | Ppp1r3b       | protein_coding       |
| ENSMUST00000142289 | 1 | 1 | 22 | Gm13008       | antisense            |
| ENSMUST00000027752 | 1 | 1 | 20 | Lamc1         | protein_coding       |
| ENSMUST00000038907 | 1 | 1 | 20 | Wee2          | protein_coding       |
| ENSMUST00000084238 | 1 | 1 | 20 | Zdhhc18       | protein_coding       |
| ENSMUST00000149076 | 1 | 1 | 20 | Nt5m          | protein_coding       |
| ENSMUST00000157056 | 1 | 1 | 20 | Pqlc1         | protein_coding       |
| ENSMUST00000182407 | 1 | 1 | 20 | Pclo          | protein_coding       |
| ENSMUST00000087983 | 1 | 1 | 18 | Il18r1        | protein_coding       |
| ENSMUST00000113853 | 1 | 1 | 18 | Ddx31         | protein_coding       |
| ENSMUST00000126582 | 1 | 1 | 18 | Acap3         | protein_coding       |
| ENSMUST00000126940 | 1 | 1 | 18 | BC025920      | protein_coding       |
| ENSMUST00000037865 | 1 | 1 | 16 | Atp6v0a2      | protein_coding       |
| ENSMUST00000039492 | 1 | 1 | 16 | Kng1          | protein_coding       |
| ENSMUST00000052355 | 1 | 1 | 16 | Nup37         | protein_coding       |
| ENSMUST00000109488 | 1 | 1 | 16 | Snhg11        | protein_coding       |
| ENSMUST00000110603 | 1 | 1 | 16 | Wdr76         | protein_coding       |
| ENSMUST00000124464 | 1 | 1 | 16 | Dhx33         | protein_coding       |
| ENSMUST00000164876 | 1 | 1 | 16 | Rhobtb1       | protein_coding       |
| ENSMUST00000016902 | 1 | 1 | 14 | Bik           | protein_coding       |
| ENSMUST00000063321 | 1 | 1 | 14 | Cdkl3         | protein_coding       |
| ENSMUST00000109558 | 1 | 1 | 14 | Ndr3          | protein_coding       |
| ENSMUST00000125325 | 1 | 1 | 14 | Ep400         | protein_coding       |
| ENSMUST00000132714 | 1 | 1 | 14 | Prpf6         | protein_coding       |
| ENSMUST00000155553 | 1 | 1 | 14 | Arid4b        | protein_coding       |
| ENSMUST00000179802 | 1 | 1 | 14 | Cmtm4         | protein_coding       |
| ENSMUST00000135670 | 1 | 1 | 14 | 9130017K11Rik | processed_transcript |
| ENSMUST00000180839 | 1 | 1 | 14 | Gm17276       | lincRNA              |
| ENSMUST00000016553 | 1 | 1 | 12 | Nkap          | protein_coding       |
| ENSMUST00000021544 | 1 | 1 | 12 | Plek2         | protein_coding       |
| ENSMUST00000033975 | 1 | 1 | 12 | Dhd2          | protein_coding       |
| ENSMUST00000044392 | 1 | 1 | 12 | Ccbl2         | protein_coding       |
| ENSMUST00000102963 | 1 | 1 | 12 | Dnaic1        | protein_coding       |
| ENSMUST00000112132 | 1 | 1 | 12 | Pzp           | protein_coding       |
| ENSMUST00000113654 | 1 | 1 | 12 | Lrrc8a        | protein_coding       |
| ENSMUST00000118952 | 1 | 1 | 12 | Papd5         | protein_coding       |
| ENSMUST00000120049 | 1 | 1 | 12 | Cfap44        | protein_coding       |
| ENSMUST00000140402 | 1 | 1 | 12 | Tmem44        | protein_coding       |
| ENSMUST00000164143 | 1 | 1 | 12 | Agpat4        | protein_coding       |
| ENSMUST00000167271 | 1 | 1 | 12 | Rfesd         | protein_coding       |
| ENSMUST00000172509 | 1 | 1 | 12 | Dnmt3a        | protein_coding       |
| ENSMUST00000181310 | 1 | 1 | 12 | Gm26871       | lincRNA              |
| ENSMUST00000183803 | 1 | 1 | 12 | Otx2os1       | lincRNA              |
| ENSMUST00000028599 | 1 | 1 | 10 | Cstf3         | protein_coding       |
| ENSMUST00000029815 | 1 | 1 | 10 | Cisd2         | protein_coding       |
| ENSMUST00000032459 | 1 | 1 | 10 | Vgll4         | protein_coding       |
| ENSMUST00000034723 | 1 | 1 | 10 | Aldh1a2       | protein_coding       |
| ENSMUST00000047075 | 1 | 1 | 10 | Setd1a        | protein_coding       |
| ENSMUST00000049027 | 1 | 1 | 10 | Slc26a9       | protein_coding       |
| ENSMUST00000071423 | 1 | 1 | 10 | Nhlrc2        | protein_coding       |
| ENSMUST00000091829 | 1 | 1 | 10 | Larp4b        | protein_coding       |
| ENSMUST00000134979 | 1 | 1 | 10 | Nfyc          | protein_coding       |
| ENSMUST00000141963 | 1 | 1 | 10 | Ssbp3         | protein_coding       |
| ENSMUST00000156909 | 1 | 1 | 10 | Prdm2         | protein_coding       |
| ENSMUST00000163446 | 1 | 1 | 10 | Tcof1         | protein_coding       |
| ENSMUST00000123388 | 1 | 1 | 10 | 4933439C10Rik | processed_transcript |
| ENSMUST00000156115 | 1 | 1 | 10 | Gm14532       | lincRNA              |
| ENSMUST00000023689 | 1 | 1 | 8  | Ifnar1        | protein_coding       |
| ENSMUST00000025354 | 1 | 1 | 8  | Pggt1b        | protein_coding       |
| ENSMUST00000029971 | 1 | 1 | 8  | 1700003M02Rik | protein_coding       |
| ENSMUST00000097542 | 1 | 1 | 8  | Cep76         | protein_coding       |
| ENSMUST00000099087 | 1 | 1 | 8  | Mbnl1         | protein_coding       |
| ENSMUST00000102743 | 1 | 1 | 8  | Rapgef6       | protein_coding       |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000102989 | 1 | 1 | 8 Nmt2          | protein_coding       |
| ENSMUST00000106112 | 1 | 1 | 8 Bnip3         | protein_coding       |
| ENSMUST00000118036 | 1 | 1 | 8 Tmed5         | protein_coding       |
| ENSMUST00000142556 | 1 | 1 | 8 Palm2         | protein_coding       |
| ENSMUST00000148144 | 1 | 1 | 8 Myo5a         | protein_coding       |
| ENSMUST00000149490 | 1 | 1 | 8 Vps9d1        | protein_coding       |
| ENSMUST00000166821 | 1 | 1 | 8 Mlh3          | protein_coding       |
| ENSMUST00000167776 | 1 | 1 | 8 Tle4          | protein_coding       |
| ENSMUST00000176781 | 1 | 1 | 8 Ctrc          | protein_coding       |
| ENSMUST00000183436 | 1 | 1 | 8 Cphx1         | protein_coding       |
| ENSMUST00000001562 | 1 | 1 | 6 Tulp3         | protein_coding       |
| ENSMUST00000004987 | 1 | 1 | 6 Sprk1         | protein_coding       |
| ENSMUST00000007012 | 1 | 1 | 6 Sod2          | protein_coding       |
| ENSMUST00000008734 | 1 | 1 | 6 Htr3b         | protein_coding       |
| ENSMUST00000036877 | 1 | 1 | 6 Dennd2a       | protein_coding       |
| ENSMUST00000060766 | 1 | 1 | 6 Cltc          | protein_coding       |
| ENSMUST00000108596 | 1 | 1 | 6 Cldn7         | protein_coding       |
| ENSMUST00000109764 | 1 | 1 | 6 Nfix          | protein_coding       |
| ENSMUST00000111435 | 1 | 1 | 6 Mpzl1         | protein_coding       |
| ENSMUST00000111867 | 1 | 1 | 6 Sufu          | protein_coding       |
| ENSMUST00000135029 | 1 | 1 | 6 Katnal2       | protein_coding       |
| ENSMUST00000139157 | 1 | 1 | 6 Tmeff2        | protein_coding       |
| ENSMUST00000141739 | 1 | 1 | 6 Amz2          | protein_coding       |
| ENSMUST00000001319 | 1 | 1 | 4 Efnb2         | protein_coding       |
| ENSMUST00000001619 | 1 | 1 | 4 Ergic1        | protein_coding       |
| ENSMUST00000007803 | 1 | 1 | 4 Bcl2l1        | protein_coding       |
| ENSMUST00000015841 | 1 | 1 | 4 Setdb1        | protein_coding       |
| ENSMUST00000026199 | 1 | 1 | 4 Cutc          | protein_coding       |
| ENSMUST00000026494 | 1 | 1 | 4 Rnf165        | protein_coding       |
| ENSMUST00000034749 | 1 | 1 | 4 Fam81a        | protein_coding       |
| ENSMUST00000045970 | 1 | 1 | 4 Gpc1          | protein_coding       |
| ENSMUST00000054440 | 1 | 1 | 4 Lymr1         | protein_coding       |
| ENSMUST00000056433 | 1 | 1 | 4 Gpr107        | protein_coding       |
| ENSMUST00000063199 | 1 | 1 | 4 Ralgs2        | protein_coding       |
| ENSMUST00000070617 | 1 | 1 | 4 Scn11a        | protein_coding       |
| ENSMUST00000086075 | 1 | 1 | 4 Scarb1        | protein_coding       |
| ENSMUST00000087465 | 1 | 1 | 4 Fbxl5         | protein_coding       |
| ENSMUST00000096069 | 1 | 1 | 4 Fam208b       | protein_coding       |
| ENSMUST00000102592 | 1 | 1 | 4 Tjp1          | protein_coding       |
| ENSMUST00000102672 | 1 | 1 | 4 Nfe2l2        | protein_coding       |
| ENSMUST00000102938 | 1 | 1 | 4 Ehmt1         | protein_coding       |
| ENSMUST00000105296 | 1 | 1 | 4 Nr1h4         | protein_coding       |
| ENSMUST00000108205 | 1 | 1 | 4 Zfp74         | protein_coding       |
| ENSMUST00000112447 | 1 | 1 | 4 Sh3kbp1       | protein_coding       |
| ENSMUST00000114406 | 1 | 1 | 4 Arhgap4       | protein_coding       |
| ENSMUST00000124071 | 1 | 1 | 4 Dmbx1         | protein_coding       |
| ENSMUST00000133614 | 1 | 1 | 4 Sh3bgrl       | protein_coding       |
| ENSMUST00000136020 | 1 | 1 | 4 Rmnd5b        | protein_coding       |
| ENSMUST00000140604 | 1 | 1 | 4 Ankrd13a      | protein_coding       |
| ENSMUST00000148777 | 1 | 1 | 4 Tesc          | protein_coding       |
| ENSMUST00000148789 | 1 | 1 | 4 St14          | protein_coding       |
| ENSMUST00000150436 | 1 | 1 | 4 Dennd5b       | protein_coding       |
| ENSMUST00000155314 | 1 | 1 | 4 Zscan5b       | protein_coding       |
| ENSMUST00000163227 | 1 | 1 | 4 Tcpl0b        | protein_coding       |
| ENSMUST00000163624 | 1 | 1 | 4 Iqch          | protein_coding       |
| ENSMUST00000173512 | 1 | 1 | 4 Gm20441       | protein_coding       |
| ENSMUST00000182869 | 1 | 1 | 4 Samd15        | protein_coding       |
| ENSMUST00000183301 | 1 | 1 | 4 Ptprc         | protein_coding       |
| ENSMUST00000127424 | 1 | 1 | 4 Gm12339       | processed_transcript |
| ENSMUST00000126922 | 1 | 1 | 4 2010013B24Rik | lincRNA              |
| ENSMUST00000152190 | 1 | 1 | 4 Gm12510       | lincRNA              |
| ENSMUST00000150173 | 1 | 1 | 2 Khl18         | protein_coding       |
| ENSMUST00000106979 | 1 | 1 | 2 Ube2u         | protein_coding       |
| ENSMUST00000150173 | 1 | 1 | 2 Khl18         | protein_coding       |
| ENSMUST00000106979 | 1 | 1 | 2 Ube2u         | protein_coding       |
| ENSMUST00000001712 | 1 | 1 | 2 Cabin1        | protein_coding       |
| ENSMUST00000003961 | 1 | 1 | 2 Ppfia3        | protein_coding       |
| ENSMUST00000014476 | 1 | 1 | 2 Klra8         | protein_coding       |



|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000020971 | 1 | 1 | 2 Rnf144a       | protein_coding       |
| ENSMUST00000021634 | 1 | 1 | 2 Akr1c13       | protein_coding       |
| ENSMUST00000025965 | 1 | 1 | 2 Hells         | protein_coding       |
| ENSMUST00000027121 | 1 | 1 | 2 Rftn2         | protein_coding       |
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| ENSMUST00000032512 | 1 | 1 | 2 Klr1a         | protein_coding       |
| ENSMUST00000034205 | 1 | 1 | 2 Cenpn         | protein_coding       |
| ENSMUST00000034280 | 1 | 1 | 2 Zdhhc7        | protein_coding       |
| ENSMUST00000035350 | 1 | 1 | 2 Aftph         | protein_coding       |
| ENSMUST00000042850 | 1 | 1 | 2 Slep1         | protein_coding       |
| ENSMUST00000044819 | 1 | 1 | 2 Gm28044       | protein_coding       |
| ENSMUST00000049503 | 1 | 1 | 2 Eml4          | protein_coding       |
| ENSMUST00000068137 | 1 | 1 | 2 Bcas1         | protein_coding       |
| ENSMUST00000069098 | 1 | 1 | 2 Soga1         | protein_coding       |
| ENSMUST00000094615 | 1 | 1 | 2 5830473C10Rik | protein_coding       |
| ENSMUST00000097888 | 1 | 1 | 2 Ago1          | protein_coding       |
| ENSMUST00000098391 | 1 | 1 | 2 Pcsk6         | protein_coding       |
| ENSMUST00000100655 | 1 | 1 | 2 9130401M01Rik | protein_coding       |
| ENSMUST00000107972 | 1 | 1 | 2 Zfp658        | protein_coding       |
| ENSMUST00000108056 | 1 | 1 | 2 Bcas3         | protein_coding       |
| ENSMUST00000111760 | 1 | 1 | 2 Nckap1        | protein_coding       |
| ENSMUST00000114783 | 1 | 1 | 2 Hadhb         | protein_coding       |
| ENSMUST00000114898 | 1 | 1 | 2 Zc3hav1       | protein_coding       |
| ENSMUST00000116528 | 1 | 1 | 2 Khlh12        | protein_coding       |
| ENSMUST00000124789 | 1 | 1 | 2 Adamtsl5      | protein_coding       |
| ENSMUST00000125858 | 1 | 1 | 2 Ppa2          | protein_coding       |
| ENSMUST00000127417 | 1 | 1 | 2 Dock7         | protein_coding       |
| ENSMUST00000129612 | 1 | 1 | 2 L1cam         | protein_coding       |
| ENSMUST00000130671 | 1 | 1 | 2 Abcc1         | protein_coding       |
| ENSMUST00000132234 | 1 | 1 | 2 Clcn3         | protein_coding       |
| ENSMUST00000139463 | 1 | 1 | 2 Depdc5        | protein_coding       |
| ENSMUST00000140834 | 1 | 1 | 2 Thsd7b        | protein_coding       |
| ENSMUST00000142000 | 1 | 1 | 2 Ift140        | protein_coding       |
| ENSMUST00000142127 | 1 | 1 | 2 Mettl5        | protein_coding       |
| ENSMUST00000148398 | 1 | 1 | 2 Elovl5        | protein_coding       |
| ENSMUST00000153109 | 1 | 1 | 2 Ngly1         | protein_coding       |
| ENSMUST00000170315 | 1 | 1 | 2 Blm           | protein_coding       |
| ENSMUST00000176795 | 1 | 1 | 2 Pou6f2        | protein_coding       |
| ENSMUST00000136518 | 1 | 1 | 2 Firre         | processed_transcript |
| ENSMUST00000153817 | 1 | 1 | 2 Gm12976       | lincRNA              |
| ENSMUST00000090409 | 1 | 1 | 2 Gm10248       | antisense            |
| ENSMUST00000124897 | 1 | 1 | 2 Mypopos       | antisense            |
| ENSMUST00000141265 | 1 | 1 | 2 1810062O18Rik | antisense            |
| ENSMUST00000180083 | 1 | 1 | 0 Col12a1       | protein_coding       |
| ENSMUST00000180083 | 1 | 1 | 0 Col12a1       | protein_coding       |
| ENSMUST00000125020 | 1 | 1 | 0 Gm13644       | processed_transcript |
| ENSMUST00000125020 | 1 | 1 | 0 Gm13644       | processed_transcript |
| ENSMUST00000002902 | 1 | 1 | 0 Qtrt1         | protein_coding       |
| ENSMUST00000003238 | 1 | 1 | 0 Foxj2         | protein_coding       |
| ENSMUST00000003659 | 1 | 1 | 0 Comp          | protein_coding       |
| ENSMUST00000004494 | 1 | 1 | 0 Sin3b         | protein_coding       |
| ENSMUST00000006020 | 1 | 1 | 0 Cnga2         | protein_coding       |
| ENSMUST00000006467 | 1 | 1 | 0 Arpc2         | protein_coding       |
| ENSMUST00000014747 | 1 | 1 | 0 Alx3          | protein_coding       |
| ENSMUST00000014996 | 1 | 1 | 0 Adamts13      | protein_coding       |
| ENSMUST00000015941 | 1 | 1 | 0 Bhmt2         | protein_coding       |
| ENSMUST00000018403 | 1 | 1 | 0 Prl8a2        | protein_coding       |
| ENSMUST00000020434 | 1 | 1 | 0 Glipr1l2      | protein_coding       |
| ENSMUST00000023450 | 1 | 1 | 0 Serpind1      | protein_coding       |
| ENSMUST00000025101 | 1 | 1 | 0 Dync2li1      | protein_coding       |
| ENSMUST00000026297 | 1 | 1 | 0 Gnl3l         | protein_coding       |
| ENSMUST00000027777 | 1 | 1 | 0 Parp1         | protein_coding       |
| ENSMUST00000030724 | 1 | 1 | 0 Sesn2         | protein_coding       |
| ENSMUST00000031588 | 1 | 1 | 0 Usp30         | protein_coding       |
| ENSMUST00000032796 | 1 | 1 | 0 Zfp790        | protein_coding       |
| ENSMUST00000034085 | 1 | 1 | 0 Brd7          | protein_coding       |
| ENSMUST00000034811 | 1 | 1 | 0 Cyp19a1       | protein_coding       |
| ENSMUST00000037285 | 1 | 1 | 0 Git1          | protein_coding       |

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| ENSMUST00000037520 | 1 | 1 | 0 Apob          | protein_coding |
| ENSMUST00000041252 | 1 | 1 | 0 Acad12        | protein_coding |
| ENSMUST00000042172 | 1 | 1 | 0 Tmem247       | protein_coding |
| ENSMUST00000043822 | 1 | 1 | 0 Cblc          | protein_coding |
| ENSMUST00000046174 | 1 | 1 | 0 Cldn11        | protein_coding |
| ENSMUST00000046659 | 1 | 1 | 0 Dlgap3        | protein_coding |
| ENSMUST00000047239 | 1 | 1 | 0 Pcnxl2        | protein_coding |
| ENSMUST00000047408 | 1 | 1 | 0 Atcay         | protein_coding |
| ENSMUST00000047929 | 1 | 1 | 0 Acsm1         | protein_coding |
| ENSMUST00000050552 | 1 | 1 | 0 Bzw1          | protein_coding |
| ENSMUST00000052396 | 1 | 1 | 0 Rnf138        | protein_coding |
| ENSMUST00000053215 | 1 | 1 | 0 Pik3cg        | protein_coding |
| ENSMUST00000053250 | 1 | 1 | 0 Clnr2         | protein_coding |
| ENSMUST00000053722 | 1 | 1 | 0 Zfp607        | protein_coding |
| ENSMUST00000060067 | 1 | 1 | 0 Dnaja3        | protein_coding |
| ENSMUST00000060539 | 1 | 1 | 0 Proca1        | protein_coding |
| ENSMUST00000061456 | 1 | 1 | 0 Fbxw13        | protein_coding |
| ENSMUST00000063588 | 1 | 1 | 0 Vamp1         | protein_coding |
| ENSMUST00000064659 | 1 | 1 | 0 Zmat1         | protein_coding |
| ENSMUST00000065927 | 1 | 1 | 0 Trnfaip6      | protein_coding |
| ENSMUST00000071728 | 1 | 1 | 0 Osbpl3        | protein_coding |
| ENSMUST00000074113 | 1 | 1 | 0 Prom1         | protein_coding |
| ENSMUST00000075869 | 1 | 1 | 0 Fbxo40        | protein_coding |
| ENSMUST00000077290 | 1 | 1 | 0 Pdia4         | protein_coding |
| ENSMUST00000078945 | 1 | 1 | 0 Grsf1         | protein_coding |
| ENSMUST00000084524 | 1 | 1 | 0 Prpf4         | protein_coding |
| ENSMUST00000084528 | 1 | 1 | 0 Fkbp15        | protein_coding |
| ENSMUST00000091269 | 1 | 1 | 0 Erbb2ip       | protein_coding |
| ENSMUST00000096199 | 1 | 1 | 0 Abcc5         | protein_coding |
| ENSMUST00000097348 | 1 | 1 | 0 BC051142      | protein_coding |
| ENSMUST00000097419 | 1 | 1 | 0 Fgfr1op       | protein_coding |
| ENSMUST00000099572 | 1 | 1 | 0 Prmt2         | protein_coding |
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| ENSMUST00000102856 | 1 | 1 | 0 Smek2         | protein_coding |
| ENSMUST00000105408 | 1 | 1 | 0 Gm10941       | protein_coding |
| ENSMUST00000106139 | 1 | 1 | 0 Dhx32         | protein_coding |
| ENSMUST00000106664 | 1 | 1 | 0 Abca8a        | protein_coding |
| ENSMUST00000107026 | 1 | 1 | 0 1700023F06Rik | protein_coding |
| ENSMUST00000107953 | 1 | 1 | 0 Unc13b        | protein_coding |
| ENSMUST00000108101 | 1 | 1 | 0 Dusp14        | protein_coding |
| ENSMUST00000108204 | 1 | 1 | 0 Fhl5          | protein_coding |
| ENSMUST00000109237 | 1 | 1 | 0 Itk           | protein_coding |
| ENSMUST00000110142 | 1 | 1 | 0 Gpcpd1        | protein_coding |
| ENSMUST00000110241 | 1 | 1 | 0 Ints10        | protein_coding |
| ENSMUST00000110557 | 1 | 1 | 0 Polr1d        | protein_coding |
| ENSMUST00000111214 | 1 | 1 | 0 Ifi204        | protein_coding |
| ENSMUST00000112043 | 1 | 1 | 0 Gpr155        | protein_coding |
| ENSMUST00000112047 | 1 | 1 | 0 Cutc          | protein_coding |
| ENSMUST00000112305 | 1 | 1 | 0 Ppm1b         | protein_coding |
| ENSMUST00000112605 | 1 | 1 | 0 Iqsec2        | protein_coding |
| ENSMUST00000112832 | 1 | 1 | 0 Rorb          | protein_coding |
| ENSMUST00000114070 | 1 | 1 | 0 Vbp1          | protein_coding |
| ENSMUST00000114908 | 1 | 1 | 0 Atp6v0a4      | protein_coding |
| ENSMUST00000115217 | 1 | 1 | 0 Napepld       | protein_coding |
| ENSMUST00000115238 | 1 | 1 | 0 Ahcyl2        | protein_coding |
| ENSMUST00000115324 | 1 | 1 | 0 Grm8          | protein_coding |
| ENSMUST00000116456 | 1 | 1 | 0 Cyth3         | protein_coding |
| ENSMUST00000118209 | 1 | 1 | 0 Atp5f1        | protein_coding |
| ENSMUST00000119705 | 1 | 1 | 0 Depdc5        | protein_coding |
| ENSMUST00000120645 | 1 | 1 | 0 Gsto2         | protein_coding |
| ENSMUST00000123221 | 1 | 1 | 0 Stpg1         | protein_coding |
| ENSMUST00000125957 | 1 | 1 | 0 Zfp282        | protein_coding |
| ENSMUST00000127338 | 1 | 1 | 0 Thoc2         | protein_coding |
| ENSMUST00000127490 | 1 | 1 | 0 Cnep1r1       | protein_coding |
| ENSMUST00000129315 | 1 | 1 | 0 Prdx1         | protein_coding |
| ENSMUST00000129335 | 1 | 1 | 0 Numb          | protein_coding |
| ENSMUST00000129605 | 1 | 1 | 0 Bnip3l        | protein_coding |
| ENSMUST00000129741 | 1 | 1 | 0 Dhx8          | protein_coding |

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| ENSMUST00000131452 | 1 | 1 | 0 Dmxl2         | protein_coding       |
| ENSMUST00000132982 | 1 | 1 | 0 Haus5         | protein_coding       |
| ENSMUST00000133862 | 1 | 1 | 0 Helz          | protein_coding       |
| ENSMUST00000134835 | 1 | 1 | 0 Arpc1a        | protein_coding       |
| ENSMUST00000136388 | 1 | 1 | 0 Lrrc49        | protein_coding       |
| ENSMUST00000137223 | 1 | 1 | 0 Slc5a6        | protein_coding       |
| ENSMUST00000137270 | 1 | 1 | 0 Kank4         | protein_coding       |
| ENSMUST00000137279 | 1 | 1 | 0 Akr1c21       | protein_coding       |
| ENSMUST00000137507 | 1 | 1 | 0 Fndc3c1       | protein_coding       |
| ENSMUST00000137846 | 1 | 1 | 0 Epb4.1        | protein_coding       |
| ENSMUST00000137904 | 1 | 1 | 0 Surf6         | protein_coding       |
| ENSMUST00000138267 | 1 | 1 | 0 Ankrd42       | protein_coding       |
| ENSMUST00000140007 | 1 | 1 | 0 Pde3b         | protein_coding       |
| ENSMUST00000140014 | 1 | 1 | 0 Pten          | protein_coding       |
| ENSMUST00000140095 | 1 | 1 | 0 Tmprss11g     | protein_coding       |
| ENSMUST00000141750 | 1 | 1 | 0 Caprin1       | protein_coding       |
| ENSMUST00000142177 | 1 | 1 | 0 Myom3         | protein_coding       |
| ENSMUST00000142366 | 1 | 1 | 0 Stk38         | protein_coding       |
| ENSMUST00000143352 | 1 | 1 | 0 Slc22a21      | protein_coding       |
| ENSMUST00000146610 | 1 | 1 | 0 Ccbe1         | protein_coding       |
| ENSMUST00000150595 | 1 | 1 | 0 Ninl          | protein_coding       |
| ENSMUST00000150640 | 1 | 1 | 0 Ccdc57        | protein_coding       |
| ENSMUST00000151553 | 1 | 1 | 0 Gm12789       | protein_coding       |
| ENSMUST00000152271 | 1 | 1 | 0 Phactr4       | protein_coding       |
| ENSMUST00000152593 | 1 | 1 | 0 Nfrkb         | protein_coding       |
| ENSMUST00000153315 | 1 | 1 | 0 Ttc39a        | protein_coding       |
| ENSMUST00000153632 | 1 | 1 | 0 Crtc1         | protein_coding       |
| ENSMUST00000154279 | 1 | 1 | 0 L1td1         | protein_coding       |
| ENSMUST00000154899 | 1 | 1 | 0 Fam188a       | protein_coding       |
| ENSMUST00000155649 | 1 | 1 | 0 Rnf168        | protein_coding       |
| ENSMUST00000156254 | 1 | 1 | 0 Tmem63b       | protein_coding       |
| ENSMUST00000156452 | 1 | 1 | 0 Mtm1          | protein_coding       |
| ENSMUST00000161008 | 1 | 1 | 0 Mycbp2        | protein_coding       |
| ENSMUST00000161459 | 1 | 1 | 0 Setdb2        | protein_coding       |
| ENSMUST00000161927 | 1 | 1 | 0 Armc2         | protein_coding       |
| ENSMUST00000162654 | 1 | 1 | 0 Dars2         | protein_coding       |
| ENSMUST00000162804 | 1 | 1 | 0 Brdt          | protein_coding       |
| ENSMUST00000163002 | 1 | 1 | 0 Pard3         | protein_coding       |
| ENSMUST00000164108 | 1 | 1 | 0 Cul3          | protein_coding       |
| ENSMUST00000166931 | 1 | 1 | 0 Erh           | protein_coding       |
| ENSMUST00000167217 | 1 | 1 | 0 Smpd4         | protein_coding       |
| ENSMUST00000167352 | 1 | 1 | 0 Atp6v0e       | protein_coding       |
| ENSMUST00000169489 | 1 | 1 | 0 Bgn           | protein_coding       |
| ENSMUST00000172750 | 1 | 1 | 0 Aldh1b1       | protein_coding       |
| ENSMUST00000173689 | 1 | 1 | 0 Jmjd1c        | protein_coding       |
| ENSMUST00000173702 | 1 | 1 | 0 Slit2         | protein_coding       |
| ENSMUST00000176750 | 1 | 1 | 0 Cct8          | protein_coding       |
| ENSMUST00000178558 | 1 | 1 | 0 Tmem40        | protein_coding       |
| ENSMUST00000181074 | 1 | 1 | 0 Ankdd1b       | protein_coding       |
| ENSMUST00000183154 | 1 | 1 | 0 Rbm25         | protein_coding       |
| ENSMUST00000184507 | 1 | 1 | 0 Gm14496       | protein_coding       |
| ENSMUST00000144661 | 1 | 1 | 0 BC039771      | processed_transcript |
| ENSMUST00000144849 | 1 | 1 | 0 5530601H04Rik | processed_transcript |
| ENSMUST00000120242 | 1 | 1 | 0 Gm13615       | processed_pseudogene |
| ENSMUST00000128652 | 1 | 1 | 0 4930597A21Rik | lincRNA              |
| ENSMUST00000138684 | 1 | 1 | 0 Gm15839       | lincRNA              |
| ENSMUST00000147685 | 1 | 1 | 0 Gm13391       | lincRNA              |
| ENSMUST00000148027 | 1 | 1 | 0 Gm12907       | lincRNA              |
| ENSMUST00000148552 | 1 | 1 | 0 G630018N14Rik | lincRNA              |
| ENSMUST00000180601 | 1 | 1 | 0 9230114K14Rik | lincRNA              |
| ENSMUST00000181128 | 1 | 1 | 0 1810019N24Rik | lincRNA              |
| ENSMUST00000167453 | 1 | 1 | 0 Nudt12os      | antisense            |
| ENSMUST00000117296 | 1 | 0 | 1396 Ank1       | protein_coding       |
| ENSMUST00000027727 | 1 | 0 | 210 Adipor1     | protein_coding       |
| ENSMUST00000097759 | 1 | 0 | 143 Prdm16      | protein_coding       |
| ENSMUST00000107171 | 1 | 0 | 59 Setdb1       | protein_coding       |
| ENSMUST00000173651 | 1 | 0 | 57 Gtf2i        | protein_coding       |
| ENSMUST00000181809 | 1 | 0 | 52 Gm4349       | lincRNA              |

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| ENSMUST00000156215  | 1 | 0 | 48 | BC004004      | protein_coding       |
| ENSMUST00000171768  | 1 | 0 | 44 | Gm17090       | antisense            |
| ENSMUST00000028403  | 1 | 0 | 38 | Cybrd1        | protein_coding       |
| ENSMUST00000109994  | 1 | 0 | 36 | Unc5a         | protein_coding       |
| ENSMUST00000045689  | 1 | 0 | 34 | Mrpl15        | protein_coding       |
| ENSMUST00000111557  | 1 | 0 | 34 | Dennd5b       | protein_coding       |
| ENSMUST00000057481  | 1 | 0 | 32 | Nup160        | protein_coding       |
| ENSMUST00000097446  | 1 | 0 | 32 | Dnah14        | protein_coding       |
| ENSMUST00000006662  | 1 | 0 | 30 | Prl8a9        | protein_coding       |
| ENSMUST00000017900  | 1 | 0 | 26 | Slc12a7       | protein_coding       |
| ENSMUST00000097836  | 1 | 0 | 26 | Hp1bp3        | protein_coding       |
| ENSMUST00000129089  | 1 | 0 | 26 | Nr6a1os       | antisense            |
| ENSMUST00000143109  | 1 | 0 | 26 | Gm12524       | antisense            |
| ENSMUST00000036113  | 1 | 0 | 24 | Tbc1d16       | protein_coding       |
| ENSMUST00000144859  | 1 | 0 | 24 | Sep15         | protein_coding       |
| ENSMUST00000088921  | 1 | 0 | 20 | Bpifb9b       | protein_coding       |
| ENSMUST00000126778  | 1 | 0 | 20 | Txnrd2        | protein_coding       |
| ENSMUST00000005825  | 1 | 0 | 18 | Pan2          | protein_coding       |
| ENSMUST00000114308  | 1 | 0 | 18 | Grin1         | protein_coding       |
| ENSMUST00000144383  | 1 | 0 | 18 | Megf11        | protein_coding       |
| ENSMUST00000144637  | 1 | 0 | 18 | Gm12682       | antisense            |
| ENSMUST00000033325  | 1 | 0 | 16 | Swap70        | protein_coding       |
| ENSMUST00000138646  | 1 | 0 | 16 | Pstpip1       | protein_coding       |
| ENSMUST00000125416  | 1 | 0 | 14 | Col14a1       | protein_coding       |
| ENSMUST00000132949  | 1 | 0 | 14 | Carf          | protein_coding       |
| ENSMUST00000139094  | 1 | 0 | 14 | Zbtb7b        | protein_coding       |
| ENSMUST00000139481  | 1 | 0 | 14 | Smg9          | protein_coding       |
| ENSMUST00000147042  | 1 | 0 | 14 | Bcas2         | protein_coding       |
| ENSMUST00000162388  | 1 | 0 | 14 | 1700069L16Rik | protein_coding       |
| ENSMUST00000166799  | 1 | 0 | 14 | Cacna2d2      | protein_coding       |
| ENSMUST00000138236  | 1 | 0 | 14 | B430212C06Rik | processed_transcript |
| ENSMUST000000047348 | 1 | 0 | 12 | Spag1         | protein_coding       |
| ENSMUST00000099967  | 1 | 0 | 12 | Fyn           | protein_coding       |
| ENSMUST00000100659  | 1 | 0 | 12 | Gm9920        | protein_coding       |
| ENSMUST00000113024  | 1 | 0 | 12 | Irak2         | protein_coding       |
| ENSMUST00000125299  | 1 | 0 | 12 | Gcn111        | protein_coding       |
| ENSMUST00000172760  | 1 | 0 | 10 | H2-K1         | protein_coding       |
| ENSMUST00000172760  | 1 | 0 | 10 | H2-K1         | protein_coding       |
| ENSMUST00000003536  | 1 | 0 | 10 | Med29         | protein_coding       |
| ENSMUST00000021900  | 1 | 0 | 10 | Sema4d        | protein_coding       |
| ENSMUST00000065932  | 1 | 0 | 10 | Gripap1       | protein_coding       |
| ENSMUST00000102557  | 1 | 0 | 10 | Nos1          | protein_coding       |
| ENSMUST00000109754  | 1 | 0 | 10 | Farsa         | protein_coding       |
| ENSMUST00000112538  | 1 | 0 | 10 | Zranb3        | protein_coding       |
| ENSMUST00000125728  | 1 | 0 | 10 | Mfap5         | protein_coding       |
| ENSMUST00000131585  | 1 | 0 | 10 | Nsun7         | protein_coding       |
| ENSMUST00000138790  | 1 | 0 | 10 | Msi2          | protein_coding       |
| ENSMUST00000139061  | 1 | 0 | 10 | Zfp715        | protein_coding       |
| ENSMUST00000140843  | 1 | 0 | 10 | Stard9        | protein_coding       |
| ENSMUST00000142464  | 1 | 0 | 10 | D430042O09Rik | protein_coding       |
| ENSMUST00000156644  | 1 | 0 | 10 | Itgb2         | protein_coding       |
| ENSMUST00000169976  | 1 | 0 | 10 | Sec23a        | protein_coding       |
| ENSMUST00000131019  | 1 | 0 | 10 | 4933405E24Rik | lincRNA              |
| ENSMUST00000017576  | 1 | 0 | 8  | Rbfox3        | protein_coding       |
| ENSMUST00000025408  | 1 | 0 | 8  | Afg3l2        | protein_coding       |
| ENSMUST00000026859  | 1 | 0 | 8  | Mfsd8         | protein_coding       |
| ENSMUST00000028256  | 1 | 0 | 8  | Morn5         | protein_coding       |
| ENSMUST00000032924  | 1 | 0 | 8  | Kctd13        | protein_coding       |
| ENSMUST00000034097  | 1 | 0 | 8  | Got2          | protein_coding       |
| ENSMUST00000035934  | 1 | 0 | 8  | Exoc3         | protein_coding       |
| ENSMUST00000040234  | 1 | 0 | 8  | Tsen2         | protein_coding       |
| ENSMUST00000043151  | 1 | 0 | 8  | Map7d2        | protein_coding       |
| ENSMUST00000048050  | 1 | 0 | 8  | Tmem45b       | protein_coding       |
| ENSMUST00000106552  | 1 | 0 | 8  | 9030624J02Rik | protein_coding       |
| ENSMUST00000110086  | 1 | 0 | 8  | Fgd3          | protein_coding       |
| ENSMUST00000121418  | 1 | 0 | 8  | Rab3il1       | protein_coding       |
| ENSMUST00000127148  | 1 | 0 | 8  | Scarb1        | protein_coding       |
| ENSMUST00000136355  | 1 | 0 | 8  | Wdr78         | protein_coding       |

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| ENSMUST00000144055 | 1 | 0 | 8 Rnf185        | protein_coding       |
| ENSMUST00000153037 | 1 | 0 | 8 3110009E18Rik | protein_coding       |
| ENSMUST00000153097 | 1 | 0 | 8 Ap5s1         | protein_coding       |
| ENSMUST00000169141 | 1 | 0 | 8 Slit1         | protein_coding       |
| ENSMUST00000182902 | 1 | 0 | 8 Atg7          | protein_coding       |
| ENSMUST00000183304 | 1 | 0 | 8 Gm26916       | lincRNA              |
| ENSMUST00000003947 | 1 | 0 | 6 Nqo1          | protein_coding       |
| ENSMUST00000015460 | 1 | 0 | 6 Slamf1        | protein_coding       |
| ENSMUST00000023630 | 1 | 0 | 6 Psmg1         | protein_coding       |
| ENSMUST00000040766 | 1 | 0 | 6 Tmed10        | protein_coding       |
| ENSMUST00000085678 | 1 | 0 | 6 Kctd3         | protein_coding       |
| ENSMUST00000088095 | 1 | 0 | 6 Ncoa3         | protein_coding       |
| ENSMUST00000111603 | 1 | 0 | 6 Rpgrip1       | protein_coding       |
| ENSMUST00000114629 | 1 | 0 | 6 Mamld1        | protein_coding       |
| ENSMUST00000119274 | 1 | 0 | 6 Stk38         | protein_coding       |
| ENSMUST00000123731 | 1 | 0 | 6 Rsf1          | protein_coding       |
| ENSMUST00000135260 | 1 | 0 | 6 Slx4ip        | protein_coding       |
| ENSMUST00000148517 | 1 | 0 | 6 Mfap5         | protein_coding       |
| ENSMUST00000156567 | 1 | 0 | 6 Acot11        | protein_coding       |
| ENSMUST00000161104 | 1 | 0 | 6 Wdr63         | protein_coding       |
| ENSMUST00000183077 | 1 | 0 | 6 Neur11b       | protein_coding       |
| ENSMUST00000137830 | 1 | 0 | 6 Trmt61b       | processed_transcript |
| ENSMUST00000000466 | 1 | 0 | 4 Plin2         | protein_coding       |
| ENSMUST00000022695 | 1 | 0 | 4 Dmtn          | protein_coding       |
| ENSMUST00000037341 | 1 | 0 | 4 Nhsl1         | protein_coding       |
| ENSMUST00000050328 | 1 | 0 | 4 Eif2s3x       | protein_coding       |
| ENSMUST00000056355 | 1 | 0 | 4 Nat8l         | protein_coding       |
| ENSMUST00000098438 | 1 | 0 | 4 Mrgpra1       | protein_coding       |
| ENSMUST00000101164 | 1 | 0 | 4 Limch1        | protein_coding       |
| ENSMUST00000105520 | 1 | 0 | 4 Enpp1         | protein_coding       |
| ENSMUST00000109800 | 1 | 0 | 4 Ccm2l         | protein_coding       |
| ENSMUST00000137082 | 1 | 0 | 4 Fam188a       | protein_coding       |
| ENSMUST00000141942 | 1 | 0 | 4 Pms2          | protein_coding       |
| ENSMUST00000145960 | 1 | 0 | 4 Ipo8          | protein_coding       |
| ENSMUST00000161455 | 1 | 0 | 4 Ctc1          | protein_coding       |
| ENSMUST00000162425 | 1 | 0 | 4 Gng2          | protein_coding       |
| ENSMUST00000162722 | 1 | 0 | 4 Clcn7         | protein_coding       |
| ENSMUST00000168828 | 1 | 0 | 4 Zfp385a       | protein_coding       |
| ENSMUST00000176462 | 1 | 0 | 4 Evi5l         | protein_coding       |
| ENSMUST00000179757 | 1 | 0 | 4 Asgr2         | protein_coding       |
| ENSMUST00000182007 | 1 | 0 | 4 Rbm5          | protein_coding       |
| ENSMUST00000141450 | 1 | 0 | 4 4930469K13Rik | processed_transcript |
| ENSMUST00000129082 | 1 | 0 | 4 9030622O22Rik | lincRNA              |
| ENSMUST00000018887 | 1 | 0 | 2 Myh10         | protein_coding       |
| ENSMUST00000019950 | 1 | 0 | 2 Ltv1          | protein_coding       |
| ENSMUST00000021428 | 1 | 0 | 2 Snw1          | protein_coding       |
| ENSMUST00000029061 | 1 | 0 | 2 Sall4         | protein_coding       |
| ENSMUST00000030164 | 1 | 0 | 2 Vcp           | protein_coding       |
| ENSMUST00000030792 | 1 | 0 | 2 Tas1r1        | protein_coding       |
| ENSMUST00000030895 | 1 | 0 | 2 Wrap73        | protein_coding       |
| ENSMUST00000032143 | 1 | 0 | 2 Rpn1          | protein_coding       |
| ENSMUST00000033276 | 1 | 0 | 2 Uros          | protein_coding       |
| ENSMUST00000033882 | 1 | 0 | 2 Chrna6        | protein_coding       |
| ENSMUST00000043785 | 1 | 0 | 2 Stap2         | protein_coding       |
| ENSMUST00000047503 | 1 | 0 | 2 Rgl2          | protein_coding       |
| ENSMUST00000050139 | 1 | 0 | 2 Ackr4         | protein_coding       |
| ENSMUST00000065543 | 1 | 0 | 2 Cwh43         | protein_coding       |
| ENSMUST00000065894 | 1 | 0 | 2 Slc51b        | protein_coding       |
| ENSMUST00000068333 | 1 | 0 | 2 Farsb         | protein_coding       |
| ENSMUST00000086198 | 1 | 0 | 2 Ncapd3        | protein_coding       |
| ENSMUST00000086327 | 1 | 0 | 2 Zfp667        | protein_coding       |
| ENSMUST00000099133 | 1 | 0 | 2 Arhgap40      | protein_coding       |
| ENSMUST00000105505 | 1 | 0 | 2 Cep57l1       | protein_coding       |
| ENSMUST00000106796 | 1 | 0 | 2 Pecam1        | protein_coding       |
| ENSMUST00000107528 | 1 | 0 | 2 Hsd12         | protein_coding       |
| ENSMUST00000109425 | 1 | 0 | 2 Jph2          | protein_coding       |
| ENSMUST00000110906 | 1 | 0 | 2 Meis2         | protein_coding       |
| ENSMUST00000112511 | 1 | 0 | 2 Lipo4         | protein_coding       |

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| ENSMUST00000112885  | 1 | 0 | 2 Dzip1l        | protein_coding         |
| ENSMUST00000115735  | 1 | 0 | 2 Paip2         | protein_coding         |
| ENSMUST00000118545  | 1 | 0 | 2 Sh3bp2        | protein_coding         |
| ENSMUST00000120918  | 1 | 0 | 2 Lyzl4         | protein_coding         |
| ENSMUST00000121623  | 1 | 0 | 2 Kxd1          | protein_coding         |
| ENSMUST00000127984  | 1 | 0 | 2 Cbfa2t3       | protein_coding         |
| ENSMUST00000130752  | 1 | 0 | 2 Tango2        | protein_coding         |
| ENSMUST00000133068  | 1 | 0 | 2 Adprhl2       | protein_coding         |
| ENSMUST00000137360  | 1 | 0 | 2 Cdc16         | protein_coding         |
| ENSMUST00000139421  | 1 | 0 | 2 Magt1         | protein_coding         |
| ENSMUST00000139422  | 1 | 0 | 2 Tnfrsf13b     | protein_coding         |
| ENSMUST00000143368  | 1 | 0 | 2 Wdfy1         | protein_coding         |
| ENSMUST00000147330  | 1 | 0 | 2 Cit           | protein_coding         |
| ENSMUST00000151395  | 1 | 0 | 2 Kif18a        | protein_coding         |
| ENSMUST00000155087  | 1 | 0 | 2 Sez6          | protein_coding         |
| ENSMUST00000156412  | 1 | 0 | 2 Hc            | protein_coding         |
| ENSMUST00000160367  | 1 | 0 | 2 Armc2         | protein_coding         |
| ENSMUST00000165111  | 1 | 0 | 2 Acly          | protein_coding         |
| ENSMUST00000166019  | 1 | 0 | 2 Rrp7a         | protein_coding         |
| ENSMUST00000166203  | 1 | 0 | 2 Nrap          | protein_coding         |
| ENSMUST00000184008  | 1 | 0 | 2 Rgs21         | protein_coding         |
| ENSMUST00000155332  | 1 | 0 | 2 Gm12592       | processed_transcript   |
| ENSMUST00000181235  | 1 | 0 | 2 4833412C05Rik | lincRNA                |
| ENSMUST00000183264  | 1 | 0 | 2 Gm27007       | lincRNA                |
| ENSMUST00000123899  | 1 | 0 | 2 Gm12679       | antisense              |
| ENSMUST00000182400  | 1 | 0 | 2 Gm27008       | antisense              |
| ENSMUST00000178354  | 1 | 0 | 0 Tmem87b       | protein_coding         |
| ENSMUST00000107277  | 1 | 0 | 0 Tuft1         | protein_coding         |
| ENSMUST00000001365  | 1 | 0 | 0 Yars          | protein_coding         |
| ENSMUST00000178354  | 1 | 0 | 0 Tmem87b       | protein_coding         |
| ENSMUST00000107277  | 1 | 0 | 0 Tuft1         | protein_coding         |
| ENSMUST00000001365  | 1 | 0 | 0 Yars          | protein_coding         |
| ENSMUST00000121835  | 1 | 0 | 0 Gm12872       | unprocessed_pseudogene |
| ENSMUST00000000958  | 1 | 0 | 0 Top1mt        | protein_coding         |
| ENSMUST00000002808  | 1 | 0 | 0 Prkra         | protein_coding         |
| ENSMUST00000003320  | 1 | 0 | 0 Eif2b5        | protein_coding         |
| ENSMUST00000004054  | 1 | 0 | 0 Kpna1         | protein_coding         |
| ENSMUST000000006818 | 1 | 0 | 0 Tcf23         | protein_coding         |
| ENSMUST000000007251 | 1 | 0 | 0 Abhd16a       | protein_coding         |
| ENSMUST0000016033   | 1 | 0 | 0 Lta4h         | protein_coding         |
| ENSMUST00000022341  | 1 | 0 | 0 2700060E02Rik | protein_coding         |
| ENSMUST00000022960  | 1 | 0 | 0 Eif3e         | protein_coding         |
| ENSMUST00000023133  | 1 | 0 | 0 Ppp1r1a       | protein_coding         |
| ENSMUST00000023156  | 1 | 0 | 0 Il1rap        | protein_coding         |
| ENSMUST00000023593  | 1 | 0 | 0 Adipoq        | protein_coding         |
| ENSMUST00000023761  | 1 | 0 | 0 Cox14         | protein_coding         |
| ENSMUST00000025062  | 1 | 0 | 0 Clps          | protein_coding         |
| ENSMUST00000025249  | 1 | 0 | 0 Apom          | protein_coding         |
| ENSMUST00000025270  | 1 | 0 | 0 Riok3         | protein_coding         |
| ENSMUST00000025484  | 1 | 0 | 0 Fech          | protein_coding         |
| ENSMUST00000025705  | 1 | 0 | 0 Jak2          | protein_coding         |
| ENSMUST00000026586  | 1 | 0 | 0 Chid1         | protein_coding         |
| ENSMUST00000028630  | 1 | 0 | 0 Slc12a1       | protein_coding         |
| ENSMUST00000028826  | 1 | 0 | 0 Chgb          | protein_coding         |
| ENSMUST00000028950  | 1 | 0 | 0 Sdcbp2        | protein_coding         |
| ENSMUST00000031101  | 1 | 0 | 0 Lias          | protein_coding         |
| ENSMUST00000031674  | 1 | 0 | 0 Tfpi2         | protein_coding         |
| ENSMUST00000032480  | 1 | 0 | 0 Ing4          | protein_coding         |
| ENSMUST00000033725  | 1 | 0 | 0 Msl3          | protein_coding         |
| ENSMUST00000034030  | 1 | 0 | 0 Tmem184c      | protein_coding         |
| ENSMUST00000038842  | 1 | 0 | 0 Ppp1r32       | protein_coding         |
| ENSMUST00000044825  | 1 | 0 | 0 Ndufaf5       | protein_coding         |
| ENSMUST00000046558  | 1 | 0 | 0 Hspb11        | protein_coding         |
| ENSMUST00000051139  | 1 | 0 | 0 Rsbn1         | protein_coding         |
| ENSMUST00000052248  | 1 | 0 | 0 Eef1g         | protein_coding         |
| ENSMUST00000055303  | 1 | 0 | 0 Mettl6        | protein_coding         |
| ENSMUST00000060303  | 1 | 0 | 0 Tshz1         | protein_coding         |
| ENSMUST00000062069  | 1 | 0 | 0 Ptgsl         | protein_coding         |

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| ENSMUST00000063314 | 1 | 0 | 0 Gtf2a1        | protein_coding |
| ENSMUST00000063761 | 1 | 0 | 0 Cpt1c         | protein_coding |
| ENSMUST00000065196 | 1 | 0 | 0 Scn5a         | protein_coding |
| ENSMUST00000067743 | 1 | 0 | 0 Gm9949        | protein_coding |
| ENSMUST00000068317 | 1 | 0 | 0 Cyp3a25       | protein_coding |
| ENSMUST00000069035 | 1 | 0 | 0 A630091E08Rik | protein_coding |
| ENSMUST00000069533 | 1 | 0 | 0 Cap1          | protein_coding |
| ENSMUST00000073428 | 1 | 0 | 0 Slc39a4       | protein_coding |
| ENSMUST00000073822 | 1 | 0 | 0 Opcml         | protein_coding |
| ENSMUST00000075670 | 1 | 0 | 0 Slbp          | protein_coding |
| ENSMUST00000080469 | 1 | 0 | 0 Met           | protein_coding |
| ENSMUST00000081702 | 1 | 0 | 0 Trabd         | protein_coding |
| ENSMUST00000086819 | 1 | 0 | 0 Kif1a         | protein_coding |
| ENSMUST00000089370 | 1 | 0 | 0 Ssxb5         | protein_coding |
| ENSMUST00000089398 | 1 | 0 | 0 Il2rb         | protein_coding |
| ENSMUST00000090487 | 1 | 0 | 0 Fam71f1       | protein_coding |
| ENSMUST00000093267 | 1 | 0 | 0 0610010F05Rik | protein_coding |
| ENSMUST00000095427 | 1 | 0 | 0 Mtch1         | protein_coding |
| ENSMUST00000096308 | 1 | 0 | 0 Nlrc3         | protein_coding |
| ENSMUST00000097680 | 1 | 0 | 0 Rab18         | protein_coding |
| ENSMUST00000098059 | 1 | 0 | 0 Musk          | protein_coding |
| ENSMUST00000099467 | 1 | 0 | 0 Sorbs1        | protein_coding |
| ENSMUST00000100208 | 1 | 0 | 0 Fnbp1         | protein_coding |
| ENSMUST00000102659 | 1 | 0 | 0 Sestd1        | protein_coding |
| ENSMUST00000102915 | 1 | 0 | 0 Smc2          | protein_coding |
| ENSMUST00000103061 | 1 | 0 | 0 Amz2          | protein_coding |
| ENSMUST00000105256 | 1 | 0 | 0 Ctdsp2        | protein_coding |
| ENSMUST00000105780 | 1 | 0 | 0 Fhad1         | protein_coding |
| ENSMUST00000105790 | 1 | 0 | 0 Clcnka        | protein_coding |
| ENSMUST00000106045 | 1 | 0 | 0 Nlrp6         | protein_coding |
| ENSMUST00000106439 | 1 | 0 | 0 Mrpl38        | protein_coding |
| ENSMUST00000106545 | 1 | 0 | 0 Cyp4x1        | protein_coding |
| ENSMUST00000107417 | 1 | 0 | 0 Shc1          | protein_coding |
| ENSMUST00000107853 | 1 | 0 | 0 Mbtd1         | protein_coding |
| ENSMUST00000108045 | 1 | 0 | 0 Tbx4          | protein_coding |
| ENSMUST00000109177 | 1 | 0 | 0 Atp9a         | protein_coding |
| ENSMUST00000109723 | 1 | 0 | 0 Mta1          | protein_coding |
| ENSMUST00000110374 | 1 | 0 | 0 Stard7        | protein_coding |
| ENSMUST00000110816 | 1 | 0 | 0 Spint1        | protein_coding |
| ENSMUST00000111404 | 1 | 0 | 0 Nrl           | protein_coding |
| ENSMUST00000111520 | 1 | 0 | 0 Olfr1256      | protein_coding |
| ENSMUST00000111926 | 1 | 0 | 0 Pla2g4a       | protein_coding |
| ENSMUST00000115584 | 1 | 0 | 0 Ssxb9         | protein_coding |
| ENSMUST00000115894 | 1 | 0 | 0 Uba1y         | protein_coding |
| ENSMUST00000116612 | 1 | 0 | 0 Rxrb          | protein_coding |
| ENSMUST00000117299 | 1 | 0 | 0 2700094K13Rik | protein_coding |
| ENSMUST00000117624 | 1 | 0 | 0 Ttc13         | protein_coding |
| ENSMUST00000117766 | 1 | 0 | 0 Mrpl1         | protein_coding |
| ENSMUST00000118100 | 1 | 0 | 0 Rapgef2       | protein_coding |
| ENSMUST00000120367 | 1 | 0 | 0 Acad8         | protein_coding |
| ENSMUST00000120722 | 1 | 0 | 0 2610002M06Rik | protein_coding |
| ENSMUST00000122836 | 1 | 0 | 0 Efcab6        | protein_coding |
| ENSMUST00000124065 | 1 | 0 | 0 Rad51ap2      | protein_coding |
| ENSMUST00000124959 | 1 | 0 | 0 Rnf145        | protein_coding |
| ENSMUST00000125192 | 1 | 0 | 0 Atxn711       | protein_coding |
| ENSMUST00000126621 | 1 | 0 | 0 Adck2         | protein_coding |
| ENSMUST00000128006 | 1 | 0 | 0 Pddc1         | protein_coding |
| ENSMUST00000128535 | 1 | 0 | 0 Mrps5         | protein_coding |
| ENSMUST00000128753 | 1 | 0 | 0 Gaa           | protein_coding |
| ENSMUST00000128987 | 1 | 0 | 0 Keg1          | protein_coding |
| ENSMUST00000130324 | 1 | 0 | 0 Upf3b         | protein_coding |
| ENSMUST00000133001 | 1 | 0 | 0 Gm6483        | protein_coding |
| ENSMUST00000133505 | 1 | 0 | 0 Tmem194       | protein_coding |
| ENSMUST00000134566 | 1 | 0 | 0 Acsl3         | protein_coding |
| ENSMUST00000134746 | 1 | 0 | 0 Cep57         | protein_coding |
| ENSMUST00000136750 | 1 | 0 | 0 Ubac1         | protein_coding |
| ENSMUST00000137347 | 1 | 0 | 0 Ftcd          | protein_coding |
| ENSMUST00000139740 | 1 | 0 | 0 Top3b         | protein_coding |

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|--------------------|---|----|----|---------------|----------------------|
| ENSMUST00000142191 | 1 | 0  | 0  | Tipr1         | protein_coding       |
| ENSMUST00000144587 | 1 | 0  | 0  | Rab11fip3     | protein_coding       |
| ENSMUST00000144773 | 1 | 0  | 0  | Scube1        | protein_coding       |
| ENSMUST00000145197 | 1 | 0  | 0  | Cabp1         | protein_coding       |
| ENSMUST00000145325 | 1 | 0  | 0  | Apmap         | protein_coding       |
| ENSMUST00000146570 | 1 | 0  | 0  | Aasdh         | protein_coding       |
| ENSMUST00000147101 | 1 | 0  | 0  | Vwf           | protein_coding       |
| ENSMUST00000148013 | 1 | 0  | 0  | Msi2          | protein_coding       |
| ENSMUST00000149106 | 1 | 0  | 0  | Scp2          | protein_coding       |
| ENSMUST00000149756 | 1 | 0  | 0  | Tulp4         | protein_coding       |
| ENSMUST00000150091 | 1 | 0  | 0  | Mcm10         | protein_coding       |
| ENSMUST00000151678 | 1 | 0  | 0  | Dusp3         | protein_coding       |
| ENSMUST00000152110 | 1 | 0  | 0  | Ddhd1         | protein_coding       |
| ENSMUST00000154764 | 1 | 0  | 0  | Itgb6         | protein_coding       |
| ENSMUST00000155249 | 1 | 0  | 0  | Itga6         | protein_coding       |
| ENSMUST00000155798 | 1 | 0  | 0  | Sdhc          | protein_coding       |
| ENSMUST00000156280 | 1 | 0  | 0  | Smek2         | protein_coding       |
| ENSMUST00000159841 | 1 | 0  | 0  | Pam           | protein_coding       |
| ENSMUST00000160986 | 1 | 0  | 0  | Mroh1         | protein_coding       |
| ENSMUST00000161052 | 1 | 0  | 0  | Pich1         | protein_coding       |
| ENSMUST00000161087 | 1 | 0  | 0  | Vil1          | protein_coding       |
| ENSMUST00000162173 | 1 | 0  | 0  | Zfat          | protein_coding       |
| ENSMUST00000162252 | 1 | 0  | 0  | Glb1l2        | protein_coding       |
| ENSMUST00000164556 | 1 | 0  | 0  | Reps1         | protein_coding       |
| ENSMUST00000164904 | 1 | 0  | 0  | Ubl3          | protein_coding       |
| ENSMUST00000164918 | 1 | 0  | 0  | Vmn2r52       | protein_coding       |
| ENSMUST00000165133 | 1 | 0  | 0  | Spata31d1b    | protein_coding       |
| ENSMUST00000165220 | 1 | 0  | 0  | Gm9742        | protein_coding       |
| ENSMUST00000165280 | 1 | 0  | 0  | Bmpr1a        | protein_coding       |
| ENSMUST00000167000 | 1 | 0  | 0  | Cct3          | protein_coding       |
| ENSMUST00000167234 | 1 | 0  | 0  | Adcyap1r1     | protein_coding       |
| ENSMUST00000167314 | 1 | 0  | 0  | Vmn2r108      | protein_coding       |
| ENSMUST00000167921 | 1 | 0  | 0  | Zbtb7c        | protein_coding       |
| ENSMUST00000168632 | 1 | 0  | 0  | Tef           | protein_coding       |
| ENSMUST00000169024 | 1 | 0  | 0  | Clcn1         | protein_coding       |
| ENSMUST00000170892 | 1 | 0  | 0  | Gm17387       | protein_coding       |
| ENSMUST00000171257 | 1 | 0  | 0  | Gm9894        | protein_coding       |
| ENSMUST00000173561 | 1 | 0  | 0  | Txn2          | protein_coding       |
| ENSMUST00000173626 | 1 | 0  | 0  | Daxx          | protein_coding       |
| ENSMUST00000174602 | 1 | 0  | 0  | Usp32         | protein_coding       |
| ENSMUST00000175912 | 1 | 0  | 0  | Ctage5        | protein_coding       |
| ENSMUST00000176009 | 1 | 0  | 0  | Stx5a         | protein_coding       |
| ENSMUST00000184312 | 1 | 0  | 0  | Tex9          | protein_coding       |
| ENSMUST00000120364 | 1 | 0  | 0  | Dancr         | processed_transcript |
| ENSMUST00000124122 | 1 | 0  | 0  | 4930412C18Rik | processed_transcript |
| ENSMUST00000147762 | 1 | 0  | 0  | Gm11974       | processed_transcript |
| ENSMUST00000148776 | 1 | 0  | 0  | Gm15506       | processed_transcript |
| ENSMUST00000176749 | 1 | 0  | 0  | Gm20700       | processed_transcript |
| ENSMUST00000122293 | 1 | 0  | 0  | Gm14849       | processed_pseudogene |
| ENSMUST00000133981 | 1 | 0  | 0  | Gm13746       | lincRNA              |
| ENSMUST00000139600 | 1 | 0  | 0  | 2210414B05Rik | lincRNA              |
| ENSMUST00000143209 | 1 | 0  | 0  | 5133400J02Rik | lincRNA              |
| ENSMUST00000147722 | 1 | 0  | 0  | Gm16211       | lincRNA              |
| ENSMUST00000151471 | 1 | 0  | 0  | 4930519D14Rik | lincRNA              |
| ENSMUST00000152462 | 1 | 0  | 0  | Haglr         | lincRNA              |
| ENSMUST00000171079 | 1 | 0  | 0  | Gm16984       | lincRNA              |
| ENSMUST00000179640 | 1 | 0  | 0  | 1500015L24Rik | lincRNA              |
| ENSMUST00000180533 | 1 | 0  | 0  | 4933433G15Rik | lincRNA              |
| ENSMUST00000123574 | 1 | 0  | 0  | Gm14002       | antisense            |
| ENSMUST00000136382 | 1 | 0  | 0  | Gm15343       | antisense            |
| ENSMUST00000099502 | 1 | 19 | 0  | Brwd1         | protein_coding       |
| ENSMUST00000167087 | 1 | 18 | 6  | Eif4ebp2      | protein_coding       |
| ENSMUST00000162536 | 1 | 16 | 16 | Pard3         | protein_coding       |
| ENSMUST00000027373 | 1 | 12 | 2  | Ppm1f         | protein_coding       |
| ENSMUST00000129031 | 1 | 12 | 2  | Drosha        | protein_coding       |
| ENSMUST00000183272 | 1 | 12 | 0  | Gapdh         | protein_coding       |
| ENSMUST00000001995 | 1 | 9  | 22 | Vwf           | protein_coding       |
| ENSMUST00000040729 | 1 | 9  | 16 | Clcn7         | protein_coding       |



|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000002529 | 1 | 9 | 14 Prpf6        | protein_coding         |
| ENSMUST00000138175 | 1 | 9 | 0 Sycp2         | protein_coding         |
| ENSMUST00000165929 | 1 | 8 | 2 Asb14         | protein_coding         |
| ENSMUST00000150155 | 1 | 8 | 0 Wdr66         | protein_coding         |
| ENSMUST00000021706 | 1 | 7 | 103 Traf3       | protein_coding         |
| ENSMUST00000147747 | 1 | 7 | 6 Csrp2bp       | protein_coding         |
| ENSMUST00000143057 | 1 | 7 | 0 Asah1         | protein_coding         |
| ENSMUST00000022927 | 1 | 7 | 6 Rad21         | protein_coding         |
| ENSMUST00000105769 | 1 | 7 | 0 Gm13084       | protein_coding         |
| ENSMUST00000075281 | 1 | 6 | 56 Mark3        | protein_coding         |
| ENSMUST00000169879 | 1 | 6 | 10 Sin3a        | protein_coding         |
| ENSMUST00000080435 | 1 | 6 | 6 Dag1          | protein_coding         |
| ENSMUST00000110336 | 1 | 6 | 2 Ubr5          | protein_coding         |
| ENSMUST00000038424 | 1 | 6 | 0 Txndc11       | protein_coding         |
| ENSMUST00000100162 | 1 | 6 | 0 Copz1         | protein_coding         |
| ENSMUST00000105371 | 1 | 6 | 0 Stk11         | protein_coding         |
| ENSMUST00000183159 | 1 | 6 | 0 Gm6317        | processed_pseudogene   |
| ENSMUST00000028767 | 1 | 5 | 42 Rtf1         | protein_coding         |
| ENSMUST00000093115 | 1 | 5 | 36 Crk          | protein_coding         |
| ENSMUST00000150546 | 1 | 5 | 34 Celf1        | protein_coding         |
| ENSMUST00000029766 | 1 | 5 | 12 Bcar3        | protein_coding         |
| ENSMUST00000029938 | 1 | 5 | 12 Gtf2b        | protein_coding         |
| ENSMUST00000041956 | 1 | 5 | 12 Spag9        | protein_coding         |
| ENSMUST00000033280 | 1 | 5 | 6 9030624J02Rik | protein_coding         |
| ENSMUST00000142442 | 1 | 5 | 6 Ubxn11        | protein_coding         |
| ENSMUST00000145664 | 1 | 5 | 4 Arid1a        | protein_coding         |
| ENSMUST00000084885 | 1 | 5 | 2 Ubp1          | protein_coding         |
| ENSMUST00000113268 | 1 | 5 | 2 Myo6          | protein_coding         |
| ENSMUST00000114669 | 1 | 5 | 2 Mlt10         | protein_coding         |
| ENSMUST00000111038 | 1 | 5 | 0 Epo           | protein_coding         |
| ENSMUST00000114512 | 1 | 5 | 0 Glis          | protein_coding         |
| ENSMUST00000136047 | 1 | 5 | 0 Cntrl         | protein_coding         |
| ENSMUST00000168699 | 1 | 5 | 0 Ltbp2         | protein_coding         |
| ENSMUST00000146903 | 1 | 5 | 81 Sympk        | protein_coding         |
| ENSMUST00000028728 | 1 | 5 | 22 Ubr1         | protein_coding         |
| ENSMUST00000114449 | 1 | 5 | 22 Maea         | protein_coding         |
| ENSMUST00000018993 | 1 | 5 | 20 Wwc1         | protein_coding         |
| ENSMUST00000123320 | 1 | 5 | 18 Ctsh         | protein_coding         |
| ENSMUST00000049248 | 1 | 5 | 16 Malt1        | protein_coding         |
| ENSMUST00000101099 | 1 | 5 | 16 Unc79        | protein_coding         |
| ENSMUST00000179445 | 1 | 5 | 14 Pitpna       | protein_coding         |
| ENSMUST00000063359 | 1 | 5 | 10 Gypa         | protein_coding         |
| ENSMUST00000146561 | 1 | 5 | 10 Ednra        | protein_coding         |
| ENSMUST00000113278 | 1 | 5 | 8 Ak1           | protein_coding         |
| ENSMUST00000045706 | 1 | 5 | 6 Cfr           | protein_coding         |
| ENSMUST00000064718 | 1 | 5 | 6 Phc3          | protein_coding         |
| ENSMUST00000102912 | 1 | 5 | 6 March3        | protein_coding         |
| ENSMUST00000137585 | 1 | 5 | 6 Chp1          | protein_coding         |
| ENSMUST00000023611 | 1 | 5 | 4 Adamts5       | protein_coding         |
| ENSMUST00000121560 | 1 | 5 | 4 Fank1         | protein_coding         |
| ENSMUST00000121996 | 1 | 5 | 2 Gm11787       | unprocessed_pseudogene |
| ENSMUST00000139629 | 1 | 5 | 2 Fam78a        | protein_coding         |
| ENSMUST00000178446 | 1 | 5 | 2 Gm20837       | protein_coding         |
| ENSMUST00000178751 | 1 | 5 | 2 Gm28891       | protein_coding         |
| ENSMUST00000179672 | 1 | 5 | 2 Gm21256       | protein_coding         |
| ENSMUST00000003079 | 1 | 5 | 0 Prkar2b       | protein_coding         |
| ENSMUST00000085192 | 1 | 5 | 0 Aldh6a1       | protein_coding         |
| ENSMUST00000095899 | 1 | 5 | 0 Syne1         | protein_coding         |
| ENSMUST00000111322 | 1 | 5 | 0 Harbi1        | protein_coding         |
| ENSMUST00000164598 | 1 | 5 | 0 Acox2         | protein_coding         |
| ENSMUST00000169764 | 1 | 5 | 0 Gm12171       | lincRNA                |
| ENSMUST00000136693 | 1 | 5 | 0 Gm3848        | antisense              |
| ENSMUST00000174641 | 1 | 4 | 24 Arhgap32     | protein_coding         |
| ENSMUST00000169095 | 1 | 4 | 20 Cd36         | protein_coding         |
| ENSMUST00000029502 | 1 | 4 | 14 Slc16a4      | protein_coding         |
| ENSMUST00000050771 | 1 | 4 | 14 Gm11437      | protein_coding         |
| ENSMUST00000108081 | 1 | 4 | 12 Ggnbp2       | protein_coding         |
| ENSMUST00000047443 | 1 | 4 | 10 Mansc1       | protein_coding         |

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| ENSMUST00000063977 | 1 | 4 | 8 Ppp1r36        | protein_coding       |
| ENSMUST00000105863 | 1 | 4 | 8 Tmem50a        | protein_coding       |
| ENSMUST00000173292 | 1 | 4 | 8 Dennd3         | protein_coding       |
| ENSMUST00000028977 | 1 | 4 | 4 Kif3b          | protein_coding       |
| ENSMUST00000043709 | 1 | 4 | 4 Gna15          | protein_coding       |
| ENSMUST00000093907 | 1 | 4 | 4 Sept9          | protein_coding       |
| ENSMUST00000039557 | 1 | 4 | 2 Arhgap18       | protein_coding       |
| ENSMUST00000053456 | 1 | 4 | 2 Sept6          | protein_coding       |
| ENSMUST00000093039 | 1 | 4 | 2 Taf5l          | protein_coding       |
| ENSMUST00000169057 | 1 | 4 | 2 Vwa3b          | protein_coding       |
| ENSMUST00000000090 | 1 | 4 | 0 Cox5a          | protein_coding       |
| ENSMUST00000029936 | 1 | 4 | 0 Gbp5           | protein_coding       |
| ENSMUST00000034175 | 1 | 4 | 0 Phlpp2         | protein_coding       |
| ENSMUST00000043317 | 1 | 4 | 0 Dnajc12        | protein_coding       |
| ENSMUST00000045560 | 1 | 4 | 0 Slc19a3        | protein_coding       |
| ENSMUST00000048073 | 1 | 4 | 0 Pigs           | protein_coding       |
| ENSMUST00000055433 | 1 | 4 | 0 Spsb4          | protein_coding       |
| ENSMUST00000070951 | 1 | 4 | 0 Ppap2a         | protein_coding       |
| ENSMUST00000074941 | 1 | 4 | 0 Zfp35          | protein_coding       |
| ENSMUST00000076664 | 1 | 4 | 0 Zfp53          | protein_coding       |
| ENSMUST00000091541 | 1 | 4 | 0 2410141K09Rik  | protein_coding       |
| ENSMUST00000110457 | 1 | 4 | 0 Myo10          | protein_coding       |
| ENSMUST00000111774 | 1 | 4 | 0 Xpr1           | protein_coding       |
| ENSMUST00000138547 | 1 | 4 | 0 Fam65b         | protein_coding       |
| ENSMUST00000148049 | 1 | 4 | 0 Afap1l2        | protein_coding       |
| ENSMUST00000154528 | 1 | 4 | 0 Pfkfb1         | protein_coding       |
| ENSMUST00000176056 | 1 | 4 | 0 Agps           | protein_coding       |
| ENSMUST00000149965 | 1 | 4 | 0 A430048G15Rik  | lincRNA              |
| ENSMUST00000035977 | 1 | 3 | 65 Ticrr         | protein_coding       |
| ENSMUST00000171682 | 1 | 3 | 28 Ift88         | protein_coding       |
| ENSMUST00000140631 | 1 | 3 | 26 Pgap2         | protein_coding       |
| ENSMUST00000175890 | 1 | 3 | 24 Fryl          | protein_coding       |
| ENSMUST00000108659 | 1 | 3 | 22 Dnah2         | protein_coding       |
| ENSMUST00000122245 | 1 | 3 | 20 Fip1l1        | protein_coding       |
| ENSMUST00000180424 | 1 | 3 | 20 Gm26708       | lincRNA              |
| ENSMUST00000008733 | 1 | 3 | 16 Dnajb6        | protein_coding       |
| ENSMUST00000151565 | 1 | 3 | 16 Adam19        | protein_coding       |
| ENSMUST00000153691 | 1 | 3 | 14 Cacna1a       | protein_coding       |
| ENSMUST00000126537 | 1 | 3 | 14 5430402O13Rik | antisense            |
| ENSMUST00000028248 | 1 | 3 | 12 Tll11         | protein_coding       |
| ENSMUST00000042889 | 1 | 3 | 12 Setd5         | protein_coding       |
| ENSMUST00000099945 | 1 | 3 | 12 Amd1          | protein_coding       |
| ENSMUST00000030434 | 1 | 3 | 10 Fuca1         | protein_coding       |
| ENSMUST00000034776 | 1 | 3 | 10 Cln6          | protein_coding       |
| ENSMUST00000146238 | 1 | 3 | 10 Sema4d        | protein_coding       |
| ENSMUST00000100487 | 1 | 3 | 8 Eif2ak1        | protein_coding       |
| ENSMUST00000106499 | 1 | 3 | 8 Grb2           | protein_coding       |
| ENSMUST00000126385 | 1 | 3 | 8 Gm16341        | antisense            |
| ENSMUST00000002133 | 1 | 3 | 6 Sdf2           | protein_coding       |
| ENSMUST00000058725 | 1 | 3 | 6 Antxrl         | protein_coding       |
| ENSMUST00000095753 | 1 | 3 | 6 Tia1           | protein_coding       |
| ENSMUST00000099110 | 1 | 3 | 6 Tox2           | protein_coding       |
| ENSMUST00000115071 | 1 | 3 | 6 Prss40         | protein_coding       |
| ENSMUST00000117638 | 1 | 3 | 6 Zfp534         | protein_coding       |
| ENSMUST00000118340 | 1 | 3 | 6 Rapgef2        | protein_coding       |
| ENSMUST00000120095 | 1 | 3 | 6 Wdr31          | protein_coding       |
| ENSMUST00000121930 | 1 | 3 | 6 Acyp1          | protein_coding       |
| ENSMUST00000154334 | 1 | 3 | 6 5530601H04Rik  | processed_transcript |
| ENSMUST00000039164 | 1 | 3 | 4 Lpar3          | protein_coding       |
| ENSMUST00000082177 | 1 | 3 | 4 Kdm5c          | protein_coding       |
| ENSMUST00000137868 | 1 | 3 | 4 Speg           | protein_coding       |
| ENSMUST00000151292 | 1 | 3 | 4 Nfatc2         | protein_coding       |
| ENSMUST00000169037 | 1 | 3 | 4 Adcy7          | protein_coding       |
| ENSMUST00000124842 | 1 | 3 | 4 Firre          | processed_transcript |
| ENSMUST00000056866 | 1 | 3 | 2 Pnpla1         | protein_coding       |
| ENSMUST00000077889 | 1 | 3 | 2 Spata45        | protein_coding       |
| ENSMUST00000079204 | 1 | 3 | 2 Rph3a          | protein_coding       |
| ENSMUST00000110143 | 1 | 3 | 2 Mef2b          | protein_coding       |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000121533 | 1 | 3 | 2 1700025G04Rik | protein_coding         |
| ENSMUST00000128363 | 1 | 3 | 2 Socs2         | protein_coding         |
| ENSMUST00000130147 | 1 | 3 | 2 Manba         | protein_coding         |
| ENSMUST00000138994 | 1 | 3 | 2 Map3k5        | protein_coding         |
| ENSMUST00000154492 | 1 | 3 | 2 Ifit88        | protein_coding         |
| ENSMUST00000167713 | 1 | 3 | 2 Esp6Esp5      | protein_coding         |
| ENSMUST00000006659 | 1 | 3 | 0 Prl7a1        | protein_coding         |
| ENSMUST00000025477 | 1 | 3 | 0 St8sia3       | protein_coding         |
| ENSMUST00000026360 | 1 | 3 | 0 Itgb8         | protein_coding         |
| ENSMUST00000043962 | 1 | 3 | 0 Cdc16         | protein_coding         |
| ENSMUST00000063481 | 1 | 3 | 0 9830107B12Rik | protein_coding         |
| ENSMUST00000065289 | 1 | 3 | 0 Clec12a       | protein_coding         |
| ENSMUST00000074301 | 1 | 3 | 0 Smyd1         | protein_coding         |
| ENSMUST00000087614 | 1 | 3 | 0 Aebp2         | protein_coding         |
| ENSMUST00000093239 | 1 | 3 | 0 Mtif2         | protein_coding         |
| ENSMUST00000106470 | 1 | 3 | 0 Prdx1         | protein_coding         |
| ENSMUST00000107245 | 1 | 3 | 0 Nfib          | protein_coding         |
| ENSMUST00000107822 | 1 | 3 | 0 Luc7l3        | protein_coding         |
| ENSMUST00000108718 | 1 | 3 | 0 Dhfr7b        | protein_coding         |
| ENSMUST00000114657 | 1 | 3 | 0 Fmr1          | protein_coding         |
| ENSMUST00000121391 | 1 | 3 | 0 Aim1l         | protein_coding         |
| ENSMUST00000130352 | 1 | 3 | 0 Clcc1         | protein_coding         |
| ENSMUST00000151700 | 1 | 3 | 0 Thsd7b        | protein_coding         |
| ENSMUST00000166716 | 1 | 3 | 0 Pth1r         | protein_coding         |
| ENSMUST00000170257 | 1 | 3 | 0 Vmn2r86       | protein_coding         |
| ENSMUST00000171423 | 1 | 3 | 0 Anxa1         | protein_coding         |
| ENSMUST00000173347 | 1 | 3 | 0 Lig3          | protein_coding         |
| ENSMUST00000175865 | 1 | 3 | 0 Lsm5          | protein_coding         |
| ENSMUST00000154068 | 1 | 3 | 0 Gm12198       | processed_transcript   |
| ENSMUST00000181289 | 1 | 3 | 0 Gm17322       | lincRNA                |
| ENSMUST00000137422 | 1 | 3 | 0 Tmem74bos     | antisense              |
| ENSMUST00000004381 | 1 | 3 | 40 Lpcat3       | protein_coding         |
| ENSMUST00000106930 | 1 | 3 | 38 Dnajc6       | protein_coding         |
| ENSMUST00000022566 | 1 | 3 | 30 Spata13      | protein_coding         |
| ENSMUST00000153389 | 1 | 3 | 30 Armc9        | protein_coding         |
| ENSMUST00000026011 | 1 | 3 | 26 Sfxn2        | protein_coding         |
| ENSMUST00000028187 | 1 | 3 | 24 Lamc3        | protein_coding         |
| ENSMUST00000086361 | 1 | 3 | 24 AB124611     | protein_coding         |
| ENSMUST00000142072 | 1 | 3 | 24 Disp2        | protein_coding         |
| ENSMUST00000153891 | 1 | 3 | 24 Stpg1        | protein_coding         |
| ENSMUST00000147185 | 1 | 3 | 22 Ubap1l       | protein_coding         |
| ENSMUST00000180419 | 1 | 3 | 22 Gm16845      | lincRNA                |
| ENSMUST00000014545 | 1 | 3 | 20 Ldhc         | protein_coding         |
| ENSMUST00000036473 | 1 | 3 | 20 Pomt1        | protein_coding         |
| ENSMUST00000129024 | 1 | 3 | 20 Coq5         | protein_coding         |
| ENSMUST00000107381 | 1 | 3 | 18 Ttl13        | protein_coding         |
| ENSMUST00000138159 | 1 | 3 | 18 Dram1        | protein_coding         |
| ENSMUST00000177249 | 1 | 3 | 18 Avl9         | protein_coding         |
| ENSMUST00000025208 | 1 | 3 | 16 Dnajc18      | protein_coding         |
| ENSMUST00000102752 | 1 | 3 | 16 Homer1       | protein_coding         |
| ENSMUST00000168981 | 1 | 3 | 16 Tead1        | protein_coding         |
| ENSMUST00000117381 | 1 | 3 | 14 Gm14278      | unprocessed_pseudogene |
| ENSMUST00000026617 | 1 | 3 | 14 Phkg1        | protein_coding         |
| ENSMUST00000045026 | 1 | 3 | 14 Spag5        | protein_coding         |
| ENSMUST00000180719 | 1 | 3 | 14 Gm26520      | lincRNA                |
| ENSMUST00000023648 | 1 | 3 | 12 Krtap15      | protein_coding         |
| ENSMUST00000140194 | 1 | 3 | 12 Ccdc88a      | protein_coding         |
| ENSMUST00000173310 | 1 | 3 | 12 Gm20488      | processed_transcript   |
| ENSMUST00000181446 | 1 | 3 | 12 Gm26883      | lincRNA                |
| ENSMUST00000028969 | 1 | 3 | 10 Tpx2         | protein_coding         |
| ENSMUST00000047860 | 1 | 3 | 10 Noa1         | protein_coding         |
| ENSMUST00000099560 | 1 | 3 | 10 Ptar1        | protein_coding         |
| ENSMUST00000102705 | 1 | 3 | 10 Rad54l       | protein_coding         |
| ENSMUST00000000335 | 1 | 3 | 8 Comt          | protein_coding         |
| ENSMUST00000060710 | 1 | 3 | 8 Cdc25c        | protein_coding         |
| ENSMUST00000099224 | 1 | 3 | 8 Csnk2a1       | protein_coding         |
| ENSMUST00000118724 | 1 | 3 | 8 1700034E13Rik | protein_coding         |
| ENSMUST00000180727 | 1 | 3 | 8 Gm16794       | antisense              |

|                     |   |   |            |                        |
|---------------------|---|---|------------|------------------------|
| ENSMUST00000011302  | 1 | 3 | 6 Brf1     | protein_coding         |
| ENSMUST00000020208  | 1 | 3 | 6 Fgd6     | protein_coding         |
| ENSMUST00000021990  | 1 | 3 | 6 Ptdss1   | protein_coding         |
| ENSMUST00000031186  | 1 | 3 | 6 Ugt2b35  | protein_coding         |
| ENSMUST00000034079  | 1 | 3 | 6 Heatr3   | protein_coding         |
| ENSMUST00000085992  | 1 | 3 | 6 Dusp27   | protein_coding         |
| ENSMUST000000100348 | 1 | 3 | 6 Cacna1b  | protein_coding         |
| ENSMUST000000107364 | 1 | 3 | 6 Rab5c    | protein_coding         |
| ENSMUST000000127282 | 1 | 3 | 6 Ucma     | protein_coding         |
| ENSMUST000000127703 | 1 | 3 | 6 Brap     | protein_coding         |
| ENSMUST000000142048 | 1 | 3 | 6 Epb4.111 | protein_coding         |
| ENSMUST000000155114 | 1 | 3 | 6 Nme5     | protein_coding         |
| ENSMUST000000159530 | 1 | 3 | 6 Rb1cc1   | protein_coding         |
| ENSMUST000000161838 | 1 | 3 | 6 Ipo9     | protein_coding         |
| ENSMUST000000180066 | 1 | 3 | 6 Gm21976  | protein_coding         |
| ENSMUST00000006221  | 1 | 3 | 4 Vps54    | protein_coding         |
| ENSMUST00000010579  | 1 | 3 | 4 Spaca7   | protein_coding         |
| ENSMUST00000020624  | 1 | 3 | 4 Cnot6    | protein_coding         |
| ENSMUST00000035106  | 1 | 3 | 4 Slc25a38 | protein_coding         |
| ENSMUST00000076264  | 1 | 3 | 4 Zfp512   | protein_coding         |
| ENSMUST000000109290 | 1 | 3 | 4 Gabrg2   | protein_coding         |
| ENSMUST000000114583 | 1 | 3 | 4 Zfp777   | protein_coding         |
| ENSMUST000000128185 | 1 | 3 | 4 Sh3kbp1  | protein_coding         |
| ENSMUST000000136250 | 1 | 3 | 4 Jazf1    | protein_coding         |
| ENSMUST000000164835 | 1 | 3 | 4 Dnajc1   | protein_coding         |
| ENSMUST000000174679 | 1 | 3 | 4 Cog4     | protein_coding         |
| ENSMUST000000136315 | 1 | 3 | 4 Gm14273  | antisense              |
| ENSMUST00000020931  | 1 | 3 | 2 Smc6     | protein_coding         |
| ENSMUST00000030698  | 1 | 3 | 2 Stx12    | protein_coding         |
| ENSMUST00000031691  | 1 | 3 | 2 Hyal4    | protein_coding         |
| ENSMUST00000060945  | 1 | 3 | 2 Aff4     | protein_coding         |
| ENSMUST00000084727  | 1 | 3 | 2 Zfp143   | protein_coding         |
| ENSMUST000000132022 | 1 | 3 | 2 Actr2    | protein_coding         |
| ENSMUST000000153268 | 1 | 3 | 2 Slco1a5  | protein_coding         |
| ENSMUST000000161800 | 1 | 3 | 2 Insc     | protein_coding         |
| ENSMUST000000163095 | 1 | 3 | 2 Smek1    | protein_coding         |
| ENSMUST000000168756 | 1 | 3 | 2 Adsl     | protein_coding         |
| ENSMUST000000170795 | 1 | 3 | 2 Mcm3ap   | protein_coding         |
| ENSMUST000000182639 | 1 | 3 | 2 Gm1976   | lincRNA                |
| ENSMUST000000117899 | 1 | 3 | 0 Gm15437  | unprocessed_pseudogene |
| ENSMUST00000013807  | 1 | 3 | 0 Pten     | protein_coding         |
| ENSMUST00000017961  | 1 | 3 | 0 Jph2     | protein_coding         |
| ENSMUST00000019616  | 1 | 3 | 0 Icam5    | protein_coding         |
| ENSMUST00000022451  | 1 | 3 | 0 Capn7    | protein_coding         |
| ENSMUST00000025081  | 1 | 3 | 0 Zeb1     | protein_coding         |
| ENSMUST00000030033  | 1 | 3 | 0 Murc     | protein_coding         |
| ENSMUST00000033577  | 1 | 3 | 0 Pbdcl    | protein_coding         |
| ENSMUST00000033809  | 1 | 3 | 0 Prps1    | protein_coding         |
| ENSMUST00000036208  | 1 | 3 | 0 Slc9a3   | protein_coding         |
| ENSMUST00000040159  | 1 | 3 | 0 C1galt1  | protein_coding         |
| ENSMUST00000064991  | 1 | 3 | 0 Scmh1    | protein_coding         |
| ENSMUST00000069511  | 1 | 3 | 0 Abcd2    | protein_coding         |
| ENSMUST00000074352  | 1 | 3 | 0 Osbpl1a  | protein_coding         |
| ENSMUST00000089925  | 1 | 3 | 0 Dgkg     | protein_coding         |
| ENSMUST000000105742 | 1 | 3 | 0 Gm13225  | protein_coding         |
| ENSMUST000000112194 | 1 | 3 | 0 Trappc2  | protein_coding         |
| ENSMUST000000114753 | 1 | 3 | 0 Ptpla    | protein_coding         |
| ENSMUST000000115547 | 1 | 3 | 0 Abcc5    | protein_coding         |
| ENSMUST000000123879 | 1 | 3 | 0 Txndc16  | protein_coding         |
| ENSMUST000000128197 | 1 | 3 | 0 Gria3    | protein_coding         |
| ENSMUST000000133610 | 1 | 3 | 0 Frem1    | protein_coding         |
| ENSMUST000000135967 | 1 | 3 | 0 Znfx1    | protein_coding         |
| ENSMUST000000137429 | 1 | 3 | 0 Rmnd1    | protein_coding         |
| ENSMUST000000142824 | 1 | 3 | 0 Prmt10   | protein_coding         |
| ENSMUST000000146968 | 1 | 3 | 0 Wdr91    | protein_coding         |
| ENSMUST000000151201 | 1 | 3 | 0 Helq     | protein_coding         |
| ENSMUST000000170318 | 1 | 3 | 0 Adam3    | protein_coding         |
| ENSMUST000000176285 | 1 | 3 | 0 Med23    | protein_coding         |

|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUST00000176500 | 1 | 3 | 0 Arhgef2        | protein_coding                     |
| ENSMUST00000180142 | 1 | 3 | 0 Abcb11         | protein_coding                     |
| ENSMUST00000145448 | 1 | 3 | 0 4930430E12Rik  | antisense                          |
| ENSMUST00000137478 | 1 | 2 | 63 0610040F04Rik | antisense                          |
| ENSMUST00000006380 | 1 | 2 | 38 Fam131c       | protein_coding                     |
| ENSMUST00000109261 | 1 | 2 | 38 Clint1        | protein_coding                     |
| ENSMUST00000030842 | 1 | 2 | 36 Lzic          | protein_coding                     |
| ENSMUST00000052449 | 1 | 2 | 34 Ubn1          | protein_coding                     |
| ENSMUST00000162276 | 1 | 2 | 30 Gm2619        | transcribed_unprocessed_pseudogene |
| ENSMUST00000046257 | 1 | 2 | 30 Sptan1        | protein_coding                     |
| ENSMUST00000111737 | 1 | 2 | 30 Mxi1          | protein_coding                     |
| ENSMUST00000111879 | 1 | 2 | 30 Dclk3         | protein_coding                     |
| ENSMUST00000102608 | 1 | 2 | 28 AU040320      | protein_coding                     |
| ENSMUST00000167799 | 1 | 2 | 28 Xpnpep3       | protein_coding                     |
| ENSMUST00000020375 | 1 | 2 | 24 Rab3ip        | protein_coding                     |
| ENSMUST00000169681 | 1 | 2 | 24 Eif4b         | protein_coding                     |
| ENSMUST00000039720 | 1 | 2 | 22 Rragb         | protein_coding                     |
| ENSMUST00000020549 | 1 | 2 | 20 Gzmm          | protein_coding                     |
| ENSMUST00000029653 | 1 | 2 | 20 Egf           | protein_coding                     |
| ENSMUST00000065977 | 1 | 2 | 20 Nrd1          | protein_coding                     |
| ENSMUST00000110194 | 1 | 2 | 20 Rnf24         | protein_coding                     |
| ENSMUST00000002327 | 1 | 2 | 18 Def6          | protein_coding                     |
| ENSMUST00000026173 | 1 | 2 | 18 Wdr45b        | protein_coding                     |
| ENSMUST00000030872 | 1 | 2 | 18 Orc5          | protein_coding                     |
| ENSMUST00000094357 | 1 | 2 | 18 Tmem116       | protein_coding                     |
| ENSMUST00000107782 | 1 | 2 | 18 Stra6l        | protein_coding                     |
| ENSMUST00000146628 | 1 | 2 | 18 Desi1         | protein_coding                     |
| ENSMUST00000178997 | 1 | 2 | 18 Tpx2          | protein_coding                     |
| ENSMUST00000126480 | 1 | 2 | 18 Gm11542       | processed_transcript               |
| ENSMUST00000150856 | 1 | 2 | 16 Vmn2r-ps54    | transcribed_unprocessed_pseudogene |
| ENSMUST00000140667 | 1 | 2 | 16 Phkg1         | protein_coding                     |
| ENSMUST00000144377 | 1 | 2 | 16 Pdpr          | protein_coding                     |
| ENSMUST00000151046 | 1 | 2 | 16 Bach1         | protein_coding                     |
| ENSMUST00000030757 | 1 | 2 | 14 Fbxo42        | protein_coding                     |
| ENSMUST00000033934 | 1 | 2 | 14 Mrps31        | protein_coding                     |
| ENSMUST00000059914 | 1 | 2 | 14 1110037F02Rik | protein_coding                     |
| ENSMUST00000085245 | 1 | 2 | 14 Slc39a9       | protein_coding                     |
| ENSMUST00000105963 | 1 | 2 | 14 Taf12         | protein_coding                     |
| ENSMUST00000128117 | 1 | 2 | 14 Clvs1         | protein_coding                     |
| ENSMUST00000132373 | 1 | 2 | 14 Wdr76         | protein_coding                     |
| ENSMUST00000101202 | 1 | 2 | 12 Ylpm1         | protein_coding                     |
| ENSMUST00000109619 | 1 | 2 | 12 Cep250        | protein_coding                     |
| ENSMUST00000111272 | 1 | 2 | 12 Prdm11        | protein_coding                     |
| ENSMUST00000115206 | 1 | 2 | 12 Nrf1          | protein_coding                     |
| ENSMUST00000120550 | 1 | 2 | 12 Srp72         | protein_coding                     |
| ENSMUST00000152735 | 1 | 2 | 12 Nkiras1       | protein_coding                     |
| ENSMUST00000168357 | 1 | 2 | 12 Sorcs1        | protein_coding                     |
| ENSMUST00000055372 | 1 | 2 | 10 1110037F02Rik | protein_coding                     |
| ENSMUST00000103172 | 1 | 2 | 10 Dstn          | protein_coding                     |
| ENSMUST00000112996 | 1 | 2 | 10 Tsc22d3       | protein_coding                     |
| ENSMUST00000132448 | 1 | 2 | 10 Chp1          | protein_coding                     |
| ENSMUST00000133213 | 1 | 2 | 10 Igsf9b        | protein_coding                     |
| ENSMUST00000148378 | 1 | 2 | 10 Sugp2         | protein_coding                     |
| ENSMUST00000151078 | 1 | 2 | 10 Uqcc1         | protein_coding                     |
| ENSMUST00000025420 | 1 | 2 | 8 Ptpn2          | protein_coding                     |
| ENSMUST00000025649 | 1 | 2 | 8 Ddb1           | protein_coding                     |
| ENSMUST00000106333 | 1 | 2 | 8 Sez6l2         | protein_coding                     |
| ENSMUST00000109868 | 1 | 2 | 8 Idnk           | protein_coding                     |
| ENSMUST00000168621 | 1 | 2 | 8 Ptpnj          | protein_coding                     |
| ENSMUST00000177943 | 1 | 2 | 8 Slc45a3        | protein_coding                     |
| ENSMUST00000000188 | 1 | 2 | 6 Ccnd2          | protein_coding                     |
| ENSMUST00000001253 | 1 | 2 | 6 Slc26a4        | protein_coding                     |
| ENSMUST00000008594 | 1 | 2 | 6 Nutf2          | protein_coding                     |
| ENSMUST00000022344 | 1 | 2 | 6 Ecd            | protein_coding                     |
| ENSMUST00000027853 | 1 | 2 | 6 Mpc2           | protein_coding                     |
| ENSMUST00000028727 | 1 | 2 | 6 Snap25         | protein_coding                     |
| ENSMUST00000031621 | 1 | 2 | 6 Ccz1           | protein_coding                     |
| ENSMUST00000039939 | 1 | 2 | 6 Szrd1          | protein_coding                     |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000057612 | 1 | 2 | 6 Ssc5d         | protein_coding |
| ENSMUST00000069148 | 1 | 2 | 6 Chodl         | protein_coding |
| ENSMUST00000078434 | 1 | 2 | 6 Ppp3cc        | protein_coding |
| ENSMUST00000090293 | 1 | 2 | 6 Raph1         | protein_coding |
| ENSMUST00000113075 | 1 | 2 | 6 Fbxw2         | protein_coding |
| ENSMUST00000134754 | 1 | 2 | 6 Ctnnal1       | protein_coding |
| ENSMUST00000151174 | 1 | 2 | 6 Myo1c         | protein_coding |
| ENSMUST00000182293 | 1 | 2 | 6 Mzf1          | protein_coding |
| ENSMUST00000155758 | 1 | 2 | 6 Halr1         | lincRNA        |
| ENSMUST00000181781 | 1 | 2 | 6 5730420D15Rik | lincRNA        |
| ENSMUST00000020653 | 1 | 2 | 4 Sar1b         | protein_coding |
| ENSMUST00000025581 | 1 | 2 | 4 Ms4a4d        | protein_coding |
| ENSMUST00000026367 | 1 | 2 | 4 Sp4           | protein_coding |
| ENSMUST00000041053 | 1 | 2 | 4 Acaa2         | protein_coding |
| ENSMUST00000052740 | 1 | 2 | 4 Tcaim         | protein_coding |
| ENSMUST00000087883 | 1 | 2 | 4 Col3a1        | protein_coding |
| ENSMUST00000103171 | 1 | 2 | 4 Ovol2         | protein_coding |
| ENSMUST00000105582 | 1 | 2 | 4 Ube2j2        | protein_coding |
| ENSMUST00000115366 | 1 | 2 | 4 Slc12a2       | protein_coding |
| ENSMUST00000127090 | 1 | 2 | 4 Sec14l1       | protein_coding |
| ENSMUST00000152551 | 1 | 2 | 4 111008F13Rik  | protein_coding |
| ENSMUST00000160517 | 1 | 2 | 4 Pcmt1         | protein_coding |
| ENSMUST00000174372 | 1 | 2 | 4 Slc2a1        | protein_coding |
| ENSMUST00000181863 | 1 | 2 | 4 Gm17514       | lincRNA        |
| ENSMUST00000141440 | 1 | 2 | 4 Gm15687       | antisense      |
| ENSMUST00000004770 | 1 | 2 | 2 Tyr           | protein_coding |
| ENSMUST00000006716 | 1 | 2 | 2 Wnt6          | protein_coding |
| ENSMUST00000020017 | 1 | 2 | 2 Aim1          | protein_coding |
| ENSMUST00000021046 | 1 | 2 | 2 Ddx42         | protein_coding |
| ENSMUST00000022494 | 1 | 2 | 2 Ebpl          | protein_coding |
| ENSMUST00000033920 | 1 | 2 | 2 Aga           | protein_coding |
| ENSMUST00000034874 | 1 | 2 | 2 Cyp11a1       | protein_coding |
| ENSMUST00000037827 | 1 | 2 | 2 Slc45a1       | protein_coding |
| ENSMUST00000041638 | 1 | 2 | 2 Gtf3c3        | protein_coding |
| ENSMUST00000052209 | 1 | 2 | 2 Cbfb          | protein_coding |
| ENSMUST00000088650 | 1 | 2 | 2 Ergic3        | protein_coding |
| ENSMUST00000098190 | 1 | 2 | 2 Rragd         | protein_coding |
| ENSMUST00000108826 | 1 | 2 | 2 Lypd8         | protein_coding |
| ENSMUST00000114729 | 1 | 2 | 2 Dpysl5        | protein_coding |
| ENSMUST00000121503 | 1 | 2 | 2 Tpm3          | protein_coding |
| ENSMUST00000122233 | 1 | 2 | 2 Kif2a         | protein_coding |
| ENSMUST00000125761 | 1 | 2 | 2 Faah          | protein_coding |
| ENSMUST00000130066 | 1 | 2 | 2 Man1a2        | protein_coding |
| ENSMUST00000131489 | 1 | 2 | 2 Sugp2         | protein_coding |
| ENSMUST00000133925 | 1 | 2 | 2 Terf2         | protein_coding |
| ENSMUST00000133939 | 1 | 2 | 2 4933427G17Rik | protein_coding |
| ENSMUST00000144280 | 1 | 2 | 2 Herc1         | protein_coding |
| ENSMUST00000148810 | 1 | 2 | 2 Fam129a       | protein_coding |
| ENSMUST00000150434 | 1 | 2 | 2 Brwd3         | protein_coding |
| ENSMUST00000161360 | 1 | 2 | 2 Tbxas1        | protein_coding |
| ENSMUST00000171765 | 1 | 2 | 2 Proc          | protein_coding |
| ENSMUST00000173998 | 1 | 2 | 2 Dtnb          | protein_coding |
| ENSMUST00000182731 | 1 | 2 | 2 Ppfia1        | protein_coding |
| ENSMUST00000002091 | 1 | 2 | 0 Bcap31        | protein_coding |
| ENSMUST00000003203 | 1 | 2 | 0 Cdk12         | protein_coding |
| ENSMUST00000010550 | 1 | 2 | 0 Mrpl52        | protein_coding |
| ENSMUST00000016678 | 1 | 2 | 0 Lamp2         | protein_coding |
| ENSMUST00000022815 | 1 | 2 | 0 Ngdn          | protein_coding |
| ENSMUST00000023559 | 1 | 2 | 0 Ehhadh        | protein_coding |
| ENSMUST00000025739 | 1 | 2 | 0 Uhrf2         | protein_coding |
| ENSMUST00000026154 | 1 | 2 | 0 Zdhhc16       | protein_coding |
| ENSMUST00000027499 | 1 | 2 | 0 Bok           | protein_coding |
| ENSMUST00000027802 | 1 | 2 | 0 Pycr2         | protein_coding |
| ENSMUST00000029256 | 1 | 2 | 0 Sec62         | protein_coding |
| ENSMUST00000029611 | 1 | 2 | 0 Lef1          | protein_coding |
| ENSMUST00000033429 | 1 | 2 | 0 Elf4          | protein_coding |
| ENSMUST00000033806 | 1 | 2 | 0 Vsig1         | protein_coding |
| ENSMUST00000034046 | 1 | 2 | 0 Acs11         | protein_coding |

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| ENSMUST00000034300 | 1 | 2 | 0 Hsbp1         | protein_coding |
| ENSMUST00000034961 | 1 | 2 | 0 Igdcc3        | protein_coding |
| ENSMUST00000035871 | 1 | 2 | 0 Tmem127       | protein_coding |
| ENSMUST00000036333 | 1 | 2 | 0 Prkx          | protein_coding |
| ENSMUST00000037260 | 1 | 2 | 0 Zfp623        | protein_coding |
| ENSMUST00000037553 | 1 | 2 | 0 Galp          | protein_coding |
| ENSMUST00000041591 | 1 | 2 | 0 Enpp2         | protein_coding |
| ENSMUST00000051145 | 1 | 2 | 0 Wdr47         | protein_coding |
| ENSMUST00000058173 | 1 | 2 | 0 Akap10        | protein_coding |
| ENSMUST00000060917 | 1 | 2 | 0 Aqp9          | protein_coding |
| ENSMUST00000062307 | 1 | 2 | 0 Phf11a        | protein_coding |
| ENSMUST00000070690 | 1 | 2 | 0 Ptafr         | protein_coding |
| ENSMUST00000071370 | 1 | 2 | 0 Pcdh17        | protein_coding |
| ENSMUST00000072376 | 1 | 2 | 0 Rnf14         | protein_coding |
| ENSMUST00000072835 | 1 | 2 | 0 Ccdc112       | protein_coding |
| ENSMUST00000084724 | 1 | 2 | 0 3110043O21Rik | protein_coding |
| ENSMUST00000086216 | 1 | 2 | 0 Anapc5        | protein_coding |
| ENSMUST00000086854 | 1 | 2 | 0 Mapk10        | protein_coding |
| ENSMUST00000098436 | 1 | 2 | 0 Mrgpra9       | protein_coding |
| ENSMUST00000106989 | 1 | 2 | 0 Mapt          | protein_coding |
| ENSMUST00000110042 | 1 | 2 | 0 Gm15440       | protein_coding |
| ENSMUST00000110044 | 1 | 2 | 0 Secisbp2      | protein_coding |
| ENSMUST00000110489 | 1 | 2 | 0 4930447C04Rik | protein_coding |
| ENSMUST00000112127 | 1 | 2 | 0 Arhgap6       | protein_coding |
| ENSMUST00000113755 | 1 | 2 | 0 Odf2          | protein_coding |
| ENSMUST00000119504 | 1 | 2 | 0 Usp16         | protein_coding |
| ENSMUST00000120522 | 1 | 2 | 0 Slc22a26      | protein_coding |
| ENSMUST00000123270 | 1 | 2 | 0 Prrc2b        | protein_coding |
| ENSMUST00000123869 | 1 | 2 | 0 Mlh1          | protein_coding |
| ENSMUST00000124561 | 1 | 2 | 0 Uimc1         | protein_coding |
| ENSMUST00000126523 | 1 | 2 | 0 3110002H16Rik | protein_coding |
| ENSMUST00000127652 | 1 | 2 | 0 Tmem59        | protein_coding |
| ENSMUST00000129480 | 1 | 2 | 0 Invs          | protein_coding |
| ENSMUST00000130839 | 1 | 2 | 0 Prodh2        | protein_coding |
| ENSMUST00000131348 | 1 | 2 | 0 Fgf1          | protein_coding |
| ENSMUST00000131600 | 1 | 2 | 0 Rere          | protein_coding |
| ENSMUST00000132157 | 1 | 2 | 0 Ldha          | protein_coding |
| ENSMUST00000132501 | 1 | 2 | 0 Mpp1          | protein_coding |
| ENSMUST00000136004 | 1 | 2 | 0 Ccdc158       | protein_coding |
| ENSMUST00000136424 | 1 | 2 | 0 Tmem165       | protein_coding |
| ENSMUST00000136816 | 1 | 2 | 0 Fam102a       | protein_coding |
| ENSMUST00000138538 | 1 | 2 | 0 Cep112        | protein_coding |
| ENSMUST00000142654 | 1 | 2 | 0 B4galt7       | protein_coding |
| ENSMUST00000144044 | 1 | 2 | 0 Spo11         | protein_coding |
| ENSMUST00000145473 | 1 | 2 | 0 Met           | protein_coding |
| ENSMUST00000145934 | 1 | 2 | 0 Ankrd13b      | protein_coding |
| ENSMUST00000146688 | 1 | 2 | 0 Gm13150       | protein_coding |
| ENSMUST00000149489 | 1 | 2 | 0 Psmd3         | protein_coding |
| ENSMUST00000149956 | 1 | 2 | 0 Aim1l         | protein_coding |
| ENSMUST00000150316 | 1 | 2 | 0 Naa20         | protein_coding |
| ENSMUST00000151366 | 1 | 2 | 0 Ptpn12        | protein_coding |
| ENSMUST00000153844 | 1 | 2 | 0 Dkc1          | protein_coding |
| ENSMUST00000155282 | 1 | 2 | 0 Myo5a         | protein_coding |
| ENSMUST00000155415 | 1 | 2 | 0 Ppfbp1        | protein_coding |
| ENSMUST00000155575 | 1 | 2 | 0 BC005537      | protein_coding |
| ENSMUST00000156317 | 1 | 2 | 0 Wnt2          | protein_coding |
| ENSMUST00000156627 | 1 | 2 | 0 Gpr98         | protein_coding |
| ENSMUST00000159061 | 1 | 2 | 0 Nmrk1         | protein_coding |
| ENSMUST00000159705 | 1 | 2 | 0 Fer1l6        | protein_coding |
| ENSMUST00000160223 | 1 | 2 | 0 Ang6          | protein_coding |
| ENSMUST00000160298 | 1 | 2 | 0 Gm8113        | protein_coding |
| ENSMUST00000161093 | 1 | 2 | 0 Polr3g        | protein_coding |
| ENSMUST00000161162 | 1 | 2 | 0 Arhgef10      | protein_coding |
| ENSMUST00000161954 | 1 | 2 | 0 Nckap5        | protein_coding |
| ENSMUST00000162449 | 1 | 2 | 0 Vwa3b         | protein_coding |
| ENSMUST00000162971 | 1 | 2 | 0 Fancc         | protein_coding |
| ENSMUST00000165105 | 1 | 2 | 0 Alkbh8        | protein_coding |
| ENSMUST00000167133 | 1 | 2 | 0 Vmn2r15       | protein_coding |

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| ENSMUST00000168163 | 1 | 2 | 0 Parpbp         | protein_coding       |
| ENSMUST00000171586 | 1 | 2 | 0 Slit1          | protein_coding       |
| ENSMUST00000174737 | 1 | 2 | 0 Kpna1          | protein_coding       |
| ENSMUST00000174806 | 1 | 2 | 0 Snx14          | protein_coding       |
| ENSMUST00000175692 | 1 | 2 | 0 Rwd4a          | protein_coding       |
| ENSMUST00000175924 | 1 | 2 | 0 Cpsf6          | protein_coding       |
| ENSMUST00000176910 | 1 | 2 | 0 Fryl           | protein_coding       |
| ENSMUST00000177710 | 1 | 2 | 0 Slc25a14       | protein_coding       |
| ENSMUST00000178340 | 1 | 2 | 0 P2ry2          | protein_coding       |
| ENSMUST00000182283 | 1 | 2 | 0 Ptprc          | protein_coding       |
| ENSMUST00000184020 | 1 | 2 | 0 Nedd4          | protein_coding       |
| ENSMUST00000184461 | 1 | 2 | 0 Ccdc132        | protein_coding       |
| ENSMUST00000184862 | 1 | 2 | 0 Mtg2           | protein_coding       |
| ENSMUST00000130912 | 1 | 2 | 0 Tctn2          | processed_transcript |
| ENSMUST00000140105 | 1 | 2 | 0 F730043M19Rik  | processed_transcript |
| ENSMUST00000152569 | 1 | 2 | 0 Gm13684        | processed_transcript |
| ENSMUST00000141935 | 1 | 2 | 0 Gm13393        | lincRNA              |
| ENSMUST00000151443 | 1 | 2 | 0 A630050E04Rik  | lincRNA              |
| ENSMUST00000183678 | 1 | 2 | 0 1700063H06Rik  | lincRNA              |
| ENSMUST00000146887 | 1 | 2 | 0 Gm15731        | antisense            |
| ENSMUST00000095345 | 1 | 1 | 85 Mboat4        | protein_coding       |
| ENSMUST00000121227 | 1 | 1 | 63 Col12a1       | protein_coding       |
| ENSMUST00000171071 | 1 | 1 | 61 Zfp236        | protein_coding       |
| ENSMUST00000034862 | 1 | 1 | 50 Al118078      | protein_coding       |
| ENSMUST00000035007 | 1 | 1 | 48 Cmtm6         | protein_coding       |
| ENSMUST00000108269 | 1 | 1 | 40 Lgals9        | protein_coding       |
| ENSMUST00000035077 | 1 | 1 | 34 Ltf           | protein_coding       |
| ENSMUST00000170157 | 1 | 1 | 34 Slc3a2        | protein_coding       |
| ENSMUST00000040992 | 1 | 1 | 30 Nek9          | protein_coding       |
| ENSMUST00000015501 | 1 | 1 | 28 Clpx          | protein_coding       |
| ENSMUST00000023159 | 1 | 1 | 28 Mgrn1         | protein_coding       |
| ENSMUST00000180474 | 1 | 1 | 28 Gm26787       | antisense            |
| ENSMUST00000036044 | 1 | 1 | 26 Zfc3h1        | protein_coding       |
| ENSMUST00000069619 | 1 | 1 | 24 Stag2         | protein_coding       |
| ENSMUST00000098060 | 1 | 1 | 24 Arhgap17      | protein_coding       |
| ENSMUST00000111800 | 1 | 1 | 24 Sh3pxd2a      | protein_coding       |
| ENSMUST00000106298 | 1 | 1 | 22 Scmh1         | protein_coding       |
| ENSMUST00000128495 | 1 | 1 | 22 Zfp444        | protein_coding       |
| ENSMUST00000151406 | 1 | 1 | 22 Rad51         | protein_coding       |
| ENSMUST00000000808 | 1 | 1 | 20 Il12rb1       | protein_coding       |
| ENSMUST00000032057 | 1 | 1 | 20 Gfpt1         | protein_coding       |
| ENSMUST00000066058 | 1 | 1 | 20 Mapkbp1       | protein_coding       |
| ENSMUST00000077191 | 1 | 1 | 20 Ethe1         | protein_coding       |
| ENSMUST00000108673 | 1 | 1 | 20 Myh10         | protein_coding       |
| ENSMUST00000109469 | 1 | 1 | 20 Mpped1        | protein_coding       |
| ENSMUST00000166984 | 1 | 1 | 20 Fubp1         | protein_coding       |
| ENSMUST00000017290 | 1 | 1 | 18 Brca1         | protein_coding       |
| ENSMUST00000027302 | 1 | 1 | 18 Ptpn18        | protein_coding       |
| ENSMUST00000091259 | 1 | 1 | 18 Slc7a14       | protein_coding       |
| ENSMUST00000091789 | 1 | 1 | 18 Mbp           | protein_coding       |
| ENSMUST00000101800 | 1 | 1 | 18 Msrb1         | protein_coding       |
| ENSMUST00000104893 | 1 | 1 | 18 Pcyt1a        | protein_coding       |
| ENSMUST00000113819 | 1 | 1 | 18 Arpc2         | protein_coding       |
| ENSMUST00000117083 | 1 | 1 | 18 Trip4         | protein_coding       |
| ENSMUST00000143372 | 1 | 1 | 18 Adck4         | protein_coding       |
| ENSMUST00000148262 | 1 | 1 | 18 Tmem189       | protein_coding       |
| ENSMUST00000141035 | 1 | 1 | 18 Gm14471       | processed_transcript |
| ENSMUST00000016530 | 1 | 1 | 16 Mpped2        | protein_coding       |
| ENSMUST00000039840 | 1 | 1 | 16 Enpp6         | protein_coding       |
| ENSMUST00000061823 | 1 | 1 | 16 4933440M02Rik | protein_coding       |
| ENSMUST00000084621 | 1 | 1 | 16 Tbc1d2        | protein_coding       |
| ENSMUST00000107358 | 1 | 1 | 16 Stat5b        | protein_coding       |
| ENSMUST00000109255 | 1 | 1 | 16 Prickle1      | protein_coding       |
| ENSMUST00000130509 | 1 | 1 | 16 Wdfy4         | protein_coding       |
| ENSMUST00000134529 | 1 | 1 | 16 Glt1d1        | protein_coding       |
| ENSMUST00000139961 | 1 | 1 | 16 Msrb3         | protein_coding       |
| ENSMUST00000027432 | 1 | 1 | 14 Psm1          | protein_coding       |
| ENSMUST00000033617 | 1 | 1 | 14 Btk           | protein_coding       |



|                    |   |   |                  |                |
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| ENSMUST00000036030 | 1 | 1 | 14 Tmed7         | protein_coding |
| ENSMUST00000070681 | 1 | 1 | 14 Gid4          | protein_coding |
| ENSMUST00000097855 | 1 | 1 | 14 Ccr5          | protein_coding |
| ENSMUST00000106631 | 1 | 1 | 14 Calr4         | protein_coding |
| ENSMUST00000118626 | 1 | 1 | 14 Mfap5         | protein_coding |
| ENSMUST00000124310 | 1 | 1 | 14 Bfsp2         | protein_coding |
| ENSMUST00000138468 | 1 | 1 | 14 Itch          | protein_coding |
| ENSMUST00000180880 | 1 | 1 | 14 Gm26637       | lincRNA        |
| ENSMUST00000168835 | 1 | 1 | 14 C230037L18Rik | antisense      |
| ENSMUST00000022100 | 1 | 1 | 12 Slc6a3        | protein_coding |
| ENSMUST00000028802 | 1 | 1 | 12 Casc5         | protein_coding |
| ENSMUST00000041555 | 1 | 1 | 12 Mvb12b        | protein_coding |
| ENSMUST00000049353 | 1 | 1 | 12 Zfp692        | protein_coding |
| ENSMUST00000056028 | 1 | 1 | 12 Sbk1          | protein_coding |
| ENSMUST00000058735 | 1 | 1 | 12 Ubqln1        | protein_coding |
| ENSMUST00000059680 | 1 | 1 | 12 Golph3        | protein_coding |
| ENSMUST00000067387 | 1 | 1 | 12 BC055111      | protein_coding |
| ENSMUST00000091299 | 1 | 1 | 12 Cdk7          | protein_coding |
| ENSMUST00000100262 | 1 | 1 | 12 Slc38a1       | protein_coding |
| ENSMUST00000112350 | 1 | 1 | 12 Mta3          | protein_coding |
| ENSMUST00000162860 | 1 | 1 | 12 Gcc2          | protein_coding |
| ENSMUST00000170552 | 1 | 1 | 12 Supt20        | protein_coding |
| ENSMUST00000126140 | 1 | 1 | 12 F730016J06Rik | lincRNA        |
| ENSMUST00000181403 | 1 | 1 | 12 1810034E14Rik | antisense      |
| ENSMUST00000025999 | 1 | 1 | 10 Add3          | protein_coding |
| ENSMUST00000031366 | 1 | 1 | 10 Kntc1         | protein_coding |
| ENSMUST00000031376 | 1 | 1 | 10 Zcchc8        | protein_coding |
| ENSMUST00000034728 | 1 | 1 | 10 Dock6         | protein_coding |
| ENSMUST00000034949 | 1 | 1 | 10 Csnk1g1       | protein_coding |
| ENSMUST00000043658 | 1 | 1 | 10 Hlf           | protein_coding |
| ENSMUST00000054212 | 1 | 1 | 10 Rab11fip1     | protein_coding |
| ENSMUST00000079833 | 1 | 1 | 10 Hsf2          | protein_coding |
| ENSMUST00000097580 | 1 | 1 | 10 Arl14epl      | protein_coding |
| ENSMUST00000106354 | 1 | 1 | 10 Sept9         | protein_coding |
| ENSMUST00000113337 | 1 | 1 | 10 Ubr2          | protein_coding |
| ENSMUST00000114779 | 1 | 1 | 10 Ssbp1         | protein_coding |
| ENSMUST00000144364 | 1 | 1 | 10 Iffo1         | protein_coding |
| ENSMUST00000148238 | 1 | 1 | 10 Mto1          | protein_coding |
| ENSMUST00000148263 | 1 | 1 | 10 Dhx40         | protein_coding |
| ENSMUST00000150336 | 1 | 1 | 10 Zfp287        | protein_coding |
| ENSMUST00000151606 | 1 | 1 | 10 Tbx15         | protein_coding |
| ENSMUST00000152741 | 1 | 1 | 10 Rad54l        | protein_coding |
| ENSMUST00000160640 | 1 | 1 | 10 4933434E20Rik | protein_coding |
| ENSMUST00000160790 | 1 | 1 | 10 Ttc21a        | protein_coding |
| ENSMUST00000079720 | 1 | 1 | 10 Gm1631        | lincRNA        |
| ENSMUST00000139424 | 1 | 1 | 10 Gm11635       | lincRNA        |
| ENSMUST00000180383 | 1 | 1 | 10 Gm26594       | lincRNA        |
| ENSMUST00000018645 | 1 | 1 | 8 Ncor1          | protein_coding |
| ENSMUST00000018800 | 1 | 1 | 8 Myl4           | protein_coding |
| ENSMUST00000021368 | 1 | 1 | 8 Nemf           | protein_coding |
| ENSMUST00000022325 | 1 | 1 | 8 9230112D13Rik  | protein_coding |
| ENSMUST00000025434 | 1 | 1 | 8 Slc14a2        | protein_coding |
| ENSMUST00000028087 | 1 | 1 | 8 Ppp6c          | protein_coding |
| ENSMUST00000029371 | 1 | 1 | 8 Smad9          | protein_coding |
| ENSMUST00000031032 | 1 | 1 | 8 Ppm1g          | protein_coding |
| ENSMUST00000048994 | 1 | 1 | 8 Nfkbil1        | protein_coding |
| ENSMUST00000058889 | 1 | 1 | 8 Fancm          | protein_coding |
| ENSMUST00000090981 | 1 | 1 | 8 Pear1          | protein_coding |
| ENSMUST00000099479 | 1 | 1 | 8 Ddx46          | protein_coding |
| ENSMUST00000106308 | 1 | 1 | 8 Dnah17         | protein_coding |
| ENSMUST00000108127 | 1 | 1 | 8 3110043O21Rik  | protein_coding |
| ENSMUST00000112657 | 1 | 1 | 8 Cadps          | protein_coding |
| ENSMUST00000117389 | 1 | 1 | 8 Prdm10         | protein_coding |
| ENSMUST00000120061 | 1 | 1 | 8 Rbfox3         | protein_coding |
| ENSMUST00000121219 | 1 | 1 | 8 Frmd5          | protein_coding |
| ENSMUST00000129853 | 1 | 1 | 8 Fam57a         | protein_coding |
| ENSMUST00000131201 | 1 | 1 | 8 Palm2          | protein_coding |
| ENSMUST00000134028 | 1 | 1 | 8 Arhgef6        | protein_coding |

|                    |   |   |                 |                      |
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| ENSMUST00000166802 | 1 | 1 | 8 Gpr114        | protein_coding       |
| ENSMUST00000173741 | 1 | 1 | 8 Zdhhc21       | protein_coding       |
| ENSMUST00000132267 | 1 | 1 | 8 Gm15559       | processed_transcript |
| ENSMUST0000010502  | 1 | 1 | 6 Ifi35         | protein_coding       |
| ENSMUST00000024749 | 1 | 1 | 6 Polh          | protein_coding       |
| ENSMUST00000025752 | 1 | 1 | 6 Pola2         | protein_coding       |
| ENSMUST00000043305 | 1 | 1 | 6 Wdtdc1        | protein_coding       |
| ENSMUST00000049995 | 1 | 1 | 6 March10       | protein_coding       |
| ENSMUST00000052404 | 1 | 1 | 6 Epb4.1l5      | protein_coding       |
| ENSMUST00000055294 | 1 | 1 | 6 Grem2         | protein_coding       |
| ENSMUST00000056474 | 1 | 1 | 6 Fam221b       | protein_coding       |
| ENSMUST00000058326 | 1 | 1 | 6 Sall2         | protein_coding       |
| ENSMUST00000066295 | 1 | 1 | 6 Kcnk3         | protein_coding       |
| ENSMUST00000081591 | 1 | 1 | 6 Zc3h15        | protein_coding       |
| ENSMUST00000084299 | 1 | 1 | 6 Akirin2       | protein_coding       |
| ENSMUST00000089403 | 1 | 1 | 6 Porcn         | protein_coding       |
| ENSMUST00000102917 | 1 | 1 | 6 Col15a1       | protein_coding       |
| ENSMUST00000106762 | 1 | 1 | 6 Bptf          | protein_coding       |
| ENSMUST00000108062 | 1 | 1 | 6 Bcas3         | protein_coding       |
| ENSMUST00000111795 | 1 | 1 | 6 Tmem116       | protein_coding       |
| ENSMUST00000122222 | 1 | 1 | 6 Casz1         | protein_coding       |
| ENSMUST00000125106 | 1 | 1 | 6 Prpf38a       | protein_coding       |
| ENSMUST00000125171 | 1 | 1 | 6 Mob1b         | protein_coding       |
| ENSMUST00000133046 | 1 | 1 | 6 Lsm14a        | protein_coding       |
| ENSMUST00000141015 | 1 | 1 | 6 Gm608         | protein_coding       |
| ENSMUST00000151689 | 1 | 1 | 6 Magt1         | protein_coding       |
| ENSMUST00000164922 | 1 | 1 | 6 Irf5          | protein_coding       |
| ENSMUST00000165868 | 1 | 1 | 6 Rfx4          | protein_coding       |
| ENSMUST00000167322 | 1 | 1 | 6 9030617O03Rik | protein_coding       |
| ENSMUST00000171601 | 1 | 1 | 6 Mpp6          | protein_coding       |
| ENSMUST00000130262 | 1 | 1 | 6 Gm14055       | lincRNA              |
| ENSMUST00000181667 | 1 | 1 | 6 Gm805         | lincRNA              |
| ENSMUST00000019909 | 1 | 1 | 4 Rgs17         | protein_coding       |
| ENSMUST00000020922 | 1 | 1 | 4 Trib2         | protein_coding       |
| ENSMUST00000024599 | 1 | 1 | 4 Igf2r         | protein_coding       |
| ENSMUST00000025404 | 1 | 1 | 4 Cidea         | protein_coding       |
| ENSMUST00000029946 | 1 | 1 | 4 Rragd         | protein_coding       |
| ENSMUST00000035635 | 1 | 1 | 4 Bmp2k         | protein_coding       |
| ENSMUST00000048192 | 1 | 1 | 4 Haus1         | protein_coding       |
| ENSMUST00000059018 | 1 | 1 | 4 Fbxo31        | protein_coding       |
| ENSMUST00000060537 | 1 | 1 | 4 Kif1b         | protein_coding       |
| ENSMUST00000071230 | 1 | 1 | 4 Eif2s1        | protein_coding       |
| ENSMUST00000084203 | 1 | 1 | 4 Plekha7       | protein_coding       |
| ENSMUST00000086104 | 1 | 1 | 4 Prkd2         | protein_coding       |
| ENSMUST00000102793 | 1 | 1 | 4 Tm2d1         | protein_coding       |
| ENSMUST00000102864 | 1 | 1 | 4 Rel           | protein_coding       |
| ENSMUST00000106495 | 1 | 1 | 4 Grb2          | protein_coding       |
| ENSMUST00000108287 | 1 | 1 | 4 Sarm1         | protein_coding       |
| ENSMUST00000111899 | 1 | 1 | 4 Pprc1         | protein_coding       |
| ENSMUST00000119612 | 1 | 1 | 4 Lypla1        | protein_coding       |
| ENSMUST00000126306 | 1 | 1 | 4 Rab11fip3     | protein_coding       |
| ENSMUST00000134032 | 1 | 1 | 4 Lrp1b         | protein_coding       |
| ENSMUST00000142092 | 1 | 1 | 4 Adam17        | protein_coding       |
| ENSMUST00000147003 | 1 | 1 | 4 Pigx          | protein_coding       |
| ENSMUST00000153895 | 1 | 1 | 4 Ifi140        | protein_coding       |
| ENSMUST00000154406 | 1 | 1 | 4 Chp1          | protein_coding       |
| ENSMUST00000156263 | 1 | 1 | 4 Rad23b        | protein_coding       |
| ENSMUST00000161853 | 1 | 1 | 4 Pdia6         | protein_coding       |
| ENSMUST00000165310 | 1 | 1 | 4 Ms4a6c        | protein_coding       |
| ENSMUST00000177543 | 1 | 1 | 4 Aftph         | protein_coding       |
| ENSMUST00000184118 | 1 | 1 | 4 Meaf6         | protein_coding       |
| ENSMUST00000185176 | 1 | 1 | 4 Lzts1         | protein_coding       |
| ENSMUST00000138077 | 1 | 1 | 4 Gm13110       | processed_transcript |
| ENSMUST00000141267 | 1 | 1 | 2 Arhgap29      | protein_coding       |
| ENSMUST00000141267 | 1 | 1 | 2 Arhgap29      | protein_coding       |
| ENSMUST00000006377 | 1 | 1 | 2 Zbtb17        | protein_coding       |
| ENSMUST00000016086 | 1 | 1 | 2 Gtf2ird2      | protein_coding       |
| ENSMUST00000021040 | 1 | 1 | 2 Cct6b         | protein_coding       |

|                     |   |   |                 |                        |
|---------------------|---|---|-----------------|------------------------|
| ENSMUST00000022172  | 1 | 1 | 2 Polk          | protein_coding         |
| ENSMUST00000025356  | 1 | 1 | 2 Mal2          | protein_coding         |
| ENSMUST00000025570  | 1 | 1 | 2 Sdhaf2        | protein_coding         |
| ENSMUST00000026315  | 1 | 1 | 2 Dnase1l3      | protein_coding         |
| ENSMUST00000029610  | 1 | 1 | 2 Hadh          | protein_coding         |
| ENSMUST00000032762  | 1 | 1 | 2 Plin1         | protein_coding         |
| ENSMUST00000043294  | 1 | 1 | 2 Asb4          | protein_coding         |
| ENSMUST00000046975  | 1 | 1 | 2 Pcgf3         | protein_coding         |
| ENSMUST00000050646  | 1 | 1 | 2 Ttc19         | protein_coding         |
| ENSMUST00000054547  | 1 | 1 | 2 Ptpn11        | protein_coding         |
| ENSMUST00000062202  | 1 | 1 | 2 Sned1         | protein_coding         |
| ENSMUST00000066545  | 1 | 1 | 2 Shank3        | protein_coding         |
| ENSMUST00000070080  | 1 | 1 | 2 B4galt6       | protein_coding         |
| ENSMUST00000074660  | 1 | 1 | 2 Chrdl1        | protein_coding         |
| ENSMUST00000076635  | 1 | 1 | 2 Zfp280c       | protein_coding         |
| ENSMUST00000084215  | 1 | 1 | 2 Eif4g3        | protein_coding         |
| ENSMUST00000092459  | 1 | 1 | 2 Cd300lh       | protein_coding         |
| ENSMUST00000097856  | 1 | 1 | 2 Fam76a        | protein_coding         |
| ENSMUST00000100239  | 1 | 1 | 2 Gm11711       | protein_coding         |
| ENSMUST00000100240  | 1 | 1 | 2 Gm11710       | protein_coding         |
| ENSMUST00000100347  | 1 | 1 | 2 Mapt          | protein_coding         |
| ENSMUST00000100538  | 1 | 1 | 2 Zc3h3         | protein_coding         |
| ENSMUST00000108486  | 1 | 1 | 2 Atp2a3        | protein_coding         |
| ENSMUST00000109092  | 1 | 1 | 2 Sec24a        | protein_coding         |
| ENSMUST00000110551  | 1 | 1 | 2 Sord          | protein_coding         |
| ENSMUST00000110857  | 1 | 1 | 2 Dld           | protein_coding         |
| ENSMUST00000110983  | 1 | 1 | 2 Tsc22d4       | protein_coding         |
| ENSMUST00000122231  | 1 | 1 | 2 Rufy2         | protein_coding         |
| ENSMUST00000129143  | 1 | 1 | 2 Smox          | protein_coding         |
| ENSMUST00000129181  | 1 | 1 | 2 Sdhb          | protein_coding         |
| ENSMUST00000139054  | 1 | 1 | 2 Aff4          | protein_coding         |
| ENSMUST00000144318  | 1 | 1 | 2 Top2a         | protein_coding         |
| ENSMUST00000148152  | 1 | 1 | 2 Fyn           | protein_coding         |
| ENSMUST00000149254  | 1 | 1 | 2 Ap4e1         | protein_coding         |
| ENSMUST00000149405  | 1 | 1 | 2 BC004004      | protein_coding         |
| ENSMUST00000153312  | 1 | 1 | 2 Cd59a         | protein_coding         |
| ENSMUST00000155487  | 1 | 1 | 2 Hiatl1        | protein_coding         |
| ENSMUST00000160360  | 1 | 1 | 2 Hipk2         | protein_coding         |
| ENSMUST00000161195  | 1 | 1 | 2 Lrrc9         | protein_coding         |
| ENSMUST00000168862  | 1 | 1 | 2 Ap2a1         | protein_coding         |
| ENSMUST00000174335  | 1 | 1 | 2 Il1rl1        | protein_coding         |
| ENSMUST00000177180  | 1 | 1 | 2 Ttll8         | protein_coding         |
| ENSMUST00000178195  | 1 | 1 | 2 Pkd11l        | protein_coding         |
| ENSMUST00000178573  | 1 | 1 | 2 Wdr53         | protein_coding         |
| ENSMUST00000179353  | 1 | 1 | 2 Sept2         | protein_coding         |
| ENSMUST00000140041  | 1 | 1 | 2 A530058N18Rik | processed_transcript   |
| ENSMUST00000174654  | 1 | 1 | 2 Gm20470       | processed_transcript   |
| ENSMUST00000117663  | 1 | 1 | 2 Gm15901       | processed_pseudogene   |
| ENSMUST00000180468  | 1 | 1 | 2 Gm26510       | lincRNA                |
| ENSMUST00000181237  | 1 | 1 | 2 Gm26722       | lincRNA                |
| ENSMUST00000121376  | 1 | 1 | 0 Gm11384       | unprocessed_pseudogene |
| ENSMUST00000122043  | 1 | 1 | 0 Xlr5e-ps      | unprocessed_pseudogene |
| ENSMUST00000181571  | 1 | 1 | 0 Gm26701       | unprocessed_pseudogene |
| ENSMUST00000001824  | 1 | 1 | 0 Folh1         | protein_coding         |
| ENSMUST000000005791 | 1 | 1 | 0 Cabp5         | protein_coding         |
| ENSMUST00000007042  | 1 | 1 | 0 Ik            | protein_coding         |
| ENSMUST00000007046  | 1 | 1 | 0 Tmco6         | protein_coding         |
| ENSMUST000000013755 | 1 | 1 | 0 Snx31         | protein_coding         |
| ENSMUST00000018816  | 1 | 1 | 0 Copz2         | protein_coding         |
| ENSMUST00000019333  | 1 | 1 | 0 Rnf145        | protein_coding         |
| ENSMUST00000020776  | 1 | 1 | 0 Ccdc117       | protein_coding         |
| ENSMUST00000021251  | 1 | 1 | 0 Lrrc46        | protein_coding         |
| ENSMUST00000025546  | 1 | 1 | 0 Cndp2         | protein_coding         |
| ENSMUST00000026175  | 1 | 1 | 0 Fn3k          | protein_coding         |
| ENSMUST00000026211  | 1 | 1 | 0 Cyp2c44       | protein_coding         |
| ENSMUST00000028347  | 1 | 1 | 0 Rbms1         | protein_coding         |
| ENSMUST00000029106  | 1 | 1 | 0 Zbtb46        | protein_coding         |
| ENSMUST00000029570  | 1 | 1 | 0 Hiat1         | protein_coding         |

|                    |   |   |                 |                |
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| ENSMUST00000029671 | 1 | 1 | 0 Ifi44         | protein_coding |
| ENSMUST00000031841 | 1 | 1 | 0 Tra2a         | protein_coding |
| ENSMUST00000031868 | 1 | 1 | 0 Slc13a4       | protein_coding |
| ENSMUST00000032060 | 1 | 1 | 0 Nfu1          | protein_coding |
| ENSMUST00000032165 | 1 | 1 | 0 Ruvbl1        | protein_coding |
| ENSMUST00000032477 | 1 | 1 | 0 Necap1        | protein_coding |
| ENSMUST00000033185 | 1 | 1 | 0 Hpx           | protein_coding |
| ENSMUST00000033263 | 1 | 1 | 0 Umod          | protein_coding |
| ENSMUST00000033880 | 1 | 1 | 0 Eif4ebp1      | protein_coding |
| ENSMUST00000034896 | 1 | 1 | 0 Mto1          | protein_coding |
| ENSMUST00000036003 | 1 | 1 | 0 Khlh42        | protein_coding |
| ENSMUST00000039537 | 1 | 1 | 0 Fam63a        | protein_coding |
| ENSMUST00000039665 | 1 | 1 | 0 Troap         | protein_coding |
| ENSMUST00000040465 | 1 | 1 | 0 Clca5         | protein_coding |
| ENSMUST00000041778 | 1 | 1 | 0 Zfp174        | protein_coding |
| ENSMUST00000042046 | 1 | 1 | 0 Scara3        | protein_coding |
| ENSMUST00000042220 | 1 | 1 | 0 Naip6         | protein_coding |
| ENSMUST00000043061 | 1 | 1 | 0 Fam159b       | protein_coding |
| ENSMUST00000043160 | 1 | 1 | 0 Aqr           | protein_coding |
| ENSMUST00000043356 | 1 | 1 | 0 0610010F05Rik | protein_coding |
| ENSMUST00000046266 | 1 | 1 | 0 Elmsan1       | protein_coding |
| ENSMUST00000047672 | 1 | 1 | 0 Cct2          | protein_coding |
| ENSMUST00000051906 | 1 | 1 | 0 Akap17b       | protein_coding |
| ENSMUST00000055226 | 1 | 1 | 0 Fn1           | protein_coding |
| ENSMUST00000055984 | 1 | 1 | 0 Isg20l2       | protein_coding |
| ENSMUST00000056053 | 1 | 1 | 0 Setd1b        | protein_coding |
| ENSMUST00000057037 | 1 | 1 | 0 Cep170        | protein_coding |
| ENSMUST00000057454 | 1 | 1 | 0 Gchfr         | protein_coding |
| ENSMUST00000058045 | 1 | 1 | 0 Gareml        | protein_coding |
| ENSMUST00000059343 | 1 | 1 | 0 EphA10        | protein_coding |
| ENSMUST00000059970 | 1 | 1 | 0 Gulo          | protein_coding |
| ENSMUST00000061322 | 1 | 1 | 0 Mlf1          | protein_coding |
| ENSMUST00000061446 | 1 | 1 | 0 Tmem130       | protein_coding |
| ENSMUST00000061593 | 1 | 1 | 0 Cphx1         | protein_coding |
| ENSMUST00000064393 | 1 | 1 | 0 Rcl1          | protein_coding |
| ENSMUST00000065330 | 1 | 1 | 0 Clk3          | protein_coding |
| ENSMUST00000065603 | 1 | 1 | 0 Lrrc49        | protein_coding |
| ENSMUST00000068275 | 1 | 1 | 0 Nyap2         | protein_coding |
| ENSMUST00000071487 | 1 | 1 | 0 Larp1         | protein_coding |
| ENSMUST00000071937 | 1 | 1 | 0 Kcnj14        | protein_coding |
| ENSMUST00000072287 | 1 | 1 | 0 Pi4kb         | protein_coding |
| ENSMUST00000075258 | 1 | 1 | 0 Pitpnm3       | protein_coding |
| ENSMUST00000076372 | 1 | 1 | 0 Sf3b4         | protein_coding |
| ENSMUST00000077159 | 1 | 1 | 0 Mical3        | protein_coding |
| ENSMUST00000077530 | 1 | 1 | 0 Rdh19         | protein_coding |
| ENSMUST00000077696 | 1 | 1 | 0 Igdcc4        | protein_coding |
| ENSMUST00000077787 | 1 | 1 | 0 Zfp14         | protein_coding |
| ENSMUST00000078574 | 1 | 1 | 0 Xlr5a         | protein_coding |
| ENSMUST00000079642 | 1 | 1 | 0 Zfp119a       | protein_coding |
| ENSMUST00000081134 | 1 | 1 | 0 Sycp2         | protein_coding |
| ENSMUST00000081387 | 1 | 1 | 0 Birc5         | protein_coding |
| ENSMUST00000084253 | 1 | 1 | 0 Epb4.1        | protein_coding |
| ENSMUST00000085894 | 1 | 1 | 0 Cfap45        | protein_coding |
| ENSMUST00000091878 | 1 | 1 | 0 Gm13051       | protein_coding |
| ENSMUST00000092645 | 1 | 1 | 0 Epb4.1l2      | protein_coding |
| ENSMUST00000093791 | 1 | 1 | 0 Cep63         | protein_coding |
| ENSMUST00000094790 | 1 | 1 | 0 Gipr          | protein_coding |
| ENSMUST00000096038 | 1 | 1 | 0 3425401B19Rik | protein_coding |
| ENSMUST00000096191 | 1 | 1 | 0 Vps8          | protein_coding |
| ENSMUST00000099923 | 1 | 1 | 0 4833423E24Rik | protein_coding |
| ENSMUST00000100207 | 1 | 1 | 0 Fnbp1         | protein_coding |
| ENSMUST00000102543 | 1 | 1 | 0 Aqr           | protein_coding |
| ENSMUST00000102703 | 1 | 1 | 0 Zfp39         | protein_coding |
| ENSMUST00000103242 | 1 | 1 | 0 Tmem97        | protein_coding |
| ENSMUST00000105463 | 1 | 1 | 0 Cdh23         | protein_coding |
| ENSMUST00000105741 | 1 | 1 | 0 Gm13225       | protein_coding |
| ENSMUST00000106054 | 1 | 1 | 0 Yars          | protein_coding |
| ENSMUST00000106310 | 1 | 1 | 0 Foxj3         | protein_coding |

|                    |   |   |                 |                |
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| ENSMUST00000106731 | 1 | 1 | 0 Lrp8          | protein_coding |
| ENSMUST00000106939 | 1 | 1 | 0 Tik2          | protein_coding |
| ENSMUST00000107474 | 1 | 1 | 0 Rara          | protein_coding |
| ENSMUST00000107891 | 1 | 1 | 0 Nup62         | protein_coding |
| ENSMUST00000108288 | 1 | 1 | 0 Lrfr1         | protein_coding |
| ENSMUST00000109172 | 1 | 1 | 0 Rasgef1c      | protein_coding |
| ENSMUST00000110040 | 1 | 1 | 0 Sema4d        | protein_coding |
| ENSMUST00000110840 | 1 | 1 | 0 Dcun1d2       | protein_coding |
| ENSMUST00000111257 | 1 | 1 | 0 Cd82          | protein_coding |
| ENSMUST00000111768 | 1 | 1 | 0 Gm766         | protein_coding |
| ENSMUST00000112336 | 1 | 1 | 0 Crybb2        | protein_coding |
| ENSMUST00000112393 | 1 | 1 | 0 Pm20d1        | protein_coding |
| ENSMUST00000113624 | 1 | 1 | 0 Rora          | protein_coding |
| ENSMUST00000114158 | 1 | 1 | 0 Crmp1         | protein_coding |
| ENSMUST00000114446 | 1 | 1 | 0 Cbx3          | protein_coding |
| ENSMUST00000115021 | 1 | 1 | 0 Cald1         | protein_coding |
| ENSMUST00000115561 | 1 | 1 | 0 Gm5751        | protein_coding |
| ENSMUST00000118438 | 1 | 1 | 0 Arl6          | protein_coding |
| ENSMUST00000119285 | 1 | 1 | 0 Gm4297        | protein_coding |
| ENSMUST00000122175 | 1 | 1 | 0 Osbpl1a       | protein_coding |
| ENSMUST00000122427 | 1 | 1 | 0 Slc12a8       | protein_coding |
| ENSMUST00000124099 | 1 | 1 | 0 Mapk13        | protein_coding |
| ENSMUST00000124867 | 1 | 1 | 0 Rnf170        | protein_coding |
| ENSMUST00000125114 | 1 | 1 | 0 Slc25a45      | protein_coding |
| ENSMUST00000125172 | 1 | 1 | 0 Phb           | protein_coding |
| ENSMUST00000125750 | 1 | 1 | 0 D330045A20Rik | protein_coding |
| ENSMUST00000126595 | 1 | 1 | 0 Plb1          | protein_coding |
| ENSMUST00000126981 | 1 | 1 | 0 Coq2          | protein_coding |
| ENSMUST00000127226 | 1 | 1 | 0 Slc43a2       | protein_coding |
| ENSMUST00000130091 | 1 | 1 | 0 Hk1           | protein_coding |
| ENSMUST00000130265 | 1 | 1 | 0 Chd6          | protein_coding |
| ENSMUST00000132416 | 1 | 1 | 0 Alg13         | protein_coding |
| ENSMUST00000132838 | 1 | 1 | 0 Slc38a8       | protein_coding |
| ENSMUST00000133445 | 1 | 1 | 0 Rragc         | protein_coding |
| ENSMUST00000134138 | 1 | 1 | 0 Ddx26b        | protein_coding |
| ENSMUST00000134935 | 1 | 1 | 0 Sptbn5        | protein_coding |
| ENSMUST00000135031 | 1 | 1 | 0 Pdzk1         | protein_coding |
| ENSMUST00000136307 | 1 | 1 | 0 Slc22a5       | protein_coding |
| ENSMUST00000136513 | 1 | 1 | 0 Napb          | protein_coding |
| ENSMUST00000138935 | 1 | 1 | 0 Cep128        | protein_coding |
| ENSMUST00000139906 | 1 | 1 | 0 Adra1b        | protein_coding |
| ENSMUST00000141416 | 1 | 1 | 0 Whsc1         | protein_coding |
| ENSMUST00000141545 | 1 | 1 | 0 Adam23        | protein_coding |
| ENSMUST00000141703 | 1 | 1 | 0 Lym7          | protein_coding |
| ENSMUST00000142554 | 1 | 1 | 0 Abl1          | protein_coding |
| ENSMUST00000146880 | 1 | 1 | 0 Gpn1          | protein_coding |
| ENSMUST00000147265 | 1 | 1 | 0 Srsf3         | protein_coding |
| ENSMUST00000147299 | 1 | 1 | 0 Bpifb9a       | protein_coding |
| ENSMUST00000147566 | 1 | 1 | 0 Lpcat1        | protein_coding |
| ENSMUST00000149331 | 1 | 1 | 0 Fndc3c1       | protein_coding |
| ENSMUST00000149861 | 1 | 1 | 0 4933406J08Rik | protein_coding |
| ENSMUST00000150649 | 1 | 1 | 0 Pydc4         | protein_coding |
| ENSMUST00000152006 | 1 | 1 | 0 Arhgef11      | protein_coding |
| ENSMUST00000152037 | 1 | 1 | 0 Uba2          | protein_coding |
| ENSMUST00000152289 | 1 | 1 | 0 Ifit74        | protein_coding |
| ENSMUST00000153324 | 1 | 1 | 0 Trim6         | protein_coding |
| ENSMUST00000153496 | 1 | 1 | 0 Tmtc4         | protein_coding |
| ENSMUST00000153519 | 1 | 1 | 0 Mixipl        | protein_coding |
| ENSMUST00000153602 | 1 | 1 | 0 Cerkl         | protein_coding |
| ENSMUST00000153694 | 1 | 1 | 0 Phgdh         | protein_coding |
| ENSMUST00000153707 | 1 | 1 | 0 Pik3c2b       | protein_coding |
| ENSMUST00000156437 | 1 | 1 | 0 Gpr133        | protein_coding |
| ENSMUST00000157047 | 1 | 1 | 0 Ppan          | protein_coding |
| ENSMUST00000157065 | 1 | 1 | 0 Slc1a3        | protein_coding |
| ENSMUST00000159126 | 1 | 1 | 0 Wdr35         | protein_coding |
| ENSMUST00000159333 | 1 | 1 | 0 Stk19         | protein_coding |
| ENSMUST00000159483 | 1 | 1 | 0 Stag3         | protein_coding |
| ENSMUST00000160170 | 1 | 1 | 0 Psat1         | protein_coding |

|                    |   |   |     |               |                      |
|--------------------|---|---|-----|---------------|----------------------|
| ENSMUST00000160190 | 1 | 1 | 0   | Zmiz1         | protein_coding       |
| ENSMUST00000160422 | 1 | 1 | 0   | Cpsf4         | protein_coding       |
| ENSMUST00000161896 | 1 | 1 | 0   | Zkscan5       | protein_coding       |
| ENSMUST00000163394 | 1 | 1 | 0   | Pnlcd1        | protein_coding       |
| ENSMUST00000164294 | 1 | 1 | 0   | Ccnt1         | protein_coding       |
| ENSMUST00000166032 | 1 | 1 | 0   | Tdrkh         | protein_coding       |
| ENSMUST00000167880 | 1 | 1 | 0   | Sbf2          | protein_coding       |
| ENSMUST00000168808 | 1 | 1 | 0   | Ptpn4         | protein_coding       |
| ENSMUST00000169559 | 1 | 1 | 0   | Vmn2r110      | protein_coding       |
| ENSMUST00000171366 | 1 | 1 | 0   | Disp1         | protein_coding       |
| ENSMUST00000173584 | 1 | 1 | 0   | Vars          | protein_coding       |
| ENSMUST00000175959 | 1 | 1 | 0   | Kdm2a         | protein_coding       |
| ENSMUST00000177376 | 1 | 1 | 0   | Cct8          | protein_coding       |
| ENSMUST00000177768 | 1 | 1 | 0   | Fam177a       | protein_coding       |
| ENSMUST00000177978 | 1 | 1 | 0   | 1700047117Rik | protein_coding       |
| ENSMUST00000179865 | 1 | 1 | 0   | Canx          | protein_coding       |
| ENSMUST00000179976 | 1 | 1 | 0   | Sh2d1b1       | protein_coding       |
| ENSMUST00000182419 | 1 | 1 | 0   | Ano4          | protein_coding       |
| ENSMUST00000182687 | 1 | 1 | 0   | Ank3          | protein_coding       |
| ENSMUST00000183448 | 1 | 1 | 0   | Dmtf1         | protein_coding       |
| ENSMUST00000184279 | 1 | 1 | 0   | Kcnh8         | protein_coding       |
| ENSMUST00000184577 | 1 | 1 | 0   | Cphx3         | protein_coding       |
| ENSMUST00000136927 | 1 | 1 | 0   | Gm11714       | processed_transcript |
| ENSMUST00000117874 | 1 | 1 | 0   | Gm12641       | processed_pseudogene |
| ENSMUST00000180567 | 1 | 1 | 0   | 2810429104Rik | lincRNA              |
| ENSMUST00000180742 | 1 | 1 | 0   | 4930598A11Rik | lincRNA              |
| ENSMUST00000180941 | 1 | 1 | 0   | 2310026122Rik | lincRNA              |
| ENSMUST00000181596 | 1 | 1 | 0   | Gm10822       | lincRNA              |
| ENSMUST00000181883 | 1 | 1 | 0   | Gm17733       | lincRNA              |
| ENSMUST00000183670 | 1 | 1 | 0   | Gm27253       | lincRNA              |
| ENSMUST00000126025 | 1 | 1 | 0   | Gm16126       | antisense            |
| ENSMUST00000131215 | 1 | 1 | 0   | 2610204G07Rik | antisense            |
| ENSMUST00000150079 | 1 | 1 | 0   | Gm15938       | antisense            |
| ENSMUST00000154566 | 1 | 1 | 0   | Grip1os3      | antisense            |
| ENSMUST00000162641 | 1 | 1 | 0   | Gm16282       | antisense            |
| ENSMUST00000162770 | 1 | 1 | 0   | 5330439A09Rik | antisense            |
| ENSMUST00000009214 | 1 | 1 | 145 | Rsph14        | protein_coding       |
| ENSMUST00000155901 | 1 | 1 | 89  | Cnot6l        | protein_coding       |
| ENSMUST00000165293 | 1 | 1 | 73  | Pum2          | protein_coding       |
| ENSMUST00000066994 | 1 | 1 | 59  | Zfp395        | protein_coding       |
| ENSMUST00000167734 | 1 | 1 | 59  | Nrxn3         | protein_coding       |
| ENSMUST00000007949 | 1 | 1 | 46  | Twist2        | protein_coding       |
| ENSMUST00000157003 | 1 | 1 | 44  | Aco2          | protein_coding       |
| ENSMUST00000162404 | 1 | 1 | 42  | Arrb1         | protein_coding       |
| ENSMUST00000022579 | 1 | 1 | 40  | 4930564B18Rik | protein_coding       |
| ENSMUST00000053109 | 1 | 1 | 38  | Fbxo46        | protein_coding       |
| ENSMUST00000094819 | 1 | 1 | 38  | Zmynd12       | protein_coding       |
| ENSMUST00000026209 | 1 | 1 | 36  | Dnmbp         | protein_coding       |
| ENSMUST00000184336 | 1 | 1 | 36  | Nav2          | protein_coding       |
| ENSMUST00000050125 | 1 | 1 | 34  | 2900026A02Rik | protein_coding       |
| ENSMUST00000018805 | 1 | 1 | 32  | Cog1          | protein_coding       |
| ENSMUST00000024805 | 1 | 1 | 30  | Cpne5         | protein_coding       |
| ENSMUST00000110461 | 1 | 1 | 30  | Hlf1a         | protein_coding       |
| ENSMUST00000095754 | 1 | 1 | 28  | Tia1          | protein_coding       |
| ENSMUST00000132369 | 1 | 1 | 28  | Mbp           | protein_coding       |
| ENSMUST00000174534 | 1 | 1 | 28  | Sfta2         | protein_coding       |
| ENSMUST00000025092 | 1 | 1 | 26  | Tmem178       | protein_coding       |
| ENSMUST00000087897 | 1 | 1 | 26  | Depdc5        | protein_coding       |
| ENSMUST00000106535 | 1 | 1 | 26  | Rnpc3         | protein_coding       |
| ENSMUST00000108378 | 1 | 1 | 26  | Adck4         | protein_coding       |
| ENSMUST00000125103 | 1 | 1 | 26  | Wdr95         | protein_coding       |
| ENSMUST00000143005 | 1 | 1 | 26  | Hltf          | protein_coding       |
| ENSMUST00000165841 | 1 | 1 | 26  | Naa35         | protein_coding       |
| ENSMUST00000179624 | 1 | 1 | 26  | Park2         | protein_coding       |
| ENSMUST00000045779 | 1 | 1 | 24  | Ttyh2         | protein_coding       |
| ENSMUST00000114529 | 1 | 1 | 24  | Acbd5         | protein_coding       |
| ENSMUST00000176807 | 1 | 1 | 22  | Gm20646       | sense_overlapping    |
| ENSMUST00000091039 | 1 | 1 | 22  | Ralgps1       | protein_coding       |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUST00000096369 | 1 | 1 | 22 Kihl15        | protein_coding         |
| ENSMUST00000006825 | 1 | 1 | 20 Nphs1         | protein_coding         |
| ENSMUST00000096495 | 1 | 1 | 20 Med14         | protein_coding         |
| ENSMUST00000124835 | 1 | 1 | 20 Tmco4         | protein_coding         |
| ENSMUST00000135868 | 1 | 1 | 20 Maml1         | protein_coding         |
| ENSMUST00000166696 | 1 | 1 | 20 Rfx4          | protein_coding         |
| ENSMUST00000169934 | 1 | 1 | 20 Vsx2          | protein_coding         |
| ENSMUST00000028278 | 1 | 1 | 18 Psmc14        | protein_coding         |
| ENSMUST00000037418 | 1 | 1 | 18 Tmed8         | protein_coding         |
| ENSMUST00000044475 | 1 | 1 | 18 Ogt           | protein_coding         |
| ENSMUST00000096239 | 1 | 1 | 18 Tut1          | protein_coding         |
| ENSMUST00000136093 | 1 | 1 | 18 Jade3         | protein_coding         |
| ENSMUST00000141772 | 1 | 1 | 18 Pcyt1a        | protein_coding         |
| ENSMUST00000164832 | 1 | 1 | 18 Dpy30         | protein_coding         |
| ENSMUST00000117457 | 1 | 1 | 16 Gm11540       | unprocessed_pseudogene |
| ENSMUST00000030662 | 1 | 1 | 16 Gpatch3       | protein_coding         |
| ENSMUST00000031405 | 1 | 1 | 16 Tmem116       | protein_coding         |
| ENSMUST00000035115 | 1 | 1 | 16 Vipr1         | protein_coding         |
| ENSMUST00000046644 | 1 | 1 | 16 Tbca          | protein_coding         |
| ENSMUST00000084249 | 1 | 1 | 16 Phactr4       | protein_coding         |
| ENSMUST00000095333 | 1 | 1 | 16 Usp44         | protein_coding         |
| ENSMUST00000106301 | 1 | 1 | 16 Scmh1         | protein_coding         |
| ENSMUST00000109279 | 1 | 1 | 16 Slc13a3       | protein_coding         |
| ENSMUST00000114683 | 1 | 1 | 16 Tmem217       | protein_coding         |
| ENSMUST00000129462 | 1 | 1 | 16 Fancd2        | protein_coding         |
| ENSMUST00000146207 | 1 | 1 | 16 Tmem175       | protein_coding         |
| ENSMUST00000165316 | 1 | 1 | 16 lars          | protein_coding         |
| ENSMUST00000171223 | 1 | 1 | 16 Fgr           | protein_coding         |
| ENSMUST00000176013 | 1 | 1 | 16 Stx5a         | protein_coding         |
| ENSMUST00000009875 | 1 | 1 | 14 Kcnd1         | protein_coding         |
| ENSMUST00000025699 | 1 | 1 | 14 1700123101Rik | protein_coding         |
| ENSMUST00000030742 | 1 | 1 | 14 Mecr          | protein_coding         |
| ENSMUST00000031474 | 1 | 1 | 14 Ankle2        | protein_coding         |
| ENSMUST00000081435 | 1 | 1 | 14 H2-Q4         | protein_coding         |
| ENSMUST00000086615 | 1 | 1 | 14 Tmem211       | protein_coding         |
| ENSMUST00000107994 | 1 | 1 | 14 9830147E19Rik | protein_coding         |
| ENSMUST00000112070 | 1 | 1 | 14 Col7a1        | protein_coding         |
| ENSMUST00000115387 | 1 | 1 | 14 Rp2h          | protein_coding         |
| ENSMUST00000115663 | 1 | 1 | 14 Slc35a2       | protein_coding         |
| ENSMUST00000121616 | 1 | 1 | 14 Fus           | protein_coding         |
| ENSMUST00000133721 | 1 | 1 | 14 Kihl12        | protein_coding         |
| ENSMUST00000138774 | 1 | 1 | 14 Cfap61        | protein_coding         |
| ENSMUST00000141740 | 1 | 1 | 14 4932438A13Rik | protein_coding         |
| ENSMUST00000142957 | 1 | 1 | 14 Pisd          | protein_coding         |
| ENSMUST00000144976 | 1 | 1 | 14 Mtmr14        | protein_coding         |
| ENSMUST00000174278 | 1 | 1 | 14 Dctd          | protein_coding         |
| ENSMUST00000137643 | 1 | 1 | 14 C130036L24Rik | processed_transcript   |
| ENSMUST00000142249 | 1 | 1 | 14 Gm13817       | lincRNA                |
| ENSMUST00000006367 | 1 | 1 | 12 Htra1         | protein_coding         |
| ENSMUST00000024946 | 1 | 1 | 12 Eci1          | protein_coding         |
| ENSMUST00000026699 | 1 | 1 | 12 Mklm1         | protein_coding         |
| ENSMUST00000039061 | 1 | 1 | 12 Trappc11      | protein_coding         |
| ENSMUST00000040135 | 1 | 1 | 12 Nup43         | protein_coding         |
| ENSMUST00000048982 | 1 | 1 | 12 Prickle1      | protein_coding         |
| ENSMUST00000069756 | 1 | 1 | 12 Ocln          | protein_coding         |
| ENSMUST00000072031 | 1 | 1 | 12 Mprip         | protein_coding         |
| ENSMUST00000085939 | 1 | 1 | 12 Fxyd6         | protein_coding         |
| ENSMUST00000093925 | 1 | 1 | 12 Crhr1         | protein_coding         |
| ENSMUST00000093943 | 1 | 1 | 12 Cbx1          | protein_coding         |
| ENSMUST00000094962 | 1 | 1 | 12 Kmt2e         | protein_coding         |
| ENSMUST00000111484 | 1 | 1 | 12 Acin1         | protein_coding         |
| ENSMUST00000113562 | 1 | 1 | 12 Fnbp1         | protein_coding         |
| ENSMUST00000115515 | 1 | 1 | 12 Tmbim7        | protein_coding         |
| ENSMUST00000123478 | 1 | 1 | 12 Vgll4         | protein_coding         |
| ENSMUST00000124496 | 1 | 1 | 12 Tex15         | protein_coding         |
| ENSMUST00000125251 | 1 | 1 | 12 Slc16a5       | protein_coding         |
| ENSMUST00000137458 | 1 | 1 | 12 Rasal3        | protein_coding         |
| ENSMUST00000143809 | 1 | 1 | 12 Optn          | protein_coding         |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUST00000160153 | 1 | 1 | 12 Opa1          | protein_coding       |
| ENSMUST00000131064 | 1 | 1 | 12 4931415C17Rik | processed_transcript |
| ENSMUST00000134312 | 1 | 1 | 12 Gm16201       | processed_transcript |
| ENSMUST00000142509 | 1 | 1 | 12 Gssos1        | antisense            |
| ENSMUST00000012540 | 1 | 1 | 10 Nanog         | protein_coding       |
| ENSMUST00000021832 | 1 | 1 | 10 Wnrip1        | protein_coding       |
| ENSMUST00000025714 | 1 | 1 | 10 Rpp30         | protein_coding       |
| ENSMUST00000026975 | 1 | 1 | 10 Heatr2        | protein_coding       |
| ENSMUST00000030014 | 1 | 1 | 10 Ncbp1         | protein_coding       |
| ENSMUST00000046835 | 1 | 1 | 10 Fnip1         | protein_coding       |
| ENSMUST00000057801 | 1 | 1 | 10 Kcnj4         | protein_coding       |
| ENSMUST00000060798 | 1 | 1 | 10 Unc119b       | protein_coding       |
| ENSMUST00000064765 | 1 | 1 | 10 Stx17         | protein_coding       |
| ENSMUST00000076807 | 1 | 1 | 10 PCDHGB6       | protein_coding       |
| ENSMUST00000084035 | 1 | 1 | 10 Adam9         | protein_coding       |
| ENSMUST00000089289 | 1 | 1 | 10 Arl13b        | protein_coding       |
| ENSMUST00000094135 | 1 | 1 | 10 Myo15         | protein_coding       |
| ENSMUST00000100544 | 1 | 1 | 10 Agfg2         | protein_coding       |
| ENSMUST00000100722 | 1 | 1 | 10 Cct6b         | protein_coding       |
| ENSMUST00000101564 | 1 | 1 | 10 Lrguk         | protein_coding       |
| ENSMUST00000111191 | 1 | 1 | 10 Cd44          | protein_coding       |
| ENSMUST00000115802 | 1 | 1 | 10 Pdxdc1        | protein_coding       |
| ENSMUST00000120717 | 1 | 1 | 10 Capn11        | protein_coding       |
| ENSMUST00000125113 | 1 | 1 | 10 Samd4         | protein_coding       |
| ENSMUST00000127682 | 1 | 1 | 10 Eya3          | protein_coding       |
| ENSMUST00000135984 | 1 | 1 | 10 Lrmp          | protein_coding       |
| ENSMUST00000136049 | 1 | 1 | 10 Syt6          | protein_coding       |
| ENSMUST00000142474 | 1 | 1 | 10 Alas2         | protein_coding       |
| ENSMUST00000153121 | 1 | 1 | 10 Erich2        | protein_coding       |
| ENSMUST00000172934 | 1 | 1 | 10 March2        | protein_coding       |
| ENSMUST00000142397 | 1 | 1 | 10 8430429K09Rik | processed_transcript |
| ENSMUST00000181056 | 1 | 1 | 10 Gm26836       | lincRNA              |
| ENSMUST00000107279 | 1 | 1 | 8 Tuft1          | protein_coding       |
| ENSMUST00000107279 | 1 | 1 | 8 Tuft1          | protein_coding       |
| ENSMUST00000000285 | 1 | 1 | 8 Dgke           | protein_coding       |
| ENSMUST00000020234 | 1 | 1 | 8 Timp3          | protein_coding       |
| ENSMUST00000020298 | 1 | 1 | 8 Pcbd1          | protein_coding       |
| ENSMUST00000022051 | 1 | 1 | 8 Nkd2           | protein_coding       |
| ENSMUST00000022528 | 1 | 1 | 8 Pinx1          | protein_coding       |
| ENSMUST00000024620 | 1 | 1 | 8 Riok2          | protein_coding       |
| ENSMUST00000029170 | 1 | 1 | 8 Rbl1           | protein_coding       |
| ENSMUST00000032237 | 1 | 1 | 8 Bms1           | protein_coding       |
| ENSMUST00000033513 | 1 | 1 | 8 Ftsj1          | protein_coding       |
| ENSMUST00000035430 | 1 | 1 | 8 Dars2          | protein_coding       |
| ENSMUST00000036854 | 1 | 1 | 8 Efhd2          | protein_coding       |
| ENSMUST00000039810 | 1 | 1 | 8 Xpot           | protein_coding       |
| ENSMUST00000040772 | 1 | 1 | 8 Fermt3         | protein_coding       |
| ENSMUST00000043359 | 1 | 1 | 8 Smarca5        | protein_coding       |
| ENSMUST00000056660 | 1 | 1 | 8 Tmem229b       | protein_coding       |
| ENSMUST00000057921 | 1 | 1 | 8 Arf2           | protein_coding       |
| ENSMUST00000060655 | 1 | 1 | 8 Nod1           | protein_coding       |
| ENSMUST00000113734 | 1 | 1 | 8 Zbtb21         | protein_coding       |
| ENSMUST00000125377 | 1 | 1 | 8 Rab43          | protein_coding       |
| ENSMUST00000138239 | 1 | 1 | 8 N4bp2          | protein_coding       |
| ENSMUST00000143421 | 1 | 1 | 8 Zwiich         | protein_coding       |
| ENSMUST00000145772 | 1 | 1 | 8 Wsb1           | protein_coding       |
| ENSMUST00000147613 | 1 | 1 | 8 Hook3          | protein_coding       |
| ENSMUST00000148256 | 1 | 1 | 8 Itgav          | protein_coding       |
| ENSMUST00000154219 | 1 | 1 | 8 Eif2a          | protein_coding       |
| ENSMUST00000165879 | 1 | 1 | 8 Col9a3         | protein_coding       |
| ENSMUST00000169129 | 1 | 1 | 8 Sox6           | protein_coding       |
| ENSMUST00000172546 | 1 | 1 | 8 Wdr46          | protein_coding       |
| ENSMUST00000172680 | 1 | 1 | 8 Greb1l         | protein_coding       |
| ENSMUST00000177694 | 1 | 1 | 8 Sirt1          | protein_coding       |
| ENSMUST00000145095 | 1 | 1 | 8 Gm12290        | lincRNA              |
| ENSMUST00000174630 | 1 | 1 | 8 Gm20442        | lincRNA              |
| ENSMUST00000181424 | 1 | 1 | 8 4933416M07Rik  | lincRNA              |
| ENSMUST00000156809 | 1 | 1 | 8 Gm13938        | antisense            |



|                    |   |   |                 |                                 |
|--------------------|---|---|-----------------|---------------------------------|
| ENSMUST00000004379 | 1 | 1 | 6 Emg1          | protein_coding                  |
| ENSMUST00000011029 | 1 | 1 | 6 Dnajc19       | protein_coding                  |
| ENSMUST00000013338 | 1 | 1 | 6 Arih2         | protein_coding                  |
| ENSMUST00000015664 | 1 | 1 | 6 Ctsk          | protein_coding                  |
| ENSMUST00000020712 | 1 | 1 | 6 4921536K21Rik | protein_coding                  |
| ENSMUST00000021520 | 1 | 1 | 6 4930408O17Rik | protein_coding                  |
| ENSMUST00000023054 | 1 | 1 | 6 Apobec3       | protein_coding                  |
| ENSMUST00000027992 | 1 | 1 | 6 Enkur         | protein_coding                  |
| ENSMUST00000030443 | 1 | 1 | 6 Ptch2         | protein_coding                  |
| ENSMUST00000031901 | 1 | 1 | 6 Trpv5         | protein_coding                  |
| ENSMUST00000034435 | 1 | 1 | 6 Ctrb1         | protein_coding                  |
| ENSMUST00000037798 | 1 | 1 | 6 Slc24a1       | protein_coding                  |
| ENSMUST00000038014 | 1 | 1 | 6 Dnajc16       | protein_coding                  |
| ENSMUST00000038926 | 1 | 1 | 6 Baz1a         | protein_coding                  |
| ENSMUST00000041827 | 1 | 1 | 6 Slc22a20      | protein_coding                  |
| ENSMUST00000052029 | 1 | 1 | 6 Ppip5k1       | protein_coding                  |
| ENSMUST00000073173 | 1 | 1 | 6 Abcc9         | protein_coding                  |
| ENSMUST00000073870 | 1 | 1 | 6 Dupd1         | protein_coding                  |
| ENSMUST00000076687 | 1 | 1 | 6 Cdc42bpa      | protein_coding                  |
| ENSMUST00000092366 | 1 | 1 | 6 Tspear        | protein_coding                  |
| ENSMUST00000097474 | 1 | 1 | 6 Rcsd1         | protein_coding                  |
| ENSMUST00000111937 | 1 | 1 | 6 Crebl2        | protein_coding                  |
| ENSMUST00000122895 | 1 | 1 | 6 Ttc3          | protein_coding                  |
| ENSMUST00000126287 | 1 | 1 | 6 Srcin1        | protein_coding                  |
| ENSMUST00000131009 | 1 | 1 | 6 Hexdc         | protein_coding                  |
| ENSMUST00000134146 | 1 | 1 | 6 Ankhdl1       | protein_coding                  |
| ENSMUST00000137311 | 1 | 1 | 6 Dgkg          | protein_coding                  |
| ENSMUST00000141482 | 1 | 1 | 6 Slc27a2       | protein_coding                  |
| ENSMUST00000141874 | 1 | 1 | 6 Zfp106        | protein_coding                  |
| ENSMUST00000152381 | 1 | 1 | 6 Jkamp         | protein_coding                  |
| ENSMUST00000154230 | 1 | 1 | 6 Arhgap21      | protein_coding                  |
| ENSMUST00000156847 | 1 | 1 | 6 Mtx1          | protein_coding                  |
| ENSMUST00000161302 | 1 | 1 | 6 Fhit          | protein_coding                  |
| ENSMUST00000165745 | 1 | 1 | 6 Racgap1       | protein_coding                  |
| ENSMUST00000167084 | 1 | 1 | 6 Gtf2ird1      | protein_coding                  |
| ENSMUST00000167309 | 1 | 1 | 6 Arhgap17      | protein_coding                  |
| ENSMUST00000169238 | 1 | 1 | 6 Adsl          | protein_coding                  |
| ENSMUST00000172107 | 1 | 1 | 6 Stt13         | protein_coding                  |
| ENSMUST00000182011 | 1 | 1 | 6 Sipa1l3       | protein_coding                  |
| ENSMUST00000138763 | 1 | 1 | 6 4933439C10Rik | processed_transcript            |
| ENSMUST00000108741 | 1 | 1 | 6 Gm17382       | lincRNA                         |
| ENSMUST00000148405 | 1 | 1 | 6 4932435O22Rik | lincRNA                         |
| ENSMUST00000110279 | 1 | 1 | 6 Prox1os       | antisense                       |
| ENSMUST00000184083 | 1 | 1 | 6 Gm9872        | antisense                       |
| ENSMUST00000120329 | 1 | 1 | 4 Fbxw21        | protein_coding                  |
| ENSMUST00000120329 | 1 | 1 | 4 Fbxw21        | protein_coding                  |
| ENSMUST00000184236 | 1 | 1 | 4 Gm2260        | translated_processed_pseudogene |
| ENSMUST00000000821 | 1 | 1 | 4 Usp32         | protein_coding                  |
| ENSMUST00000000984 | 1 | 1 | 4 Slc7a7        | protein_coding                  |
| ENSMUST00000001185 | 1 | 1 | 4 Gmcl1         | protein_coding                  |
| ENSMUST00000003502 | 1 | 1 | 4 Rab3b         | protein_coding                  |
| ENSMUST00000005015 | 1 | 1 | 4 Prcc          | protein_coding                  |
| ENSMUST00000020251 | 1 | 1 | 4 Gnptab        | protein_coding                  |
| ENSMUST00000020999 | 1 | 1 | 4 Kif3c         | protein_coding                  |
| ENSMUST00000021231 | 1 | 1 | 4 Abcc3         | protein_coding                  |
| ENSMUST00000021684 | 1 | 1 | 4 Cyp46a1       | protein_coding                  |
| ENSMUST00000022765 | 1 | 1 | 4 Rab2b         | protein_coding                  |
| ENSMUST00000023673 | 1 | 1 | 4 Runx1         | protein_coding                  |
| ENSMUST00000025924 | 1 | 1 | 4 Al846148      | protein_coding                  |
| ENSMUST00000026858 | 1 | 1 | 4 Plk4          | protein_coding                  |
| ENSMUST00000027955 | 1 | 1 | 4 Olah          | protein_coding                  |
| ENSMUST00000029587 | 1 | 1 | 4 Neurog2       | protein_coding                  |
| ENSMUST00000029812 | 1 | 1 | 4 Nfkb1         | protein_coding                  |
| ENSMUST00000031349 | 1 | 1 | 4 Snrmp35       | protein_coding                  |
| ENSMUST00000040241 | 1 | 1 | 4 Ddx19b        | protein_coding                  |
| ENSMUST00000044207 | 1 | 1 | 4 Sart1         | protein_coding                  |
| ENSMUST00000048065 | 1 | 1 | 4 Trem3         | protein_coding                  |
| ENSMUST00000052514 | 1 | 1 | 4 Slc38a9       | protein_coding                  |

|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000055557 | 1 | 1 | 4 Stx19         | protein_coding                     |
| ENSMUST00000057293 | 1 | 1 | 4 Prr12         | protein_coding                     |
| ENSMUST00000060524 | 1 | 1 | 4 Trim10        | protein_coding                     |
| ENSMUST00000069325 | 1 | 1 | 4 Dnaic2        | protein_coding                     |
| ENSMUST00000076813 | 1 | 1 | 4 Iah1          | protein_coding                     |
| ENSMUST00000081125 | 1 | 1 | 4 Myt1          | protein_coding                     |
| ENSMUST00000086153 | 1 | 1 | 4 Fam20b        | protein_coding                     |
| ENSMUST00000087264 | 1 | 1 | 4 N4bp2         | protein_coding                     |
| ENSMUST00000095172 | 1 | 1 | 4 Cmip          | protein_coding                     |
| ENSMUST00000105619 | 1 | 1 | 4 C030017K20Rik | protein_coding                     |
| ENSMUST00000107812 | 1 | 1 | 4 Ift80         | protein_coding                     |
| ENSMUST00000108039 | 1 | 1 | 4 Ints2         | protein_coding                     |
| ENSMUST00000109381 | 1 | 1 | 4 Brd1          | protein_coding                     |
| ENSMUST00000111446 | 1 | 1 | 4 Rapsn         | protein_coding                     |
| ENSMUST00000113265 | 1 | 1 | 4 Foxp4         | protein_coding                     |
| ENSMUST00000118961 | 1 | 1 | 4 Ltbp4         | protein_coding                     |
| ENSMUST00000121591 | 1 | 1 | 4 Cdkl3         | protein_coding                     |
| ENSMUST00000122412 | 1 | 1 | 4 Ptpn2         | protein_coding                     |
| ENSMUST00000127963 | 1 | 1 | 4 Eif2s3x       | protein_coding                     |
| ENSMUST00000136610 | 1 | 1 | 4 Slc2a5        | protein_coding                     |
| ENSMUST00000140523 | 1 | 1 | 4 Slc38a6       | protein_coding                     |
| ENSMUST00000140948 | 1 | 1 | 4 Mcmdc2        | protein_coding                     |
| ENSMUST00000141249 | 1 | 1 | 4 Rgs1          | protein_coding                     |
| ENSMUST00000147546 | 1 | 1 | 4 Mis18a        | protein_coding                     |
| ENSMUST00000148252 | 1 | 1 | 4 Rtel1         | protein_coding                     |
| ENSMUST00000149776 | 1 | 1 | 4 Dusp16        | protein_coding                     |
| ENSMUST00000150321 | 1 | 1 | 4 Usp14         | protein_coding                     |
| ENSMUST00000150792 | 1 | 1 | 4 Nrxa2         | protein_coding                     |
| ENSMUST00000153319 | 1 | 1 | 4 Stk4          | protein_coding                     |
| ENSMUST00000154090 | 1 | 1 | 4 Ift46         | protein_coding                     |
| ENSMUST00000159590 | 1 | 1 | 4 Fbxw4         | protein_coding                     |
| ENSMUST00000159810 | 1 | 1 | 4 Shprh         | protein_coding                     |
| ENSMUST00000160964 | 1 | 1 | 4 Ndr4          | protein_coding                     |
| ENSMUST00000162997 | 1 | 1 | 4 Gan           | protein_coding                     |
| ENSMUST00000163272 | 1 | 1 | 4 Suz12         | protein_coding                     |
| ENSMUST00000173173 | 1 | 1 | 4 Gigyf2        | protein_coding                     |
| ENSMUST00000174665 | 1 | 1 | 4 Klhdc4        | protein_coding                     |
| ENSMUST00000179265 | 1 | 1 | 4 Hectd1        | protein_coding                     |
| ENSMUST00000180646 | 1 | 1 | 4 Rpgrip1       | protein_coding                     |
| ENSMUST00000125308 | 1 | 1 | 4 Gm15283       | processed_transcript               |
| ENSMUST00000134427 | 1 | 1 | 4 Gm11613       | processed_transcript               |
| ENSMUST00000138819 | 1 | 1 | 4 Gm12299       | processed_transcript               |
| ENSMUST00000145520 | 1 | 1 | 4 5830444B04Rik | processed_transcript               |
| ENSMUST00000175717 | 1 | 1 | 4 B130034C11Rik | processed_transcript               |
| ENSMUST00000140639 | 1 | 1 | 4 Gm12911       | lincRNA                            |
| ENSMUST00000141946 | 1 | 1 | 4 Gm15262       | lincRNA                            |
| ENSMUST00000144294 | 1 | 1 | 4 Gm14696       | lincRNA                            |
| ENSMUST00000148435 | 1 | 1 | 4 Gm7237        | lincRNA                            |
| ENSMUST00000153429 | 1 | 1 | 4 4933434M16Rik | lincRNA                            |
| ENSMUST00000155317 | 1 | 1 | 4 Gm12302       | lincRNA                            |
| ENSMUST00000181098 | 1 | 1 | 4 D030068K23Rik | lincRNA                            |
| ENSMUST00000137749 | 1 | 1 | 4 Gm11802       | antisense                          |
| ENSMUST00000155455 | 1 | 1 | 4 Gm14330       | antisense                          |
| ENSMUST00000184388 | 1 | 1 | 2 Klrb1-ps1     | transcribed_unprocessed_pseudogene |
| ENSMUST0000010974  | 1 | 1 | 2 Kdelr3        | protein_coding                     |
| ENSMUST0000016901  | 1 | 1 | 2 Tll12         | protein_coding                     |
| ENSMUST0000019684  | 1 | 1 | 2 Slc9a3r2      | protein_coding                     |
| ENSMUST00000020977 | 1 | 1 | 2 Dus4l         | protein_coding                     |
| ENSMUST00000021197 | 1 | 1 | 2 Blmh          | protein_coding                     |
| ENSMUST00000022597 | 1 | 1 | 2 Naa16         | protein_coding                     |
| ENSMUST00000025418 | 1 | 1 | 2 Psmg2         | protein_coding                     |
| ENSMUST00000025961 | 1 | 1 | 2 Prdx3         | protein_coding                     |
| ENSMUST00000026553 | 1 | 1 | 2 Syce1         | protein_coding                     |
| ENSMUST00000027065 | 1 | 1 | 2 Tmem14a       | protein_coding                     |
| ENSMUST00000028348 | 1 | 1 | 2 Itgb6         | protein_coding                     |
| ENSMUST00000030011 | 1 | 1 | 2 Stra6l        | protein_coding                     |
| ENSMUST00000030471 | 1 | 1 | 2 Lrrc41        | protein_coding                     |
| ENSMUST00000031106 | 1 | 1 | 2 Rhoh          | protein_coding                     |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000031654 | 1 | 1 | 2 Pomp          | protein_coding |
| ENSMUST00000033198 | 1 | 1 | 2 Crym          | protein_coding |
| ENSMUST00000034405 | 1 | 1 | 2 Mre11a        | protein_coding |
| ENSMUST00000036210 | 1 | 1 | 2 Poglut1       | protein_coding |
| ENSMUST00000039161 | 1 | 1 | 2 Thyn1         | protein_coding |
| ENSMUST00000040210 | 1 | 1 | 2 Trpm8         | protein_coding |
| ENSMUST00000040448 | 1 | 1 | 2 Mtmr3         | protein_coding |
| ENSMUST00000040700 | 1 | 1 | 2 Dock9         | protein_coding |
| ENSMUST00000040980 | 1 | 1 | 2 Prkrip1       | protein_coding |
| ENSMUST00000041377 | 1 | 1 | 2 Lyn           | protein_coding |
| ENSMUST00000042517 | 1 | 1 | 2 Fam169a       | protein_coding |
| ENSMUST00000044734 | 1 | 1 | 2 Rims4         | protein_coding |
| ENSMUST00000045153 | 1 | 1 | 2 Pik3ip1       | protein_coding |
| ENSMUST00000045897 | 1 | 1 | 2 Ptma          | protein_coding |
| ENSMUST00000047091 | 1 | 1 | 2 Btbd10        | protein_coding |
| ENSMUST00000047441 | 1 | 1 | 2 Obscn         | protein_coding |
| ENSMUST00000050561 | 1 | 1 | 2 Mau2          | protein_coding |
| ENSMUST00000051236 | 1 | 1 | 2 Arl4c         | protein_coding |
| ENSMUST00000053811 | 1 | 1 | 2 Dlst          | protein_coding |
| ENSMUST00000059857 | 1 | 1 | 2 Rinl          | protein_coding |
| ENSMUST00000060225 | 1 | 1 | 2 Gpr4          | protein_coding |
| ENSMUST00000060716 | 1 | 1 | 2 Samd3         | protein_coding |
| ENSMUST00000061350 | 1 | 1 | 2 Atp13a3       | protein_coding |
| ENSMUST00000061427 | 1 | 1 | 2 Adamts3       | protein_coding |
| ENSMUST00000062631 | 1 | 1 | 2 Fam186a       | protein_coding |
| ENSMUST00000064475 | 1 | 1 | 2 Deffb34       | protein_coding |
| ENSMUST00000066473 | 1 | 1 | 2 Madd          | protein_coding |
| ENSMUST00000070658 | 1 | 1 | 2 Mgrn1         | protein_coding |
| ENSMUST00000076060 | 1 | 1 | 2 Scube1        | protein_coding |
| ENSMUST00000076249 | 1 | 1 | 2 I830012O16Rik | protein_coding |
| ENSMUST00000077639 | 1 | 1 | 2 Cyp4f37       | protein_coding |
| ENSMUST00000081491 | 1 | 1 | 2 Oas2          | protein_coding |
| ENSMUST00000099112 | 1 | 1 | 2 Itga7         | protein_coding |
| ENSMUST00000099712 | 1 | 1 | 2 Ambra1        | protein_coding |
| ENSMUST00000100399 | 1 | 1 | 2 Xrcc6         | protein_coding |
| ENSMUST00000100895 | 1 | 1 | 2 Gm10406       | protein_coding |
| ENSMUST00000101637 | 1 | 1 | 2 Dtnb          | protein_coding |
| ENSMUST00000102825 | 1 | 1 | 2 Ifit3         | protein_coding |
| ENSMUST00000106455 | 1 | 1 | 2 Toe1          | protein_coding |
| ENSMUST00000106962 | 1 | 1 | 2 Cdc27         | protein_coding |
| ENSMUST00000107283 | 1 | 1 | 2 Snx27         | protein_coding |
| ENSMUST00000107562 | 1 | 1 | 2 Cacnb1        | protein_coding |
| ENSMUST00000110005 | 1 | 1 | 2 Rin2          | protein_coding |
| ENSMUST00000111237 | 1 | 1 | 2 Ttc17         | protein_coding |
| ENSMUST00000111368 | 1 | 1 | 2 Nuf2          | protein_coding |
| ENSMUST00000112571 | 1 | 1 | 2 Dpy30         | protein_coding |
| ENSMUST00000113242 | 1 | 1 | 2 Sh2d3c        | protein_coding |
| ENSMUST00000114819 | 1 | 1 | 2 Iqcb1         | protein_coding |
| ENSMUST00000115019 | 1 | 1 | 2 Sephs1        | protein_coding |
| ENSMUST00000115233 | 1 | 1 | 2 Ppp1r2        | protein_coding |
| ENSMUST00000115251 | 1 | 1 | 2 Tnpo3         | protein_coding |
| ENSMUST00000115716 | 1 | 1 | 2 Psd2          | protein_coding |
| ENSMUST00000117492 | 1 | 1 | 2 Usp33         | protein_coding |
| ENSMUST00000120429 | 1 | 1 | 2 Spink2        | protein_coding |
| ENSMUST00000120549 | 1 | 1 | 2 Fuca2         | protein_coding |
| ENSMUST00000122873 | 1 | 1 | 2 Ube2l3        | protein_coding |
| ENSMUST00000122936 | 1 | 1 | 2 Prss41        | protein_coding |
| ENSMUST00000123069 | 1 | 1 | 2 Cops4         | protein_coding |
| ENSMUST00000123233 | 1 | 1 | 2 Ago3          | protein_coding |
| ENSMUST00000123314 | 1 | 1 | 2 Fnbp4         | protein_coding |
| ENSMUST00000123401 | 1 | 1 | 2 Opn1mw        | protein_coding |
| ENSMUST00000123876 | 1 | 1 | 2 St7l          | protein_coding |
| ENSMUST00000124972 | 1 | 1 | 2 Gabpb1        | protein_coding |
| ENSMUST00000125446 | 1 | 1 | 2 Ttc21b        | protein_coding |
| ENSMUST00000126499 | 1 | 1 | 2 Abca9         | protein_coding |
| ENSMUST00000126654 | 1 | 1 | 2 Adamtsl1      | protein_coding |
| ENSMUST00000128346 | 1 | 1 | 2 Rasa2         | protein_coding |
| ENSMUST00000130665 | 1 | 1 | 2 Tmtc2         | protein_coding |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000130931 | 1 | 1 | 2 Pkd2          | protein_coding       |
| ENSMUST00000134178 | 1 | 1 | 2 Chd6          | protein_coding       |
| ENSMUST00000134379 | 1 | 1 | 2 Eri3          | protein_coding       |
| ENSMUST00000135053 | 1 | 1 | 2 Vps33b        | protein_coding       |
| ENSMUST00000137338 | 1 | 1 | 2 Edrf1         | protein_coding       |
| ENSMUST00000138905 | 1 | 1 | 2 Gm826         | protein_coding       |
| ENSMUST00000139389 | 1 | 1 | 2 Treh          | protein_coding       |
| ENSMUST00000140061 | 1 | 1 | 2 Ankhd1        | protein_coding       |
| ENSMUST00000140429 | 1 | 1 | 2 Lsm12         | protein_coding       |
| ENSMUST00000142437 | 1 | 1 | 2 Mrps21        | protein_coding       |
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| ENSMUST00000144850 | 1 | 1 | 2 Hscb          | protein_coding       |
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| ENSMUST00000145651 | 1 | 1 | 2 Daglb         | protein_coding       |
| ENSMUST00000147063 | 1 | 1 | 2 Prmt7         | protein_coding       |
| ENSMUST00000147564 | 1 | 1 | 2 Arpc1a        | protein_coding       |
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| ENSMUST00000150767 | 1 | 1 | 2 Cerk          | protein_coding       |
| ENSMUST00000150949 | 1 | 1 | 2 Mklm1         | protein_coding       |
| ENSMUST00000151165 | 1 | 1 | 2 Cyth1         | protein_coding       |
| ENSMUST00000152148 | 1 | 1 | 2 Mga           | protein_coding       |
| ENSMUST00000153209 | 1 | 1 | 2 Cdc42se2      | protein_coding       |
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| ENSMUST00000162538 | 1 | 1 | 2 Ciapin1       | protein_coding       |
| ENSMUST00000164377 | 1 | 1 | 2 Trf           | protein_coding       |
| ENSMUST00000164705 | 1 | 1 | 2 Med16         | protein_coding       |
| ENSMUST00000167466 | 1 | 1 | 2 Sel1l         | protein_coding       |
| ENSMUST00000169241 | 1 | 1 | 2 Tor1aip1      | protein_coding       |
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| ENSMUST00000177714 | 1 | 1 | 2 2010315B03Rik | protein_coding       |
| ENSMUST00000179565 | 1 | 1 | 2 Gramd1c       | protein_coding       |
| ENSMUST00000180230 | 1 | 1 | 2 Ikbkg         | protein_coding       |
| ENSMUST00000183224 | 1 | 1 | 2 Birc6         | protein_coding       |
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| ENSMUST00000140319 | 1 | 1 | 2 9130015L21Rik | lincRNA              |
| ENSMUST00000181292 | 1 | 1 | 2 Gm26606       | lincRNA              |
| ENSMUST00000181499 | 1 | 1 | 2 Gm26641       | lincRNA              |
| ENSMUST00000181516 | 1 | 1 | 2 Gm26806       | lincRNA              |
| ENSMUST00000181526 | 1 | 1 | 2 2610020C07Rik | lincRNA              |
| ENSMUST00000181676 | 1 | 1 | 2 Gm26715       | lincRNA              |
| ENSMUST00000181870 | 1 | 1 | 2 1700109K24Rik | lincRNA              |
| ENSMUST00000184759 | 1 | 1 | 2 4930524O08Rik | lincRNA              |
| ENSMUST00000123933 | 1 | 1 | 2 Gm12446       | antisense            |
| ENSMUST00000125496 | 1 | 1 | 2 Gm15962       | antisense            |
| ENSMUST00000152384 | 1 | 1 | 2 Foxo6os       | antisense            |
| ENSMUST00000174087 | 1 | 1 | 0 Sox2ot        | sense_overlapping    |
| ENSMUST00000174087 | 1 | 1 | 0 Sox2ot        | sense_overlapping    |
| ENSMUST00000142037 | 1 | 1 | 0 Atp11b        | retained_intron      |
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| ENSMUST00000059011 | 1 | 1 | 0 Olfr631       | protein_coding       |
| ENSMUST00000146369 | 1 | 1 | 0 Dennd1b       | processed_transcript |

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| ENSMUST00000054653 | 1 | 1 | 0 Als2cr11      | unprocessed_pseudogene           |
| ENSMUST00000117962 | 1 | 1 | 0 Rhox11-ps     | unprocessed_pseudogene           |
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| ENSMUST00000177413 | 1 | 1 | 0 Gm7171        | unprocessed_pseudogene           |
| ENSMUST00000179999 | 1 | 1 | 0 Gm21142       | unprocessed_pseudogene           |
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| ENSMUST00000177503 | 1 | 1 | 0 Gm20615       | unitary_pseudogene               |
| ENSMUST00000146858 | 1 | 1 | 0 1700073E17Rik | transcribed_processed_pseudogene |
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| ENSMUST00000030673 | 1 | 1 | 0 Csf3r    | protein_coding |
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| ENSMUST00000110087 | 1 | 1 | 0 Fgd3          | protein_coding |
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| ENSMUST00000111162 | 1 | 1 | 0 Styxl1        | protein_coding |
| ENSMUST00000111252 | 1 | 1 | 0 Pex19         | protein_coding |
| ENSMUST00000111781 | 1 | 1 | 0 Mapkapk5      | protein_coding |
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| ENSMUST00000120613 | 1 | 1 | 0 Kif3a         | protein_coding |
| ENSMUST00000121739 | 1 | 1 | 0 Kdm2b         | protein_coding |
| ENSMUST00000122026 | 1 | 1 | 0 Lias          | protein_coding |
| ENSMUST00000122216 | 1 | 1 | 0 Bola3         | protein_coding |
| ENSMUST00000122409 | 1 | 1 | 0 Lrp3          | protein_coding |
| ENSMUST00000123027 | 1 | 1 | 0 Tnfrsf8       | protein_coding |
| ENSMUST00000123657 | 1 | 1 | 0 Ercc8         | protein_coding |
| ENSMUST00000123818 | 1 | 1 | 0 Oip5          | protein_coding |
| ENSMUST00000124720 | 1 | 1 | 0 Tmem260       | protein_coding |
| ENSMUST00000124826 | 1 | 1 | 0 Itgb1         | protein_coding |
| ENSMUST00000124993 | 1 | 1 | 0 Atp5b         | protein_coding |
| ENSMUST00000125004 | 1 | 1 | 0 Yme1l1        | protein_coding |
| ENSMUST00000125052 | 1 | 1 | 0 Itsn1         | protein_coding |
| ENSMUST00000125231 | 1 | 1 | 0 Tenm1         | protein_coding |
| ENSMUST00000125563 | 1 | 1 | 0 Col4a3        | protein_coding |
| ENSMUST00000126046 | 1 | 1 | 0 Ube2g1        | protein_coding |
| ENSMUST00000126303 | 1 | 1 | 0 Asns          | protein_coding |
| ENSMUST00000126449 | 1 | 1 | 0 Car6          | protein_coding |
| ENSMUST00000126518 | 1 | 1 | 0 Srp19         | protein_coding |
| ENSMUST00000126803 | 1 | 1 | 0 2610002J02Rik | protein_coding |
| ENSMUST00000126804 | 1 | 1 | 0 Gpatch8       | protein_coding |
| ENSMUST00000126824 | 1 | 1 | 0 Prrg4         | protein_coding |
| ENSMUST00000126839 | 1 | 1 | 0 Ptpn1         | protein_coding |
| ENSMUST00000127621 | 1 | 1 | 0 Smek2         | protein_coding |
| ENSMUST00000128485 | 1 | 1 | 0 Cap1          | protein_coding |
| ENSMUST00000128511 | 1 | 1 | 0 Nudt9         | protein_coding |



|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000128661 | 1 | 1 | 0 Nuak2         | protein_coding |
| ENSMUST00000128856 | 1 | 1 | 0 Dgcr8         | protein_coding |
| ENSMUST00000128882 | 1 | 1 | 0 Srxn1         | protein_coding |
| ENSMUST00000129785 | 1 | 1 | 0 Dna2          | protein_coding |
| ENSMUST00000130090 | 1 | 1 | 0 Rpa2          | protein_coding |
| ENSMUST00000130469 | 1 | 1 | 0 Rps6kb2       | protein_coding |
| ENSMUST00000131076 | 1 | 1 | 0 Rin3          | protein_coding |
| ENSMUST00000131245 | 1 | 1 | 0 Trp53bp1      | protein_coding |
| ENSMUST00000131430 | 1 | 1 | 0 Gpr155        | protein_coding |
| ENSMUST00000131695 | 1 | 1 | 0 Bbx           | protein_coding |
| ENSMUST00000131824 | 1 | 1 | 0 Ralgapa2      | protein_coding |
| ENSMUST00000132435 | 1 | 1 | 0 Tmcc2         | protein_coding |
| ENSMUST00000133017 | 1 | 1 | 0 Fmo5          | protein_coding |
| ENSMUST00000133437 | 1 | 1 | 0 Btbd18        | protein_coding |
| ENSMUST00000133774 | 1 | 1 | 0 Nsf           | protein_coding |
| ENSMUST00000134301 | 1 | 1 | 0 Cdh7          | protein_coding |
| ENSMUST00000135066 | 1 | 1 | 0 1700012A03Rik | protein_coding |
| ENSMUST00000135569 | 1 | 1 | 0 Cyp4b1        | protein_coding |
| ENSMUST00000136274 | 1 | 1 | 0 Tcaim         | protein_coding |
| ENSMUST00000136917 | 1 | 1 | 0 Nol11         | protein_coding |
| ENSMUST00000137068 | 1 | 1 | 0 Strip2        | protein_coding |
| ENSMUST00000137581 | 1 | 1 | 0 Snrpc         | protein_coding |
| ENSMUST00000137619 | 1 | 1 | 0 Mrpl12        | protein_coding |
| ENSMUST00000137971 | 1 | 1 | 0 Farp1         | protein_coding |
| ENSMUST00000138301 | 1 | 1 | 0 Frmd4b        | protein_coding |
| ENSMUST00000138654 | 1 | 1 | 0 Dnajc16       | protein_coding |
| ENSMUST00000138796 | 1 | 1 | 0 BC100530      | protein_coding |
| ENSMUST00000138803 | 1 | 1 | 0 Mesdc2        | protein_coding |
| ENSMUST00000139340 | 1 | 1 | 0 Nsl1          | protein_coding |
| ENSMUST00000139503 | 1 | 1 | 0 Ifnar2        | protein_coding |
| ENSMUST00000139872 | 1 | 1 | 0 Snx1          | protein_coding |
| ENSMUST00000140920 | 1 | 1 | 0 Urb1          | protein_coding |
| ENSMUST00000140974 | 1 | 1 | 0 Hmha1         | protein_coding |
| ENSMUST00000140990 | 1 | 1 | 0 Atat1         | protein_coding |
| ENSMUST00000141384 | 1 | 1 | 0 Cep85         | protein_coding |
| ENSMUST00000141823 | 1 | 1 | 0 Mpv17         | protein_coding |
| ENSMUST00000142192 | 1 | 1 | 0 Sgpl1         | protein_coding |
| ENSMUST00000142227 | 1 | 1 | 0 Smc2          | protein_coding |
| ENSMUST00000142426 | 1 | 1 | 0 Sh3kbp1       | protein_coding |
| ENSMUST00000142586 | 1 | 1 | 0 Ift46         | protein_coding |
| ENSMUST00000142874 | 1 | 1 | 0 Dnhd1         | protein_coding |
| ENSMUST00000142984 | 1 | 1 | 0 Hdac1         | protein_coding |
| ENSMUST00000143176 | 1 | 1 | 0 Cdc42bpa      | protein_coding |
| ENSMUST00000143267 | 1 | 1 | 0 Usp54         | protein_coding |
| ENSMUST00000143583 | 1 | 1 | 0 Bmf           | protein_coding |
| ENSMUST00000143621 | 1 | 1 | 0 Hdac11        | protein_coding |
| ENSMUST00000143650 | 1 | 1 | 0 Fnip1         | protein_coding |
| ENSMUST00000143756 | 1 | 1 | 0 Inip          | protein_coding |
| ENSMUST00000143987 | 1 | 1 | 0 Ndufv2        | protein_coding |
| ENSMUST00000144276 | 1 | 1 | 0 Bcas3         | protein_coding |
| ENSMUST00000144415 | 1 | 1 | 0 Dapl1         | protein_coding |
| ENSMUST00000144739 | 1 | 1 | 0 Oca2          | protein_coding |
| ENSMUST00000145168 | 1 | 1 | 0 Bsdcl         | protein_coding |
| ENSMUST00000145359 | 1 | 1 | 0 Inpp5b        | protein_coding |
| ENSMUST00000145477 | 1 | 1 | 0 Sms           | protein_coding |
| ENSMUST00000146652 | 1 | 1 | 0 Ep400         | protein_coding |
| ENSMUST00000147750 | 1 | 1 | 0 Yme1l1        | protein_coding |
| ENSMUST00000148234 | 1 | 1 | 0 1700008F21Rik | protein_coding |
| ENSMUST00000148389 | 1 | 1 | 0 BC003331      | protein_coding |
| ENSMUST00000148880 | 1 | 1 | 0 Rbbp6         | protein_coding |
| ENSMUST00000149565 | 1 | 1 | 0 Agpat5        | protein_coding |
| ENSMUST00000149907 | 1 | 1 | 0 Copg1         | protein_coding |
| ENSMUST00000150137 | 1 | 1 | 0 Calm2         | protein_coding |
| ENSMUST00000150488 | 1 | 1 | 0 Wdr17         | protein_coding |
| ENSMUST00000150959 | 1 | 1 | 0 Trnau1ap      | protein_coding |
| ENSMUST00000151509 | 1 | 1 | 0 Tpmt          | protein_coding |
| ENSMUST00000151768 | 1 | 1 | 0 Arhgef6       | protein_coding |
| ENSMUST00000151906 | 1 | 1 | 0 Emid1         | protein_coding |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000151978 | 1 | 1 | 0 Kremen1       | protein_coding |
| ENSMUST00000152072 | 1 | 1 | 0 Pdrgr1        | protein_coding |
| ENSMUST00000152161 | 1 | 1 | 0 Ehmt1         | protein_coding |
| ENSMUST00000152433 | 1 | 1 | 0 Atp8a1        | protein_coding |
| ENSMUST00000152499 | 1 | 1 | 0 Cttnbp2       | protein_coding |
| ENSMUST00000153128 | 1 | 1 | 0 Cnnm4         | protein_coding |
| ENSMUST00000153183 | 1 | 1 | 0 Tbl2          | protein_coding |
| ENSMUST00000153511 | 1 | 1 | 0 Rab4b         | protein_coding |
| ENSMUST00000153964 | 1 | 1 | 0 Mybpc1        | protein_coding |
| ENSMUST00000154325 | 1 | 1 | 0 Sec24a        | protein_coding |
| ENSMUST00000154536 | 1 | 1 | 0 Krba1         | protein_coding |
| ENSMUST00000154547 | 1 | 1 | 0 Tmem209       | protein_coding |
| ENSMUST00000155757 | 1 | 1 | 0 Rragc         | protein_coding |
| ENSMUST00000156828 | 1 | 1 | 0 Odf4          | protein_coding |
| ENSMUST00000156996 | 1 | 1 | 0 Oc90          | protein_coding |
| ENSMUST00000159076 | 1 | 1 | 0 1700019B03Rik | protein_coding |
| ENSMUST00000159510 | 1 | 1 | 0 Ssh1          | protein_coding |
| ENSMUST00000159680 | 1 | 1 | 0 Tnik          | protein_coding |
| ENSMUST00000160733 | 1 | 1 | 0 Trmu          | protein_coding |
| ENSMUST00000161123 | 1 | 1 | 0 Pcmt1         | protein_coding |
| ENSMUST00000161305 | 1 | 1 | 0 Mroh1         | protein_coding |
| ENSMUST00000161335 | 1 | 1 | 0 Aebp2         | protein_coding |
| ENSMUST00000161642 | 1 | 1 | 0 Birc3         | protein_coding |
| ENSMUST00000161825 | 1 | 1 | 0 Gfm2          | protein_coding |
| ENSMUST00000162080 | 1 | 1 | 0 Pkd1l2        | protein_coding |
| ENSMUST00000162215 | 1 | 1 | 0 Impdh1        | protein_coding |
| ENSMUST00000162537 | 1 | 1 | 0 Mycbp2        | protein_coding |
| ENSMUST00000162805 | 1 | 1 | 0 Slc4a8        | protein_coding |
| ENSMUST00000164083 | 1 | 1 | 0 Ascc1         | protein_coding |
| ENSMUST00000164099 | 1 | 1 | 0 Snx19         | protein_coding |
| ENSMUST00000164636 | 1 | 1 | 0 Zfp414        | protein_coding |
| ENSMUST00000164801 | 1 | 1 | 0 Mettl17       | protein_coding |
| ENSMUST00000165031 | 1 | 1 | 0 Gtf2h1        | protein_coding |
| ENSMUST00000165506 | 1 | 1 | 0 Etv5          | protein_coding |
| ENSMUST00000165859 | 1 | 1 | 0 Tmem194b      | protein_coding |
| ENSMUST00000166526 | 1 | 1 | 0 U2af1         | protein_coding |
| ENSMUST00000166752 | 1 | 1 | 0 Vps53         | protein_coding |
| ENSMUST00000166952 | 1 | 1 | 0 Sh3bgr        | protein_coding |
| ENSMUST00000167115 | 1 | 1 | 0 Alcam         | protein_coding |
| ENSMUST00000167161 | 1 | 1 | 0 Kif20a        | protein_coding |
| ENSMUST00000167364 | 1 | 1 | 0 Trim36        | protein_coding |
| ENSMUST00000167688 | 1 | 1 | 0 Cdh1          | protein_coding |
| ENSMUST00000167741 | 1 | 1 | 0 Cox7a2l       | protein_coding |
| ENSMUST00000167797 | 1 | 1 | 0 Phykpl        | protein_coding |
| ENSMUST00000168115 | 1 | 1 | 0 Prpsap2       | protein_coding |
| ENSMUST00000168288 | 1 | 1 | 0 Cux2          | protein_coding |
| ENSMUST00000168332 | 1 | 1 | 0 Gm17545       | protein_coding |
| ENSMUST00000168669 | 1 | 1 | 0 Tdh           | protein_coding |
| ENSMUST00000168757 | 1 | 1 | 0 Atp6v0a1      | protein_coding |
| ENSMUST00000168919 | 1 | 1 | 0 Klrk1         | protein_coding |
| ENSMUST00000169311 | 1 | 1 | 0 Nob1          | protein_coding |
| ENSMUST00000169358 | 1 | 1 | 0 Tbcbl         | protein_coding |
| ENSMUST00000169750 | 1 | 1 | 0 Pum2          | protein_coding |
| ENSMUST00000169859 | 1 | 1 | 0 Gm17542       | protein_coding |
| ENSMUST00000169948 | 1 | 1 | 0 Rchy1         | protein_coding |
| ENSMUST00000170377 | 1 | 1 | 0 Rit1          | protein_coding |
| ENSMUST00000170675 | 1 | 1 | 0 Xpo6          | protein_coding |
| ENSMUST00000170817 | 1 | 1 | 0 Slc22a8       | protein_coding |
| ENSMUST00000171300 | 1 | 1 | 0 Sumf2         | protein_coding |
| ENSMUST00000171588 | 1 | 1 | 0 Lifr          | protein_coding |
| ENSMUST00000172244 | 1 | 1 | 0 Hoga1         | protein_coding |
| ENSMUST00000172443 | 1 | 1 | 0 Pcid2         | protein_coding |
| ENSMUST00000172996 | 1 | 1 | 0 Smarca4       | protein_coding |
| ENSMUST00000173085 | 1 | 1 | 0 Yap1          | protein_coding |
| ENSMUST00000173283 | 1 | 1 | 0 Gm7221        | protein_coding |
| ENSMUST00000174234 | 1 | 1 | 0 Fap           | protein_coding |
| ENSMUST00000177133 | 1 | 1 | 0 Trub2         | protein_coding |
| ENSMUST00000177258 | 1 | 1 | 0 Mterf1b       | protein_coding |

|                    |   |   |      |               |                      |
|--------------------|---|---|------|---------------|----------------------|
| ENSMUST00000177293 | 1 | 1 | 0    | Atp2c1        | protein_coding       |
| ENSMUST00000177684 | 1 | 1 | 0    | Ms4a18        | protein_coding       |
| ENSMUST00000179022 | 1 | 1 | 0    | Lmnb2         | protein_coding       |
| ENSMUST00000179218 | 1 | 1 | 0    | Golga5        | protein_coding       |
| ENSMUST00000179321 | 1 | 1 | 0    | Slc18b1       | protein_coding       |
| ENSMUST00000179430 | 1 | 1 | 0    | Gm10845       | protein_coding       |
| ENSMUST00000180195 | 1 | 1 | 0    | Rad21l        | protein_coding       |
| ENSMUST00000181434 | 1 | 1 | 0    | Metap2        | protein_coding       |
| ENSMUST00000181987 | 1 | 1 | 0    | Arhgef9       | protein_coding       |
| ENSMUST00000182199 | 1 | 1 | 0    | Osbp10        | protein_coding       |
| ENSMUST00000182287 | 1 | 1 | 0    | Rpf2          | protein_coding       |
| ENSMUST00000182393 | 1 | 1 | 0    | Prrc2c        | protein_coding       |
| ENSMUST00000182659 | 1 | 1 | 0    | Rbm5          | protein_coding       |
| ENSMUST00000183052 | 1 | 1 | 0    | Rpf2          | protein_coding       |
| ENSMUST00000183350 | 1 | 1 | 0    | Mlip          | protein_coding       |
| ENSMUST00000183475 | 1 | 1 | 0    | 1110008L16Rik | protein_coding       |
| ENSMUST00000069896 | 1 | 1 | 0    | 9330154J02Rik | processed_transcript |
| ENSMUST00000128654 | 1 | 1 | 0    | 8430419K02Rik | processed_transcript |
| ENSMUST00000135682 | 1 | 1 | 0    | Gm13657       | processed_transcript |
| ENSMUST00000135825 | 1 | 1 | 0    | D030028A08Rik | processed_transcript |
| ENSMUST00000161599 | 1 | 1 | 0    | 4930594M22Rik | processed_transcript |
| ENSMUST00000117127 | 1 | 1 | 0    | Gm14786       | processed_pseudogene |
| ENSMUST00000118699 | 1 | 1 | 0    | Gm13758       | processed_pseudogene |
| ENSMUST00000119335 | 1 | 1 | 0    | Gm9051        | processed_pseudogene |
| ENSMUST00000121562 | 1 | 1 | 0    | Gm11855       | processed_pseudogene |
| ENSMUST00000178791 | 1 | 1 | 0    | Gm2058        | processed_pseudogene |
| ENSMUST00000128473 | 1 | 1 | 0    | B230112J18Rik | lincRNA              |
| ENSMUST00000132221 | 1 | 1 | 0    | 6430628N08Rik | lincRNA              |
| ENSMUST00000141162 | 1 | 1 | 0    | Gm11217       | lincRNA              |
| ENSMUST00000141532 | 1 | 1 | 0    | A630023P12Rik | lincRNA              |
| ENSMUST00000141559 | 1 | 1 | 0    | Gm11685       | lincRNA              |
| ENSMUST00000142008 | 1 | 1 | 0    | Gm16351       | lincRNA              |
| ENSMUST00000145871 | 1 | 1 | 0    | F730035M05Rik | lincRNA              |
| ENSMUST00000152483 | 1 | 1 | 0    | 4932414J04Rik | lincRNA              |
| ENSMUST00000152825 | 1 | 1 | 0    | Gm11630       | lincRNA              |
| ENSMUST00000154798 | 1 | 1 | 0    | 2810433D01Rik | lincRNA              |
| ENSMUST00000156508 | 1 | 1 | 0    | F730016J06Rik | lincRNA              |
| ENSMUST00000179310 | 1 | 1 | 0    | Slc6a16       | lincRNA              |
| ENSMUST00000180623 | 1 | 1 | 0    | Gm2061        | lincRNA              |
| ENSMUST00000180895 | 1 | 1 | 0    | A630075F10Rik | lincRNA              |
| ENSMUST00000181282 | 1 | 1 | 0    | Gm26887       | lincRNA              |
| ENSMUST00000181299 | 1 | 1 | 0    | A730056A06Rik | lincRNA              |
| ENSMUST00000181371 | 1 | 1 | 0    | D030040B21Rik | lincRNA              |
| ENSMUST00000181481 | 1 | 1 | 0    | Gm26582       | lincRNA              |
| ENSMUST00000181618 | 1 | 1 | 0    | 6530411M01Rik | lincRNA              |
| ENSMUST00000181838 | 1 | 1 | 0    | Gm26507       | lincRNA              |
| ENSMUST00000182788 | 1 | 1 | 0    | C130071C03Rik | lincRNA              |
| ENSMUST00000127218 | 1 | 1 | 0    | Apol7d        | antisense            |
| ENSMUST00000130025 | 1 | 1 | 0    | Gm14089       | antisense            |
| ENSMUST00000133476 | 1 | 1 | 0    | Gm15857       | antisense            |
| ENSMUST00000137176 | 1 | 1 | 0    | Gm14232       | antisense            |
| ENSMUST00000140161 | 1 | 1 | 0    | Etaa1os       | antisense            |
| ENSMUST00000141958 | 1 | 1 | 0    | Gm13763       | antisense            |
| ENSMUST00000149048 | 1 | 1 | 0    | Gm15865       | antisense            |
| ENSMUST00000151984 | 1 | 1 | 0    | Gm13571       | antisense            |
| ENSMUST00000153814 | 1 | 1 | 0    | Gm12905       | antisense            |
| ENSMUST00000155499 | 1 | 1 | 0    | 9130410C08Rik | antisense            |
| ENSMUST00000156443 | 1 | 1 | 0    | Sox5os2       | antisense            |
| ENSMUST00000159838 | 1 | 1 | 0    | 4930448H16Rik | antisense            |
| ENSMUST00000160380 | 1 | 1 | 0    | 1700007P06Rik | antisense            |
| ENSMUST00000180460 | 1 | 0 | 1471 | D130017N08Rik | lincRNA              |
| ENSMUST00000139344 | 1 | 0 | 145  | Rhoq          | protein_coding       |
| ENSMUST00000065796 | 1 | 0 | 127  | Jak2          | protein_coding       |
| ENSMUST00000106696 | 1 | 0 | 69   | Arsg          | protein_coding       |
| ENSMUST00000016771 | 1 | 0 | 54   | Myh9          | protein_coding       |
| ENSMUST00000092966 | 1 | 0 | 50   | Dynlt1c       | protein_coding       |
| ENSMUST00000169415 | 1 | 0 | 46   | Dynlt1a       | protein_coding       |
| ENSMUST00000179554 | 1 | 0 | 46   | Dynlt1f       | protein_coding       |

|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUST00000031513 | 1 | 0 | 44 Srsf9         | protein_coding                     |
| ENSMUST00000142530 | 1 | 0 | 42 4933427D14Rik | protein_coding                     |
| ENSMUST00000046073 | 1 | 0 | 40 Kdm2b         | protein_coding                     |
| ENSMUST00000111155 | 1 | 0 | 40 Hspb1         | protein_coding                     |
| ENSMUST00000091268 | 1 | 0 | 36 Camsap1       | protein_coding                     |
| ENSMUST00000033450 | 1 | 0 | 34 Gpc4          | protein_coding                     |
| ENSMUST00000126370 | 1 | 0 | 34 Ptpn5         | protein_coding                     |
| ENSMUST00000129965 | 1 | 0 | 34 Gm16158       | lincRNA                            |
| ENSMUST00000155660 | 1 | 0 | 32 Gm6483        | protein_coding                     |
| ENSMUST00000167258 | 1 | 0 | 32 Ttl6          | protein_coding                     |
| ENSMUST00000161424 | 1 | 0 | 30 Gm7609        | transcribed_unprocessed_pseudogene |
| ENSMUST00000043050 | 1 | 0 | 30 Chst12        | protein_coding                     |
| ENSMUST00000106094 | 1 | 0 | 30 Dlgap3        | protein_coding                     |
| ENSMUST00000113215 | 1 | 0 | 30 Sh3bgrl2      | protein_coding                     |
| ENSMUST00000128292 | 1 | 0 | 30 Zfp286os      | antisense                          |
| ENSMUST00000017831 | 1 | 0 | 28 Rhot1         | protein_coding                     |
| ENSMUST00000029920 | 1 | 0 | 28 Odf2l         | protein_coding                     |
| ENSMUST00000010250 | 1 | 0 | 26 Slc22a6       | protein_coding                     |
| ENSMUST00000023578 | 1 | 0 | 26 Dgkg          | protein_coding                     |
| ENSMUST00000119736 | 1 | 0 | 26 Dus2          | protein_coding                     |
| ENSMUST00000128626 | 1 | 0 | 26 Eef1g         | protein_coding                     |
| ENSMUST00000140059 | 1 | 0 | 26 Atg16l2       | protein_coding                     |
| ENSMUST00000147069 | 1 | 0 | 26 E130114P18Rik | protein_coding                     |
| ENSMUST00000040865 | 1 | 0 | 24 Tmem98        | protein_coding                     |
| ENSMUST00000086010 | 1 | 0 | 24 Zfp114        | protein_coding                     |
| ENSMUST00000090797 | 1 | 0 | 24 Hormad1       | protein_coding                     |
| ENSMUST00000030202 | 1 | 0 | 22 Glpr2         | protein_coding                     |
| ENSMUST00000033818 | 1 | 0 | 22 Atp11a        | protein_coding                     |
| ENSMUST00000041162 | 1 | 0 | 22 1700017N19Rik | protein_coding                     |
| ENSMUST00000080771 | 1 | 0 | 22 Zbtb24        | protein_coding                     |
| ENSMUST00000114426 | 1 | 0 | 22 Tacc3         | protein_coding                     |
| ENSMUST00000148550 | 1 | 0 | 22 Adcy10        | protein_coding                     |
| ENSMUST00000181318 | 1 | 0 | 22 Gm26693       | lincRNA                            |
| ENSMUST00000018691 | 1 | 0 | 20 Pip4k2b       | protein_coding                     |
| ENSMUST00000029131 | 1 | 0 | 20 Ggt7          | protein_coding                     |
| ENSMUST00000033776 | 1 | 0 | 20 Dkc1          | protein_coding                     |
| ENSMUST00000065263 | 1 | 0 | 20 Sbn1          | protein_coding                     |
| ENSMUST00000084974 | 1 | 0 | 20 Mok           | protein_coding                     |
| ENSMUST00000111286 | 1 | 0 | 20 Pvrl4         | protein_coding                     |
| ENSMUST00000113581 | 1 | 0 | 20 Mgl1          | protein_coding                     |
| ENSMUST00000115000 | 1 | 0 | 20 Xpnpep2       | protein_coding                     |
| ENSMUST00000138276 | 1 | 0 | 20 Cln6          | protein_coding                     |
| ENSMUST00000139747 | 1 | 0 | 20 Gm13103       | protein_coding                     |
| ENSMUST00000165405 | 1 | 0 | 20 Micu1         | protein_coding                     |
| ENSMUST00000029800 | 1 | 0 | 18 Tspan5        | protein_coding                     |
| ENSMUST00000046334 | 1 | 0 | 18 Exoc6b        | protein_coding                     |
| ENSMUST00000123881 | 1 | 0 | 18 Eml6          | protein_coding                     |
| ENSMUST00000176992 | 1 | 0 | 18 Gbf1          | protein_coding                     |
| ENSMUST00000162218 | 1 | 0 | 18 4930594M22Rik | processed_transcript               |
| ENSMUST00000004784 | 1 | 0 | 16 Cnn2          | protein_coding                     |
| ENSMUST00000045247 | 1 | 0 | 16 Wdr18         | protein_coding                     |
| ENSMUST00000054483 | 1 | 0 | 16 Tifa          | protein_coding                     |
| ENSMUST00000070953 | 1 | 0 | 16 Pank4         | protein_coding                     |
| ENSMUST00000103218 | 1 | 0 | 16 Rffl          | protein_coding                     |
| ENSMUST00000125319 | 1 | 0 | 16 Primpol       | protein_coding                     |
| ENSMUST00000137727 | 1 | 0 | 16 Cpne5         | protein_coding                     |
| ENSMUST00000142465 | 1 | 0 | 16 Arhgap23      | protein_coding                     |
| ENSMUST00000148246 | 1 | 0 | 16 Eml2          | protein_coding                     |
| ENSMUST00000149972 | 1 | 0 | 16 Nfat5         | protein_coding                     |
| ENSMUST00000150981 | 1 | 0 | 16 Lrrc8c        | protein_coding                     |
| ENSMUST00000168656 | 1 | 0 | 16 Tnks2         | protein_coding                     |
| ENSMUST00000174547 | 1 | 0 | 16 Dtnb          | protein_coding                     |
| ENSMUST00000185117 | 1 | 0 | 16 Tcf12         | protein_coding                     |
| ENSMUST00000184383 | 1 | 0 | 16 Gm27188       | lincRNA                            |
| ENSMUST00000176417 | 1 | 0 | 14 Hmbx1         | protein_coding                     |
| ENSMUST00000176417 | 1 | 0 | 14 Hmbx1         | protein_coding                     |
| ENSMUST00000018002 | 1 | 0 | 14 Ifi52         | protein_coding                     |
| ENSMUST00000020647 | 1 | 0 | 14 3010026O09Rik | protein_coding                     |

|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUST00000035672 | 1 | 0 | 14 Ppl           | protein_coding                     |
| ENSMUST00000038421 | 1 | 0 | 14 Lsm1          | protein_coding                     |
| ENSMUST00000090927 | 1 | 0 | 14 Clk2          | protein_coding                     |
| ENSMUST00000095083 | 1 | 0 | 14 Sptan1        | protein_coding                     |
| ENSMUST00000102628 | 1 | 0 | 14 Yrdc          | protein_coding                     |
| ENSMUST00000106769 | 1 | 0 | 14 St7l          | protein_coding                     |
| ENSMUST00000111872 | 1 | 0 | 14 Arpp21        | protein_coding                     |
| ENSMUST00000115593 | 1 | 0 | 14 Ccdc67        | protein_coding                     |
| ENSMUST00000115827 | 1 | 0 | 14 Clec16a       | protein_coding                     |
| ENSMUST00000117364 | 1 | 0 | 14 Fam175a       | protein_coding                     |
| ENSMUST00000123424 | 1 | 0 | 14 Cdc42se2      | protein_coding                     |
| ENSMUST00000133916 | 1 | 0 | 14 Copg2         | protein_coding                     |
| ENSMUST00000137963 | 1 | 0 | 14 Mroh4         | protein_coding                     |
| ENSMUST00000160345 | 1 | 0 | 14 Dnah14        | protein_coding                     |
| ENSMUST00000174533 | 1 | 0 | 14 Paip1         | protein_coding                     |
| ENSMUST00000168951 | 1 | 0 | 14 Gm17058       | antisense                          |
| ENSMUST00000053635 | 1 | 0 | 12 4930432E11Rik | transcribed_unprocessed_pseudogene |
| ENSMUST00000001042 | 1 | 0 | 12 Ilf2          | protein_coding                     |
| ENSMUST00000017408 | 1 | 0 | 12 Exosc10       | protein_coding                     |
| ENSMUST00000026313 | 1 | 0 | 12 Abhd6         | protein_coding                     |
| ENSMUST00000031080 | 1 | 0 | 12 Fam114a1      | protein_coding                     |
| ENSMUST00000032198 | 1 | 0 | 12 Usp18         | protein_coding                     |
| ENSMUST00000034388 | 1 | 0 | 12 Vps4a         | protein_coding                     |
| ENSMUST00000039480 | 1 | 0 | 12 Zswim4        | protein_coding                     |
| ENSMUST00000041097 | 1 | 0 | 12 Ppp2r2d       | protein_coding                     |
| ENSMUST00000050497 | 1 | 0 | 12 C87436        | protein_coding                     |
| ENSMUST00000071130 | 1 | 0 | 12 Alox5ap       | protein_coding                     |
| ENSMUST00000090925 | 1 | 0 | 12 Baz2b         | protein_coding                     |
| ENSMUST00000103057 | 1 | 0 | 12 Dido1         | protein_coding                     |
| ENSMUST00000105333 | 1 | 0 | 12 Tmprss9       | protein_coding                     |
| ENSMUST00000110299 | 1 | 0 | 12 Tgm3          | protein_coding                     |
| ENSMUST00000120306 | 1 | 0 | 12 Urgcp         | protein_coding                     |
| ENSMUST00000120809 | 1 | 0 | 12 Zscan22       | protein_coding                     |
| ENSMUST00000127092 | 1 | 0 | 12 Stk40         | protein_coding                     |
| ENSMUST00000136592 | 1 | 0 | 12 C330021F23Rik | protein_coding                     |
| ENSMUST00000140723 | 1 | 0 | 12 Nif3l1        | protein_coding                     |
| ENSMUST00000150378 | 1 | 0 | 12 Fbxl20        | protein_coding                     |
| ENSMUST00000150838 | 1 | 0 | 12 Stx1a         | protein_coding                     |
| ENSMUST00000161429 | 1 | 0 | 12 Fam69c        | protein_coding                     |
| ENSMUST00000164189 | 1 | 0 | 12 Oplah         | protein_coding                     |
| ENSMUST00000164945 | 1 | 0 | 12 Unc45b        | protein_coding                     |
| ENSMUST00000170129 | 1 | 0 | 12 Parg          | protein_coding                     |
| ENSMUST00000179857 | 1 | 0 | 12 Tomm20        | protein_coding                     |
| ENSMUST00000180101 | 1 | 0 | 12 A630095N17Rik | protein_coding                     |
| ENSMUST00000176296 | 1 | 0 | 12 B130034C11Rik | processed_transcript               |
| ENSMUST00000136806 | 1 | 0 | 12 Hoxaas3       | antisense                          |
| ENSMUST00000021645 | 1 | 0 | 10 Dcaf4         | protein_coding                     |
| ENSMUST00000024851 | 1 | 0 | 10 Ndc80         | protein_coding                     |
| ENSMUST00000038210 | 1 | 0 | 10 Sec24a        | protein_coding                     |
| ENSMUST00000039174 | 1 | 0 | 10 Prdm1         | protein_coding                     |
| ENSMUST00000040536 | 1 | 0 | 10 Batf          | protein_coding                     |
| ENSMUST00000040721 | 1 | 0 | 10 Tpst1         | protein_coding                     |
| ENSMUST00000041466 | 1 | 0 | 10 Zbed5         | protein_coding                     |
| ENSMUST00000054213 | 1 | 0 | 10 Timm8a1       | protein_coding                     |
| ENSMUST00000062024 | 1 | 0 | 10 Tusc5         | protein_coding                     |
| ENSMUST00000064139 | 1 | 0 | 10 Ppap2b        | protein_coding                     |
| ENSMUST00000075671 | 1 | 0 | 10 Nfatc2ip      | protein_coding                     |
| ENSMUST00000075856 | 1 | 0 | 10 Kdm2a         | protein_coding                     |
| ENSMUST00000077730 | 1 | 0 | 10 Pik3c2b       | protein_coding                     |
| ENSMUST00000077909 | 1 | 0 | 10 St5           | protein_coding                     |
| ENSMUST00000079146 | 1 | 0 | 10 Ttc8          | protein_coding                     |
| ENSMUST00000084721 | 1 | 0 | 10 Ak6           | protein_coding                     |
| ENSMUST00000084867 | 1 | 0 | 10 Cmtm7         | protein_coding                     |
| ENSMUST00000094844 | 1 | 0 | 10 Ccdc108       | protein_coding                     |
| ENSMUST00000098143 | 1 | 0 | 10 Nfx1          | protein_coding                     |
| ENSMUST00000105869 | 1 | 0 | 10 Pafah2        | protein_coding                     |
| ENSMUST00000106157 | 1 | 0 | 10 Zranb1        | protein_coding                     |
| ENSMUST00000111314 | 1 | 0 | 10 Adamts4       | protein_coding                     |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000115885 | 1 | 0 | 10 Disc1        | protein_coding       |
| ENSMUST00000118242 | 1 | 0 | 10 Limch1       | protein_coding       |
| ENSMUST00000119284 | 1 | 0 | 10 Prkd3        | protein_coding       |
| ENSMUST00000120721 | 1 | 0 | 10 Eif4enif1    | protein_coding       |
| ENSMUST00000120784 | 1 | 0 | 10 Traf1        | protein_coding       |
| ENSMUST00000130806 | 1 | 0 | 10 Mtrf1        | protein_coding       |
| ENSMUST00000133564 | 1 | 0 | 10 Esr2         | protein_coding       |
| ENSMUST00000134338 | 1 | 0 | 10 Trip4        | protein_coding       |
| ENSMUST00000141142 | 1 | 0 | 10 Acads        | protein_coding       |
| ENSMUST00000142235 | 1 | 0 | 10 Atrx         | protein_coding       |
| ENSMUST00000143773 | 1 | 0 | 10 Mtch2        | protein_coding       |
| ENSMUST00000147167 | 1 | 0 | 10 Card14       | protein_coding       |
| ENSMUST00000153754 | 1 | 0 | 10 Lrrc8c       | protein_coding       |
| ENSMUST00000155928 | 1 | 0 | 10 Pi4ka        | protein_coding       |
| ENSMUST00000162503 | 1 | 0 | 10 Adck5        | protein_coding       |
| ENSMUST00000172465 | 1 | 0 | 10 Duxbl1       | protein_coding       |
| ENSMUST00000173423 | 1 | 0 | 10 Duxbl3       | protein_coding       |
| ENSMUST00000178271 | 1 | 0 | 10 Zfp131       | protein_coding       |
| ENSMUST00000180495 | 1 | 0 | 10 Gm19705      | lincRNA              |
| ENSMUST00000151851 | 1 | 0 | 10 Gad1os       | antisense            |
| ENSMUST00000000287 | 1 | 0 | 8 Scpep1        | protein_coding       |
| ENSMUST00000018875 | 1 | 0 | 8 Ap2b1         | protein_coding       |
| ENSMUST00000025908 | 1 | 0 | 8 Kcnk4         | protein_coding       |
| ENSMUST00000030025 | 1 | 0 | 8 Nr4a3         | protein_coding       |
| ENSMUST00000040270 | 1 | 0 | 8 Actr1a        | protein_coding       |
| ENSMUST00000040856 | 1 | 0 | 8 Tmco5b        | protein_coding       |
| ENSMUST00000045372 | 1 | 0 | 8 Bpgm          | protein_coding       |
| ENSMUST00000045586 | 1 | 0 | 8 Lcorl         | protein_coding       |
| ENSMUST00000047242 | 1 | 0 | 8 Traf3ip1      | protein_coding       |
| ENSMUST00000049378 | 1 | 0 | 8 Ablim3        | protein_coding       |
| ENSMUST00000064848 | 1 | 0 | 8 Nup107        | protein_coding       |
| ENSMUST00000071093 | 1 | 0 | 8 Rims3         | protein_coding       |
| ENSMUST00000078953 | 1 | 0 | 8 Dennd6b       | protein_coding       |
| ENSMUST00000087122 | 1 | 0 | 8 Speg          | protein_coding       |
| ENSMUST00000088484 | 1 | 0 | 8 Nnat          | protein_coding       |
| ENSMUST00000088555 | 1 | 0 | 8 Smgc          | protein_coding       |
| ENSMUST00000090020 | 1 | 0 | 8 Osbpl7        | protein_coding       |
| ENSMUST00000090563 | 1 | 0 | 8 Mybphl        | protein_coding       |
| ENSMUST00000095270 | 1 | 0 | 8 Slc26a10      | protein_coding       |
| ENSMUST00000096246 | 1 | 0 | 8 Ganab         | protein_coding       |
| ENSMUST00000102803 | 1 | 0 | 8 Myh7          | protein_coding       |
| ENSMUST00000106616 | 1 | 0 | 8 Cdc42ep4      | protein_coding       |
| ENSMUST00000106728 | 1 | 0 | 8 Scube2        | protein_coding       |
| ENSMUST00000107403 | 1 | 0 | 8 Jup           | protein_coding       |
| ENSMUST00000110540 | 1 | 0 | 8 Agxt2         | protein_coding       |
| ENSMUST00000111221 | 1 | 0 | 8 Wbscr27       | protein_coding       |
| ENSMUST00000125567 | 1 | 0 | 8 Dagla         | protein_coding       |
| ENSMUST00000128083 | 1 | 0 | 8 Zc3h7a        | protein_coding       |
| ENSMUST00000128533 | 1 | 0 | 8 Tcp10a        | protein_coding       |
| ENSMUST00000135745 | 1 | 0 | 8 Eif4g3        | protein_coding       |
| ENSMUST00000136412 | 1 | 0 | 8 Atg13         | protein_coding       |
| ENSMUST00000138141 | 1 | 0 | 8 Spns1         | protein_coding       |
| ENSMUST00000139179 | 1 | 0 | 8 Coro2a        | protein_coding       |
| ENSMUST00000140852 | 1 | 0 | 8 Wdsub1        | protein_coding       |
| ENSMUST00000142605 | 1 | 0 | 8 Drg1          | protein_coding       |
| ENSMUST00000143954 | 1 | 0 | 8 Ppig          | protein_coding       |
| ENSMUST00000161901 | 1 | 0 | 8 Wtap          | protein_coding       |
| ENSMUST00000167911 | 1 | 0 | 8 Sptlc2        | protein_coding       |
| ENSMUST00000174236 | 1 | 0 | 8 Gcnt1         | protein_coding       |
| ENSMUST00000176328 | 1 | 0 | 8 Vmn2r3        | protein_coding       |
| ENSMUST00000178826 | 1 | 0 | 8 Gclm          | protein_coding       |
| ENSMUST00000133231 | 1 | 0 | 8 BC006965      | processed_transcript |
| ENSMUST00000128743 | 1 | 0 | 8 Gm13376       | lincRNA              |
| ENSMUST00000146702 | 1 | 0 | 8 9330198N18Rik | lincRNA              |
| ENSMUST00000180904 | 1 | 0 | 8 Gm10556       | lincRNA              |
| ENSMUST00000008451 | 1 | 0 | 6 1700109H08Rik | protein_coding       |
| ENSMUST00000020513 | 1 | 0 | 6 Papolg        | protein_coding       |
| ENSMUST00000025571 | 1 | 0 | 6 Cd5           | protein_coding       |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000026324 | 1 | 0 | 6 Acot9         | protein_coding         |
| ENSMUST00000028389 | 1 | 0 | 6 Frzb          | protein_coding         |
| ENSMUST00000029485 | 1 | 0 | 6 1700013F07Rik | protein_coding         |
| ENSMUST00000030124 | 1 | 0 | 6 Tal2          | protein_coding         |
| ENSMUST00000030326 | 1 | 0 | 6 Pramef12      | protein_coding         |
| ENSMUST00000031273 | 1 | 0 | 6 Cds1          | protein_coding         |
| ENSMUST00000038552 | 1 | 0 | 6 Coro7         | protein_coding         |
| ENSMUST00000039071 | 1 | 0 | 6 Cacng5        | protein_coding         |
| ENSMUST00000040023 | 1 | 0 | 6 Iffo2         | protein_coding         |
| ENSMUST00000041627 | 1 | 0 | 6 Sdk2          | protein_coding         |
| ENSMUST00000043634 | 1 | 0 | 6 Scube1        | protein_coding         |
| ENSMUST00000043735 | 1 | 0 | 6 Mthfd1l       | protein_coding         |
| ENSMUST00000044616 | 1 | 0 | 6 Ints8         | protein_coding         |
| ENSMUST00000046717 | 1 | 0 | 6 Mga           | protein_coding         |
| ENSMUST00000050248 | 1 | 0 | 6 Zbtb11        | protein_coding         |
| ENSMUST00000055352 | 1 | 0 | 6 Fam120b       | protein_coding         |
| ENSMUST00000056051 | 1 | 0 | 6 Car7          | protein_coding         |
| ENSMUST00000057265 | 1 | 0 | 6 BC048562      | protein_coding         |
| ENSMUST00000064883 | 1 | 0 | 6 Plekha2       | protein_coding         |
| ENSMUST00000065815 | 1 | 0 | 6 Glt8d2        | protein_coding         |
| ENSMUST00000068135 | 1 | 0 | 6 Adamts8       | protein_coding         |
| ENSMUST00000075644 | 1 | 0 | 6 Calcr         | protein_coding         |
| ENSMUST00000077160 | 1 | 0 | 6 Sox5          | protein_coding         |
| ENSMUST00000077303 | 1 | 0 | 6 Ptpra         | protein_coding         |
| ENSMUST00000081966 | 1 | 0 | 6 Odf1          | protein_coding         |
| ENSMUST00000085592 | 1 | 0 | 6 4931406P16Rik | protein_coding         |
| ENSMUST00000086787 | 1 | 0 | 6 Tcp10b        | protein_coding         |
| ENSMUST00000092302 | 1 | 0 | 6 Fn3k          | protein_coding         |
| ENSMUST00000098242 | 1 | 0 | 6 Ggh           | protein_coding         |
| ENSMUST00000099682 | 1 | 0 | 6 B230118H07Rik | protein_coding         |
| ENSMUST00000105261 | 1 | 0 | 6 Grip1         | protein_coding         |
| ENSMUST00000106645 | 1 | 0 | 6 Micalcl       | protein_coding         |
| ENSMUST00000108187 | 1 | 0 | 6 Thap8         | protein_coding         |
| ENSMUST00000109614 | 1 | 0 | 6 Chd9          | protein_coding         |
| ENSMUST00000114122 | 1 | 0 | 6 Tiam1         | protein_coding         |
| ENSMUST00000121566 | 1 | 0 | 6 Cep85         | protein_coding         |
| ENSMUST00000132932 | 1 | 0 | 6 Gpt2          | protein_coding         |
| ENSMUST00000132943 | 1 | 0 | 6 Spink4        | protein_coding         |
| ENSMUST00000137833 | 1 | 0 | 6 Sgpl1         | protein_coding         |
| ENSMUST00000138035 | 1 | 0 | 6 Agpat3        | protein_coding         |
| ENSMUST00000141187 | 1 | 0 | 6 Cntn1         | protein_coding         |
| ENSMUST00000143179 | 1 | 0 | 6 Hk1           | protein_coding         |
| ENSMUST00000145656 | 1 | 0 | 6 Nmi           | protein_coding         |
| ENSMUST00000147976 | 1 | 0 | 6 Rin2          | protein_coding         |
| ENSMUST00000148070 | 1 | 0 | 6 Lym7          | protein_coding         |
| ENSMUST00000148926 | 1 | 0 | 6 Dusp16        | protein_coding         |
| ENSMUST00000151242 | 1 | 0 | 6 Dnmt3l        | protein_coding         |
| ENSMUST00000151589 | 1 | 0 | 6 Zfp385c       | protein_coding         |
| ENSMUST00000153445 | 1 | 0 | 6 Fam179a       | protein_coding         |
| ENSMUST00000155043 | 1 | 0 | 6 Repts2        | protein_coding         |
| ENSMUST00000156222 | 1 | 0 | 6 Lactb2        | protein_coding         |
| ENSMUST00000160713 | 1 | 0 | 6 Poli          | protein_coding         |
| ENSMUST00000162774 | 1 | 0 | 6 Slc9c1        | protein_coding         |
| ENSMUST00000163073 | 1 | 0 | 6 Fyb           | protein_coding         |
| ENSMUST00000163898 | 1 | 0 | 6 Igfbp7        | protein_coding         |
| ENSMUST00000167427 | 1 | 0 | 6 Slpi          | protein_coding         |
| ENSMUST00000168064 | 1 | 0 | 6 Vgll3         | protein_coding         |
| ENSMUST00000172334 | 1 | 0 | 6 Smagp         | protein_coding         |
| ENSMUST00000173419 | 1 | 0 | 6 Klhdc1        | protein_coding         |
| ENSMUST00000174481 | 1 | 0 | 6 Rps6ka1       | protein_coding         |
| ENSMUST00000185011 | 1 | 0 | 6 Strn4         | protein_coding         |
| ENSMUST00000151188 | 1 | 0 | 6 Gm15348       | lincRNA                |
| ENSMUST00000180643 | 1 | 0 | 6 2310015A10Rik | lincRNA                |
| ENSMUST00000180652 | 1 | 0 | 6 Gm26725       | lincRNA                |
| ENSMUST00000155877 | 1 | 0 | 6 Atxn7l1os1    | antisense              |
| ENSMUST00000174728 | 1 | 0 | 6 BC023719      | antisense              |
| ENSMUST00000122193 | 1 | 0 | 4 Gm12628       | unprocessed_pseudogene |
| ENSMUST00000000707 | 1 | 0 | 4 Loxl3         | protein_coding         |

|                    |   |   |             |                |
|--------------------|---|---|-------------|----------------|
| ENSMUST00000003438 | 1 | 0 | 4 Mob3a     | protein_coding |
| ENSMUST00000003754 | 1 | 0 | 4 Calb2     | protein_coding |
| ENSMUST00000008748 | 1 | 0 | 4 Ubqln4    | protein_coding |
| ENSMUST00000009885 | 1 | 0 | 4 Ubp1      | protein_coding |
| ENSMUST00000010536 | 1 | 0 | 4 Gosr1     | protein_coding |
| ENSMUST00000012104 | 1 | 0 | 4 Ccnt1     | protein_coding |
| ENSMUST00000020197 | 1 | 0 | 4 Eya3      | protein_coding |
| ENSMUST00000020400 | 1 | 0 | 4 Lrrtm1    | protein_coding |
| ENSMUST00000021423 | 1 | 0 | 4 Noxred1   | protein_coding |
| ENSMUST00000021611 | 1 | 0 | 4 Pitrm1    | protein_coding |
| ENSMUST00000022725 | 1 | 0 | 4 Dct       | protein_coding |
| ENSMUST00000024832 | 1 | 0 | 4 Rsph1     | protein_coding |
| ENSMUST00000028663 | 1 | 0 | 4 Creb3l1   | protein_coding |
| ENSMUST00000028801 | 1 | 0 | 4 Spef1     | protein_coding |
| ENSMUST00000031051 | 1 | 0 | 4 Cgref1    | protein_coding |
| ENSMUST00000033275 | 1 | 0 | 4 Tex36     | protein_coding |
| ENSMUST00000034620 | 1 | 0 | 4 Acrv1     | protein_coding |
| ENSMUST00000038749 | 1 | 0 | 4 Padi6     | protein_coding |
| ENSMUST00000040218 | 1 | 0 | 4 Fbxo8     | protein_coding |
| ENSMUST00000042318 | 1 | 0 | 4 Fsd2      | protein_coding |
| ENSMUST00000045521 | 1 | 0 | 4 Dtx4      | protein_coding |
| ENSMUST00000045971 | 1 | 0 | 4 Chrb1     | protein_coding |
| ENSMUST00000048860 | 1 | 0 | 4 Mreg      | protein_coding |
| ENSMUST00000049544 | 1 | 0 | 4 Ccdc141   | protein_coding |
| ENSMUST00000051400 | 1 | 0 | 4 Cyp4x1    | protein_coding |
| ENSMUST00000051772 | 1 | 0 | 4 Morn4     | protein_coding |
| ENSMUST00000053683 | 1 | 0 | 4 Ggnbp1    | protein_coding |
| ENSMUST00000058210 | 1 | 0 | 4 Eps8      | protein_coding |
| ENSMUST00000058438 | 1 | 0 | 4 Dcaf7     | protein_coding |
| ENSMUST00000061699 | 1 | 0 | 4 Bpifc     | protein_coding |
| ENSMUST00000066504 | 1 | 0 | 4 Rph3a1    | protein_coding |
| ENSMUST00000069142 | 1 | 0 | 4 Akrl1c1   | protein_coding |
| ENSMUST00000071554 | 1 | 0 | 4 Klra9     | protein_coding |
| ENSMUST00000071873 | 1 | 0 | 4 Serpinb9e | protein_coding |
| ENSMUST00000072899 | 1 | 0 | 4 Cgnl1     | protein_coding |
| ENSMUST00000073787 | 1 | 0 | 4 Akrl7a5   | protein_coding |
| ENSMUST00000074783 | 1 | 0 | 4 Hmcn1     | protein_coding |
| ENSMUST00000077407 | 1 | 0 | 4 Dctn1     | protein_coding |
| ENSMUST00000079038 | 1 | 0 | 4 Hhip      | protein_coding |
| ENSMUST00000079605 | 1 | 0 | 4 Zfp462    | protein_coding |
| ENSMUST00000081695 | 1 | 0 | 4 Gon4l     | protein_coding |
| ENSMUST00000089157 | 1 | 0 | 4 Cenpm     | protein_coding |
| ENSMUST00000097496 | 1 | 0 | 4 Cd226     | protein_coding |
| ENSMUST00000098346 | 1 | 0 | 4 Man2a2    | protein_coding |
| ENSMUST00000100874 | 1 | 0 | 4 Selplg    | protein_coding |
| ENSMUST00000102863 | 1 | 0 | 4 Papolg    | protein_coding |
| ENSMUST00000106750 | 1 | 0 | 4 Psmc12    | protein_coding |
| ENSMUST00000106977 | 1 | 0 | 4 Kansl1    | protein_coding |
| ENSMUST00000106998 | 1 | 0 | 4 Clpb      | protein_coding |
| ENSMUST00000107129 | 1 | 0 | 4 Zfp352    | protein_coding |
| ENSMUST00000107214 | 1 | 0 | 4 Psip1     | protein_coding |
| ENSMUST00000107644 | 1 | 0 | 4 Gtf2h1    | protein_coding |
| ENSMUST00000109616 | 1 | 0 | 4 Cbx7      | protein_coding |
| ENSMUST00000110909 | 1 | 0 | 4 Arhgef7   | protein_coding |
| ENSMUST00000111641 | 1 | 0 | 4 Serpin1   | protein_coding |
| ENSMUST00000113661 | 1 | 0 | 4 Ccbl1     | protein_coding |
| ENSMUST00000114038 | 1 | 0 | 4 Dnah6     | protein_coding |
| ENSMUST00000115458 | 1 | 0 | 4 Pde4a     | protein_coding |
| ENSMUST00000115721 | 1 | 0 | 4 Ppil2     | protein_coding |
| ENSMUST00000117242 | 1 | 0 | 4 Golim4    | protein_coding |
| ENSMUST00000118755 | 1 | 0 | 4 Prss36    | protein_coding |
| ENSMUST00000119509 | 1 | 0 | 4 Sacs      | protein_coding |
| ENSMUST00000123971 | 1 | 0 | 4 Prkci     | protein_coding |
| ENSMUST00000124451 | 1 | 0 | 4 Fgr       | protein_coding |
| ENSMUST00000125445 | 1 | 0 | 4 Tmem39b   | protein_coding |
| ENSMUST00000127872 | 1 | 0 | 4 Gpr107    | protein_coding |
| ENSMUST00000128102 | 1 | 0 | 4 Gm28308   | protein_coding |
| ENSMUST00000134469 | 1 | 0 | 4 Mkl1      | protein_coding |



|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000135673 | 1 | 0 | 4 Pogk          | protein_coding |
| ENSMUST00000138805 | 1 | 0 | 4 Ehmt1         | protein_coding |
| ENSMUST00000139180 | 1 | 0 | 4 Gcdh          | protein_coding |
| ENSMUST00000139210 | 1 | 0 | 4 Socs2         | protein_coding |
| ENSMUST00000139510 | 1 | 0 | 4 Ercc5         | protein_coding |
| ENSMUST00000140939 | 1 | 0 | 4 Rad51         | protein_coding |
| ENSMUST00000147151 | 1 | 0 | 4 Irgm1         | protein_coding |
| ENSMUST00000147582 | 1 | 0 | 4 Appl2         | protein_coding |
| ENSMUST00000148203 | 1 | 0 | 4 Pex14         | protein_coding |
| ENSMUST00000151937 | 1 | 0 | 4 Slc25a12      | protein_coding |
| ENSMUST00000153148 | 1 | 0 | 4 Wdr54         | protein_coding |
| ENSMUST00000153438 | 1 | 0 | 4 Cntd1         | protein_coding |
| ENSMUST00000159085 | 1 | 0 | 4 Insig2        | protein_coding |
| ENSMUST00000161078 | 1 | 0 | 4 Fbxo41        | protein_coding |
| ENSMUST00000161254 | 1 | 0 | 4 Nwd1          | protein_coding |
| ENSMUST00000161713 | 1 | 0 | 4 Dusp26        | protein_coding |
| ENSMUST00000162155 | 1 | 0 | 4 Cacna1i       | protein_coding |
| ENSMUST00000165947 | 1 | 0 | 4 C030017K20Rik | protein_coding |
| ENSMUST00000166712 | 1 | 0 | 4 Cacul1        | protein_coding |
| ENSMUST00000168271 | 1 | 0 | 4 Cyfip1        | protein_coding |
| ENSMUST00000168483 | 1 | 0 | 4 Zfp600        | protein_coding |
| ENSMUST00000173137 | 1 | 0 | 4 Ralgapb       | protein_coding |
| ENSMUST00000173496 | 1 | 0 | 4 Col26a1       | protein_coding |
| ENSMUST00000177779 | 1 | 0 | 4 Psap          | protein_coding |
| ENSMUST00000177851 | 1 | 0 | 4 Gatad2a       | protein_coding |
| ENSMUST00000178946 | 1 | 0 | 4 Kcne3         | protein_coding |
| ENSMUST00000179379 | 1 | 0 | 4 Vipas39       | protein_coding |
| ENSMUST00000180498 | 1 | 0 | 4 Nkain1        | protein_coding |
| ENSMUST00000182842 | 1 | 0 | 4 Nomo1         | protein_coding |
| ENSMUST00000184404 | 1 | 0 | 4 lsm1          | protein_coding |
| ENSMUST00000125309 | 1 | 0 | 4 4933427E13Rik | lincRNA        |
| ENSMUST00000180841 | 1 | 0 | 4 AA543186      | lincRNA        |
| ENSMUST00000181328 | 1 | 0 | 4 Gm26518       | lincRNA        |
| ENSMUST00000001825 | 1 | 0 | 2 Chordc1       | protein_coding |
| ENSMUST00000002456 | 1 | 0 | 2 Nt5c1b        | protein_coding |
| ENSMUST00000003572 | 1 | 0 | 2 Gars          | protein_coding |
| ENSMUST00000006749 | 1 | 0 | 2 Slc4a1        | protein_coding |
| ENSMUST00000007249 | 1 | 0 | 2 Slc44a4       | protein_coding |
| ENSMUST00000010020 | 1 | 0 | 2 Cox4i2        | protein_coding |
| ENSMUST00000016231 | 1 | 0 | 2 Fli1          | protein_coding |
| ENSMUST00000019937 | 1 | 0 | 2 Sec63         | protein_coding |
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| ENSMUST00000020150 | 1 | 0 | 2 Ikbip         | protein_coding |
| ENSMUST00000020158 | 1 | 0 | 2 Myb           | protein_coding |
| ENSMUST00000020586 | 1 | 0 | 2 Slc22a4       | protein_coding |
| ENSMUST00000022032 | 1 | 0 | 2 2210016F16Rik | protein_coding |
| ENSMUST00000022140 | 1 | 0 | 2 Ocln          | protein_coding |
| ENSMUST00000022593 | 1 | 0 | 2 Akap11        | protein_coding |
| ENSMUST00000023351 | 1 | 0 | 2 Mzt2          | protein_coding |
| ENSMUST00000024011 | 1 | 0 | 2 Kcnk5         | protein_coding |
| ENSMUST00000025728 | 1 | 0 | 2 Frmd8         | protein_coding |
| ENSMUST00000025955 | 1 | 0 | 2 Eif3a         | protein_coding |
| ENSMUST00000027472 | 1 | 0 | 2 Efh1          | protein_coding |
| ENSMUST00000027532 | 1 | 0 | 2 Scly          | protein_coding |
| ENSMUST00000027768 | 1 | 0 | 2 Ahctf1        | protein_coding |
| ENSMUST00000027933 | 1 | 0 | 2 Dtl           | protein_coding |
| ENSMUST00000028844 | 1 | 0 | 2 Sppl2a        | protein_coding |
| ENSMUST00000029546 | 1 | 0 | 2 Jtb           | protein_coding |
| ENSMUST00000030563 | 1 | 0 | 2 Pef1          | protein_coding |
| ENSMUST00000030741 | 1 | 0 | 2 Ptpru         | protein_coding |
| ENSMUST00000032130 | 1 | 0 | 2 Aplf          | protein_coding |
| ENSMUST00000032891 | 1 | 0 | 2 Smg1          | protein_coding |
| ENSMUST00000033169 | 1 | 0 | 2 Cdr2          | protein_coding |
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| ENSMUST00000036350 | 1 | 0 | 2 Cdnf          | protein_coding |
| ENSMUST00000041115 | 1 | 0 | 2 Erich6        | protein_coding |
| ENSMUST00000042641 | 1 | 0 | 2 Zfp60         | protein_coding |
| ENSMUST00000046557 | 1 | 0 | 2 Akap14        | protein_coding |

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| ENSMUST00000047305 | 1 | 0 | 2 Wbscr28       | protein_coding |
| ENSMUST00000047412 | 1 | 0 | 2 Mier3         | protein_coding |
| ENSMUST00000048016 | 1 | 0 | 2 Fut11         | protein_coding |
| ENSMUST00000049994 | 1 | 0 | 2 Rimk1a        | protein_coding |
| ENSMUST00000054230 | 1 | 0 | 2 Sfmtb1        | protein_coding |
| ENSMUST00000057811 | 1 | 0 | 2 Olfr27        | protein_coding |
| ENSMUST00000063632 | 1 | 0 | 2 Sec31b        | protein_coding |
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| ENSMUST00000070139 | 1 | 0 | 2 Cndp1         | protein_coding |
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| ENSMUST00000076265 | 1 | 0 | 2 Upf3b         | protein_coding |
| ENSMUST00000076454 | 1 | 0 | 2 Ubqln1        | protein_coding |
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| ENSMUST00000080164 | 1 | 0 | 2 Fip1l1        | protein_coding |
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| ENSMUST00000085116 | 1 | 0 | 2 Ptpn21        | protein_coding |
| ENSMUST00000086399 | 1 | 0 | 2 Icam1         | protein_coding |
| ENSMUST00000087399 | 1 | 0 | 2 Tnxb          | protein_coding |
| ENSMUST00000088880 | 1 | 0 | 2 Gm6994        | protein_coding |
| ENSMUST00000089334 | 1 | 0 | 2 Fgd5          | protein_coding |
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| ENSMUST00000092227 | 1 | 0 | 2 Scyl2         | protein_coding |
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| ENSMUST00000099149 | 1 | 0 | 2 Nnt           | protein_coding |
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| ENSMUST00000101180 | 1 | 0 | 2 Gm15097       | protein_coding |
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| ENSMUST00000101667 | 1 | 0 | 2 Gm5935        | protein_coding |
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| ENSMUST00000106267 | 1 | 0 | 2 Stx1b         | protein_coding |
| ENSMUST00000107704 | 1 | 0 | 2 Msantd3       | protein_coding |
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| ENSMUST00000108314 | 1 | 0 | 2 Supt6         | protein_coding |
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| ENSMUST00000108995 | 1 | 0 | 2 Gm14435       | protein_coding |
| ENSMUST00000109222 | 1 | 0 | 2 Chst4         | protein_coding |
| ENSMUST00000110294 | 1 | 0 | 2 Elmsan1       | protein_coding |
| ENSMUST00000110463 | 1 | 0 | 2 Cops2         | protein_coding |
| ENSMUST00000110766 | 1 | 0 | 2 Fbxl18        | protein_coding |
| ENSMUST00000111610 | 1 | 0 | 2 Hnrnpc        | protein_coding |
| ENSMUST00000112537 | 1 | 0 | 2 1700013D24Rik | protein_coding |
| ENSMUST00000112590 | 1 | 0 | 2 Acpp          | protein_coding |
| ENSMUST00000112923 | 1 | 0 | 2 Ift122        | protein_coding |
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| ENSMUST00000120081 | 1 | 0 | 2 Olfr390       | protein_coding |
| ENSMUST00000120630 | 1 | 0 | 2 Amz1          | protein_coding |
| ENSMUST00000121142 | 1 | 0 | 2 R3hcc1        | protein_coding |
| ENSMUST00000123749 | 1 | 0 | 2 Prkag2        | protein_coding |
| ENSMUST00000128715 | 1 | 0 | 2 Plekha2       | protein_coding |
| ENSMUST00000128739 | 1 | 0 | 2 Tdp1          | protein_coding |
| ENSMUST00000128948 | 1 | 0 | 2 Lepr          | protein_coding |
| ENSMUST00000129453 | 1 | 0 | 2 Myh9          | protein_coding |
| ENSMUST00000129683 | 1 | 0 | 2 Psmd13        | protein_coding |

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| ENSMUST00000133481  | 1 | 0 | 2 Upf3b         | protein_coding         |
| ENSMUST00000133872  | 1 | 0 | 2 Cul5          | protein_coding         |
| ENSMUST00000133994  | 1 | 0 | 2 Itfg2         | protein_coding         |
| ENSMUST00000134118  | 1 | 0 | 2 Adap2         | protein_coding         |
| ENSMUST00000134762  | 1 | 0 | 2 Prkar1b       | protein_coding         |
| ENSMUST00000135495  | 1 | 0 | 2 Ccdc92        | protein_coding         |
| ENSMUST00000138730  | 1 | 0 | 2 Wisp2         | protein_coding         |
| ENSMUST00000140391  | 1 | 0 | 2 Mis18bp1      | protein_coding         |
| ENSMUST00000141862  | 1 | 0 | 2 Cfap36        | protein_coding         |
| ENSMUST00000143276  | 1 | 0 | 2 Acacb         | protein_coding         |
| ENSMUST00000143832  | 1 | 0 | 2 Serpinb2      | protein_coding         |
| ENSMUST00000145440  | 1 | 0 | 2 Sp100         | protein_coding         |
| ENSMUST00000145593  | 1 | 0 | 2 Paip2b        | protein_coding         |
| ENSMUST00000145881  | 1 | 0 | 2 9430038I01Rik | protein_coding         |
| ENSMUST00000145938  | 1 | 0 | 2 Mgar          | protein_coding         |
| ENSMUST00000146475  | 1 | 0 | 2 Trpc3         | protein_coding         |
| ENSMUST00000147267  | 1 | 0 | 2 Bbc3          | protein_coding         |
| ENSMUST00000148407  | 1 | 0 | 2 Ptpn11        | protein_coding         |
| ENSMUST00000151530  | 1 | 0 | 2 Ears2         | protein_coding         |
| ENSMUST00000152447  | 1 | 0 | 2 Nt5c3         | protein_coding         |
| ENSMUST00000152926  | 1 | 0 | 2 1700021F05Rik | protein_coding         |
| ENSMUST00000153090  | 1 | 0 | 2 Atp6v1c2      | protein_coding         |
| ENSMUST00000153980  | 1 | 0 | 2 Uvssa         | protein_coding         |
| ENSMUST00000154606  | 1 | 0 | 2 Ccdc30        | protein_coding         |
| ENSMUST00000154872  | 1 | 0 | 2 Hdac8         | protein_coding         |
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| ENSMUST00000159754  | 1 | 0 | 2 Zfp579        | protein_coding         |
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| ENSMUST00000161032  | 1 | 0 | 2 Ipo9          | protein_coding         |
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| ENSMUST00000166376  | 1 | 0 | 2 Mfap2         | protein_coding         |
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| ENSMUST00000167715  | 1 | 0 | 2 Sin3a         | protein_coding         |
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| ENSMUST00000169192  | 1 | 0 | 2 Ankrd13d      | protein_coding         |
| ENSMUST00000169573  | 1 | 0 | 2 Myzap         | protein_coding         |
| ENSMUST00000169928  | 1 | 0 | 2 Itgb4         | protein_coding         |
| ENSMUST00000170124  | 1 | 0 | 2 D6Ert527e     | protein_coding         |
| ENSMUST00000176008  | 1 | 0 | 2 Tll5          | protein_coding         |
| ENSMUST00000176668  | 1 | 0 | 2 Traf7         | protein_coding         |
| ENSMUST00000177336  | 1 | 0 | 2 Fbxw10        | protein_coding         |
| ENSMUST00000182723  | 1 | 0 | 2 Sh3d19        | protein_coding         |
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| ENSMUST00000125269  | 1 | 0 | 2 Gm11739       | antisense              |
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| ENSMUST00000163069  | 1 | 0 | 2 Tbc1d22bos    | antisense              |
| ENSMUST00000163074  | 1 | 0 | 0 Gmps          | retained_intron        |
| ENSMUST00000125706  | 1 | 0 | 0 Fbxw20        | retained_intron        |
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| ENSMUST00000081004  | 1 | 0 | 0 Gm6644        | pseudogene             |
| ENSMUST00000081004  | 1 | 0 | 0 Gm6644        | pseudogene             |
| ENSMUST00000176174  | 1 | 0 | 0 Nrnx1         | protein_coding         |
| ENSMUST00000173703  | 1 | 0 | 0 Serpinb10     | protein_coding         |
| ENSMUST00000072243  | 1 | 0 | 0 Txndc9        | protein_coding         |
| ENSMUST000000061206 | 1 | 0 | 0 Dennd2d       | protein_coding         |
| ENSMUST00000176174  | 1 | 0 | 0 Nrnx1         | protein_coding         |
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| ENSMUST00000114986  | 1 | 0 | 0 Fam178b       | processed_transcript   |
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| ENSMUST00000118046  | 1 | 0 | 0 Gm2066        | unprocessed_pseudogene |
| ENSMUST00000120184  | 1 | 0 | 0 Amy2b         | unprocessed_pseudogene |
| ENSMUST00000173244  | 1 | 0 | 0 Gm4134        | unprocessed_pseudogene |
| ENSMUST00000173825  | 1 | 0 | 0 Gm7235        | unprocessed_pseudogene |

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| ENSMUST00000125451 | 1 | 0 | 0 3000002C10Rik | transcribed_processed_pseudogene |
| ENSMUST00000000985 | 1 | 0 | 0 Oxa1l         | protein_coding                   |
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| ENSMUST00000002274 | 1 | 0 | 0 Napsa         | protein_coding                   |
| ENSMUST00000002457 | 1 | 0 | 0 Bmp8b         | protein_coding                   |
| ENSMUST00000002976 | 1 | 0 | 0 Il17ra        | protein_coding                   |
| ENSMUST00000003681 | 1 | 0 | 0 Sec14l2       | protein_coding                   |
| ENSMUST00000004756 | 1 | 0 | 0 Wwox          | protein_coding                   |
| ENSMUST00000005233 | 1 | 0 | 0 Eif2ak4       | protein_coding                   |
| ENSMUST00000005607 | 1 | 0 | 0 Asf1b         | protein_coding                   |
| ENSMUST00000005749 | 1 | 0 | 0 Ctr9          | protein_coding                   |
| ENSMUST00000006614 | 1 | 0 | 0 EphA2         | protein_coding                   |
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| ENSMUST00000008966 | 1 | 0 | 0 Acyp1         | protein_coding                   |
| ENSMUST00000011407 | 1 | 0 | 0 Exoc3l2       | protein_coding                   |
| ENSMUST00000014370 | 1 | 0 | 0 Cacybp        | protein_coding                   |
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| ENSMUST00000015719 | 1 | 0 | 0 Atp6v0e       | protein_coding                   |
| ENSMUST00000016452 | 1 | 0 | 0 Ube2a         | protein_coding                   |
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| ENSMUST00000017590 | 1 | 0 | 0 C1qtnf1       | protein_coding                   |
| ENSMUST00000018005 | 1 | 0 | 0 Mybl2         | protein_coding                   |
| ENSMUST00000018313 | 1 | 0 | 0 Mfng          | protein_coding                   |
| ENSMUST00000018744 | 1 | 0 | 0 Shmt1         | protein_coding                   |
| ENSMUST00000019268 | 1 | 0 | 0 Scrn1         | protein_coding                   |
| ENSMUST00000019908 | 1 | 0 | 0 Mtrf1l        | protein_coding                   |
| ENSMUST00000019994 | 1 | 0 | 0 Popdc3        | protein_coding                   |
| ENSMUST00000020043 | 1 | 0 | 0 Lrriq1        | protein_coding                   |
| ENSMUST00000020129 | 1 | 0 | 0 Kitl          | protein_coding                   |
| ENSMUST00000020334 | 1 | 0 | 0 Usp15         | protein_coding                   |
| ENSMUST00000020554 | 1 | 0 | 0 Madcam1       | protein_coding                   |
| ENSMUST00000020581 | 1 | 0 | 0 Hcn2          | protein_coding                   |
| ENSMUST00000020643 | 1 | 0 | 0 Rufy1         | protein_coding                   |
| ENSMUST00000020878 | 1 | 0 | 0 Efcab10       | protein_coding                   |
| ENSMUST00000021077 | 1 | 0 | 0 Slc9a3r1      | protein_coding                   |
| ENSMUST00000021207 | 1 | 0 | 0 Fam101b       | protein_coding                   |
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| ENSMUST00000021639 | 1 | 0 | 0 Tubal3        | protein_coding                   |
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| ENSMUST00000023050 | 1 | 0 | 0 Tab1          | protein_coding                   |
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| ENSMUST00000025020 | 1 | 0 | 0 Rgs11         | protein_coding                   |
| ENSMUST00000025093 | 1 | 0 | 0 Thumpd2       | protein_coding                   |
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| ENSMUST00000025403 | 1 | 0 | 0 Impa2         | protein_coding                   |
| ENSMUST00000025430 | 1 | 0 | 0 Setbp1        | protein_coding                   |
| ENSMUST00000025472 | 1 | 0 | 0 Pcyox1l       | protein_coding                   |
| ENSMUST00000025483 | 1 | 0 | 0 Nars          | protein_coding                   |

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| ENSMUST00000025617 | 1 | 0 | 0 Rfk      | protein_coding |
| ENSMUST00000025663 | 1 | 0 | 0 Tmem2    | protein_coding |
| ENSMUST00000025680 | 1 | 0 | 0 Lipf     | protein_coding |
| ENSMUST00000026045 | 1 | 0 | 0 Col17a1  | protein_coding |
| ENSMUST00000026613 | 1 | 0 | 0 Gusb     | protein_coding |
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| ENSMUST00000029769 | 1 | 0 | 0 Gclm     | protein_coding |
| ENSMUST00000029783 | 1 | 0 | 0 Snx27    | protein_coding |
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| ENSMUST00000033503 | 1 | 0 | 0 Glod5    | protein_coding |
| ENSMUST00000033583 | 1 | 0 | 0 Magt1    | protein_coding |
| ENSMUST00000034034 | 1 | 0 | 0 Isx      | protein_coding |
| ENSMUST00000034133 | 1 | 0 | 0 Mylk3    | protein_coding |
| ENSMUST00000034218 | 1 | 0 | 0 Slc12a3  | protein_coding |
| ENSMUST00000034796 | 1 | 0 | 0 Elovl4   | protein_coding |
| ENSMUST00000034834 | 1 | 0 | 0 Pkm      | protein_coding |
| ENSMUST00000034902 | 1 | 0 | 0 Gsta2    | protein_coding |
| ENSMUST00000034983 | 1 | 0 | 0 Atp1b3   | protein_coding |
| ENSMUST00000034991 | 1 | 0 | 0 Tbx18    | protein_coding |
| ENSMUST00000035034 | 1 | 0 | 0 Mrps22   | protein_coding |
| ENSMUST00000035202 | 1 | 0 | 0 Mon1a    | protein_coding |
| ENSMUST00000035419 | 1 | 0 | 0 Prf1     | protein_coding |
| ENSMUST00000035597 | 1 | 0 | 0 Sppl2b   | protein_coding |
| ENSMUST00000036370 | 1 | 0 | 0 Tagap    | protein_coding |
| ENSMUST00000036476 | 1 | 0 | 0 Kazn     | protein_coding |
| ENSMUST00000036647 | 1 | 0 | 0 Ctdspl2  | protein_coding |
| ENSMUST00000037280 | 1 | 0 | 0 Vps18    | protein_coding |
| ENSMUST00000037960 | 1 | 0 | 0 Zdhhc9   | protein_coding |
| ENSMUST00000038096 | 1 | 0 | 0 Fn3krp   | protein_coding |
| ENSMUST00000038973 | 1 | 0 | 0 Gnptg    | protein_coding |
| ENSMUST00000039021 | 1 | 0 | 0 Ssx2ip   | protein_coding |
| ENSMUST00000039212 | 1 | 0 | 0 Slc4a5   | protein_coding |
| ENSMUST00000039620 | 1 | 0 | 0 Cbr3     | protein_coding |
| ENSMUST00000039631 | 1 | 0 | 0 Acta2    | protein_coding |
| ENSMUST00000040213 | 1 | 0 | 0 Tyw1     | protein_coding |
| ENSMUST00000040231 | 1 | 0 | 0 Trp63    | protein_coding |
| ENSMUST00000040284 | 1 | 0 | 0 BC031181 | protein_coding |

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| ENSMUST00000040361 | 1 | 0 | 0 Atp6v0e2      | protein_coding |
| ENSMUST00000040718 | 1 | 0 | 0 Ostm1         | protein_coding |
| ENSMUST00000041059 | 1 | 0 | 0 Trpc4ap       | protein_coding |
| ENSMUST00000041375 | 1 | 0 | 0 Sik2          | protein_coding |
| ENSMUST00000041717 | 1 | 0 | 0 Tcf7l2        | protein_coding |
| ENSMUST00000041830 | 1 | 0 | 0 Ntmt1         | protein_coding |
| ENSMUST00000041882 | 1 | 0 | 0 1600002K03Rik | protein_coding |
| ENSMUST00000042601 | 1 | 0 | 0 Dhx38         | protein_coding |
| ENSMUST00000043062 | 1 | 0 | 0 Acsbg2        | protein_coding |
| ENSMUST00000043208 | 1 | 0 | 0 Six4          | protein_coding |
| ENSMUST00000043654 | 1 | 0 | 0 Tubg2         | protein_coding |
| ENSMUST00000043696 | 1 | 0 | 0 Serpinf2      | protein_coding |
| ENSMUST00000043983 | 1 | 0 | 0 Igsf3         | protein_coding |
| ENSMUST00000044116 | 1 | 0 | 0 Spg20         | protein_coding |
| ENSMUST00000044306 | 1 | 0 | 0 Grm1          | protein_coding |
| ENSMUST00000044567 | 1 | 0 | 0 Alg5          | protein_coding |
| ENSMUST00000044684 | 1 | 0 | 0 Helq          | protein_coding |
| ENSMUST00000044751 | 1 | 0 | 0 Zer1          | protein_coding |
| ENSMUST00000044923 | 1 | 0 | 0 Ddx24         | protein_coding |
| ENSMUST00000045602 | 1 | 0 | 0 Ndufb10       | protein_coding |
| ENSMUST00000045747 | 1 | 0 | 0 Wnt4          | protein_coding |
| ENSMUST00000045896 | 1 | 0 | 0 Pacsin1       | protein_coding |
| ENSMUST00000047179 | 1 | 0 | 0 Zfp598        | protein_coding |
| ENSMUST00000047208 | 1 | 0 | 0 Dzip1         | protein_coding |
| ENSMUST00000048578 | 1 | 0 | 0 Ttc1          | protein_coding |
| ENSMUST00000048647 | 1 | 0 | 0 Rbm46         | protein_coding |
| ENSMUST00000048660 | 1 | 0 | 0 Pm20d1        | protein_coding |
| ENSMUST00000049178 | 1 | 0 | 0 Cyp2c37       | protein_coding |
| ENSMUST00000049483 | 1 | 0 | 0 Fmnl2         | protein_coding |
| ENSMUST00000050398 | 1 | 0 | 0 Flad1         | protein_coding |
| ENSMUST00000050757 | 1 | 0 | 0 Ptprd         | protein_coding |
| ENSMUST00000051184 | 1 | 0 | 0 Kcnrg         | protein_coding |
| ENSMUST00000051226 | 1 | 0 | 0 Pfkf          | protein_coding |
| ENSMUST00000051873 | 1 | 0 | 0 Pfkfb4        | protein_coding |
| ENSMUST00000052250 | 1 | 0 | 0 Zfp423        | protein_coding |
| ENSMUST00000052368 | 1 | 0 | 0 Kdm6a         | protein_coding |
| ENSMUST00000053157 | 1 | 0 | 0 Fam159a       | protein_coding |
| ENSMUST00000054930 | 1 | 0 | 0 Ptx4          | protein_coding |
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| ENSMUST00000056370 | 1 | 0 | 0 Pmf1          | protein_coding |
| ENSMUST00000057216 | 1 | 0 | 0 Mtch2         | protein_coding |
| ENSMUST00000057767 | 1 | 0 | 0 Upk1b         | protein_coding |
| ENSMUST00000058060 | 1 | 0 | 0 Bod1          | protein_coding |
| ENSMUST00000058098 | 1 | 0 | 0 Mbtps2        | protein_coding |
| ENSMUST00000059295 | 1 | 0 | 0 Syt12         | protein_coding |
| ENSMUST00000059676 | 1 | 0 | 0 Aqp12         | protein_coding |
| ENSMUST00000060501 | 1 | 0 | 0 Cdkn2a        | protein_coding |
| ENSMUST00000060797 | 1 | 0 | 0 Casc1         | protein_coding |
| ENSMUST00000061244 | 1 | 0 | 0 Ephb4         | protein_coding |
| ENSMUST00000061260 | 1 | 0 | 0 Fat4          | protein_coding |
| ENSMUST00000061295 | 1 | 0 | 0 Dnajc22       | protein_coding |
| ENSMUST00000061891 | 1 | 0 | 0 1110034G24Rik | protein_coding |
| ENSMUST00000062787 | 1 | 0 | 0 Cd300e        | protein_coding |
| ENSMUST00000062860 | 1 | 0 | 0 Mmgt2         | protein_coding |
| ENSMUST00000062944 | 1 | 0 | 0 Gja8          | protein_coding |
| ENSMUST00000064244 | 1 | 0 | 0 Rexo4         | protein_coding |
| ENSMUST00000064679 | 1 | 0 | 0 5430435G22Rik | protein_coding |
| ENSMUST00000064910 | 1 | 0 | 0 Strap         | protein_coding |
| ENSMUST00000065418 | 1 | 0 | 0 Rab13         | protein_coding |
| ENSMUST00000065512 | 1 | 0 | 0 Rtkn          | protein_coding |
| ENSMUST00000065515 | 1 | 0 | 0 Tfg           | protein_coding |
| ENSMUST00000066285 | 1 | 0 | 0 Hspa12a       | protein_coding |
| ENSMUST00000066532 | 1 | 0 | 0 Lipg          | protein_coding |
| ENSMUST00000066650 | 1 | 0 | 0 Dbr1          | protein_coding |
| ENSMUST00000067398 | 1 | 0 | 0 Mdm4          | protein_coding |
| ENSMUST00000067444 | 1 | 0 | 0 Gfap          | protein_coding |
| ENSMUST00000068282 | 1 | 0 | 0 Ati2          | protein_coding |

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| ENSMUST00000068583 | 1 | 0 | 0 Aebp2         | protein_coding |
| ENSMUST00000069520 | 1 | 0 | 0 Syp           | protein_coding |
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| ENSMUST00000070656 | 1 | 0 | 0 Tgfb1i1       | protein_coding |
| ENSMUST00000071301 | 1 | 0 | 0 Rnf7          | protein_coding |
| ENSMUST00000071592 | 1 | 0 | 0 Prmt7         | protein_coding |
| ENSMUST00000073029 | 1 | 0 | 0 Fancc         | protein_coding |
| ENSMUST00000073892 | 1 | 0 | 0 Fxyd7         | protein_coding |
| ENSMUST00000074912 | 1 | 0 | 0 2010012O05Rik | protein_coding |
| ENSMUST00000074957 | 1 | 0 | 0 Bud13         | protein_coding |
| ENSMUST00000075301 | 1 | 0 | 0 Neb           | protein_coding |
| ENSMUST00000075641 | 1 | 0 | 0 Npm1          | protein_coding |
| ENSMUST00000075954 | 1 | 0 | 0 Taf1b         | protein_coding |
| ENSMUST00000076592 | 1 | 0 | 0 Ccdc36        | protein_coding |
| ENSMUST00000077902 | 1 | 0 | 0 Gfap          | protein_coding |
| ENSMUST00000078050 | 1 | 0 | 0 Rnf114        | protein_coding |
| ENSMUST00000078223 | 1 | 0 | 0 Gimap8        | protein_coding |
| ENSMUST00000078835 | 1 | 0 | 0 Klk1b1        | protein_coding |
| ENSMUST00000079634 | 1 | 0 | 0 Exosc5        | protein_coding |
| ENSMUST00000079644 | 1 | 0 | 0 Ybx1          | protein_coding |
| ENSMUST00000079838 | 1 | 0 | 0 Hdac7         | protein_coding |
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| ENSMUST00000080583 | 1 | 0 | 0 Gstcd         | protein_coding |
| ENSMUST00000080713 | 1 | 0 | 0 Utp14a        | protein_coding |
| ENSMUST00000080806 | 1 | 0 | 0 Sfxn4         | protein_coding |
| ENSMUST00000080880 | 1 | 0 | 0 Dab2          | protein_coding |
| ENSMUST00000081335 | 1 | 0 | 0 Tgif2         | protein_coding |
| ENSMUST00000081496 | 1 | 0 | 0 Ltbp3         | protein_coding |
| ENSMUST00000081654 | 1 | 0 | 0 Col18a1       | protein_coding |
| ENSMUST00000081982 | 1 | 0 | 0 Dzank1        | protein_coding |
| ENSMUST00000082219 | 1 | 0 | 0 Chil4         | protein_coding |
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| ENSMUST00000085661 | 1 | 0 | 0 Zfp655        | protein_coding |
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| ENSMUST00000085835 | 1 | 0 | 0 Map4k1        | protein_coding |
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| ENSMUST00000087366 | 1 | 0 | 0 Creb1         | protein_coding |
| ENSMUST00000087951 | 1 | 0 | 0 Vps37c        | protein_coding |
| ENSMUST00000088081 | 1 | 0 | 0 Dpysl5        | protein_coding |
| ENSMUST00000088452 | 1 | 0 | 0 Slc38a1       | protein_coding |
| ENSMUST00000088631 | 1 | 0 | 0 Zic3          | protein_coding |
| ENSMUST00000088935 | 1 | 0 | 0 Zdhhc9        | protein_coding |
| ENSMUST00000089015 | 1 | 0 | 0 Mas1          | protein_coding |
| ENSMUST00000089056 | 1 | 0 | 0 Tmem255a      | protein_coding |
| ENSMUST00000089926 | 1 | 0 | 0 Mfap1a        | protein_coding |
| ENSMUST00000090046 | 1 | 0 | 0 Tmem87a       | protein_coding |
| ENSMUST00000090095 | 1 | 0 | 0 Oxr1          | protein_coding |
| ENSMUST00000090973 | 1 | 0 | 0 Nes           | protein_coding |
| ENSMUST00000091377 | 1 | 0 | 0 1700029F12Rik | protein_coding |
| ENSMUST00000092163 | 1 | 0 | 0 Lyz2          | protein_coding |
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| ENSMUST00000092984 | 1 | 0 | 0 Myh10         | protein_coding |
| ENSMUST00000093336 | 1 | 0 | 0 2610318N02Rik | protein_coding |
| ENSMUST00000093801 | 1 | 0 | 0 Plscr1        | protein_coding |
| ENSMUST00000094218 | 1 | 0 | 0 Slc17a9       | protein_coding |
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| ENSMUST00000096299 | 1 | 0 | 0 Htr2c         | protein_coding |
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| ENSMUST00000096990 | 1 | 0 | 0 Cdc45         | protein_coding |
| ENSMUST00000097311 | 1 | 0 | 0 Foxp4         | protein_coding |
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| ENSMUST00000097816 | 1 | 0 | 0 Crocc         | protein_coding |

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| ENSMUST00000098849 | 1 | 0 | 0 Otud7b        | protein_coding |
| ENSMUST00000099067 | 1 | 0 | 0 Nfatc2        | protein_coding |
| ENSMUST00000099166 | 1 | 0 | 0 Ddx4          | protein_coding |
| ENSMUST00000099562 | 1 | 0 | 0 Krtap14       | protein_coding |
| ENSMUST00000099676 | 1 | 0 | 0 AW112010      | protein_coding |
| ENSMUST00000099735 | 1 | 0 | 0 Yae1d1        | protein_coding |
| ENSMUST00000100015 | 1 | 0 | 0 Ola1          | protein_coding |
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| ENSMUST00000100837 | 1 | 0 | 0 Camk2g        | protein_coding |
| ENSMUST00000101032 | 1 | 0 | 0 March8        | protein_coding |
| ENSMUST00000101190 | 1 | 0 | 0 Gm15127       | protein_coding |
| ENSMUST00000101324 | 1 | 0 | 0 Dmrtc1b       | protein_coding |
| ENSMUST00000101560 | 1 | 0 | 0 Zfp449        | protein_coding |
| ENSMUST00000102522 | 1 | 0 | 0 Cela3b        | protein_coding |
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| ENSMUST00000102900 | 1 | 0 | 0 Abo           | protein_coding |
| ENSMUST00000103001 | 1 | 0 | 0 Ssx9          | protein_coding |
| ENSMUST00000103003 | 1 | 0 | 0 Ssxb10        | protein_coding |
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| ENSMUST00000103132 | 1 | 0 | 0 Krt222        | protein_coding |
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| ENSMUST00000105850 | 1 | 0 | 0 Hnrnpr        | protein_coding |
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| ENSMUST00000105912 | 1 | 0 | 0 Wasf2         | protein_coding |
| ENSMUST00000105994 | 1 | 0 | 0 Snrnp40       | protein_coding |
| ENSMUST00000106099 | 1 | 0 | 0 Zmym1         | protein_coding |
| ENSMUST00000106107 | 1 | 0 | 0 Rab40b        | protein_coding |
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| ENSMUST00000106302 | 1 | 0 | 0 Cyth1         | protein_coding |
| ENSMUST00000106473 | 1 | 0 | 0 Lppr5         | protein_coding |
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| ENSMUST00000106528 | 1 | 0 | 0 Acsm3         | protein_coding |
| ENSMUST00000106855 | 1 | 0 | 0 Mier1         | protein_coding |
| ENSMUST00000107034 | 1 | 0 | 0 Inadl         | protein_coding |
| ENSMUST00000107377 | 1 | 0 | 0 Tnc           | protein_coding |
| ENSMUST00000107487 | 1 | 0 | 0 Msl1          | protein_coding |
| ENSMUST00000107505 | 1 | 0 | 0 Syt11         | protein_coding |
| ENSMUST00000107563 | 1 | 0 | 0 Arl5c         | protein_coding |
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| ENSMUST00000107722 | 1 | 0 | 0 Spop          | protein_coding |
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| ENSMUST00000107829 | 1 | 0 | 0 Nosip         | protein_coding |
| ENSMUST00000107934 | 1 | 0 | 0 Shank1        | protein_coding |
| ENSMUST00000107971 | 1 | 0 | 0 Spg20         | protein_coding |
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| ENSMUST00000108160 | 1 | 0 | 0 Unc45b        | protein_coding |
| ENSMUST00000108178 | 1 | 0 | 0 Casp8ap2      | protein_coding |
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| ENSMUST00000108447 | 1 | 0 | 0 Srr           | protein_coding |
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| ENSMUST00000109380 | 1 | 0 | 0 Brd1          | protein_coding |
| ENSMUST00000109384 | 1 | 0 | 0 Tomm34        | protein_coding |
| ENSMUST00000109570 | 1 | 0 | 0 Aar2          | protein_coding |
| ENSMUST00000109759 | 1 | 0 | 0 Bpifb4        | protein_coding |



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| ENSMUST00000109801 | 1 | 0 | 0 Ttl9          | protein_coding |
| ENSMUST00000109974 | 1 | 0 | 0 Calr3         | protein_coding |
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| ENSMUST00000110105 | 1 | 0 | 0 Zc3h14        | protein_coding |
| ENSMUST00000110417 | 1 | 0 | 0 Asah1         | protein_coding |
| ENSMUST00000110432 | 1 | 0 | 0 Btn2a2        | protein_coding |
| ENSMUST00000110635 | 1 | 0 | 0 Zmynd11       | protein_coding |
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| ENSMUST00000110965 | 1 | 0 | 0 Bpnt1         | protein_coding |
| ENSMUST00000111432 | 1 | 0 | 0 Creg1         | protein_coding |
| ENSMUST00000111477 | 1 | 0 | 0 2810006K23Rik | protein_coding |
| ENSMUST00000111720 | 1 | 0 | 0 Angptl1       | protein_coding |
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| ENSMUST00000112095 | 1 | 0 | 0 Pbrm1         | protein_coding |
| ENSMUST00000112105 | 1 | 0 | 0 Mid1          | protein_coding |
| ENSMUST00000112366 | 1 | 0 | 0 Scn1a         | protein_coding |
| ENSMUST00000112482 | 1 | 0 | 0 Pole          | protein_coding |
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| ENSMUST00000112690 | 1 | 0 | 0 Hfm1          | protein_coding |
| ENSMUST00000112898 | 1 | 0 | 0 Mrps18c       | protein_coding |
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| ENSMUST00000113447 | 1 | 0 | 0 Prickle2      | protein_coding |
| ENSMUST00000113750 | 1 | 0 | 0 Plcd4         | protein_coding |
| ENSMUST00000114119 | 1 | 0 | 0 Gm5640        | protein_coding |
| ENSMUST00000114209 | 1 | 0 | 0 Gm11143       | protein_coding |
| ENSMUST00000114491 | 1 | 0 | 0 Ccdc126       | protein_coding |
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| ENSMUST00000114965 | 1 | 0 | 0 Galnt15       | protein_coding |
| ENSMUST00000115116 | 1 | 0 | 0 Muc20         | protein_coding |
| ENSMUST00000115126 | 1 | 0 | 0 Tnk2          | protein_coding |
| ENSMUST00000115160 | 1 | 0 | 0 Tmem209       | protein_coding |
| ENSMUST00000115535 | 1 | 0 | 0 Zfp944        | protein_coding |
| ENSMUST00000115695 | 1 | 0 | 0 Magix         | protein_coding |
| ENSMUST00000115812 | 1 | 0 | 0 Pik3c3        | protein_coding |
| ENSMUST00000115848 | 1 | 0 | 0 Dsc3          | protein_coding |
| ENSMUST00000115864 | 1 | 0 | 0 Esco1         | protein_coding |
| ENSMUST00000116238 | 1 | 0 | 0 Hk1           | protein_coding |
| ENSMUST00000116359 | 1 | 0 | 0 Ctc1          | protein_coding |
| ENSMUST00000117506 | 1 | 0 | 0 Ube4a         | protein_coding |
| ENSMUST00000117726 | 1 | 0 | 0 Abhd3         | protein_coding |
| ENSMUST00000118108 | 1 | 0 | 0 Rabepk        | protein_coding |
| ENSMUST00000118113 | 1 | 0 | 0 Erg           | protein_coding |
| ENSMUST00000118159 | 1 | 0 | 0 Gramd1b       | protein_coding |
| ENSMUST00000118390 | 1 | 0 | 0 Synj1         | protein_coding |
| ENSMUST00000118707 | 1 | 0 | 0 Dixdc1        | protein_coding |
| ENSMUST00000118959 | 1 | 0 | 0 Fanci         | protein_coding |
| ENSMUST00000119245 | 1 | 0 | 0 Trip4         | protein_coding |
| ENSMUST00000119499 | 1 | 0 | 0 Osbpl5        | protein_coding |
| ENSMUST00000119863 | 1 | 0 | 0 Olfr381       | protein_coding |
| ENSMUST00000120083 | 1 | 0 | 0 Pomgnt1       | protein_coding |
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| ENSMUST00000121111 | 1 | 0 | 0 Lepre1        | protein_coding |
| ENSMUST00000121331 | 1 | 0 | 0 Vps25         | protein_coding |
| ENSMUST00000121491 | 1 | 0 | 0 Ttpa          | protein_coding |
| ENSMUST00000121787 | 1 | 0 | 0 Mapk8ip3      | protein_coding |
| ENSMUST00000121950 | 1 | 0 | 0 Fip11         | protein_coding |

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| ENSMUST00000123470 | 1 | 0 | 0 Anxa2     | protein_coding |
| ENSMUST00000123590 | 1 | 0 | 0 Vmp1      | protein_coding |
| ENSMUST00000123593 | 1 | 0 | 0 Kif1b     | protein_coding |
| ENSMUST00000123940 | 1 | 0 | 0 Dnmt3l    | protein_coding |
| ENSMUST00000124125 | 1 | 0 | 0 Fhad1     | protein_coding |
| ENSMUST00000124173 | 1 | 0 | 0 Tmf1      | protein_coding |
| ENSMUST00000124177 | 1 | 0 | 0 Cln3      | protein_coding |
| ENSMUST00000124304 | 1 | 0 | 0 Tnip1     | protein_coding |
| ENSMUST00000124358 | 1 | 0 | 0 Ush2a     | protein_coding |
| ENSMUST00000124529 | 1 | 0 | 0 Tmed2     | protein_coding |
| ENSMUST00000125285 | 1 | 0 | 0 Snx5      | protein_coding |
| ENSMUST00000125322 | 1 | 0 | 0 Rif1      | protein_coding |
| ENSMUST00000125552 | 1 | 0 | 0 Sec11c    | protein_coding |
| ENSMUST00000125745 | 1 | 0 | 0 Mdfi      | protein_coding |
| ENSMUST00000126050 | 1 | 0 | 0 Dhdh      | protein_coding |
| ENSMUST00000126319 | 1 | 0 | 0 Tbl3      | protein_coding |
| ENSMUST00000126346 | 1 | 0 | 0 Ccnl2     | protein_coding |
| ENSMUST00000126600 | 1 | 0 | 0 Khlh22    | protein_coding |
| ENSMUST00000126626 | 1 | 0 | 0 Bai3      | protein_coding |
| ENSMUST00000126707 | 1 | 0 | 0 Tnfrsf9   | protein_coding |
| ENSMUST00000127250 | 1 | 0 | 0 Ahctf1    | protein_coding |
| ENSMUST00000127292 | 1 | 0 | 0 Tomm22    | protein_coding |
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| ENSMUST00000127862 | 1 | 0 | 0 Hspa12b   | protein_coding |
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| ENSMUST00000128199 | 1 | 0 | 0 Ppp1r26   | protein_coding |
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| ENSMUST00000128698 | 1 | 0 | 0 Tvp23b    | protein_coding |
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| ENSMUST00000129294 | 1 | 0 | 0 Scamp3    | protein_coding |
| ENSMUST00000129424 | 1 | 0 | 0 Gcn111    | protein_coding |
| ENSMUST00000129577 | 1 | 0 | 0 Clk1      | protein_coding |
| ENSMUST00000129956 | 1 | 0 | 0 Prpf39    | protein_coding |
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| ENSMUST00000130196 | 1 | 0 | 0 Gipc2     | protein_coding |
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| ENSMUST00000130871 | 1 | 0 | 0 Gm28043   | protein_coding |
| ENSMUST00000131390 | 1 | 0 | 0 Mfsd9     | protein_coding |
| ENSMUST00000131669 | 1 | 0 | 0 Pik3r6    | protein_coding |
| ENSMUST00000131747 | 1 | 0 | 0 Saal1     | protein_coding |
| ENSMUST00000131993 | 1 | 0 | 0 Git2      | protein_coding |
| ENSMUST00000132178 | 1 | 0 | 0 Ap2b1     | protein_coding |
| ENSMUST00000132597 | 1 | 0 | 0 Dlg4      | protein_coding |
| ENSMUST00000132620 | 1 | 0 | 0 Mprlp     | protein_coding |
| ENSMUST00000132807 | 1 | 0 | 0 Exoc1     | protein_coding |
| ENSMUST00000132816 | 1 | 0 | 0 Tmem245   | protein_coding |
| ENSMUST00000132990 | 1 | 0 | 0 Nlrp4b    | protein_coding |
| ENSMUST00000133098 | 1 | 0 | 0 Prkab1    | protein_coding |
| ENSMUST00000133325 | 1 | 0 | 0 Got1      | protein_coding |
| ENSMUST00000133453 | 1 | 0 | 0 Wdr47     | protein_coding |
| ENSMUST00000133628 | 1 | 0 | 0 Gabarapl2 | protein_coding |
| ENSMUST00000133875 | 1 | 0 | 0 Atp7a     | protein_coding |
| ENSMUST00000133914 | 1 | 0 | 0 Uevld     | protein_coding |
| ENSMUST00000133951 | 1 | 0 | 0 Cox19     | protein_coding |
| ENSMUST00000134887 | 1 | 0 | 0 Cited1    | protein_coding |
| ENSMUST00000135241 | 1 | 0 | 0 Vamp4     | protein_coding |
| ENSMUST00000135326 | 1 | 0 | 0 Ikbbkb    | protein_coding |
| ENSMUST00000135542 | 1 | 0 | 0 Mtap7d3   | protein_coding |
| ENSMUST00000135594 | 1 | 0 | 0 Atp6v0a4  | protein_coding |
| ENSMUST00000135977 | 1 | 0 | 0 Cnot3     | protein_coding |
| ENSMUST00000136003 | 1 | 0 | 0 Csnk1e    | protein_coding |
| ENSMUST00000136237 | 1 | 0 | 0 Pbrm1     | protein_coding |
| ENSMUST00000136446 | 1 | 0 | 0 Lpo       | protein_coding |

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| ENSMUST00000136652 | 1 | 0 | 0 Tmem126a      | protein_coding |
| ENSMUST00000137112 | 1 | 0 | 0 Rere          | protein_coding |
| ENSMUST00000137708 | 1 | 0 | 0 Mllt4         | protein_coding |
| ENSMUST00000137829 | 1 | 0 | 0 Ppia          | protein_coding |
| ENSMUST00000138071 | 1 | 0 | 0 Wsb2          | protein_coding |
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| ENSMUST00000140082 | 1 | 0 | 0 Notch1        | protein_coding |
| ENSMUST00000141098 | 1 | 0 | 0 Mrpl23        | protein_coding |
| ENSMUST00000141101 | 1 | 0 | 0 Cit           | protein_coding |
| ENSMUST00000141281 | 1 | 0 | 0 Tctn1         | protein_coding |
| ENSMUST00000141343 | 1 | 0 | 0 Gnptab        | protein_coding |
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| ENSMUST00000144963 | 1 | 0 | 0 Arrdc1        | protein_coding |
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| ENSMUST00000145257 | 1 | 0 | 0 Morn3         | protein_coding |
| ENSMUST00000145261 | 1 | 0 | 0 C77080        | protein_coding |
| ENSMUST00000145714 | 1 | 0 | 0 lsm2          | protein_coding |
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| ENSMUST00000146872 | 1 | 0 | 0 Atn1          | protein_coding |
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| ENSMUST00000147040 | 1 | 0 | 0 Got2          | protein_coding |
| ENSMUST00000147196 | 1 | 0 | 0 1700021F05Rik | protein_coding |
| ENSMUST00000147495 | 1 | 0 | 0 Phldb1        | protein_coding |
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| ENSMUST00000147674 | 1 | 0 | 0 Slc18a1       | protein_coding |
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| ENSMUST00000147816 | 1 | 0 | 0 Bptf          | protein_coding |
| ENSMUST00000148135 | 1 | 0 | 0 Wdr13         | protein_coding |
| ENSMUST00000148330 | 1 | 0 | 0 Clk1          | protein_coding |
| ENSMUST00000148340 | 1 | 0 | 0 Ces1d         | protein_coding |
| ENSMUST00000148846 | 1 | 0 | 0 Med12         | protein_coding |
| ENSMUST00000148961 | 1 | 0 | 0 Eif2s3y       | protein_coding |

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| ENSMUST00000150093 | 1 | 0 | 0 Slc25a38 | protein_coding |
| ENSMUST00000150282 | 1 | 0 | 0 Cnksr3   | protein_coding |
| ENSMUST00000150680 | 1 | 0 | 0 Ii34     | protein_coding |
| ENSMUST00000151197 | 1 | 0 | 0 Pih1d2   | protein_coding |
| ENSMUST00000151361 | 1 | 0 | 0 Plbd2    | protein_coding |
| ENSMUST00000151412 | 1 | 0 | 0 Pigz     | protein_coding |
| ENSMUST00000151430 | 1 | 0 | 0 Thoc2    | protein_coding |
| ENSMUST00000151445 | 1 | 0 | 0 Idua     | protein_coding |
| ENSMUST00000151477 | 1 | 0 | 0 Tnrc18   | protein_coding |
| ENSMUST00000151742 | 1 | 0 | 0 Traf2    | protein_coding |
| ENSMUST00000151792 | 1 | 0 | 0 Tesc     | protein_coding |
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| ENSMUST00000152100 | 1 | 0 | 0 Fam115a  | protein_coding |
| ENSMUST00000152168 | 1 | 0 | 0 Tmem184c | protein_coding |
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| ENSMUST00000159293 | 1 | 0 | 0 Marc2    | protein_coding |
| ENSMUST00000159517 | 1 | 0 | 0 Gm4778   | protein_coding |
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| ENSMUST00000160019 | 1 | 0 | 0 Stac3    | protein_coding |
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| ENSMUST00000161143 | 1 | 0 | 0 Timm44   | protein_coding |
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| ENSMUST00000164012 | 1 | 0 | 0 Crhr2         | protein_coding |
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| ENSMUST00000164779 | 1 | 0 | 0 Xrcc6         | protein_coding |
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| ENSMUST00000165386 | 1 | 0 | 0 Ccdc152       | protein_coding |
| ENSMUST00000165649 | 1 | 0 | 0 Ghitm         | protein_coding |
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| ENSMUST00000169122 | 1 | 0 | 0 Serinc1       | protein_coding |
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| ENSMUST00000171394 | 1 | 0 | 0 Fam196a       | protein_coding |
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| ENSMUST00000171821 | 1 | 0 | 0 Vrk3          | protein_coding |
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| ENSMUST00000172852 | 1 | 0 | 0 Ttc6          | protein_coding |
| ENSMUST00000173655 | 1 | 0 | 0 Cpsf4l        | protein_coding |
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| ENSMUST00000178966 | 1 | 0 | 0 Gm10147       | protein_coding       |
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| ENSMUST00000179605 | 1 | 0 | 0 Zfp653        | protein_coding       |
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| ENSMUST00000180384 | 1 | 0 | 0 Crtam         | protein_coding       |
| ENSMUST00000180716 | 1 | 0 | 0 Senp1         | protein_coding       |
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| ENSMUST00000126779 | 1 | 0 | 0 Gm13434       | lincRNA              |
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| ENSMUST00000129146 | 1 | 0 | 0 E130006D01Rik | lincRNA              |
| ENSMUST00000134448 | 1 | 0 | 0 Gm15208       | lincRNA              |
| ENSMUST00000136658 | 1 | 0 | 0 4930583P06Rik | lincRNA              |
| ENSMUST00000138893 | 1 | 0 | 0 Gm17613       | lincRNA              |
| ENSMUST00000139614 | 1 | 0 | 0 Gm11820       | lincRNA              |
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| ENSMUST00000150772 | 1 | 0 | 0 Gm11419       | lincRNA              |
| ENSMUST00000154958 | 1 | 0 | 0 A230006K03Rik | lincRNA              |
| ENSMUST00000156466 | 1 | 0 | 0 Gm15984       | lincRNA              |
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| ENSMUST00000181215 | 1 | 0 | 0 Gm17508       | lincRNA              |
| ENSMUST00000181390 | 1 | 0 | 0 Gm26873       | lincRNA              |
| ENSMUST00000181775 | 1 | 0 | 0 Gm26785       | lincRNA              |
| ENSMUST00000181895 | 1 | 0 | 0 Gm2885        | lincRNA              |
| ENSMUST00000182174 | 1 | 0 | 0 Gm2694        | lincRNA              |
| ENSMUST00000183031 | 1 | 0 | 0 Gm27017       | lincRNA              |
| ENSMUST00000184645 | 1 | 0 | 0 Gm19518       | lincRNA              |
| ENSMUST00000184676 | 1 | 0 | 0 Gm27226       | lincRNA              |
| ENSMUST00000123318 | 1 | 0 | 0 Gm15965       | antisense            |
| ENSMUST00000127049 | 1 | 0 | 0 Gm14508       | antisense            |
| ENSMUST00000128240 | 1 | 0 | 0 Gm15345       | antisense            |
| ENSMUST00000133819 | 1 | 0 | 0 Gm12064       | antisense            |

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| ENSMUST00000135068 | 1 | 0  | 0   | Gm15932       | antisense            |
| ENSMUST00000135116 | 1 | 0  | 0   | Sorbs2os      | antisense            |
| ENSMUST00000137882 | 1 | 0  | 0   | 2700068H02Rik | antisense            |
| ENSMUST00000138430 | 1 | 0  | 0   | Gm15886       | antisense            |
| ENSMUST00000143287 | 1 | 0  | 0   | Gm15265       | antisense            |
| ENSMUST00000144680 | 1 | 0  | 0   | Gm16263       | antisense            |
| ENSMUST00000145050 | 1 | 0  | 0   | 1700034H15Rik | antisense            |
| ENSMUST00000150973 | 1 | 0  | 0   | A630014C17Rik | antisense            |
| ENSMUST00000151670 | 1 | 0  | 0   | Gm12996       | antisense            |
| ENSMUST00000152375 | 1 | 0  | 0   | Gm13563       | antisense            |
| ENSMUST00000155987 | 1 | 0  | 0   | Gm11640       | antisense            |
| ENSMUST00000164515 | 1 | 0  | 0   | Gm17232       | antisense            |
| ENSMUST00000174550 | 1 | 0  | 0   | Gm12002       | antisense            |
| ENSMUST00000178938 | 1 | 0  | 0   | Gm20069       | antisense            |
| ENSMUST00000179643 | 1 | 0  | 0   | Rab10os       | antisense            |
| ENSMUST00000181841 | 1 | 0  | 0   | D930019O06Rik | antisense            |
| ENSMUST00000138502 | 0 | 63 | 295 | Rps20         | protein_coding       |
| ENSMUST00000102501 | 0 | 53 | 416 | Vps39         | protein_coding       |
| ENSMUST00000134242 | 0 | 28 | 0   | Icmt          | protein_coding       |
| ENSMUST00000176035 | 0 | 22 | 12  | Amz1          | protein_coding       |
| ENSMUST00000138392 | 0 | 18 | 0   | Fcgbp         | protein_coding       |
| ENSMUST00000117633 | 0 | 18 | 0   | Son           | protein_coding       |
| ENSMUST00000181550 | 0 | 16 | 0   | Gm3764        | lincRNA              |
| ENSMUST00000128000 | 0 | 15 | 52  | Shhg12        | lincRNA              |
| ENSMUST00000125796 | 0 | 15 | 44  | Chdh          | protein_coding       |
| ENSMUST00000159516 | 0 | 11 | 0   | Scyl3         | protein_coding       |
| ENSMUST00000152521 | 0 | 10 | 75  | Eif1          | protein_coding       |
| ENSMUST00000099816 | 0 | 10 | 16  | Cd80          | protein_coding       |
| ENSMUST00000034697 | 0 | 10 | 0   | Slc44a2       | protein_coding       |
| ENSMUST00000069557 | 0 | 10 | 0   | Smad5         | protein_coding       |
| ENSMUST00000144493 | 0 | 10 | 0   | Eif4a2        | protein_coding       |
| ENSMUST00000078764 | 0 | 9  | 40  | Cox7c         | protein_coding       |
| ENSMUST00000179226 | 0 | 9  | 2   | Col4a3bp      | protein_coding       |
| ENSMUST00000174757 | 0 | 8  | 63  | Ddx39b        | protein_coding       |
| ENSMUST00000150729 | 0 | 8  | 4   | Dhdds         | protein_coding       |
| ENSMUST00000049908 | 0 | 8  | 0   | Ssbp4         | protein_coding       |
| ENSMUST00000090371 | 0 | 8  | 0   | Mettl14       | protein_coding       |
| ENSMUST00000136403 | 0 | 8  | 0   | Dnaic2        | protein_coding       |
| ENSMUST00000143085 | 0 | 8  | 0   | Cnot3         | protein_coding       |
| ENSMUST00000166396 | 0 | 8  | 0   | Fuz           | protein_coding       |
| ENSMUST00000146314 | 0 | 7  | 69  | Gm15832       | processed_transcript |
| ENSMUST00000137063 | 0 | 7  | 54  | Tulp4         | protein_coding       |
| ENSMUST00000113481 | 0 | 7  | 34  | Zfp318        | protein_coding       |
| ENSMUST00000124373 | 0 | 7  | 18  | Rreb1         | protein_coding       |
| ENSMUST00000051870 | 0 | 7  | 6   | Champ1        | protein_coding       |
| ENSMUST00000143677 | 0 | 7  | 4   | Tmem151a      | protein_coding       |
| ENSMUST00000111205 | 0 | 7  | 2   | Wbscr22       | protein_coding       |
| ENSMUST00000016654 | 0 | 7  | 0   | Mtif3         | protein_coding       |
| ENSMUST00000113807 | 0 | 7  | 0   | Trub2         | protein_coding       |
| ENSMUST00000140675 | 0 | 7  | 0   | Ccpg1         | protein_coding       |
| ENSMUST00000156196 | 0 | 7  | 0   | Gas2l1        | protein_coding       |
| ENSMUST00000120930 | 0 | 7  | 0   | Gm14908       | processed_pseudogene |
| ENSMUST00000149383 | 0 | 6  | 10  | Mapkap1       | protein_coding       |
| ENSMUST00000182802 | 0 | 6  | 4   | Arhgap32      | protein_coding       |
| ENSMUST00000055261 | 0 | 6  | 2   | Mob1a         | protein_coding       |
| ENSMUST00000038434 | 0 | 6  | 0   | Rpp25l        | protein_coding       |
| ENSMUST00000051259 | 0 | 6  | 0   | Gpr97         | protein_coding       |
| ENSMUST00000062492 | 0 | 6  | 0   | Pfdn5         | protein_coding       |
| ENSMUST00000132387 | 0 | 6  | 0   | Extl1         | protein_coding       |
| ENSMUST00000132397 | 0 | 6  | 0   | Gm20517       | protein_coding       |
| ENSMUST00000148351 | 0 | 6  | 0   | Ipo4          | protein_coding       |
| ENSMUST00000150739 | 0 | 6  | 0   | Rps27a        | protein_coding       |
| ENSMUST00000170912 | 0 | 6  | 0   | Hnmpd         | protein_coding       |
| ENSMUST00000161706 | 0 | 5  | 135 | Shhg9         | antisense            |
| ENSMUST00000109790 | 0 | 5  | 56  | Asxl1         | protein_coding       |
| ENSMUST00000027753 | 0 | 5  | 8   | Lamc2         | protein_coding       |
| ENSMUST00000127195 | 0 | 5  | 2   | Uimc1         | protein_coding       |
| ENSMUST00000026560 | 0 | 5  | 0   | Psmd13        | protein_coding       |

|                    |   |   |                 |                         |
|--------------------|---|---|-----------------|-------------------------|
| ENSMUST00000106523 | 0 | 5 | 0 Eri2          | protein_coding          |
| ENSMUST00000131949 | 0 | 5 | 0 Uckl1         | protein_coding          |
| ENSMUST00000139861 | 0 | 5 | 0 Prodh         | protein_coding          |
| ENSMUST00000032233 | 0 | 5 | 751 Tuba8       | protein_coding          |
| ENSMUST00000135678 | 0 | 5 | 40 Atp5a1       | protein_coding          |
| ENSMUST00000172299 | 0 | 5 | 38 Rnf152       | protein_coding          |
| ENSMUST00000051934 | 0 | 5 | 32 Gskip        | protein_coding          |
| ENSMUST00000138885 | 0 | 5 | 26 Rab35        | protein_coding          |
| ENSMUST00000097785 | 0 | 5 | 12 Dst          | protein_coding          |
| ENSMUST00000094288 | 0 | 5 | 10 Wdr64        | protein_coding          |
| ENSMUST00000075406 | 0 | 5 | 4 Szt2          | protein_coding          |
| ENSMUST00000125970 | 0 | 5 | 2 Tdg           | protein_coding          |
| ENSMUST00000129489 | 0 | 5 | 2 Fam188a       | protein_coding          |
| ENSMUST00000181561 | 0 | 5 | 2 A230087F16Rik | lincRNA                 |
| ENSMUST00000117501 | 0 | 5 | 0 Xlr5d-ps      | unprocessed_pseudogene  |
| ENSMUST00000026608 | 0 | 5 | 0 Crcp          | protein_coding          |
| ENSMUST00000049093 | 0 | 5 | 0 Txnip         | protein_coding          |
| ENSMUST00000102682 | 0 | 5 | 0 Tom1l2        | protein_coding          |
| ENSMUST00000102926 | 0 | 5 | 0 Anp32b        | protein_coding          |
| ENSMUST00000141500 | 0 | 5 | 0 Acss1         | protein_coding          |
| ENSMUST00000144396 | 0 | 5 | 0 Patz1         | protein_coding          |
| ENSMUST00000150726 | 0 | 5 | 0 Pttg1         | protein_coding          |
| ENSMUST00000155243 | 0 | 5 | 0 Smarcd2       | protein_coding          |
| ENSMUST00000169519 | 0 | 5 | 0 Rad1          | protein_coding          |
| ENSMUST00000170420 | 0 | 5 | 0 Dusp12        | protein_coding          |
| ENSMUST00000173118 | 0 | 5 | 0 Olfr115       | protein_coding          |
| ENSMUST00000119592 | 0 | 5 | 0 Gm11600       | processed_pseudogene    |
| ENSMUST00000128904 | 0 | 5 | 0 A830036E02Rik | antisense               |
| ENSMUST00000173373 | 0 | 4 | 24 Setd2        | nonsense_mediated_decay |
| ENSMUST00000173373 | 0 | 4 | 24 Setd2        | nonsense_mediated_decay |
| ENSMUST00000090287 | 0 | 4 | 20 Myh11        | protein_coding          |
| ENSMUST00000092684 | 0 | 4 | 18 Ttc25        | protein_coding          |
| ENSMUST00000159339 | 0 | 4 | 18 Acbd6        | protein_coding          |
| ENSMUST00000108358 | 0 | 4 | 16 Blvrb        | protein_coding          |
| ENSMUST00000006101 | 0 | 4 | 8 Itgae         | protein_coding          |
| ENSMUST00000023687 | 0 | 4 | 8 Ifngr2        | protein_coding          |
| ENSMUST00000036072 | 0 | 4 | 8 5031414D18Rik | protein_coding          |
| ENSMUST00000166020 | 0 | 4 | 6 Sbf2          | protein_coding          |
| ENSMUST00000124290 | 0 | 4 | 4 Rhbdl2        | protein_coding          |
| ENSMUST00000098924 | 0 | 4 | 2 Adar          | protein_coding          |
| ENSMUST00000126877 | 0 | 4 | 2 Cul1          | protein_coding          |
| ENSMUST00000156465 | 0 | 4 | 2 Dab2ip        | protein_coding          |
| ENSMUST00000015920 | 0 | 4 | 0 Med22         | protein_coding          |
| ENSMUST00000021412 | 0 | 4 | 0 Psma6         | protein_coding          |
| ENSMUST00000025944 | 0 | 4 | 0 Hhex          | protein_coding          |
| ENSMUST00000026661 | 0 | 4 | 0 Tk1           | protein_coding          |
| ENSMUST00000035090 | 0 | 4 | 0 Fbxl2         | protein_coding          |
| ENSMUST00000037977 | 0 | 4 | 0 Ccp1          | protein_coding          |
| ENSMUST00000045542 | 0 | 4 | 0 Tesk2         | protein_coding          |
| ENSMUST00000107494 | 0 | 4 | 0 Mst1          | protein_coding          |
| ENSMUST00000110049 | 0 | 4 | 0 Eif4enif1     | protein_coding          |
| ENSMUST00000112349 | 0 | 4 | 0 Mta3          | protein_coding          |
| ENSMUST00000112847 | 0 | 4 | 0 Mapk10        | protein_coding          |
| ENSMUST00000112999 | 0 | 4 | 0 Myeov2        | protein_coding          |
| ENSMUST00000113051 | 0 | 4 | 0 Shroom3       | protein_coding          |
| ENSMUST00000117743 | 0 | 4 | 0 Top3a         | protein_coding          |
| ENSMUST00000120940 | 0 | 4 | 0 Snap47        | protein_coding          |
| ENSMUST00000126641 | 0 | 4 | 0 Srsf10        | protein_coding          |
| ENSMUST00000135372 | 0 | 4 | 0 Senp3         | protein_coding          |
| ENSMUST00000135924 | 0 | 4 | 0 Ube2j1        | protein_coding          |
| ENSMUST00000143010 | 0 | 4 | 0 Gpld1         | protein_coding          |
| ENSMUST00000149807 | 0 | 4 | 0 Kdf1          | protein_coding          |
| ENSMUST00000151914 | 0 | 4 | 0 Tmem164       | protein_coding          |
| ENSMUST00000159406 | 0 | 4 | 0 E130309D02Rik | protein_coding          |
| ENSMUST00000164919 | 0 | 4 | 0 Lamb1         | protein_coding          |
| ENSMUST00000167646 | 0 | 4 | 0 Apoe          | protein_coding          |
| ENSMUST00000178486 | 0 | 4 | 0 Kmt2d         | protein_coding          |
| ENSMUST00000147468 | 0 | 3 | 40 Mgat4b       | protein_coding          |



|                    |   |   |    |               |                                    |
|--------------------|---|---|----|---------------|------------------------------------|
| ENSMUST00000034365 | 0 | 3 | 26 | Tsnaxip1      | protein_coding                     |
| ENSMUST00000139926 | 0 | 3 | 24 | Scrn3         | protein_coding                     |
| ENSMUST00000027700 | 0 | 3 | 22 | Rbbp5         | protein_coding                     |
| ENSMUST00000136363 | 0 | 3 | 22 | Sar1b         | protein_coding                     |
| ENSMUST00000023179 | 0 | 3 | 18 | Zfp7          | protein_coding                     |
| ENSMUST00000039127 | 0 | 3 | 16 | Ubn2          | protein_coding                     |
| ENSMUST00000036489 | 0 | 3 | 12 | Rsb1l         | protein_coding                     |
| ENSMUST00000140323 | 0 | 3 | 12 | Endov         | protein_coding                     |
| ENSMUST00000163810 | 0 | 3 | 12 | Mid1          | protein_coding                     |
| ENSMUST00000180801 | 0 | 3 | 12 | Gm26554       | lincRNA                            |
| ENSMUST00000105838 | 0 | 3 | 10 | Usp48         | protein_coding                     |
| ENSMUST00000106160 | 0 | 3 | 8  | Aspscr1       | protein_coding                     |
| ENSMUST00000108357 | 0 | 3 | 8  | Blvrb         | protein_coding                     |
| ENSMUST00000108307 | 0 | 3 | 6  | 1110037F02Rik | protein_coding                     |
| ENSMUST00000078886 | 0 | 3 | 4  | Spen          | protein_coding                     |
| ENSMUST00000132880 | 0 | 3 | 4  | Gm15290       | lincRNA                            |
| ENSMUST00000034965 | 0 | 3 | 2  | Snapc5        | protein_coding                     |
| ENSMUST00000045295 | 0 | 3 | 2  | Pnpla7        | protein_coding                     |
| ENSMUST00000113149 | 0 | 3 | 2  | Mrap2         | protein_coding                     |
| ENSMUST00000162657 | 0 | 3 | 2  | Cfap43        | protein_coding                     |
| ENSMUST00000162780 | 0 | 3 | 2  | Spef2         | protein_coding                     |
| ENSMUST00000022122 | 0 | 3 | 0  | Ckmt2         | protein_coding                     |
| ENSMUST00000031195 | 0 | 3 | 0  | Ugt2a3        | protein_coding                     |
| ENSMUST00000034172 | 0 | 3 | 0  | Ces1d         | protein_coding                     |
| ENSMUST00000034883 | 0 | 3 | 0  | Stoml1        | protein_coding                     |
| ENSMUST00000063445 | 0 | 3 | 0  | Klhdc1        | protein_coding                     |
| ENSMUST00000110938 | 0 | 3 | 0  | Esrrg         | protein_coding                     |
| ENSMUST00000115410 | 0 | 3 | 0  | Sncaip        | protein_coding                     |
| ENSMUST00000116605 | 0 | 3 | 0  | Mad2l1        | protein_coding                     |
| ENSMUST00000082153 | 0 | 3 | 0  | Gm5570        | lincRNA                            |
| ENSMUST00000180418 | 0 | 3 | 0  | Gm26854       | lincRNA                            |
| ENSMUST00000185169 | 0 | 3 | 77 | Gm27162       | lincRNA                            |
| ENSMUST00000027379 | 0 | 3 | 36 | Xrcc5         | protein_coding                     |
| ENSMUST00000023119 | 0 | 3 | 30 | Vdr           | protein_coding                     |
| ENSMUST00000086932 | 0 | 3 | 24 | Tfeb          | protein_coding                     |
| ENSMUST00000161227 | 0 | 3 | 18 | Luc7l2        | protein_coding                     |
| ENSMUST00000031736 | 0 | 3 | 16 | Agfg2         | protein_coding                     |
| ENSMUST00000176753 | 0 | 3 | 16 | Pan3          | protein_coding                     |
| ENSMUST00000093508 | 0 | 3 | 14 | Sp110         | protein_coding                     |
| ENSMUST00000100335 | 0 | 3 | 12 | Mrc2          | protein_coding                     |
| ENSMUST00000129355 | 0 | 3 | 12 | Nuak1         | protein_coding                     |
| ENSMUST00000177757 | 0 | 3 | 12 | Sag           | protein_coding                     |
| ENSMUST00000106763 | 0 | 3 | 10 | Bptf          | protein_coding                     |
| ENSMUST00000131826 | 0 | 3 | 10 | Man1b1        | protein_coding                     |
| ENSMUST00000131878 | 0 | 3 | 10 | Tmem63c       | protein_coding                     |
| ENSMUST00000132642 | 0 | 3 | 10 | Vav2          | protein_coding                     |
| ENSMUST00000160832 | 0 | 3 | 10 | Zdhhc19       | protein_coding                     |
| ENSMUST00000170347 | 0 | 3 | 10 | Ccdc125       | protein_coding                     |
| ENSMUST00000078099 | 0 | 3 | 8  | Proca1        | protein_coding                     |
| ENSMUST00000134036 | 0 | 3 | 8  | Ypel1         | protein_coding                     |
| ENSMUST00000153826 | 0 | 3 | 8  | Sept2         | protein_coding                     |
| ENSMUST00000173171 | 0 | 3 | 8  | Coro2b        | protein_coding                     |
| ENSMUST00000129353 | 0 | 3 | 8  | 1700112J05Rik | lincRNA                            |
| ENSMUST00000001202 | 0 | 3 | 6  | Ocl           | protein_coding                     |
| ENSMUST00000015333 | 0 | 3 | 6  | Cas1          | protein_coding                     |
| ENSMUST00000020629 | 0 | 3 | 6  | Gfpt2         | protein_coding                     |
| ENSMUST00000050083 | 0 | 3 | 6  | Cul4b         | protein_coding                     |
| ENSMUST00000052290 | 0 | 3 | 6  | Pop1          | protein_coding                     |
| ENSMUST00000068387 | 0 | 3 | 6  | Ep300         | protein_coding                     |
| ENSMUST00000078060 | 0 | 3 | 6  | Tex28         | protein_coding                     |
| ENSMUST00000107752 | 0 | 3 | 6  | Hsd17b14      | protein_coding                     |
| ENSMUST00000114835 | 0 | 3 | 6  | Fam122c       | protein_coding                     |
| ENSMUST00000120699 | 0 | 3 | 6  | Timm22        | protein_coding                     |
| ENSMUST00000181032 | 0 | 3 | 6  | A930029G22Rik | lincRNA                            |
| ENSMUST00000159695 | 0 | 3 | 4  | Gm16026       | transcribed_unprocessed_pseudogene |
| ENSMUST00000020543 | 0 | 3 | 4  | Cpeb4         | protein_coding                     |
| ENSMUST00000059331 | 0 | 3 | 4  | Mypop         | protein_coding                     |
| ENSMUST00000102494 | 0 | 3 | 4  | Ccdc55        | protein_coding                     |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUST00000177184 | 0 | 3 | 4 Vmn2r5         | protein_coding       |
| ENSMUST00000036904 | 0 | 3 | 2 Rnf139         | protein_coding       |
| ENSMUST00000059352 | 0 | 3 | 2 Lmod1          | protein_coding       |
| ENSMUST00000076195 | 0 | 3 | 2 Zfp935         | protein_coding       |
| ENSMUST00000085804 | 0 | 3 | 2 Lin9           | protein_coding       |
| ENSMUST00000091678 | 0 | 3 | 2 Prl2b1         | protein_coding       |
| ENSMUST00000133245 | 0 | 3 | 2 Gprc5c         | protein_coding       |
| ENSMUST00000140482 | 0 | 3 | 2 Tbc1d20        | protein_coding       |
| ENSMUST00000141793 | 0 | 3 | 2 Taldo1         | protein_coding       |
| ENSMUST00000002289 | 0 | 3 | 0 Uchl3          | protein_coding       |
| ENSMUST00000024171 | 0 | 3 | 0 Stk31          | protein_coding       |
| ENSMUST00000029424 | 0 | 3 | 0 Pdcd10         | protein_coding       |
| ENSMUST00000029644 | 0 | 3 | 0 Ppa2           | protein_coding       |
| ENSMUST00000030614 | 0 | 3 | 0 CK137956       | protein_coding       |
| ENSMUST00000032207 | 0 | 3 | 0 Klrg1          | protein_coding       |
| ENSMUST00000059787 | 0 | 3 | 0 Dsg2           | protein_coding       |
| ENSMUST00000069483 | 0 | 3 | 0 Fbrsl1         | protein_coding       |
| ENSMUST00000071972 | 0 | 3 | 0 Cfap57         | protein_coding       |
| ENSMUST00000096285 | 0 | 3 | 0 Wnk3           | protein_coding       |
| ENSMUST00000098782 | 0 | 3 | 0 Layn           | protein_coding       |
| ENSMUST00000100723 | 0 | 3 | 0 1700024G13Rik  | protein_coding       |
| ENSMUST00000107406 | 0 | 3 | 0 Krt42          | protein_coding       |
| ENSMUST00000111820 | 0 | 3 | 0 Tmppe          | protein_coding       |
| ENSMUST00000116409 | 0 | 3 | 0 Hdac7          | protein_coding       |
| ENSMUST00000117989 | 0 | 3 | 0 Ngmn           | protein_coding       |
| ENSMUST00000120876 | 0 | 3 | 0 Ric3           | protein_coding       |
| ENSMUST00000125637 | 0 | 3 | 0 Eif4enif1      | protein_coding       |
| ENSMUST00000126378 | 0 | 3 | 0 Alkbh3         | protein_coding       |
| ENSMUST00000131035 | 0 | 3 | 0 Rnf213         | protein_coding       |
| ENSMUST00000141820 | 0 | 3 | 0 Wdr53          | protein_coding       |
| ENSMUST00000146237 | 0 | 3 | 0 Stl1           | protein_coding       |
| ENSMUST00000149905 | 0 | 3 | 0 Cep250         | protein_coding       |
| ENSMUST00000153534 | 0 | 3 | 0 Sarm1          | protein_coding       |
| ENSMUST00000155171 | 0 | 3 | 0 Hfm1           | protein_coding       |
| ENSMUST00000166986 | 0 | 3 | 0 Adam3          | protein_coding       |
| ENSMUST00000167290 | 0 | 3 | 0 Smim7          | protein_coding       |
| ENSMUST00000168129 | 0 | 3 | 0 Trappc12       | protein_coding       |
| ENSMUST00000173315 | 0 | 3 | 0 Ptpn6          | protein_coding       |
| ENSMUST00000173744 | 0 | 3 | 0 Kif3a          | protein_coding       |
| ENSMUST00000178087 | 0 | 3 | 0 Lzts2          | protein_coding       |
| ENSMUST00000112652 | 0 | 2 | 48 Gm11100       | antisense            |
| ENSMUST00000034713 | 0 | 2 | 42 Ldlr          | protein_coding       |
| ENSMUST00000146066 | 0 | 2 | 40 Ten1          | protein_coding       |
| ENSMUST00000128577 | 0 | 2 | 40 Gm14164       | processed_transcript |
| ENSMUST00000025243 | 0 | 2 | 38 lws1          | protein_coding       |
| ENSMUST00000025850 | 0 | 2 | 38 Fosl1         | protein_coding       |
| ENSMUST00000028864 | 0 | 2 | 38 Fbln7         | protein_coding       |
| ENSMUST00000118471 | 0 | 2 | 30 Klcl          | protein_coding       |
| ENSMUST00000055406 | 0 | 2 | 26 Stkl1         | protein_coding       |
| ENSMUST00000063249 | 0 | 2 | 26 Xrcc1         | protein_coding       |
| ENSMUST00000050574 | 0 | 2 | 24 Ccnj1         | protein_coding       |
| ENSMUST00000003386 | 0 | 2 | 22 Mrpl4         | protein_coding       |
| ENSMUST00000088248 | 0 | 2 | 22 Ube2c         | protein_coding       |
| ENSMUST00000169453 | 0 | 2 | 22 Nfat5         | protein_coding       |
| ENSMUST00000171633 | 0 | 2 | 22 Clnk          | protein_coding       |
| ENSMUST00000072554 | 0 | 2 | 20 9430015G10Rik | protein_coding       |
| ENSMUST00000021925 | 0 | 2 | 18 Ercc6l2       | protein_coding       |
| ENSMUST00000033283 | 0 | 2 | 18 Rrm1          | protein_coding       |
| ENSMUST00000049257 | 0 | 2 | 18 Ddx52         | protein_coding       |
| ENSMUST00000055490 | 0 | 2 | 18 Otop2         | protein_coding       |
| ENSMUST00000114124 | 0 | 2 | 18 Tiam1         | protein_coding       |
| ENSMUST00000150220 | 0 | 2 | 18 9130409J20Rik | lincRNA              |
| ENSMUST00000025218 | 0 | 2 | 16 Etf1          | protein_coding       |
| ENSMUST00000036089 | 0 | 2 | 16 Trim69        | protein_coding       |
| ENSMUST00000041126 | 0 | 2 | 16 Ss18l1        | protein_coding       |
| ENSMUST00000058104 | 0 | 2 | 16 Zfp719        | protein_coding       |
| ENSMUST00000073149 | 0 | 2 | 16 Slc9a5        | protein_coding       |
| ENSMUST00000086028 | 0 | 2 | 16 Nme7          | protein_coding       |

|                    |   |   |    |               |                        |
|--------------------|---|---|----|---------------|------------------------|
| ENSMUST00000150170 | 0 | 2 | 16 | Rs1           | protein_coding         |
| ENSMUST00000171325 | 0 | 2 | 16 | Fyttl1        | protein_coding         |
| ENSMUST00000139218 | 0 | 2 | 16 | Gm16201       | processed_transcript   |
| ENSMUST00000172664 | 0 | 2 | 16 | Gm20468       | lincRNA                |
| ENSMUST00000042052 | 0 | 2 | 14 | Hectd1        | protein_coding         |
| ENSMUST00000075550 | 0 | 2 | 14 | Cenph         | protein_coding         |
| ENSMUST00000181294 | 0 | 2 | 14 | Wscd2         | protein_coding         |
| ENSMUST00000060009 | 0 | 2 | 12 | Exd1          | protein_coding         |
| ENSMUST00000067737 | 0 | 2 | 12 | 9130230L23Rik | protein_coding         |
| ENSMUST00000115734 | 0 | 2 | 12 | Paip2         | protein_coding         |
| ENSMUST00000131927 | 0 | 2 | 12 | Shpk          | protein_coding         |
| ENSMUST00000143234 | 0 | 2 | 12 | Acp6          | protein_coding         |
| ENSMUST00000148870 | 0 | 2 | 12 | Acss2         | protein_coding         |
| ENSMUST00000150744 | 0 | 2 | 12 | Cd164l2       | protein_coding         |
| ENSMUST00000165311 | 0 | 2 | 12 | Cnnm1         | protein_coding         |
| ENSMUST00000170759 | 0 | 2 | 12 | Gpatch11      | protein_coding         |
| ENSMUST00000180339 | 0 | 2 | 12 | 4931406C07Rik | protein_coding         |
| ENSMUST00000180849 | 0 | 2 | 10 | 5830417110Rik | unprocessed_pseudogene |
| ENSMUST00000180849 | 0 | 2 | 10 | 5830417110Rik | unprocessed_pseudogene |
| ENSMUST00000025476 | 0 | 2 | 10 | Txn1          | protein_coding         |
| ENSMUST00000027288 | 0 | 2 | 10 | Cnga3         | protein_coding         |
| ENSMUST00000050020 | 0 | 2 | 10 | Amica1        | protein_coding         |
| ENSMUST00000060274 | 0 | 2 | 10 | Traf3         | protein_coding         |
| ENSMUST00000084433 | 0 | 2 | 10 | Acer2         | protein_coding         |
| ENSMUST00000123095 | 0 | 2 | 10 | Zfp260        | protein_coding         |
| ENSMUST00000124234 | 0 | 2 | 10 | Tmem106b      | protein_coding         |
| ENSMUST00000130260 | 0 | 2 | 10 | Mum1          | protein_coding         |
| ENSMUST00000176739 | 0 | 2 | 10 | Arid2         | protein_coding         |
| ENSMUST00000005175 | 0 | 2 | 8  | Chd5          | protein_coding         |
| ENSMUST00000022734 | 0 | 2 | 8  | Dnajc3        | protein_coding         |
| ENSMUST00000033477 | 0 | 2 | 8  | F9            | protein_coding         |
| ENSMUST00000038194 | 0 | 2 | 8  | Atad2         | protein_coding         |
| ENSMUST00000038618 | 0 | 2 | 8  | Ltbp4         | protein_coding         |
| ENSMUST00000097813 | 0 | 2 | 8  | Rsg1          | protein_coding         |
| ENSMUST00000102866 | 0 | 2 | 8  | Set           | protein_coding         |
| ENSMUST00000112191 | 0 | 2 | 8  | Parp11        | protein_coding         |
| ENSMUST00000128851 | 0 | 2 | 8  | Fus           | protein_coding         |
| ENSMUST00000134115 | 0 | 2 | 8  | Cnih4         | protein_coding         |
| ENSMUST00000169220 | 0 | 2 | 8  | Vav1          | protein_coding         |
| ENSMUST00000176881 | 0 | 2 | 8  | Gm20680       | antisense              |
| ENSMUST00000046748 | 0 | 2 | 6  | Gpr160        | protein_coding         |
| ENSMUST00000048010 | 0 | 2 | 6  | Dse           | protein_coding         |
| ENSMUST00000078847 | 0 | 2 | 6  | Tom1          | protein_coding         |
| ENSMUST00000080780 | 0 | 2 | 6  | Lhfp15        | protein_coding         |
| ENSMUST00000098604 | 0 | 2 | 6  | Spint2        | protein_coding         |
| ENSMUST00000112512 | 0 | 2 | 6  | Golga3        | protein_coding         |
| ENSMUST00000124866 | 0 | 2 | 6  | Arhgap31      | protein_coding         |
| ENSMUST00000128712 | 0 | 2 | 6  | Acer2         | protein_coding         |
| ENSMUST00000131723 | 0 | 2 | 6  | Slc47a1       | protein_coding         |
| ENSMUST00000135842 | 0 | 2 | 6  | Echs1         | protein_coding         |
| ENSMUST00000138022 | 0 | 2 | 6  | Tbpl1         | protein_coding         |
| ENSMUST00000140624 | 0 | 2 | 6  | Prex1         | protein_coding         |
| ENSMUST00000162816 | 0 | 2 | 6  | Runx2         | protein_coding         |
| ENSMUST00000181687 | 0 | 2 | 6  | Gm26534       | lincRNA                |
| ENSMUST00000021372 | 0 | 2 | 4  | Atp5s         | protein_coding         |
| ENSMUST00000046816 | 0 | 2 | 4  | Fam227a       | protein_coding         |
| ENSMUST00000057610 | 0 | 2 | 4  | Daam2         | protein_coding         |
| ENSMUST00000068054 | 0 | 2 | 4  | Stambp        | protein_coding         |
| ENSMUST00000074856 | 0 | 2 | 4  | Arhgef7       | protein_coding         |
| ENSMUST00000092089 | 0 | 2 | 4  | Mcidas        | protein_coding         |
| ENSMUST00000102834 | 0 | 2 | 4  | Ptprd         | protein_coding         |
| ENSMUST00000126993 | 0 | 2 | 4  | Cpne5         | protein_coding         |
| ENSMUST00000127503 | 0 | 2 | 4  | Raf1          | protein_coding         |
| ENSMUST00000127904 | 0 | 2 | 4  | Fanca         | protein_coding         |
| ENSMUST00000128842 | 0 | 2 | 4  | Gtf2ird2      | protein_coding         |
| ENSMUST00000132679 | 0 | 2 | 4  | Ctcf          | protein_coding         |
| ENSMUST00000176430 | 0 | 2 | 4  | Ap2b1         | protein_coding         |
| ENSMUST00000183330 | 0 | 2 | 4  | Sipa1l3       | protein_coding         |

|                    |   |   |                 |                         |
|--------------------|---|---|-----------------|-------------------------|
| ENSMUST00000150698 | 0 | 2 | 4 Hoxb5os       | antisense               |
| ENSMUST00000130753 | 0 | 2 | 2 Setd2         | nonsense_mediated_decay |
| ENSMUST00000130753 | 0 | 2 | 2 Setd2         | nonsense_mediated_decay |
| ENSMUST00000020439 | 0 | 2 | 2 Wif1          | protein_coding          |
| ENSMUST00000021424 | 0 | 2 | 2 Sptlc2        | protein_coding          |
| ENSMUST00000023572 | 0 | 2 | 2 Cxadr         | protein_coding          |
| ENSMUST00000025684 | 0 | 2 | 2 Ehd1          | protein_coding          |
| ENSMUST00000031402 | 0 | 2 | 2 Cct6a         | protein_coding          |
| ENSMUST00000059790 | 0 | 2 | 2 Pramef8       | protein_coding          |
| ENSMUST00000064234 | 0 | 2 | 2 Ezr           | protein_coding          |
| ENSMUST00000070326 | 0 | 2 | 2 Ttk           | protein_coding          |
| ENSMUST00000099090 | 0 | 2 | 2 Tsc22d2       | protein_coding          |
| ENSMUST00000099343 | 0 | 2 | 2 Nr2c1         | protein_coding          |
| ENSMUST00000110124 | 0 | 2 | 2 Homer3        | protein_coding          |
| ENSMUST00000111152 | 0 | 2 | 2 Ssc4d         | protein_coding          |
| ENSMUST00000124483 | 0 | 2 | 2 Sgms1         | protein_coding          |
| ENSMUST00000126573 | 0 | 2 | 2 Lrp8          | protein_coding          |
| ENSMUST00000132143 | 0 | 2 | 2 Ttc25         | protein_coding          |
| ENSMUST00000133151 | 0 | 2 | 2 Sh3rf3        | protein_coding          |
| ENSMUST00000141636 | 0 | 2 | 2 Ogfd1         | protein_coding          |
| ENSMUST00000149547 | 0 | 2 | 2 Sgip1         | protein_coding          |
| ENSMUST00000153165 | 0 | 2 | 2 Aff1          | protein_coding          |
| ENSMUST00000168461 | 0 | 2 | 2 Rnf19b        | protein_coding          |
| ENSMUST00000171023 | 0 | 2 | 2 Krit1         | protein_coding          |
| ENSMUST00000177378 | 0 | 2 | 2 Ros1          | protein_coding          |
| ENSMUST00000179395 | 0 | 2 | 2 Trip4         | protein_coding          |
| ENSMUST00000128996 | 0 | 2 | 2 Gm12059       | processed_transcript    |
| ENSMUST00000148704 | 0 | 2 | 2 BC028777      | processed_transcript    |
| ENSMUST00000129364 | 0 | 2 | 2 Zfp335os      | antisense               |
| ENSMUST00000025144 | 0 | 2 | 0 Cyp4f41-ps    | unprocessed_pseudogene  |
| ENSMUST00000025144 | 0 | 2 | 0 Cyp4f41-ps    | unprocessed_pseudogene  |
| ENSMUST00000119856 | 0 | 2 | 0 Ifna-ps1      | unprocessed_pseudogene  |
| ENSMUST00000121856 | 0 | 2 | 0 Gm14694       | unprocessed_pseudogene  |
| ENSMUST00000001818 | 0 | 2 | 0 Crnk11        | protein_coding          |
| ENSMUST00000002473 | 0 | 2 | 0 Babam1        | protein_coding          |
| ENSMUST00000002502 | 0 | 2 | 0 Hltf          | protein_coding          |
| ENSMUST00000002677 | 0 | 2 | 0 Axl           | protein_coding          |
| ENSMUST00000003575 | 0 | 2 | 0 Tpm4          | protein_coding          |
| ENSMUST00000020002 | 0 | 2 | 0 Abrac1        | protein_coding          |
| ENSMUST00000023444 | 0 | 2 | 0 Lztr1         | protein_coding          |
| ENSMUST00000025957 | 0 | 2 | 0 Fam45a        | protein_coding          |
| ENSMUST00000029564 | 0 | 2 | 0 Pmvk          | protein_coding          |
| ENSMUST00000029744 | 0 | 2 | 0 Itga10        | protein_coding          |
| ENSMUST00000032373 | 0 | 2 | 0 Ldhd          | protein_coding          |
| ENSMUST00000032969 | 0 | 2 | 0 Pold3         | protein_coding          |
| ENSMUST00000033180 | 0 | 2 | 0 Vwa3a         | protein_coding          |
| ENSMUST00000033383 | 0 | 2 | 0 Usp11         | protein_coding          |
| ENSMUST00000033950 | 0 | 2 | 0 Gins4         | protein_coding          |
| ENSMUST00000035751 | 0 | 2 | 0 L3mbtl1       | protein_coding          |
| ENSMUST00000036744 | 0 | 2 | 0 Rbm4b         | protein_coding          |
| ENSMUST00000038145 | 0 | 2 | 0 Clec16a       | protein_coding          |
| ENSMUST00000039867 | 0 | 2 | 0 Zbtb41        | protein_coding          |
| ENSMUST00000046614 | 0 | 2 | 0 Gipc2         | protein_coding          |
| ENSMUST00000047577 | 0 | 2 | 0 Prdm14        | protein_coding          |
| ENSMUST00000048656 | 0 | 2 | 0 Ubash3a       | protein_coding          |
| ENSMUST00000052904 | 0 | 2 | 0 Ccdc169       | protein_coding          |
| ENSMUST00000056108 | 0 | 2 | 0 Ankrd16       | protein_coding          |
| ENSMUST00000057198 | 0 | 2 | 0 5730508B09Rik | protein_coding          |
| ENSMUST00000059081 | 0 | 2 | 0 Il18          | protein_coding          |
| ENSMUST00000067980 | 0 | 2 | 0 Amy1          | protein_coding          |
| ENSMUST00000069902 | 0 | 2 | 0 Nnt           | protein_coding          |
| ENSMUST00000071876 | 0 | 2 | 0 Cdpf1         | protein_coding          |
| ENSMUST00000072666 | 0 | 2 | 0 Zfp474        | protein_coding          |
| ENSMUST00000073124 | 0 | 2 | 0 Zfp746        | protein_coding          |
| ENSMUST00000087485 | 0 | 2 | 0 C2cd5         | protein_coding          |
| ENSMUST00000089023 | 0 | 2 | 0 Irak2         | protein_coding          |
| ENSMUST00000094451 | 0 | 2 | 0 Gpr157        | protein_coding          |
| ENSMUST00000097342 | 0 | 2 | 0 Ehmt2         | protein_coding          |

|                    |   |   |     |               |                      |
|--------------------|---|---|-----|---------------|----------------------|
| ENSMUST00000098084 | 0 | 2 | 0   | Acsn2         | protein_coding       |
| ENSMUST00000099329 | 0 | 2 | 0   | Ube2n         | protein_coding       |
| ENSMUST00000106361 | 0 | 2 | 0   | Olfir1333     | protein_coding       |
| ENSMUST00000108159 | 0 | 2 | 0   | Srsf12        | protein_coding       |
| ENSMUST00000115766 | 0 | 2 | 0   | Brd8          | protein_coding       |
| ENSMUST00000116423 | 0 | 2 | 0   | Sept3         | protein_coding       |
| ENSMUST00000116615 | 0 | 2 | 0   | Barx2         | protein_coding       |
| ENSMUST00000117069 | 0 | 2 | 0   | Ppil3         | protein_coding       |
| ENSMUST00000119014 | 0 | 2 | 0   | Pigg          | protein_coding       |
| ENSMUST00000119703 | 0 | 2 | 0   | Tmem145       | protein_coding       |
| ENSMUST00000121151 | 0 | 2 | 0   | Vpreb3        | protein_coding       |
| ENSMUST00000123909 | 0 | 2 | 0   | 0610010F05Rik | protein_coding       |
| ENSMUST00000128150 | 0 | 2 | 0   | Ift46         | protein_coding       |
| ENSMUST00000128773 | 0 | 2 | 0   | Slc25a14      | protein_coding       |
| ENSMUST00000130461 | 0 | 2 | 0   | Depdc5        | protein_coding       |
| ENSMUST00000132113 | 0 | 2 | 0   | Scube2        | protein_coding       |
| ENSMUST00000135218 | 0 | 2 | 0   | Mlh1          | protein_coding       |
| ENSMUST00000139770 | 0 | 2 | 0   | Eng           | protein_coding       |
| ENSMUST00000140247 | 0 | 2 | 0   | Cdr2          | protein_coding       |
| ENSMUST00000140796 | 0 | 2 | 0   | Eif4g3        | protein_coding       |
| ENSMUST00000143445 | 0 | 2 | 0   | Whsc111       | protein_coding       |
| ENSMUST00000146416 | 0 | 2 | 0   | Rbm12b1       | protein_coding       |
| ENSMUST00000147147 | 0 | 2 | 0   | Ehmt1         | protein_coding       |
| ENSMUST00000150969 | 0 | 2 | 0   | Gtpbp3        | protein_coding       |
| ENSMUST00000153375 | 0 | 2 | 0   | Dph7          | protein_coding       |
| ENSMUST00000153390 | 0 | 2 | 0   | Ica1          | protein_coding       |
| ENSMUST00000153680 | 0 | 2 | 0   | Atp6v1b2      | protein_coding       |
| ENSMUST00000153792 | 0 | 2 | 0   | Zfp382        | protein_coding       |
| ENSMUST00000155876 | 0 | 2 | 0   | Sec23b        | protein_coding       |
| ENSMUST00000156059 | 0 | 2 | 0   | Dolpp1        | protein_coding       |
| ENSMUST00000156218 | 0 | 2 | 0   | Zfp938        | protein_coding       |
| ENSMUST00000159259 | 0 | 2 | 0   | Nox1          | protein_coding       |
| ENSMUST00000159906 | 0 | 2 | 0   | Rb1cc1        | protein_coding       |
| ENSMUST00000160260 | 0 | 2 | 0   | Pou2f1        | protein_coding       |
| ENSMUST00000161243 | 0 | 2 | 0   | Wnk1          | protein_coding       |
| ENSMUST00000161610 | 0 | 2 | 0   | Dao           | protein_coding       |
| ENSMUST00000163372 | 0 | 2 | 0   | Arel1         | protein_coding       |
| ENSMUST00000164473 | 0 | 2 | 0   | Slc19a3       | protein_coding       |
| ENSMUST00000165594 | 0 | 2 | 0   | Sept7         | protein_coding       |
| ENSMUST00000166254 | 0 | 2 | 0   | Tmem40        | protein_coding       |
| ENSMUST00000169061 | 0 | 2 | 0   | Drosha        | protein_coding       |
| ENSMUST00000169079 | 0 | 2 | 0   | Lrrcc1        | protein_coding       |
| ENSMUST00000172079 | 0 | 2 | 0   | Snrpe         | protein_coding       |
| ENSMUST00000173019 | 0 | 2 | 0   | Rps28         | protein_coding       |
| ENSMUST00000173426 | 0 | 2 | 0   | Myo1f         | protein_coding       |
| ENSMUST00000177374 | 0 | 2 | 0   | Asap1         | protein_coding       |
| ENSMUST00000177498 | 0 | 2 | 0   | Arhgef2       | protein_coding       |
| ENSMUST00000181031 | 0 | 2 | 0   | Gm2042        | protein_coding       |
| ENSMUST00000182350 | 0 | 2 | 0   | Xcr1          | protein_coding       |
| ENSMUST00000182805 | 0 | 2 | 0   | Rnf165        | protein_coding       |
| ENSMUST00000184671 | 0 | 2 | 0   | Gm27230       | processed_transcript |
| ENSMUST00000118932 | 0 | 2 | 0   | Gm15211       | processed_pseudogene |
| ENSMUST00000121626 | 0 | 2 | 0   | Gm14977       | processed_pseudogene |
| ENSMUST00000182438 | 0 | 2 | 0   | Gm27039       | processed_pseudogene |
| ENSMUST00000123911 | 0 | 2 | 0   | Gm13470       | lincRNA              |
| ENSMUST00000151765 | 0 | 2 | 0   | B130011K05Rik | lincRNA              |
| ENSMUST00000174005 | 0 | 2 | 0   | Gm20446       | lincRNA              |
| ENSMUST00000179029 | 0 | 2 | 0   | Cnde          | lincRNA              |
| ENSMUST00000181837 | 0 | 2 | 0   | 1700113A16Rik | lincRNA              |
| ENSMUST00000181856 | 0 | 2 | 0   | Gm26908       | lincRNA              |
| ENSMUST00000174291 | 0 | 1 | 577 | Stard10       | protein_coding       |
| ENSMUST00000110524 | 0 | 1 | 139 | Slc28a2       | protein_coding       |
| ENSMUST00000173815 | 0 | 1 | 67  | Gm9268        | protein_coding       |
| ENSMUST00000169130 | 0 | 1 | 57  | Vmn2r62       | protein_coding       |
| ENSMUST00000086002 | 0 | 1 | 48  | Cd247         | protein_coding       |
| ENSMUST00000109567 | 0 | 1 | 40  | Dlgap4        | protein_coding       |
| ENSMUST00000178043 | 0 | 1 | 40  | Gm3892        | antisense            |
| ENSMUST00000005103 | 0 | 1 | 34  | Nfe2l3        | protein_coding       |

|                     |   |   |                  |                                    |
|---------------------|---|---|------------------|------------------------------------|
| ENSMUST00000115174  | 0 | 1 | 34 Rab23         | protein_coding                     |
| ENSMUST00000075578  | 0 | 1 | 30 Abcb10        | protein_coding                     |
| ENSMUST00000102537  | 0 | 1 | 28 Itgae         | protein_coding                     |
| ENSMUST00000000356  | 0 | 1 | 26 Dazap2        | protein_coding                     |
| ENSMUST00000035043  | 0 | 1 | 26 Armc8         | protein_coding                     |
| ENSMUST00000101250  | 0 | 1 | 26 Phykpl        | protein_coding                     |
| ENSMUST00000152398  | 0 | 1 | 26 Cox7b         | protein_coding                     |
| ENSMUST00000180509  | 0 | 1 | 26 G730013B05Rik | lincRNA                            |
| ENSMUST00000045351  | 0 | 1 | 24 Atg2a         | protein_coding                     |
| ENSMUST00000074849  | 0 | 1 | 24 Tacc3         | protein_coding                     |
| ENSMUST00000110413  | 0 | 1 | 24 Slc17a1       | protein_coding                     |
| ENSMUST00000134015  | 0 | 1 | 24 Pprc1         | protein_coding                     |
| ENSMUST00000140159  | 0 | 1 | 24 Oasl1         | protein_coding                     |
| ENSMUST00000154743  | 0 | 1 | 24 Fntb          | protein_coding                     |
| ENSMUST00000162703  | 0 | 1 | 24 Ppp4r1        | protein_coding                     |
| ENSMUST00000167037  | 0 | 1 | 22 2610005L07Rik | transcribed_unprocessed_pseudogene |
| ENSMUST00000167037  | 0 | 1 | 22 2610005L07Rik | transcribed_unprocessed_pseudogene |
| ENSMUST00000037807  | 0 | 1 | 22 Vax2          | protein_coding                     |
| ENSMUST00000020289  | 0 | 1 | 20 Pald1         | protein_coding                     |
| ENSMUST00000021772  | 0 | 1 | 20 Mrs2          | protein_coding                     |
| ENSMUST00000031020  | 0 | 1 | 20 4930548H24Rik | protein_coding                     |
| ENSMUST00000053764  | 0 | 1 | 20 Foxo1         | protein_coding                     |
| ENSMUST00000062350  | 0 | 1 | 20 Zscan21       | protein_coding                     |
| ENSMUST00000129773  | 0 | 1 | 20 Fam187b       | protein_coding                     |
| ENSMUST00000002121  | 0 | 1 | 18 Supt6         | protein_coding                     |
| ENSMUST00000021595  | 0 | 1 | 18 Psmc1         | protein_coding                     |
| ENSMUST00000040043  | 0 | 1 | 18 Lats1         | protein_coding                     |
| ENSMUST00000121715  | 0 | 1 | 18 Tmc5          | protein_coding                     |
| ENSMUST00000142929  | 0 | 1 | 18 Cfap52        | protein_coding                     |
| ENSMUST00000155865  | 0 | 1 | 18 Slc11a1       | protein_coding                     |
| ENSMUST00000179498  | 0 | 1 | 18 Rad54b        | protein_coding                     |
| ENSMUST00000181566  | 0 | 1 | 18 Gm12302       | protein_coding                     |
| ENSMUST00000006774  | 0 | 1 | 16 Gtf2h1        | protein_coding                     |
| ENSMUST00000009220  | 0 | 1 | 16 Zmat5         | protein_coding                     |
| ENSMUST00000023652  | 0 | 1 | 16 Grik1         | protein_coding                     |
| ENSMUST00000060444  | 0 | 1 | 16 Zfp3          | protein_coding                     |
| ENSMUST00000108015  | 0 | 1 | 16 Zfp619        | protein_coding                     |
| ENSMUST00000126071  | 0 | 1 | 16 Faf2          | protein_coding                     |
| ENSMUST00000131779  | 0 | 1 | 16 Pank2         | protein_coding                     |
| ENSMUST00000140075  | 0 | 1 | 16 Fam73b        | protein_coding                     |
| ENSMUST00000159198  | 0 | 1 | 16 Osbp19        | protein_coding                     |
| ENSMUST00000182267  | 0 | 1 | 16 Plce1         | protein_coding                     |
| ENSMUST00000180576  | 0 | 1 | 16 Gm16596       | lincRNA                            |
| ENSMUST00000018353  | 0 | 1 | 14 Stk4          | protein_coding                     |
| ENSMUST00000018571  | 0 | 1 | 14 Ypel2         | protein_coding                     |
| ENSMUST00000026548  | 0 | 1 | 14 Gpr123        | protein_coding                     |
| ENSMUST00000042438  | 0 | 1 | 14 Plekhg1       | protein_coding                     |
| ENSMUST00000064404  | 0 | 1 | 14 Glrx3         | protein_coding                     |
| ENSMUST00000106456  | 0 | 1 | 14 Tesk2         | protein_coding                     |
| ENSMUST00000111816  | 0 | 1 | 14 Trim71        | protein_coding                     |
| ENSMUST00000125675  | 0 | 1 | 14 Rnft1         | protein_coding                     |
| ENSMUST00000129173  | 0 | 1 | 14 Avil          | protein_coding                     |
| ENSMUST00000163754  | 0 | 1 | 14 Xpnpep3       | protein_coding                     |
| ENSMUST00000165952  | 0 | 1 | 14 Lats1         | protein_coding                     |
| ENSMUST00000169310  | 0 | 1 | 14 Atg7          | protein_coding                     |
| ENSMUST00000148568  | 0 | 1 | 14 Hopxos        | antisense                          |
| ENSMUST00000000312  | 0 | 1 | 12 Cdh1          | protein_coding                     |
| ENSMUST000000022281 | 0 | 1 | 12 Skiv2l2       | protein_coding                     |
| ENSMUST00000037633  | 0 | 1 | 12 Zc3h7a        | protein_coding                     |
| ENSMUST00000047687  | 0 | 1 | 12 Entpd3        | protein_coding                     |
| ENSMUST00000068813  | 0 | 1 | 12 Them7         | protein_coding                     |
| ENSMUST00000113335  | 0 | 1 | 12 Ubr2          | protein_coding                     |
| ENSMUST00000127906  | 0 | 1 | 12 Dsp           | protein_coding                     |
| ENSMUST00000130231  | 0 | 1 | 12 Thap1         | protein_coding                     |
| ENSMUST00000131037  | 0 | 1 | 12 Rusc2         | protein_coding                     |
| ENSMUST00000153697  | 0 | 1 | 12 Micalcl       | protein_coding                     |
| ENSMUST00000156119  | 0 | 1 | 12 Rnf121        | protein_coding                     |
| ENSMUST00000165322  | 0 | 1 | 12 Arih1         | protein_coding                     |

|                     |   |   |                  |                        |
|---------------------|---|---|------------------|------------------------|
| ENSMUST00000165819  | 0 | 1 | 12 Cers1         | protein_coding         |
| ENSMUST00000167926  | 0 | 1 | 12 Acot7         | protein_coding         |
| ENSMUST00000170300  | 0 | 1 | 12 Inpp5d        | protein_coding         |
| ENSMUST00000179748  | 0 | 1 | 12 Nudt5         | protein_coding         |
| ENSMUST00000183879  | 0 | 1 | 12 Ets1          | protein_coding         |
| ENSMUST00000167967  | 0 | 1 | 10 Gm21857       | unprocessed_pseudogene |
| ENSMUST00000014546  | 0 | 1 | 10 Tsg101        | protein_coding         |
| ENSMUST00000034094  | 0 | 1 | 10 Gins3         | protein_coding         |
| ENSMUST00000039674  | 0 | 1 | 10 Pknox2        | protein_coding         |
| ENSMUST00000065433  | 0 | 1 | 10 Ikzf1         | protein_coding         |
| ENSMUST00000072080  | 0 | 1 | 10 Lrrc40        | protein_coding         |
| ENSMUST00000081379  | 0 | 1 | 10 Tcl1b2        | protein_coding         |
| ENSMUST00000086165  | 0 | 1 | 10 Sytl5         | protein_coding         |
| ENSMUST00000093914  | 0 | 1 | 10 4933422H20Rik | protein_coding         |
| ENSMUST00000098661  | 0 | 1 | 10 Gramd2        | protein_coding         |
| ENSMUST00000106713  | 0 | 1 | 10 Slc1a7        | protein_coding         |
| ENSMUST00000112930  | 0 | 1 | 10 Col4a5        | protein_coding         |
| ENSMUST00000112934  | 0 | 1 | 10 Rc3h2         | protein_coding         |
| ENSMUST00000129986  | 0 | 1 | 10 Plcz1         | protein_coding         |
| ENSMUST00000131422  | 0 | 1 | 10 Dna2          | protein_coding         |
| ENSMUST00000137225  | 0 | 1 | 10 Cdkal1        | protein_coding         |
| ENSMUST00000142459  | 0 | 1 | 10 Frzb          | protein_coding         |
| ENSMUST00000176803  | 0 | 1 | 10 Frmd4a        | protein_coding         |
| ENSMUST00000183095  | 0 | 1 | 10 Ank2          | protein_coding         |
| ENSMUST00000183128  | 0 | 1 | 10 Rbm25         | protein_coding         |
| ENSMUST00000000395  | 0 | 1 | 8 Tmprss2        | protein_coding         |
| ENSMUST000000021090 | 0 | 1 | 8 Grb2           | protein_coding         |
| ENSMUST000000021940 | 0 | 1 | 8 Lman2          | protein_coding         |
| ENSMUST00000025956  | 0 | 1 | 8 Pde6c          | protein_coding         |
| ENSMUST00000042399  | 0 | 1 | 8 Rsf1           | protein_coding         |
| ENSMUST00000059839  | 0 | 1 | 8 Astl           | protein_coding         |
| ENSMUST00000065906  | 0 | 1 | 8 Ggcx           | protein_coding         |
| ENSMUST00000067916  | 0 | 1 | 8 Plcd4          | protein_coding         |
| ENSMUST00000086961  | 0 | 1 | 8 Nt5c2          | protein_coding         |
| ENSMUST00000108838  | 0 | 1 | 8 Pcbp2          | protein_coding         |
| ENSMUST00000127297  | 0 | 1 | 8 Svit           | protein_coding         |
| ENSMUST00000134212  | 0 | 1 | 8 Zcchc14        | protein_coding         |
| ENSMUST00000137427  | 0 | 1 | 8 Rbpjl          | protein_coding         |
| ENSMUST00000141716  | 0 | 1 | 8 Pik3r5         | protein_coding         |
| ENSMUST00000145167  | 0 | 1 | 8 Ept1           | protein_coding         |
| ENSMUST00000149129  | 0 | 1 | 8 Plod1          | protein_coding         |
| ENSMUST00000154822  | 0 | 1 | 8 Keg1           | protein_coding         |
| ENSMUST00000155023  | 0 | 1 | 8 Kazn           | protein_coding         |
| ENSMUST00000165443  | 0 | 1 | 8 Nup50          | protein_coding         |
| ENSMUST00000184458  | 0 | 1 | 8 Trps1          | protein_coding         |
| ENSMUST00000149826  | 0 | 1 | 8 Gm11963        | antisense              |
| ENSMUST00000009774  | 0 | 1 | 6 Ppp2cb         | protein_coding         |
| ENSMUST00000017090  | 0 | 1 | 6 Kctd5          | protein_coding         |
| ENSMUST00000022904  | 0 | 1 | 6 Atp6v1c1       | protein_coding         |
| ENSMUST00000029376  | 0 | 1 | 6 Tm4sf1         | protein_coding         |
| ENSMUST00000031364  | 0 | 1 | 6 Sdad1          | protein_coding         |
| ENSMUST00000034466  | 0 | 1 | 6 Gnpat          | protein_coding         |
| ENSMUST00000037099  | 0 | 1 | 6 Clic4          | protein_coding         |
| ENSMUST00000049074  | 0 | 1 | 6 Ptpfr          | protein_coding         |
| ENSMUST00000049146  | 0 | 1 | 6 Ephx4          | protein_coding         |
| ENSMUST00000054427  | 0 | 1 | 6 Dmkn           | protein_coding         |
| ENSMUST00000058899  | 0 | 1 | 6 Nr1h5          | protein_coding         |
| ENSMUST00000065482  | 0 | 1 | 6 Mllt11         | protein_coding         |
| ENSMUST00000065978  | 0 | 1 | 6 BC048502       | protein_coding         |
| ENSMUST00000068686  | 0 | 1 | 6 Calcoco2       | protein_coding         |
| ENSMUST00000076997  | 0 | 1 | 6 Uxs1           | protein_coding         |
| ENSMUST00000079582  | 0 | 1 | 6 Erc1           | protein_coding         |
| ENSMUST00000091851  | 0 | 1 | 6 Mapk4          | protein_coding         |
| ENSMUST00000095726  | 0 | 1 | 6 Tcpl0a         | protein_coding         |
| ENSMUST00000101617  | 0 | 1 | 6 Flnc           | protein_coding         |
| ENSMUST00000106037  | 0 | 1 | 6 Dcdc2b         | protein_coding         |
| ENSMUST00000106331  | 0 | 1 | 6 6030468B19Rik  | protein_coding         |
| ENSMUST00000112588  | 0 | 1 | 6 Kdm5c          | protein_coding         |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000113334 | 0 | 1 | 6 Ciz1          | protein_coding       |
| ENSMUST00000117422 | 0 | 1 | 6 Creb3l3       | protein_coding       |
| ENSMUST00000119027 | 0 | 1 | 6 Rabgef1       | protein_coding       |
| ENSMUST00000128646 | 0 | 1 | 6 Phactr1       | protein_coding       |
| ENSMUST00000132980 | 0 | 1 | 6 Otud7b        | protein_coding       |
| ENSMUST00000133672 | 0 | 1 | 6 Gipc2         | protein_coding       |
| ENSMUST00000135753 | 0 | 1 | 6 Muc4          | protein_coding       |
| ENSMUST00000138166 | 0 | 1 | 6 Bbx           | protein_coding       |
| ENSMUST00000145015 | 0 | 1 | 6 Tmbim4        | protein_coding       |
| ENSMUST00000152644 | 0 | 1 | 6 Zfp367        | protein_coding       |
| ENSMUST00000159699 | 0 | 1 | 6 Hmga2         | protein_coding       |
| ENSMUST00000160539 | 0 | 1 | 6 Nepn          | protein_coding       |
| ENSMUST00000164411 | 0 | 1 | 6 Ccr6          | protein_coding       |
| ENSMUST00000165590 | 0 | 1 | 6 Apc           | protein_coding       |
| ENSMUST00000166103 | 0 | 1 | 6 Usp19         | protein_coding       |
| ENSMUST00000170060 | 0 | 1 | 6 Zfp839        | protein_coding       |
| ENSMUST00000171342 | 0 | 1 | 6 Rnf41         | protein_coding       |
| ENSMUST00000171598 | 0 | 1 | 6 Oxnad1        | protein_coding       |
| ENSMUST00000176637 | 0 | 1 | 6 Gnb1          | protein_coding       |
| ENSMUST00000121149 | 0 | 1 | 6 Gm12096       | processed_pseudogene |
| ENSMUST00000181190 | 0 | 1 | 6 4933404O12Rik | lincRNA              |
| ENSMUST00000181348 | 0 | 1 | 6 4921507G05Rik | lincRNA              |
| ENSMUST00000181858 | 0 | 1 | 6 Gm26540       | lincRNA              |
| ENSMUST00000183759 | 0 | 1 | 6 Gm27175       | antisense            |
| ENSMUST00000184653 | 0 | 1 | 6 Gm27223       | antisense            |
| ENSMUST00000178314 | 0 | 1 | 4 Rarres1       | protein_coding       |
| ENSMUST00000178314 | 0 | 1 | 4 Rarres1       | protein_coding       |
| ENSMUST00000021669 | 0 | 1 | 4 Fcf1          | protein_coding       |
| ENSMUST00000023509 | 0 | 1 | 4 Kihl24        | protein_coding       |
| ENSMUST00000024596 | 0 | 1 | 4 Slc22a1       | protein_coding       |
| ENSMUST00000024711 | 0 | 1 | 4 Gpr115        | protein_coding       |
| ENSMUST00000028132 | 0 | 1 | 4 Lrsam1        | protein_coding       |
| ENSMUST00000030074 | 0 | 1 | 4 Ugcg          | protein_coding       |
| ENSMUST00000035079 | 0 | 1 | 4 Mlh1          | protein_coding       |
| ENSMUST00000037958 | 0 | 1 | 4 Arhgap29      | protein_coding       |
| ENSMUST00000038439 | 0 | 1 | 4 Dnajc17       | protein_coding       |
| ENSMUST00000038523 | 0 | 1 | 4 Ric8b         | protein_coding       |
| ENSMUST00000044795 | 0 | 1 | 4 Nup133        | protein_coding       |
| ENSMUST00000045154 | 0 | 1 | 4 Themis2       | protein_coding       |
| ENSMUST00000053577 | 0 | 1 | 4 Epcam         | protein_coding       |
| ENSMUST00000064141 | 0 | 1 | 4 Dcaf17        | protein_coding       |
| ENSMUST00000065353 | 0 | 1 | 4 Yap1          | protein_coding       |
| ENSMUST00000065887 | 0 | 1 | 4 2510003E04Rik | protein_coding       |
| ENSMUST00000068045 | 0 | 1 | 4 Actn4         | protein_coding       |
| ENSMUST00000073054 | 0 | 1 | 4 Mppe1         | protein_coding       |
| ENSMUST00000079158 | 0 | 1 | 4 Abcc5         | protein_coding       |
| ENSMUST00000080371 | 0 | 1 | 4 Mtss1         | protein_coding       |
| ENSMUST00000092351 | 0 | 1 | 4 Cacng8        | protein_coding       |
| ENSMUST00000100737 | 0 | 1 | 4 P2rx7         | protein_coding       |
| ENSMUST00000103133 | 0 | 1 | 4 Smarce1       | protein_coding       |
| ENSMUST00000107112 | 0 | 1 | 4 Capn5         | protein_coding       |
| ENSMUST00000114655 | 0 | 1 | 4 Fmr1          | protein_coding       |
| ENSMUST00000122188 | 0 | 1 | 4 Lonp2         | protein_coding       |
| ENSMUST00000131154 | 0 | 1 | 4 Ppfia3        | protein_coding       |
| ENSMUST00000134629 | 0 | 1 | 4 Syap1         | protein_coding       |
| ENSMUST00000138933 | 0 | 1 | 4 Mapkap1       | protein_coding       |
| ENSMUST00000140249 | 0 | 1 | 4 Dpm1          | protein_coding       |
| ENSMUST00000155285 | 0 | 1 | 4 Mdm2          | protein_coding       |
| ENSMUST00000155990 | 0 | 1 | 4 Epb4.1        | protein_coding       |
| ENSMUST00000160708 | 0 | 1 | 4 Stxbp2        | protein_coding       |
| ENSMUST00000161073 | 0 | 1 | 4 Prpf3         | protein_coding       |
| ENSMUST00000172356 | 0 | 1 | 4 Thsd7a        | protein_coding       |
| ENSMUST00000137706 | 0 | 1 | 4 Gm10629       | lincRNA              |
| ENSMUST00000180922 | 0 | 1 | 4 Gm26672       | lincRNA              |
| ENSMUST00000181875 | 0 | 1 | 4 4930478K11Rik | lincRNA              |
| ENSMUST00000144651 | 0 | 1 | 4 Gm10863       | antisense            |
| ENSMUST00000168356 | 0 | 1 | 2 Gm21685       | protein_coding       |
| ENSMUST00000040459 | 0 | 1 | 2 Mapkap1       | protein_coding       |



|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000168356 | 0 | 1 | 2 Gm21685       | protein_coding |
| ENSMUST00000040459 | 0 | 1 | 2 Mapkap1       | protein_coding |
| ENSMUST00000014913 | 0 | 1 | 2 Psmb1         | protein_coding |
| ENSMUST00000019063 | 0 | 1 | 2 Tm4sf5        | protein_coding |
| ENSMUST00000021554 | 0 | 1 | 2 Actn1         | protein_coding |
| ENSMUST00000022060 | 0 | 1 | 2 Pdcd6         | protein_coding |
| ENSMUST00000025106 | 0 | 1 | 2 Polr2d        | protein_coding |
| ENSMUST00000026169 | 0 | 1 | 2 Ogfd3         | protein_coding |
| ENSMUST00000026907 | 0 | 1 | 2 Cyp4v3        | protein_coding |
| ENSMUST00000027769 | 0 | 1 | 2 Tfb2m         | protein_coding |
| ENSMUST00000030245 | 0 | 1 | 2 4921539E11Rik | protein_coding |
| ENSMUST00000030628 | 0 | 1 | 2 Tmem57        | protein_coding |
| ENSMUST00000032944 | 0 | 1 | 2 Gdpd3         | protein_coding |
| ENSMUST00000033341 | 0 | 1 | 2 Tub           | protein_coding |
| ENSMUST00000033952 | 0 | 1 | 2 Sfrp1         | protein_coding |
| ENSMUST00000034472 | 0 | 1 | 2 Jam3          | protein_coding |
| ENSMUST00000034843 | 0 | 1 | 2 Ireb2         | protein_coding |
| ENSMUST00000039267 | 0 | 1 | 2 Chd7          | protein_coding |
| ENSMUST00000042771 | 0 | 1 | 2 Sbn2          | protein_coding |
| ENSMUST00000047037 | 0 | 1 | 2 Thoc2         | protein_coding |
| ENSMUST00000048427 | 0 | 1 | 2 Ankrd35       | protein_coding |
| ENSMUST00000049149 | 0 | 1 | 2 Lrp1          | protein_coding |
| ENSMUST00000053079 | 0 | 1 | 2 Nf2           | protein_coding |
| ENSMUST00000062740 | 0 | 1 | 2 Acp1          | protein_coding |
| ENSMUST00000062765 | 0 | 1 | 2 Zfp583        | protein_coding |
| ENSMUST00000062917 | 0 | 1 | 2 Iqcf3         | protein_coding |
| ENSMUST00000063344 | 0 | 1 | 2 Lmf1          | protein_coding |
| ENSMUST00000064831 | 0 | 1 | 2 Entpd4        | protein_coding |
| ENSMUST00000067854 | 0 | 1 | 2 1600014C10Rik | protein_coding |
| ENSMUST00000074770 | 0 | 1 | 2 Trpm3         | protein_coding |
| ENSMUST00000077182 | 0 | 1 | 2 Nr2f2         | protein_coding |
| ENSMUST00000086975 | 0 | 1 | 2 Gpr55         | protein_coding |
| ENSMUST00000087540 | 0 | 1 | 2 Trmt2b        | protein_coding |
| ENSMUST00000089628 | 0 | 1 | 2 Gm5416        | protein_coding |
| ENSMUST00000090806 | 0 | 1 | 2 Rai1          | protein_coding |
| ENSMUST00000100729 | 0 | 1 | 2 Psmd9         | protein_coding |
| ENSMUST00000101150 | 0 | 1 | 2 Zkscan17      | protein_coding |
| ENSMUST00000102929 | 0 | 1 | 2 Tdrd7         | protein_coding |
| ENSMUST00000103008 | 0 | 1 | 2 Sdcbp         | protein_coding |
| ENSMUST00000105906 | 0 | 1 | 2 Wdr31         | protein_coding |
| ENSMUST00000106758 | 0 | 1 | 2 Cyb5r1        | protein_coding |
| ENSMUST00000107638 | 0 | 1 | 2 Fktn          | protein_coding |
| ENSMUST00000111330 | 0 | 1 | 2 Arhgap1       | protein_coding |
| ENSMUST00000113990 | 0 | 1 | 2 Paqr5         | protein_coding |
| ENSMUST00000115364 | 0 | 1 | 2 Cdk16         | protein_coding |
| ENSMUST00000119291 | 0 | 1 | 2 Gadl1         | protein_coding |
| ENSMUST00000119665 | 0 | 1 | 2 Ccdc33        | protein_coding |
| ENSMUST00000132533 | 0 | 1 | 2 9130230L23Rik | protein_coding |
| ENSMUST00000133739 | 0 | 1 | 2 Fam118b       | protein_coding |
| ENSMUST00000134625 | 0 | 1 | 2 Cd200r1       | protein_coding |
| ENSMUST00000136222 | 0 | 1 | 2 Sec14l4       | protein_coding |
| ENSMUST00000136644 | 0 | 1 | 2 Atxn7l1       | protein_coding |
| ENSMUST00000136965 | 0 | 1 | 2 Pik3cb        | protein_coding |
| ENSMUST00000139451 | 0 | 1 | 2 Uxs1          | protein_coding |
| ENSMUST00000139943 | 0 | 1 | 2 Ifit88        | protein_coding |
| ENSMUST00000142220 | 0 | 1 | 2 Rabep1        | protein_coding |
| ENSMUST00000145708 | 0 | 1 | 2 Sgsm1         | protein_coding |
| ENSMUST00000151491 | 0 | 1 | 2 Kalm          | protein_coding |
| ENSMUST00000151590 | 0 | 1 | 2 Plcg1         | protein_coding |
| ENSMUST00000152389 | 0 | 1 | 2 Ccdc63        | protein_coding |
| ENSMUST00000160146 | 0 | 1 | 2 Fam173b       | protein_coding |
| ENSMUST00000162431 | 0 | 1 | 2 A930017K11Rik | protein_coding |
| ENSMUST00000162915 | 0 | 1 | 2 Man2c1        | protein_coding |
| ENSMUST00000165088 | 0 | 1 | 2 Tmprss5       | protein_coding |
| ENSMUST00000167015 | 0 | 1 | 2 Acin1         | protein_coding |
| ENSMUST00000170320 | 0 | 1 | 2 Agbl2         | protein_coding |
| ENSMUST00000170811 | 0 | 1 | 2 Rnf14         | protein_coding |
| ENSMUST00000171647 | 0 | 1 | 2 Slc6a20a      | protein_coding |

|                    |   |   |                 |                                  |
|--------------------|---|---|-----------------|----------------------------------|
| ENSMUST00000172794 | 0 | 1 | 2 Gigyf2        | protein_coding                   |
| ENSMUST00000173408 | 0 | 1 | 2 Bcd1          | protein_coding                   |
| ENSMUST00000176707 | 0 | 1 | 2 Vmn1r69       | protein_coding                   |
| ENSMUST00000176723 | 0 | 1 | 2 Ercc1         | protein_coding                   |
| ENSMUST00000179951 | 0 | 1 | 2 Musk          | protein_coding                   |
| ENSMUST00000181401 | 0 | 1 | 2 Rpgrip1       | protein_coding                   |
| ENSMUST00000184155 | 0 | 1 | 2 Nav2          | protein_coding                   |
| ENSMUST00000184931 | 0 | 1 | 2 Ext2          | protein_coding                   |
| ENSMUST00000175690 | 0 | 1 | 2 Gm20650       | processed_transcript             |
| ENSMUST00000111075 | 0 | 1 | 2 Gm3054        | lincRNA                          |
| ENSMUST00000181195 | 0 | 1 | 2 E030044B06Rik | lincRNA                          |
| ENSMUST00000182496 | 0 | 1 | 2 Gm26918       | antisense                        |
| ENSMUST00000182984 | 0 | 1 | 0 Ube2w         | protein_coding                   |
| ENSMUST00000113327 | 0 | 1 | 0 Ugt2b5        | protein_coding                   |
| ENSMUST00000182984 | 0 | 1 | 0 Ube2w         | protein_coding                   |
| ENSMUST00000113327 | 0 | 1 | 0 Ugt2b5        | protein_coding                   |
| ENSMUST00000117794 | 0 | 1 | 0 Olfr407-ps1   | unprocessed_pseudogene           |
| ENSMUST00000121013 | 0 | 1 | 0 Gm15142       | unprocessed_pseudogene           |
| ENSMUST00000121132 | 0 | 1 | 0 Mup-ps20      | unprocessed_pseudogene           |
| ENSMUST00000163084 | 0 | 1 | 0 4930519F09Rik | transcribed_processed_pseudogene |
| ENSMUST00000001055 | 0 | 1 | 0 Icam2         | protein_coding                   |
| ENSMUST00000001479 | 0 | 1 | 0 Kpnb1         | protein_coding                   |
| ENSMUST00000002180 | 0 | 1 | 0 Spi1          | protein_coding                   |
| ENSMUST00000005600 | 0 | 1 | 0 Rfx1          | protein_coding                   |
| ENSMUST00000008579 | 0 | 1 | 0 Rdh13         | protein_coding                   |
| ENSMUST00000009036 | 0 | 1 | 0 Vdac3         | protein_coding                   |
| ENSMUST00000009174 | 0 | 1 | 0 Pdcl          | protein_coding                   |
| ENSMUST00000011896 | 0 | 1 | 0 Pgam1         | protein_coding                   |
| ENSMUST00000018383 | 0 | 1 | 0 Zcchc10       | protein_coding                   |
| ENSMUST00000019677 | 0 | 1 | 0 Mknk1         | protein_coding                   |
| ENSMUST00000020449 | 0 | 1 | 0 Helb          | protein_coding                   |
| ENSMUST00000020649 | 0 | 1 | 0 Rad50         | protein_coding                   |
| ENSMUST00000020672 | 0 | 1 | 0 Fabp6         | protein_coding                   |
| ENSMUST00000020822 | 0 | 1 | 0 Cnot8         | protein_coding                   |
| ENSMUST00000020831 | 0 | 1 | 0 Fam114a2      | protein_coding                   |
| ENSMUST00000022474 | 0 | 1 | 0 Pbrm1         | protein_coding                   |
| ENSMUST00000022639 | 0 | 1 | 0 Nefl          | protein_coding                   |
| ENSMUST00000023238 | 0 | 1 | 0 Gsdmd         | protein_coding                   |
| ENSMUST00000023666 | 0 | 1 | 0 Chaf1b        | protein_coding                   |
| ENSMUST00000023768 | 0 | 1 | 0 Dip2b         | protein_coding                   |
| ENSMUST00000024486 | 0 | 1 | 0 Mrps23        | protein_coding                   |
| ENSMUST00000024733 | 0 | 1 | 0 Aars2         | protein_coding                   |
| ENSMUST00000026479 | 0 | 1 | 0 Dctn2         | protein_coding                   |
| ENSMUST00000027032 | 0 | 1 | 0 Rp1           | protein_coding                   |
| ENSMUST00000027125 | 0 | 1 | 0 Coq10b        | protein_coding                   |
| ENSMUST00000027198 | 0 | 1 | 0 Orc2          | protein_coding                   |
| ENSMUST00000027863 | 0 | 1 | 0 Atp1b1        | protein_coding                   |
| ENSMUST00000028300 | 0 | 1 | 0 Nacc2         | protein_coding                   |
| ENSMUST00000029367 | 0 | 1 | 0 Bche          | protein_coding                   |
| ENSMUST00000029553 | 0 | 1 | 0 Ubap2l        | protein_coding                   |
| ENSMUST00000029628 | 0 | 1 | 0 Plrg1         | protein_coding                   |
| ENSMUST00000030145 | 0 | 1 | 0 Dcaf12        | protein_coding                   |
| ENSMUST00000030381 | 0 | 1 | 0 Ctps          | protein_coding                   |
| ENSMUST00000030940 | 0 | 1 | 0 Gnb1          | protein_coding                   |
| ENSMUST00000031146 | 0 | 1 | 0 Nmu           | protein_coding                   |
| ENSMUST00000031250 | 0 | 1 | 0 Nudt9         | protein_coding                   |
| ENSMUST00000031344 | 0 | 1 | 0 Mphosph9      | protein_coding                   |
| ENSMUST00000031535 | 0 | 1 | 0 Hnf1a         | protein_coding                   |
| ENSMUST00000033081 | 0 | 1 | 0 Fbxl19        | protein_coding                   |
| ENSMUST00000033958 | 0 | 1 | 0 Adam3         | protein_coding                   |
| ENSMUST00000034898 | 0 | 1 | 0 Mb21d1        | protein_coding                   |
| ENSMUST00000035230 | 0 | 1 | 0 Amt           | protein_coding                   |
| ENSMUST00000035661 | 0 | 1 | 0 Cspg4         | protein_coding                   |
| ENSMUST00000035914 | 0 | 1 | 0 BC034090      | protein_coding                   |
| ENSMUST00000037235 | 0 | 1 | 0 Xkr7          | protein_coding                   |
| ENSMUST00000037811 | 0 | 1 | 0 Apob          | protein_coding                   |
| ENSMUST00000038252 | 0 | 1 | 0 B3galt2       | protein_coding                   |
| ENSMUST00000039197 | 0 | 1 | 0 Slc44a3       | protein_coding                   |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000039390 | 0 | 1 | 0 Ky            | protein_coding |
| ENSMUST00000040021 | 0 | 1 | 0 Ptpn23        | protein_coding |
| ENSMUST00000042405 | 0 | 1 | 0 Fbl           | protein_coding |
| ENSMUST00000042755 | 0 | 1 | 0 Afp           | protein_coding |
| ENSMUST00000043864 | 0 | 1 | 0 Cdc123        | protein_coding |
| ENSMUST00000046389 | 0 | 1 | 0 Rbm45         | protein_coding |
| ENSMUST00000046859 | 0 | 1 | 0 Foxn3         | protein_coding |
| ENSMUST00000046875 | 0 | 1 | 0 Ugg1          | protein_coding |
| ENSMUST00000050383 | 0 | 1 | 0 Zfp646        | protein_coding |
| ENSMUST00000050983 | 0 | 1 | 0 4932411E22Rik | protein_coding |
| ENSMUST00000051826 | 0 | 1 | 0 Col13a1       | protein_coding |
| ENSMUST00000051862 | 0 | 1 | 0 BC007180      | protein_coding |
| ENSMUST00000052437 | 0 | 1 | 0 Lrrc25        | protein_coding |
| ENSMUST00000053087 | 0 | 1 | 0 Kihl23        | protein_coding |
| ENSMUST00000055107 | 0 | 1 | 0 Gm4922        | protein_coding |
| ENSMUST00000058092 | 0 | 1 | 0 Mrgprg        | protein_coding |
| ENSMUST00000059115 | 0 | 1 | 0 Mtus1         | protein_coding |
| ENSMUST00000060396 | 0 | 1 | 0 Slc25a46      | protein_coding |
| ENSMUST00000061169 | 0 | 1 | 0 Gal3st3       | protein_coding |
| ENSMUST00000061279 | 0 | 1 | 0 PCDHGB6       | protein_coding |
| ENSMUST00000062368 | 0 | 1 | 0 DHX30         | protein_coding |
| ENSMUST00000062747 | 0 | 1 | 0 Klf17         | protein_coding |
| ENSMUST00000068487 | 0 | 1 | 0 Rad18         | protein_coding |
| ENSMUST00000070070 | 0 | 1 | 0 Dnaja4        | protein_coding |
| ENSMUST00000070172 | 0 | 1 | 0 Snx32         | protein_coding |
| ENSMUST00000070584 | 0 | 1 | 0 4930564D02Rik | protein_coding |
| ENSMUST00000070755 | 0 | 1 | 0 Rad54b        | protein_coding |
| ENSMUST00000071544 | 0 | 1 | 0 Snapc3        | protein_coding |
| ENSMUST00000075695 | 0 | 1 | 0 Spag9         | protein_coding |
| ENSMUST00000075748 | 0 | 1 | 0 Ddx4          | protein_coding |
| ENSMUST00000075994 | 0 | 1 | 0 Pdzrn3        | protein_coding |
| ENSMUST00000076383 | 0 | 1 | 0 Fbxw11        | protein_coding |
| ENSMUST00000077839 | 0 | 1 | 0 Nrbf2         | protein_coding |
| ENSMUST00000080536 | 0 | 1 | 0 Abce1         | protein_coding |
| ENSMUST00000081891 | 0 | 1 | 0 Zfp128        | protein_coding |
| ENSMUST00000085217 | 0 | 1 | 0 Gk5           | protein_coding |
| ENSMUST00000086482 | 0 | 1 | 0 Olfr860       | protein_coding |
| ENSMUST00000087442 | 0 | 1 | 0 Prom1         | protein_coding |
| ENSMUST00000088013 | 0 | 1 | 0 Myrf          | protein_coding |
| ENSMUST00000089677 | 0 | 1 | 0 Zfp148        | protein_coding |
| ENSMUST00000089825 | 0 | 1 | 0 Myef2         | protein_coding |
| ENSMUST00000092735 | 0 | 1 | 0 Med1          | protein_coding |
| ENSMUST00000093813 | 0 | 1 | 0 Arhgef40      | protein_coding |
| ENSMUST00000094140 | 0 | 1 | 0 Lrrc48        | protein_coding |
| ENSMUST00000095323 | 0 | 1 | 0 1700029J07Rik | protein_coding |
| ENSMUST00000096200 | 0 | 1 | 0 Tmprss12      | protein_coding |
| ENSMUST00000096350 | 0 | 1 | 0 Maff          | protein_coding |
| ENSMUST00000097393 | 0 | 1 | 0 Ermard        | protein_coding |
| ENSMUST00000100414 | 0 | 1 | 0 Vps25         | protein_coding |
| ENSMUST00000101610 | 0 | 1 | 0 Rhbdd3        | protein_coding |
| ENSMUST00000101615 | 0 | 1 | 0 Thoc5         | protein_coding |
| ENSMUST00000102540 | 0 | 1 | 0 Gale          | protein_coding |
| ENSMUST00000103147 | 0 | 1 | 0 Psmb3         | protein_coding |
| ENSMUST00000105417 | 0 | 1 | 0 Dip2a         | protein_coding |
| ENSMUST00000105437 | 0 | 1 | 0 Rtkn2         | protein_coding |
| ENSMUST00000106248 | 0 | 1 | 0 Trim72        | protein_coding |
| ENSMUST00000106524 | 0 | 1 | 0 Efcab14       | protein_coding |
| ENSMUST00000106828 | 0 | 1 | 0 Trim30c       | protein_coding |
| ENSMUST00000107772 | 0 | 1 | 0 Tstd2         | protein_coding |
| ENSMUST00000108165 | 0 | 1 | 0 Proser3       | protein_coding |
| ENSMUST00000108449 | 0 | 1 | 0 Cblc          | protein_coding |
| ENSMUST00000108815 | 0 | 1 | 0 Rtel1         | protein_coding |
| ENSMUST00000109011 | 0 | 1 | 0 Gm6710        | protein_coding |
| ENSMUST00000109184 | 0 | 1 | 0 Nfatc2        | protein_coding |
| ENSMUST00000110329 | 0 | 1 | 0 Azin1         | protein_coding |
| ENSMUST00000110387 | 0 | 1 | 0 Ncaph         | protein_coding |
| ENSMUST00000110773 | 0 | 1 | 0 Mga           | protein_coding |
| ENSMUST00000111597 | 0 | 1 | 0 Olfr988       | protein_coding |

|                    |   |   |            |                |
|--------------------|---|---|------------|----------------|
| ENSMUST00000112316 | 0 | 1 | 0 Txlng    | protein_coding |
| ENSMUST00000112683 | 0 | 1 | 0 Tsr2     | protein_coding |
| ENSMUST00000113595 | 0 | 1 | 0 Rnf111   | protein_coding |
| ENSMUST00000113802 | 0 | 1 | 0 Gm5878   | protein_coding |
| ENSMUST00000113952 | 0 | 1 | 0 Wdr5     | protein_coding |
| ENSMUST00000113974 | 0 | 1 | 0 Suv420h1 | protein_coding |
| ENSMUST00000114475 | 0 | 1 | 0 Brd4     | protein_coding |
| ENSMUST00000114823 | 0 | 1 | 0 Mkrr1    | protein_coding |
| ENSMUST00000115804 | 0 | 1 | 0 Pdxdc1   | protein_coding |
| ENSMUST00000117543 | 0 | 1 | 0 Insc     | protein_coding |
| ENSMUST00000118205 | 0 | 1 | 0 Vezt     | protein_coding |
| ENSMUST00000118316 | 0 | 1 | 0 N4bp2l2  | protein_coding |
| ENSMUST00000118966 | 0 | 1 | 0 Rhoj     | protein_coding |
| ENSMUST00000119480 | 0 | 1 | 0 Zbtb8os  | protein_coding |
| ENSMUST00000119547 | 0 | 1 | 0 Matk     | protein_coding |
| ENSMUST00000119902 | 0 | 1 | 0 Tspan2   | protein_coding |
| ENSMUST00000120441 | 0 | 1 | 0 Plekha1  | protein_coding |
| ENSMUST00000121322 | 0 | 1 | 0 Cgnl1    | protein_coding |
| ENSMUST00000121402 | 0 | 1 | 0 Aip      | protein_coding |
| ENSMUST00000123244 | 0 | 1 | 0 Sycp3    | protein_coding |
| ENSMUST00000123372 | 0 | 1 | 0 Trpc2    | protein_coding |
| ENSMUST00000123665 | 0 | 1 | 0 Snx30    | protein_coding |
| ENSMUST00000124346 | 0 | 1 | 0 Pcmt2    | protein_coding |
| ENSMUST00000125041 | 0 | 1 | 0 Cep89    | protein_coding |
| ENSMUST00000125427 | 0 | 1 | 0 Mym1     | protein_coding |
| ENSMUST00000125842 | 0 | 1 | 0 Fntb     | protein_coding |
| ENSMUST00000125994 | 0 | 1 | 0 Cp       | protein_coding |
| ENSMUST00000126417 | 0 | 1 | 0 Ncr1     | protein_coding |
| ENSMUST00000127089 | 0 | 1 | 0 Sms      | protein_coding |
| ENSMUST00000127120 | 0 | 1 | 0 Glis2    | protein_coding |
| ENSMUST00000127339 | 0 | 1 | 0 Neb      | protein_coding |
| ENSMUST00000127941 | 0 | 1 | 0 Caprin2  | protein_coding |
| ENSMUST00000128024 | 0 | 1 | 0 Dpy19l4  | protein_coding |
| ENSMUST00000128101 | 0 | 1 | 0 Ccdc63   | protein_coding |
| ENSMUST00000128123 | 0 | 1 | 0 Tmem59   | protein_coding |
| ENSMUST00000128674 | 0 | 1 | 0 Nacc2    | protein_coding |
| ENSMUST00000129150 | 0 | 1 | 0 Zmynd12  | protein_coding |
| ENSMUST00000130028 | 0 | 1 | 0 Rabl3    | protein_coding |
| ENSMUST00000130420 | 0 | 1 | 0 Arhgap44 | protein_coding |
| ENSMUST00000131544 | 0 | 1 | 0 Zfp617   | protein_coding |
| ENSMUST00000132577 | 0 | 1 | 0 Pak6     | protein_coding |
| ENSMUST00000132966 | 0 | 1 | 0 Mtfmt    | protein_coding |
| ENSMUST00000133547 | 0 | 1 | 0 Anxa11   | protein_coding |
| ENSMUST00000133757 | 0 | 1 | 0 Elovl5   | protein_coding |
| ENSMUST00000133930 | 0 | 1 | 0 BC030867 | protein_coding |
| ENSMUST00000134134 | 0 | 1 | 0 Tmem219  | protein_coding |
| ENSMUST00000134144 | 0 | 1 | 0 Rgs10    | protein_coding |
| ENSMUST00000134501 | 0 | 1 | 0 Kdm2b    | protein_coding |
| ENSMUST00000134717 | 0 | 1 | 0 Ncmap    | protein_coding |
| ENSMUST00000135280 | 0 | 1 | 0 Cd86     | protein_coding |
| ENSMUST00000136335 | 0 | 1 | 0 Primpol  | protein_coding |
| ENSMUST00000137368 | 0 | 1 | 0 Uhrf2    | protein_coding |
| ENSMUST00000137889 | 0 | 1 | 0 Fubp3    | protein_coding |
| ENSMUST00000138701 | 0 | 1 | 0 Echdc2   | protein_coding |
| ENSMUST00000138807 | 0 | 1 | 0 Mtf1     | protein_coding |
| ENSMUST00000139256 | 0 | 1 | 0 Txndc8   | protein_coding |
| ENSMUST00000139655 | 0 | 1 | 0 Chka     | protein_coding |
| ENSMUST00000140979 | 0 | 1 | 0 Satb1    | protein_coding |
| ENSMUST00000141412 | 0 | 1 | 0 Plcd4    | protein_coding |
| ENSMUST00000142757 | 0 | 1 | 0 Cntrl    | protein_coding |
| ENSMUST00000144321 | 0 | 1 | 0 Mtf2     | protein_coding |
| ENSMUST00000144538 | 0 | 1 | 0 Trim6    | protein_coding |
| ENSMUST00000144901 | 0 | 1 | 0 Upf2     | protein_coding |
| ENSMUST00000145044 | 0 | 1 | 0 Mroh7    | protein_coding |
| ENSMUST00000146009 | 0 | 1 | 0 Synj2    | protein_coding |
| ENSMUST00000146217 | 0 | 1 | 0 Ralgds   | protein_coding |
| ENSMUST00000146819 | 0 | 1 | 0 Mcph1    | protein_coding |
| ENSMUST00000147072 | 0 | 1 | 0 Ints10   | protein_coding |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000147984 | 0 | 1 | 0 Ttc1          | protein_coding       |
| ENSMUST00000148106 | 0 | 1 | 0 Nr3c2         | protein_coding       |
| ENSMUST00000148315 | 0 | 1 | 0 Apbb1ip       | protein_coding       |
| ENSMUST00000148328 | 0 | 1 | 0 Necab2        | protein_coding       |
| ENSMUST00000148583 | 0 | 1 | 0 Pip4k2a       | protein_coding       |
| ENSMUST00000148683 | 0 | 1 | 0 Pde6d         | protein_coding       |
| ENSMUST00000149063 | 0 | 1 | 0 Ftsj1         | protein_coding       |
| ENSMUST00000150317 | 0 | 1 | 0 Syne2         | protein_coding       |
| ENSMUST00000151425 | 0 | 1 | 0 Slc35e2       | protein_coding       |
| ENSMUST00000151933 | 0 | 1 | 0 Zfp606        | protein_coding       |
| ENSMUST00000152197 | 0 | 1 | 0 Brwd1         | protein_coding       |
| ENSMUST00000152794 | 0 | 1 | 0 Fnbp4         | protein_coding       |
| ENSMUST00000152904 | 0 | 1 | 0 Papln         | protein_coding       |
| ENSMUST00000153514 | 0 | 1 | 0 Rbm39         | protein_coding       |
| ENSMUST00000153761 | 0 | 1 | 0 Myl4          | protein_coding       |
| ENSMUST00000154372 | 0 | 1 | 0 Npepps        | protein_coding       |
| ENSMUST00000155486 | 0 | 1 | 0 Ncor1         | protein_coding       |
| ENSMUST00000155625 | 0 | 1 | 0 Tmem245       | protein_coding       |
| ENSMUST00000155866 | 0 | 1 | 0 Exosc9        | protein_coding       |
| ENSMUST00000156116 | 0 | 1 | 0 Cfap46        | protein_coding       |
| ENSMUST00000156324 | 0 | 1 | 0 Pramel4       | protein_coding       |
| ENSMUST00000159410 | 0 | 1 | 0 Col22a1       | protein_coding       |
| ENSMUST00000159898 | 0 | 1 | 0 Rasgrp4       | protein_coding       |
| ENSMUST00000160393 | 0 | 1 | 0 Osgep         | protein_coding       |
| ENSMUST00000161306 | 0 | 1 | 0 Tmprss11e     | protein_coding       |
| ENSMUST00000161317 | 0 | 1 | 0 Cul2          | protein_coding       |
| ENSMUST00000162713 | 0 | 1 | 0 Dnal4         | protein_coding       |
| ENSMUST00000162857 | 0 | 1 | 0 Tanc1         | protein_coding       |
| ENSMUST00000162912 | 0 | 1 | 0 Glud1         | protein_coding       |
| ENSMUST00000163425 | 0 | 1 | 0 Stx11         | protein_coding       |
| ENSMUST00000163545 | 0 | 1 | 0 Rbm26         | protein_coding       |
| ENSMUST00000165576 | 0 | 1 | 0 Fam3c         | protein_coding       |
| ENSMUST00000166227 | 0 | 1 | 0 Gm17651       | protein_coding       |
| ENSMUST00000166343 | 0 | 1 | 0 Glyat13       | protein_coding       |
| ENSMUST00000167580 | 0 | 1 | 0 Fndc1         | protein_coding       |
| ENSMUST00000168379 | 0 | 1 | 0 AU016765      | protein_coding       |
| ENSMUST00000168578 | 0 | 1 | 0 Tmem238       | protein_coding       |
| ENSMUST00000170935 | 0 | 1 | 0 Mon2          | protein_coding       |
| ENSMUST00000171083 | 0 | 1 | 0 Smc3          | protein_coding       |
| ENSMUST00000171095 | 0 | 1 | 0 Dock3         | protein_coding       |
| ENSMUST00000171445 | 0 | 1 | 0 Eps8l1        | protein_coding       |
| ENSMUST00000172035 | 0 | 1 | 0 Gemin5        | protein_coding       |
| ENSMUST00000172602 | 0 | 1 | 0 Fam161a       | protein_coding       |
| ENSMUST00000173176 | 0 | 1 | 0 Baz1a         | protein_coding       |
| ENSMUST00000173206 | 0 | 1 | 0 Dennd2c       | protein_coding       |
| ENSMUST00000173748 | 0 | 1 | 0 Dusp7         | protein_coding       |
| ENSMUST00000175937 | 0 | 1 | 0 Wbp1l         | protein_coding       |
| ENSMUST00000176274 | 0 | 1 | 0 Cyhr1         | protein_coding       |
| ENSMUST00000176895 | 0 | 1 | 0 Pknox1        | protein_coding       |
| ENSMUST00000179162 | 0 | 1 | 0 Fer1l5        | protein_coding       |
| ENSMUST00000179693 | 0 | 1 | 0 Ctcf1         | protein_coding       |
| ENSMUST00000179832 | 0 | 1 | 0 Hsf3          | protein_coding       |
| ENSMUST00000182484 | 0 | 1 | 0 Sipa1l3       | protein_coding       |
| ENSMUST00000183532 | 0 | 1 | 0 Ccdc132       | protein_coding       |
| ENSMUST00000139272 | 0 | 1 | 0 Gm12610       | processed_transcript |
| ENSMUST00000170047 | 0 | 1 | 0 5730435O14Rik | processed_transcript |
| ENSMUST00000178108 | 0 | 1 | 0 Muc19         | processed_transcript |
| ENSMUST00000117213 | 0 | 1 | 0 Gm13142       | processed_pseudogene |
| ENSMUST00000118585 | 0 | 1 | 0 Gm16465       | processed_pseudogene |
| ENSMUST00000118760 | 0 | 1 | 0 Gm13233       | processed_pseudogene |
| ENSMUST00000118855 | 0 | 1 | 0 Gm13244       | processed_pseudogene |
| ENSMUST00000120503 | 0 | 1 | 0 Gm11298       | processed_pseudogene |
| ENSMUST00000120793 | 0 | 1 | 0 3110067C02Rik | processed_pseudogene |
| ENSMUST00000122090 | 0 | 1 | 0 Gm13169       | processed_pseudogene |
| ENSMUST00000029642 | 0 | 1 | 0 1700061117Rik | lincRNA              |
| ENSMUST00000123014 | 0 | 1 | 0 Gm6938        | lincRNA              |
| ENSMUST00000123592 | 0 | 1 | 0 Gm12066       | lincRNA              |
| ENSMUST00000128591 | 0 | 1 | 0 2310081O03Rik | lincRNA              |

|                     |   |   |     |               |                         |
|---------------------|---|---|-----|---------------|-------------------------|
| ENSMUST00000146043  | 0 | 1 | 0   | 4933428C19Rik | lincRNA                 |
| ENSMUST00000150628  | 0 | 1 | 0   | Gm11728       | lincRNA                 |
| ENSMUST00000162900  | 0 | 1 | 0   | Gm1965        | lincRNA                 |
| ENSMUST00000173738  | 0 | 1 | 0   | Gm20484       | lincRNA                 |
| ENSMUST00000180561  | 0 | 1 | 0   | Gm26849       | lincRNA                 |
| ENSMUST00000182440  | 0 | 1 | 0   | Rmst          | lincRNA                 |
| ENSMUST00000021378  | 0 | 1 | 0   | 4930512B01Rik | antisense               |
| ENSMUST00000124336  | 0 | 1 | 0   | AV099323      | antisense               |
| ENSMUST00000130943  | 0 | 1 | 0   | 4930579M01Rik | antisense               |
| ENSMUST00000143877  | 0 | 1 | 0   | Gm16365       | antisense               |
| ENSMUST00000144031  | 0 | 1 | 0   | Gm13201       | antisense               |
| ENSMUST00000147717  | 0 | 1 | 0   | Gm12126       | antisense               |
| ENSMUST00000155350  | 0 | 1 | 0   | Gm13617       | antisense               |
| ENSMUST00000162454  | 0 | 1 | 0   | Gm15872       | antisense               |
| ENSMUST00000182275  | 0 | 1 | 0   | Gm10535       | antisense               |
| ENSMUST00000109267  | 0 | 1 | 264 | Map3k1        | protein_coding          |
| ENSMUST00000022153  | 0 | 1 | 101 | Ptcd2         | protein_coding          |
| ENSMUST00000105364  | 0 | 1 | 75  | Ndufs7        | protein_coding          |
| ENSMUST00000141839  | 0 | 1 | 67  | Nudcd2        | protein_coding          |
| ENSMUST00000039317  | 0 | 1 | 54  | Tmc3          | protein_coding          |
| ENSMUST00000038398  | 0 | 1 | 44  | Parp12        | protein_coding          |
| ENSMUST00000115161  | 0 | 1 | 44  | Bend6         | protein_coding          |
| ENSMUST00000124664  | 0 | 1 | 44  | 4930520O04Rik | processed_transcript    |
| ENSMUST00000071642  | 0 | 1 | 40  | Mdn1          | protein_coding          |
| ENSMUST00000155551  | 0 | 1 | 40  | Dcaf10        | protein_coding          |
| ENSMUST00000165563  | 0 | 1 | 40  | Micu1         | protein_coding          |
| ENSMUST00000029598  | 0 | 1 | 38  | 1700006A11Rik | protein_coding          |
| ENSMUST00000157016  | 0 | 1 | 38  | Rhbdl3        | protein_coding          |
| ENSMUST00000150482  | 0 | 1 | 38  | Gm13780       | lincRNA                 |
| ENSMUST00000006761  | 0 | 1 | 36  | Runx1t1       | protein_coding          |
| ENSMUST00000071944  | 0 | 1 | 36  | Tec           | protein_coding          |
| ENSMUST00000138947  | 0 | 1 | 36  | Nceh1         | protein_coding          |
| ENSMUST00000140324  | 0 | 1 | 36  | Gzmk          | protein_coding          |
| ENSMUST00000147911  | 0 | 1 | 36  | Galnt2        | protein_coding          |
| ENSMUST00000154221  | 0 | 1 | 36  | Ppfbp1        | protein_coding          |
| ENSMUST00000053288  | 0 | 1 | 34  | Cdr2l         | protein_coding          |
| ENSMUST00000148899  | 0 | 1 | 34  | Chpt1         | protein_coding          |
| ENSMUST00000151896  | 0 | 1 | 30  | Ube4bos1      | antisense               |
| ENSMUST00000125336  | 0 | 1 | 28  | Pfkfb4        | nonsense_mediated_decay |
| ENSMUST00000125336  | 0 | 1 | 28  | Pfkfb4        | nonsense_mediated_decay |
| ENSMUST00000020909  | 0 | 1 | 28  | Laptn4a       | protein_coding          |
| ENSMUST00000030128  | 0 | 1 | 28  | Chmp5         | protein_coding          |
| ENSMUST00000030432  | 0 | 1 | 28  | Hmgcl         | protein_coding          |
| ENSMUST00000039333  | 0 | 1 | 28  | Pdpr          | protein_coding          |
| ENSMUST00000080033  | 0 | 1 | 28  | Diap1         | protein_coding          |
| ENSMUST00000126434  | 0 | 1 | 28  | Tcf7l2        | protein_coding          |
| ENSMUST00000151620  | 0 | 1 | 28  | Ubash3a       | protein_coding          |
| ENSMUST00000173200  | 0 | 1 | 28  | Ap1g1         | protein_coding          |
| ENSMUST00000174521  | 0 | 1 | 28  | Sfta2         | protein_coding          |
| ENSMUST00000022637  | 0 | 1 | 26  | Ebf2          | protein_coding          |
| ENSMUST00000048688  | 0 | 1 | 26  | Fbxo38        | protein_coding          |
| ENSMUST00000094116  | 0 | 1 | 26  | Zscan25       | protein_coding          |
| ENSMUST00000107665  | 0 | 1 | 26  | Nipsnap3b     | protein_coding          |
| ENSMUST00000002735  | 0 | 1 | 24  | Clpp          | protein_coding          |
| ENSMUST00000106978  | 0 | 1 | 24  | Anapc15       | protein_coding          |
| ENSMUST00000173758  | 0 | 1 | 24  | Tmem234       | protein_coding          |
| ENSMUST00000174210  | 0 | 1 | 24  | Mtmr10        | protein_coding          |
| ENSMUST00000000384  | 0 | 1 | 22  | Trappc10      | protein_coding          |
| ENSMUST00000008445  | 0 | 1 | 22  | Phax          | protein_coding          |
| ENSMUST00000110122  | 0 | 1 | 22  | Crls1         | protein_coding          |
| ENSMUST00000117564  | 0 | 1 | 22  | Zan           | protein_coding          |
| ENSMUST00000132244  | 0 | 1 | 22  | Ptges         | protein_coding          |
| ENSMUST00000148565  | 0 | 1 | 22  | Ldhc          | protein_coding          |
| ENSMUST00000000476  | 0 | 1 | 20  | Pdgfra        | protein_coding          |
| ENSMUST000000005413 | 0 | 1 | 20  | Zfp112        | protein_coding          |
| ENSMUST00000007602  | 0 | 1 | 20  | M6pr          | protein_coding          |
| ENSMUST00000020266  | 0 | 1 | 20  | Pbld1         | protein_coding          |
| ENSMUST00000023069  | 0 | 1 | 20  | Fam118a       | protein_coding          |

|                    |   |   |                  |                |
|--------------------|---|---|------------------|----------------|
| ENSMUST00000026292 | 0 | 1 | 20 Huwe1         | protein_coding |
| ENSMUST00000067857 | 0 | 1 | 20 Aifm2         | protein_coding |
| ENSMUST00000087563 | 0 | 1 | 20 Mtg2          | protein_coding |
| ENSMUST00000105379 | 0 | 1 | 20 Palm          | protein_coding |
| ENSMUST00000108909 | 0 | 1 | 20 Scn8a         | protein_coding |
| ENSMUST00000123621 | 0 | 1 | 20 Scn3          | protein_coding |
| ENSMUST00000127267 | 0 | 1 | 20 Vmp1          | protein_coding |
| ENSMUST00000128359 | 0 | 1 | 20 Spag5         | protein_coding |
| ENSMUST00000128679 | 0 | 1 | 20 Ier3ip1       | protein_coding |
| ENSMUST00000134104 | 0 | 1 | 20 Glis2         | protein_coding |
| ENSMUST00000135973 | 0 | 1 | 20 Armc9         | protein_coding |
| ENSMUST00000151825 | 0 | 1 | 20 Gm16062       | antisense      |
| ENSMUST00000021217 | 0 | 1 | 18 Nme2          | protein_coding |
| ENSMUST00000029730 | 0 | 1 | 18 Chd1l         | protein_coding |
| ENSMUST00000032185 | 0 | 1 | 18 Slc6a6        | protein_coding |
| ENSMUST00000045428 | 0 | 1 | 18 Fbxl21        | protein_coding |
| ENSMUST00000059452 | 0 | 1 | 18 Zfp831        | protein_coding |
| ENSMUST00000109799 | 0 | 1 | 18 Hck           | protein_coding |
| ENSMUST00000111608 | 0 | 1 | 18 Ankrd45       | protein_coding |
| ENSMUST00000113795 | 0 | 1 | 18 Igsf5         | protein_coding |
| ENSMUST00000136262 | 0 | 1 | 18 Atp8b5        | protein_coding |
| ENSMUST00000147048 | 0 | 1 | 18 Ttn           | protein_coding |
| ENSMUST00000153238 | 0 | 1 | 18 Dgkq          | protein_coding |
| ENSMUST00000169200 | 0 | 1 | 18 Hagh          | protein_coding |
| ENSMUST00000172269 | 0 | 1 | 18 Sptbn4        | protein_coding |
| ENSMUST00000174373 | 0 | 1 | 18 Ptdss2        | protein_coding |
| ENSMUST00000133644 | 0 | 1 | 18 Gm13299       | antisense      |
| ENSMUST00000002518 | 0 | 1 | 16 Aes           | protein_coding |
| ENSMUST00000020277 | 0 | 1 | 16 Hkdc1         | protein_coding |
| ENSMUST00000020734 | 0 | 1 | 16 Eif4enif1     | protein_coding |
| ENSMUST00000021380 | 0 | 1 | 16 Trappc6b      | protein_coding |
| ENSMUST00000028795 | 0 | 1 | 16 Rad51         | protein_coding |
| ENSMUST00000029773 | 0 | 1 | 16 Cnn3          | protein_coding |
| ENSMUST00000032557 | 0 | 1 | 16 Mark2         | protein_coding |
| ENSMUST00000040089 | 0 | 1 | 16 Rnf43         | protein_coding |
| ENSMUST00000050719 | 0 | 1 | 16 Fmnl2         | protein_coding |
| ENSMUST00000060652 | 0 | 1 | 16 Eny2          | protein_coding |
| ENSMUST00000107924 | 0 | 1 | 16 Selt          | protein_coding |
| ENSMUST00000118487 | 0 | 1 | 16 Itfg3         | protein_coding |
| ENSMUST00000120818 | 0 | 1 | 16 C530008M17Rik | protein_coding |
| ENSMUST00000124242 | 0 | 1 | 16 Tchp          | protein_coding |
| ENSMUST00000126946 | 0 | 1 | 16 Tcf4          | protein_coding |
| ENSMUST00000134424 | 0 | 1 | 16 Ppig          | protein_coding |
| ENSMUST00000141660 | 0 | 1 | 16 Frmpd3        | protein_coding |
| ENSMUST00000150008 | 0 | 1 | 16 Carf          | protein_coding |
| ENSMUST00000145170 | 0 | 1 | 16 Gm13708       | lincRNA        |
| ENSMUST00000021060 | 0 | 1 | 14 Polg2         | protein_coding |
| ENSMUST00000021381 | 0 | 1 | 14 Pnn           | protein_coding |
| ENSMUST00000051773 | 0 | 1 | 14 Onecut3       | protein_coding |
| ENSMUST00000052068 | 0 | 1 | 14 Rbp1          | protein_coding |
| ENSMUST00000091583 | 0 | 1 | 14 Khlh3         | protein_coding |
| ENSMUST00000101148 | 0 | 1 | 14 Nlrp3         | protein_coding |
| ENSMUST00000108077 | 0 | 1 | 14 3110057O12Rik | protein_coding |
| ENSMUST00000112298 | 0 | 1 | 14 Ssh1          | protein_coding |
| ENSMUST00000123357 | 0 | 1 | 14 Chma9         | protein_coding |
| ENSMUST00000127472 | 0 | 1 | 14 Tdrd12        | protein_coding |
| ENSMUST00000155329 | 0 | 1 | 14 Ankhd1        | protein_coding |
| ENSMUST00000155364 | 0 | 1 | 14 Mpc1          | protein_coding |
| ENSMUST00000162488 | 0 | 1 | 14 Dennd3        | protein_coding |
| ENSMUST00000165062 | 0 | 1 | 14 Pdc           | protein_coding |
| ENSMUST00000170832 | 0 | 1 | 14 Prol1         | protein_coding |
| ENSMUST00000176199 | 0 | 1 | 14 Pcsk6         | protein_coding |
| ENSMUST00000176489 | 0 | 1 | 14 Hmbox1        | protein_coding |
| ENSMUST00000022340 | 0 | 1 | 12 Nid2          | protein_coding |
| ENSMUST00000027696 | 0 | 1 | 12 Elk4          | protein_coding |
| ENSMUST00000036176 | 0 | 1 | 12 Arhgap39      | protein_coding |
| ENSMUST00000040481 | 0 | 1 | 12 Slc38a7       | protein_coding |
| ENSMUST00000043781 | 0 | 1 | 12 Esrp1         | protein_coding |

|                    |   |   |             |                      |
|--------------------|---|---|-------------|----------------------|
| ENSMUST00000051016 | 0 | 1 | 12 Orai1    | protein_coding       |
| ENSMUST00000051777 | 0 | 1 | 12 C2cd3    | protein_coding       |
| ENSMUST00000065788 | 0 | 1 | 12 Kcnma1   | protein_coding       |
| ENSMUST00000078111 | 0 | 1 | 12 Bace1    | protein_coding       |
| ENSMUST00000085177 | 0 | 1 | 12 Msl2     | protein_coding       |
| ENSMUST00000085290 | 0 | 1 | 12 Phyh1    | protein_coding       |
| ENSMUST00000090945 | 0 | 1 | 12 Syt11    | protein_coding       |
| ENSMUST00000091186 | 0 | 1 | 12 Intu     | protein_coding       |
| ENSMUST00000092266 | 0 | 1 | 12 Tdg      | protein_coding       |
| ENSMUST00000099720 | 0 | 1 | 12 Zscan12  | protein_coding       |
| ENSMUST00000105298 | 0 | 1 | 12 Gas2l3   | protein_coding       |
| ENSMUST00000106363 | 0 | 1 | 12 Mfsd11   | protein_coding       |
| ENSMUST00000106752 | 0 | 1 | 12 Psm12    | protein_coding       |
| ENSMUST00000111983 | 0 | 1 | 12 Hoxd3    | protein_coding       |
| ENSMUST00000115394 | 0 | 1 | 12 Carm1    | protein_coding       |
| ENSMUST00000121017 | 0 | 1 | 12 Ccdc155  | protein_coding       |
| ENSMUST00000121521 | 0 | 1 | 12 G2e3     | protein_coding       |
| ENSMUST00000122912 | 0 | 1 | 12 Csrp3    | protein_coding       |
| ENSMUST00000125342 | 0 | 1 | 12 Ndc1     | protein_coding       |
| ENSMUST00000125882 | 0 | 1 | 12 Myo5b    | protein_coding       |
| ENSMUST00000126532 | 0 | 1 | 12 Heg1     | protein_coding       |
| ENSMUST00000138168 | 0 | 1 | 12 Abcb8    | protein_coding       |
| ENSMUST00000138856 | 0 | 1 | 12 Il15ra   | protein_coding       |
| ENSMUST00000141099 | 0 | 1 | 12 Rabepk   | protein_coding       |
| ENSMUST00000150106 | 0 | 1 | 12 Svop     | protein_coding       |
| ENSMUST00000166839 | 0 | 1 | 12 Emilin1  | protein_coding       |
| ENSMUST00000170452 | 0 | 1 | 12 Ccnt1    | protein_coding       |
| ENSMUST00000176456 | 0 | 1 | 12 Flt3     | protein_coding       |
| ENSMUST00000177457 | 0 | 1 | 12 Frmd4a   | protein_coding       |
| ENSMUST00000100706 | 0 | 1 | 12 Tctn2    | processed_transcript |
| ENSMUST00000137275 | 0 | 1 | 12 Gm14320  | antisense            |
| ENSMUST00000020286 | 0 | 1 | 10 Ppa1     | protein_coding       |
| ENSMUST00000020502 | 0 | 1 | 10 Slc36a3  | protein_coding       |
| ENSMUST00000020927 | 0 | 1 | 10 Hs1bp3   | protein_coding       |
| ENSMUST00000021547 | 0 | 1 | 10 Zfyve26  | protein_coding       |
| ENSMUST00000038757 | 0 | 1 | 10 Csd2     | protein_coding       |
| ENSMUST00000040105 | 0 | 1 | 10 Specc1l  | protein_coding       |
| ENSMUST00000043200 | 0 | 1 | 10 Smap2    | protein_coding       |
| ENSMUST00000045441 | 0 | 1 | 10 Pygb     | protein_coding       |
| ENSMUST00000047655 | 0 | 1 | 10 Slc25a43 | protein_coding       |
| ENSMUST00000050401 | 0 | 1 | 10 She      | protein_coding       |
| ENSMUST00000077458 | 0 | 1 | 10 Stxbp1   | protein_coding       |
| ENSMUST00000091374 | 0 | 1 | 10 Sumo1    | protein_coding       |
| ENSMUST00000099709 | 0 | 1 | 10 Dgkz     | protein_coding       |
| ENSMUST00000102596 | 0 | 1 | 10 Lck      | protein_coding       |
| ENSMUST00000102598 | 0 | 1 | 10 Rbbp4    | protein_coding       |
| ENSMUST00000102956 | 0 | 1 | 10 Slmap    | protein_coding       |
| ENSMUST00000105414 | 0 | 1 | 10 Spatc1l  | protein_coding       |
| ENSMUST00000106204 | 0 | 1 | 10 Rhbdl2   | protein_coding       |
| ENSMUST00000107165 | 0 | 1 | 10 Tenm4    | protein_coding       |
| ENSMUST00000110391 | 0 | 1 | 10 Cmah     | protein_coding       |
| ENSMUST00000113904 | 0 | 1 | 10 Zcchc4   | protein_coding       |
| ENSMUST00000117262 | 0 | 1 | 10 Slc4a1ap | protein_coding       |
| ENSMUST00000123285 | 0 | 1 | 10 Nyap2    | protein_coding       |
| ENSMUST00000124067 | 0 | 1 | 10 Sirpb1c  | protein_coding       |
| ENSMUST00000125879 | 0 | 1 | 10 Sdk2     | protein_coding       |
| ENSMUST00000130697 | 0 | 1 | 10 Irf9     | protein_coding       |
| ENSMUST00000133039 | 0 | 1 | 10 Trim47   | protein_coding       |
| ENSMUST00000133998 | 0 | 1 | 10 Mpnd     | protein_coding       |
| ENSMUST00000134885 | 0 | 1 | 10 Rapgef3  | protein_coding       |
| ENSMUST00000137268 | 0 | 1 | 10 Mier3    | protein_coding       |
| ENSMUST00000139250 | 0 | 1 | 10 Dyrk1a   | protein_coding       |
| ENSMUST00000139297 | 0 | 1 | 10 Smurf2   | protein_coding       |
| ENSMUST00000142385 | 0 | 1 | 10 Mxipl    | protein_coding       |
| ENSMUST00000144668 | 0 | 1 | 10 Dhdds    | protein_coding       |
| ENSMUST00000149069 | 0 | 1 | 10 Nbn      | protein_coding       |
| ENSMUST00000150148 | 0 | 1 | 10 Rnf220   | protein_coding       |
| ENSMUST00000151770 | 0 | 1 | 10 Ttc3     | protein_coding       |



|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUST00000154716 | 0 | 1 | 10 Dapp1         | protein_coding                     |
| ENSMUST00000155860 | 0 | 1 | 10 Mapkapk3      | protein_coding                     |
| ENSMUST00000160460 | 0 | 1 | 10 Slc9b1        | protein_coding                     |
| ENSMUST00000162385 | 0 | 1 | 10 Ttc19         | protein_coding                     |
| ENSMUST00000165937 | 0 | 1 | 10 Tox2          | protein_coding                     |
| ENSMUST00000168698 | 0 | 1 | 10 Cotti1        | protein_coding                     |
| ENSMUST00000171018 | 0 | 1 | 10 Bean1         | protein_coding                     |
| ENSMUST00000174504 | 0 | 1 | 10 Rnf123        | protein_coding                     |
| ENSMUST00000182972 | 0 | 1 | 10 Ank3          | protein_coding                     |
| ENSMUST00000183096 | 0 | 1 | 10 Sipa1l3       | protein_coding                     |
| ENSMUST00000119625 | 0 | 1 | 10 Gm11693       | processed_pseudogene               |
| ENSMUST00000156977 | 0 | 1 | 10 4933404K08Rik | lincRNA                            |
| ENSMUST00000180936 | 0 | 1 | 10 Gm26767       | lincRNA                            |
| ENSMUST00000181142 | 0 | 1 | 10 9030616G12Rik | lincRNA                            |
| ENSMUST00000183344 | 0 | 1 | 10 Gm27169       | lincRNA                            |
| ENSMUST00000097928 | 0 | 1 | 10 Faddos        | antisense                          |
| ENSMUST00000056103 | 0 | 1 | 8 1600029I14Rik  | transcribed_unprocessed_pseudogene |
| ENSMUST00000001667 | 0 | 1 | 8 Csn3           | protein_coding                     |
| ENSMUST00000010191 | 0 | 1 | 8 Hyal2          | protein_coding                     |
| ENSMUST00000014339 | 0 | 1 | 8 Dnajc7         | protein_coding                     |
| ENSMUST00000018143 | 0 | 1 | 8 Ddx27          | protein_coding                     |
| ENSMUST00000023747 | 0 | 1 | 8 Nckap5l        | protein_coding                     |
| ENSMUST00000026743 | 0 | 1 | 8 Uqcrc1         | protein_coding                     |
| ENSMUST00000029141 | 0 | 1 | 8 Mmp24          | protein_coding                     |
| ENSMUST00000030675 | 0 | 1 | 8 Mrps15         | protein_coding                     |
| ENSMUST00000033992 | 0 | 1 | 8 Gsr            | protein_coding                     |
| ENSMUST00000034431 | 0 | 1 | 8 Tmem170        | protein_coding                     |
| ENSMUST00000034547 | 0 | 1 | 8 Acat1          | protein_coding                     |
| ENSMUST00000035689 | 0 | 1 | 8 4932438H23Rik  | protein_coding                     |
| ENSMUST00000040112 | 0 | 1 | 8 Papl           | protein_coding                     |
| ENSMUST00000040336 | 0 | 1 | 8 Slc22a23       | protein_coding                     |
| ENSMUST00000046589 | 0 | 1 | 8 Cst13          | protein_coding                     |
| ENSMUST00000048374 | 0 | 1 | 8 C330027C09Rik  | protein_coding                     |
| ENSMUST00000048716 | 0 | 1 | 8 Fgd3           | protein_coding                     |
| ENSMUST00000050205 | 0 | 1 | 8 Nudt1          | protein_coding                     |
| ENSMUST00000051633 | 0 | 1 | 8 Ubiad1         | protein_coding                     |
| ENSMUST00000058229 | 0 | 1 | 8 Rp1l1          | protein_coding                     |
| ENSMUST00000067167 | 0 | 1 | 8 Fra10ac1       | protein_coding                     |
| ENSMUST00000077925 | 0 | 1 | 8 Unc5b          | protein_coding                     |
| ENSMUST00000090839 | 0 | 1 | 8 Selenbp1       | protein_coding                     |
| ENSMUST00000092723 | 0 | 1 | 8 Arid1b         | protein_coding                     |
| ENSMUST00000093792 | 0 | 1 | 8 Slc35g2        | protein_coding                     |
| ENSMUST00000097080 | 0 | 1 | 8 Als2cr11       | protein_coding                     |
| ENSMUST00000097432 | 0 | 1 | 8 Serac1         | protein_coding                     |
| ENSMUST00000105860 | 0 | 1 | 8 Ncmap          | protein_coding                     |
| ENSMUST00000107259 | 0 | 1 | 8 Gm27029        | protein_coding                     |
| ENSMUST00000107362 | 0 | 1 | 8 Furin          | protein_coding                     |
| ENSMUST00000108722 | 0 | 1 | 8 Lrrc48         | protein_coding                     |
| ENSMUST00000108853 | 0 | 1 | 8 Glra1          | protein_coding                     |
| ENSMUST00000109221 | 0 | 1 | 8 B4galt5        | protein_coding                     |
| ENSMUST00000113823 | 0 | 1 | 8 Dysf           | protein_coding                     |
| ENSMUST00000115050 | 0 | 1 | 8 Spire1         | protein_coding                     |
| ENSMUST00000121744 | 0 | 1 | 8 Tmc5           | protein_coding                     |
| ENSMUST00000121870 | 0 | 1 | 8 Ppt1           | protein_coding                     |
| ENSMUST00000123031 | 0 | 1 | 8 Coro7          | protein_coding                     |
| ENSMUST00000123756 | 0 | 1 | 8 Setd4          | protein_coding                     |
| ENSMUST00000124501 | 0 | 1 | 8 Tex15          | protein_coding                     |
| ENSMUST00000124502 | 0 | 1 | 8 Siglecg        | protein_coding                     |
| ENSMUST00000126288 | 0 | 1 | 8 Osbpl9         | protein_coding                     |
| ENSMUST00000127276 | 0 | 1 | 8 Golga2         | protein_coding                     |
| ENSMUST00000127542 | 0 | 1 | 8 Heatr2         | protein_coding                     |
| ENSMUST00000129449 | 0 | 1 | 8 Tmem170b       | protein_coding                     |
| ENSMUST00000129662 | 0 | 1 | 8 Prickle3       | protein_coding                     |
| ENSMUST00000130178 | 0 | 1 | 8 Fam78a         | protein_coding                     |
| ENSMUST00000131186 | 0 | 1 | 8 Rev3l          | protein_coding                     |
| ENSMUST00000132502 | 0 | 1 | 8 Kif18b         | protein_coding                     |
| ENSMUST00000138283 | 0 | 1 | 8 Ndfip2         | protein_coding                     |
| ENSMUST00000140490 | 0 | 1 | 8 Steap3         | protein_coding                     |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUST00000140766 | 0 | 1 | 8 Tmem143       | protein_coding         |
| ENSMUST00000143180 | 0 | 1 | 8 Fbxl2         | protein_coding         |
| ENSMUST00000149796 | 0 | 1 | 8 Rer1          | protein_coding         |
| ENSMUST00000154999 | 0 | 1 | 8 Plin2         | protein_coding         |
| ENSMUST00000155034 | 0 | 1 | 8 Ampd1         | protein_coding         |
| ENSMUST00000162532 | 0 | 1 | 8 Cmb1          | protein_coding         |
| ENSMUST00000168761 | 0 | 1 | 8 Brix1         | protein_coding         |
| ENSMUST00000171751 | 0 | 1 | 8 Rbfox2        | protein_coding         |
| ENSMUST00000173104 | 0 | 1 | 8 Vdr           | protein_coding         |
| ENSMUST00000173569 | 0 | 1 | 8 Gne           | protein_coding         |
| ENSMUST00000182851 | 0 | 1 | 8 Celf2         | protein_coding         |
| ENSMUST00000138744 | 0 | 1 | 8 Gm16725       | processed_transcript   |
| ENSMUST00000133243 | 0 | 1 | 8 Gm15411       | lincRNA                |
| ENSMUST00000180519 | 0 | 1 | 8 F630040K05Rik | lincRNA                |
| ENSMUST00000124047 | 0 | 1 | 8 Gm12224       | antisense              |
| ENSMUST00000126476 | 0 | 1 | 8 3300002A11Rik | antisense              |
| ENSMUST00000144256 | 0 | 1 | 8 Ctcfls        | antisense              |
| ENSMUST00000168187 | 0 | 1 | 8 Gm17036       | antisense              |
| ENSMUST00000178260 | 0 | 1 | 6 Gm21909       | unprocessed_pseudogene |
| ENSMUST00000004294 | 0 | 1 | 6 Kifc2         | protein_coding         |
| ENSMUST00000009102 | 0 | 1 | 6 Vps72         | protein_coding         |
| ENSMUST00000019982 | 0 | 1 | 6 Gtf3c6        | protein_coding         |
| ENSMUST00000020085 | 0 | 1 | 6 Ube2d1        | protein_coding         |
| ENSMUST00000020965 | 0 | 1 | 6 Allc          | protein_coding         |
| ENSMUST00000021045 | 0 | 1 | 6 Asic2         | protein_coding         |
| ENSMUST00000023151 | 0 | 1 | 6 Bcl6          | protein_coding         |
| ENSMUST00000024123 | 0 | 1 | 6 Agap3         | protein_coding         |
| ENSMUST00000025076 | 0 | 1 | 6 Lyzl1         | protein_coding         |
| ENSMUST00000025381 | 0 | 1 | 6 Spink3        | protein_coding         |
| ENSMUST00000026446 | 0 | 1 | 6 Cnpy2         | protein_coding         |
| ENSMUST00000027495 | 0 | 1 | 6 Sept2         | protein_coding         |
| ENSMUST00000027741 | 0 | 1 | 6 Xpr1          | protein_coding         |
| ENSMUST00000030187 | 0 | 1 | 6 Tln1          | protein_coding         |
| ENSMUST00000030992 | 0 | 1 | 6 Rnf4          | protein_coding         |
| ENSMUST00000031038 | 0 | 1 | 6 Ociad1        | protein_coding         |
| ENSMUST00000032497 | 0 | 1 | 6 D6Wsu163e     | protein_coding         |
| ENSMUST00000033036 | 0 | 1 | 6 Dkk3          | protein_coding         |
| ENSMUST00000033956 | 0 | 1 | 6 Ido1          | protein_coding         |
| ENSMUST00000042706 | 0 | 1 | 6 Nr0b2         | protein_coding         |
| ENSMUST00000044604 | 0 | 1 | 6 Crybg3        | protein_coding         |
| ENSMUST00000046045 | 0 | 1 | 6 Nexn          | protein_coding         |
| ENSMUST00000046587 | 0 | 1 | 6 Scamp5        | protein_coding         |
| ENSMUST00000053666 | 0 | 1 | 6 Slc12a6       | protein_coding         |
| ENSMUST00000058418 | 0 | 1 | 6 Slc29a4       | protein_coding         |
| ENSMUST00000060174 | 0 | 1 | 6 P2ry6         | protein_coding         |
| ENSMUST00000060837 | 0 | 1 | 6 Rab11fip5     | protein_coding         |
| ENSMUST00000068225 | 0 | 1 | 6 Nusap1        | protein_coding         |
| ENSMUST00000068242 | 0 | 1 | 6 Rimklb        | protein_coding         |
| ENSMUST00000071096 | 0 | 1 | 6 Hemgn         | protein_coding         |
| ENSMUST00000071522 | 0 | 1 | 6 Gm10032       | protein_coding         |
| ENSMUST00000073161 | 0 | 1 | 6 Gtf2ird1      | protein_coding         |
| ENSMUST00000073618 | 0 | 1 | 6 BC021785      | protein_coding         |
| ENSMUST00000074969 | 0 | 1 | 6 Cage1         | protein_coding         |
| ENSMUST00000085635 | 0 | 1 | 6 Mfsd7b        | protein_coding         |
| ENSMUST00000088386 | 0 | 1 | 6 Slc15a1       | protein_coding         |
| ENSMUST00000090849 | 0 | 1 | 6 Mettl8        | protein_coding         |
| ENSMUST00000093938 | 0 | 1 | 6 Gsdma2        | protein_coding         |
| ENSMUST00000096355 | 0 | 1 | 6 Csf2rb        | protein_coding         |
| ENSMUST00000099309 | 0 | 1 | 6 Bhmt          | protein_coding         |
| ENSMUST00000099543 | 0 | 1 | 6 Eva1c         | protein_coding         |
| ENSMUST00000099981 | 0 | 1 | 6 Ttn           | protein_coding         |
| ENSMUST00000100463 | 0 | 1 | 6 Dclre1c       | protein_coding         |
| ENSMUST00000102641 | 0 | 1 | 6 Bmp8a         | protein_coding         |
| ENSMUST00000102758 | 0 | 1 | 6 Vdac1         | protein_coding         |
| ENSMUST00000103121 | 0 | 1 | 6 D630003M21Rik | protein_coding         |
| ENSMUST00000105447 | 0 | 1 | 6 Vps26a        | protein_coding         |
| ENSMUST00000107399 | 0 | 1 | 6 Nt5c3b        | protein_coding         |
| ENSMUST00000111332 | 0 | 1 | 6 Pcp411        | protein_coding         |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000114996 | 0 | 1 | 6 Optn          | protein_coding       |
| ENSMUST00000115113 | 0 | 1 | 6 Rint1         | protein_coding       |
| ENSMUST00000118161 | 0 | 1 | 6 Grm4          | protein_coding       |
| ENSMUST00000123771 | 0 | 1 | 6 Mras          | protein_coding       |
| ENSMUST00000124011 | 0 | 1 | 6 Ttc38         | protein_coding       |
| ENSMUST00000134748 | 0 | 1 | 6 2700049A03Rik | protein_coding       |
| ENSMUST00000134939 | 0 | 1 | 6 Qars          | protein_coding       |
| ENSMUST00000135638 | 0 | 1 | 6 Cdh23         | protein_coding       |
| ENSMUST00000136125 | 0 | 1 | 6 Tpm3          | protein_coding       |
| ENSMUST00000137753 | 0 | 1 | 6 Tox4          | protein_coding       |
| ENSMUST00000141795 | 0 | 1 | 6 Pde6g         | protein_coding       |
| ENSMUST00000142849 | 0 | 1 | 6 Stx4a         | protein_coding       |
| ENSMUST00000145665 | 0 | 1 | 6 Irak3         | protein_coding       |
| ENSMUST00000145858 | 0 | 1 | 6 Ept1          | protein_coding       |
| ENSMUST00000146965 | 0 | 1 | 6 Hsf3          | protein_coding       |
| ENSMUST00000147975 | 0 | 1 | 6 Tanc2         | protein_coding       |
| ENSMUST00000149984 | 0 | 1 | 6 Stxbp5l       | protein_coding       |
| ENSMUST00000150096 | 0 | 1 | 6 Ptprf         | protein_coding       |
| ENSMUST00000152706 | 0 | 1 | 6 Timm17a       | protein_coding       |
| ENSMUST00000153206 | 0 | 1 | 6 Gm12216       | protein_coding       |
| ENSMUST00000153574 | 0 | 1 | 6 Sp100         | protein_coding       |
| ENSMUST00000153720 | 0 | 1 | 6 Selenbp1      | protein_coding       |
| ENSMUST00000153976 | 0 | 1 | 6 Sympk         | protein_coding       |
| ENSMUST00000156635 | 0 | 1 | 6 Rcan3         | protein_coding       |
| ENSMUST00000159314 | 0 | 1 | 6 Lmo7          | protein_coding       |
| ENSMUST00000159459 | 0 | 1 | 6 Ocln          | protein_coding       |
| ENSMUST00000159682 | 0 | 1 | 6 Ccdc150       | protein_coding       |
| ENSMUST00000160609 | 0 | 1 | 6 Wbscr17       | protein_coding       |
| ENSMUST00000160719 | 0 | 1 | 6 Mfap3l        | protein_coding       |
| ENSMUST00000167496 | 0 | 1 | 6 Rnf20         | protein_coding       |
| ENSMUST00000174418 | 0 | 1 | 6 Mtmr12        | protein_coding       |
| ENSMUST00000175903 | 0 | 1 | 6 Arhgef2       | protein_coding       |
| ENSMUST00000179953 | 0 | 1 | 6 Gm7903        | protein_coding       |
| ENSMUST00000183338 | 0 | 1 | 6 Elf2          | protein_coding       |
| ENSMUST00000184885 | 0 | 1 | 6 Trps1         | protein_coding       |
| ENSMUST00000122923 | 0 | 1 | 6 C630043F03Rik | processed_transcript |
| ENSMUST00000124015 | 0 | 1 | 6 2900089D17Rik | processed_transcript |
| ENSMUST00000132584 | 0 | 1 | 6 B230206L02Rik | processed_transcript |
| ENSMUST00000141011 | 0 | 1 | 6 Gm15545       | processed_transcript |
| ENSMUST00000119840 | 0 | 1 | 6 Gm13140       | processed_pseudogene |
| ENSMUST00000181801 | 0 | 1 | 6 Gm9918        | lincRNA              |
| ENSMUST00000175846 | 0 | 1 | 6 Gm20686       | antisense            |
| ENSMUST00000111966 | 0 | 1 | 4 Smarcc1       | protein_coding       |
| ENSMUST00000060976 | 0 | 1 | 4 Slco6b1       | protein_coding       |
| ENSMUST00000111966 | 0 | 1 | 4 Smarcc1       | protein_coding       |
| ENSMUST00000060976 | 0 | 1 | 4 Slco6b1       | protein_coding       |
| ENSMUST00000163190 | 0 | 1 | 4 AC161246.1    | pseudogene           |
| ENSMUST00000000186 | 0 | 1 | 4 Fgf23         | protein_coding       |
| ENSMUST00000005768 | 0 | 1 | 4 Pip5k1a       | protein_coding       |
| ENSMUST00000008542 | 0 | 1 | 4 Elk3          | protein_coding       |
| ENSMUST00000009790 | 0 | 1 | 4 Pla2g12b      | protein_coding       |
| ENSMUST00000011877 | 0 | 1 | 4 Sptbn1        | protein_coding       |
| ENSMUST00000020283 | 0 | 1 | 4 H2afy2        | protein_coding       |
| ENSMUST00000020366 | 0 | 1 | 4 Gabrp         | protein_coding       |
| ENSMUST00000020579 | 0 | 1 | 4 Hmnr          | protein_coding       |
| ENSMUST00000020741 | 0 | 1 | 4 Drg1          | protein_coding       |
| ENSMUST00000021606 | 0 | 1 | 4 Atxn3         | protein_coding       |
| ENSMUST00000021824 | 0 | 1 | 4 Nol8          | protein_coding       |
| ENSMUST00000021828 | 0 | 1 | 4 Nxn12         | protein_coding       |
| ENSMUST00000022328 | 0 | 1 | 4 Ldb3          | protein_coding       |
| ENSMUST00000023104 | 0 | 1 | 4 Rpap3         | protein_coding       |
| ENSMUST00000027534 | 0 | 1 | 4 Ilkap         | protein_coding       |
| ENSMUST00000027975 | 0 | 1 | 4 Phyh          | protein_coding       |
| ENSMUST00000028055 | 0 | 1 | 4 Trdmt1        | protein_coding       |
| ENSMUST00000030539 | 0 | 1 | 4 Kif17         | protein_coding       |
| ENSMUST00000031311 | 0 | 1 | 4 Dck           | protein_coding       |
| ENSMUST00000031490 | 0 | 1 | 4 Ulk1          | protein_coding       |
| ENSMUST00000032180 | 0 | 1 | 4 Wnt7a         | protein_coding       |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000032492 | 0 | 1 | 4 Cd9           | protein_coding |
| ENSMUST00000034460 | 0 | 1 | 4 Cog2          | protein_coding |
| ENSMUST00000035201 | 0 | 1 | 4 Rbm6          | protein_coding |
| ENSMUST00000035340 | 0 | 1 | 4 Usp54         | protein_coding |
| ENSMUST00000035840 | 0 | 1 | 4 Zdhhc5        | protein_coding |
| ENSMUST00000040280 | 0 | 1 | 4 Slc25a23      | protein_coding |
| ENSMUST00000041733 | 0 | 1 | 4 Taf2          | protein_coding |
| ENSMUST00000042373 | 0 | 1 | 4 Shcbp1l       | protein_coding |
| ENSMUST00000042780 | 0 | 1 | 4 Tex2          | protein_coding |
| ENSMUST00000043560 | 0 | 1 | 4 Smg7          | protein_coding |
| ENSMUST00000044773 | 0 | 1 | 4 Frmpd1        | protein_coding |
| ENSMUST00000045319 | 0 | 1 | 4 Gpr142        | protein_coding |
| ENSMUST00000048086 | 0 | 1 | 4 Hoxd11        | protein_coding |
| ENSMUST00000048444 | 0 | 1 | 4 Klk5          | protein_coding |
| ENSMUST00000049124 | 0 | 1 | 4 C1rl          | protein_coding |
| ENSMUST00000049787 | 0 | 1 | 4 Lrrn4         | protein_coding |
| ENSMUST00000052201 | 0 | 1 | 4 Mis18bp1      | protein_coding |
| ENSMUST00000053593 | 0 | 1 | 4 Rap2c         | protein_coding |
| ENSMUST00000055723 | 0 | 1 | 4 Tnfrsf26      | protein_coding |
| ENSMUST00000059482 | 0 | 1 | 4 Prss27        | protein_coding |
| ENSMUST00000061986 | 0 | 1 | 4 Shb           | protein_coding |
| ENSMUST00000065113 | 0 | 1 | 4 Glis3         | protein_coding |
| ENSMUST00000066070 | 0 | 1 | 4 Eif3k         | protein_coding |
| ENSMUST00000068569 | 0 | 1 | 4 Bcl2a1b       | protein_coding |
| ENSMUST00000070316 | 0 | 1 | 4 Gpr173        | protein_coding |
| ENSMUST00000070538 | 0 | 1 | 4 Rab12         | protein_coding |
| ENSMUST00000073600 | 0 | 1 | 4 Errf1         | protein_coding |
| ENSMUST00000076281 | 0 | 1 | 4 Zfp781        | protein_coding |
| ENSMUST00000079033 | 0 | 1 | 4 Bloc1s2       | protein_coding |
| ENSMUST00000079773 | 0 | 1 | 4 Csnk1g2       | protein_coding |
| ENSMUST00000080015 | 0 | 1 | 4 H2-T22        | protein_coding |
| ENSMUST00000081017 | 0 | 1 | 4 Defb4         | protein_coding |
| ENSMUST00000081580 | 0 | 1 | 4 Gm5089        | protein_coding |
| ENSMUST00000085948 | 0 | 1 | 4 Axl           | protein_coding |
| ENSMUST00000086483 | 0 | 1 | 4 Ccdc60        | protein_coding |
| ENSMUST00000100507 | 0 | 1 | 4 Eif3b         | protein_coding |
| ENSMUST00000100949 | 0 | 1 | 4 Glmn          | protein_coding |
| ENSMUST00000105909 | 0 | 1 | 4 Cars          | protein_coding |
| ENSMUST00000107415 | 0 | 1 | 4 Zfp618        | protein_coding |
| ENSMUST00000107721 | 0 | 1 | 4 Stx17         | protein_coding |
| ENSMUST00000107896 | 0 | 1 | 4 Trim25        | protein_coding |
| ENSMUST00000109527 | 0 | 1 | 4 Arl2bp        | protein_coding |
| ENSMUST00000110395 | 0 | 1 | 4 Max           | protein_coding |
| ENSMUST00000110398 | 0 | 1 | 4 Lrrc16a       | protein_coding |
| ENSMUST00000110509 | 0 | 1 | 4 Katnal1       | protein_coding |
| ENSMUST00000110808 | 0 | 1 | 4 Ino80         | protein_coding |
| ENSMUST00000111113 | 0 | 1 | 4 Wdr35         | protein_coding |
| ENSMUST00000111142 | 0 | 1 | 4 Dtx2          | protein_coding |
| ENSMUST00000111764 | 0 | 1 | 4 Qsox1         | protein_coding |
| ENSMUST00000111916 | 0 | 1 | 4 8430419L09Rik | protein_coding |
| ENSMUST00000112123 | 0 | 1 | 4 Exosc1        | protein_coding |
| ENSMUST00000114103 | 0 | 1 | 4 Adam23        | protein_coding |
| ENSMUST00000114838 | 0 | 1 | 4 Fam122b       | protein_coding |
| ENSMUST00000114862 | 0 | 1 | 4 Sfmbt2        | protein_coding |
| ENSMUST00000115442 | 0 | 1 | 4 Met           | protein_coding |
| ENSMUST00000116552 | 0 | 1 | 4 Gtf2a2        | protein_coding |
| ENSMUST00000118687 | 0 | 1 | 4 Efhd1         | protein_coding |
| ENSMUST00000119990 | 0 | 1 | 4 Plekhg2       | protein_coding |
| ENSMUST00000120498 | 0 | 1 | 4 Ythdc1        | protein_coding |
| ENSMUST00000123294 | 0 | 1 | 4 Ccnc          | protein_coding |
| ENSMUST00000124781 | 0 | 1 | 4 Mettl8        | protein_coding |
| ENSMUST00000124992 | 0 | 1 | 4 Ube2j1        | protein_coding |
| ENSMUST00000126367 | 0 | 1 | 4 Acsm1         | protein_coding |
| ENSMUST00000126574 | 0 | 1 | 4 Sepsecs       | protein_coding |
| ENSMUST00000127470 | 0 | 1 | 4 Ltk           | protein_coding |
| ENSMUST00000127727 | 0 | 1 | 4 Dennd5b       | protein_coding |
| ENSMUST00000127843 | 0 | 1 | 4 Prima1        | protein_coding |
| ENSMUST00000127888 | 0 | 1 | 4 Ldlrad3       | protein_coding |

|                    |   |   |                 |                                    |
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| ENSMUST00000129957 | 0 | 1 | 4 Stil          | protein_coding                     |
| ENSMUST00000130465 | 0 | 1 | 4 Al118078      | protein_coding                     |
| ENSMUST00000133617 | 0 | 1 | 4 Alas1         | protein_coding                     |
| ENSMUST00000136490 | 0 | 1 | 4 Tbc1d14       | protein_coding                     |
| ENSMUST00000137276 | 0 | 1 | 4 C4bp          | protein_coding                     |
| ENSMUST00000137428 | 0 | 1 | 4 Tcp111        | protein_coding                     |
| ENSMUST00000138333 | 0 | 1 | 4 Ccl1          | protein_coding                     |
| ENSMUST00000139976 | 0 | 1 | 4 Plch2         | protein_coding                     |
| ENSMUST00000140410 | 0 | 1 | 4 Cdc42ep5      | protein_coding                     |
| ENSMUST00000143252 | 0 | 1 | 4 Angptl2       | protein_coding                     |
| ENSMUST00000143330 | 0 | 1 | 4 Mmachc        | protein_coding                     |
| ENSMUST00000143521 | 0 | 1 | 4 G6pdx         | protein_coding                     |
| ENSMUST00000144231 | 0 | 1 | 4 Ube2d1        | protein_coding                     |
| ENSMUST00000145363 | 0 | 1 | 4 Cit           | protein_coding                     |
| ENSMUST00000147840 | 0 | 1 | 4 Rgs10         | protein_coding                     |
| ENSMUST00000153962 | 0 | 1 | 4 Cnst          | protein_coding                     |
| ENSMUST00000154205 | 0 | 1 | 4 Slc39a6       | protein_coding                     |
| ENSMUST00000154911 | 0 | 1 | 4 Sytl1         | protein_coding                     |
| ENSMUST00000155460 | 0 | 1 | 4 Mettl2        | protein_coding                     |
| ENSMUST00000155623 | 0 | 1 | 4 B4galt5       | protein_coding                     |
| ENSMUST00000155632 | 0 | 1 | 4 Telo2         | protein_coding                     |
| ENSMUST00000155966 | 0 | 1 | 4 Pigx          | protein_coding                     |
| ENSMUST00000156071 | 0 | 1 | 4 Lhfpl2        | protein_coding                     |
| ENSMUST00000160844 | 0 | 1 | 4 Nrnx1         | protein_coding                     |
| ENSMUST00000161083 | 0 | 1 | 4 Pygl          | protein_coding                     |
| ENSMUST00000165555 | 0 | 1 | 4 Mib1          | protein_coding                     |
| ENSMUST00000166282 | 0 | 1 | 4 Stk35         | protein_coding                     |
| ENSMUST00000166652 | 0 | 1 | 4 Pde2a         | protein_coding                     |
| ENSMUST00000166758 | 0 | 1 | 4 Caly          | protein_coding                     |
| ENSMUST00000167242 | 0 | 1 | 4 Xpo7          | protein_coding                     |
| ENSMUST00000170955 | 0 | 1 | 4 Baiap2l2      | protein_coding                     |
| ENSMUST00000171843 | 0 | 1 | 4 Jakmip3       | protein_coding                     |
| ENSMUST00000173456 | 0 | 1 | 4 Vdac2         | protein_coding                     |
| ENSMUST00000173759 | 0 | 1 | 4 Gm9573        | protein_coding                     |
| ENSMUST00000177451 | 0 | 1 | 4 Foxn3         | protein_coding                     |
| ENSMUST00000180021 | 0 | 1 | 4 Il18          | protein_coding                     |
| ENSMUST00000181663 | 0 | 1 | 4 Fbxo31        | protein_coding                     |
| ENSMUST00000183316 | 0 | 1 | 4 Ccser2        | protein_coding                     |
| ENSMUST00000184146 | 0 | 1 | 4 Rab27a        | protein_coding                     |
| ENSMUST00000184189 | 0 | 1 | 4 Rgs21         | protein_coding                     |
| ENSMUST00000134992 | 0 | 1 | 4 Gm16618       | processed_transcript               |
| ENSMUST00000143569 | 0 | 1 | 4 Gm11523       | processed_transcript               |
| ENSMUST00000125582 | 0 | 1 | 4 Gm13052       | lincRNA                            |
| ENSMUST00000180962 | 0 | 1 | 4 Gm19705       | lincRNA                            |
| ENSMUST00000181160 | 0 | 1 | 4 Gm9530        | lincRNA                            |
| ENSMUST00000181198 | 0 | 1 | 4 4930552P12Rik | lincRNA                            |
| ENSMUST00000181819 | 0 | 1 | 4 Gm16740       | lincRNA                            |
| ENSMUST00000114854 | 0 | 1 | 4 A630012P03Rik | antisense                          |
| ENSMUST00000123155 | 0 | 1 | 4 Gm15886       | antisense                          |
| ENSMUST00000126849 | 0 | 1 | 4 Gm15558       | antisense                          |
| ENSMUST00000146349 | 0 | 1 | 4 Gm15862       | antisense                          |
| ENSMUST00000152968 | 0 | 1 | 4 Gm12236       | antisense                          |
| ENSMUST00000160334 | 0 | 1 | 4 Gm16573       | antisense                          |
| ENSMUST00000177012 | 0 | 1 | 4 Gm13381       | antisense                          |
| ENSMUST00000120075 | 0 | 1 | 2 Gm6207        | transcribed_unprocessed_pseudogene |
| ENSMUST00000178856 | 0 | 1 | 2 Gm6228        | transcribed_unprocessed_pseudogene |
| ENSMUST00000001279 | 0 | 1 | 2 Lsr           | protein_coding                     |
| ENSMUST00000004943 | 0 | 1 | 2 Tmed11        | protein_coding                     |
| ENSMUST00000005616 | 0 | 1 | 2 Pkn1          | protein_coding                     |
| ENSMUST00000006626 | 0 | 1 | 2 Actn3         | protein_coding                     |
| ENSMUST00000006742 | 0 | 1 | 2 Atp7b         | protein_coding                     |
| ENSMUST00000007993 | 0 | 1 | 2 Rbm28         | protein_coding                     |
| ENSMUST00000010189 | 0 | 1 | 2 Tmem115       | protein_coding                     |
| ENSMUST00000011262 | 0 | 1 | 2 Panx3         | protein_coding                     |
| ENSMUST00000011733 | 0 | 1 | 2 Fsd1          | protein_coding                     |
| ENSMUST00000013787 | 0 | 1 | 2 Lypd8         | protein_coding                     |
| ENSMUST00000015877 | 0 | 1 | 2 Capza2        | protein_coding                     |
| ENSMUST00000016106 | 0 | 1 | 2 1700016C15Rik | protein_coding                     |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000020522 | 0 | 1 | 2 Pfkf          | protein_coding |
| ENSMUST00000020920 | 0 | 1 | 2 Rgs9          | protein_coding |
| ENSMUST00000021512 | 0 | 1 | 2 Dhhs7         | protein_coding |
| ENSMUST00000021971 | 0 | 1 | 2 Slc25a48      | protein_coding |
| ENSMUST00000022087 | 0 | 1 | 2 Nsun2         | protein_coding |
| ENSMUST00000022577 | 0 | 1 | 2 Zc3h13        | protein_coding |
| ENSMUST00000022690 | 0 | 1 | 2 Fam160b2      | protein_coding |
| ENSMUST00000024870 | 0 | 1 | 2 Slc30a6       | protein_coding |
| ENSMUST00000025279 | 0 | 1 | 2 Npc1          | protein_coding |
| ENSMUST00000025522 | 0 | 1 | 2 Pdgfrb        | protein_coding |
| ENSMUST00000026008 | 0 | 1 | 2 Trim8         | protein_coding |
| ENSMUST00000026507 | 0 | 1 | 2 Usp33         | protein_coding |
| ENSMUST00000027372 | 0 | 1 | 2 Cxcr2         | protein_coding |
| ENSMUST00000027956 | 0 | 1 | 2 Suv39h2       | protein_coding |
| ENSMUST00000027986 | 0 | 1 | 2 Optn          | protein_coding |
| ENSMUST00000028517 | 0 | 1 | 2 Ola1          | protein_coding |
| ENSMUST00000028866 | 0 | 1 | 2 Zc3h8         | protein_coding |
| ENSMUST00000029336 | 0 | 1 | 2 Dhx36         | protein_coding |
| ENSMUST00000029748 | 0 | 1 | 2 Fcgr1         | protein_coding |
| ENSMUST00000029770 | 0 | 1 | 2 Abcd3         | protein_coding |
| ENSMUST00000030090 | 0 | 1 | 2 Alad          | protein_coding |
| ENSMUST00000030660 | 0 | 1 | 2 Trappc3       | protein_coding |
| ENSMUST00000031145 | 0 | 1 | 2 Pdccl2        | protein_coding |
| ENSMUST00000031286 | 0 | 1 | 2 Crybb1        | protein_coding |
| ENSMUST00000031695 | 0 | 1 | 2 Wasl          | protein_coding |
| ENSMUST00000032754 | 0 | 1 | 2 Sema4b        | protein_coding |
| ENSMUST00000032781 | 0 | 1 | 2 Nox4          | protein_coding |
| ENSMUST00000033414 | 0 | 1 | 2 Slc6a14       | protein_coding |
| ENSMUST00000033662 | 0 | 1 | 2 Pdha1         | protein_coding |
| ENSMUST00000034171 | 0 | 1 | 2 Ap1g1         | protein_coding |
| ENSMUST00000036383 | 0 | 1 | 2 Dnali1        | protein_coding |
| ENSMUST00000037701 | 0 | 1 | 2 Al661453      | protein_coding |
| ENSMUST00000039742 | 0 | 1 | 2 Hykk          | protein_coding |
| ENSMUST00000040828 | 0 | 1 | 2 H2-Ab1        | protein_coding |
| ENSMUST00000042246 | 0 | 1 | 2 Shc4          | protein_coding |
| ENSMUST00000043042 | 0 | 1 | 2 Tmco4         | protein_coding |
| ENSMUST00000043172 | 0 | 1 | 2 Rarg          | protein_coding |
| ENSMUST00000044204 | 0 | 1 | 2 Tyw1          | protein_coding |
| ENSMUST00000044355 | 0 | 1 | 2 Sepw1         | protein_coding |
| ENSMUST00000045693 | 0 | 1 | 2 Smyd5         | protein_coding |
| ENSMUST00000047621 | 0 | 1 | 2 Ppp1r13l      | protein_coding |
| ENSMUST00000048118 | 0 | 1 | 2 Hsd17b13      | protein_coding |
| ENSMUST00000048964 | 0 | 1 | 2 Ciz1          | protein_coding |
| ENSMUST00000049040 | 0 | 1 | 2 Bri3bp        | protein_coding |
| ENSMUST00000049281 | 0 | 1 | 2 Fam53c        | protein_coding |
| ENSMUST00000049461 | 0 | 1 | 2 Cars2         | protein_coding |
| ENSMUST00000049584 | 0 | 1 | 2 Dnajc27       | protein_coding |
| ENSMUST00000050480 | 0 | 1 | 2 Ccdc66        | protein_coding |
| ENSMUST00000052946 | 0 | 1 | 2 Tbx20         | protein_coding |
| ENSMUST00000054279 | 0 | 1 | 2 Sp100         | protein_coding |
| ENSMUST00000055242 | 0 | 1 | 2 Clptm1        | protein_coding |
| ENSMUST00000056191 | 0 | 1 | 2 Tet3          | protein_coding |
| ENSMUST00000057000 | 0 | 1 | 2 Zc3h14        | protein_coding |
| ENSMUST00000058479 | 0 | 1 | 2 Drc7          | protein_coding |
| ENSMUST00000058714 | 0 | 1 | 2 Cd24a         | protein_coding |
| ENSMUST00000059644 | 0 | 1 | 2 Rbm33         | protein_coding |
| ENSMUST00000060792 | 0 | 1 | 2 Ptrf          | protein_coding |
| ENSMUST00000061885 | 0 | 1 | 2 1700001C19Rik | protein_coding |
| ENSMUST00000063507 | 0 | 1 | 2 Mcf2          | protein_coding |
| ENSMUST00000064513 | 0 | 1 | 2 Endov         | protein_coding |
| ENSMUST00000066601 | 0 | 1 | 2 Hyou1         | protein_coding |
| ENSMUST00000069536 | 0 | 1 | 2 Tcf7l1        | protein_coding |
| ENSMUST00000071698 | 0 | 1 | 2 Erlin1        | protein_coding |
| ENSMUST00000073001 | 0 | 1 | 2 Lgals9        | protein_coding |
| ENSMUST00000076147 | 0 | 1 | 2 Ackr4         | protein_coding |
| ENSMUST00000076634 | 0 | 1 | 2 Esr2          | protein_coding |
| ENSMUST00000077972 | 0 | 1 | 2 Osbp16        | protein_coding |
| ENSMUST00000081619 | 0 | 1 | 2 Sh3pxd2a      | protein_coding |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000081964 | 0 | 1 | 2 Hopx          | protein_coding |
| ENSMUST00000092074 | 0 | 1 | 2 Stat6         | protein_coding |
| ENSMUST00000094303 | 0 | 1 | 2 Fcrl6         | protein_coding |
| ENSMUST00000095217 | 0 | 1 | 2 Obox3         | protein_coding |
| ENSMUST00000097399 | 0 | 1 | 2 Gm3448        | protein_coding |
| ENSMUST00000097905 | 0 | 1 | 2 Gm12888       | protein_coding |
| ENSMUST00000097964 | 0 | 1 | 2 I0C0044D17Rik | protein_coding |
| ENSMUST00000100739 | 0 | 1 | 2 Fam105a       | protein_coding |
| ENSMUST00000101642 | 0 | 1 | 2 Limk2         | protein_coding |
| ENSMUST00000102813 | 0 | 1 | 2 1700019L03Rik | protein_coding |
| ENSMUST00000103053 | 0 | 1 | 2 Nkain4        | protein_coding |
| ENSMUST00000103135 | 0 | 1 | 2 Epb4.111      | protein_coding |
| ENSMUST00000105097 | 0 | 1 | 2 Zswim6        | protein_coding |
| ENSMUST00000105462 | 0 | 1 | 2 Cdh23         | protein_coding |
| ENSMUST00000105646 | 0 | 1 | 2 Ajap1         | protein_coding |
| ENSMUST00000105861 | 0 | 1 | 2 Srrm1         | protein_coding |
| ENSMUST00000106039 | 0 | 1 | 2 Pkp3          | protein_coding |
| ENSMUST00000106296 | 0 | 1 | 2 Usp36         | protein_coding |
| ENSMUST00000108318 | 0 | 1 | 2 Ints8         | protein_coding |
| ENSMUST00000108834 | 0 | 1 | 2 4930438A08Rik | protein_coding |
| ENSMUST00000110193 | 0 | 1 | 2 Tfap2a        | protein_coding |
| ENSMUST00000110492 | 0 | 1 | 2 D8Ert82e      | protein_coding |
| ENSMUST00000111238 | 0 | 1 | 2 Ttc17         | protein_coding |
| ENSMUST00000111386 | 0 | 1 | 2 Rxrg          | protein_coding |
| ENSMUST00000111790 | 0 | 1 | 2 Wdhd1         | protein_coding |
| ENSMUST00000111836 | 0 | 1 | 2 Smg7          | protein_coding |
| ENSMUST00000112585 | 0 | 1 | 2 Apobec1       | protein_coding |
| ENSMUST00000112618 | 0 | 1 | 2 Gpd2          | protein_coding |
| ENSMUST00000112662 | 0 | 1 | 2 Phf8          | protein_coding |
| ENSMUST00000112666 | 0 | 1 | 2 Phf8          | protein_coding |
| ENSMUST00000113102 | 0 | 1 | 2 Naaa          | protein_coding |
| ENSMUST00000113272 | 0 | 1 | 2 Eng           | protein_coding |
| ENSMUST00000113818 | 0 | 1 | 2 Dysf          | protein_coding |
| ENSMUST00000114737 | 0 | 1 | 2 Pnpla1        | protein_coding |
| ENSMUST00000114780 | 0 | 1 | 2 Stxbp5l       | protein_coding |
| ENSMUST00000114942 | 0 | 1 | 2 Proser2       | protein_coding |
| ENSMUST00000115012 | 0 | 1 | 2 Agbl3         | protein_coding |
| ENSMUST00000115029 | 0 | 1 | 2 Arid5a        | protein_coding |
| ENSMUST00000115632 | 0 | 1 | 2 Mre11a        | protein_coding |
| ENSMUST00000116273 | 0 | 1 | 2 Kdm1a         | protein_coding |
| ENSMUST00000117082 | 0 | 1 | 2 Dgcr2         | protein_coding |
| ENSMUST00000117177 | 0 | 1 | 2 Rnft2         | protein_coding |
| ENSMUST00000117338 | 0 | 1 | 2 Eml2          | protein_coding |
| ENSMUST00000119929 | 0 | 1 | 2 Tmem41b       | protein_coding |
| ENSMUST00000120585 | 0 | 1 | 2 Mthfd1l       | protein_coding |
| ENSMUST00000121204 | 0 | 1 | 2 Wdr61         | protein_coding |
| ENSMUST00000123349 | 0 | 1 | 2 Gramd4        | protein_coding |
| ENSMUST00000123679 | 0 | 1 | 2 Rbks          | protein_coding |
| ENSMUST00000123989 | 0 | 1 | 2 Fgd2          | protein_coding |
| ENSMUST00000124043 | 0 | 1 | 2 Gpsm2         | protein_coding |
| ENSMUST00000124961 | 0 | 1 | 2 Lrp11         | protein_coding |
| ENSMUST00000126036 | 0 | 1 | 2 Lias          | protein_coding |
| ENSMUST00000126811 | 0 | 1 | 2 Tceal7        | protein_coding |
| ENSMUST00000126848 | 0 | 1 | 2 Nr2e1         | protein_coding |
| ENSMUST00000127582 | 0 | 1 | 2 Abcc5         | protein_coding |
| ENSMUST00000130171 | 0 | 1 | 2 Hps3          | protein_coding |
| ENSMUST00000130967 | 0 | 1 | 2 Tia1          | protein_coding |
| ENSMUST00000131389 | 0 | 1 | 2 Ttbk2         | protein_coding |
| ENSMUST00000131412 | 0 | 1 | 2 Armc9         | protein_coding |
| ENSMUST00000131546 | 0 | 1 | 2 4933427D14Rik | protein_coding |
| ENSMUST00000131973 | 0 | 1 | 2 Tex14         | protein_coding |
| ENSMUST00000133518 | 0 | 1 | 2 Dhx34         | protein_coding |
| ENSMUST00000134352 | 0 | 1 | 2 Mylk4         | protein_coding |
| ENSMUST00000135055 | 0 | 1 | 2 Eif3i         | protein_coding |
| ENSMUST00000135121 | 0 | 1 | 2 Eif2b3        | protein_coding |
| ENSMUST00000135944 | 0 | 1 | 2 Pdlim2        | protein_coding |
| ENSMUST00000136614 | 0 | 1 | 2 Shcbp1l       | protein_coding |
| ENSMUST00000140664 | 0 | 1 | 2 Aifm2         | protein_coding |

|                    |   |   |                 |                      |
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| ENSMUST00000140982 | 0 | 1 | 2 Nipal3        | protein_coding       |
| ENSMUST00000141615 | 0 | 1 | 2 Zcchc17       | protein_coding       |
| ENSMUST00000142152 | 0 | 1 | 2 Gyk           | protein_coding       |
| ENSMUST00000142405 | 0 | 1 | 2 Apol6         | protein_coding       |
| ENSMUST00000142471 | 0 | 1 | 2 Pitpnm3       | protein_coding       |
| ENSMUST00000143712 | 0 | 1 | 2 Oscp1         | protein_coding       |
| ENSMUST00000143916 | 0 | 1 | 2 Celf6         | protein_coding       |
| ENSMUST00000144521 | 0 | 1 | 2 Brwd3         | protein_coding       |
| ENSMUST00000145854 | 0 | 1 | 2 Hvcn1         | protein_coding       |
| ENSMUST00000145982 | 0 | 1 | 2 Trim30b       | protein_coding       |
| ENSMUST00000147905 | 0 | 1 | 2 C9            | protein_coding       |
| ENSMUST00000148311 | 0 | 1 | 2 Flg           | protein_coding       |
| ENSMUST00000148573 | 0 | 1 | 2 Dnase2a       | protein_coding       |
| ENSMUST00000148913 | 0 | 1 | 2 Arpc3         | protein_coding       |
| ENSMUST00000149457 | 0 | 1 | 2 9230104L09Rik | protein_coding       |
| ENSMUST00000150156 | 0 | 1 | 2 Rtn1          | protein_coding       |
| ENSMUST00000150998 | 0 | 1 | 2 Aknad1        | protein_coding       |
| ENSMUST00000151218 | 0 | 1 | 2 P4ha2         | protein_coding       |
| ENSMUST00000151633 | 0 | 1 | 2 C330021F23Rik | protein_coding       |
| ENSMUST00000152054 | 0 | 1 | 2 Tsfn          | protein_coding       |
| ENSMUST00000153988 | 0 | 1 | 2 Ttc3          | protein_coding       |
| ENSMUST00000154699 | 0 | 1 | 2 Nt5m          | protein_coding       |
| ENSMUST00000155401 | 0 | 1 | 2 Pipox         | protein_coding       |
| ENSMUST00000155500 | 0 | 1 | 2 Rab5c         | protein_coding       |
| ENSMUST00000156518 | 0 | 1 | 2 Pold3         | protein_coding       |
| ENSMUST00000156619 | 0 | 1 | 2 Macrod2       | protein_coding       |
| ENSMUST00000156799 | 0 | 1 | 2 Commdd9       | protein_coding       |
| ENSMUST00000156876 | 0 | 1 | 2 Mfsd6         | protein_coding       |
| ENSMUST00000159166 | 0 | 1 | 2 Als2          | protein_coding       |
| ENSMUST00000159375 | 0 | 1 | 2 Pkp3          | protein_coding       |
| ENSMUST00000159664 | 0 | 1 | 2 Tbc1d4        | protein_coding       |
| ENSMUST00000159715 | 0 | 1 | 2 Galnt6        | protein_coding       |
| ENSMUST00000160322 | 0 | 1 | 2 Sgtb          | protein_coding       |
| ENSMUST00000160430 | 0 | 1 | 2 Luc7l2        | protein_coding       |
| ENSMUST00000161160 | 0 | 1 | 2 Hk1           | protein_coding       |
| ENSMUST00000162280 | 0 | 1 | 2 Lhfpl4        | protein_coding       |
| ENSMUST00000163226 | 0 | 1 | 2 Camk2d        | protein_coding       |
| ENSMUST00000163735 | 0 | 1 | 2 Cct3          | protein_coding       |
| ENSMUST00000165095 | 0 | 1 | 2 Pacsin2       | protein_coding       |
| ENSMUST00000165149 | 0 | 1 | 2 Slc37a1       | protein_coding       |
| ENSMUST00000165231 | 0 | 1 | 2 Dlec1         | protein_coding       |
| ENSMUST00000167032 | 0 | 1 | 2 Inpp5d        | protein_coding       |
| ENSMUST00000167091 | 0 | 1 | 2 Parp6         | protein_coding       |
| ENSMUST00000167998 | 0 | 1 | 2 Gba           | protein_coding       |
| ENSMUST00000170134 | 0 | 1 | 2 Rangap1       | protein_coding       |
| ENSMUST00000170217 | 0 | 1 | 2 Farsb         | protein_coding       |
| ENSMUST00000170242 | 0 | 1 | 2 Myo9b         | protein_coding       |
| ENSMUST00000171001 | 0 | 1 | 2 Dhfr3         | protein_coding       |
| ENSMUST00000171076 | 0 | 1 | 2 Inpp4b        | protein_coding       |
| ENSMUST00000171197 | 0 | 1 | 2 Tead1         | protein_coding       |
| ENSMUST00000171215 | 0 | 1 | 2 Zfp106        | protein_coding       |
| ENSMUST00000171974 | 0 | 1 | 2 Bdh2          | protein_coding       |
| ENSMUST00000174461 | 0 | 1 | 2 Chd1          | protein_coding       |
| ENSMUST00000177381 | 0 | 1 | 2 Hectd2        | protein_coding       |
| ENSMUST00000177587 | 0 | 1 | 2 Jdp2          | protein_coding       |
| ENSMUST00000177967 | 0 | 1 | 2 Ecsit         | protein_coding       |
| ENSMUST00000178942 | 0 | 1 | 2 7530416G11Rik | protein_coding       |
| ENSMUST00000179434 | 0 | 1 | 2 Cyp4f14       | protein_coding       |
| ENSMUST00000179592 | 0 | 1 | 2 Fgfr1         | protein_coding       |
| ENSMUST00000179647 | 0 | 1 | 2 9430069I07Rik | protein_coding       |
| ENSMUST00000181208 | 0 | 1 | 2 Rpgrip1       | protein_coding       |
| ENSMUST00000181716 | 0 | 1 | 2 Tspan18       | protein_coding       |
| ENSMUST00000182898 | 0 | 1 | 2 Anapc16       | protein_coding       |
| ENSMUST00000184454 | 0 | 1 | 2 Inpp5b        | protein_coding       |
| ENSMUST00000184615 | 0 | 1 | 2 Kri1          | protein_coding       |
| ENSMUST00000126668 | 0 | 1 | 2 Gm12743       | processed_transcript |
| ENSMUST00000130898 | 0 | 1 | 2 4930566F21Rik | processed_transcript |
| ENSMUST00000146364 | 0 | 1 | 2 Gm10433       | processed_transcript |



|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000160935 | 0 | 1 | 2 2010320O07Rik | processed_transcript               |
| ENSMUST00000183833 | 0 | 1 | 2 Gm27225       | processed_pseudogene               |
| ENSMUST00000126143 | 0 | 1 | 2 Gm12708       | lincRNA                            |
| ENSMUST00000134567 | 0 | 1 | 2 Gm11493       | lincRNA                            |
| ENSMUST00000135423 | 0 | 1 | 2 4933406K04Rik | lincRNA                            |
| ENSMUST00000141678 | 0 | 1 | 2 1700061J23Rik | lincRNA                            |
| ENSMUST00000173141 | 0 | 1 | 2 Gm20546       | lincRNA                            |
| ENSMUST00000180609 | 0 | 1 | 2 A330032B11Rik | lincRNA                            |
| ENSMUST00000181003 | 0 | 1 | 2 Gm26563       | lincRNA                            |
| ENSMUST00000181109 | 0 | 1 | 2 Gm27042       | lincRNA                            |
| ENSMUST00000181152 | 0 | 1 | 2 Gm26563       | lincRNA                            |
| ENSMUST00000181238 | 0 | 1 | 2 2310001H17Rik | lincRNA                            |
| ENSMUST00000123633 | 0 | 1 | 2 Ccdc34os      | antisense                          |
| ENSMUST00000126462 | 0 | 1 | 2 Rapgef4os1    | antisense                          |
| ENSMUST00000143671 | 0 | 1 | 2 1700093J21Rik | antisense                          |
| ENSMUST00000155822 | 0 | 1 | 2 Gm11413       | antisense                          |
| ENSMUST00000100820 | 0 | 1 | 0 Gm9780        | transcribed_unprocessed_pseudogene |
| ENSMUST00000100820 | 0 | 1 | 0 Gm9780        | transcribed_unprocessed_pseudogene |
| ENSMUST00000179534 | 0 | 1 | 0 Fsd1l         | protein_coding                     |
| ENSMUST00000131328 | 0 | 1 | 0 Scap          | protein_coding                     |
| ENSMUST00000113808 | 0 | 1 | 0 Gm13547       | protein_coding                     |
| ENSMUST00000108186 | 0 | 1 | 0 Atp11b        | protein_coding                     |
| ENSMUST00000179534 | 0 | 1 | 0 Fsd1l         | protein_coding                     |
| ENSMUST00000131328 | 0 | 1 | 0 Scap          | protein_coding                     |
| ENSMUST00000113808 | 0 | 1 | 0 Gm13547       | protein_coding                     |
| ENSMUST00000108186 | 0 | 1 | 0 Atp11b        | protein_coding                     |
| ENSMUST00000162262 | 0 | 1 | 0 Abcd3         | processed_transcript               |
| ENSMUST00000156930 | 0 | 1 | 0 4930447C04Rik | processed_transcript               |
| ENSMUST00000142715 | 0 | 1 | 0 Fbxw21        | processed_transcript               |
| ENSMUST00000131336 | 0 | 1 | 0 Fam178b       | processed_transcript               |
| ENSMUST00000162262 | 0 | 1 | 0 Abcd3         | processed_transcript               |
| ENSMUST00000156930 | 0 | 1 | 0 4930447C04Rik | processed_transcript               |
| ENSMUST00000142715 | 0 | 1 | 0 Fbxw21        | processed_transcript               |
| ENSMUST00000131336 | 0 | 1 | 0 Fam178b       | processed_transcript               |
| ENSMUST00000144266 | 0 | 1 | 0 Mccc1         | nonsense_mediated_decay            |
| ENSMUST00000140010 | 0 | 1 | 0 Mccc1         | nonsense_mediated_decay            |
| ENSMUST00000137818 | 0 | 1 | 0 Pfkfb4        | nonsense_mediated_decay            |
| ENSMUST00000144266 | 0 | 1 | 0 Mccc1         | nonsense_mediated_decay            |
| ENSMUST00000140010 | 0 | 1 | 0 Mccc1         | nonsense_mediated_decay            |
| ENSMUST00000137818 | 0 | 1 | 0 Pfkfb4        | nonsense_mediated_decay            |
| ENSMUST00000117867 | 0 | 1 | 0 Gm12883       | unprocessed_pseudogene             |
| ENSMUST00000118094 | 0 | 1 | 0 Olfr400-ps1   | unprocessed_pseudogene             |
| ENSMUST00000155015 | 0 | 1 | 0 Gm8988        | unprocessed_pseudogene             |
| ENSMUST00000173024 | 0 | 1 | 0 Gm18359       | unprocessed_pseudogene             |
| ENSMUST00000173038 | 0 | 1 | 0 Gm3654        | unprocessed_pseudogene             |
| ENSMUST00000173275 | 0 | 1 | 0 Vmn1r-ps62    | unprocessed_pseudogene             |
| ENSMUST00000173752 | 0 | 1 | 0 Vmn2r-ps38    | unprocessed_pseudogene             |
| ENSMUST00000174515 | 0 | 1 | 0 Vmn2r-ps47    | unprocessed_pseudogene             |
| ENSMUST00000127510 | 0 | 1 | 0 Gm11978       | transcribed_processed_pseudogene   |
| ENSMUST00000127554 | 0 | 1 | 0 Gm5124        | transcribed_processed_pseudogene   |
| ENSMUST00000176618 | 0 | 1 | 0 Gm20621       | sense_overlapping                  |
| ENSMUST00000181194 | 0 | 1 | 0 Gm26709       | sense_overlapping                  |
| ENSMUST00000000208 | 0 | 1 | 0 Sifn4         | protein_coding                     |
| ENSMUST00000000755 | 0 | 1 | 0 Sult5a1       | protein_coding                     |
| ENSMUST00000000767 | 0 | 1 | 0 Rpa1          | protein_coding                     |
| ENSMUST00000001183 | 0 | 1 | 0 Ftcd          | protein_coding                     |
| ENSMUST00000001416 | 0 | 1 | 0 Hars          | protein_coding                     |
| ENSMUST00000001989 | 0 | 1 | 0 Uba1          | protein_coding                     |
| ENSMUST00000002043 | 0 | 1 | 0 Ccdc47        | protein_coding                     |
| ENSMUST00000002445 | 0 | 1 | 0 Ranbp3        | protein_coding                     |
| ENSMUST00000002850 | 0 | 1 | 0 Abcc6         | protein_coding                     |
| ENSMUST00000002989 | 0 | 1 | 0 Arrdc2        | protein_coding                     |
| ENSMUST00000003121 | 0 | 1 | 0 Rab8a         | protein_coding                     |
| ENSMUST00000003574 | 0 | 1 | 0 Cyp4f18       | protein_coding                     |
| ENSMUST00000004055 | 0 | 1 | 0 Dzip1         | protein_coding                     |
| ENSMUST00000004206 | 0 | 1 | 0 Eif3g         | protein_coding                     |
| ENSMUST00000004505 | 0 | 1 | 0 Npc111        | protein_coding                     |
| ENSMUST00000005051 | 0 | 1 | 0 Ldha          | protein_coding                     |

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| ENSMUST00000005508 | 0 | 1 | 0 Tbl2          | protein_coding |
| ENSMUST00000005950 | 0 | 1 | 0 Mmp12         | protein_coding |
| ENSMUST00000006508 | 0 | 1 | 0 Ggt1          | protein_coding |
| ENSMUST00000007559 | 0 | 1 | 0 Gatad1        | protein_coding |
| ENSMUST00000008991 | 0 | 1 | 0 Sptbn2        | protein_coding |
| ENSMUST00000010506 | 0 | 1 | 0 Rdm1          | protein_coding |
| ENSMUST00000011493 | 0 | 1 | 0 Dmrtd2        | protein_coding |
| ENSMUST00000011895 | 0 | 1 | 0 Sptbn4        | protein_coding |
| ENSMUST00000013949 | 0 | 1 | 0 Birc3         | protein_coding |
| ENSMUST00000014920 | 0 | 1 | 0 Nol3          | protein_coding |
| ENSMUST00000015484 | 0 | 1 | 0 Cybb          | protein_coding |
| ENSMUST00000015585 | 0 | 1 | 0 Gzmc          | protein_coding |
| ENSMUST00000015829 | 0 | 1 | 0 Acadsb        | protein_coding |
| ENSMUST00000016094 | 0 | 1 | 0 Ncf1          | protein_coding |
| ENSMUST00000016115 | 0 | 1 | 0 Actr8         | protein_coding |
| ENSMUST00000017562 | 0 | 1 | 0 Arl5b         | protein_coding |
| ENSMUST00000018506 | 0 | 1 | 0 Kpna2         | protein_coding |
| ENSMUST00000018531 | 0 | 1 | 0 Shroom1       | protein_coding |
| ENSMUST00000018610 | 0 | 1 | 0 Nos2          | protein_coding |
| ENSMUST00000018685 | 0 | 1 | 0 Cwc25         | protein_coding |
| ENSMUST00000018909 | 0 | 1 | 0 Fxr2          | protein_coding |
| ENSMUST00000019109 | 0 | 1 | 0 Ywhah         | protein_coding |
| ENSMUST00000019199 | 0 | 1 | 0 Plod1         | protein_coding |
| ENSMUST00000020034 | 0 | 1 | 0 Echdc1        | protein_coding |
| ENSMUST00000020102 | 0 | 1 | 0 Slc17a8       | protein_coding |
| ENSMUST00000020457 | 0 | 1 | 0 Fzr1          | protein_coding |
| ENSMUST00000020527 | 0 | 1 | 0 1700093K21Rik | protein_coding |
| ENSMUST00000020668 | 0 | 1 | 0 Havcr2        | protein_coding |
| ENSMUST00000020756 | 0 | 1 | 0 Pnpt1         | protein_coding |
| ENSMUST00000020827 | 0 | 1 | 0 Rnft1         | protein_coding |
| ENSMUST00000021048 | 0 | 1 | 0 Ftsj3         | protein_coding |
| ENSMUST00000021119 | 0 | 1 | 0 Aspa          | protein_coding |
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| ENSMUST00000021287 | 0 | 1 | 0 Cfap52        | protein_coding |
| ENSMUST00000021926 | 0 | 1 | 0 Ercc6l2       | protein_coding |
| ENSMUST00000021961 | 0 | 1 | 0 Catsper3      | protein_coding |
| ENSMUST00000022030 | 0 | 1 | 0 Ccnh          | protein_coding |
| ENSMUST00000022135 | 0 | 1 | 0 Ak6           | protein_coding |
| ENSMUST00000022185 | 0 | 1 | 0 F2rl1         | protein_coding |
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| ENSMUST00000022529 | 0 | 1 | 0 Tkt           | protein_coding |
| ENSMUST00000022641 | 0 | 1 | 0 Adamdec1      | protein_coding |
| ENSMUST00000022727 | 0 | 1 | 0 Tgds          | protein_coding |
| ENSMUST00000022767 | 0 | 1 | 0 Mettl3        | protein_coding |
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| ENSMUST00000023095 | 0 | 1 | 0 Sept3         | protein_coding |
| ENSMUST00000023157 | 0 | 1 | 0 Anks3         | protein_coding |
| ENSMUST00000023211 | 0 | 1 | 0 Sharpin       | protein_coding |
| ENSMUST00000023343 | 0 | 1 | 0 Atg3          | protein_coding |
| ENSMUST00000023655 | 0 | 1 | 0 Mx1           | protein_coding |
| ENSMUST00000023836 | 0 | 1 | 0 Mospd1        | protein_coding |
| ENSMUST00000023965 | 0 | 1 | 0 Cfhr1         | protein_coding |
| ENSMUST00000024774 | 0 | 1 | 0 Guca1b        | protein_coding |
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| ENSMUST00000025209 | 0 | 1 | 0 Spata24       | protein_coding |
| ENSMUST00000025409 | 0 | 1 | 0 Lox           | protein_coding |
| ENSMUST00000025520 | 0 | 1 | 0 Slc6a7        | protein_coding |
| ENSMUST00000025774 | 0 | 1 | 0 Sf3b2         | protein_coding |
| ENSMUST00000025800 | 0 | 1 | 0 Pip5k1b       | protein_coding |
| ENSMUST00000025867 | 0 | 1 | 0 Rela          | protein_coding |
| ENSMUST00000025998 | 0 | 1 | 0 Mxi1          | protein_coding |
| ENSMUST00000026084 | 0 | 1 | 0 Slc18a2       | protein_coding |
| ENSMUST00000026168 | 0 | 1 | 0 Mms19         | protein_coding |
| ENSMUST00000026196 | 0 | 1 | 0 Got1          | protein_coding |
| ENSMUST00000026445 | 0 | 1 | 0 Fscn2         | protein_coding |
| ENSMUST00000026896 | 0 | 1 | 0 St8sia2       | protein_coding |
| ENSMUST00000027139 | 0 | 1 | 0 Wdr75         | protein_coding |

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| ENSMUST00000027257 | 0 | 1 | 0 Mitd1     | protein_coding |
| ENSMUST00000027263 | 0 | 1 | 0 Stk17b    | protein_coding |
| ENSMUST00000027366 | 0 | 1 | 0 Vil1      | protein_coding |
| ENSMUST00000027579 | 0 | 1 | 0 Actr3     | protein_coding |
| ENSMUST00000027655 | 0 | 1 | 0 Ddx59     | protein_coding |
| ENSMUST00000027833 | 0 | 1 | 0 Copa      | protein_coding |
| ENSMUST00000027888 | 0 | 1 | 0 Abl2      | protein_coding |
| ENSMUST00000028117 | 0 | 1 | 0 Yme1l1    | protein_coding |
| ENSMUST00000028311 | 0 | 1 | 0 Traf2     | protein_coding |
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| ENSMUST00000031092 | 0 | 1 | 0 Rfc1      | protein_coding |
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| ENSMUST00000031367 | 0 | 1 | 0 Slc15a4   | protein_coding |
| ENSMUST00000031640 | 0 | 1 | 0 Cdk8      | protein_coding |
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| ENSMUST00000032356 | 0 | 1 | 0 Plcz1     | protein_coding |
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| ENSMUST00000032956 | 0 | 1 | 0 Ccdc101   | protein_coding |
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| ENSMUST00000033184 | 0 | 1 | 0 Tpp1      | protein_coding |
| ENSMUST00000033236 | 0 | 1 | 0 Thumpd1   | protein_coding |
| ENSMUST00000033310 | 0 | 1 | 0 Mki67     | protein_coding |
| ENSMUST00000033393 | 0 | 1 | 0 Ano1      | protein_coding |
| ENSMUST00000033646 | 0 | 1 | 0 Il13ra2   | protein_coding |
| ENSMUST00000033824 | 0 | 1 | 0 Lamp1     | protein_coding |
| ENSMUST00000033871 | 0 | 1 | 0 Slc25a15  | protein_coding |
| ENSMUST00000033923 | 0 | 1 | 0 Dlc1      | protein_coding |
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| ENSMUST00000034136 | 0 | 1 | 0 Gpt2      | protein_coding |
| ENSMUST00000034187 | 0 | 1 | 0 Mmp2      | protein_coding |
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| ENSMUST00000034272 | 0 | 1 | 0 Mvb12a    | protein_coding |
| ENSMUST00000034343 | 0 | 1 | 0 Cmtm3     | protein_coding |
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| ENSMUST00000034510 | 0 | 1 | 0 Pvrl1     | protein_coding |
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| ENSMUST00000034643 | 0 | 1 | 0 Robo3     | protein_coding |
| ENSMUST00000034702 | 0 | 1 | 0 Lysmd2    | protein_coding |
| ENSMUST00000034889 | 0 | 1 | 0 Hcn4      | protein_coding |
| ENSMUST00000034945 | 0 | 1 | 0 Fam96a    | protein_coding |
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| ENSMUST00000036025 | 0 | 1 | 0 Ccdc93    | protein_coding |
| ENSMUST00000036156 | 0 | 1 | 0 Ipo13     | protein_coding |
| ENSMUST00000036387 | 0 | 1 | 0 S100b     | protein_coding |

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| ENSMUST00000036451 | 0 | 1 | 0 Wdr78         | protein_coding |
| ENSMUST00000036665 | 0 | 1 | 0 Cog6          | protein_coding |
| ENSMUST00000036748 | 0 | 1 | 0 Slc38a8       | protein_coding |
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| ENSMUST00000037025 | 0 | 1 | 0 Kdm1b         | protein_coding |
| ENSMUST00000037843 | 0 | 1 | 0 Ubald1        | protein_coding |
| ENSMUST00000037930 | 0 | 1 | 0 Msl1          | protein_coding |
| ENSMUST00000038677 | 0 | 1 | 0 Rrp12         | protein_coding |
| ENSMUST00000038684 | 0 | 1 | 0 Fhl3          | protein_coding |
| ENSMUST00000038694 | 0 | 1 | 0 Vmn1r172      | protein_coding |
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| ENSMUST00000038794 | 0 | 1 | 0 Dpp9          | protein_coding |
| ENSMUST00000039101 | 0 | 1 | 0 Rwd2b         | protein_coding |
| ENSMUST00000039178 | 0 | 1 | 0 Tnn           | protein_coding |
| ENSMUST00000039419 | 0 | 1 | 0 Igsf10        | protein_coding |
| ENSMUST00000039545 | 0 | 1 | 0 Klf8          | protein_coding |
| ENSMUST00000039627 | 0 | 1 | 0 Bzrap1        | protein_coding |
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| ENSMUST00000040416 | 0 | 1 | 0 Ddx19a        | protein_coding |
| ENSMUST00000041369 | 0 | 1 | 0 Socs5         | protein_coding |
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| ENSMUST00000042661 | 0 | 1 | 0 Ttyh3         | protein_coding |
| ENSMUST00000042734 | 0 | 1 | 0 1700066M21Rik | protein_coding |
| ENSMUST00000043235 | 0 | 1 | 0 Tipr1         | protein_coding |
| ENSMUST00000043352 | 0 | 1 | 0 Tmem156       | protein_coding |
| ENSMUST00000043415 | 0 | 1 | 0 Tekt5         | protein_coding |
| ENSMUST00000044331 | 0 | 1 | 0 Kat6a         | protein_coding |
| ENSMUST00000045469 | 0 | 1 | 0 Pip5k1c       | protein_coding |
| ENSMUST00000045583 | 0 | 1 | 0 Crhbp         | protein_coding |
| ENSMUST00000045907 | 0 | 1 | 0 2700049A03Rik | protein_coding |
| ENSMUST00000046154 | 0 | 1 | 0 Lin54         | protein_coding |
| ENSMUST00000046399 | 0 | 1 | 0 Apmmap        | protein_coding |
| ENSMUST00000046647 | 0 | 1 | 0 4930549C01Rik | protein_coding |
| ENSMUST00000046892 | 0 | 1 | 0 Cplx1         | protein_coding |
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| ENSMUST00000047203 | 0 | 1 | 0 Rnf126        | protein_coding |
| ENSMUST00000047285 | 0 | 1 | 0 Ap4b1         | protein_coding |
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| ENSMUST00000047315 | 0 | 1 | 0 Foxa2         | protein_coding |
| ENSMUST00000047783 | 0 | 1 | 0 Rpgrip1l      | protein_coding |
| ENSMUST00000048184 | 0 | 1 | 0 Pdcd7         | protein_coding |
| ENSMUST00000048391 | 0 | 1 | 0 Clspn         | protein_coding |
| ENSMUST00000048452 | 0 | 1 | 0 Plvap         | protein_coding |
| ENSMUST00000049052 | 0 | 1 | 0 9130019O22Rik | protein_coding |
| ENSMUST00000049323 | 0 | 1 | 0 Wdr55         | protein_coding |
| ENSMUST00000049348 | 0 | 1 | 0 Traip         | protein_coding |
| ENSMUST00000049355 | 0 | 1 | 0 Mapk6         | protein_coding |
| ENSMUST00000049424 | 0 | 1 | 0 Wdr74         | protein_coding |
| ENSMUST00000049470 | 0 | 1 | 0 Tmem183a      | protein_coding |
| ENSMUST00000049780 | 0 | 1 | 0 Depdc5        | protein_coding |
| ENSMUST00000049896 | 0 | 1 | 0 Gpkow         | protein_coding |
| ENSMUST00000049912 | 0 | 1 | 0 Relb          | protein_coding |
| ENSMUST00000050236 | 0 | 1 | 0 Txndc2        | protein_coding |
| ENSMUST00000050611 | 0 | 1 | 0 Cep68         | protein_coding |
| ENSMUST00000050890 | 0 | 1 | 0 Neu4          | protein_coding |
| ENSMUST00000051169 | 0 | 1 | 0 Edrf1         | protein_coding |
| ENSMUST00000051477 | 0 | 1 | 0 Cdc42         | protein_coding |
| ENSMUST00000051589 | 0 | 1 | 0 Aasdhppt      | protein_coding |
| ENSMUST00000051674 | 0 | 1 | 0 Lin28a        | protein_coding |
| ENSMUST00000052286 | 0 | 1 | 0 Plac9a        | protein_coding |
| ENSMUST00000052296 | 0 | 1 | 0 Pthlh         | protein_coding |
| ENSMUST00000052509 | 0 | 1 | 0 Zfp771        | protein_coding |
| ENSMUST00000052605 | 0 | 1 | 0 Ceacam19      | protein_coding |
| ENSMUST00000053506 | 0 | 1 | 0 Bbs1          | protein_coding |

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| ENSMUST00000053734 | 0 | 1 | 0 Duox2         | protein_coding |
| ENSMUST00000054308 | 0 | 1 | 0 G2e3          | protein_coding |
| ENSMUST00000054414 | 0 | 1 | 0 Ccr4          | protein_coding |
| ENSMUST00000055040 | 0 | 1 | 0 Ccdc69        | protein_coding |
| ENSMUST00000055947 | 0 | 1 | 0 Samd14        | protein_coding |
| ENSMUST00000056708 | 0 | 1 | 0 Kcnv2         | protein_coding |
| ENSMUST00000056932 | 0 | 1 | 0 4933408B17Rik | protein_coding |
| ENSMUST00000056937 | 0 | 1 | 0 Hscb          | protein_coding |
| ENSMUST00000057115 | 0 | 1 | 0 Isca1         | protein_coding |
| ENSMUST00000057209 | 0 | 1 | 0 Sgsm1         | protein_coding |
| ENSMUST00000057410 | 0 | 1 | 0 Fbln1         | protein_coding |
| ENSMUST00000057442 | 0 | 1 | 0 Diras2        | protein_coding |
| ENSMUST00000057525 | 0 | 1 | 0 Trim3         | protein_coding |
| ENSMUST00000057798 | 0 | 1 | 0 Apba3         | protein_coding |
| ENSMUST00000057799 | 0 | 1 | 0 Zfp867        | protein_coding |
| ENSMUST00000058295 | 0 | 1 | 0 Erbb2         | protein_coding |
| ENSMUST00000058407 | 0 | 1 | 0 Uqcr10        | protein_coding |
| ENSMUST00000058906 | 0 | 1 | 0 Chchd10       | protein_coding |
| ENSMUST00000059072 | 0 | 1 | 0 Best2         | protein_coding |
| ENSMUST00000059851 | 0 | 1 | 0 Dcun1d3       | protein_coding |
| ENSMUST00000060226 | 0 | 1 | 0 Tmed2         | protein_coding |
| ENSMUST00000060404 | 0 | 1 | 0 Tor1aip2      | protein_coding |
| ENSMUST00000060609 | 0 | 1 | 0 Gm10037       | protein_coding |
| ENSMUST00000061135 | 0 | 1 | 0 Msantd3       | protein_coding |
| ENSMUST00000061512 | 0 | 1 | 0 Map3k19       | protein_coding |
| ENSMUST00000061688 | 0 | 1 | 0 Ermard        | protein_coding |
| ENSMUST00000061755 | 0 | 1 | 0 Lamp2         | protein_coding |
| ENSMUST00000062879 | 0 | 1 | 0 Gm5414        | protein_coding |
| ENSMUST00000063425 | 0 | 1 | 0 Vmn2r72       | protein_coding |
| ENSMUST00000064204 | 0 | 1 | 0 Actn2         | protein_coding |
| ENSMUST00000064950 | 0 | 1 | 0 Dedd          | protein_coding |
| ENSMUST00000065403 | 0 | 1 | 0 Daw1          | protein_coding |
| ENSMUST00000065587 | 0 | 1 | 0 Ackr3         | protein_coding |
| ENSMUST00000065767 | 0 | 1 | 0 Kdelc1        | protein_coding |
| ENSMUST00000066026 | 0 | 1 | 0 Cul9          | protein_coding |
| ENSMUST00000066211 | 0 | 1 | 0 Gper1         | protein_coding |
| ENSMUST00000066544 | 0 | 1 | 0 Dnajc5g       | protein_coding |
| ENSMUST00000066807 | 0 | 1 | 0 Ercc6         | protein_coding |
| ENSMUST00000066854 | 0 | 1 | 0 Whsc1         | protein_coding |
| ENSMUST00000066880 | 0 | 1 | 0 Capn12        | protein_coding |
| ENSMUST00000067530 | 0 | 1 | 0 Vapb          | protein_coding |
| ENSMUST00000067673 | 0 | 1 | 0 Ms4a5         | protein_coding |
| ENSMUST00000067801 | 0 | 1 | 0 Cbs           | protein_coding |
| ENSMUST00000067836 | 0 | 1 | 0 Ano9          | protein_coding |
| ENSMUST00000067929 | 0 | 1 | 0 Far1          | protein_coding |
| ENSMUST00000068258 | 0 | 1 | 0 9130008F23Rik | protein_coding |
| ENSMUST00000069486 | 0 | 1 | 0 Gemin6        | protein_coding |
| ENSMUST00000069800 | 0 | 1 | 0 Fut2          | protein_coding |
| ENSMUST00000070395 | 0 | 1 | 0 Aarsd1        | protein_coding |
| ENSMUST00000070514 | 0 | 1 | 0 Nat3          | protein_coding |
| ENSMUST00000070524 | 0 | 1 | 0 Tgoln1        | protein_coding |
| ENSMUST00000070918 | 0 | 1 | 0 Cmb1          | protein_coding |
| ENSMUST00000071510 | 0 | 1 | 0 Skap1         | protein_coding |
| ENSMUST00000071708 | 0 | 1 | 0 Frem1         | protein_coding |
| ENSMUST00000072055 | 0 | 1 | 0 Chka          | protein_coding |
| ENSMUST00000072061 | 0 | 1 | 0 Entpd5        | protein_coding |
| ENSMUST00000072119 | 0 | 1 | 0 Ccnb1         | protein_coding |
| ENSMUST00000072154 | 0 | 1 | 0 Pigh          | protein_coding |
| ENSMUST00000072539 | 0 | 1 | 0 Csn1s2b       | protein_coding |
| ENSMUST00000073387 | 0 | 1 | 0 EphA1         | protein_coding |
| ENSMUST00000073642 | 0 | 1 | 0 Gm4744        | protein_coding |
| ENSMUST00000073833 | 0 | 1 | 0 Zfp111        | protein_coding |
| ENSMUST00000073899 | 0 | 1 | 0 Syt7          | protein_coding |
| ENSMUST00000076615 | 0 | 1 | 0 Crtc1         | protein_coding |
| ENSMUST00000076957 | 0 | 1 | 0 Zdhhc8        | protein_coding |
| ENSMUST00000077689 | 0 | 1 | 0 Ssh1          | protein_coding |
| ENSMUST00000078286 | 0 | 1 | 0 Rpl7I1        | protein_coding |
| ENSMUST00000078496 | 0 | 1 | 0 Cacna1h       | protein_coding |

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| ENSMUST00000079042 | 0 | 1 | 0 Zfp317        | protein_coding |
| ENSMUST00000079229 | 0 | 1 | 0 Gm10323       | protein_coding |
| ENSMUST00000079746 | 0 | 1 | 0 Ctlbp1        | protein_coding |
| ENSMUST00000080440 | 0 | 1 | 0 Camk2g        | protein_coding |
| ENSMUST00000080453 | 0 | 1 | 0 Tbp12         | protein_coding |
| ENSMUST00000080905 | 0 | 1 | 0 Zfp811        | protein_coding |
| ENSMUST00000081628 | 0 | 1 | 0 Dnmt3b        | protein_coding |
| ENSMUST00000081742 | 0 | 1 | 0 Gm13154       | protein_coding |
| ENSMUST00000081921 | 0 | 1 | 0 Cfap57        | protein_coding |
| ENSMUST00000082059 | 0 | 1 | 0 Erbb3         | protein_coding |
| ENSMUST00000084731 | 0 | 1 | 0 Ipo7          | protein_coding |
| ENSMUST00000085314 | 0 | 1 | 0 Nin           | protein_coding |
| ENSMUST00000085708 | 0 | 1 | 0 Stat2         | protein_coding |
| ENSMUST00000085809 | 0 | 1 | 0 Sipa1i3       | protein_coding |
| ENSMUST00000085818 | 0 | 1 | 0 Kcnk6         | protein_coding |
| ENSMUST00000086471 | 0 | 1 | 0 Suds3         | protein_coding |
| ENSMUST00000086475 | 0 | 1 | 0 Chit1         | protein_coding |
| ENSMUST00000087200 | 0 | 1 | 0 Gnl1          | protein_coding |
| ENSMUST00000088260 | 0 | 1 | 0 Wfdc13        | protein_coding |
| ENSMUST00000088735 | 0 | 1 | 0 Olfm4         | protein_coding |
| ENSMUST00000088898 | 0 | 1 | 0 Zfp280c       | protein_coding |
| ENSMUST00000090171 | 0 | 1 | 0 Adh7          | protein_coding |
| ENSMUST00000091236 | 0 | 1 | 0 Gpbp1         | protein_coding |
| ENSMUST00000091481 | 0 | 1 | 0 Zfp72         | protein_coding |
| ENSMUST00000092041 | 0 | 1 | 0 Ss18          | protein_coding |
| ENSMUST00000092931 | 0 | 1 | 0 Gm4952        | protein_coding |
| ENSMUST00000093033 | 0 | 1 | 0 Capn9         | protein_coding |
| ENSMUST00000093120 | 0 | 1 | 0 Kars          | protein_coding |
| ENSMUST00000093191 | 0 | 1 | 0 Spdl1         | protein_coding |
| ENSMUST00000093773 | 0 | 1 | 0 Mobp          | protein_coding |
| ENSMUST00000094312 | 0 | 1 | 0 Rgma          | protein_coding |
| ENSMUST00000094863 | 0 | 1 | 0 Vmn2r51       | protein_coding |
| ENSMUST00000095048 | 0 | 1 | 0 Rab7          | protein_coding |
| ENSMUST00000095254 | 0 | 1 | 0 Tom1l2        | protein_coding |
| ENSMUST00000096224 | 0 | 1 | 0 Adcy6         | protein_coding |
| ENSMUST00000097395 | 0 | 1 | 0 Ermard        | protein_coding |
| ENSMUST00000097437 | 0 | 1 | 0 Plac8         | protein_coding |
| ENSMUST00000097625 | 0 | 1 | 0 Pam           | protein_coding |
| ENSMUST00000097805 | 0 | 1 | 0 Casp9         | protein_coding |
| ENSMUST00000097945 | 0 | 1 | 0 Mier1         | protein_coding |
| ENSMUST00000098362 | 0 | 1 | 0 Mbtps1        | protein_coding |
| ENSMUST00000098486 | 0 | 1 | 0 Bcl2a1d       | protein_coding |
| ENSMUST00000098548 | 0 | 1 | 0 Scn1b         | protein_coding |
| ENSMUST00000098673 | 0 | 1 | 0 Amy2a5        | protein_coding |
| ENSMUST00000098859 | 0 | 1 | 0 Tnni3         | protein_coding |
| ENSMUST00000099060 | 0 | 1 | 0 Gcnt7         | protein_coding |
| ENSMUST00000099139 | 0 | 1 | 0 Rbms2         | protein_coding |
| ENSMUST00000099461 | 0 | 1 | 0 Duox1         | protein_coding |
| ENSMUST00000099513 | 0 | 1 | 0 Hcn2          | protein_coding |
| ENSMUST00000099706 | 0 | 1 | 0 Aifm2         | protein_coding |
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| ENSMUST00000100248 | 0 | 1 | 0 Cpsf4l        | protein_coding |
| ENSMUST00000100765 | 0 | 1 | 0 2810474O19Rik | protein_coding |
| ENSMUST00000101029 | 0 | 1 | 0 Inf2          | protein_coding |
| ENSMUST00000101095 | 0 | 1 | 0 Ctps2         | protein_coding |
| ENSMUST00000101419 | 0 | 1 | 0 4930428D18Rik | protein_coding |
| ENSMUST00000102636 | 0 | 1 | 0 Akirin1       | protein_coding |
| ENSMUST00000102706 | 0 | 1 | 0 Fastkd1       | protein_coding |
| ENSMUST00000102735 | 0 | 1 | 0 Slc4a10       | protein_coding |
| ENSMUST00000102747 | 0 | 1 | 0 March7        | protein_coding |
| ENSMUST00000102874 | 0 | 1 | 0 Mdh1          | protein_coding |
| ENSMUST00000102930 | 0 | 1 | 0 Ewsr1         | protein_coding |
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| ENSMUST00000103176 | 0 | 1 | 0 Mib2          | protein_coding |
| ENSMUST00000103205 | 0 | 1 | 0 Polr1b        | protein_coding |
| ENSMUST00000105263 | 0 | 1 | 0 Mdm2          | protein_coding |
| ENSMUST00000105378 | 0 | 1 | 0 Med16         | protein_coding |

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| ENSMUST00000105634 | 0 | 1 | 0 Mmel1         | protein_coding |
| ENSMUST00000105653 | 0 | 1 | 0 Espn          | protein_coding |
| ENSMUST00000105730 | 0 | 1 | 0 Gm13051       | protein_coding |
| ENSMUST00000105856 | 0 | 1 | 0 Nipal3        | protein_coding |
| ENSMUST00000105965 | 0 | 1 | 0 Gmeb1         | protein_coding |
| ENSMUST00000106003 | 0 | 1 | 0 Rplp2         | protein_coding |
| ENSMUST00000106203 | 0 | 1 | 0 Hgs           | protein_coding |
| ENSMUST00000106268 | 0 | 1 | 0 Tmco2         | protein_coding |
| ENSMUST00000106334 | 0 | 1 | 0 Tmc8          | protein_coding |
| ENSMUST00000106621 | 0 | 1 | 0 D11Wsu47e     | protein_coding |
| ENSMUST00000106741 | 0 | 1 | 0 Trim66        | protein_coding |
| ENSMUST00000106961 | 0 | 1 | 0 Cdc27         | protein_coding |
| ENSMUST00000107010 | 0 | 1 | 0 Arap1         | protein_coding |
| ENSMUST00000107154 | 0 | 1 | 0 Hormad1       | protein_coding |
| ENSMUST00000107213 | 0 | 1 | 0 Nbr1          | protein_coding |
| ENSMUST00000107236 | 0 | 1 | 0 Pip5k1a       | protein_coding |
| ENSMUST00000107273 | 0 | 1 | 0 Cgn           | protein_coding |
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| ENSMUST00000107558 | 0 | 1 | 0 Mef2d         | protein_coding |
| ENSMUST00000107669 | 0 | 1 | 0 Tph1          | protein_coding |
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| ENSMUST00000107855 | 0 | 1 | 0 Glipr2        | protein_coding |
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| ENSMUST00000108162 | 0 | 1 | 0 Gabrr2        | protein_coding |
| ENSMUST00000108267 | 0 | 1 | 0 Lrriq4        | protein_coding |
| ENSMUST00000108502 | 0 | 1 | 0 Tekt1         | protein_coding |
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| ENSMUST00000108808 | 0 | 1 | 0 Arfrp1        | protein_coding |
| ENSMUST00000108889 | 0 | 1 | 0 Tnip1         | protein_coding |
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| ENSMUST00000109176 | 0 | 1 | 0 Atp9a         | protein_coding |
| ENSMUST00000109210 | 0 | 1 | 0 Gm5431        | protein_coding |
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| ENSMUST00000109363 | 0 | 1 | 0 Fgf18         | protein_coding |
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| ENSMUST00000109515 | 0 | 1 | 0 Cyp2d34       | protein_coding |
| ENSMUST00000109544 | 0 | 1 | 0 Vcan          | protein_coding |
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| ENSMUST00000109922 | 0 | 1 | 0 Gm14124       | protein_coding |
| ENSMUST00000109926 | 0 | 1 | 0 Gm14139       | protein_coding |
| ENSMUST00000110371 | 0 | 1 | 0 Acs1          | protein_coding |
| ENSMUST00000110416 | 0 | 1 | 0 Usp8          | protein_coding |
| ENSMUST00000110570 | 0 | 1 | 0 Map4k5        | protein_coding |
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| ENSMUST00000110729 | 0 | 1 | 0 Tmem87a       | protein_coding |
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| ENSMUST00000111752 | 0 | 1 | 0 Cux2          | protein_coding |
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| ENSMUST00000112522 | 0 | 1 | 0 Mbtps2        | protein_coding |
| ENSMUST00000112677 | 0 | 1 | 0 Brdt          | protein_coding |
| ENSMUST00000112713 | 0 | 1 | 0 Pfkfb1        | protein_coding |
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| ENSMUST00000112844 | 0 | 1 | 0 Gin1          | protein_coding |

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| ENSMUST00000112850 | 0 | 1 | 0 Golga1        | protein_coding |
| ENSMUST00000112870 | 0 | 1 | 0 Vav1          | protein_coding |
| ENSMUST00000112881 | 0 | 1 | 0 D2hgdh        | protein_coding |
| ENSMUST00000112901 | 0 | 1 | 0 Mrps18c       | protein_coding |
| ENSMUST00000113022 | 0 | 1 | 0 Tatdn2        | protein_coding |
| ENSMUST00000113252 | 0 | 1 | 0 Trmt2b        | protein_coding |
| ENSMUST00000113436 | 0 | 1 | 0 Daw1          | protein_coding |
| ENSMUST00000113449 | 0 | 1 | 0 Rest          | protein_coding |
| ENSMUST00000113463 | 0 | 1 | 0 Nr2c2         | protein_coding |
| ENSMUST00000113470 | 0 | 1 | 0 Prdm12        | protein_coding |
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| ENSMUST00000113566 | 0 | 1 | 0 Magt1         | protein_coding |
| ENSMUST00000113660 | 0 | 1 | 0 Ccbl1         | protein_coding |
| ENSMUST00000113719 | 0 | 1 | 0 Sptan1        | protein_coding |
| ENSMUST00000113829 | 0 | 1 | 0 Brwd1         | protein_coding |
| ENSMUST00000113899 | 0 | 1 | 0 Slc4a5        | protein_coding |
| ENSMUST00000114047 | 0 | 1 | 0 Fbxl5         | protein_coding |
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| ENSMUST00000114360 | 0 | 1 | 0 Irak1         | protein_coding |
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| ENSMUST00000114574 | 0 | 1 | 0 Glp1r         | protein_coding |
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| ENSMUST00000114810 | 0 | 1 | 0 Xlr           | protein_coding |
| ENSMUST00000114939 | 0 | 1 | 0 Smad4         | protein_coding |
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| ENSMUST00000115342 | 0 | 1 | 0 Timp1         | protein_coding |
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| ENSMUST00000115538 | 0 | 1 | 0 Mrpl15        | protein_coding |
| ENSMUST00000115681 | 0 | 1 | 0 Lztr1         | protein_coding |
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| ENSMUST00000117196 | 0 | 1 | 0 Cdc7          | protein_coding |
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| ENSMUST00000117546 | 0 | 1 | 0 Rcn3          | protein_coding |
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| ENSMUST00000118139 | 0 | 1 | 0 Glt1d1        | protein_coding |
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| ENSMUST00000118896 | 0 | 1 | 0 Sgcz          | protein_coding |
| ENSMUST00000119081 | 0 | 1 | 0 Mcmbp         | protein_coding |
| ENSMUST00000119354 | 0 | 1 | 0 Azin2         | protein_coding |
| ENSMUST00000119373 | 0 | 1 | 0 Gramd1b       | protein_coding |
| ENSMUST00000119498 | 0 | 1 | 0 Nyap1         | protein_coding |
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| ENSMUST00000122014 | 0 | 1 | 0 2610015P09Rik | protein_coding |
| ENSMUST00000122113 | 0 | 1 | 0 Por           | protein_coding |
| ENSMUST00000122857 | 0 | 1 | 0 Paf1          | protein_coding |
| ENSMUST00000122872 | 0 | 1 | 0 Pgbd1         | protein_coding |
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| ENSMUST00000123393 | 0 | 1 | 0 Stap1         | protein_coding |
| ENSMUST00000123682 | 0 | 1 | 0 Aasdh         | protein_coding |
| ENSMUST00000123781 | 0 | 1 | 0 Stk39         | protein_coding |
| ENSMUST00000123832 | 0 | 1 | 0 Fkbp14        | protein_coding |
| ENSMUST00000124048 | 0 | 1 | 0 Ccdc30        | protein_coding |



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| ENSMUST00000124360 | 0 | 1 | 0 Itga9         | protein_coding |
| ENSMUST00000124638 | 0 | 1 | 0 Setdb1        | protein_coding |
| ENSMUST00000124806 | 0 | 1 | 0 Tmem87a       | protein_coding |
| ENSMUST00000125263 | 0 | 1 | 0 Bach2         | protein_coding |
| ENSMUST00000125456 | 0 | 1 | 0 Foxm1         | protein_coding |
| ENSMUST00000125466 | 0 | 1 | 0 Plekha2       | protein_coding |
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| ENSMUST00000125780 | 0 | 1 | 0 Sdhb          | protein_coding |
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| ENSMUST00000126028 | 0 | 1 | 0 Ncf4          | protein_coding |
| ENSMUST00000126145 | 0 | 1 | 0 Trim12a       | protein_coding |
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| ENSMUST00000126755 | 0 | 1 | 0 Cpne5         | protein_coding |
| ENSMUST00000126792 | 0 | 1 | 0 Knop1         | protein_coding |
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| ENSMUST00000127833 | 0 | 1 | 0 Atp13a2       | protein_coding |
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| ENSMUST00000128309 | 0 | 1 | 0 Ppp1cc        | protein_coding |
| ENSMUST00000128396 | 0 | 1 | 0 Hemk1         | protein_coding |
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| ENSMUST00000128860 | 0 | 1 | 0 Cdh8          | protein_coding |
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| ENSMUST00000129427 | 0 | 1 | 0 Pdk1          | protein_coding |
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| ENSMUST00000129913 | 0 | 1 | 0 Igf2bp2       | protein_coding |
| ENSMUST00000129935 | 0 | 1 | 0 Rpl10a        | protein_coding |
| ENSMUST00000130067 | 0 | 1 | 0 Atp5c1        | protein_coding |
| ENSMUST00000130768 | 0 | 1 | 0 Ppp3ca        | protein_coding |
| ENSMUST00000130778 | 0 | 1 | 0 Sec22b        | protein_coding |
| ENSMUST00000130969 | 0 | 1 | 0 Strip2        | protein_coding |
| ENSMUST00000130973 | 0 | 1 | 0 Pes1          | protein_coding |
| ENSMUST00000130999 | 0 | 1 | 0 Eml1          | protein_coding |
| ENSMUST00000131002 | 0 | 1 | 0 Kmt2b         | protein_coding |
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| ENSMUST00000131121 | 0 | 1 | 0 Sirt4         | protein_coding |
| ENSMUST00000131282 | 0 | 1 | 0 Mms22l        | protein_coding |
| ENSMUST00000131322 | 0 | 1 | 0 Brwd1         | protein_coding |
| ENSMUST00000131432 | 0 | 1 | 0 Slc4a5        | protein_coding |
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| ENSMUST00000131814 | 0 | 1 | 0 Taf13         | protein_coding |
| ENSMUST00000131966 | 0 | 1 | 0 Ccdc81        | protein_coding |
| ENSMUST00000131975 | 0 | 1 | 0 Prkcz         | protein_coding |
| ENSMUST00000131996 | 0 | 1 | 0 Rgs17         | protein_coding |
| ENSMUST00000132054 | 0 | 1 | 0 Mga           | protein_coding |
| ENSMUST00000132118 | 0 | 1 | 0 Dbp           | protein_coding |
| ENSMUST00000132213 | 0 | 1 | 0 Cds1          | protein_coding |
| ENSMUST00000132259 | 0 | 1 | 0 Pbx4          | protein_coding |
| ENSMUST00000132339 | 0 | 1 | 0 Adam17        | protein_coding |

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| ENSMUST00000132500 | 0 | 1 | 0 Lphn1         | protein_coding |
| ENSMUST00000132602 | 0 | 1 | 0 Tomm34        | protein_coding |
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| ENSMUST00000132648 | 0 | 1 | 0 Crif1         | protein_coding |
| ENSMUST00000132650 | 0 | 1 | 0 Ttc4          | protein_coding |
| ENSMUST00000132653 | 0 | 1 | 0 Kif3a         | protein_coding |
| ENSMUST00000132751 | 0 | 1 | 0 Arhgef1       | protein_coding |
| ENSMUST00000132846 | 0 | 1 | 0 Ppia          | protein_coding |
| ENSMUST00000133249 | 0 | 1 | 0 Nde1          | protein_coding |
| ENSMUST00000133306 | 0 | 1 | 0 Sgce          | protein_coding |
| ENSMUST00000133621 | 0 | 1 | 0 Phkg2         | protein_coding |
| ENSMUST00000133701 | 0 | 1 | 0 Chil1         | protein_coding |
| ENSMUST00000133753 | 0 | 1 | 0 C87436        | protein_coding |
| ENSMUST00000134071 | 0 | 1 | 0 Tpst2         | protein_coding |
| ENSMUST00000134220 | 0 | 1 | 0 Pex7          | protein_coding |
| ENSMUST00000134257 | 0 | 1 | 0 Slc25a14      | protein_coding |
| ENSMUST00000134309 | 0 | 1 | 0 Ncapg         | protein_coding |
| ENSMUST00000134318 | 0 | 1 | 0 Chpt1         | protein_coding |
| ENSMUST00000134423 | 0 | 1 | 0 Slc47a2       | protein_coding |
| ENSMUST00000134648 | 0 | 1 | 0 Car6          | protein_coding |
| ENSMUST00000134703 | 0 | 1 | 0 Sh3bp1        | protein_coding |
| ENSMUST00000134727 | 0 | 1 | 0 Cdc26         | protein_coding |
| ENSMUST00000134732 | 0 | 1 | 0 Cdk5rap3      | protein_coding |
| ENSMUST00000134785 | 0 | 1 | 0 Htatsf1       | protein_coding |
| ENSMUST00000134786 | 0 | 1 | 0 Fam221a       | protein_coding |
| ENSMUST00000134794 | 0 | 1 | 0 Pter          | protein_coding |
| ENSMUST00000134821 | 0 | 1 | 0 Arl2          | protein_coding |
| ENSMUST00000134901 | 0 | 1 | 0 Inadl         | protein_coding |
| ENSMUST00000135158 | 0 | 1 | 0 Chst3         | protein_coding |
| ENSMUST00000135219 | 0 | 1 | 0 Dnase2a       | protein_coding |
| ENSMUST00000135236 | 0 | 1 | 0 Ttc23         | protein_coding |
| ENSMUST00000135281 | 0 | 1 | 0 Itgb1         | protein_coding |
| ENSMUST00000135538 | 0 | 1 | 0 Timeless      | protein_coding |
| ENSMUST00000135562 | 0 | 1 | 0 Slco1c1       | protein_coding |
| ENSMUST00000135576 | 0 | 1 | 0 Trim63        | protein_coding |
| ENSMUST00000135666 | 0 | 1 | 0 Ccdc186       | protein_coding |
| ENSMUST00000135823 | 0 | 1 | 0 Coro7         | protein_coding |
| ENSMUST00000135831 | 0 | 1 | 0 Dynlrb1       | protein_coding |
| ENSMUST00000135891 | 0 | 1 | 0 Ubr1          | protein_coding |
| ENSMUST00000135939 | 0 | 1 | 0 Prg3          | protein_coding |
| ENSMUST00000135962 | 0 | 1 | 0 Numb          | protein_coding |
| ENSMUST00000136214 | 0 | 1 | 0 Mettl2        | protein_coding |
| ENSMUST00000136521 | 0 | 1 | 0 6330403A02Rik | protein_coding |
| ENSMUST00000136685 | 0 | 1 | 0 Sec61b        | protein_coding |
| ENSMUST00000136868 | 0 | 1 | 0 Psmc4         | protein_coding |
| ENSMUST00000136872 | 0 | 1 | 0 Mtch2         | protein_coding |
| ENSMUST00000137006 | 0 | 1 | 0 Eif2s3y       | protein_coding |
| ENSMUST00000137078 | 0 | 1 | 0 Hipk1         | protein_coding |
| ENSMUST00000137143 | 0 | 1 | 0 Tmem180       | protein_coding |
| ENSMUST00000137240 | 0 | 1 | 0 Pkn3          | protein_coding |
| ENSMUST00000137267 | 0 | 1 | 0 Ydjc          | protein_coding |
| ENSMUST00000137288 | 0 | 1 | 0 Mpdu1         | protein_coding |
| ENSMUST00000137290 | 0 | 1 | 0 Mylk3         | protein_coding |
| ENSMUST00000137486 | 0 | 1 | 0 Rps6ka1       | protein_coding |
| ENSMUST00000137659 | 0 | 1 | 0 Las1l         | protein_coding |
| ENSMUST00000137953 | 0 | 1 | 0 Trmt1         | protein_coding |
| ENSMUST00000138287 | 0 | 1 | 0 Srpr          | protein_coding |
| ENSMUST00000138412 | 0 | 1 | 0 Atox1         | protein_coding |
| ENSMUST00000138429 | 0 | 1 | 0 Cwh43         | protein_coding |
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| ENSMUST00000138513 | 0 | 1 | 0 Igf2bp1       | protein_coding |
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| ENSMUST00000138987 | 0 | 1 | 0 Abat          | protein_coding |
| ENSMUST00000139086 | 0 | 1 | 0 Chia1         | protein_coding |
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| ENSMUST00000139127 | 0 | 1 | 0 1700022111Rik | protein_coding |
| ENSMUST00000139188 | 0 | 1 | 0 Stk40         | protein_coding |

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| ENSMUST00000139310 | 0 | 1 | 0 Gpr143   | protein_coding |
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| ENSMUST00000139456 | 0 | 1 | 0 Ndufab1  | protein_coding |
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| ENSMUST00000139520 | 0 | 1 | 0 Tmem150c | protein_coding |
| ENSMUST00000139727 | 0 | 1 | 0 Cystm1   | protein_coding |
| ENSMUST00000139731 | 0 | 1 | 0 Eral1    | protein_coding |
| ENSMUST00000139778 | 0 | 1 | 0 Garnl3   | protein_coding |
| ENSMUST00000139954 | 0 | 1 | 0 Mfsd11   | protein_coding |
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| ENSMUST00000140378 | 0 | 1 | 0 Cdc7     | protein_coding |
| ENSMUST00000140430 | 0 | 1 | 0 Lyzl6    | protein_coding |
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| ENSMUST00000141169 | 0 | 1 | 0 Supt4a   | protein_coding |
| ENSMUST00000141192 | 0 | 1 | 0 Ttc3     | protein_coding |
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| ENSMUST00000142599 | 0 | 1 | 0 Kin      | protein_coding |
| ENSMUST00000142891 | 0 | 1 | 0 Sh3d21   | protein_coding |
| ENSMUST00000142931 | 0 | 1 | 0 Ercc8    | protein_coding |
| ENSMUST00000142947 | 0 | 1 | 0 Nfatc2ip | protein_coding |
| ENSMUST00000142966 | 0 | 1 | 0 Synrg    | protein_coding |
| ENSMUST00000143052 | 0 | 1 | 0 Vezf1    | protein_coding |
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| ENSMUST00000144954 | 0 | 1 | 0 Rad51ap1 | protein_coding |
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| ENSMUST00000145898 | 0 | 1 | 0 Nudt1    | protein_coding |
| ENSMUST00000146074 | 0 | 1 | 0 Zfp568   | protein_coding |
| ENSMUST00000146092 | 0 | 1 | 0 E2f3     | protein_coding |
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| ENSMUST00000146794 | 0 | 1 | 0 Prss45   | protein_coding |
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| ENSMUST00000147182 | 0 | 1 | 0 Vsig10   | protein_coding |
| ENSMUST00000147214 | 0 | 1 | 0 Prmt5    | protein_coding |

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| ENSMUST00000147458 | 0 | 1 | 0 Pithd1        | protein_coding |
| ENSMUST00000147466 | 0 | 1 | 0 Setd3         | protein_coding |
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| ENSMUST00000147776 | 0 | 1 | 0 Oc90          | protein_coding |
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| ENSMUST00000148005 | 0 | 1 | 0 Mmp12         | protein_coding |
| ENSMUST00000148166 | 0 | 1 | 0 Cep89         | protein_coding |
| ENSMUST00000148307 | 0 | 1 | 0 Pigq          | protein_coding |
| ENSMUST00000148586 | 0 | 1 | 0 9030624J02Rik | protein_coding |
| ENSMUST00000148819 | 0 | 1 | 0 Osgin2        | protein_coding |
| ENSMUST00000148973 | 0 | 1 | 0 Capns1        | protein_coding |
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| ENSMUST00000149474 | 0 | 1 | 0 Cdk1          | protein_coding |
| ENSMUST00000149542 | 0 | 1 | 0 Cops7b        | protein_coding |
| ENSMUST00000149886 | 0 | 1 | 0 Letm1         | protein_coding |
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| ENSMUST00000150043 | 0 | 1 | 0 Adamts1       | protein_coding |
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| ENSMUST00000150571 | 0 | 1 | 0 Ddx27         | protein_coding |
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| ENSMUST00000151693 | 0 | 1 | 0 Fchsd2        | protein_coding |
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| ENSMUST00000152567 | 0 | 1 | 0 Rap1gap       | protein_coding |
| ENSMUST00000152572 | 0 | 1 | 0 Sptbn4        | protein_coding |
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| ENSMUST00000152694 | 0 | 1 | 0 Myo1h         | protein_coding |
| ENSMUST00000152836 | 0 | 1 | 0 Trmt6         | protein_coding |
| ENSMUST00000152921 | 0 | 1 | 0 Thoc2         | protein_coding |
| ENSMUST00000153079 | 0 | 1 | 0 Atp6v1b2      | protein_coding |
| ENSMUST00000153440 | 0 | 1 | 0 Brat1         | protein_coding |
| ENSMUST00000153636 | 0 | 1 | 0 Ttl4          | protein_coding |
| ENSMUST00000153712 | 0 | 1 | 0 Map4k5        | protein_coding |
| ENSMUST00000153771 | 0 | 1 | 0 Stkld1        | protein_coding |
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| ENSMUST00000155537 | 0 | 1 | 0 Slc43a3       | protein_coding |
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| ENSMUST00000155986 | 0 | 1 | 0 Slc25a4       | protein_coding |
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| ENSMUST00000156497 | 0 | 1 | 0 Gm15401  | protein_coding |
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| ENSMUST00000156542 | 0 | 1 | 0 Slx4     | protein_coding |
| ENSMUST00000156643 | 0 | 1 | 0 Cobll1   | protein_coding |
| ENSMUST00000156661 | 0 | 1 | 0 Fryl     | protein_coding |
| ENSMUST00000156703 | 0 | 1 | 0 Bcorl1   | protein_coding |
| ENSMUST00000156729 | 0 | 1 | 0 Crcp     | protein_coding |
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| ENSMUST00000159218 | 0 | 1 | 0 Mroh1    | protein_coding |
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| ENSMUST00000159384 | 0 | 1 | 0 Phc1     | protein_coding |
| ENSMUST00000159467 | 0 | 1 | 0 Cdk8     | protein_coding |
| ENSMUST00000159576 | 0 | 1 | 0 Alg9     | protein_coding |
| ENSMUST00000159940 | 0 | 1 | 0 Pard3    | protein_coding |
| ENSMUST00000160465 | 0 | 1 | 0 Soat2    | protein_coding |
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| ENSMUST00000161226 | 0 | 1 | 0 Aut2     | protein_coding |
| ENSMUST00000161560 | 0 | 1 | 0 Stab2    | protein_coding |
| ENSMUST00000161574 | 0 | 1 | 0 Rnf6     | protein_coding |
| ENSMUST00000161796 | 0 | 1 | 0 Hmgn3    | protein_coding |
| ENSMUST00000161851 | 0 | 1 | 0 Lekr1    | protein_coding |
| ENSMUST00000161933 | 0 | 1 | 0 Grhl2    | protein_coding |
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| ENSMUST00000162939 | 0 | 1 | 0 Spata13  | protein_coding |
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| ENSMUST00000164403 | 0 | 1 | 0 Sugp2    | protein_coding |
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| ENSMUST00000167787 | 0 | 1 | 0 Smurf2        | protein_coding |
| ENSMUST00000168099 | 0 | 1 | 0 Ndufs1        | protein_coding |
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| ENSMUST00000171122 | 0 | 1 | 0 Slc6a20b      | protein_coding |
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| ENSMUST00000173642 | 0 | 1 | 0 Tcerg1        | protein_coding |
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| ENSMUST00000174272 | 0 | 1 | 0 Dnmt3a        | protein_coding |
| ENSMUST00000174468 | 0 | 1 | 0 Txn2          | protein_coding |
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| ENSMUST00000175949 | 0 | 1 | 0 Scn3b         | protein_coding |
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| ENSMUST00000176429 | 0 | 1 | 0 Wdr37         | protein_coding |
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| ENSMUST00000176466 | 0 | 1 | 0 Pan3          | protein_coding |
| ENSMUST00000176611 | 0 | 1 | 0 Tirap         | protein_coding |
| ENSMUST00000176632 | 0 | 1 | 0 Foxp1         | protein_coding |
| ENSMUST00000176670 | 0 | 1 | 0 Cpsf6         | protein_coding |
| ENSMUST00000176756 | 0 | 1 | 0 Dnah11        | protein_coding |
| ENSMUST00000176804 | 0 | 1 | 0 Arhgef2       | protein_coding |
| ENSMUST00000177045 | 0 | 1 | 0 Zwi1ch        | protein_coding |
| ENSMUST00000177372 | 0 | 1 | 0 Ap4e1         | protein_coding |
| ENSMUST00000177514 | 0 | 1 | 0 Kik6          | protein_coding |
| ENSMUST00000177525 | 0 | 1 | 0 Tllf5         | protein_coding |
| ENSMUST00000178958 | 0 | 1 | 0 A630023A22Rik | protein_coding |
| ENSMUST00000179297 | 0 | 1 | 0 Prpf19        | protein_coding |
| ENSMUST00000179331 | 0 | 1 | 0 Smg1          | protein_coding |
| ENSMUST00000179799 | 0 | 1 | 0 Gm8298        | protein_coding |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000180037 | 0 | 1 | 0 Birc6         | protein_coding       |
| ENSMUST00000180198 | 0 | 1 | 0 Gm5128        | protein_coding       |
| ENSMUST00000180288 | 0 | 1 | 0 Hist1h2br     | protein_coding       |
| ENSMUST00000180299 | 0 | 1 | 0 Dlgap5        | protein_coding       |
| ENSMUST00000180573 | 0 | 1 | 0 Plxnc1        | protein_coding       |
| ENSMUST00000181177 | 0 | 1 | 0 Slc35a5       | protein_coding       |
| ENSMUST00000181313 | 0 | 1 | 0 Gm21936       | protein_coding       |
| ENSMUST00000181823 | 0 | 1 | 0 Rpgrip1       | protein_coding       |
| ENSMUST00000181975 | 0 | 1 | 0 Sipa1l3       | protein_coding       |
| ENSMUST00000181998 | 0 | 1 | 0 Plekha7       | protein_coding       |
| ENSMUST00000182016 | 0 | 1 | 0 Rnasel        | protein_coding       |
| ENSMUST00000182512 | 0 | 1 | 0 Abhd12b       | protein_coding       |
| ENSMUST00000182584 | 0 | 1 | 0 Rsrc2         | protein_coding       |
| ENSMUST00000182704 | 0 | 1 | 0 Ank2          | protein_coding       |
| ENSMUST00000183063 | 0 | 1 | 0 Ppfi1         | protein_coding       |
| ENSMUST00000183217 | 0 | 1 | 0 Piezo2        | protein_coding       |
| ENSMUST00000183247 | 0 | 1 | 0 Sec31a        | protein_coding       |
| ENSMUST00000183410 | 0 | 1 | 0 Zfp280d       | protein_coding       |
| ENSMUST00000183698 | 0 | 1 | 0 Dusp13        | protein_coding       |
| ENSMUST00000183746 | 0 | 1 | 0 Pigb          | protein_coding       |
| ENSMUST00000184142 | 0 | 1 | 0 Plac9b        | protein_coding       |
| ENSMUST00000184861 | 0 | 1 | 0 Clec7a        | protein_coding       |
| ENSMUST00000123784 | 0 | 1 | 0 Gm11629       | processed_transcript |
| ENSMUST00000124452 | 0 | 1 | 0 E130218l03Rik | processed_transcript |
| ENSMUST00000126016 | 0 | 1 | 0 4930502E09Rik | processed_transcript |
| ENSMUST00000126080 | 0 | 1 | 0 9830144P21Rik | processed_transcript |
| ENSMUST00000131221 | 0 | 1 | 0 2310058D17Rik | processed_transcript |
| ENSMUST00000132154 | 0 | 1 | 0 4930432L08Rik | processed_transcript |
| ENSMUST00000135186 | 0 | 1 | 0 Gm14027       | processed_transcript |
| ENSMUST00000135630 | 0 | 1 | 0 Gm11762       | processed_transcript |
| ENSMUST00000138875 | 0 | 1 | 0 Gm14004       | processed_transcript |
| ENSMUST00000138926 | 0 | 1 | 0 Gm15929       | processed_transcript |
| ENSMUST00000139752 | 0 | 1 | 0 Gm11574       | processed_transcript |
| ENSMUST00000140267 | 0 | 1 | 0 Tmem134       | processed_transcript |
| ENSMUST00000144232 | 0 | 1 | 0 Mkl11os       | processed_transcript |
| ENSMUST00000147066 | 0 | 1 | 0 Gm12680       | processed_transcript |
| ENSMUST00000149601 | 0 | 1 | 0 1500017E21Rik | processed_transcript |
| ENSMUST00000153659 | 0 | 1 | 0 C230034O21Rik | processed_transcript |
| ENSMUST00000180835 | 0 | 1 | 0 6030442K20Rik | processed_transcript |
| ENSMUST00000181692 | 0 | 1 | 0 Gm26788       | processed_transcript |
| ENSMUST00000117289 | 0 | 1 | 0 Gm16394       | processed_pseudogene |
| ENSMUST00000117594 | 0 | 1 | 0 Gm12795       | processed_pseudogene |
| ENSMUST00000118023 | 0 | 1 | 0 Cct3-ps1      | processed_pseudogene |
| ENSMUST00000118038 | 0 | 1 | 0 Gm7108        | processed_pseudogene |
| ENSMUST00000118320 | 0 | 1 | 0 4930503H13Rik | processed_pseudogene |
| ENSMUST00000118690 | 0 | 1 | 0 Gm12901       | processed_pseudogene |
| ENSMUST00000119937 | 0 | 1 | 0 Gm15574       | processed_pseudogene |
| ENSMUST00000120941 | 0 | 1 | 0 Tcp1-ps1      | processed_pseudogene |
| ENSMUST00000174341 | 0 | 1 | 0 Gm8902        | processed_pseudogene |
| ENSMUST00000061899 | 0 | 1 | 0 4931429P17Rik | lincRNA              |
| ENSMUST00000125569 | 0 | 1 | 0 4930453H23Rik | lincRNA              |
| ENSMUST00000127441 | 0 | 1 | 0 Gm14321       | lincRNA              |
| ENSMUST00000128342 | 0 | 1 | 0 Gm16576       | lincRNA              |
| ENSMUST00000128563 | 0 | 1 | 0 Gm13028       | lincRNA              |
| ENSMUST00000131907 | 0 | 1 | 0 C130071C03Rik | lincRNA              |
| ENSMUST00000132691 | 0 | 1 | 0 Gm4926        | lincRNA              |
| ENSMUST00000133945 | 0 | 1 | 0 Gm12139       | lincRNA              |
| ENSMUST00000134264 | 0 | 1 | 0 Gm14095       | lincRNA              |
| ENSMUST00000139576 | 0 | 1 | 0 Gm11368       | lincRNA              |
| ENSMUST00000143488 | 0 | 1 | 0 Gm15461       | lincRNA              |
| ENSMUST00000143649 | 0 | 1 | 0 1200007C13Rik | lincRNA              |
| ENSMUST00000144006 | 0 | 1 | 0 Gm15328       | lincRNA              |
| ENSMUST00000147128 | 0 | 1 | 0 Gm14136       | lincRNA              |
| ENSMUST00000148413 | 0 | 1 | 0 A530017D24Rik | lincRNA              |
| ENSMUST00000153921 | 0 | 1 | 0 4933427I22Rik | lincRNA              |
| ENSMUST00000155224 | 0 | 1 | 0 Gm12440       | lincRNA              |
| ENSMUST00000155475 | 0 | 1 | 0 Gm13417       | lincRNA              |
| ENSMUST00000156950 | 0 | 1 | 0 Gm15458       | lincRNA              |

|                    |   |   |       |               |                |
|--------------------|---|---|-------|---------------|----------------|
| ENSMUST00000160947 | 0 | 1 | 0     | Gm15834       | lincRNA        |
| ENSMUST00000168234 | 0 | 1 | 0     | 4933413J09Rik | lincRNA        |
| ENSMUST00000180538 | 0 | 1 | 0     | Gm26792       | lincRNA        |
| ENSMUST00000180594 | 0 | 1 | 0     | 4921504A21Rik | lincRNA        |
| ENSMUST00000180992 | 0 | 1 | 0     | Gm26735       | lincRNA        |
| ENSMUST00000181106 | 0 | 1 | 0     | Gm26737       | lincRNA        |
| ENSMUST00000181466 | 0 | 1 | 0     | C330046G13Rik | lincRNA        |
| ENSMUST00000181510 | 0 | 1 | 0     | B130046B21Rik | lincRNA        |
| ENSMUST00000181530 | 0 | 1 | 0     | Fendrr        | lincRNA        |
| ENSMUST00000181547 | 0 | 1 | 0     | 4933440J02Rik | lincRNA        |
| ENSMUST00000181689 | 0 | 1 | 0     | Gm26756       | lincRNA        |
| ENSMUST00000181758 | 0 | 1 | 0     | 2010300F17Rik | lincRNA        |
| ENSMUST00000181804 | 0 | 1 | 0     | A330076H08Rik | lincRNA        |
| ENSMUST00000114051 | 0 | 1 | 0     | Gm15402       | antisense      |
| ENSMUST00000123882 | 0 | 1 | 0     | Gm16045       | antisense      |
| ENSMUST00000127450 | 0 | 1 | 0     | Rptoros       | antisense      |
| ENSMUST00000133496 | 0 | 1 | 0     | Maats1os      | antisense      |
| ENSMUST00000134250 | 0 | 1 | 0     | Gm16048       | antisense      |
| ENSMUST00000137776 | 0 | 1 | 0     | Spag17os      | antisense      |
| ENSMUST00000143893 | 0 | 1 | 0     | Kcnd3os       | antisense      |
| ENSMUST00000144350 | 0 | 1 | 0     | Gm15577       | antisense      |
| ENSMUST00000146806 | 0 | 1 | 0     | Bcas3os1      | antisense      |
| ENSMUST00000147006 | 0 | 1 | 0     | Gm11683       | antisense      |
| ENSMUST00000150154 | 0 | 1 | 0     | Bloc1s6os     | antisense      |
| ENSMUST00000162027 | 0 | 1 | 0     | Gm16343       | antisense      |
| ENSMUST00000169146 | 0 | 1 | 0     | Gm17168       | antisense      |
| ENSMUST00000177682 | 0 | 1 | 0     | Clnkos        | antisense      |
| ENSMUST00000180452 | 0 | 1 | 0     | Gm26555       | antisense      |
| ENSMUST00000181127 | 0 | 1 | 0     | Gm26879       | antisense      |
| ENSMUST00000181572 | 0 | 0 | 57323 | Gm26870       | lincRNA        |
| ENSMUST00000181242 | 0 | 0 | 45932 | Gm26870       | lincRNA        |
| ENSMUST00000177817 | 0 | 0 | 27121 | Gm21738       | protein_coding |
| ENSMUST00000099051 | 0 | 0 | 22424 | Gm10717       | protein_coding |
| ENSMUST00000179272 | 0 | 0 | 17834 | Gm10719       | protein_coding |
| ENSMUST00000177601 | 0 | 0 | 17578 | Gm10717       | protein_coding |
| ENSMUST00000177722 | 0 | 0 | 16815 | Gm11168       | protein_coding |
| ENSMUST00000099046 | 0 | 0 | 16408 | Gm10718       | protein_coding |
| ENSMUST00000098372 | 0 | 0 | 15945 | Gm10619       | lincRNA        |
| ENSMUST00000099049 | 0 | 0 | 10742 | Gm10719       | protein_coding |
| ENSMUST00000151376 | 0 | 0 | 10393 | Gm10722       | protein_coding |
| ENSMUST00000179881 | 0 | 0 | 10316 | Gm11168       | protein_coding |
| ENSMUST00000178641 | 0 | 0 | 8458  | Gm17535       | protein_coding |
| ENSMUST00000099056 | 0 | 0 | 6892  | Gm10717       | protein_coding |
| ENSMUST00000179264 | 0 | 0 | 5319  | Gm10717       | protein_coding |
| ENSMUST00000099050 | 0 | 0 | 4860  | Gm10720       | protein_coding |
| ENSMUST00000177969 | 0 | 0 | 4080  | Gm10715       | protein_coding |
| ENSMUST00000143083 | 0 | 0 | 3664  | Gm10721       | protein_coding |
| ENSMUST00000177875 | 0 | 0 | 3660  | Gm10717       | protein_coding |
| ENSMUST00000179839 | 0 | 0 | 2930  | Gm10717       | protein_coding |
| ENSMUST00000099683 | 0 | 0 | 2219  | Gm10800       | protein_coding |
| ENSMUST00000099047 | 0 | 0 | 1913  | Gm10719       | protein_coding |
| ENSMUST00000075573 | 0 | 0 | 1909  | Gm10717       | protein_coding |
| ENSMUST00000101655 | 0 | 0 | 942   | Sfi1          | protein_coding |
| ENSMUST00000140374 | 0 | 0 | 888   | Gm20499       | protein_coding |
| ENSMUST00000155807 | 0 | 0 | 747   | Gm10715       | protein_coding |
| ENSMUST00000145277 | 0 | 0 | 486   | Gga2          | protein_coding |
| ENSMUST00000137606 | 0 | 0 | 440   | 1700042G15Rik | lincRNA        |
| ENSMUST00000138078 | 0 | 0 | 375   | Chd6          | protein_coding |
| ENSMUST00000002048 | 0 | 0 | 319   | Taco1         | protein_coding |
| ENSMUST00000151398 | 0 | 0 | 299   | Gm10505       | lincRNA        |
| ENSMUST00000144359 | 0 | 0 | 295   | Sfi1          | protein_coding |
| ENSMUST00000144738 | 0 | 0 | 289   | Gm15726       | antisense      |
| ENSMUST00000151220 | 0 | 0 | 246   | 4932702P03Rik | antisense      |
| ENSMUST00000156329 | 0 | 0 | 240   | 4933414I15Rik | protein_coding |
| ENSMUST00000065797 | 0 | 0 | 176   | Chst1         | protein_coding |
| ENSMUST00000129642 | 0 | 0 | 169   | Mid1          | protein_coding |
| ENSMUST00000113582 | 0 | 0 | 133   | Mgll          | protein_coding |
| ENSMUST00000140826 | 0 | 0 | 133   | Gm12462       | antisense      |



|                     |   |   |     |               |                      |
|---------------------|---|---|-----|---------------|----------------------|
| ENSMUST00000164148  | 0 | 0 | 131 | Gm46          | protein_coding       |
| ENSMUST00000116666  | 0 | 0 | 111 | Tcp10b        | protein_coding       |
| ENSMUST00000129709  | 0 | 0 | 105 | Tcp10a        | protein_coding       |
| ENSMUST00000141375  | 0 | 0 | 101 | Gm13307       | antisense            |
| ENSMUST00000144296  | 0 | 0 | 97  | Ephb4         | protein_coding       |
| ENSMUST00000009039  | 0 | 0 | 91  | Rpl30         | protein_coding       |
| ENSMUST00000151062  | 0 | 0 | 81  | Hmgxb4        | protein_coding       |
| ENSMUST00000069949  | 0 | 0 | 79  | Hnrmpa2b1     | protein_coding       |
| ENSMUST00000143795  | 0 | 0 | 77  | Fam78a        | protein_coding       |
| ENSMUST00000148642  | 0 | 0 | 77  | Stx8          | protein_coding       |
| ENSMUST00000176651  | 0 | 0 | 73  | Atp2c1        | protein_coding       |
| ENSMUST00000057896  | 0 | 0 | 69  | Gxylt1        | protein_coding       |
| ENSMUST00000137505  | 0 | 0 | 67  | Hspa5         | processed_transcript |
| ENSMUST00000137505  | 0 | 0 | 67  | Hspa5         | processed_transcript |
| ENSMUST00000143151  | 0 | 0 | 67  | Fytd1         | protein_coding       |
| ENSMUST00000112621  | 0 | 0 | 63  | Ccdc93        | protein_coding       |
| ENSMUST00000123311  | 0 | 0 | 63  | Yipf3         | protein_coding       |
| ENSMUST00000128706  | 0 | 0 | 63  | Tcf4          | protein_coding       |
| ENSMUST00000151458  | 0 | 0 | 63  | Naa25         | protein_coding       |
| ENSMUST00000177316  | 0 | 0 | 61  | Nptxr         | protein_coding       |
| ENSMUST00000177316  | 0 | 0 | 61  | Nptxr         | protein_coding       |
| ENSMUST00000141215  | 0 | 0 | 61  | Pdss1         | protein_coding       |
| ENSMUST00000153425  | 0 | 0 | 61  | Sfi1          | protein_coding       |
| ENSMUST00000132630  | 0 | 0 | 59  | Nr2f6         | protein_coding       |
| ENSMUST00000150657  | 0 | 0 | 59  | Hnrmp1        | protein_coding       |
| ENSMUST00000091493  | 0 | 0 | 56  | Zdhhc11       | protein_coding       |
| ENSMUST00000136507  | 0 | 0 | 56  | Psph          | protein_coding       |
| ENSMUST00000155207  | 0 | 0 | 54  | Morf4l2       | protein_coding       |
| ENSMUST00000182149  | 0 | 0 | 52  | Prrc2c        | protein_coding       |
| ENSMUST00000123272  | 0 | 0 | 52  | Foxd2os       | processed_transcript |
| ENSMUST00000072777  | 0 | 0 | 48  | Hmga2         | protein_coding       |
| ENSMUST00000148720  | 0 | 0 | 48  | Stox1         | protein_coding       |
| ENSMUST00000155617  | 0 | 0 | 48  | 2210013O21Rik | processed_transcript |
| ENSMUST00000172619  | 0 | 0 | 46  | Tapbp         | protein_coding       |
| ENSMUST00000049845  | 0 | 0 | 44  | Plxna1        | protein_coding       |
| ENSMUST00000161991  | 0 | 0 | 44  | Tbc1d4        | protein_coding       |
| ENSMUST00000042942  | 0 | 0 | 42  | Sec23ip       | protein_coding       |
| ENSMUST00000081823  | 0 | 0 | 42  | Myc15         | protein_coding       |
| ENSMUST00000109096  | 0 | 0 | 42  | Gnas          | protein_coding       |
| ENSMUST00000112797  | 0 | 0 | 42  | D830030K20Rik | protein_coding       |
| ENSMUST00000114774  | 0 | 0 | 42  | Gpr113        | protein_coding       |
| ENSMUST00000128735  | 0 | 0 | 42  | Cntd1         | protein_coding       |
| ENSMUST00000164459  | 0 | 0 | 42  | Gm3278        | protein_coding       |
| ENSMUST00000169555  | 0 | 0 | 42  | Gm3755        | protein_coding       |
| ENSMUST00000170639  | 0 | 0 | 42  | Gm3043        | protein_coding       |
| ENSMUST00000025590  | 0 | 0 | 40  | Osbp          | protein_coding       |
| ENSMUST00000049966  | 0 | 0 | 40  | Copg1         | protein_coding       |
| ENSMUST00000107305  | 0 | 0 | 40  | Hdgfrp3       | protein_coding       |
| ENSMUST00000117847  | 0 | 0 | 40  | Ccdc64        | protein_coding       |
| ENSMUST00000111070  | 0 | 0 | 38  | Pnpla6        | protein_coding       |
| ENSMUST00000112770  | 0 | 0 | 38  | 4930555G01Rik | protein_coding       |
| ENSMUST00000127119  | 0 | 0 | 38  | Sh3bp5l       | protein_coding       |
| ENSMUST00000159152  | 0 | 0 | 38  | 2010111I01Rik | protein_coding       |
| ENSMUST00000159552  | 0 | 0 | 38  | Dab2          | protein_coding       |
| ENSMUST00000182589  | 0 | 0 | 38  | Plce1         | protein_coding       |
| ENSMUST00000122988  | 0 | 0 | 38  | Gm2800        | lincRNA              |
| ENSMUST0000019074   | 0 | 0 | 36  | Ccl4          | protein_coding       |
| ENSMUST000000066760 | 0 | 0 | 36  | Senp3         | protein_coding       |
| ENSMUST00000066936  | 0 | 0 | 36  | Gpsm1         | protein_coding       |
| ENSMUST00000106291  | 0 | 0 | 36  | Ube2d3        | protein_coding       |
| ENSMUST00000120672  | 0 | 0 | 36  | Ercc8         | protein_coding       |
| ENSMUST00000140032  | 0 | 0 | 36  | Ifitm10       | protein_coding       |
| ENSMUST00000140770  | 0 | 0 | 36  | Plekhd1       | protein_coding       |
| ENSMUST00000161805  | 0 | 0 | 36  | Fxyd5         | protein_coding       |
| ENSMUST00000163336  | 0 | 0 | 36  | Ncoa4         | protein_coding       |
| ENSMUST00000173278  | 0 | 0 | 36  | Gm8750        | processed_pseudogene |
| ENSMUST00000173427  | 0 | 0 | 36  | Gm8752        | processed_pseudogene |
| ENSMUST00000062495  | 0 | 0 | 34  | Cdcp2         | protein_coding       |

|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUST00000118286 | 0 | 0 | 34 Mfn1          | protein_coding                     |
| ENSMUST00000123237 | 0 | 0 | 34 Usp33         | protein_coding                     |
| ENSMUST00000124342 | 0 | 0 | 34 Gbas          | protein_coding                     |
| ENSMUST00000129190 | 0 | 0 | 34 Kansl1l       | protein_coding                     |
| ENSMUST00000129819 | 0 | 0 | 34 Nphp3         | protein_coding                     |
| ENSMUST00000147405 | 0 | 0 | 34 Bbs9          | protein_coding                     |
| ENSMUST00000165375 | 0 | 0 | 34 Hoxc4         | protein_coding                     |
| ENSMUST00000166956 | 0 | 0 | 34 Skor2         | protein_coding                     |
| ENSMUST00000167489 | 0 | 0 | 34 Spdef         | protein_coding                     |
| ENSMUST0000022296  | 0 | 0 | 32 Ube2e1        | protein_coding                     |
| ENSMUST0000028804  | 0 | 0 | 32 Cdc25b        | protein_coding                     |
| ENSMUST00000064447 | 0 | 0 | 32 Nup188        | protein_coding                     |
| ENSMUST00000065856 | 0 | 0 | 32 Hunk          | protein_coding                     |
| ENSMUST00000087605 | 0 | 0 | 32 Myo1f         | protein_coding                     |
| ENSMUST00000113900 | 0 | 0 | 32 Slc4a5        | protein_coding                     |
| ENSMUST00000130418 | 0 | 0 | 32 Aldh1l1       | protein_coding                     |
| ENSMUST00000151945 | 0 | 0 | 32 Gm16876       | antisense                          |
| ENSMUST00000001181 | 0 | 0 | 30 Col6a2        | protein_coding                     |
| ENSMUST00000028799 | 0 | 0 | 30 Casc5         | protein_coding                     |
| ENSMUST00000057927 | 0 | 0 | 30 Rasip1        | protein_coding                     |
| ENSMUST00000060441 | 0 | 0 | 30 Pik3r6        | protein_coding                     |
| ENSMUST00000064853 | 0 | 0 | 30 1700030K09Rik | protein_coding                     |
| ENSMUST00000106804 | 0 | 0 | 30 1700024P16Rik | protein_coding                     |
| ENSMUST00000126406 | 0 | 0 | 30 Mettl20       | protein_coding                     |
| ENSMUST00000156198 | 0 | 0 | 30 Rassf1        | protein_coding                     |
| ENSMUST00000159572 | 0 | 0 | 30 Nmrk1         | protein_coding                     |
| ENSMUST00000183070 | 0 | 0 | 30 Nktr          | protein_coding                     |
| ENSMUST00000145240 | 0 | 0 | 30 Gm12940       | processed_transcript               |
| ENSMUST00000150777 | 0 | 0 | 30 Atad3aos      | antisense                          |
| ENSMUST00000160674 | 0 | 0 | 28 Gm7592        | transcribed_unprocessed_pseudogene |
| ENSMUST00000020278 | 0 | 0 | 28 Tacr2         | protein_coding                     |
| ENSMUST00000037636 | 0 | 0 | 28 Ina           | protein_coding                     |
| ENSMUST00000061639 | 0 | 0 | 28 Spty2d1       | protein_coding                     |
| ENSMUST00000120101 | 0 | 0 | 28 Pxylp1        | protein_coding                     |
| ENSMUST00000123187 | 0 | 0 | 28 Adarb2        | protein_coding                     |
| ENSMUST00000137169 | 0 | 0 | 28 Depdc5        | protein_coding                     |
| ENSMUST00000139244 | 0 | 0 | 28 Swt1          | protein_coding                     |
| ENSMUST00000140030 | 0 | 0 | 28 Camta1        | protein_coding                     |
| ENSMUST00000149770 | 0 | 0 | 28 Rai1          | protein_coding                     |
| ENSMUST00000154793 | 0 | 0 | 28 Nckap1        | protein_coding                     |
| ENSMUST00000159775 | 0 | 0 | 28 Tbc1d31       | protein_coding                     |
| ENSMUST00000162294 | 0 | 0 | 28 Tepp          | protein_coding                     |
| ENSMUST00000162633 | 0 | 0 | 28 Fez1          | protein_coding                     |
| ENSMUST00000127563 | 0 | 0 | 28 Gm13822       | antisense                          |
| ENSMUST00000020969 | 0 | 0 | 26 Cmpk2         | protein_coding                     |
| ENSMUST00000025681 | 0 | 0 | 26 Cdc42bpg      | protein_coding                     |
| ENSMUST00000032809 | 0 | 0 | 26 Yif1b         | protein_coding                     |
| ENSMUST00000038498 | 0 | 0 | 26 Bag4          | protein_coding                     |
| ENSMUST00000050101 | 0 | 0 | 26 Zfp322a       | protein_coding                     |
| ENSMUST00000050949 | 0 | 0 | 26 Tmco4         | protein_coding                     |
| ENSMUST00000051614 | 0 | 0 | 26 Adam24        | protein_coding                     |
| ENSMUST00000100866 | 0 | 0 | 26 E130309D14Rik | protein_coding                     |
| ENSMUST00000107353 | 0 | 0 | 26 Zfp592        | protein_coding                     |
| ENSMUST00000107659 | 0 | 0 | 26 Nfe2l1        | protein_coding                     |
| ENSMUST00000117330 | 0 | 0 | 26 Ick           | protein_coding                     |
| ENSMUST00000123467 | 0 | 0 | 26 Ssrp1         | protein_coding                     |
| ENSMUST00000129119 | 0 | 0 | 26 Dlgap2        | protein_coding                     |
| ENSMUST00000136792 | 0 | 0 | 26 Rragd         | protein_coding                     |
| ENSMUST00000139405 | 0 | 0 | 26 Frs3          | protein_coding                     |
| ENSMUST00000141164 | 0 | 0 | 26 Prdm16        | protein_coding                     |
| ENSMUST00000150266 | 0 | 0 | 26 Ttc17         | protein_coding                     |
| ENSMUST00000154158 | 0 | 0 | 26 Scrn3         | protein_coding                     |
| ENSMUST00000154562 | 0 | 0 | 26 Gpkow         | protein_coding                     |
| ENSMUST00000161293 | 0 | 0 | 26 Ano2          | protein_coding                     |
| ENSMUST00000170656 | 0 | 0 | 26 Ap2a1         | protein_coding                     |
| ENSMUST00000175644 | 0 | 0 | 26 Trub2         | protein_coding                     |
| ENSMUST00000184908 | 0 | 0 | 26 Pou6f1        | protein_coding                     |
| ENSMUST00000133471 | 0 | 0 | 26 E330012B07Rik | lincRNA                            |

|                    |   |   |    |               |                                  |
|--------------------|---|---|----|---------------|----------------------------------|
| ENSMUST00000140989 | 0 | 0 | 26 | Gm11789       | antisense                        |
| ENSMUST00000183295 | 0 | 0 | 24 | Gm4832        | transcribed_processed_pseudogene |
| ENSMUST00000002291 | 0 | 0 | 24 | Paxip1        | protein_coding                   |
| ENSMUST00000017604 | 0 | 0 | 24 | Cyba          | protein_coding                   |
| ENSMUST00000020255 | 0 | 0 | 24 | Slc5a8        | protein_coding                   |
| ENSMUST00000022781 | 0 | 0 | 24 | Dad1          | protein_coding                   |
| ENSMUST00000031055 | 0 | 0 | 24 | Emilin1       | protein_coding                   |
| ENSMUST00000039744 | 0 | 0 | 24 | Ln timer      | protein_coding                   |
| ENSMUST00000045557 | 0 | 0 | 24 | Slc7a5        | protein_coding                   |
| ENSMUST00000045855 | 0 | 0 | 24 | Hebp1         | protein_coding                   |
| ENSMUST00000061856 | 0 | 0 | 24 | Gpam          | protein_coding                   |
| ENSMUST00000099178 | 0 | 0 | 24 | Cbfa2t2       | protein_coding                   |
| ENSMUST00000111169 | 0 | 0 | 24 | Cenpo         | protein_coding                   |
| ENSMUST00000112010 | 0 | 0 | 24 | Atf2          | protein_coding                   |
| ENSMUST00000122916 | 0 | 0 | 24 | Tmem106b      | protein_coding                   |
| ENSMUST00000126215 | 0 | 0 | 24 | Ncbp2         | protein_coding                   |
| ENSMUST00000142436 | 0 | 0 | 24 | Gapvd1        | protein_coding                   |
| ENSMUST00000143054 | 0 | 0 | 24 | Taf13         | protein_coding                   |
| ENSMUST00000143472 | 0 | 0 | 24 | Capn7         | protein_coding                   |
| ENSMUST00000164309 | 0 | 0 | 24 | Mcm5          | protein_coding                   |
| ENSMUST00000177357 | 0 | 0 | 24 | Meis1         | protein_coding                   |
| ENSMUST00000181579 | 0 | 0 | 24 | Tmem234       | protein_coding                   |
| ENSMUST00000132184 | 0 | 0 | 24 | Gm16153       | processed_transcript             |
| ENSMUST00000156376 | 0 | 0 | 24 | 1700013N06Rik | lincRNA                          |
| ENSMUST00000181903 | 0 | 0 | 24 | 2900076A07Rik | lincRNA                          |
| ENSMUST00000129108 | 0 | 0 | 24 | Tbx3os1       | antisense                        |
| ENSMUST00000154775 | 0 | 0 | 24 | Gm15638       | antisense                        |
| ENSMUST00000009358 | 0 | 0 | 22 | Tmem8c        | protein_coding                   |
| ENSMUST00000021016 | 0 | 0 | 22 | Hnf1b         | protein_coding                   |
| ENSMUST00000021866 | 0 | 0 | 22 | Riok1         | protein_coding                   |
| ENSMUST00000032566 | 0 | 0 | 22 | Qpctl         | protein_coding                   |
| ENSMUST00000034093 | 0 | 0 | 22 | Eif2ak3       | protein_coding                   |
| ENSMUST00000038104 | 0 | 0 | 22 | Bdp1          | protein_coding                   |
| ENSMUST00000048249 | 0 | 0 | 22 | Ndufa7        | protein_coding                   |
| ENSMUST00000061052 | 0 | 0 | 22 | Atat1         | protein_coding                   |
| ENSMUST00000091848 | 0 | 0 | 22 | Akr1e1        | protein_coding                   |
| ENSMUST00000092663 | 0 | 0 | 22 | Atp6v0a1      | protein_coding                   |
| ENSMUST00000092706 | 0 | 0 | 22 | Cdc6          | protein_coding                   |
| ENSMUST00000106176 | 0 | 0 | 22 | Gnl2          | protein_coding                   |
| ENSMUST00000115511 | 0 | 0 | 22 | Phf14         | protein_coding                   |
| ENSMUST00000122886 | 0 | 0 | 22 | Gas2l1        | protein_coding                   |
| ENSMUST00000123228 | 0 | 0 | 22 | Sema6a        | protein_coding                   |
| ENSMUST00000123418 | 0 | 0 | 22 | Ank1          | protein_coding                   |
| ENSMUST00000124369 | 0 | 0 | 22 | Ptpr          | protein_coding                   |
| ENSMUST00000125270 | 0 | 0 | 22 | Nsf11c        | protein_coding                   |
| ENSMUST00000140149 | 0 | 0 | 22 | Enpp6         | protein_coding                   |
| ENSMUST00000160699 | 0 | 0 | 22 | Rnf214        | protein_coding                   |
| ENSMUST00000160814 | 0 | 0 | 22 | Dmrt1         | protein_coding                   |
| ENSMUST00000162126 | 0 | 0 | 22 | Rnf26         | protein_coding                   |
| ENSMUST00000162685 | 0 | 0 | 22 | Cnih3         | protein_coding                   |
| ENSMUST00000163075 | 0 | 0 | 22 | Pip5k1c       | protein_coding                   |
| ENSMUST00000164166 | 0 | 0 | 22 | Cct3          | protein_coding                   |
| ENSMUST00000164509 | 0 | 0 | 22 | Vldlr         | protein_coding                   |
| ENSMUST00000165824 | 0 | 0 | 22 | 2810459M11Rik | protein_coding                   |
| ENSMUST00000167164 | 0 | 0 | 22 | Grm5          | protein_coding                   |
| ENSMUST00000171205 | 0 | 0 | 22 | Spag1         | protein_coding                   |
| ENSMUST00000117741 | 0 | 0 | 20 | Gm16242       | unprocessed_pseudogene           |
| ENSMUST00000076633 | 0 | 0 | 20 | Gm10364       | transcribed_processed_pseudogene |
| ENSMUST00000000291 | 0 | 0 | 20 | Mnt           | protein_coding                   |
| ENSMUST00000001254 | 0 | 0 | 20 | Slc26a3       | protein_coding                   |
| ENSMUST00000020824 | 0 | 0 | 20 | Rps6kb1       | protein_coding                   |
| ENSMUST00000024627 | 0 | 0 | 20 | Chd1          | protein_coding                   |
| ENSMUST00000025239 | 0 | 0 | 20 | Bin1          | protein_coding                   |
| ENSMUST00000027507 | 0 | 0 | 20 | Pdcd1         | protein_coding                   |
| ENSMUST00000028494 | 0 | 0 | 20 | Phospho2      | protein_coding                   |
| ENSMUST00000030893 | 0 | 0 | 20 | Dffb          | protein_coding                   |
| ENSMUST00000033087 | 0 | 0 | 20 | Ruvbl2        | protein_coding                   |
| ENSMUST00000033570 | 0 | 0 | 20 | Igbbp1        | protein_coding                   |

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| ENSMUST00000038574  | 0 | 0 | 20 Dhx29         | protein_coding |
| ENSMUST00000051839  | 0 | 0 | 20 Hepacam       | protein_coding |
| ENSMUST00000063882  | 0 | 0 | 20 Dcun1d4       | protein_coding |
| ENSMUST00000082088  | 0 | 0 | 20 Mamld1        | protein_coding |
| ENSMUST00000087033  | 0 | 0 | 20 Igj           | protein_coding |
| ENSMUST00000102822  | 0 | 0 | 20 Nrp2          | protein_coding |
| ENSMUST00000106111  | 0 | 0 | 20 Jakmip3       | protein_coding |
| ENSMUST00000107164  | 0 | 0 | 20 Cd300lg       | protein_coding |
| ENSMUST00000107508  | 0 | 0 | 20 Gsdma3        | protein_coding |
| ENSMUST00000111002  | 0 | 0 | 20 Fbxo24        | protein_coding |
| ENSMUST00000117699  | 0 | 0 | 20 Htr1d         | protein_coding |
| ENSMUST00000123540  | 0 | 0 | 20 Fundc2        | protein_coding |
| ENSMUST00000126465  | 0 | 0 | 20 Palm2Akap2    | protein_coding |
| ENSMUST00000128889  | 0 | 0 | 20 Tpt1          | protein_coding |
| ENSMUST00000128997  | 0 | 0 | 20 Pdpk1         | protein_coding |
| ENSMUST00000140474  | 0 | 0 | 20 Kmo           | protein_coding |
| ENSMUST00000142198  | 0 | 0 | 20 Dnajc11       | protein_coding |
| ENSMUST00000150422  | 0 | 0 | 20 Mllt10        | protein_coding |
| ENSMUST00000160344  | 0 | 0 | 20 Tmem120b      | protein_coding |
| ENSMUST00000162085  | 0 | 0 | 20 Tmem191c      | protein_coding |
| ENSMUST00000173342  | 0 | 0 | 20 Zic4          | protein_coding |
| ENSMUST00000175972  | 0 | 0 | 20 1700006E09Rik | protein_coding |
| ENSMUST00000177974  | 0 | 0 | 20 Atp2a2        | protein_coding |
| ENSMUST00000184445  | 0 | 0 | 20 Il6st         | protein_coding |
| ENSMUST00000159053  | 0 | 0 | 20 Pitpnm2os2    | lincRNA        |
| ENSMUST00000168525  | 0 | 0 | 20 4930463O16Rik | lincRNA        |
| ENSMUST00000125829  | 0 | 0 | 20 Gm15729       | antisense      |
| ENSMUST00000181473  | 0 | 0 | 18 F630040L22Rik | lincRNA        |
| ENSMUST00000181473  | 0 | 0 | 18 F630040L22Rik | lincRNA        |
| ENSMUST00000009798  | 0 | 0 | 18 Oit3          | protein_coding |
| ENSMUST00000017348  | 0 | 0 | 18 Gsdma         | protein_coding |
| ENSMUST000000022419 | 0 | 0 | 18 Ppif          | protein_coding |
| ENSMUST000000029665 | 0 | 0 | 18 Dkk2          | protein_coding |
| ENSMUST000000031318 | 0 | 0 | 18 Cxcl5         | protein_coding |
| ENSMUST000000031663 | 0 | 0 | 18 C8b           | protein_coding |
| ENSMUST000000033941 | 0 | 0 | 18 Plat          | protein_coding |
| ENSMUST000000044163 | 0 | 0 | 18 Cnot4         | protein_coding |
| ENSMUST000000048657 | 0 | 0 | 18 Sec24c        | protein_coding |
| ENSMUST000000050027 | 0 | 0 | 18 Nov           | protein_coding |
| ENSMUST000000051691 | 0 | 0 | 18 Slk           | protein_coding |
| ENSMUST000000054764 | 0 | 0 | 18 Suox          | protein_coding |
| ENSMUST000000070720 | 0 | 0 | 18 Sorcs2        | protein_coding |
| ENSMUST000000074875 | 0 | 0 | 18 Bcas3         | protein_coding |
| ENSMUST000000077320 | 0 | 0 | 18 Zbed5         | protein_coding |
| ENSMUST000000085679 | 0 | 0 | 18 Arpc1b        | protein_coding |
| ENSMUST000000089558 | 0 | 0 | 18 Snrpg         | protein_coding |
| ENSMUST000000097430 | 0 | 0 | 18 Sytl3         | protein_coding |
| ENSMUST00000102508  | 0 | 0 | 18 Capzb         | protein_coding |
| ENSMUST00000105637  | 0 | 0 | 18 Prdm16        | protein_coding |
| ENSMUST00000107111  | 0 | 0 | 18 Elavl2        | protein_coding |
| ENSMUST00000108271  | 0 | 0 | 18 Mecom         | protein_coding |
| ENSMUST00000108278  | 0 | 0 | 18 Fbxo17        | protein_coding |
| ENSMUST00000109787  | 0 | 0 | 18 Zmiz2         | protein_coding |
| ENSMUST00000110918  | 0 | 0 | 18 BC052040      | protein_coding |
| ENSMUST00000111810  | 0 | 0 | 18 Rgs8          | protein_coding |
| ENSMUST00000112584  | 0 | 0 | 18 Kdm5c         | protein_coding |
| ENSMUST00000113026  | 0 | 0 | 18 Rnf128        | protein_coding |
| ENSMUST00000113222  | 0 | 0 | 18 Stxbp1        | protein_coding |
| ENSMUST00000124278  | 0 | 0 | 18 Casp8ap2      | protein_coding |
| ENSMUST00000125454  | 0 | 0 | 18 Timm17a       | protein_coding |
| ENSMUST00000129227  | 0 | 0 | 18 Zscan10       | protein_coding |
| ENSMUST00000132974  | 0 | 0 | 18 Atp11a        | protein_coding |
| ENSMUST00000133743  | 0 | 0 | 18 Lrrk2         | protein_coding |
| ENSMUST00000134153  | 0 | 0 | 18 Clmp          | protein_coding |
| ENSMUST00000140186  | 0 | 0 | 18 Eif4a1        | protein_coding |
| ENSMUST00000143868  | 0 | 0 | 18 Kdm1b         | protein_coding |
| ENSMUST00000144527  | 0 | 0 | 18 Vps4a         | protein_coding |
| ENSMUST00000145195  | 0 | 0 | 18 Slc9b2        | protein_coding |

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| ENSMUST00000148647 | 0 | 0 | 18 Usp45         | protein_coding       |
| ENSMUST00000152053 | 0 | 0 | 18 Shkbp1        | protein_coding       |
| ENSMUST00000154551 | 0 | 0 | 18 Arhgap26      | protein_coding       |
| ENSMUST00000155854 | 0 | 0 | 18 Ccdc88a       | protein_coding       |
| ENSMUST00000161388 | 0 | 0 | 18 B3glt         | protein_coding       |
| ENSMUST00000162761 | 0 | 0 | 18 Car7          | protein_coding       |
| ENSMUST00000163803 | 0 | 0 | 18 Vmn2r63       | protein_coding       |
| ENSMUST00000164232 | 0 | 0 | 18 Gm6401        | protein_coding       |
| ENSMUST00000164967 | 0 | 0 | 18 Gm7954        | protein_coding       |
| ENSMUST00000165349 | 0 | 0 | 18 Gm8082        | protein_coding       |
| ENSMUST00000166110 | 0 | 0 | 18 Gm17654       | protein_coding       |
| ENSMUST00000166411 | 0 | 0 | 18 Ssb           | protein_coding       |
| ENSMUST00000167712 | 0 | 0 | 18 Gm3072        | protein_coding       |
| ENSMUST00000168128 | 0 | 0 | 18 Gm6482        | protein_coding       |
| ENSMUST00000171202 | 0 | 0 | 18 Gm17027       | protein_coding       |
| ENSMUST00000171700 | 0 | 0 | 18 Aspscr1       | protein_coding       |
| ENSMUST00000177301 | 0 | 0 | 18 Cct8          | protein_coding       |
| ENSMUST00000178711 | 0 | 0 | 18 Gm7929        | protein_coding       |
| ENSMUST00000179803 | 0 | 0 | 18 Gm3015        | protein_coding       |
| ENSMUST00000180036 | 0 | 0 | 18 Oaz1          | protein_coding       |
| ENSMUST00000183249 | 0 | 0 | 18 Birc6         | protein_coding       |
| ENSMUST00000184067 | 0 | 0 | 18 Col27a1       | protein_coding       |
| ENSMUST00000156664 | 0 | 0 | 18 Gm16091       | processed_transcript |
| ENSMUST00000020222 | 0 | 0 | 18 4930463O16Rik | lincRNA              |
| ENSMUST00000123107 | 0 | 0 | 18 0610043K17Rik | lincRNA              |
| ENSMUST00000140009 | 0 | 0 | 18 Gm13905       | lincRNA              |
| ENSMUST00000180412 | 0 | 0 | 18 A930038B10Rik | lincRNA              |
| ENSMUST00000125068 | 0 | 0 | 18 Gm12120       | antisense            |
| ENSMUST00000135347 | 0 | 0 | 18 Frmd8os       | antisense            |
| ENSMUST00000136820 | 0 | 0 | 18 Gm11571       | antisense            |
| ENSMUST00000142723 | 0 | 0 | 18 Gm16365       | antisense            |
| ENSMUST00000143595 | 0 | 0 | 18 Gm16277       | antisense            |
| ENSMUST00000001485 | 0 | 0 | 16 Mrpl10        | protein_coding       |
| ENSMUST00000007340 | 0 | 0 | 16 Atp12a        | protein_coding       |
| ENSMUST00000017153 | 0 | 0 | 16 Sdc4          | protein_coding       |
| ENSMUST00000018407 | 0 | 0 | 16 Tbx5          | protein_coding       |
| ENSMUST00000018569 | 0 | 0 | 16 Dhx40         | protein_coding       |
| ENSMUST00000020490 | 0 | 0 | 16 Wdr82         | protein_coding       |
| ENSMUST00000020908 | 0 | 0 | 16 E2f6          | protein_coding       |
| ENSMUST00000021289 | 0 | 0 | 16 Glp2r         | protein_coding       |
| ENSMUST00000022906 | 0 | 0 | 16 Fzd6          | protein_coding       |
| ENSMUST00000032800 | 0 | 0 | 16 Tyrobp        | protein_coding       |
| ENSMUST00000034411 | 0 | 0 | 16 Med17         | protein_coding       |
| ENSMUST00000037541 | 0 | 0 | 16 Dgat2l6       | protein_coding       |
| ENSMUST00000043440 | 0 | 0 | 16 Igsf23        | protein_coding       |
| ENSMUST00000044081 | 0 | 0 | 16 Papd7         | protein_coding       |
| ENSMUST00000056136 | 0 | 0 | 16 Kcnj10        | protein_coding       |
| ENSMUST00000061568 | 0 | 0 | 16 Slc36a4       | protein_coding       |
| ENSMUST00000063694 | 0 | 0 | 16 Klf13         | protein_coding       |
| ENSMUST00000063888 | 0 | 0 | 16 Pld4          | protein_coding       |
| ENSMUST00000071880 | 0 | 0 | 16 Myo15         | protein_coding       |
| ENSMUST00000072093 | 0 | 0 | 16 Plxnb1        | protein_coding       |
| ENSMUST00000072875 | 0 | 0 | 16 Srsf11        | protein_coding       |
| ENSMUST00000076251 | 0 | 0 | 16 Zfp865        | protein_coding       |
| ENSMUST00000076889 | 0 | 0 | 16 Gnb5          | protein_coding       |
| ENSMUST00000079791 | 0 | 0 | 16 Pcyt1a        | protein_coding       |
| ENSMUST00000085453 | 0 | 0 | 16 Rasl12        | protein_coding       |
| ENSMUST00000089027 | 0 | 0 | 16 Tm9sf4        | protein_coding       |
| ENSMUST00000093944 | 0 | 0 | 16 Hoxb3         | protein_coding       |
| ENSMUST00000097843 | 0 | 0 | 16 Cnr2          | protein_coding       |
| ENSMUST00000099373 | 0 | 0 | 16 Cnnm2         | protein_coding       |
| ENSMUST00000107091 | 0 | 0 | 16 Fggy          | protein_coding       |
| ENSMUST00000112414 | 0 | 0 | 16 Acrbp         | protein_coding       |
| ENSMUST00000112886 | 0 | 0 | 16 Dzip1l        | protein_coding       |
| ENSMUST00000115011 | 0 | 0 | 16 Lman2l        | protein_coding       |
| ENSMUST00000115150 | 0 | 0 | 16 Rhox10        | protein_coding       |
| ENSMUST00000115737 | 0 | 0 | 16 Paip2         | protein_coding       |
| ENSMUST00000119543 | 0 | 0 | 16 Tm6sf1        | protein_coding       |

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| ENSMUST00000123335 | 0 | 0 | 16 | Odf2          | protein_coding |
| ENSMUST00000124114 | 0 | 0 | 16 | Car9          | protein_coding |
| ENSMUST00000128873 | 0 | 0 | 16 | Gmpr          | protein_coding |
| ENSMUST00000130946 | 0 | 0 | 16 | Hnmpm         | protein_coding |
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| ENSMUST00000132507 | 0 | 0 | 16 | Glb1l         | protein_coding |
| ENSMUST00000133887 | 0 | 0 | 16 | Itgb6         | protein_coding |
| ENSMUST00000140918 | 0 | 0 | 16 | Fgd2          | protein_coding |
| ENSMUST00000144767 | 0 | 0 | 16 | G2e3          | protein_coding |
| ENSMUST00000145213 | 0 | 0 | 16 | Ap1m1         | protein_coding |
| ENSMUST00000145304 | 0 | 0 | 16 | Myom3         | protein_coding |
| ENSMUST00000151594 | 0 | 0 | 16 | Cd4           | protein_coding |
| ENSMUST00000155247 | 0 | 0 | 16 | Sdcbp         | protein_coding |
| ENSMUST00000155933 | 0 | 0 | 16 | Slc16a9       | protein_coding |
| ENSMUST00000160619 | 0 | 0 | 16 | Arhgef10      | protein_coding |
| ENSMUST00000167374 | 0 | 0 | 16 | Ripk1         | protein_coding |
| ENSMUST00000168387 | 0 | 0 | 16 | Dysf          | protein_coding |
| ENSMUST00000168786 | 0 | 0 | 16 | Iqsec2        | protein_coding |
| ENSMUST00000171210 | 0 | 0 | 16 | Rad51b        | protein_coding |
| ENSMUST00000176445 | 0 | 0 | 16 | Gclm          | protein_coding |
| ENSMUST00000185052 | 0 | 0 | 16 | Mef2c         | protein_coding |
| ENSMUST00000180815 | 0 | 0 | 16 | 4930471D02Rik | lincRNA        |
| ENSMUST00000154067 | 0 | 0 | 16 | 1700026D11Rik | antisense      |
| ENSMUST00000000590 | 0 | 0 | 14 | Rdx           | protein_coding |
| ENSMUST00000007248 | 0 | 0 | 14 | Hspa1l        | protein_coding |
| ENSMUST00000017077 | 0 | 0 | 14 | Plcg1         | protein_coding |
| ENSMUST00000019075 | 0 | 0 | 14 | Natd1         | protein_coding |
| ENSMUST00000021028 | 0 | 0 | 14 | Itgb3         | protein_coding |
| ENSMUST00000021527 | 0 | 0 | 14 | Prkch         | protein_coding |
| ENSMUST00000026081 | 0 | 0 | 14 | Pnliprp2      | protein_coding |
| ENSMUST00000026225 | 0 | 0 | 14 | Sema4g        | protein_coding |
| ENSMUST00000026989 | 0 | 0 | 14 | 4833439L19Rik | protein_coding |
| ENSMUST00000027247 | 0 | 0 | 14 | Pdcl3         | protein_coding |
| ENSMUST00000027690 | 0 | 0 | 14 | Avpr1b        | protein_coding |
| ENSMUST00000029377 | 0 | 0 | 14 | Tm4sf4        | protein_coding |
| ENSMUST00000030964 | 0 | 0 | 14 | Cd38          | protein_coding |
| ENSMUST00000034429 | 0 | 0 | 14 | Tmem231       | protein_coding |
| ENSMUST00000035812 | 0 | 0 | 14 | Ttl           | protein_coding |
| ENSMUST00000041569 | 0 | 0 | 14 | Ccdc113       | protein_coding |
| ENSMUST00000042808 | 0 | 0 | 14 | Scarf1        | protein_coding |
| ENSMUST00000048896 | 0 | 0 | 14 | Fbrs          | protein_coding |
| ENSMUST00000049822 | 0 | 0 | 14 | Them4         | protein_coding |
| ENSMUST00000053177 | 0 | 0 | 14 | Wdfy3         | protein_coding |
| ENSMUST00000061590 | 0 | 0 | 14 | Intu          | protein_coding |
| ENSMUST00000062678 | 0 | 0 | 14 | Rrp1          | protein_coding |
| ENSMUST00000070575 | 0 | 0 | 14 | Csnk1d        | protein_coding |
| ENSMUST00000080872 | 0 | 0 | 14 | Gm10030       | protein_coding |
| ENSMUST00000081497 | 0 | 0 | 14 | Pop5          | protein_coding |
| ENSMUST00000087723 | 0 | 0 | 14 | Notch3        | protein_coding |
| ENSMUST00000091694 | 0 | 0 | 14 | Fam65b        | protein_coding |
| ENSMUST00000106475 | 0 | 0 | 14 | Gbbp111       | protein_coding |
| ENSMUST00000107975 | 0 | 0 | 14 | N28178        | protein_coding |
| ENSMUST00000108595 | 0 | 0 | 14 | Elp5          | protein_coding |
| ENSMUST00000110879 | 0 | 0 | 14 | Mcf2l         | protein_coding |
| ENSMUST00000111297 | 0 | 0 | 14 | Phf21a        | protein_coding |
| ENSMUST00000111665 | 0 | 0 | 14 | Tmx2          | protein_coding |
| ENSMUST00000112730 | 0 | 0 | 14 | Serpinb5      | protein_coding |
| ENSMUST00000114307 | 0 | 0 | 14 | Grin1         | protein_coding |
| ENSMUST00000114922 | 0 | 0 | 14 | Xrcc2         | protein_coding |
| ENSMUST00000116400 | 0 | 0 | 14 | Kansl2        | protein_coding |
| ENSMUST00000117441 | 0 | 0 | 14 | Il12rb2       | protein_coding |
| ENSMUST00000119786 | 0 | 0 | 14 | Kcnt2         | protein_coding |
| ENSMUST00000119825 | 0 | 0 | 14 | Ddr1          | protein_coding |
| ENSMUST00000124152 | 0 | 0 | 14 | Myo19         | protein_coding |
| ENSMUST00000128044 | 0 | 0 | 14 | Ucp3          | protein_coding |
| ENSMUST00000128339 | 0 | 0 | 14 | Sp110         | protein_coding |
| ENSMUST00000133832 | 0 | 0 | 14 | Lrsam1        | protein_coding |
| ENSMUST00000135571 | 0 | 0 | 14 | Cdca8         | protein_coding |

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| ENSMUST00000135743 | 0 | 0 | 14 Bpgm          | protein_coding         |
| ENSMUST00000135795 | 0 | 0 | 14 Tctn3         | protein_coding         |
| ENSMUST00000137119 | 0 | 0 | 14 Kif1c         | protein_coding         |
| ENSMUST00000137266 | 0 | 0 | 14 Inpp4a        | protein_coding         |
| ENSMUST00000138036 | 0 | 0 | 14 Prpf40b       | protein_coding         |
| ENSMUST00000139114 | 0 | 0 | 14 Snrpb2        | protein_coding         |
| ENSMUST00000143343 | 0 | 0 | 14 Dgcr6         | protein_coding         |
| ENSMUST00000146406 | 0 | 0 | 14 Timm17b       | protein_coding         |
| ENSMUST00000146941 | 0 | 0 | 14 Dynll2        | protein_coding         |
| ENSMUST00000148866 | 0 | 0 | 14 Vav3          | protein_coding         |
| ENSMUST00000149477 | 0 | 0 | 14 Dvl2          | protein_coding         |
| ENSMUST00000155123 | 0 | 0 | 14 Phrf1         | protein_coding         |
| ENSMUST00000159797 | 0 | 0 | 14 Lmo7          | protein_coding         |
| ENSMUST00000161517 | 0 | 0 | 14 Gm21970       | protein_coding         |
| ENSMUST00000162665 | 0 | 0 | 14 Pard3         | protein_coding         |
| ENSMUST00000162992 | 0 | 0 | 14 Ercc1         | protein_coding         |
| ENSMUST00000163748 | 0 | 0 | 14 Elf2          | protein_coding         |
| ENSMUST00000166512 | 0 | 0 | 14 Cd200         | protein_coding         |
| ENSMUST00000167588 | 0 | 0 | 14 Trim67        | protein_coding         |
| ENSMUST00000170686 | 0 | 0 | 14 Gm3453        | protein_coding         |
| ENSMUST00000178710 | 0 | 0 | 14 Clasp1        | protein_coding         |
| ENSMUST00000176521 | 0 | 0 | 14 5730480H06Rik | processed_transcript   |
| ENSMUST00000174287 | 0 | 0 | 14 Neat1         | lincRNA                |
| ENSMUST00000181070 | 0 | 0 | 14 A530020G20Rik | lincRNA                |
| ENSMUST00000181723 | 0 | 0 | 14 Gm26721       | lincRNA                |
| ENSMUST00000155684 | 0 | 0 | 14 Fcnaos        | antisense              |
| ENSMUST00000183738 | 0 | 0 | 12 Kiss1         | protein_coding         |
| ENSMUST00000179702 | 0 | 0 | 12 B930078G14Rik | protein_coding         |
| ENSMUST00000183738 | 0 | 0 | 12 Kiss1         | protein_coding         |
| ENSMUST00000179702 | 0 | 0 | 12 B930078G14Rik | protein_coding         |
| ENSMUST00000168736 | 0 | 0 | 12 Speer6-ps1    | unprocessed_pseudogene |
| ENSMUST00000000299 | 0 | 0 | 12 Itgb2         | protein_coding         |
| ENSMUST00000001480 | 0 | 0 | 12 Npepps        | protein_coding         |
| ENSMUST00000002395 | 0 | 0 | 12 Rec8          | protein_coding         |
| ENSMUST00000018287 | 0 | 0 | 12 Mafk          | protein_coding         |
| ENSMUST00000020349 | 0 | 0 | 12 Apc2          | protein_coding         |
| ENSMUST00000023015 | 0 | 0 | 12 Wnt7b         | protein_coding         |
| ENSMUST00000023335 | 0 | 0 | 12 Pvr13         | protein_coding         |
| ENSMUST00000024983 | 0 | 0 | 12 Ift140        | protein_coding         |
| ENSMUST00000026462 | 0 | 0 | 12 Hsd17b6       | protein_coding         |
| ENSMUST00000026735 | 0 | 0 | 12 Ccdc51        | protein_coding         |
| ENSMUST00000026843 | 0 | 0 | 12 Hadha         | protein_coding         |
| ENSMUST00000029540 | 0 | 0 | 12 Npr1          | protein_coding         |
| ENSMUST00000029588 | 0 | 0 | 12 Larf7         | protein_coding         |
| ENSMUST00000030690 | 0 | 0 | 12 Cdca8         | protein_coding         |
| ENSMUST00000031429 | 0 | 0 | 12 P2rx4         | protein_coding         |
| ENSMUST00000031851 | 0 | 0 | 12 Tmem213       | protein_coding         |
| ENSMUST00000034492 | 0 | 0 | 12 Mmp1a         | protein_coding         |
| ENSMUST00000034630 | 0 | 0 | 12 Fez1          | protein_coding         |
| ENSMUST00000034903 | 0 | 0 | 12 Gsta4         | protein_coding         |
| ENSMUST00000036493 | 0 | 0 | 12 Atp1a1        | protein_coding         |
| ENSMUST00000036561 | 0 | 0 | 12 Wdr48         | protein_coding         |
| ENSMUST00000038980 | 0 | 0 | 12 Trrap         | protein_coding         |
| ENSMUST00000039517 | 0 | 0 | 12 Syde2         | protein_coding         |
| ENSMUST00000043011 | 0 | 0 | 12 Fam198a       | protein_coding         |
| ENSMUST00000044790 | 0 | 0 | 12 Foxn4         | protein_coding         |
| ENSMUST00000046662 | 0 | 0 | 12 Gm4847        | protein_coding         |
| ENSMUST00000048781 | 0 | 0 | 12 Pck2          | protein_coding         |
| ENSMUST00000049245 | 0 | 0 | 12 Rbmxl1        | protein_coding         |
| ENSMUST00000049352 | 0 | 0 | 12 Hoxb7         | protein_coding         |
| ENSMUST00000054301 | 0 | 0 | 12 Lipe          | protein_coding         |
| ENSMUST00000055704 | 0 | 0 | 12 Gnai2         | protein_coding         |
| ENSMUST00000057652 | 0 | 0 | 12 Zfp420        | protein_coding         |
| ENSMUST00000060251 | 0 | 0 | 12 Higd1a        | protein_coding         |
| ENSMUST00000061390 | 0 | 0 | 12 Fkrp          | protein_coding         |
| ENSMUST00000064035 | 0 | 0 | 12 Ston1         | protein_coding         |
| ENSMUST00000064214 | 0 | 0 | 12 Rnase9        | protein_coding         |
| ENSMUST00000066387 | 0 | 0 | 12 Rdh8          | protein_coding         |

|                    |   |   |                  |                |
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| ENSMUST00000074416 | 0 | 0 | 12 Prima1        | protein_coding |
| ENSMUST00000075164 | 0 | 0 | 12 Kif21b        | protein_coding |
| ENSMUST00000075341 | 0 | 0 | 12 Orm2          | protein_coding |
| ENSMUST00000076051 | 0 | 0 | 12 Slc8b1        | protein_coding |
| ENSMUST00000080651 | 0 | 0 | 12 Zfp941        | protein_coding |
| ENSMUST00000085374 | 0 | 0 | 12 Slc17a7       | protein_coding |
| ENSMUST00000088010 | 0 | 0 | 12 Gtf3c2        | protein_coding |
| ENSMUST00000090180 | 0 | 0 | 12 Sema3g        | protein_coding |
| ENSMUST00000093942 | 0 | 0 | 12 Gpr179        | protein_coding |
| ENSMUST00000094463 | 0 | 0 | 12 Mn1           | protein_coding |
| ENSMUST00000095550 | 0 | 0 | 12 Syndig1l      | protein_coding |
| ENSMUST00000097470 | 0 | 0 | 12 Sh2d1b2       | protein_coding |
| ENSMUST00000099557 | 0 | 0 | 12 Pak6          | protein_coding |
| ENSMUST00000101445 | 0 | 0 | 12 Zfp956        | protein_coding |
| ENSMUST00000105321 | 0 | 0 | 12 Nfic          | protein_coding |
| ENSMUST00000105781 | 0 | 0 | 12 Ctrc          | protein_coding |
| ENSMUST00000106027 | 0 | 0 | 12 Phrf1         | protein_coding |
| ENSMUST00000106077 | 0 | 0 | 12 A3galt2       | protein_coding |
| ENSMUST00000108306 | 0 | 0 | 12 Rad54b        | protein_coding |
| ENSMUST00000108411 | 0 | 0 | 12 Gsk3a         | protein_coding |
| ENSMUST00000109142 | 0 | 0 | 12 Hnrmph1       | protein_coding |
| ENSMUST00000109326 | 0 | 0 | 12 Dnrtip1       | protein_coding |
| ENSMUST00000109408 | 0 | 0 | 12 Ttpal         | protein_coding |
| ENSMUST00000109416 | 0 | 0 | 12 R3hdml        | protein_coding |
| ENSMUST00000109869 | 0 | 0 | 12 Psmf1         | protein_coding |
| ENSMUST00000111183 | 0 | 0 | 12 Pdhx          | protein_coding |
| ENSMUST00000114327 | 0 | 0 | 12 Pde1c         | protein_coding |
| ENSMUST00000115149 | 0 | 0 | 12 Tm4sf19       | protein_coding |
| ENSMUST00000115644 | 0 | 0 | 12 Piwil4        | protein_coding |
| ENSMUST00000116349 | 0 | 0 | 12 Xylt2         | protein_coding |
| ENSMUST00000118199 | 0 | 0 | 12 Pef1          | protein_coding |
| ENSMUST00000118867 | 0 | 0 | 12 Isg20         | protein_coding |
| ENSMUST00000119792 | 0 | 0 | 12 Anapc7        | protein_coding |
| ENSMUST00000120129 | 0 | 0 | 12 Prr14l        | protein_coding |
| ENSMUST00000121826 | 0 | 0 | 12 Tspan5        | protein_coding |
| ENSMUST00000124758 | 0 | 0 | 12 Ptpfr         | protein_coding |
| ENSMUST00000125065 | 0 | 0 | 12 Trappc11      | protein_coding |
| ENSMUST00000128201 | 0 | 0 | 12 Prmt7         | protein_coding |
| ENSMUST00000128276 | 0 | 0 | 12 Frrs1l        | protein_coding |
| ENSMUST00000128746 | 0 | 0 | 12 Acs1          | protein_coding |
| ENSMUST00000130131 | 0 | 0 | 12 Usp34         | protein_coding |
| ENSMUST00000130558 | 0 | 0 | 12 Arhgap36      | protein_coding |
| ENSMUST00000131597 | 0 | 0 | 12 Tmod4         | protein_coding |
| ENSMUST00000133035 | 0 | 0 | 12 D230025D16Rik | protein_coding |
| ENSMUST00000134192 | 0 | 0 | 12 Ccdc163       | protein_coding |
| ENSMUST00000135818 | 0 | 0 | 12 Tmem56        | protein_coding |
| ENSMUST00000137520 | 0 | 0 | 12 Trna1ap       | protein_coding |
| ENSMUST00000138272 | 0 | 0 | 12 Lgals7        | protein_coding |
| ENSMUST00000139634 | 0 | 0 | 12 Trp73         | protein_coding |
| ENSMUST00000139725 | 0 | 0 | 12 Mitd1         | protein_coding |
| ENSMUST00000140211 | 0 | 0 | 12 Cep41         | protein_coding |
| ENSMUST00000140541 | 0 | 0 | 12 Acot11        | protein_coding |
| ENSMUST00000141072 | 0 | 0 | 12 Setd5         | protein_coding |
| ENSMUST00000141089 | 0 | 0 | 12 Prss44        | protein_coding |
| ENSMUST00000141173 | 0 | 0 | 12 Myo19         | protein_coding |
| ENSMUST00000142080 | 0 | 0 | 12 Whsc1         | protein_coding |
| ENSMUST00000144390 | 0 | 0 | 12 Api5          | protein_coding |
| ENSMUST00000146415 | 0 | 0 | 12 Ubxn10        | protein_coding |
| ENSMUST00000146990 | 0 | 0 | 12 Clu           | protein_coding |
| ENSMUST00000147297 | 0 | 0 | 12 Alg8          | protein_coding |
| ENSMUST00000148108 | 0 | 0 | 12 Elmod3        | protein_coding |
| ENSMUST00000148788 | 0 | 0 | 12 Iqce          | protein_coding |
| ENSMUST00000149013 | 0 | 0 | 12 Tmem214       | protein_coding |
| ENSMUST00000149019 | 0 | 0 | 12 Nbr1          | protein_coding |
| ENSMUST00000149030 | 0 | 0 | 12 EphA7         | protein_coding |
| ENSMUST00000149162 | 0 | 0 | 12 Dennd2a       | protein_coding |
| ENSMUST00000150877 | 0 | 0 | 12 Slc23a1       | protein_coding |
| ENSMUST00000151119 | 0 | 0 | 12 Plekha1       | protein_coding |



|                     |   |   |                  |                      |
|---------------------|---|---|------------------|----------------------|
| ENSMUST00000151432  | 0 | 0 | 12 Rab36         | protein_coding       |
| ENSMUST00000152084  | 0 | 0 | 12 Slc22a5       | protein_coding       |
| ENSMUST00000152159  | 0 | 0 | 12 Megf6         | protein_coding       |
| ENSMUST00000153537  | 0 | 0 | 12 Dctn6         | protein_coding       |
| ENSMUST00000159368  | 0 | 0 | 12 Spef2         | protein_coding       |
| ENSMUST00000161053  | 0 | 0 | 12 Cldn16        | protein_coding       |
| ENSMUST00000162478  | 0 | 0 | 12 Fndc3a        | protein_coding       |
| ENSMUST00000163821  | 0 | 0 | 12 4930506M07Rik | protein_coding       |
| ENSMUST00000164242  | 0 | 0 | 12 Cchcr1        | protein_coding       |
| ENSMUST00000165935  | 0 | 0 | 12 Pphln1        | protein_coding       |
| ENSMUST00000166770  | 0 | 0 | 12 Fgf9          | protein_coding       |
| ENSMUST00000172288  | 0 | 0 | 12 Dennd2c       | protein_coding       |
| ENSMUST00000172599  | 0 | 0 | 12 Clic1         | protein_coding       |
| ENSMUST00000173093  | 0 | 0 | 12 Zbtb12        | protein_coding       |
| ENSMUST00000173774  | 0 | 0 | 12 Slit2         | protein_coding       |
| ENSMUST00000174244  | 0 | 0 | 12 Cct4          | protein_coding       |
| ENSMUST00000174412  | 0 | 0 | 12 4930481A15Rik | protein_coding       |
| ENSMUST00000175726  | 0 | 0 | 12 9930021J03Rik | protein_coding       |
| ENSMUST00000178093  | 0 | 0 | 12 Txnrd2        | protein_coding       |
| ENSMUST00000179171  | 0 | 0 | 12 4430402I18Rik | protein_coding       |
| ENSMUST00000183032  | 0 | 0 | 12 Rbm6          | protein_coding       |
| ENSMUST00000184265  | 0 | 0 | 12 Cpne1         | protein_coding       |
| ENSMUST00000184297  | 0 | 0 | 12 Hnrnp1l       | protein_coding       |
| ENSMUST00000184314  | 0 | 0 | 12 Entpd4        | protein_coding       |
| ENSMUST00000185072  | 0 | 0 | 12 Gm21685       | protein_coding       |
| ENSMUST00000148180  | 0 | 0 | 12 Gm15396       | processed_transcript |
| ENSMUST00000147834  | 0 | 0 | 12 Gm15669       | lincRNA              |
| ENSMUST00000180722  | 0 | 0 | 12 D230017M19Rik | lincRNA              |
| ENSMUST00000180812  | 0 | 0 | 12 Gm10390       | lincRNA              |
| ENSMUST00000180919  | 0 | 0 | 12 Gm26613       | lincRNA              |
| ENSMUST00000183423  | 0 | 0 | 12 Gm3331        | lincRNA              |
| ENSMUST000000067468 | 0 | 0 | 12 Gm4793        | antisense            |
| ENSMUST000000087588 | 0 | 0 | 12 Gm17080       | antisense            |
| ENSMUST00000135048  | 0 | 0 | 12 Gm11770       | antisense            |
| ENSMUST00000135153  | 0 | 0 | 12 Wt1os         | antisense            |
| ENSMUST00000140556  | 0 | 0 | 12 Adap2os       | antisense            |
| ENSMUST00000141172  | 0 | 0 | 12 Pla2g10os     | antisense            |
| ENSMUST00000147359  | 0 | 0 | 12 4930403D09Rik | antisense            |
| ENSMUST00000152787  | 0 | 0 | 12 Usp46os2      | antisense            |
| ENSMUST00000156477  | 0 | 0 | 12 A730090H04Rik | antisense            |
| ENSMUST00000159602  | 0 | 0 | 12 A230009B12Rik | antisense            |
| ENSMUST00000163273  | 0 | 0 | 12 Gm17178       | antisense            |
| ENSMUST00000163707  | 0 | 0 | 12 Gm17189       | antisense            |
| ENSMUST00000181420  | 0 | 0 | 12 0610038B21Rik | antisense            |
| ENSMUST00000128979  | 0 | 0 | 10 Dhx30         | retained_intron      |
| ENSMUST00000128979  | 0 | 0 | 10 Dhx30         | retained_intron      |
| ENSMUST00000000153  | 0 | 0 | 10 Gna12         | protein_coding       |
| ENSMUST00000001757  | 0 | 0 | 10 Eef1e1        | protein_coding       |
| ENSMUST00000002444  | 0 | 0 | 10 Rfx2          | protein_coding       |
| ENSMUST00000004143  | 0 | 0 | 10 Stat5b        | protein_coding       |
| ENSMUST00000005606  | 0 | 0 | 10 Prkaca        | protein_coding       |
| ENSMUST000000008745 | 0 | 0 | 10 Rab25         | protein_coding       |
| ENSMUST000000009411 | 0 | 0 | 10 Zfp212        | protein_coding       |
| ENSMUST00000010044  | 0 | 0 | 10 Wnt3a         | protein_coding       |
| ENSMUST00000016569  | 0 | 0 | 10 Pds5b         | protein_coding       |
| ENSMUST00000017567  | 0 | 0 | 10 Zfp207        | protein_coding       |
| ENSMUST00000018478  | 0 | 0 | 10 Ksr1          | protein_coding       |
| ENSMUST000000021282 | 0 | 0 | 10 Pfas          | protein_coding       |
| ENSMUST000000021796 | 0 | 0 | 10 Edn1          | protein_coding       |
| ENSMUST000000022522 | 0 | 0 | 10 Tdh           | protein_coding       |
| ENSMUST000000024958 | 0 | 0 | 10 Caskin1       | protein_coding       |
| ENSMUST000000026243 | 0 | 0 | 10 Mgea5         | protein_coding       |
| ENSMUST000000026879 | 0 | 0 | 10 Gdap1         | protein_coding       |
| ENSMUST000000027059 | 0 | 0 | 10 Tfap2b        | protein_coding       |
| ENSMUST000000029179 | 0 | 0 | 10 Tti1          | protein_coding       |
| ENSMUST000000029891 | 0 | 0 | 10 Tmem68        | protein_coding       |
| ENSMUST000000030465 | 0 | 0 | 10 Tspan1        | protein_coding       |
| ENSMUST000000031264 | 0 | 0 | 10 Plac8         | protein_coding       |

|                    |   |   |                  |                |
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| ENSMUST00000031898 | 0 | 0 | 10 Sval1         | protein_coding |
| ENSMUST00000032402 | 0 | 0 | 10 Bcat1         | protein_coding |
| ENSMUST00000032501 | 0 | 0 | 10 Tspan11       | protein_coding |
| ENSMUST00000034597 | 0 | 0 | 10 Tmprss13      | protein_coding |
| ENSMUST00000034644 | 0 | 0 | 10 Vps11         | protein_coding |
| ENSMUST00000035894 | 0 | 0 | 10 Tbata         | protein_coding |
| ENSMUST00000037218 | 0 | 0 | 10 Rasl10a       | protein_coding |
| ENSMUST00000037299 | 0 | 0 | 10 Ythdf1        | protein_coding |
| ENSMUST00000037575 | 0 | 0 | 10 Ncor1         | protein_coding |
| ENSMUST00000038739 | 0 | 0 | 10 Rfwd3         | protein_coding |
| ENSMUST00000039516 | 0 | 0 | 10 Egln3         | protein_coding |
| ENSMUST00000039959 | 0 | 0 | 10 1810046K07Rik | protein_coding |
| ENSMUST00000041776 | 0 | 0 | 10 Rgs8          | protein_coding |
| ENSMUST00000042078 | 0 | 0 | 10 Alx4          | protein_coding |
| ENSMUST00000043503 | 0 | 0 | 10 Scube3        | protein_coding |
| ENSMUST00000043794 | 0 | 0 | 10 Jakmip1       | protein_coding |
| ENSMUST00000044551 | 0 | 0 | 10 Ick           | protein_coding |
| ENSMUST00000045593 | 0 | 0 | 10 Daglb         | protein_coding |
| ENSMUST00000047331 | 0 | 0 | 10 Lgi3          | protein_coding |
| ENSMUST00000047652 | 0 | 0 | 10 Tspan14       | protein_coding |
| ENSMUST00000052413 | 0 | 0 | 10 Lcp2          | protein_coding |
| ENSMUST00000052932 | 0 | 0 | 10 Pde12         | protein_coding |
| ENSMUST00000054814 | 0 | 0 | 10 Shprh         | protein_coding |
| ENSMUST00000055607 | 0 | 0 | 10 Ankdd1b       | protein_coding |
| ENSMUST00000059034 | 0 | 0 | 10 Sfxn5         | protein_coding |
| ENSMUST00000062357 | 0 | 0 | 10 4930539E08Rik | protein_coding |
| ENSMUST00000063508 | 0 | 0 | 10 Gria4         | protein_coding |
| ENSMUST00000066207 | 0 | 0 | 10 Mepe          | protein_coding |
| ENSMUST00000066587 | 0 | 0 | 10 Acox1         | protein_coding |
| ENSMUST00000068116 | 0 | 0 | 10 Lrrfp1        | protein_coding |
| ENSMUST00000071065 | 0 | 0 | 10 Nfil3         | protein_coding |
| ENSMUST00000074002 | 0 | 0 | 10 Ube3b         | protein_coding |
| ENSMUST00000078508 | 0 | 0 | 10 Sp7           | protein_coding |
| ENSMUST00000081440 | 0 | 0 | 10 Scnn1a        | protein_coding |
| ENSMUST00000086041 | 0 | 0 | 10 Clasrp        | protein_coding |
| ENSMUST00000095495 | 0 | 0 | 10 Armc10        | protein_coding |
| ENSMUST00000095572 | 0 | 0 | 10 Slc10a1       | protein_coding |
| ENSMUST00000097284 | 0 | 0 | 10 Fam179a       | protein_coding |
| ENSMUST00000097849 | 0 | 0 | 10 Gm7534        | protein_coding |
| ENSMUST00000098259 | 0 | 0 | 10 C2cd3         | protein_coding |
| ENSMUST00000101371 | 0 | 0 | 10 D130052B06Rik | protein_coding |
| ENSMUST00000101613 | 0 | 0 | 10 Ap1b1         | protein_coding |
| ENSMUST00000103007 | 0 | 0 | 10 Nudt11        | protein_coding |
| ENSMUST00000105644 | 0 | 0 | 10 Trp73         | protein_coding |
| ENSMUST00000107168 | 0 | 0 | 10 Mpp3          | protein_coding |
| ENSMUST00000107759 | 0 | 0 | 10 Tulp2         | protein_coding |
| ENSMUST00000108371 | 0 | 0 | 10 Sdcbp         | protein_coding |
| ENSMUST00000108818 | 0 | 0 | 10 Btnl10        | protein_coding |
| ENSMUST00000109872 | 0 | 0 | 10 Tmem74b       | protein_coding |
| ENSMUST00000110032 | 0 | 0 | 10 Banf2         | protein_coding |
| ENSMUST00000112658 | 0 | 0 | 10 Cadps         | protein_coding |
| ENSMUST00000112689 | 0 | 0 | 10 Pxx           | protein_coding |
| ENSMUST00000113229 | 0 | 0 | 10 Mob1b         | protein_coding |
| ENSMUST00000114694 | 0 | 0 | 10 Zbtb20        | protein_coding |
| ENSMUST00000114953 | 0 | 0 | 10 Kalrn         | protein_coding |
| ENSMUST00000120490 | 0 | 0 | 10 Abca16        | protein_coding |
| ENSMUST00000121489 | 0 | 0 | 10 P2rx7         | protein_coding |
| ENSMUST00000124164 | 0 | 0 | 10 Dnah17        | protein_coding |
| ENSMUST00000124341 | 0 | 0 | 10 Slc4a3        | protein_coding |
| ENSMUST00000125271 | 0 | 0 | 10 Amot          | protein_coding |
| ENSMUST00000126091 | 0 | 0 | 10 Suz12         | protein_coding |
| ENSMUST00000126179 | 0 | 0 | 10 Vav3          | protein_coding |
| ENSMUST00000126256 | 0 | 0 | 10 Casc4         | protein_coding |
| ENSMUST00000126483 | 0 | 0 | 10 Med1          | protein_coding |
| ENSMUST00000127704 | 0 | 0 | 10 Cdc14a        | protein_coding |
| ENSMUST00000129193 | 0 | 0 | 10 Golga2        | protein_coding |
| ENSMUST00000129328 | 0 | 0 | 10 Gabbr2        | protein_coding |
| ENSMUST00000131217 | 0 | 0 | 10 Rptor         | protein_coding |

|                    |   |   |                  |                      |
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| ENSMUST00000131405 | 0 | 0 | 10 Pik3c3        | protein_coding       |
| ENSMUST00000133841 | 0 | 0 | 10 Cyp2f2        | protein_coding       |
| ENSMUST00000134078 | 0 | 0 | 10 Stk4          | protein_coding       |
| ENSMUST00000134521 | 0 | 0 | 10 Exoc1         | protein_coding       |
| ENSMUST00000136016 | 0 | 0 | 10 C130060K24Rik | protein_coding       |
| ENSMUST00000136967 | 0 | 0 | 10 Erich2        | protein_coding       |
| ENSMUST00000137079 | 0 | 0 | 10 Ccdc167       | protein_coding       |
| ENSMUST00000139294 | 0 | 0 | 10 Cluap1        | protein_coding       |
| ENSMUST00000139428 | 0 | 0 | 10 Tmem62        | protein_coding       |
| ENSMUST00000140205 | 0 | 0 | 10 Adam10        | protein_coding       |
| ENSMUST00000140369 | 0 | 0 | 10 Elac2         | protein_coding       |
| ENSMUST00000141802 | 0 | 0 | 10 9430015G10Rik | protein_coding       |
| ENSMUST00000142674 | 0 | 0 | 10 Tgm5          | protein_coding       |
| ENSMUST00000143336 | 0 | 0 | 10 Cc2d1b        | protein_coding       |
| ENSMUST00000145032 | 0 | 0 | 10 Siah2         | protein_coding       |
| ENSMUST00000146219 | 0 | 0 | 10 Col4a2        | protein_coding       |
| ENSMUST00000146377 | 0 | 0 | 10 Ptgr2         | protein_coding       |
| ENSMUST00000147170 | 0 | 0 | 10 Itpkc         | protein_coding       |
| ENSMUST00000149041 | 0 | 0 | 10 Exosc9        | protein_coding       |
| ENSMUST00000151547 | 0 | 0 | 10 Lgals4        | protein_coding       |
| ENSMUST00000152041 | 0 | 0 | 10 Art3          | protein_coding       |
| ENSMUST00000152898 | 0 | 0 | 10 Khlh23        | protein_coding       |
| ENSMUST00000153250 | 0 | 0 | 10 Pax9          | protein_coding       |
| ENSMUST00000153289 | 0 | 0 | 10 Msrb2         | protein_coding       |
| ENSMUST00000153935 | 0 | 0 | 10 Rdh5          | protein_coding       |
| ENSMUST00000154583 | 0 | 0 | 10 Azi2          | protein_coding       |
| ENSMUST00000155077 | 0 | 0 | 10 Htr2b         | protein_coding       |
| ENSMUST00000156354 | 0 | 0 | 10 Smc4          | protein_coding       |
| ENSMUST00000159401 | 0 | 0 | 10 Eif2ak3       | protein_coding       |
| ENSMUST00000159440 | 0 | 0 | 10 Glis2         | protein_coding       |
| ENSMUST00000159499 | 0 | 0 | 10 Bace1         | protein_coding       |
| ENSMUST00000160214 | 0 | 0 | 10 Nms           | protein_coding       |
| ENSMUST00000160529 | 0 | 0 | 10 Gfm1          | protein_coding       |
| ENSMUST00000163475 | 0 | 0 | 10 2610021A01Rik | protein_coding       |
| ENSMUST00000163507 | 0 | 0 | 10 Pfkam         | protein_coding       |
| ENSMUST00000164172 | 0 | 0 | 10 Elf5          | protein_coding       |
| ENSMUST00000165630 | 0 | 0 | 10 Tom1          | protein_coding       |
| ENSMUST00000168311 | 0 | 0 | 10 Otoa          | protein_coding       |
| ENSMUST00000169751 | 0 | 0 | 10 Kcna10        | protein_coding       |
| ENSMUST00000169818 | 0 | 0 | 10 Gm17606       | protein_coding       |
| ENSMUST00000170374 | 0 | 0 | 10 Ampd3         | protein_coding       |
| ENSMUST00000171414 | 0 | 0 | 10 Hacr1         | protein_coding       |
| ENSMUST00000171699 | 0 | 0 | 10 Spats2l       | protein_coding       |
| ENSMUST00000172638 | 0 | 0 | 10 Prdm5         | protein_coding       |
| ENSMUST00000172646 | 0 | 0 | 10 Zic4          | protein_coding       |
| ENSMUST00000173923 | 0 | 0 | 10 Fam161a       | protein_coding       |
| ENSMUST00000173932 | 0 | 0 | 10 Ndst4         | protein_coding       |
| ENSMUST00000181855 | 0 | 0 | 10 Senp1         | protein_coding       |
| ENSMUST00000182047 | 0 | 0 | 10 Rnf4          | protein_coding       |
| ENSMUST00000182812 | 0 | 0 | 10 Sec31a        | protein_coding       |
| ENSMUST00000183200 | 0 | 0 | 10 Cacng6        | protein_coding       |
| ENSMUST00000125191 | 0 | 0 | 10 Tctn2         | processed_transcript |
| ENSMUST00000135144 | 0 | 0 | 10 Gm15998       | processed_transcript |
| ENSMUST00000135829 | 0 | 0 | 10 Gm13415       | processed_transcript |
| ENSMUST00000145262 | 0 | 0 | 10 2410003L11Rik | processed_transcript |
| ENSMUST00000154194 | 0 | 0 | 10 1700123M08Rik | processed_transcript |
| ENSMUST00000154524 | 0 | 0 | 10 Gm14343       | processed_transcript |
| ENSMUST00000176841 | 0 | 0 | 10 4930438E09Rik | processed_transcript |
| ENSMUST00000125234 | 0 | 0 | 10 4933427E13Rik | lincRNA              |
| ENSMUST00000129425 | 0 | 0 | 10 D630024D03Rik | lincRNA              |
| ENSMUST00000134580 | 0 | 0 | 10 3110099E03Rik | lincRNA              |
| ENSMUST00000172874 | 0 | 0 | 10 4833427F10Rik | lincRNA              |
| ENSMUST00000124728 | 0 | 0 | 10 Gm14397       | antisense            |
| ENSMUST00000133723 | 0 | 0 | 10 Gm15050       | antisense            |
| ENSMUST00000135203 | 0 | 0 | 10 Gm4577        | antisense            |
| ENSMUST00000160960 | 0 | 0 | 10 Galnt6os      | antisense            |
| ENSMUST00000161985 | 0 | 0 | 10 Gm16579       | antisense            |
| ENSMUST00000183818 | 0 | 0 | 10 Gm27201       | antisense            |

|                    |   |   |                 |                        |
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| ENSMUST00000126783 | 0 | 0 | 8 Rorc          | retained_intron        |
| ENSMUST00000126783 | 0 | 0 | 8 Rorc          | retained_intron        |
| ENSMUST00000115164 | 0 | 0 | 8 Zfp451        | protein_coding         |
| ENSMUST00000115164 | 0 | 0 | 8 Zfp451        | protein_coding         |
| ENSMUST00000122073 | 0 | 0 | 8 Gm12551       | unprocessed_pseudogene |
| ENSMUST00000001327 | 0 | 0 | 8 Itgb7         | protein_coding         |
| ENSMUST00000001544 | 0 | 0 | 8 Vwa5a         | protein_coding         |
| ENSMUST00000002318 | 0 | 0 | 8 Zfp523        | protein_coding         |
| ENSMUST00000003826 | 0 | 0 | 8 Htr3a         | protein_coding         |
| ENSMUST00000004200 | 0 | 0 | 8 Cwc15         | protein_coding         |
| ENSMUST00000004964 | 0 | 0 | 8 Pou1f1        | protein_coding         |
| ENSMUST00000005933 | 0 | 0 | 8 Klk1b16       | protein_coding         |
| ENSMUST00000006431 | 0 | 0 | 8 Atp6v1b1      | protein_coding         |
| ENSMUST00000007747 | 0 | 0 | 8 Dus3l         | protein_coding         |
| ENSMUST00000008605 | 0 | 0 | 8 Fut1          | protein_coding         |
| ENSMUST00000008812 | 0 | 0 | 8 Rps18         | protein_coding         |
| ENSMUST00000010899 | 0 | 0 | 8 Cars          | protein_coding         |
| ENSMUST00000019708 | 0 | 0 | 8 Arid3a        | protein_coding         |
| ENSMUST00000020039 | 0 | 0 | 8 Mgat4c        | protein_coding         |
| ENSMUST00000021268 | 0 | 0 | 8 Aloxe3        | protein_coding         |
| ENSMUST00000021377 | 0 | 0 | 8 Cdkl1         | protein_coding         |
| ENSMUST00000022461 | 0 | 0 | 8 Dph3          | protein_coding         |
| ENSMUST00000022518 | 0 | 0 | 8 N6amt2        | protein_coding         |
| ENSMUST00000023370 | 0 | 0 | 8 Boc           | protein_coding         |
| ENSMUST00000025675 | 0 | 0 | 8 Naa40         | protein_coding         |
| ENSMUST00000025875 | 0 | 0 | 8 Slc1a1        | protein_coding         |
| ENSMUST00000026899 | 0 | 0 | 8 Slc25a10      | protein_coding         |
| ENSMUST00000027867 | 0 | 0 | 8 Ccdc181       | protein_coding         |
| ENSMUST00000027980 | 0 | 0 | 8 Mcm10         | protein_coding         |
| ENSMUST00000028624 | 0 | 0 | 8 Gatm          | protein_coding         |
| ENSMUST00000028843 | 0 | 0 | 8 Trpm7         | protein_coding         |
| ENSMUST00000028926 | 0 | 0 | 8 Napb          | protein_coding         |
| ENSMUST00000029831 | 0 | 0 | 8 Zranb2        | protein_coding         |
| ENSMUST00000031190 | 0 | 0 | 8 Dr1           | protein_coding         |
| ENSMUST00000033123 | 0 | 0 | 8 Abcc8         | protein_coding         |
| ENSMUST00000033141 | 0 | 0 | 8 Tacc2         | protein_coding         |
| ENSMUST00000035029 | 0 | 0 | 8 Rbp2          | protein_coding         |
| ENSMUST00000035612 | 0 | 0 | 8 Ccar2         | protein_coding         |
| ENSMUST00000035646 | 0 | 0 | 8 Plcb4         | protein_coding         |
| ENSMUST00000035899 | 0 | 0 | 8 Bloc1s5       | protein_coding         |
| ENSMUST00000036187 | 0 | 0 | 8 Qsox2         | protein_coding         |
| ENSMUST00000036691 | 0 | 0 | 8 Prrc2b        | protein_coding         |
| ENSMUST00000037349 | 0 | 0 | 8 Aifm1         | protein_coding         |
| ENSMUST00000037361 | 0 | 0 | 8 Lefty1        | protein_coding         |
| ENSMUST00000037473 | 0 | 0 | 8 Ap5m1         | protein_coding         |
| ENSMUST00000039064 | 0 | 0 | 8 Fam124a       | protein_coding         |
| ENSMUST00000039408 | 0 | 0 | 8 Pkp2          | protein_coding         |
| ENSMUST00000040097 | 0 | 0 | 8 Palmd         | protein_coding         |
| ENSMUST00000040603 | 0 | 0 | 8 Agl           | protein_coding         |
| ENSMUST00000040835 | 0 | 0 | 8 Chchd4        | protein_coding         |
| ENSMUST00000041105 | 0 | 0 | 8 Sfmbt2        | protein_coding         |
| ENSMUST00000041272 | 0 | 0 | 8 Plekhm1       | protein_coding         |
| ENSMUST00000043069 | 0 | 0 | 8 Cyth4         | protein_coding         |
| ENSMUST00000044565 | 0 | 0 | 8 Col16a1       | protein_coding         |
| ENSMUST00000044602 | 0 | 0 | 8 Ces1g         | protein_coding         |
| ENSMUST00000045617 | 0 | 0 | 8 Hpse          | protein_coding         |
| ENSMUST00000046571 | 0 | 0 | 8 Odf2          | protein_coding         |
| ENSMUST00000046763 | 0 | 0 | 8 D330045A20Rik | protein_coding         |
| ENSMUST00000047446 | 0 | 0 | 8 Sidt1         | protein_coding         |
| ENSMUST00000047951 | 0 | 0 | 8 Fbxo2         | protein_coding         |
| ENSMUST00000049168 | 0 | 0 | 8 Cog3          | protein_coding         |
| ENSMUST00000052648 | 0 | 0 | 8 Ccdc28a       | protein_coding         |
| ENSMUST00000054287 | 0 | 0 | 8 Zbtb39        | protein_coding         |
| ENSMUST00000056758 | 0 | 0 | 8 Ppp3ca        | protein_coding         |
| ENSMUST00000056994 | 0 | 0 | 8 4921513I03Rik | protein_coding         |
| ENSMUST00000058633 | 0 | 0 | 8 A730017C20Rik | protein_coding         |
| ENSMUST00000059250 | 0 | 0 | 8 Brms1l        | protein_coding         |
| ENSMUST00000059662 | 0 | 0 | 8 Otulin        | protein_coding         |

|                    |   |   |                 |                |
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| ENSMUST00000061187 | 0 | 0 | 8 Dmrta2        | protein_coding |
| ENSMUST00000063635 | 0 | 0 | 8 Radil         | protein_coding |
| ENSMUST00000063785 | 0 | 0 | 8 Prss51        | protein_coding |
| ENSMUST00000065411 | 0 | 0 | 8 Larp1b        | protein_coding |
| ENSMUST00000066041 | 0 | 0 | 8 Shisa7        | protein_coding |
| ENSMUST00000066498 | 0 | 0 | 8 Tmem255a      | protein_coding |
| ENSMUST00000067098 | 0 | 0 | 8 Ffar4         | protein_coding |
| ENSMUST00000070345 | 0 | 0 | 8 Usp39         | protein_coding |
| ENSMUST00000070508 | 0 | 0 | 8 Lrrc29        | protein_coding |
| ENSMUST00000072186 | 0 | 0 | 8 Strbp         | protein_coding |
| ENSMUST00000074408 | 0 | 0 | 8 Ifnlr1        | protein_coding |
| ENSMUST00000075144 | 0 | 0 | 8 Nrp2          | protein_coding |
| ENSMUST00000075515 | 0 | 0 | 8 Serpinb9f     | protein_coding |
| ENSMUST00000077354 | 0 | 0 | 8 Kik1b4        | protein_coding |
| ENSMUST00000080115 | 0 | 0 | 8 Abcc12        | protein_coding |
| ENSMUST00000082158 | 0 | 0 | 8 Dnajb2        | protein_coding |
| ENSMUST00000086046 | 0 | 0 | 8 Gbas          | protein_coding |
| ENSMUST00000086559 | 0 | 0 | 8 Slc41a1       | protein_coding |
| ENSMUST00000088198 | 0 | 0 | 8 Obp1b         | protein_coding |
| ENSMUST00000088598 | 0 | 0 | 8 Dcpp2         | protein_coding |
| ENSMUST00000092285 | 0 | 0 | 8 Gng7          | protein_coding |
| ENSMUST00000094327 | 0 | 0 | 8 Lrrc43        | protein_coding |
| ENSMUST00000094641 | 0 | 0 | 8 Csn1s1        | protein_coding |
| ENSMUST00000096127 | 0 | 0 | 8 Ccdc50        | protein_coding |
| ENSMUST00000096197 | 0 | 0 | 8 Vwa5b2        | protein_coding |
| ENSMUST00000096492 | 0 | 0 | 8 Gpr34         | protein_coding |
| ENSMUST00000099157 | 0 | 0 | 8 Nab2          | protein_coding |
| ENSMUST00000101103 | 0 | 0 | 8 Tnfrsf13b     | protein_coding |
| ENSMUST00000101298 | 0 | 0 | 8 Dok7          | protein_coding |
| ENSMUST00000101347 | 0 | 0 | 8 Mat2b         | protein_coding |
| ENSMUST00000102560 | 0 | 0 | 8 Cit           | protein_coding |
| ENSMUST00000102801 | 0 | 0 | 8 Tenm2         | protein_coding |
| ENSMUST00000105455 | 0 | 0 | 8 Aifm2         | protein_coding |
| ENSMUST00000106398 | 0 | 0 | 8 Rnf157        | protein_coding |
| ENSMUST00000106568 | 0 | 0 | 8 Skint7        | protein_coding |
| ENSMUST00000106933 | 0 | 0 | 8 Dnajc6        | protein_coding |
| ENSMUST00000107845 | 0 | 0 | 8 Clta          | protein_coding |
| ENSMUST00000108304 | 0 | 0 | 8 Gem           | protein_coding |
| ENSMUST00000108431 | 0 | 0 | 8 Myo1c         | protein_coding |
| ENSMUST00000108530 | 0 | 0 | 8 Nup88         | protein_coding |
| ENSMUST00000108710 | 0 | 0 | 8 Akap10        | protein_coding |
| ENSMUST00000109158 | 0 | 0 | 8 Mia3          | protein_coding |
| ENSMUST00000109214 | 0 | 0 | 8 Rnf114        | protein_coding |
| ENSMUST00000109338 | 0 | 0 | 8 Wfdc8         | protein_coding |
| ENSMUST00000110242 | 0 | 0 | 8 Ints10        | protein_coding |
| ENSMUST00000110686 | 0 | 0 | 8 Tmem62        | protein_coding |
| ENSMUST00000110756 | 0 | 0 | 8 Sptbn5        | protein_coding |
| ENSMUST00000111016 | 0 | 0 | 8 Muc15         | protein_coding |
| ENSMUST00000111639 | 0 | 0 | 8 Arntl2        | protein_coding |
| ENSMUST00000112286 | 0 | 0 | 8 Bbs5          | protein_coding |
| ENSMUST00000112463 | 0 | 0 | 8 2010002M12Rik | protein_coding |
| ENSMUST00000112525 | 0 | 0 | 8 Pla2r1        | protein_coding |
| ENSMUST00000112874 | 0 | 0 | 8 Nck1          | protein_coding |
| ENSMUST00000112915 | 0 | 0 | 8 Gm11110       | protein_coding |
| ENSMUST00000113054 | 0 | 0 | 8 Shroom3       | protein_coding |
| ENSMUST00000113749 | 0 | 0 | 8 Plcd4         | protein_coding |
| ENSMUST00000113770 | 0 | 0 | 8 Pradc1        | protein_coding |
| ENSMUST00000114130 | 0 | 0 | 8 Ikbkg         | protein_coding |
| ENSMUST00000114547 | 0 | 0 | 8 Cadm1         | protein_coding |
| ENSMUST00000114858 | 0 | 0 | 8 Gm5483        | protein_coding |
| ENSMUST00000114900 | 0 | 0 | 8 Zc3hav1       | protein_coding |
| ENSMUST00000115588 | 0 | 0 | 8 Slc36a4       | protein_coding |
| ENSMUST00000117085 | 0 | 0 | 8 Abhd17c       | protein_coding |
| ENSMUST00000118234 | 0 | 0 | 8 Pex26         | protein_coding |
| ENSMUST00000120052 | 0 | 0 | 8 Lrit1         | protein_coding |
| ENSMUST00000120080 | 0 | 0 | 8 Adcy9         | protein_coding |
| ENSMUST00000120135 | 0 | 0 | 8 Syk           | protein_coding |
| ENSMUST00000120310 | 0 | 0 | 8 Ddah1         | protein_coding |

|                    |   |   |                 |                |
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| ENSMUST00000121148 | 0 | 0 | 8 Sgcg          | protein_coding |
| ENSMUST00000121608 | 0 | 0 | 8 4930595D18Rik | protein_coding |
| ENSMUST00000121990 | 0 | 0 | 8 Syt2          | protein_coding |
| ENSMUST00000122342 | 0 | 0 | 8 Dhhs13        | protein_coding |
| ENSMUST00000123410 | 0 | 0 | 8 Loxhd1        | protein_coding |
| ENSMUST00000123421 | 0 | 0 | 8 Spata1        | protein_coding |
| ENSMUST00000124156 | 0 | 0 | 8 Hsp90aa1      | protein_coding |
| ENSMUST00000124861 | 0 | 0 | 8 C1qtnf1       | protein_coding |
| ENSMUST00000124954 | 0 | 0 | 8 Got1          | protein_coding |
| ENSMUST00000125475 | 0 | 0 | 8 Fam3b         | protein_coding |
| ENSMUST00000126066 | 0 | 0 | 8 Zbtb38        | protein_coding |
| ENSMUST00000126084 | 0 | 0 | 8 Bpifb9a       | protein_coding |
| ENSMUST00000126522 | 0 | 0 | 8 Myo15         | protein_coding |
| ENSMUST00000127100 | 0 | 0 | 8 Plod3         | protein_coding |
| ENSMUST00000127205 | 0 | 0 | 8 Srp68         | protein_coding |
| ENSMUST00000128241 | 0 | 0 | 8 Aire          | protein_coding |
| ENSMUST00000128778 | 0 | 0 | 8 Flt3l         | protein_coding |
| ENSMUST00000128906 | 0 | 0 | 8 Tmem80        | protein_coding |
| ENSMUST00000129476 | 0 | 0 | 8 Tnfrsf22      | protein_coding |
| ENSMUST00000130414 | 0 | 0 | 8 Syt9          | protein_coding |
| ENSMUST00000130865 | 0 | 0 | 8 Fuca2         | protein_coding |
| ENSMUST00000131202 | 0 | 0 | 8 Ska2          | protein_coding |
| ENSMUST00000131475 | 0 | 0 | 8 Ggct          | protein_coding |
| ENSMUST00000131990 | 0 | 0 | 8 Umps          | protein_coding |
| ENSMUST00000132428 | 0 | 0 | 8 Ddx26b        | protein_coding |
| ENSMUST00000132562 | 0 | 0 | 8 Wrap73        | protein_coding |
| ENSMUST00000133237 | 0 | 0 | 8 Nlrp5         | protein_coding |
| ENSMUST00000133533 | 0 | 0 | 8 Trp73         | protein_coding |
| ENSMUST00000135490 | 0 | 0 | 8 Rtkn          | protein_coding |
| ENSMUST00000136278 | 0 | 0 | 8 Lepre1        | protein_coding |
| ENSMUST00000136399 | 0 | 0 | 8 Piwil4        | protein_coding |
| ENSMUST00000137401 | 0 | 0 | 8 Atpaf1        | protein_coding |
| ENSMUST00000137861 | 0 | 0 | 8 Shcbp1l       | protein_coding |
| ENSMUST00000137890 | 0 | 0 | 8 Wsb1          | protein_coding |
| ENSMUST00000138754 | 0 | 0 | 8 Foxp1         | protein_coding |
| ENSMUST00000139518 | 0 | 0 | 8 Slbp          | protein_coding |
| ENSMUST00000139984 | 0 | 0 | 8 Adnp          | protein_coding |
| ENSMUST00000140478 | 0 | 0 | 8 Gad1          | protein_coding |
| ENSMUST00000140592 | 0 | 0 | 8 Dpm2          | protein_coding |
| ENSMUST00000140753 | 0 | 0 | 8 Cntnap4       | protein_coding |
| ENSMUST00000141264 | 0 | 0 | 8 Wipf1         | protein_coding |
| ENSMUST00000142978 | 0 | 0 | 8 Aanat         | protein_coding |
| ENSMUST00000142988 | 0 | 0 | 8 Dscr3         | protein_coding |
| ENSMUST00000144671 | 0 | 0 | 8 Galnt5        | protein_coding |
| ENSMUST00000145224 | 0 | 0 | 8 Slc26a8       | protein_coding |
| ENSMUST00000146078 | 0 | 0 | 8 Dab1          | protein_coding |
| ENSMUST00000146200 | 0 | 0 | 8 Cul1          | protein_coding |
| ENSMUST00000146799 | 0 | 0 | 8 Ube2k         | protein_coding |
| ENSMUST00000147730 | 0 | 0 | 8 Plk3          | protein_coding |
| ENSMUST00000148995 | 0 | 0 | 8 Slc25a36      | protein_coding |
| ENSMUST00000149841 | 0 | 0 | 8 Brd7          | protein_coding |
| ENSMUST00000150325 | 0 | 0 | 8 Ube2l6        | protein_coding |
| ENSMUST00000151431 | 0 | 0 | 8 Wdr92         | protein_coding |
| ENSMUST00000151711 | 0 | 0 | 8 Bccip         | protein_coding |
| ENSMUST00000151879 | 0 | 0 | 8 Hmgcl         | protein_coding |
| ENSMUST00000152117 | 0 | 0 | 8 Ttc3          | protein_coding |
| ENSMUST00000152251 | 0 | 0 | 8 Gba2          | protein_coding |
| ENSMUST00000153105 | 0 | 0 | 8 Cd40          | protein_coding |
| ENSMUST00000153656 | 0 | 0 | 8 Atp13a3       | protein_coding |
| ENSMUST00000154294 | 0 | 0 | 8 Ccdc42        | protein_coding |
| ENSMUST00000154312 | 0 | 0 | 8 Vwa5b1        | protein_coding |
| ENSMUST00000154801 | 0 | 0 | 8 Tmem63c       | protein_coding |
| ENSMUST00000156854 | 0 | 0 | 8 Cdc26         | protein_coding |
| ENSMUST00000159354 | 0 | 0 | 8 Kif6          | protein_coding |
| ENSMUST00000160157 | 0 | 0 | 8 Lamtor4       | protein_coding |
| ENSMUST00000160192 | 0 | 0 | 8 Ercc1         | protein_coding |
| ENSMUST00000160221 | 0 | 0 | 8 Ric1          | protein_coding |
| ENSMUST00000160409 | 0 | 0 | 8 Wdr41         | protein_coding |

|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUST00000160433 | 0 | 0 | 8 Kcnc1         | protein_coding                     |
| ENSMUST00000160811 | 0 | 0 | 8 Rnf214        | protein_coding                     |
| ENSMUST00000160940 | 0 | 0 | 8 Tecta         | protein_coding                     |
| ENSMUST00000161806 | 0 | 0 | 8 Hspa4l        | protein_coding                     |
| ENSMUST00000162395 | 0 | 0 | 8 Wtap          | protein_coding                     |
| ENSMUST00000162494 | 0 | 0 | 8 Cdk8          | protein_coding                     |
| ENSMUST00000163322 | 0 | 0 | 8 Kcnma1        | protein_coding                     |
| ENSMUST00000164113 | 0 | 0 | 8 Megf11        | protein_coding                     |
| ENSMUST00000164506 | 0 | 0 | 8 Ccdc43        | protein_coding                     |
| ENSMUST00000164925 | 0 | 0 | 8 Rwd3          | protein_coding                     |
| ENSMUST00000165860 | 0 | 0 | 8 Ubr4          | protein_coding                     |
| ENSMUST00000166668 | 0 | 0 | 8 Vwa3a         | protein_coding                     |
| ENSMUST00000167122 | 0 | 0 | 8 Adamts7       | protein_coding                     |
| ENSMUST00000167850 | 0 | 0 | 8 Cope          | protein_coding                     |
| ENSMUST00000168498 | 0 | 0 | 8 Adprhl1       | protein_coding                     |
| ENSMUST00000168502 | 0 | 0 | 8 Sin3a         | protein_coding                     |
| ENSMUST00000168815 | 0 | 0 | 8 Ly6k          | protein_coding                     |
| ENSMUST00000169609 | 0 | 0 | 8 Sc5d          | protein_coding                     |
| ENSMUST00000169707 | 0 | 0 | 8 Ccnt1         | protein_coding                     |
| ENSMUST00000171055 | 0 | 0 | 8 Nos1          | protein_coding                     |
| ENSMUST00000171433 | 0 | 0 | 8 Mid1          | protein_coding                     |
| ENSMUST00000172280 | 0 | 0 | 8 4931429L15Rik | protein_coding                     |
| ENSMUST00000172795 | 0 | 0 | 8 Cyb5r1        | protein_coding                     |
| ENSMUST00000172898 | 0 | 0 | 8 Mgat4e        | protein_coding                     |
| ENSMUST00000173011 | 0 | 0 | 8 Snx14         | protein_coding                     |
| ENSMUST00000173931 | 0 | 0 | 8 Adamts10      | protein_coding                     |
| ENSMUST00000174603 | 0 | 0 | 8 Msh5          | protein_coding                     |
| ENSMUST00000176159 | 0 | 0 | 8 Cog2          | protein_coding                     |
| ENSMUST00000176411 | 0 | 0 | 8 Gnb1          | protein_coding                     |
| ENSMUST00000176413 | 0 | 0 | 8 Tshz3         | protein_coding                     |
| ENSMUST00000176867 | 0 | 0 | 8 Lrp5          | protein_coding                     |
| ENSMUST00000179072 | 0 | 0 | 8 Gm6902        | protein_coding                     |
| ENSMUST00000153865 | 0 | 0 | 8 Gm13775       | processed_transcript               |
| ENSMUST00000151070 | 0 | 0 | 8 Gm14268       | lincRNA                            |
| ENSMUST00000152737 | 0 | 0 | 8 1700049E15Rik | lincRNA                            |
| ENSMUST00000155496 | 0 | 0 | 8 Gm13853       | lincRNA                            |
| ENSMUST00000179170 | 0 | 0 | 8 Gm21718       | lincRNA                            |
| ENSMUST00000180426 | 0 | 0 | 8 Gm26881       | lincRNA                            |
| ENSMUST00000181269 | 0 | 0 | 8 Redrum        | lincRNA                            |
| ENSMUST00000181576 | 0 | 0 | 8 Gm26521       | lincRNA                            |
| ENSMUST00000181638 | 0 | 0 | 8 5033428I22Rik | lincRNA                            |
| ENSMUST00000123402 | 0 | 0 | 8 Vax2os        | antisense                          |
| ENSMUST00000127074 | 0 | 0 | 8 Slfn5os       | antisense                          |
| ENSMUST00000132326 | 0 | 0 | 8 Hoxd3os1      | antisense                          |
| ENSMUST00000138303 | 0 | 0 | 8 4930545L23Rik | antisense                          |
| ENSMUST00000150690 | 0 | 0 | 8 Gm15239       | antisense                          |
| ENSMUST00000151014 | 0 | 0 | 8 Gm15418       | antisense                          |
| ENSMUST00000152043 | 0 | 0 | 8 Gm17163       | antisense                          |
| ENSMUST00000162348 | 0 | 0 | 8 Gm16552       | antisense                          |
| ENSMUST00000185122 | 0 | 0 | 8 0610031O16Rik | antisense                          |
| ENSMUST00000166828 | 0 | 0 | 6 D17H6S56E-5   | protein_coding                     |
| ENSMUST00000165366 | 0 | 0 | 6 Gpr124        | protein_coding                     |
| ENSMUST00000024565 | 0 | 0 | 6 Nox3          | protein_coding                     |
| ENSMUST00000166828 | 0 | 0 | 6 D17H6S56E-5   | protein_coding                     |
| ENSMUST00000165366 | 0 | 0 | 6 Gpr124        | protein_coding                     |
| ENSMUST00000024565 | 0 | 0 | 6 Nox3          | protein_coding                     |
| ENSMUST00000023469 | 0 | 0 | 6 Btln7-ps      | unprocessed_pseudogene             |
| ENSMUST00000184272 | 0 | 0 | 6 Gm9780        | transcribed_unprocessed_pseudogene |
| ENSMUST00000180972 | 0 | 0 | 6 Trav12-2      | TR_V_gene                          |
| ENSMUST00000001497 | 0 | 0 | 6 Cideb         | protein_coding                     |
| ENSMUST00000004986 | 0 | 0 | 6 Mapk13        | protein_coding                     |
| ENSMUST00000005292 | 0 | 0 | 6 Prdx2         | protein_coding                     |
| ENSMUST00000006362 | 0 | 0 | 6 Rhox6         | protein_coding                     |
| ENSMUST00000010745 | 0 | 0 | 6 Apol7a        | protein_coding                     |
| ENSMUST00000010795 | 0 | 0 | 6 Acaa1b        | protein_coding                     |
| ENSMUST00000012161 | 0 | 0 | 6 Scarf2        | protein_coding                     |
| ENSMUST00000012331 | 0 | 0 | 6 Mogat1        | protein_coding                     |
| ENSMUST00000016680 | 0 | 0 | 6 Cul4a         | protein_coding                     |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUST00000018992 | 0 | 0 | 6 Rars          | protein_coding |
| ENSMUST00000019469 | 0 | 0 | 6 G6pc          | protein_coding |
| ENSMUST00000019931 | 0 | 0 | 6 Lrp11         | protein_coding |
| ENSMUST00000020062 | 0 | 0 | 6 Gprc6a        | protein_coding |
| ENSMUST00000020496 | 0 | 0 | 6 Adarb1        | protein_coding |
| ENSMUST00000020986 | 0 | 0 | 6 Dnajc27       | protein_coding |
| ENSMUST00000021056 | 0 | 0 | 6 Scn4a         | protein_coding |
| ENSMUST00000021290 | 0 | 0 | 6 Rcvrn         | protein_coding |
| ENSMUST00000021346 | 0 | 0 | 6 Tshr          | protein_coding |
| ENSMUST00000021559 | 0 | 0 | 6 Erh           | protein_coding |
| ENSMUST00000021635 | 0 | 0 | 6 Akr1c18       | protein_coding |
| ENSMUST00000021857 | 0 | 0 | 6 Fars2         | protein_coding |
| ENSMUST00000022338 | 0 | 0 | 6 Rgr           | protein_coding |
| ENSMUST00000023053 | 0 | 0 | 6 Col14a1       | protein_coding |
| ENSMUST00000023832 | 0 | 0 | 6 Rgn           | protein_coding |
| ENSMUST00000024906 | 0 | 0 | 6 Twsg1         | protein_coding |
| ENSMUST00000025419 | 0 | 0 | 6 Ppic          | protein_coding |
| ENSMUST00000025549 | 0 | 0 | 6 Cyb5a         | protein_coding |
| ENSMUST00000026039 | 0 | 0 | 6 Gyk           | protein_coding |
| ENSMUST00000026406 | 0 | 0 | 6 Rdh5          | protein_coding |
| ENSMUST00000027289 | 0 | 0 | 6 Vwa3b         | protein_coding |
| ENSMUST00000027847 | 0 | 0 | 6 Gpa33         | protein_coding |
| ENSMUST00000027874 | 0 | 0 | 6 Sele          | protein_coding |
| ENSMUST00000028229 | 0 | 0 | 6 Zeb2          | protein_coding |
| ENSMUST00000029635 | 0 | 0 | 6 Gucy1b3       | protein_coding |
| ENSMUST00000029771 | 0 | 0 | 6 F3            | protein_coding |
| ENSMUST00000030021 | 0 | 0 | 6 Coro2a        | protein_coding |
| ENSMUST00000030284 | 0 | 0 | 6 Rnf11         | protein_coding |
| ENSMUST00000030642 | 0 | 0 | 6 Psmb2         | protein_coding |
| ENSMUST00000030826 | 0 | 0 | 6 Slc2a5        | protein_coding |
| ENSMUST00000030903 | 0 | 0 | 6 Atad3a        | protein_coding |
| ENSMUST00000032258 | 0 | 0 | 6 Clec2e        | protein_coding |
| ENSMUST00000032396 | 0 | 0 | 6 Lrmp          | protein_coding |
| ENSMUST00000032433 | 0 | 0 | 6 Smco2         | protein_coding |
| ENSMUST00000033541 | 0 | 0 | 6 Fundc2        | protein_coding |
| ENSMUST00000033549 | 0 | 0 | 6 Asb12         | protein_coding |
| ENSMUST00000033606 | 0 | 0 | 6 Srpx2         | protein_coding |
| ENSMUST00000033930 | 0 | 0 | 6 Dusp4         | protein_coding |
| ENSMUST00000033933 | 0 | 0 | 6 Saraf         | protein_coding |
| ENSMUST00000034382 | 0 | 0 | 6 Zfp90         | protein_coding |
| ENSMUST00000034470 | 0 | 0 | 6 Vps26b        | protein_coding |
| ENSMUST00000036033 | 0 | 0 | 6 Dip2a         | protein_coding |
| ENSMUST00000037261 | 0 | 0 | 6 Ptgdr2        | protein_coding |
| ENSMUST00000037762 | 0 | 0 | 6 Hif3a         | protein_coding |
| ENSMUST00000038141 | 0 | 0 | 6 Slfn8         | protein_coding |
| ENSMUST00000038144 | 0 | 0 | 6 Esm1          | protein_coding |
| ENSMUST00000038514 | 0 | 0 | 6 Nup54         | protein_coding |
| ENSMUST00000038804 | 0 | 0 | 6 Kbtbd12       | protein_coding |
| ENSMUST00000039059 | 0 | 0 | 6 Pcsk7         | protein_coding |
| ENSMUST00000039450 | 0 | 0 | 6 Mcoln3        | protein_coding |
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| ENSMUST00000040442 | 0 | 0 | 6 Aox4          | protein_coding |
| ENSMUST00000040468 | 0 | 0 | 6 Primpol       | protein_coding |
| ENSMUST00000042009 | 0 | 0 | 6 Dlg5          | protein_coding |
| ENSMUST00000042286 | 0 | 0 | 6 Fmnl1         | protein_coding |
| ENSMUST00000042603 | 0 | 0 | 6 Inhba         | protein_coding |
| ENSMUST00000043195 | 0 | 0 | 6 Gcfc2         | protein_coding |
| ENSMUST00000044022 | 0 | 0 | 6 Epb4.1l4b     | protein_coding |
| ENSMUST00000044216 | 0 | 0 | 6 Shd           | protein_coding |
| ENSMUST00000044990 | 0 | 0 | 6 Slc24a2       | protein_coding |
| ENSMUST00000045969 | 0 | 0 | 6 Zfp458        | protein_coding |
| ENSMUST00000046404 | 0 | 0 | 6 Ubr7          | protein_coding |
| ENSMUST00000046792 | 0 | 0 | 6 Olfml2b       | protein_coding |
| ENSMUST00000047099 | 0 | 0 | 6 Pif1          | protein_coding |
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| ENSMUST00000048644 | 0 | 0 | 6 Pnliprp1      | protein_coding |
| ENSMUST00000048893 | 0 | 0 | 6 1700013G24Rik | protein_coding |



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| ENSMUST00000048945 | 0 | 0 | 6 Klk1b26       | protein_coding |
| ENSMUST00000049285 | 0 | 0 | 6 Lrrn1         | protein_coding |
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| ENSMUST00000051765 | 0 | 0 | 6 Glp2r         | protein_coding |
| ENSMUST00000053230 | 0 | 0 | 6 Ulk3          | protein_coding |
| ENSMUST00000053459 | 0 | 0 | 6 Pxdc1         | protein_coding |
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| ENSMUST00000055115 | 0 | 0 | 6 Vwce          | protein_coding |
| ENSMUST00000055506 | 0 | 0 | 6 Gtf3c1        | protein_coding |
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| ENSMUST00000057792 | 0 | 0 | 6 Pon2          | protein_coding |
| ENSMUST00000058679 | 0 | 0 | 6 Mtmr9         | protein_coding |
| ENSMUST00000058839 | 0 | 0 | 6 Klhl6         | protein_coding |
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| ENSMUST00000059287 | 0 | 0 | 6 Ephb2         | protein_coding |
| ENSMUST00000060895 | 0 | 0 | 6 Ugp2          | protein_coding |
| ENSMUST00000062145 | 0 | 0 | 6 4933430117Rik | protein_coding |
| ENSMUST00000063524 | 0 | 0 | 6 5031410106Rik | protein_coding |
| ENSMUST00000063719 | 0 | 0 | 6 Tmem9         | protein_coding |
| ENSMUST00000066148 | 0 | 0 | 6 Tbccl         | protein_coding |
| ENSMUST00000066717 | 0 | 0 | 6 Tcf4          | protein_coding |
| ENSMUST00000067060 | 0 | 0 | 6 Klf1          | protein_coding |
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| ENSMUST00000068264 | 0 | 0 | 6 Meis1         | protein_coding |
| ENSMUST00000068415 | 0 | 0 | 6 Zeb2          | protein_coding |
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| ENSMUST00000070735 | 0 | 0 | 6 Gabrg2        | protein_coding |
| ENSMUST00000071057 | 0 | 0 | 6 Ddx55         | protein_coding |
| ENSMUST00000072141 | 0 | 0 | 6 Pdcd11        | protein_coding |
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| ENSMUST00000076085 | 0 | 0 | 6 Ccdc186       | protein_coding |
| ENSMUST00000077119 | 0 | 0 | 6 Gjc3          | protein_coding |
| ENSMUST00000078438 | 0 | 0 | 6 Trim31        | protein_coding |
| ENSMUST00000079157 | 0 | 0 | 6 Eya3          | protein_coding |
| ENSMUST00000079269 | 0 | 0 | 6 Mmel1         | protein_coding |
| ENSMUST00000079590 | 0 | 0 | 6 Myo1a         | protein_coding |
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| ENSMUST00000084521 | 0 | 0 | 6 Rgs3          | protein_coding |
| ENSMUST00000084935 | 0 | 0 | 6 Pgm2l1        | protein_coding |
| ENSMUST00000085206 | 0 | 0 | 6 Slc25a36      | protein_coding |
| ENSMUST00000085461 | 0 | 0 | 6 Klk8          | protein_coding |
| ENSMUST00000085553 | 0 | 0 | 6 Grhl1         | protein_coding |
| ENSMUST00000085913 | 0 | 0 | 6 Atp1a2        | protein_coding |
| ENSMUST00000087927 | 0 | 0 | 6 Zfp827        | protein_coding |
| ENSMUST00000088080 | 0 | 0 | 6 Gm10217       | protein_coding |
| ENSMUST00000088236 | 0 | 0 | 6 Gm10220       | protein_coding |
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| ENSMUST00000092176 | 0 | 0 | 6 Caps2         | protein_coding |
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| ENSMUST00000094337 | 0 | 0 | 6 Fcrlb         | protein_coding |
| ENSMUST00000094821 | 0 | 0 | 6 Gltscr1       | protein_coding |

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| ENSMUST00000096766 | 0 | 0 | 6 Eml4          | protein_coding |
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| ENSMUST00000097944 | 0 | 0 | 6 4921539E11Rik | protein_coding |
| ENSMUST00000099172 | 0 | 0 | 6 Kif5a         | protein_coding |
| ENSMUST00000100467 | 0 | 0 | 6 Trrap         | protein_coding |
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| ENSMUST00000101044 | 0 | 0 | 6 Atp2b2        | protein_coding |
| ENSMUST00000102858 | 0 | 0 | 6 Atp1a3        | protein_coding |
| ENSMUST00000103029 | 0 | 0 | 6 Rhbdf2        | protein_coding |
| ENSMUST00000103210 | 0 | 0 | 6 Bcl2l11       | protein_coding |
| ENSMUST00000103234 | 0 | 0 | 6 Fbn1          | protein_coding |
| ENSMUST00000105242 | 0 | 0 | 6 Timeless      | protein_coding |
| ENSMUST00000105351 | 0 | 0 | 6 Plk5          | protein_coding |
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| ENSMUST00000106543 | 0 | 0 | 6 Otop3         | protein_coding |
| ENSMUST00000106929 | 0 | 0 | 6 Dnajc6        | protein_coding |
| ENSMUST00000106965 | 0 | 0 | 6 Lrrc51        | protein_coding |
| ENSMUST00000107024 | 0 | 0 | 6 Arhgap27      | protein_coding |
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| ENSMUST00000107617 | 0 | 0 | 6 Ptpn5         | protein_coding |
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| ENSMUST00000111207 | 0 | 0 | 6 Defb30        | protein_coding |
| ENSMUST00000111634 | 0 | 0 | 6 Smco2         | protein_coding |
| ENSMUST00000111963 | 0 | 0 | 6 Etv6          | protein_coding |
| ENSMUST00000112040 | 0 | 0 | 6 Fbxw14        | protein_coding |
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| ENSMUST00000112329 | 0 | 0 | 6 Pde6c         | protein_coding |
| ENSMUST00000112408 | 0 | 0 | 6 Gpr64         | protein_coding |
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| ENSMUST00000113263 | 0 | 0 | 6 Foxp4         | protein_coding |
| ENSMUST00000113711 | 0 | 0 | 6 Wdr34         | protein_coding |
| ENSMUST00000114154 | 0 | 0 | 6 Evc           | protein_coding |
| ENSMUST00000114634 | 0 | 0 | 6 Boc           | protein_coding |
| ENSMUST00000114715 | 0 | 0 | 6 Nsun6         | protein_coding |
| ENSMUST00000114740 | 0 | 0 | 6 Maats1        | protein_coding |
| ENSMUST00000115191 | 0 | 0 | 6 Rhox2b        | protein_coding |
| ENSMUST00000115224 | 0 | 0 | 6 Strip2        | protein_coding |
| ENSMUST00000115544 | 0 | 0 | 6 SrpX          | protein_coding |
| ENSMUST00000115579 | 0 | 0 | 6 Sgce          | protein_coding |
| ENSMUST00000115659 | 0 | 0 | 6 Pcdha9        | protein_coding |
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| ENSMUST00000117096 | 0 | 0 | 6 Elovl2        | protein_coding |
| ENSMUST00000117100 | 0 | 0 | 6 Slc45a2       | protein_coding |
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| ENSMUST00000118993 | 0 | 0 | 6 Tpst1         | protein_coding |
| ENSMUST00000119139 | 0 | 0 | 6 6330408A02Rik | protein_coding |
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| ENSMUST00000123208 | 0 | 0 | 6 Sec14l3       | protein_coding |
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| ENSMUST00000124488 | 0 | 0 | 6 Trdmt1        | protein_coding |
| ENSMUST00000124569 | 0 | 0 | 6 Slc15a4       | protein_coding |
| ENSMUST00000124633 | 0 | 0 | 6 Rpia          | protein_coding |
| ENSMUST00000124856 | 0 | 0 | 6 Snapc3        | protein_coding |
| ENSMUST00000125418 | 0 | 0 | 6 Gata1         | protein_coding |
| ENSMUST00000126004 | 0 | 0 | 6 Ldhc          | protein_coding |
| ENSMUST00000127341 | 0 | 0 | 6 Wap           | protein_coding |
| ENSMUST00000127439 | 0 | 0 | 6 Atp5b         | protein_coding |
| ENSMUST00000128119 | 0 | 0 | 6 Megf8         | protein_coding |
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| ENSMUST00000128228 | 0 | 0 | 6 Extl2         | protein_coding |
| ENSMUST00000128325 | 0 | 0 | 6 Hcfc1         | protein_coding |
| ENSMUST00000128352 | 0 | 0 | 6 Prpf40b       | protein_coding |
| ENSMUST00000128540 | 0 | 0 | 6 Akt2          | protein_coding |
| ENSMUST00000128928 | 0 | 0 | 6 Oaz2          | protein_coding |
| ENSMUST00000129039 | 0 | 0 | 6 Desi1         | protein_coding |
| ENSMUST00000129384 | 0 | 0 | 6 Stard9        | protein_coding |
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| ENSMUST00000134073 | 0 | 0 | 6 Vwf           | protein_coding |
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| ENSMUST00000134750 | 0 | 0 | 6 Vrk3          | protein_coding |
| ENSMUST00000135240 | 0 | 0 | 6 Gm15409       | protein_coding |
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| ENSMUST00000137085 | 0 | 0 | 6 Grb14         | protein_coding |
| ENSMUST00000137166 | 0 | 0 | 6 Nrnx2         | protein_coding |
| ENSMUST00000138045 | 0 | 0 | 6 Capzb         | protein_coding |
| ENSMUST00000138993 | 0 | 0 | 6 Dpf1          | protein_coding |
| ENSMUST00000139445 | 0 | 0 | 6 Ikbkap        | protein_coding |
| ENSMUST00000139555 | 0 | 0 | 6 Dnajc11       | protein_coding |
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| ENSMUST00000140972 | 0 | 0 | 6 Rasa4         | protein_coding |
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| ENSMUST00000141706 | 0 | 0 | 6 Drosha        | protein_coding |
| ENSMUST00000142171 | 0 | 0 | 6 Lrrc16a       | protein_coding |
| ENSMUST00000142183 | 0 | 0 | 6 Pla2g4f       | protein_coding |
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| ENSMUST00000144827 | 0 | 0 | 6 Efcab8        | protein_coding |
| ENSMUST00000145122 | 0 | 0 | 6 Cd52          | protein_coding |
| ENSMUST00000145351 | 0 | 0 | 6 Unc45a        | protein_coding |
| ENSMUST00000145631 | 0 | 0 | 6 Zkscan3       | protein_coding |

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| ENSMUST00000147278 | 0 | 0 | 6 Afap1l1       | protein_coding |
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| ENSMUST00000149480 | 0 | 0 | 6 Svop          | protein_coding |
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| ENSMUST00000150670 | 0 | 0 | 6 Ncs1          | protein_coding |
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| ENSMUST00000150697 | 0 | 0 | 6 Tbrg4         | protein_coding |
| ENSMUST00000150817 | 0 | 0 | 6 Dcbld2        | protein_coding |
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| ENSMUST00000150948 | 0 | 0 | 6 9530053A07Rik | protein_coding |
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| ENSMUST00000152274 | 0 | 0 | 6 Srsf11        | protein_coding |
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| ENSMUST00000155176 | 0 | 0 | 6 B9d1          | protein_coding |
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| ENSMUST00000159027 | 0 | 0 | 6 Ppp3cb        | protein_coding |
| ENSMUST00000159598 | 0 | 0 | 6 Pde8b         | protein_coding |
| ENSMUST00000159907 | 0 | 0 | 6 Slc30a9       | protein_coding |
| ENSMUST00000160256 | 0 | 0 | 6 Slc4a8        | protein_coding |
| ENSMUST00000160329 | 0 | 0 | 6 Wdr35         | protein_coding |
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| ENSMUST00000160942 | 0 | 0 | 6 Fam83a        | protein_coding |
| ENSMUST00000160962 | 0 | 0 | 6 Hipk2         | protein_coding |
| ENSMUST00000161100 | 0 | 0 | 6 Ppp4r1        | protein_coding |
| ENSMUST00000162169 | 0 | 0 | 6 Stab1         | protein_coding |
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| ENSMUST00000162636 | 0 | 0 | 6 Arhgef10      | protein_coding |
| ENSMUST00000163260 | 0 | 0 | 6 Pkp1          | protein_coding |
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| ENSMUST00000164202 | 0 | 0 | 6 Rbm20         | protein_coding |
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| ENSMUST00000168561 | 0 | 0 | 6 Mroh3         | protein_coding |
| ENSMUST00000169651 | 0 | 0 | 6 Nlrx1         | protein_coding |
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| ENSMUST00000170394 | 0 | 0 | 6 Nlk           | protein_coding |
| ENSMUST00000170712 | 0 | 0 | 6 Tdrd3         | protein_coding |
| ENSMUST00000170883 | 0 | 0 | 6 Hdlbp         | protein_coding |
| ENSMUST00000171256 | 0 | 0 | 6 Smad2         | protein_coding |
| ENSMUST00000171456 | 0 | 0 | 6 Adcy7         | protein_coding |
| ENSMUST00000171719 | 0 | 0 | 6 Ccr2          | protein_coding |
| ENSMUST00000172303 | 0 | 0 | 6 Myo18a        | protein_coding |
| ENSMUST00000174653 | 0 | 0 | 6 Krr1          | protein_coding |
| ENSMUST00000174691 | 0 | 0 | 6 Paip1         | protein_coding |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUST00000175859 | 0 | 0 | 6 Acaa1a        | protein_coding       |
| ENSMUST00000175916 | 0 | 0 | 6 Prox1         | protein_coding       |
| ENSMUST00000176029 | 0 | 0 | 6 Ebf2          | protein_coding       |
| ENSMUST00000176044 | 0 | 0 | 6 Isl1          | protein_coding       |
| ENSMUST00000176506 | 0 | 0 | 6 Meis3         | protein_coding       |
| ENSMUST00000177616 | 0 | 0 | 6 Gm21905       | protein_coding       |
| ENSMUST00000177951 | 0 | 0 | 6 Musk          | protein_coding       |
| ENSMUST00000178382 | 0 | 0 | 6 Carkd         | protein_coding       |
| ENSMUST00000179801 | 0 | 0 | 6 Gm7694        | protein_coding       |
| ENSMUST00000181117 | 0 | 0 | 6 Cdc20b        | protein_coding       |
| ENSMUST00000181244 | 0 | 0 | 6 Plxnc1        | protein_coding       |
| ENSMUST00000182068 | 0 | 0 | 6 Bin2          | protein_coding       |
| ENSMUST00000182134 | 0 | 0 | 6 Prkdc         | protein_coding       |
| ENSMUST00000183108 | 0 | 0 | 6 Xpnpep1       | protein_coding       |
| ENSMUST00000183725 | 0 | 0 | 6 Plac9a        | protein_coding       |
| ENSMUST00000183811 | 0 | 0 | 6 Plac9b        | protein_coding       |
| ENSMUST00000184546 | 0 | 0 | 6 Rhox2f        | protein_coding       |
| ENSMUST00000184772 | 0 | 0 | 6 Gm28047       | protein_coding       |
| ENSMUST00000184863 | 0 | 0 | 6 Dexi          | protein_coding       |
| ENSMUST00000123263 | 0 | 0 | 6 Gm13791       | processed_transcript |
| ENSMUST00000127317 | 0 | 0 | 6 Gm15999       | processed_transcript |
| ENSMUST00000131381 | 0 | 0 | 6 Gm12915       | processed_transcript |
| ENSMUST00000132432 | 0 | 0 | 6 Gm16731       | processed_transcript |
| ENSMUST00000140807 | 0 | 0 | 6 1700110K17Rik | processed_transcript |
| ENSMUST00000141027 | 0 | 0 | 6 Gm11607       | processed_transcript |
| ENSMUST00000143166 | 0 | 0 | 6 Gm13538       | processed_transcript |
| ENSMUST00000148230 | 0 | 0 | 6 D330023K18Rik | processed_transcript |
| ENSMUST00000156538 | 0 | 0 | 6 Gm14207       | processed_transcript |
| ENSMUST00000161364 | 0 | 0 | 6 Gm15663       | processed_transcript |
| ENSMUST00000162148 | 0 | 0 | 6 A430072P03Rik | processed_transcript |
| ENSMUST00000163396 | 0 | 0 | 6 Gm4675        | processed_transcript |
| ENSMUST00000163493 | 0 | 0 | 6 2810468N07Rik | processed_transcript |
| ENSMUST00000172075 | 0 | 0 | 6 Gm17396       | processed_transcript |
| ENSMUST00000117999 | 0 | 0 | 6 Supt20-ps     | processed_pseudogene |
| ENSMUST00000119639 | 0 | 0 | 6 Gm13784       | processed_pseudogene |
| ENSMUST00000098303 | 0 | 0 | 6 Gm9934        | lincRNA              |
| ENSMUST00000128307 | 0 | 0 | 6 Gm14033       | lincRNA              |
| ENSMUST00000130022 | 0 | 0 | 6 Gm11463       | lincRNA              |
| ENSMUST00000130109 | 0 | 0 | 6 A330102I10Rik | lincRNA              |
| ENSMUST00000132332 | 0 | 0 | 6 Gm13667       | lincRNA              |
| ENSMUST00000136620 | 0 | 0 | 6 Gm11213       | lincRNA              |
| ENSMUST00000142581 | 0 | 0 | 6 0610043K17Rik | lincRNA              |
| ENSMUST00000144993 | 0 | 0 | 6 5330416C01Rik | lincRNA              |
| ENSMUST00000146535 | 0 | 0 | 6 Gm14635       | lincRNA              |
| ENSMUST00000149538 | 0 | 0 | 6 Gm16019       | lincRNA              |
| ENSMUST00000150895 | 0 | 0 | 6 Gm12171       | lincRNA              |
| ENSMUST00000171902 | 0 | 0 | 6 Gm8817        | lincRNA              |
| ENSMUST00000180491 | 0 | 0 | 6 6430562O15Rik | lincRNA              |
| ENSMUST00000180592 | 0 | 0 | 6 Gm26652       | lincRNA              |
| ENSMUST00000180682 | 0 | 0 | 6 Gm16973       | lincRNA              |
| ENSMUST00000180689 | 0 | 0 | 6 Pantr1        | lincRNA              |
| ENSMUST00000181226 | 0 | 0 | 6 A330023F24Rik | lincRNA              |
| ENSMUST00000181587 | 0 | 0 | 6 1810014B01Rik | lincRNA              |
| ENSMUST00000181811 | 0 | 0 | 6 Gm17275       | lincRNA              |
| ENSMUST00000181833 | 0 | 0 | 6 C430002E04Rik | lincRNA              |
| ENSMUST00000181874 | 0 | 0 | 6 Gm26512       | lincRNA              |
| ENSMUST00000182424 | 0 | 0 | 6 Gm26936       | lincRNA              |
| ENSMUST00000103593 | 0 | 0 | 6 Trav12d-2     | IG_LV_gene           |
| ENSMUST00000103619 | 0 | 0 | 6 Trav12n-2     | IG_LV_gene           |
| ENSMUST00000084713 | 0 | 0 | 6 Gm10475       | antisense            |
| ENSMUST00000097612 | 0 | 0 | 6 Gm10545       | antisense            |
| ENSMUST00000124929 | 0 | 0 | 6 1700125H03Rik | antisense            |
| ENSMUST00000125611 | 0 | 0 | 6 Mecomos       | antisense            |
| ENSMUST00000126219 | 0 | 0 | 6 4933423P22Rik | antisense            |
| ENSMUST00000126231 | 0 | 0 | 6 4930455G09Rik | antisense            |
| ENSMUST00000126572 | 0 | 0 | 6 Gm13944       | antisense            |
| ENSMUST00000128094 | 0 | 0 | 6 Junos         | antisense            |
| ENSMUST00000136557 | 0 | 0 | 6 Gm16068       | antisense            |

|                    |   |   |                 |           |
|--------------------|---|---|-----------------|-----------|
| ENSMUST00000136906 | 0 | 0 | 6 1700016G14Rik | antisense |
| ENSMUST00000139835 | 0 | 0 | 6 Gm11266       | antisense |
| ENSMUST00000140501 | 0 | 0 | 6 Gm13031       | antisense |
| ENSMUST00000142774 | 0 | 0 | 6 Gm13389       | antisense |
| ENSMUST00000145804 | 0 | 0 | 6 Ppp1r18os     | antisense |
| ENSMUST00000148687 | 0 | 0 | 6 Gm16638       | antisense |
| ENSMUST00000156193 | 0 | 0 | 6 Gm11418       | antisense |
| ENSMUST00000167415 | 0 | 0 | 6 Gt(ROSA)26Sor | antisense |
| ENSMUST00000173978 | 0 | 0 | 6 BB365896      | antisense |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

Vega annotation: [http://vega.sanger.ac.uk/info/about/gene\\_and\\_transcript\\_types.html](http://vega.sanger.ac.uk/info/about/gene_and_transcript_types.html)

**Supplemental Table 2. Intron derived RapiRNA and NRapiRNA expressions.****NRapiRNA**

| Ensembl ID         | Normalized counts |        |         | Gene symbol   | Vega Biotype            |
|--------------------|-------------------|--------|---------|---------------|-------------------------|
|                    | oocyte            | zygote | sperm   |               |                         |
| ENSMUST00000176921 | 462730            | 318831 | 1853789 | Rab26os       | antisense               |
| ENSMUST00000025217 | 29113             | 22324  | 2883    | Hspa9         | protein_coding          |
| ENSMUST00000125074 | 11637             | 6403   | 24119   | Rpl13a        | processed_transcript    |
| ENSMUST00000130775 | 5990              | 6985   | 5627    | Eif4a2        | retained_intron         |
| ENSMUST00000131787 | 4721              | 3723   | 1130    | 2410006H16Rik | processed_transcript    |
| ENSMUST00000099272 | 2313              | 1522   | 6015    | Rpl21         | protein_coding          |
| ENSMUST00000153590 | 2163              | 1687   | 797     | Rpl5          | protein_coding          |
| ENSMUST00000110695 | 1827              | 1466   | 34      | Bri3          | protein_coding          |
| ENSMUST00000081650 | 1790              | 1658   | 11121   | Rpl3          | protein_coding          |
| ENSMUST00000093360 | 1220              | 688    | 2679    | Tnp2          | protein_coding          |
| ENSMUST00000180868 | 921               | 295    | 17895   | Gm26694       | lincRNA                 |
| ENSMUST00000136379 | 843               | 629    | 0       | Ttrap         | retained_intron         |
| ENSMUST00000020268 | 829               | 784    | 412     | Ccar1         | protein_coding          |
| ENSMUST00000142239 | 796               | 221    | 124523  | Rpl13a        | processed_transcript    |
| ENSMUST00000079716 | 739               | 373    | 456     | Rpl17         | protein_coding          |
| ENSMUST00000004203 | 714               | 529    | 15215   | Ppan          | protein_coding          |
| ENSMUST00000128840 | 594               | 393    | 85      | Eif4g1        | processed_transcript    |
| ENSMUST00000139959 | 548               | 402    | 176     | Gnb2l1        | processed_transcript    |
| ENSMUST00000034966 | 463               | 250    | 2889    | Rpl4          | protein_coding          |
| ENSMUST00000144458 | 405               | 301    | 872     | Usp10         | protein_coding          |
| ENSMUST00000160152 | 389               | 349    | 264     | Gas5          | retained_intron         |
| ENSMUST00000069817 | 381               | 315    | 121     | Prrc2b        | protein_coding          |
| ENSMUST00000137551 | 381               | 315    | 121     | Prrc2b        | protein_coding          |
| ENSMUST00000107232 | 368               | 315    | 121     | Pip5k1a       | protein_coding          |
| ENSMUST00000128131 | 353               | 303    | 813     | Snhg12        | lincRNA                 |
| ENSMUST00000136703 | 322               | 252    | 282     | Gnb2l1        | retained_intron         |
| ENSMUST00000108661 | 284               | 205    | 652     | Chd3          | protein_coding          |
| ENSMUST00000063021 | 240               | 252    | 0       | Luzp1         | protein_coding          |
| ENSMUST00000027438 | 230               | 216    | 141     | Ncl           | protein_coding          |
| ENSMUST00000102898 | 213               | 147    | 0       | Rpl7a         | protein_coding          |
| ENSMUST00000035105 | 205               | 6      | 135     | Rpsa          | protein_coding          |
| ENSMUST00000037739 | 196               | 265    | 315     | Gnl3          | protein_coding          |
| ENSMUST00000023849 | 192               | 249    | 0       | Ccrn4l        | protein_coding          |
| ENSMUST00000119260 | 182               | 215    | 83      | Fgfr2         | protein_coding          |
| ENSMUST00000096273 | 182               | 30     | 0       | Snx29         | protein_coding          |
| ENSMUST00000161790 | 168               | 168    | 668     | Eif4g2        | processed_transcript    |
| ENSMUST00000181574 | 166               | 123    | 97      | 2700038G22Rik | lincRNA                 |
| ENSMUST00000183026 | 161               | 152    | 0       | Rian          | lincRNA                 |
| ENSMUST00000130910 | 136               | 161    | 95      | Tsr1          | retained_intron         |
| ENSMUST00000113550 | 117               | 108    | 0       | Chchd6        | protein_coding          |
| ENSMUST00000111337 | 114               | 62     | 315     | Ckap5         | protein_coding          |
| ENSMUST00000072727 | 110               | 95     | 12      | Nap1l4        | protein_coding          |
| ENSMUST00000124951 | 95                | 80     | 0       | Th            | nonsense_mediated_decay |
| ENSMUST00000034787 | 93                | 12     | 36      | Phip          | protein_coding          |

|                    |    |     |                  |                         |
|--------------------|----|-----|------------------|-------------------------|
| ENSMUST00000082094 | 81 | 56  | 165 Ptcd3        | protein_coding          |
| ENSMUST00000109211 | 80 | 70  | 0 Spata2         | protein_coding          |
| ENSMUST00000049016 | 75 | 91  | 0 Zfp532         | protein_coding          |
| ENSMUST00000027174 | 68 | 23  | 137 Nop58        | protein_coding          |
| ENSMUST00000159114 | 67 | 80  | 0 C130026I21Rik  | processed_transcript    |
| ENSMUST00000139628 | 58 | 56  | 0 Atg16l1        | retained_intron         |
| ENSMUST00000066049 | 58 | 24  | 67 Tmem200a      | protein_coding          |
| ENSMUST00000173757 | 53 | 64  | 0 Tbc1d14        | nonsense_mediated_decay |
| ENSMUST00000102589 | 53 | 41  | 169 Eif4a1       | nonsense_mediated_decay |
| ENSMUST00000180743 | 53 | 38  | 0 Gm26561        | lincRNA                 |
| ENSMUST00000015920 | 50 | 46  | 0 Med22          | protein_coding          |
| ENSMUST00000027451 | 49 | 8   | 539 EphA4        | protein_coding          |
| ENSMUST00000121426 | 47 | 89  | 0 Cul4a          | protein_coding          |
| ENSMUST00000178353 | 47 | 85  | 28 Gm21992       | nonsense_mediated_decay |
| ENSMUST00000102483 | 47 | 58  | 63 Rpl23a        | protein_coding          |
| ENSMUST00000041983 | 46 | 13  | 0 Farp2          | protein_coding          |
| ENSMUST00000050993 | 44 | 30  | 351 Eif5         | protein_coding          |
| ENSMUST00000125633 | 38 | 47  | 0 Pex26          | nonsense_mediated_decay |
| ENSMUST00000162854 | 36 | 62  | 0 Kif6           | protein_coding          |
| ENSMUST00000021738 | 36 | 31  | 0 Gpr137b        | protein_coding          |
| ENSMUST00000150312 | 36 | 15  | 0 9130204K15Rik  | lincRNA                 |
| ENSMUST00000166615 | 36 | 28  | 0 Wwp2           | protein_coding          |
| ENSMUST00000111205 | 35 | 107 | 0 Wbscr22        | protein_coding          |
| ENSMUST00000173734 | 35 | 88  | 0 Khdc3          | protein_coding          |
| ENSMUST00000070607 | 35 | 14  | 0 Haus6          | protein_coding          |
| ENSMUST00000151914 | 34 | 33  | 0 Tmem164        | protein_coding          |
| ENSMUST00000155805 | 34 | 22  | 0 Rps16          | processed_transcript    |
| ENSMUST00000172913 | 33 | 18  | 0 Dnmt3a         | protein_coding          |
| ENSMUST00000174757 | 30 | 17  | 105 Ddx39b       | protein_coding          |
| ENSMUST00000155816 | 29 | 13  | 210 Snhg3        | processed_transcript    |
| ENSMUST00000176210 | 27 | 47  | 18 Rnf141        | nonsense_mediated_decay |
| ENSMUST00000129345 | 27 | 13  | 65 1110004E09Rik | protein_coding          |
| ENSMUST00000132778 | 27 | 0   | 0 AU022252       | processed_transcript    |
| ENSMUST00000115601 | 25 | 37  | 0 Gnb1l          | protein_coding          |
| ENSMUST00000123824 | 24 | 26  | 0 Aen            | processed_transcript    |
| ENSMUST00000133937 | 24 | 18  | 28 Zhx3          | processed_transcript    |
| ENSMUST00000178075 | 23 | 30  | 0 Usp19          | protein_coding          |
| ENSMUST00000161763 | 23 | 26  | 0 Gm10552        | antisense               |
| ENSMUST00000160056 | 23 | 22  | 165 Zbtb37       | nonsense_mediated_decay |
| ENSMUST00000152576 | 22 | 20  | 0 Gm11944        | processed_transcript    |
| ENSMUST00000094004 | 22 | 0   | 0 Abhd15         | protein_coding          |
| ENSMUST00000159304 | 21 | 26  | 0 Drg1           | nonsense_mediated_decay |
| ENSMUST00000161272 | 21 | 5   | 0 Manf           | protein_coding          |
| ENSMUST00000149259 | 21 | 0   | 127 Mier1        | processed_transcript    |
| ENSMUST00000144905 | 20 | 21  | 18 2410002F23Rik | processed_transcript    |
| ENSMUST00000151921 | 20 | 20  | 0 E130307A14Rik  | processed_transcript    |
| ENSMUST00000131002 | 20 | 17  | 0 Kmt2b          | protein_coding          |
| ENSMUST00000176948 | 19 | 32  | 0 Pon3           | protein_coding          |
| ENSMUST00000030143 | 19 | 25  | 0 Ubap2          | protein_coding          |



|                    |    |    |                  |                         |
|--------------------|----|----|------------------|-------------------------|
| ENSMUST00000071826 | 19 | 16 | 0 Crb3           | protein_coding          |
| ENSMUST00000182088 | 19 | 15 | 0 Rian           | lincRNA                 |
| ENSMUST00000094077 | 18 | 9  | 71 Kdm6b         | protein_coding          |
| ENSMUST00000045909 | 16 | 44 | 0 Zbed3          | protein_coding          |
| ENSMUST00000148945 | 16 | 25 | 0 Zfp652         | nonsense_mediated_decay |
| ENSMUST00000132654 | 16 | 18 | 0 Rcan3          | protein_coding          |
| ENSMUST00000134770 | 16 | 8  | 0 Alkbh5         | processed_transcript    |
| ENSMUST00000122383 | 16 | 5  | 0 Gk5            | protein_coding          |
| ENSMUST00000163180 | 16 | 5  | 0 Ccnt1          | processed_transcript    |
| ENSMUST00000032998 | 15 | 16 | 145 Rps3         | protein_coding          |
| ENSMUST00000066804 | 15 | 7  | 0 Sirt5          | protein_coding          |
| ENSMUST00000119055 | 14 | 25 | 0 Rab3d          | protein_coding          |
| ENSMUST00000135963 | 14 | 16 | 12 Rad51d        | nonsense_mediated_decay |
| ENSMUST00000141523 | 14 | 6  | 0 Dnajc5         | processed_transcript    |
| ENSMUST00000023631 | 14 | 5  | 0 Brwd1          | protein_coding          |
| ENSMUST00000098924 | 14 | 4  | 0 Adar           | protein_coding          |
| ENSMUST00000091628 | 14 | 0  | 0 Atxn1          | protein_coding          |
| ENSMUST00000047086 | 13 | 19 | 115 Wdr43        | protein_coding          |
| ENSMUST00000107096 | 13 | 13 | 418 Rps3         | protein_coding          |
| ENSMUST00000115052 | 13 | 13 | 0 Fam107b        | protein_coding          |
| ENSMUST00000137671 | 13 | 5  | 0 AA415398       | processed_transcript    |
| ENSMUST00000180659 | 13 | 0  | 34 Snhg7         | lincRNA                 |
| ENSMUST00000022040 | 13 | 0  | 0 Agtbbp1        | protein_coding          |
| ENSMUST00000131949 | 13 | 0  | 0 Uckl1          | protein_coding          |
| ENSMUST00000148575 | 13 | 29 | 0 Serf2          | nonsense_mediated_decay |
| ENSMUST00000112371 | 13 | 21 | 0 Scn1a          | protein_coding          |
| ENSMUST00000178644 | 13 | 8  | 0 Gm21969        | nonsense_mediated_decay |
| ENSMUST00000134242 | 12 | 24 | 0 Icmt           | processed_transcript    |
| ENSMUST00000101245 | 12 | 12 | 0 Mob1a          | protein_coding          |
| ENSMUST00000125007 | 12 | 1  | 26 Pxn           | processed_transcript    |
| ENSMUST00000179939 | 12 | 0  | 0 Atp2a2         | protein_coding          |
| ENSMUST00000137022 | 12 | 0  | 0 Ppp1r12b       | processed_transcript    |
| ENSMUST00000183807 | 12 | 0  | 0 Nipal3         | nonsense_mediated_decay |
| ENSMUST00000135631 | 11 | 25 | 0 Nudcd3         | protein_coding          |
| ENSMUST00000031029 | 11 | 21 | 0 Snx17          | protein_coding          |
| ENSMUST00000065420 | 11 | 16 | 0 Hjurp          | protein_coding          |
| ENSMUST00000182499 | 11 | 12 | 0 Mirg           | lincRNA                 |
| ENSMUST00000023774 | 11 | 9  | 0 Slc11a2        | protein_coding          |
| ENSMUST00000123522 | 11 | 9  | 0 Med27          | processed_transcript    |
| ENSMUST00000135877 | 11 | 5  | 0 Eef1b2         | nonsense_mediated_decay |
| ENSMUST00000128437 | 10 | 8  | 0 Gga3           | processed_transcript    |
| ENSMUST00000050178 | 10 | 5  | 0 Ccdc60         | protein_coding          |
| ENSMUST00000081840 | 10 | 5  | 18 Rpl32         | protein_coding          |
| ENSMUST00000020158 | 10 | 0  | 65 Myb           | protein_coding          |
| ENSMUST00000133236 | 10 | 14 | 0 Ino80d         | nonsense_mediated_decay |
| ENSMUST00000125318 | 10 | 9  | 14 2410002F23Rik | processed_transcript    |
| ENSMUST00000114284 | 10 | 9  | 0 Rgs12          | protein_coding          |
| ENSMUST00000048565 | 10 | 7  | 0 Trim60         | protein_coding          |
| ENSMUST00000114537 | 10 | 5  | 0 Myo1b          | protein_coding          |

|                    |    |    |                  |                         |
|--------------------|----|----|------------------|-------------------------|
| ENSMUST00000155301 | 10 | 4  | 0 Fbxl12         | protein_coding          |
| ENSMUST0000019843  | 10 | 0  | 0 Akt3           | protein_coding          |
| ENSMUST00000074945 | 10 | 0  | 0 Agap1          | protein_coding          |
| ENSMUST00000084937 | 10 | 0  | 0 2410002F23Rik  | protein_coding          |
| ENSMUST00000129433 | 9  | 8  | 0 Dusp16         | protein_coding          |
| ENSMUST00000110679 | 9  | 0  | 42 Ggact         | protein_coding          |
| ENSMUST00000125763 | 9  | 0  | 0 Zfp407         | protein_coding          |
| ENSMUST00000155685 | 9  | 0  | 0 Camta1         | processed_transcript    |
| ENSMUST00000174568 | 9  | 0  | 0 9130230N09Rik  | processed_transcript    |
| ENSMUST00000081335 | 8  | 5  | 0 Tgif2          | protein_coding          |
| ENSMUST00000156677 | 8  | 4  | 0 Ahdc1          | processed_transcript    |
| ENSMUST00000033463 | 8  | 3  | 12 Slc9a9        | protein_coding          |
| ENSMUST00000113523 | 8  | 0  | 77 Tmem63b       | protein_coding          |
| ENSMUST00000022806 | 8  | 0  | 0 Bcl2l2         | protein_coding          |
| ENSMUST00000115137 | 8  | 0  | 0 Pcyt1a         | protein_coding          |
| ENSMUST00000161795 | 7  | 19 | 22 5830418K08Rik | protein_coding          |
| ENSMUST00000149698 | 7  | 12 | 0 B4galt5        | protein_coding          |
| ENSMUST00000022544 | 7  | 9  | 0 Hmbox1         | protein_coding          |
| ENSMUST00000182100 | 7  | 9  | 0 Rian           | lincRNA                 |
| ENSMUST00000107720 | 7  | 8  | 0 Stx17          | protein_coding          |
| ENSMUST00000092723 | 7  | 7  | 0 Arid1b         | protein_coding          |
| ENSMUST00000126662 | 7  | 6  | 0 Gm21974        | nonsense_mediated_decay |
| ENSMUST00000160591 | 7  | 0  | 0 Dars2          | retained_intron         |
| ENSMUST00000022816 | 7  | 0  | 0 Sub1           | protein_coding          |
| ENSMUST00000049093 | 7  | 0  | 0 Txnip          | protein_coding          |
| ENSMUST00000069557 | 7  | 0  | 0 Smad5          | protein_coding          |
| ENSMUST00000180679 | 7  | 0  | 0 Gm26816        | lincRNA                 |
| ENSMUST00000037930 | 7  | 15 | 0 Msl1           | protein_coding          |
| ENSMUST00000054674 | 7  | 11 | 0 Hjurp          | protein_coding          |
| ENSMUST00000154447 | 7  | 7  | 28 Srsf10        | processed_transcript    |
| ENSMUST00000133055 | 7  | 3  | 0 Ak4            | protein_coding          |
| ENSMUST00000143711 | 7  | 0  | 57 Dnal1         | retained_intron         |
| ENSMUST00000136836 | 7  | 0  | 0 Skap1          | retained_intron         |
| ENSMUST00000028071 | 7  | 0  | 0 Bmi1           | protein_coding          |
| ENSMUST00000056096 | 7  | 0  | 0 Zfp697         | protein_coding          |
| ENSMUST00000087441 | 7  | 0  | 0 Prom1          | protein_coding          |
| ENSMUST00000113165 | 7  | 0  | 0 Ralgps1        | protein_coding          |
| ENSMUST00000176144 | 7  | 0  | 0 Has3           | protein_coding          |
| ENSMUST00000159060 | 7  | 0  | 0 Zfp263         | processed_transcript    |
| ENSMUST00000063976 | 6  | 9  | 0 Opa3           | protein_coding          |
| ENSMUST00000178704 | 6  | 6  | 24 Ddc           | protein_coding          |
| ENSMUST00000170406 | 6  | 5  | 0 Ulk4           | processed_transcript    |
| ENSMUST00000021208 | 6  | 0  | 0 Rph3al         | protein_coding          |
| ENSMUST00000022257 | 6  | 0  | 0 Atxn7          | protein_coding          |
| ENSMUST00000022517 | 6  | 0  | 0 Cryl1          | protein_coding          |
| ENSMUST00000064166 | 6  | 0  | 0 Gpr20          | protein_coding          |
| ENSMUST00000091201 | 6  | 0  | 0 Arl15          | protein_coding          |
| ENSMUST00000119118 | 6  | 0  | 0 Fam189a1       | protein_coding          |
| ENSMUST00000142080 | 6  | 0  | 0 Whsc1          | protein_coding          |

|                    |   |    |                 |                         |
|--------------------|---|----|-----------------|-------------------------|
| ENSMUST00000141467 | 6 | 0  | 0 Arpc5l        | processed_transcript    |
| ENSMUST00000101513 | 5 | 25 | 0 Fam126a       | protein_coding          |
| ENSMUST00000109469 | 5 | 7  | 0 Mpped1        | protein_coding          |
| ENSMUST00000106549 | 5 | 6  | 0 Knop1         | protein_coding          |
| ENSMUST00000129021 | 5 | 6  | 0 Aptx          | nonsense_mediated_decay |
| ENSMUST00000176216 | 5 | 5  | 77 Cux1         | protein_coding          |
| ENSMUST00000126045 | 5 | 5  | 0 Knstrn        | protein_coding          |
| ENSMUST00000182926 | 5 | 5  | 0 Rbpms         | nonsense_mediated_decay |
| ENSMUST00000112363 | 5 | 4  | 0 Eml4          | protein_coding          |
| ENSMUST00000026635 | 5 | 0  | 131 Farp1       | protein_coding          |
| ENSMUST00000038463 | 5 | 0  | 0 Raver2        | protein_coding          |
| ENSMUST00000041375 | 5 | 0  | 0 Sik2          | protein_coding          |
| ENSMUST00000045041 | 5 | 0  | 0 Galnt12       | protein_coding          |
| ENSMUST00000054343 | 5 | 0  | 0 Akt1s1        | protein_coding          |
| ENSMUST00000074653 | 5 | 0  | 0 8030462N17Rik | protein_coding          |
| ENSMUST00000090806 | 5 | 0  | 0 Rai1          | protein_coding          |
| ENSMUST00000100375 | 5 | 0  | 0 Poldip3       | protein_coding          |
| ENSMUST00000106101 | 5 | 0  | 0 Zzz3          | protein_coding          |
| ENSMUST00000106344 | 5 | 0  | 0 Tnrc6c        | protein_coding          |
| ENSMUST00000114744 | 5 | 0  | 0 Nck2          | protein_coding          |
| ENSMUST00000119558 | 5 | 0  | 0 6330408A02Rik | protein_coding          |
| ENSMUST00000146780 | 5 | 0  | 0 Tmem184a      | protein_coding          |
| ENSMUST00000177173 | 5 | 0  | 0 Cdhr4         | protein_coding          |
| ENSMUST00000130616 | 5 | 0  | 0 Zfp664        | processed_transcript    |
| ENSMUST00000133212 | 5 | 0  | 0 Nacc2         | processed_transcript    |
| ENSMUST00000135850 | 5 | 0  | 0 Tcte2         | processed_transcript    |
| ENSMUST00000138572 | 5 | 0  | 0 Arl4a         | processed_transcript    |
| ENSMUST00000151152 | 5 | 0  | 0 Kcnh1         | processed_transcript    |
| ENSMUST00000154976 | 5 | 0  | 0 Ttc19         | processed_transcript    |
| ENSMUST00000156194 | 5 | 0  | 0 Tfpt          | processed_transcript    |
| ENSMUST00000142957 | 5 | 0  | 0 Pisd          | nonsense_mediated_decay |
| ENSMUST00000183690 | 4 | 24 | 75 Strbp        | nonsense_mediated_decay |
| ENSMUST00000076410 | 4 | 19 | 0 Hsph1         | protein_coding          |
| ENSMUST00000033652 | 4 | 18 | 0 Phka2         | protein_coding          |
| ENSMUST00000091565 | 4 | 17 | 246 Zfp652      | protein_coding          |
| ENSMUST00000161532 | 4 | 7  | 0 Grhl2         | protein_coding          |
| ENSMUST00000143085 | 4 | 6  | 0 Cnot3         | retained_intron         |
| ENSMUST00000087104 | 4 | 5  | 0 Cdkl5         | protein_coding          |
| ENSMUST00000039608 | 4 | 5  | 0 Dym           | protein_coding          |
| ENSMUST00000022239 | 2 | 1  | 14 Parp8        | protein_coding          |
| ENSMUST00000132123 | 0 | 18 | 0 Ago3          | protein_coding          |
| ENSMUST00000139833 | 0 | 14 | 0 Fam46c        | processed_transcript    |
| ENSMUST00000135469 | 0 | 12 | 0 Zak           | protein_coding          |
| ENSMUST00000059145 | 0 | 12 | 0 Tacc2         | protein_coding          |
| ENSMUST00000128196 | 0 | 12 | 0 Slc5a10       | processed_transcript    |
| ENSMUST00000100185 | 0 | 12 | 0 Pgs1          | nonsense_mediated_decay |
| ENSMUST00000125624 | 0 | 10 | 0 Ino80e        | retained_intron         |
| ENSMUST00000041178 | 0 | 9  | 0 1700006J14Rik | processed_transcript    |
| ENSMUST00000026459 | 0 | 9  | 0 Atp5b         | protein_coding          |

|                    |   |   |                    |                         |
|--------------------|---|---|--------------------|-------------------------|
| ENSMUST00000141450 | 0 | 9 | 0 4930469K13Rik    | processed_transcript    |
| ENSMUST00000147218 | 0 | 9 | 0 Elk4             | nonsense_mediated_decay |
| ENSMUST00000047429 | 0 | 8 | 12 Mrps6           | protein_coding          |
| ENSMUST00000025483 | 0 | 8 | 0 Nars             | protein_coding          |
| ENSMUST00000089506 | 0 | 8 | 0 Ap5s1            | protein_coding          |
| ENSMUST00000109283 | 0 | 8 | 0 Slc2a13          | protein_coding          |
| ENSMUST00000161249 | 0 | 8 | 0 1700112E06Rik    | protein_coding          |
| ENSMUST00000129314 | 0 | 8 | 0 Ski              | processed_transcript    |
| ENSMUST00000140333 | 0 | 7 | 22 Abcb7           | retained_intron         |
| ENSMUST00000005066 | 0 | 7 | 0 Map2k1           | protein_coding          |
| ENSMUST00000100271 | 0 | 7 | 0 D030018L15Rik    | lincRNA                 |
| ENSMUST00000034964 | 0 | 6 | 0 Tipin            | protein_coding          |
| ENSMUST00000081528 | 0 | 6 | 0 Kcnq2            | protein_coding          |
| ENSMUST00000105778 | 0 | 6 | 0 Prdm2            | protein_coding          |
| ENSMUST00000111169 | 0 | 6 | 0 Cenpo            | protein_coding          |
| ENSMUST00000117140 | 0 | 6 | 0 Rgp1             | protein_coding          |
| ENSMUST00000136490 | 0 | 6 | 0 Tbc1d14          | protein_coding          |
| ENSMUST00000118942 | 0 | 5 | 0 Disc1            | protein_coding          |
| ENSMUST00000121331 | 0 | 5 | 0 Vps25            | protein_coding          |
| ENSMUST00000130349 | 0 | 5 | 0 Prdx4            | protein_coding          |
| ENSMUST00000181503 | 0 | 5 | 0 Gm26608          | lincRNA                 |
| ENSMUST00000001562 | 0 | 5 | 0 Tulp3            | protein_coding          |
| ENSMUST00000041042 | 0 | 5 | 0 Tbc1d10a         | protein_coding          |
| ENSMUST00000105680 | 0 | 5 | 0 Rere             | protein_coding          |
| ENSMUST00000107891 | 0 | 5 | 0 Nup62            | protein_coding          |
| ENSMUST00000110267 | 0 | 5 | 0 Sybu             | protein_coding          |
| ENSMUST00000112842 | 0 | 5 | 0 Gin1             | protein_coding          |
| ENSMUST00000132726 | 0 | 5 | 0 Mepce            | protein_coding          |
| ENSMUST00000135666 | 0 | 5 | 0 A630007B06Rik    | protein_coding          |
| ENSMUST00000135673 | 0 | 5 | 0 Pogk             | protein_coding          |
| ENSMUST00000150821 | 0 | 5 | 0 Uhmk1            | protein_coding          |
| ENSMUST00000162819 | 0 | 5 | 0 Wdr26            | protein_coding          |
| ENSMUST00000163754 | 0 | 5 | 0 Xpnpep3          | protein_coding          |
| ENSMUST00000177754 | 0 | 5 | 0 Dnmt1            | protein_coding          |
| ENSMUST00000179857 | 0 | 5 | 0 Tomm20           | protein_coding          |
| ENSMUST00000182671 | 0 | 5 | 0 Ccdc74a          | protein_coding          |
| ENSMUST00000138132 | 0 | 5 | 0 Lrrc14           | processed_transcript    |
| ENSMUST00000138345 | 0 | 5 | 0 Tcte2            | processed_transcript    |
| ENSMUST00000165166 | 0 | 5 | 0 Phc3             | processed_transcript    |
| ENSMUST00000165758 | 0 | 5 | 0 Sec31b           | nonsense_mediated_decay |
| ENSMUST00000098372 | 0 | 4 | 32482 Gm10619      | protein_coding          |
| ENSMUST00000026096 | 0 | 3 | 28 Bnc1            | protein_coding          |
| ENSMUST00000126270 | 0 | 0 | 8123 Gm12648       | lincRNA                 |
| ENSMUST00000046901 | 0 | 0 | 1820 Pdgfa         | protein_coding          |
| ENSMUST00000137606 | 0 | 0 | 1527 1700042G15Rik | lincRNA                 |
| ENSMUST00000099718 | 0 | 0 | 478 Gm16976        | processed_transcript    |
| ENSMUST00000127020 | 0 | 0 | 408 Gm14152        | lincRNA                 |
| ENSMUST00000151220 | 0 | 0 | 393 4932702P03Rik  | antisense               |
| ENSMUST00000174103 | 0 | 0 | 339 Wdfy3          | protein_coding          |

|                    |   |   |                   |                         |
|--------------------|---|---|-------------------|-------------------------|
| ENSMUST00000137546 | 0 | 0 | 226 1700121C08Rik | antisense               |
| ENSMUST00000138469 | 0 | 0 | 208 Tgfbr3        | processed_transcript    |
| ENSMUST00000142249 | 0 | 0 | 141 Gm13817       | lincRNA                 |
| ENSMUST00000106523 | 0 | 0 | 133 Eri2          | protein_coding          |
| ENSMUST00000139863 | 0 | 0 | 97 Tanc1          | protein_coding          |
| ENSMUST00000114996 | 0 | 0 | 89 Optn           | protein_coding          |
| ENSMUST00000159152 | 0 | 0 | 67 2010111I01Rik  | protein_coding          |
| ENSMUST00000181873 | 0 | 0 | 67 5430416N02Rik  | lincRNA                 |
| ENSMUST00000065797 | 0 | 0 | 57 Chst1          | protein_coding          |
| ENSMUST00000134501 | 0 | 0 | 46 Kdm2b          | retained_intron         |
| ENSMUST00000139013 | 0 | 0 | 46 Abcg1          | retained_intron         |
| ENSMUST00000060807 | 0 | 0 | 46 Fam83h         | protein_coding          |
| ENSMUST00000123658 | 0 | 0 | 46 Rnf43          | processed_transcript    |
| ENSMUST00000006912 | 0 | 0 | 42 Pip4k2a        | protein_coding          |
| ENSMUST00000109108 | 0 | 0 | 40 Wwox           | protein_coding          |
| ENSMUST00000149822 | 0 | 0 | 38 2810008D09Rik  | lincRNA                 |
| ENSMUST00000114671 | 0 | 0 | 34 Mllt10         | protein_coding          |
| ENSMUST00000141820 | 0 | 0 | 30 Wdr53          | processed_transcript    |
| ENSMUST00000166839 | 0 | 0 | 28 Emilin1        | retained_intron         |
| ENSMUST00000140826 | 0 | 0 | 28 Gm12462        | antisense               |
| ENSMUST00000008733 | 0 | 0 | 26 Dnajb6         | protein_coding          |
| ENSMUST00000153149 | 0 | 0 | 26 Cdh23          | processed_transcript    |
| ENSMUST00000099072 | 0 | 0 | 24 Dpm1           | nonsense_mediated_decay |
| ENSMUST00000033300 | 0 | 0 | 22 Art1           | protein_coding          |
| ENSMUST00000110367 | 0 | 0 | 22 Stox2          | protein_coding          |
| ENSMUST00000134036 | 0 | 0 | 22 Ypel1          | nonsense_mediated_decay |
| ENSMUST00000106065 | 0 | 0 | 20 Negr1          | protein_coding          |
| ENSMUST00000113968 | 0 | 0 | 20 Suv420h1       | protein_coding          |
| ENSMUST00000143107 | 0 | 0 | 20 Rpl27a         | protein_coding          |
| ENSMUST00000139934 | 0 | 0 | 20 1810032O08Rik  | nonsense_mediated_decay |
| ENSMUST00000070575 | 0 | 0 | 18 Csnk1d         | protein_coding          |
| ENSMUST00000117882 | 0 | 0 | 18 Pom121l2       | protein_coding          |
| ENSMUST00000166592 | 0 | 0 | 18 Tnp02          | protein_coding          |
| ENSMUST00000091694 | 0 | 0 | 16 Fam65b         | protein_coding          |
| ENSMUST00000163998 | 0 | 0 | 16 Gcom1          | protein_coding          |
| ENSMUST00000160071 | 0 | 0 | 16 Auts2          | processed_transcript    |
| ENSMUST00000154585 | 0 | 0 | 16 Ccnl1          | nonsense_mediated_decay |
| ENSMUST00000033157 | 0 | 0 | 14 Ndufab1        | protein_coding          |
| ENSMUST00000047652 | 0 | 0 | 14 Tspan14        | protein_coding          |
| ENSMUST00000054523 | 0 | 0 | 14 lba57          | protein_coding          |
| ENSMUST00000062672 | 0 | 0 | 14 Rpp38          | protein_coding          |
| ENSMUST00000107726 | 0 | 0 | 14 Cyth2          | protein_coding          |
| ENSMUST00000138182 | 0 | 0 | 14 Ugt1a10        | protein_coding          |
| ENSMUST00000142351 | 0 | 0 | 14 Vegfa          | protein_coding          |
| ENSMUST00000149146 | 0 | 0 | 14 Epha10         | protein_coding          |
| ENSMUST00000144815 | 0 | 0 | 14 Dnaja3         | processed_transcript    |
| ENSMUST00000133362 | 0 | 0 | 14 Ext1           | nonsense_mediated_decay |
| ENSMUST00000172594 | 0 | 0 | 14 Calm3          | nonsense_mediated_decay |
| ENSMUST00000183522 | 0 | 0 | 14 RP23-131O4.2   | lincRNA                 |

|                     |   |   |                  |                         |
|---------------------|---|---|------------------|-------------------------|
| ENSMUST00000002445  | 0 | 0 | 12 Ranbp3        | protein_coding          |
| ENSMUST00000003049  | 0 | 0 | 12 Med25         | protein_coding          |
| ENSMUST000000022476 | 0 | 0 | 12 Glt8d1        | protein_coding          |
| ENSMUST000000036210 | 0 | 0 | 12 Poglut1       | protein_coding          |
| ENSMUST000000075220 | 0 | 0 | 12 Cdyl          | protein_coding          |
| ENSMUST000000094408 | 0 | 0 | 12 2010015L04Rik | protein_coding          |
| ENSMUST000000094609 | 0 | 0 | 12 Nckap5        | protein_coding          |
| ENSMUST000000109261 | 0 | 0 | 12 Clint1        | protein_coding          |
| ENSMUST000000110991 | 0 | 0 | 12 Slc12a6       | protein_coding          |
| ENSMUST000000111550 | 0 | 0 | 12 Ablim1        | protein_coding          |
| ENSMUST000000115698 | 0 | 0 | 12 Hic2          | protein_coding          |
| ENSMUST000000128123 | 0 | 0 | 12 Tmem59        | protein_coding          |
| ENSMUST000000153488 | 0 | 0 | 12 Naa30         | protein_coding          |
| ENSMUST000000173758 | 0 | 0 | 12 Tmem234       | protein_coding          |
| ENSMUST000000137505 | 0 | 0 | 12 Hspa5         | processed_transcript    |
| ENSMUST000000150657 | 0 | 0 | 12 Hnrnp1        | processed_transcript    |
| ENSMUST000000027585 | 0 | 0 | 12 Tmem163       | nonsense_mediated_decay |
| ENSMUST000000126380 | 0 | 0 | 12 Snhg12        | lincRNA                 |
| ENSMUST000000181301 | 0 | 0 | 12 Gm26904       | lincRNA                 |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

Vega annotation: [http://vega.sanger.ac.uk/info/about/gene\\_and\\_transcript\\_types.html](http://vega.sanger.ac.uk/info/about/gene_and_transcript_types.html)

**Supplemental Table 3. Exon derived RapiRNA and NRapiRNA expressions.**  
**RapIRNA**

| Ensembl ID         | Normalized counts |        |        | Gene symbol   | Vega Biotype                     |
|--------------------|-------------------|--------|--------|---------------|----------------------------------|
|                    | oocyte            | zygote | sperm  |               |                                  |
| ENSMUSG00000098178 | 63728             | 30316  | 118399 | Gm42418       | lincRNA                          |
| ENSMUSG00000079553 | 22115             | 21688  | 0      | Kifc1         | protein_coding                   |
| ENSMUSG00000089281 | 15311             | 14544  | 137    | Scarna6       | snoRNA                           |
| ENSMUSG00000065922 | 9264              | 6030   | 3525   | n-R5-8s1      | rRNA                             |
| ENSMUSG00000052477 | 8165              | 10508  | 0      | C130026I21Rik | protein_coding                   |
| ENSMUSG00000061950 | 6746              | 8951   | 0      | Ppp4r1        | protein_coding                   |
| ENSMUSG00000054766 | 5489              | 5848   | 22     | Set           | protein_coding                   |
| ENSMUSG00000065196 | 5147              | 4301   | 1027   | Snord85       | snoRNA                           |
| ENSMUSG00000079225 | 5000              | 5390   | 14     | Gm9531        | transcribed_processed_pseudogene |
| ENSMUSG00000027737 | 4493              | 4535   | 0      | Slc7a11       | protein_coding                   |
| ENSMUSG00000055296 | 4130              | 4085   | 2      | Tmem245       | protein_coding                   |
| ENSMUSG00000024301 | 3856              | 4150   | 0      | Kifc5b        | protein_coding                   |
| ENSMUSG00000038943 | 3180              | 4502   | 12     | Prc1          | protein_coding                   |
| ENSMUSG00000065734 | 3131              | 2481   | 6886   | Snord49a      | snoRNA                           |
| ENSMUSG00000074682 | 3053              | 3305   | 0      | Zcchc3        | protein_coding                   |
| ENSMUSG00000070031 | 2819              | 3744   | 6      | Sp140         | protein_coding                   |
| ENSMUSG00000089844 | 2762              | 3663   | 0      | A530032D15Rik | protein_coding                   |
| ENSMUSG00000020255 | 2727              | 2730   | 0      | D10Wsu102e    | protein_coding                   |
| ENSMUSG00000035202 | 2671              | 904    | 13034  | Lars2         | protein_coding                   |
| ENSMUSG00000079259 | 2622              | 3339   | 2      | Trim71        | protein_coding                   |
| ENSMUSG00000070034 | 2537              | 3266   | 2      | Sp110         | protein_coding                   |
| ENSMUSG00000103998 | 2537              | 2858   | 0      | Gm38025       | lincRNA                          |
| ENSMUSG00000093565 | 2363              | 281    | 747    | Rab26os       | antisense                        |
| ENSMUSG00000032586 | 2246              | 2895   | 0      | Traip         | protein_coding                   |
| ENSMUSG00000067750 | 2178              | 2311   | 0      | Khdc1a        | protein_coding                   |
| ENSMUSG00000065701 | 2144              | 694    | 4524   | Rny1          | misc_RNA                         |
| ENSMUSG00000042229 | 2104              | 2401   | 0      | Rabif         | protein_coding                   |
| ENSMUSG00000064899 | 2097              | 2674   | 149    | Snord118      | snoRNA                           |
| ENSMUSG00000028678 | 2038              | 3169   | 0      | Kif2c         | protein_coding                   |
| ENSMUSG00000060461 | 1979              | 2549   | 0      | Dppa5a        | protein_coding                   |
| ENSMUSG00000077527 | 1970              | 316    | 2123   | Gm25506       | snoRNA                           |
| ENSMUSG00000065904 | 1956              | 1176   | 256    | Gm26109       | snoRNA                           |
| ENSMUSG00000034764 | 1845              | 1894   | 0      | 1700006J14Rik | processed_transcript             |
| ENSMUSG00000020330 | 1725              | 2911   | 0      | Hmmr          | protein_coding                   |
| ENSMUSG00000102887 | 1689              | 2271   | 0      | Gm10857       | lincRNA                          |
| ENSMUSG00000088595 | 1675              | 3674   | 1628   | Gm24601       | rRNA                             |
| ENSMUSG00000102204 | 1670              | 1916   | 0      | Gm36958       | TEC                              |
| ENSMUSG00000014074 | 1617              | 2196   | 6      | Rnf168        | protein_coding                   |
| ENSMUSG00000073867 | 1607              | 428    | 4269   | AA474408      | protein_coding                   |
| ENSMUSG00000034311 | 1605              | 1973   | 6      | Kif4          | protein_coding                   |
| ENSMUSG00000009013 | 1600              | 2281   | 0      | Dynll1        | protein_coding                   |
| ENSMUSG00000032383 | 1584              | 2042   | 73     | Ppib          | protein_coding                   |
| ENSMUSG00000072109 | 1569              | 2047   | 0      | A530040E14Rik | antisense                        |
| ENSMUSG00000023944 | 1539              | 1545   | 440    | Hsp90ab1      | protein_coding                   |

|                     |      |      |                 |                                    |
|---------------------|------|------|-----------------|------------------------------------|
| ENSMUSG00000082332  | 1537 | 1837 | 0 Gm13384       | processed_pseudogene               |
| ENSMUSG00000098641  | 1531 | 1788 | 1467 Rnu3b4     | snoRNA                             |
| ENSMUSG00000098925  | 1531 | 1788 | 1467 Rnu3b2     | snoRNA                             |
| ENSMUSG00000098943  | 1531 | 1788 | 1467 Rnu3b1     | snoRNA                             |
| ENSMUSG00000099291  | 1531 | 1788 | 1467 Rnu3b3     | snoRNA                             |
| ENSMUSG00000064563  | 1511 | 1697 | 97 Snora7a      | snoRNA                             |
| ENSMUSG00000099135  | 1504 | 1686 | 97 Gm27607      | snoRNA                             |
| ENSMUSG00000098425  | 1490 | 1756 | 1382 Gm24949    | snoRNA                             |
| ENSMUSG00000019773  | 1446 | 1735 | 0 Fbxo5         | protein_coding                     |
| ENSMUSG00000058057  | 1426 | 2012 | 0 Mettl7a3      | protein_coding                     |
| ENSMUSG00000082088  | 1410 | 4079 | 0 Gm15753       | processed_pseudogene               |
| ENSMUSG00000056673  | 1397 | 1616 | 0 Kdm5d         | protein_coding                     |
| ENSMUSG00000021998  | 1357 | 1733 | 0 Lcp1          | protein_coding                     |
| ENSMUSG00000065818  | 1313 | 144  | 387 Snord35a    | snoRNA                             |
| ENSMUSG000000104303 | 1312 | 1553 | 2 Gm36976       | TEC                                |
| ENSMUSG00000065629  | 1306 | 1610 | 1305 Gm24826    | snoRNA                             |
| ENSMUSG000000104498 | 1265 | 1494 | 4 Gm37110       | TEC                                |
| ENSMUSG000000103560 | 1238 | 1467 | 2 Gm38070       | TEC                                |
| ENSMUSG00000065126  | 1182 | 1115 | 2633 Snord104   | snoRNA                             |
| ENSMUSG00000023087  | 1152 | 1245 | 0 Noct          | protein_coding                     |
| ENSMUSG00000037989  | 1141 | 1132 | 1136 Wnk2       | protein_coding                     |
| ENSMUSG00000031821  | 1132 | 1023 | 0 Gins2         | protein_coding                     |
| ENSMUSG00000062226  | 1130 | 1614 | 0 Gm10112       | protein_coding                     |
| ENSMUSG00000032803  | 1124 | 1241 | 0 Cdv3          | protein_coding                     |
| ENSMUSG00000022257  | 1071 | 704  | 0 Laptm4b       | protein_coding                     |
| ENSMUSG00000038722  | 1019 | 1417 | 0 Bud31         | protein_coding                     |
| ENSMUSG00000079455  | 1002 | 1351 | 0 Gm16026       | transcribed_unprocessed_pseudogene |
| ENSMUSG00000061062  | 979  | 1324 | 0 Gm10093       | protein_coding                     |
| ENSMUSG00000064797  | 965  | 888  | 510 Gm24357     | snoRNA                             |
| ENSMUSG00000028906  | 960  | 1238 | 22 Epb41        | protein_coding                     |
| ENSMUSG00000019992  | 951  | 1203 | 0 Mtf2          | protein_coding                     |
| ENSMUSG00000062647  | 932  | 835  | 369 Rpl7a       | protein_coding                     |
| ENSMUSG00000049106  | 925  | 1063 | 0 Dcaf5         | protein_coding                     |
| ENSMUSG00000065258  | 909  | 88   | 0 Gm23969       | snoRNA                             |
| ENSMUSG00000026380  | 901  | 799  | 14 Tfcp2l1      | protein_coding                     |
| ENSMUSG00000004530  | 897  | 1056 | 0 Coro1c        | protein_coding                     |
| ENSMUSG00000050936  | 886  | 1270 | 0 Gm42743       | protein_coding                     |
| ENSMUSG00000036136  | 878  | 1044 | 0 Fam110c       | protein_coding                     |
| ENSMUSG00000037172  | 874  | 739  | 0 E330009J07Rik | protein_coding                     |
| ENSMUSG00000039452  | 860  | 998  | 0 Snx22         | protein_coding                     |
| ENSMUSG00000029430  | 859  | 1257 | 2 Ran           | protein_coding                     |
| ENSMUSG00000028800  | 842  | 1153 | 0 Hdac1         | protein_coding                     |
| ENSMUSG00000098148  | 820  | 704  | 224 Gm20204     | lincRNA                            |
| ENSMUSG00000058301  | 819  | 915  | 543 Upf1        | protein_coding                     |
| ENSMUSG00000054619  | 810  | 1069 | 0 Mettl7a1      | protein_coding                     |
| ENSMUSG00000037313  | 802  | 941  | 16 Tacc3        | protein_coding                     |
| ENSMUSG00000039307  | 773  | 876  | 2 Hexdc         | protein_coding                     |
| ENSMUSG00000065463  | 751  | 403  | 135 Snord45c    | snoRNA                             |
| ENSMUSG00000061607  | 737  | 895  | 0 Mde1          | protein_coding                     |



|                    |     |      |                 |                                  |
|--------------------|-----|------|-----------------|----------------------------------|
| ENSMUSG00000048109 | 736 | 1005 | 0 Rbm15         | protein_coding                   |
| ENSMUSG00000096276 | 736 | 910  | 0 Gm2042        | protein_coding                   |
| ENSMUSG00000096576 | 736 | 910  | 0 Oog1          | protein_coding                   |
| ENSMUSG00000071856 | 708 | 662  | 0 Mcc           | protein_coding                   |
| ENSMUSG00000028691 | 706 | 785  | 0 Prdx1         | protein_coding                   |
| ENSMUSG00000034377 | 695 | 697  | 0 Tulp4         | protein_coding                   |
| ENSMUSG00000001098 | 677 | 949  | 42 Kctd10       | protein_coding                   |
| ENSMUSG00000045404 | 657 | 707  | 0 Kcnk13        | protein_coding                   |
| ENSMUSG00000022427 | 637 | 726  | 0 Tomm22        | protein_coding                   |
| ENSMUSG00000064702 | 617 | 1002 | 5423 Gm24950    | snRNA                            |
| ENSMUSG00000065251 | 617 | 1002 | 5423 Gm23971    | snRNA                            |
| ENSMUSG00000065767 | 617 | 1002 | 5423 Gm23849    | snRNA                            |
| ENSMUSG00000065944 | 617 | 1002 | 5423 Rnu2-10    | snRNA                            |
| ENSMUSG00000064682 | 615 | 1003 | 5409 Gm25813    | snRNA                            |
| ENSMUSG00000020153 | 588 | 984  | 2161 Ndufs7     | protein_coding                   |
| ENSMUSG00000039148 | 587 | 793  | 0 Sart1         | protein_coding                   |
| ENSMUSG00000086324 | 587 | 190  | 1295 Gm15564    | antisense                        |
| ENSMUSG00000027242 | 585 | 534  | 0 Wdr76         | protein_coding                   |
| ENSMUSG00000054387 | 583 | 461  | 38 Mdm4         | protein_coding                   |
| ENSMUSG00000078182 | 579 | 672  | 0 Gm6083        | processed_pseudogene             |
| ENSMUSG00000005893 | 576 | 537  | 521 Nr2c2       | protein_coding                   |
| ENSMUSG00000032182 | 566 | 705  | 0 Yipf2         | protein_coding                   |
| ENSMUSG00000037791 | 560 | 1029 | 0 Phf12         | protein_coding                   |
| ENSMUSG00000064772 | 554 | 935  | 5022 Gm25202    | snRNA                            |
| ENSMUSG00000093178 | 554 | 560  | 113 Snord87     | snoRNA                           |
| ENSMUSG00000023932 | 554 | 665  | 0 Cdc5l         | protein_coding                   |
| ENSMUSG00000065820 | 545 | 929  | 5300 Gm26316    | snRNA                            |
| ENSMUSG00000081406 | 538 | 600  | 16 Rps6-ps4     | processed_pseudogene             |
| ENSMUSG00000028495 | 531 | 580  | 16 Rps6         | protein_coding                   |
| ENSMUSG00000042121 | 521 | 677  | 0 Ssh1          | protein_coding                   |
| ENSMUSG00000041483 | 512 | 964  | 0 Zfp281        | protein_coding                   |
| ENSMUSG00000040195 | 506 | 462  | 3218 Nemp1      | protein_coding                   |
| ENSMUSG00000006498 | 500 | 672  | 2 Ptbp1         | protein_coding                   |
| ENSMUSG00000005886 | 491 | 600  | 0 Ncoa2         | protein_coding                   |
| ENSMUSG00000103845 | 490 | 568  | 0 Gm19026       | processed_pseudogene             |
| ENSMUSG00000078894 | 487 | 523  | 0 2210418O10Rik | protein_coding                   |
| ENSMUSG00000082496 | 486 | 611  | 0 Gm6798        | processed_pseudogene             |
| ENSMUSG00000026933 | 475 | 610  | 48 Camsap1      | protein_coding                   |
| ENSMUSG00000064400 | 468 | 610  | 1019 Gm23927    | snoRNA                           |
| ENSMUSG00000066850 | 464 | 701  | 0 Vmn1r65       | protein_coding                   |
| ENSMUSG00000093656 | 457 | 631  | 0 Gm20628       | antisense                        |
| ENSMUSG00000081999 | 456 | 639  | 0 Gm13461       | processed_pseudogene             |
| ENSMUSG00000086130 | 454 | 543  | 0 Gm16211       | lincRNA                          |
| ENSMUSG00000089317 | 446 | 208  | 708 Snord123    | snoRNA                           |
| ENSMUSG00000027694 | 442 | 558  | 0 Gm8325        | transcribed_processed_pseudogene |
| ENSMUSG00000100755 | 440 | 717  | 2 Rps23-ps1     | processed_pseudogene             |
| ENSMUSG00000021395 | 440 | 330  | 83 Spin1        | protein_coding                   |
| ENSMUSG00000092680 | 437 | 288  | 1370 Snord55    | snoRNA                           |
| ENSMUSG00000077714 | 434 | 428  | 2270 Snord17    | snoRNA                           |

|                    |     |     |                   |                      |
|--------------------|-----|-----|-------------------|----------------------|
| ENSMUSG00000064945 | 426 | 97  | 262 Rny3          | misc_RNA             |
| ENSMUSG00000099021 | 423 | 393 | 11315 Rn7s1       | misc_RNA             |
| ENSMUSG00000099250 | 423 | 393 | 11315 Rn7s2       | misc_RNA             |
| ENSMUSG00000074527 | 415 | 448 | 0 Gm14296         | protein_coding       |
| ENSMUSG00000038965 | 409 | 544 | 2 Ube2l3          | protein_coding       |
| ENSMUSG00000092203 | 409 | 93  | 228 1110038B12Rik | processed_transcript |
| ENSMUSG00000049598 | 407 | 380 | 176 Vsig8         | protein_coding       |
| ENSMUSG00000084322 | 400 | 527 | 0                 | processed_pseudogene |
| ENSMUSG00000102307 | 395 | 526 | 0 Gm38194         | TEC                  |
| ENSMUSG00000022724 | 391 | 402 | 4 Mina            | protein_coding       |
| ENSMUSG00000065870 | 390 | 600 | 1031 Rnu3a        | snoRNA               |
| ENSMUSG00000084786 | 390 | 453 | 0 Ubl5            | protein_coding       |
| ENSMUSG00000049517 | 385 | 650 | 2 Rps23           | protein_coding       |
| ENSMUSG00000059495 | 383 | 466 | 0 Arhgef12        | protein_coding       |
| ENSMUSG00000029249 | 374 | 526 | 28 Rest           | protein_coding       |
| ENSMUSG00000065036 | 365 | 531 | 0 Gm22362         | snoRNA               |
| ENSMUSG00000099280 | 363 | 414 | 40 Gm27991        | snoRNA               |
| ENSMUSG00000082809 | 363 | 462 | 4 Gm14150         | processed_pseudogene |
| ENSMUSG00000077239 | 363 | 185 | 186 Snord66       | snoRNA               |
| ENSMUSG00000001089 | 361 | 372 | 0 Luzp1           | protein_coding       |
| ENSMUSG00000079523 | 358 | 522 | 0 Tmsb10          | protein_coding       |
| ENSMUSG00000065145 | 357 | 240 | 0 Vaultc5         | misc_RNA             |
| ENSMUSG00000020527 | 355 | 462 | 0 Myo19           | protein_coding       |
| ENSMUSG00000094530 | 354 | 452 | 0 Gm21399         | processed_pseudogene |
| ENSMUSG00000065282 | 352 | 555 | 200 Gm24455       | snoRNA               |
| ENSMUSG00000047514 | 349 | 404 | 0 Tspyl1          | protein_coding       |
| ENSMUSG00000078925 | 346 | 481 | 0 D030018L15Rik   | lincRNA              |
| ENSMUSG00000069620 | 346 | 404 | 0 Gm5250          | processed_pseudogene |
| ENSMUSG00000066902 | 343 | 605 | 2 Rps23-ps2       | processed_pseudogene |
| ENSMUSG00000043716 | 341 | 327 | 133 Rpl7          | protein_coding       |
| ENSMUSG00000064542 | 340 | 250 | 993 Gm22980       | snoRNA               |
| ENSMUSG00000062081 | 338 | 401 | 0 Gm6055          | processed_pseudogene |
| ENSMUSG00000008668 | 337 | 389 | 8 Rps18           | protein_coding       |
| ENSMUSG00000037064 | 337 | 352 | 0 Gm5229          | pseudogene           |
| ENSMUSG00000086842 | 332 | 458 | 0 Gm15681         | processed_pseudogene |
| ENSMUSG00000081620 | 331 | 586 | 2 Gm14633         | processed_pseudogene |
| ENSMUSG00000077737 | 329 | 307 | 46 Snord72        | snoRNA               |
| ENSMUSG00000027326 | 329 | 306 | 0 Casc5           | protein_coding       |
| ENSMUSG00000058360 | 327 | 535 | 0 Gm10040         | pseudogene           |
| ENSMUSG00000031303 | 327 | 296 | 0 Map3k15         | protein_coding       |
| ENSMUSG00000074412 | 326 | 414 | 2 Gm10689         | processed_pseudogene |
| ENSMUSG00000037674 | 326 | 405 | 0 Rfx7            | protein_coding       |
| ENSMUSG00000049354 | 326 | 323 | 111 Dcaf7         | protein_coding       |
| ENSMUSG00000036282 | 326 | 363 | 0 Naa30           | protein_coding       |
| ENSMUSG00000037085 | 323 | 414 | 0 Trmt12          | protein_coding       |
| ENSMUSG00000102189 | 322 | 176 | 1243 Gm37194      | TEC                  |
| ENSMUSG00000015656 | 321 | 249 | 2102 Hspa8        | protein_coding       |
| ENSMUSG00000071644 | 321 | 415 | 4 Eef1g           | protein_coding       |
| ENSMUSG00000023004 | 321 | 370 | 6 Tuba1b          | protein_coding       |

|                     |     |     |                 |                        |
|---------------------|-----|-----|-----------------|------------------------|
| ENSMUSG00000026436  | 318 | 273 | 0 Elk4          | protein_coding         |
| ENSMUSG00000051606  | 315 | 282 | 0 2010001K21Rik | pseudogene             |
| ENSMUSG00000026672  | 312 | 437 | 0 Optn          | protein_coding         |
| ENSMUSG00000042202  | 309 | 230 | 24 Slc35e2      | protein_coding         |
| ENSMUSG00000022312  | 306 | 422 | 0 Eif3h         | protein_coding         |
| ENSMUSG00000020840  | 303 | 228 | 14 Blmh         | protein_coding         |
| ENSMUSG00000029674  | 303 | 350 | 0 Limk1         | protein_coding         |
| ENSMUSG00000072978  | 298 | 417 | 0 Gm5830        | processed_pseudogene   |
| ENSMUSG00000096435  | 298 | 365 | 0 Gm9049        | processed_pseudogene   |
| ENSMUSG00000096791  | 298 | 365 | 0 Gm9045        | processed_pseudogene   |
| ENSMUSG00000094517  | 298 | 363 | 0 Gm9044        | processed_pseudogene   |
| ENSMUSG00000094544  | 298 | 363 | 0 Gm9040        | processed_pseudogene   |
| ENSMUSG00000018040  | 296 | 399 | 0 Rrp7a         | protein_coding         |
| ENSMUSG00000032652  | 295 | 134 | 18 Crebl2       | protein_coding         |
| ENSMUSG00000083563  | 295 | 200 | 4400 Gm13340    | unprocessed_pseudogene |
| ENSMUSG00000021608  | 294 | 452 | 0 Lpcat1        | protein_coding         |
| ENSMUSG00000032594  | 292 | 263 | 34 Ip6k1        | protein_coding         |
| ENSMUSG00000066027  | 291 | 462 | 0 Gm10436       | protein_coding         |
| ENSMUSG00000042363  | 291 | 342 | 0 Lgalsl        | protein_coding         |
| ENSMUSG000000103877 | 290 | 296 | 0 Gm21358       | processed_pseudogene   |
| ENSMUSG00000058625  | 289 | 317 | 6 Gm17383       | pseudogene             |
| ENSMUSG00000043091  | 289 | 337 | 6 Tuba1c        | protein_coding         |
| ENSMUSG00000072235  | 288 | 329 | 6 Tuba1a        | protein_coding         |
| ENSMUSG00000024413  | 283 | 259 | 0 Npc1          | protein_coding         |
| ENSMUSG00000021255  | 283 | 253 | 0 Esrrb         | protein_coding         |
| ENSMUSG00000090737  | 281 | 293 | 0 Gm6788        | processed_pseudogene   |
| ENSMUSG00000088689  | 281 | 189 | 89 Scarna17     | snoRNA                 |
| ENSMUSG00000094055  | 278 | 351 | 0               | processed_pseudogene   |
| ENSMUSG00000022992  | 278 | 267 | 0 Kansl2        | protein_coding         |
| ENSMUSG00000042508  | 274 | 324 | 0 Dmtf1         | protein_coding         |
| ENSMUSG00000094286  | 272 | 371 | 0 Gm12424       | processed_pseudogene   |
| ENSMUSG00000037503  | 272 | 357 | 0 Fam168b       | protein_coding         |
| ENSMUSG00000047030  | 272 | 250 | 0 Spata2        | protein_coding         |
| ENSMUSG00000065952  | 269 | 313 | 0 C330021F23Rik | protein_coding         |
| ENSMUSG00000083407  | 268 | 653 | 0 Gm13176       | processed_pseudogene   |
| ENSMUSG00000066952  | 268 | 396 | 0 Myo1h         | protein_coding         |
| ENSMUSG00000033102  | 267 | 500 | 0 Cdc14b        | protein_coding         |
| ENSMUSG00000077588  | 264 | 56  | 1431 Gm24372    | misc_RNA               |
| ENSMUSG00000055839  | 262 | 336 | 4 Tceb2         | protein_coding         |
| ENSMUSG00000089719  | 262 | 261 | 0 Gm15758       | lincRNA                |
| ENSMUSG00000025220  | 260 | 294 | 0 Mgea5         | protein_coding         |
| ENSMUSG00000027636  | 255 | 331 | 0 Sla2          | protein_coding         |
| ENSMUSG00000022957  | 255 | 321 | 77 Itsn1        | protein_coding         |
| ENSMUSG00000027637  | 253 | 296 | 0 1110008F13Rik | protein_coding         |
| ENSMUSG00000032890  | 253 | 255 | 0 Rims3         | protein_coding         |
| ENSMUSG00000029651  | 252 | 372 | 0 Mtus2         | protein_coding         |
| ENSMUSG00000064208  | 252 | 336 | 0 Gm10145       | processed_pseudogene   |
| ENSMUSG00000025607  | 252 | 408 | 0 Copg2         | protein_coding         |
| ENSMUSG00000022884  | 251 | 345 | 0 Eif4a2        | protein_coding         |

|                    |     |     |              |                      |
|--------------------|-----|-----|--------------|----------------------|
| ENSMUSG00000074506 | 249 | 335 | 0 Gm10705    | processed_pseudogene |
| ENSMUSG00000086049 | 249 | 246 | 0 Gm12735    | antisense            |
| ENSMUSG00000081739 | 249 | 139 | 24 Mdm4-ps   | processed_pseudogene |
| ENSMUSG00000021770 | 246 | 403 | 12 Samd8     | protein_coding       |
| ENSMUSG00000050234 | 246 | 338 | 0 Gja4       | protein_coding       |
| ENSMUSG00000028782 | 246 | 257 | 1576 Adgrb2  | protein_coding       |
| ENSMUSG00000036698 | 246 | 286 | 1146 Ago2    | protein_coding       |
| ENSMUSG00000066640 | 245 | 330 | 0 Fbxl18     | protein_coding       |
| ENSMUSG00000093893 | 245 | 87  | 619 n-R5s124 | rRNA                 |
| ENSMUSG00000094003 | 245 | 87  | 619 n-R5s128 | rRNA                 |
| ENSMUSG00000094097 | 245 | 87  | 619 n-R5s111 | rRNA                 |
| ENSMUSG00000094270 | 245 | 87  | 619 Gm22291  | rRNA                 |
| ENSMUSG00000094657 | 245 | 87  | 619 n-R5s142 | rRNA                 |
| ENSMUSG00000094720 | 245 | 87  | 619 n-R5s100 | rRNA                 |
| ENSMUSG00000094751 | 245 | 87  | 619 Gm25018  | rRNA                 |
| ENSMUSG00000094760 | 245 | 87  | 619 n-R5s139 | rRNA                 |
| ENSMUSG00000094801 | 245 | 87  | 619 n-R5s113 | rRNA                 |
| ENSMUSG00000094916 | 245 | 87  | 619 Gm26391  | rRNA                 |
| ENSMUSG00000094956 | 245 | 87  | 619 n-R5s122 | rRNA                 |
| ENSMUSG00000095131 | 245 | 87  | 619 n-R5s110 | rRNA                 |
| ENSMUSG00000095183 | 245 | 87  | 619 n-R5s138 | rRNA                 |
| ENSMUSG00000095249 | 245 | 87  | 619 n-R5s103 | rRNA                 |
| ENSMUSG00000095350 | 245 | 87  | 619 Gm23284  | rRNA                 |
| ENSMUSG00000095376 | 245 | 87  | 619 Gm22109  | rRNA                 |
| ENSMUSG00000095410 | 245 | 87  | 619 n-R5s121 | rRNA                 |
| ENSMUSG00000095453 | 245 | 87  | 619 n-R5s149 | rRNA                 |
| ENSMUSG00000095645 | 245 | 87  | 619 n-R5s143 | rRNA                 |
| ENSMUSG00000095652 | 245 | 87  | 619 n-R5s123 | rRNA                 |
| ENSMUSG00000095749 | 245 | 87  | 619 n-R5s141 | rRNA                 |
| ENSMUSG00000095966 | 245 | 87  | 619 n-R5s105 | rRNA                 |
| ENSMUSG00000096015 | 245 | 87  | 619 n-R5s134 | rRNA                 |
| ENSMUSG00000096170 | 245 | 87  | 619 n-R5s146 | rRNA                 |
| ENSMUSG00000096300 | 245 | 87  | 619 Gm25212  | rRNA                 |
| ENSMUSG00000096307 | 245 | 87  | 619 n-R5s104 | rRNA                 |
| ENSMUSG00000096335 | 245 | 87  | 619 n-R5s108 | rRNA                 |
| ENSMUSG00000096343 | 245 | 87  | 619 n-R5s133 | rRNA                 |
| ENSMUSG00000096367 | 245 | 87  | 619 n-R5s107 | rRNA                 |
| ENSMUSG00000096406 | 245 | 87  | 619 Rn5s     | rRNA                 |
| ENSMUSG00000096710 | 245 | 87  | 619 n-R5s117 | rRNA                 |
| ENSMUSG00000096765 | 245 | 87  | 619 n-R5s144 | rRNA                 |
| ENSMUSG00000093852 | 244 | 87  | 636 Gm24312  | rRNA                 |
| ENSMUSG00000094178 | 244 | 87  | 636 n-R5s118 | rRNA                 |
| ENSMUSG00000094537 | 244 | 87  | 636 n-R5s106 | rRNA                 |
| ENSMUSG00000096785 | 244 | 87  | 636 n-R5s130 | rRNA                 |
| ENSMUSG00000031822 | 244 | 237 | 6 Gse1       | protein_coding       |
| ENSMUSG00000082466 | 243 | 307 | 0            | processed_pseudogene |
| ENSMUSG00000026740 | 241 | 364 | 2 Dnaje1     | protein_coding       |
| ENSMUSG00000085840 | 241 | 236 | 0 Gm11261    | lincRNA              |
| ENSMUSG00000056943 | 240 | 313 | 0 Gm10015    | processed_pseudogene |

|                    |     |     |                 |                      |
|--------------------|-----|-----|-----------------|----------------------|
| ENSMUSG00000094519 | 240 | 312 | 0 Gm9048        | processed_pseudogene |
| ENSMUSG00000096912 | 240 | 312 | 0 Gm9046        | processed_pseudogene |
| ENSMUSG00000048398 | 240 | 287 | 0 Gm5065        | protein_coding       |
| ENSMUSG00000068206 | 240 | 287 | 0 Pick1         | protein_coding       |
| ENSMUSG00000090114 | 239 | 313 | 0 Gm3076        | processed_pseudogene |
| ENSMUSG00000103214 | 238 | 336 | 0 Gm38286       | TEC                  |
| ENSMUSG00000083649 | 238 | 344 | 0 Rasl2-9       | protein_coding       |
| ENSMUSG00000064823 | 238 | 205 | 163 Snord82     | snoRNA               |
| ENSMUSG00000029346 | 236 | 244 | 0 Srrd          | protein_coding       |
| ENSMUSG00000057778 | 236 | 156 | 0 Cyb5d2        | protein_coding       |
| ENSMUSG00000063001 | 235 | 302 | 2 Gm9701        | processed_pseudogene |
| ENSMUSG00000030621 | 233 | 358 | 0 Me3           | protein_coding       |
| ENSMUSG00000096837 | 232 | 332 | 0               | processed_pseudogene |
| ENSMUSG00000082273 | 232 | 299 | 0               | processed_pseudogene |
| ENSMUSG00000064844 | 232 | 127 | 450 Gm26202     | snoRNA               |
| ENSMUSG00000035337 | 231 | 358 | 0 Uchl4         | protein_coding       |
| ENSMUSG00000096037 | 231 | 83  | 399 n-R5s136    | rRNA                 |
| ENSMUSG00000086167 | 229 | 293 | 0 Gm13827       | processed_pseudogene |
| ENSMUSG00000083474 | 227 | 313 | 0 Gm15267       | processed_pseudogene |
| ENSMUSG00000027714 | 225 | 303 | 10 Exosc9       | protein_coding       |
| ENSMUSG00000064602 | 224 | 381 | 38 Snora41      | snoRNA               |
| ENSMUSG00000026596 | 221 | 145 | 44 Abl2         | protein_coding       |
| ENSMUSG00000091955 | 221 | 321 | 0 Gm9844        | protein_coding       |
| ENSMUSG00000103096 | 221 | 320 | 0 Gm8022        | processed_pseudogene |
| ENSMUSG00000026181 | 219 | 185 | 0 Ppm1f         | protein_coding       |
| ENSMUSG00000077734 | 218 | 156 | 1457 Snord83b   | snoRNA               |
| ENSMUSG00000022111 | 218 | 354 | 0 Uchl3         | protein_coding       |
| ENSMUSG00000036197 | 216 | 257 | 0 Gxylt1        | protein_coding       |
| ENSMUSG00000065954 | 215 | 184 | 315 Tacc1       | protein_coding       |
| ENSMUSG00000015837 | 214 | 267 | 22 Sqstm1       | protein_coding       |
| ENSMUSG00000036450 | 213 | 223 | 18 Hif1an       | protein_coding       |
| ENSMUSG00000035275 | 212 | 221 | 0 Raver2        | protein_coding       |
| ENSMUSG00000042606 | 211 | 436 | 0 Hirip3        | protein_coding       |
| ENSMUSG00000097415 | 211 | 183 | 0 AU020206      | lincRNA              |
| ENSMUSG00000064731 | 211 | 133 | 14 Snord45b     | snoRNA               |
| ENSMUSG00000073559 | 210 | 236 | 0 Gm8618        | processed_pseudogene |
| ENSMUSG00000049539 | 209 | 250 | 0 Hist1h1a      | protein_coding       |
| ENSMUSG00000064856 | 209 | 210 | 1263 Gm23444    | snRNA                |
| ENSMUSG00000094050 | 209 | 210 | 1261 Gm23472    | snRNA                |
| ENSMUSG00000093843 | 208 | 211 | 1223 Gm25939    | snRNA                |
| ENSMUSG00000027404 | 208 | 127 | 252 Snrpb       | protein_coding       |
| ENSMUSG00000028702 | 203 | 219 | 0 Rad54l        | protein_coding       |
| ENSMUSG00000064984 | 203 | 139 | 797 Snord73a    | snoRNA               |
| ENSMUSG00000028911 | 201 | 214 | 0 Srsf4         | protein_coding       |
| ENSMUSG00000083914 | 199 | 228 | 8 Rps18-ps1     | processed_pseudogene |
| ENSMUSG00000087968 | 198 | 251 | 20 Gm25395      | snoRNA               |
| ENSMUSG00000024410 | 198 | 184 | 0 3110002H16Rik | protein_coding       |
| ENSMUSG00000051855 | 198 | 242 | 0 Mest          | protein_coding       |
| ENSMUSG00000009741 | 198 | 184 | 0 Ubpl          | protein_coding       |

|                    |     |     |                 |                                  |
|--------------------|-----|-----|-----------------|----------------------------------|
| ENSMUSG00000096613 | 198 | 79  | 599 n-R5s102    | rRNA                             |
| ENSMUSG00000038344 | 197 | 286 | 0 Txlng         | protein_coding                   |
| ENSMUSG00000014496 | 197 | 262 | 0 Ankrd28       | protein_coding                   |
| ENSMUSG00000101249 | 197 | 116 | 2344 Gm29216    | unprocessed_pseudogene           |
| ENSMUSG00000071866 | 195 | 215 | 0 Ppia          | protein_coding                   |
| ENSMUSG00000056758 | 195 | 200 | 48 Hmga2        | protein_coding                   |
| ENSMUSG00000024791 | 195 | 200 | 0 Cdca5         | protein_coding                   |
| ENSMUSG00000064647 | 194 | 196 | 297 Gm23301     | snoRNA                           |
| ENSMUSG00000077797 | 194 | 16  | 0 Snord19       | snoRNA                           |
| ENSMUSG00000030556 | 193 | 361 | 0 Lrrc28        | protein_coding                   |
| ENSMUSG00000071078 | 192 | 245 | 0 Nr2c2ap       | protein_coding                   |
| ENSMUSG00000095449 | 192 | 66  | 482 n-R5s112    | rRNA                             |
| ENSMUSG00000096092 | 192 | 66  | 482 n-R5s125    | rRNA                             |
| ENSMUSG00000096855 | 192 | 66  | 482 n-R5s120    | rRNA                             |
| ENSMUSG00000080867 | 190 | 284 | 0               | processed_pseudogene             |
| ENSMUSG00000064063 | 190 | 229 | 0 BC048507      | protein_coding                   |
| ENSMUSG00000099492 | 189 | 257 | 0 Gm5525        | processed_pseudogene             |
| ENSMUSG00000037536 | 189 | 203 | 0 Fbxo34        | protein_coding                   |
| ENSMUSG00000025574 | 189 | 188 | 0 Tk1           | protein_coding                   |
| ENSMUSG00000081383 | 189 | 184 | 0 Gm5742        | processed_pseudogene             |
| ENSMUSG00000022518 | 188 | 200 | 0 4930562C15Rik | protein_coding                   |
| ENSMUSG00000030609 | 188 | 198 | 0 Aen           | protein_coding                   |
| ENSMUSG00000029223 | 186 | 137 | 0 Uchl1         | protein_coding                   |
| ENSMUSG00000024290 | 184 | 257 | 0 Rock1         | protein_coding                   |
| ENSMUSG00000051335 | 184 | 154 | 0 Gfod1         | protein_coding                   |
| ENSMUSG00000058174 | 184 | 234 | 4 Gm5148        | protein_coding                   |
| ENSMUSG00000074354 | 182 | 302 | 0 Arhgap20os    | antisense                        |
| ENSMUSG00000043800 | 182 | 260 | 0 Kifc5c-ps     | transcribed_processed_pseudogene |
| ENSMUSG00000032309 | 181 | 164 | 0 Fbxo22        | protein_coding                   |
| ENSMUSG00000074501 | 177 | 203 | 0 Gm5612        | protein_coding                   |
| ENSMUSG00000016510 | 176 | 282 | 12 Mtif3        | protein_coding                   |
| ENSMUSG00000020482 | 175 | 245 | 109 Ccdc117     | protein_coding                   |
| ENSMUSG00000082905 | 175 | 229 | 0 Gm7823        | processed_pseudogene             |
| ENSMUSG00000064871 | 175 | 107 | 1840 Snord58b   | snoRNA                           |
| ENSMUSG00000065853 | 175 | 102 | 1840 Gm22354    | snoRNA                           |
| ENSMUSG00000044646 | 175 | 93  | 63 Zbtb7c       | protein_coding                   |
| ENSMUSG00000018412 | 174 | 32  | 81 Kansl1       | protein_coding                   |
| ENSMUSG00000029472 | 172 | 240 | 0 Anapc5        | protein_coding                   |
| ENSMUSG00000001403 | 172 | 216 | 0 Ube2c         | protein_coding                   |
| ENSMUSG00000077440 | 172 | 210 | 502 Gm23130     | snoRNA                           |
| ENSMUSG00000078899 | 172 | 194 | 2 Gm4631        | protein_coding                   |
| ENSMUSG00000083496 | 171 | 225 | 16 Gm11263      | processed_pseudogene             |
| ENSMUSG00000089625 | 171 | 91  | 0 Gm25443       | snoRNA                           |
| ENSMUSG00000069117 | 170 | 188 | 24 Gm10260      | protein_coding                   |
| ENSMUSG00000055960 | 169 | 126 | 0 Skint4        | protein_coding                   |
| ENSMUSG00000027599 | 168 | 225 | 14 Armc1        | protein_coding                   |
| ENSMUSG00000031446 | 168 | 179 | 0 Cul4a         | protein_coding                   |
| ENSMUSG00000026211 | 167 | 15  | 494 Obsl1       | protein_coding                   |
| ENSMUSG00000035033 | 164 | 350 | 34 Tbr1         | protein_coding                   |

|                    |     |     |                 |                                  |
|--------------------|-----|-----|-----------------|----------------------------------|
| ENSMUSG00000057657 | 163 | 181 | 8 Rps18-ps3     | protein_coding                   |
| ENSMUSG00000094392 | 162 | 259 | 0 Gm3788        | processed_pseudogene             |
| ENSMUSG00000040717 | 162 | 239 | 0 Il17rd        | protein_coding                   |
| ENSMUSG00000061330 | 162 | 180 | 6 Gm11361       | processed_pseudogene             |
| ENSMUSG00000094541 | 162 | 49  | 159 Gm24089     | rRNA                             |
| ENSMUSG00000095723 | 162 | 49  | 159 Gm23647     | rRNA                             |
| ENSMUSG00000058586 | 161 | 162 | 0 Serhl         | protein_coding                   |
| ENSMUSG00000082609 | 159 | 231 | 2 Gm15464       | processed_pseudogene             |
| ENSMUSG00000062933 | 159 | 208 | 0 Gm10123       | processed_pseudogene             |
| ENSMUSG00000101749 | 159 | 152 | 0               | processed_pseudogene             |
| ENSMUSG00000049470 | 157 | 143 | 40 Aff4         | protein_coding                   |
| ENSMUSG00000081153 | 156 | 190 | 0 Gm11401       | processed_pseudogene             |
| ENSMUSG00000031353 | 155 | 253 | 0 Rbbp7         | protein_coding                   |
| ENSMUSG00000008690 | 155 | 217 | 0 Ncaph2        | protein_coding                   |
| ENSMUSG00000078584 | 155 | 171 | 10 AU022252     | protein_coding                   |
| ENSMUSG00000028933 | 153 | 125 | 30 Xrcc2        | protein_coding                   |
| ENSMUSG00000092746 | 152 | 77  | 9788 Rn7s6      | misc_RNA                         |
| ENSMUSG00000096400 | 152 | 223 | 0 Gm6098        | processed_pseudogene             |
| ENSMUSG00000081111 | 152 | 123 | 0 Gm5913        | processed_pseudogene             |
| ENSMUSG00000040760 | 151 | 244 | 0 Appl1         | protein_coding                   |
| ENSMUSG00000070639 | 151 | 201 | 14 Lrrc8b       | protein_coding                   |
| ENSMUSG00000084644 | 151 | 45  | 63 Gm24379      | misc_RNA                         |
| ENSMUSG00000070225 | 150 | 37  | 149 n-R5s33     | rRNA                             |
| ENSMUSG00000076258 | 150 | 37  | 99 Gm23935      | miRNA                            |
| ENSMUSG00000076281 | 150 | 37  | 99 Gm24270      | miRNA                            |
| ENSMUSG00000087943 | 150 | 37  | 99 Gm24245      | miRNA                            |
| ENSMUSG00000089814 | 149 | 273 | 0 Gm15310       | transcribed_processed_pseudogene |
| ENSMUSG00000045896 | 149 | 179 | 2 Paip2b        | protein_coding                   |
| ENSMUSG00000023050 | 146 | 160 | 0 Map3k12       | protein_coding                   |
| ENSMUSG00000019578 | 145 | 170 | 22 Ubxn6        | protein_coding                   |
| ENSMUSG00000027306 | 145 | 141 | 0 Nusap1        | protein_coding                   |
| ENSMUSG00000035495 | 144 | 173 | 14 Tstd2        | protein_coding                   |
| ENSMUSG00000036890 | 144 | 173 | 0 Gtde1         | protein_coding                   |
| ENSMUSG00000101810 | 144 | 167 | 0 1700066C05Rik | lincRNA                          |
| ENSMUSG00000083705 | 143 | 182 | 2 Gm8624        | transcribed_processed_pseudogene |
| ENSMUSG00000087790 | 143 | 83  | 391 Gm25970     | snoRNA                           |
| ENSMUSG00000032311 | 142 | 113 | 0 Nrg4          | protein_coding                   |
| ENSMUSG00000065176 | 141 | 149 | 5956 Rnu12      | snRNA                            |
| ENSMUSG00000089265 | 141 | 134 | 0 Gm22888       | snoRNA                           |
| ENSMUSG00000082465 | 140 | 174 | 14 Rps6-ps3     | processed_pseudogene             |
| ENSMUSG00000082456 | 139 | 196 | 4 Gm11598       | processed_pseudogene             |
| ENSMUSG00000052005 | 139 | 189 | 0 Gm9864        | pseudogene                       |
| ENSMUSG00000064798 | 139 | 63  | 549 n-R5s193    | rRNA                             |
| ENSMUSG00000064231 | 138 | 156 | 0 Gm5321        | processed_pseudogene             |
| ENSMUSG00000000439 | 138 | 243 | 0 Mkcn2         | protein_coding                   |
| ENSMUSG00000075581 | 138 | 166 | 14 Gm16409      | processed_pseudogene             |
| ENSMUSG00000086907 | 138 | 150 | 0 Gm15298       | lincRNA                          |
| ENSMUSG00000093956 | 138 | 139 | 1156 Gm24497    | snRNA                            |
| ENSMUSG00000094455 | 137 | 49  | 367 n-R5s129    | rRNA                             |

|                    |     |     |                 |                        |
|--------------------|-----|-----|-----------------|------------------------|
| ENSMUSG00000095073 | 137 | 49  | 367 n-R5s101    | rRNA                   |
| ENSMUSG00000037742 | 136 | 172 | 157 Eef1a1      | protein_coding         |
| ENSMUSG00000024357 | 135 | 186 | 0 Sil1          | protein_coding         |
| ENSMUSG00000086684 | 135 | 152 | 0 Gm12590       | lincRNA                |
| ENSMUSG00000096132 | 135 | 49  | 367 n-R5s119    | rRNA                   |
| ENSMUSG00000096358 | 135 | 49  | 367 n-R5s131    | rRNA                   |
| ENSMUSG00000096599 | 135 | 49  | 367 n-R5s114    | rRNA                   |
| ENSMUSG00000063875 | 134 | 166 | 14 Rps6-ps1     | processed_pseudogene   |
| ENSMUSG00000078866 | 134 | 149 | 2 Zfp970        | protein_coding         |
| ENSMUSG00000063972 | 134 | 76  | 0 Nr6a1         | protein_coding         |
| ENSMUSG00000062825 | 133 | 179 | 32 Actg1        | protein_coding         |
| ENSMUSG00000045973 | 133 | 122 | 30 Slc25a51     | protein_coding         |
| ENSMUSG00000026110 | 133 | 115 | 0 Mgat4a        | protein_coding         |
| ENSMUSG00000098358 | 132 | 146 | 0 Gm27164       | lincRNA                |
| ENSMUSG00000000149 | 132 | 206 | 0 Gna12         | protein_coding         |
| ENSMUSG00000085635 | 132 | 114 | 0 Gm14565       | lincRNA                |
| ENSMUSG00000065353 | 132 | 26  | 75 Snora73b     | snoRNA                 |
| ENSMUSG00000078515 | 131 | 135 | 0 Ddi2          | protein_coding         |
| ENSMUSG00000087701 | 130 | 154 | 0 Gm13493       | processed_pseudogene   |
| ENSMUSG00000027331 | 130 | 79  | 0 Knstrn        | protein_coding         |
| ENSMUSG00000075918 | 130 | 35  | 113 n-R5s2      | rRNA                   |
| ENSMUSG00000085667 | 130 | 271 | 0 Gm12992       | processed_transcript   |
| ENSMUSG00000093392 | 130 | 158 | 0 Gm6061        | processed_pseudogene   |
| ENSMUSG00000040268 | 130 | 35  | 91 Plekha1      | protein_coding         |
| ENSMUSG00000003039 | 129 | 340 | 0 Fam32a        | protein_coding         |
| ENSMUSG00000026575 | 129 | 176 | 26 Nme7         | protein_coding         |
| ENSMUSG00000034320 | 129 | 95  | 4 Slc26a2       | protein_coding         |
| ENSMUSG00000060081 | 128 | 219 | 0 Hist1h2aa     | protein_coding         |
| ENSMUSG00000057534 | 127 | 135 | 0 Gm15698       | protein_coding         |
| ENSMUSG00000080800 | 126 | 177 | 0 Gm11582       | processed_pseudogene   |
| ENSMUSG00000074884 | 125 | 137 | 20 Serf2        | protein_coding         |
| ENSMUSG00000058932 | 124 | 164 | 0 Gm2174        | protein_coding         |
| ENSMUSG00000080709 | 124 | 120 | 2 Gm14324       | unprocessed_pseudogene |
| ENSMUSG00000013076 | 124 | 93  | 0 Amotl1        | protein_coding         |
| ENSMUSG00000009112 | 124 | 90  | 12 Bcl2l13      | protein_coding         |
| ENSMUSG00000092805 | 124 | 53  | 9562 Gm26461    | misc_RNA               |
| ENSMUSG00000103313 | 123 | 102 | 0 Gm38357       | TEC                    |
| ENSMUSG00000042650 | 123 | 58  | 0 Alkbh5        | protein_coding         |
| ENSMUSG00000096243 | 123 | 42  | 1435 Gm24265    | snRNA                  |
| ENSMUSG00000094377 | 123 | 42  | 1330 Gm24407    | snRNA                  |
| ENSMUSG00000064581 | 122 | 135 | 22 Gm25133      | snoRNA                 |
| ENSMUSG00000065259 | 122 | 135 | 22 Snora30      | snoRNA                 |
| ENSMUSG00000075595 | 122 | 107 | 105 Zfp652      | protein_coding         |
| ENSMUSG00000073538 | 121 | 139 | 0 E330020D12Rik | processed_transcript   |
| ENSMUSG00000085220 | 121 | 137 | 4               | antisense              |
| ENSMUSG00000103490 | 121 | 125 | 0               | TEC                    |
| ENSMUSG00000022940 | 121 | 119 | 0 Pigp          | protein_coding         |
| ENSMUSG00000082926 | 121 | 166 | 8 Gm8172        | processed_pseudogene   |
| ENSMUSG00000067736 | 121 | 88  | 480 Gm10222     | unprocessed_pseudogene |



|                    |     |     |                     |                                    |
|--------------------|-----|-----|---------------------|------------------------------------|
| ENSMUSG00000007815 | 119 | 129 | 0 Rhoa              | protein_coding                     |
| ENSMUSG00000038587 | 119 | 91  | 12 Akap12           | protein_coding                     |
| ENSMUSG00000097971 | 118 | 10  | 6537 Gm26917        | processed_transcript               |
| ENSMUSG00000020740 | 117 | 94  | 0 Gga3              | protein_coding                     |
| ENSMUSG00000056201 | 115 | 224 | 0 Cfl1              | protein_coding                     |
| ENSMUSG00000016756 | 115 | 109 | 0 Cmah              | protein_coding                     |
| ENSMUSG00000080465 | 114 | 112 | 305 Gm22486         | snoRNA                             |
| ENSMUSG00000003316 | 114 | 81  | 0 Glg1              | protein_coding                     |
| ENSMUSG00000078578 | 113 | 139 | 0 Ube2d3            | protein_coding                     |
| ENSMUSG00000092702 | 113 | 37  | 9439 Gm24514        | misc_RNA                           |
| ENSMUSG00000047501 | 113 | 173 | 22 Cldn4            | protein_coding                     |
| ENSMUSG00000083756 | 113 | 164 | 0                   | processed_pseudogene               |
| ENSMUSG00000038347 | 113 | 141 | 0 Tcte2             | protein_coding                     |
| ENSMUSG00000094265 | 113 | 43  | 268 n-R5s109        | rRNA                               |
| ENSMUSG00000038766 | 112 | 184 | 12 Gabpb2           | protein_coding                     |
| ENSMUSG00000034342 | 112 | 65  | 24 Cbl              | protein_coding                     |
| ENSMUSG00000056904 | 111 | 153 | 4 Gm5620            | processed_pseudogene               |
| ENSMUSG00000081572 | 110 | 158 | 10 Gm14138          | processed_pseudogene               |
| ENSMUSG00000085590 | 110 | 152 | 0                   | processed_transcript               |
| ENSMUSG00000097431 | 110 | 129 | 0 Gm26782           | lincRNA                            |
| ENSMUSG00000081499 | 110 | 129 | 2 Gm12517           | processed_pseudogene               |
| ENSMUSG00000082320 | 110 | 116 | 0 Gm11877           | processed_pseudogene               |
| ENSMUSG00000041774 | 110 | 116 | 0 Ydje              | protein_coding                     |
| ENSMUSG00000034429 | 110 | 107 | 0 Zfp707            | protein_coding                     |
| ENSMUSG00000077571 | 110 | 96  | 0 Snora36b          | snoRNA                             |
| ENSMUSG00000041995 | 110 | 8   | 0 Zbed3             | protein_coding                     |
| ENSMUSG00000057990 | 109 | 127 | 0 E030024N20Rik     | processed_pseudogene               |
| ENSMUSG00000080610 | 109 | 122 | 34 Snord110         | snoRNA                             |
| ENSMUSG00000018931 | 109 | 82  | 0 Natd1             | protein_coding                     |
| ENSMUSG00000064514 | 109 | 54  | 127 Gm22455         | snoRNA                             |
| ENSMUSG00000002064 | 108 | 137 | 0 Sdf2              | protein_coding                     |
| ENSMUSG00000089716 | 108 | 135 | 0 Gm6264            | transcribed_unprocessed_pseudogene |
| ENSMUSG00000001249 | 108 | 26  | 63 Hpn              | protein_coding                     |
| ENSMUSG00000019320 | 107 | 169 | 0 Noxo1             | protein_coding                     |
| ENSMUSG00000063830 | 107 | 126 | 0 Gm6065            | processed_pseudogene               |
| ENSMUSG00000001983 | 107 | 91  | 0 Taco1             | protein_coding                     |
| ENSMUSG00000094830 | 107 | 25  | 71 n-R5s194         | rRNA                               |
| ENSMUSG00000088609 | 107 | 14  | 30 Gm24187          | miRNA                              |
| ENSMUSG00000102917 | 107 | 107 | 4 Gm37724           | lincRNA                            |
| ENSMUSG00000035877 | 107 | 92  | 0 Zhx3              | protein_coding                     |
| ENSMUSG00000051527 | 106 | 147 | 0 Usp29             | protein_coding                     |
| ENSMUSG00000097378 | 106 | 91  | 43587 B230208H11Rik | lincRNA                            |
| ENSMUSG00000029624 | 105 | 207 | 0 Ptdcl             | protein_coding                     |
| ENSMUSG00000033257 | 105 | 86  | 0 Ttl4              | protein_coding                     |
| ENSMUSG00000100750 | 104 | 110 | 0 Gm29084           | antisense                          |
| ENSMUSG00000095915 | 104 | 39  | 363 n-R5s115        | rRNA                               |
| ENSMUSG00000001910 | 104 | 150 | 0 Nacc1             | protein_coding                     |
| ENSMUSG00000099680 | 104 | 148 | 0                   | processed_pseudogene               |
| ENSMUSG00000038393 | 104 | 84  | 0 Txnip             | protein_coding                     |

|                     |     |     |                 |                                  |
|---------------------|-----|-----|-----------------|----------------------------------|
| ENSMUSG00000040935  | 104 | 73  | 0 Padi6         | protein_coding                   |
| ENSMUSG00000093960  | 104 | 36  | 95 n-R5s127     | rRNA                             |
| ENSMUSG00000058655  | 103 | 164 | 54 Eif4b        | protein_coding                   |
| ENSMUSG00000030008  | 103 | 119 | 0 Pradc1        | protein_coding                   |
| ENSMUSG00000031578  | 103 | 86  | 0 Mak16         | protein_coding                   |
| ENSMUSG00000088108  | 103 | 76  | 34 Snora47      | snoRNA                           |
| ENSMUSG00000030287  | 102 | 77  | 0 Itpr2         | protein_coding                   |
| ENSMUSG00000064851  | 101 | 127 | 4247 Gm24525    | snRNA                            |
| ENSMUSG00000033364  | 101 | 122 | 10 Usp37        | protein_coding                   |
| ENSMUSG00000094224  | 101 | 117 | 0               | processed_pseudogene             |
| ENSMUSG00000034758  | 101 | 70  | 0 Tle6          | protein_coding                   |
| ENSMUSG00000081489  | 101 | 129 | 0               | processed_pseudogene             |
| ENSMUSG000000101698 | 101 | 120 | 0 Gm29562       | lincRNA                          |
| ENSMUSG00000020375  | 101 | 116 | 0 Rufy1         | protein_coding                   |
| ENSMUSG00000093064  | 101 | 32  | 9245 Gm23153    | misc_RNA                         |
| ENSMUSG00000022441  | 99  | 95  | 0 Efcab6        | protein_coding                   |
| ENSMUSG00000078902  | 98  | 104 | 0 Gm14443       | protein_coding                   |
| ENSMUSG00000035325  | 98  | 55  | 109 Sec31a      | protein_coding                   |
| ENSMUSG00000020869  | 98  | 136 | 0 Lrrc59        | protein_coding                   |
| ENSMUSG00000096456  | 98  | 120 | 0               | processed_pseudogene             |
| ENSMUSG00000024096  | 97  | 162 | 0 Ralbp1        | protein_coding                   |
| ENSMUSG00000022010  | 97  | 106 | 490 Tsc22d1     | protein_coding                   |
| ENSMUSG00000044783  | 97  | 95  | 14 Hjurp        | protein_coding                   |
| ENSMUSG00000087259  | 97  | 67  | 0 2610035D17Rik | lincRNA                          |
| ENSMUSG000000102600 | 96  | 139 | 0 Gm37266       | TEC                              |
| ENSMUSG00000081050  | 96  | 109 | 0 Gm12461       | processed_pseudogene             |
| ENSMUSG000000103833 | 95  | 127 | 0 Gm37610       | sense_overlapping                |
| ENSMUSG00000034300  | 95  | 114 | 0 Fam53c        | protein_coding                   |
| ENSMUSG00000002728  | 95  | 88  | 0 Naa20         | protein_coding                   |
| ENSMUSG00000065311  | 95  | 15  | 190 n-R5s156    | rRNA                             |
| ENSMUSG00000044468  | 95  | 133 | 67 Fam46c       | protein_coding                   |
| ENSMUSG00000028988  | 95  | 71  | 0 Ctnnbip1      | protein_coding                   |
| ENSMUSG00000097893  | 94  | 108 | 0 1700034P13Rik | antisense                        |
| ENSMUSG00000095205  | 93  | 148 | 0 Snord93       | snoRNA                           |
| ENSMUSG00000096832  | 93  | 148 | 0 Mir3096       | snoRNA                           |
| ENSMUSG00000085328  | 93  | 121 | 0 Gm17131       | unprocessed_pseudogene           |
| ENSMUSG00000029833  | 93  | 110 | 0 Trim24        | protein_coding                   |
| ENSMUSG00000099964  | 93  | 108 | 0 Gm29514       | antisense                        |
| ENSMUSG00000065147  | 93  | 70  | 755 Snora31     | snoRNA                           |
| ENSMUSG00000032519  | 93  | 53  | 0 Slc25a38      | protein_coding                   |
| ENSMUSG00000041722  | 93  | 118 | 0 Khdc1c        | protein_coding                   |
| ENSMUSG00000094503  | 93  | 108 | 0               | processed_pseudogene             |
| ENSMUSG00000077756  | 93  | 75  | 218 Snord90     | snoRNA                           |
| ENSMUSG00000031903  | 92  | 146 | 0 Pla2g15       | protein_coding                   |
| ENSMUSG00000028078  | 92  | 143 | 0 Dclk2         | protein_coding                   |
| ENSMUSG0000003099   | 92  | 133 | 57 Ppp5c        | protein_coding                   |
| ENSMUSG00000083996  | 92  | 120 | 0 Gm11649       | transcribed_processed_pseudogene |
| ENSMUSG00000031028  | 92  | 65  | 0 Tub           | protein_coding                   |
| ENSMUSG00000058050  | 91  | 110 | 0 Gm9234        | processed_pseudogene             |

|                    |    |     |                 |                        |
|--------------------|----|-----|-----------------|------------------------|
| ENSMUSG00000039405 | 90 | 143 | 153 Prss23      | protein_coding         |
| ENSMUSG00000083627 | 90 | 121 | 0 Gm12502       | processed_pseudogene   |
| ENSMUSG00000094655 | 90 | 104 | 512 Gm25360     | snRNA                  |
| ENSMUSG00000031902 | 90 | 93  | 0 Nfatc3        | protein_coding         |
| ENSMUSG00000021868 | 90 | 105 | 30 Ppif         | protein_coding         |
| ENSMUSG00000024378 | 90 | 68  | 20 Stard4       | protein_coding         |
| ENSMUSG00000097987 | 89 | 118 | 2 Gm17786       | processed_pseudogene   |
| ENSMUSG00000026820 | 89 | 99  | 0 Ptges2        | protein_coding         |
| ENSMUSG00000049764 | 89 | 60  | 52 Zfp280b      | protein_coding         |
| ENSMUSG00000029142 | 89 | 46  | 1267            | protein_coding         |
| ENSMUSG00000082568 | 88 | 94  | 0               | processed_pseudogene   |
| ENSMUSG00000018395 | 88 | 93  | 0 Kif3a         | protein_coding         |
| ENSMUSG00000047220 | 88 | 93  | 0 Ccdc36        | protein_coding         |
| ENSMUSG00000020843 | 88 | 92  | 0 Timm22        | protein_coding         |
| ENSMUSG00000037355 | 87 | 187 | 0 Uvssa         | protein_coding         |
| ENSMUSG00000083623 | 87 | 100 | 0 Gm7224        | unprocessed_pseudogene |
| ENSMUSG00000084824 | 86 | 82  | 0 Gm16344       | antisense              |
| ENSMUSG00000023908 | 86 | 78  | 0 Pkmyt1        | protein_coding         |
| ENSMUSG00000057359 | 85 | 118 | 0 Gm17494       | antisense              |
| ENSMUSG00000081519 | 85 | 113 | 0 Gm13331       | processed_pseudogene   |
| ENSMUSG00000083283 | 85 | 111 | 0 Gm15361       | processed_pseudogene   |
| ENSMUSG00000084883 | 85 | 97  | 0 Ccdc85c       | protein_coding         |
| ENSMUSG00000027502 | 85 | 46  | 0 Rtfdc1        | protein_coding         |
| ENSMUSG00000022329 | 84 | 43  | 0 Stk3          | protein_coding         |
| ENSMUSG00000099759 | 84 | 111 | 0 1700030C10Rik | processed_transcript   |
| ENSMUSG00000029613 | 84 | 71  | 0 Eif2ak1       | protein_coding         |
| ENSMUSG00000034832 | 84 | 67  | 0 Tet3          | protein_coding         |
| ENSMUSG00000064748 | 84 | 41  | 256 n-R5s28     | rRNA                   |
| ENSMUSG00000080518 | 83 | 215 | 210 Gm22193     | snoRNA                 |
| ENSMUSG00000040728 | 83 | 137 | 6 Esrp1         | protein_coding         |
| ENSMUSG00000046020 | 83 | 93  | 0 Pofut1        | protein_coding         |
| ENSMUSG00000097796 | 83 | 92  | 0 Gm16702       | lincRNA                |
| ENSMUSG00000097695 | 83 | 89  | 14 Gm26905      | lincRNA                |
| ENSMUSG00000065635 | 83 | 43  | 44 Gm24253      | snoRNA                 |
| ENSMUSG00000077493 | 82 | 13  | 16 Snord91a     | snoRNA                 |
| ENSMUSG00000083883 | 81 | 100 | 0               | processed_pseudogene   |
| ENSMUSG00000103234 | 81 | 93  | 0 Gm37158       | TEC                    |
| ENSMUSG00000044712 | 81 | 87  | 2 Slc38a6       | protein_coding         |
| ENSMUSG00000028212 | 81 | 64  | 0 Ccne2         | protein_coding         |
| ENSMUSG00000056772 | 81 | 84  | 8 Rps6-ps2      | processed_pseudogene   |
| ENSMUSG00000036309 | 80 | 99  | 12 Skp1a        | protein_coding         |
| ENSMUSG00000089855 | 80 | 40  | 127 Gm15662     | unprocessed_pseudogene |
| ENSMUSG00000030269 | 80 | 30  | 0 Mtmr14        | protein_coding         |
| ENSMUSG00000081347 | 79 | 112 | 0               | processed_pseudogene   |
| ENSMUSG00000100210 | 79 | 94  | 0 Hist1h3f      | protein_coding         |
| ENSMUSG00000069267 | 79 | 90  | 0 Hist1h3b      | protein_coding         |
| ENSMUSG00000031740 | 79 | 87  | 0 Mmp2          | protein_coding         |
| ENSMUSG00000018583 | 79 | 87  | 0 G3bp1         | protein_coding         |
| ENSMUSG00000068747 | 79 | 45  | 676 Sort1       | protein_coding         |

|                    |    |     |                 |                      |
|--------------------|----|-----|-----------------|----------------------|
| ENSMUSG00000069265 | 78 | 88  | 0 Hist1h3a      | protein_coding       |
| ENSMUSG00000067081 | 78 | 81  | 0 Asb18         | protein_coding       |
| ENSMUSG00000048164 | 78 | 137 | 0 Gm7204        | processed_pseudogene |
| ENSMUSG00000081551 | 78 | 131 | 0 Gm14654       | processed_pseudogene |
| ENSMUSG00000085478 | 78 | 92  | 0 Gm11851       | lincRNA              |
| ENSMUSG00000069310 | 78 | 89  | 0 Hist1h3c      | protein_coding       |
| ENSMUSG00000004865 | 78 | 58  | 6 Srpkl         | protein_coding       |
| ENSMUSG00000065219 | 78 | 15  | 1124 Snord32a   | snoRNA               |
| ENSMUSG00000103628 | 77 | 165 | 0 Gm37361       | processed_pseudogene |
| ENSMUSG00000075245 | 77 | 89  | 0 Gm6043        | processed_pseudogene |
| ENSMUSG00000026123 | 77 | 66  | 0 Plekhhb2      | protein_coding       |
| ENSMUSG00000078365 | 77 | 41  | 0 Mos           | protein_coding       |
| ENSMUSG00000040848 | 76 | 91  | 0 Sft2d2        | protein_coding       |
| ENSMUSG00000101355 | 76 | 87  | 0 Hist1h3h      | protein_coding       |
| ENSMUSG00000069273 | 76 | 86  | 0 Hist1h3e      | protein_coding       |
| ENSMUSG00000053063 | 76 | 81  | 0 Clec12a       | protein_coding       |
| ENSMUSG00000099517 | 75 | 87  | 0 Hist1h3g      | protein_coding       |
| ENSMUSG00000033632 | 75 | 85  | 16 AW554918     | protein_coding       |
| ENSMUSG00000050229 | 75 | 84  | 28 Pigm         | protein_coding       |
| ENSMUSG00000052488 | 75 | 82  | 0 Cherp         | protein_coding       |
| ENSMUSG00000102840 | 75 | 49  | 0 Gm38037       | antisense            |
| ENSMUSG00000022656 | 75 | 43  | 12 Nectin3      | protein_coding       |
| ENSMUSG00000043467 | 75 | 92  | 63 Zbtb37       | protein_coding       |
| ENSMUSG00000101972 | 75 | 87  | 0 Hist1h3i      | protein_coding       |
| ENSMUSG00000027035 | 75 | 77  | 2 Cers6         | protein_coding       |
| ENSMUSG00000034105 | 75 | 77  | 0 Tlde1         | protein_coding       |
| ENSMUSG00000046897 | 75 | 60  | 0 Zfp740        | protein_coding       |
| ENSMUSG00000029345 | 74 | 124 | 0 Tfip11        | protein_coding       |
| ENSMUSG00000035152 | 74 | 122 | 0 Ap2b1         | protein_coding       |
| ENSMUSG00000020431 | 74 | 112 | 0 Adcy1         | protein_coding       |
| ENSMUSG00000081997 | 74 | 83  | 0               | processed_pseudogene |
| ENSMUSG00000002052 | 74 | 70  | 14 Supt6        | protein_coding       |
| ENSMUSG00000062866 | 74 | 44  | 222 Phactr2     | protein_coding       |
| ENSMUSG00000036160 | 74 | 39  | 0 Surf6         | protein_coding       |
| ENSMUSG00000071281 | 73 | 113 | 0 Zfp65         | protein_coding       |
| ENSMUSG00000092622 | 73 | 41  | 0 Khdc3         | protein_coding       |
| ENSMUSG00000049957 | 73 | 26  | 0 Ccdc137       | protein_coding       |
| ENSMUSG00000025234 | 73 | 82  | 0 Arih1         | protein_coding       |
| ENSMUSG00000044060 | 73 | 70  | 0 A830010M20Rik | protein_coding       |
| ENSMUSG00000060475 | 73 | 55  | 1765 Wtap       | protein_coding       |
| ENSMUSG00000038544 | 73 | 37  | 22 Inip         | protein_coding       |
| ENSMUSG00000091780 | 72 | 102 | 0 Sco2          | protein_coding       |
| ENSMUSG00000019505 | 72 | 68  | 69 Ubb          | protein_coding       |
| ENSMUSG00000013997 | 71 | 114 | 0 Nit1          | protein_coding       |
| ENSMUSG00000029416 | 71 | 96  | 0 Slc15a4       | protein_coding       |
| ENSMUSG00000002768 | 71 | 87  | 0 Mea1          | protein_coding       |
| ENSMUSG00000001065 | 71 | 86  | 0 Zfp276        | protein_coding       |
| ENSMUSG00000028096 | 71 | 83  | 0 Gpr89         | protein_coding       |
| ENSMUSG00000083713 | 71 | 79  | 0 Gm5883        | processed_pseudogene |

|                     |    |     |              |                        |
|---------------------|----|-----|--------------|------------------------|
| ENSMUSG00000084091  | 71 | 70  | 0            | processed_pseudogene   |
| ENSMUSG00000038593  | 71 | 10  | 4 Tctn1      | protein_coding         |
| ENSMUSG00000089714  | 70 | 104 | 0 Gm16092    | lincRNA                |
| ENSMUSG00000090246  | 70 | 104 | 0 Gm17017    | antisense              |
| ENSMUSG00000042377  | 70 | 88  | 0 Fam83g     | protein_coding         |
| ENSMUSG00000021102  | 70 | 82  | 0 Glrx5      | protein_coding         |
| ENSMUSG00000026622  | 70 | 79  | 14 Nek2      | protein_coding         |
| ENSMUSG000000103475 | 70 | 76  | 0 Gm37697    | TEC                    |
| ENSMUSG00000083479  | 70 | 69  | 0            | processed_pseudogene   |
| ENSMUSG00000036752  | 70 | 64  | 0 Tubb4b     | protein_coding         |
| ENSMUSG00000041671  | 70 | 60  | 4 Pyroxd1    | protein_coding         |
| ENSMUSG00000022419  | 70 | 58  | 2 Deptor     | protein_coding         |
| ENSMUSG00000038612  | 70 | 58  | 14 McI1      | protein_coding         |
| ENSMUSG00000064925  | 70 | 18  | 24 Snora62   | snoRNA                 |
| ENSMUSG00000023885  | 70 | 7   | 0 Thbs2      | protein_coding         |
| ENSMUSG00000021638  | 70 | 70  | 0 Ocln       | protein_coding         |
| ENSMUSG00000065037  | 70 | 25  | 1880 Rn7sk   | misc_RNA               |
| ENSMUSG00000080469  | 70 | 21  | 0 Snord98    | snoRNA                 |
| ENSMUSG00000013973  | 69 | 120 | 0 Dedd       | protein_coding         |
| ENSMUSG00000021391  | 69 | 112 | 0 Cenpp      | protein_coding         |
| ENSMUSG000000100078 | 69 | 88  | 59 Gm6170    | processed_pseudogene   |
| ENSMUSG00000039242  | 69 | 60  | 0 B3galnt2   | protein_coding         |
| ENSMUSG00000030019  | 69 | 41  | 0 Fbxl14     | protein_coding         |
| ENSMUSG00000083780  | 68 | 91  | 0 Gm12728    | protein_coding         |
| ENSMUSG00000021704  | 68 | 89  | 0 Mtx3       | protein_coding         |
| ENSMUSG00000032263  | 68 | 77  | 0 Bckdhh     | protein_coding         |
| ENSMUSG00000087086  | 68 | 62  | 0 Gm13269    | antisense              |
| ENSMUSG00000023505  | 68 | 43  | 0 Cdca3      | protein_coding         |
| ENSMUSG00000027671  | 67 | 94  | 12 Actl6a    | protein_coding         |
| ENSMUSG00000025764  | 67 | 68  | 97 Jade1     | protein_coding         |
| ENSMUSG00000064587  | 67 | 27  | 1063 Gm25131 | snRNA                  |
| ENSMUSG00000037593  | 67 | 1   | 2 BC030499   | protein_coding         |
| ENSMUSG00000089542  | 67 | 110 | 299 Gm25835  | snoRNA                 |
| ENSMUSG00000082536  | 67 | 89  | 95 Gm13456   | processed_pseudogene   |
| ENSMUSG00000087598  | 66 | 113 | 0 Zfp111     | protein_coding         |
| ENSMUSG00000040888  | 66 | 108 | 0 Gfer       | protein_coding         |
| ENSMUSG000000102712 | 66 | 75  | 0 Gm37758    | TEC                    |
| ENSMUSG00000055795  | 66 | 74  | 0 Gm5160     | protein_coding         |
| ENSMUSG00000044285  | 66 | 63  | 48 Gm1821    | processed_pseudogene   |
| ENSMUSG00000026974  | 66 | 35  | 14 Zmynd19   | protein_coding         |
| ENSMUSG00000024953  | 65 | 88  | 20 Prdx5     | protein_coding         |
| ENSMUSG00000085508  | 65 | 88  | 0 Gm13965    | processed_transcript   |
| ENSMUSG000000104377 | 65 | 84  | 0 Gm37515    | processed_pseudogene   |
| ENSMUSG00000085897  | 65 | 76  | 0 Gm11604    | processed_pseudogene   |
| ENSMUSG00000025702  | 65 | 59  | 0 March8     | protein_coding         |
| ENSMUSG00000036120  | 64 | 92  | 0 Rfxank     | protein_coding         |
| ENSMUSG00000059409  | 64 | 92  | 0 Ppp2r5d    | protein_coding         |
| ENSMUSG00000061331  | 64 | 89  | 0 Gm17132    | unprocessed_pseudogene |
| ENSMUSG000000100768 | 64 | 87  | 0 Gm29055    | sense_intronic         |

|                    |    |     |                 |                        |
|--------------------|----|-----|-----------------|------------------------|
| ENSMUSG00000086721 | 64 | 70  | 0 Gm13750       | processed_pseudogene   |
| ENSMUSG00000088895 | 64 | 45  | 117 Gm22519     | snoRNA                 |
| ENSMUSG00000014867 | 64 | 45  | 0 Surf4         | protein_coding         |
| ENSMUSG00000064120 | 64 | 97  | 0 Mocs1         | protein_coding         |
| ENSMUSG00000084328 | 64 | 81  | 0 Gm14046       | processed_pseudogene   |
| ENSMUSG00000022533 | 64 | 72  | 0 Atp13a3       | protein_coding         |
| ENSMUSG00000034850 | 64 | 51  | 0 Tmem127       | protein_coding         |
| ENSMUSG00000089093 | 63 | 85  | 48 Snord11      | snoRNA                 |
| ENSMUSG00000082349 | 63 | 79  | 0               | processed_pseudogene   |
| ENSMUSG00000020658 | 63 | 49  | 14 Efr3b        | protein_coding         |
| ENSMUSG00000065738 | 63 | 45  | 174 Gm24494     | snoRNA                 |
| ENSMUSG00000023873 | 62 | 99  | 0 1700010I14Rik | protein_coding         |
| ENSMUSG00000039055 | 62 | 76  | 0 Eme1          | protein_coding         |
| ENSMUSG00000036114 | 62 | 73  | 0 Rpp25l        | protein_coding         |
| ENSMUSG00000102666 | 62 | 70  | 2 Gm8599        | processed_pseudogene   |
| ENSMUSG00000084874 | 62 | 64  | 0 Gm12906       | processed_pseudogene   |
| ENSMUSG00000046546 | 62 | 58  | 333 Fam43a      | protein_coding         |
| ENSMUSG00000005225 | 62 | 50  | 0 Plekha8       | protein_coding         |
| ENSMUSG00000032050 | 62 | 21  | 87 Rdx          | protein_coding         |
| ENSMUSG00000053038 | 61 | 120 | 0 Gm6180        | processed_pseudogene   |
| ENSMUSG00000062944 | 61 | 86  | 0 9130023H24Rik | protein_coding         |
| ENSMUSG00000102591 | 61 | 85  | 0 Gm38383       | TEC                    |
| ENSMUSG00000095892 | 61 | 77  | 2008 Rnu5g      | snRNA                  |
| ENSMUSG00000094472 | 61 | 69  | 0 Gm21897       | protein_coding         |
| ENSMUSG00000069895 | 61 | 45  | 0 Atxn1l        | protein_coding         |
| ENSMUSG00000035919 | 61 | 93  | 0 Bbs9          | protein_coding         |
| ENSMUSG00000094281 | 61 | 71  | 0 Gm8034        | processed_pseudogene   |
| ENSMUSG00000086455 | 61 | 50  | 0 Gm11815       | lincRNA                |
| ENSMUSG00000064952 | 61 | 32  | 44 Gm24920      | snoRNA                 |
| ENSMUSG00000094251 | 61 | 32  | 44 Gm25632      | snoRNA                 |
| ENSMUSG00000094382 | 61 | 32  | 44 Gm22192      | snoRNA                 |
| ENSMUSG00000033306 | 60 | 72  | 6 Lpp           | protein_coding         |
| ENSMUSG00000039176 | 60 | 60  | 0 Polg          | protein_coding         |
| ENSMUSG00000092400 | 60 | 59  | 0               | processed_pseudogene   |
| ENSMUSG00000050240 | 60 | 57  | 0 Hic2          | protein_coding         |
| ENSMUSG00000040225 | 60 | 56  | 0 Prrc2c        | protein_coding         |
| ENSMUSG00000029313 | 60 | 43  | 0 Aff1          | protein_coding         |
| ENSMUSG00000029505 | 59 | 142 | 12 Ep400        | protein_coding         |
| ENSMUSG00000053293 | 59 | 90  | 0 Pom121        | protein_coding         |
| ENSMUSG00000021540 | 59 | 58  | 0 Smad5         | protein_coding         |
| ENSMUSG00000089937 | 59 | 30  | 0 Gm7281        | unprocessed_pseudogene |
| ENSMUSG00000025616 | 58 | 99  | 2 Usp16         | protein_coding         |
| ENSMUSG00000083442 | 58 | 89  | 0               | processed_pseudogene   |
| ENSMUSG00000081058 | 58 | 60  | 0 Hist2h3c2     | protein_coding         |
| ENSMUSG00000074403 | 58 | 58  | 0 Hist2h3b      | protein_coding         |
| ENSMUSG00000030020 | 58 | 100 | 0 Prickle2      | protein_coding         |
| ENSMUSG00000086273 | 58 | 85  | 0 Rbm46os       | antisense              |
| ENSMUSG00000096726 | 58 | 63  | 0 Gm5558        | processed_pseudogene   |
| ENSMUSG00000034333 | 57 | 94  | 2 Zbed4         | protein_coding         |

|                     |    |     |              |                                  |
|---------------------|----|-----|--------------|----------------------------------|
| ENSMUSG00000025239  | 57 | 85  | 20 Limd1     | protein_coding                   |
| ENSMUSG00000039156  | 57 | 74  | 0 Stim2      | protein_coding                   |
| ENSMUSG000000041161 | 57 | 37  | 0 Otud3      | protein_coding                   |
| ENSMUSG00000038569  | 56 | 81  | 0 Rad9b      | protein_coding                   |
| ENSMUSG00000090474  | 56 | 55  | 0 Gm9372     | processed_pseudogene             |
| ENSMUSG00000027170  | 56 | 51  | 0 Eif3m      | protein_coding                   |
| ENSMUSG00000082935  | 56 | 51  | 0 Gm7658     | processed_pseudogene             |
| ENSMUSG00000027673  | 56 | 33  | 0 Ndufb5     | protein_coding                   |
| ENSMUSG00000091549  | 56 | 85  | 65 Gm6548    | processed_pseudogene             |
| ENSMUSG00000095676  | 56 | 83  | 1860 Gm25099 | snRNA                            |
| ENSMUSG00000088948  | 56 | 71  | 125 Gm23262  | snoRNA                           |
| ENSMUSG00000034265  | 56 | 26  | 0 Zdhhc14    | protein_coding                   |
| ENSMUSG00000069114  | 55 | 114 | 24 Zbtb10    | protein_coding                   |
| ENSMUSG00000037885  | 55 | 114 | 0 Stk35      | protein_coding                   |
| ENSMUSG00000090224  | 55 | 83  | 0 Gm15974    | processed_pseudogene             |
| ENSMUSG00000031812  | 55 | 69  | 0 Map1lc3b   | protein_coding                   |
| ENSMUSG00000029192  | 55 | 42  | 0 Tbc1d14    | protein_coding                   |
| ENSMUSG00000053617  | 54 | 43  | 0 Sh3pxd2a   | protein_coding                   |
| ENSMUSG00000048076  | 53 | 114 | 8 Arf1       | protein_coding                   |
| ENSMUSG00000022401  | 53 | 80  | 30 Xpnpep3   | protein_coding                   |
| ENSMUSG00000027425  | 53 | 75  | 0 Csrp2bp    | protein_coding                   |
| ENSMUSG00000089617  | 53 | 68  | 42 Scarna10  | snoRNA                           |
| ENSMUSG00000067352  | 53 | 55  | 0 Gm14149    | lincRNA                          |
| ENSMUSG00000033075  | 53 | 49  | 18 Senp1     | protein_coding                   |
| ENSMUSG00000035614  | 53 | 37  | 0 Fam179b    | protein_coding                   |
| ENSMUSG00000080078  | 53 | 90  | 2 Gm15583    | processed_pseudogene             |
| ENSMUSG00000029640  | 53 | 87  | 10 Usp12     | protein_coding                   |
| ENSMUSG00000038533  | 53 | 54  | 28 Cbfa2t2   | protein_coding                   |
| ENSMUSG00000061436  | 53 | 54  | 0 Hipk2      | protein_coding                   |
| ENSMUSG00000099583  | 53 | 53  | 0 Hist1h3d   | protein_coding                   |
| ENSMUSG00000038060  | 53 | 35  | 0 Dlec1      | protein_coding                   |
| ENSMUSG00000102796  | 52 | 33  | 0 Gm37711    | TEC                              |
| ENSMUSG00000021774  | 52 | 27  | 0 Ube2e1     | protein_coding                   |
| ENSMUSG00000028391  | 52 | 26  | 14 Wdr31     | protein_coding                   |
| ENSMUSG00000022205  | 51 | 58  | 14 Sub1      | protein_coding                   |
| ENSMUSG00000041343  | 51 | 9   | 0 Ankrd42    | protein_coding                   |
| ENSMUSG00000092389  | 50 | 90  | 0 Gm20483    | antisense                        |
| ENSMUSG00000005362  | 50 | 76  | 0 Crbn       | protein_coding                   |
| ENSMUSG00000052763  | 50 | 70  | 0 Zfp212     | protein_coding                   |
| ENSMUSG00000073700  | 50 | 40  | 0 Klhl21     | protein_coding                   |
| ENSMUSG00000032305  | 50 | 33  | 0 Fam219b    | protein_coding                   |
| ENSMUSG00000088929  | 50 | 28  | 71 Gm24299   | snoRNA                           |
| ENSMUSG00000029364  | 50 | 22  | 0 Wsb2       | protein_coding                   |
| ENSMUSG00000038095  | 50 | 13  | 2 Sbno1      | protein_coding                   |
| ENSMUSG00000017715  | 50 | 96  | 0 Pgs1       | protein_coding                   |
| ENSMUSG00000102478  | 50 | 91  | 0 BC085271   | transcribed_processed_pseudogene |
| ENSMUSG00000043090  | 50 | 78  | 8 Zfp866     | protein_coding                   |
| ENSMUSG00000026667  | 50 | 70  | 0 Uhmkl      | protein_coding                   |
| ENSMUSG00000103276  | 50 | 70  | 0 Gm37917    | TEC                              |

|                    |    |     |              |                                  |
|--------------------|----|-----|--------------|----------------------------------|
| ENSMUSG00000035666 | 50 | 44  | 0 Gtf3c4     | protein_coding                   |
| ENSMUSG00000020495 | 50 | 42  | 0 Smg8       | protein_coding                   |
| ENSMUSG00000020962 | 50 | 0   | 83 Gtf2a1    | protein_coding                   |
| ENSMUSG00000097141 | 49 | 111 | 0 Gm10524    | TEC                              |
| ENSMUSG00000037443 | 49 | 86  | 0 Cep85      | protein_coding                   |
| ENSMUSG00000093538 | 49 | 42  | 0 Gm20711    | antisense                        |
| ENSMUSG00000102700 | 49 | 39  | 0 Gm38312    | TEC                              |
| ENSMUSG00000051920 | 49 | 30  | 0 Rspo2      | protein_coding                   |
| ENSMUSG00000075973 | 49 | 20  | 81 n-R5s64   | rRNA                             |
| ENSMUSG00000030598 | 49 | 16  | 4 Fbxo17     | protein_coding                   |
| ENSMUSG00000094405 | 48 | 63  | 1822 Gm23143 | snRNA                            |
| ENSMUSG00000091269 | 48 | 62  | 0 Gm6682     | processed_pseudogene             |
| ENSMUSG00000082559 | 48 | 60  | 0            | processed_pseudogene             |
| ENSMUSG00000021972 | 48 | 54  | 0 Hmbox1     | protein_coding                   |
| ENSMUSG00000086710 | 47 | 62  | 0 Gm13465    | lincRNA                          |
| ENSMUSG00000069939 | 47 | 62  | 0 Gm12070    | processed_pseudogene             |
| ENSMUSG00000078636 | 47 | 62  | 0 Gm7336     | processed_pseudogene             |
| ENSMUSG00000096617 | 47 | 61  | 0 Gm5559     | processed_pseudogene             |
| ENSMUSG00000038485 | 47 | 53  | 0 Socs7      | protein_coding                   |
| ENSMUSG00000073628 | 47 | 41  | 0 Gm10552    | antisense                        |
| ENSMUSG00000095159 | 47 | 41  | 0 Tubb4b-ps1 | protein_coding                   |
| ENSMUSG00000022554 | 47 | 39  | 0 Hgh1       | protein_coding                   |
| ENSMUSG00000073179 | 47 | 26  | 0 Gm10478    | pseudogene                       |
| ENSMUSG00000028522 | 47 | 12  | 236 Mier1    | protein_coding                   |
| ENSMUSG00000021277 | 47 | 55  | 0 Traf3      | protein_coding                   |
| ENSMUSG00000083985 | 47 | 45  | 0 Gm12468    | processed_pseudogene             |
| ENSMUSG00000018820 | 47 | 22  | 0 Zfyve27    | protein_coding                   |
| ENSMUSG00000000001 | 47 | 16  | 56 Gnai3     | protein_coding                   |
| ENSMUSG00000048911 | 46 | 112 | 4 Rnf24      | protein_coding                   |
| ENSMUSG00000007850 | 46 | 70  | 59 Hnrnph1   | protein_coding                   |
| ENSMUSG00000095738 | 46 | 63  | 1997 Gm25313 | snRNA                            |
| ENSMUSG00000078300 | 46 | 61  | 0 Gm2606     | processed_pseudogene             |
| ENSMUSG00000090860 | 46 | 61  | 0 Gm17134    | antisense                        |
| ENSMUSG00000097979 | 46 | 58  | 0 Gm4691     | transcribed_processed_pseudogene |
| ENSMUSG00000043881 | 46 | 49  | 0 Kbtbd7     | protein_coding                   |
| ENSMUSG00000024287 | 46 | 39  | 0 Thoc1      | protein_coding                   |
| ENSMUSG00000028822 | 46 | 38  | 0 Tmem50a    | protein_coding                   |
| ENSMUSG00000093952 | 46 | 17  | 52 n-R5s195  | rRNA                             |
| ENSMUSG00000047193 | 46 | 16  | 56 Dync2h1   | protein_coding                   |
| ENSMUSG00000042724 | 46 | 13  | 0 Map3k9     | protein_coding                   |
| ENSMUSG00000064609 | 46 | 12  | 0 Gm25635    | snoRNA                           |
| ENSMUSG00000100813 | 45 | 90  | 0 Gm28874    | lincRNA                          |
| ENSMUSG00000094131 | 45 | 75  | 1800 Gm22265 | snRNA                            |
| ENSMUSG00000038740 | 45 | 62  | 10 Mvb12b    | protein_coding                   |
| ENSMUSG00000083773 | 45 | 60  | 0 Gm13394    | processed_pseudogene             |
| ENSMUSG00000094708 | 45 | 59  | 0 Gm10359    | processed_pseudogene             |
| ENSMUSG00000095937 | 45 | 59  | 0 Gm12671    | processed_pseudogene             |
| ENSMUSG00000081221 | 45 | 57  | 0 Gm14760    | processed_pseudogene             |
| ENSMUSG00000101751 | 45 | 51  | 0 Gm2427     | unprocessed_pseudogene           |



|                    |    |    |                 |                      |
|--------------------|----|----|-----------------|----------------------|
| ENSMUSG00000047888 | 45 | 48 | 2 Tnrc6b        | protein_coding       |
| ENSMUSG00000021000 | 45 | 40 | 0 Ctage5        | protein_coding       |
| ENSMUSG00000099997 | 45 | 35 | 0 Tubb4b-ps2    | processed_pseudogene |
| ENSMUSG00000037375 | 45 | 32 | 0 Hhat          | protein_coding       |
| ENSMUSG00000017291 | 45 | 1  | 30 Taok1        | protein_coding       |
| ENSMUSG00000068922 | 44 | 80 | 0 Msto1         | protein_coding       |
| ENSMUSG00000078965 | 44 | 60 | 0 Gm12033       | processed_pseudogene |
| ENSMUSG00000080938 | 44 | 47 | 0 Gm6062        | processed_pseudogene |
| ENSMUSG00000072640 | 44 | 43 | 30 Lym9         | protein_coding       |
| ENSMUSG00000060860 | 44 | 39 | 2 Ube2s         | protein_coding       |
| ENSMUSG00000040502 | 44 | 14 | 61 March9       | protein_coding       |
| ENSMUSG00000070178 | 44 | 13 | 54 n-R5s71      | rRNA                 |
| ENSMUSG00000033554 | 44 | 0  | 18 Dph5         | protein_coding       |
| ENSMUSG00000028703 | 44 | 84 | 0 Lrrc41        | protein_coding       |
| ENSMUSG00000015932 | 44 | 68 | 24 Dstn         | protein_coding       |
| ENSMUSG00000024500 | 44 | 63 | 0 Ppp2r2b       | protein_coding       |
| ENSMUSG00000040950 | 44 | 63 | 0 Mgl2          | protein_coding       |
| ENSMUSG00000095042 | 44 | 60 | 0 Gm12537       | processed_pseudogene |
| ENSMUSG00000051359 | 44 | 58 | 6 Ncald         | protein_coding       |
| ENSMUSG00000024382 | 44 | 58 | 0 Ercc3         | protein_coding       |
| ENSMUSG00000078592 | 44 | 54 | 0 Gm4609        | processed_pseudogene |
| ENSMUSG00000035439 | 44 | 48 | 2 Haus8         | protein_coding       |
| ENSMUSG00000028785 | 44 | 45 | 0 Hpc4          | protein_coding       |
| ENSMUSG00000071669 | 44 | 39 | 0 Snx29         | protein_coding       |
| ENSMUSG00000039662 | 44 | 39 | 0 Icmt          | protein_coding       |
| ENSMUSG00000022193 | 44 | 29 | 0 Psmb5         | protein_coding       |
| ENSMUSG00000025813 | 44 | 21 | 0 Homer2        | protein_coding       |
| ENSMUSG00000041741 | 44 | 20 | 36 Pde3a        | protein_coding       |
| ENSMUSG00000017639 | 44 | 18 | 0 Rab11fip4     | protein_coding       |
| ENSMUSG00000016541 | 44 | 11 | 14 Atxn10       | protein_coding       |
| ENSMUSG00000057177 | 43 | 66 | 0 Gsk3a         | protein_coding       |
| ENSMUSG00000078162 | 43 | 57 | 0 Gm2574        | processed_pseudogene |
| ENSMUSG00000082424 | 43 | 57 | 0 Gm13292       | processed_pseudogene |
| ENSMUSG00000089940 | 43 | 53 | 14 Gm4117       | processed_transcript |
| ENSMUSG00000039917 | 43 | 48 | 0 Rhbdd2        | protein_coding       |
| ENSMUSG00000086968 | 43 | 47 | 0 4933431E20Rik | processed_transcript |
| ENSMUSG00000080775 | 43 | 41 | 0 Gm6368        | processed_pseudogene |
| ENSMUSG00000040614 | 43 | 40 | 0 Nlrp9c        | protein_coding       |
| ENSMUSG00000080949 | 43 | 39 | 0 Gm13683       | processed_pseudogene |
| ENSMUSG00000039936 | 43 | 35 | 0 Pik3cd        | protein_coding       |
| ENSMUSG00000028842 | 43 | 25 | 0 Ago3          | protein_coding       |
| ENSMUSG00000069237 | 43 | 23 | 0 Fam8a1        | protein_coding       |
| ENSMUSG00000009575 | 43 | 21 | 93 Cbx5         | protein_coding       |
| ENSMUSG00000028955 | 43 | 18 | 0 Vamp3         | protein_coding       |
| ENSMUSG00000097188 | 43 | 7  | 0               | lincRNA              |
| ENSMUSG00000102443 | 42 | 60 | 0 Gm37102       | processed_pseudogene |
| ENSMUSG00000051220 | 42 | 57 | 0 Ercc6l        | protein_coding       |
| ENSMUSG00000062997 | 42 | 49 | 24 Rpl35        | protein_coding       |
| ENSMUSG00000078193 | 42 | 49 | 24 Gm2000       | protein_coding       |

|                    |    |     |                 |                                    |
|--------------------|----|-----|-----------------|------------------------------------|
| ENSMUSG00000100798 | 42 | 48  | 0 Gm19589       | lincRNA                            |
| ENSMUSG00000035696 | 42 | 47  | 0 Rnf38         | protein_coding                     |
| ENSMUSG00000054808 | 42 | 45  | 0 Actn4         | protein_coding                     |
| ENSMUSG00000021270 | 42 | 37  | 6 Hsp90aa1      | protein_coding                     |
| ENSMUSG00000034663 | 42 | 35  | 0 Bmp2k         | protein_coding                     |
| ENSMUSG00000021039 | 41 | 85  | 0 Snw1          | protein_coding                     |
| ENSMUSG00000097989 | 41 | 53  | 0 Gm4335        | processed_pseudogene               |
| ENSMUSG00000022682 | 41 | 47  | 0 Rrn3          | protein_coding                     |
| ENSMUSG00000039716 | 41 | 41  | 0 Dock3         | protein_coding                     |
| ENSMUSG00000058446 | 41 | 39  | 0 Znrf2         | protein_coding                     |
| ENSMUSG00000089536 | 41 | 37  | 0 Scarna3a      | snoRNA                             |
| ENSMUSG00000054136 | 41 | 32  | 0 Adm2          | protein_coding                     |
| ENSMUSG00000034613 | 41 | 31  | 0 Ppm1h         | protein_coding                     |
| ENSMUSG00000025817 | 41 | 26  | 12 Nudt5        | protein_coding                     |
| ENSMUSG00000031596 | 41 | 24  | 0 Slc7a2        | protein_coding                     |
| ENSMUSG00000031545 | 41 | 22  | 0 Gpat4         | protein_coding                     |
| ENSMUSG00000003865 | 41 | 13  | 107 Gys1        | protein_coding                     |
| ENSMUSG00000091639 | 41 | 95  | 0 Gm3756        | processed_pseudogene               |
| ENSMUSG00000097268 | 41 | 71  | 0 Gm26805       | antisense                          |
| ENSMUSG00000037544 | 41 | 64  | 0 Dlgap5        | protein_coding                     |
| ENSMUSG00000053684 | 41 | 57  | 6 BC048403      | protein_coding                     |
| ENSMUSG00000078967 | 41 | 55  | 0 Gm3272        | processed_pseudogene               |
| ENSMUSG00000070025 | 41 | 53  | 0 Gm10284       | processed_pseudogene               |
| ENSMUSG00000096438 | 41 | 53  | 0 Gapdh-ps15    | processed_pseudogene               |
| ENSMUSG00000070443 | 41 | 51  | 0 Gm10291       | processed_pseudogene               |
| ENSMUSG00000020661 | 41 | 45  | 0 Dnmt3a        | protein_coding                     |
| ENSMUSG00000032244 | 41 | 39  | 0 Fem1b         | protein_coding                     |
| ENSMUSG00000000740 | 41 | 39  | 81 Rpl13        | protein_coding                     |
| ENSMUSG00000097451 | 41 | 38  | 0 Rian          | processed_transcript               |
| ENSMUSG00000049960 | 41 | 37  | 0 Mrps16        | protein_coding                     |
| ENSMUSG00000094856 | 41 | 36  | 0 Gm21962       | protein_coding                     |
| ENSMUSG00000044148 | 41 | 33  | 0 1810030O07Rik | protein_coding                     |
| ENSMUSG00000098685 | 41 | 31  | 0 Gm27224       | lincRNA                            |
| ENSMUSG00000039660 | 41 | 29  | 0 D2Wsu81e      | protein_coding                     |
| ENSMUSG00000028403 | 41 | 27  | 0 Zdhhc21       | protein_coding                     |
| ENSMUSG00000103367 | 40 | 129 | 0 Gm38158       | processed_pseudogene               |
| ENSMUSG00000096917 | 40 | 71  | 0 2500002B13Rik | lincRNA                            |
| ENSMUSG00000041596 | 40 | 64  | 0 Nlrp5-ps      | transcribed_unprocessed_pseudogene |
| ENSMUSG00000097346 | 40 | 62  | 0 Gm26619       | lincRNA                            |
| ENSMUSG00000096280 | 40 | 60  | 1822 Gm23287    | snRNA                              |
| ENSMUSG00000096010 | 40 | 55  | 0 Hist4h4       | protein_coding                     |
| ENSMUSG00000084170 | 40 | 52  | 0 Gm11954       | processed_pseudogene               |
| ENSMUSG00000070490 | 40 | 51  | 0 Gm10293       | processed_pseudogene               |
| ENSMUSG00000022195 | 40 | 50  | 0 6030458C11Rik | protein_coding                     |
| ENSMUSG00000024188 | 40 | 46  | 14 Luc7l        | protein_coding                     |
| ENSMUSG00000027405 | 40 | 43  | 16 Nop56        | protein_coding                     |
| ENSMUSG00000082402 | 40 | 42  | 0 Gm15621       | processed_pseudogene               |
| ENSMUSG00000020738 | 40 | 36  | 0 Sumo2         | protein_coding                     |
| ENSMUSG00000089213 | 40 | 6   | 8 Gm23388       | miRNA                              |

|                    |    |     |                 |                                    |
|--------------------|----|-----|-----------------|------------------------------------|
| ENSMUSG00000022723 | 39 | 105 | 0 Crybg3        | protein_coding                     |
| ENSMUSG00000045312 | 39 | 43  | 0 Lhfpl2        | protein_coding                     |
| ENSMUSG00000020982 | 39 | 33  | 0 Nemf          | protein_coding                     |
| ENSMUSG00000038002 | 39 | 17  | 0 Cramp11       | protein_coding                     |
| ENSMUSG00000074164 | 39 | 16  | 0 Vmn2r-ps54    | transcribed_unprocessed_pseudogene |
| ENSMUSG00000015944 | 39 | 6   | 0 Gatsl2        | protein_coding                     |
| ENSMUSG00000072432 | 38 | 52  | 0 Gm10358       | processed_pseudogene               |
| ENSMUSG00000079501 | 38 | 51  | 0 Gm5138        | processed_pseudogene               |
| ENSMUSG00000096810 | 38 | 51  | 0 Gm10481       | processed_pseudogene               |
| ENSMUSG00000071343 | 38 | 49  | 0 Gm10327       | processed_pseudogene               |
| ENSMUSG00000028385 | 38 | 49  | 0 Snx30         | protein_coding                     |
| ENSMUSG00000026771 | 38 | 45  | 0 Spopl         | protein_coding                     |
| ENSMUSG00000080774 | 38 | 43  | 2 Gm9143        | processed_pseudogene               |
| ENSMUSG00000005493 | 38 | 41  | 20 Msh4         | protein_coding                     |
| ENSMUSG00000004099 | 38 | 40  | 2 Dnmt1         | protein_coding                     |
| ENSMUSG00000102070 | 38 | 39  | 1053 Gm28661    | unprocessed_pseudogene             |
| ENSMUSG00000041037 | 38 | 22  | 424 Irgq        | protein_coding                     |
| ENSMUSG00000081311 | 38 | 93  | 0               | processed_pseudogene               |
| ENSMUSG00000030306 | 38 | 79  | 0 Tmtc1         | protein_coding                     |
| ENSMUSG00000064390 | 38 | 73  | 573 Rnu73b      | snoRNA                             |
| ENSMUSG00000066031 | 38 | 66  | 0 Gm13023       | protein_coding                     |
| ENSMUSG00000103071 | 38 | 58  | 4 Gm38110       | TEC                                |
| ENSMUSG00000086377 | 38 | 54  | 2 4930529C04Rik | processed_pseudogene               |
| ENSMUSG00000098192 | 38 | 47  | 0 Gm3534        | processed_pseudogene               |
| ENSMUSG00000084205 | 38 | 46  | 0 Gm8061        | processed_pseudogene               |
| ENSMUSG00000050812 | 38 | 45  | 0 AI314180      | protein_coding                     |
| ENSMUSG00000052482 | 38 | 43  | 0 Gm8174        | processed_pseudogene               |
| ENSMUSG00000017428 | 38 | 41  | 12 Psmc11       | protein_coding                     |
| ENSMUSG00000075502 | 38 | 40  | 0 Kbtbd6        | protein_coding                     |
| ENSMUSG00000077549 | 38 | 37  | 460 Snord71     | snoRNA                             |
| ENSMUSG00000102694 | 38 | 32  | 0 Gm37496       | TEC                                |
| ENSMUSG00000021097 | 38 | 22  | 0 Clmn          | protein_coding                     |
| ENSMUSG00000061458 | 38 | 21  | 0 Nol10         | protein_coding                     |
| ENSMUSG00000073721 | 38 | 16  | 0 Gm13125       | protein_coding                     |
| ENSMUSG00000024764 | 38 | 15  | 0 Naa40         | protein_coding                     |
| ENSMUSG00000000214 | 37 | 61  | 0 Th            | protein_coding                     |
| ENSMUSG00000079311 | 37 | 51  | 0 Gm3222        | processed_pseudogene               |
| ENSMUSG00000078370 | 37 | 47  | 0 Gm6316        | processed_pseudogene               |
| ENSMUSG00000097388 | 37 | 47  | 0 Gm3200        | processed_pseudogene               |
| ENSMUSG00000073737 | 37 | 47  | 0 Gm10566       | processed_pseudogene               |
| ENSMUSG00000098208 | 37 | 46  | 0 Gm8349        | processed_pseudogene               |
| ENSMUSG00000002109 | 37 | 43  | 0 Ddb2          | protein_coding                     |
| ENSMUSG00000081974 | 37 | 42  | 0 Gm11960       | transcribed_processed_pseudogene   |
| ENSMUSG00000004948 | 37 | 37  | 0 Zp3           | protein_coding                     |
| ENSMUSG00000104060 | 37 | 35  | 0 Gm37954       | TEC                                |
| ENSMUSG00000043889 | 37 | 32  | 24 Gm8399       | pseudogene                         |
| ENSMUSG00000056536 | 37 | 31  | 16 Pign         | protein_coding                     |
| ENSMUSG00000059195 | 37 | 30  | 24 Gm12715      | processed_pseudogene               |
| ENSMUSG00000021175 | 37 | 27  | 0 Cdca71        | protein_coding                     |

|                    |    |     |                   |                        |
|--------------------|----|-----|-------------------|------------------------|
| ENSMUSG00000022982 | 37 | 23  | 8 Sod1            | protein_coding         |
| ENSMUSG00000102994 | 37 | 20  | 0 Gm37767         | TEC                    |
| ENSMUSG00000042185 | 37 | 16  | 87 Nfrkb          | protein_coding         |
| ENSMUSG00000101111 | 37 | 5   | 1646 Gm28437      | unprocessed_pseudogene |
| ENSMUSG00000026000 | 37 | 4   | 0 Lanc1l          | protein_coding         |
| ENSMUSG00000024740 | 37 | 0   | 317 Ddb1          | protein_coding         |
| ENSMUSG00000039206 | 36 | 89  | 0 Daglb           | protein_coding         |
| ENSMUSG00000046262 | 36 | 64  | 0 C87977          | protein_coding         |
| ENSMUSG00000081453 | 36 | 53  | 65 Gm6767         | processed_pseudogene   |
| ENSMUSG00000089806 | 36 | 50  | 0 Gm16570         | processed_pseudogene   |
| ENSMUSG00000098123 | 36 | 47  | 0 Gm4518          | processed_pseudogene   |
| ENSMUSG00000073294 | 36 | 45  | 0 AU022751        | protein_coding         |
| ENSMUSG00000064778 | 36 | 40  | 87 Snord59a       | snoRNA                 |
| ENSMUSG00000064409 | 36 | 13  | 105 n-R5s40       | rRNA                   |
| ENSMUSG00000065752 | 36 | 106 | 111 Gm23344       | snoRNA                 |
| ENSMUSG00000086648 | 36 | 83  | 0 Gm15511         | antisense              |
| ENSMUSG00000028542 | 36 | 81  | 0 Slc6a9          | protein_coding         |
| ENSMUSG00000051638 | 36 | 70  | 0 Gm9857          | protein_coding         |
| ENSMUSG00000083100 | 36 | 49  | 0 Gm6044          | processed_pseudogene   |
| ENSMUSG00000083245 | 36 | 47  | 0 Gm11185         | processed_pseudogene   |
| ENSMUSG00000082325 | 36 | 43  | 0 Gm12642         | processed_pseudogene   |
| ENSMUSG00000002489 | 36 | 40  | 0 Tiam1           | protein_coding         |
| ENSMUSG00000032872 | 36 | 37  | 0 Cyb5r4          | protein_coding         |
| ENSMUSG00000029672 | 36 | 20  | 0 Fam3c           | protein_coding         |
| ENSMUSG00000031913 | 36 | 18  | 0 Vps4a           | protein_coding         |
| ENSMUSG00000097876 | 36 | 14  | 0 Gm16892         | lincRNA                |
| ENSMUSG00000024501 | 36 | 9   | 139 Dpysl3        | protein_coding         |
| ENSMUSG00000074398 | 35 | 60  | 0 Gm15441         | processed_transcript   |
| ENSMUSG00000048277 | 35 | 53  | 0 Syngn2          | protein_coding         |
| ENSMUSG00000028322 | 35 | 49  | 0 Exosc3          | protein_coding         |
| ENSMUSG00000081721 | 35 | 45  | 0 Gm13882         | processed_pseudogene   |
| ENSMUSG00000082927 | 35 | 45  | 0 Gm5863          | processed_pseudogene   |
| ENSMUSG00000097711 | 35 | 44  | 0 Gm5523          | processed_pseudogene   |
| ENSMUSG00000052241 | 35 | 42  | 0 A930035D04Rik   | pseudogene             |
| ENSMUSG00000058230 | 35 | 32  | 0 Arhgap35        | protein_coding         |
| ENSMUSG00000044730 | 35 | 28  | 0 9930104L06Rik   | processed_transcript   |
| ENSMUSG00000083788 | 35 | 26  | 0                 | processed_pseudogene   |
| ENSMUSG00000087077 | 35 | 21  | 0 Gm12480         | lincRNA                |
| ENSMUSG00000022838 | 34 | 58  | 0 Eaf2            | protein_coding         |
| ENSMUSG00000096054 | 34 | 47  | 0 Syne1           | protein_coding         |
| ENSMUSG00000075511 | 34 | 47  | 129 1700001L05Rik | lincRNA                |
| ENSMUSG00000051339 | 34 | 44  | 0 2900026A02Rik   | protein_coding         |
| ENSMUSG00000101652 | 34 | 43  | 0 Gm6060          | processed_pseudogene   |
| ENSMUSG00000031600 | 34 | 42  | 0 Vps37a          | protein_coding         |
| ENSMUSG00000098048 | 34 | 42  | 0 Gm8330          | processed_pseudogene   |
| ENSMUSG00000060508 | 34 | 38  | 0 Nlrp9b          | protein_coding         |
| ENSMUSG00000100826 | 34 | 37  | 8 Snhg14          | processed_transcript   |
| ENSMUSG00000029578 | 34 | 36  | 12 Wipi2          | protein_coding         |
| ENSMUSG00000094030 | 34 | 36  | 0 Gm21833         | protein_coding         |

|                    |    |    |                  |                      |
|--------------------|----|----|------------------|----------------------|
| ENSMUSG00000003382 | 34 | 32 | 0 Etv3           | protein_coding       |
| ENSMUSG00000029554 | 34 | 31 | 0 Mad11l         | protein_coding       |
| ENSMUSG00000035129 | 34 | 25 | 0 Gm6781         | processed_pseudogene |
| ENSMUSG00000027663 | 34 | 24 | 40 Zmat3         | protein_coding       |
| ENSMUSG00000059659 | 34 | 24 | 2 Gm10069        | lincRNA              |
| ENSMUSG00000014550 | 34 | 24 | 0 Rbsn           | protein_coding       |
| ENSMUSG00000032285 | 34 | 18 | 12 Dnaja4        | protein_coding       |
| ENSMUSG00000019066 | 34 | 10 | 0 Rab3d          | protein_coding       |
| ENSMUSG00000036819 | 34 | 9  | 12 Jmjd4         | protein_coding       |
| ENSMUSG00000065691 | 34 | 0  | 6 n-R5s77        | rRNA                 |
| ENSMUSG00000094081 | 33 | 46 | 0 Gm20826        | protein_coding       |
| ENSMUSG00000081600 | 33 | 45 | 0 Gm12286        | processed_pseudogene |
| ENSMUSG00000022805 | 33 | 45 | 0 Maatsl         | protein_coding       |
| ENSMUSG00000053740 | 33 | 42 | 0 Gm6457         | processed_pseudogene |
| ENSMUSG00000098141 | 33 | 41 | 0 Gm6944         | processed_pseudogene |
| ENSMUSG00000021012 | 33 | 37 | 0 Zc3h14         | protein_coding       |
| ENSMUSG00000078794 | 33 | 36 | 73 Dact3         | protein_coding       |
| ENSMUSG00000027652 | 33 | 36 | 0 Ralgapb        | protein_coding       |
| ENSMUSG00000043940 | 33 | 32 | 133 Wdfy3        | protein_coding       |
| ENSMUSG00000030983 | 33 | 28 | 0 Bccip          | protein_coding       |
| ENSMUSG00000096887 | 33 | 26 | 147 Gm20594      | protein_coding       |
| ENSMUSG00000018209 | 33 | 24 | 0 Stk4           | protein_coding       |
| ENSMUSG00000038312 | 33 | 20 | 0 Edem2          | protein_coding       |
| ENSMUSG00000040209 | 33 | 18 | 0 Zfp704         | protein_coding       |
| ENSMUSG00000024661 | 33 | 7  | 52 Fth1          | protein_coding       |
| ENSMUSG00000089652 | 33 | 55 | 0 Gm16025        | lincRNA              |
| ENSMUSG00000057666 | 33 | 53 | 0 Gapdh          | protein_coding       |
| ENSMUSG00000097935 | 33 | 45 | 0 Gm3809         | processed_pseudogene |
| ENSMUSG00000098154 | 33 | 43 | 0 Gm5787         | processed_pseudogene |
| ENSMUSG00000032215 | 33 | 41 | 0 Rsl24d1        | protein_coding       |
| ENSMUSG00000039976 | 33 | 39 | 48 Tbc1d16       | protein_coding       |
| ENSMUSG00000020091 | 33 | 37 | 0 Eif4ebp2       | protein_coding       |
| ENSMUSG00000081064 | 33 | 37 | 0 Gm6071         | processed_pseudogene |
| ENSMUSG00000047878 | 33 | 28 | 0 A4galt         | protein_coding       |
| ENSMUSG00000039230 | 33 | 24 | 0 Tbcd           | protein_coding       |
| ENSMUSG00000029670 | 33 | 21 | 0 Ing3           | protein_coding       |
| ENSMUSG00000065893 | 33 | 12 | 36 n-R5s151      | rRNA                 |
| ENSMUSG00000002996 | 32 | 69 | 12 Hbp1          | protein_coding       |
| ENSMUSG00000037514 | 32 | 54 | 0 Pank2          | protein_coding       |
| ENSMUSG00000042046 | 32 | 49 | 0 Dstyk          | protein_coding       |
| ENSMUSG00000058793 | 32 | 44 | 0 Cds2           | protein_coding       |
| ENSMUSG00000083028 | 32 | 44 | 0                | processed_pseudogene |
| ENSMUSG00000047446 | 32 | 41 | 0 Arl4a          | protein_coding       |
| ENSMUSG00000082387 | 32 | 41 | 0                | processed_pseudogene |
| ENSMUSG00000097177 | 32 | 39 | 24 9330159M07Rik | processed_transcript |
| ENSMUSG00000028868 | 32 | 38 | 0 Wasf2          | protein_coding       |
| ENSMUSG00000099051 | 32 | 33 | 0 Gm27241        | antisense            |
| ENSMUSG00000026623 | 32 | 31 | 0 Lpgat1         | protein_coding       |
| ENSMUSG00000002688 | 32 | 22 | 0 Prkd1          | protein_coding       |

|                    |    |     |                  |                        |
|--------------------|----|-----|------------------|------------------------|
| ENSMUSG00000043673 | 32 | 20  | 161 Kcns3        | protein_coding         |
| ENSMUSG00000086825 | 32 | 20  | 0 Gm15675        | lincRNA                |
| ENSMUSG00000080989 | 32 | 18  | 0 Gm14048        | processed_pseudogene   |
| ENSMUSG00000030870 | 32 | 16  | 0 Ubfd1          | protein_coding         |
| ENSMUSG00000016503 | 31 | 66  | 0 Gtf3a          | protein_coding         |
| ENSMUSG00000050799 | 31 | 62  | 12 Hist1h2ba     | protein_coding         |
| ENSMUSG00000021055 | 31 | 53  | 0 Esr2           | protein_coding         |
| ENSMUSG00000001289 | 31 | 47  | 12 Pfdn5         | protein_coding         |
| ENSMUSG00000042570 | 31 | 46  | 0 Mier2          | protein_coding         |
| ENSMUSG00000100104 | 31 | 43  | 12 Gm5644        | processed_pseudogene   |
| ENSMUSG00000083578 | 31 | 42  | 0                | processed_pseudogene   |
| ENSMUSG00000032434 | 31 | 41  | 0 Cmtm6          | protein_coding         |
| ENSMUSG00000041347 | 31 | 41  | 0 Bdkrb1         | protein_coding         |
| ENSMUSG00000074476 | 31 | 39  | 0 Spc24          | protein_coding         |
| ENSMUSG00000085811 | 31 | 36  | 8 Cep112it       | sense_intronic         |
| ENSMUSG00000036061 | 31 | 33  | 0 Smug1          | protein_coding         |
| ENSMUSG00000102048 | 31 | 33  | 0 Gm6075         | processed_pseudogene   |
| ENSMUSG00000032185 | 31 | 29  | 0 Carm1          | protein_coding         |
| ENSMUSG00000046865 | 31 | 29  | 0 Fbl            | protein_coding         |
| ENSMUSG00000039630 | 31 | 28  | 0 Hnrnpu         | protein_coding         |
| ENSMUSG00000096188 | 31 | 28  | 0 Cmtm4          | protein_coding         |
| ENSMUSG00000096473 | 31 | 27  | 109 Gm24463      | snoRNA                 |
| ENSMUSG00000028420 | 31 | 25  | 59 Tmem38b       | protein_coding         |
| ENSMUSG00000005936 | 31 | 22  | 0 Kctd20         | protein_coding         |
| ENSMUSG00000025147 | 31 | 22  | 0 Mob2           | protein_coding         |
| ENSMUSG00000100862 | 30 | 55  | 1539 Gm10925     | unprocessed_pseudogene |
| ENSMUSG00000038047 | 30 | 49  | 0 Haus6          | protein_coding         |
| ENSMUSG00000058761 | 30 | 43  | 0 Rnf169         | protein_coding         |
| ENSMUSG00000081126 | 30 | 42  | 16 Gm15784       | processed_pseudogene   |
| ENSMUSG00000021273 | 30 | 31  | 0 Fdft1          | protein_coding         |
| ENSMUSG00000075405 | 30 | 22  | 56 9430097D07Rik | protein_coding         |
| ENSMUSG00000005907 | 30 | 19  | 0 Pex1           | protein_coding         |
| ENSMUSG00000025577 | 30 | 16  | 12 Cbx2          | protein_coding         |
| ENSMUSG00000095944 | 30 | 7   | 24 n-R5s210      | rRNA                   |
| ENSMUSG00000020629 | 30 | 117 | 0 Adi1           | protein_coding         |
| ENSMUSG00000026812 | 30 | 53  | 0 Tsc1           | protein_coding         |
| ENSMUSG00000080486 | 30 | 50  | 371 Snord100     | snoRNA                 |
| ENSMUSG00000095168 | 30 | 37  | 0 Gm4795         | processed_pseudogene   |
| ENSMUSG00000003429 | 30 | 35  | 2 Rps11          | protein_coding         |
| ENSMUSG00000084260 | 30 | 32  | 0 Gm12844        | processed_pseudogene   |
| ENSMUSG00000037910 | 30 | 30  | 0 1700018B24Rik  | lincRNA                |
| ENSMUSG00000037958 | 30 | 27  | 0 Nsrp1          | protein_coding         |
| ENSMUSG00000029775 | 30 | 18  | 14 Klhdc10       | protein_coding         |
| ENSMUSG00000022671 | 30 | 17  | 0 Mzt2           | protein_coding         |
| ENSMUSG00000022772 | 30 | 16  | 0 Senp5          | protein_coding         |
| ENSMUSG00000038121 | 30 | 16  | 0 Fam210a        | protein_coding         |
| ENSMUSG00000041298 | 29 | 87  | 4 Katnal1        | protein_coding         |
| ENSMUSG00000005481 | 29 | 35  | 0 Ddx39          | protein_coding         |
| ENSMUSG00000035629 | 29 | 34  | 0 Rubcn          | protein_coding         |

|                    |    |    |                 |                        |
|--------------------|----|----|-----------------|------------------------|
| ENSMUSG00000083853 | 29 | 34 | 0 Gm15696       | processed_pseudogene   |
| ENSMUSG00000025815 | 29 | 29 | 0 Dhtkd1        | protein_coding         |
| ENSMUSG00000033940 | 29 | 24 | 0 Brk1          | protein_coding         |
| ENSMUSG00000034324 | 29 | 15 | 0 Tmem132c      | protein_coding         |
| ENSMUSG00000024193 | 29 | 14 | 0 Phf1          | protein_coding         |
| ENSMUSG00000086841 | 29 | 12 | 0 2410006H16Rik | processed_transcript   |
| ENSMUSG00000030036 | 29 | 5  | 174 Mogs        | protein_coding         |
| ENSMUSG00000103241 | 28 | 71 | 0 Gm38089       | TEC                    |
| ENSMUSG00000048578 | 28 | 66 | 6 Mlec          | protein_coding         |
| ENSMUSG00000032507 | 28 | 64 | 0 Fbx12         | protein_coding         |
| ENSMUSG00000038116 | 28 | 53 | 0 Phf20         | protein_coding         |
| ENSMUSG00000028890 | 28 | 45 | 0 Mtf1          | protein_coding         |
| ENSMUSG00000096171 | 28 | 43 | 0 Gm8055        | processed_pseudogene   |
| ENSMUSG00000041915 | 28 | 41 | 0 Ammecn1       | protein_coding         |
| ENSMUSG00000083589 | 28 | 37 | 0               | processed_pseudogene   |
| ENSMUSG00000101279 | 28 | 37 | 0 Gm18342       | unprocessed_pseudogene |
| ENSMUSG00000046324 | 28 | 36 | 0 Ermp1         | protein_coding         |
| ENSMUSG00000002957 | 28 | 34 | 2 Ap2a2         | protein_coding         |
| ENSMUSG00000024560 | 28 | 34 | 2 Cxxc1         | protein_coding         |
| ENSMUSG00000038406 | 28 | 33 | 0 Scaf1         | protein_coding         |
| ENSMUSG00000084299 | 28 | 30 | 0 Gm6630        | processed_pseudogene   |
| ENSMUSG00000083797 | 28 | 30 | 0               | processed_pseudogene   |
| ENSMUSG00000083660 | 28 | 28 | 0 Gm11853       | processed_pseudogene   |
| ENSMUSG00000020267 | 28 | 18 | 30 Hint1        | protein_coding         |
| ENSMUSG00000020697 | 28 | 18 | 0 Lig3          | protein_coding         |
| ENSMUSG00000021962 | 28 | 13 | 0 Dcp1a         | protein_coding         |
| ENSMUSG00000021486 | 28 | 9  | 0 Prelid1       | protein_coding         |
| ENSMUSG00000081643 | 28 | 9  | 0 Gm11605       | processed_pseudogene   |
| ENSMUSG00000031059 | 28 | 8  | 0 Ndufb11       | protein_coding         |
| ENSMUSG00000048108 | 28 | 4  | 0 Tmem72        | protein_coding         |
| ENSMUSG00000082384 | 27 | 74 | 0               | processed_pseudogene   |
| ENSMUSG00000069300 | 27 | 52 | 0 Hist1h2bj     | protein_coding         |
| ENSMUSG00000068566 | 27 | 50 | 0 Myadm         | protein_coding         |
| ENSMUSG00000093815 | 27 | 46 | 155 Gm26444     | snRNA                  |
| ENSMUSG00000094826 | 27 | 46 | 155 Gm23804     | snRNA                  |
| ENSMUSG00000095969 | 27 | 46 | 155 Rnu1a1      | snRNA                  |
| ENSMUSG00000096205 | 27 | 46 | 155 Gm22068     | snRNA                  |
| ENSMUSG00000096206 | 27 | 46 | 155 Gm22317     | snRNA                  |
| ENSMUSG00000096214 | 27 | 46 | 155 Gm22634     | snRNA                  |
| ENSMUSG00000096659 | 27 | 46 | 155 Gm25679     | snRNA                  |
| ENSMUSG00000026849 | 27 | 41 | 0 Tor1a         | protein_coding         |
| ENSMUSG00000080940 | 27 | 39 | 0               | processed_pseudogene   |
| ENSMUSG00000091449 | 27 | 37 | 24 Gm10269      | protein_coding         |
| ENSMUSG00000019883 | 27 | 37 | 0 Echdc1        | protein_coding         |
| ENSMUSG00000084156 | 27 | 36 | 0               | processed_pseudogene   |
| ENSMUSG00000036104 | 27 | 33 | 0 Rab3gap1      | protein_coding         |
| ENSMUSG00000090516 | 27 | 32 | 85 Rps11-ps1    | processed_pseudogene   |
| ENSMUSG00000036208 | 27 | 27 | 4 Nepro         | protein_coding         |
| ENSMUSG00000078886 | 27 | 26 | 2 Gm2026        | protein_coding         |

|                    |    |    |                 |                                  |
|--------------------|----|----|-----------------|----------------------------------|
| ENSMUSG00000084678 | 27 | 24 | 36 Gm26020      | snRNA                            |
| ENSMUSG00000006800 | 27 | 23 | 8 Sulf2         | protein_coding                   |
| ENSMUSG00000039231 | 27 | 19 | 0 Suv39h1       | protein_coding                   |
| ENSMUSG00000002103 | 27 | 18 | 0 Acp2          | protein_coding                   |
| ENSMUSG00000044026 | 27 | 18 | 0 Slc35g1       | protein_coding                   |
| ENSMUSG00000088835 | 27 | 15 | 34 Gm23547      | snoRNA                           |
| ENSMUSG00000065083 | 27 | 10 | 67 n-R5s205     | rRNA                             |
| ENSMUSG00000039860 | 27 | 7  | 32 Srrm3        | protein_coding                   |
| ENSMUSG00000069089 | 27 | 1  | 0 Cdk7          | protein_coding                   |
| ENSMUSG00000000916 | 27 | 57 | 0 Nsun5         | protein_coding                   |
| ENSMUSG00000029610 | 27 | 53 | 0 Aimp2         | protein_coding                   |
| ENSMUSG00000096349 | 27 | 46 | 153 Gm22513     | snRNA                            |
| ENSMUSG00000095590 | 27 | 45 | 153 Gm24305     | snRNA                            |
| ENSMUSG00000067336 | 27 | 39 | 2 Bmpr2         | protein_coding                   |
| ENSMUSG00000083044 | 27 | 38 | 0 Gm12416       | processed_pseudogene             |
| ENSMUSG00000048154 | 27 | 37 | 40 Kmt2d        | protein_coding                   |
| ENSMUSG00000096463 | 27 | 34 | 0 Gm21750       | protein_coding                   |
| ENSMUSG00000020961 | 27 | 32 | 0 Ston2         | protein_coding                   |
| ENSMUSG00000071655 | 27 | 30 | 34 Ubxn1        | protein_coding                   |
| ENSMUSG00000025885 | 27 | 28 | 0 Myo5b         | protein_coding                   |
| ENSMUSG00000000318 | 27 | 26 | 0 Clec10a       | protein_coding                   |
| ENSMUSG00000035713 | 27 | 24 | 0 Usp35         | protein_coding                   |
| ENSMUSG00000053838 | 27 | 24 | 0 Nudcd3        | protein_coding                   |
| ENSMUSG00000060733 | 27 | 24 | 200 Ipmk        | protein_coding                   |
| ENSMUSG00000038168 | 27 | 24 | 0 P3h2          | protein_coding                   |
| ENSMUSG00000020889 | 27 | 21 | 0 Nr1d1         | protein_coding                   |
| ENSMUSG00000083899 | 27 | 21 | 0 Gm12346       | transcribed_processed_pseudogene |
| ENSMUSG00000038876 | 27 | 20 | 0 Rnf146        | protein_coding                   |
| ENSMUSG00000056851 | 27 | 16 | 0 Pcbp2         | protein_coding                   |
| ENSMUSG00000096232 | 27 | 16 | 4               | pseudogene                       |
| ENSMUSG00000043773 | 27 | 15 | 0 1700048O20Rik | protein_coding                   |
| ENSMUSG00000009569 | 27 | 14 | 0 Mkl2          | protein_coding                   |
| ENSMUSG00000094812 | 26 | 45 | 127 Gm22614     | snRNA                            |
| ENSMUSG00000095260 | 26 | 45 | 127 Gm25890     | snRNA                            |
| ENSMUSG00000020257 | 26 | 41 | 14 Wdr82        | protein_coding                   |
| ENSMUSG00000033634 | 26 | 39 | 0 Nat8f2        | protein_coding                   |
| ENSMUSG00000089993 | 26 | 37 | 6 Gm5822        | processed_pseudogene             |
| ENSMUSG00000042178 | 26 | 37 | 0 Armc5         | protein_coding                   |
| ENSMUSG00000089643 | 26 | 36 | 0 Gm16301       | processed_pseudogene             |
| ENSMUSG00000067702 | 26 | 31 | 14 Tuba3a       | protein_coding                   |
| ENSMUSG00000039202 | 26 | 25 | 28 Abhd2        | protein_coding                   |
| ENSMUSG00000025402 | 26 | 24 | 0 Nab2          | protein_coding                   |
| ENSMUSG00000091577 | 26 | 23 | 0 Gm6211        | transcribed_processed_pseudogene |
| ENSMUSG00000054199 | 26 | 22 | 0 Gon4l         | protein_coding                   |
| ENSMUSG00000044795 | 26 | 20 | 18 Cyb5d1       | protein_coding                   |
| ENSMUSG00000041440 | 26 | 17 | 6 Gk5           | protein_coding                   |
| ENSMUSG00000070738 | 26 | 17 | 0 Dgkd          | protein_coding                   |
| ENSMUSG00000024122 | 26 | 14 | 0 Pdpk1         | protein_coding                   |
| ENSMUSG00000008393 | 26 | 13 | 0 Carhsp1       | protein_coding                   |



|                     |    |    |                 |                        |
|---------------------|----|----|-----------------|------------------------|
| ENSMUSG00000010307  | 26 | 0  | 0 Tmem86a       | protein_coding         |
| ENSMUSG00000037664  | 25 | 47 | 8 Cdkn1c        | protein_coding         |
| ENSMUSG00000093834  | 25 | 44 | 131 Rnu1b2      | snRNA                  |
| ENSMUSG00000095580  | 25 | 44 | 131 Rnu1b1      | snRNA                  |
| ENSMUSG00000064923  | 25 | 44 | 125 Gm22042     | snRNA                  |
| ENSMUSG00000020132  | 25 | 30 | 0 Rab21         | protein_coding         |
| ENSMUSG00000085856  | 25 | 28 | 0 Gm12050       | lincRNA                |
| ENSMUSG00000035769  | 25 | 28 | 6 Xylb          | protein_coding         |
| ENSMUSG00000033478  | 25 | 28 | 4 Fam160b1      | protein_coding         |
| ENSMUSG00000062014  | 25 | 25 | 0 Gmfb          | protein_coding         |
| ENSMUSG00000049252  | 25 | 24 | 0 Lrp1b         | protein_coding         |
| ENSMUSG00000051043  | 25 | 24 | 0 Gprc5c        | protein_coding         |
| ENSMUSG00000052415  | 25 | 22 | 56 Tchh         | protein_coding         |
| ENSMUSG00000032788  | 25 | 20 | 0 Pdxk          | protein_coding         |
| ENSMUSG00000098092  | 25 | 20 | 0 Gm2076        | processed_pseudogene   |
| ENSMUSG00000016256  | 25 | 18 | 8 Ctsz          | protein_coding         |
| ENSMUSG00000082045  | 25 | 18 | 0 Gm11585       | processed_pseudogene   |
| ENSMUSG00000083551  | 25 | 17 | 4 Gm14516       | processed_pseudogene   |
| ENSMUSG00000063362  | 25 | 16 | 0 Alg11         | protein_coding         |
| ENSMUSG00000001642  | 25 | 15 | 4 Akr1b3        | protein_coding         |
| ENSMUSG00000059713  | 25 | 5  | 0 Rcan3         | protein_coding         |
| ENSMUSG00000084040  | 24 | 37 | 0               | processed_pseudogene   |
| ENSMUSG00000001473  | 24 | 35 | 0 Tubb6         | protein_coding         |
| ENSMUSG000000100990 | 24 | 31 | 0 Gm7891        | processed_pseudogene   |
| ENSMUSG00000021840  | 24 | 30 | 0 Mapk1ip11     | protein_coding         |
| ENSMUSG00000077563  | 24 | 30 | 30 Snora68      | snoRNA                 |
| ENSMUSG00000028411  | 24 | 26 | 0 Aptx          | protein_coding         |
| ENSMUSG00000083228  | 24 | 26 | 0 Gm11779       | processed_pseudogene   |
| ENSMUSG00000090330  | 24 | 26 | 0 9130221H12Rik | antisense              |
| ENSMUSG00000024181  | 24 | 24 | 0 Mrpl28        | protein_coding         |
| ENSMUSG000000100600 | 24 | 22 | 0 A230077H06Rik | antisense              |
| ENSMUSG00000024052  | 24 | 21 | 0 Lpin2         | protein_coding         |
| ENSMUSG00000070923  | 24 | 20 | 14 Klhl9        | protein_coding         |
| ENSMUSG00000028847  | 24 | 18 | 18 Trappc3      | protein_coding         |
| ENSMUSG00000026234  | 24 | 9  | 0 Ncl           | protein_coding         |
| ENSMUSG00000077221  | 24 | 4  | 0 Snord67       | snoRNA                 |
| ENSMUSG00000041977  | 24 | 49 | 0 Arhgef11      | protein_coding         |
| ENSMUSG00000081471  | 24 | 49 | 0 Gm14735       | processed_pseudogene   |
| ENSMUSG00000015937  | 24 | 44 | 0 H2afy         | protein_coding         |
| ENSMUSG00000098142  | 24 | 35 | 0 Gm7507        | processed_pseudogene   |
| ENSMUSG00000026626  | 24 | 33 | 2 Ppp2r5a       | protein_coding         |
| ENSMUSG00000081818  | 24 | 30 | 0               | processed_pseudogene   |
| ENSMUSG00000078308  | 24 | 29 | 0 Gm7293        | protein_coding         |
| ENSMUSG00000065676  | 24 | 24 | 103 Snord42b    | snoRNA                 |
| ENSMUSG00000026271  | 24 | 24 | 6 Gpr35         | protein_coding         |
| ENSMUSG00000051639  | 24 | 24 | 0 Gm5812        | processed_pseudogene   |
| ENSMUSG00000083863  | 24 | 22 | 506 Gm13341     | unprocessed_pseudogene |
| ENSMUSG00000046079  | 24 | 22 | 0 Lrrc8d        | protein_coding         |
| ENSMUSG00000089948  | 24 | 22 | 6 Far2os1       | antisense              |

|                     |    |     |                 |                      |
|---------------------|----|-----|-----------------|----------------------|
| ENSMUSG00000039428  | 24 | 21  | 0 Tmem135       | protein_coding       |
| ENSMUSG00000021814  | 24 | 19  | 0 Anxa7         | protein_coding       |
| ENSMUSG00000026565  | 24 | 12  | 67 Pou2f1       | protein_coding       |
| ENSMUSG00000020380  | 24 | 12  | 0 Rad50         | protein_coding       |
| ENSMUSG00000039748  | 24 | 10  | 0 Exo1          | protein_coding       |
| ENSMUSG00000065445  | 24 | 9   | 0 Mir143        | miRNA                |
| ENSMUSG00000065911  | 24 | 8   | 644 Gm24447     | misc_RNA             |
| ENSMUSG00000065824  | 24 | 7   | 615 Gm26315     | misc_RNA             |
| ENSMUSG00000064999  | 24 | 7   | 613 Gm26035     | misc_RNA             |
| ENSMUSG00000096047  | 24 | 0   | 4 n-R5s211      | rRNA                 |
| ENSMUSG00000022383  | 24 | 0   | 0 Ppara         | protein_coding       |
| ENSMUSG00000032402  | 23 | 101 | 22 Smad3        | protein_coding       |
| ENSMUSG00000022788  | 23 | 35  | 0 Fgd4          | protein_coding       |
| ENSMUSG00000098113  | 23 | 34  | 0 Gm2445        | processed_pseudogene |
| ENSMUSG00000082640  | 23 | 32  | 0               | processed_pseudogene |
| ENSMUSG00000073226  | 23 | 31  | 0 Gm10482       | lincRNA              |
| ENSMUSG00000094649  | 23 | 30  | 0 Gm7102        | protein_coding       |
| ENSMUSG00000048232  | 23 | 29  | 46 Fbxo10       | protein_coding       |
| ENSMUSG00000065749  | 23 | 28  | 0 AF357428      | snoRNA               |
| ENSMUSG000000104211 | 23 | 28  | 0 Gm37985       | TEC                  |
| ENSMUSG00000031559  | 23 | 27  | 0 4930555F03Rik | protein_coding       |
| ENSMUSG000000104080 | 23 | 26  | 0 Gm38279       | TEC                  |
| ENSMUSG00000098222  | 23 | 25  | 0 Gm8318        | processed_pseudogene |
| ENSMUSG00000045482  | 23 | 24  | 38 Ttrap        | protein_coding       |
| ENSMUSG00000028886  | 23 | 23  | 0 Eya3          | protein_coding       |
| ENSMUSG00000062380  | 23 | 22  | 0 Tubb3         | protein_coding       |
| ENSMUSG00000045709  | 23 | 22  | 0 Smkr-ps       | lincRNA              |
| ENSMUSG00000059033  | 23 | 20  | 2 Rpl18a-ps1    | processed_pseudogene |
| ENSMUSG00000025145  | 23 | 20  | 0 Lrrc45        | protein_coding       |
| ENSMUSG00000083594  | 23 | 20  | 0 Gm13722       | processed_pseudogene |
| ENSMUSG00000085741  | 23 | 12  | 6 5430405H02Rik | processed_transcript |
| ENSMUSG00000031652  | 23 | 12  | 0 N4bp1         | protein_coding       |
| ENSMUSG00000021371  | 23 | 12  | 0 Mcur1         | protein_coding       |
| ENSMUSG00000092636  | 23 | 8   | 22 Gm26381      | rRNA                 |
| ENSMUSG00000096219  | 23 | 7   | 28 n-R5s93      | rRNA                 |
| ENSMUSG00000052712  | 23 | 6   | 0 BC004004      | protein_coding       |
| ENSMUSG00000047415  | 22 | 76  | 0 Gpr68         | protein_coding       |
| ENSMUSG00000046997  | 22 | 43  | 117 Spsb4       | protein_coding       |
| ENSMUSG00000083927  | 22 | 39  | 0 Gm14749       | processed_pseudogene |
| ENSMUSG00000027465  | 22 | 37  | 0 Tbc1d20       | protein_coding       |
| ENSMUSG00000042364  | 22 | 37  | 0 Snx18         | protein_coding       |
| ENSMUSG00000094395  | 22 | 35  | 0               | processed_pseudogene |
| ENSMUSG00000087385  | 22 | 33  | 6 AA415398      | protein_coding       |
| ENSMUSG00000097743  | 22 | 32  | 0 Gm16973       | lincRNA              |
| ENSMUSG00000025266  | 22 | 32  | 0 Gnl3l         | protein_coding       |
| ENSMUSG00000052298  | 22 | 30  | 0 Cdc42se2      | protein_coding       |
| ENSMUSG00000024319  | 22 | 28  | 2 Vps52         | protein_coding       |
| ENSMUSG00000029765  | 22 | 28  | 2 Plxna4        | protein_coding       |
| ENSMUSG00000098573  | 22 | 28  | 0 Gm27232       | antisense            |

|                    |    |    |                 |                      |
|--------------------|----|----|-----------------|----------------------|
| ENSMUSG00000097868 | 22 | 26 | 6 A330069E16Rik | lincRNA              |
| ENSMUSG00000081087 | 22 | 25 | 6 Rps15a-ps7    | processed_pseudogene |
| ENSMUSG00000086667 | 22 | 25 | 0 Gm13434       | lincRNA              |
| ENSMUSG00000052854 | 22 | 22 | 0 NrK           | protein_coding       |
| ENSMUSG00000078599 | 22 | 22 | 0 Skint8        | protein_coding       |
| ENSMUSG00000001870 | 22 | 19 | 81 Ltbp1        | protein_coding       |
| ENSMUSG00000087535 | 22 | 18 | 188 Zmiz1os1    | processed_transcript |
| ENSMUSG00000036155 | 22 | 17 | 59 Mgat5        | protein_coding       |
| ENSMUSG00000030213 | 22 | 11 | 129 Atf7ip      | protein_coding       |
| ENSMUSG00000033658 | 22 | 10 | 73 Ddx19b       | protein_coding       |
| ENSMUSG00000037622 | 22 | 10 | 0 Wdtd1         | protein_coding       |
| ENSMUSG00000053040 | 22 | 10 | 0 Aph1c         | protein_coding       |
| ENSMUSG00000001525 | 22 | 9  | 0 Tubb5         | protein_coding       |
| ENSMUSG00000075874 | 22 | 8  | 22 n-R5s1       | rRNA                 |
| ENSMUSG00000092730 | 22 | 6  | 30 Snora24      | snoRNA               |
| ENSMUSG00000046722 | 22 | 6  | 0 Cdc42se1      | protein_coding       |
| ENSMUSG00000027630 | 21 | 38 | 36 Tbl1xr1      | protein_coding       |
| ENSMUSG00000060336 | 21 | 38 | 2 Zfp937        | protein_coding       |
| ENSMUSG00000072568 | 21 | 37 | 0 Fam84b        | protein_coding       |
| ENSMUSG00000060288 | 21 | 35 | 0 Ppih          | protein_coding       |
| ENSMUSG00000074247 | 21 | 35 | 0 Dda1          | protein_coding       |
| ENSMUSG00000037519 | 21 | 30 | 3662 Ppfia1     | protein_coding       |
| ENSMUSG00000102892 | 21 | 29 | 0 Gm37854       | antisense            |
| ENSMUSG00000035173 | 21 | 28 | 0 Ccdc186       | protein_coding       |
| ENSMUSG00000051225 | 21 | 27 | 4 Fam83a        | protein_coding       |
| ENSMUSG00000080994 | 21 | 26 | 0 Gm13464       | processed_pseudogene |
| ENSMUSG00000098111 | 21 | 26 | 0 Gm4654        | processed_pseudogene |
| ENSMUSG00000030689 | 21 | 25 | 0 Ino80e        | protein_coding       |
| ENSMUSG00000081494 | 21 | 24 | 0 Gm14130       | processed_pseudogene |
| ENSMUSG00000024030 | 21 | 24 | 8 Abcg1         | protein_coding       |
| ENSMUSG00000071660 | 21 | 23 | 2 Ttc9c         | protein_coding       |
| ENSMUSG00000081285 | 21 | 23 | 0 Gm18859       | processed_pseudogene |
| ENSMUSG00000086992 | 21 | 23 | 0 Gm15941       | processed_transcript |
| ENSMUSG00000014551 | 21 | 20 | 0 Mrps25        | protein_coding       |
| ENSMUSG00000074221 | 21 | 20 | 0 Zfp568        | protein_coding       |
| ENSMUSG00000045794 | 21 | 18 | 171 Lkaaeal     | protein_coding       |
| ENSMUSG00000033126 | 21 | 14 | 0 Ybey          | protein_coding       |
| ENSMUSG00000031984 | 21 | 13 | 0 2810004N23Rik | protein_coding       |
| ENSMUSG00000100397 | 21 | 12 | 0 Gm28071       | processed_pseudogene |
| ENSMUSG00000089958 | 21 | 11 | 0 Gm16165       | processed_pseudogene |
| ENSMUSG00000022389 | 21 | 9  | 0 Tef           | protein_coding       |
| ENSMUSG00000040270 | 21 | 9  | 0 Bach2         | protein_coding       |
| ENSMUSG00000040565 | 21 | 9  | 0 Btafl         | protein_coding       |
| ENSMUSG00000064455 | 21 | 8  | 22 n-R5s56      | rRNA                 |
| ENSMUSG00000092774 | 21 | 8  | 22 Gm26197      | rRNA                 |
| ENSMUSG00000092674 | 21 | 7  | 129 Gm24105     | misc_RNA             |
| ENSMUSG00000018727 | 21 | 6  | 0 Cpsf4l        | protein_coding       |
| ENSMUSG00000022855 | 21 | 5  | 0 Senp2         | protein_coding       |
| ENSMUSG00000027479 | 21 | 5  | 0 Mapre1        | protein_coding       |

|                    |    |    |                 |                                  |
|--------------------|----|----|-----------------|----------------------------------|
| ENSMUSG00000025085 | 21 | 4  | 0 Ablim1        | protein_coding                   |
| ENSMUSG00000074305 | 21 | 0  | 0 Peak1         | protein_coding                   |
| ENSMUSG00000045598 | 21 | 50 | 0 Zfp553        | protein_coding                   |
| ENSMUSG00000031818 | 21 | 43 | 12 Cox4i1       | protein_coding                   |
| ENSMUSG00000082476 | 21 | 40 | 2 Gm12242       | processed_pseudogene             |
| ENSMUSG00000083184 | 21 | 34 | 0               | processed_pseudogene             |
| ENSMUSG00000045128 | 21 | 30 | 16 Rpl18a       | protein_coding                   |
| ENSMUSG00000025403 | 21 | 30 | 0 Shmt2         | protein_coding                   |
| ENSMUSG00000084354 | 21 | 28 | 0               | processed_pseudogene             |
| ENSMUSG00000026283 | 21 | 26 | 0 Ing5          | protein_coding                   |
| ENSMUSG00000083022 | 21 | 23 | 6 Rps15a-ps6    | processed_pseudogene             |
| ENSMUSG00000060798 | 21 | 23 | 0 Intu          | protein_coding                   |
| ENSMUSG00000098091 | 21 | 23 | 0 Gm16470       | processed_pseudogene             |
| ENSMUSG00000067058 | 21 | 22 | 6 Rps15a-ps5    | processed_pseudogene             |
| ENSMUSG00000023066 | 21 | 22 | 0 Rtnn          | protein_coding                   |
| ENSMUSG00000025747 | 21 | 20 | 2 Tyms          | protein_coding                   |
| ENSMUSG00000027864 | 21 | 20 | 0 Ptgfrn        | protein_coding                   |
| ENSMUSG00000029361 | 21 | 18 | 2 Nos1          | protein_coding                   |
| ENSMUSG00000089828 | 21 | 18 | 0 Gm16300       | processed_pseudogene             |
| ENSMUSG00000021215 | 21 | 16 | 0 Net1          | protein_coding                   |
| ENSMUSG00000070871 | 21 | 16 | 0 Ccnyl1        | protein_coding                   |
| ENSMUSG00000018322 | 21 | 15 | 0 Tomm34        | protein_coding                   |
| ENSMUSG00000089774 | 21 | 14 | 184 Slc5a3      | protein_coding                   |
| ENSMUSG00000004221 | 21 | 9  | 0 Ikbkg         | protein_coding                   |
| ENSMUSG00000070219 | 21 | 6  | 20 n-R5s13      | rRNA                             |
| ENSMUSG00000024056 | 21 | 5  | 0 Ndc80         | protein_coding                   |
| ENSMUSG00000064606 | 21 | 3  | 8 Gm25899       | snRNA                            |
| ENSMUSG00000074071 | 21 | 1  | 2 Fam169b       | lincRNA                          |
| ENSMUSG00000089571 | 21 | 0  | 486 Gm23008     | snoRNA                           |
| ENSMUSG00000027180 | 21 | 0  | 0 Fbxo3         | protein_coding                   |
| ENSMUSG00000028657 | 21 | 0  | 0 Ppt1          | protein_coding                   |
| ENSMUSG00000045538 | 20 | 76 | 0 Ddx28         | protein_coding                   |
| ENSMUSG00000030051 | 20 | 33 | 0 Aplf          | protein_coding                   |
| ENSMUSG00000023030 | 20 | 32 | 0 Slc11a2       | protein_coding                   |
| ENSMUSG00000020413 | 20 | 31 | 0 Hus1          | protein_coding                   |
| ENSMUSG00000098147 | 20 | 28 | 0 Gm17798       | processed_pseudogene             |
| ENSMUSG00000083072 | 20 | 28 | 0 Gm13668       | processed_pseudogene             |
| ENSMUSG00000092257 | 20 | 27 | 0 Gm2308        | processed_pseudogene             |
| ENSMUSG00000081783 | 20 | 25 | 2 Gm15599       | unprocessed_pseudogene           |
| ENSMUSG00000082816 | 20 | 25 | 0 Gm11953       | processed_pseudogene             |
| ENSMUSG00000101585 | 20 | 25 | 0 1600010M07Rik | lincRNA                          |
| ENSMUSG00000070282 | 20 | 24 | 6 3000002C10Rik | transcribed_processed_pseudogene |
| ENSMUSG00000030649 | 20 | 22 | 0 Anapc15       | protein_coding                   |
| ENSMUSG00000035960 | 20 | 18 | 0 Apex1         | protein_coding                   |
| ENSMUSG00000097749 | 20 | 18 | 0 Gm16938       | lincRNA                          |
| ENSMUSG00000018001 | 20 | 17 | 0 Cyth3         | protein_coding                   |
| ENSMUSG00000092713 | 20 | 16 | 1426 Gm22858    | snoRNA                           |
| ENSMUSG00000096433 | 20 | 16 | 0 Zfp994        | protein_coding                   |
| ENSMUSG00000035530 | 20 | 14 | 8 Eifl          | protein_coding                   |

|                    |    |    |             |                                  |
|--------------------|----|----|-------------|----------------------------------|
| ENSMUSG00000020151 | 20 | 12 | 1021 Ptpr   | protein_coding                   |
| ENSMUSG00000064487 | 20 | 12 | 26 Gm23736  | snoRNA                           |
| ENSMUSG00000077167 | 20 | 9  | 0 Gm24119   | snoRNA                           |
| ENSMUSG00000037979 | 20 | 8  | 16 Ccdc92   | protein_coding                   |
| ENSMUSG00000025235 | 20 | 8  | 0 Bbs4      | protein_coding                   |
| ENSMUSG00000067586 | 20 | 6  | 0 Slpr3     | protein_coding                   |
| ENSMUSG00000028690 | 20 | 5  | 0 Mmachc    | protein_coding                   |
| ENSMUSG00000039485 | 20 | 0  | 0 Tspyl4    | protein_coding                   |
| ENSMUSG00000038991 | 19 | 79 | 0 Txndc5    | protein_coding                   |
| ENSMUSG00000041453 | 19 | 37 | 2 Rpl21     | protein_coding                   |
| ENSMUSG00000028226 | 19 | 30 | 0 Mmp16     | protein_coding                   |
| ENSMUSG00000083911 | 19 | 29 | 4 Gm4342    | processed_pseudogene             |
| ENSMUSG00000084223 | 19 | 26 | 0 Gm12244   | processed_pseudogene             |
| ENSMUSG00000055676 | 19 | 25 | 0 Gm5069    | transcribed_processed_pseudogene |
| ENSMUSG00000067224 | 19 | 25 | 0 Gm3695    | processed_pseudogene             |
| ENSMUSG00000003970 | 19 | 24 | 196 Rpl8    | protein_coding                   |
| ENSMUSG00000025922 | 19 | 23 | 4 Gm5045    | processed_pseudogene             |
| ENSMUSG00000021481 | 19 | 23 | 0 Zfp346    | protein_coding                   |
| ENSMUSG00000021928 | 19 | 21 | 22 Ebpl     | protein_coding                   |
| ENSMUSG00000006262 | 19 | 20 | 0 Mob1b     | protein_coding                   |
| ENSMUSG00000027752 | 19 | 16 | 8 Exosc8    | protein_coding                   |
| ENSMUSG00000052551 | 19 | 16 | 0 Adarb2    | protein_coding                   |
| ENSMUSG00000070837 | 19 | 15 | 0 Aurkc     | protein_coding                   |
| ENSMUSG00000080916 | 19 | 15 | 0 Gm12463   | processed_pseudogene             |
| ENSMUSG00000025373 | 19 | 7  | 0 Rnf41     | protein_coding                   |
| ENSMUSG00000029405 | 19 | 7  | 20 G3bp2    | protein_coding                   |
| ENSMUSG00000039826 | 19 | 7  | 0 Trub2     | protein_coding                   |
| ENSMUSG00000032346 | 19 | 6  | 0 Ooep      | protein_coding                   |
| ENSMUSG00000064857 | 19 | 5  | 26 n-R5s25  | rRNA                             |
| ENSMUSG00000004040 | 19 | 4  | 0 Stat3     | protein_coding                   |
| ENSMUSG00000040451 | 19 | 0  | 0 Sgms1     | protein_coding                   |
| ENSMUSG00000032454 | 19 | 46 | 5861 Rbp2   | protein_coding                   |
| ENSMUSG00000019868 | 19 | 36 | 0 Vta1      | protein_coding                   |
| ENSMUSG00000008683 | 19 | 35 | 6 Rps15a    | protein_coding                   |
| ENSMUSG00000038582 | 19 | 32 | 0 Pptc7     | protein_coding                   |
| ENSMUSG00000098002 | 19 | 28 | 0 Gm9658    | processed_pseudogene             |
| ENSMUSG00000098185 | 19 | 27 | 0 Gm9146    | processed_pseudogene             |
| ENSMUSG00000101371 | 19 | 27 | 0 Gm9114    | processed_pseudogene             |
| ENSMUSG00000090331 | 19 | 26 | 0 Gm17199   | processed_pseudogene             |
| ENSMUSG00000022899 | 19 | 26 | 0 Slc15a2   | protein_coding                   |
| ENSMUSG00000021693 | 19 | 24 | 0 Kif2a     | protein_coding                   |
| ENSMUSG00000030494 | 19 | 24 | 0 Rhpn2     | protein_coding                   |
| ENSMUSG00000028527 | 19 | 23 | 0 Ak4       | protein_coding                   |
| ENSMUSG00000069376 | 19 | 23 | 0 Gm5507    | processed_pseudogene             |
| ENSMUSG00000089810 | 19 | 23 | 0 Gm16536   | antisense                        |
| ENSMUSG00000081305 | 19 | 22 | 0 Gm12879   | processed_pseudogene             |
| ENSMUSG00000027439 | 19 | 20 | 12 Gzfl     | protein_coding                   |
| ENSMUSG00000094411 | 19 | 18 | 54 Snord16a | snoRNA                           |
| ENSMUSG00000016200 | 19 | 18 | 0 Syt14     | protein_coding                   |

|                    |    |    |                 |                      |
|--------------------|----|----|-----------------|----------------------|
| ENSMUSG00000038976 | 19 | 18 | 0 Ppp1r9b       | protein_coding       |
| ENSMUSG00000020829 | 19 | 14 | 38 Slc46a1      | protein_coding       |
| ENSMUSG00000083859 | 19 | 14 | 2 Gm12003       | processed_pseudogene |
| ENSMUSG00000027323 | 19 | 13 | 0 Rad51         | protein_coding       |
| ENSMUSG00000026788 | 19 | 12 | 0 Zbtb43        | protein_coding       |
| ENSMUSG00000072582 | 19 | 10 | 0 Pthr2         | protein_coding       |
| ENSMUSG00000000751 | 19 | 9  | 0 Rpa1          | protein_coding       |
| ENSMUSG00000058897 | 19 | 9  | 0 Col25a1       | protein_coding       |
| ENSMUSG00000026311 | 19 | 9  | 270 Asb1        | protein_coding       |
| ENSMUSG00000019864 | 19 | 8  | 26 Rtn4ip1      | protein_coding       |
| ENSMUSG00000084548 | 19 | 5  | 26 n-R5s175     | rRNA                 |
| ENSMUSG00000044857 | 19 | 4  | 0 Lemd2         | protein_coding       |
| ENSMUSG00000045100 | 19 | 4  | 0 Slc25a26      | protein_coding       |
| ENSMUSG00000020260 | 19 | 0  | 0 Pofut2        | protein_coding       |
| ENSMUSG00000079658 | 18 | 39 | 0 Tceb1         | protein_coding       |
| ENSMUSG00000102890 | 18 | 32 | 0 Gm7626        | processed_pseudogene |
| ENSMUSG00000047799 | 18 | 31 | 0 Oog4          | protein_coding       |
| ENSMUSG00000075470 | 18 | 30 | 0 Alg10b        | protein_coding       |
| ENSMUSG00000082685 | 18 | 29 | 0               | processed_pseudogene |
| ENSMUSG00000081524 | 18 | 27 | 0 Gm11658       | processed_pseudogene |
| ENSMUSG00000083012 | 18 | 27 | 0 Fam220a       | protein_coding       |
| ENSMUSG00000044065 | 18 | 26 | 0 Gm9788        | processed_pseudogene |
| ENSMUSG00000072419 | 18 | 26 | 0 Dppa2         | protein_coding       |
| ENSMUSG00000084196 | 18 | 26 | 0 Gm12874       | processed_pseudogene |
| ENSMUSG00000103958 | 18 | 26 | 0 Gm8023        | processed_pseudogene |
| ENSMUSG00000038298 | 18 | 25 | 0 Pdzk1         | protein_coding       |
| ENSMUSG00000025134 | 18 | 24 | 0 Alyref        | protein_coding       |
| ENSMUSG00000056342 | 18 | 23 | 0 Usp34         | protein_coding       |
| ENSMUSG00000098105 | 18 | 22 | 0 Gm8825        | processed_pseudogene |
| ENSMUSG00000044340 | 18 | 21 | 4 Phlpp1        | protein_coding       |
| ENSMUSG00000097353 | 18 | 21 | 0 A430046D13Rik | lincRNA              |
| ENSMUSG00000098006 | 18 | 20 | 0 Gm8565        | processed_pseudogene |
| ENSMUSG00000103949 | 18 | 20 | 0 Gm38226       | TEC                  |
| ENSMUSG00000024109 | 18 | 18 | 26 Nrnx1        | protein_coding       |
| ENSMUSG00000009863 | 18 | 18 | 0 Sdhb          | protein_coding       |
| ENSMUSG00000044103 | 18 | 18 | 0 Il1f9         | protein_coding       |
| ENSMUSG00000057036 | 18 | 17 | 2 Gm7536        | processed_pseudogene |
| ENSMUSG00000039473 | 18 | 16 | 12 Ubn1         | protein_coding       |
| ENSMUSG00000060073 | 18 | 16 | 0 Psma3         | protein_coding       |
| ENSMUSG00000083483 | 18 | 16 | 0 Gm14044       | processed_pseudogene |
| ENSMUSG00000046364 | 18 | 16 | 2 Rpl27a        | protein_coding       |
| ENSMUSG00000099471 | 18 | 16 | 2 Gm8451        | processed_pseudogene |
| ENSMUSG00000037242 | 18 | 16 | 0 Clic4         | protein_coding       |
| ENSMUSG00000024687 | 18 | 15 | 0 Osbp          | protein_coding       |
| ENSMUSG00000015501 | 18 | 14 | 0 Hivep2        | protein_coding       |
| ENSMUSG00000029729 | 18 | 14 | 0 Zkscan1       | protein_coding       |
| ENSMUSG00000097207 | 18 | 12 | 0 6030443J06Rik | lincRNA              |
| ENSMUSG00000070150 | 18 | 6  | 20 n-R5s152     | rRNA                 |
| ENSMUSG00000088971 | 18 | 6  | 20 Gm23764      | rRNA                 |

|                    |    |    |             |                                  |
|--------------------|----|----|-------------|----------------------------------|
| ENSMUSG00000077345 | 18 | 4  | 12 Snord70  | snoRNA                           |
| ENSMUSG00000096296 | 18 | 0  | 46 Snord88c | snoRNA                           |
| ENSMUSG00000031987 | 17 | 41 | 0 Egl1      | protein_coding                   |
| ENSMUSG00000021669 | 17 | 38 | 0 Col4a3bp  | protein_coding                   |
| ENSMUSG00000085070 | 17 | 30 | 0 Gm13211   | lincRNA                          |
| ENSMUSG00000087141 | 17 | 30 | 0 Plcx2     | protein_coding                   |
| ENSMUSG00000029993 | 17 | 26 | 0 Nfu1      | protein_coding                   |
| ENSMUSG00000094484 | 17 | 26 | 0 Gm21244   | protein_coding                   |
| ENSMUSG00000022412 | 17 | 25 | 10 Mief1    | protein_coding                   |
| ENSMUSG00000083439 | 17 | 24 | 0 Gm14491   | processed_pseudogene             |
| ENSMUSG00000053604 | 17 | 23 | 0 Rpia      | protein_coding                   |
| ENSMUSG00000028524 | 17 | 20 | 0 Sgip1     | protein_coding                   |
| ENSMUSG00000025878 | 17 | 18 | 0 Uimc1     | protein_coding                   |
| ENSMUSG00000030428 | 17 | 18 | 167 Ttyh1   | protein_coding                   |
| ENSMUSG00000048852 | 17 | 18 | 0 Gm12185   | protein_coding                   |
| ENSMUSG00000051391 | 17 | 18 | 0 Ywhag     | protein_coding                   |
| ENSMUSG00000097920 | 17 | 18 | 0 Gm7784    | processed_pseudogene             |
| ENSMUSG00000098081 | 17 | 17 | 0 Gm26913   | processed_pseudogene             |
| ENSMUSG00000102383 | 17 | 16 | 0 Gm38142   | TEC                              |
| ENSMUSG00000035203 | 17 | 15 | 22 Epn1     | protein_coding                   |
| ENSMUSG00000082880 | 17 | 14 | 0           | processed_pseudogene             |
| ENSMUSG00000032418 | 17 | 12 | 0 Me1       | protein_coding                   |
| ENSMUSG00000097195 | 17 | 12 | 63 Snhg5    | processed_transcript             |
| ENSMUSG00000026333 | 17 | 12 | 4 Gin1      | protein_coding                   |
| ENSMUSG00000038489 | 17 | 10 | 0 Polr2l    | protein_coding                   |
| ENSMUSG00000078429 | 17 | 7  | 12 Ctdsp2   | protein_coding                   |
| ENSMUSG00000040667 | 17 | 5  | 0 Nup88     | protein_coding                   |
| ENSMUSG00000069678 | 17 | 5  | 0 Pcgfl     | protein_coding                   |
| ENSMUSG00000020211 | 17 | 4  | 0 Sf3a2     | protein_coding                   |
| ENSMUSG00000073557 | 17 | 3  | 0 Ppp1r12b  | protein_coding                   |
| ENSMUSG00000067274 | 17 | 3  | 8 Rplp0     | protein_coding                   |
| ENSMUSG00000001018 | 17 | 0  | 0 Snapin    | protein_coding                   |
| ENSMUSG00000007836 | 16 | 36 | 0 Hnrnpa0   | protein_coding                   |
| ENSMUSG00000045822 | 16 | 35 | 0 Zswim3    | protein_coding                   |
| ENSMUSG00000049940 | 16 | 28 | 0 Pgrmc2    | protein_coding                   |
| ENSMUSG00000043067 | 16 | 26 | 0 Dpy19l1   | protein_coding                   |
| ENSMUSG00000079426 | 16 | 26 | 0 Arpc4     | protein_coding                   |
| ENSMUSG00000068284 | 16 | 24 | 0 Usf3      | protein_coding                   |
| ENSMUSG00000082896 | 16 | 21 | 0 Gm5844    | processed_pseudogene             |
| ENSMUSG00000087246 | 16 | 21 | 0 Gm13346   | lincRNA                          |
| ENSMUSG00000072492 | 16 | 20 | 0 Gm10364   | transcribed_processed_pseudogene |
| ENSMUSG00000026383 | 16 | 19 | 4 Epb41l5   | protein_coding                   |
| ENSMUSG00000021361 | 16 | 19 | 0 Tmem14c   | protein_coding                   |
| ENSMUSG00000088252 | 16 | 19 | 0 Snord13   | snoRNA                           |
| ENSMUSG00000090252 | 16 | 18 | 22 Gm16028  | antisense                        |
| ENSMUSG00000082622 | 16 | 18 | 0 Gm12632   | processed_pseudogene             |
| ENSMUSG00000024258 | 16 | 18 | 0 Polr2d    | protein_coding                   |
| ENSMUSG00000065950 | 16 | 17 | 2           | processed_pseudogene             |
| ENSMUSG00000083270 | 16 | 17 | 0 Gm13498   | processed_pseudogene             |

|                    |    |    |                   |                      |
|--------------------|----|----|-------------------|----------------------|
| ENSMUSG00000084413 | 16 | 16 | 0 Gm12017         | processed_pseudogene |
| ENSMUSG00000084051 | 16 | 16 | 0                 | processed_pseudogene |
| ENSMUSG00000052281 | 16 | 15 | 2 Tspan32os       | antisense            |
| ENSMUSG00000037270 | 16 | 15 | 0 4932438A13Rik   | protein_coding       |
| ENSMUSG00000082474 | 16 | 15 | 0 Gm8213          | processed_pseudogene |
| ENSMUSG00000098180 | 16 | 15 | 0 Gm5430          | processed_pseudogene |
| ENSMUSG00000047531 | 16 | 14 | 30 Rtp2           | protein_coding       |
| ENSMUSG00000058558 | 16 | 14 | 24 Rpl5           | protein_coding       |
| ENSMUSG00000086519 | 16 | 14 | 0 Gm13393         | lincRNA              |
| ENSMUSG00000098492 | 16 | 14 | 0 Gm19353         | processed_pseudogene |
| ENSMUSG00000091993 | 16 | 14 | 174 B930036N10Rik | antisense            |
| ENSMUSG00000024580 | 16 | 14 | 0 Grpel2          | protein_coding       |
| ENSMUSG00000028426 | 16 | 14 | 0 Rad23b          | protein_coding       |
| ENSMUSG00000016619 | 16 | 12 | 0 Nup50           | protein_coding       |
| ENSMUSG00000070834 | 16 | 9  | 0 Gm13015         | processed_pseudogene |
| ENSMUSG00000027583 | 16 | 9  | 0 Zbtb46          | protein_coding       |
| ENSMUSG00000057134 | 16 | 9  | 0 Ado             | protein_coding       |
| ENSMUSG00000037736 | 16 | 8  | 0 Limch1          | protein_coding       |
| ENSMUSG00000071659 | 16 | 7  | 0 Hnrnpul2        | protein_coding       |
| ENSMUSG00000077457 | 16 | 7  | 0 Snord65         | snoRNA               |
| ENSMUSG00000083815 | 16 | 7  | 0 Gm13435         | processed_pseudogene |
| ENSMUSG00000065660 | 16 | 5  | 20 n-R5s170       | rRNA                 |
| ENSMUSG00000015970 | 16 | 5  | 0 Chdh            | protein_coding       |
| ENSMUSG00000038633 | 16 | 5  | 26 Degs1          | protein_coding       |
| ENSMUSG00000045414 | 16 | 5  | 0 1190002N15Rik   | protein_coding       |
| ENSMUSG00000001280 | 16 | 4  | 30 Sp1            | protein_coding       |
| ENSMUSG00000002308 | 16 | 4  | 0 Cd320           | protein_coding       |
| ENSMUSG00000027247 | 16 | 0  | 0 Arhgap1         | protein_coding       |
| ENSMUSG00000027472 | 16 | 0  | 0 Pdrgl           | protein_coding       |
| ENSMUSG00000037197 | 16 | 0  | 0 Rbm17           | protein_coding       |
| ENSMUSG00000039041 | 16 | 0  | 0 Adrm1           | protein_coding       |
| ENSMUSG00000042165 | 16 | 0  | 0 Gm9774          | protein_coding       |
| ENSMUSG00000077506 | 16 | 0  | 0 Scarna9         | snoRNA               |
| ENSMUSG00000085731 | 16 | 0  | 0 Gm16229         | antisense            |
| ENSMUSG00000029814 | 16 | 45 | 0 Igf2bp3         | protein_coding       |
| ENSMUSG00000080776 | 16 | 35 | 10 Gm12174        | processed_pseudogene |
| ENSMUSG00000034040 | 16 | 31 | 0 Wbscr17         | protein_coding       |
| ENSMUSG00000030410 | 16 | 26 | 4 Dmwd            | protein_coding       |
| ENSMUSG00000064655 | 16 | 24 | 0 Gm25788         | snoRNA               |
| ENSMUSG00000065778 | 16 | 24 | 0 Gm22154         | snoRNA               |
| ENSMUSG00000083743 | 16 | 23 | 0 Gm12421         | processed_pseudogene |
| ENSMUSG00000021131 | 16 | 21 | 2 Erh             | protein_coding       |
| ENSMUSG00000104051 | 16 | 21 | 0 Gm38128         | TEC                  |
| ENSMUSG00000063412 | 16 | 20 | 2 Gm10131         | processed_pseudogene |
| ENSMUSG00000098224 | 16 | 20 | 0 Gm7985          | processed_pseudogene |
| ENSMUSG00000090019 | 16 | 18 | 0 Gimap1          | protein_coding       |
| ENSMUSG00000098138 | 16 | 18 | 0 Gm9081          | processed_pseudogene |
| ENSMUSG00000024335 | 16 | 18 | 0 Brd2            | protein_coding       |
| ENSMUSG00000054226 | 16 | 18 | 0 Tprkb           | protein_coding       |



|                    |    |    |                 |                        |
|--------------------|----|----|-----------------|------------------------|
| ENSMUSG00000083507 | 16 | 18 | 0 Gm12842       | processed_pseudogene   |
| ENSMUSG00000091764 | 16 | 18 | 0 Zfp964        | protein_coding         |
| ENSMUSG00000082087 | 16 | 17 | 10 Gm12138      | processed_pseudogene   |
| ENSMUSG00000100309 | 16 | 17 | 10 Gm6644       | processed_pseudogene   |
| ENSMUSG00000071414 | 16 | 16 | 10 Gm6736       | processed_pseudogene   |
| ENSMUSG00000097973 | 16 | 16 | 0 Gm4929        | processed_pseudogene   |
| ENSMUSG00000033751 | 16 | 16 | 0 Gadd45gip1    | protein_coding         |
| ENSMUSG00000038712 | 16 | 16 | 0 Fam63a        | protein_coding         |
| ENSMUSG00000021830 | 16 | 15 | 2 Txndc16       | protein_coding         |
| ENSMUSG00000057229 | 16 | 13 | 0 Atp5sl        | protein_coding         |
| ENSMUSG00000074892 | 16 | 13 | 0 B3galt5       | protein_coding         |
| ENSMUSG00000057181 | 16 | 12 | 0 5730455P16Rik | protein_coding         |
| ENSMUSG00000033036 | 16 | 12 | 0 Gm7879        | processed_pseudogene   |
| ENSMUSG00000055013 | 16 | 11 | 12 Agap1        | protein_coding         |
| ENSMUSG00000065232 | 16 | 10 | 73 Gm22973      | snRNA                  |
| ENSMUSG00000062296 | 16 | 10 | 0 Trank1        | protein_coding         |
| ENSMUSG00000030084 | 16 | 9  | 0 Plxna1        | protein_coding         |
| ENSMUSG00000031370 | 16 | 9  | 0 Zrsr2         | protein_coding         |
| ENSMUSG00000046707 | 16 | 9  | 0 Csnk2a2       | protein_coding         |
| ENSMUSG00000020777 | 16 | 7  | 18 Acox1        | protein_coding         |
| ENSMUSG00000056820 | 16 | 5  | 0 Tsnax         | protein_coding         |
| ENSMUSG00000002699 | 16 | 1  | 12 Lcp2         | protein_coding         |
| ENSMUSG00000020577 | 16 | 0  | 0 Tspan13       | protein_coding         |
| ENSMUSG00000022881 | 16 | 0  | 0 Rfc4          | protein_coding         |
| ENSMUSG00000057469 | 16 | 0  | 0 E2f6          | protein_coding         |
| ENSMUSG00000089512 | 15 | 64 | 18 Gm26287      | snoRNA                 |
| ENSMUSG00000034636 | 15 | 49 | 0 Zyg11b        | protein_coding         |
| ENSMUSG00000037211 | 15 | 40 | 0 Spry1         | protein_coding         |
| ENSMUSG00000071379 | 15 | 34 | 0 Hpcal1        | protein_coding         |
| ENSMUSG00000058603 | 15 | 33 | 0 Rpl28-ps1     | processed_pseudogene   |
| ENSMUSG00000058905 | 15 | 33 | 0 Gm10051       | processed_pseudogene   |
| ENSMUSG00000046658 | 15 | 27 | 6 Zfp316        | protein_coding         |
| ENSMUSG00000060899 | 15 | 24 | 2 Rpl21-ps11    | processed_pseudogene   |
| ENSMUSG00000061242 | 15 | 24 | 2 Gm9104        | processed_pseudogene   |
| ENSMUSG00000081559 | 15 | 24 | 2 Gm12411       | processed_pseudogene   |
| ENSMUSG00000084149 | 15 | 24 | 2 Gm12944       | processed_pseudogene   |
| ENSMUSG00000082097 | 15 | 24 | 0 Gm14039       | processed_pseudogene   |
| ENSMUSG00000064441 | 15 | 24 | 656 Snord37     | snoRNA                 |
| ENSMUSG00000021124 | 15 | 21 | 12 Vti1b        | protein_coding         |
| ENSMUSG00000037235 | 15 | 20 | 0 Mxd4          | protein_coding         |
| ENSMUSG00000091076 | 15 | 20 | 0 Vmn2r115      | protein_coding         |
| ENSMUSG00000091407 | 15 | 20 | 0 Vmn2r117      | protein_coding         |
| ENSMUSG00000096270 | 15 | 20 | 0 Vmn2r-ps134   | unprocessed_pseudogene |
| ENSMUSG00000101609 | 15 | 18 | 4 Kcnq1ot1      | antisense              |
| ENSMUSG00000050097 | 15 | 17 | 0 Ces2b         | protein_coding         |
| ENSMUSG00000056962 | 15 | 17 | 0 Jmjd6         | protein_coding         |
| ENSMUSG00000060938 | 15 | 16 | 34 Rpl26        | protein_coding         |
| ENSMUSG00000080303 | 15 | 16 | 0 Gm12419       | processed_pseudogene   |
| ENSMUSG00000038812 | 15 | 15 | 0 Trmt112       | protein_coding         |

|                    |    |    |                 |                      |
|--------------------|----|----|-----------------|----------------------|
| ENSMUSG00000043131 | 15 | 15 | 0 Mob1a         | protein_coding       |
| ENSMUSG00000040600 | 15 | 11 | 0 Eps8l3        | protein_coding       |
| ENSMUSG00000041025 | 15 | 10 | 40 Iffo2        | protein_coding       |
| ENSMUSG00000032112 | 15 | 9  | 0 Trappc4       | protein_coding       |
| ENSMUSG00000050332 | 15 | 9  | 0 Amer1         | protein_coding       |
| ENSMUSG00000085982 | 15 | 9  | 0 9530051G07Rik | processed_transcript |
| ENSMUSG00000059273 | 15 | 9  | 0 Zc3h4         | protein_coding       |
| ENSMUSG00000025203 | 15 | 8  | 61 Scd2         | protein_coding       |
| ENSMUSG00000059040 | 15 | 8  | 4 Eno1b         | protein_coding       |
| ENSMUSG00000064193 | 15 | 8  | 4 Gm4735        | processed_pseudogene |
| ENSMUSG00000039840 | 15 | 8  | 0 Epg5          | protein_coding       |
| ENSMUSG00000048701 | 15 | 8  | 0 Ccdc6         | protein_coding       |
| ENSMUSG00000066235 | 15 | 7  | 0 Pomgnt2       | protein_coding       |
| ENSMUSG00000063457 | 15 | 6  | 30 Rps15        | protein_coding       |
| ENSMUSG00000025786 | 15 | 6  | 8 Zdhhc3        | protein_coding       |
| ENSMUSG00000005621 | 15 | 6  | 0 Zfp592        | protein_coding       |
| ENSMUSG00000025860 | 15 | 5  | 2 Xiap          | protein_coding       |
| ENSMUSG00000022760 | 15 | 5  | 0 Thap7         | protein_coding       |
| ENSMUSG00000097748 | 15 | 4  | 0 Gm26533       | lincRNA              |
| ENSMUSG00000021427 | 15 | 1  | 52 Ssr1         | protein_coding       |
| ENSMUSG00000072872 | 15 | 0  | 10 Rybp         | protein_coding       |
| ENSMUSG00000041075 | 15 | 0  | 2 Fzd7          | protein_coding       |
| ENSMUSG00000034518 | 15 | 0  | 0 Hmgxb4        | protein_coding       |
| ENSMUSG00000043760 | 15 | 0  | 0 Pkhd1         | protein_coding       |
| ENSMUSG00000027715 | 14 | 53 | 0 Ccna2         | protein_coding       |
| ENSMUSG00000022914 | 14 | 35 | 0 Brwd1         | protein_coding       |
| ENSMUSG00000044600 | 14 | 32 | 20 Smim7        | protein_coding       |
| ENSMUSG00000024165 | 14 | 31 | 0 Hn1l          | protein_coding       |
| ENSMUSG00000103312 | 14 | 30 | 0 Gm6677        | processed_pseudogene |
| ENSMUSG00000085307 | 14 | 28 | 0 Gm11525       | antisense            |
| ENSMUSG00000035151 | 14 | 24 | 0 Elmod2        | protein_coding       |
| ENSMUSG00000083646 | 14 | 24 | 0 Gm6088        | processed_pseudogene |
| ENSMUSG00000092186 | 14 | 23 | 0 Gm5967        | processed_pseudogene |
| ENSMUSG00000080784 | 14 | 22 | 0 Gm13765       | processed_pseudogene |
| ENSMUSG00000103933 | 14 | 21 | 6 Gm36964       | processed_pseudogene |
| ENSMUSG00000022008 | 14 | 20 | 2 Gpalpp1       | protein_coding       |
| ENSMUSG00000098235 | 14 | 18 | 0 Gm7497        | processed_pseudogene |
| ENSMUSG00000023959 | 14 | 17 | 2 Clic5         | protein_coding       |
| ENSMUSG00000100794 | 14 | 17 | 0 Gm29667       | processed_pseudogene |
| ENSMUSG00000081051 | 14 | 16 | 16 Gm15427      | processed_pseudogene |
| ENSMUSG00000081382 | 14 | 16 | 16 Rpl18-ps1    | processed_pseudogene |
| ENSMUSG00000082394 | 14 | 16 | 0 Gm4596        | processed_pseudogene |
| ENSMUSG00000032612 | 14 | 16 | 12 Usp4         | protein_coding       |
| ENSMUSG00000068663 | 14 | 16 | 0 Clec16a       | protein_coding       |
| ENSMUSG00000005374 | 14 | 15 | 1592 Tbl2       | protein_coding       |
| ENSMUSG00000080845 | 14 | 14 | 4 Gm9115        | processed_pseudogene |
| ENSMUSG00000015711 | 14 | 12 | 0 Prune         | protein_coding       |
| ENSMUSG00000027635 | 14 | 12 | 0 Dsn1          | protein_coding       |
| ENSMUSG00000092349 | 14 | 12 | 0 Platr17       | lincRNA              |

|                    |    |    |                  |                      |
|--------------------|----|----|------------------|----------------------|
| ENSMUSG00000087318 | 14 | 11 | 0 Gm12114        | lincRNA              |
| ENSMUSG00000039410 | 14 | 10 | 52 Prdm16        | protein_coding       |
| ENSMUSG00000097502 | 14 | 8  | 0 4930528D03Rik  | lincRNA              |
| ENSMUSG00000030890 | 14 | 7  | 0 Ilk            | protein_coding       |
| ENSMUSG00000086584 | 14 | 7  | 0 Gm12002        | antisense            |
| ENSMUSG00000041319 | 14 | 7  | 0 Thoc6          | protein_coding       |
| ENSMUSG00000046562 | 14 | 6  | 125 Unc119b      | protein_coding       |
| ENSMUSG00000048647 | 14 | 6  | 0 Exd1           | protein_coding       |
| ENSMUSG00000041415 | 14 | 5  | 0 Dicer1         | protein_coding       |
| ENSMUSG00000053110 | 14 | 5  | 0 Yap1           | protein_coding       |
| ENSMUSG00000008429 | 14 | 4  | 0 Herpud2        | protein_coding       |
| ENSMUSG00000014959 | 14 | 4  | 0 Gorasp2        | protein_coding       |
| ENSMUSG00000037813 | 14 | 1  | 20 D630003M21Rik | protein_coding       |
| ENSMUSG00000085438 | 14 | 1  | 16 1700020I14Rik | lincRNA              |
| ENSMUSG00000092341 | 14 | 0  | 761 Malat1       | lincRNA              |
| ENSMUSG00000002012 | 14 | 0  | 34 Pnck          | protein_coding       |
| ENSMUSG00000025354 | 14 | 0  | 0 Dnajc14        | protein_coding       |
| ENSMUSG00000030881 | 14 | 0  | 0 Arfp2          | protein_coding       |
| ENSMUSG00000031889 | 14 | 0  | 0 D230025D16Rik  | protein_coding       |
| ENSMUSG00000036087 | 14 | 0  | 0 Slain2         | protein_coding       |
| ENSMUSG00000048486 | 14 | 0  | 0 Fitm2          | protein_coding       |
| ENSMUSG00000086949 | 14 | 0  | 0 Gm13066        | antisense            |
| ENSMUSG00000035572 | 13 | 36 | 14 Dcaf10        | protein_coding       |
| ENSMUSG00000059923 | 13 | 34 | 0 Grb2           | protein_coding       |
| ENSMUSG00000074102 | 13 | 28 | 0 Rbm15b         | protein_coding       |
| ENSMUSG00000039187 | 13 | 24 | 0 Fanci          | protein_coding       |
| ENSMUSG00000053841 | 13 | 24 | 0 Txlna          | protein_coding       |
| ENSMUSG00000021978 | 13 | 22 | 0 Extl3          | protein_coding       |
| ENSMUSG00000085566 | 13 | 22 | 0 A730017L22Rik  | processed_transcript |
| ENSMUSG00000081121 | 13 | 20 | 0 Gm12791        | processed_pseudogene |
| ENSMUSG00000094306 | 13 | 20 | 129 Gm24924      | snRNA                |
| ENSMUSG00000095616 | 13 | 20 | 129 Gm26244      | snRNA                |
| ENSMUSG00000083884 | 13 | 19 | 0 Gm15388        | processed_pseudogene |
| ENSMUSG00000082004 | 13 | 17 | 0                | processed_pseudogene |
| ENSMUSG00000102858 | 13 | 16 | 0 Gm37086        | TEC                  |
| ENSMUSG00000021428 | 13 | 16 | 0 Riok1          | protein_coding       |
| ENSMUSG00000097772 | 13 | 15 | 2 5430416N02Rik  | lincRNA              |
| ENSMUSG00000004317 | 13 | 15 | 0 Clcn5          | protein_coding       |
| ENSMUSG00000080002 | 13 | 15 | 0 Gm5566         | processed_pseudogene |
| ENSMUSG00000097999 | 13 | 15 | 0 Gm9061         | processed_pseudogene |
| ENSMUSG00000100267 | 13 | 14 | 0 Gm28779        | processed_pseudogene |
| ENSMUSG00000032294 | 13 | 14 | 10 Pkm           | protein_coding       |
| ENSMUSG00000042857 | 13 | 14 | 0 Gm9776         | protein_coding       |
| ENSMUSG00000085685 | 13 | 14 | 0                | processed_pseudogene |
| ENSMUSG00000099899 | 13 | 13 | 0 Gm28784        | lincRNA              |
| ENSMUSG00000062727 | 13 | 12 | 0 Hist1h2bk      | protein_coding       |
| ENSMUSG00000069303 | 13 | 12 | 0 Hist1h2br      | protein_coding       |
| ENSMUSG00000069307 | 13 | 12 | 0 Hist1h2bq      | protein_coding       |
| ENSMUSG00000086089 | 13 | 10 | 0 Gm11640        | antisense            |

|                    |    |    |                 |                      |
|--------------------|----|----|-----------------|----------------------|
| ENSMUSG00000045350 | 13 | 9  | 2 Fam186a       | protein_coding       |
| ENSMUSG00000074783 | 13 | 8  | 0 AU019990      | lincRNA              |
| ENSMUSG00000029836 | 13 | 7  | 14 Cbx3         | protein_coding       |
| ENSMUSG00000023118 | 13 | 7  | 6 Sympk         | protein_coding       |
| ENSMUSG00000023980 | 13 | 7  | 0 Taf8          | protein_coding       |
| ENSMUSG00000062456 | 13 | 6  | 20 Rpl9-ps6     | protein_coding       |
| ENSMUSG00000028140 | 13 | 5  | 0 Mrpl9         | protein_coding       |
| ENSMUSG00000092837 | 13 | 5  | 83 Rpph1        | misc_RNA             |
| ENSMUSG00000061859 | 13 | 5  | 0 Inadl         | protein_coding       |
| ENSMUSG00000029462 | 13 | 4  | 42 Vps29        | protein_coding       |
| ENSMUSG00000030768 | 13 | 4  | 0 Displ         | protein_coding       |
| ENSMUSG00000064634 | 13 | 4  | 0 Gm22620       | snoRNA               |
| ENSMUSG00000054263 | 13 | 1  | 24 Lifr         | protein_coding       |
| ENSMUSG00000009640 | 13 | 0  | 0 Dmap1         | protein_coding       |
| ENSMUSG00000020708 | 13 | 0  | 0 Psmc5         | protein_coding       |
| ENSMUSG00000021756 | 13 | 0  | 0 Il6st         | protein_coding       |
| ENSMUSG00000035776 | 13 | 0  | 0 Cd99l2        | protein_coding       |
| ENSMUSG00000037971 | 13 | 0  | 0 1110032A03Rik | protein_coding       |
| ENSMUSG00000052833 | 13 | 0  | 0 Sae1          | protein_coding       |
| ENSMUSG00000017679 | 13 | 29 | 0 Ttpal         | protein_coding       |
| ENSMUSG00000090083 | 13 | 24 | 0 Rnf8          | protein_coding       |
| ENSMUSG00000025465 | 13 | 24 | 6 Echs1         | protein_coding       |
| ENSMUSG00000020876 | 13 | 22 | 0 Snx11         | protein_coding       |
| ENSMUSG00000067338 | 13 | 22 | 14 Tuba3b       | protein_coding       |
| ENSMUSG00000026670 | 13 | 22 | 0 Uap1          | protein_coding       |
| ENSMUSG00000064941 | 13 | 19 | 121 Gm23238     | snRNA                |
| ENSMUSG00000098019 | 13 | 18 | 0 Gm2546        | processed_pseudogene |
| ENSMUSG00000098240 | 13 | 18 | 0 Gm4575        | processed_pseudogene |
| ENSMUSG00000046330 | 13 | 17 | 10 Rpl37a       | protein_coding       |
| ENSMUSG00000098203 | 13 | 16 | 0 Gm9568        | processed_pseudogene |
| ENSMUSG00000048756 | 13 | 14 | 0 Foxo3         | protein_coding       |
| ENSMUSG00000039959 | 13 | 14 | 0 Hip1          | protein_coding       |
| ENSMUSG00000073569 | 13 | 13 | 0 Gm10540       | processed_pseudogene |
| ENSMUSG00000084838 | 13 | 13 | 0 Gm10241       | processed_pseudogene |
| ENSMUSG00000085738 | 13 | 13 | 0 Gm12335       | processed_pseudogene |
| ENSMUSG00000018102 | 13 | 12 | 0 Hist1h2bc     | protein_coding       |
| ENSMUSG00000019848 | 13 | 12 | 0 Popdc3        | protein_coding       |
| ENSMUSG00000031022 | 13 | 12 | 0 BC051019      | protein_coding       |
| ENSMUSG00000098199 | 13 | 12 | 0 Gm9358        | processed_pseudogene |
| ENSMUSG00000094338 | 13 | 11 | 0 Hist1h2bl     | protein_coding       |
| ENSMUSG00000097426 | 13 | 11 | 0 Gm8941        | processed_pseudogene |
| ENSMUSG00000043424 | 13 | 10 | 0 Eif3j2        | protein_coding       |
| ENSMUSG00000086565 | 13 | 10 | 0 Gm13133       | antisense            |
| ENSMUSG00000095217 | 13 | 10 | 0 Hist1h2bn     | protein_coding       |
| ENSMUSG00000048280 | 13 | 9  | 6 Zfp738        | protein_coding       |
| ENSMUSG00000101935 | 13 | 9  | 0 Gm17748       | processed_pseudogene |
| ENSMUSG00000058704 | 13 | 9  | 6 Memo1         | protein_coding       |
| ENSMUSG00000066407 | 13 | 8  | 0 Gm10263       | protein_coding       |
| ENSMUSG00000056076 | 13 | 7  | 0 Eif3b         | protein_coding       |

|                    |    |    |                 |                        |
|--------------------|----|----|-----------------|------------------------|
| ENSMUSG00000057886 | 13 | 6  | 10 Cbx3-ps6     | processed_pseudogene   |
| ENSMUSG00000059647 | 13 | 6  | 10 Cbx3-ps7     | processed_pseudogene   |
| ENSMUSG00000031949 | 13 | 5  | 12 Adat1        | protein_coding         |
| ENSMUSG00000038368 | 13 | 5  | 0 Focad         | protein_coding         |
| ENSMUSG00000046062 | 13 | 5  | 0 Ppp1r15b      | protein_coding         |
| ENSMUSG00000063801 | 13 | 5  | 0 Ap3s2         | protein_coding         |
| ENSMUSG00000022895 | 13 | 4  | 0 Ets2          | protein_coding         |
| ENSMUSG00000061852 | 13 | 4  | 0 Gm7582        | unprocessed_pseudogene |
| ENSMUSG00000026502 | 13 | 1  | 14 Desi2        | protein_coding         |
| ENSMUSG00000031819 | 13 | 1  | 0 Emc8          | protein_coding         |
| ENSMUSG00000073684 | 13 | 0  | 32 Faap20       | protein_coding         |
| ENSMUSG00000045071 | 13 | 0  | 2 E130308A19Rik | protein_coding         |
| ENSMUSG00000003348 | 13 | 0  | 0 Mob3a         | protein_coding         |
| ENSMUSG00000022858 | 13 | 0  | 0 Tra2b         | protein_coding         |
| ENSMUSG00000025578 | 13 | 0  | 0 Cbx8          | protein_coding         |
| ENSMUSG00000029098 | 13 | 0  | 0 Acox3         | protein_coding         |
| ENSMUSG00000046138 | 13 | 0  | 0 9930021J03Rik | protein_coding         |
| ENSMUSG00000046709 | 13 | 0  | 0 Mapk10        | protein_coding         |
| ENSMUSG00000049553 | 13 | 0  | 0 Polr1a        | protein_coding         |
| ENSMUSG00000050022 | 12 | 35 | 0 Amz1          | protein_coding         |
| ENSMUSG00000027427 | 12 | 30 | 0 Polr3f        | protein_coding         |
| ENSMUSG00000097530 | 12 | 26 | 0 Kansl2-ps     | processed_pseudogene   |
| ENSMUSG00000005161 | 12 | 25 | 4 Prdx2         | protein_coding         |
| ENSMUSG00000042548 | 12 | 24 | 0 Asxl1         | protein_coding         |
| ENSMUSG00000098678 | 12 | 23 | 103 Mroh6       | protein_coding         |
| ENSMUSG00000091053 | 12 | 23 | 0 Gm9742        | protein_coding         |
| ENSMUSG00000041064 | 12 | 22 | 0 Pif1          | protein_coding         |
| ENSMUSG00000040624 | 12 | 20 | 0 Plekhg1       | protein_coding         |
| ENSMUSG00000081067 | 12 | 19 | 26 Gm12912      | processed_pseudogene   |
| ENSMUSG00000065845 | 12 | 18 | 97 Gm25189      | snRNA                  |
| ENSMUSG00000065905 | 12 | 18 | 91 Gm26110      | snRNA                  |
| ENSMUSG00000066148 | 12 | 18 | 16 Prpf4        | protein_coding         |
| ENSMUSG00000103175 | 12 | 16 | 0 Gm37169       | TEC                    |
| ENSMUSG00000053414 | 12 | 14 | 93 Hunk         | protein_coding         |
| ENSMUSG00000006304 | 12 | 14 | 115 Arpc2       | protein_coding         |
| ENSMUSG00000083232 | 12 | 14 | 0 Gm11796       | processed_pseudogene   |
| ENSMUSG00000003992 | 12 | 13 | 0 Ssbp2         | protein_coding         |
| ENSMUSG00000097965 | 12 | 12 | 0 Gm5839        | processed_pseudogene   |
| ENSMUSG00000030313 | 12 | 12 | 2 Dennd5b       | protein_coding         |
| ENSMUSG00000086922 | 12 | 12 | 0 Gm13835       | processed_pseudogene   |
| ENSMUSG00000058385 | 12 | 11 | 0 Hist1h2bg     | protein_coding         |
| ENSMUSG00000064168 | 12 | 11 | 0 Hist1h2bh     | protein_coding         |
| ENSMUSG00000079042 | 12 | 11 | 0 Apela         | protein_coding         |
| ENSMUSG00000080758 | 12 | 11 | 0 Gm5392        | processed_pseudogene   |
| ENSMUSG00000087605 | 12 | 11 | 0 Gm15742       | sense_intronic         |
| ENSMUSG00000001016 | 12 | 10 | 0 Ilf2          | protein_coding         |
| ENSMUSG00000047246 | 12 | 10 | 0 Hist1h2be     | protein_coding         |
| ENSMUSG00000093183 | 12 | 9  | 171 Gm25687     | misc_RNA               |
| ENSMUSG00000042500 | 12 | 9  | 0 Ago4          | protein_coding         |

|                    |    |    |                 |                                  |
|--------------------|----|----|-----------------|----------------------------------|
| ENSMUSG00000048960 | 12 | 9  | 0 Prex2         | protein_coding                   |
| ENSMUSG00000038160 | 12 | 8  | 12 Atg5         | protein_coding                   |
| ENSMUSG00000063524 | 12 | 8  | 4 Eno1          | protein_coding                   |
| ENSMUSG00000028654 | 12 | 7  | 59 Mycl         | protein_coding                   |
| ENSMUSG00000031998 | 12 | 7  | 0 1700128F08Rik | protein_coding                   |
| ENSMUSG00000080241 | 12 | 6  | 0 Dppa3-ps      | transcribed_processed_pseudogene |
| ENSMUSG00000024334 | 12 | 5  | 0 H2-Oa         | protein_coding                   |
| ENSMUSG00000048905 | 12 | 5  | 0 4930539E08Rik | protein_coding                   |
| ENSMUSG00000053559 | 12 | 5  | 0 Smagp         | protein_coding                   |
| ENSMUSG00000086984 | 12 | 5  | 0 Gm6762        | processed_pseudogene             |
| ENSMUSG00000022601 | 12 | 4  | 14 Zbtb11       | protein_coding                   |
| ENSMUSG00000040540 | 12 | 4  | 0 Gm9770        | pseudogene                       |
| ENSMUSG00000081596 | 12 | 4  | 0 Gm15968       | processed_pseudogene             |
| ENSMUSG00000082755 | 12 | 3  | 0 Gm8692        | processed_pseudogene             |
| ENSMUSG00000030879 | 12 | 0  | 0 Mrpl17        | protein_coding                   |
| ENSMUSG00000037845 | 12 | 0  | 0 Fdxacb1       | protein_coding                   |
| ENSMUSG00000039130 | 12 | 0  | 0 Zc3hc1        | protein_coding                   |
| ENSMUSG00000075229 | 12 | 0  | 0 Ccdc58        | protein_coding                   |
| ENSMUSG00000063317 | 11 | 43 | 0 Usp31         | protein_coding                   |
| ENSMUSG00000077625 | 11 | 33 | 97 Snord4a      | snoRNA                           |
| ENSMUSG00000036983 | 11 | 33 | 0 Tfb1m         | protein_coding                   |
| ENSMUSG00000045136 | 11 | 29 | 0 Tubb2b        | protein_coding                   |
| ENSMUSG00000058672 | 11 | 29 | 0 Tubb2a        | protein_coding                   |
| ENSMUSG00000083291 | 11 | 24 | 0 Gm13679       | processed_pseudogene             |
| ENSMUSG00000081766 | 11 | 20 | 0 2210409E12Rik | transcribed_processed_pseudogene |
| ENSMUSG00000070462 | 11 | 20 | 12 Mesdc1       | protein_coding                   |
| ENSMUSG00000083727 | 11 | 20 | 0               | processed_pseudogene             |
| ENSMUSG00000021690 | 11 | 19 | 0 Jmy           | protein_coding                   |
| ENSMUSG00000068479 | 11 | 19 | 0 Mfap1a        | protein_coding                   |
| ENSMUSG00000065097 | 11 | 18 | 339 Snora16a    | snoRNA                           |
| ENSMUSG00000047714 | 11 | 18 | 0 Ppp1r2        | protein_coding                   |
| ENSMUSG00000025609 | 11 | 18 | 8 Mklm1         | protein_coding                   |
| ENSMUSG00000081281 | 11 | 18 | 6 Gm6274        | processed_pseudogene             |
| ENSMUSG00000102599 | 11 | 18 | 0 Gm38386       | TEC                              |
| ENSMUSG00000057685 | 11 | 17 | 2 Gm8526        | processed_pseudogene             |
| ENSMUSG00000082778 | 11 | 16 | 0 Gm15191       | processed_pseudogene             |
| ENSMUSG00000027340 | 11 | 14 | 12 Slc23a2      | protein_coding                   |
| ENSMUSG00000020864 | 11 | 14 | 0 Ankrd40       | protein_coding                   |
| ENSMUSG00000000276 | 11 | 13 | 0 Dgke          | protein_coding                   |
| ENSMUSG00000081071 | 11 | 13 | 0 Gm9836        | processed_pseudogene             |
| ENSMUSG00000027012 | 11 | 12 | 8 Dync1i2       | protein_coding                   |
| ENSMUSG00000021595 | 11 | 12 | 0 Nsun2         | protein_coding                   |
| ENSMUSG00000033159 | 11 | 12 | 0 Cnppd1        | protein_coding                   |
| ENSMUSG00000081401 | 11 | 12 | 0               | processed_pseudogene             |
| ENSMUSG00000097883 | 11 | 12 | 0 Gm8357        | processed_pseudogene             |
| ENSMUSG00000097936 | 11 | 12 | 0 Gm4819        | processed_pseudogene             |
| ENSMUSG00000074212 | 11 | 12 | 36 Dnajb14      | protein_coding                   |
| ENSMUSG00000070319 | 11 | 12 | 0 Eif3g         | protein_coding                   |
| ENSMUSG00000103322 | 11 | 12 | 0 Gm37404       | TEC                              |

|                    |    |    |                    |                                  |
|--------------------|----|----|--------------------|----------------------------------|
| ENSMUSG00000070271 | 11 | 11 | 34 Gm13268         | processed_pseudogene             |
| ENSMUSG00000040945 | 11 | 11 | 14 Rcc2            | protein_coding                   |
| ENSMUSG00000068039 | 11 | 11 | 0 Tcp1             | protein_coding                   |
| ENSMUSG00000103123 | 11 | 11 | 0 Gm37390          | TEC                              |
| ENSMUSG00000002107 | 11 | 10 | 0 Celf2            | protein_coding                   |
| ENSMUSG00000071235 | 11 | 10 | 0 Vrtm             | protein_coding                   |
| ENSMUSG00000084104 | 11 | 10 | 0 Gm13578          | processed_pseudogene             |
| ENSMUSG00000060739 | 11 | 9  | 0 Nsa2             | protein_coding                   |
| ENSMUSG00000069308 | 11 | 9  | 0 Hist1h2bp        | protein_coding                   |
| ENSMUSG00000075031 | 11 | 9  | 0 Hist1h2bb        | protein_coding                   |
| ENSMUSG00000100014 | 11 | 9  | 0 Gm29290          | lincRNA                          |
| ENSMUSG00000029528 | 11 | 9  | 50 Pxn             | protein_coding                   |
| ENSMUSG00000020633 | 11 | 9  | 0 Dcdc2c           | protein_coding                   |
| ENSMUSG00000078627 | 11 | 9  | 0 March10          | protein_coding                   |
| ENSMUSG00000030555 | 11 | 8  | 0 Ttc23            | protein_coding                   |
| ENSMUSG00000060657 | 11 | 8  | 0 Marf1            | protein_coding                   |
| ENSMUSG00000067288 | 11 | 8  | 0 Rps28            | protein_coding                   |
| ENSMUSG00000027076 | 11 | 7  | 0 Timm10           | protein_coding                   |
| ENSMUSG00000027510 | 11 | 7  | 0 Rbm38            | protein_coding                   |
| ENSMUSG00000060639 | 11 | 5  | 6 Hist1h4i         | protein_coding                   |
| ENSMUSG00000032998 | 11 | 5  | 0 Foxj3            | protein_coding                   |
| ENSMUSG00000023068 | 11 | 5  | 2 Nus1             | protein_coding                   |
| ENSMUSG00000059423 | 11 | 5  | 0 Zfp933           | protein_coding                   |
| ENSMUSG00000066406 | 11 | 5  | 0 Akap13           | protein_coding                   |
| ENSMUSG00000071089 | 11 | 5  | 0 Trim75           | protein_coding                   |
| ENSMUSG00000084729 | 11 | 4  | 278 Gm24139        | misc_RNA                         |
| ENSMUSG00000088562 | 11 | 4  | 240 Gm23780        | misc_RNA                         |
| ENSMUSG00000031565 | 11 | 4  | 26 Fgfr1           | protein_coding                   |
| ENSMUSG00000015776 | 11 | 4  | 0 Med22            | protein_coding                   |
| ENSMUSG00000029014 | 11 | 3  | 0 Dnajc2           | protein_coding                   |
| ENSMUSG00000055033 | 11 | 1  | 0 Olfr420          | protein_coding                   |
| ENSMUSG00000037236 | 11 | 1  | 14 Matr3           | protein_coding                   |
| ENSMUSG00000039501 | 11 | 1  | 0 Znfx1            | protein_coding                   |
| ENSMUSG00000018379 | 11 | 0  | 500 Srsf1          | protein_coding                   |
| ENSMUSG00000001175 | 11 | 0  | 280 Calm1          | protein_coding                   |
| ENSMUSG00000019838 | 11 | 0  | 14 Slc16a10        | protein_coding                   |
| ENSMUSG00000048429 | 11 | 0  | 12 1810026J23Rik   | protein_coding                   |
| ENSMUSG00000087412 | 11 | 0  | 6 Gm15501          | transcribed_processed_pseudogene |
| ENSMUSG00000102550 | 11 | 0  | 6 Gm8276           | processed_pseudogene             |
| ENSMUSG00000023965 | 11 | 0  | 0 Fbx117           | protein_coding                   |
| ENSMUSG00000026374 | 11 | 0  | 0 Tsn              | protein_coding                   |
| ENSMUSG00000028836 | 11 | 0  | 0 Slc30a2          | protein_coding                   |
| ENSMUSG00000031393 | 11 | 0  | 0 Mecp2            | protein_coding                   |
| ENSMUSG00000082247 | 11 | 0  | 0 Gm16074          | processed_pseudogene             |
| ENSMUSG00000031299 | 10 | 43 | 0 Pdha1            | protein_coding                   |
| ENSMUSG00000069892 | 10 | 28 | 101 9930111J21Rik2 | protein_coding                   |
| ENSMUSG00000021460 | 10 | 25 | 0 Auh              | protein_coding                   |
| ENSMUSG00000022960 | 10 | 24 | 0 Donson           | protein_coding                   |
| ENSMUSG00000074030 | 10 | 23 | 16 Exoc8           | protein_coding                   |

|                    |    |    |                  |                                  |
|--------------------|----|----|------------------|----------------------------------|
| ENSMUSG00000031672 | 10 | 18 | 204 Got2         | protein_coding                   |
| ENSMUSG00000035944 | 10 | 17 | 0 Ttc38          | protein_coding                   |
| ENSMUSG00000085572 | 10 | 17 | 0 Gm16234        | antisense                        |
| ENSMUSG00000058706 | 10 | 16 | 79 0610030E20Rik | protein_coding                   |
| ENSMUSG00000028438 | 10 | 16 | 0 Kif24          | protein_coding                   |
| ENSMUSG00000048807 | 10 | 16 | 0 Slc35e4        | protein_coding                   |
| ENSMUSG00000075162 | 10 | 16 | 0 Gm10812        | pseudogene                       |
| ENSMUSG00000092354 | 10 | 15 | 0 Gm20548        | processed_transcript             |
| ENSMUSG00000037415 | 10 | 14 | 0 Ranbp10        | protein_coding                   |
| ENSMUSG00000093560 | 10 | 14 | 0 Gm6695         | processed_pseudogene             |
| ENSMUSG00000026915 | 10 | 13 | 67 Strbp         | protein_coding                   |
| ENSMUSG00000081552 | 10 | 13 | 4 Gm12328        | processed_pseudogene             |
| ENSMUSG00000025464 | 10 | 13 | 0 Paox           | protein_coding                   |
| ENSMUSG00000052395 | 10 | 13 | 0 Rft1           | protein_coding                   |
| ENSMUSG00000058756 | 10 | 13 | 0 Thra           | protein_coding                   |
| ENSMUSG00000070960 | 10 | 13 | 0 Gm19680        | processed_pseudogene             |
| ENSMUSG00000079357 | 10 | 13 | 0 Gm11100        | antisense                        |
| ENSMUSG00000074489 | 10 | 12 | 0 Bglap3         | protein_coding                   |
| ENSMUSG00000097941 | 10 | 12 | 0 Gm8984         | processed_pseudogene             |
| ENSMUSG00000102156 | 10 | 12 | 0 Gm37471        | TEC                              |
| ENSMUSG00000030275 | 10 | 12 | 14 Etnk1         | protein_coding                   |
| ENSMUSG00000083909 | 10 | 12 | 2 Gm15842        | processed_pseudogene             |
| ENSMUSG00000067825 | 10 | 12 | 0 Pex26          | protein_coding                   |
| ENSMUSG00000081201 | 10 | 12 | 0 Smt3h2-ps4     | processed_pseudogene             |
| ENSMUSG00000082970 | 10 | 12 | 0 Gm15214        | processed_pseudogene             |
| ENSMUSG00000085477 | 10 | 12 | 0 Gm13335        | antisense                        |
| ENSMUSG00000087350 | 10 | 12 | 0 Gm16254        | processed_pseudogene             |
| ENSMUSG00000021936 | 10 | 11 | 8 Mapk8          | protein_coding                   |
| ENSMUSG00000034940 | 10 | 11 | 6 Synrg          | protein_coding                   |
| ENSMUSG00000030432 | 10 | 11 | 0 Rpl28          | protein_coding                   |
| ENSMUSG00000080950 | 10 | 11 | 0 Gm7278         | processed_pseudogene             |
| ENSMUSG00000087367 | 10 | 11 | 0 Gm15491        | antisense                        |
| ENSMUSG00000078126 | 10 | 10 | 6 Rpl23a-ps3     | protein_coding                   |
| ENSMUSG00000036825 | 10 | 10 | 0 Ssx2ip         | protein_coding                   |
| ENSMUSG00000058546 | 10 | 10 | 0 Rpl23a         | protein_coding                   |
| ENSMUSG00000074184 | 10 | 10 | 0 Smt3h2-ps2     | processed_pseudogene             |
| ENSMUSG00000074250 | 10 | 10 | 0 Gm10653        | transcribed_processed_pseudogene |
| ENSMUSG00000063556 | 10 | 9  | 6 Gm10132        | processed_pseudogene             |
| ENSMUSG00000071532 | 10 | 9  | 6 Gm10335        | processed_pseudogene             |
| ENSMUSG00000085442 | 10 | 9  | 6 Gm3362         | processed_pseudogene             |
| ENSMUSG00000032540 | 10 | 9  | 0 Abhd5          | protein_coding                   |
| ENSMUSG00000078180 | 10 | 9  | 0 Gm20900        | processed_pseudogene             |
| ENSMUSG00000023800 | 10 | 9  | 12 Tiam2         | protein_coding                   |
| ENSMUSG00000033538 | 10 | 9  | 0 Casp4          | protein_coding                   |
| ENSMUSG00000061578 | 10 | 9  | 0 Ksr2           | protein_coding                   |
| ENSMUSG00000072258 | 10 | 9  | 0 Taf1a          | protein_coding                   |
| ENSMUSG00000070576 | 10 | 7  | 0 Mn1            | protein_coding                   |
| ENSMUSG00000085817 | 10 | 7  | 0 Gm12668        | lincRNA                          |
| ENSMUSG00000021510 | 10 | 7  | 6 Zfp729a        | protein_coding                   |



|                     |    |    |               |                      |
|---------------------|----|----|---------------|----------------------|
| ENSMUSG00000025332  | 10 | 7  | 0 Kdm5c       | protein_coding       |
| ENSMUSG00000028932  | 10 | 7  | 0 Psmc2       | protein_coding       |
| ENSMUSG00000037640  | 10 | 7  | 0 Zfp60       | protein_coding       |
| ENSMUSG000000103839 | 10 | 7  | 0 Gm37607     | TEC                  |
| ENSMUSG00000047215  | 10 | 6  | 10 Rpl9       | protein_coding       |
| ENSMUSG00000033022  | 10 | 6  | 0 Cdo1        | protein_coding       |
| ENSMUSG00000026932  | 10 | 5  | 0 Nacc2       | protein_coding       |
| ENSMUSG00000028136  | 10 | 5  | 0 Snx27       | protein_coding       |
| ENSMUSG00000029598  | 10 | 5  | 0 Plbd2       | protein_coding       |
| ENSMUSG00000044617  | 10 | 5  | 0 Zbtb39      | protein_coding       |
| ENSMUSG00000084674  | 10 | 4  | 238 Gm26027   | misc_RNA             |
| ENSMUSG00000085208  | 10 | 4  | 4 Brip1os     | antisense            |
| ENSMUSG00000033933  | 10 | 4  | 0 Vhl         | protein_coding       |
| ENSMUSG00000070610  | 10 | 4  | 0 Gm13127     | processed_pseudogene |
| ENSMUSG00000092888  | 10 | 3  | 567 Gm22122   | snRNA                |
| ENSMUSG00000028644  | 10 | 3  | 2 Ermap       | protein_coding       |
| ENSMUSG00000075014  | 10 | 0  | 72591 Gm10800 | protein_coding       |
| ENSMUSG00000025337  | 10 | 0  | 44 Sbd5       | protein_coding       |
| ENSMUSG00000048170  | 10 | 0  | 12 Mcmbp      | protein_coding       |
| ENSMUSG00000040472  | 10 | 0  | 10 RabggtA    | protein_coding       |
| ENSMUSG00000052407  | 10 | 0  | 2 Ccdc171     | protein_coding       |
| ENSMUSG00000000346  | 10 | 0  | 0 Dazap2      | protein_coding       |
| ENSMUSG00000006818  | 10 | 0  | 0 Sod2        | protein_coding       |
| ENSMUSG00000014498  | 10 | 0  | 0 Ankrd52     | protein_coding       |
| ENSMUSG00000020074  | 10 | 0  | 0 Ccar1       | protein_coding       |
| ENSMUSG00000025873  | 10 | 0  | 0 Faf2        | protein_coding       |
| ENSMUSG00000028394  | 10 | 0  | 0 Pole3       | protein_coding       |
| ENSMUSG00000029238  | 10 | 0  | 0 Clock       | protein_coding       |
| ENSMUSG00000029247  | 10 | 0  | 0 Paics       | protein_coding       |
| ENSMUSG00000032485  | 10 | 0  | 0 Scap        | protein_coding       |
| ENSMUSG00000040928  | 10 | 0  | 0 S100pbp     | protein_coding       |
| ENSMUSG00000041685  | 10 | 0  | 0 Fcho2       | protein_coding       |
| ENSMUSG00000044847  | 10 | 0  | 0 Lsm11       | protein_coding       |
| ENSMUSG00000053957  | 10 | 0  | 0 Gm12474     | lincRNA              |
| ENSMUSG00000056184  | 10 | 0  | 0 Olfr283     | protein_coding       |
| ENSMUSG00000063804  | 10 | 0  | 0 Lin28b      | protein_coding       |
| ENSMUSG00000065068  | 10 | 0  | 0 n-R5s5      | rRNA                 |
| ENSMUSG00000066176  | 10 | 0  | 0 Gm12511     | lincRNA              |
| ENSMUSG00000077711  | 10 | 0  | 0 AF357399    | snoRNA               |
| ENSMUSG00000022197  | 10 | 36 | 0 Pdzd2       | protein_coding       |
| ENSMUSG00000021891  | 10 | 25 | 0 Mettl6      | protein_coding       |
| ENSMUSG00000034522  | 10 | 20 | 0 Zfp395      | protein_coding       |
| ENSMUSG00000048000  | 10 | 20 | 159 Gigyf2    | protein_coding       |
| ENSMUSG00000026031  | 10 | 19 | 4 Cflar       | protein_coding       |
| ENSMUSG00000033307  | 10 | 18 | 4 Mif         | protein_coding       |
| ENSMUSG00000020883  | 10 | 18 | 0 Fbxl20      | protein_coding       |
| ENSMUSG000000104046 | 10 | 17 | 0 Gm37567     | TEC                  |
| ENSMUSG00000028138  | 10 | 16 | 12 Adh5       | protein_coding       |
| ENSMUSG00000083669  | 10 | 16 | 4 Gm10169     | processed_pseudogene |

|                    |    |    |             |                                    |
|--------------------|----|----|-------------|------------------------------------|
| ENSMUSG00000029815 | 10 | 16 | 0 Malsu1    | protein_coding                     |
| ENSMUSG00000030986 | 10 | 15 | 14 Dhx32    | protein_coding                     |
| ENSMUSG00000089646 | 10 | 15 | 6 Gm15796   | processed_pseudogene               |
| ENSMUSG00000033430 | 10 | 14 | 24 Terf2ip  | protein_coding                     |
| ENSMUSG00000021890 | 10 | 14 | 0 Eaf1      | protein_coding                     |
| ENSMUSG00000081607 | 10 | 14 | 0 Gm15294   | protein_coding                     |
| ENSMUSG00000022840 | 10 | 13 | 4 Adcy5     | protein_coding                     |
| ENSMUSG00000052783 | 10 | 12 | 0 Grk4      | protein_coding                     |
| ENSMUSG00000083391 | 10 | 12 | 0 Gm14148   | processed_pseudogene               |
| ENSMUSG00000011179 | 10 | 12 | 4 Odc1      | protein_coding                     |
| ENSMUSG00000082900 | 10 | 12 | 0 Gm11557   | processed_pseudogene               |
| ENSMUSG00000039065 | 10 | 11 | 0 Fam173b   | protein_coding                     |
| ENSMUSG00000062353 | 10 | 9  | 34 Gm15772  | processed_pseudogene               |
| ENSMUSG00000040123 | 10 | 9  | 0 Zmym5     | protein_coding                     |
| ENSMUSG00000077323 | 10 | 9  | 0 Rnu11     | snRNA                              |
| ENSMUSG00000086926 | 10 | 9  | 0 Gm6226    | processed_pseudogene               |
| ENSMUSG00000082768 | 10 | 9  | 0 Gm12727   | processed_pseudogene               |
| ENSMUSG00000099478 | 10 | 9  | 0 Gm28370   | antisense                          |
| ENSMUSG00000002129 | 10 | 8  | 0 Sf3a1     | protein_coding                     |
| ENSMUSG00000021254 | 10 | 8  | 0 Gpatch2l  | protein_coding                     |
| ENSMUSG00000079457 | 10 | 7  | 2 Gm7609    | transcribed_unprocessed_pseudogene |
| ENSMUSG00000026889 | 10 | 7  | 0 Rbm18     | protein_coding                     |
| ENSMUSG00000031722 | 10 | 7  | 0 Hp        | protein_coding                     |
| ENSMUSG00000022636 | 10 | 7  | 250 Alcam   | protein_coding                     |
| ENSMUSG00000031861 | 10 | 7  | 0 Lpar2     | protein_coding                     |
| ENSMUSG00000034875 | 10 | 7  | 0 Nudt19    | protein_coding                     |
| ENSMUSG00000038150 | 10 | 7  | 0 Ormdl3    | protein_coding                     |
| ENSMUSG00000047528 | 10 | 7  | 0 Als2cr12  | protein_coding                     |
| ENSMUSG00000063576 | 10 | 7  | 0 Klhdc3    | protein_coding                     |
| ENSMUSG00000033557 | 10 | 6  | 18 Fam20b   | protein_coding                     |
| ENSMUSG00000019866 | 10 | 6  | 2 Aim1      | protein_coding                     |
| ENSMUSG00000014606 | 10 | 6  | 0 Slc25a11  | protein_coding                     |
| ENSMUSG00000026605 | 10 | 6  | 0 Cenpf     | protein_coding                     |
| ENSMUSG00000029790 | 10 | 6  | 0 Cep41     | protein_coding                     |
| ENSMUSG00000072940 | 10 | 6  | 0 Gm10443   | processed_pseudogene               |
| ENSMUSG00000028107 | 10 | 5  | 0 Tars2     | protein_coding                     |
| ENSMUSG00000034111 | 10 | 4  | 0 Tmed8     | protein_coding                     |
| ENSMUSG00000068732 | 10 | 4  | 0 Tmem167b  | protein_coding                     |
| ENSMUSG00000025949 | 10 | 3  | 4 Pikfyve   | protein_coding                     |
| ENSMUSG00000066877 | 10 | 3  | 0 Nck2      | protein_coding                     |
| ENSMUSG00000065822 | 10 | 3  | 20 Snord15a | snoRNA                             |
| ENSMUSG00000015165 | 10 | 1  | 48 Hnrnpl   | protein_coding                     |
| ENSMUSG00000052459 | 10 | 1  | 0 Atp6v1a   | protein_coding                     |
| ENSMUSG00000019823 | 10 | 1  | 0 Mical1    | protein_coding                     |
| ENSMUSG00000022472 | 10 | 0  | 313 Desi1   | protein_coding                     |
| ENSMUSG00000053411 | 10 | 0  | 14 Cbx7     | protein_coding                     |
| ENSMUSG00000003068 | 10 | 0  | 0 Stk11     | protein_coding                     |
| ENSMUSG00000004947 | 10 | 0  | 0 Dtx2      | protein_coding                     |
| ENSMUSG00000009092 | 10 | 0  | 0 Derl3     | protein_coding                     |

|                    |    |    |                  |                        |
|--------------------|----|----|------------------|------------------------|
| ENSMUSG00000019978 | 10 | 0  | 0 Epb41l2        | protein_coding         |
| ENSMUSG00000022024 | 10 | 0  | 0 Sugt1          | protein_coding         |
| ENSMUSG00000023026 | 10 | 0  | 0 Dip2b          | protein_coding         |
| ENSMUSG00000030045 | 10 | 0  | 0 Mrpl19         | protein_coding         |
| ENSMUSG00000032840 | 10 | 0  | 0 2410131K14Rik  | protein_coding         |
| ENSMUSG00000041895 | 10 | 0  | 0 Wipi1          | protein_coding         |
| ENSMUSG00000043323 | 10 | 0  | 0 Fbrsl1         | protein_coding         |
| ENSMUSG00000045193 | 10 | 0  | 0 Cirbp          | protein_coding         |
| ENSMUSG00000047412 | 10 | 0  | 0 Zbtb44         | protein_coding         |
| ENSMUSG00000047953 | 10 | 0  | 0 Gp5            | protein_coding         |
| ENSMUSG00000050821 | 10 | 0  | 0 Fam131a        | protein_coding         |
| ENSMUSG00000055763 | 10 | 0  | 0 Rybp-ps        | processed_pseudogene   |
| ENSMUSG00000061313 | 10 | 0  | 0 Ddhd2          | protein_coding         |
| ENSMUSG00000081302 | 10 | 0  | 0 Gm12020        | processed_pseudogene   |
| ENSMUSG00000082136 | 9  | 47 | 0 Gm15660        | processed_pseudogene   |
| ENSMUSG00000097119 | 9  | 35 | 12 B230354K17Rik | lincRNA                |
| ENSMUSG00000056771 | 9  | 30 | 2193 Gm10010     | protein_coding         |
| ENSMUSG00000055239 | 9  | 30 | 0 Kcmf1          | protein_coding         |
| ENSMUSG00000065089 | 9  | 30 | 0 Gm26493        | snoRNA                 |
| ENSMUSG00000028798 | 9  | 29 | 0 Eif3i          | protein_coding         |
| ENSMUSG00000058392 | 9  | 28 | 0 Rrp1b          | protein_coding         |
| ENSMUSG00000079942 | 9  | 28 | 0 Rpl28-ps3      | processed_pseudogene   |
| ENSMUSG00000104208 | 9  | 25 | 0 Gm37401        | antisense              |
| ENSMUSG00000006527 | 9  | 23 | 16 Sfmbt1        | protein_coding         |
| ENSMUSG00000083433 | 9  | 20 | 0                | processed_pseudogene   |
| ENSMUSG00000050490 | 9  | 18 | 0 Gm8394         | protein_coding         |
| ENSMUSG00000068749 | 9  | 18 | 0 Psma5          | protein_coding         |
| ENSMUSG00000083678 | 9  | 18 | 0 Gm12989        | processed_pseudogene   |
| ENSMUSG00000034329 | 9  | 18 | 0 Bripl          | protein_coding         |
| ENSMUSG00000080152 | 9  | 17 | 0 Gm12260        | unprocessed_pseudogene |
| ENSMUSG00000047388 | 9  | 16 | 57 Atmin         | protein_coding         |
| ENSMUSG00000083095 | 9  | 16 | 0                | processed_pseudogene   |
| ENSMUSG00000040407 | 9  | 16 | 0 Akap9          | protein_coding         |
| ENSMUSG00000040658 | 9  | 16 | 0 Dnph1          | protein_coding         |
| ENSMUSG00000081123 | 9  | 16 | 0 Gm11469        | processed_pseudogene   |
| ENSMUSG00000034187 | 9  | 15 | 0 Nsf            | protein_coding         |
| ENSMUSG00000063275 | 9  | 14 | 0 Hacd1          | protein_coding         |
| ENSMUSG00000080254 | 9  | 14 | 0 Fam220-ps      | processed_pseudogene   |
| ENSMUSG00000083552 | 9  | 14 | 0                | processed_pseudogene   |
| ENSMUSG00000001445 | 9  | 13 | 0 Mrpl10         | protein_coding         |
| ENSMUSG00000040339 | 9  | 13 | 0 Fam102b        | protein_coding         |
| ENSMUSG00000098187 | 9  | 13 | 0 Gm8927         | processed_pseudogene   |
| ENSMUSG00000102683 | 9  | 13 | 0 Gm37375        | TEC                    |
| ENSMUSG00000010554 | 9  | 12 | 40 Mettl16       | protein_coding         |
| ENSMUSG00000039615 | 9  | 12 | 0 Stub1          | protein_coding         |
| ENSMUSG00000062963 | 9  | 12 | 0 Ufc1           | protein_coding         |
| ENSMUSG00000102839 | 9  | 12 | 0 Gm37385        | TEC                    |
| ENSMUSG00000097954 | 9  | 12 | 0 Gm4217         | processed_pseudogene   |
| ENSMUSG00000103651 | 9  | 12 | 0 Gm37206        | TEC                    |

|                     |   |    |                  |                        |
|---------------------|---|----|------------------|------------------------|
| ENSMUSG00000080478  | 9 | 11 | 202 Snord23      | snoRNA                 |
| ENSMUSG00000097073  | 9 | 11 | 14 9430037G07Rik | lincRNA                |
| ENSMUSG00000070995  | 9 | 11 | 0 Gm6313         | lincRNA                |
| ENSMUSG00000072679  | 9 | 11 | 0 D6Ert474e      | lincRNA                |
| ENSMUSG00000083454  | 9 | 11 | 0 Gm13226        | processed_pseudogene   |
| ENSMUSG00000038646  | 9 | 10 | 0 Fam103a1       | protein_coding         |
| ENSMUSG00000094437  | 9 | 10 | 0 Gm9830         | protein_coding         |
| ENSMUSG00000061482  | 9 | 9  | 24 Hist1h4d      | protein_coding         |
| ENSMUSG00000053436  | 9 | 9  | 14 Mapk14        | protein_coding         |
| ENSMUSG00000027309  | 9 | 9  | 2 4930402H24Rik  | protein_coding         |
| ENSMUSG00000082431  | 9 | 9  | 0 Tdp1-ps1       | processed_pseudogene   |
| ENSMUSG00000098524  | 9 | 9  | 0 Gm19015        | processed_pseudogene   |
| ENSMUSG00000098897  | 9 | 9  | 0 Gm19013        | processed_pseudogene   |
| ENSMUSG00000099325  | 9 | 9  | 0 Gm19014        | processed_pseudogene   |
| ENSMUSG00000071419  | 9 | 9  | 12 Rps15-ps2     | processed_pseudogene   |
| ENSMUSG00000022330  | 9 | 9  | 0 Osr2           | protein_coding         |
| ENSMUSG00000044533  | 9 | 9  | 0 Rps2           | protein_coding         |
| ENSMUSG00000066487  | 9 | 9  | 0 Gm5786         | protein_coding         |
| ENSMUSG00000069268  | 9 | 9  | 0 Hist1h2bf      | protein_coding         |
| ENSMUSG00000083500  | 9 | 9  | 0 Gm15470        | processed_pseudogene   |
| ENSMUSG00000088604  | 9 | 9  | 0                | snoRNA                 |
| ENSMUSG00000027809  | 9 | 8  | 0 Etf1dh         | protein_coding         |
| ENSMUSG00000028647  | 9 | 8  | 0 Mycbp          | protein_coding         |
| ENSMUSG00000042599  | 9 | 8  | 0 Kdm7a          | protein_coding         |
| ENSMUSG00000039329  | 9 | 7  | 8 Tex19.1        | protein_coding         |
| ENSMUSG000000101939 | 9 | 7  | 40 Gm28438       | unprocessed_pseudogene |
| ENSMUSG00000063087  | 9 | 7  | 0 Gm10125        | processed_transcript   |
| ENSMUSG00000097964  | 9 | 7  | 0 Gm21045        | processed_pseudogene   |
| ENSMUSG000000101001 | 9 | 7  | 0 Gm3121         | processed_pseudogene   |
| ENSMUSG00000023737  | 9 | 6  | 0 1700082M22Rik  | antisense              |
| ENSMUSG00000069188  | 9 | 6  | 0 Gm13192        | processed_pseudogene   |
| ENSMUSG00000094483  | 9 | 6  | 0 Purb           | protein_coding         |
| ENSMUSG000000101447 | 9 | 6  | 0 Gm28826        | lincRNA                |
| ENSMUSG00000032745  | 9 | 5  | 0 Gbp1           | protein_coding         |
| ENSMUSG00000037824  | 9 | 5  | 0 Tspan14        | protein_coding         |
| ENSMUSG00000040596  | 9 | 5  | 0 Pogk           | protein_coding         |
| ENSMUSG00000048351  | 9 | 5  | 0 Coa7           | protein_coding         |
| ENSMUSG00000057101  | 9 | 5  | 0 Zfp180         | protein_coding         |
| ENSMUSG00000038342  | 9 | 4  | 20 Mlxip         | protein_coding         |
| ENSMUSG00000016626  | 9 | 4  | 0 Nlrp14         | protein_coding         |
| ENSMUSG00000018846  | 9 | 4  | 0 Pank3          | protein_coding         |
| ENSMUSG00000025264  | 9 | 4  | 0 Tsr2           | protein_coding         |
| ENSMUSG00000027669  | 9 | 4  | 0 Gnb4           | protein_coding         |
| ENSMUSG00000034591  | 9 | 4  | 0 Slc41a2        | protein_coding         |
| ENSMUSG00000035694  | 9 | 4  | 0 Caps2          | protein_coding         |
| ENSMUSG00000036036  | 9 | 4  | 0 Zfp57          | protein_coding         |
| ENSMUSG00000082154  | 9 | 4  | 0 Gm16464        | processed_pseudogene   |
| ENSMUSG00000086161  | 9 | 4  | 0 Gm15389        | lincRNA                |
| ENSMUSG00000039000  | 9 | 3  | 4 Ube3c          | protein_coding         |

|                    |   |    |                    |                        |
|--------------------|---|----|--------------------|------------------------|
| ENSMUSG00000031887 | 9 | 3  | 6 Tradd            | protein_coding         |
| ENSMUSG00000088587 | 9 | 3  | 0 Gm22962          | snoRNA                 |
| ENSMUSG00000029162 | 9 | 1  | 4 Khk              | protein_coding         |
| ENSMUSG00000021279 | 9 | 1  | 48 Cdc42bpb        | protein_coding         |
| ENSMUSG00000006134 | 9 | 1  | 0 Crkl             | protein_coding         |
| ENSMUSG00000036712 | 9 | 1  | 0 Cyld             | protein_coding         |
| ENSMUSG00000042216 | 9 | 1  | 0 Sgsm1            | protein_coding         |
| ENSMUSG00000101404 | 9 | 0  | 1582 1700009C05Rik | lincRNA                |
| ENSMUSG00000034158 | 9 | 0  | 32 Lrrc58          | protein_coding         |
| ENSMUSG00000006418 | 9 | 0  | 28 Rnf114          | protein_coding         |
| ENSMUSG00000013155 | 9 | 0  | 14 Enkd1           | protein_coding         |
| ENSMUSG00000027248 | 9 | 0  | 12 Pdia3           | protein_coding         |
| ENSMUSG00000096252 | 9 | 0  | 8 Tes3-ps          | processed_pseudogene   |
| ENSMUSG00000004891 | 9 | 0  | 0 Nes              | protein_coding         |
| ENSMUSG00000007050 | 9 | 0  | 0 Lsm2             | protein_coding         |
| ENSMUSG00000020361 | 9 | 0  | 0 Hspa4            | protein_coding         |
| ENSMUSG00000021945 | 9 | 0  | 0 Zmym2            | protein_coding         |
| ENSMUSG00000025060 | 9 | 0  | 0 Slk              | protein_coding         |
| ENSMUSG00000025241 | 9 | 0  | 0 Fyco1            | protein_coding         |
| ENSMUSG00000025243 | 9 | 0  | 0 Slc6a20b         | protein_coding         |
| ENSMUSG00000026924 | 9 | 0  | 0 Sec16a           | protein_coding         |
| ENSMUSG00000028792 | 9 | 0  | 0 Ak2              | protein_coding         |
| ENSMUSG00000029695 | 9 | 0  | 0 Aass             | protein_coding         |
| ENSMUSG00000030911 | 9 | 0  | 0 Zp2              | protein_coding         |
| ENSMUSG00000031563 | 9 | 0  | 0 Wwc2             | protein_coding         |
| ENSMUSG00000034601 | 9 | 0  | 0 2700049A03Rik    | protein_coding         |
| ENSMUSG00000043885 | 9 | 0  | 0 Slc36a4          | protein_coding         |
| ENSMUSG00000045328 | 9 | 0  | 0 Cenpe            | protein_coding         |
| ENSMUSG00000068184 | 9 | 0  | 0 Ndufaf2          | protein_coding         |
| ENSMUSG00000083438 | 9 | 0  | 0 Gm5402           | processed_pseudogene   |
| ENSMUSG00000088185 | 9 | 0  | 0 Scarna2          | snoRNA                 |
| ENSMUSG00000071226 | 8 | 29 | 0 Cecr2            | protein_coding         |
| ENSMUSG00000063704 | 8 | 22 | 0 Mapk15           | protein_coding         |
| ENSMUSG00000084316 | 8 | 20 | 0 Gm8668           | processed_pseudogene   |
| ENSMUSG00000026317 | 8 | 18 | 0 Cln8             | protein_coding         |
| ENSMUSG00000021569 | 8 | 18 | 0 Trip13           | protein_coding         |
| ENSMUSG00000084072 | 8 | 16 | 0 Gm11285          | unprocessed_pseudogene |
| ENSMUSG00000026782 | 8 | 16 | 28 Abi2            | protein_coding         |
| ENSMUSG00000061272 | 8 | 14 | 10 Gm14173         | processed_pseudogene   |
| ENSMUSG00000015092 | 8 | 14 | 0 Edf1             | protein_coding         |
| ENSMUSG00000033510 | 8 | 14 | 0 Otud7a           | protein_coding         |
| ENSMUSG00000006057 | 8 | 14 | 22 Atp5g1          | protein_coding         |
| ENSMUSG00000093552 | 8 | 14 | 0 Gm5777           | processed_pseudogene   |
| ENSMUSG00000031367 | 8 | 13 | 30 Ap1s2           | protein_coding         |
| ENSMUSG00000043671 | 8 | 13 | 16 Dpy19l3         | protein_coding         |
| ENSMUSG00000068299 | 8 | 12 | 0 Nat8f4           | protein_coding         |
| ENSMUSG00000085385 | 8 | 12 | 0 Snhg17           | processed_transcript   |
| ENSMUSG00000020097 | 8 | 12 | 6 Sgpl1            | protein_coding         |
| ENSMUSG00000015126 | 8 | 12 | 0 Tsr3             | protein_coding         |

|                    |   |    |              |                      |
|--------------------|---|----|--------------|----------------------|
| ENSMUSG00000024472 | 8 | 12 | 0 Dcp2       | protein_coding       |
| ENSMUSG00000040661 | 8 | 12 | 0 Rad54l2    | protein_coding       |
| ENSMUSG00000074877 | 8 | 12 | 0 Gm10780    | pseudogene           |
| ENSMUSG00000084314 | 8 | 11 | 6 Rps15a-ps3 | processed_pseudogene |
| ENSMUSG00000085878 | 8 | 11 | 0 Gm12823    | antisense            |
| ENSMUSG00000100493 | 8 | 11 | 0            | lincRNA              |
| ENSMUSG00000082180 | 8 | 10 | 0 Gm12230    | processed_pseudogene |
| ENSMUSG00000023010 | 8 | 9  | 46 Tmbim6    | protein_coding       |
| ENSMUSG00000047905 | 8 | 9  | 30 Gm8566    | processed_pseudogene |
| ENSMUSG00000004462 | 8 | 9  | 16 Tbccd1    | protein_coding       |
| ENSMUSG00000020262 | 8 | 9  | 0 Adarb1     | protein_coding       |
| ENSMUSG00000039828 | 8 | 9  | 0 Wdr70      | protein_coding       |
| ENSMUSG00000030509 | 8 | 9  | 12 Asb7      | protein_coding       |
| ENSMUSG00000030752 | 8 | 9  | 0 Kdm8       | protein_coding       |
| ENSMUSG00000042133 | 8 | 9  | 0 Ppig       | protein_coding       |
| ENSMUSG00000098158 | 8 | 9  | 0 Gm4804     | processed_pseudogene |
| ENSMUSG00000102500 | 8 | 9  | 0 Gm37371    | TEC                  |
| ENSMUSG00000032101 | 8 | 8  | 0 Ddx25      | protein_coding       |
| ENSMUSG00000062175 | 8 | 8  | 0 Tgif2      | protein_coding       |
| ENSMUSG00000102718 | 8 | 8  | 0 Gm37761    | TEC                  |
| ENSMUSG00000029110 | 8 | 7  | 10 Rnf4      | protein_coding       |
| ENSMUSG00000081957 | 8 | 7  | 0 Ak3l2-ps   | processed_pseudogene |
| ENSMUSG00000047227 | 8 | 7  | 12 Gm527     | protein_coding       |
| ENSMUSG00000019996 | 8 | 7  | 0 Map7       | protein_coding       |
| ENSMUSG00000075467 | 8 | 7  | 0 Dnlz       | protein_coding       |
| ENSMUSG00000090475 | 8 | 7  | 0 Gm6245     | processed_pseudogene |
| ENSMUSG00000096807 | 8 | 7  | 0 Hist1h2bm  | protein_coding       |
| ENSMUSG00000042298 | 8 | 6  | 0 Ttc19      | protein_coding       |
| ENSMUSG00000082310 | 8 | 5  | 12 Gm12904   | processed_pseudogene |
| ENSMUSG00000057113 | 8 | 5  | 6 Npm1       | protein_coding       |
| ENSMUSG00000045409 | 8 | 5  | 0 Trim39     | protein_coding       |
| ENSMUSG00000102220 | 8 | 5  | 0 Rpl23a-ps5 | processed_pseudogene |
| ENSMUSG00000038178 | 8 | 4  | 244 Slc43a2  | protein_coding       |
| ENSMUSG00000020048 | 8 | 4  | 169 Hsp90b1  | protein_coding       |
| ENSMUSG00000025261 | 8 | 4  | 0 Huwe1      | protein_coding       |
| ENSMUSG00000032097 | 8 | 4  | 0 Ddx6       | protein_coding       |
| ENSMUSG00000032238 | 8 | 4  | 0 Rora       | protein_coding       |
| ENSMUSG00000097548 | 8 | 4  | 0 Gm26748    | lincRNA              |
| ENSMUSG00000032827 | 8 | 3  | 6 Ppp1r9a    | protein_coding       |
| ENSMUSG00000058488 | 8 | 3  | 2 Kl         | protein_coding       |
| ENSMUSG00000027610 | 8 | 3  | 34 Gss       | protein_coding       |
| ENSMUSG00000077283 | 8 | 2  | 10 n-R5s158  | rRNA                 |
| ENSMUSG00000098392 | 8 | 2  | 10 Gm28001   | rRNA                 |
| ENSMUSG00000064795 | 8 | 2  | 4 Gm22423    | snRNA                |
| ENSMUSG00000026634 | 8 | 2  | 0 Angel2     | protein_coding       |
| ENSMUSG00000048222 | 8 | 2  | 0 Mfap1b     | protein_coding       |
| ENSMUSG00000096966 | 8 | 2  | 0 Gm18336    | processed_pseudogene |
| ENSMUSG00000030869 | 8 | 1  | 0 Ndufab1    | protein_coding       |
| ENSMUSG00000037940 | 8 | 1  | 0 Inpp4b     | protein_coding       |

|                    |   |    |                 |                                  |
|--------------------|---|----|-----------------|----------------------------------|
| ENSMUSG00000046219 | 8 | 1  | 0 C230012O17Rik | processed_transcript             |
| ENSMUSG00000020844 | 8 | 0  | 63 Nxn          | protein_coding                   |
| ENSMUSG00000009291 | 8 | 0  | 0 Pttgl1p       | protein_coding                   |
| ENSMUSG00000019710 | 8 | 0  | 0 Mrpl24        | protein_coding                   |
| ENSMUSG00000024944 | 8 | 0  | 0 Arl2          | protein_coding                   |
| ENSMUSG00000027803 | 8 | 0  | 0 Wwtr1         | protein_coding                   |
| ENSMUSG00000028484 | 8 | 0  | 0 Psip1         | protein_coding                   |
| ENSMUSG00000033773 | 8 | 0  | 0 Rpap2         | protein_coding                   |
| ENSMUSG00000038456 | 8 | 0  | 0 Dennd2a       | protein_coding                   |
| ENSMUSG00000038770 | 8 | 0  | 0 Kpna7         | protein_coding                   |
| ENSMUSG00000048832 | 8 | 0  | 0 Vps37c        | protein_coding                   |
| ENSMUSG00000057777 | 8 | 0  | 0 Mab21l2       | protein_coding                   |
| ENSMUSG00000064410 | 8 | 0  | 0 Gm22247       | snoRNA                           |
| ENSMUSG00000065022 | 8 | 0  | 0 AF357341      | snoRNA                           |
| ENSMUSG00000065663 | 7 | 35 | 0 Gm22579       | snoRNA                           |
| ENSMUSG00000088956 | 7 | 35 | 0 Gm24945       | snoRNA                           |
| ENSMUSG00000093874 | 7 | 35 | 0 Gm24539       | snoRNA                           |
| ENSMUSG00000096563 | 7 | 35 | 0 Gm24095       | snoRNA                           |
| ENSMUSG00000012187 | 7 | 21 | 0 Mogat1        | protein_coding                   |
| ENSMUSG00000025280 | 7 | 20 | 0 Polr3a        | protein_coding                   |
| ENSMUSG00000102490 | 7 | 20 | 8 Gm36985       | processed_pseudogene             |
| ENSMUSG00000018481 | 7 | 20 | 0 Appbp2        | protein_coding                   |
| ENSMUSG00000077212 | 7 | 19 | 26 Snord69      | snoRNA                           |
| ENSMUSG00000018171 | 7 | 18 | 81 Vmpl         | protein_coding                   |
| ENSMUSG00000065773 | 7 | 17 | 85 Rnu1b6       | snRNA                            |
| ENSMUSG00000095701 | 7 | 17 | 85 Gm24830      | snRNA                            |
| ENSMUSG00000096838 | 7 | 17 | 85 Gm26232      | snRNA                            |
| ENSMUSG00000059658 | 7 | 15 | 4 Gm16379       | transcribed_processed_pseudogene |
| ENSMUSG00000038970 | 7 | 15 | 0 Lmtk2         | protein_coding                   |
| ENSMUSG00000087193 | 7 | 15 | 0 Gm14820       | antisense                        |
| ENSMUSG00000099608 | 7 | 14 | 2 4933411E06Rik | lincRNA                          |
| ENSMUSG00000099562 | 7 | 14 | 12 Gm19027      | processed_pseudogene             |
| ENSMUSG00000052516 | 7 | 12 | 2 Robo2         | protein_coding                   |
| ENSMUSG00000012117 | 7 | 12 | 0 Dhdds         | protein_coding                   |
| ENSMUSG00000087474 | 7 | 12 | 0 Gm12100       | processed_transcript             |
| ENSMUSG00000026430 | 7 | 12 | 0 Rassf5        | protein_coding                   |
| ENSMUSG00000090353 | 7 | 12 | 0 Gm17555       | protein_coding                   |
| ENSMUSG00000036167 | 7 | 11 | 12 Pphln1       | protein_coding                   |
| ENSMUSG00000036103 | 7 | 11 | 0 Colec12       | protein_coding                   |
| ENSMUSG00000041144 | 7 | 11 | 0 Dnah7b        | protein_coding                   |
| ENSMUSG00000038371 | 7 | 10 | 12 Sbf2         | protein_coding                   |
| ENSMUSG00000063954 | 7 | 10 | 12 Hist2h2aa2   | protein_coding                   |
| ENSMUSG00000073409 | 7 | 10 | 0 H2-Q6         | protein_coding                   |
| ENSMUSG00000074826 | 7 | 10 | 0 Gm10767       | protein_coding                   |
| ENSMUSG00000038827 | 7 | 9  | 1338 Fam206a    | protein_coding                   |
| ENSMUSG00000095826 | 7 | 9  | 2 Gm9002        | processed_pseudogene             |
| ENSMUSG00000007338 | 7 | 9  | 0 Mrpl49        | protein_coding                   |
| ENSMUSG00000026705 | 7 | 9  | 0 Klhl20        | protein_coding                   |
| ENSMUSG00000027889 | 7 | 9  | 0 Ampd2         | protein_coding                   |

|                    |   |   |                 |                                  |
|--------------------|---|---|-----------------|----------------------------------|
| ENSMUSG00000030177 | 7 | 9 | 0 Ccdc77        | protein_coding                   |
| ENSMUSG00000099901 | 7 | 9 | 2 Zbed4-ps2     | processed_pseudogene             |
| ENSMUSG00000027419 | 7 | 9 | 0 Pcsk2         | protein_coding                   |
| ENSMUSG00000029700 | 7 | 9 | 0 Slc13a1       | protein_coding                   |
| ENSMUSG00000060371 | 7 | 9 | 0 Caln1         | protein_coding                   |
| ENSMUSG00000062421 | 7 | 9 | 0 Arf2          | protein_coding                   |
| ENSMUSG00000014313 | 7 | 8 | 113 Cox6c       | protein_coding                   |
| ENSMUSG00000066491 | 7 | 8 | 113 Gm6265      | processed_pseudogene             |
| ENSMUSG00000091952 | 7 | 8 | 4 Gm17709       | processed_pseudogene             |
| ENSMUSG00000063358 | 7 | 8 | 0 Mapk1         | protein_coding                   |
| ENSMUSG00000086414 | 7 | 8 | 0 Gm15645       | transcribed_processed_pseudogene |
| ENSMUSG00000098987 | 7 | 8 | 0 Gm8982        | processed_pseudogene             |
| ENSMUSG00000102791 | 7 | 7 | 145 Gm37709     | TEC                              |
| ENSMUSG00000001138 | 7 | 7 | 8 Cnnm3         | protein_coding                   |
| ENSMUSG00000098238 | 7 | 7 | 0 Gm8756        | processed_pseudogene             |
| ENSMUSG00000024350 | 7 | 7 | 0 Dnajc18       | protein_coding                   |
| ENSMUSG00000038546 | 7 | 7 | 0 Ranbp9        | protein_coding                   |
| ENSMUSG00000042417 | 7 | 7 | 0 Ccno          | protein_coding                   |
| ENSMUSG00000042501 | 7 | 7 | 0 Cpa6          | protein_coding                   |
| ENSMUSG00000080870 | 7 | 7 | 0 Gm14111       | processed_pseudogene             |
| ENSMUSG00000082064 | 7 | 6 | 24 Rpl5-ps2     | processed_pseudogene             |
| ENSMUSG00000082193 | 7 | 6 | 24 Rpl5-ps1     | processed_pseudogene             |
| ENSMUSG00000086583 | 7 | 6 | 24 Gm15500      | transcribed_processed_pseudogene |
| ENSMUSG00000024098 | 7 | 6 | 0 Twsg1         | protein_coding                   |
| ENSMUSG00000026058 | 7 | 6 | 0 Khdrbs2       | protein_coding                   |
| ENSMUSG00000026648 | 7 | 6 | 0 Dclre1c       | protein_coding                   |
| ENSMUSG00000063065 | 7 | 6 | 0 Mapk3         | protein_coding                   |
| ENSMUSG00000064694 | 7 | 5 | 373 Gm24146     | misc_RNA                         |
| ENSMUSG00000069305 | 7 | 5 | 6 Hist1h4n      | protein_coding                   |
| ENSMUSG00000069306 | 7 | 5 | 6 Hist1h4m      | protein_coding                   |
| ENSMUSG00000082988 | 7 | 5 | 0 Gm5903        | processed_pseudogene             |
| ENSMUSG00000083328 | 7 | 5 | 8 Gm11826       | processed_pseudogene             |
| ENSMUSG00000026447 | 7 | 5 | 2 Pik3c2b       | protein_coding                   |
| ENSMUSG00000013736 | 7 | 5 | 0 Trnt1         | protein_coding                   |
| ENSMUSG00000045078 | 7 | 5 | 0 Rnf216        | protein_coding                   |
| ENSMUSG00000064030 | 7 | 5 | 0 Pym1          | protein_coding                   |
| ENSMUSG00000101337 | 7 | 5 | 0 Dnah7c        | protein_coding                   |
| ENSMUSG00000101517 | 7 | 5 | 0 4732465J04Rik | lincRNA                          |
| ENSMUSG00000003814 | 7 | 4 | 141 Calr        | protein_coding                   |
| ENSMUSG00000028414 | 7 | 4 | 18 Fktn         | protein_coding                   |
| ENSMUSG00000023259 | 7 | 4 | 0 Slc26a6       | protein_coding                   |
| ENSMUSG00000024515 | 7 | 4 | 0 Smad4         | protein_coding                   |
| ENSMUSG00000027778 | 7 | 4 | 0 Ifit80        | protein_coding                   |
| ENSMUSG00000032344 | 7 | 4 | 0 Mb21d1        | protein_coding                   |
| ENSMUSG00000040383 | 7 | 4 | 0 Aqr           | protein_coding                   |
| ENSMUSG00000049649 | 7 | 4 | 0 Gpr3          | protein_coding                   |
| ENSMUSG00000061175 | 7 | 4 | 0 Fnip2         | protein_coding                   |
| ENSMUSG00000028059 | 7 | 3 | 4 Arhgef2       | protein_coding                   |
| ENSMUSG00000032999 | 7 | 3 | 0 Nlrp4f        | protein_coding                   |



|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000043782 | 7 | 3  | 163 Ccdc64b     | protein_coding       |
| ENSMUSG00000025025 | 7 | 3  | 75 Mxi1         | protein_coding       |
| ENSMUSG00000024697 | 7 | 3  | 10 Gna14        | protein_coding       |
| ENSMUSG00000074804 | 7 | 3  | 0 AU015228      | processed_pseudogene |
| ENSMUSG00000065254 | 7 | 2  | 145 Gm23973     | misc_RNA             |
| ENSMUSG00000071076 | 7 | 2  | 56 Jund         | protein_coding       |
| ENSMUSG00000032525 | 7 | 2  | 30 Nktr         | protein_coding       |
| ENSMUSG00000028370 | 7 | 2  | 22 Pappa        | protein_coding       |
| ENSMUSG00000098083 | 7 | 2  | 0 Gm8957        | processed_pseudogene |
| ENSMUSG00000084700 | 7 | 1  | 6 Gm22984       | snRNA                |
| ENSMUSG00000006705 | 7 | 1  | 0 Pknx1         | protein_coding       |
| ENSMUSG00000022108 | 7 | 0  | 1233 Itm2b      | protein_coding       |
| ENSMUSG00000048279 | 7 | 0  | 42 Sacs         | protein_coding       |
| ENSMUSG00000013646 | 7 | 0  | 38 Sh3bp5l      | protein_coding       |
| ENSMUSG00000034211 | 7 | 0  | 18 Mrps17       | protein_coding       |
| ENSMUSG00000000787 | 7 | 0  | 16 Ddx3x        | protein_coding       |
| ENSMUSG00000032637 | 7 | 0  | 14 Atxn2l       | protein_coding       |
| ENSMUSG00000037692 | 7 | 0  | 14 Ahdc1        | protein_coding       |
| ENSMUSG00000074578 | 7 | 0  | 2 Zfas1         | protein_coding       |
| ENSMUSG00000007216 | 7 | 0  | 0 Zfp775        | protein_coding       |
| ENSMUSG00000020307 | 7 | 0  | 0 Cdc34         | protein_coding       |
| ENSMUSG00000028857 | 7 | 0  | 0 Tmem222       | protein_coding       |
| ENSMUSG00000030007 | 7 | 0  | 0 Cct7          | protein_coding       |
| ENSMUSG00000035354 | 7 | 0  | 0 Uvrag         | protein_coding       |
| ENSMUSG00000037257 | 7 | 0  | 0 Aagab         | protein_coding       |
| ENSMUSG00000040455 | 7 | 0  | 0 Usp45         | protein_coding       |
| ENSMUSG00000045962 | 7 | 0  | 0 Wnk1          | protein_coding       |
| ENSMUSG00000048833 | 7 | 0  | 0 Slc39a9       | protein_coding       |
| ENSMUSG00000049643 | 7 | 0  | 0 2310022A10Rik | protein_coding       |
| ENSMUSG00000052056 | 7 | 0  | 0 Zfp217        | protein_coding       |
| ENSMUSG00000070291 | 7 | 0  | 0 Ddx43         | protein_coding       |
| ENSMUSG00000074479 | 7 | 0  | 0 Gm10704       | processed_pseudogene |
| ENSMUSG00000078765 | 7 | 0  | 0 U2af114       | protein_coding       |
| ENSMUSG00000082691 | 7 | 0  | 0 Dynl1-ps1     | processed_pseudogene |
| ENSMUSG00000029397 | 7 | 31 | 2 Rchy1         | protein_coding       |
| ENSMUSG00000039117 | 7 | 29 | 0 Taf4          | protein_coding       |
| ENSMUSG00000001270 | 7 | 22 | 0 Ckb           | protein_coding       |
| ENSMUSG00000033847 | 7 | 19 | 0 Pla2g4c       | protein_coding       |
| ENSMUSG00000029922 | 7 | 17 | 0 Mkrn1         | protein_coding       |
| ENSMUSG00000015668 | 7 | 16 | 0 Pdzd11        | protein_coding       |
| ENSMUSG00000103021 | 7 | 16 | 0 Gm37682       | processed_pseudogene |
| ENSMUSG00000093650 | 7 | 15 | 0 Gm20631       | antisense            |
| ENSMUSG00000036006 | 7 | 14 | 34 Fam65b       | protein_coding       |
| ENSMUSG00000059291 | 7 | 14 | 10 Rpl11        | protein_coding       |
| ENSMUSG00000024037 | 7 | 14 | 0 Wdr4          | protein_coding       |
| ENSMUSG00000057572 | 7 | 13 | 10 Zbtb8os      | protein_coding       |
| ENSMUSG00000101532 | 7 | 13 | 2 Zbed4-ps1     | processed_pseudogene |
| ENSMUSG00000042744 | 7 | 12 | 10 Gm15800      | protein_coding       |
| ENSMUSG00000104098 | 7 | 12 | 0 AA619741      | processed_pseudogene |

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000081751 | 7 | 12 | 0 Gm14251       | processed_pseudogene |
| ENSMUSG00000082478 | 7 | 11 | 0 Gm11619       | processed_pseudogene |
| ENSMUSG00000047371 | 7 | 10 | 0 Zfp768        | protein_coding       |
| ENSMUSG00000041870 | 7 | 9  | 0 Ankrd13a      | protein_coding       |
| ENSMUSG00000050079 | 7 | 9  | 0 Rspry1        | protein_coding       |
| ENSMUSG00000068686 | 7 | 9  | 0 Cd59b         | protein_coding       |
| ENSMUSG00000078588 | 7 | 9  | 0 Ccdc24        | protein_coding       |
| ENSMUSG00000086189 | 7 | 9  | 0 Gm15462       | antisense            |
| ENSMUSG00000093385 | 7 | 9  | 0 A330044P14Rik | lincRNA              |
| ENSMUSG00000097017 | 7 | 9  | 0 Gm26707       | lincRNA              |
| ENSMUSG00000039004 | 7 | 9  | 0 Bmp6          | protein_coding       |
| ENSMUSG00000051671 | 7 | 9  | 0 Coa6          | protein_coding       |
| ENSMUSG00000098232 | 7 | 9  | 0 Gm3671        | processed_pseudogene |
| ENSMUSG00000101211 | 7 | 9  | 0 Gm28818       | lincRNA              |
| ENSMUSG00000081094 | 7 | 8  | 81 Rpl19-ps11   | processed_pseudogene |
| ENSMUSG00000063754 | 7 | 8  | 24 Gm10136      | processed_pseudogene |
| ENSMUSG00000021772 | 7 | 8  | 12 Nkiras1      | protein_coding       |
| ENSMUSG00000022781 | 7 | 8  | 10 Pak2         | protein_coding       |
| ENSMUSG00000037112 | 7 | 8  | 2 Sik2          | protein_coding       |
| ENSMUSG00000002455 | 7 | 8  | 0 Prpf6         | protein_coding       |
| ENSMUSG00000070934 | 7 | 8  | 0 Rraga         | protein_coding       |
| ENSMUSG00000104174 | 7 | 8  | 0 Gm37701       | TEC                  |
| ENSMUSG00000021209 | 7 | 7  | 52 Ppp4r4       | protein_coding       |
| ENSMUSG00000078808 | 7 | 7  | 0 Vmn1r58       | protein_coding       |
| ENSMUSG00000081105 | 7 | 7  | 0               | processed_pseudogene |
| ENSMUSG00000017404 | 7 | 7  | 77 Rpl19        | protein_coding       |
| ENSMUSG00000001924 | 7 | 7  | 12 Uba1         | protein_coding       |
| ENSMUSG00000083149 | 7 | 7  | 2 Gm11380       | processed_pseudogene |
| ENSMUSG00000070641 | 7 | 7  | 0 Gm16410       | processed_pseudogene |
| ENSMUSG00000074978 | 7 | 7  | 0 Actg-ps1      | processed_pseudogene |
| ENSMUSG00000098340 | 7 | 7  | 0 Gm27253       | lincRNA              |
| ENSMUSG00000082178 | 7 | 6  | 10 Gm11307      | processed_pseudogene |
| ENSMUSG00000103729 | 7 | 6  | 10 Gm37098      | processed_pseudogene |
| ENSMUSG00000027668 | 7 | 6  | 0 Mfn1          | protein_coding       |
| ENSMUSG00000033417 | 7 | 6  | 0 Cacul1        | protein_coding       |
| ENSMUSG00000033488 | 7 | 6  | 0 BC026585      | protein_coding       |
| ENSMUSG00000050954 | 7 | 6  | 0 Zfp169        | protein_coding       |
| ENSMUSG00000081855 | 7 | 6  | 0 Rpl17-ps5     | processed_pseudogene |
| ENSMUSG00000081895 | 7 | 6  | 0 Rpl17-ps10    | processed_pseudogene |
| ENSMUSG00000084345 | 7 | 6  | 0 Rpl17-ps4     | processed_pseudogene |
| ENSMUSG00000086436 | 7 | 6  | 0 Gm13690       | processed_pseudogene |
| ENSMUSG00000102193 | 7 | 6  | 0 Gm7299        | processed_pseudogene |
| ENSMUSG00000025979 | 7 | 5  | 115 Mob4        | protein_coding       |
| ENSMUSG00000037652 | 7 | 5  | 16 Phc3         | protein_coding       |
| ENSMUSG00000085748 | 7 | 5  | 4 Gm12280       | antisense            |
| ENSMUSG00000030282 | 7 | 5  | 0 Cmas          | protein_coding       |
| ENSMUSG00000033106 | 7 | 5  | 0 Slc7a6os      | protein_coding       |
| ENSMUSG00000040537 | 7 | 5  | 0 Adam22        | protein_coding       |
| ENSMUSG00000047221 | 7 | 5  | 0 Fam185a       | protein_coding       |

|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUSG00000055319 | 7 | 5 | 0 Sec23ip       | protein_coding                     |
| ENSMUSG00000060450 | 7 | 5 | 0 Rnf14         | protein_coding                     |
| ENSMUSG00000074182 | 7 | 5 | 0 Znhit6        | protein_coding                     |
| ENSMUSG00000090942 | 7 | 5 | 0 F830016B08Rik | protein_coding                     |
| ENSMUSG00000097352 | 7 | 5 | 0 C920009B18Rik | transcribed_unprocessed_pseudogene |
| ENSMUSG00000101162 | 7 | 5 | 0 Gm26728       | antisense                          |
| ENSMUSG00000020454 | 7 | 5 | 14 Eif4enif1    | protein_coding                     |
| ENSMUSG00000009630 | 7 | 5 | 2 Ppp2cb        | protein_coding                     |
| ENSMUSG00000023307 | 7 | 5 | 0 March5        | protein_coding                     |
| ENSMUSG00000035201 | 7 | 5 | 0 B020004J07Rik | protein_coding                     |
| ENSMUSG00000041852 | 7 | 5 | 0 Tcf20         | protein_coding                     |
| ENSMUSG00000026229 | 7 | 4 | 50 Psmc1        | protein_coding                     |
| ENSMUSG00000096802 | 7 | 4 | 28 Gm15433      | processed_pseudogene               |
| ENSMUSG00000020346 | 7 | 4 | 0 Mgat1         | protein_coding                     |
| ENSMUSG00000041408 | 7 | 4 | 0 Wapl          | protein_coding                     |
| ENSMUSG00000052392 | 7 | 4 | 0 Acot4         | protein_coding                     |
| ENSMUSG00000090186 | 7 | 4 | 0 Gm7592        | transcribed_unprocessed_pseudogene |
| ENSMUSG00000022064 | 7 | 3 | 16 Pibf1        | protein_coding                     |
| ENSMUSG00000077450 | 7 | 3 | 16 Rab11b       | protein_coding                     |
| ENSMUSG00000022848 | 7 | 3 | 0 Dirc2         | protein_coding                     |
| ENSMUSG00000028101 | 7 | 3 | 0 Pias3         | protein_coding                     |
| ENSMUSG00000072844 | 7 | 3 | 0 G530011O06Rik | processed_transcript               |
| ENSMUSG00000082747 | 7 | 3 | 0               | processed_pseudogene               |
| ENSMUSG00000027288 | 7 | 3 | 2 Zfp106        | protein_coding                     |
| ENSMUSG00000097099 | 7 | 3 | 0 Gm9917        | antisense                          |
| ENSMUSG00000042079 | 7 | 2 | 38 Hnrnpf       | protein_coding                     |
| ENSMUSG00000074918 | 7 | 1 | 34 Inafm2       | antisense                          |
| ENSMUSG00000000194 | 7 | 1 | 22 Gpr107       | protein_coding                     |
| ENSMUSG00000031450 | 7 | 1 | 0 Grk1          | protein_coding                     |
| ENSMUSG00000087627 | 7 | 1 | 0 A230059L01Rik | processed_transcript               |
| ENSMUSG00000026883 | 7 | 1 | 20 Dab2ip       | protein_coding                     |
| ENSMUSG00000088246 | 7 | 1 | 6 Gm25911       | miRNA                              |
| ENSMUSG00000022020 | 7 | 1 | 0 Naa16         | protein_coding                     |
| ENSMUSG00000026043 | 7 | 0 | 295 Col3a1      | protein_coding                     |
| ENSMUSG00000062078 | 7 | 0 | 26 Qk           | protein_coding                     |
| ENSMUSG00000022536 | 7 | 0 | 16 Gylr1        | protein_coding                     |
| ENSMUSG00000039703 | 7 | 0 | 14 Nploc4       | protein_coding                     |
| ENSMUSG00000004364 | 7 | 0 | 12 Cul3         | protein_coding                     |
| ENSMUSG00000031754 | 7 | 0 | 6 Nudt21        | protein_coding                     |
| ENSMUSG00000031467 | 7 | 0 | 4 Agpat5        | protein_coding                     |
| ENSMUSG00000025571 | 7 | 0 | 2 Tnrc6c        | protein_coding                     |
| ENSMUSG00000003531 | 7 | 0 | 0 Dgcr6         | protein_coding                     |
| ENSMUSG00000020290 | 7 | 0 | 0 Xpo1          | protein_coding                     |
| ENSMUSG00000020949 | 7 | 0 | 0 Fkbp3         | protein_coding                     |
| ENSMUSG00000022174 | 7 | 0 | 0 Dad1          | protein_coding                     |
| ENSMUSG00000022451 | 7 | 0 | 0 Twf1          | protein_coding                     |
| ENSMUSG00000023832 | 7 | 0 | 0 Acat2         | protein_coding                     |
| ENSMUSG00000023994 | 7 | 0 | 0 Nfya          | protein_coding                     |
| ENSMUSG00000026687 | 7 | 0 | 0 Aldh9a1       | protein_coding                     |

|                    |   |    |                 |                                  |
|--------------------|---|----|-----------------|----------------------------------|
| ENSMUSG00000029656 | 7 | 0  | 0 C8b           | protein_coding                   |
| ENSMUSG00000030451 | 7 | 0  | 0 Herc2         | protein_coding                   |
| ENSMUSG00000031479 | 7 | 0  | 0 Vps36         | protein_coding                   |
| ENSMUSG00000034473 | 7 | 0  | 0 Sec22a        | protein_coding                   |
| ENSMUSG00000035086 | 7 | 0  | 0 Becn1         | protein_coding                   |
| ENSMUSG00000036223 | 7 | 0  | 0 Ska1          | protein_coding                   |
| ENSMUSG00000039166 | 7 | 0  | 0 Akap7         | protein_coding                   |
| ENSMUSG00000039693 | 7 | 0  | 0 Msantd3       | protein_coding                   |
| ENSMUSG00000042032 | 7 | 0  | 0 Mat2b         | protein_coding                   |
| ENSMUSG00000044791 | 7 | 0  | 0 Setd2         | protein_coding                   |
| ENSMUSG00000046230 | 7 | 0  | 0 Vps13a        | protein_coding                   |
| ENSMUSG00000047539 | 7 | 0  | 0 Fbxo28        | protein_coding                   |
| ENSMUSG00000047746 | 7 | 0  | 0 Fbxo40        | protein_coding                   |
| ENSMUSG00000047911 | 7 | 0  | 0 Npm2          | protein_coding                   |
| ENSMUSG00000050714 | 7 | 0  | 0 Zbtb26        | protein_coding                   |
| ENSMUSG00000062480 | 7 | 0  | 0 Acat3         | protein_coding                   |
| ENSMUSG00000064380 | 7 | 0  | 0 Gm26448       | snoRNA                           |
| ENSMUSG00000064796 | 7 | 0  | 0 Terc          | misc_RNA                         |
| ENSMUSG00000072662 | 7 | 0  | 0 Mansc4        | protein_coding                   |
| ENSMUSG00000075707 | 7 | 0  | 0 Dio3          | protein_coding                   |
| ENSMUSG00000091172 | 7 | 0  | 0 Gm17120       | antisense                        |
| ENSMUSG00000097493 | 7 | 0  | 0 9930014A18Rik | processed_transcript             |
| ENSMUSG00000098172 | 7 | 0  | 0 Gm26973       | antisense                        |
| ENSMUSG00000081403 | 6 | 44 | 0               | processed_pseudogene             |
| ENSMUSG00000089308 | 6 | 43 | 14 Gm24837      | snoRNA                           |
| ENSMUSG00000000826 | 6 | 22 | 0 Dnajc5        | protein_coding                   |
| ENSMUSG00000031951 | 6 | 20 | 0 Tmem231       | protein_coding                   |
| ENSMUSG00000041997 | 6 | 19 | 0 Tlk1          | protein_coding                   |
| ENSMUSG00000043145 | 6 | 18 | 0 Gm11292       | processed_transcript             |
| ENSMUSG00000033278 | 6 | 16 | 4 Ptprm         | protein_coding                   |
| ENSMUSG00000032064 | 6 | 16 | 6 Dixdc1        | protein_coding                   |
| ENSMUSG00000039046 | 6 | 16 | 6 Usp6nl        | protein_coding                   |
| ENSMUSG00000029433 | 6 | 16 | 0 Diablo        | protein_coding                   |
| ENSMUSG00000103070 | 6 | 16 | 0 Gm37903       | TEC                              |
| ENSMUSG00000084251 | 6 | 15 | 0 Gm12310       | processed_pseudogene             |
| ENSMUSG00000095597 | 6 | 14 | 8 Gm6472        | transcribed_processed_pseudogene |
| ENSMUSG00000058064 | 6 | 14 | 6 Gm10036       | protein_coding                   |
| ENSMUSG00000044424 | 6 | 14 | 4 Gm9493        | protein_coding                   |
| ENSMUSG00000054708 | 6 | 14 | 50 Ankrd24      | protein_coding                   |
| ENSMUSG00000061477 | 6 | 14 | 8 Rps7          | protein_coding                   |
| ENSMUSG00000021629 | 6 | 13 | 0 Slc30a5       | protein_coding                   |
| ENSMUSG00000022051 | 6 | 12 | 8 Bnip3l        | protein_coding                   |
| ENSMUSG00000073198 | 6 | 12 | 8 Bnip3l-ps     | processed_pseudogene             |
| ENSMUSG00000031482 | 6 | 12 | 0 Slc25a15      | protein_coding                   |
| ENSMUSG00000100550 | 6 | 12 | 0 2310039L15Rik | lincRNA                          |
| ENSMUSG00000060143 | 6 | 12 | 8 Gm10076       | protein_coding                   |
| ENSMUSG00000093674 | 6 | 12 | 8 Rpl4l         | protein_coding                   |
| ENSMUSG00000030002 | 6 | 12 | 0 Dusp11        | protein_coding                   |
| ENSMUSG00000023904 | 6 | 10 | 0 Hcfc1r1       | protein_coding                   |

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000079677 | 6 | 10 | 0 Fdx11         | protein_coding       |
| ENSMUSG00000084172 | 6 | 10 | 0 Gm16420       | processed_pseudogene |
| ENSMUSG00000100615 | 6 | 10 | 0 Gm5511        | processed_pseudogene |
| ENSMUSG00000024260 | 6 | 9  | 0 Sap130        | protein_coding       |
| ENSMUSG00000080914 | 6 | 9  | 0 Gm7129        | processed_pseudogene |
| ENSMUSG00000082983 | 6 | 9  | 0 Gm12318       | processed_pseudogene |
| ENSMUSG00000028086 | 6 | 9  | 2 Fbxw7         | protein_coding       |
| ENSMUSG00000001827 | 6 | 9  | 0 Folr1         | protein_coding       |
| ENSMUSG00000027957 | 6 | 9  | 0 Slc35a3       | protein_coding       |
| ENSMUSG00000081926 | 6 | 9  | 0 Gm15536       | processed_pseudogene |
| ENSMUSG00000082756 | 6 | 9  | 0               | processed_pseudogene |
| ENSMUSG00000064637 | 6 | 8  | 14 Snora20      | snoRNA               |
| ENSMUSG00000017764 | 6 | 8  | 0 Zswim1        | protein_coding       |
| ENSMUSG00000025591 | 6 | 8  | 0 Tma16         | protein_coding       |
| ENSMUSG00000030322 | 6 | 8  | 0 Mbd4          | protein_coding       |
| ENSMUSG00000086311 | 6 | 8  | 0 Gm12122       | sense_intronic       |
| ENSMUSG00000092405 | 6 | 8  | 0 Gm20402       | antisense            |
| ENSMUSG00000082085 | 6 | 7  | 6 Gm6441        | processed_pseudogene |
| ENSMUSG00000022900 | 6 | 7  | 4 Ildr1         | protein_coding       |
| ENSMUSG00000021484 | 6 | 7  | 0 Lman2         | protein_coding       |
| ENSMUSG00000026955 | 6 | 7  | 0 Sapcd2        | protein_coding       |
| ENSMUSG00000038085 | 6 | 7  | 0 Cnbd2         | protein_coding       |
| ENSMUSG00000045767 | 6 | 7  | 0 B230219D22Rik | protein_coding       |
| ENSMUSG00000084379 | 6 | 7  | 0 Gm12957       | processed_pseudogene |
| ENSMUSG00000082189 | 6 | 7  | 12 Gm4784       | processed_pseudogene |
| ENSMUSG00000087819 | 6 | 7  | 12 Gm25117      | snoRNA               |
| ENSMUSG00000020696 | 6 | 7  | 0 Rffl          | protein_coding       |
| ENSMUSG00000039396 | 6 | 7  | 0 Neil3         | protein_coding       |
| ENSMUSG00000053119 | 6 | 7  | 0 Chmp3         | protein_coding       |
| ENSMUSG00000081447 | 6 | 7  | 0 Gm13870       | processed_pseudogene |
| ENSMUSG00000083757 | 6 | 7  | 0 Rps15a-ps4    | processed_pseudogene |
| ENSMUSG00000042523 | 6 | 6  | 50 Dnal1        | protein_coding       |
| ENSMUSG00000033952 | 6 | 6  | 24 Aspm         | protein_coding       |
| ENSMUSG00000026480 | 6 | 6  | 10 Ncf2         | protein_coding       |
| ENSMUSG00000020088 | 6 | 6  | 0 Sar1a         | protein_coding       |
| ENSMUSG00000046854 | 6 | 6  | 0 Pip5kl1       | protein_coding       |
| ENSMUSG00000060244 | 6 | 6  | 0 Alyref2       | protein_coding       |
| ENSMUSG00000081235 | 6 | 6  | 0 Gm14788       | processed_pseudogene |
| ENSMUSG00000083955 | 6 | 6  | 0 Gm14785       | processed_pseudogene |
| ENSMUSG00000026725 | 6 | 5  | 202 Tnn         | protein_coding       |
| ENSMUSG00000099596 | 6 | 5  | 2 Zbed4-ps3     | processed_pseudogene |
| ENSMUSG00000024050 | 6 | 5  | 0 Wiz           | protein_coding       |
| ENSMUSG00000029310 | 6 | 5  | 0 Nudt9         | protein_coding       |
| ENSMUSG00000051650 | 6 | 5  | 0 B3gnt2        | protein_coding       |
| ENSMUSG00000066543 | 6 | 5  | 0 Rpl17-ps9     | processed_pseudogene |
| ENSMUSG00000073761 | 6 | 5  | 0 4933427I04Rik | protein_coding       |
| ENSMUSG00000080825 | 6 | 5  | 0 Gm14892       | processed_pseudogene |
| ENSMUSG00000084825 | 6 | 5  | 0 2410152P15Rik | processed_transcript |
| ENSMUSG00000025139 | 6 | 5  | 99 Tollip       | protein_coding       |

|                    |   |   |              |                                  |
|--------------------|---|---|--------------|----------------------------------|
| ENSMUSG00000029767 | 6 | 5 | 0 Calu       | protein_coding                   |
| ENSMUSG00000040697 | 6 | 5 | 0 Dnajc16    | protein_coding                   |
| ENSMUSG00000044042 | 6 | 5 | 0 Fmn1       | protein_coding                   |
| ENSMUSG00000078954 | 6 | 5 | 0 Arhgap8    | protein_coding                   |
| ENSMUSG00000086249 | 6 | 5 | 0 Gm12724    | processed_transcript             |
| ENSMUSG00000103318 | 6 | 5 | 0 Gm38356    | processed_pseudogene             |
| ENSMUSG00000020657 | 6 | 4 | 12 Dnajc27   | protein_coding                   |
| ENSMUSG00000000441 | 6 | 4 | 0 Raf1       | protein_coding                   |
| ENSMUSG00000035764 | 6 | 4 | 0 Fbxo45     | protein_coding                   |
| ENSMUSG00000056310 | 6 | 4 | 0 Tyw1       | protein_coding                   |
| ENSMUSG00000056459 | 6 | 4 | 0 Zbtb25     | protein_coding                   |
| ENSMUSG00000041841 | 6 | 3 | 20 Rpl37     | protein_coding                   |
| ENSMUSG00000072692 | 6 | 3 | 20 Rpl37rt   | transcribed_processed_pseudogene |
| ENSMUSG00000085116 | 6 | 3 | 12 Gm2735    | processed_pseudogene             |
| ENSMUSG00000092014 | 6 | 3 | 8 Gm4468     | processed_pseudogene             |
| ENSMUSG00000028926 | 6 | 3 | 2 Cdk14      | protein_coding                   |
| ENSMUSG00000063646 | 6 | 3 | 0 Jakmip1    | protein_coding                   |
| ENSMUSG00000090027 | 6 | 3 | 0 Gm15740    | processed_pseudogene             |
| ENSMUSG00000097095 | 6 | 3 | 0 Gm26547    | lincRNA                          |
| ENSMUSG00000030688 | 6 | 3 | 577 Stard10  | protein_coding                   |
| ENSMUSG00000033382 | 6 | 3 | 30 Trappc8   | protein_coding                   |
| ENSMUSG00000104232 | 6 | 3 | 8 Gm37590    | TEC                              |
| ENSMUSG00000024774 | 6 | 3 | 0 Ankrd22    | protein_coding                   |
| ENSMUSG00000030246 | 6 | 2 | 6 Ldhb       | protein_coding                   |
| ENSMUSG00000098991 | 6 | 2 | 6 Gm27595    | rRNA                             |
| ENSMUSG00000027285 | 6 | 2 | 0 Haus2      | protein_coding                   |
| ENSMUSG00000028948 | 6 | 2 | 0 Nol9       | protein_coding                   |
| ENSMUSG00000063273 | 6 | 2 | 0 Naa15      | protein_coding                   |
| ENSMUSG00000037563 | 6 | 1 | 69 Rps16     | protein_coding                   |
| ENSMUSG00000060419 | 6 | 1 | 69 Rps16-ps2 | processed_pseudogene             |
| ENSMUSG00000020358 | 6 | 1 | 0 Hnrnpab    | protein_coding                   |
| ENSMUSG00000049556 | 6 | 1 | 14 Lingo1    | protein_coding                   |
| ENSMUSG00000023723 | 6 | 1 | 0 Mrps23     | protein_coding                   |
| ENSMUSG00000027487 | 6 | 1 | 0 Cdk5rap1   | protein_coding                   |
| ENSMUSG00000033909 | 6 | 1 | 0 Usp36      | protein_coding                   |
| ENSMUSG00000033732 | 6 | 0 | 40 Sf3b3     | protein_coding                   |
| ENSMUSG00000038507 | 6 | 0 | 36 Parp12    | protein_coding                   |
| ENSMUSG00000037075 | 6 | 0 | 32 Rnf139    | protein_coding                   |
| ENSMUSG00000049401 | 6 | 0 | 30 Ogfr      | protein_coding                   |
| ENSMUSG00000021266 | 6 | 0 | 24 Wars      | protein_coding                   |
| ENSMUSG00000022136 | 6 | 0 | 24 Dnajc3    | protein_coding                   |
| ENSMUSG00000014748 | 6 | 0 | 12 Tex261    | protein_coding                   |
| ENSMUSG00000024456 | 6 | 0 | 12 Diaph1    | protein_coding                   |
| ENSMUSG00000034913 | 6 | 0 | 12 Spert     | protein_coding                   |
| ENSMUSG00000036473 | 6 | 0 | 6 Tbc1d24    | protein_coding                   |
| ENSMUSG00000025982 | 6 | 0 | 4 Sf3b1      | protein_coding                   |
| ENSMUSG00000031862 | 6 | 0 | 4 Atp13a1    | protein_coding                   |
| ENSMUSG00000010392 | 6 | 0 | 2 Gosr1      | protein_coding                   |
| ENSMUSG00000000142 | 6 | 0 | 0 Axin2      | protein_coding                   |

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000000711 | 6 | 0  | 0 Rab5b         | protein_coding       |
| ENSMUSG00000002486 | 6 | 0  | 0 Tchp          | protein_coding       |
| ENSMUSG00000002846 | 6 | 0  | 0 Timmdc1       | protein_coding       |
| ENSMUSG00000004929 | 6 | 0  | 0 Thop1         | protein_coding       |
| ENSMUSG00000006932 | 6 | 0  | 0 Ctnnb1        | protein_coding       |
| ENSMUSG00000014592 | 6 | 0  | 0 Camta1        | protein_coding       |
| ENSMUSG00000021636 | 6 | 0  | 0 Marveld2      | protein_coding       |
| ENSMUSG00000024732 | 6 | 0  | 0 Ccdc86        | protein_coding       |
| ENSMUSG00000024978 | 6 | 0  | 0 Gpam          | protein_coding       |
| ENSMUSG00000025178 | 6 | 0  | 0 Pi4k2a        | protein_coding       |
| ENSMUSG00000025959 | 6 | 0  | 0 Klf7          | protein_coding       |
| ENSMUSG00000026385 | 6 | 0  | 0 Dbi           | protein_coding       |
| ENSMUSG00000028591 | 6 | 0  | 0 Pramef12      | protein_coding       |
| ENSMUSG00000029131 | 6 | 0  | 0 Dnajb6        | protein_coding       |
| ENSMUSG00000029319 | 6 | 0  | 0 Coq2          | protein_coding       |
| ENSMUSG00000031157 | 6 | 0  | 0 Pqbp1         | protein_coding       |
| ENSMUSG00000031657 | 6 | 0  | 0 Heatr3        | protein_coding       |
| ENSMUSG00000031660 | 6 | 0  | 0 Brd7          | protein_coding       |
| ENSMUSG00000031776 | 6 | 0  | 0 Arl2bp        | protein_coding       |
| ENSMUSG00000036432 | 6 | 0  | 0 Siah2         | protein_coding       |
| ENSMUSG00000036751 | 6 | 0  | 0 Cox6b1        | protein_coding       |
| ENSMUSG00000037982 | 6 | 0  | 0 Gm9725        | lincRNA              |
| ENSMUSG00000039086 | 6 | 0  | 0 Ss18l1        | protein_coding       |
| ENSMUSG00000039515 | 6 | 0  | 0 Ptpa          | protein_coding       |
| ENSMUSG00000039879 | 6 | 0  | 0 Heca          | protein_coding       |
| ENSMUSG00000040183 | 6 | 0  | 0 Ankrd6        | protein_coding       |
| ENSMUSG00000041040 | 6 | 0  | 0 Fam117b       | protein_coding       |
| ENSMUSG00000042015 | 6 | 0  | 0 Wdr41         | protein_coding       |
| ENSMUSG00000043029 | 6 | 0  | 0 Trpv3         | protein_coding       |
| ENSMUSG00000044164 | 6 | 0  | 0 Rnf182        | protein_coding       |
| ENSMUSG00000045411 | 6 | 0  | 0 2410002F23Rik | protein_coding       |
| ENSMUSG00000046034 | 6 | 0  | 0 Otulin        | protein_coding       |
| ENSMUSG00000048410 | 6 | 0  | 0 Zfp407        | protein_coding       |
| ENSMUSG00000048574 | 6 | 0  | 0 Gm5593        | processed_pseudogene |
| ENSMUSG00000054091 | 6 | 0  | 0 1810037I17Rik | protein_coding       |
| ENSMUSG00000055184 | 6 | 0  | 0 Fam72a        | protein_coding       |
| ENSMUSG00000059555 | 6 | 0  | 0 Tor4a         | protein_coding       |
| ENSMUSG00000059669 | 6 | 0  | 0 Taf1b         | protein_coding       |
| ENSMUSG00000059708 | 6 | 0  | 0 Akap17b       | protein_coding       |
| ENSMUSG00000063856 | 6 | 0  | 0 Gpx1          | protein_coding       |
| ENSMUSG00000068114 | 6 | 0  | 0 Ccdc134       | protein_coding       |
| ENSMUSG00000072847 | 6 | 0  | 0 A530017D24Rik | lincRNA              |
| ENSMUSG00000081787 | 6 | 0  | 0 Gm13991       | processed_pseudogene |
| ENSMUSG00000086474 | 6 | 0  | 0 9130204K15Rik | lincRNA              |
| ENSMUSG00000095868 | 6 | 0  | 0 Gm23136       | snoRNA               |
| ENSMUSG00000019857 | 5 | 31 | 0 Asf1a         | protein_coding       |
| ENSMUSG00000090207 | 5 | 29 | 0 4930524O07Rik | antisense            |
| ENSMUSG00000001847 | 5 | 17 | 2 Rac1          | protein_coding       |
| ENSMUSG00000049811 | 5 | 17 | 0 Fam161a       | protein_coding       |

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000083750 | 5 | 16 | 0 Gm14108       | processed_pseudogene |
| ENSMUSG00000029467 | 5 | 15 | 8 Atp2a2        | protein_coding       |
| ENSMUSG00000046417 | 5 | 15 | 2 Lrrc75a       | protein_coding       |
| ENSMUSG00000050310 | 5 | 15 | 2 Rictor        | protein_coding       |
| ENSMUSG00000030172 | 5 | 14 | 165 Erc1        | protein_coding       |
| ENSMUSG00000064776 | 5 | 14 | 38 Gm25203      | snoRNA               |
| ENSMUSG00000040601 | 5 | 14 | 0 Nlrp4a        | protein_coding       |
| ENSMUSG00000030744 | 5 | 12 | 8 Rps3          | protein_coding       |
| ENSMUSG00000101452 | 5 | 12 | 4 Gm28530       | processed_pseudogene |
| ENSMUSG00000023345 | 5 | 12 | 8 Poc1a         | protein_coding       |
| ENSMUSG00000042978 | 5 | 12 | 0 Sbk1          | protein_coding       |
| ENSMUSG00000024360 | 5 | 11 | 0 Etf1          | protein_coding       |
| ENSMUSG00000073436 | 5 | 11 | 0 Eme2          | protein_coding       |
| ENSMUSG00000082050 | 5 | 11 | 0               | processed_pseudogene |
| ENSMUSG00000074805 | 5 | 10 | 0 Il1bos        | antisense            |
| ENSMUSG00000019795 | 5 | 9  | 0 Pcmt1         | protein_coding       |
| ENSMUSG00000036564 | 5 | 9  | 0 Ndrp4         | protein_coding       |
| ENSMUSG00000037251 | 5 | 9  | 0 Pomk          | protein_coding       |
| ENSMUSG00000102064 | 5 | 9  | 0 Gm28625       | lincRNA              |
| ENSMUSG00000064432 | 5 | 9  | 56 Gm25587      | snRNA                |
| ENSMUSG00000032410 | 5 | 9  | 0 Xrn1          | protein_coding       |
| ENSMUSG00000061576 | 5 | 9  | 0 Dpp6          | protein_coding       |
| ENSMUSG00000088131 | 5 | 9  | 0               | snoRNA               |
| ENSMUSG00000093146 | 5 | 9  | 0               | snoRNA               |
| ENSMUSG00000098149 | 5 | 9  | 0 Gapdh-ps14    | processed_pseudogene |
| ENSMUSG00000099870 | 5 | 9  | 0 Gm7200        | processed_pseudogene |
| ENSMUSG00000085022 | 5 | 8  | 2 Gm5860        | lincRNA              |
| ENSMUSG00000022561 | 5 | 8  | 0 Gpaa1         | protein_coding       |
| ENSMUSG00000030788 | 5 | 8  | 0 Rnf141        | protein_coding       |
| ENSMUSG00000016757 | 5 | 7  | 8 Ttl12         | protein_coding       |
| ENSMUSG00000018196 | 5 | 7  | 0 Glrx2         | protein_coding       |
| ENSMUSG00000026174 | 5 | 7  | 0 Cnot9         | protein_coding       |
| ENSMUSG00000074158 | 5 | 7  | 0 Zfp976        | protein_coding       |
| ENSMUSG00000084124 | 5 | 7  | 0 Gm13588       | processed_pseudogene |
| ENSMUSG00000027582 | 5 | 7  | 36 Zgpat        | protein_coding       |
| ENSMUSG00000026219 | 5 | 7  | 14 Trip12       | protein_coding       |
| ENSMUSG00000058126 | 5 | 7  | 0 Tpm3-rs7      | protein_coding       |
| ENSMUSG00000082331 | 5 | 7  | 0               | processed_pseudogene |
| ENSMUSG00000083101 | 5 | 7  | 0 Gm13430       | processed_pseudogene |
| ENSMUSG00000087370 | 5 | 7  | 0 Tmem170b      | protein_coding       |
| ENSMUSG00000097091 | 5 | 7  | 0 4930526L06Rik | antisense            |
| ENSMUSG00000098201 | 5 | 7  | 0 Gm26983       | processed_pseudogene |
| ENSMUSG00000102705 | 5 | 7  | 0 4632432E15Rik | TEC                  |
| ENSMUSG00000065685 | 5 | 6  | 61 Gm23732      | snRNA                |
| ENSMUSG00000064412 | 5 | 6  | 59 Gm22246      | snRNA                |
| ENSMUSG00000065819 | 5 | 6  | 59 Gm24693      | snRNA                |
| ENSMUSG00000095245 | 5 | 6  | 59 Gm24753      | snRNA                |
| ENSMUSG00000096297 | 5 | 6  | 59 Gm23934      | snRNA                |
| ENSMUSG00000064735 | 5 | 6  | 57 Gm23057      | snRNA                |



|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000094897 | 5 | 6 | 57 Gm22288      | snRNA                |
| ENSMUSG00000096415 | 5 | 6 | 57 Gm24722      | snRNA                |
| ENSMUSG00000097171 | 5 | 6 | 2 Gm17644       | lincRNA              |
| ENSMUSG00000000275 | 5 | 6 | 0 Trim25        | protein_coding       |
| ENSMUSG00000025010 | 5 | 6 | 0 Ccnj          | protein_coding       |
| ENSMUSG00000030096 | 5 | 6 | 0 Slc6a6        | protein_coding       |
| ENSMUSG00000037531 | 5 | 6 | 0 Mrpl47        | protein_coding       |
| ENSMUSG00000041609 | 5 | 6 | 0 Ccdc64        | protein_coding       |
| ENSMUSG00000042821 | 5 | 6 | 0 Snai1         | protein_coding       |
| ENSMUSG00000056952 | 5 | 6 | 0 Tatdn2        | protein_coding       |
| ENSMUSG00000041297 | 5 | 5 | 26 Cdk13        | protein_coding       |
| ENSMUSG00000029062 | 5 | 5 | 14 Cdk11b       | protein_coding       |
| ENSMUSG00000074800 | 5 | 5 | 10 Gm4149       | pseudogene           |
| ENSMUSG00000005615 | 5 | 5 | 0 Pcyt1a        | protein_coding       |
| ENSMUSG00000028961 | 5 | 5 | 0 Pgd           | protein_coding       |
| ENSMUSG00000034690 | 5 | 5 | 0 Nlrp4c        | protein_coding       |
| ENSMUSG00000037896 | 5 | 5 | 0 Rcor1         | protein_coding       |
| ENSMUSG00000039652 | 5 | 5 | 0 Cpeb3         | protein_coding       |
| ENSMUSG00000046691 | 5 | 5 | 0 Chtf8         | protein_coding       |
| ENSMUSG00000048758 | 5 | 5 | 0 Rpl29         | protein_coding       |
| ENSMUSG00000074516 | 5 | 5 | 0 Gm10709       | protein_coding       |
| ENSMUSG00000082035 | 5 | 5 | 0 Rpl17-ps8     | processed_pseudogene |
| ENSMUSG00000082143 | 5 | 5 | 0 Gm12864       | processed_pseudogene |
| ENSMUSG00000082186 | 5 | 5 | 0 Gm12403       | processed_pseudogene |
| ENSMUSG00000098005 | 5 | 5 | 0 Gm6114        | processed_pseudogene |
| ENSMUSG00000098021 | 5 | 5 | 0 Gm9522        | processed_pseudogene |
| ENSMUSG00000065115 | 5 | 5 | 32 Gm23298      | snRNA                |
| ENSMUSG00000103034 | 5 | 5 | 16 Gm8797       | protein_coding       |
| ENSMUSG00000027937 | 5 | 5 | 12 Jtb          | protein_coding       |
| ENSMUSG00000032504 | 5 | 5 | 12 Pdcd6ip      | protein_coding       |
| ENSMUSG00000064145 | 5 | 5 | 6 Arih2         | protein_coding       |
| ENSMUSG00000103801 | 5 | 5 | 6 Spin3-ps      | processed_pseudogene |
| ENSMUSG00000046157 | 5 | 5 | 2 Tmem229b      | protein_coding       |
| ENSMUSG00000056219 | 5 | 5 | 2 Tmem229b-ps   | protein_coding       |
| ENSMUSG00000020546 | 5 | 5 | 0 Stxbp4        | protein_coding       |
| ENSMUSG00000026018 | 5 | 5 | 0 Ica1l         | protein_coding       |
| ENSMUSG00000026659 | 5 | 5 | 0 Dusp12        | protein_coding       |
| ENSMUSG00000030680 | 5 | 5 | 0 Pagr1a        | protein_coding       |
| ENSMUSG00000038598 | 5 | 5 | 0 AI481877      | protein_coding       |
| ENSMUSG00000039220 | 5 | 5 | 0 Ppp1r10       | protein_coding       |
| ENSMUSG00000055833 | 5 | 5 | 0 1700034H15Rik | antisense            |
| ENSMUSG00000059920 | 5 | 5 | 0 4930453N24Rik | protein_coding       |
| ENSMUSG00000073045 | 5 | 5 | 0 Gm5570        | lincRNA              |
| ENSMUSG00000079419 | 5 | 5 | 0 Ms4a6c        | protein_coding       |
| ENSMUSG00000082250 | 5 | 5 | 0 Gm12181       | processed_pseudogene |
| ENSMUSG00000097130 | 5 | 5 | 0 Gm5262        | processed_pseudogene |
| ENSMUSG00000035107 | 5 | 4 | 6 Dcbld2        | protein_coding       |
| ENSMUSG00000027243 | 5 | 4 | 2 Harbi1        | protein_coding       |
| ENSMUSG00000033697 | 5 | 4 | 2 Arhgap39      | protein_coding       |

|                    |   |   |                 |                                  |
|--------------------|---|---|-----------------|----------------------------------|
| ENSMUSG00000069301 | 5 | 4 | 2 Hist1h2ag     | protein_coding                   |
| ENSMUSG00000071478 | 5 | 4 | 2 Hist1h2ad     | protein_coding                   |
| ENSMUSG00000026275 | 5 | 4 | 0 Ppp1r7        | protein_coding                   |
| ENSMUSG00000026848 | 5 | 4 | 0 Tor1b         | protein_coding                   |
| ENSMUSG00000036941 | 5 | 4 | 0 Elac1         | protein_coding                   |
| ENSMUSG00000046441 | 5 | 4 | 0 Cmtr2         | protein_coding                   |
| ENSMUSG00000049800 | 5 | 4 | 0 Sertad2       | protein_coding                   |
| ENSMUSG00000052296 | 5 | 4 | 0 Ppp6r1        | protein_coding                   |
| ENSMUSG00000052928 | 5 | 4 | 0 Ctif          | protein_coding                   |
| ENSMUSG00000063730 | 5 | 4 | 0 Hsd3b2        | protein_coding                   |
| ENSMUSG00000064267 | 5 | 4 | 0 Hvcn1         | protein_coding                   |
| ENSMUSG00000065939 | 5 | 4 | 0 Snora2b       | snoRNA                           |
| ENSMUSG00000081291 | 5 | 4 | 0               | processed_pseudogene             |
| ENSMUSG00000085799 | 5 | 4 | 0 Gm6963        | processed_pseudogene             |
| ENSMUSG00000085973 | 5 | 4 | 0 Gm14742       | lincRNA                          |
| ENSMUSG00000087306 | 5 | 4 | 0 A230004M16Rik | processed_transcript             |
| ENSMUSG00000097204 | 5 | 4 | 0 Gm17690       | lincRNA                          |
| ENSMUSG00000097994 | 5 | 4 | 0 Gm26982       | antisense                        |
| ENSMUSG00000102052 | 5 | 4 | 0 Gm28387       | lincRNA                          |
| ENSMUSG00000098065 | 5 | 3 | 6 Gm5177        | transcribed_processed_pseudogene |
| ENSMUSG00000055805 | 5 | 3 | 2 Fmnl1         | protein_coding                   |
| ENSMUSG00000020700 | 5 | 3 | 0 Map3k3        | protein_coding                   |
| ENSMUSG00000074604 | 5 | 3 | 0 Mgst2         | protein_coding                   |
| ENSMUSG00000092051 | 5 | 3 | 0 Gm17229       | processed_pseudogene             |
| ENSMUSG00000095690 | 5 | 3 | 0 Rab11b-ps2    | processed_pseudogene             |
| ENSMUSG00000103000 | 5 | 3 | 0 Gm37900       | TEC                              |
| ENSMUSG00000077419 | 5 | 3 | 83 Gm23744      | snRNA                            |
| ENSMUSG00000014771 | 5 | 3 | 0 Pdcd2         | protein_coding                   |
| ENSMUSG00000027940 | 5 | 3 | 0 Tpm3          | protein_coding                   |
| ENSMUSG00000029406 | 5 | 3 | 0 Pitpnm2       | protein_coding                   |
| ENSMUSG00000045658 | 5 | 3 | 0 Pid1          | protein_coding                   |
| ENSMUSG00000074863 | 5 | 3 | 0 Platr25       | lincRNA                          |
| ENSMUSG00000010608 | 5 | 2 | 59 Rbm25        | protein_coding                   |
| ENSMUSG00000084621 | 5 | 2 | 38 Gm25106      | snRNA                            |
| ENSMUSG00000024158 | 5 | 2 | 2 Hagh          | protein_coding                   |
| ENSMUSG00000026715 | 5 | 2 | 0 Serpinc1      | protein_coding                   |
| ENSMUSG00000036073 | 5 | 2 | 0 Galt          | protein_coding                   |
| ENSMUSG00000079003 | 5 | 2 | 0 Samd1         | protein_coding                   |
| ENSMUSG00000090602 | 5 | 2 | 0 Gm5611        | protein_coding                   |
| ENSMUSG00000026226 | 5 | 1 | 8 Spata3        | protein_coding                   |
| ENSMUSG00000006676 | 5 | 1 | 6 Usp19         | protein_coding                   |
| ENSMUSG00000026694 | 5 | 1 | 0 Mettl13       | protein_coding                   |
| ENSMUSG00000026917 | 5 | 1 | 0 Wdr5          | protein_coding                   |
| ENSMUSG00000101867 | 5 | 1 | 0 C78334        | antisense                        |
| ENSMUSG00000032376 | 5 | 1 | 155 Usp3        | protein_coding                   |
| ENSMUSG00000026276 | 5 | 1 | 24 Sept2        | protein_coding                   |
| ENSMUSG00000039768 | 5 | 1 | 8 Dnaje11       | protein_coding                   |
| ENSMUSG00000027001 | 5 | 1 | 2 Dusp19        | protein_coding                   |
| ENSMUSG00000052962 | 5 | 1 | 0 Mrpl35        | protein_coding                   |

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|--------------------|---|---|-----------------|----------------|
| ENSMUSG00000078786 | 5 | 1 | 0 BC024978      | protein_coding |
| ENSMUSG00000086938 | 5 | 1 | 0 4930481A15Rik | protein_coding |
| ENSMUSG00000026034 | 5 | 0 | 83 Clk1         | protein_coding |
| ENSMUSG00000023764 | 5 | 0 | 69 Sfi1         | protein_coding |
| ENSMUSG00000034024 | 5 | 0 | 56 Cct2         | protein_coding |
| ENSMUSG00000021745 | 5 | 0 | 52 Ptprg        | protein_coding |
| ENSMUSG00000030591 | 5 | 0 | 38 Psmd8        | protein_coding |
| ENSMUSG00000025794 | 5 | 0 | 24 Rpl14        | protein_coding |
| ENSMUSG00000046721 | 5 | 0 | 24 Rpl14-ps1    | pseudogene     |
| ENSMUSG00000029864 | 5 | 0 | 22 Gstk1        | protein_coding |
| ENSMUSG00000033955 | 5 | 0 | 18 Tnks1bp1     | protein_coding |
| ENSMUSG00000042350 | 5 | 0 | 14 Are1l        | protein_coding |
| ENSMUSG00000063077 | 5 | 0 | 14 Kif1b        | protein_coding |
| ENSMUSG00000078622 | 5 | 0 | 14 Ccdc47       | protein_coding |
| ENSMUSG00000019961 | 5 | 0 | 12 Tmpo         | protein_coding |
| ENSMUSG00000047719 | 5 | 0 | 12 Ubiad1       | protein_coding |
| ENSMUSG00000051864 | 5 | 0 | 12 Tbc1d22a     | protein_coding |
| ENSMUSG00000063882 | 5 | 0 | 8 Uqcrh         | protein_coding |
| ENSMUSG00000003731 | 5 | 0 | 2 Kpna6         | protein_coding |
| ENSMUSG00000000127 | 5 | 0 | 0 Fer           | protein_coding |
| ENSMUSG00000000303 | 5 | 0 | 0 Cdh1          | protein_coding |
| ENSMUSG00000000631 | 5 | 0 | 0 Myo18a        | protein_coding |
| ENSMUSG00000004934 | 5 | 0 | 0 Pias4         | protein_coding |
| ENSMUSG00000004936 | 5 | 0 | 0 Map2k1        | protein_coding |
| ENSMUSG00000009549 | 5 | 0 | 0 Srp14         | protein_coding |
| ENSMUSG00000009733 | 5 | 0 | 0 Tfcp2         | protein_coding |
| ENSMUSG00000017667 | 5 | 0 | 0 Zfp334        | protein_coding |
| ENSMUSG00000017756 | 5 | 0 | 0 Slc12a7       | protein_coding |
| ENSMUSG00000018401 | 5 | 0 | 0 Mtmr4         | protein_coding |
| ENSMUSG00000019590 | 5 | 0 | 0 Cyb561        | protein_coding |
| ENSMUSG00000020235 | 5 | 0 | 0 Fzr1          | protein_coding |
| ENSMUSG00000020250 | 5 | 0 | 0 Txnrd1        | protein_coding |
| ENSMUSG00000020271 | 5 | 0 | 0 Fbxw11        | protein_coding |
| ENSMUSG00000020377 | 5 | 0 | 0 Ltc4s         | protein_coding |
| ENSMUSG00000020694 | 5 | 0 | 0 Tlk2          | protein_coding |
| ENSMUSG00000021025 | 5 | 0 | 0 Nfkbia        | protein_coding |
| ENSMUSG00000021120 | 5 | 0 | 0 Pigh          | protein_coding |
| ENSMUSG00000021192 | 5 | 0 | 0 Golga5        | protein_coding |
| ENSMUSG00000021477 | 5 | 0 | 0 Ctsl          | protein_coding |
| ENSMUSG00000021501 | 5 | 0 | 0 Caml          | protein_coding |
| ENSMUSG00000021514 | 5 | 0 | 0 Zfp369        | protein_coding |
| ENSMUSG00000022119 | 5 | 0 | 0 Rbm26         | protein_coding |
| ENSMUSG00000022387 | 5 | 0 | 0 Brd1          | protein_coding |
| ENSMUSG00000022757 | 5 | 0 | 0 Tfg           | protein_coding |
| ENSMUSG00000024346 | 5 | 0 | 0 Pfdn1         | protein_coding |
| ENSMUSG00000024539 | 5 | 0 | 0 Ptpn2         | protein_coding |
| ENSMUSG00000024576 | 5 | 0 | 0 Csnk1a1       | protein_coding |
| ENSMUSG00000025722 | 5 | 0 | 0 Wdr73         | protein_coding |
| ENSMUSG00000025781 | 5 | 0 | 0 Atp5c1        | protein_coding |

|                    |   |   |            |                |
|--------------------|---|---|------------|----------------|
| ENSMUSG00000026342 | 5 | 0 | 0 Slc35f5  | protein_coding |
| ENSMUSG00000026554 | 5 | 0 | 0 Dcaf8    | protein_coding |
| ENSMUSG00000026683 | 5 | 0 | 0 Nuf2     | protein_coding |
| ENSMUSG00000026688 | 5 | 0 | 0 Mgst3    | protein_coding |
| ENSMUSG00000026698 | 5 | 0 | 0 Pigc     | protein_coding |
| ENSMUSG00000028053 | 5 | 0 | 0 Ash1l    | protein_coding |
| ENSMUSG00000028224 | 5 | 0 | 0 Nbn      | protein_coding |
| ENSMUSG00000028437 | 5 | 0 | 0 Ubap1    | protein_coding |
| ENSMUSG00000028572 | 5 | 0 | 0 Hook1    | protein_coding |
| ENSMUSG00000028684 | 5 | 0 | 0 Urod     | protein_coding |
| ENSMUSG00000029465 | 5 | 0 | 0 Arpc3    | protein_coding |
| ENSMUSG00000029592 | 5 | 0 | 0 Usp30    | protein_coding |
| ENSMUSG00000029726 | 5 | 0 | 0 Mepce    | protein_coding |
| ENSMUSG00000030105 | 5 | 0 | 0 Arl8b    | protein_coding |
| ENSMUSG00000030255 | 5 | 0 | 0 Sspn     | protein_coding |
| ENSMUSG00000030839 | 5 | 0 | 0 Sergef   | protein_coding |
| ENSMUSG00000030871 | 5 | 0 | 0 Ears2    | protein_coding |
| ENSMUSG00000030884 | 5 | 0 | 0 Uqcr2    | protein_coding |
| ENSMUSG00000031295 | 5 | 0 | 0 Phka2    | protein_coding |
| ENSMUSG00000031536 | 5 | 0 | 0 Polb     | protein_coding |
| ENSMUSG00000031634 | 5 | 0 | 0 Ufsp2    | protein_coding |
| ENSMUSG00000031985 | 5 | 0 | 0 Gnpat    | protein_coding |
| ENSMUSG00000032359 | 5 | 0 | 0 Ctsh     | protein_coding |
| ENSMUSG00000032437 | 5 | 0 | 0 Stt3b    | protein_coding |
| ENSMUSG00000033540 | 5 | 0 | 0 Idua     | protein_coding |
| ENSMUSG00000034349 | 5 | 0 | 0 Smc4     | protein_coding |
| ENSMUSG00000034707 | 5 | 0 | 0 Gns      | protein_coding |
| ENSMUSG00000034820 | 5 | 0 | 0 Cpsf7    | protein_coding |
| ENSMUSG00000035329 | 5 | 0 | 0 Fbxo33   | protein_coding |
| ENSMUSG00000036834 | 5 | 0 | 0 Plch1    | protein_coding |
| ENSMUSG00000036955 | 5 | 0 | 0 Kif1bp   | protein_coding |
| ENSMUSG00000037007 | 5 | 0 | 0 Zfp113   | protein_coding |
| ENSMUSG00000037351 | 5 | 0 | 0 Actr1b   | protein_coding |
| ENSMUSG00000037902 | 5 | 0 | 0 Sirpa    | protein_coding |
| ENSMUSG00000037938 | 5 | 0 | 0 Chchd5   | protein_coding |
| ENSMUSG00000038028 | 5 | 0 | 0 Tigar    | protein_coding |
| ENSMUSG00000038437 | 5 | 0 | 0 Mllt6    | protein_coding |
| ENSMUSG00000038510 | 5 | 0 | 0 Rpf2     | protein_coding |
| ENSMUSG00000038733 | 5 | 0 | 0 Wdr26    | protein_coding |
| ENSMUSG00000038807 | 5 | 0 | 0 Rap1gap2 | protein_coding |
| ENSMUSG00000039224 | 5 | 0 | 0 D1Pas1   | protein_coding |
| ENSMUSG00000039275 | 5 | 0 | 0 Foxk2    | protein_coding |
| ENSMUSG00000039298 | 5 | 0 | 0 Cdk5rap2 | protein_coding |
| ENSMUSG00000039960 | 5 | 0 | 0 Rhou     | protein_coding |
| ENSMUSG00000040029 | 5 | 0 | 0 Ipo8     | protein_coding |
| ENSMUSG00000041313 | 5 | 0 | 0 Slc7a1   | protein_coding |
| ENSMUSG00000042105 | 5 | 0 | 0 Inpp5f   | protein_coding |
| ENSMUSG00000042680 | 5 | 0 | 0 Gareem   | protein_coding |
| ENSMUSG00000042719 | 5 | 0 | 0 Naa25    | protein_coding |

|                    |   |    |                 |                                  |
|--------------------|---|----|-----------------|----------------------------------|
| ENSMUSG00000044465 | 5 | 0  | 0 Fam160a2      | protein_coding                   |
| ENSMUSG00000046947 | 5 | 0  | 0 Adck2         | protein_coding                   |
| ENSMUSG00000047804 | 5 | 0  | 0 Akap10        | protein_coding                   |
| ENSMUSG00000048261 | 5 | 0  | 0 Gm4879        | processed_pseudogene             |
| ENSMUSG00000048379 | 5 | 0  | 0 Socs4         | protein_coding                   |
| ENSMUSG00000049562 | 5 | 0  | 0 Ap5b1         | protein_coding                   |
| ENSMUSG00000049832 | 5 | 0  | 0 Gm9840        | processed_pseudogene             |
| ENSMUSG00000050447 | 5 | 0  | 0 Lypd6         | protein_coding                   |
| ENSMUSG00000050627 | 5 | 0  | 0 Gpd1l         | protein_coding                   |
| ENSMUSG00000052310 | 5 | 0  | 0 Slc39a1       | protein_coding                   |
| ENSMUSG00000054008 | 5 | 0  | 0 Ndst1         | protein_coding                   |
| ENSMUSG00000055660 | 5 | 0  | 0 Mettl4        | protein_coding                   |
| ENSMUSG00000056124 | 5 | 0  | 0 B4galt6       | protein_coding                   |
| ENSMUSG00000056429 | 5 | 0  | 0 Tgoln1        | protein_coding                   |
| ENSMUSG00000058407 | 5 | 0  | 0 Txndc9        | protein_coding                   |
| ENSMUSG00000062040 | 5 | 0  | 0 Zfp27         | protein_coding                   |
| ENSMUSG00000063015 | 5 | 0  | 0 Ccni          | protein_coding                   |
| ENSMUSG00000063334 | 5 | 0  | 0 Krr1          | protein_coding                   |
| ENSMUSG00000063511 | 5 | 0  | 0 Snrnp70       | protein_coding                   |
| ENSMUSG00000064264 | 5 | 0  | 0 Zfp428        | protein_coding                   |
| ENSMUSG00000066392 | 5 | 0  | 0 Nrnx3         | protein_coding                   |
| ENSMUSG00000066892 | 5 | 0  | 0 Fbxl12        | protein_coding                   |
| ENSMUSG00000068036 | 5 | 0  | 0 Mllt4         | protein_coding                   |
| ENSMUSG00000071650 | 5 | 0  | 0 Ganab         | protein_coding                   |
| ENSMUSG00000073542 | 5 | 0  | 0 Cep76         | protein_coding                   |
| ENSMUSG00000074238 | 5 | 0  | 0 Ap1ar         | protein_coding                   |
| ENSMUSG00000074656 | 5 | 0  | 0 Eif2s2        | protein_coding                   |
| ENSMUSG00000078570 | 5 | 0  | 0 1110065P20Rik | protein_coding                   |
| ENSMUSG00000080268 | 5 | 0  | 0 Brms1         | protein_coding                   |
| ENSMUSG00000085069 | 5 | 0  | 0 Gm13111       | antisense                        |
| ENSMUSG00000087050 | 5 | 0  | 0 Dhrrs13os     | antisense                        |
| ENSMUSG00000089775 | 5 | 0  | 0 Gm16270       | transcribed_processed_pseudogene |
| ENSMUSG00000092284 | 5 | 0  | 0 Gm8801        | unprocessed_pseudogene           |
| ENSMUSG00000098506 | 5 | 0  | 0 Phf20-ps      | processed_pseudogene             |
| ENSMUSG00000018428 | 4 | 50 | 12 Akap1        | protein_coding                   |
| ENSMUSG00000040236 | 4 | 37 | 0 Trappc5       | protein_coding                   |
| ENSMUSG00000080396 | 4 | 35 | 24 Snord111     | snoRNA                           |
| ENSMUSG00000051413 | 4 | 32 | 0 Plagl2        | protein_coding                   |
| ENSMUSG00000095832 | 4 | 31 | 0               | protein_coding                   |
| ENSMUSG00000026880 | 4 | 29 | 0 Stom          | protein_coding                   |
| ENSMUSG00000043733 | 4 | 29 | 0 Ptpn11        | protein_coding                   |
| ENSMUSG00000029173 | 4 | 28 | 0 Sepsecs       | protein_coding                   |
| ENSMUSG00000024914 | 4 | 26 | 0 Drap1         | protein_coding                   |
| ENSMUSG00000030795 | 4 | 21 | 0 Fus           | protein_coding                   |
| ENSMUSG00000074136 | 4 | 18 | 0 4930513N10Rik | processed_transcript             |
| ENSMUSG00000091623 | 4 | 16 | 0 Gm17092       | antisense                        |
| ENSMUSG00000026339 | 4 | 16 | 0 Ccdc93        | protein_coding                   |
| ENSMUSG00000030539 | 4 | 16 | 0 Sema4b        | protein_coding                   |
| ENSMUSG00000038217 | 4 | 16 | 0 Tlcd2         | protein_coding                   |

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000022408 | 4 | 15 | 0 Fam83f        | protein_coding       |
| ENSMUSG00000024811 | 4 | 15 | 0 Tnks2         | protein_coding       |
| ENSMUSG00000039512 | 4 | 15 | 0 Uhrf1bp1      | protein_coding       |
| ENSMUSG00000046756 | 4 | 14 | 0 Mrps7         | protein_coding       |
| ENSMUSG00000010095 | 4 | 14 | 34 Slc3a2       | protein_coding       |
| ENSMUSG00000024160 | 4 | 14 | 0 Spsb3         | protein_coding       |
| ENSMUSG00000032186 | 4 | 13 | 0 Tmod2         | protein_coding       |
| ENSMUSG00000052557 | 4 | 13 | 0 Gan           | protein_coding       |
| ENSMUSG00000070343 | 4 | 12 | 4 Gm10288       | processed_pseudogene |
| ENSMUSG00000061684 | 4 | 12 | 2 Rpl21-ps8     | processed_pseudogene |
| ENSMUSG00000041712 | 4 | 12 | 0 Ubr7          | protein_coding       |
| ENSMUSG00000050144 | 4 | 12 | 0 Slc25a44      | protein_coding       |
| ENSMUSG00000023032 | 4 | 12 | 24 Slc4a8       | protein_coding       |
| ENSMUSG00000021340 | 4 | 12 | 0 Gpld1         | protein_coding       |
| ENSMUSG00000081015 | 4 | 12 | 0               | processed_pseudogene |
| ENSMUSG00000086967 | 4 | 12 | 0               | processed_transcript |
| ENSMUSG00000054555 | 4 | 11 | 0 Adam12        | protein_coding       |
| ENSMUSG00000066592 | 4 | 11 | 0 Gm7589        | processed_pseudogene |
| ENSMUSG00000091981 | 4 | 11 | 0               | processed_pseudogene |
| ENSMUSG00000092012 | 4 | 11 | 0               | protein_coding       |
| ENSMUSG00000094300 | 4 | 11 | 0               | processed_pseudogene |
| ENSMUSG00000100895 | 4 | 11 | 0 Gm28685       | processed_pseudogene |
| ENSMUSG00000027361 | 4 | 10 | 0 Gabpb1        | protein_coding       |
| ENSMUSG00000028838 | 4 | 10 | 0 Extl1         | protein_coding       |
| ENSMUSG00000030842 | 4 | 10 | 0 Lamtor1       | protein_coding       |
| ENSMUSG00000017774 | 4 | 9  | 8 Myo1c         | protein_coding       |
| ENSMUSG00000020689 | 4 | 9  | 0 Itgb3         | protein_coding       |
| ENSMUSG00000021810 | 4 | 9  | 0 Ecd           | protein_coding       |
| ENSMUSG00000042506 | 4 | 9  | 0 Usp22         | protein_coding       |
| ENSMUSG00000081099 | 4 | 9  | 0 Gm5270        | processed_pseudogene |
| ENSMUSG00000087177 | 4 | 9  | 0 E130307A14Rik | processed_transcript |
| ENSMUSG00000004677 | 4 | 9  | 0 Myo9b         | protein_coding       |
| ENSMUSG00000025408 | 4 | 9  | 0 Ddit3         | protein_coding       |
| ENSMUSG00000030852 | 4 | 9  | 0 Tacc2         | protein_coding       |
| ENSMUSG00000036835 | 4 | 9  | 0 Psenen        | protein_coding       |
| ENSMUSG00000083979 | 4 | 9  | 0 Gm12527       | processed_pseudogene |
| ENSMUSG00000081575 | 4 | 8  | 6 Gm12090       | processed_pseudogene |
| ENSMUSG00000031758 | 4 | 8  | 0 Cdyl2         | protein_coding       |
| ENSMUSG00000037990 | 4 | 8  | 0 Sh3rf3        | protein_coding       |
| ENSMUSG00000089417 | 4 | 7  | 153 Gm22009     | snoRNA               |
| ENSMUSG00000027475 | 4 | 7  | 16 Kif3b        | protein_coding       |
| ENSMUSG00000059820 | 4 | 7  | 8 AU019823      | protein_coding       |
| ENSMUSG00000037020 | 4 | 7  | 0 Wdr62         | protein_coding       |
| ENSMUSG00000050212 | 4 | 7  | 0 Eva1b         | protein_coding       |
| ENSMUSG00000063171 | 4 | 7  | 0 Rps4l         | protein_coding       |
| ENSMUSG00000084203 | 4 | 7  | 0 Gm15593       | processed_pseudogene |
| ENSMUSG00000096959 | 4 | 7  | 0 4930509G22Rik | lincRNA              |
| ENSMUSG00000097537 | 4 | 7  | 0 2610020C07Rik | lincRNA              |
| ENSMUSG00000098030 | 4 | 7  | 0 Gm6771        | processed_pseudogene |

|                    |   |   |            |                      |
|--------------------|---|---|------------|----------------------|
| ENSMUSG00000088597 | 4 | 7 | 61 Gm24584 | snRNA                |
| ENSMUSG00000096005 | 4 | 7 | 61 Gm24863 | snRNA                |
| ENSMUSG00000065851 | 4 | 7 | 59 Gm22352 | snRNA                |
| ENSMUSG00000065678 | 4 | 7 | 48 Gm24261 | snRNA                |
| ENSMUSG00000037740 | 4 | 7 | 16 Mrps26  | protein_coding       |
| ENSMUSG00000004359 | 4 | 7 | 0 Spic     | protein_coding       |
| ENSMUSG00000022313 | 4 | 7 | 0 Utp23    | protein_coding       |
| ENSMUSG00000028995 | 4 | 7 | 0 Fam126a  | protein_coding       |
| ENSMUSG00000098031 | 4 | 7 | 0 Gm9341   | processed_pseudogene |
| ENSMUSG00000064663 | 4 | 6 | 65 Gm24859 | snRNA                |
| ENSMUSG00000095489 | 4 | 6 | 65 Gm25737 | snRNA                |
| ENSMUSG00000095791 | 4 | 6 | 65 Gm26295 | snRNA                |
| ENSMUSG00000096642 | 4 | 6 | 65 Gm24870 | snRNA                |
| ENSMUSG00000064907 | 4 | 6 | 63 Gm25405 | snRNA                |
| ENSMUSG00000065007 | 4 | 6 | 63 Gm26324 | snRNA                |
| ENSMUSG00000065661 | 4 | 6 | 63 Gm22580 | snRNA                |
| ENSMUSG00000065788 | 4 | 6 | 63 Gm22682 | snRNA                |
| ENSMUSG00000094201 | 4 | 6 | 63 Gm25064 | snRNA                |
| ENSMUSG00000094665 | 4 | 6 | 63 Gm24873 | snRNA                |
| ENSMUSG00000094963 | 4 | 6 | 63 Gm22418 | snRNA                |
| ENSMUSG00000095610 | 4 | 6 | 63 Gm26245 | snRNA                |
| ENSMUSG00000095678 | 4 | 6 | 63 Gm25101 | snRNA                |
| ENSMUSG00000096423 | 4 | 6 | 63 Gm24978 | snRNA                |
| ENSMUSG00000065245 | 4 | 6 | 61 Gm22295 | snRNA                |
| ENSMUSG00000065270 | 4 | 6 | 61 Gm25127 | snRNA                |
| ENSMUSG00000065789 | 4 | 6 | 61 Gm25869 | snRNA                |
| ENSMUSG00000095003 | 4 | 6 | 61 Gm25173 | snRNA                |
| ENSMUSG00000064399 | 4 | 6 | 59 Gm23629 | snRNA                |
| ENSMUSG00000064494 | 4 | 6 | 59 Gm22063 | snRNA                |
| ENSMUSG00000064755 | 4 | 6 | 59 Gm26328 | snRNA                |
| ENSMUSG00000065127 | 4 | 6 | 59 Gm26127 | snRNA                |
| ENSMUSG00000065347 | 4 | 6 | 59 Gm25583 | snRNA                |
| ENSMUSG00000065828 | 4 | 6 | 59 Gm26317 | snRNA                |
| ENSMUSG00000094229 | 4 | 6 | 59 Gm22969 | snRNA                |
| ENSMUSG00000094452 | 4 | 6 | 59 Gm22623 | snRNA                |
| ENSMUSG00000094703 | 4 | 6 | 59 Gm24486 | snRNA                |
| ENSMUSG00000094710 | 4 | 6 | 59 Gm22823 | snRNA                |
| ENSMUSG00000094977 | 4 | 6 | 59 Gm25256 | snRNA                |
| ENSMUSG00000095023 | 4 | 6 | 59 Gm24019 | snRNA                |
| ENSMUSG00000095233 | 4 | 6 | 59 Gm26378 | snRNA                |
| ENSMUSG00000095615 | 4 | 6 | 59 Gm26243 | snRNA                |
| ENSMUSG00000064429 | 4 | 6 | 57 Gm22747 | snRNA                |
| ENSMUSG00000065138 | 4 | 6 | 57 Gm24458 | snRNA                |
| ENSMUSG00000094292 | 4 | 6 | 57 Gm23610 | snRNA                |
| ENSMUSG00000094820 | 4 | 6 | 57 Gm23805 | snRNA                |
| ENSMUSG00000095752 | 4 | 6 | 57 Gm24182 | snRNA                |
| ENSMUSG00000093988 | 4 | 6 | 50 Gm24861 | snRNA                |
| ENSMUSG00000094510 | 4 | 6 | 48 Gm24565 | snRNA                |
| ENSMUSG00000008682 | 4 | 6 | 14 Rpl10   | protein_coding       |

|                    |   |   |                 |                                  |
|--------------------|---|---|-----------------|----------------------------------|
| ENSMUSG00000058443 | 4 | 6 | 14 Rpl10-ps3    | protein_coding                   |
| ENSMUSG00000080859 | 4 | 6 | 14 Rpl10-ps1    | transcribed_processed_pseudogene |
| ENSMUSG00000042272 | 4 | 6 | 12 Sestd1       | protein_coding                   |
| ENSMUSG00000042444 | 4 | 6 | 2 Fam63b        | protein_coding                   |
| ENSMUSG00000020387 | 4 | 6 | 0 Jade2         | protein_coding                   |
| ENSMUSG00000042197 | 4 | 6 | 0 Zfp451        | protein_coding                   |
| ENSMUSG00000044726 | 4 | 6 | 0 Erich5        | protein_coding                   |
| ENSMUSG00000045104 | 4 | 6 | 0 Gm5514        | processed_pseudogene             |
| ENSMUSG00000062232 | 4 | 6 | 0 Rapgef2       | protein_coding                   |
| ENSMUSG00000082601 | 4 | 6 | 0 Gm12700       | processed_pseudogene             |
| ENSMUSG00000084005 | 4 | 6 | 0               | processed_pseudogene             |
| ENSMUSG00000085180 | 4 | 6 | 0 AI838599      | lincRNA                          |
| ENSMUSG00000089717 | 4 | 6 | 0 Olfr275       | protein_coding                   |
| ENSMUSG00000098100 | 4 | 6 | 0 Gm7572        | processed_pseudogene             |
| ENSMUSG00000095068 | 4 | 5 | 38 Gm26189      | snRNA                            |
| ENSMUSG00000064653 | 4 | 5 | 36 Gm26129      | snRNA                            |
| ENSMUSG00000064782 | 4 | 5 | 36 Gm22685      | snRNA                            |
| ENSMUSG00000065104 | 4 | 5 | 36 Gm26128      | snRNA                            |
| ENSMUSG00000084476 | 4 | 5 | 36 Gm25781      | snRNA                            |
| ENSMUSG00000034006 | 4 | 5 | 20 Pqlc1        | protein_coding                   |
| ENSMUSG00000064742 | 4 | 5 | 12 Gm24705      | snRNA                            |
| ENSMUSG00000001763 | 4 | 5 | 10 Tspan33      | protein_coding                   |
| ENSMUSG00000094494 | 4 | 5 | 10 Rnu6-ps2     | snRNA                            |
| ENSMUSG00000060093 | 4 | 5 | 6 Hist1h4a      | protein_coding                   |
| ENSMUSG00000060678 | 4 | 5 | 6 Hist1h4c      | protein_coding                   |
| ENSMUSG00000060981 | 4 | 5 | 6 Hist1h4h      | protein_coding                   |
| ENSMUSG00000064288 | 4 | 5 | 6 Hist1h4k      | protein_coding                   |
| ENSMUSG00000067455 | 4 | 5 | 6 Hist1h4j      | protein_coding                   |
| ENSMUSG00000069266 | 4 | 5 | 6 Hist1h4b      | protein_coding                   |
| ENSMUSG00000069274 | 4 | 5 | 6 Hist1h4f      | protein_coding                   |
| ENSMUSG00000001105 | 4 | 5 | 0 Ift20         | protein_coding                   |
| ENSMUSG00000004896 | 4 | 5 | 0 Rmad1         | protein_coding                   |
| ENSMUSG00000005417 | 4 | 5 | 0 Mprp          | protein_coding                   |
| ENSMUSG00000034343 | 4 | 5 | 0 Ube2f         | protein_coding                   |
| ENSMUSG00000038416 | 4 | 5 | 0 Cdc16         | protein_coding                   |
| ENSMUSG00000047635 | 4 | 5 | 0 2810006K23Rik | protein_coding                   |
| ENSMUSG00000083460 | 4 | 5 | 0 Gm12182       | processed_pseudogene             |
| ENSMUSG00000097429 | 4 | 5 | 0 Gm26520       | lincRNA                          |
| ENSMUSG00000098016 | 4 | 5 | 0 Gm9211        | processed_pseudogene             |
| ENSMUSG00000101636 | 4 | 5 | 0 4930579H20Rik | antisense                        |
| ENSMUSG00000038984 | 4 | 5 | 83 Tspyl5       | protein_coding                   |
| ENSMUSG00000065195 | 4 | 5 | 36 Gm26071      | snRNA                            |
| ENSMUSG00000065203 | 4 | 5 | 36 Gm24614      | snRNA                            |
| ENSMUSG00000064867 | 4 | 5 | 34 Gm25039      | snRNA                            |
| ENSMUSG00000065892 | 4 | 5 | 34 Gm24521      | snRNA                            |
| ENSMUSG00000065906 | 4 | 5 | 34 Gm26107      | snRNA                            |
| ENSMUSG00000094726 | 4 | 5 | 34 Gm23355      | snRNA                            |
| ENSMUSG00000095502 | 4 | 5 | 34 Gm22450      | snRNA                            |
| ENSMUSG00000096247 | 4 | 5 | 34 Gm24268      | snRNA                            |



|                    |   |   |              |                                    |
|--------------------|---|---|--------------|------------------------------------|
| ENSMUSG00000096713 | 4 | 5 | 34 Gm23148   | snRNA                              |
| ENSMUSG00000089106 | 4 | 5 | 32 Gm23116   | snRNA                              |
| ENSMUSG00000095825 | 4 | 5 | 32 Gm25448   | snRNA                              |
| ENSMUSG00000056579 | 4 | 5 | 26 Tug1      | processed_transcript               |
| ENSMUSG00000019432 | 4 | 5 | 12 Ddx39b    | protein_coding                     |
| ENSMUSG00000093831 | 4 | 5 | 10 Gm23144   | snRNA                              |
| ENSMUSG00000095070 | 4 | 5 | 10 Gm24508   | snRNA                              |
| ENSMUSG00000094870 | 4 | 5 | 2 Zfp131     | protein_coding                     |
| ENSMUSG00000001151 | 4 | 5 | 0 Pcnt       | protein_coding                     |
| ENSMUSG00000005370 | 4 | 5 | 0 Msh6       | protein_coding                     |
| ENSMUSG00000006850 | 4 | 5 | 0 Tmco6      | protein_coding                     |
| ENSMUSG00000010290 | 4 | 5 | 0 AI597479   | protein_coding                     |
| ENSMUSG00000010453 | 4 | 5 | 0 Kansl3     | protein_coding                     |
| ENSMUSG00000016481 | 4 | 5 | 0 Cr11       | protein_coding                     |
| ENSMUSG00000023572 | 4 | 5 | 0 Ccndbp1    | protein_coding                     |
| ENSMUSG00000024222 | 4 | 5 | 0 Fkbp5      | protein_coding                     |
| ENSMUSG00000026281 | 4 | 5 | 0 Dtymk      | protein_coding                     |
| ENSMUSG00000031487 | 4 | 5 | 0 Brf2       | protein_coding                     |
| ENSMUSG00000032867 | 4 | 5 | 0 Fbxw8      | protein_coding                     |
| ENSMUSG00000039994 | 4 | 5 | 0 Timeless   | protein_coding                     |
| ENSMUSG00000041141 | 4 | 5 | 0 Pnmal1     | protein_coding                     |
| ENSMUSG00000043872 | 4 | 5 | 0 Zmym1      | protein_coding                     |
| ENSMUSG00000056055 | 4 | 5 | 0 Sag        | protein_coding                     |
| ENSMUSG00000071262 | 4 | 5 | 0 Zfp957     | protein_coding                     |
| ENSMUSG00000078528 | 4 | 5 | 0 Gm17068    | processed_pseudogene               |
| ENSMUSG00000081034 | 4 | 5 | 0 Gm5944     | processed_pseudogene               |
| ENSMUSG00000090319 | 4 | 5 | 0 Gm4462     | processed_pseudogene               |
| ENSMUSG00000082286 | 4 | 4 | 523 Pisd-ps1 | transcribed_unprocessed_pseudogene |
| ENSMUSG00000064254 | 4 | 4 | 67 Ethel     | protein_coding                     |
| ENSMUSG00000001472 | 4 | 4 | 18 Tcf25     | protein_coding                     |
| ENSMUSG00000101776 | 4 | 4 | 14 Gm28268   | lincRNA                            |
| ENSMUSG00000091383 | 4 | 4 | 6 Hist1h2al  | protein_coding                     |
| ENSMUSG00000028452 | 4 | 3 | 73 Vcp       | protein_coding                     |
| ENSMUSG00000083327 | 4 | 3 | 73 Vcp-rs    | processed_pseudogene               |
| ENSMUSG00000020719 | 4 | 2 | 40 Ddx5      | protein_coding                     |
| ENSMUSG00000082454 | 4 | 2 | 40 Gm12183   | processed_pseudogene               |
| ENSMUSG00000055900 | 4 | 2 | 12 Tmem69    | protein_coding                     |
| ENSMUSG00000032892 | 4 | 2 | 8 Rangrf     | protein_coding                     |
| ENSMUSG00000072381 | 4 | 2 | 8 Gm10355    | protein_coding                     |
| ENSMUSG00000024695 | 4 | 1 | 139 Zfp91    | protein_coding                     |
| ENSMUSG00000022407 | 4 | 1 | 12 Adsl      | protein_coding                     |
| ENSMUSG00000006731 | 4 | 1 | 10 B4galnt1  | protein_coding                     |
| ENSMUSG00000059775 | 4 | 1 | 77 Rps26-ps1 | protein_coding                     |
| ENSMUSG00000069662 | 4 | 1 | 26 Marcks    | protein_coding                     |
| ENSMUSG00000025362 | 4 | 1 | 16 Rps26     | protein_coding                     |
| ENSMUSG00000009739 | 4 | 0 | 341 Pou6f1   | protein_coding                     |
| ENSMUSG00000035885 | 4 | 0 | 280 Cox8a    | protein_coding                     |
| ENSMUSG00000001119 | 4 | 0 | 236 Col6a1   | protein_coding                     |
| ENSMUSG00000064612 | 4 | 0 | 174 Gm26457  | snoRNA                             |

|                    |   |    |             |                      |
|--------------------|---|----|-------------|----------------------|
| ENSMUSG00000033644 | 4 | 0  | 103 Piwil2  | protein_coding       |
| ENSMUSG00000026864 | 4 | 0  | 93 Hspa5    | protein_coding       |
| ENSMUSG00000027342 | 4 | 0  | 91 PcnA     | protein_coding       |
| ENSMUSG00000081043 | 4 | 0  | 89 Gm11512  | processed_pseudogene |
| ENSMUSG00000065715 | 4 | 0  | 67 Snord7   | snoRNA               |
| ENSMUSG00000003131 | 4 | 0  | 50 Pafah1b2 | protein_coding       |
| ENSMUSG00000065836 | 4 | 0  | 50 Gm23502  | snRNA                |
| ENSMUSG00000043535 | 4 | 0  | 40 Setx     | protein_coding       |
| ENSMUSG00000078186 | 4 | 0  | 38          | protein_coding       |
| ENSMUSG00000030286 | 4 | 0  | 36 Emc3     | protein_coding       |
| ENSMUSG00000048371 | 4 | 0  | 36 Pdp2     | protein_coding       |
| ENSMUSG00000002980 | 4 | 0  | 26 Bcam     | protein_coding       |
| ENSMUSG00000022967 | 4 | 0  | 26 Ifnar1   | protein_coding       |
| ENSMUSG00000051695 | 4 | 0  | 26 Pcbp1    | protein_coding       |
| ENSMUSG00000020652 | 4 | 0  | 24 Cenpo    | protein_coding       |
| ENSMUSG00000029705 | 4 | 0  | 24 Cux1     | protein_coding       |
| ENSMUSG00000046862 | 4 | 0  | 20 Pramef8  | protein_coding       |
| ENSMUSG00000036636 | 4 | 0  | 18 Clcn7    | protein_coding       |
| ENSMUSG00000006095 | 4 | 0  | 16 Tbc1b    | protein_coding       |
| ENSMUSG00000031010 | 4 | 0  | 16 Usp9x    | protein_coding       |
| ENSMUSG00000007564 | 4 | 0  | 14 Ppp2r1a  | protein_coding       |
| ENSMUSG00000022680 | 4 | 0  | 14 Pdxdc1   | protein_coding       |
| ENSMUSG00000029501 | 4 | 0  | 14 Ankle2   | protein_coding       |
| ENSMUSG00000062949 | 4 | 0  | 14 Atp11c   | protein_coding       |
| ENSMUSG00000020513 | 4 | 0  | 12 Tubd1    | protein_coding       |
| ENSMUSG00000022710 | 4 | 0  | 12 Usp7     | protein_coding       |
| ENSMUSG00000024234 | 4 | 0  | 12 Mtpap    | protein_coding       |
| ENSMUSG00000028423 | 4 | 0  | 12 Nfx1     | protein_coding       |
| ENSMUSG00000030851 | 4 | 0  | 12 Ldhc     | protein_coding       |
| ENSMUSG00000032267 | 4 | 0  | 12 Usp28    | protein_coding       |
| ENSMUSG00000032607 | 4 | 0  | 12 Amt      | protein_coding       |
| ENSMUSG00000042002 | 4 | 0  | 8 Foxn4     | protein_coding       |
| ENSMUSG00000091264 | 4 | 0  | 8 Smim13    | protein_coding       |
| ENSMUSG00000033669 | 4 | 48 | 0 Zfp7      | protein_coding       |
| ENSMUSG00000085079 | 4 | 16 | 0 Khdc1b    | protein_coding       |
| ENSMUSG00000082324 | 4 | 14 | 0 Gm14615   | processed_pseudogene |
| ENSMUSG00000076937 | 4 | 10 | 6 Ig1c2     | protein_coding       |
| ENSMUSG00000080765 | 4 | 9  | 0 Gm8908    | processed_pseudogene |
| ENSMUSG00000072968 | 4 | 9  | 2 Gm17728   | protein_coding       |
| ENSMUSG00000099577 | 4 | 9  | 0 Gm3605    | processed_pseudogene |
| ENSMUSG00000080718 | 4 | 8  | 0 Gm8019    | processed_pseudogene |
| ENSMUSG00000090467 | 4 | 7  | 10 Gm4613   | processed_pseudogene |
| ENSMUSG00000097551 | 4 | 7  | 2 Gm7976    | lincRNA              |
| ENSMUSG00000024127 | 4 | 7  | 0 Prepl     | protein_coding       |
| ENSMUSG00000042492 | 4 | 7  | 0 Tbc1d10b  | protein_coding       |
| ENSMUSG00000040731 | 4 | 7  | 0 Eif4h     | protein_coding       |
| ENSMUSG00000081994 | 4 | 7  | 0 Gm14517   | processed_pseudogene |
| ENSMUSG00000083419 | 4 | 7  | 0 Gm14485   | processed_pseudogene |
| ENSMUSG00000014850 | 4 | 6  | 0 Msh3      | protein_coding       |

|                    |   |   |             |                                    |
|--------------------|---|---|-------------|------------------------------------|
| ENSMUSG00000068303 | 4 | 6 | 0 Spr-ps1   | transcribed_unprocessed_pseudogene |
| ENSMUSG00000092592 | 4 | 6 | 0 Gm20449   | protein_coding                     |
| ENSMUSG00000027030 | 4 | 5 | 81 Stk39    | protein_coding                     |
| ENSMUSG00000096391 | 4 | 5 | 54 Gm23686  | snRNA                              |
| ENSMUSG00000065344 | 4 | 5 | 40 Gm25581  | snRNA                              |
| ENSMUSG00000065371 | 4 | 5 | 40 Gm22739  | snRNA                              |
| ENSMUSG00000059796 | 4 | 5 | 30 Eif4a1   | protein_coding                     |
| ENSMUSG00000101188 | 4 | 5 | 6 Eif4a-ps4 | processed_pseudogene               |
| ENSMUSG00000030706 | 4 | 5 | 4 Mrpl48    | protein_coding                     |
| ENSMUSG00000015027 | 4 | 5 | 0 Galns     | protein_coding                     |
| ENSMUSG00000098242 | 4 | 5 | 0 Gm26929   | processed_pseudogene               |
| ENSMUSG00000064577 | 4 | 5 | 12 Gm25799  | snRNA                              |
| ENSMUSG00000021592 | 4 | 5 | 0 Arsk      | protein_coding                     |
| ENSMUSG00000027670 | 4 | 5 | 0 Ocstamp   | protein_coding                     |
| ENSMUSG00000058463 | 4 | 5 | 0 Gm5471    | processed_pseudogene               |
| ENSMUSG00000062328 | 4 | 5 | 0 Rpl17     | protein_coding                     |
| ENSMUSG00000066270 | 4 | 5 | 0 Gm10157   | processed_pseudogene               |
| ENSMUSG00000075288 | 4 | 5 | 0 Gm6913    | processed_pseudogene               |
| ENSMUSG00000080865 | 4 | 5 | 0 Eif1-ps3  | processed_pseudogene               |
| ENSMUSG00000093826 | 4 | 5 | 0 Gm6900    | processed_pseudogene               |
| ENSMUSG00000095762 | 4 | 5 | 0 Gm16378   | processed_pseudogene               |
| ENSMUSG00000098106 | 4 | 5 | 0 Gm5350    | processed_pseudogene               |
| ENSMUSG00000065743 | 4 | 4 | 10 Gm25008  | snRNA                              |
| ENSMUSG00000094471 | 4 | 4 | 10 Gm25937  | snRNA                              |
| ENSMUSG00000065185 | 4 | 3 | 28 Gm25137  | snRNA                              |
| ENSMUSG00000096208 | 4 | 3 | 28 Gm22070  | snRNA                              |
| ENSMUSG00000065368 | 4 | 3 | 38 Gm24414  | snRNA                              |
| ENSMUSG00000095165 | 4 | 3 | 38 Gm25547  | snRNA                              |
| ENSMUSG00000035900 | 4 | 3 | 18 Gramd4   | protein_coding                     |
| ENSMUSG00000100131 | 4 | 2 | 56 Gm28439  | unprocessed_pseudogene             |
| ENSMUSG00000096341 | 4 | 2 | 38 Gm22886  | snRNA                              |
| ENSMUSG00000065659 | 4 | 2 | 26 Gm23103  | snRNA                              |
| ENSMUSG00000022721 | 4 | 2 | 8 Trmt2a    | protein_coding                     |
| ENSMUSG00000026478 | 4 | 2 | 8 Lamc1     | protein_coding                     |
| ENSMUSG00000049488 | 4 | 2 | 8 Tmem67    | protein_coding                     |
| ENSMUSG00000065348 | 4 | 1 | 38 Gm25577  | snRNA                              |
| ENSMUSG00000052748 | 4 | 1 | 20 Swt1     | protein_coding                     |
| ENSMUSG00000046993 | 4 | 1 | 12 Gm5637   | processed_pseudogene               |
| ENSMUSG00000064983 | 4 | 1 | 12 Gm25258  | snRNA                              |
| ENSMUSG00000004455 | 4 | 1 | 0 Ppp1cc    | protein_coding                     |
| ENSMUSG00000029622 | 4 | 1 | 0 Arpc1b    | protein_coding                     |
| ENSMUSG00000079741 | 4 | 1 | 0 Nlrp4g    | protein_coding                     |
| ENSMUSG00000083693 | 4 | 1 | 0 Gm11971   | processed_pseudogene               |
| ENSMUSG00000054000 | 4 | 1 | 50 Tusc1    | protein_coding                     |
| ENSMUSG00000031715 | 4 | 1 | 40 Smarca5  | protein_coding                     |
| ENSMUSG00000026167 | 4 | 1 | 20 Wnt10a   | protein_coding                     |
| ENSMUSG00000025202 | 4 | 1 | 16 Scd3     | protein_coding                     |
| ENSMUSG00000019836 | 4 | 1 | 10 Amd-ps4  | processed_pseudogene               |
| ENSMUSG00000060096 | 4 | 1 | 10 Amd-ps3  | processed_pseudogene               |

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000063953 | 4 | 1  | 10 Amd2         | protein_coding       |
| ENSMUSG00000075232 | 4 | 1  | 10 Amd1         | protein_coding       |
| ENSMUSG00000036391 | 4 | 1  | 8 Sec24a        | protein_coding       |
| ENSMUSG00000101995 | 4 | 1  | 8 Gm29480       | antisense            |
| ENSMUSG00000031523 | 4 | 1  | 0 Dlc1          | protein_coding       |
| ENSMUSG00000064982 | 4 | 1  | 0 Gm25259       | snRNA                |
| ENSMUSG00000020515 | 4 | 0  | 10 Cnot8        | protein_coding       |
| ENSMUSG00000039164 | 4 | 0  | 10 Naif1        | protein_coding       |
| ENSMUSG00000024048 | 4 | 0  | 6 Myl12a        | protein_coding       |
| ENSMUSG00000082705 | 4 | 0  | 6 Gm15616       | processed_pseudogene |
| ENSMUSG00000049657 | 3 | 26 | 0 Zbtb5         | protein_coding       |
| ENSMUSG00000082255 | 3 | 14 | 0 Gm11822       | processed_pseudogene |
| ENSMUSG00000073702 | 3 | 14 | 36 Rpl31        | protein_coding       |
| ENSMUSG00000021067 | 3 | 14 | 0 Sav1          | protein_coding       |
| ENSMUSG00000046110 | 3 | 13 | 0 Serinc4       | protein_coding       |
| ENSMUSG00000084403 | 3 | 12 | 0 Rps15a-ps8    | processed_pseudogene |
| ENSMUSG00000061633 | 3 | 10 | 2 1700029P11Rik | protein_coding       |
| ENSMUSG00000021306 | 3 | 9  | 6 Gpr137b       | protein_coding       |
| ENSMUSG00000066867 | 3 | 9  | 0 Oas1e         | protein_coding       |
| ENSMUSG00000082165 | 3 | 7  | 0 Gm7091        | processed_pseudogene |
| ENSMUSG00000097939 | 3 | 7  | 0 Gm8601        | processed_pseudogene |
| ENSMUSG00000097977 | 3 | 7  | 0 Gm5652        | processed_pseudogene |
| ENSMUSG00000028851 | 3 | 7  | 0 Nude          | protein_coding       |
| ENSMUSG00000071102 | 3 | 7  | 0 Gm10313       | processed_pseudogene |
| ENSMUSG00000087402 | 3 | 7  | 0 Gm11867       | processed_transcript |
| ENSMUSG00000090957 | 3 | 7  | 0 Gm7535        | protein_coding       |
| ENSMUSG00000098223 | 3 | 7  | 0 Gm4891        | processed_pseudogene |
| ENSMUSG00000101483 | 3 | 7  | 0 1700016L21Rik | lincRNA              |
| ENSMUSG00000064901 | 3 | 6  | 22 Snora21      | snoRNA               |
| ENSMUSG00000065940 | 3 | 6  | 22 Gm23795      | snoRNA               |
| ENSMUSG00000080885 | 3 | 6  | 14 Rpl10-ps6    | processed_pseudogene |
| ENSMUSG00000032564 | 3 | 6  | 10 Cpne4        | protein_coding       |
| ENSMUSG00000098088 | 3 | 6  | 2 Gm26916       | lincRNA              |
| ENSMUSG00000025156 | 3 | 6  | 0 Gps1          | protein_coding       |
| ENSMUSG00000041237 | 3 | 6  | 0 Pklr          | protein_coding       |
| ENSMUSG00000075256 | 3 | 6  | 0 Cerkl         | protein_coding       |
| ENSMUSG00000083572 | 3 | 6  | 0 Gm11849       | processed_pseudogene |
| ENSMUSG00000083893 | 3 | 6  | 0 Gm13347       | processed_pseudogene |
| ENSMUSG00000085931 | 3 | 6  | 0 Gm12648       | lincRNA              |
| ENSMUSG00000029580 | 3 | 5  | 474 Actb        | protein_coding       |
| ENSMUSG00000028661 | 3 | 5  | 410 Epha8       | protein_coding       |
| ENSMUSG00000064281 | 3 | 5  | 77 Rpl19-ps1    | processed_pseudogene |
| ENSMUSG00000074763 | 3 | 5  | 42 MacroD2os2   | antisense            |
| ENSMUSG00000033596 | 3 | 5  | 0 Rfwd3         | protein_coding       |
| ENSMUSG00000037058 | 3 | 5  | 0 Paip2         | protein_coding       |
| ENSMUSG00000040181 | 3 | 5  | 0 Fmo1          | protein_coding       |
| ENSMUSG00000058799 | 3 | 5  | 0 Nap111        | protein_coding       |
| ENSMUSG00000081892 | 3 | 5  | 0 Gm8864        | processed_pseudogene |
| ENSMUSG00000097713 | 3 | 5  | 0 Gm7741        | processed_pseudogene |

|                    |   |   |                |                      |
|--------------------|---|---|----------------|----------------------|
| ENSMUSG00000065178 | 3 | 5 | 44 Gm22126     | snRNA                |
| ENSMUSG00000065770 | 3 | 5 | 44 Gm22155     | snRNA                |
| ENSMUSG00000089988 | 3 | 5 | 4 Gm16238      | processed_pseudogene |
| ENSMUSG00000029701 | 3 | 5 | 0 Rbm28        | protein_coding       |
| ENSMUSG00000036545 | 3 | 5 | 0 Adamts2      | protein_coding       |
| ENSMUSG00000041920 | 3 | 5 | 0 Slc16a6      | protein_coding       |
| ENSMUSG00000056895 | 3 | 5 | 0 Hist3h2ba    | protein_coding       |
| ENSMUSG00000080712 | 3 | 5 | 0 Hist3h2bb-ps | processed_pseudogene |
| ENSMUSG00000083807 | 3 | 5 | 0 Gm13466      | processed_pseudogene |
| ENSMUSG00000089994 | 3 | 5 | 0 Gm16239      | antisense            |
| ENSMUSG00000096141 | 3 | 5 | 0 Dnah7a       | protein_coding       |
| ENSMUSG00000097628 | 3 | 5 | 0 Gm2383       | processed_pseudogene |
| ENSMUSG00000097658 | 3 | 5 | 0 Gm16755      | lincRNA              |
| ENSMUSG00000097943 | 3 | 5 | 0 Gm7833       | processed_pseudogene |
| ENSMUSG00000098012 | 3 | 5 | 0 Gm8907       | processed_pseudogene |
| ENSMUSG00000098080 | 3 | 5 | 0 Gm5732       | processed_pseudogene |
| ENSMUSG00000098099 | 3 | 5 | 0 Gm7456       | processed_pseudogene |
| ENSMUSG00000098136 | 3 | 5 | 0 Gm8513       | processed_pseudogene |
| ENSMUSG00000098209 | 3 | 5 | 0 Gm8245       | processed_pseudogene |
| ENSMUSG00000098215 | 3 | 5 | 0 Gm7069       | processed_pseudogene |
| ENSMUSG00000094850 | 3 | 4 | 16 Gm24319     | snRNA                |
| ENSMUSG00000065260 | 3 | 4 | 10 Gm23453     | snRNA                |
| ENSMUSG00000064512 | 3 | 3 | 34 Gm22456     | snRNA                |
| ENSMUSG00000094400 | 3 | 3 | 14 Gm23140     | snRNA                |
| ENSMUSG00000064718 | 3 | 3 | 10 Gm25929     | snRNA                |
| ENSMUSG00000095729 | 3 | 3 | 10 Gm23649     | snRNA                |
| ENSMUSG00000084722 | 3 | 3 | 167 Gm24140    | misc_RNA             |
| ENSMUSG00000064887 | 3 | 3 | 38 Gm24205     | snRNA                |
| ENSMUSG00000028455 | 3 | 3 | 12 Stoml2      | protein_coding       |
| ENSMUSG00000054087 | 3 | 3 | 12 Fbxw28      | protein_coding       |
| ENSMUSG00000094717 | 3 | 3 | 12 Gm22821     | snRNA                |
| ENSMUSG00000096412 | 3 | 3 | 12 Gm25484     | snRNA                |
| ENSMUSG00000096786 | 3 | 3 | 12 Gm24641     | snRNA                |
| ENSMUSG00000030232 | 3 | 3 | 6 Aebp2        | protein_coding       |
| ENSMUSG00000084552 | 3 | 2 | 48 Gm24840     | snRNA                |
| ENSMUSG00000053716 | 3 | 2 | 38 Dusp7       | protein_coding       |
| ENSMUSG00000065742 | 3 | 2 | 38 Gm25007     | snRNA                |
| ENSMUSG00000065751 | 3 | 2 | 36 Gm23345     | snRNA                |
| ENSMUSG00000084461 | 3 | 2 | 36 Gm22958     | snRNA                |
| ENSMUSG00000084752 | 3 | 2 | 36 Gm22451     | snRNA                |
| ENSMUSG00000028445 | 3 | 2 | 30 Enho        | protein_coding       |
| ENSMUSG00000039529 | 3 | 2 | 28 Atp8b1      | protein_coding       |
| ENSMUSG00000026305 | 3 | 2 | 10 Lrrfip1     | protein_coding       |
| ENSMUSG00000097715 | 3 | 2 | 10 Gpr137b-ps  | lincRNA              |
| ENSMUSG00000095276 | 3 | 2 | 6 Gfy          | protein_coding       |
| ENSMUSG00000064424 | 3 | 1 | 42 Gm22749     | snRNA                |
| ENSMUSG00000094394 | 3 | 1 | 42 Gm23402     | snRNA                |
| ENSMUSG00000065074 | 3 | 1 | 40 Gm24535     | snRNA                |
| ENSMUSG00000040396 | 3 | 1 | 20 Abhd13      | protein_coding       |

|                     |   |    |                  |                      |
|---------------------|---|----|------------------|----------------------|
| ENSMUSG00000064743  | 3 | 1  | 14 Gm24856       | snRNA                |
| ENSMUSG00000094895  | 3 | 1  | 14 Gm22286       | snRNA                |
| ENSMUSG00000083823  | 3 | 1  | 10 Amd-ps1       | processed_pseudogene |
| ENSMUSG00000092898  | 3 | 1  | 169 Gm23806      | rRNA                 |
| ENSMUSG00000084291  | 3 | 1  | 77 Gm6654        | processed_pseudogene |
| ENSMUSG00000050890  | 3 | 1  | 14 Pdik11        | protein_coding       |
| ENSMUSG00000074698  | 3 | 0  | 75 Csnk2a1       | protein_coding       |
| ENSMUSG00000019256  | 3 | 0  | 69 Ahr           | protein_coding       |
| ENSMUSG00000067870  | 3 | 0  | 18 Rpl31-ps8     | processed_pseudogene |
| ENSMUSG00000097393  | 3 | 0  | 14 D030068K23Rik | lincRNA              |
| ENSMUSG00000030554  | 3 | 0  | 12 Synm          | protein_coding       |
| ENSMUSG00000032042  | 3 | 0  | 12 Srpr          | protein_coding       |
| ENSMUSG00000054428  | 3 | 0  | 12 Atpif1        | protein_coding       |
| ENSMUSG00000059854  | 3 | 0  | 6 Hydin          | protein_coding       |
| ENSMUSG00000039621  | 2 | 15 | 6 Prex1          | protein_coding       |
| ENSMUSG00000090150  | 2 | 14 | 0 Acad11         | protein_coding       |
| ENSMUSG00000016664  | 2 | 11 | 0 Pacsin2        | protein_coding       |
| ENSMUSG00000098135  | 2 | 9  | 0 Gm6946         | processed_pseudogene |
| ENSMUSG00000035726  | 2 | 9  | 0 Supt16         | protein_coding       |
| ENSMUSG00000071454  | 2 | 9  | 0 Dtnb           | protein_coding       |
| ENSMUSG00000090100  | 2 | 9  | 0 Ttbk2          | protein_coding       |
| ENSMUSG00000046323  | 2 | 8  | 0 Dppa3          | protein_coding       |
| ENSMUSG00000060019  | 2 | 7  | 12 Gm10073       | protein_coding       |
| ENSMUSG00000026116  | 2 | 7  | 4 Tmem131        | protein_coding       |
| ENSMUSG00000029546  | 2 | 7  | 4 Uncx           | protein_coding       |
| ENSMUSG00000036030  | 2 | 7  | 4 Prtg           | protein_coding       |
| ENSMUSG00000048264  | 2 | 7  | 4 Dip2c          | protein_coding       |
| ENSMUSG00000085125  | 2 | 7  | 0 Gm16070        | antisense            |
| ENSMUSG000000103643 | 2 | 7  | 0 Gm37770        | processed_pseudogene |
| ENSMUSG00000026827  | 2 | 6  | 125 Gpd2         | protein_coding       |
| ENSMUSG00000028018  | 2 | 6  | 52 Gsted         | protein_coding       |
| ENSMUSG00000039262  | 2 | 6  | 18 Prrc2b        | protein_coding       |
| ENSMUSG00000023927  | 2 | 6  | 6 Satb1          | protein_coding       |
| ENSMUSG00000036181  | 2 | 6  | 6 Hist1h1c       | protein_coding       |
| ENSMUSG00000046620  | 2 | 6  | 2 Rps11-ps4      | processed_pseudogene |
| ENSMUSG00000036792  | 2 | 6  | 0 Mbd5           | protein_coding       |
| ENSMUSG00000056877  | 2 | 5  | 6 Rps15a-ps1     | processed_pseudogene |
| ENSMUSG00000039095  | 2 | 5  | 2 En2            | protein_coding       |
| ENSMUSG00000081096  | 2 | 5  | 2 Gm12691        | processed_pseudogene |
| ENSMUSG00000082780  | 2 | 5  | 2 Rps11-ps5      | processed_pseudogene |
| ENSMUSG000000102145 | 2 | 5  | 2 Gm38056        | TEC                  |
| ENSMUSG00000003458  | 2 | 5  | 0 Ncstn          | protein_coding       |
| ENSMUSG00000051627  | 2 | 5  | 0 Hist1h1e       | protein_coding       |
| ENSMUSG00000052565  | 2 | 5  | 0 Hist1h1d       | protein_coding       |
| ENSMUSG00000056919  | 2 | 5  | 0 Cep162         | protein_coding       |
| ENSMUSG00000090266  | 2 | 5  | 0 Mettl23        | protein_coding       |
| ENSMUSG00000096086  | 2 | 5  | 0 Gm4761         | processed_pseudogene |
| ENSMUSG00000059150  | 2 | 5  | 18 Rpl26-ps4     | processed_pseudogene |
| ENSMUSG00000029106  | 2 | 5  | 16 Add1          | protein_coding       |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUSG00000081968 | 2 | 5 | 6 Rpl23a-ps2     | processed_pseudogene |
| ENSMUSG00000084139 | 2 | 5 | 6 Gm12322        | processed_pseudogene |
| ENSMUSG00000024197 | 2 | 5 | 0 Plin3          | protein_coding       |
| ENSMUSG00000070896 | 2 | 5 | 0 Rpl23a-ps1     | processed_pseudogene |
| ENSMUSG00000078291 | 2 | 5 | 0 Gm3940         | processed_pseudogene |
| ENSMUSG00000080998 | 2 | 5 | 0 Gm5384         | processed_pseudogene |
| ENSMUSG00000083498 | 2 | 5 | 0 Gm14172        | processed_pseudogene |
| ENSMUSG00000083573 | 2 | 5 | 0 Gm7312         | processed_pseudogene |
| ENSMUSG00000083723 | 2 | 5 | 0 Rpl23a-ps14    | processed_pseudogene |
| ENSMUSG00000090817 | 2 | 5 | 0 Gm4450         | protein_coding       |
| ENSMUSG00000091881 | 2 | 5 | 0 Gm17146        | antisense            |
| ENSMUSG00000092392 | 2 | 5 | 0 Gm20546        | lincRNA              |
| ENSMUSG00000093747 | 2 | 5 | 0 Gm20673        | processed_pseudogene |
| ENSMUSG00000096216 | 2 | 5 | 0 Gm21959        | processed_pseudogene |
| ENSMUSG00000096623 | 2 | 5 | 0 Gm8112         | processed_pseudogene |
| ENSMUSG00000102623 | 2 | 5 | 0 Gm37673        | TEC                  |
| ENSMUSG00000039219 | 2 | 4 | 20 Arid4b        | protein_coding       |
| ENSMUSG00000086411 | 2 | 4 | 20 Gm14236       | antisense            |
| ENSMUSG00000022770 | 2 | 4 | 14 Dlg1          | protein_coding       |
| ENSMUSG00000094158 | 2 | 3 | 10 Gm23264       | snRNA                |
| ENSMUSG00000029823 | 2 | 3 | 6 Luc7l2         | protein_coding       |
| ENSMUSG00000097048 | 2 | 3 | 83 1600020E01Rik | lincRNA              |
| ENSMUSG00000100801 | 2 | 3 | 69 Gm15459       | processed_pseudogene |
| ENSMUSG00000095025 | 2 | 3 | 36 Gm24018       | snRNA                |
| ENSMUSG00000095132 | 2 | 3 | 36 Rnu6          | snRNA                |
| ENSMUSG00000065084 | 2 | 3 | 34 Gm26496       | snRNA                |
| ENSMUSG00000025757 | 2 | 3 | 30 Hspa4l        | protein_coding       |
| ENSMUSG00000064403 | 2 | 3 | 30 Gm23928       | snRNA                |
| ENSMUSG00000035783 | 2 | 3 | 26 Acta2         | protein_coding       |
| ENSMUSG00000096451 | 2 | 3 | 22 Gm22645       | snRNA                |
| ENSMUSG00000093864 | 2 | 3 | 12 Gm22633       | snRNA                |
| ENSMUSG00000095731 | 2 | 3 | 12 Gm25312       | snRNA                |
| ENSMUSG00000020978 | 2 | 3 | 6 Klhdc2         | protein_coding       |
| ENSMUSG00000084622 | 2 | 2 | 56 Gm25545       | misc_RNA             |
| ENSMUSG00000095857 | 2 | 2 | 42 Gm22618       | snRNA                |
| ENSMUSG00000064489 | 2 | 2 | 34 Gm23296       | snRNA                |
| ENSMUSG00000095112 | 2 | 2 | 34 Gm23712       | snRNA                |
| ENSMUSG00000065627 | 2 | 2 | 32 Gm24803       | snRNA                |
| ENSMUSG00000096895 | 2 | 2 | 32 Gm25245       | snRNA                |
| ENSMUSG00000077294 | 2 | 2 | 18 Gm24123       | snoRNA               |
| ENSMUSG00000096111 | 2 | 2 | 18 Gm21917       | antisense            |
| ENSMUSG00000015023 | 2 | 2 | 6 Ddx19a         | protein_coding       |
| ENSMUSG00000022332 | 2 | 1 | 16 Khdrbs3       | protein_coding       |
| ENSMUSG00000068921 | 2 | 1 | 16 Dap3          | protein_coding       |
| ENSMUSG00000019876 | 2 | 1 | 12 Pkib          | protein_coding       |
| ENSMUSG00000034560 | 2 | 1 | 6 A230046K03Rik  | protein_coding       |
| ENSMUSG00000036817 | 2 | 1 | 6 Sun1           | protein_coding       |
| ENSMUSG00000059327 | 2 | 1 | 6 Eda            | protein_coding       |
| ENSMUSG00000075983 | 2 | 1 | 6 Gm24121        | snRNA                |

|                    |   |    |                   |                      |
|--------------------|---|----|-------------------|----------------------|
| ENSMUSG00000034110 | 2 | 1  | 1085 Kctd7        | protein_coding       |
| ENSMUSG00000093056 | 2 | 1  | 57 Gm24812        | misc_RNA             |
| ENSMUSG00000084588 | 2 | 1  | 12 n-R5s68        | rRNA                 |
| ENSMUSG00000026019 | 2 | 1  | 8 Wdr12           | protein_coding       |
| ENSMUSG00000024896 | 2 | 1  | 6 Minpp1          | protein_coding       |
| ENSMUSG00000051615 | 2 | 1  | 6 Rap2a           | protein_coding       |
| ENSMUSG00000097908 | 2 | 0  | 954 4933404O12Rik | lincRNA              |
| ENSMUSG00000005442 | 2 | 0  | 32 Cic            | protein_coding       |
| ENSMUSG00000028039 | 2 | 0  | 18 Efna3          | protein_coding       |
| ENSMUSG00000041815 | 2 | 0  | 18 Poldip3        | protein_coding       |
| ENSMUSG00000032399 | 2 | 0  | 16 Rpl4           | protein_coding       |
| ENSMUSG00000071172 | 2 | 0  | 14 Srsf3          | protein_coding       |
| ENSMUSG00000095595 | 2 | 0  | 14 Fam177a        | protein_coding       |
| ENSMUSG00000026750 | 2 | 0  | 12 Psmb7          | protein_coding       |
| ENSMUSG00000048047 | 2 | 0  | 12 Zbtb33         | protein_coding       |
| ENSMUSG00000056569 | 2 | 0  | 12 Mpz            | protein_coding       |
| ENSMUSG00000071415 | 2 | 0  | 12 Rpl23          | protein_coding       |
| ENSMUSG00000026222 | 2 | 0  | 10 Sp100          | protein_coding       |
| ENSMUSG00000055053 | 2 | 0  | 10 Nfic           | protein_coding       |
| ENSMUSG00000064550 | 2 | 0  | 8 Gm24623         | snRNA                |
| ENSMUSG00000055745 | 2 | 0  | 6 Ldoc1l          | protein_coding       |
| ENSMUSG00000060198 | 2 | 0  | 6 Gm11353         | processed_pseudogene |
| ENSMUSG00000074547 | 2 | 0  | 6 Rps8-ps4        | processed_pseudogene |
| ENSMUSG00000013822 | 1 | 13 | 0 Elofl           | protein_coding       |
| ENSMUSG00000039108 | 1 | 11 | 0 Lsm14b          | protein_coding       |
| ENSMUSG00000034674 | 1 | 9  | 0 Tdg             | protein_coding       |
| ENSMUSG00000047347 | 1 | 9  | 0 Tdg-ps          | processed_pseudogene |
| ENSMUSG00000028271 | 1 | 9  | 12 Gtf2b          | protein_coding       |
| ENSMUSG00000037818 | 1 | 8  | 6 Abhd18          | protein_coding       |
| ENSMUSG00000068014 | 1 | 8  | 2 Gm14648         | processed_pseudogene |
| ENSMUSG00000028333 | 1 | 7  | 10 Anp32b         | protein_coding       |
| ENSMUSG00000081792 | 1 | 7  | 10 Anp32b-ps1     | processed_pseudogene |
| ENSMUSG00000004642 | 1 | 7  | 0 Slbp            | protein_coding       |
| ENSMUSG00000022032 | 1 | 7  | 0 Scara5          | protein_coding       |
| ENSMUSG00000092507 | 1 | 7  | 0                 | processed_pseudogene |
| ENSMUSG00000098028 | 1 | 6  | 0 Gm8824          | processed_pseudogene |
| ENSMUSG00000082647 | 1 | 5  | 8 Gm14056         | processed_pseudogene |
| ENSMUSG00000028980 | 1 | 5  | 4 H6pd            | protein_coding       |
| ENSMUSG00000039263 | 1 | 5  | 2 Npepl1          | protein_coding       |
| ENSMUSG00000098102 | 1 | 5  | 0 Gm2467          | processed_pseudogene |
| ENSMUSG00000031960 | 1 | 5  | 4 Aars            | protein_coding       |
| ENSMUSG00000033774 | 1 | 5  | 4 Npbwr1          | protein_coding       |
| ENSMUSG00000039200 | 1 | 5  | 4 Atf7ip2         | protein_coding       |
| ENSMUSG00000041560 | 1 | 5  | 4 Gltscr2         | protein_coding       |
| ENSMUSG00000084218 | 1 | 5  | 4 Gm8145          | processed_pseudogene |
| ENSMUSG00000000579 | 1 | 5  | 0 Dynlt1c         | protein_coding       |
| ENSMUSG00000030786 | 1 | 5  | 0 Itgam           | protein_coding       |
| ENSMUSG00000032280 | 1 | 5  | 0 Tle3            | protein_coding       |
| ENSMUSG00000040528 | 1 | 5  | 0 Milr1           | protein_coding       |



|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUSG00000058076 | 1 | 5 | 0 Sdhc           | protein_coding                     |
| ENSMUSG00000064558 | 1 | 5 | 0 Gm24620        | snoRNA                             |
| ENSMUSG00000072653 | 1 | 5 | 0 Zfp783         | transcribed_unprocessed_pseudogene |
| ENSMUSG00000082436 | 1 | 5 | 0 Gm11688        | processed_pseudogene               |
| ENSMUSG00000085623 | 1 | 5 | 0 Gm16041        | antisense                          |
| ENSMUSG00000097056 | 1 | 5 | 0 Gm4262         | lincRNA                            |
| ENSMUSG00000097945 | 1 | 5 | 0 Gm17799        | processed_pseudogene               |
| ENSMUSG00000095584 | 1 | 4 | 42 Gm22628       | snRNA                              |
| ENSMUSG00000064395 | 1 | 4 | 22 Gm23623       | snRNA                              |
| ENSMUSG00000028042 | 1 | 4 | 8 Zbtb7b         | protein_coding                     |
| ENSMUSG00000089531 | 1 | 4 | 6 Gm25162        | snoRNA                             |
| ENSMUSG00000096043 | 1 | 3 | 42 Gm24968       | snRNA                              |
| ENSMUSG00000094199 | 1 | 3 | 22 Gm25450       | snRNA                              |
| ENSMUSG00000094833 | 1 | 3 | 22 Gm25473       | snRNA                              |
| ENSMUSG00000064734 | 1 | 3 | 20 Gm23445       | snRNA                              |
| ENSMUSG00000065320 | 1 | 3 | 20 Gm22056       | snRNA                              |
| ENSMUSG00000032555 | 1 | 3 | 8 Topbp1         | protein_coding                     |
| ENSMUSG00000081189 | 1 | 3 | 8 Hspd1-ps4      | processed_pseudogene               |
| ENSMUSG00000020101 | 1 | 3 | 89 Vsir          | protein_coding                     |
| ENSMUSG00000064890 | 1 | 3 | 44 Gm22505       | snRNA                              |
| ENSMUSG00000065034 | 1 | 3 | 42 Gm22363       | snRNA                              |
| ENSMUSG00000094713 | 1 | 3 | 36 Gm22822       | snRNA                              |
| ENSMUSG00000065132 | 1 | 3 | 34 Gm24456       | snRNA                              |
| ENSMUSG00000094367 | 1 | 3 | 32 Gm26058       | snRNA                              |
| ENSMUSG00000094875 | 1 | 3 | 32 Gm23151       | snRNA                              |
| ENSMUSG00000065881 | 1 | 3 | 30 Gm22866       | snRNA                              |
| ENSMUSG00000065045 | 1 | 3 | 20 Gm24046       | snRNA                              |
| ENSMUSG00000084507 | 1 | 3 | 18 Gm25321       | snRNA                              |
| ENSMUSG00000096339 | 1 | 3 | 14 Gm24713       | snRNA                              |
| ENSMUSG00000064746 | 1 | 3 | 10 Gm24707       | snRNA                              |
| ENSMUSG00000048949 | 1 | 3 | 6 Gm6206         | processed_pseudogene               |
| ENSMUSG00000064624 | 1 | 3 | 6 Gm22305        | snRNA                              |
| ENSMUSG00000094137 | 1 | 3 | 6 Gm22264        | snRNA                              |
| ENSMUSG00000071793 | 1 | 2 | 59 2610005L07Rik | transcribed_unprocessed_pseudogene |
| ENSMUSG00000071796 | 1 | 2 | 57 6820431F20Rik | transcribed_unprocessed_pseudogene |
| ENSMUSG00000087153 | 1 | 2 | 56 Gm6483        | protein_coding                     |
| ENSMUSG00000093873 | 1 | 2 | 34 Gm24540       | snRNA                              |
| ENSMUSG00000095361 | 1 | 2 | 34 Gm24967       | snRNA                              |
| ENSMUSG00000032714 | 1 | 2 | 32 Syde1         | protein_coding                     |
| ENSMUSG00000033004 | 1 | 2 | 32 Mycbp2        | protein_coding                     |
| ENSMUSG00000053046 | 1 | 2 | 32 Brsk2         | protein_coding                     |
| ENSMUSG00000065017 | 1 | 2 | 28 Gm23510       | snRNA                              |
| ENSMUSG00000065331 | 1 | 2 | 18 Gm24927       | snRNA                              |
| ENSMUSG00000065794 | 1 | 2 | 16 Gm25514       | snRNA                              |
| ENSMUSG00000025825 | 1 | 2 | 10 Iscu          | protein_coding                     |
| ENSMUSG00000079641 | 1 | 2 | 10 Rpl39         | protein_coding                     |
| ENSMUSG00000097439 | 1 | 2 | 10 Gm16754       | lincRNA                            |
| ENSMUSG00000025937 | 1 | 2 | 8 Lactb2         | protein_coding                     |
| ENSMUSG00000060730 | 1 | 2 | 6 Gm10086        | processed_pseudogene               |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUSG00000062006 | 1 | 2 | 6 Rpl34          | protein_coding       |
| ENSMUSG00000065315 | 1 | 2 | 6 Gm26064        | snRNA                |
| ENSMUSG00000066116 | 1 | 2 | 6 Gm10154        | processed_pseudogene |
| ENSMUSG00000068396 | 1 | 2 | 6 Rpl34-ps1      | processed_pseudogene |
| ENSMUSG00000086054 | 1 | 2 | 6 Hnf1aos1       | antisense            |
| ENSMUSG00000053153 | 1 | 1 | 54 Spag16        | protein_coding       |
| ENSMUSG00000095086 | 1 | 1 | 42 Gm25327       | snRNA                |
| ENSMUSG00000064408 | 1 | 1 | 36 Gm23924       | snRNA                |
| ENSMUSG00000093992 | 1 | 1 | 36 Gm26427       | snRNA                |
| ENSMUSG00000095129 | 1 | 1 | 36 Gm23217       | snRNA                |
| ENSMUSG00000095805 | 1 | 1 | 36 Gm22092       | snRNA                |
| ENSMUSG00000096633 | 1 | 1 | 36 Gm22170       | snRNA                |
| ENSMUSG00000096303 | 1 | 1 | 34 Gm25211       | snRNA                |
| ENSMUSG00000064605 | 1 | 1 | 32 Gm22220       | snRNA                |
| ENSMUSG00000065913 | 1 | 1 | 26 Gm24448       | snRNA                |
| ENSMUSG00000003153 | 1 | 1 | 16 Slc2a3        | protein_coding       |
| ENSMUSG00000064673 | 1 | 1 | 14 Gm22805       | snRNA                |
| ENSMUSG00000026770 | 1 | 1 | 8 Il2ra          | protein_coding       |
| ENSMUSG00000022200 | 1 | 1 | 6 Golph3         | protein_coding       |
| ENSMUSG00000065072 | 1 | 1 | 6 Gm24533        | snoRNA               |
| ENSMUSG00000065158 | 1 | 1 | 6 Gm25483        | snoRNA               |
| ENSMUSG00000065328 | 1 | 1 | 6 Gm22053        | snoRNA               |
| ENSMUSG00000070324 | 1 | 1 | 6 Fbxw22         | protein_coding       |
| ENSMUSG00000090952 | 1 | 1 | 6 Gm17251        | processed_transcript |
| ENSMUSG00000048720 | 1 | 1 | 28 Tbc1d12       | protein_coding       |
| ENSMUSG00000027695 | 1 | 1 | 26 Pld1          | protein_coding       |
| ENSMUSG00000042208 | 1 | 1 | 22 0610010F05Rik | protein_coding       |
| ENSMUSG00000063160 | 1 | 1 | 22 Numbl         | protein_coding       |
| ENSMUSG00000065050 | 1 | 1 | 18 Gm25704       | snRNA                |
| ENSMUSG00000057626 | 1 | 1 | 14 Gm5621        | processed_pseudogene |
| ENSMUSG00000059834 | 1 | 1 | 12 Sc1l          | protein_coding       |
| ENSMUSG00000013878 | 1 | 1 | 10 Rnf170        | protein_coding       |
| ENSMUSG00000072893 | 1 | 1 | 10 4933439C10Rik | processed_transcript |
| ENSMUSG00000084790 | 1 | 1 | 10 Gm15879       | antisense            |
| ENSMUSG00000086043 | 1 | 1 | 10 Gm12473       | antisense            |
| ENSMUSG00000074108 | 1 | 1 | 8 Rpl10-ps2      | processed_pseudogene |
| ENSMUSG00000004668 | 1 | 1 | 6 Abca13         | protein_coding       |
| ENSMUSG00000096211 | 1 | 1 | 6 Gm23330        | snRNA                |
| ENSMUSG00000025512 | 1 | 0 | 85 Chid1         | protein_coding       |
| ENSMUSG00000022283 | 1 | 0 | 57 Pabpc1        | protein_coding       |
| ENSMUSG00000023025 | 1 | 0 | 48 Larp4         | protein_coding       |
| ENSMUSG00000085310 | 1 | 0 | 24 Gm11491       | antisense            |
| ENSMUSG00000050565 | 1 | 0 | 18 Tor1aip2      | protein_coding       |
| ENSMUSG00000081650 | 1 | 0 | 16 Gm16181       | protein_coding       |
| ENSMUSG00000020072 | 1 | 0 | 14 Pbld2         | protein_coding       |
| ENSMUSG00000040812 | 1 | 0 | 14 Agbl2         | protein_coding       |
| ENSMUSG00000021660 | 1 | 0 | 12 Btf3          | protein_coding       |
| ENSMUSG00000041638 | 1 | 0 | 12 Gcn111        | protein_coding       |
| ENSMUSG00000054939 | 1 | 0 | 12 Zfp174        | protein_coding       |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000061315 | 1 | 0 | 12 Naca         | protein_coding       |
| ENSMUSG00000089782 | 1 | 0 | 12 Gm3531       | processed_pseudogene |
| ENSMUSG00000034205 | 1 | 0 | 10 Loxl2        | protein_coding       |
| ENSMUSG00000030771 | 1 | 0 | 8 Micalcl       | protein_coding       |
| ENSMUSG00000086798 | 1 | 0 | 8 Gm16222       | antisense            |
| ENSMUSG00000091985 | 1 | 0 | 8 Gm17354       | lincRNA              |
| ENSMUSG00000097746 | 1 | 0 | 8 Gm6225        | lincRNA              |
| ENSMUSG00000011752 | 1 | 0 | 6 Pgam1         | protein_coding       |
| ENSMUSG00000064714 | 1 | 0 | 6 n-R5s62       | rRNA                 |
| ENSMUSG00000082511 | 1 | 0 | 6 Gm4915        | processed_pseudogene |
| ENSMUSG00000102135 | 1 | 0 | 6 Gm37108       | processed_pseudogene |
| ENSMUSG00000001998 | 1 | 9 | 0 Ap4e1         | protein_coding       |
| ENSMUSG00000029782 | 1 | 9 | 0 Tmem209       | protein_coding       |
| ENSMUSG00000022498 | 1 | 9 | 4 Txndc11       | protein_coding       |
| ENSMUSG00000102404 | 1 | 7 | 0 5530400K19Rik | TEC                  |
| ENSMUSG00000059218 | 1 | 7 | 0 Gm13084       | protein_coding       |
| ENSMUSG00000062510 | 1 | 6 | 0 Nsl1          | protein_coding       |
| ENSMUSG00000091742 | 1 | 6 | 0 Gm5093        | protein_coding       |
| ENSMUSG00000011960 | 1 | 5 | 0 Ccnt1         | protein_coding       |
| ENSMUSG00000025477 | 1 | 5 | 10 Inpp5a       | protein_coding       |
| ENSMUSG00000015127 | 1 | 5 | 8 Unkl          | protein_coding       |
| ENSMUSG00000027739 | 1 | 5 | 4 Rab33b        | protein_coding       |
| ENSMUSG00000007880 | 1 | 5 | 2 Arid1a        | protein_coding       |
| ENSMUSG00000001829 | 1 | 5 | 0 Clpb          | protein_coding       |
| ENSMUSG00000033411 | 1 | 5 | 0 Ctdspl2       | protein_coding       |
| ENSMUSG00000094938 | 1 | 4 | 36 Gm23092      | snRNA                |
| ENSMUSG00000095272 | 1 | 4 | 36 Gm24242      | snRNA                |
| ENSMUSG00000033948 | 1 | 4 | 24 Zswim5       | protein_coding       |
| ENSMUSG00000064884 | 1 | 4 | 16 Gm24204      | snRNA                |
| ENSMUSG00000064758 | 1 | 3 | 36 Gm26331      | snRNA                |
| ENSMUSG00000027598 | 1 | 3 | 16 Itch         | protein_coding       |
| ENSMUSG00000075903 | 1 | 3 | 16 Gm23941      | snRNA                |
| ENSMUSG00000064572 | 1 | 3 | 14 Gm25801      | snRNA                |
| ENSMUSG00000065309 | 1 | 3 | 14 Gm23244      | snRNA                |
| ENSMUSG00000064840 | 1 | 3 | 12 Gm26204      | snRNA                |
| ENSMUSG00000065915 | 1 | 3 | 12 Gm24445      | snRNA                |
| ENSMUSG00000065675 | 1 | 3 | 38 Gm24260      | snRNA                |
| ENSMUSG00000095955 | 1 | 3 | 38 Gm22360      | snRNA                |
| ENSMUSG00000094013 | 1 | 3 | 36 Gm25829      | snRNA                |
| ENSMUSG00000095972 | 1 | 3 | 36 Gm23512      | snRNA                |
| ENSMUSG00000065220 | 1 | 3 | 34 Gm25794      | snRNA                |
| ENSMUSG00000065227 | 1 | 3 | 34 Gm25790      | snRNA                |
| ENSMUSG00000065926 | 1 | 3 | 34 Gm22798      | snRNA                |
| ENSMUSG00000084453 | 1 | 3 | 34 Gm24596      | snRNA                |
| ENSMUSG00000096357 | 1 | 3 | 34 Gm25709      | snRNA                |
| ENSMUSG00000096292 | 1 | 3 | 28 Gm2666       | processed_pseudogene |
| ENSMUSG00000028069 | 1 | 3 | 22 Gpatch4      | protein_coding       |
| ENSMUSG00000037847 | 1 | 3 | 20 Nmrk1        | protein_coding       |
| ENSMUSG00000096195 | 1 | 3 | 18 Gm26138      | snRNA                |

|                    |   |   |                    |                        |
|--------------------|---|---|--------------------|------------------------|
| ENSMUSG00000065791 | 1 | 3 | 16 Gm25516         | snRNA                  |
| ENSMUSG00000065859 | 1 | 3 | 16 Gm22351         | snRNA                  |
| ENSMUSG00000094521 | 1 | 3 | 16 Gm22911         | snRNA                  |
| ENSMUSG00000065321 | 1 | 3 | 14 Gm22057         | snRNA                  |
| ENSMUSG00000088184 | 1 | 3 | 14 Gm23137         | snRNA                  |
| ENSMUSG00000102330 | 1 | 3 | 14 Gm37234         | TEC                    |
| ENSMUSG00000040414 | 1 | 3 | 8 Slc25a28         | protein_coding         |
| ENSMUSG00000053182 | 1 | 3 | 8 Gm609            | protein_coding         |
| ENSMUSG00000093436 | 1 | 3 | 8 Gm20646          | sense_overlapping      |
| ENSMUSG00000096866 | 1 | 3 | 6 Gm22260          | snRNA                  |
| ENSMUSG00000102900 | 1 | 2 | 113 Gm37811        | TEC                    |
| ENSMUSG00000040054 | 1 | 2 | 24 Baz2a           | protein_coding         |
| ENSMUSG00000051375 | 1 | 2 | 20 Pcdh1           | protein_coding         |
| ENSMUSG00000022203 | 1 | 2 | 8 Efs              | protein_coding         |
| ENSMUSG00000065876 | 1 | 2 | 8 Gm25682          | snRNA                  |
| ENSMUSG00000030380 | 1 | 2 | 6 Mzf1             | protein_coding         |
| ENSMUSG00000064472 | 1 | 2 | 6 Gm23407          | snRNA                  |
| ENSMUSG00000096401 | 1 | 2 | 6 Gm21811          | unprocessed_pseudogene |
| ENSMUSG00000064926 | 1 | 1 | 38 Gm22044         | snRNA                  |
| ENSMUSG00000070733 | 1 | 1 | 20 Fryl            | protein_coding         |
| ENSMUSG00000084911 | 1 | 1 | 18 Gm16185         | antisense              |
| ENSMUSG00000039254 | 1 | 1 | 14 Pomt1           | protein_coding         |
| ENSMUSG00000015757 | 1 | 1 | 12 Ppil4           | protein_coding         |
| ENSMUSG00000054611 | 1 | 1 | 12 Kdm2a           | protein_coding         |
| ENSMUSG00000104268 | 1 | 1 | 12 Gm37750         | TEC                    |
| ENSMUSG00000038271 | 1 | 1 | 10 Iffo1           | protein_coding         |
| ENSMUSG00000043633 | 1 | 1 | 6 Fam221b          | protein_coding         |
| ENSMUSG00000069171 | 1 | 1 | 6 Nr2f1            | protein_coding         |
| ENSMUSG00000095624 | 1 | 1 | 6 Gm23947          | snRNA                  |
| ENSMUSG00000069893 | 1 | 1 | 101 9930111J21Rik1 | protein_coding         |
| ENSMUSG00000034248 | 1 | 1 | 50 Slc25a37        | protein_coding         |
| ENSMUSG00000071337 | 1 | 1 | 28 Tia1            | protein_coding         |
| ENSMUSG00000047875 | 1 | 1 | 24 Gpr157          | protein_coding         |
| ENSMUSG00000052738 | 1 | 1 | 24 Suclg1          | protein_coding         |
| ENSMUSG00000086629 | 1 | 1 | 20 2810403D21Rik   | processed_transcript   |
| ENSMUSG00000104279 | 1 | 1 | 20 Gm38300         | TEC                    |
| ENSMUSG00000046447 | 1 | 1 | 16 Camk2n1         | protein_coding         |
| ENSMUSG00000030826 | 1 | 1 | 14 Bcat2           | protein_coding         |
| ENSMUSG00000044349 | 1 | 1 | 14 Snhg11          | protein_coding         |
| ENSMUSG00000103273 | 1 | 1 | 14 Gm37913         | TEC                    |
| ENSMUSG00000026193 | 1 | 1 | 12 Fn1             | protein_coding         |
| ENSMUSG00000026516 | 1 | 1 | 12 Nvl             | protein_coding         |
| ENSMUSG00000032216 | 1 | 1 | 12 Nedd4           | protein_coding         |
| ENSMUSG00000033313 | 1 | 1 | 12 Fbxl8           | protein_coding         |
| ENSMUSG00000095513 | 1 | 1 | 12 Gm24136         | snRNA                  |
| ENSMUSG00000027387 | 1 | 1 | 10 Zc3h8           | protein_coding         |
| ENSMUSG00000065883 | 1 | 1 | 10 Gm22865         | snoRNA                 |
| ENSMUSG00000020063 | 1 | 1 | 8 Sirt1            | protein_coding         |
| ENSMUSG00000025658 | 1 | 1 | 8 Cnksr2           | protein_coding         |

|                    |   |   |                    |                      |
|--------------------|---|---|--------------------|----------------------|
| ENSMUSG00000064967 | 1 | 1 | 8 Gm24405          | snRNA                |
| ENSMUSG00000065096 | 1 | 1 | 8 Gm23680          | snRNA                |
| ENSMUSG00000101262 | 1 | 1 | 8 Gm8326           | processed_pseudogene |
| ENSMUSG00000009114 | 1 | 1 | 6 2610028H24Rik    | protein_coding       |
| ENSMUSG00000082342 | 1 | 1 | 6 Gm5395           | processed_pseudogene |
| ENSMUSG00000090262 | 1 | 1 | 6                  | protein_coding       |
| ENSMUSG00000097287 | 1 | 0 | 5557 D130017N08Rik | lincRNA              |
| ENSMUSG00000060261 | 1 | 0 | 63 Gtf2i           | protein_coding       |
| ENSMUSG00000031441 | 1 | 0 | 38 Atp11a          | protein_coding       |
| ENSMUSG00000024937 | 1 | 0 | 36 Ehbp111         | protein_coding       |
| ENSMUSG00000022240 | 1 | 0 | 34 Ctnnd2          | protein_coding       |
| ENSMUSG00000027014 | 1 | 0 | 32 Cwc22           | protein_coding       |
| ENSMUSG00000030854 | 1 | 0 | 32 Ptpn5           | protein_coding       |
| ENSMUSG00000079247 | 1 | 0 | 32 Gm13691         | protein_coding       |
| ENSMUSG00000094125 | 1 | 0 | 32 Gm13698         | protein_coding       |
| ENSMUSG00000094336 | 1 | 0 | 32 Gm13693         | protein_coding       |
| ENSMUSG00000095824 | 1 | 0 | 32 Gm13697         | protein_coding       |
| ENSMUSG00000096337 | 1 | 0 | 32 Gm13694         | protein_coding       |
| ENSMUSG00000096484 | 1 | 0 | 32 Gm13696         | protein_coding       |
| ENSMUSG00000096729 | 1 | 0 | 32 Gm13695         | protein_coding       |
| ENSMUSG00000095403 | 1 | 0 | 28 Gm21092         | protein_coding       |
| ENSMUSG00000086451 | 1 | 0 | 20 4933431K23Rik   | processed_transcript |
| ENSMUSG00000102719 | 1 | 0 | 20 Gm37760         | TEC                  |
| ENSMUSG00000041781 | 1 | 0 | 14 Cpsf2           | protein_coding       |
| ENSMUSG00000046215 | 1 | 0 | 14 Rprml           | protein_coding       |
| ENSMUSG00000086127 | 1 | 0 | 14 Gm11934         | processed_transcript |
| ENSMUSG00000091732 | 1 | 0 | 14 Gm17541         | protein_coding       |
| ENSMUSG00000099966 | 1 | 0 | 14 2810402E24Rik   | antisense            |
| ENSMUSG00000005610 | 1 | 0 | 12 Eif4g2          | protein_coding       |
| ENSMUSG00000017478 | 1 | 0 | 12 Zc3h18          | protein_coding       |
| ENSMUSG00000028195 | 1 | 0 | 12 Cyr61           | protein_coding       |
| ENSMUSG00000103109 | 1 | 0 | 12                 | TEC                  |
| ENSMUSG00000020181 | 1 | 0 | 10 Nav3            | protein_coding       |
| ENSMUSG00000027282 | 1 | 0 | 10 Mtch2           | protein_coding       |
| ENSMUSG00000034157 | 1 | 0 | 10 Cipc            | protein_coding       |
| ENSMUSG00000037151 | 1 | 0 | 10 Lrrc20          | protein_coding       |
| ENSMUSG00000104222 | 1 | 0 | 10 Gm7292          | TEC                  |
| ENSMUSG00000017493 | 1 | 0 | 8 Igfbp4           | protein_coding       |
| ENSMUSG00000020457 | 1 | 0 | 8 Drg1             | protein_coding       |
| ENSMUSG00000027015 | 1 | 0 | 8 Cybrd1           | protein_coding       |
| ENSMUSG00000029647 | 1 | 0 | 8 Pan3             | protein_coding       |
| ENSMUSG00000030741 | 1 | 0 | 8 Spns1            | protein_coding       |
| ENSMUSG00000048349 | 1 | 0 | 8 Pou4f1           | protein_coding       |
| ENSMUSG00000060227 | 1 | 0 | 8 Casc4            | protein_coding       |
| ENSMUSG00000060879 | 1 | 0 | 8 Gm6564           | processed_pseudogene |
| ENSMUSG00000067786 | 1 | 0 | 8 Nnat             | protein_coding       |
| ENSMUSG00000095256 | 1 | 0 | 8 n-R5s209         | rRNA                 |
| ENSMUSG00000098877 | 1 | 0 | 8 Gm27959          | rRNA                 |
| ENSMUSG00000020273 | 1 | 0 | 6 Papolg           | protein_coding       |

|                    |   |    |             |                      |
|--------------------|---|----|-------------|----------------------|
| ENSMUSG00000031883 | 1 | 0  | 6 Car7      | protein_coding       |
| ENSMUSG00000047675 | 1 | 0  | 6 Rps8      | protein_coding       |
| ENSMUSG00000063586 | 1 | 0  | 6 Gm5513    | processed_pseudogene |
| ENSMUSG00000071303 | 1 | 0  | 6 Rps8-ps1  | processed_pseudogene |
| ENSMUSG00000082901 | 1 | 0  | 6 Gm14323   | processed_pseudogene |
| ENSMUSG00000083481 | 1 | 0  | 6 Rps8-ps2  | processed_pseudogene |
| ENSMUSG00000083619 | 1 | 0  | 6 Gm14414   | processed_pseudogene |
| ENSMUSG00000084323 | 1 | 0  | 6 Gm14438   | processed_pseudogene |
| ENSMUSG00000088703 | 1 | 0  | 6 Gm25555   | rRNA                 |
| ENSMUSG00000100228 | 1 | 0  | 6 Gm29257   | processed_pseudogene |
| ENSMUSG00000104392 | 1 | 0  | 6 Gm37962   | TEC                  |
| ENSMUSG00000064918 | 0 | 62 | 242 Gm22571 | snoRNA               |
| ENSMUSG00000022961 | 0 | 54 | 34 Son      | protein_coding       |
| ENSMUSG00000027291 | 0 | 53 | 416 Vps39   | protein_coding       |
| ENSMUSG00000038457 | 0 | 30 | 0 Tmem255b  | protein_coding       |
| ENSMUSG00000064540 | 0 | 28 | 34 Snord42a | snoRNA               |
| ENSMUSG00000029461 | 0 | 24 | 0 Fam168a   | protein_coding       |
| ENSMUSG00000053192 | 0 | 24 | 0 Mllt11    | protein_coding       |
| ENSMUSG00000025209 | 0 | 22 | 0 Peo1      | protein_coding       |
| ENSMUSG00000021133 | 0 | 20 | 0 Susd6     | protein_coding       |
| ENSMUSG00000040028 | 0 | 20 | 0 Elavl1    | protein_coding       |
| ENSMUSG00000024191 | 0 | 19 | 0 Bnip1     | protein_coding       |
| ENSMUSG00000029627 | 0 | 19 | 0 Zkscan14  | protein_coding       |
| ENSMUSG00000032411 | 0 | 19 | 0 Tfdp2     | protein_coding       |
| ENSMUSG00000041629 | 0 | 19 | 0 Fam104a   | protein_coding       |
| ENSMUSG00000085495 | 0 | 19 | 0 Gm16796   | antisense            |
| ENSMUSG00000050567 | 0 | 18 | 0 Maml1     | protein_coding       |
| ENSMUSG00000054083 | 0 | 18 | 0 Capn12    | protein_coding       |
| ENSMUSG00000066441 | 0 | 16 | 14 Rdh11    | protein_coding       |
| ENSMUSG00000022248 | 0 | 16 | 0 Rad1      | protein_coding       |
| ENSMUSG00000049323 | 0 | 16 | 0 Smcr8     | protein_coding       |
| ENSMUSG00000060279 | 0 | 16 | 6 Ap2a1     | protein_coding       |
| ENSMUSG00000091405 | 0 | 16 | 6 Hist2h4   | protein_coding       |
| ENSMUSG00000020547 | 0 | 16 | 0 Bzw2      | protein_coding       |
| ENSMUSG00000025231 | 0 | 16 | 0 Sufu      | protein_coding       |
| ENSMUSG00000024400 | 0 | 15 | 0 Wdr33     | protein_coding       |
| ENSMUSG00000030956 | 0 | 15 | 0 Fam53b    | protein_coding       |
| ENSMUSG00000042190 | 0 | 15 | 0 Cmk1r1    | protein_coding       |
| ENSMUSG00000054079 | 0 | 15 | 0 Utp18     | protein_coding       |
| ENSMUSG00000002985 | 0 | 14 | 16 Apoe     | protein_coding       |
| ENSMUSG00000018841 | 0 | 14 | 0 Rad51d    | protein_coding       |
| ENSMUSG00000022833 | 0 | 14 | 0 Ccdc14    | protein_coding       |
| ENSMUSG00000057963 | 0 | 14 | 0 Itpk1     | protein_coding       |
| ENSMUSG00000065336 | 0 | 14 | 0 Snora34   | snoRNA               |
| ENSMUSG00000074397 | 0 | 13 | 0 Foxr1     | protein_coding       |
| ENSMUSG00000003604 | 0 | 12 | 0 Aven      | protein_coding       |
| ENSMUSG00000027394 | 0 | 12 | 0 Ttl       | protein_coding       |
| ENSMUSG00000029196 | 0 | 12 | 0 Tada2b    | protein_coding       |
| ENSMUSG00000035278 | 0 | 12 | 0 Plekhj1   | protein_coding       |

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000067869 | 0 | 12 | 0 Tcea1-ps1     | processed_pseudogene |
| ENSMUSG00000024563 | 0 | 12 | 0 Smad2         | protein_coding       |
| ENSMUSG00000025081 | 0 | 12 | 0 Tdrd1         | protein_coding       |
| ENSMUSG00000026576 | 0 | 12 | 0 Atp1b1        | protein_coding       |
| ENSMUSG00000047649 | 0 | 12 | 0 Cd3eap        | protein_coding       |
| ENSMUSG00000048661 | 0 | 12 | 0 Lemd3         | protein_coding       |
| ENSMUSG00000028803 | 0 | 11 | 178 Nipal3      | protein_coding       |
| ENSMUSG00000083219 | 0 | 11 | 56 Gm11410      | processed_pseudogene |
| ENSMUSG00000002835 | 0 | 11 | 12 Chaf1a       | protein_coding       |
| ENSMUSG00000007415 | 0 | 11 | 0 Gatad1        | protein_coding       |
| ENSMUSG00000026584 | 0 | 11 | 0 Scyl3         | protein_coding       |
| ENSMUSG00000031935 | 0 | 11 | 0 Med17         | protein_coding       |
| ENSMUSG00000041124 | 0 | 11 | 0 Msantd4       | protein_coding       |
| ENSMUSG00000024863 | 0 | 10 | 0 Mbl2          | protein_coding       |
| ENSMUSG00000027602 | 0 | 10 | 0 Map1lc3a      | protein_coding       |
| ENSMUSG00000033379 | 0 | 10 | 0 Atp6v0b       | protein_coding       |
| ENSMUSG00000034120 | 0 | 10 | 0 Srsf2         | protein_coding       |
| ENSMUSG00000064917 | 0 | 9  | 40 Gm22574      | snoRNA               |
| ENSMUSG00000093112 | 0 | 9  | 8 Gm22701       | misc_RNA             |
| ENSMUSG00000020441 | 0 | 9  | 0 2310033P09Rik | protein_coding       |
| ENSMUSG00000035829 | 0 | 9  | 0 Ppp1r26       | protein_coding       |
| ENSMUSG00000039357 | 0 | 9  | 0 Fut11         | protein_coding       |
| ENSMUSG00000074873 | 0 | 9  | 0 Al606181      | protein_coding       |
| ENSMUSG00000086487 | 0 | 9  | 0 Gm11638       | processed_transcript |
| ENSMUSG00000063888 | 0 | 9  | 24 Rpl7l1       | protein_coding       |
| ENSMUSG00000026313 | 0 | 9  | 0 Hdac4         | protein_coding       |
| ENSMUSG00000030104 | 0 | 9  | 0 Edem1         | protein_coding       |
| ENSMUSG00000030867 | 0 | 9  | 0 Plk1          | protein_coding       |
| ENSMUSG00000043648 | 0 | 9  | 0 Pld6          | protein_coding       |
| ENSMUSG00000057406 | 0 | 9  | 0 Whsc1         | protein_coding       |
| ENSMUSG00000087574 | 0 | 9  | 0 C030037D09Rik | lincRNA              |
| ENSMUSG00000065273 | 0 | 8  | 63 Gm25128      | snoRNA               |
| ENSMUSG00000002409 | 0 | 8  | 0 Dyrk1b        | protein_coding       |
| ENSMUSG00000011658 | 0 | 8  | 0 Fuz           | protein_coding       |
| ENSMUSG00000020444 | 0 | 8  | 0 Guk1          | protein_coding       |
| ENSMUSG00000022544 | 0 | 8  | 0 Eef2kmt       | protein_coding       |
| ENSMUSG00000025510 | 0 | 8  | 0 Cd151         | protein_coding       |
| ENSMUSG00000035890 | 0 | 8  | 0 Rnf126        | protein_coding       |
| ENSMUSG00000037573 | 0 | 8  | 0 Tob1          | protein_coding       |
| ENSMUSG00000039068 | 0 | 8  | 0 Zzz3          | protein_coding       |
| ENSMUSG00000039183 | 0 | 8  | 0 Nubp2         | protein_coding       |
| ENSMUSG00000049091 | 0 | 8  | 0 Sephs2        | protein_coding       |
| ENSMUSG00000063810 | 0 | 8  | 0 Alms1         | protein_coding       |
| ENSMUSG00000077704 | 0 | 7  | 69 Snord89      | snoRNA               |
| ENSMUSG00000096222 | 0 | 7  | 20 Gm25412      | snRNA                |
| ENSMUSG00000042671 | 0 | 7  | 8 Rgs8          | protein_coding       |
| ENSMUSG00000020491 | 0 | 7  | 0 2810021J22Rik | protein_coding       |
| ENSMUSG00000022698 | 0 | 7  | 0 Naa50         | protein_coding       |
| ENSMUSG00000025157 | 0 | 7  | 0 Zdhhc16       | protein_coding       |

|                    |   |   |              |                      |
|--------------------|---|---|--------------|----------------------|
| ENSMUSG00000028187 | 0 | 7 | 0 Rpf1       | protein_coding       |
| ENSMUSG00000031231 | 0 | 7 | 0 Cox7b      | protein_coding       |
| ENSMUSG00000032316 | 0 | 7 | 0 Clk3       | protein_coding       |
| ENSMUSG00000039789 | 0 | 7 | 0 Zfp597     | protein_coding       |
| ENSMUSG00000050213 | 0 | 7 | 0 Snip1      | protein_coding       |
| ENSMUSG00000056412 | 0 | 7 | 0 Gm12396    | processed_pseudogene |
| ENSMUSG00000056692 | 0 | 7 | 0 D17Wsu92e  | protein_coding       |
| ENSMUSG00000032384 | 0 | 7 | 24 Csnk1g1   | protein_coding       |
| ENSMUSG00000073664 | 0 | 7 | 24 Nbeal1    | protein_coding       |
| ENSMUSG00000034201 | 0 | 7 | 22 Gas2l1    | protein_coding       |
| ENSMUSG00000032905 | 0 | 7 | 14 Atg12     | protein_coding       |
| ENSMUSG00000038538 | 0 | 7 | 8 Ubn2       | protein_coding       |
| ENSMUSG00000025555 | 0 | 7 | 2 Farp1      | protein_coding       |
| ENSMUSG00000100441 | 0 | 7 | 2 Gm7266     | processed_pseudogene |
| ENSMUSG00000005204 | 0 | 7 | 0 Senp3      | protein_coding       |
| ENSMUSG00000005802 | 0 | 7 | 0 Slc30a4    | protein_coding       |
| ENSMUSG00000014859 | 0 | 7 | 0 E2f4       | protein_coding       |
| ENSMUSG00000018239 | 0 | 7 | 0 Zcchc10    | protein_coding       |
| ENSMUSG00000022999 | 0 | 7 | 0 Lmbr11     | protein_coding       |
| ENSMUSG00000024079 | 0 | 7 | 0 Eif2ak2    | protein_coding       |
| ENSMUSG00000027132 | 0 | 7 | 0 Katnbl1    | protein_coding       |
| ENSMUSG00000029186 | 0 | 7 | 0 Pi4k2b     | protein_coding       |
| ENSMUSG00000029414 | 0 | 7 | 0 Kntc1      | protein_coding       |
| ENSMUSG00000029560 | 0 | 7 | 0 Snx8       | protein_coding       |
| ENSMUSG00000033099 | 0 | 7 | 0 Nol12      | protein_coding       |
| ENSMUSG00000033624 | 0 | 7 | 0 Pdpr       | protein_coding       |
| ENSMUSG00000038335 | 0 | 7 | 0 Tsr1       | protein_coding       |
| ENSMUSG00000045036 | 0 | 7 | 0 Tmem232    | protein_coding       |
| ENSMUSG00000056209 | 0 | 7 | 0 Npm3       | protein_coding       |
| ENSMUSG00000056537 | 0 | 7 | 0 Rlim       | protein_coding       |
| ENSMUSG00000060862 | 0 | 7 | 0 Zbtb40     | protein_coding       |
| ENSMUSG00000062627 | 0 | 7 | 0 Mysm1      | protein_coding       |
| ENSMUSG00000083169 | 0 | 7 | 0 Gm6580     | processed_pseudogene |
| ENSMUSG00000085232 | 0 | 7 | 0 Gm11962    | processed_pseudogene |
| ENSMUSG00000088008 | 0 | 7 | 0 Gm25492    | snoRNA               |
| ENSMUSG00000088158 | 0 | 7 | 0 Scarna3b   | snoRNA               |
| ENSMUSG00000053199 | 0 | 6 | 385 Arhgap20 | protein_coding       |
| ENSMUSG00000067150 | 0 | 6 | 32 Xpo5      | protein_coding       |
| ENSMUSG00000028771 | 0 | 6 | 16 Ptpn12    | protein_coding       |
| ENSMUSG00000002319 | 0 | 6 | 12 Ipo4      | protein_coding       |
| ENSMUSG00000005882 | 0 | 6 | 10 Uqcc1     | protein_coding       |
| ENSMUSG00000038145 | 0 | 6 | 10 Snrk      | protein_coding       |
| ENSMUSG00000020460 | 0 | 6 | 8 Rps27a     | protein_coding       |
| ENSMUSG00000005371 | 0 | 6 | 2 Fbxo11     | protein_coding       |
| ENSMUSG00000000568 | 0 | 6 | 0 Hnrnpd     | protein_coding       |
| ENSMUSG00000010067 | 0 | 6 | 0 Rassf1     | protein_coding       |
| ENSMUSG00000016257 | 0 | 6 | 0 Slmo2      | protein_coding       |
| ENSMUSG00000017664 | 0 | 6 | 0 Slc35c2    | protein_coding       |
| ENSMUSG00000020430 | 0 | 6 | 0 Pes1       | protein_coding       |



|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000025001 | 0 | 6 | 0 Hells         | protein_coding       |
| ENSMUSG00000026435 | 0 | 6 | 0 Slc45a3       | protein_coding       |
| ENSMUSG00000028757 | 0 | 6 | 0 Ddost         | protein_coding       |
| ENSMUSG00000030780 | 0 | 6 | 0 BC017158      | protein_coding       |
| ENSMUSG00000031629 | 0 | 6 | 0 Cenpu         | protein_coding       |
| ENSMUSG00000031732 | 0 | 6 | 0 Phlpp2        | protein_coding       |
| ENSMUSG00000033991 | 0 | 6 | 0 Ttc37         | protein_coding       |
| ENSMUSG00000038214 | 0 | 6 | 0 Bend3         | protein_coding       |
| ENSMUSG00000038900 | 0 | 6 | 0 Rpl12         | protein_coding       |
| ENSMUSG00000040877 | 0 | 6 | 0 Wdr25         | protein_coding       |
| ENSMUSG00000049287 | 0 | 6 | 0 Iba57         | protein_coding       |
| ENSMUSG00000053070 | 0 | 6 | 0 9230110C19Rik | protein_coding       |
| ENSMUSG00000065817 | 0 | 6 | 0 Gm24698       | snoRNA               |
| ENSMUSG00000067194 | 0 | 6 | 0 Eif1ax        | protein_coding       |
| ENSMUSG00000085783 | 0 | 6 | 0 Gm9816        | processed_pseudogene |
| ENSMUSG00000090115 | 0 | 6 | 0 Usp49         | protein_coding       |
| ENSMUSG00000034994 | 0 | 5 | 131 Eef2        | protein_coding       |
| ENSMUSG00000008348 | 0 | 5 | 125 Ubc         | protein_coding       |
| ENSMUSG00000038828 | 0 | 5 | 12 Tmem214      | protein_coding       |
| ENSMUSG00000065808 | 0 | 5 | 6 Gm23037       | misc_RNA             |
| ENSMUSG00000020691 | 0 | 5 | 4 Mettl2        | protein_coding       |
| ENSMUSG00000030929 | 0 | 5 | 4 Eri2          | protein_coding       |
| ENSMUSG00000048814 | 0 | 5 | 2 Lonrf2        | protein_coding       |
| ENSMUSG00000000823 | 0 | 5 | 0 Zfp512b       | protein_coding       |
| ENSMUSG00000001323 | 0 | 5 | 0 Srr           | protein_coding       |
| ENSMUSG00000004071 | 0 | 5 | 0 Cdip1         | protein_coding       |
| ENSMUSG00000010914 | 0 | 5 | 0 Pdhx          | protein_coding       |
| ENSMUSG00000020133 | 0 | 5 | 0 2310011J03Rik | protein_coding       |
| ENSMUSG00000020261 | 0 | 5 | 0 Slc36a1       | protein_coding       |
| ENSMUSG00000020745 | 0 | 5 | 0 Pafah1b1      | protein_coding       |
| ENSMUSG00000025240 | 0 | 5 | 0 Sacm11        | protein_coding       |
| ENSMUSG00000027613 | 0 | 5 | 0 Eif6          | protein_coding       |
| ENSMUSG00000028099 | 0 | 5 | 0 Polr3c        | protein_coding       |
| ENSMUSG00000028964 | 0 | 5 | 0 Park7         | protein_coding       |
| ENSMUSG00000029146 | 0 | 5 | 0 Snx17         | protein_coding       |
| ENSMUSG00000029165 | 0 | 5 | 0 Agbl5         | protein_coding       |
| ENSMUSG00000029176 | 0 | 5 | 0 Anapc4        | protein_coding       |
| ENSMUSG00000029179 | 0 | 5 | 0 Zcchc4        | protein_coding       |
| ENSMUSG00000029715 | 0 | 5 | 0 Pop7          | protein_coding       |
| ENSMUSG00000029723 | 0 | 5 | 0 Tsc22d4       | protein_coding       |
| ENSMUSG00000031485 | 0 | 5 | 0 Prosc         | protein_coding       |
| ENSMUSG00000032526 | 0 | 5 | 0 Deb1          | protein_coding       |
| ENSMUSG00000034152 | 0 | 5 | 0 Exoc3         | protein_coding       |
| ENSMUSG00000034761 | 0 | 5 | 0 Map4k5        | protein_coding       |
| ENSMUSG00000039735 | 0 | 5 | 0 Fnbp11        | protein_coding       |
| ENSMUSG00000040952 | 0 | 5 | 0 Rps19         | protein_coding       |
| ENSMUSG00000042096 | 0 | 5 | 0 Dao           | protein_coding       |
| ENSMUSG00000042793 | 0 | 5 | 0 Lgr6          | protein_coding       |
| ENSMUSG00000050272 | 0 | 5 | 0 Dscam         | protein_coding       |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000054150 | 0 | 5 | 0 Syne3         | protein_coding       |
| ENSMUSG00000054499 | 0 | 5 | 0 Dedd2         | protein_coding       |
| ENSMUSG00000056749 | 0 | 5 | 0 Nfil3         | protein_coding       |
| ENSMUSG00000058454 | 0 | 5 | 0 Dher7         | protein_coding       |
| ENSMUSG00000059237 | 0 | 5 | 0 Ppp1r2-ps4    | processed_pseudogene |
| ENSMUSG00000059301 | 0 | 5 | 0 Gm5434        | protein_coding       |
| ENSMUSG00000061894 | 0 | 5 | 0 Zscan20       | protein_coding       |
| ENSMUSG00000068882 | 0 | 5 | 0 Ssb           | protein_coding       |
| ENSMUSG00000071014 | 0 | 5 | 0 Ndufb6        | protein_coding       |
| ENSMUSG00000072244 | 0 | 5 | 0 Trim6         | protein_coding       |
| ENSMUSG00000078517 | 0 | 5 | 0 Emc1          | protein_coding       |
| ENSMUSG00000083261 | 0 | 5 | 0 Gm7816        | processed_pseudogene |
| ENSMUSG00000083338 | 0 | 5 | 0 Gm12475       | processed_pseudogene |
| ENSMUSG00000083396 | 0 | 5 | 0 Gm15542       | processed_pseudogene |
| ENSMUSG00000089255 | 0 | 5 | 0 Snora78       | snoRNA               |
| ENSMUSG00000094843 | 0 | 5 | 0 Ppp1r2-ps1    | processed_pseudogene |
| ENSMUSG00000095869 | 0 | 5 | 0 Ppp1r2-ps6    | processed_pseudogene |
| ENSMUSG00000096968 | 0 | 5 | 0 Gm26620       | protein_coding       |
| ENSMUSG00000099662 | 0 | 5 | 0 Ppp1r2-ps2    | processed_pseudogene |
| ENSMUSG00000100770 | 0 | 5 | 0 Gm28466       | processed_pseudogene |
| ENSMUSG00000102467 | 0 | 5 | 0 Gm37167       | TEC                  |
| ENSMUSG00000006526 | 0 | 5 | 1818 Tmem110    | protein_coding       |
| ENSMUSG00000021134 | 0 | 5 | 428 Srsf5       | protein_coding       |
| ENSMUSG00000030082 | 0 | 5 | 141 Sec61a1     | protein_coding       |
| ENSMUSG00000029816 | 0 | 5 | 115 Gpnmb       | protein_coding       |
| ENSMUSG00000034168 | 0 | 5 | 65 Irf2bp1      | protein_coding       |
| ENSMUSG00000089764 | 0 | 5 | 26 Gm16580      | processed_pseudogene |
| ENSMUSG00000049489 | 0 | 5 | 18 Fam58b       | protein_coding       |
| ENSMUSG00000054823 | 0 | 5 | 18 Whsc1l1      | protein_coding       |
| ENSMUSG00000097013 | 0 | 5 | 18 Gm26710      | lincRNA              |
| ENSMUSG00000025428 | 0 | 5 | 16 Atp5a1       | protein_coding       |
| ENSMUSG00000002741 | 0 | 5 | 14 Ykt6         | protein_coding       |
| ENSMUSG00000020230 | 0 | 5 | 14 Prmt2        | protein_coding       |
| ENSMUSG00000025173 | 0 | 5 | 14 Wdr45b       | protein_coding       |
| ENSMUSG00000028521 | 0 | 5 | 14 Slc35d1      | protein_coding       |
| ENSMUSG00000005566 | 0 | 5 | 12 Trim28       | protein_coding       |
| ENSMUSG00000016554 | 0 | 5 | 8 Eif3d         | protein_coding       |
| ENSMUSG00000020790 | 0 | 5 | 6 Ankfy1        | protein_coding       |
| ENSMUSG00000084890 | 0 | 5 | 6 A830036E02Rik | antisense            |
| ENSMUSG00000084288 | 0 | 5 | 4 Gm5228        | processed_pseudogene |
| ENSMUSG00000002210 | 0 | 5 | 2 Smg9          | protein_coding       |
| ENSMUSG00000001036 | 0 | 5 | 0 Epn2          | protein_coding       |
| ENSMUSG00000002076 | 0 | 5 | 0 Hsf2bp        | protein_coding       |
| ENSMUSG00000002280 | 0 | 5 | 0 Narfl         | protein_coding       |
| ENSMUSG00000004070 | 0 | 5 | 0 Hmox2         | protein_coding       |
| ENSMUSG00000007021 | 0 | 5 | 0 Syngn3        | protein_coding       |
| ENSMUSG00000012777 | 0 | 5 | 0 Acpt          | protein_coding       |
| ENSMUSG00000013160 | 0 | 5 | 0 Atp6v0d1      | protein_coding       |
| ENSMUSG00000018848 | 0 | 5 | 0 Rars          | protein_coding       |

|                    |   |   |             |                |
|--------------------|---|---|-------------|----------------|
| ENSMUSG00000019731 | 0 | 5 | 0 Slc35e1   | protein_coding |
| ENSMUSG00000020075 | 0 | 5 | 0 Ddx21     | protein_coding |
| ENSMUSG00000020415 | 0 | 5 | 0 Pttg1     | protein_coding |
| ENSMUSG00000020453 | 0 | 5 | 0 Patz1     | protein_coding |
| ENSMUSG00000021221 | 0 | 5 | 0 Dpf3      | protein_coding |
| ENSMUSG00000021377 | 0 | 5 | 0 Dek       | protein_coding |
| ENSMUSG00000021431 | 0 | 5 | 0 Snrnp48   | protein_coding |
| ENSMUSG00000021759 | 0 | 5 | 0 Plpp1     | protein_coding |
| ENSMUSG00000021952 | 0 | 5 | 0 Xpo4      | protein_coding |
| ENSMUSG00000022228 | 0 | 5 | 0 Zscan26   | protein_coding |
| ENSMUSG00000022946 | 0 | 5 | 0 Dopey2    | protein_coding |
| ENSMUSG00000022951 | 0 | 5 | 0 Rcan1     | protein_coding |
| ENSMUSG00000023043 | 0 | 5 | 0 Krt18     | protein_coding |
| ENSMUSG00000024922 | 0 | 5 | 0 Ovol1     | protein_coding |
| ENSMUSG00000025439 | 0 | 5 | 0 Clns1a    | protein_coding |
| ENSMUSG00000025525 | 0 | 5 | 0 Apool     | protein_coding |
| ENSMUSG00000025938 | 0 | 5 | 0 Slco5a1   | protein_coding |
| ENSMUSG00000025955 | 0 | 5 | 0 Akr1c1    | protein_coding |
| ENSMUSG00000026035 | 0 | 5 | 0 Ppil3     | protein_coding |
| ENSMUSG00000026185 | 0 | 5 | 0 Igfbp5    | protein_coding |
| ENSMUSG00000026546 | 0 | 5 | 0 Cfap45    | protein_coding |
| ENSMUSG00000027080 | 0 | 5 | 0 Med19     | protein_coding |
| ENSMUSG00000027244 | 0 | 5 | 0 Atg13     | protein_coding |
| ENSMUSG00000027349 | 0 | 5 | 0 Fam98b    | protein_coding |
| ENSMUSG00000027496 | 0 | 5 | 0 Aurka     | protein_coding |
| ENSMUSG00000028044 | 0 | 5 | 0 Cks1b     | protein_coding |
| ENSMUSG00000028114 | 0 | 5 | 0 Mettl14   | protein_coding |
| ENSMUSG00000028517 | 0 | 5 | 0 Plpp3     | protein_coding |
| ENSMUSG00000028546 | 0 | 5 | 0 Elavl4    | protein_coding |
| ENSMUSG00000028698 | 0 | 5 | 0 Pik3r3    | protein_coding |
| ENSMUSG00000029538 | 0 | 5 | 0 Srsf9     | protein_coding |
| ENSMUSG00000030057 | 0 | 5 | 0 Cnbp      | protein_coding |
| ENSMUSG00000031990 | 0 | 5 | 0 Jam3      | protein_coding |
| ENSMUSG00000032400 | 0 | 5 | 0 Zwilch    | protein_coding |
| ENSMUSG00000033721 | 0 | 5 | 0 Vav3      | protein_coding |
| ENSMUSG00000034088 | 0 | 5 | 0 Hdlbp     | protein_coding |
| ENSMUSG00000034160 | 0 | 5 | 0 Ogt       | protein_coding |
| ENSMUSG00000034303 | 0 | 5 | 0 Ccdc15    | protein_coding |
| ENSMUSG00000035007 | 0 | 5 | 0 Rundc1    | protein_coding |
| ENSMUSG00000035093 | 0 | 5 | 0 Secisbp2l | protein_coding |
| ENSMUSG00000035772 | 0 | 5 | 0 Mrps2     | protein_coding |
| ENSMUSG00000036398 | 0 | 5 | 0 Ppp1r11   | protein_coding |
| ENSMUSG00000038690 | 0 | 5 | 0 Atp5j2    | protein_coding |
| ENSMUSG00000038784 | 0 | 5 | 0 Cnot4     | protein_coding |
| ENSMUSG00000039253 | 0 | 5 | 0 Fn3krp    | protein_coding |
| ENSMUSG00000040651 | 0 | 5 | 0 Fam208a   | protein_coding |
| ENSMUSG00000040725 | 0 | 5 | 0 Hnrnpul1  | protein_coding |
| ENSMUSG00000040865 | 0 | 5 | 0 Ino80d    | protein_coding |
| ENSMUSG00000040957 | 0 | 5 | 0 Cables1   | protein_coding |

|                    |   |   |                    |                      |
|--------------------|---|---|--------------------|----------------------|
| ENSMUSG00000041459 | 0 | 5 | 0 Tardbp           | protein_coding       |
| ENSMUSG00000042035 | 0 | 5 | 0 Igsf3            | protein_coding       |
| ENSMUSG00000042390 | 0 | 5 | 0 Gatad2b          | protein_coding       |
| ENSMUSG00000045466 | 0 | 5 | 0 Zfp956           | protein_coding       |
| ENSMUSG00000045934 | 0 | 5 | 0 Mtnr11           | protein_coding       |
| ENSMUSG00000046500 | 0 | 5 | 0 Fam19a4          | protein_coding       |
| ENSMUSG00000047379 | 0 | 5 | 0 B4gat1           | protein_coding       |
| ENSMUSG00000053111 | 0 | 5 | 0 Fank1            | protein_coding       |
| ENSMUSG00000054027 | 0 | 5 | 0 Nt5dc3           | protein_coding       |
| ENSMUSG00000055912 | 0 | 5 | 0 Tmem150a         | protein_coding       |
| ENSMUSG00000058816 | 0 | 5 | 0 Ppp1r2-ps3       | processed_pseudogene |
| ENSMUSG00000059481 | 0 | 5 | 0 Plg              | protein_coding       |
| ENSMUSG00000062054 | 0 | 5 | 0 Iah1             | protein_coding       |
| ENSMUSG00000062127 | 0 | 5 | 0 Ctnnb2nl         | protein_coding       |
| ENSMUSG00000066735 | 0 | 5 | 0 Vkorc1l1         | protein_coding       |
| ENSMUSG00000067367 | 0 | 5 | 0 Lyar             | protein_coding       |
| ENSMUSG00000074259 | 0 | 5 | 0 Gramd2           | protein_coding       |
| ENSMUSG00000075327 | 0 | 5 | 0 Zbtb2            | protein_coding       |
| ENSMUSG00000075525 | 0 | 5 | 0 Gm10849          | pseudogene           |
| ENSMUSG00000078619 | 0 | 5 | 0 Smarcd2          | protein_coding       |
| ENSMUSG00000086724 | 0 | 5 | 0 Gm12833          | processed_pseudogene |
| ENSMUSG00000092558 | 0 | 5 | 0 Med20            | protein_coding       |
| ENSMUSG00000098009 | 0 | 5 | 0 Gm5597           | processed_pseudogene |
| ENSMUSG00000098176 | 0 | 5 | 0 Ccdc166          | protein_coding       |
| ENSMUSG00000101013 | 0 | 5 | 0 A630072M18Rik    | antisense            |
| ENSMUSG00000102270 | 0 | 5 | 0 Gm8388           | processed_pseudogene |
| ENSMUSG00000103570 | 0 | 5 | 0 C630004M23Rik    | TEC                  |
| ENSMUSG00000103945 | 0 | 5 | 0 Gm38228          | TEC                  |
| ENSMUSG00000045928 | 0 | 4 | 5280 4933440M02Rik | protein_coding       |
| ENSMUSG00000097164 | 0 | 4 | 1051 Cep83os       | lincRNA              |
| ENSMUSG00000032883 | 0 | 4 | 127 Acsl3          | protein_coding       |
| ENSMUSG00000030201 | 0 | 4 | 103 Lrp6           | protein_coding       |
| ENSMUSG00000035517 | 0 | 4 | 79 Tdrd7           | protein_coding       |
| ENSMUSG00000042594 | 0 | 4 | 56 Sh2b3           | protein_coding       |
| ENSMUSG00000021738 | 0 | 4 | 28 Atxn7           | protein_coding       |
| ENSMUSG00000038615 | 0 | 4 | 26 Nfe2l1          | protein_coding       |
| ENSMUSG00000053332 | 0 | 4 | 18 Gas5            | processed_transcript |
| ENSMUSG00000026600 | 0 | 4 | 16 Soat1           | protein_coding       |
| ENSMUSG00000046603 | 0 | 4 | 16 Tcaim           | protein_coding       |
| ENSMUSG00000024844 | 0 | 4 | 12 Banf1           | protein_coding       |
| ENSMUSG00000027680 | 0 | 4 | 12 Fxr1            | protein_coding       |
| ENSMUSG00000030802 | 0 | 4 | 12 Bckdk           | protein_coding       |
| ENSMUSG00000040356 | 0 | 4 | 12 Skiv2l          | protein_coding       |
| ENSMUSG00000034686 | 0 | 4 | 8 Prr7             | protein_coding       |
| ENSMUSG00000023456 | 0 | 4 | 4 Tpi1             | protein_coding       |
| ENSMUSG00000032841 | 0 | 4 | 2 Prr5l            | protein_coding       |
| ENSMUSG00000000532 | 0 | 4 | 0 Acvr1b           | protein_coding       |
| ENSMUSG00000001416 | 0 | 4 | 0 Cct3             | protein_coding       |
| ENSMUSG00000001604 | 0 | 4 | 0 Tcea3            | protein_coding       |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUSG00000001687 | 0 | 4 | 0 Ubl3          | protein_coding |
| ENSMUSG00000001767 | 0 | 4 | 0 Crnk11        | protein_coding |
| ENSMUSG00000002416 | 0 | 4 | 0 Ndufb2        | protein_coding |
| ENSMUSG00000002814 | 0 | 4 | 0 Top3a         | protein_coding |
| ENSMUSG00000003234 | 0 | 4 | 0 Abcf3         | protein_coding |
| ENSMUSG00000003526 | 0 | 4 | 0 Prodh         | protein_coding |
| ENSMUSG00000003779 | 0 | 4 | 0 Kif20a        | protein_coding |
| ENSMUSG00000005683 | 0 | 4 | 0 Cs            | protein_coding |
| ENSMUSG00000005699 | 0 | 4 | 0 Pard6a        | protein_coding |
| ENSMUSG00000007812 | 0 | 4 | 0 Zfp655        | protein_coding |
| ENSMUSG00000007989 | 0 | 4 | 0 Fzd3          | protein_coding |
| ENSMUSG00000009293 | 0 | 4 | 0 Ube2g2        | protein_coding |
| ENSMUSG00000009628 | 0 | 4 | 0 Tex15         | protein_coding |
| ENSMUSG00000009681 | 0 | 4 | 0 Bcr           | protein_coding |
| ENSMUSG00000009894 | 0 | 4 | 0 Snap47        | protein_coding |
| ENSMUSG00000010721 | 0 | 4 | 0 Lmbr1         | protein_coding |
| ENSMUSG00000017831 | 0 | 4 | 0 Rab5a         | protein_coding |
| ENSMUSG00000018427 | 0 | 4 | 0 Ypel2         | protein_coding |
| ENSMUSG00000019518 | 0 | 4 | 0 Ap4m1         | protein_coding |
| ENSMUSG00000019845 | 0 | 4 | 0 Tube1         | protein_coding |
| ENSMUSG00000020038 | 0 | 4 | 0 Cry1          | protein_coding |
| ENSMUSG00000020170 | 0 | 4 | 0 Frs2          | protein_coding |
| ENSMUSG00000020385 | 0 | 4 | 0 Clk4          | protein_coding |
| ENSMUSG00000020607 | 0 | 4 | 0 Fam84a        | protein_coding |
| ENSMUSG00000020847 | 0 | 4 | 0 Rph3al        | protein_coding |
| ENSMUSG00000020936 | 0 | 4 | 0 Nmt1          | protein_coding |
| ENSMUSG00000021339 | 0 | 4 | 0 Mrs2          | protein_coding |
| ENSMUSG00000021366 | 0 | 4 | 0 Hivep1        | protein_coding |
| ENSMUSG00000021929 | 0 | 4 | 0 Kpna3         | protein_coding |
| ENSMUSG00000022003 | 0 | 4 | 0 Slc25a30      | protein_coding |
| ENSMUSG00000022031 | 0 | 4 | 0 Elp3          | protein_coding |
| ENSMUSG00000022141 | 0 | 4 | 0 Nipbl         | protein_coding |
| ENSMUSG00000022385 | 0 | 4 | 0 Gtse1         | protein_coding |
| ENSMUSG00000022476 | 0 | 4 | 0 Polr3h        | protein_coding |
| ENSMUSG00000022897 | 0 | 4 | 0 Dyrk1a        | protein_coding |
| ENSMUSG00000023909 | 0 | 4 | 0 Paqr4         | protein_coding |
| ENSMUSG00000024118 | 0 | 4 | 0 1600002H07Rik | protein_coding |
| ENSMUSG00000024142 | 0 | 4 | 0 Mlst8         | protein_coding |
| ENSMUSG00000024174 | 0 | 4 | 0 Pot1b         | protein_coding |
| ENSMUSG00000025154 | 0 | 4 | 0 Arhgap19      | protein_coding |
| ENSMUSG00000025326 | 0 | 4 | 0 Ube3a         | protein_coding |
| ENSMUSG00000025730 | 0 | 4 | 0 Rab40c        | protein_coding |
| ENSMUSG00000026072 | 0 | 4 | 0 Il1r1         | protein_coding |
| ENSMUSG00000026273 | 0 | 4 | 0 Mterf4        | protein_coding |
| ENSMUSG00000026353 | 0 | 4 | 0 Ubxn4         | protein_coding |
| ENSMUSG00000026558 | 0 | 4 | 0 Uck2          | protein_coding |
| ENSMUSG00000026655 | 0 | 4 | 0 Fam107b       | protein_coding |
| ENSMUSG00000026767 | 0 | 4 | 0 Fam188a       | protein_coding |
| ENSMUSG00000026969 | 0 | 4 | 0 Fam166a       | protein_coding |

|                    |   |   |                 |                |
|--------------------|---|---|-----------------|----------------|
| ENSMUSG00000027281 | 0 | 4 | 0 Slx4ip        | protein_coding |
| ENSMUSG00000027316 | 0 | 4 | 0 Gfra4         | protein_coding |
| ENSMUSG00000027518 | 0 | 4 | 0 1700021F07Rik | protein_coding |
| ENSMUSG00000027601 | 0 | 4 | 0 Mtrf1         | protein_coding |
| ENSMUSG00000027678 | 0 | 4 | 0 Ncoa3         | protein_coding |
| ENSMUSG00000027784 | 0 | 4 | 0 Ppm1l         | protein_coding |
| ENSMUSG00000028277 | 0 | 4 | 0 Ube2j1        | protein_coding |
| ENSMUSG00000028496 | 0 | 4 | 0 Mllt3         | protein_coding |
| ENSMUSG00000028676 | 0 | 4 | 0 Srsf10        | protein_coding |
| ENSMUSG00000028693 | 0 | 4 | 0 Nasp          | protein_coding |
| ENSMUSG00000028759 | 0 | 4 | 0 Hp1bp3        | protein_coding |
| ENSMUSG00000028796 | 0 | 4 | 0 Phc2          | protein_coding |
| ENSMUSG00000029203 | 0 | 4 | 0 Ube2k         | protein_coding |
| ENSMUSG00000029276 | 0 | 4 | 0 Glmn          | protein_coding |
| ENSMUSG00000029321 | 0 | 4 | 0 Slc10a6       | protein_coding |
| ENSMUSG00000029403 | 0 | 4 | 0 Cdkl2         | protein_coding |
| ENSMUSG00000029471 | 0 | 4 | 0 Camkk2        | protein_coding |
| ENSMUSG00000029504 | 0 | 4 | 0 Ddx51         | protein_coding |
| ENSMUSG00000029684 | 0 | 4 | 0 Wasl          | protein_coding |
| ENSMUSG00000029686 | 0 | 4 | 0 Cull1         | protein_coding |
| ENSMUSG00000029787 | 0 | 4 | 0 Avl9          | protein_coding |
| ENSMUSG00000030031 | 0 | 4 | 0 Kbtbd8        | protein_coding |
| ENSMUSG00000030168 | 0 | 4 | 0 Adipor2       | protein_coding |
| ENSMUSG00000030681 | 0 | 4 | 0 Mvp           | protein_coding |
| ENSMUSG00000031072 | 0 | 4 | 0 Oraov1        | protein_coding |
| ENSMUSG00000031562 | 0 | 4 | 0 Dctd          | protein_coding |
| ENSMUSG00000031921 | 0 | 4 | 0 Terf2         | protein_coding |
| ENSMUSG00000032202 | 0 | 4 | 0 Rab27a        | protein_coding |
| ENSMUSG00000032307 | 0 | 4 | 0 Ube2q2        | protein_coding |
| ENSMUSG00000032318 | 0 | 4 | 0 Isl2          | protein_coding |
| ENSMUSG00000032435 | 0 | 4 | 0 Dync1li1      | protein_coding |
| ENSMUSG00000033128 | 0 | 4 | 0 Gga1          | protein_coding |
| ENSMUSG00000033294 | 0 | 4 | 0 Noc4l         | protein_coding |
| ENSMUSG00000033416 | 0 | 4 | 0 Gucd1         | protein_coding |
| ENSMUSG00000033763 | 0 | 4 | 0 Mtss1l        | protein_coding |
| ENSMUSG00000033985 | 0 | 4 | 0 Tesk2         | protein_coding |
| ENSMUSG00000034574 | 0 | 4 | 0 Daam1         | protein_coding |
| ENSMUSG00000034724 | 0 | 4 | 0 Cnot6l        | protein_coding |
| ENSMUSG00000035171 | 0 | 4 | 0 1110059E24Rik | protein_coding |
| ENSMUSG00000035754 | 0 | 4 | 0 Wdr18         | protein_coding |
| ENSMUSG00000035765 | 0 | 4 | 0 Dym           | protein_coding |
| ENSMUSG00000035953 | 0 | 4 | 0 Tmem55b       | protein_coding |
| ENSMUSG00000036501 | 0 | 4 | 0 Fam13b        | protein_coding |
| ENSMUSG00000037600 | 0 | 4 | 0 Kdfl          | protein_coding |
| ENSMUSG00000038172 | 0 | 4 | 0 Ttc39b        | protein_coding |
| ENSMUSG00000038205 | 0 | 4 | 0 Prkab2        | protein_coding |
| ENSMUSG00000038240 | 0 | 4 | 0 Pdss2         | protein_coding |
| ENSMUSG00000038398 | 0 | 4 | 0 Upf3a         | protein_coding |
| ENSMUSG00000038696 | 0 | 4 | 0 Mapkap1       | protein_coding |

|                    |   |   |                 |                        |
|--------------------|---|---|-----------------|------------------------|
| ENSMUSG00000038801 | 0 | 4 | 0 Scgb1c1       | protein_coding         |
| ENSMUSG00000038816 | 0 | 4 | 0 Ctnnal1       | protein_coding         |
| ENSMUSG00000038838 | 0 | 4 | 0 Vars2         | protein_coding         |
| ENSMUSG00000039737 | 0 | 4 | 0 Prkrip1       | protein_coding         |
| ENSMUSG00000039842 | 0 | 4 | 0 Mcph1         | protein_coding         |
| ENSMUSG00000040506 | 0 | 4 | 0 Ambra1        | protein_coding         |
| ENSMUSG00000041216 | 0 | 4 | 0 Clvs1         | protein_coding         |
| ENSMUSG00000042293 | 0 | 4 | 0 Gm5617        | protein_coding         |
| ENSMUSG00000043259 | 0 | 4 | 0 Fam13c        | protein_coding         |
| ENSMUSG00000044433 | 0 | 4 | 0 Camsap3       | protein_coding         |
| ENSMUSG00000044434 | 0 | 4 | 0 Gm9791        | protein_coding         |
| ENSMUSG00000045867 | 0 | 4 | 0 Cradd         | protein_coding         |
| ENSMUSG00000046856 | 0 | 4 | 0 Gpr1          | protein_coding         |
| ENSMUSG00000047045 | 0 | 4 | 0 Tmem164       | protein_coding         |
| ENSMUSG00000047434 | 0 | 4 | 0 Xxylt1        | protein_coding         |
| ENSMUSG00000048012 | 0 | 4 | 0 Zfp473        | protein_coding         |
| ENSMUSG00000048796 | 0 | 4 | 0 Cyb561d1      | protein_coding         |
| ENSMUSG00000052384 | 0 | 4 | 0 Nrros         | protein_coding         |
| ENSMUSG00000052698 | 0 | 4 | 0 Tln2          | protein_coding         |
| ENSMUSG00000053113 | 0 | 4 | 0 Socs3         | protein_coding         |
| ENSMUSG00000053453 | 0 | 4 | 0 Thoc7         | protein_coding         |
| ENSMUSG00000054408 | 0 | 4 | 0 Spcs3         | protein_coding         |
| ENSMUSG00000054604 | 0 | 4 | 0 Cggbp1        | protein_coding         |
| ENSMUSG00000056268 | 0 | 4 | 0 Dennd1b       | protein_coding         |
| ENSMUSG00000056394 | 0 | 4 | 0 Lig1          | protein_coding         |
| ENSMUSG00000059288 | 0 | 4 | 0 Cdyl          | protein_coding         |
| ENSMUSG00000059811 | 0 | 4 | 0 Atl2          | protein_coding         |
| ENSMUSG00000060034 | 0 | 4 | 0 Ctf2          | protein_coding         |
| ENSMUSG00000061848 | 0 | 4 | 0 Gm5805        | processed_pseudogene   |
| ENSMUSG00000062203 | 0 | 4 | 0 Gspt1         | protein_coding         |
| ENSMUSG00000062461 | 0 | 4 | 0 Gm5453        | processed_pseudogene   |
| ENSMUSG00000062542 | 0 | 4 | 0 Syt9          | protein_coding         |
| ENSMUSG00000063320 | 0 | 4 | 0 1190007I07Rik | protein_coding         |
| ENSMUSG00000064065 | 0 | 4 | 0 Ipcef1        | protein_coding         |
| ENSMUSG00000065990 | 0 | 4 | 0 Aurkaip1      | protein_coding         |
| ENSMUSG00000068250 | 0 | 4 | 0 Amn1          | protein_coding         |
| ENSMUSG00000068302 | 0 | 4 | 0 Noto          | protein_coding         |
| ENSMUSG00000068329 | 0 | 4 | 0 Htra2         | protein_coding         |
| ENSMUSG00000070336 | 0 | 4 | 0 Fbxo47        | protein_coding         |
| ENSMUSG00000070426 | 0 | 4 | 0 Rnf121        | protein_coding         |
| ENSMUSG00000072723 | 0 | 4 | 0 Gm10044       | processed_transcript   |
| ENSMUSG00000073616 | 0 | 4 | 0 Myeov2        | protein_coding         |
| ENSMUSG00000078348 | 0 | 4 | 0 Sf3b5         | protein_coding         |
| ENSMUSG00000079445 | 0 | 4 | 0 B3gnt7        | protein_coding         |
| ENSMUSG00000081288 | 0 | 4 | 0 Gm11386       | processed_pseudogene   |
| ENSMUSG00000082406 | 0 | 4 | 0 Gm5401        | processed_pseudogene   |
| ENSMUSG00000083610 | 0 | 4 | 0 Oaz2-ps       | processed_pseudogene   |
| ENSMUSG00000084004 | 0 | 4 | 0 Gm12047       | processed_pseudogene   |
| ENSMUSG00000092174 | 0 | 4 | 0 Gm7029        | unprocessed_pseudogene |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000097078 | 0 | 4 | 0 Gm26566       | protein_coding       |
| ENSMUSG00000097167 | 0 | 4 | 0 Gm16740       | lincRNA              |
| ENSMUSG00000099658 | 0 | 4 | 0 Gm28980       | processed_pseudogene |
| ENSMUSG00000101225 | 0 | 4 | 0 1700008J07Rik | antisense            |
| ENSMUSG00000104360 | 0 | 4 | 0 Gm8762        | processed_pseudogene |
| ENSMUSG00000016559 | 0 | 3 | 50 H3f3b        | protein_coding       |
| ENSMUSG00000027255 | 0 | 3 | 24 Arfgap2      | protein_coding       |
| ENSMUSG00000020485 | 0 | 3 | 12 Supt4a       | protein_coding       |
| ENSMUSG00000097906 | 0 | 3 | 8 Gm9625        | processed_pseudogene |
| ENSMUSG00000027624 | 0 | 3 | 4 Epb41l1       | protein_coding       |
| ENSMUSG00000039725 | 0 | 3 | 4 Trp53rka      | protein_coding       |
| ENSMUSG00000017264 | 0 | 3 | 2 Exosc10       | protein_coding       |
| ENSMUSG00000063696 | 0 | 3 | 2 Gm8730        | protein_coding       |
| ENSMUSG00000001930 | 0 | 3 | 0 Vwf           | protein_coding       |
| ENSMUSG00000022021 | 0 | 3 | 0 Diaph3        | protein_coding       |
| ENSMUSG00000028410 | 0 | 3 | 0 Dnaja1        | protein_coding       |
| ENSMUSG00000042854 | 0 | 3 | 0 Trp53rkb      | protein_coding       |
| ENSMUSG00000048755 | 0 | 3 | 0 Mcat          | protein_coding       |
| ENSMUSG00000066807 | 0 | 3 | 0 Gm10179       | pseudogene           |
| ENSMUSG00000078700 | 0 | 3 | 0 D030028A08Rik | processed_transcript |
| ENSMUSG00000080798 | 0 | 3 | 0 Gm5135        | processed_pseudogene |
| ENSMUSG00000080966 | 0 | 3 | 0 Gm6263        | processed_pseudogene |
| ENSMUSG00000083443 | 0 | 3 | 0 Gm15519       | processed_pseudogene |
| ENSMUSG00000085678 | 0 | 3 | 0 Gm16349       | processed_transcript |
| ENSMUSG00000045999 | 0 | 3 | 85              | TEC                  |
| ENSMUSG00000032959 | 0 | 3 | 56 Pebp1        | protein_coding       |
| ENSMUSG00000022285 | 0 | 3 | 24 Ywhaz        | protein_coding       |
| ENSMUSG00000091421 | 0 | 3 | 24 Gm4202       | processed_pseudogene |
| ENSMUSG00000093149 | 0 | 3 | 10 Gm23374      | miRNA                |
| ENSMUSG00000093152 | 0 | 3 | 10 Gm25032      | miRNA                |
| ENSMUSG00000035545 | 0 | 3 | 6 Leng8         | protein_coding       |
| ENSMUSG00000008763 | 0 | 2 | 14 Man1a2       | protein_coding       |
| ENSMUSG00000044167 | 0 | 2 | 14 Foxo1        | protein_coding       |
| ENSMUSG00000082044 | 0 | 2 | 14 Snrprt       | processed_pseudogene |
| ENSMUSG00000081729 | 0 | 2 | 12 Hspa9-ps1    | processed_pseudogene |
| ENSMUSG00000082570 | 0 | 2 | 8 Gm15711       | processed_pseudogene |
| ENSMUSG00000091083 | 0 | 2 | 8 Gm4535        | processed_pseudogene |
| ENSMUSG00000029502 | 0 | 2 | 6 Golga3        | protein_coding       |
| ENSMUSG00000029754 | 0 | 2 | 6 Dlx6          | protein_coding       |
| ENSMUSG00000030180 | 0 | 2 | 6 Kdm5a         | protein_coding       |
| ENSMUSG00000057841 | 0 | 2 | 6 Rpl32         | protein_coding       |
| ENSMUSG00000084145 | 0 | 2 | 6 Gm12263       | processed_pseudogene |
| ENSMUSG00000064397 | 0 | 1 | 57 Gm23624      | misc_RNA             |
| ENSMUSG00000064686 | 0 | 1 | 52 Gm25810      | snRNA                |
| ENSMUSG00000064626 | 0 | 1 | 48 Gm22306      | snRNA                |
| ENSMUSG00000064659 | 0 | 1 | 46 Gm26131      | snRNA                |
| ENSMUSG00000070203 | 0 | 1 | 46 Gm22444      | snRNA                |
| ENSMUSG00000096738 | 0 | 1 | 46 Gm24317      | snRNA                |
| ENSMUSG00000064616 | 0 | 1 | 44 Gm26454      | snRNA                |



|                    |   |   |             |                      |
|--------------------|---|---|-------------|----------------------|
| ENSMUSG00000075833 | 0 | 1 | 44 Gm22003  | snRNA                |
| ENSMUSG00000093902 | 0 | 1 | 44 Gm25021  | snRNA                |
| ENSMUSG00000022774 | 0 | 1 | 42 Ncbp2    | protein_coding       |
| ENSMUSG00000064460 | 0 | 1 | 38 Gm25080  | snRNA                |
| ENSMUSG00000096238 | 0 | 1 | 38 Gm22583  | snRNA                |
| ENSMUSG00000064822 | 0 | 1 | 34 Gm24292  | snRNA                |
| ENSMUSG00000065291 | 0 | 1 | 34 Gm26125  | snRNA                |
| ENSMUSG00000065380 | 0 | 1 | 34 Gm23095  | snRNA                |
| ENSMUSG00000095016 | 0 | 1 | 34 Gm26285  | snRNA                |
| ENSMUSG00000096598 | 0 | 1 | 34 Gm26239  | snRNA                |
| ENSMUSG00000065869 | 0 | 1 | 32 Gm24917  | snRNA                |
| ENSMUSG00000093932 | 0 | 1 | 32 Gm25525  | snRNA                |
| ENSMUSG00000064446 | 0 | 1 | 30 Gm26228  | snRNA                |
| ENSMUSG00000094275 | 0 | 1 | 26 Gm22290  | snRNA                |
| ENSMUSG00000034462 | 0 | 1 | 20 Pkd2     | protein_coding       |
| ENSMUSG00000043998 | 0 | 1 | 20 Mgat2    | protein_coding       |
| ENSMUSG00000064818 | 0 | 1 | 20 Gm22359  | snRNA                |
| ENSMUSG00000093283 | 0 | 1 | 18 Gm22567  | misc_RNA             |
| ENSMUSG00000013787 | 0 | 1 | 16 Ehmt2    | protein_coding       |
| ENSMUSG00000006784 | 0 | 1 | 14 Ttc25    | protein_coding       |
| ENSMUSG00000024769 | 0 | 1 | 14 Cdc42bpg | protein_coding       |
| ENSMUSG00000064566 | 0 | 1 | 14 Gm24144  | snRNA                |
| ENSMUSG00000018189 | 0 | 1 | 8 Uchl5     | protein_coding       |
| ENSMUSG00000026803 | 0 | 1 | 8 Ttf1      | protein_coding       |
| ENSMUSG00000031232 | 0 | 1 | 8 Magt1     | protein_coding       |
| ENSMUSG00000057722 | 0 | 1 | 8 Lepr      | protein_coding       |
| ENSMUSG00000009555 | 0 | 1 | 6 Cdk9      | protein_coding       |
| ENSMUSG00000032604 | 0 | 1 | 6 Qars      | protein_coding       |
| ENSMUSG00000091542 | 0 | 1 | 240 Gm17167 | processed_transcript |
| ENSMUSG00000084581 | 0 | 1 | 149 Gm25179 | snRNA                |
| ENSMUSG00000009070 | 0 | 1 | 127 Rsph14  | protein_coding       |
| ENSMUSG00000020706 | 0 | 1 | 113 Ftsj3   | protein_coding       |
| ENSMUSG00000084589 | 0 | 1 | 103 Gm25176 | snRNA                |
| ENSMUSG00000064419 | 0 | 1 | 95 Gm22249  | snRNA                |
| ENSMUSG00000084665 | 0 | 1 | 95 Gm23214  | snRNA                |
| ENSMUSG00000084703 | 0 | 1 | 95 Gm22985  | snRNA                |
| ENSMUSG00000020734 | 0 | 1 | 85 Grin2c   | protein_coding       |
| ENSMUSG00000082013 | 0 | 1 | 77 Gm13216  | processed_pseudogene |
| ENSMUSG00000103823 | 0 | 1 | 65 Gm7899   | processed_pseudogene |
| ENSMUSG00000053877 | 0 | 1 | 50 Srcap    | protein_coding       |
| ENSMUSG00000088498 | 0 | 1 | 38 Gm24402  | snRNA                |
| ENSMUSG00000033845 | 0 | 1 | 32 Mrpl15   | protein_coding       |
| ENSMUSG00000053286 | 0 | 1 | 32 Trmt11   | protein_coding       |
| ENSMUSG00000065165 | 0 | 1 | 30 Gm23815  | snRNA                |
| ENSMUSG00000096030 | 0 | 1 | 30 Gm24424  | snRNA                |
| ENSMUSG00000064831 | 0 | 1 | 28 Gm25698  | snRNA                |
| ENSMUSG00000065164 | 0 | 1 | 28 Gm23814  | snRNA                |
| ENSMUSG00000088402 | 0 | 1 | 28 Gm25887  | snRNA                |
| ENSMUSG00000096163 | 0 | 1 | 28 Gm24142  | snRNA                |

|                     |   |   |             |                      |
|---------------------|---|---|-------------|----------------------|
| ENSMUSG00000003812  | 0 | 1 | 26 Dnase2a  | protein_coding       |
| ENSMUSG00000077403  | 0 | 1 | 26 Gm25419  | snoRNA               |
| ENSMUSG000000087875 | 0 | 1 | 26 Gm26104  | snRNA                |
| ENSMUSG000000095052 | 0 | 1 | 26 Gm25672  | snRNA                |
| ENSMUSG000000095142 | 0 | 1 | 26 Gm24389  | snRNA                |
| ENSMUSG000000095712 | 0 | 1 | 26 Gm26465  | snRNA                |
| ENSMUSG000000096434 | 0 | 1 | 26 Gm22129  | snRNA                |
| ENSMUSG000000096790 | 0 | 1 | 26 Gm22995  | snRNA                |
| ENSMUSG00000013833  | 0 | 1 | 24 Med16    | protein_coding       |
| ENSMUSG00000024548  | 0 | 1 | 24 Setbp1   | protein_coding       |
| ENSMUSG00000065872  | 0 | 1 | 24 Gm25681  | snRNA                |
| ENSMUSG00000015733  | 0 | 1 | 22 Capza2   | protein_coding       |
| ENSMUSG00000065239  | 0 | 1 | 22 Gm22971  | snRNA                |
| ENSMUSG00000070175  | 0 | 1 | 22 Gm24162  | snRNA                |
| ENSMUSG000000093875 | 0 | 1 | 22 Gm24538  | snRNA                |
| ENSMUSG00000094730  | 0 | 1 | 22 Gm26178  | snRNA                |
| ENSMUSG00000002055  | 0 | 1 | 20 Spag5    | protein_coding       |
| ENSMUSG00000006412  | 0 | 1 | 20 Pfdn2    | protein_coding       |
| ENSMUSG00000039069  | 0 | 1 | 20 Mtg2     | protein_coding       |
| ENSMUSG00000058006  | 0 | 1 | 20 Mdn1     | protein_coding       |
| ENSMUSG00000084506  | 0 | 1 | 20 Gm23792  | snRNA                |
| ENSMUSG00000024773  | 0 | 1 | 18 Atg2a    | protein_coding       |
| ENSMUSG00000030304  | 0 | 1 | 18 Ergic2   | protein_coding       |
| ENSMUSG00000027245  | 0 | 1 | 16 Hypk     | protein_coding       |
| ENSMUSG00000064719  | 0 | 1 | 16 Gm25930  | snRNA                |
| ENSMUSG00000067873  | 0 | 1 | 16 Htatsf1  | protein_coding       |
| ENSMUSG00000095396  | 0 | 1 | 16 Gm25618  | snRNA                |
| ENSMUSG00000095482  | 0 | 1 | 16 Gm25739  | snRNA                |
| ENSMUSG00000005871  | 0 | 1 | 14 Apc      | protein_coding       |
| ENSMUSG00000017747  | 0 | 1 | 14 Ghdc     | protein_coding       |
| ENSMUSG00000018707  | 0 | 1 | 14 Dync1h1  | protein_coding       |
| ENSMUSG00000020328  | 0 | 1 | 14 Nudcd2   | protein_coding       |
| ENSMUSG00000062585  | 0 | 1 | 14 Cnr2     | protein_coding       |
| ENSMUSG00000064715  | 0 | 1 | 14 Gm24207  | snRNA                |
| ENSMUSG00000065373  | 0 | 1 | 14 Gm22740  | snRNA                |
| ENSMUSG00000089199  | 0 | 1 | 14 Gm25772  | snRNA                |
| ENSMUSG00000096310  | 0 | 1 | 14 Gm23523  | snRNA                |
| ENSMUSG00000026335  | 0 | 1 | 12 Pam      | protein_coding       |
| ENSMUSG00000039756  | 0 | 1 | 12 Dnttip2  | protein_coding       |
| ENSMUSG00000057561  | 0 | 1 | 12 Eif1a    | protein_coding       |
| ENSMUSG00000065936  | 0 | 1 | 12 Gm25628  | snRNA                |
| ENSMUSG00000073792  | 0 | 1 | 12 Alg6     | protein_coding       |
| ENSMUSG00000094551  | 0 | 1 | 12 Gm22392  | snRNA                |
| ENSMUSG00000029659  | 0 | 1 | 10 Medag    | protein_coding       |
| ENSMUSG00000037636  | 0 | 1 | 10 Slc25a43 | protein_coding       |
| ENSMUSG00000060036  | 0 | 1 | 10 Rpl3     | protein_coding       |
| ENSMUSG00000064443  | 0 | 1 | 10 Gm26226  | snRNA                |
| ENSMUSG00000065657  | 0 | 1 | 10 Gm25337  | snRNA                |
| ENSMUSG00000082200  | 0 | 1 | 10 Gm12871  | processed_pseudogene |

|                    |   |   |                    |                                    |
|--------------------|---|---|--------------------|------------------------------------|
| ENSMUSG00000083011 | 0 | 1 | 10 Gm12816         | processed_pseudogene               |
| ENSMUSG00000084131 | 0 | 1 | 10 Rpl3-ps2        | processed_pseudogene               |
| ENSMUSG00000084349 | 0 | 1 | 10 Rpl3-ps1        | processed_pseudogene               |
| ENSMUSG00000084454 | 0 | 1 | 10 Gm24592         | snRNA                              |
| ENSMUSG00000096731 | 0 | 1 | 10 Gm24316         | snRNA                              |
| ENSMUSG00000103286 | 0 | 1 | 10 Gm5850          | processed_pseudogene               |
| ENSMUSG00000104028 | 0 | 1 | 10 Gm5851          | processed_pseudogene               |
| ENSMUSG00000011751 | 0 | 1 | 8 Sptbn4           | protein_coding                     |
| ENSMUSG00000032409 | 0 | 1 | 8 Atr              | protein_coding                     |
| ENSMUSG00000047676 | 0 | 1 | 8 Rpsa-ps10        | protein_coding                     |
| ENSMUSG00000064779 | 0 | 1 | 8 Gm22997          | snRNA                              |
| ENSMUSG00000090258 | 0 | 1 | 8 Churc1           | protein_coding                     |
| ENSMUSG00000094440 | 0 | 1 | 8 Gm25453          | snRNA                              |
| ENSMUSG00000004626 | 0 | 1 | 6 Stxbp2           | protein_coding                     |
| ENSMUSG00000014776 | 0 | 1 | 6 Nol3             | protein_coding                     |
| ENSMUSG00000021282 | 0 | 1 | 6 Eif5             | protein_coding                     |
| ENSMUSG00000023826 | 0 | 1 | 6 Park2            | protein_coding                     |
| ENSMUSG00000029076 | 0 | 1 | 6 Sdf4             | protein_coding                     |
| ENSMUSG00000031534 | 0 | 1 | 6 Smim19           | protein_coding                     |
| ENSMUSG00000032413 | 0 | 1 | 6 Rasa2            | protein_coding                     |
| ENSMUSG00000053930 | 0 | 1 | 6 Shisa6           | protein_coding                     |
| ENSMUSG00000064972 | 0 | 1 | 6 Gm26055          | snRNA                              |
| ENSMUSG00000065622 | 0 | 1 | 6 Gm24763          | snRNA                              |
| ENSMUSG00000067235 | 0 | 1 | 6 H2-Q10           | protein_coding                     |
| ENSMUSG00000082204 | 0 | 1 | 6 Gm7722           | unprocessed_pseudogene             |
| ENSMUSG00000088293 | 0 | 1 | 6 Gm26411          | snRNA                              |
| ENSMUSG00000090877 | 0 | 1 | 6 Hspa1b           | protein_coding                     |
| ENSMUSG00000091971 | 0 | 1 | 6 Hspa1a           | protein_coding                     |
| ENSMUSG00000101625 | 0 | 1 | 6 Gm29371          | lincRNA                            |
| ENSMUSG00000075015 | 0 | 0 | 55737 Gm10801      | protein_coding                     |
| ENSMUSG00000095891 | 0 | 0 | 37974 Gm10717      | protein_coding                     |
| ENSMUSG00000095547 | 0 | 0 | 23752 Gm10719      | protein_coding                     |
| ENSMUSG00000096385 | 0 | 0 | 18698 Gm11168      | protein_coding                     |
| ENSMUSG00000095280 | 0 | 0 | 16872 Gm21738      | protein_coding                     |
| ENSMUSG00000097312 | 0 | 0 | 14545 Gm26870      | lincRNA                            |
| ENSMUSG00000095186 | 0 | 0 | 13290 Gm10718      | protein_coding                     |
| ENSMUSG00000096519 | 0 | 0 | 12041 Gm10721      | protein_coding                     |
| ENSMUSG00000072952 | 0 | 0 | 9011 Gm5878        | protein_coding                     |
| ENSMUSG00000091028 | 0 | 0 | 8571 Gm10722       | protein_coding                     |
| ENSMUSG00000074564 | 0 | 0 | 8478 Gm10720       | protein_coding                     |
| ENSMUSG00000086788 | 0 | 0 | 8232 1700029M20Rik | lincRNA                            |
| ENSMUSG00000096736 | 0 | 0 | 7734 Gm17535       | protein_coding                     |
| ENSMUSG00000096201 | 0 | 0 | 6900 Gm10715       | protein_coding                     |
| ENSMUSG00000074067 | 0 | 0 | 5444 Gm10619       | lincRNA                            |
| ENSMUSG00000027973 | 0 | 0 | 4027 1700006A11Rik | protein_coding                     |
| ENSMUSG00000087162 | 0 | 0 | 1380 Gm14244       | antisense                          |
| ENSMUSG00000073430 | 0 | 0 | 1138 Gm10505       | lincRNA                            |
| ENSMUSG00000087044 | 0 | 0 | 1007 1700042G15Rik | lincRNA                            |
| ENSMUSG00000023795 | 0 | 0 | 523 Pisd-ps2       | transcribed_unprocessed_pseudogene |

|                    |   |   |                   |                        |
|--------------------|---|---|-------------------|------------------------|
| ENSMUSG00000082396 | 0 | 0 | 496 Zfp389        | processed_pseudogene   |
| ENSMUSG00000100253 | 0 | 0 | 478 1700020N18Rik | lincRNA                |
| ENSMUSG00000016921 | 0 | 0 | 428 Srsf6         | protein_coding         |
| ENSMUSG00000080860 | 0 | 0 | 399 Gm13815       | processed_pseudogene   |
| ENSMUSG00000029407 | 0 | 0 | 377 Uso1          | protein_coding         |
| ENSMUSG00000097519 | 0 | 0 | 335 4930558J18Rik | lincRNA                |
| ENSMUSG00000063870 | 0 | 0 | 333 Chd4          | protein_coding         |
| ENSMUSG00000086796 | 0 | 0 | 252 4932702P03Rik | antisense              |
| ENSMUSG00000083929 | 0 | 0 | 238 Gm10600       | protein_coding         |
| ENSMUSG00000044084 | 0 | 0 | 214 4933402P03Rik | protein_coding         |
| ENSMUSG00000095779 | 0 | 0 | 198 Gm2163        | protein_coding         |
| ENSMUSG00000026482 | 0 | 0 | 194 Rgl1          | protein_coding         |
| ENSMUSG00000082658 | 0 | 0 | 194 Fau-ps2       | processed_pseudogene   |
| ENSMUSG00000095258 | 0 | 0 | 190 Gm10593       | antisense              |
| ENSMUSG00000095348 | 0 | 0 | 190 Gm3892        | antisense              |
| ENSMUSG00000001506 | 0 | 0 | 184 Colla1        | protein_coding         |
| ENSMUSG00000045954 | 0 | 0 | 184 Sdpr          | protein_coding         |
| ENSMUSG00000093909 | 0 | 0 | 184 Gm3883        | unprocessed_pseudogene |
| ENSMUSG00000073879 | 0 | 0 | 178 Gm5859        | unprocessed_pseudogene |
| ENSMUSG00000022214 | 0 | 0 | 169 Dcaf11        | protein_coding         |
| ENSMUSG00000080935 | 0 | 0 | 169 Got2-ps1      | processed_pseudogene   |
| ENSMUSG00000082962 | 0 | 0 | 157 Gm10601       | unprocessed_pseudogene |
| ENSMUSG00000078721 | 0 | 0 | 145 Fam205a1      | protein_coding         |
| ENSMUSG00000078746 | 0 | 0 | 145 Fam205a4      | protein_coding         |
| ENSMUSG00000093996 | 0 | 0 | 145 Fam205a3      | protein_coding         |
| ENSMUSG00000094066 | 0 | 0 | 145 Fam205a2      | protein_coding         |
| ENSMUSG00000094293 | 0 | 0 | 139 Gm3893        | protein_coding         |
| ENSMUSG00000025395 | 0 | 0 | 133 Prim1         | protein_coding         |
| ENSMUSG00000033174 | 0 | 0 | 133 Mgl1          | protein_coding         |
| ENSMUSG00000073411 | 0 | 0 | 133 H2-D1         | protein_coding         |
| ENSMUSG00000069833 | 0 | 0 | 127 Ahnak         | protein_coding         |
| ENSMUSG00000087609 | 0 | 0 | 127 4930442J19Rik | lincRNA                |
| ENSMUSG00000087495 | 0 | 0 | 119 Gm14152       | lincRNA                |
| ENSMUSG00000021048 | 0 | 0 | 109 Mthfd1        | protein_coding         |
| ENSMUSG00000022037 | 0 | 0 | 105 Clu           | protein_coding         |
| ENSMUSG00000101012 | 0 | 0 | 99 1700008K24Rik  | lincRNA                |
| ENSMUSG00000051732 | 0 | 0 | 95 Pabpc2         | protein_coding         |
| ENSMUSG00000036533 | 0 | 0 | 91 Cdc42ep3       | protein_coding         |
| ENSMUSG00000086078 | 0 | 0 | 91 Gm11657        | antisense              |
| ENSMUSG00000020585 | 0 | 0 | 89 Laptm4a        | protein_coding         |
| ENSMUSG00000087337 | 0 | 0 | 89 Gm14144        | lincRNA                |
| ENSMUSG00000103542 | 0 | 0 | 89 Gm34768        | unprocessed_pseudogene |
| ENSMUSG00000020571 | 0 | 0 | 87 Pdia6          | protein_coding         |
| ENSMUSG00000024044 | 0 | 0 | 87 Epb4113        | protein_coding         |
| ENSMUSG00000042082 | 0 | 0 | 87 Arsb           | protein_coding         |
| ENSMUSG00000001211 | 0 | 0 | 85 Agpat3         | protein_coding         |
| ENSMUSG00000020368 | 0 | 0 | 85 Canx           | protein_coding         |
| ENSMUSG00000073725 | 0 | 0 | 85 Lmbrd1         | protein_coding         |
| ENSMUSG00000011877 | 0 | 0 | 83 Git1           | protein_coding         |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUSG00000037062 | 0 | 0 | 83 Sh3glb1       | protein_coding         |
| ENSMUSG00000004980 | 0 | 0 | 79 Hnrnpa2b1     | protein_coding         |
| ENSMUSG00000024085 | 0 | 0 | 77 Man2a1        | protein_coding         |
| ENSMUSG00000031422 | 0 | 0 | 77 Morf4l2       | protein_coding         |
| ENSMUSG00000050592 | 0 | 0 | 77 Fam78a        | protein_coding         |
| ENSMUSG00000017707 | 0 | 0 | 75 Serinc3       | protein_coding         |
| ENSMUSG00000022286 | 0 | 0 | 75 Grhl2         | protein_coding         |
| ENSMUSG00000027006 | 0 | 0 | 75 Dnajc10       | protein_coding         |
| ENSMUSG00000091994 | 0 | 0 | 71 E130317F20Rik | processed_transcript   |
| ENSMUSG00000022019 | 0 | 0 | 69 Tdrd3         | protein_coding         |
| ENSMUSG00000038015 | 0 | 0 | 67 Prm2          | protein_coding         |
| ENSMUSG00000025151 | 0 | 0 | 65 Maged1        | protein_coding         |
| ENSMUSG00000025431 | 0 | 0 | 65 Crisp1        | protein_coding         |
| ENSMUSG00000039218 | 0 | 0 | 65 Srrm2         | protein_coding         |
| ENSMUSG00000072983 | 0 | 0 | 65 4933414I15Rik | protein_coding         |
| ENSMUSG00000026926 | 0 | 0 | 63 Pmpca         | protein_coding         |
| ENSMUSG00000071074 | 0 | 0 | 63 Yipf3         | protein_coding         |
| ENSMUSG00000021670 | 0 | 0 | 57 Hmger         | protein_coding         |
| ENSMUSG00000043140 | 0 | 0 | 57 Tmem186       | protein_coding         |
| ENSMUSG00000053091 | 0 | 0 | 57 Lins1         | protein_coding         |
| ENSMUSG00000062110 | 0 | 0 | 57 Scfd2         | protein_coding         |
| ENSMUSG00000084010 | 0 | 0 | 57 Gm13302       | unprocessed_pseudogene |
| ENSMUSG00000092274 | 0 | 0 | 57 Neat1         | lincRNA                |
| ENSMUSG00000029661 | 0 | 0 | 56 Colla2        | protein_coding         |
| ENSMUSG00000073471 | 0 | 0 | 56 Rsph3a        | protein_coding         |
| ENSMUSG00000089715 | 0 | 0 | 56 Cbx6          | protein_coding         |
| ENSMUSG00000100747 | 0 | 0 | 54 1700084E18Rik | antisense              |
| ENSMUSG00000027808 | 0 | 0 | 52 Serp1         | protein_coding         |
| ENSMUSG00000047604 | 0 | 0 | 52 Frat2         | protein_coding         |
| ENSMUSG00000051067 | 0 | 0 | 52 Lingo3        | protein_coding         |
| ENSMUSG00000017843 | 0 | 0 | 50 Ppp2r5c       | protein_coding         |
| ENSMUSG00000078722 | 0 | 0 | 50 Gm12394       | protein_coding         |
| ENSMUSG00000104126 | 0 | 0 | 50 Gm37486       | processed_pseudogene   |
| ENSMUSG00000020520 | 0 | 0 | 48 Galnt10       | protein_coding         |
| ENSMUSG00000028998 | 0 | 0 | 48 Tomm7         | protein_coding         |
| ENSMUSG00000018559 | 0 | 0 | 46 Ctdnep1       | protein_coding         |
| ENSMUSG00000024308 | 0 | 0 | 46 Tapbp         | protein_coding         |
| ENSMUSG00000071661 | 0 | 0 | 46 Zbtb3         | protein_coding         |
| ENSMUSG00000082414 | 0 | 0 | 46 Gm13303       | unprocessed_pseudogene |
| ENSMUSG00000020372 | 0 | 0 | 44 Rack1         | protein_coding         |
| ENSMUSG00000021003 | 0 | 0 | 44 Galc          | protein_coding         |
| ENSMUSG00000021957 | 0 | 0 | 44 Tkt           | protein_coding         |
| ENSMUSG00000037012 | 0 | 0 | 44 Hk1           | protein_coding         |
| ENSMUSG00000045854 | 0 | 0 | 44 Lymr2         | protein_coding         |
| ENSMUSG00000058690 | 0 | 0 | 44 Ccser2        | protein_coding         |
| ENSMUSG00000074039 | 0 | 0 | 44 4930520O04Rik | processed_transcript   |
| ENSMUSG00000082575 | 0 | 0 | 44 Gm13050       | processed_pseudogene   |
| ENSMUSG00000014177 | 0 | 0 | 42 Tvp23b        | protein_coding         |
| ENSMUSG00000032978 | 0 | 0 | 42 Guca2b        | protein_coding         |

|                    |   |   |                  |                                  |
|--------------------|---|---|------------------|----------------------------------|
| ENSMUSG00000063415 | 0 | 0 | 42 Cyp26b1       | protein_coding                   |
| ENSMUSG00000001435 | 0 | 0 | 40 Col18a1       | protein_coding                   |
| ENSMUSG00000008822 | 0 | 0 | 40 Acyp1         | protein_coding                   |
| ENSMUSG00000025159 | 0 | 0 | 40 Mms19         | protein_coding                   |
| ENSMUSG00000027523 | 0 | 0 | 40 Gnas          | protein_coding                   |
| ENSMUSG00000046798 | 0 | 0 | 40 Cldn12        | protein_coding                   |
| ENSMUSG00000064394 | 0 | 0 | 40 Gm23622       | snRNA                            |
| ENSMUSG00000080540 | 0 | 0 | 40 Gm22711       | snoRNA                           |
| ENSMUSG00000002660 | 0 | 0 | 38 Clpp          | protein_coding                   |
| ENSMUSG00000015090 | 0 | 0 | 38 Ptgds         | protein_coding                   |
| ENSMUSG00000020033 | 0 | 0 | 38 4930463O16Rik | lincRNA                          |
| ENSMUSG00000022150 | 0 | 0 | 38 Dab2          | protein_coding                   |
| ENSMUSG00000028551 | 0 | 0 | 38 Cdkn2c        | protein_coding                   |
| ENSMUSG00000029419 | 0 | 0 | 38 Gm996         | protein_coding                   |
| ENSMUSG00000039741 | 0 | 0 | 38 Bahcc1        | protein_coding                   |
| ENSMUSG00000040423 | 0 | 0 | 38 Rc3h1         | protein_coding                   |
| ENSMUSG00000043050 | 0 | 0 | 38 Tnp2          | protein_coding                   |
| ENSMUSG00000052912 | 0 | 0 | 38 Smarca5-ps    | transcribed_processed_pseudogene |
| ENSMUSG00000064971 | 0 | 0 | 38 Gm26054       | snRNA                            |
| ENSMUSG00000081179 | 0 | 0 | 38 Gm13136       | processed_pseudogene             |
| ENSMUSG00000082820 | 0 | 0 | 38 Gm13803       | processed_pseudogene             |
| ENSMUSG00000083027 | 0 | 0 | 38 Gm13140       | processed_pseudogene             |
| ENSMUSG00000089829 | 0 | 0 | 38 Gm16565       | processed_transcript             |
| ENSMUSG00000096851 | 0 | 0 | 38 Gm22756       | snRNA                            |
| ENSMUSG00000007891 | 0 | 0 | 36 Ctsd          | protein_coding                   |
| ENSMUSG00000016487 | 0 | 0 | 36 Ppfibp1       | protein_coding                   |
| ENSMUSG00000021767 | 0 | 0 | 36 Kat6b         | protein_coding                   |
| ENSMUSG00000022827 | 0 | 0 | 36 Rabl3         | protein_coding                   |
| ENSMUSG00000026930 | 0 | 0 | 36 Gpsm1         | protein_coding                   |
| ENSMUSG00000028173 | 0 | 0 | 36 Wls           | protein_coding                   |
| ENSMUSG00000038467 | 0 | 0 | 36 Chmp4b        | protein_coding                   |
| ENSMUSG00000050106 | 0 | 0 | 36 Tmc8          | protein_coding                   |
| ENSMUSG00000053565 | 0 | 0 | 36 Eif3k         | protein_coding                   |
| ENSMUSG00000056050 | 0 | 0 | 36 Mia3          | protein_coding                   |
| ENSMUSG00000065732 | 0 | 0 | 36 Gm24492       | snRNA                            |
| ENSMUSG00000085279 | 0 | 0 | 36 Gm15965       | antisense                        |
| ENSMUSG00000089916 | 0 | 0 | 36 Gm16160       | lincRNA                          |
| ENSMUSG00000006333 | 0 | 0 | 34 Rps9          | protein_coding                   |
| ENSMUSG00000014956 | 0 | 0 | 34 Ppp1cb        | protein_coding                   |
| ENSMUSG00000020900 | 0 | 0 | 34 Myh10         | protein_coding                   |
| ENSMUSG00000023930 | 0 | 0 | 34 Crisp2        | protein_coding                   |
| ENSMUSG00000072791 | 0 | 0 | 34 Abcb5         | protein_coding                   |
| ENSMUSG00000078653 | 0 | 0 | 34 Cntd1         | protein_coding                   |
| ENSMUSG00000082195 | 0 | 0 | 34 Gm13034       | processed_pseudogene             |
| ENSMUSG00000096256 | 0 | 0 | 34 Gm21093       | protein_coding                   |
| ENSMUSG00000005779 | 0 | 0 | 32 Psmb4         | protein_coding                   |
| ENSMUSG00000020594 | 0 | 0 | 32 Pum2          | protein_coding                   |
| ENSMUSG00000022752 | 0 | 0 | 32 Tomm70a       | protein_coding                   |
| ENSMUSG00000025809 | 0 | 0 | 32 Itgb1         | protein_coding                   |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUSG00000025876 | 0 | 0 | 32 Unc5a         | protein_coding       |
| ENSMUSG00000026790 | 0 | 0 | 32 Odf2          | protein_coding       |
| ENSMUSG00000029090 | 0 | 0 | 32 Adgra3        | protein_coding       |
| ENSMUSG00000029427 | 0 | 0 | 32 Zcchc8        | protein_coding       |
| ENSMUSG00000034708 | 0 | 0 | 32 Grn           | protein_coding       |
| ENSMUSG00000043487 | 0 | 0 | 32 Acot6         | protein_coding       |
| ENSMUSG00000052337 | 0 | 0 | 32 Immt          | protein_coding       |
| ENSMUSG00000052727 | 0 | 0 | 32 Map1b         | protein_coding       |
| ENSMUSG00000065798 | 0 | 0 | 32 Gm25518       | snRNA                |
| ENSMUSG00000096124 | 0 | 0 | 32 Gm22308       | snRNA                |
| ENSMUSG00000096241 | 0 | 0 | 32 Gm24267       | snRNA                |
| ENSMUSG00000104237 | 0 | 0 | 32 Gm33533       | lincRNA              |
| ENSMUSG00000003421 | 0 | 0 | 30 Nosip         | protein_coding       |
| ENSMUSG00000020186 | 0 | 0 | 30 Csrp2         | protein_coding       |
| ENSMUSG00000021264 | 0 | 0 | 30 Yy1           | protein_coding       |
| ENSMUSG00000025130 | 0 | 0 | 30 P4hb          | protein_coding       |
| ENSMUSG00000025917 | 0 | 0 | 30 Cops5         | protein_coding       |
| ENSMUSG00000028141 | 0 | 0 | 30 Oaz3          | protein_coding       |
| ENSMUSG00000040204 | 0 | 0 | 30 2810417H13Rik | protein_coding       |
| ENSMUSG00000054400 | 0 | 0 | 30 Cklf          | protein_coding       |
| ENSMUSG00000070249 | 0 | 0 | 30 Gm23520       | snRNA                |
| ENSMUSG00000083772 | 0 | 0 | 30 Gm15566       | processed_pseudogene |
| ENSMUSG00000017466 | 0 | 0 | 28 Timp2         | protein_coding       |
| ENSMUSG00000019818 | 0 | 0 | 28 Cd164         | protein_coding       |
| ENSMUSG00000026878 | 0 | 0 | 28 Rab14         | protein_coding       |
| ENSMUSG00000028179 | 0 | 0 | 28 Cth           | protein_coding       |
| ENSMUSG00000031556 | 0 | 0 | 28 Tm2d2         | protein_coding       |
| ENSMUSG00000033931 | 0 | 0 | 28 Rbm34         | protein_coding       |
| ENSMUSG00000040128 | 0 | 0 | 28 Pnrc1         | protein_coding       |
| ENSMUSG00000045983 | 0 | 0 | 28 Eif4g1        | protein_coding       |
| ENSMUSG00000053846 | 0 | 0 | 28 Lipg          | protein_coding       |
| ENSMUSG00000063450 | 0 | 0 | 28 Syne2         | protein_coding       |
| ENSMUSG00000065327 | 0 | 0 | 28 Gm22058       | misc_RNA             |
| ENSMUSG00000089763 | 0 | 0 | 28 Gm2635        | processed_pseudogene |
| ENSMUSG00000016024 | 0 | 0 | 26 Lbp           | protein_coding       |
| ENSMUSG00000020483 | 0 | 0 | 26 Dynll2        | protein_coding       |
| ENSMUSG00000023266 | 0 | 0 | 26 Frs3          | protein_coding       |
| ENSMUSG00000023923 | 0 | 0 | 26 Tbc1d5        | protein_coding       |
| ENSMUSG00000030588 | 0 | 0 | 26 Yif1b         | protein_coding       |
| ENSMUSG00000030960 | 0 | 0 | 26 Mettl10       | protein_coding       |
| ENSMUSG00000031258 | 0 | 0 | 26 Xkrx          | protein_coding       |
| ENSMUSG00000034781 | 0 | 0 | 26 Gna11         | protein_coding       |
| ENSMUSG00000044147 | 0 | 0 | 26 Arf6          | protein_coding       |
| ENSMUSG00000062859 | 0 | 0 | 26 Tcp11         | protein_coding       |
| ENSMUSG00000064387 | 0 | 0 | 26 Snora73a      | snoRNA               |
| ENSMUSG00000064632 | 0 | 0 | 26 Gm25142       | snRNA                |
| ENSMUSG00000065237 | 0 | 0 | 26 Gm22975       | snRNA                |
| ENSMUSG00000075102 | 0 | 0 | 26 Olfr1221      | protein_coding       |
| ENSMUSG00000078630 | 0 | 0 | 26 Tomt          | protein_coding       |

|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUSG00000094489 | 0 | 0 | 26 Gm23269       | snRNA                              |
| ENSMUSG00000102526 | 0 | 0 | 26 Gm37785       | TEC                                |
| ENSMUSG00000001948 | 0 | 0 | 24 Spa17         | protein_coding                     |
| ENSMUSG00000004032 | 0 | 0 | 24 Gstm5         | protein_coding                     |
| ENSMUSG00000006373 | 0 | 0 | 24 Pgrmc1        | protein_coding                     |
| ENSMUSG00000007653 | 0 | 0 | 24 Gabrb2        | protein_coding                     |
| ENSMUSG00000020241 | 0 | 0 | 24 Col6a2        | protein_coding                     |
| ENSMUSG00000020649 | 0 | 0 | 24 Rrm2          | protein_coding                     |
| ENSMUSG00000020873 | 0 | 0 | 24 Slc35b1       | protein_coding                     |
| ENSMUSG00000024414 | 0 | 0 | 24 Mrpl27        | protein_coding                     |
| ENSMUSG00000026650 | 0 | 0 | 24 Meig1         | protein_coding                     |
| ENSMUSG00000027353 | 0 | 0 | 24 Mcm8          | protein_coding                     |
| ENSMUSG00000029163 | 0 | 0 | 24 Emilin1       | protein_coding                     |
| ENSMUSG00000029840 | 0 | 0 | 24 Mtpn          | protein_coding                     |
| ENSMUSG00000030815 | 0 | 0 | 24 Phkg2         | protein_coding                     |
| ENSMUSG00000031673 | 0 | 0 | 24 Cdh11         | protein_coding                     |
| ENSMUSG00000038383 | 0 | 0 | 24 Pigu          | protein_coding                     |
| ENSMUSG00000041544 | 0 | 0 | 24 Ptchd2        | protein_coding                     |
| ENSMUSG00000045427 | 0 | 0 | 24 Hnrnp2        | protein_coding                     |
| ENSMUSG00000045690 | 0 | 0 | 24 Wdr89         | protein_coding                     |
| ENSMUSG00000054452 | 0 | 0 | 24 Aes           | protein_coding                     |
| ENSMUSG00000065100 | 0 | 0 | 24 Gm26132       | snoRNA                             |
| ENSMUSG00000065721 | 0 | 0 | 24 Gm26168       | misc_RNA                           |
| ENSMUSG00000069769 | 0 | 0 | 24 Msi2          | protein_coding                     |
| ENSMUSG00000070167 | 0 | 0 | 24 Snora57       | snoRNA                             |
| ENSMUSG00000073647 | 0 | 0 | 24 Gm10557       | pseudogene                         |
| ENSMUSG00000093579 | 0 | 0 | 24 Gm20036       | processed_transcript               |
| ENSMUSG00000096862 | 0 | 0 | 24 Gm13301       | transcribed_unprocessed_pseudogene |
| ENSMUSG00000013523 | 0 | 0 | 22 Bcas1         | protein_coding                     |
| ENSMUSG00000015337 | 0 | 0 | 22 Endog         | protein_coding                     |
| ENSMUSG00000019254 | 0 | 0 | 22 Ppp1r12c      | protein_coding                     |
| ENSMUSG00000020183 | 0 | 0 | 22 Cpm           | protein_coding                     |
| ENSMUSG00000024772 | 0 | 0 | 22 Ehd1          | protein_coding                     |
| ENSMUSG00000026879 | 0 | 0 | 22 Gsn           | protein_coding                     |
| ENSMUSG00000029064 | 0 | 0 | 22 Gnb1          | protein_coding                     |
| ENSMUSG00000032548 | 0 | 0 | 22 Slco2a1       | protein_coding                     |
| ENSMUSG00000033916 | 0 | 0 | 22 Chmp2a        | protein_coding                     |
| ENSMUSG00000034453 | 0 | 0 | 22 Polr3b        | protein_coding                     |
| ENSMUSG00000035805 | 0 | 0 | 22 Mlc1          | protein_coding                     |
| ENSMUSG00000037253 | 0 | 0 | 22 Mex3c         | protein_coding                     |
| ENSMUSG00000039853 | 0 | 0 | 22 Trim14        | protein_coding                     |
| ENSMUSG00000040152 | 0 | 0 | 22 Thbs1         | protein_coding                     |
| ENSMUSG00000060126 | 0 | 0 | 22 Tpt1          | protein_coding                     |
| ENSMUSG00000063623 | 0 | 0 | 22 C230062I16Rik | protein_coding                     |
| ENSMUSG00000082179 | 0 | 0 | 22 Gm11407       | processed_pseudogene               |
| ENSMUSG00000084869 | 0 | 0 | 22 Gm13063       | lincRNA                            |
| ENSMUSG00000093930 | 0 | 0 | 22 Hmgcs1        | protein_coding                     |
| ENSMUSG00000002102 | 0 | 0 | 20 Psmc3         | protein_coding                     |
| ENSMUSG00000002718 | 0 | 0 | 20 Cse11         | protein_coding                     |



|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUSG00000006369 | 0 | 0 | 20 Fbln1         | protein_coding       |
| ENSMUSG00000010136 | 0 | 0 | 20 Pifo          | protein_coding       |
| ENSMUSG00000018339 | 0 | 0 | 20 Gpx3          | protein_coding       |
| ENSMUSG00000018677 | 0 | 0 | 20 Slc25a39      | protein_coding       |
| ENSMUSG00000023106 | 0 | 0 | 20 Denr          | protein_coding       |
| ENSMUSG00000025076 | 0 | 0 | 20 Casp7         | protein_coding       |
| ENSMUSG00000025142 | 0 | 0 | 20 Aspscr1       | protein_coding       |
| ENSMUSG00000025967 | 0 | 0 | 20 Eef1b2        | protein_coding       |
| ENSMUSG00000026246 | 0 | 0 | 20 Alpl2         | protein_coding       |
| ENSMUSG00000027534 | 0 | 0 | 20 Snx16         | protein_coding       |
| ENSMUSG00000027935 | 0 | 0 | 20 Rab13         | protein_coding       |
| ENSMUSG00000028412 | 0 | 0 | 20 Slc44a1       | protein_coding       |
| ENSMUSG00000031328 | 0 | 0 | 20 Flna          | protein_coding       |
| ENSMUSG00000031706 | 0 | 0 | 20 Rfx1          | protein_coding       |
| ENSMUSG00000031782 | 0 | 0 | 20 Coq9          | protein_coding       |
| ENSMUSG00000034075 | 0 | 0 | 20 Zdhhc5        | protein_coding       |
| ENSMUSG00000035413 | 0 | 0 | 20 Tmem98        | protein_coding       |
| ENSMUSG00000036211 | 0 | 0 | 20 Hist1h1t      | protein_coding       |
| ENSMUSG00000036923 | 0 | 0 | 20 Stox1         | protein_coding       |
| ENSMUSG00000037926 | 0 | 0 | 20 Ssh2          | protein_coding       |
| ENSMUSG00000046985 | 0 | 0 | 20 Tapt1         | protein_coding       |
| ENSMUSG00000048732 | 0 | 0 | 20 Klhl11        | protein_coding       |
| ENSMUSG00000055024 | 0 | 0 | 20 Ep300         | protein_coding       |
| ENSMUSG00000065705 | 0 | 0 | 20 Gm22829       | snRNA                |
| ENSMUSG00000068823 | 0 | 0 | 20 Csde1         | protein_coding       |
| ENSMUSG00000069713 | 0 | 0 | 20 4933406P04Rik | protein_coding       |
| ENSMUSG00000076609 | 0 | 0 | 20 Igkc          | IG_C_gene            |
| ENSMUSG00000081208 | 0 | 0 | 20 Gm11400       | processed_pseudogene |
| ENSMUSG00000083725 | 0 | 0 | 20 Gm11865       | processed_pseudogene |
| ENSMUSG00000084284 | 0 | 0 | 20 Tpt1-ps6      | processed_pseudogene |
| ENSMUSG00000084319 | 0 | 0 | 20 Tpt1-ps3      | processed_pseudogene |
| ENSMUSG00000084608 | 0 | 0 | 20 Gm22198       | misc_RNA             |
| ENSMUSG00000089911 | 0 | 0 | 20 Mfsd14a       | protein_coding       |
| ENSMUSG00000095059 | 0 | 0 | 20 Gm25670       | snRNA                |
| ENSMUSG00000096147 | 0 | 0 | 20 Gm25818       | snRNA                |
| ENSMUSG00000005251 | 0 | 0 | 18 Ripk4         | protein_coding       |
| ENSMUSG00000019834 | 0 | 0 | 18 Slc22a16      | protein_coding       |
| ENSMUSG00000025094 | 0 | 0 | 18 Slc18a2       | protein_coding       |
| ENSMUSG00000025868 | 0 | 0 | 18 Higd2a        | protein_coding       |
| ENSMUSG00000026289 | 0 | 0 | 18 Atg16l1       | protein_coding       |
| ENSMUSG00000027347 | 0 | 0 | 18 Rasgrp1       | protein_coding       |
| ENSMUSG00000029246 | 0 | 0 | 18 Ppat          | protein_coding       |
| ENSMUSG00000033487 | 0 | 0 | 18 Fndc3a        | protein_coding       |
| ENSMUSG00000035242 | 0 | 0 | 18 Oaz1          | protein_coding       |
| ENSMUSG00000035277 | 0 | 0 | 18 Arx           | protein_coding       |
| ENSMUSG00000042211 | 0 | 0 | 18 Fbxo38        | protein_coding       |
| ENSMUSG00000042353 | 0 | 0 | 18 Frem3         | protein_coding       |
| ENSMUSG00000050737 | 0 | 0 | 18 Ptges         | protein_coding       |
| ENSMUSG00000050910 | 0 | 0 | 18 Cdr2l         | protein_coding       |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUSG00000051723 | 0 | 0 | 18 Rpl31-ps13    | processed_pseudogene   |
| ENSMUSG00000055835 | 0 | 0 | 18 Zfp1          | protein_coding         |
| ENSMUSG00000059366 | 0 | 0 | 18 Olfr959       | protein_coding         |
| ENSMUSG00000062121 | 0 | 0 | 18 Olfr149       | protein_coding         |
| ENSMUSG00000062896 | 0 | 0 | 18 Rpl31-ps11    | processed_pseudogene   |
| ENSMUSG00000064692 | 0 | 0 | 18 Gm24151       | snoRNA                 |
| ENSMUSG00000070327 | 0 | 0 | 18 Rnf213        | protein_coding         |
| ENSMUSG00000070667 | 0 | 0 | 18 Rpl31-ps10    | processed_pseudogene   |
| ENSMUSG00000074647 | 0 | 0 | 18 Fam83c        | protein_coding         |
| ENSMUSG00000079144 | 0 | 0 | 18 A130010J15Rik | protein_coding         |
| ENSMUSG00000083192 | 0 | 0 | 18 Rpl31-ps12    | processed_pseudogene   |
| ENSMUSG00000084336 | 0 | 0 | 18 Olfr1267-ps1  | unprocessed_pseudogene |
| ENSMUSG00000084609 | 0 | 0 | 18 Gm22199       | misc_RNA               |
| ENSMUSG00000094191 | 0 | 0 | 18 Rpl31-ps14    | processed_pseudogene   |
| ENSMUSG00000097079 | 0 | 0 | 18 Gm26604       | lincRNA                |
| ENSMUSG00000097672 | 0 | 0 | 18 Gm26609       | lincRNA                |
| ENSMUSG00000097803 | 0 | 0 | 18 Rpl31-ps16    | processed_pseudogene   |
| ENSMUSG00000003119 | 0 | 0 | 16 Cdk12         | protein_coding         |
| ENSMUSG00000020100 | 0 | 0 | 16 Slc29a3       | protein_coding         |
| ENSMUSG00000020917 | 0 | 0 | 16 Acly          | protein_coding         |
| ENSMUSG00000021408 | 0 | 0 | 16 Ripk1         | protein_coding         |
| ENSMUSG00000021464 | 0 | 0 | 16 Ror2          | protein_coding         |
| ENSMUSG00000021910 | 0 | 0 | 16 Nisch         | protein_coding         |
| ENSMUSG00000022245 | 0 | 0 | 16 Skor1         | protein_coding         |
| ENSMUSG00000022637 | 0 | 0 | 16 Cblb          | protein_coding         |
| ENSMUSG00000025508 | 0 | 0 | 16 Rplp2         | protein_coding         |
| ENSMUSG00000025612 | 0 | 0 | 16 Bach1         | protein_coding         |
| ENSMUSG00000026200 | 0 | 0 | 16 Glb1l         | protein_coding         |
| ENSMUSG00000026348 | 0 | 0 | 16 Acmsd         | protein_coding         |
| ENSMUSG00000027204 | 0 | 0 | 16 Fbn1          | protein_coding         |
| ENSMUSG00000028249 | 0 | 0 | 16 Sdcbp         | protein_coding         |
| ENSMUSG00000028334 | 0 | 0 | 16 Nans          | protein_coding         |
| ENSMUSG00000029093 | 0 | 0 | 16 Sorcs2        | protein_coding         |
| ENSMUSG00000029992 | 0 | 0 | 16 Gfpt1         | protein_coding         |
| ENSMUSG00000030592 | 0 | 0 | 16 Ryr1          | protein_coding         |
| ENSMUSG00000031532 | 0 | 0 | 16 Saraf         | protein_coding         |
| ENSMUSG00000031995 | 0 | 0 | 16 St14          | protein_coding         |
| ENSMUSG00000032353 | 0 | 0 | 16 Tmed3         | protein_coding         |
| ENSMUSG00000032366 | 0 | 0 | 16 Tpm1          | protein_coding         |
| ENSMUSG00000033237 | 0 | 0 | 16 Arid2         | protein_coding         |
| ENSMUSG00000034908 | 0 | 0 | 16 Sidt2         | protein_coding         |
| ENSMUSG00000037005 | 0 | 0 | 16 Xpnpep2       | protein_coding         |
| ENSMUSG00000037669 | 0 | 0 | 16 Ldah          | protein_coding         |
| ENSMUSG00000042425 | 0 | 0 | 16 Frmpd3        | protein_coding         |
| ENSMUSG00000045464 | 0 | 0 | 16 2810002D19Rik | processed_transcript   |
| ENSMUSG00000046687 | 0 | 0 | 16 Gm5424        | protein_coding         |
| ENSMUSG00000053799 | 0 | 0 | 16 Exoc6         | protein_coding         |
| ENSMUSG00000055436 | 0 | 0 | 16 Srsf11        | protein_coding         |
| ENSMUSG00000057054 | 0 | 0 | 16 Inca1         | protein_coding         |

|                    |   |   |               |                      |
|--------------------|---|---|---------------|----------------------|
| ENSMUSG00000064685 | 0 | 0 | 16 Gm25812    | snRNA                |
| ENSMUSG00000065012 | 0 | 0 | 16 Gm23507    | snRNA                |
| ENSMUSG00000065235 | 0 | 0 | 16 Gm22974    | snRNA                |
| ENSMUSG00000065246 | 0 | 0 | 16 Gm22297    | snRNA                |
| ENSMUSG00000065322 | 0 | 0 | 16 Gm22055    | snRNA                |
| ENSMUSG00000073680 | 0 | 0 | 16 Tmem88b    | protein_coding       |
| ENSMUSG00000083288 | 0 | 0 | 16 Csnk2a1-ps | processed_pseudogene |
| ENSMUSG00000094768 | 0 | 0 | 16 Gm25524    | snRNA                |
| ENSMUSG00000094989 | 0 | 0 | 16 Rpl9-ps4   | processed_pseudogene |
| ENSMUSG00000095722 | 0 | 0 | 16 Gm23648    | snRNA                |
| ENSMUSG00000096449 | 0 | 0 | 16 Gm4076     | protein_coding       |
| ENSMUSG00000101795 | 0 | 0 | 16 Gm5835     | processed_pseudogene |
| ENSMUSG00000004667 | 0 | 0 | 14 Polr2e     | protein_coding       |
| ENSMUSG00000006169 | 0 | 0 | 14 Clint1     | protein_coding       |
| ENSMUSG00000006378 | 0 | 0 | 14 Gcat       | protein_coding       |
| ENSMUSG00000006728 | 0 | 0 | 14 Cdk4       | protein_coding       |
| ENSMUSG00000010025 | 0 | 0 | 14 Aldh3a2    | protein_coding       |
| ENSMUSG00000015451 | 0 | 0 | 14 C4a        | processed_transcript |
| ENSMUSG00000015790 | 0 | 0 | 14 Surf1      | protein_coding       |
| ENSMUSG00000017776 | 0 | 0 | 14 Crk        | protein_coding       |
| ENSMUSG00000018476 | 0 | 0 | 14 Kdm6b      | protein_coding       |
| ENSMUSG00000019806 | 0 | 0 | 14 Aig1       | protein_coding       |
| ENSMUSG00000019891 | 0 | 0 | 14 Dcbld1     | protein_coding       |
| ENSMUSG00000020376 | 0 | 0 | 14 Rnf130     | protein_coding       |
| ENSMUSG00000020888 | 0 | 0 | 14 Dvl2       | protein_coding       |
| ENSMUSG00000020903 | 0 | 0 | 14 Stx8       | protein_coding       |
| ENSMUSG00000021311 | 0 | 0 | 14 Mtr        | protein_coding       |
| ENSMUSG00000021374 | 0 | 0 | 14 Nup153     | protein_coding       |
| ENSMUSG00000021916 | 0 | 0 | 14 Glt8d1     | protein_coding       |
| ENSMUSG00000021940 | 0 | 0 | 14 Ptpn20     | protein_coding       |
| ENSMUSG00000022178 | 0 | 0 | 14 Ajuba      | protein_coding       |
| ENSMUSG00000022185 | 0 | 0 | 14 Acin1      | protein_coding       |
| ENSMUSG00000023175 | 0 | 0 | 14 Bsg        | protein_coding       |
| ENSMUSG00000024143 | 0 | 0 | 14 Rhoq       | protein_coding       |
| ENSMUSG00000024525 | 0 | 0 | 14 Impa2      | protein_coding       |
| ENSMUSG00000024666 | 0 | 0 | 14 Tmem138    | protein_coding       |
| ENSMUSG00000025223 | 0 | 0 | 14 Ldb1       | protein_coding       |
| ENSMUSG00000025519 | 0 | 0 | 14 Tktl2      | protein_coding       |
| ENSMUSG00000026135 | 0 | 0 | 14 Zfp142     | protein_coding       |
| ENSMUSG00000026499 | 0 | 0 | 14 Acbd3      | protein_coding       |
| ENSMUSG00000027016 | 0 | 0 | 14 Zfp385b    | protein_coding       |
| ENSMUSG00000027661 | 0 | 0 | 14 Slc2a10    | protein_coding       |
| ENSMUSG00000028161 | 0 | 0 | 14 Ppp3ca     | protein_coding       |
| ENSMUSG00000028393 | 0 | 0 | 14 Alad       | protein_coding       |
| ENSMUSG00000028718 | 0 | 0 | 14 Stil       | protein_coding       |
| ENSMUSG00000028986 | 0 | 0 | 14 Klhl7      | protein_coding       |
| ENSMUSG00000029028 | 0 | 0 | 14 Lrrc47     | protein_coding       |
| ENSMUSG00000029392 | 0 | 0 | 14 Rilpl1     | protein_coding       |
| ENSMUSG00000029478 | 0 | 0 | 14 Ncor2      | protein_coding       |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUSG00000029587 | 0 | 0 | 14 Zfp12         | protein_coding       |
| ENSMUSG00000029999 | 0 | 0 | 14 Tgfa          | protein_coding       |
| ENSMUSG00000030335 | 0 | 0 | 14 Mrpl51        | protein_coding       |
| ENSMUSG00000030671 | 0 | 0 | 14 Pde3b         | protein_coding       |
| ENSMUSG00000030823 | 0 | 0 | 14 9130019O22Rik | protein_coding       |
| ENSMUSG00000031029 | 0 | 0 | 14 Eif3f         | protein_coding       |
| ENSMUSG00000031447 | 0 | 0 | 14 Lamp1         | protein_coding       |
| ENSMUSG00000031730 | 0 | 0 | 14 Dhodh         | protein_coding       |
| ENSMUSG00000031924 | 0 | 0 | 14 Cyb5b         | protein_coding       |
| ENSMUSG00000031958 | 0 | 0 | 14 Ldhd          | protein_coding       |
| ENSMUSG00000031982 | 0 | 0 | 14 Arv1          | protein_coding       |
| ENSMUSG00000032172 | 0 | 0 | 14 Olfm2         | protein_coding       |
| ENSMUSG00000032187 | 0 | 0 | 14 Smarca4       | protein_coding       |
| ENSMUSG00000032212 | 0 | 0 | 14 Sltm          | protein_coding       |
| ENSMUSG00000032518 | 0 | 0 | 14 Rpsa          | protein_coding       |
| ENSMUSG00000032679 | 0 | 0 | 14 Cd59a         | protein_coding       |
| ENSMUSG00000033502 | 0 | 0 | 14 Cdc14a        | protein_coding       |
| ENSMUSG00000033684 | 0 | 0 | 14 Qsox1         | protein_coding       |
| ENSMUSG00000034007 | 0 | 0 | 14 Scaper        | protein_coding       |
| ENSMUSG00000035394 | 0 | 0 | 14 Cfap53        | protein_coding       |
| ENSMUSG00000035397 | 0 | 0 | 14 Klf16         | protein_coding       |
| ENSMUSG00000035840 | 0 | 0 | 14 Lysmd3        | protein_coding       |
| ENSMUSG00000036743 | 0 | 0 | 14 Psma8         | protein_coding       |
| ENSMUSG00000039754 | 0 | 0 | 14 Alkbh4        | protein_coding       |
| ENSMUSG00000039952 | 0 | 0 | 14 Dag1          | protein_coding       |
| ENSMUSG00000039977 | 0 | 0 | 14 Ccdc67        | protein_coding       |
| ENSMUSG00000040459 | 0 | 0 | 14 Arglu1        | protein_coding       |
| ENSMUSG00000040610 | 0 | 0 | 14 Tlx3          | protein_coding       |
| ENSMUSG00000042446 | 0 | 0 | 14 Zmym4         | protein_coding       |
| ENSMUSG00000043252 | 0 | 0 | 14 Tmem64        | protein_coding       |
| ENSMUSG00000043866 | 0 | 0 | 14 Taf10         | protein_coding       |
| ENSMUSG00000044442 | 0 | 0 | 14 N6amt1        | protein_coding       |
| ENSMUSG00000045757 | 0 | 0 | 14 Zfp764        | protein_coding       |
| ENSMUSG00000046957 | 0 | 0 | 14 Spz1          | protein_coding       |
| ENSMUSG00000047965 | 0 | 0 | 14 Rpl9-ps7      | processed_pseudogene |
| ENSMUSG00000050043 | 0 | 0 | 14 Tmx2          | protein_coding       |
| ENSMUSG00000054381 | 0 | 0 | 14 Zfp747        | protein_coding       |
| ENSMUSG00000057421 | 0 | 0 | 14 Las1l         | protein_coding       |
| ENSMUSG00000057738 | 0 | 0 | 14 Sptan1        | protein_coding       |
| ENSMUSG00000063142 | 0 | 0 | 14 Kenma1        | protein_coding       |
| ENSMUSG00000064845 | 0 | 0 | 14 Gm26203       | snRNA                |
| ENSMUSG00000064928 | 0 | 0 | 14 Gm22045       | snRNA                |
| ENSMUSG00000065011 | 0 | 0 | 14 Gm23506       | snRNA                |
| ENSMUSG00000065301 | 0 | 0 | 14 Gm23248       | snRNA                |
| ENSMUSG00000068240 | 0 | 0 | 14 Gm11808       | protein_coding       |
| ENSMUSG00000071035 | 0 | 0 | 14 Gm5499        | processed_pseudogene |
| ENSMUSG00000073131 | 0 | 0 | 14 Vma21         | protein_coding       |
| ENSMUSG00000073418 | 0 | 0 | 14 C4b           | protein_coding       |
| ENSMUSG00000075906 | 0 | 0 | 14 Gm23942       | snRNA                |

|                    |   |   |                  |                        |
|--------------------|---|---|------------------|------------------------|
| ENSMUSG00000078580 | 0 | 0 | 14 E430018J23Rik | protein_coding         |
| ENSMUSG00000078945 | 0 | 0 | 14 Naip2         | protein_coding         |
| ENSMUSG00000081816 | 0 | 0 | 14 Gm15528       | processed_pseudogene   |
| ENSMUSG00000084417 | 0 | 0 | 14 Gm23463       | snRNA                  |
| ENSMUSG00000087575 | 0 | 0 | 14 Gm12976       | lincRNA                |
| ENSMUSG00000089183 | 0 | 0 | 14 Gm22946       | snRNA                  |
| ENSMUSG00000090338 | 0 | 0 | 14 Gm17081       | unprocessed_pseudogene |
| ENSMUSG00000091460 | 0 | 0 | 14 Gm7808        | protein_coding         |
| ENSMUSG00000094605 | 0 | 0 | 14 Gm25873       | snRNA                  |
| ENSMUSG00000095085 | 0 | 0 | 14 Gm25326       | snRNA                  |
| ENSMUSG00000097310 | 0 | 0 | 14 A930038B10Rik | lincRNA                |
| ENSMUSG00000100133 | 0 | 0 | 14 Tgif2lx1      | protein_coding         |
| ENSMUSG00000102225 | 0 | 0 | 14 Gm37983       | TEC                    |
| ENSMUSG00000000594 | 0 | 0 | 12 Gm2a          | protein_coding         |
| ENSMUSG00000001240 | 0 | 0 | 12 Ramp2         | protein_coding         |
| ENSMUSG00000001552 | 0 | 0 | 12 Jup           | protein_coding         |
| ENSMUSG00000001627 | 0 | 0 | 12 Ifrd1         | protein_coding         |
| ENSMUSG00000002625 | 0 | 0 | 12 Akap8l        | protein_coding         |
| ENSMUSG00000002981 | 0 | 0 | 12 Clptm1        | protein_coding         |
| ENSMUSG00000003363 | 0 | 0 | 12 Pld3          | protein_coding         |
| ENSMUSG00000005503 | 0 | 0 | 12 Evx1          | protein_coding         |
| ENSMUSG00000006906 | 0 | 0 | 12 Stambp        | protein_coding         |
| ENSMUSG00000007038 | 0 | 0 | 12 Neu1          | protein_coding         |
| ENSMUSG00000009687 | 0 | 0 | 12 Fxyd5         | protein_coding         |
| ENSMUSG00000010911 | 0 | 0 | 12 Apip          | protein_coding         |
| ENSMUSG00000014195 | 0 | 0 | 12 Dnajc7        | protein_coding         |
| ENSMUSG00000015647 | 0 | 0 | 12 Lama5         | protein_coding         |
| ENSMUSG00000017801 | 0 | 0 | 12 Mlx           | protein_coding         |
| ENSMUSG00000018666 | 0 | 0 | 12 Cbx1          | protein_coding         |
| ENSMUSG00000018796 | 0 | 0 | 12 Acs1l         | protein_coding         |
| ENSMUSG00000019303 | 0 | 0 | 12 Psmc3ip       | protein_coding         |
| ENSMUSG00000019373 | 0 | 0 | 12 Cops3         | protein_coding         |
| ENSMUSG00000019433 | 0 | 0 | 12 Gipc1         | protein_coding         |
| ENSMUSG00000019977 | 0 | 0 | 12 Hbs1l         | protein_coding         |
| ENSMUSG00000020109 | 0 | 0 | 12 Dnajb12       | protein_coding         |
| ENSMUSG00000020246 | 0 | 0 | 12 Hcfc2         | protein_coding         |
| ENSMUSG00000020523 | 0 | 0 | 12 Fam114a2      | protein_coding         |
| ENSMUSG00000020538 | 0 | 0 | 12 Srebfl        | protein_coding         |
| ENSMUSG00000020850 | 0 | 0 | 12 Prpf8         | protein_coding         |
| ENSMUSG00000020954 | 0 | 0 | 12 Strn3         | protein_coding         |
| ENSMUSG00000021112 | 0 | 0 | 12 Mpp5          | protein_coding         |
| ENSMUSG00000021114 | 0 | 0 | 12 Atp6v1d       | protein_coding         |
| ENSMUSG00000021238 | 0 | 0 | 12 Aldh6a1       | protein_coding         |
| ENSMUSG00000021901 | 0 | 0 | 12 Bap1          | protein_coding         |
| ENSMUSG00000021951 | 0 | 0 | 12 Eef1akmt1     | protein_coding         |
| ENSMUSG00000022066 | 0 | 0 | 12 Gm21685       | protein_coding         |
| ENSMUSG00000022269 | 0 | 0 | 12 March11       | protein_coding         |
| ENSMUSG00000022354 | 0 | 0 | 12 Ndufb9        | protein_coding         |
| ENSMUSG00000023008 | 0 | 0 | 12 Fmnl3         | protein_coding         |

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|--------------------|---|---|------------------|----------------|
| ENSMUSG00000024097 | 0 | 0 | 12 Srsf7         | protein_coding |
| ENSMUSG00000024169 | 0 | 0 | 12 Ifi140        | protein_coding |
| ENSMUSG00000024392 | 0 | 0 | 12 Bag6          | protein_coding |
| ENSMUSG00000024477 | 0 | 0 | 12 Pgg1b         | protein_coding |
| ENSMUSG00000024610 | 0 | 0 | 12 Cd74          | protein_coding |
| ENSMUSG00000024654 | 0 | 0 | 12 Asrgl1        | protein_coding |
| ENSMUSG00000024665 | 0 | 0 | 12 Fads2         | protein_coding |
| ENSMUSG00000025366 | 0 | 0 | 12 Esyt1         | protein_coding |
| ENSMUSG00000025381 | 0 | 0 | 12 Cnpy2         | protein_coding |
| ENSMUSG00000025812 | 0 | 0 | 12 Pard3         | protein_coding |
| ENSMUSG00000025871 | 0 | 0 | 12 4833439L19Rik | protein_coding |
| ENSMUSG00000025964 | 0 | 0 | 12 Adam23        | protein_coding |
| ENSMUSG00000025997 | 0 | 0 | 12 Ikzf2         | protein_coding |
| ENSMUSG00000026182 | 0 | 0 | 12 Tnp1          | protein_coding |
| ENSMUSG00000026249 | 0 | 0 | 12 Serpine2      | protein_coding |
| ENSMUSG00000026618 | 0 | 0 | 12 Iars2         | protein_coding |
| ENSMUSG00000026918 | 0 | 0 | 12 Brd3          | protein_coding |
| ENSMUSG00000027463 | 0 | 0 | 12 Slc52a3       | protein_coding |
| ENSMUSG00000027642 | 0 | 0 | 12 Rpn2          | protein_coding |
| ENSMUSG00000027938 | 0 | 0 | 12 Creb3l4       | protein_coding |
| ENSMUSG00000028245 | 0 | 0 | 12 Nsmaf         | protein_coding |
| ENSMUSG00000028294 | 0 | 0 | 12 Cfap206       | protein_coding |
| ENSMUSG00000028318 | 0 | 0 | 12 Polr1e        | protein_coding |
| ENSMUSG00000028347 | 0 | 0 | 12 Tmeff1        | protein_coding |
| ENSMUSG00000028382 | 0 | 0 | 12 Ptbp3         | protein_coding |
| ENSMUSG00000028416 | 0 | 0 | 12 Bag1          | protein_coding |
| ENSMUSG00000028514 | 0 | 0 | 12 Usp24         | protein_coding |
| ENSMUSG00000028557 | 0 | 0 | 12 Rnf11         | protein_coding |
| ENSMUSG00000028619 | 0 | 0 | 12 Tceanc2       | protein_coding |
| ENSMUSG00000028692 | 0 | 0 | 12 Akr1a1        | protein_coding |
| ENSMUSG00000028794 | 0 | 0 | 12 A3galt2       | protein_coding |
| ENSMUSG00000028898 | 0 | 0 | 12 Trnaulap      | protein_coding |
| ENSMUSG00000028931 | 0 | 0 | 12 Kcnab2        | protein_coding |
| ENSMUSG00000029178 | 0 | 0 | 12 Klf3          | protein_coding |
| ENSMUSG00000029330 | 0 | 0 | 12 Cds1          | protein_coding |
| ENSMUSG00000030041 | 0 | 0 | 12 M1ap          | protein_coding |
| ENSMUSG00000030062 | 0 | 0 | 12 Rpn1          | protein_coding |
| ENSMUSG00000030314 | 0 | 0 | 12 Atg7          | protein_coding |
| ENSMUSG00000030536 | 0 | 0 | 12 Iqgap1        | protein_coding |
| ENSMUSG00000030551 | 0 | 0 | 12 Nr2f2         | protein_coding |
| ENSMUSG00000030557 | 0 | 0 | 12 Mef2a         | protein_coding |
| ENSMUSG00000030748 | 0 | 0 | 12 Il4ra         | protein_coding |
| ENSMUSG00000030816 | 0 | 0 | 12 Rnf40         | protein_coding |
| ENSMUSG00000030982 | 0 | 0 | 12 9030624J02Rik | protein_coding |
| ENSMUSG00000030987 | 0 | 0 | 12 Stim1         | protein_coding |
| ENSMUSG00000031351 | 0 | 0 | 12 Zfp185        | protein_coding |
| ENSMUSG00000031700 | 0 | 0 | 12 Gpt2          | protein_coding |
| ENSMUSG00000031847 | 0 | 0 | 12 1700030J22Rik | protein_coding |
| ENSMUSG00000032425 | 0 | 0 | 12 Zfp949        | protein_coding |

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|--------------------|---|---|------------------|----------------|
| ENSMUSG00000032503 | 0 | 0 | 12 Arpp21        | protein_coding |
| ENSMUSG00000032688 | 0 | 0 | 12 Malt1         | protein_coding |
| ENSMUSG00000032712 | 0 | 0 | 12 2810474O19Rik | protein_coding |
| ENSMUSG00000032869 | 0 | 0 | 12 Psmf1         | protein_coding |
| ENSMUSG00000033295 | 0 | 0 | 12 Ptpnf         | protein_coding |
| ENSMUSG00000033949 | 0 | 0 | 12 Trim36        | protein_coding |
| ENSMUSG00000034714 | 0 | 0 | 12 Ttyh2         | protein_coding |
| ENSMUSG00000035049 | 0 | 0 | 12 Rrp12         | protein_coding |
| ENSMUSG00000035469 | 0 | 0 | 12 Rcbtb1        | protein_coding |
| ENSMUSG00000035992 | 0 | 0 | 12 Fnip1         | protein_coding |
| ENSMUSG00000036112 | 0 | 0 | 12 Metap2        | protein_coding |
| ENSMUSG00000037214 | 0 | 0 | 12 Thap1         | protein_coding |
| ENSMUSG00000037234 | 0 | 0 | 12 Hook3         | protein_coding |
| ENSMUSG00000037608 | 0 | 0 | 12 Bclaf1        | protein_coding |
| ENSMUSG00000037656 | 0 | 0 | 12 Slc20a2       | protein_coding |
| ENSMUSG00000037752 | 0 | 0 | 12 Xkr8          | protein_coding |
| ENSMUSG00000038252 | 0 | 0 | 12 Ncapd2        | protein_coding |
| ENSMUSG00000038773 | 0 | 0 | 12 Kdm3b         | protein_coding |
| ENSMUSG00000038803 | 0 | 0 | 12 Ost4          | protein_coding |
| ENSMUSG00000038806 | 0 | 0 | 12 Sde2          | protein_coding |
| ENSMUSG00000038914 | 0 | 0 | 12 Dido1         | protein_coding |
| ENSMUSG00000038936 | 0 | 0 | 12 Sccpdh        | protein_coding |
| ENSMUSG00000038994 | 0 | 0 | 12 Hils1         | protein_coding |
| ENSMUSG00000039018 | 0 | 0 | 12 Mtg1          | protein_coding |
| ENSMUSG00000039449 | 0 | 0 | 12 Prpf18        | protein_coding |
| ENSMUSG00000040410 | 0 | 0 | 12 Fbxl4         | protein_coding |
| ENSMUSG00000040483 | 0 | 0 | 12 Xaf1          | protein_coding |
| ENSMUSG00000041530 | 0 | 0 | 12 Ago1          | protein_coding |
| ENSMUSG00000041697 | 0 | 0 | 12 Cox6a1        | protein_coding |
| ENSMUSG00000042851 | 0 | 0 | 12 Zc3h6         | protein_coding |
| ENSMUSG00000043190 | 0 | 0 | 12 Rfesd         | protein_coding |
| ENSMUSG00000045210 | 0 | 0 | 12 Vcpip1        | protein_coding |
| ENSMUSG00000045639 | 0 | 0 | 12 Zfp629        | protein_coding |
| ENSMUSG00000045662 | 0 | 0 | 12 Henmt1        | protein_coding |
| ENSMUSG00000046671 | 0 | 0 | 12 Mtrf11        | protein_coding |
| ENSMUSG00000046841 | 0 | 0 | 12 Ckap4         | protein_coding |
| ENSMUSG00000046934 | 0 | 0 | 12 Csl           | protein_coding |
| ENSMUSG00000047454 | 0 | 0 | 12 Gphn          | protein_coding |
| ENSMUSG00000047777 | 0 | 0 | 12 Phf13         | protein_coding |
| ENSMUSG00000047945 | 0 | 0 | 12 Marcks11      | protein_coding |
| ENSMUSG00000047995 | 0 | 0 | 12 Cypt4         | protein_coding |
| ENSMUSG00000049115 | 0 | 0 | 12 Agtr1a        | protein_coding |
| ENSMUSG00000051159 | 0 | 0 | 12 Cited1        | protein_coding |
| ENSMUSG00000051483 | 0 | 0 | 12 Cbr1          | protein_coding |
| ENSMUSG00000051853 | 0 | 0 | 12 Arf3          | protein_coding |
| ENSMUSG00000052131 | 0 | 0 | 12 Akr1b7        | protein_coding |
| ENSMUSG00000053279 | 0 | 0 | 12 Aldh1a1       | protein_coding |
| ENSMUSG00000054280 | 0 | 0 | 12 Prr14l        | protein_coding |
| ENSMUSG00000054514 | 0 | 0 | 12 Atad3aos      | antisense      |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUSG00000055447 | 0 | 0 | 12 Cd47          | protein_coding       |
| ENSMUSG00000056493 | 0 | 0 | 12 Foxk1         | protein_coding       |
| ENSMUSG00000056698 | 0 | 0 | 12 Elmod3        | protein_coding       |
| ENSMUSG00000057093 | 0 | 0 | 12 Zfp607b       | protein_coding       |
| ENSMUSG00000057156 | 0 | 0 | 12 Homez         | protein_coding       |
| ENSMUSG00000057236 | 0 | 0 | 12 Rbbp4         | protein_coding       |
| ENSMUSG00000057697 | 0 | 0 | 12 Vmn1r53       | protein_coding       |
| ENSMUSG00000058135 | 0 | 0 | 12 Gstm1         | protein_coding       |
| ENSMUSG00000058287 | 0 | 0 | 12 Gm12253       | protein_coding       |
| ENSMUSG00000059776 | 0 | 0 | 12 Rpl13-ps6     | processed_pseudogene |
| ENSMUSG00000059835 | 0 | 0 | 12 Rpl13-ps3     | protein_coding       |
| ENSMUSG00000060743 | 0 | 0 | 12 H3f3a         | protein_coding       |
| ENSMUSG00000061981 | 0 | 0 | 12 Flot2         | protein_coding       |
| ENSMUSG00000062478 | 0 | 0 | 12 Ctrc          | protein_coding       |
| ENSMUSG00000063428 | 0 | 0 | 12 Ddo           | protein_coding       |
| ENSMUSG00000065637 | 0 | 0 | 12 Gm26397       | snoRNA               |
| ENSMUSG00000065907 | 0 | 0 | 12 Gm26108       | snRNA                |
| ENSMUSG00000066315 | 0 | 0 | 12 Gm12918       | processed_pseudogene |
| ENSMUSG00000067847 | 0 | 0 | 12 Romo1         | protein_coding       |
| ENSMUSG00000068614 | 0 | 0 | 12 Actc1         | protein_coding       |
| ENSMUSG00000069729 | 0 | 0 | 12 Arid1b        | protein_coding       |
| ENSMUSG00000070417 | 0 | 0 | 12 Olfr2         | protein_coding       |
| ENSMUSG00000070493 | 0 | 0 | 12 Chchd2        | protein_coding       |
| ENSMUSG00000070980 | 0 | 0 | 12 Actl7b        | protein_coding       |
| ENSMUSG00000071451 | 0 | 0 | 12 Psmg4         | protein_coding       |
| ENSMUSG00000071604 | 0 | 0 | 12 Fam189a2      | protein_coding       |
| ENSMUSG00000073532 | 0 | 0 | 12 Gm7276        | protein_coding       |
| ENSMUSG00000074052 | 0 | 0 | 12 BC048644      | antisense            |
| ENSMUSG00000074207 | 0 | 0 | 12 Adh1          | protein_coding       |
| ENSMUSG00000074236 | 0 | 0 | 12 Gm9387        | processed_pseudogene |
| ENSMUSG00000074435 | 0 | 0 | 12 Smcp          | protein_coding       |
| ENSMUSG00000074743 | 0 | 0 | 12 Thbd          | protein_coding       |
| ENSMUSG00000074796 | 0 | 0 | 12 Slc4a11       | protein_coding       |
| ENSMUSG00000075225 | 0 | 0 | 12 Ccdc162       | protein_coding       |
| ENSMUSG00000079484 | 0 | 0 | 12 Phyhd1        | protein_coding       |
| ENSMUSG00000081145 | 0 | 0 | 12 Gm14585       | processed_pseudogene |
| ENSMUSG00000081550 | 0 | 0 | 12 Gm15877       | processed_pseudogene |
| ENSMUSG00000081984 | 0 | 0 | 12 Dnajb3        | protein_coding       |
| ENSMUSG00000084111 | 0 | 0 | 12 Gm15710       | processed_pseudogene |
| ENSMUSG00000084536 | 0 | 0 | 12 Gm25844       | misc_RNA             |
| ENSMUSG00000084635 | 0 | 0 | 12 Gm23883       | misc_RNA             |
| ENSMUSG00000085683 | 0 | 0 | 12 9130409J20Rik | lincRNA              |
| ENSMUSG00000087260 | 0 | 0 | 12 Lamtor5       | protein_coding       |
| ENSMUSG00000090074 | 0 | 0 | 12 Gm6921        | processed_pseudogene |
| ENSMUSG00000091194 | 0 | 0 | 12 Gm19840       | processed_pseudogene |
| ENSMUSG00000092600 | 0 | 0 | 12 Gm20442       | lincRNA              |
| ENSMUSG00000094114 | 0 | 0 | 12 Gm21967       | protein_coding       |
| ENSMUSG00000095463 | 0 | 0 | 12 Entpd4        | protein_coding       |
| ENSMUSG00000096199 | 0 | 0 | 12 Ptrhd1        | protein_coding       |



|                     |   |   |                  |                        |
|---------------------|---|---|------------------|------------------------|
| ENSMUSG00000098404  | 0 | 0 | 12 Mrip-ps       | unprocessed_pseudogene |
| ENSMUSG00000100627  | 0 | 0 | 12 A830008E24Rik | lincRNA                |
| ENSMUSG00000102117  | 0 | 0 | 12 Rpsa-ps1      | processed_pseudogene   |
| ENSMUSG00000102249  | 0 | 0 | 12 4930423C22Rik | TEC                    |
| ENSMUSG00000102367  | 0 | 0 | 12 Kiss1         | protein_coding         |
| ENSMUSG00000103057  | 0 | 0 | 12               | TEC                    |
| ENSMUSG00000104133  | 0 | 0 | 12 4921511E07Rik | TEC                    |
| ENSMUSG00000000168  | 0 | 0 | 10 Dlat          | protein_coding         |
| ENSMUSG00000000266  | 0 | 0 | 10 Mid2          | protein_coding         |
| ENSMUSG000000020687 | 0 | 0 | 10 Cdc27         | protein_coding         |
| ENSMUSG000000020929 | 0 | 0 | 10 Eftud2        | protein_coding         |
| ENSMUSG000000021732 | 0 | 0 | 10 Fgf10         | protein_coding         |
| ENSMUSG000000026177 | 0 | 0 | 10 Slc11a1       | protein_coding         |
| ENSMUSG000000026179 | 0 | 0 | 10 Pnkd          | protein_coding         |
| ENSMUSG000000029402 | 0 | 0 | 10 Snrnp35       | protein_coding         |
| ENSMUSG000000030411 | 0 | 0 | 10 Nova2         | protein_coding         |
| ENSMUSG000000033219 | 0 | 0 | 10 Gm9758        | protein_coding         |
| ENSMUSG000000037643 | 0 | 0 | 10 Prkci         | protein_coding         |
| ENSMUSG000000040479 | 0 | 0 | 10 Dgkz          | protein_coding         |
| ENSMUSG000000041845 | 0 | 0 | 10 Rhod          | protein_coding         |
| ENSMUSG000000047181 | 0 | 0 | 10 Samd14        | protein_coding         |
| ENSMUSG000000050241 | 0 | 0 | 10 Klre1         | protein_coding         |
| ENSMUSG000000050530 | 0 | 0 | 10 Fam171a1      | protein_coding         |
| ENSMUSG000000050621 | 0 | 0 | 10 Rps27rt       | protein_coding         |
| ENSMUSG000000052373 | 0 | 0 | 10 Mpp3          | protein_coding         |
| ENSMUSG000000058643 | 0 | 0 | 10 Speer4f1      | protein_coding         |
| ENSMUSG000000059461 | 0 | 0 | 10 Gm7331        | processed_pseudogene   |
| ENSMUSG000000060121 | 0 | 0 | 10 Gemin2        | protein_coding         |
| ENSMUSG000000061232 | 0 | 0 | 10 H2-K1         | protein_coding         |
| ENSMUSG000000061288 | 0 | 0 | 10 Taok3         | protein_coding         |
| ENSMUSG000000064549 | 0 | 0 | 10 Gm22977       | snRNA                  |
| ENSMUSG000000064664 | 0 | 0 | 10 Gm24459       | snRNA                  |
| ENSMUSG000000065199 | 0 | 0 | 10 Gm23461       | snRNA                  |
| ENSMUSG000000065737 | 0 | 0 | 10 Gm24490       | snRNA                  |
| ENSMUSG000000068638 | 0 | 0 | 10 4930403O15Rik | processed_transcript   |
| ENSMUSG000000071253 | 0 | 0 | 10 Slc25a16      | protein_coding         |
| ENSMUSG000000072188 | 0 | 0 | 10 Gm10354       | protein_coding         |
| ENSMUSG000000073208 | 0 | 0 | 10 Speer4c       | protein_coding         |
| ENSMUSG000000074129 | 0 | 0 | 10 Rpl13a        | protein_coding         |
| ENSMUSG000000082305 | 0 | 0 | 10 Gm2420        | unprocessed_pseudogene |
| ENSMUSG000000082978 | 0 | 0 | 10 Rpsa-ps11     | processed_pseudogene   |
| ENSMUSG000000084566 | 0 | 0 | 10 Gm26477       | misc_RNA               |
| ENSMUSG000000084714 | 0 | 0 | 10 Gm24631       | snRNA                  |
| ENSMUSG000000085457 | 0 | 0 | 10 1110046J04Rik | antisense              |
| ENSMUSG000000090750 | 0 | 0 | 10 Gm21999       | unprocessed_pseudogene |
| ENSMUSG000000090874 | 0 | 0 | 10 Olfr733       | protein_coding         |
| ENSMUSG000000091255 | 0 | 0 | 10 Speer4e       | protein_coding         |
| ENSMUSG000000091827 | 0 | 0 | 10 Speer4f2      | protein_coding         |
| ENSMUSG000000091873 | 0 | 0 | 10 Olfr732       | protein_coding         |

|                    |   |   |                  |                      |
|--------------------|---|---|------------------|----------------------|
| ENSMUSG00000091897 | 0 | 0 | 10 Gm17019       | protein_coding       |
| ENSMUSG00000095506 | 0 | 0 | 10 Gm22448       | snRNA                |
| ENSMUSG00000096091 | 0 | 0 | 10 Gm26335       | snRNA                |
| ENSMUSG00000096641 | 0 | 0 | 10 Gm904         | protein_coding       |
| ENSMUSG00000097392 | 0 | 0 | 10 D930016D06Rik | lincRNA              |
| ENSMUSG00000099660 | 0 | 0 | 10 Gm2316        | processed_pseudogene |
| ENSMUSG00000099879 | 0 | 0 | 10 Gm29123       | antisense            |
| ENSMUSG00000102471 | 0 | 0 | 10 Gm5100        | processed_pseudogene |
| ENSMUSG00000004233 | 0 | 0 | 8 Wars2          | protein_coding       |
| ENSMUSG00000004846 | 0 | 0 | 8 Plod3          | protein_coding       |
| ENSMUSG00000008845 | 0 | 0 | 8 Cd163          | protein_coding       |
| ENSMUSG00000015829 | 0 | 0 | 8 Tnr            | protein_coding       |
| ENSMUSG00000018433 | 0 | 0 | 8 Nol11          | protein_coding       |
| ENSMUSG00000019579 | 0 | 0 | 8 Mydgf          | protein_coding       |
| ENSMUSG00000021552 | 0 | 0 | 8 Gkap1          | protein_coding       |
| ENSMUSG00000021905 | 0 | 0 | 8 Dph3           | protein_coding       |
| ENSMUSG00000022962 | 0 | 0 | 8 Gart           | protein_coding       |
| ENSMUSG00000022983 | 0 | 0 | 8 Scaf4          | protein_coding       |
| ENSMUSG00000024134 | 0 | 0 | 8 Six2           | protein_coding       |
| ENSMUSG00000024436 | 0 | 0 | 8 Mrps18b        | protein_coding       |
| ENSMUSG00000024617 | 0 | 0 | 8 Camk2a         | protein_coding       |
| ENSMUSG00000024831 | 0 | 0 | 8 Ighmbp2        | protein_coding       |
| ENSMUSG00000025194 | 0 | 0 | 8 Abcc2          | protein_coding       |
| ENSMUSG00000025433 | 0 | 0 | 8 Crisp3         | protein_coding       |
| ENSMUSG00000025505 | 0 | 0 | 8 Tmem80         | protein_coding       |
| ENSMUSG00000025792 | 0 | 0 | 8 Slc25a10       | protein_coding       |
| ENSMUSG00000025858 | 0 | 0 | 8 Get4           | protein_coding       |
| ENSMUSG00000026674 | 0 | 0 | 8 Ddr2           | protein_coding       |
| ENSMUSG00000026991 | 0 | 0 | 8 Pkp4           | protein_coding       |
| ENSMUSG00000027365 | 0 | 0 | 8 Trpm7          | protein_coding       |
| ENSMUSG00000027708 | 0 | 0 | 8 Dcun1d1        | protein_coding       |
| ENSMUSG00000027787 | 0 | 0 | 8 Nmd3           | protein_coding       |
| ENSMUSG00000028124 | 0 | 0 | 8 Gclm           | protein_coding       |
| ENSMUSG00000028234 | 0 | 0 | 8 Rps20          | protein_coding       |
| ENSMUSG00000028710 | 0 | 0 | 8 Atpaf1         | protein_coding       |
| ENSMUSG00000029033 | 0 | 0 | 8 Acap3          | protein_coding       |
| ENSMUSG00000029563 | 0 | 0 | 8 Foxp2          | protein_coding       |
| ENSMUSG00000030401 | 0 | 0 | 8 Rtn2           | protein_coding       |
| ENSMUSG00000030530 | 0 | 0 | 8 Furin          | protein_coding       |
| ENSMUSG00000030695 | 0 | 0 | 8 Aldoa          | protein_coding       |
| ENSMUSG00000031099 | 0 | 0 | 8 Smarca1        | protein_coding       |
| ENSMUSG00000032096 | 0 | 0 | 8 Arcn1          | protein_coding       |
| ENSMUSG00000033701 | 0 | 0 | 8 Acbd6          | protein_coding       |
| ENSMUSG00000033793 | 0 | 0 | 8 Atp6v1h        | protein_coding       |
| ENSMUSG00000036775 | 0 | 0 | 8 Decr2          | protein_coding       |
| ENSMUSG00000037096 | 0 | 0 | 8 Gm9762         | processed_pseudogene |
| ENSMUSG00000038534 | 0 | 0 | 8 Osbp17         | protein_coding       |
| ENSMUSG00000038543 | 0 | 0 | 8 BC028528       | protein_coding       |
| ENSMUSG00000039221 | 0 | 0 | 8 Rpl22l1        | protein_coding       |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000040158 | 0 | 0 | 8 Tax1bp3       | protein_coding       |
| ENSMUSG00000040557 | 0 | 0 | 8 Wbscr27       | protein_coding       |
| ENSMUSG00000041498 | 0 | 0 | 8 Kif14         | protein_coding       |
| ENSMUSG00000042507 | 0 | 0 | 8 Elmsan1       | protein_coding       |
| ENSMUSG00000042579 | 0 | 0 | 8 4632404H12Rik | protein_coding       |
| ENSMUSG00000043557 | 0 | 0 | 8 Mdga1         | protein_coding       |
| ENSMUSG00000043602 | 0 | 0 | 8 Zfp3          | protein_coding       |
| ENSMUSG00000043683 | 0 | 0 | 8 Fem1a         | protein_coding       |
| ENSMUSG00000044626 | 0 | 0 | 8 Liph          | protein_coding       |
| ENSMUSG00000044708 | 0 | 0 | 8 Kcnj10        | protein_coding       |
| ENSMUSG00000045969 | 0 | 0 | 8 Ing1          | protein_coding       |
| ENSMUSG00000049303 | 0 | 0 | 8 Syt12         | protein_coding       |
| ENSMUSG00000049807 | 0 | 0 | 8 Arhgap23      | protein_coding       |
| ENSMUSG00000050288 | 0 | 0 | 8 Fzd2          | protein_coding       |
| ENSMUSG00000050855 | 0 | 0 | 8 Zfp940        | protein_coding       |
| ENSMUSG00000055093 | 0 | 0 | 8 Gm8430        | processed_pseudogene |
| ENSMUSG00000058975 | 0 | 0 | 8 Kcnc1         | protein_coding       |
| ENSMUSG00000059343 | 0 | 0 | 8 Aldoart1      | protein_coding       |
| ENSMUSG00000061390 | 0 | 0 | 8 Gm7866        | processed_pseudogene |
| ENSMUSG00000063129 | 0 | 0 | 8 Aldoart2      | protein_coding       |
| ENSMUSG00000063683 | 0 | 0 | 8 Glyat         | protein_coding       |
| ENSMUSG00000063919 | 0 | 0 | 8 Srrm4         | protein_coding       |
| ENSMUSG00000064422 | 0 | 0 | 8 Gm22502       | snRNA                |
| ENSMUSG00000064590 | 0 | 0 | 8 Gm22301       | snRNA                |
| ENSMUSG00000064889 | 0 | 0 | 8 Gm24200       | snRNA                |
| ENSMUSG00000065343 | 0 | 0 | 8 Gm25580       | misc_RNA             |
| ENSMUSG00000065718 | 0 | 0 | 8 Gm25650       | snRNA                |
| ENSMUSG00000068748 | 0 | 0 | 8 Ptpbz1        | protein_coding       |
| ENSMUSG00000069917 | 0 | 0 | 8 Hba-a2        | protein_coding       |
| ENSMUSG00000069919 | 0 | 0 | 8 Hba-a1        | protein_coding       |
| ENSMUSG00000070263 | 0 | 0 | 8 Gm22365       | snRNA                |
| ENSMUSG00000071138 | 0 | 0 | 8 Tex24         | protein_coding       |
| ENSMUSG00000073154 | 0 | 0 | 8 9330158H04Rik | processed_transcript |
| ENSMUSG00000075408 | 0 | 0 | 8 6030408B16Rik | lincRNA              |
| ENSMUSG00000078157 | 0 | 0 | 8 4931440F15Rik | protein_coding       |
| ENSMUSG00000079227 | 0 | 0 | 8 Ccr5          | protein_coding       |
| ENSMUSG00000079669 | 0 | 0 | 8 Gm17396       | processed_transcript |
| ENSMUSG00000080746 | 0 | 0 | 8 Rpsa-ps12     | processed_pseudogene |
| ENSMUSG00000080779 | 0 | 0 | 8 Gm8731        | processed_pseudogene |
| ENSMUSG00000081076 | 0 | 0 | 8 Rpsa-ps4      | processed_pseudogene |
| ENSMUSG00000081157 | 0 | 0 | 8 Gm13552       | processed_pseudogene |
| ENSMUSG00000081745 | 0 | 0 | 8 Gm15549       | processed_pseudogene |
| ENSMUSG00000083539 | 0 | 0 | 8 Gm12466       | processed_pseudogene |
| ENSMUSG00000084557 | 0 | 0 | 8 Gm25279       | snRNA                |
| ENSMUSG00000084694 | 0 | 0 | 8 Gm24893       | misc_RNA             |
| ENSMUSG00000084973 | 0 | 0 | 8 Gm13848       | lincRNA              |
| ENSMUSG00000086061 | 0 | 0 | 8 Gm13075       | antisense            |
| ENSMUSG00000087708 | 0 | 0 | 8 Gm23000       | snRNA                |
| ENSMUSG00000087812 | 0 | 0 | 8 Gm25115       | snRNA                |

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000087896 | 0 | 0 | 8 Gm25282       | snRNA                |
| ENSMUSG00000088168 | 0 | 0 | 8 Gm23540       | snRNA                |
| ENSMUSG00000088281 | 0 | 0 | 8 Gm23585       | snRNA                |
| ENSMUSG00000088368 | 0 | 0 | 8 Gm26323       | misc_RNA             |
| ENSMUSG00000090099 | 0 | 0 | 8 Gm8837        | processed_pseudogene |
| ENSMUSG00000091442 | 0 | 0 | 8 Gm17031       | processed_pseudogene |
| ENSMUSG00000091896 | 0 | 0 | 8 Ube2d2a       | protein_coding       |
| ENSMUSG00000093240 | 0 | 0 | 8 Gm24573       | rRNA                 |
| ENSMUSG00000093879 | 0 | 0 | 8 Gm25457       | snRNA                |
| ENSMUSG00000097667 | 0 | 0 | 8 Gm26764       | lincRNA              |
| ENSMUSG00000097825 | 0 | 0 | 8 9630001P10Rik | lincRNA              |
| ENSMUSG00000101257 | 0 | 0 | 8 2310015K22Rik | lincRNA              |
| ENSMUSG00000102504 | 0 | 0 | 8 Gm21955       | TEC                  |
| ENSMUSG00000103694 | 0 | 0 | 8 Gm37530       | TEC                  |
| ENSMUSG00000103951 | 0 | 0 | 8 Gm37269       | TEC                  |
| ENSMUSG00000104293 | 0 | 0 | 8 Gm38043       | TEC                  |
| ENSMUSG00000000301 | 0 | 0 | 6 Pemt          | protein_coding       |
| ENSMUSG00000003549 | 0 | 0 | 6 Ercc1         | protein_coding       |
| ENSMUSG00000006649 | 0 | 0 | 6 Nphs1         | protein_coding       |
| ENSMUSG00000006740 | 0 | 0 | 6 Kif5b         | protein_coding       |
| ENSMUSG00000015087 | 0 | 0 | 6 Rabl6         | protein_coding       |
| ENSMUSG00000015542 | 0 | 0 | 6 Nat9          | protein_coding       |
| ENSMUSG00000016346 | 0 | 0 | 6 Kcnq2         | protein_coding       |
| ENSMUSG00000020155 | 0 | 0 | 6 Kcnmb1        | protein_coding       |
| ENSMUSG00000020396 | 0 | 0 | 6 Nefh          | protein_coding       |
| ENSMUSG00000020783 | 0 | 0 | 6 Ncbp3         | protein_coding       |
| ENSMUSG00000020891 | 0 | 0 | 6 Alox8         | protein_coding       |
| ENSMUSG00000021211 | 0 | 0 | 6 Akr1c12       | protein_coding       |
| ENSMUSG00000021213 | 0 | 0 | 6 Akr1c13       | protein_coding       |
| ENSMUSG00000021327 | 0 | 0 | 6 Zkscan3       | protein_coding       |
| ENSMUSG00000022231 | 0 | 0 | 6 Sema5a        | protein_coding       |
| ENSMUSG00000022253 | 0 | 0 | 6 Nadk2         | protein_coding       |
| ENSMUSG00000022538 | 0 | 0 | 6 Lsg1          | protein_coding       |
| ENSMUSG00000022753 | 0 | 0 | 6 Tmem30c       | protein_coding       |
| ENSMUSG00000023284 | 0 | 0 | 6 Zfp605        | protein_coding       |
| ENSMUSG00000023328 | 0 | 0 | 6 Ache          | protein_coding       |
| ENSMUSG00000023806 | 0 | 0 | 6 Rsph3b        | protein_coding       |
| ENSMUSG00000024095 | 0 | 0 | 6 Hnmp1l        | protein_coding       |
| ENSMUSG00000024833 | 0 | 0 | 6 Pola2         | protein_coding       |
| ENSMUSG00000025907 | 0 | 0 | 6 Rblcc1        | protein_coding       |
| ENSMUSG00000026463 | 0 | 0 | 6 Atp2b4        | protein_coding       |
| ENSMUSG00000026851 | 0 | 0 | 6 BC005624      | protein_coding       |
| ENSMUSG00000027091 | 0 | 0 | 6 Zc3h15        | protein_coding       |
| ENSMUSG00000027221 | 0 | 0 | 6 Chst1         | protein_coding       |
| ENSMUSG00000027227 | 0 | 0 | 6 Sord          | protein_coding       |
| ENSMUSG00000027355 | 0 | 0 | 6 Tmco5         | protein_coding       |
| ENSMUSG00000027834 | 0 | 0 | 6 Serpini1      | protein_coding       |
| ENSMUSG00000027942 | 0 | 0 | 6 4933434E20Rik | protein_coding       |
| ENSMUSG00000028419 | 0 | 0 | 6 Chmp5         | protein_coding       |

|                    |   |   |            |                      |
|--------------------|---|---|------------|----------------------|
| ENSMUSG00000029344 | 0 | 0 | 6 Tpst2    | protein_coding       |
| ENSMUSG00000032288 | 0 | 0 | 6 Imp3     | protein_coding       |
| ENSMUSG00000032328 | 0 | 0 | 6 Tmem30a  | protein_coding       |
| ENSMUSG00000033039 | 0 | 0 | 6 Micall1  | protein_coding       |
| ENSMUSG00000033253 | 0 | 0 | 6 Szt2     | protein_coding       |
| ENSMUSG00000033623 | 0 | 0 | 6 Pcgf3    | protein_coding       |
| ENSMUSG00000033726 | 0 | 0 | 6 Emx1     | protein_coding       |
| ENSMUSG00000034032 | 0 | 0 | 6 Rpap1    | protein_coding       |
| ENSMUSG00000034412 | 0 | 0 | 6 Tbc1d10a | protein_coding       |
| ENSMUSG00000035575 | 0 | 0 | 6 Utp6     | protein_coding       |
| ENSMUSG00000036139 | 0 | 0 | 6 Hoxc9    | protein_coding       |
| ENSMUSG00000036430 | 0 | 0 | 6 Tbcc     | protein_coding       |
| ENSMUSG00000037071 | 0 | 0 | 6 Scd1     | protein_coding       |
| ENSMUSG00000037857 | 0 | 0 | 6 Nufip2   | protein_coding       |
| ENSMUSG00000038122 | 0 | 0 | 6 Tbc1d32  | protein_coding       |
| ENSMUSG00000038274 | 0 | 0 | 6 Fau      | protein_coding       |
| ENSMUSG00000039001 | 0 | 0 | 6 Rps21    | protein_coding       |
| ENSMUSG00000039509 | 0 | 0 | 6 Nup133   | protein_coding       |
| ENSMUSG00000039850 | 0 | 0 | 6 Endov    | protein_coding       |
| ENSMUSG00000040282 | 0 | 0 | 6 BC052040 | protein_coding       |
| ENSMUSG00000040681 | 0 | 0 | 6 Hmgn1    | protein_coding       |
| ENSMUSG00000040859 | 0 | 0 | 6 Bsdcl    | protein_coding       |
| ENSMUSG00000042043 | 0 | 0 | 6 Tbca     | protein_coding       |
| ENSMUSG00000042109 | 0 | 0 | 6 Csdcl    | protein_coding       |
| ENSMUSG00000042115 | 0 | 0 | 6 Klhdc8a  | protein_coding       |
| ENSMUSG00000042286 | 0 | 0 | 6 Stab1    | protein_coding       |
| ENSMUSG00000042616 | 0 | 0 | 6 Oscp1    | protein_coding       |
| ENSMUSG00000044043 | 0 | 0 | 6 Pcdhb14  | protein_coding       |
| ENSMUSG00000045799 | 0 | 0 | 6 Gm9800   | pseudogene           |
| ENSMUSG00000046178 | 0 | 0 | 6 Nxph1    | protein_coding       |
| ENSMUSG00000046580 | 0 | 0 | 6 Gm7862   | processed_pseudogene |
| ENSMUSG00000047810 | 0 | 0 | 6 Ccdc88b  | protein_coding       |
| ENSMUSG00000048482 | 0 | 0 | 6 Bdnf     | protein_coding       |
| ENSMUSG00000048709 | 0 | 0 | 6 Gm8666   | processed_pseudogene |
| ENSMUSG00000049103 | 0 | 0 | 6 Ccr2     | protein_coding       |
| ENSMUSG00000049624 | 0 | 0 | 6 Slc17a5  | protein_coding       |
| ENSMUSG00000050299 | 0 | 0 | 6 Gm9843   | protein_coding       |
| ENSMUSG00000050708 | 0 | 0 | 6 Ftl1     | protein_coding       |
| ENSMUSG00000052534 | 0 | 0 | 6 Pbx1     | protein_coding       |
| ENSMUSG00000052539 | 0 | 0 | 6 Magi3    | protein_coding       |
| ENSMUSG00000053749 | 0 | 0 | 6 Gm9920   | protein_coding       |
| ENSMUSG00000054405 | 0 | 0 | 6 Dnajc8   | protein_coding       |
| ENSMUSG00000054938 | 0 | 0 | 6 Olfr1346 | protein_coding       |
| ENSMUSG00000054986 | 0 | 0 | 6 Sec14l3  | protein_coding       |
| ENSMUSG00000055485 | 0 | 0 | 6 Soga1    | protein_coding       |
| ENSMUSG00000056880 | 0 | 0 | 6 Gadl1    | protein_coding       |
| ENSMUSG00000057499 | 0 | 0 | 6 Gm6177   | processed_pseudogene |
| ENSMUSG00000058542 | 0 | 0 | 6 Gm15590  | processed_pseudogene |
| ENSMUSG00000060550 | 0 | 0 | 6 H2-Q7    | protein_coding       |

|                    |   |   |                 |                                  |
|--------------------|---|---|-----------------|----------------------------------|
| ENSMUSG00000062382 | 0 | 0 | 6 Ftl1-ps1      | protein_coding                   |
| ENSMUSG00000064299 | 0 | 0 | 6 4921528I07Rik | protein_coding                   |
| ENSMUSG00000064481 | 0 | 0 | 6 Gm23737       | snRNA                            |
| ENSMUSG00000064802 | 0 | 0 | 6 Gm24036       | snRNA                            |
| ENSMUSG00000064958 | 0 | 0 | 6 Gm24921       | snRNA                            |
| ENSMUSG00000065212 | 0 | 0 | 6 Gm26264       | snRNA                            |
| ENSMUSG00000065307 | 0 | 0 | 6 Gm23247       | snRNA                            |
| ENSMUSG00000065750 | 0 | 0 | 6 Gm23346       | snoRNA                           |
| ENSMUSG00000065763 | 0 | 0 | 6 Gm23847       | snRNA                            |
| ENSMUSG00000065919 | 0 | 0 | 6 Gm24449       | snRNA                            |
| ENSMUSG00000066621 | 0 | 0 | 6 Tecpr1        | protein_coding                   |
| ENSMUSG00000067212 | 0 | 0 | 6 H2-T23        | protein_coding                   |
| ENSMUSG00000067547 | 0 | 0 | 6 Gm7666        | transcribed_processed_pseudogene |
| ENSMUSG00000067818 | 0 | 0 | 6 Myl9          | protein_coding                   |
| ENSMUSG00000068048 | 0 | 0 | 6 Rhox9         | protein_coding                   |
| ENSMUSG00000069515 | 0 | 0 | 6 Lyz1          | protein_coding                   |
| ENSMUSG00000069516 | 0 | 0 | 6 Lyz2          | protein_coding                   |
| ENSMUSG00000071041 | 0 | 0 | 6 Gm15210       | processed_pseudogene             |
| ENSMUSG00000071552 | 0 | 0 | 6 Tigit         | protein_coding                   |
| ENSMUSG00000071748 | 0 | 0 | 6 Gm14698       | protein_coding                   |
| ENSMUSG00000072616 | 0 | 0 | 6 Gm7853        | unprocessed_pseudogene           |
| ENSMUSG00000072623 | 0 | 0 | 6 Zfp9          | protein_coding                   |
| ENSMUSG00000073236 | 0 | 0 | 6 2500004C02Rik | processed_transcript             |
| ENSMUSG00000075064 | 0 | 0 | 6 Olfr1506      | protein_coding                   |
| ENSMUSG00000075268 | 0 | 0 | 6 Gm10819       | processed_pseudogene             |
| ENSMUSG00000075864 | 0 | 0 | 6 Gm26002       | snRNA                            |
| ENSMUSG00000078289 | 0 | 0 | 6 Gm10923       | processed_pseudogene             |
| ENSMUSG00000080980 | 0 | 0 | 6 1700071K01Rik | processed_pseudogene             |
| ENSMUSG00000081251 | 0 | 0 | 6 Gm12164       | processed_pseudogene             |
| ENSMUSG00000081456 | 0 | 0 | 6 Gm7781        | processed_pseudogene             |
| ENSMUSG00000081731 | 0 | 0 | 6 Calr-ps       | processed_pseudogene             |
| ENSMUSG00000082016 | 0 | 0 | 6 Pgaml-ps2     | processed_pseudogene             |
| ENSMUSG00000082062 | 0 | 0 | 6 Ftl2-ps       | processed_pseudogene             |
| ENSMUSG00000082248 | 0 | 0 | 6 Gm13161       | processed_pseudogene             |
| ENSMUSG00000082491 | 0 | 0 | 6 Gm5909        | processed_pseudogene             |
| ENSMUSG00000082774 | 0 | 0 | 6 Gm8805        | processed_pseudogene             |
| ENSMUSG00000082779 | 0 | 0 | 6 Gm13162       | processed_pseudogene             |
| ENSMUSG00000082790 | 0 | 0 | 6 Gm12155       | processed_pseudogene             |
| ENSMUSG00000082893 | 0 | 0 | 6 Gm11383       | processed_pseudogene             |
| ENSMUSG00000083019 | 0 | 0 | 6 Gm6222        | transcribed_processed_pseudogene |
| ENSMUSG00000083033 | 0 | 0 | 6 Gm9083        | processed_pseudogene             |
| ENSMUSG00000083200 | 0 | 0 | 6 Gm15066       | processed_pseudogene             |
| ENSMUSG00000083622 | 0 | 0 | 6 Gm15570       | processed_pseudogene             |
| ENSMUSG00000084096 | 0 | 0 | 6 Vmn1r-ps135   | unprocessed_pseudogene           |
| ENSMUSG00000084304 | 0 | 0 | 6 Gm6142        | processed_pseudogene             |
| ENSMUSG00000084639 | 0 | 0 | 6 Gm23888       | misc_RNA                         |
| ENSMUSG00000084737 | 0 | 0 | 6 Gm25805       | snRNA                            |
| ENSMUSG00000084803 | 0 | 0 | 6 5830444B04Rik | processed_transcript             |
| ENSMUSG00000084957 | 0 | 0 | 6 Bbip1         | protein_coding                   |

|                    |   |   |                 |                                  |
|--------------------|---|---|-----------------|----------------------------------|
| ENSMUSG00000085057 | 0 | 0 | 6 Gm13415       | processed_transcript             |
| ENSMUSG00000085282 | 0 | 0 | 6 Gm15663       | processed_transcript             |
| ENSMUSG00000085399 | 0 | 0 | 6 Foxd2os       | processed_transcript             |
| ENSMUSG00000085794 | 0 | 0 | 6 Vax2os        | antisense                        |
| ENSMUSG00000086166 | 0 | 0 | 6 Gm14342       | lincRNA                          |
| ENSMUSG00000086697 | 0 | 0 | 6 4933427G23Rik | transcribed_processed_pseudogene |
| ENSMUSG00000087351 | 0 | 0 | 6 Gm11464       | lincRNA                          |
| ENSMUSG00000088258 | 0 | 0 | 6 Gm24291       | snRNA                            |
| ENSMUSG00000088456 | 0 | 0 | 6 Gm26372       | misc_RNA                         |
| ENSMUSG00000088494 | 0 | 0 | 6 Gm24399       | snRNA                            |
| ENSMUSG00000089670 | 0 | 0 | 6 Gm16581       | processed_pseudogene             |
| ENSMUSG00000089859 | 0 | 0 | 6 Gm13769       | protein_coding                   |
| ENSMUSG00000089945 | 0 | 0 | 6 Pakap         | protein_coding                   |
| ENSMUSG00000090211 | 0 | 0 | 6 Gm16050       | lincRNA                          |
| ENSMUSG00000092418 | 0 | 0 | 6 Gm20406       | antisense                        |
| ENSMUSG00000093983 | 0 | 0 | 6 Gm25431       | snRNA                            |
| ENSMUSG00000093999 | 0 | 0 | 6 Gm26501       | snRNA                            |
| ENSMUSG00000095478 | 0 | 0 | 6 Gm9824        | processed_pseudogene             |
| ENSMUSG00000096405 | 0 | 0 | 6 4930474N05Rik | protein_coding                   |
| ENSMUSG00000096676 | 0 | 0 | 6 Gm24517       | snRNA                            |
| ENSMUSG00000099644 | 0 | 0 | 6 Gm28626       | antisense                        |
| ENSMUSG00000099697 | 0 | 0 | 6               | lincRNA                          |
| ENSMUSG00000099728 | 0 | 0 | 6 Gm8510        | processed_pseudogene             |
| ENSMUSG00000100145 | 0 | 0 | 6 Gm8502        | processed_pseudogene             |
| ENSMUSG00000101066 | 0 | 0 | 6 Gm8498        | processed_pseudogene             |
| ENSMUSG00000102522 | 0 | 0 | 6 Gm37782       | TEC                              |
| ENSMUSG00000102809 | 0 | 0 | 6 Gm8643        | processed_pseudogene             |
| ENSMUSG00000103778 | 0 | 0 | 6 Gm36930       | TEC                              |
| ENSMUSG00000103905 | 0 | 0 | 6 Gm34379       | processed_pseudogene             |
| ENSMUSG00000103944 | 0 | 0 | 6 Rpl26-ps3     | processed_pseudogene             |
| ENSMUSG00000104045 | 0 | 0 | 6 Gm37565       | lincRNA                          |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

Vega annotation: [http://vega.sanger.ac.uk/info/about/gene\\_and\\_transcript\\_types.html](http://vega.sanger.ac.uk/info/about/gene_and_transcript_types.html)

**Supplemental Table 3. Exon derived RapiRNA and NRapiRNA expressions.****NRapiRNA**

| Ensembl ID          | Normalized counts |        |        | Gene symbol | Vega Biotype   |
|---------------------|-------------------|--------|--------|-------------|----------------|
|                     | oocyte            | zygote | sperm  |             |                |
| ENSMUSG000000065904 | 29113             | 22324  | 2883   | Gm26109     | snoRNA         |
| ENSMUSG000000093565 | 27774             | 14110  | 59514  | Rab26os     | antisense      |
| ENSMUSG000000065818 | 11637             | 6403   | 24119  | Snord35a    | snoRNA         |
| ENSMUSG000000065734 | 4531              | 3480   | 720    | Snord49a    | snoRNA         |
| ENSMUSG000000077527 | 1220              | 688    | 2679   | Gm25506     | snoRNA         |
| ENSMUSG000000055296 | 1017              | 1110   | 0      | Tmem245     | protein_coding |
| ENSMUSG000000080469 | 829               | 784    | 412    | Snord98     | snoRNA         |
| ENSMUSG000000065219 | 792               | 221    | 124467 | Snord32a    | snoRNA         |
| ENSMUSG000000005893 | 631               | 755    | 452    | Nr2c2       | protein_coding |
| ENSMUSG000000026596 | 606               | 592    | 0      | Abl2        | protein_coding |
| ENSMUSG000000077239 | 594               | 393    | 85     | Snord66     | snoRNA         |
| ENSMUSG000000077734 | 571               | 357    | 9662   | Snord83b    | snoRNA         |
| ENSMUSG000000044783 | 503               | 468    | 0      | Hjurp       | protein_coding |
| ENSMUSG000000064647 | 420               | 238    | 105    | Gm23301     | snoRNA         |
| ENSMUSG000000034832 | 400               | 283    | 0      | Tet3        | protein_coding |
| ENSMUSG000000033102 | 400               | 502    | 0      | Cdc14b      | protein_coding |
| ENSMUSG000000034320 | 382               | 342    | 0      | Slc26a2     | protein_coding |
| ENSMUSG000000000740 | 320               | 244    | 872    | Rpl13       | protein_coding |
| ENSMUSG000000079259 | 311               | 255    | 0      | Trim71      | protein_coding |
| ENSMUSG000000064844 | 310               | 127    | 351    | Gm26202     | snoRNA         |
| ENSMUSG000000026181 | 273               | 259    | 30     | Ppm1f       | protein_coding |
| ENSMUSG000000039662 | 267               | 226    | 0      | Icmt        | protein_coding |
| ENSMUSG000000074682 | 261               | 257    | 0      | Zcchc3      | protein_coding |
| ENSMUSG000000040195 | 258               | 313    | 500    | Nemp1       | protein_coding |
| ENSMUSG000000094251 | 252               | 227    | 99     | Gm25632     | snoRNA         |
| ENSMUSG000000094382 | 252               | 227    | 99     | Gm22192     | snoRNA         |
| ENSMUSG000000069895 | 244               | 179    | 0      | Atxn1l      | protein_coding |
| ENSMUSG000000048756 | 242               | 330    | 0      | Foxo3       | protein_coding |
| ENSMUSG000000001089 | 240               | 252    | 0      | Luzp1       | protein_coding |
| ENSMUSG000000064952 | 238               | 227    | 99     | Gm24920     | snoRNA         |
| ENSMUSG000000064823 | 230               | 216    | 141    | Snord82     | snoRNA         |
| ENSMUSG000000034342 | 229               | 256    | 111    | Cbl         | protein_coding |
| ENSMUSG000000065258 | 213               | 143    | 0      | Gm23969     | snoRNA         |
| ENSMUSG000000064925 | 205               | 6      | 135    | Snora62     | snoRNA         |
| ENSMUSG000000071669 | 187               | 30     | 0      | Snx29       | protein_coding |
| ENSMUSG000000035666 | 184               | 257    | 67     | Gtf3c4      | protein_coding |
| ENSMUSG000000030956 | 182               | 215    | 83     | Fam53b      | protein_coding |
| ENSMUSG000000048578 | 172               | 119    | 0      | Mlec        | protein_coding |
| ENSMUSG000000015970 | 167               | 176    | 0      | Chdh        | protein_coding |
| ENSMUSG000000054387 | 167               | 137    | 0      | Mdm4        | protein_coding |
| ENSMUSG000000095205 | 166               | 123    | 97     | Snord93     | snoRNA         |



## nrapiRNA

|                    |     |     |                 |                      |
|--------------------|-----|-----|-----------------|----------------------|
| ENSMUSG00000086841 | 164 | 116 | 0 2410006H16Rik | processed_transcript |
| ENSMUSG00000097451 | 161 | 152 | 0 Rian          | processed_transcript |
| ENSMUSG00000040209 | 152 | 169 | 0 Zfp704        | protein_coding       |
| ENSMUSG00000004865 | 151 | 160 | 0 Srpkl         | protein_coding       |
| ENSMUSG00000036450 | 145 | 181 | 0 Hif1an        | protein_coding       |
| ENSMUSG00000096188 | 144 | 120 | 0 Cmtm4         | protein_coding       |
| ENSMUSG00000018428 | 142 | 74  | 0 Akap1         | protein_coding       |
| ENSMUSG00000048108 | 141 | 150 | 0 Tmem72        | protein_coding       |
| ENSMUSG00000077797 | 141 | 88  | 67 Snord19      | snoRNA               |
| ENSMUSG00000040717 | 140 | 94  | 0 Il17rd        | protein_coding       |
| ENSMUSG00000077493 | 136 | 161 | 95 Snord91a     | snoRNA               |
| ENSMUSG00000098148 | 119 | 171 | 12              | lincRNA              |
| ENSMUSG00000029192 | 115 | 148 | 0 Tbc1d14       | protein_coding       |
| ENSMUSG00000077221 | 114 | 62  | 315 Snord67     | snoRNA               |
| ENSMUSG00000058558 | 111 | 161 | 89 Rpl5         | protein_coding       |
| ENSMUSG00000065118 | 110 | 95  | 12 Gm23297      | snoRNA               |
| ENSMUSG00000036698 | 109 | 166 | 161 Ago2        | protein_coding       |
| ENSMUSG00000028385 | 106 | 131 | 0 Snx30         | protein_coding       |
| ENSMUSG00000028822 | 104 | 68  | 0 Tmem50a       | protein_coding       |
| ENSMUSG00000023980 | 101 | 107 | 0 Taf8          | protein_coding       |
| ENSMUSG00000026812 | 98  | 61  | 0 Tsc1          | protein_coding       |
| ENSMUSG00000020482 | 96  | 170 | 125 Ccdc117     | protein_coding       |
| ENSMUSG00000030870 | 86  | 66  | 0 Ubfd1         | protein_coding       |
| ENSMUSG00000047030 | 85  | 74  | 0 Spata2        | protein_coding       |
| ENSMUSG00000034764 | 82  | 74  | 0 1700006J14Rik | processed_transcript |
| ENSMUSG00000080465 | 81  | 56  | 165 Gm22486     | snoRNA               |
| ENSMUSG00000098178 | 79  | 94  | 2058 Gm42418    | lincRNA              |
| ENSMUSG00000021608 | 79  | 70  | 0 Lpcat1        | protein_coding       |
| ENSMUSG00000064918 | 78  | 56  | 75 Gm22571      | snoRNA               |
| ENSMUSG00000028868 | 76  | 60  | 0 Wasf2         | protein_coding       |
| ENSMUSG00000070639 | 75  | 178 | 0 Lrrc8b        | protein_coding       |
| ENSMUSG00000015776 | 75  | 77  | 0 Med22         | protein_coding       |
| ENSMUSG00000028920 | 75  | 55  | 0 Fbxo42        | protein_coding       |
| ENSMUSG00000095868 | 75  | 45  | 57 Gm23136      | snoRNA               |
| ENSMUSG00000066640 | 74  | 57  | 0 Fbxl18        | protein_coding       |
| ENSMUSG00000028527 | 73  | 86  | 0 Ak4           | protein_coding       |
| ENSMUSG00000000826 | 73  | 39  | 0 Dnajc5        | protein_coding       |
| ENSMUSG00000071655 | 73  | 33  | 16 Ubxn1        | protein_coding       |
| ENSMUSG00000020431 | 73  | 53  | 0 Adcyl         | protein_coding       |
| ENSMUSG00000022992 | 70  | 80  | 0 Kansl2        | protein_coding       |
| ENSMUSG00000020658 | 69  | 53  | 0 Efr3b         | protein_coding       |
| ENSMUSG00000032890 | 68  | 64  | 0 Rims3         | protein_coding       |
| ENSMUSG00000096832 | 67  | 33  | 0 Mir3096       | snoRNA               |
| ENSMUSG00000024764 | 67  | 24  | 0 Naa40         | protein_coding       |
| ENSMUSG00000020661 | 67  | 39  | 0 Dnmt3a        | protein_coding       |
| ENSMUSG00000088948 | 66  | 33  | 153 Gm23262     | snoRNA               |

## nrapiRNA

|                    |    |     |                 |                                    |
|--------------------|----|-----|-----------------|------------------------------------|
| ENSMUSG00000052477 | 65 | 80  | 0 C130026I21Rik | protein_coding                     |
| ENSMUSG00000038485 | 64 | 39  | 0 Socs7         | protein_coding                     |
| ENSMUSG00000070031 | 64 | 80  | 0 Sp140         | protein_coding                     |
| ENSMUSG00000089716 | 62 | 80  | 0 Gm6264        | transcribed_unprocessed_pseudogene |
| ENSMUSG00000034187 | 61 | 93  | 0 Nsf           | protein_coding                     |
| ENSMUSG00000058793 | 60 | 87  | 0 Cds2          | protein_coding                     |
| ENSMUSG00000078515 | 60 | 54  | 0 Ddi2          | protein_coding                     |
| ENSMUSG00000092730 | 60 | 32  | 12 Snora24      | snoRNA                             |
| ENSMUSG00000001870 | 60 | 29  | 476 Ltbp1       | protein_coding                     |
| ENSMUSG00000026436 | 59 | 91  | 0 Elk4          | protein_coding                     |
| ENSMUSG00000032383 | 58 | 88  | 0 Ppib          | protein_coding                     |
| ENSMUSG00000064514 | 58 | 49  | 91 Gm22455      | snoRNA                             |
| ENSMUSG00000063972 | 58 | 114 | 0 Nr6a1         | protein_coding                     |
| ENSMUSG00000058761 | 58 | 77  | 0 Rnf169        | protein_coding                     |
| ENSMUSG00000087968 | 58 | 56  | 0 Gm25395       | snoRNA                             |
| ENSMUSG00000039936 | 58 | 44  | 0 Pik3cd        | protein_coding                     |
| ENSMUSG00000038766 | 58 | 32  | 0 Gabpb2        | protein_coding                     |
| ENSMUSG00000026788 | 57 | 69  | 0 Zbtb43        | protein_coding                     |
| ENSMUSG00000029640 | 57 | 43  | 0 Usp12         | protein_coding                     |
| ENSMUSG00000027331 | 57 | 20  | 0 Knstrn        | protein_coding                     |
| ENSMUSG00000065752 | 56 | 58  | 65 Gm23344      | snoRNA                             |
| ENSMUSG00000077212 | 56 | 177 | 248 Snord69     | snoRNA                             |
| ENSMUSG00000008393 | 56 | 19  | 0 Carhsp1       | protein_coding                     |
| ENSMUSG00000026383 | 55 | 46  | 0 Epb4115       | protein_coding                     |
| ENSMUSG00000038002 | 55 | 35  | 12 Cramp11      | protein_coding                     |
| ENSMUSG00000058488 | 54 | 35  | 87 Kl           | protein_coding                     |
| ENSMUSG00000027465 | 54 | 20  | 14 Tbc1d20      | protein_coding                     |
| ENSMUSG00000024052 | 53 | 38  | 0 Lpin2         | protein_coding                     |
| ENSMUSG00000021540 | 52 | 60  | 0 Smad5         | protein_coding                     |
| ENSMUSG00000067825 | 52 | 51  | 0 Pex26         | protein_coding                     |
| ENSMUSG00000020840 | 52 | 29  | 0 Blmh          | protein_coding                     |
| ENSMUSG00000089093 | 51 | 23  | 137 Snord11     | snoRNA                             |
| ENSMUSG00000032402 | 50 | 99  | 0 Smad3         | protein_coding                     |
| ENSMUSG00000049657 | 50 | 41  | 0 Zbtb5         | protein_coding                     |
| ENSMUSG00000017639 | 50 | 39  | 0 Rab11fip4     | protein_coding                     |
| ENSMUSG00000026667 | 48 | 52  | 16 Uhmkl        | protein_coding                     |
| ENSMUSG00000036282 | 47 | 65  | 12 Naa30        | protein_coding                     |
| ENSMUSG00000048833 | 47 | 18  | 0 Slc39a9       | protein_coding                     |
| ENSMUSG00000031928 | 47 | 28  | 0 Mrel1a        | protein_coding                     |
| ENSMUSG00000033624 | 46 | 39  | 0 Pdpr          | protein_coding                     |
| ENSMUSG00000038587 | 44 | 52  | 0 Akap12        | protein_coding                     |
| ENSMUSG00000049539 | 44 | 9   | 0 Hist1h1a      | protein_coding                     |
| ENSMUSG00000061436 | 43 | 51  | 0 Hipk2         | protein_coding                     |
| ENSMUSG00000020961 | 43 | 35  | 0 Ston2         | protein_coding                     |
| ENSMUSG00000051391 | 43 | 26  | 0 Ywhag         | protein_coding                     |
| ENSMUSG00000044600 | 43 | 18  | 0 Smim7         | protein_coding                     |

## nrapiRNA

|                     |    |    |                 |                      |
|---------------------|----|----|-----------------|----------------------|
| ENSMUSG00000035275  | 42 | 30 | 0 Raver2        | protein_coding       |
| ENSMUSG00000031545  | 42 | 28 | 0 Gpat4         | protein_coding       |
| ENSMUSG00000035173  | 42 | 23 | 0 Ccdc186       | protein_coding       |
| ENSMUSG00000030269  | 41 | 19 | 0 Mtmr14        | protein_coding       |
| ENSMUSG00000049354  | 41 | 49 | 0 Dcaf7         | protein_coding       |
| ENSMUSG00000026623  | 41 | 33 | 0 Lpgat1        | protein_coding       |
| ENSMUSG00000029223  | 40 | 37 | 0 Uchl1         | protein_coding       |
| ENSMUSG00000026380  | 40 | 37 | 0 Tfcp2l1       | protein_coding       |
| ENSMUSG00000022412  | 40 | 15 | 12 Mief1        | protein_coding       |
| ENSMUSG00000027635  | 39 | 33 | 0 Dsn1          | protein_coding       |
| ENSMUSG00000009575  | 39 | 28 | 24 Cbx5         | protein_coding       |
| ENSMUSG000000094411 | 39 | 0  | 1110 Snord16a   | snoRNA               |
| ENSMUSG00000024098  | 38 | 24 | 0 Twsg1         | protein_coding       |
| ENSMUSG00000037089  | 38 | 8  | 0 Slc35b2       | protein_coding       |
| ENSMUSG00000032244  | 38 | 5  | 0 Fem1b         | protein_coding       |
| ENSMUSG00000048109  | 38 | 40 | 0 Rbm15         | protein_coding       |
| ENSMUSG00000025873  | 38 | 26 | 0 Faf2          | protein_coding       |
| ENSMUSG000000097971 | 38 | 4  | 8133 Gm26917    | processed_transcript |
| ENSMUSG00000026974  | 36 | 12 | 0 Zmynd19       | protein_coding       |
| ENSMUSG00000075595  | 36 | 58 | 246 Zfp652      | protein_coding       |
| ENSMUSG00000032652  | 36 | 38 | 0 Crebl2        | protein_coding       |
| ENSMUSG000000089542 | 36 | 28 | 149 Gm25835     | snoRNA               |
| ENSMUSG00000000823  | 36 | 23 | 0 Zfp512b       | protein_coding       |
| ENSMUSG000000065445 | 36 | 7  | 61 Mir143       | miRNA                |
| ENSMUSG000000065954 | 35 | 79 | 67 Tacc1        | protein_coding       |
| ENSMUSG00000047045  | 34 | 33 | 0 Tmem164       | protein_coding       |
| ENSMUSG00000052915  | 33 | 46 | 0 Msl1          | protein_coding       |
| ENSMUSG00000028886  | 33 | 37 | 0 Eya3          | protein_coding       |
| ENSMUSG00000026150  | 33 | 18 | 0 Mff           | protein_coding       |
| ENSMUSG00000047227  | 33 | 18 | 22 Gm527        | protein_coding       |
| ENSMUSG00000029146  | 32 | 38 | 0 Snx17         | protein_coding       |
| ENSMUSG00000021514  | 32 | 37 | 0 Zfp369        | protein_coding       |
| ENSMUSG00000027439  | 32 | 18 | 0 Gzfl          | protein_coding       |
| ENSMUSG00000024472  | 32 | 13 | 0 Dcp2          | protein_coding       |
| ENSMUSG00000049323  | 31 | 23 | 46 Smcr8        | protein_coding       |
| ENSMUSG00000028933  | 31 | 22 | 0 Xrcc2         | protein_coding       |
| ENSMUSG000000065273 | 30 | 17 | 105 Gm25128     | snoRNA               |
| ENSMUSG00000019066  | 30 | 30 | 0 Rab3d         | protein_coding       |
| ENSMUSG00000072109  | 30 | 28 | 0 A530040E14Rik | antisense            |
| ENSMUSG00000021255  | 30 | 12 | 0 Esrrb         | protein_coding       |
| ENSMUSG000000064437 | 30 | 9  | 16 Snord49b     | snoRNA               |
| ENSMUSG00000025373  | 30 | 9  | 26 Rnf41        | protein_coding       |
| ENSMUSG000000093656 | 29 | 43 | 0 Gm20628       | antisense            |
| ENSMUSG00000050229  | 29 | 42 | 0 Pigm          | protein_coding       |
| ENSMUSG00000004317  | 29 | 24 | 0 Clcn5         | protein_coding       |
| ENSMUSG00000049800  | 29 | 18 | 0 Sertad2       | protein_coding       |

## nrapiRNA

|                     |    |    |            |                |
|---------------------|----|----|------------|----------------|
| ENSMUSG00000032346  | 29 | 13 | 0 Ooep     | protein_coding |
| ENSMUSG00000074030  | 28 | 39 | 16 Exoc8   | protein_coding |
| ENSMUSG00000097994  | 28 | 35 | 0 Gm26982  | antisense      |
| ENSMUSG00000044164  | 28 | 34 | 0 Rnf182   | protein_coding |
| ENSMUSG00000049106  | 28 | 28 | 0 Dcaf5    | protein_coding |
| ENSMUSG00000026782  | 28 | 20 | 0 Abi2     | protein_coding |
| ENSMUSG00000058446  | 28 | 10 | 0 Znf2     | protein_coding |
| ENSMUSG00000030788  | 27 | 47 | 18 Rnf141  | protein_coding |
| ENSMUSG00000025239  | 27 | 30 | 0 Limd1    | protein_coding |
| ENSMUSG00000051638  | 27 | 22 | 0 Gm9857   | protein_coding |
| ENSMUSG00000055932  | 27 | 16 | 0 Fto      | protein_coding |
| ENSMUSG00000052056  | 27 | 8  | 0 Zfp217   | protein_coding |
| ENSMUSG00000035121  | 27 | 0  | 0 Neil2    | protein_coding |
| ENSMUSG00000078584  | 27 | 0  | 0 AU022252 | protein_coding |
| ENSMUSG00000042439  | 27 | 21 | 0 Zfp532   | protein_coding |
| ENSMUSG00000036309  | 27 | 12 | 0 Skp1a    | protein_coding |
| ENSMUSG00000021978  | 26 | 31 | 0 Extl3    | protein_coding |
| ENSMUSG00000073018  | 26 | 27 | 0 Gm1070   | protein_coding |
| ENSMUSG00000039960  | 26 | 16 | 0 Rhou     | protein_coding |
| ENSMUSG00000051920  | 25 | 10 | 0 Rspo2    | protein_coding |
| ENSMUSG00000031482  | 25 | 9  | 0 Slc25a15 | protein_coding |
| ENSMUSG00000030609  | 24 | 30 | 0 Aen      | protein_coding |
| ENSMUSG00000062202  | 24 | 29 | 0 Btbd9    | protein_coding |
| ENSMUSG00000021143  | 24 | 28 | 0 Pacs2    | protein_coding |
| ENSMUSG00000027316  | 24 | 22 | 0 Gfra4    | protein_coding |
| ENSMUSG00000046562  | 24 | 20 | 0 Unc119b  | protein_coding |
| ENSMUSG00000035877  | 24 | 18 | 28 Zhx3    | protein_coding |
| ENSMUSG00000049553  | 24 | 5  | 0 Polr1a   | protein_coding |
| ENSMUSG00000009569  | 24 | 22 | 0 Mkl2     | protein_coding |
| ENSMUSG00000018841  | 23 | 47 | 12 Rad51d  | protein_coding |
| ENSMUSG00000043467  | 23 | 33 | 165 Zbtb37 | protein_coding |
| ENSMUSG00000006676  | 23 | 30 | 0 Usp19    | protein_coding |
| ENSMUSG00000009112  | 23 | 19 | 28 Bcl2l13 | protein_coding |
| ENSMUSG00000023030  | 23 | 18 | 0 Slc11a2  | protein_coding |
| ENSMUSG00000056629  | 23 | 18 | 0 Fkbp2    | protein_coding |
| ENSMUSG00000029405  | 22 | 39 | 0 G3bp2    | protein_coding |
| ENSMUSG00000051510  | 22 | 38 | 0 Mafg     | protein_coding |
| ENSMUSG00000059713  | 22 | 28 | 0 Rcan3    | protein_coding |
| ENSMUSG00000043131  | 22 | 19 | 0 Mob1a    | protein_coding |
| ENSMUSG00000020883  | 22 | 14 | 0 Fbxl20   | protein_coding |
| ENSMUSG00000022441  | 22 | 11 | 0 Efcab6   | protein_coding |
| ENSMUSG00000052298  | 22 | 0  | 0 Cdc42se2 | protein_coding |
| ENSMUSG000000086049 | 21 | 26 | 0 Gm12735  | antisense      |
| ENSMUSG00000026715  | 21 | 0  | 0 Serpinc1 | protein_coding |
| ENSMUSG00000040093  | 21 | 0  | 0 Bmf      | protein_coding |
| ENSMUSG00000042675  | 21 | 0  | 0 Ypel3    | protein_coding |

## nrapiRNA

|                    |    |    |                 |                |
|--------------------|----|----|-----------------|----------------|
| ENSMUSG00000015944 | 21 | 18 | 0 Gatsl2        | protein_coding |
| ENSMUSG00000020444 | 21 | 16 | 0 Guk1          | protein_coding |
| ENSMUSG00000005374 | 21 | 14 | 1844 Tbl2       | protein_coding |
| ENSMUSG00000074102 | 21 | 5  | 0 Rbm15b        | protein_coding |
| ENSMUSG00000028522 | 21 | 0  | 127 Mier1       | protein_coding |
| ENSMUSG00000028906 | 20 | 37 | 0 Epb41         | protein_coding |
| ENSMUSG00000029173 | 20 | 34 | 0 Sepsecs       | protein_coding |
| ENSMUSG00000037104 | 20 | 25 | 0 Socs5         | protein_coding |
| ENSMUSG00000047501 | 20 | 22 | 0 Cldn4         | protein_coding |
| ENSMUSG00000084883 | 20 | 20 | 0 Ccdc85c       | protein_coding |
| ENSMUSG00000032384 | 20 | 16 | 0 Csnk1g1       | protein_coding |
| ENSMUSG00000025209 | 20 | 14 | 0 Peo1          | protein_coding |
| ENSMUSG00000038126 | 20 | 14 | 0 Mphosph9      | protein_coding |
| ENSMUSG00000001280 | 20 | 14 | 40 Sp1          | protein_coding |
| ENSMUSG00000039917 | 20 | 14 | 0 Rhbdd2        | protein_coding |
| ENSMUSG00000017929 | 20 | 12 | 0 B4galt5       | protein_coding |
| ENSMUSG00000021277 | 20 | 9  | 0 Traf3         | protein_coding |
| ENSMUSG00000027951 | 20 | 4  | 0 Adar          | protein_coding |
| ENSMUSG00000039512 | 19 | 26 | 0 Uhrf1bp1      | protein_coding |
| ENSMUSG00000089308 | 19 | 25 | 0 Gm24837       | snoRNA         |
| ENSMUSG00000022389 | 19 | 17 | 0 Tef           | protein_coding |
| ENSMUSG00000024826 | 19 | 14 | 0 Dpf2          | protein_coding |
| ENSMUSG00000031393 | 19 | 10 | 0 Mecp2         | protein_coding |
| ENSMUSG00000041617 | 19 | 9  | 0 Ccdc74a       | protein_coding |
| ENSMUSG00000034189 | 19 | 0  | 0 Hsd1l         | protein_coding |
| ENSMUSG00000063576 | 19 | 0  | 0 Klhdc3        | protein_coding |
| ENSMUSG00000036155 | 19 | 24 | 0 Mgat5         | protein_coding |
| ENSMUSG00000005615 | 19 | 15 | 0 Pcyt1a        | protein_coding |
| ENSMUSG00000031758 | 19 | 12 | 0 Cdyl2         | protein_coding |
| ENSMUSG00000064540 | 19 | 12 | 0 Snord42a      | snoRNA         |
| ENSMUSG00000029723 | 19 | 12 | 0 Tsc22d4       | protein_coding |
| ENSMUSG00000086474 | 19 | 11 | 0 9130204K15Rik | lincRNA        |
| ENSMUSG00000004948 | 19 | 9  | 0 Zp3           | protein_coding |
| ENSMUSG00000006527 | 19 | 8  | 0 Sfmbl1        | protein_coding |
| ENSMUSG00000075707 | 19 | 7  | 0 Dio3          | protein_coding |
| ENSMUSG00000029790 | 19 | 5  | 0 Cep41         | protein_coding |
| ENSMUSG00000052384 | 18 | 25 | 0 Nrros         | protein_coding |
| ENSMUSG00000047415 | 18 | 12 | 0 Gpr68         | protein_coding |
| ENSMUSG00000070576 | 18 | 12 | 0 Mn1           | protein_coding |
| ENSMUSG00000075703 | 18 | 7  | 0 Ept1          | protein_coding |
| ENSMUSG00000022946 | 18 | 5  | 0 Dopey2        | protein_coding |
| ENSMUSG00000029860 | 18 | 5  | 0 Zyx           | protein_coding |
| ENSMUSG00000021133 | 18 | 4  | 0 Susd6         | protein_coding |
| ENSMUSG00000045538 | 17 | 30 | 0 Ddx28         | protein_coding |
| ENSMUSG00000002835 | 17 | 26 | 0 Chaf1a        | protein_coding |
| ENSMUSG00000010453 | 17 | 24 | 0 Kansl3        | protein_coding |

## nrapiRNA

|                    |    |    |                 |                |
|--------------------|----|----|-----------------|----------------|
| ENSMUSG00000022010 | 17 | 18 | 0 Tsc22d1       | protein_coding |
| ENSMUSG00000052557 | 17 | 15 | 0 Gan           | protein_coding |
| ENSMUSG00000001521 | 17 | 13 | 0 Tulp3         | protein_coding |
| ENSMUSG00000044134 | 17 | 10 | 0 Fam109a       | protein_coding |
| ENSMUSG00000043903 | 17 | 7  | 0 Gm22          | lincRNA        |
| ENSMUSG00000026622 | 17 | 6  | 0 Nek2          | protein_coding |
| ENSMUSG00000068747 | 17 | 4  | 270 Sort1       | protein_coding |
| ENSMUSG00000056429 | 17 | 4  | 12 Tgoln1       | protein_coding |
| ENSMUSG00000077345 | 17 | 0  | 0 Snord70       | snoRNA         |
| ENSMUSG00000053838 | 17 | 0  | 0 Nudcd3        | protein_coding |
| ENSMUSG00000024193 | 16 | 30 | 0 Phf1          | protein_coding |
| ENSMUSG00000030084 | 16 | 22 | 14 Plxna1       | protein_coding |
| ENSMUSG00000047514 | 16 | 21 | 0 Tspyl1        | protein_coding |
| ENSMUSG00000022472 | 16 | 9  | 210 Desi1       | protein_coding |
| ENSMUSG00000011960 | 16 | 9  | 0 Cent1         | protein_coding |
| ENSMUSG00000042650 | 16 | 8  | 0 Alkbh5        | protein_coding |
| ENSMUSG00000073557 | 16 | 8  | 0 Ppp1r12b      | protein_coding |
| ENSMUSG00000037896 | 16 | 7  | 0 Rcor1         | protein_coding |
| ENSMUSG00000064210 | 16 | 5  | 0 Ano6          | protein_coding |
| ENSMUSG00000021488 | 16 | 0  | 0 Nsd1          | protein_coding |
| ENSMUSG00000030203 | 16 | 25 | 0 Dusp16        | protein_coding |
| ENSMUSG00000057181 | 16 | 14 | 0 5730455P16Rik | protein_coding |
| ENSMUSG00000029249 | 16 | 13 | 0 Rest          | protein_coding |
| ENSMUSG00000089571 | 16 | 12 | 20 Gm23008      | snoRNA         |
| ENSMUSG00000032289 | 16 | 7  | 0 Thsd4         | protein_coding |
| ENSMUSG00000031782 | 16 | 0  | 0 Coq9          | protein_coding |
| ENSMUSG00000033444 | 16 | 0  | 0 Specc11       | protein_coding |
| ENSMUSG00000065676 | 15 | 37 | 32 Snord42b     | snoRNA         |
| ENSMUSG00000051335 | 15 | 31 | 0 Gfod1         | protein_coding |
| ENSMUSG00000065822 | 15 | 16 | 145 Snord15a    | snoRNA         |
| ENSMUSG00000040848 | 15 | 10 | 0 Sft2d2        | protein_coding |
| ENSMUSG00000068284 | 15 | 10 | 0 Usf3          | protein_coding |
| ENSMUSG00000026932 | 15 | 9  | 0 Nacc2         | protein_coding |
| ENSMUSG00000003178 | 15 | 7  | 0               | protein_coding |
| ENSMUSG00000039410 | 15 | 7  | 0 Prdm16        | protein_coding |
| ENSMUSG00000040028 | 15 | 6  | 0 Elavl1        | protein_coding |
| ENSMUSG00000038495 | 15 | 4  | 0 Otud7b        | protein_coding |
| ENSMUSG00000040722 | 15 | 0  | 0 Scamp5        | protein_coding |
| ENSMUSG00000057101 | 14 | 16 | 0 Zfp180        | protein_coding |
| ENSMUSG00000086965 | 14 | 14 | 0 Gm16314       | protein_coding |
| ENSMUSG00000010392 | 14 | 12 | 50 Gosr1        | protein_coding |
| ENSMUSG00000087141 | 14 | 11 | 0 Plexd2        | protein_coding |
| ENSMUSG00000040842 | 14 | 9  | 0 Szrd1         | protein_coding |
| ENSMUSG00000044148 | 13 | 26 | 0 1810030O07Rik | protein_coding |
| ENSMUSG00000034111 | 13 | 26 | 14 Tmed8        | protein_coding |
| ENSMUSG00000036160 | 13 | 23 | 0 Surf6         | protein_coding |

## nrapiRNA

|                    |    |    |             |                      |
|--------------------|----|----|-------------|----------------------|
| ENSMUSG00000021361 | 13 | 22 | 0 Tmem14c   | protein_coding       |
| ENSMUSG00000021097 | 13 | 20 | 0 Clmn      | protein_coding       |
| ENSMUSG00000092713 | 13 | 19 | 115 Gm22858 | snoRNA               |
| ENSMUSG00000057058 | 13 | 18 | 0 Skap1     | protein_coding       |
| ENSMUSG00000082117 | 13 | 16 | 0 Gm4994    | processed_pseudogene |
| ENSMUSG00000042202 | 13 | 16 | 0 Slc35e2   | protein_coding       |
| ENSMUSG00000028438 | 13 | 14 | 0 Kif24     | protein_coding       |
| ENSMUSG00000038299 | 13 | 11 | 0 Wdr36     | protein_coding       |
| ENSMUSG00000077625 | 13 | 10 | 32 Snord4a  | snoRNA               |
| ENSMUSG00000029461 | 13 | 9  | 0 Fam168a   | protein_coding       |
| ENSMUSG00000005225 | 13 | 5  | 0 Plekha8   | protein_coding       |
| ENSMUSG00000088958 | 13 | 0  | 0 Scarna8   | snoRNA               |
| ENSMUSG00000030168 | 13 | 0  | 0 Adipor2   | protein_coding       |
| ENSMUSG00000074884 | 13 | 29 | 0 Serf2     | protein_coding       |
| ENSMUSG00000027715 | 13 | 20 | 0 Ccna2     | protein_coding       |
| ENSMUSG00000004099 | 13 | 18 | 0 Dnmt1     | protein_coding       |
| ENSMUSG00000041025 | 13 | 8  | 0 Iffo2     | protein_coding       |
| ENSMUSG00000058444 | 13 | 0  | 50 Map2k5   | protein_coding       |
| ENSMUSG00000087370 | 13 | 0  | 16 Tmem170b | protein_coding       |
| ENSMUSG00000053094 | 13 | 0  | 0 Tmem248   | protein_coding       |
| ENSMUSG00000058392 | 13 | 0  | 0 Rrp1b     | protein_coding       |
| ENSMUSG00000035781 | 12 | 31 | 0 R3hdm4    | protein_coding       |
| ENSMUSG00000016200 | 12 | 26 | 0 Syt14     | protein_coding       |
| ENSMUSG00000004849 | 12 | 20 | 0 Ap1s1     | protein_coding       |
| ENSMUSG00000029775 | 12 | 18 | 0 Klhdc10   | protein_coding       |
| ENSMUSG00000041037 | 12 | 13 | 0 Irgq      | protein_coding       |
| ENSMUSG00000018143 | 12 | 9  | 0 Mafk      | protein_coding       |
| ENSMUSG00000028890 | 12 | 9  | 0 Mtf1      | protein_coding       |
| ENSMUSG00000058248 | 12 | 7  | 0 Kcnh1     | protein_coding       |
| ENSMUSG00000026600 | 12 | 5  | 0 Soat1     | protein_coding       |
| ENSMUSG00000053490 | 12 | 5  | 0 Trim60    | protein_coding       |
| ENSMUSG00000034636 | 12 | 4  | 0 Zyg11b    | protein_coding       |
| ENSMUSG00000041440 | 12 | 4  | 0 Gk5       | protein_coding       |
| ENSMUSG00000029528 | 12 | 1  | 26 Pxn      | protein_coding       |
| ENSMUSG00000001175 | 12 | 0  | 0 Calm1     | protein_coding       |
| ENSMUSG00000022708 | 12 | 0  | 0 Zbtb20    | protein_coding       |
| ENSMUSG00000027035 | 12 | 0  | 0 Cers6     | protein_coding       |
| ENSMUSG00000028803 | 12 | 0  | 0 Nipal3    | protein_coding       |
| ENSMUSG00000072568 | 11 | 25 | 0 Fam84b    | protein_coding       |
| ENSMUSG00000014550 | 11 | 15 | 0 Rbsn      | protein_coding       |
| ENSMUSG00000021770 | 11 | 14 | 0 Samd8     | protein_coding       |
| ENSMUSG00000097391 | 11 | 12 | 0 Mirg      | lincRNA              |
| ENSMUSG00000032285 | 11 | 12 | 0 Dnaja4    | protein_coding       |
| ENSMUSG00000028969 | 11 | 11 | 0 Cdk5      | protein_coding       |
| ENSMUSG00000042724 | 11 | 9  | 0 Map3k9    | protein_coding       |
| ENSMUSG00000039656 | 11 | 8  | 0 Rxrb      | protein_coding       |

## nrapiRNA

|                     |    |    |                 |                      |
|---------------------|----|----|-----------------|----------------------|
| ENSMUSG00000026311  | 11 | 7  | 1792 Asb1       | protein_coding       |
| ENSMUSG000000081957 | 11 | 7  | 0 Ak3l2-ps      | processed_pseudogene |
| ENSMUSG000000064612 | 11 | 5  | 0 Gm26457       | snoRNA               |
| ENSMUSG00000010554  | 11 | 0  | 0 Mettl16       | protein_coding       |
| ENSMUSG00000014496  | 11 | 0  | 0 Ankrd28       | protein_coding       |
| ENSMUSG000000021690 | 11 | 0  | 0 Jmy           | protein_coding       |
| ENSMUSG000000022529 | 11 | 0  | 0 Zfp263        | protein_coding       |
| ENSMUSG000000024580 | 11 | 0  | 0 Grpel2        | protein_coding       |
| ENSMUSG000000033943 | 11 | 0  | 0 Mga           | protein_coding       |
| ENSMUSG000000022668 | 10 | 20 | 0 Gtpbp8        | protein_coding       |
| ENSMUSG00000019731  | 10 | 18 | 0 Slc35e1       | protein_coding       |
| ENSMUSG000000063317 | 10 | 18 | 0 Usp31         | protein_coding       |
| ENSMUSG000000021481 | 10 | 15 | 0 Zfp346        | protein_coding       |
| ENSMUSG000000045005 | 10 | 10 | 0 Fzd5          | protein_coding       |
| ENSMUSG000000028702 | 10 | 9  | 0 Rad54l        | protein_coding       |
| ENSMUSG000000024878 | 10 | 9  | 0 Cbwd1         | protein_coding       |
| ENSMUSG000000025465 | 10 | 9  | 0 Echs1         | protein_coding       |
| ENSMUSG000000039771 | 10 | 8  | 0 Polr2j        | protein_coding       |
| ENSMUSG00000019864  | 10 | 7  | 0 Rtn4ip1       | protein_coding       |
| ENSMUSG000000040620 | 10 | 7  | 0 Dhx33         | protein_coding       |
| ENSMUSG000000021484 | 10 | 7  | 0 Lman2         | protein_coding       |
| ENSMUSG000000027663 | 10 | 5  | 73 Zmat3        | protein_coding       |
| ENSMUSG000000006705 | 10 | 5  | 0 Pknox1        | protein_coding       |
| ENSMUSG000000027583 | 10 | 5  | 0 Zbtb46        | protein_coding       |
| ENSMUSG000000030213 | 10 | 5  | 0 Atf7ip        | protein_coding       |
| ENSMUSG000000044730 | 10 | 5  | 0 9930104L06Rik | processed_transcript |
| ENSMUSG000000064563 | 10 | 5  | 18 Snora7a      | snoRNA               |
| ENSMUSG000000039202 | 10 | 5  | 0 Abhd2         | protein_coding       |
| ENSMUSG00000017837  | 10 | 0  | 0 Nkiras2       | protein_coding       |
| ENSMUSG00000018012  | 10 | 0  | 0 Rac3          | protein_coding       |
| ENSMUSG000000022387 | 10 | 0  | 0 Brd1          | protein_coding       |
| ENSMUSG000000023026 | 10 | 0  | 0 Dip2b         | protein_coding       |
| ENSMUSG000000024515 | 10 | 0  | 0 Smad4         | protein_coding       |
| ENSMUSG000000032437 | 10 | 0  | 0 Stt3b         | protein_coding       |
| ENSMUSG000000035572 | 10 | 0  | 0 Dcaf10        | protein_coding       |
| ENSMUSG000000048807 | 10 | 0  | 0 Slc35e4       | protein_coding       |
| ENSMUSG000000035203 | 10 | 14 | 0 Epn1          | protein_coding       |
| ENSMUSG000000029397 | 10 | 14 | 0 Rchy1         | protein_coding       |
| ENSMUSG000000040865 | 10 | 14 | 0 Ino80d        | protein_coding       |
| ENSMUSG000000058709 | 10 | 9  | 0 Egln2         | protein_coding       |
| ENSMUSG000000029101 | 10 | 9  | 0 Rgs12         | protein_coding       |
| ENSMUSG000000032411 | 10 | 8  | 0 Tfdp2         | protein_coding       |
| ENSMUSG000000079042 | 10 | 7  | 0 Apela         | protein_coding       |
| ENSMUSG000000005370 | 10 | 6  | 0 Msh6          | protein_coding       |
| ENSMUSG000000029705 | 10 | 5  | 77 Cux1         | protein_coding       |
| ENSMUSG000000025795 | 10 | 5  | 0 Rassf3        | protein_coding       |



## nrapiRNA

|                    |    |    |            |                |
|--------------------|----|----|------------|----------------|
| ENSMUSG00000039108 | 10 | 5  | 0 Lsm14b   | protein_coding |
| ENSMUSG00000004530 | 10 | 4  | 0 Coro1c   | protein_coding |
| ENSMUSG00000038013 | 10 | 4  | 0 Wipf2    | protein_coding |
| ENSMUSG00000066892 | 10 | 4  | 0 Fbxl12   | protein_coding |
| ENSMUSG00000015837 | 10 | 0  | 0 Sqstm1   | protein_coding |
| ENSMUSG00000019699 | 10 | 0  | 0 Akt3     | protein_coding |
| ENSMUSG00000024132 | 10 | 0  | 0 Eci1     | protein_coding |
| ENSMUSG00000024400 | 10 | 0  | 0 Wdr33    | protein_coding |
| ENSMUSG00000026283 | 10 | 0  | 0 Ing5     | protein_coding |
| ENSMUSG00000030259 | 10 | 0  | 0 Rassf8   | protein_coding |
| ENSMUSG00000032485 | 10 | 0  | 0 Scap     | protein_coding |
| ENSMUSG00000034265 | 10 | 0  | 0 Zdhhc14  | protein_coding |
| ENSMUSG00000037112 | 10 | 0  | 0 Sik2     | protein_coding |
| ENSMUSG00000046572 | 10 | 0  | 0 Zfp518b  | protein_coding |
| ENSMUSG00000048647 | 10 | 0  | 0 Exd1     | protein_coding |
| ENSMUSG00000050966 | 10 | 0  | 0 Lin28a   | protein_coding |
| ENSMUSG00000041712 | 9  | 22 | 0 Ubr7     | protein_coding |
| ENSMUSG00000057691 | 9  | 18 | 0 Zfp746   | protein_coding |
| ENSMUSG00000030287 | 9  | 12 | 0 Itpr2    | protein_coding |
| ENSMUSG00000098176 | 9  | 10 | 0 Ccdc166  | protein_coding |
| ENSMUSG00000046556 | 9  | 9  | 0 Zfp319   | protein_coding |
| ENSMUSG00000002844 | 9  | 9  | 0 Adprh    | protein_coding |
| ENSMUSG00000027222 | 9  | 9  | 0 Pex16    | protein_coding |
| ENSMUSG00000024142 | 9  | 7  | 0 Mlst8    | protein_coding |
| ENSMUSG00000033272 | 9  | 7  | 0 Slc35a4  | protein_coding |
| ENSMUSG00000022710 | 9  | 4  | 0 Usp7     | protein_coding |
| ENSMUSG00000046836 | 9  | 3  | 0 Brox     | protein_coding |
| ENSMUSG00000027479 | 9  | 0  | 16 Mapre1  | protein_coding |
| ENSMUSG00000006154 | 9  | 0  | 0 Eps8l1   | protein_coding |
| ENSMUSG00000013150 | 9  | 0  | 0 Gfod2    | protein_coding |
| ENSMUSG00000027395 | 9  | 0  | 0 Polr1b   | protein_coding |
| ENSMUSG00000028669 | 9  | 0  | 0 Pithd1   | protein_coding |
| ENSMUSG00000033705 | 9  | 0  | 0 Stard9   | protein_coding |
| ENSMUSG00000034066 | 9  | 0  | 0 Farp2    | protein_coding |
| ENSMUSG00000048410 | 9  | 0  | 0 Zfp407   | protein_coding |
| ENSMUSG00000049516 | 9  | 0  | 0 Spty2d1  | protein_coding |
| ENSMUSG00000091780 | 8  | 32 | 0 Sco2     | protein_coding |
| ENSMUSG00000064871 | 8  | 8  | 0 Snord58b | snoRNA         |
| ENSMUSG00000047746 | 8  | 8  | 0 Fbxo40   | protein_coding |
| ENSMUSG00000062175 | 8  | 5  | 0 Tgif2    | protein_coding |
| ENSMUSG00000042599 | 8  | 4  | 0 Kdm7a    | protein_coding |
| ENSMUSG00000042831 | 8  | 4  | 0 Alkbh6   | protein_coding |
| ENSMUSG00000026918 | 8  | 3  | 0 Brd3     | protein_coding |
| ENSMUSG00000027288 | 8  | 0  | 0 Zfp106   | protein_coding |
| ENSMUSG00000037692 | 8  | 0  | 0 Ahdc1    | protein_coding |
| ENSMUSG00000070720 | 8  | 0  | 0 Tmem200b | protein_coding |

## nrapiRNA

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000089682 | 8 | 0  | 0 Bcl2l2        | protein_coding       |
| ENSMUSG00000093930 | 8 | 0  | 0 Hmgcs1        | protein_coding       |
| ENSMUSG00000077394 | 7 | 15 | 22 Gm24339      | snoRNA               |
| ENSMUSG00000026313 | 7 | 15 | 0 Hdac4         | protein_coding       |
| ENSMUSG00000028698 | 7 | 13 | 0 Pik3r3        | protein_coding       |
| ENSMUSG00000031022 | 7 | 13 | 0 BC051019      | protein_coding       |
| ENSMUSG00000043671 | 7 | 13 | 0 Dpy19l3       | protein_coding       |
| ENSMUSG00000038028 | 7 | 12 | 0 Tigar         | protein_coding       |
| ENSMUSG00000010054 | 7 | 10 | 0 Tusc2         | protein_coding       |
| ENSMUSG00000018583 | 7 | 6  | 0 G3bp1         | protein_coding       |
| ENSMUSG00000045896 | 7 | 6  | 0 Paip2b        | protein_coding       |
| ENSMUSG00000096145 | 7 | 6  | 0 Vkorc1        | protein_coding       |
| ENSMUSG00000024425 | 7 | 5  | 0 Ndfip1        | protein_coding       |
| ENSMUSG00000085438 | 7 | 5  | 0 1700020I14Rik | lincRNA              |
| ENSMUSG00000034300 | 7 | 5  | 0 Fam53c        | protein_coding       |
| ENSMUSG00000037916 | 7 | 5  | 0 Ndufv1        | protein_coding       |
| ENSMUSG00000021279 | 7 | 4  | 6 Cdc42bpb      | protein_coding       |
| ENSMUSG00000018415 | 7 | 4  | 0 Gid4          | protein_coding       |
| ENSMUSG00000036398 | 7 | 4  | 0 Ppp1r1l       | protein_coding       |
| ENSMUSG00000059273 | 7 | 4  | 0 Zc3h4         | protein_coding       |
| ENSMUSG00000006932 | 7 | 0  | 0 Ctnnb1        | protein_coding       |
| ENSMUSG00000019338 | 7 | 0  | 0 Zfp687        | protein_coding       |
| ENSMUSG00000022205 | 7 | 0  | 0 Sub1          | protein_coding       |
| ENSMUSG00000024222 | 7 | 0  | 0 Fkbp5         | protein_coding       |
| ENSMUSG00000025393 | 7 | 0  | 0 Atp5b         | protein_coding       |
| ENSMUSG00000026709 | 7 | 0  | 0 Dars2         | protein_coding       |
| ENSMUSG00000028358 | 7 | 0  | 0 Zfp618        | protein_coding       |
| ENSMUSG00000033703 | 7 | 0  | 0 Fuk           | protein_coding       |
| ENSMUSG00000038393 | 7 | 0  | 0 Txnip         | protein_coding       |
| ENSMUSG00000038705 | 7 | 0  | 0 Gmeb2         | protein_coding       |
| ENSMUSG00000042032 | 7 | 0  | 0 Mat2b         | protein_coding       |
| ENSMUSG00000047824 | 7 | 0  | 0 Pygo2         | protein_coding       |
| ENSMUSG00000058706 | 7 | 0  | 0 0610030E20Rik | protein_coding       |
| ENSMUSG00000083646 | 7 | 0  | 0 Gm6088        | processed_pseudogene |
| ENSMUSG00000032434 | 7 | 22 | 0 Cmtm6         | protein_coding       |
| ENSMUSG00000056515 | 7 | 16 | 0 Rab31         | protein_coding       |
| ENSMUSG00000087177 | 7 | 11 | 0 E130307A14Rik | processed_transcript |
| ENSMUSG00000037815 | 7 | 9  | 0 Ctnna1        | protein_coding       |
| ENSMUSG00000021240 | 7 | 7  | 0 Abcd4         | protein_coding       |
| ENSMUSG00000032601 | 7 | 7  | 0 Prkar2a       | protein_coding       |
| ENSMUSG00000043760 | 7 | 7  | 0 Pkhd1         | protein_coding       |
| ENSMUSG00000022197 | 7 | 7  | 0 Pdzd2         | protein_coding       |
| ENSMUSG00000036120 | 7 | 7  | 0 Rfxank        | protein_coding       |
| ENSMUSG00000037434 | 7 | 5  | 0 Slc30a1       | protein_coding       |
| ENSMUSG00000087385 | 7 | 5  | 0 AA415398      | protein_coding       |
| ENSMUSG00000041530 | 7 | 5  | 0 Ago1          | protein_coding       |

## nrapiRNA

|                     |   |    |                 |                                    |
|---------------------|---|----|-----------------|------------------------------------|
| ENSMUSG00000073628  | 7 | 5  | 0 Gm10552       | antisense                          |
| ENSMUSG00000026655  | 7 | 4  | 12 Fam107b      | protein_coding                     |
| ENSMUSG00000027367  | 7 | 4  | 0 Stard7        | protein_coding                     |
| ENSMUSG00000022108  | 7 | 0  | 1150 Itm2b      | protein_coding                     |
| ENSMUSG00000042523  | 7 | 0  | 57 Dnal1        | protein_coding                     |
| ENSMUSG00000001440  | 7 | 0  | 0 Kpnb1         | protein_coding                     |
| ENSMUSG00000003992  | 7 | 0  | 0 Ssbp2         | protein_coding                     |
| ENSMUSG00000029094  | 7 | 0  | 0 Afap1         | protein_coding                     |
| ENSMUSG000000031910 | 7 | 0  | 0 Has3          | protein_coding                     |
| ENSMUSG000000038515 | 7 | 0  | 0 Grtp1         | protein_coding                     |
| ENSMUSG000000038697 | 7 | 0  | 0 Taf5l         | protein_coding                     |
| ENSMUSG000000053192 | 7 | 0  | 0 Mllt11        | protein_coding                     |
| ENSMUSG000000053436 | 7 | 0  | 0 Mapk14        | protein_coding                     |
| ENSMUSG000000061111 | 7 | 0  | 0 Fam195b       | protein_coding                     |
| ENSMUSG000000072640 | 7 | 0  | 0 Lymr9         | protein_coding                     |
| ENSMUSG000000085596 | 7 | 0  | 0 Gm11476       | processed_transcript               |
| ENSMUSG000000042976 | 7 | 0  | 0 9930038B18Rik | lincRNA                            |
| ENSMUSG000000049649 | 6 | 30 | 0 Gpr3          | protein_coding                     |
| ENSMUSG000000056476 | 6 | 26 | 0 Med12l        | protein_coding                     |
| ENSMUSG000000059278 | 6 | 25 | 0 Naa38         | protein_coding                     |
| ENSMUSG000000046721 | 6 | 12 | 0 Rpl14-ps1     | pseudogene                         |
| ENSMUSG000000030689 | 6 | 10 | 0 Ino80e        | protein_coding                     |
| ENSMUSG000000031028 | 6 | 10 | 0 Tub           | protein_coding                     |
| ENSMUSG000000052214 | 6 | 9  | 0 Opa3          | protein_coding                     |
| ENSMUSG000000020740 | 6 | 8  | 0 Gga3          | protein_coding                     |
| ENSMUSG000000036136 | 6 | 8  | 0 Fam110c       | protein_coding                     |
| ENSMUSG000000004789 | 6 | 7  | 0 Dlst          | protein_coding                     |
| ENSMUSG000000033420 | 6 | 6  | 0 Antxr1        | protein_coding                     |
| ENSMUSG000000034614 | 6 | 5  | 0 Pik3ip1       | protein_coding                     |
| ENSMUSG000000039740 | 6 | 5  | 0 Alg2          | protein_coding                     |
| ENSMUSG000000042608 | 6 | 5  | 0 Stk40         | protein_coding                     |
| ENSMUSG000000046822 | 6 | 5  | 0 Slc39a3       | protein_coding                     |
| ENSMUSG000000048905 | 6 | 5  | 0 4930539E08Rik | protein_coding                     |
| ENSMUSG000000029729 | 6 | 4  | 0 Zkscan1       | protein_coding                     |
| ENSMUSG000000051344 | 6 | 4  | 0 Plekhm3       | protein_coding                     |
| ENSMUSG000000020372 | 6 | 0  | 99 Rack1        | protein_coding                     |
| ENSMUSG000000060657 | 6 | 0  | 14 Marf1        | protein_coding                     |
| ENSMUSG000000093880 | 6 | 0  | 0 Tmem181c-ps   | unprocessed_pseudogene             |
| ENSMUSG000000096780 | 6 | 0  | 0 Tmem181b-ps   | transcribed_unprocessed_pseudogene |
| ENSMUSG000000000056 | 6 | 0  | 0 Narf          | protein_coding                     |
| ENSMUSG000000001211 | 6 | 0  | 0 Agpat3        | protein_coding                     |
| ENSMUSG000000002064 | 6 | 0  | 0 Sdf2          | protein_coding                     |
| ENSMUSG000000004207 | 6 | 0  | 0 Psap          | protein_coding                     |
| ENSMUSG000000004393 | 6 | 0  | 0 Ddx56         | protein_coding                     |
| ENSMUSG000000006418 | 6 | 0  | 0 Rnf114        | protein_coding                     |
| ENSMUSG000000011158 | 6 | 0  | 0 Brf1          | protein_coding                     |

## nrapiRNA

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000018167 | 6 | 0  | 0 Stard3        | protein_coding       |
| ENSMUSG00000018474 | 6 | 0  | 0 Chd3          | protein_coding       |
| ENSMUSG00000021962 | 6 | 0  | 0 Dcp1a         | protein_coding       |
| ENSMUSG00000024975 | 6 | 0  | 0 Pdcd4         | protein_coding       |
| ENSMUSG00000025544 | 6 | 0  | 0 Tm9sf2        | protein_coding       |
| ENSMUSG00000026489 | 6 | 0  | 0 Coq8a         | protein_coding       |
| ENSMUSG00000026502 | 6 | 0  | 0 Desi2         | protein_coding       |
| ENSMUSG00000026554 | 6 | 0  | 0 Dcaf8         | protein_coding       |
| ENSMUSG00000027427 | 6 | 0  | 0 Polr3f        | protein_coding       |
| ENSMUSG00000027673 | 6 | 0  | 0 Ndufb5        | protein_coding       |
| ENSMUSG00000028136 | 6 | 0  | 0 Snx27         | protein_coding       |
| ENSMUSG00000028207 | 6 | 0  | 0 Asph          | protein_coding       |
| ENSMUSG00000028518 | 6 | 0  | 0 Prkaa2        | protein_coding       |
| ENSMUSG00000028876 | 6 | 0  | 0 EphA10        | protein_coding       |
| ENSMUSG00000029624 | 6 | 0  | 0 Ptc1          | protein_coding       |
| ENSMUSG00000031781 | 6 | 0  | 0 Ciapin1       | protein_coding       |
| ENSMUSG00000031930 | 6 | 0  | 0 Wwp2          | protein_coding       |
| ENSMUSG00000032536 | 6 | 0  | 0 Trak1         | protein_coding       |
| ENSMUSG00000032841 | 6 | 0  | 0 Prr5l         | protein_coding       |
| ENSMUSG00000035337 | 6 | 0  | 0 Uchl4         | protein_coding       |
| ENSMUSG00000038141 | 6 | 0  | 0 Tmem181a      | protein_coding       |
| ENSMUSG00000041688 | 6 | 0  | 0 Amot          | protein_coding       |
| ENSMUSG00000041949 | 6 | 0  | 0 Tango6        | protein_coding       |
| ENSMUSG00000043154 | 6 | 0  | 0 Ppp2r3a       | protein_coding       |
| ENSMUSG00000046707 | 6 | 0  | 0 Csnk2a2       | protein_coding       |
| ENSMUSG00000048701 | 6 | 0  | 0 Ccdc6         | protein_coding       |
| ENSMUSG00000051518 | 6 | 0  | 0 Rps19bp1      | protein_coding       |
| ENSMUSG00000051592 | 6 | 0  | 0 Ccnb3         | protein_coding       |
| ENSMUSG00000054003 | 6 | 0  | 0 Tdrd9         | protein_coding       |
| ENSMUSG00000054611 | 6 | 0  | 0 Kdm2a         | protein_coding       |
| ENSMUSG00000057406 | 6 | 0  | 0 Whsc1         | protein_coding       |
| ENSMUSG00000078429 | 6 | 0  | 0 Ctdsp2        | protein_coding       |
| ENSMUSG00000084941 | 6 | 0  | 0 Gm11944       | processed_transcript |
| ENSMUSG00000075511 | 6 | 0  | 0 1700001L05Rik | lincRNA              |
| ENSMUSG00000028995 | 5 | 25 | 0 Fam126a       | protein_coding       |
| ENSMUSG00000005621 | 5 | 22 | 0 Zfp592        | protein_coding       |
| ENSMUSG00000000538 | 5 | 13 | 0 Tom112        | protein_coding       |
| ENSMUSG00000004040 | 5 | 12 | 0 Stat3         | protein_coding       |
| ENSMUSG00000071659 | 5 | 11 | 0 Hnrnpul2      | protein_coding       |
| ENSMUSG00000000276 | 5 | 10 | 0 Dgke          | protein_coding       |
| ENSMUSG00000034312 | 5 | 9  | 0 Iqsec1        | protein_coding       |
| ENSMUSG00000006335 | 5 | 7  | 0 Tfpt          | protein_coding       |
| ENSMUSG00000041708 | 5 | 7  | 0 Mpped1        | protein_coding       |
| ENSMUSG00000028411 | 5 | 6  | 0 Aptx          | protein_coding       |
| ENSMUSG00000030980 | 5 | 6  | 0 Knop1         | protein_coding       |
| ENSMUSG00000036402 | 5 | 5  | 0 Gng12         | protein_coding       |

## nrapiRNA

|                    |   |   |                 |                                    |
|--------------------|---|---|-----------------|------------------------------------|
| ENSMUSG00000024740 | 5 | 5 | 12 Ddb1         | protein_coding                     |
| ENSMUSG00000024212 | 5 | 5 | 0 Mllt1         | protein_coding                     |
| ENSMUSG00000026594 | 5 | 5 | 0 Ralgps2       | protein_coding                     |
| ENSMUSG00000056493 | 5 | 5 | 0 Foxk1         | protein_coding                     |
| ENSMUSG00000074925 | 5 | 4 | 34 Ptar1        | protein_coding                     |
| ENSMUSG00000018727 | 5 | 4 | 0 Cpsf4l        | protein_coding                     |
| ENSMUSG00000020448 | 5 | 4 | 0 Rnf185        | protein_coding                     |
| ENSMUSG00000023994 | 5 | 4 | 0 Nfya          | protein_coding                     |
| ENSMUSG00000031976 | 5 | 4 | 0 Urb2          | protein_coding                     |
| ENSMUSG00000032204 | 5 | 4 | 0 Aqp9          | protein_coding                     |
| ENSMUSG00000039145 | 5 | 4 | 0 Camk1d        | protein_coding                     |
| ENSMUSG00000049659 | 5 | 4 | 0 Aftph         | protein_coding                     |
| ENSMUSG00000018040 | 5 | 2 | 0 Rrp7a         | protein_coding                     |
| ENSMUSG00000074067 | 5 | 0 | 1739 Gm10619    | lincRNA                            |
| ENSMUSG00000044636 | 5 | 0 | 16 Csrnp2       | protein_coding                     |
| ENSMUSG00000098090 | 5 | 0 | 0 2700099C18Rik | transcribed_unprocessed_pseudogene |
| ENSMUSG00000002076 | 5 | 0 | 0 Hsf2bp        | protein_coding                     |
| ENSMUSG00000002409 | 5 | 0 | 0 Dyrk1b        | protein_coding                     |
| ENSMUSG00000003731 | 5 | 0 | 0 Kpna6         | protein_coding                     |
| ENSMUSG00000005483 | 5 | 0 | 0 Dnajb1        | protein_coding                     |
| ENSMUSG00000006941 | 5 | 0 | 0 Eif1b         | protein_coding                     |
| ENSMUSG00000009035 | 5 | 0 | 0 Tmem184b      | protein_coding                     |
| ENSMUSG00000017715 | 5 | 0 | 0 Pgs1          | protein_coding                     |
| ENSMUSG00000020361 | 5 | 0 | 0 Hspa4         | protein_coding                     |
| ENSMUSG00000020770 | 5 | 0 | 0 Unk           | protein_coding                     |
| ENSMUSG00000021371 | 5 | 0 | 0 Mcur1         | protein_coding                     |
| ENSMUSG00000022305 | 5 | 0 | 0 Lrp12         | protein_coding                     |
| ENSMUSG00000022682 | 5 | 0 | 0 Rrn3          | protein_coding                     |
| ENSMUSG00000022914 | 5 | 0 | 0 Brwd1         | protein_coding                     |
| ENSMUSG00000022999 | 5 | 0 | 0 Lmbr1l        | protein_coding                     |
| ENSMUSG00000023072 | 5 | 0 | 0 Cep89         | protein_coding                     |
| ENSMUSG00000023087 | 5 | 0 | 0 Noct          | protein_coding                     |
| ENSMUSG00000023118 | 5 | 0 | 0 Sympk         | protein_coding                     |
| ENSMUSG00000024661 | 5 | 0 | 0 Fth1          | protein_coding                     |
| ENSMUSG00000025083 | 5 | 0 | 0 Afap1l2       | protein_coding                     |
| ENSMUSG00000025234 | 5 | 0 | 0 Arih1         | protein_coding                     |
| ENSMUSG00000025762 | 5 | 0 | 0 Larp1b        | protein_coding                     |
| ENSMUSG00000026764 | 5 | 0 | 0 Kif5c         | protein_coding                     |
| ENSMUSG00000026790 | 5 | 0 | 0 Odf2          | protein_coding                     |
| ENSMUSG00000026848 | 5 | 0 | 0 Tor1b         | protein_coding                     |
| ENSMUSG00000027668 | 5 | 0 | 0 Mfn1          | protein_coding                     |
| ENSMUSG00000027864 | 5 | 0 | 0 Ptgfrn        | protein_coding                     |
| ENSMUSG00000028078 | 5 | 0 | 0 Dclk2         | protein_coding                     |
| ENSMUSG00000028318 | 5 | 0 | 0 Polr1e        | protein_coding                     |
| ENSMUSG00000029238 | 5 | 0 | 0 Clock         | protein_coding                     |
| ENSMUSG00000029551 | 5 | 0 | 0 Psmg3         | protein_coding                     |

## nrapiRNA

|                    |   |    |                 |                      |
|--------------------|---|----|-----------------|----------------------|
| ENSMUSG00000029840 | 5 | 0  | 0 Mtpn          | protein_coding       |
| ENSMUSG00000030801 | 5 | 0  | 0 Kat8          | protein_coding       |
| ENSMUSG00000031903 | 5 | 0  | 0 Pla2g15       | protein_coding       |
| ENSMUSG00000032376 | 5 | 0  | 0 Usp3          | protein_coding       |
| ENSMUSG00000033228 | 5 | 0  | 0 Scaf11        | protein_coding       |
| ENSMUSG00000034793 | 5 | 0  | 0 G6pc3         | protein_coding       |
| ENSMUSG00000034820 | 5 | 0  | 0 Cpsf7         | protein_coding       |
| ENSMUSG00000035247 | 5 | 0  | 0 Hectd1        | protein_coding       |
| ENSMUSG00000035439 | 5 | 0  | 0 Haus8         | protein_coding       |
| ENSMUSG00000037514 | 5 | 0  | 0 Pank2         | protein_coding       |
| ENSMUSG00000038848 | 5 | 0  | 0 Ythdf1        | protein_coding       |
| ENSMUSG00000038866 | 5 | 0  | 0 Zcchc2        | protein_coding       |
| ENSMUSG00000038872 | 5 | 0  | 0 Zfhx3         | protein_coding       |
| ENSMUSG00000039046 | 5 | 0  | 0 Usp6nl        | protein_coding       |
| ENSMUSG00000039068 | 5 | 0  | 0 Zzz3          | protein_coding       |
| ENSMUSG00000039262 | 5 | 0  | 0 Prrc2b        | protein_coding       |
| ENSMUSG00000040699 | 5 | 0  | 0 Limd2         | protein_coding       |
| ENSMUSG00000041815 | 5 | 0  | 0 Poldip3       | protein_coding       |
| ENSMUSG00000042211 | 5 | 0  | 0 Fbxo38        | protein_coding       |
| ENSMUSG00000043535 | 5 | 0  | 0 Setx          | protein_coding       |
| ENSMUSG00000043987 | 5 | 0  | 0 Cep164        | protein_coding       |
| ENSMUSG00000047446 | 5 | 0  | 0 Arl4a         | protein_coding       |
| ENSMUSG00000048814 | 5 | 0  | 0 Lonrf2        | protein_coding       |
| ENSMUSG00000048911 | 5 | 0  | 0 Rnf24         | protein_coding       |
| ENSMUSG00000049939 | 5 | 0  | 0 Lrrc4         | protein_coding       |
| ENSMUSG00000051339 | 5 | 0  | 0 2900026A02Rik | protein_coding       |
| ENSMUSG00000051615 | 5 | 0  | 0 Rap2a         | protein_coding       |
| ENSMUSG00000053293 | 5 | 0  | 0 Pom121        | protein_coding       |
| ENSMUSG00000054280 | 5 | 0  | 0 Prr14l        | protein_coding       |
| ENSMUSG00000054604 | 5 | 0  | 0 Cggbp1        | protein_coding       |
| ENSMUSG00000059323 | 5 | 0  | 0 Tonsl         | protein_coding       |
| ENSMUSG00000059474 | 5 | 0  | 0 Mbtd1         | protein_coding       |
| ENSMUSG00000059995 | 5 | 0  | 0 Atxn7l3       | protein_coding       |
| ENSMUSG00000060798 | 5 | 0  | 0 Intu          | protein_coding       |
| ENSMUSG00000064068 | 5 | 0  | 0 Mtx1          | protein_coding       |
| ENSMUSG00000070814 | 5 | 0  | 0 6330408A02Rik | protein_coding       |
| ENSMUSG00000071078 | 5 | 0  | 0 Nr2c2ap       | protein_coding       |
| ENSMUSG00000071645 | 5 | 0  | 0 Tut1          | protein_coding       |
| ENSMUSG00000071652 | 5 | 0  | 0 Ints5         | protein_coding       |
| ENSMUSG00000079215 | 5 | 0  | 0 Zfp664        | protein_coding       |
| ENSMUSG00000096160 | 5 | 0  | 0 Gm3436        | processed_pseudogene |
| ENSMUSG00000103733 | 5 | 0  | 0 Gm6162        | processed_pseudogene |
| ENSMUSG00000102052 | 5 | 0  | 0 Gm28387       | lincRNA              |
| ENSMUSG00000102095 | 5 | 0  | 0 C730036E19Rik | lincRNA              |
| ENSMUSG00000026915 | 4 | 24 | 75 Strbp        | protein_coding       |
| ENSMUSG00000057778 | 4 | 20 | 0 Cyb5d2        | protein_coding       |

## nrapiRNA

|                    |   |    |                  |                      |
|--------------------|---|----|------------------|----------------------|
| ENSMUSG00000029657 | 4 | 19 | 0 Hsph1          | protein_coding       |
| ENSMUSG00000028294 | 4 | 14 | 0 Cfap206        | protein_coding       |
| ENSMUSG00000072258 | 4 | 12 | 0 Taf1a          | protein_coding       |
| ENSMUSG00000033658 | 4 | 10 | 32 Ddx19b        | protein_coding       |
| ENSMUSG00000020696 | 4 | 10 | 0 Rffl           | protein_coding       |
| ENSMUSG00000050936 | 4 | 10 | 0 Gm42743        | protein_coding       |
| ENSMUSG00000003316 | 4 | 9  | 0 Glg1           | protein_coding       |
| ENSMUSG00000016528 | 4 | 9  | 0 Mapkapk2       | protein_coding       |
| ENSMUSG00000042364 | 4 | 9  | 0 Snx18          | protein_coding       |
| ENSMUSG00000059119 | 4 | 9  | 0 Nap114         | protein_coding       |
| ENSMUSG00000025575 | 4 | 8  | 0 Cant1          | protein_coding       |
| ENSMUSG00000034105 | 4 | 8  | 0 Tlde1          | protein_coding       |
| ENSMUSG00000042406 | 4 | 8  | 0 Atf4           | protein_coding       |
| ENSMUSG00000030045 | 4 | 7  | 0 Mrpl19         | protein_coding       |
| ENSMUSG00000024382 | 4 | 7  | 0 Ercc3          | protein_coding       |
| ENSMUSG00000091562 | 4 | 7  | 0 Crybg3         | processed_transcript |
| ENSMUSG00000022889 | 4 | 6  | 0 Mrpl39         | protein_coding       |
| ENSMUSG00000029627 | 4 | 6  | 0 Zkscan14       | protein_coding       |
| ENSMUSG00000072915 | 4 | 6  | 0 Gm12258        | protein_coding       |
| ENSMUSG00000013646 | 4 | 5  | 0 Sh3bp5l        | protein_coding       |
| ENSMUSG00000025938 | 4 | 5  | 0 Slco5a1        | protein_coding       |
| ENSMUSG00000045248 | 4 | 5  | 0 Med26          | protein_coding       |
| ENSMUSG00000047710 | 4 | 5  | 57 Champ1        | protein_coding       |
| ENSMUSG00000027575 | 4 | 5  | 0 Arfgap1        | protein_coding       |
| ENSMUSG00000036114 | 4 | 5  | 0 Rpp25l         | protein_coding       |
| ENSMUSG00000038342 | 4 | 5  | 0 Mlxip          | protein_coding       |
| ENSMUSG00000025203 | 4 | 0  | 30 Scd2          | protein_coding       |
| ENSMUSG00000063077 | 4 | 0  | 20 Kif1b         | protein_coding       |
| ENSMUSG00000088185 | 4 | 0  | 16 Scarna2       | snoRNA               |
| ENSMUSG00000048271 | 4 | 0  | 14 Rbm33         | protein_coding       |
| ENSMUSG00000030982 | 4 | 0  | 12 9030624J02Rik | protein_coding       |
| ENSMUSG00000061411 | 4 | 0  | 12 Nol4l         | protein_coding       |
| ENSMUSG00000007850 | 3 | 0  | 12 Hnrnp1        | protein_coding       |
| ENSMUSG00000008690 | 2 | 6  | 0 Ncaph2         | protein_coding       |
| ENSMUSG00000090957 | 2 | 6  | 0 Gm7535         | protein_coding       |
| ENSMUSG00000030036 | 2 | 5  | 16 Mogs          | protein_coding       |
| ENSMUSG00000027014 | 1 | 0  | 6 Cwc22          | protein_coding       |
| ENSMUSG00000079247 | 1 | 0  | 6 Gm13691        | protein_coding       |
| ENSMUSG00000094125 | 1 | 0  | 6 Gm13698        | protein_coding       |
| ENSMUSG00000094336 | 1 | 0  | 6 Gm13693        | protein_coding       |
| ENSMUSG00000095824 | 1 | 0  | 6 Gm13697        | protein_coding       |
| ENSMUSG00000096337 | 1 | 0  | 6 Gm13694        | protein_coding       |
| ENSMUSG00000096484 | 1 | 0  | 6 Gm13696        | protein_coding       |
| ENSMUSG00000096729 | 1 | 0  | 6 Gm13695        | protein_coding       |
| ENSMUSG00000088008 | 0 | 72 | 0 Gm25492        | snoRNA               |
| ENSMUSG00000026565 | 0 | 22 | 0 Pou2f1         | protein_coding       |

## nrapiRNA

|                    |   |    |             |                |
|--------------------|---|----|-------------|----------------|
| ENSMUSG00000028842 | 0 | 18 | 0 Ago3      | protein_coding |
| ENSMUSG00000000532 | 0 | 16 | 0 Acvr1b    | protein_coding |
| ENSMUSG00000017764 | 0 | 16 | 0 Zswim1    | protein_coding |
| ENSMUSG00000051747 | 0 | 16 | 0 Ttn       | protein_coding |
| ENSMUSG00000038615 | 0 | 15 | 0 Nfe2l1    | protein_coding |
| ENSMUSG00000044468 | 0 | 14 | 0 Fam46c    | protein_coding |
| ENSMUSG00000029190 | 0 | 14 | 0 D5Ert579e | protein_coding |
| ENSMUSG00000053617 | 0 | 14 | 0 Sh3pxd2a  | protein_coding |
| ENSMUSG00000068264 | 0 | 14 | 0 Ap5s1     | protein_coding |
| ENSMUSG00000004085 | 0 | 12 | 0 Zak       | protein_coding |
| ENSMUSG00000061410 | 0 | 12 | 0 Zcchc14   | protein_coding |
| ENSMUSG00000030852 | 0 | 12 | 0 Tacc2     | protein_coding |
| ENSMUSG00000031511 | 0 | 12 | 0 Arhgef7   | protein_coding |
| ENSMUSG00000073664 | 0 | 12 | 0 Nbeal1    | protein_coding |
| ENSMUSG00000032519 | 0 | 11 | 0 Slc25a38  | protein_coding |
| ENSMUSG00000040760 | 0 | 11 | 0 Appl1     | protein_coding |
| ENSMUSG00000050511 | 0 | 11 | 0 Oprd1     | protein_coding |
| ENSMUSG00000053716 | 0 | 11 | 0 Dusp7     | protein_coding |
| ENSMUSG00000021385 | 0 | 10 | 0 Ippk      | protein_coding |
| ENSMUSG00000024188 | 0 | 10 | 0 Luc7l     | protein_coding |
| ENSMUSG00000034613 | 0 | 10 | 0 Ppm1h     | protein_coding |
| ENSMUSG00000035629 | 0 | 10 | 0 Rubcn     | protein_coding |
| ENSMUSG00000002103 | 0 | 9  | 0 Acp2      | protein_coding |
| ENSMUSG00000006456 | 0 | 9  | 0 Rbm14     | protein_coding |
| ENSMUSG00000022656 | 0 | 9  | 0 Nectin3   | protein_coding |
| ENSMUSG00000024276 | 0 | 9  | 0 Zfp397    | protein_coding |
| ENSMUSG00000026435 | 0 | 9  | 0 Slc45a3   | protein_coding |
| ENSMUSG00000045752 | 0 | 9  | 0 Tssc4     | protein_coding |
| ENSMUSG00000048486 | 0 | 9  | 0 Fitm2     | protein_coding |
| ENSMUSG00000068039 | 0 | 9  | 0 Tcp1      | protein_coding |
| ENSMUSG00000070923 | 0 | 9  | 0 Klhl9     | protein_coding |
| ENSMUSG00000064778 | 0 | 9  | 0 Snord59a  | snoRNA         |
| ENSMUSG00000005312 | 0 | 9  | 0 Ubqln1    | protein_coding |
| ENSMUSG00000026926 | 0 | 9  | 0 Pmpca     | protein_coding |
| ENSMUSG00000028936 | 0 | 9  | 0 Rpl22     | protein_coding |
| ENSMUSG00000031295 | 0 | 9  | 0 Phka2     | protein_coding |
| ENSMUSG00000038056 | 0 | 9  | 0 Kmt2c     | protein_coding |
| ENSMUSG00000039844 | 0 | 9  | 0 Rapgef1   | protein_coding |
| ENSMUSG00000064145 | 0 | 9  | 0 Arih2     | protein_coding |
| ENSMUSG00000068663 | 0 | 9  | 0 Clec16a   | protein_coding |
| ENSMUSG00000071856 | 0 | 9  | 0 Mcc       | protein_coding |
| ENSMUSG00000089774 | 0 | 8  | 12 Slc5a3   | protein_coding |
| ENSMUSG00000006134 | 0 | 8  | 0 Crkl      | protein_coding |
| ENSMUSG00000024360 | 0 | 8  | 0 Etf1      | protein_coding |
| ENSMUSG00000031652 | 0 | 8  | 0 N4bp1     | protein_coding |
| ENSMUSG00000054027 | 0 | 8  | 0 Nt5dc3    | protein_coding |



## nrapiRNA

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000059625 | 0 | 8 | 0 Sohlh1        | protein_coding       |
| ENSMUSG00000028452 | 0 | 7 | 22 Vcp          | protein_coding       |
| ENSMUSG00000083327 | 0 | 7 | 22 Vcp-rs       | processed_pseudogene |
| ENSMUSG00000031987 | 0 | 7 | 0 Egl1          | protein_coding       |
| ENSMUSG00000035764 | 0 | 7 | 0 Fbxo45        | protein_coding       |
| ENSMUSG00000036672 | 0 | 7 | 0 Cenpt         | protein_coding       |
| ENSMUSG00000037579 | 0 | 7 | 0 Kcnh3         | protein_coding       |
| ENSMUSG00000041241 | 0 | 7 | 0 Mul1          | protein_coding       |
| ENSMUSG00000053929 | 0 | 7 | 0 Cyhr1         | protein_coding       |
| ENSMUSG00000072952 | 0 | 7 | 73358 Gm5878    | lincRNA              |
| ENSMUSG00000004462 | 0 | 7 | 0 Tbccd1        | protein_coding       |
| ENSMUSG00000007989 | 0 | 7 | 0 Fzd3          | protein_coding       |
| ENSMUSG00000016619 | 0 | 7 | 0 Nup50         | protein_coding       |
| ENSMUSG00000020522 | 0 | 7 | 0 Mfap3         | protein_coding       |
| ENSMUSG00000021972 | 0 | 7 | 0 Hmbox1        | protein_coding       |
| ENSMUSG00000025010 | 0 | 7 | 0 Ccnj          | protein_coding       |
| ENSMUSG00000030096 | 0 | 7 | 0 Slc6a6        | protein_coding       |
| ENSMUSG00000032010 | 0 | 7 | 0 Usp2          | protein_coding       |
| ENSMUSG00000032560 | 0 | 7 | 0 Dnajc13       | protein_coding       |
| ENSMUSG00000037344 | 0 | 7 | 0 Slc12a9       | protein_coding       |
| ENSMUSG00000042121 | 0 | 7 | 0 Ssh1          | protein_coding       |
| ENSMUSG00000050144 | 0 | 7 | 0 Slc25a44      | protein_coding       |
| ENSMUSG00000053110 | 0 | 7 | 0 Yap1          | protein_coding       |
| ENSMUSG00000056536 | 0 | 7 | 0 Pign          | protein_coding       |
| ENSMUSG00000094724 | 0 | 7 | 0 Rnaset2b      | protein_coding       |
| ENSMUSG00000095687 | 0 | 7 | 0 Rnaset2a      | protein_coding       |
| ENSMUSG00000078925 | 0 | 7 | 0 D030018L15Rik | lincRNA              |
| ENSMUSG00000062866 | 0 | 6 | 22 Phactr2      | protein_coding       |
| ENSMUSG00000097820 | 0 | 6 | 0 E530011L22Rik | TEC                  |
| ENSMUSG00000016346 | 0 | 6 | 0 Kcnq2         | protein_coding       |
| ENSMUSG00000020652 | 0 | 6 | 0 Cenpo         | protein_coding       |
| ENSMUSG00000021509 | 0 | 6 | 0 Slc25a48      | protein_coding       |
| ENSMUSG00000028099 | 0 | 6 | 0 Polr3c        | protein_coding       |
| ENSMUSG00000028468 | 0 | 6 | 0 Rgp1          | protein_coding       |
| ENSMUSG00000028899 | 0 | 6 | 0 Taf12         | protein_coding       |
| ENSMUSG00000029767 | 0 | 6 | 0 Calu          | protein_coding       |
| ENSMUSG00000036306 | 0 | 6 | 0 Lzts1         | protein_coding       |
| ENSMUSG00000038214 | 0 | 6 | 0 Bend3         | protein_coding       |
| ENSMUSG00000039840 | 0 | 6 | 0 Epg5          | protein_coding       |
| ENSMUSG00000041741 | 0 | 6 | 0 Pde3a         | protein_coding       |
| ENSMUSG00000002413 | 0 | 5 | 36 Braf         | protein_coding       |
| ENSMUSG00000001098 | 0 | 5 | 0 Kctd10        | protein_coding       |
| ENSMUSG00000002814 | 0 | 5 | 0 Top3a         | protein_coding       |
| ENSMUSG00000008683 | 0 | 5 | 0 Rps15a        | protein_coding       |
| ENSMUSG00000015790 | 0 | 5 | 0 Surf1         | protein_coding       |
| ENSMUSG00000019432 | 0 | 5 | 0 Ddx39b        | protein_coding       |

## nrapiRNA

|                    |   |   |                 |                      |
|--------------------|---|---|-----------------|----------------------|
| ENSMUSG00000021737 | 0 | 5 | 0 Psmc6         | protein_coding       |
| ENSMUSG00000021947 | 0 | 5 | 0 Cryl1         | protein_coding       |
| ENSMUSG00000023044 | 0 | 5 | 0 Csa1          | protein_coding       |
| ENSMUSG00000025178 | 0 | 5 | 0 Pi4k2a        | protein_coding       |
| ENSMUSG00000025280 | 0 | 5 | 0 Polr3a        | protein_coding       |
| ENSMUSG00000025289 | 0 | 5 | 0 Prdx4         | protein_coding       |
| ENSMUSG00000029560 | 0 | 5 | 0 Snx8          | protein_coding       |
| ENSMUSG00000030697 | 0 | 5 | 0 Ppp4c         | protein_coding       |
| ENSMUSG00000031303 | 0 | 5 | 0 Map3k15       | protein_coding       |
| ENSMUSG00000031960 | 0 | 5 | 0 Aars          | protein_coding       |
| ENSMUSG00000033306 | 0 | 5 | 0 Lpp           | protein_coding       |
| ENSMUSG00000039452 | 0 | 5 | 0 Snx22         | protein_coding       |
| ENSMUSG00000039686 | 0 | 5 | 0 Zer1          | protein_coding       |
| ENSMUSG00000040472 | 0 | 5 | 0 Rabggt1       | protein_coding       |
| ENSMUSG00000043683 | 0 | 5 | 0 Fem1a         | protein_coding       |
| ENSMUSG00000046897 | 0 | 5 | 0 Zfp740        | protein_coding       |
| ENSMUSG00000047003 | 0 | 5 | 0 Zfp41         | protein_coding       |
| ENSMUSG00000050022 | 0 | 5 | 0 Amz1          | protein_coding       |
| ENSMUSG00000054021 | 0 | 5 | 0 Sirt5         | protein_coding       |
| ENSMUSG00000054612 | 0 | 5 | 0 Mgmt          | protein_coding       |
| ENSMUSG00000074259 | 0 | 5 | 0 Gramd2        | protein_coding       |
| ENSMUSG00000082743 | 0 | 5 | 0 Gm12988       | processed_pseudogene |
| ENSMUSG0000008637  | 0 | 5 | 0 Gm26397       | snoRNA               |
| ENSMUSG0000009863  | 0 | 5 | 0 Sdhb          | protein_coding       |
| ENSMUSG00000014959 | 0 | 5 | 0 Gorasp2       | protein_coding       |
| ENSMUSG00000016554 | 0 | 5 | 0 Eif3d         | protein_coding       |
| ENSMUSG00000018846 | 0 | 5 | 0 Pank3         | protein_coding       |
| ENSMUSG00000020132 | 0 | 5 | 0 Rab21         | protein_coding       |
| ENSMUSG00000020823 | 0 | 5 | 0 Sec14l1       | protein_coding       |
| ENSMUSG00000021044 | 0 | 5 | 0 Adck1         | protein_coding       |
| ENSMUSG00000021192 | 0 | 5 | 0 Golga5        | protein_coding       |
| ENSMUSG00000022385 | 0 | 5 | 0 Gtse1         | protein_coding       |
| ENSMUSG00000022401 | 0 | 5 | 0 Xpnpep3       | protein_coding       |
| ENSMUSG00000022773 | 0 | 5 | 0 Ypel1         | protein_coding       |
| ENSMUSG00000024527 | 0 | 5 | 0 Afg3l2        | protein_coding       |
| ENSMUSG00000025217 | 0 | 5 | 0 Btrc          | protein_coding       |
| ENSMUSG00000025651 | 0 | 5 | 0 Uqcrc1        | protein_coding       |
| ENSMUSG00000027247 | 0 | 5 | 0 Arhgap1       | protein_coding       |
| ENSMUSG00000027678 | 0 | 5 | 0 Ncoa3         | protein_coding       |
| ENSMUSG00000028557 | 0 | 5 | 0 Rnf11         | protein_coding       |
| ENSMUSG00000029726 | 0 | 5 | 0 Mepce         | protein_coding       |
| ENSMUSG00000030505 | 0 | 5 | 0 Prmt3         | protein_coding       |
| ENSMUSG00000031446 | 0 | 5 | 0 Cul4a         | protein_coding       |
| ENSMUSG00000031821 | 0 | 5 | 0 Gins2         | protein_coding       |
| ENSMUSG00000032267 | 0 | 5 | 0 Usp28         | protein_coding       |
| ENSMUSG00000032680 | 0 | 5 | 0 6820408C15Rik | protein_coding       |

## nrapiRNA

|                    |   |   |                    |                      |
|--------------------|---|---|--------------------|----------------------|
| ENSMUSG00000033565 | 0 | 5 | 0 Rbfox2           | protein_coding       |
| ENSMUSG00000033728 | 0 | 5 | 0 Lrrc14           | protein_coding       |
| ENSMUSG00000034412 | 0 | 5 | 0 Tbc1d10a         | protein_coding       |
| ENSMUSG00000037652 | 0 | 5 | 0 Phc3             | protein_coding       |
| ENSMUSG00000038347 | 0 | 5 | 0 Tcte2            | protein_coding       |
| ENSMUSG00000038437 | 0 | 5 | 0 Mllt6            | protein_coding       |
| ENSMUSG00000039509 | 0 | 5 | 0 Nup133           | protein_coding       |
| ENSMUSG00000040596 | 0 | 5 | 0 Pogk             | protein_coding       |
| ENSMUSG00000040928 | 0 | 5 | 0 S100pbp          | protein_coding       |
| ENSMUSG00000041168 | 0 | 5 | 0 Lonp1            | protein_coding       |
| ENSMUSG00000042417 | 0 | 5 | 0 Ccno             | protein_coding       |
| ENSMUSG00000043858 | 0 | 5 | 0                  | protein_coding       |
| ENSMUSG00000043866 | 0 | 5 | 0 Taf10            | protein_coding       |
| ENSMUSG00000048626 | 0 | 5 | 0 Klf17            | protein_coding       |
| ENSMUSG00000049739 | 0 | 5 | 0 Zfp646           | protein_coding       |
| ENSMUSG00000053774 | 0 | 5 | 0 Ubxn7            | protein_coding       |
| ENSMUSG00000056204 | 0 | 5 | 0 Pgpep1           | protein_coding       |
| ENSMUSG00000057177 | 0 | 5 | 0 Gsk3a            | protein_coding       |
| ENSMUSG00000061589 | 0 | 5 | 0 Dot1l            | protein_coding       |
| ENSMUSG00000061666 | 0 | 5 | 0 Gdpd1            | protein_coding       |
| ENSMUSG00000068923 | 0 | 5 | 0 Syt1l            | protein_coding       |
| ENSMUSG00000070738 | 0 | 5 | 0 Dgkd             | protein_coding       |
| ENSMUSG00000084145 | 0 | 5 | 0 Gm12263          | processed_pseudogene |
| ENSMUSG00000005779 | 0 | 4 | 26 Psmc4           | protein_coding       |
| ENSMUSG00000042548 | 0 | 4 | 12 Asxl1           | protein_coding       |
| ENSMUSG00000053199 | 0 | 0 | 4368 Arhgap20      | protein_coding       |
| ENSMUSG00000097287 | 0 | 0 | 1535 D130017N08Rik | lincRNA              |
| ENSMUSG00000045928 | 0 | 0 | 1519 4933440M02Rik | protein_coding       |
| ENSMUSG00000087162 | 0 | 0 | 1150 Gm14244       | antisense            |
| ENSMUSG00000087044 | 0 | 0 | 1090 1700042G15Rik | lincRNA              |
| ENSMUSG00000034110 | 0 | 0 | 745 Kctd7          | protein_coding       |
| ENSMUSG00000036533 | 0 | 0 | 613 Cdc42ep3       | protein_coding       |
| ENSMUSG00000097908 | 0 | 0 | 571 4933404O12Rik  | lincRNA              |
| ENSMUSG00000043940 | 0 | 0 | 426 Wdfy3          | protein_coding       |
| ENSMUSG00000086796 | 0 | 0 | 393 4932702P03Rik  | antisense            |
| ENSMUSG00000101012 | 0 | 0 | 301 1700008K24Rik  | lincRNA              |
| ENSMUSG00000038994 | 0 | 0 | 232 Hils1          | protein_coding       |
| ENSMUSG00000027006 | 0 | 0 | 171 Dnajc10        | protein_coding       |
| ENSMUSG00000021134 | 0 | 0 | 157 Srsf5          | protein_coding       |
| ENSMUSG00000030929 | 0 | 0 | 133 Eri2           | protein_coding       |
| ENSMUSG00000020153 | 0 | 0 | 117 Ndufs7         | protein_coding       |
| ENSMUSG00000092341 | 0 | 0 | 113 Malat1         | lincRNA              |
| ENSMUSG00000021745 | 0 | 0 | 105 Ptprg          | protein_coding       |
| ENSMUSG00000069713 | 0 | 0 | 71 4933406P04Rik   | protein_coding       |
| ENSMUSG00000001506 | 0 | 0 | 63 Colla1          | protein_coding       |
| ENSMUSG00000017707 | 0 | 0 | 57 Serinc3         | protein_coding       |

## nrapiRNA

|                    |   |   |                  |                |
|--------------------|---|---|------------------|----------------|
| ENSMUSG00000074224 | 0 | 0 | 50 4932431P20Rik | protein_coding |
| ENSMUSG00000034177 | 0 | 0 | 46 Rnf43         | protein_coding |
| ENSMUSG00000038909 | 0 | 0 | 44 Kat7          | protein_coding |
| ENSMUSG00000043460 | 0 | 0 | 44 Elfn2         | protein_coding |
| ENSMUSG00000020657 | 0 | 0 | 42 Dnajc27       | protein_coding |
| ENSMUSG00000069662 | 0 | 0 | 42 Marcks        | protein_coding |
| ENSMUSG00000101404 | 0 | 0 | 40 1700009C05Rik | lincRNA        |
| ENSMUSG00000040423 | 0 | 0 | 36 Rc3h1         | protein_coding |
| ENSMUSG00000097519 | 0 | 0 | 32 4930558J18Rik | lincRNA        |
| ENSMUSG00000002486 | 0 | 0 | 30 Tchp          | protein_coding |
| ENSMUSG00000018593 | 0 | 0 | 30 Sparc         | protein_coding |
| ENSMUSG00000052415 | 0 | 0 | 30 Tchh          | protein_coding |
| ENSMUSG00000020033 | 0 | 0 | 28 4930463O16Rik | lincRNA        |
| ENSMUSG00000033174 | 0 | 0 | 26 Mgl1          | protein_coding |
| ENSMUSG00000033732 | 0 | 0 | 26 Sf3b3         | protein_coding |
| ENSMUSG00000001552 | 0 | 0 | 24 Jup           | protein_coding |
| ENSMUSG00000024654 | 0 | 0 | 24 Asrgl1        | protein_coding |
| ENSMUSG00000038015 | 0 | 0 | 24 Prm2          | protein_coding |
| ENSMUSG00000026043 | 0 | 0 | 22 Col3a1        | protein_coding |
| ENSMUSG00000038178 | 0 | 0 | 22 Slc43a2       | protein_coding |
| ENSMUSG00000055447 | 0 | 0 | 22 Cd47          | protein_coding |
| ENSMUSG00000065635 | 0 | 0 | 20 Gm24253       | snoRNA         |
| ENSMUSG00000028668 | 0 | 0 | 20 Tceb3         | protein_coding |
| ENSMUSG00000031529 | 0 | 0 | 20 Tnks          | protein_coding |
| ENSMUSG00000092274 | 0 | 0 | 20 Neat1         | lincRNA        |
| ENSMUSG00000016921 | 0 | 0 | 18 Srsf6         | protein_coding |
| ENSMUSG00000016982 | 0 | 0 | 18 Pom121l2      | protein_coding |
| ENSMUSG00000026797 | 0 | 0 | 18 Stxbp1        | protein_coding |
| ENSMUSG00000030536 | 0 | 0 | 18 Iqgap1        | protein_coding |
| ENSMUSG00000034024 | 0 | 0 | 18 Cct2          | protein_coding |
| ENSMUSG00000035805 | 0 | 0 | 18 Mlc1          | protein_coding |
| ENSMUSG00000024759 | 0 | 0 | 16 Atf3          | protein_coding |
| ENSMUSG00000030557 | 0 | 0 | 16 Mef2a         | protein_coding |
| ENSMUSG00000032199 | 0 | 0 | 16 Polr2m        | protein_coding |
| ENSMUSG00000032788 | 0 | 0 | 16 Pdxk          | protein_coding |
| ENSMUSG00000034801 | 0 | 0 | 16 Sos2          | protein_coding |
| ENSMUSG00000000282 | 0 | 0 | 14 Mnt           | protein_coding |
| ENSMUSG00000005481 | 0 | 0 | 14 Ddx39         | protein_coding |
| ENSMUSG00000006050 | 0 | 0 | 14 Sra1          | protein_coding |
| ENSMUSG00000011877 | 0 | 0 | 14 Git1          | protein_coding |
| ENSMUSG00000019370 | 0 | 0 | 14 Calm3         | protein_coding |
| ENSMUSG00000021125 | 0 | 0 | 14 Arg2          | protein_coding |
| ENSMUSG00000021339 | 0 | 0 | 14 Mrs2          | protein_coding |
| ENSMUSG00000022964 | 0 | 0 | 14 Tmem50b       | protein_coding |
| ENSMUSG00000027177 | 0 | 0 | 14 Hipk3         | protein_coding |
| ENSMUSG00000030869 | 0 | 0 | 14 Ndubf1        | protein_coding |

## nrapiRNA

|                    |   |   |                  |                                    |
|--------------------|---|---|------------------|------------------------------------|
| ENSMUSG00000031375 | 0 | 0 | 14 Bgn           | protein_coding                     |
| ENSMUSG00000032554 | 0 | 0 | 14 Trf           | protein_coding                     |
| ENSMUSG00000038481 | 0 | 0 | 14 Cdk19         | protein_coding                     |
| ENSMUSG00000048732 | 0 | 0 | 14 Klhl11        | protein_coding                     |
| ENSMUSG00000050089 | 0 | 0 | 14 Akap4         | protein_coding                     |
| ENSMUSG00000069114 | 0 | 0 | 14 Zbtb10        | protein_coding                     |
| ENSMUSG00000079235 | 0 | 0 | 14 Ccdc13        | protein_coding                     |
| ENSMUSG00000091558 | 0 | 0 | 14 Gm17227       | protein_coding                     |
| ENSMUSG00000085293 | 0 | 0 | 14 Gm13817       | lincRNA                            |
| ENSMUSG00000083844 | 0 | 0 | 12 Ube2d-ps      | transcribed_unprocessed_pseudogene |
| ENSMUSG00000065097 | 0 | 0 | 12 Snora16a      | snoRNA                             |
| ENSMUSG00000000753 | 0 | 0 | 12 Serpinf1      | protein_coding                     |
| ENSMUSG00000003269 | 0 | 0 | 12 Cyth2         | protein_coding                     |
| ENSMUSG00000003354 | 0 | 0 | 12 Ccdc65        | protein_coding                     |
| ENSMUSG00000003814 | 0 | 0 | 12 Calr          | protein_coding                     |
| ENSMUSG00000015597 | 0 | 0 | 12 Zfp318        | protein_coding                     |
| ENSMUSG00000020520 | 0 | 0 | 12 Galnt10       | protein_coding                     |
| ENSMUSG00000021994 | 0 | 0 | 12 Wnt5a         | protein_coding                     |
| ENSMUSG00000023886 | 0 | 0 | 12 Smoc2         | protein_coding                     |
| ENSMUSG00000025894 | 0 | 0 | 12 Aasdhpt       | protein_coding                     |
| ENSMUSG00000026193 | 0 | 0 | 12 Fn1           | protein_coding                     |
| ENSMUSG00000026864 | 0 | 0 | 12 Hspa5         | protein_coding                     |
| ENSMUSG00000027130 | 0 | 0 | 12 Slc12a6       | protein_coding                     |
| ENSMUSG00000028457 | 0 | 0 | 12 Atp8b5        | protein_coding                     |
| ENSMUSG00000028530 | 0 | 0 | 12 Jak1          | protein_coding                     |
| ENSMUSG00000028618 | 0 | 0 | 12 Tmem59        | protein_coding                     |
| ENSMUSG00000028797 | 0 | 0 | 12 Tmem234       | protein_coding                     |
| ENSMUSG00000028931 | 0 | 0 | 12 Kcnab2        | protein_coding                     |
| ENSMUSG00000031479 | 0 | 0 | 12 Vps36         | protein_coding                     |
| ENSMUSG00000031924 | 0 | 0 | 12 Cyb5b         | protein_coding                     |
| ENSMUSG00000032366 | 0 | 0 | 12 Tpm1          | protein_coding                     |
| ENSMUSG00000034723 | 0 | 0 | 12 Tmx4          | protein_coding                     |
| ENSMUSG00000036923 | 0 | 0 | 12 Stox1         | protein_coding                     |
| ENSMUSG00000040274 | 0 | 0 | 12 Cdk6          | protein_coding                     |
| ENSMUSG00000041308 | 0 | 0 | 12 Sntb2         | protein_coding                     |
| ENSMUSG00000045835 | 0 | 0 | 12 Hdgfl1        | protein_coding                     |
| ENSMUSG00000047412 | 0 | 0 | 12 Zbtb44        | protein_coding                     |
| ENSMUSG00000057286 | 0 | 0 | 12 St6galnac2    | protein_coding                     |
| ENSMUSG00000060733 | 0 | 0 | 12 Ipmk          | protein_coding                     |
| ENSMUSG00000061759 | 0 | 0 | 12 Armt1         | protein_coding                     |
| ENSMUSG00000078490 | 0 | 0 | 12 Cfap74        | protein_coding                     |
| ENSMUSG00000037884 | 0 | 0 | 12 1700017G19Rik | lincRNA                            |
| ENSMUSG00000087256 | 0 | 0 | 12 Gm15990       | antisense                          |
| ENSMUSG00000078861 | 0 | 0 | 10 Zfp931        | protein_coding                     |
| ENSMUSG00000039001 | 0 | 0 | 6 Rps21          | protein_coding                     |

## nrapiRNA

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

Vega annotation: [http://vega.sanger.ac.uk/info/about/gene\\_and\\_transcript\\_types.html](http://vega.sanger.ac.uk/info/about/gene_and_transcript_types.html)

**Supplemental Table 4. Protein coding gene transcripts with UTR region associated RapiRNAs.**

**RapiRNAs sense to 3'UTR**

| Ensembl ID          | Normalized counts |        |       | Gene symbol     | Annotation  | MGI ID      |
|---------------------|-------------------|--------|-------|-----------------|---|-------------|
|                     | oocyte            | zygote | sperm |                 |   |             |
| ENSMUST00000174507  | 16035             | 17420  |       | 0 Kifc1         | kinesin family member C1  | MGI:109596  |
| ENSMUST00000173492  | 4498              | 2603   |       | 0 Kifc1         | kinesin family member C1  | MGI:109596  |
| ENSMUST00000029297  | 4493              | 4533   |       | 0 Slc7a11       | solute carrier family 7 (cationic amino acid transporter, y+ system), member 11 | MGI:1347355 |
| ENSMUST00000068792  | 4123              | 4071   |       | 2 Tmem245       | transmembrane protein 245   | MGI:2445107 |
| ENSMUST00000162109  | 2736              | 3355   |       | 0 Ppp4r1        | protein phosphatase 4, regulatory subunit 1                                     | MGI:1917601 |
| ENSMUST00000038863  | 2671              | 904    | 13034 | Lars2           | leucyl-tRNA synthetase, mitochondrial   | MGI:2142973 |
| ENSMUST00000113385  | 2662              | 3573   |       | 0 Sp140         | Sp140 nuclear body protein  | MGI:3702467 |
| ENSMUST00000131950  | 2537              | 3266   |       | 0 Sp110         | Sp110 nuclear body protein  | MGI:1923364 |
| ENSMUST00000020488  | 2153              | 2196   |       | 0 D10Wsu102e    | DNA segment, Chr 10, Wayne State University 102, expressed                      | MGI:106381  |
| ENSMUST00000088407  | 2081              | 2197   |       | 0 Khdc1a        | KH domain containing 1A   | MGI:2676610 |
| ENSMUST00000020579  | 1707              | 2879   |       | 0 Hmnr          | hyaluronan mediated motility receptor (RHAMM)                                   | MGI:104667  |
| ENSMUST00000014218  | 1548              | 2143   |       | 6 Rnf168        | ring finger protein 168   | MGI:1917488 |
| ENSMUST00000161685  | 1307              | 1533   |       | 0 C130026I21Rik | RIKEN cDNA C130026I21 gene  | MGI:3612702 |
| ENSMUST00000161494  | 1273              | 1688   |       | 0 Glcci1        | glucocorticoid induced transcript 1   | MGI:2179717 |
| ENSMUST00000146526  | 1127              | 1023   |       | 0 Gins2         | GIN5 complex subunit 2 (Psf2 homolog)   | MGI:1921019 |
| ENSMUST00000116517  | 1124              | 1241   |       | 0 Cdv3          | carnitine deficiency-associated gene expressed in ventricle 3                   | MGI:2448759 |
| ENSMUST00000146770  | 1095              | 1124   |       | 0 Hsp90ab1      | heat shock protein 90 alpha (cytosolic), class B member 1                       | MGI:96247   |
| ENSMUST00000155990  | 959               | 1237   | 12    | Epb41           | erythrocyte membrane protein band 4.1   | MGI:95401   |
| ENSMUST00000162594  | 944               | 1318   |       | 0 Bud31         | BUD31 homolog   | MGI:2141291 |
| ENSMUST00000047978  | 910               | 1189   |       | 0 Rabif         | RAB interacting factor  | MGI:2138605 |
| ENSMUST00000027629  | 890               | 747    | 14    | Tfcp2l1         | transcription factor CP2-like 1   | MGI:2444691 |
| ENSMUST00000044711  | 860               | 998    |       | 0 Snx22         | sorting nexin 22  | MGI:2685966 |
| ENSMUST00000137423  | 812               | 1101   | 795   | Rps8            | ribosomal protein S8  | MGI:98166   |
| ENSMUST00000009157  | 806               | 1297   |       | 0 Dynll1        | dynein light chain LC8-type 1   | MGI:1861457 |
| ENSMUST00000138240  | 798               | 931    |       | 0 Tacc3         | transforming, acidic coiled-coil containing protein 3                           | MGI:1341163 |
| ENSMUST00000125959  | 794               | 983    |       | 0 Dynll1        | dynein light chain LC8-type 1   | MGI:1861457 |
| ENSMUST00000082337  | 737               | 895    |       | 0 Mdc1          | mediator of DNA damage checkpoint 1   | MGI:3525201 |
| ENSMUST00000181326  | 736               | 908    |       | 0 Gm2042        | predicted gene 2042   | MGI:3800544 |
| ENSMUST00000095509  | 734               | 904    |       | 0 Oog1          | oogenesis 1   | MGI:2679150 |
| ENSMUST00000102581  | 668               | 945    | 42    | Kctd10          | potassium channel tetramerisation domain containing 10                          | MGI:2141207 |
| ENSMUST00000028676  | 582               | 534    |       | 0 Wdr76         | WD repeat domain 76   | MGI:1926186 |
| ENSMUST000000034700 | 566               | 705    |       | 0 Yipf2         | Yip1 domain family, member 2  | MGI:1922016 |
| ENSMUST00000113917  | 566               | 659    |       | 0 Pigp          | phosphatidylinositol glycan anchor biosynthesis, class P                        | MGI:1860433 |
| ENSMUST00000049167  | 560               | 1029   |       | 0 Phf12         | PHD finger protein 12   | MGI:1924057 |
| ENSMUST00000139305  | 539               | 823    |       | 0 Hdac1         | histone deacetylase 1   | MGI:108086  |
| ENSMUST00000067996  | 493               | 462    |       | 0 Set           | SET nuclear oncogene  | MGI:1860267 |
| ENSMUST00000099009  | 487               | 523    |       | 0 2210418O10Rik | RIKEN cDNA 2210418O10 gene  | MGI:1924208 |

|                    |     |     |                 |  |             |
|--------------------|-----|-----|-----------------|--|-------------|
| ENSMUST00000101492 | 481 | 467 | 0 E330009J07Rik | RIKEN cDNA E330009J07 gene                                     | MGI:2444256 |
| ENSMUST00000057343 | 476 | 627 | 2 Ptbp1         | polypyrimidine tract binding protein 1                         | MGI:97791   |
| ENSMUST00000109207 | 466 | 642 | 0 Ube2v1        | ubiquitin-conjugating enzyme E2 variant 1                      | MGI:1913839 |
| ENSMUST00000146175 | 457 | 465 | 519 Nr2c2       | nuclear receptor subfamily 2, group C, member 2                | MGI:1352466 |
| ENSMUST00000023062 | 453 | 516 | 0 Tomm22        | translocase of outer mitochondrial membrane 22 homolog (yeast) | MGI:2450248 |
| ENSMUST00000143977 | 434 | 536 | 0 Camsap1       | calmodulin regulated spectrin-associated protein 1             | MGI:3036242 |
| ENSMUST00000151306 | 434 | 403 | 0 Hsp90ab1      | heat shock protein 90 alpha (cytosolic), class B member 1      | MGI:96247   |
| ENSMUST00000123229 | 433 | 458 | 4 Rps6          | ribosomal protein S6   | MGI:98159   |
| ENSMUST00000004646 | 432 | 516 | 0 Coro1c        | coronin, actin binding protein 1C                              | MGI:1345964 |
| ENSMUST00000142200 | 420 | 553 | 0 Fbxo5         | F-box protein 5  | MGI:1914391 |
| ENSMUST00000164980 | 420 | 470 | 0 Coro1c        | coronin, actin binding protein 1C                              | MGI:1345964 |
| ENSMUST00000099007 | 408 | 439 | 0 Gm14296       | predicted gene 14296   | MGI:3708667 |
| ENSMUST00000118728 | 402 | 371 | 1725 Nemp1      | nuclear envelope integral membrane protein 1                   | MGI:2446113 |
| ENSMUST00000111343 | 390 | 596 | 0 Ran           | RAN, member RAS oncogene family                                | MGI:1333112 |
| ENSMUST00000165665 | 383 | 466 | 0 Arhgef12      | Rho guanine nucleotide exchange factor (GEF) 12                | MGI:1916882 |
| ENSMUST00000160571 | 375 | 376 | 0 Mina          | myc induced nuclear antigen                                    | MGI:1914264 |
| ENSMUST00000095797 | 364 | 273 | 57 Spin1        | spindlin 1   | MGI:109242  |
| ENSMUST00000093969 | 355 | 462 | 0 Myo19         | myosin XIX   | MGI:1913446 |
| ENSMUST00000176566 | 342 | 320 | 34 Ip6k1        | inositol hexaphosphate kinase 1                                | MGI:1351633 |
| ENSMUST00000089874 | 340 | 289 | 0 Mcc           | mutated in colorectal cancers                                  | MGI:96930   |
| ENSMUST00000008812 | 335 | 388 | 8 Rps18         | ribosomal protein S18  | MGI:98146   |
| ENSMUST00000028802 | 329 | 306 | 0 Knl1          | kinetochore scaffold 1   | MGI:1923714 |
| ENSMUST00000058438 | 315 | 302 | 111 Dcaf7       | DDB1 and CUL4 associated factor 7                              | MGI:1919083 |
| ENSMUST00000125203 | 312 | 437 | 0 Optn          | optineurin   | MGI:1918898 |
| ENSMUST00000159592 | 310 | 426 | 0 Ssh1          | slingshot homolog 1 (Drosophila)                               | MGI:2686240 |
| ENSMUST00000105608 | 309 | 230 | 24 Slc35e2      | solute carrier family 35, member E2                            | MGI:2444240 |
| ENSMUST00000067429 | 307 | 183 | 24 Mdm4         | transformed mouse 3T3 cell double minute 4                     | MGI:107934  |
| ENSMUST00000015137 | 303 | 350 | 0 Limk1         | LIM-domain containing, protein kinase                          | MGI:104572  |
| ENSMUST00000018184 | 296 | 399 | 0 Rrp7a         | ribosomal RNA processing 7 homolog A (S. cerevisiae)           | MGI:1922028 |
| ENSMUST00000123766 | 294 | 452 | 0 Lpcat1        | lysophosphatidylcholine acyltransferase 1                      | MGI:2384812 |
| ENSMUST00000168124 | 294 | 219 | 14 Blmh         | bleomycin hydrolase  | MGI:1345186 |
| ENSMUST00000047028 | 291 | 342 | 0 Lgalsl        | lectin, galactoside binding-like                               | MGI:1916114 |
| ENSMUST00000125718 | 289 | 307 | 0 Hdac1         | histone deacetylase 1  | MGI:108086  |
| ENSMUST00000071580 | 285 | 450 | 0 Gm10436       | predicted gene 10436   | MGI:3704393 |
| ENSMUST00000025279 | 279 | 254 | 0 Npc1          | Niemann-Pick type C1   | MGI:1097712 |
| ENSMUST00000144830 | 278 | 315 | 0 Ube2v1        | ubiquitin-conjugating enzyme E2 variant 1                      | MGI:1913839 |
| ENSMUST00000046303 | 276 | 122 | 18 Crebl2       | cAMP responsive element binding protein-like 2                 | MGI:1889385 |
| ENSMUST00000071921 | 274 | 324 | 0 Dmtf1         | cyclin D binding myb-like transcription factor 1               | MGI:1344415 |
| ENSMUST00000167518 | 272 | 357 | 0 Fam168b       | family with sequence similarity 168, member B                  | MGI:2448487 |
| ENSMUST00000125005 | 269 | 226 | 127 Rpl7        | ribosomal protein L7   | MGI:98073   |
| ENSMUST00000169347 | 268 | 396 | 0 Myo1h         | myosin 1H  | MGI:1914674 |
| ENSMUST00000033665 | 264 | 252 | 0 Map3k15       | mitogen-activated protein kinase kinase kinase 15              | MGI:2448588 |
| ENSMUST00000029164 | 255 | 331 | 0 Sla2          | Src-like-adaptor 2   | MGI:1925049 |



|                    |     |     |                   |  |             |
|--------------------|-----|-----|-------------------|--|-------------|
| ENSMUST00000146425 | 252 | 372 | 0 Mtus2           | microtubule associated tumor suppressor candidate 2                        | MGI:1915388 |
| ENSMUST00000048774 | 252 | 408 | 0 Copg2           | coatomer protein complex, subunit gamma 2                                  | MGI:1858683 |
| ENSMUST00000144061 | 246 | 399 | 12 Samd8          | sterile alpha motif domain containing 8                                    | MGI:1914880 |
| ENSMUST00000034279 | 244 | 237 | 0 Gse1            | genetic suppressor element 1, coiled-coil protein                          | MGI:1098275 |
| ENSMUST00000026243 | 241 | 276 | 0 Mgea5           | meningioma expressed antigen 5 (hyaluronidase)                             | MGI:1932139 |
| ENSMUST00000166495 | 240 | 363 | 0 Dnajc1          | DnaJ heat shock protein family (Hsp40) member C1                           | MGI:103268  |
| ENSMUST00000053926 | 240 | 287 | 0 Pick1           | protein interacting with C kinase 1  | MGI:894645  |
| ENSMUST00000056639 | 240 | 287 | 0 Gm5065          | predicted gene 5065  | MGI:3643170 |
| ENSMUST00000161790 | 239 | 100 | 452 Eif4g2        | eukaryotic translation initiation factor 4, gamma 2                        | MGI:109207  |
| ENSMUST00000071093 | 235 | 236 | 0 Rims3           | regulating synaptic membrane exocytosis 3                                  | MGI:2443331 |
| ENSMUST00000146784 | 221 | 278 | 0 Ncoa2           | nuclear receptor coactivator 2   | MGI:1276533 |
| ENSMUST00000131316 | 221 | 303 | 0 Exosc9          | exosome component 9  | MGI:1355319 |
| ENSMUST00000054145 | 215 | 273 | 0 Dcaf5           | DDB1 and CUL4 associated factor 5  | MGI:2444785 |
| ENSMUST00000040455 | 213 | 200 | 18 Hif1an         | hypoxia-inducible factor 1, alpha subunit inhibitor                        | MGI:2442345 |
| ENSMUST00000110766 | 210 | 296 | 0 Fbxl18          | F-box and leucine-rich repeat protein 18                                   | MGI:2444450 |
| ENSMUST00000136329 | 209 | 229 | 4 Tuba1a          | tubulin, alpha 1A  | MGI:98869   |
| ENSMUST00000049484 | 207 | 239 | 0 Gxylt1          | glucoside xylosyltransferase 1   | MGI:2684933 |
| ENSMUST00000131871 | 205 | 283 | 0 Eif4a2          | eukaryotic translation initiation factor 4A2                               | MGI:106906  |
| ENSMUST00000044113 | 205 | 254 | 1124 Ago2         | argonaute RISC catalytic subunit 2   | MGI:2446632 |
| ENSMUST00000155756 | 205 | 233 | 0 Srrd            | SRR1 domain containing   | MGI:1917368 |
| ENSMUST00000141141 | 204 | 134 | 0 Cyb5d2          | cytochrome b5 domain containing 2  | MGI:2684848 |
| ENSMUST00000139147 | 203 | 219 | 0 Rad54l          | RAD54 like (S. cerevisiae)   | MGI:894697  |
| ENSMUST00000139225 | 203 | 123 | 252 Snrpb         | small nuclear ribonucleoprotein B  | MGI:98342   |
| ENSMUST00000022867 | 198 | 150 | 0 Laptm4b         | lysosomal-associated protein transmembrane 4B                              | MGI:1890494 |
| ENSMUST00000163949 | 198 | 242 | 0 Mest            | mesoderm specific transcript   | MGI:96968   |
| ENSMUST00000116492 | 198 | 184 | 0 Ubp1            | upstream binding protein 1   | MGI:104889  |
| ENSMUST00000112316 | 197 | 286 | 0 Txlng           | taxilin gamma  | MGI:3590652 |
| ENSMUST00000014640 | 197 | 266 | 0 Ankrd28         | ankyrin repeat domain 28   | MGI:2145661 |
| ENSMUST00000166172 | 190 | 127 | 44 Abl2           | v-abl Abelson murine leukemia viral oncogene 2 (arg, Abelson-related gene) | MGI:87860   |
| ENSMUST00000153872 | 189 | 184 | 0 Tk1             | thymidine kinase 1   | MGI:98763   |
| ENSMUST00000032775 | 187 | 361 | 0 Lrrc28          | leucine rich repeat containing 28  | MGI:1915689 |
| ENSMUST00000144049 | 187 | 166 | 472 1810032O08Rik | RIKEN cDNA 1810032O08 gene   | MGI:1913543 |
| ENSMUST00000029165 | 184 | 197 | 0 1110008F13Rik   | RIKEN cDNA 1110008F13 gene   | MGI:1914638 |
| ENSMUST00000173885 | 181 | 312 | 0 Kifc1           | kinesin family member C1   | MGI:109596  |
| ENSMUST00000153970 | 181 | 164 | 0 Fbxo22          | F-box protein 22   | MGI:1926014 |
| ENSMUST00000114050 | 172 | 220 | 0 Tmsb10          | thymosin, beta 10  | MGI:109146  |
| ENSMUST00000066675 | 172 | 246 | 0 Mtif3           | mitochondrial translational initiation factor 3                            | MGI:1923616 |
| ENSMUST00000121393 | 172 | 194 | 2 Gm4631          | predicted gene 4631  | MGI:3782813 |
| ENSMUST00000106565 | 169 | 126 | 0 Skint4          | selection and upkeep of intraepithelial T cells 4                          | MGI:2444425 |
| ENSMUST00000145306 | 167 | 15  | 494 Obsl1         | obscurin-like 1  | MGI:2138628 |
| ENSMUST00000105849 | 165 | 143 | 0 Luzp1           | leucine zipper protein 1   | MGI:107629  |
| ENSMUST00000055341 | 161 | 118 | 0 Gfod1           | glucose-fructose oxidoreductase domain containing 1                        | MGI:2145304 |
| ENSMUST00000060945 | 157 | 143 | 28 Aff4           | AF4/FMR2 family, member 4  | MGI:2136171 |

|                    |     |     |             |  |             |
|--------------------|-----|-----|-------------|--|-------------|
| ENSMUST00000143681 | 155 | 253 | 0 Rbbp7     | retinoblastoma binding protein 7   | MGI:1194910 |
| ENSMUST00000145259 | 155 | 217 | 0 Ncaph2    | non-SMC condensin II complex, subunit H2   | MGI:1289164 |
| ENSMUST00000141112 | 155 | 171 | 10 AU022252 | expressed sequence AU022252  | MGI:2140466 |
| ENSMUST00000084512 | 155 | 129 | 315 Tacc1   | transforming, acidic coiled-coil containing protein 1  | MGI:2443510 |
| ENSMUST00000078218 | 154 | 145 | 0 Serhl     | serine hydrolase-like  | MGI:1890404 |
| ENSMUST00000030773 | 153 | 125 | 30 Xrcc2    | X-ray repair complementing defective repair in Chinese hamster cells 2                       | MGI:1927345 |
| ENSMUST00000124088 | 152 | 154 | 0 Ncoa2     | nuclear receptor coactivator 2   | MGI:1276533 |
| ENSMUST00000036570 | 151 | 240 | 0 Appl1     | adaptor protein, phosphotyrosine interaction, PH domain and leucine zipper containing 1      | MGI:1920243 |
| ENSMUST00000020776 | 150 | 203 | 109 Ccdc117 | coiled-coil domain containing 117  | MGI:2144383 |
| ENSMUST00000144337 | 149 | 222 | 0 Tmsb10    | thymosin, beta 10  | MGI:109146  |
| ENSMUST00000023812 | 146 | 160 | 0 Map3k12   | mitogen-activated protein kinase kinase kinase 12  | MGI:1346881 |
| ENSMUST00000019722 | 145 | 170 | 22 Ubxn6    | UBX domain protein 6   | MGI:1913780 |
| ENSMUST00000072777 | 145 | 119 | 0 Hmga2     | high mobility group AT-hook 2  | MGI:101761  |
| ENSMUST00000135531 | 142 | 113 | 0 Nrg4      | neuregulin 4   | MGI:1933833 |
| ENSMUST00000030127 | 138 | 49  | 129 Tmem38b | transmembrane protein 38B  | MGI:1098718 |
| ENSMUST00000015981 | 137 | 213 | 22 Sqstm1   | sequestosome 1   | MGI:107931  |
| ENSMUST00000109769 | 135 | 203 | 0 Cdc14b    | CDC14 cell division cycle 14B  | MGI:2441808 |
| ENSMUST00000000449 | 133 | 237 | 0 Mkrn2     | makorin, ring finger protein, 2  | MGI:1914277 |
| ENSMUST00000058383 | 132 | 162 | 0 Paip2b    | poly(A) binding protein interacting protein 2B   | MGI:2386865 |
| ENSMUST00000151119 | 130 | 35  | 91 Plekha1  | pleckstrin homology domain containing, family A (phosphoinositide binding specific) member 1 | MGI:2442213 |
| ENSMUST00000003123 | 129 | 340 | 0 Fam32a    | family with sequence similarity 32, member A   | MGI:1915172 |
| ENSMUST00000159646 | 129 | 194 | 0 Ppp4r1    | protein phosphatase 4, regulatory subunit 1  | MGI:1917601 |
| ENSMUST00000099002 | 129 | 149 | 2 Zfp970    | zinc finger protein 970  | MGI:3652255 |
| ENSMUST00000115699 | 126 | 171 | 2 Ube2l3    | ubiquitin-conjugating enzyme E2L 3   | MGI:109240  |
| ENSMUST00000160770 | 124 | 87  | 0 Amotl1    | angiomin-like 1  | MGI:1922973 |
| ENSMUST00000071991 | 120 | 116 | 0 Dppa5a    | developmental pluripotency associated 5A   | MGI:101800  |
| ENSMUST00000086556 | 118 | 100 | 0 Elk4      | ELK4, member of ETS oncogene family  | MGI:102853  |
| ENSMUST00000009256 | 118 | 85  | 12 Bcl2l13  | BCL2-like 13 (apoptosis facilitator)   | MGI:2136959 |
| ENSMUST00000112810 | 118 | 156 | 0 Gtdc1     | glycosyltransferase-like domain containing 1   | MGI:2444269 |
| ENSMUST00000160008 | 117 | 141 | 0 Tstd2     | thiosulfate sulfurtransferase (rhodanese)-like domain containing 2                           | MGI:3039624 |
| ENSMUST00000050859 | 115 | 104 | 0 Cmah      | cytidine monophospho-N-acetylneuraminic acid hydroxylase                                     | MGI:103227  |
| ENSMUST00000111816 | 115 | 86  | 0 Trim71    | tripartite motif-containing 71   | MGI:2685973 |
| ENSMUST00000169020 | 114 | 81  | 0 Glg1      | golgi apparatus protein 1  | MGI:104967  |
| ENSMUST00000143570 | 111 | 127 | 105 Eef1a1  | eukaryotic translation elongation factor 1 alpha 1   | MGI:1096881 |
| ENSMUST00000042161 | 111 | 109 | 0 Mgat4a    | mannoside acetylglucosaminyltransferase 4, isoenzyme A                                       | MGI:2662992 |
| ENSMUST00000115706 | 110 | 116 | 0 YdjC      | YdjC homolog (bacterial)   | MGI:1916351 |
| ENSMUST00000165124 | 108 | 26  | 63 Hpn      | hepsin   | MGI:1196620 |
| ENSMUST00000146409 | 107 | 57  | 0 Slc26a2   | solute carrier family 26 (sulfate transporter), member 2                                     | MGI:892977  |
| ENSMUST00000031628 | 105 | 207 | 0 Ptc1      | pentatricopeptide repeat domain 1  | MGI:1919049 |
| ENSMUST00000079573 | 102 | 77  | 0 Itpr2     | inositol 1,4,5-triphosphate receptor 2   | MGI:99418   |
| ENSMUST00000044260 | 101 | 121 | 0 Usp37     | ubiquitin specific peptidase 37  | MGI:2442483 |
| ENSMUST00000044250 | 101 | 37  | 0 Alkbh5    | alkB homolog 5, RNA demethylase  | MGI:2144489 |
| ENSMUST00000110615 | 101 | 112 | 0 Serf2     | small EDRK-rich factor 2   | MGI:1337041 |

|                     |     |     |            |   |             |
|---------------------|-----|-----|------------|---|-------------|
| ENSMUST00000102484  | 101 | 45  | 0 Ddi2     | DNA-damage inducible protein 2  | MGI:1917244 |
| ENSMUST00000035336  | 100 | 164 | 0 Il17rd   | interleukin 17 receptor D   | MGI:2159727 |
| ENSMUST00000042125  | 100 | 82  | 0 Ttll4    | tubulin tyrosine ligase-like family, member 4                             | MGI:1914784 |
| ENSMUST00000148314  | 99  | 169 | 48 Gm13889 | predicted gene 13889  | MGI:3652053 |
| ENSMUST00000140969  | 99  | 111 | 0 Tuba1b   | tubulin, alpha 1B   | MGI:107804  |
| ENSMUST000000127251 | 98  | 104 | 0 Gm14443  | predicted gene 14443  | MGI:3652324 |
| ENSMUST00000182144  | 98  | 55  | 109 Sec31a | Sec31 homolog A (S. cerevisiae)   | MGI:1916412 |
| ENSMUST00000032080  | 98  | 101 | 0 Pradc1   | protease-associated domain containing 1                                   | MGI:1920577 |
| ENSMUST00000054674  | 97  | 71  | 12 Hjurp   | Holliday junction recognition protein                                     | MGI:2685821 |
| ENSMUST00000136139  | 96  | 162 | 12 Gabpb2  | GA repeat binding protein, beta 2   | MGI:95612   |
| ENSMUST00000157013  | 96  | 106 | 0 Ube2l3   | ubiquitin-conjugating enzyme E2L 3  | MGI:109240  |
| ENSMUST00000023285  | 96  | 75  | 0 Tymp     | thymidine phosphorylase   | MGI:1920212 |
| ENSMUST00000128278  | 96  | 70  | 0 Tle6     | transducin-like enhancer of split 6                                       | MGI:2149593 |
| ENSMUST00000110000  | 95  | 88  | 0 Naa20    | N(alpha)-acetyltransferase 20, NatB catalytic subunit                     | MGI:1915127 |
| ENSMUST00000144169  | 95  | 84  | 0 Efcab6   | EF-hand calcium binding domain 6  | MGI:1924877 |
| ENSMUST00000105692  | 95  | 71  | 0 Ctnnbip1 | catenin beta interacting protein 1  | MGI:1915756 |
| ENSMUST00000176356  | 94  | 124 | 30 Gm20662 | predicted gene 20662  | MGI:5313109 |
| ENSMUST00000021239  | 93  | 136 | 0 Lrrc59   | leucine rich repeat containing 59   | MGI:2138133 |
| ENSMUST00000034377  | 92  | 146 | 0 Pla2g15  | phospholipase A2, group XV  | MGI:2178076 |
| ENSMUST00000145997  | 92  | 133 | 57 Ppp5c   | protein phosphatase 5, catalytic subunit                                  | MGI:102666  |
| ENSMUST00000143603  | 91  | 122 | 0 Ncoa2    | nuclear receptor coactivator 2  | MGI:1276533 |
| ENSMUST00000109308  | 90  | 93  | 0 Nfatc3   | nuclear factor of activated T cells, cytoplasmic, calcineurin dependent 3 | MGI:103296  |
| ENSMUST00000112877  | 90  | 61  | 0 Nr6a1    | nuclear receptor subfamily 6, group A, member 1                           | MGI:1352459 |
| ENSMUST00000071555  | 89  | 134 | 8 Actg1    | actin, gamma, cytoplasmic 1   | MGI:87906   |
| ENSMUST00000173744  | 88  | 93  | 0 Kif3a    | kinesin family member 3A  | MGI:107689  |
| ENSMUST00000021203  | 88  | 92  | 0 Timm22   | translocase of inner mitochondrial membrane 22                            | MGI:1929742 |
| ENSMUST00000053819  | 86  | 127 | 0 Srsf4    | serine/arginine-rich splicing factor 4                                    | MGI:1890577 |
| ENSMUST00000049281  | 86  | 104 | 0 Fam53c   | family with sequence similarity 53, member C                              | MGI:1913556 |
| ENSMUST00000100487  | 84  | 71  | 0 Eif2ak1  | eukaryotic translation initiation factor 2 alpha kinase 1                 | MGI:1353448 |
| ENSMUST00000123104  | 84  | 45  | 0 Knstrn   | kinetochore-localized astrin/SPAG5 binding                                | MGI:1289298 |
| ENSMUST00000170297  | 83  | 93  | 0 Pofut1   | protein O-fucosyltransferase 1  | MGI:2153207 |
| ENSMUST00000029866  | 81  | 64  | 0 Ccne2    | cyclin E2   | MGI:1329034 |
| ENSMUST00000110204  | 79  | 68  | 0 Esrrb    | estrogen related receptor, beta   | MGI:1346832 |
| ENSMUST00000065896  | 78  | 90  | 0 Kif2c    | kinesin family member 2C  | MGI:1921054 |
| ENSMUST00000076592  | 78  | 83  | 0 Ccdc36   | coiled-coil domain containing 36  | MGI:3612242 |
| ENSMUST000000051401 | 77  | 124 | 22 Cldn4   | claudin 4   | MGI:1313314 |
| ENSMUST00000058139  | 77  | 87  | 2 Slc38a6  | solute carrier family 38, member 6  | MGI:3648156 |
| ENSMUST00000043338  | 76  | 91  | 0 Sft2d2   | SFT2 domain containing 2  | MGI:1917362 |
| ENSMUST00000169681  | 75  | 133 | 0 Eif4b    | eukaryotic translation initiation factor 4B                               | MGI:95304   |
| ENSMUST00000052455  | 75  | 84  | 28 Pigm    | phosphatidylinositol glycan anchor biosynthesis, class M                  | MGI:1914806 |
| ENSMUST00000079510  | 75  | 82  | 0 Cherp    | calcium homeostasis endoplasmic reticulum protein                         | MGI:106417  |
| ENSMUST00000028426  | 75  | 77  | 2 Cers6    | ceramide synthase 6   | MGI:2442564 |
| ENSMUST00000031288  | 74  | 124 | 0 Tfip11   | tuftelin interacting protein 11   | MGI:1930075 |

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|--------------------|----|-----|-------------|--|-------------|
| ENSMUST00000047632 | 74 | 39  | 0 Surf6     | surfeit gene 6   | MGI:98447   |
| ENSMUST00000034737 | 73 | 41  | 0 Khdc3     | KH domain containing 3, subcortical maternal complex member                | MGI:1914241 |
| ENSMUST00000143074 | 73 | 70  | 0 Gm42669   | predicted gene 42669   | MGI:5662806 |
| ENSMUST00000095063 | 73 | 37  | 22 Inip     | INTS3 and NABP interacting protein   | MGI:1913459 |
| ENSMUST00000128425 | 73 | 31  | 0 Stk3      | serine/threonine kinase 3  | MGI:1928487 |
| ENSMUST00000061455 | 72 | 102 | 40 Fam46c   | family with sequence similarity 46, member C                               | MGI:1921895 |
| ENSMUST00000154832 | 72 | 63  | 0 Gga3      | golgi associated, gamma adaptin ear containing, ARF binding protein 3      | MGI:2384159 |
| ENSMUST00000111289 | 71 | 114 | 0 Nit1      | nitrilase 1  | MGI:1350916 |
| ENSMUST00000058437 | 71 | 101 | 6 Rpl7      | ribosomal protein L7   | MGI:98073   |
| ENSMUST00000031367 | 71 | 96  | 0 Slc15a4   | solute carrier family 15, member 4   | MGI:2140796 |
| ENSMUST00000137459 | 71 | 89  | 0 Tcte2     | t-complex-associated testis expressed 2                                    | MGI:98641   |
| ENSMUST00000029738 | 71 | 83  | 0 Gpr89     | G protein-coupled receptor 89  | MGI:1914799 |
| ENSMUST00000002845 | 71 | 83  | 0 Mea1      | male enhanced antigen 1  | MGI:96957   |
| ENSMUST00000034187 | 71 | 83  | 0 Mmp2      | matrix metalloproteinase 2   | MGI:97009   |
| ENSMUST00000111738 | 71 | 10  | 4 Tctn1     | tectonic family member 1   | MGI:3603820 |
| ENSMUST00000170872 | 70 | 7   | 0 Thbs2     | thrombospondin 2   | MGI:98738   |
| ENSMUST00000127979 | 70 | 113 | 0 Zfp65     | zinc finger protein 65   | MGI:107769  |
| ENSMUST00000069756 | 70 | 70  | 0 Ocln      | occludin   | MGI:106183  |
| ENSMUST00000107796 | 70 | 55  | 16 Slc25a51 | solute carrier family 25, member 51  | MGI:2684984 |
| ENSMUST00000099747 | 69 | 60  | 0 B3galnt2  | UDP-GalNAc:betaGlcNAc beta 1,3-galactosaminyltransferase, polypeptide 2    | MGI:2145517 |
| ENSMUST00000018875 | 68 | 122 | 0 Ap2b1     | adaptor-related protein complex 2, beta 1 subunit                          | MGI:1919020 |
| ENSMUST00000076169 | 68 | 89  | 0 Mtx3      | metaxin 3  | MGI:2686040 |
| ENSMUST00000095273 | 67 | 73  | 0 Nr2c2ap   | nuclear receptor 2C2-associated protein                                    | MGI:1922942 |
| ENSMUST00000144768 | 67 | 35  | 0 Slc25a38  | solute carrier family 25, member 38  | MGI:2384782 |
| ENSMUST00000046839 | 66 | 104 | 0 Gfer      | growth factor, erv1 (S. cerevisiae)-like (augmenter of liver regeneration) | MGI:107757  |
| ENSMUST00000037947 | 66 | 51  | 14 Mcl1     | myeloid cell leukemia sequence 1   | MGI:101769  |
| ENSMUST00000135573 | 65 | 94  | 0 Prdx1     | peroxiredoxin 1  | MGI:99523   |
| ENSMUST00000075724 | 64 | 92  | 0 Rfxank    | regulatory factor X-associated ankyrin-containing protein                  | MGI:1333865 |
| ENSMUST00000015011 | 64 | 45  | 0 Surf4     | surfeit gene 4   | MGI:98445   |
| ENSMUST00000165390 | 64 | 97  | 0 Mocs1     | molybdenum cofactor synthesis 1  | MGI:1928904 |
| ENSMUST00000136174 | 64 | 65  | 12 Rps6     | ribosomal protein S6   | MGI:98159   |
| ENSMUST00000035871 | 64 | 51  | 0 Tmem127   | transmembrane protein 127  | MGI:1916720 |
| ENSMUST00000019075 | 63 | 43  | 0 Natd1     | N-acetyltransferase domain containing 1                                    | MGI:1344388 |
| ENSMUST00000039949 | 62 | 76  | 0 Eme1      | essential meiotic structure-specific endonuclease 1                        | MGI:3576783 |
| ENSMUST00000132868 | 60 | 114 | 0 Kif2c     | kinesin family member 2C   | MGI:1921054 |
| ENSMUST00000073889 | 60 | 60  | 0 Polg      | polymerase (DNA directed), gamma   | MGI:1196389 |
| ENSMUST00000090190 | 60 | 53  | 0 Hic2      | hypermethylated in cancer 2  | MGI:1929869 |
| ENSMUST00000054979 | 60 | 43  | 0 Aff1      | AF4/FMR2 family, member 1  | MGI:1100819 |
| ENSMUST00000129884 | 59 | 142 | 12 Ep400    | E1A binding protein p400   | MGI:1276124 |
| ENSMUST00000111171 | 59 | 90  | 0 Pom121    | nuclear pore membrane protein 121  | MGI:2137624 |
| ENSMUST00000038053 | 59 | 72  | 0 Lpp       | LIM domain containing preferred translocation partner in lipoma            | MGI:2441849 |
| ENSMUST00000100013 | 59 | 72  | 0 Atp13a3   | ATPase type 13A3   | MGI:2685387 |
| ENSMUST00000069557 | 59 | 58  | 0 Smad5     | SMAD family member 5   | MGI:1328787 |

|                     |    |     |            |  |             |
|---------------------|----|-----|------------|--|-------------|
| ENSMUST00000130643  | 59 | 42  | 0 Srpk1    | serine/arginine-rich protein specific kinase 1                     | MGI:106908  |
| ENSMUST00000144759  | 58 | 99  | 0 Usp16    | ubiquitin specific peptidase 16                                    | MGI:1921362 |
| ENSMUST00000142218  | 56 | 81  | 0 Zfp111   | zinc finger protein 111  | MGI:1929114 |
| ENSMUST00000117263  | 56 | 81  | 0 Rad9b    | RAD9 checkpoint clamp component B                                  | MGI:2385231 |
| ENSMUST00000131266  | 56 | 51  | 0 Eif3m    | eukaryotic translation initiation factor 3, subunit M              | MGI:1351744 |
| ENSMUST00000079012  | 56 | 49  | 0 March8   | membrane-associated ring finger (C3HC4) 8                          | MGI:1919029 |
| ENSMUST00000029217  | 56 | 33  | 0 Ndubf5   | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 5               | MGI:1913296 |
| ENSMUST00000089185  | 56 | 26  | 0 Zdhhc14  | zinc finger, DHHC domain containing 14                             | MGI:2653229 |
| ENSMUST00000129533  | 55 | 57  | 14 Sub1    | SUB1 homolog (S. cerevisiae)                                       | MGI:104811  |
| ENSMUST00000002839  | 54 | 88  | 0 Ppp2r5d  | protein phosphatase 2, regulatory subunit B', delta                | MGI:2388481 |
| ENSMUST00000027373  | 54 | 38  | 0 Ppm1f    | protein phosphatase 1F (PP2C domain containing)                    | MGI:1918464 |
| ENSMUST00000163300  | 53 | 114 | 8 Arf1     | ADP-ribosylation factor 1  | MGI:99431   |
| ENSMUST00000165258  | 53 | 80  | 30 Xpnpep3 | X-prolyl aminopeptidase 3, mitochondrial                           | MGI:2445217 |
| ENSMUST00000001092  | 53 | 81  | 0 Zfp276   | zinc finger protein (C2H2 type) 276                                | MGI:1888495 |
| ENSMUST00000161779  | 53 | 54  | 0 Hipk2    | homeodomain interacting protein kinase 2                           | MGI:1314872 |
| ENSMUST00000085614  | 52 | 74  | 4 Usp12    | ubiquitin specific peptidase 12                                    | MGI:1270128 |
| ENSMUST00000182149  | 51 | 52  | 0 Prrc2c   | proline-rich coiled-coil 2C  | MGI:1913754 |
| ENSMUST00000111178  | 51 | 49  | 0 Efr3b    | EFR3 homolog B   | MGI:2444851 |
| ENSMUST00000032998  | 50 | 74  | 284 Rps3   | ribosomal protein S3   | MGI:1350917 |
| ENSMUST00000029214  | 50 | 62  | 0 Actl6a   | actin-like 6A  | MGI:1861453 |
| ENSMUST00000123495  | 50 | 48  | 2 Haus8    | 4HAUS augmin-like complex, subunit 8                               | MGI:1923728 |
| ENSMUST00000025236  | 50 | 35  | 12 Stard4  | StAR-related lipid transfer (START) domain containing 4            | MGI:2156764 |
| ENSMUST00000093833  | 50 | 33  | 0 Fam219b  | family with sequence similarity 219, member B                      | MGI:1925573 |
| ENSMUST00000141384  | 49 | 86  | 0 Cep85    | centrosomal protein 85   | MGI:1917262 |
| ENSMUST00000032818  | 49 | 16  | 4 Fbxo17   | F-box protein 17   | MGI:1354707 |
| ENSMUST00000107717  | 48 | 56  | 103 Zfp652 | zinc finger protein 652  | MGI:2442221 |
| ENSMUST00000176386  | 48 | 42  | 0 Hmbox1   | homeobox containing 1  | MGI:2445066 |
| ENSMUST00000028350  | 47 | 13  | 14 Zmynd19 | zinc finger, MYND domain containing 19                             | MGI:1914437 |
| ENSMUST00000000001  | 47 | 16  | 56 Gnai3   | guanine nucleotide binding protein (G protein), alpha inhibiting 3 | MGI:95773   |
| ENSMUST00000059372  | 46 | 112 | 0 Rnf24    | ring finger protein 24   | MGI:1261771 |
| ENSMUST00000069304  | 46 | 66  | 0 Hnrnph1  | heterogeneous nuclear ribonucleoprotein H1                         | MGI:1891925 |
| ENSMUST00000057627  | 46 | 51  | 0 Spata2   | spermatogenesis associated 2                                       | MGI:2146885 |
| ENSMUST00000025137  | 46 | 39  | 0 Thoc1    | THO complex 1  | MGI:1919668 |
| ENSMUST00000143800  | 46 | 39  | 0 Natd1    | N-acetyltransferase domain containing 1                            | MGI:1344388 |
| ENSMUST00000123399  | 45 | 70  | 0 Uhmk1    | U2AF homology motif (UHM) kinase 1                                 | MGI:1341908 |
| ENSMUST000000067689 | 45 | 48  | 2 Tnrc6b   | trinucleotide repeat containing 6b                                 | MGI:2443730 |
| ENSMUST00000093162  | 45 | 45  | 0 Atxn1l   | ataxin 1-like  | MGI:3694797 |
| ENSMUST00000097773  | 45 | 22  | 0 Klhl21   | kelch-like 21  | MGI:1919288 |
| ENSMUST00000065263  | 45 | 13  | 0 Sbno1    | strawberry notch homolog 1 (Drosophila)                            | MGI:2384298 |
| ENSMUST00000103111  | 44 | 81  | 0 Zhx3     | zinc fingers and homeoboxes 3                                      | MGI:2444772 |
| ENSMUST00000137243  | 44 | 80  | 0 Msto1    | misato 1, mitochondrial distribution and morphology regulator      | MGI:2385175 |
| ENSMUST00000147875  | 44 | 43  | 30 Lym9    | LYR motif containing 9   | MGI:1913524 |
| ENSMUST00000017435  | 44 | 0   | 28 Taok1   | TAO kinase 1   | MGI:1914490 |

|                     |    |     |                 |   |             |
|---------------------|----|-----|-----------------|---|-------------|
| ENSMUST00000132423  | 44 | 58  | 0 Ncald         | neurocalcin delta   | MGI:1196326 |
| ENSMUST00000101385  | 44 | 44  | 0 Plekha8       | pleckstrin homology domain containing, family A (phosphoinositide binding specific) membe | MGI:2681164 |
| ENSMUST00000151372  | 44 | 39  | 0 lcmt          | isoprenylcysteine carboxyl methyltransferase  | MGI:1888594 |
| ENSMUST00000026922  | 44 | 21  | 0 Homer2        | homer scaffolding protein 2   | MGI:1347354 |
| ENSMUST00000017783  | 44 | 18  | 0 Rab11fip4     | RAB11 family interacting protein 4 (class II)   | MGI:2442920 |
| ENSMUST000000069097 | 43 | 25  | 0 Ago3          | argonaute RISC catalytic subunit 3  | MGI:2446634 |
| ENSMUST000000099547 | 43 | 23  | 0 Fam8a1        | family with sequence similarity 8, member A1  | MGI:2145496 |
| ENSMUST00000180531  | 42 | 49  | 0 Senp1         | SUMO1/sentrin specific peptidase 1  | MGI:2445054 |
| ENSMUST00000152216  | 42 | 47  | 0 Rnf38         | ring finger protein 38  | MGI:1920719 |
| ENSMUST00000068045  | 42 | 45  | 0 Actn4         | actinin alpha 4   | MGI:1890773 |
| ENSMUST000000099443 | 42 | 18  | 0 Zfyve27       | zinc finger, FYVE domain containing 27  | MGI:1919602 |
| ENSMUST00000181173  | 41 | 52  | 0 Gm3839        | predicted pseudogene 3839   | MGI:3782011 |
| ENSMUST00000023363  | 41 | 47  | 0 Rrn3          | RRN3 RNA polymerase I transcription factor homolog (yeast)                                | MGI:1925255 |
| ENSMUST000000044532 | 41 | 41  | 0 Dock3         | dedicator of cyto-kinesis 3   | MGI:2429763 |
| ENSMUST000000066991 | 41 | 32  | 0 Adm2          | adrenomedullin 2  | MGI:2675256 |
| ENSMUST000000098816 | 41 | 24  | 0 Slc7a2        | solute carrier family 7 (cationic amino acid transporter, y+ system), member 2            | MGI:99828   |
| ENSMUST000000034775 | 41 | 39  | 0 Fem1b         | feminization 1 homolog b (C. elegans)   | MGI:1335087 |
| ENSMUST000000060108 | 41 | 33  | 0 1810030O07Rik | RIKEN cDNA 1810030O07 gene  | MGI:1916405 |
| ENSMUST000000045540 | 40 | 37  | 0 Socs7         | suppressor of cytokine signaling 7  | MGI:2651588 |
| ENSMUST000000030110 | 40 | 26  | 0 Zdhhc21       | zinc finger, DHHC domain containing 21  | MGI:1915518 |
| ENSMUST000000129762 | 39 | 105 | 0 Crybg3        | beta-gamma crystallin domain containing 3   | MGI:2676311 |
| ENSMUST000000025241 | 39 | 53  | 0 Ercc3         | excision repair cross-complementing rodent repair deficiency, complementation group 3     | MGI:95414   |
| ENSMUST00000174483  | 39 | 44  | 0 Dnmt3a        | DNA methyltransferase 3A  | MGI:1261827 |
| ENSMUST000000054274 | 39 | 43  | 0 Lhfpl2        | lipoma HMGIC fusion partner-like 2  | MGI:2145236 |
| ENSMUST00000137573  | 39 | 41  | 0 Zfp866        | zinc finger protein 866   | MGI:3584369 |
| ENSMUST00000141617  | 39 | 33  | 8 Stard4        | StAR-related lipid transfer (START) domain containing 4                                   | MGI:2156764 |
| ENSMUST00000002048  | 39 | 33  | 0 Taco1         | translational activator of mitochondrially encoded cytochrome c oxidase I                 | MGI:1917457 |
| ENSMUST000000021368 | 39 | 33  | 0 Nemf          | nuclear export mediator factor  | MGI:1918305 |
| ENSMUST000000073337 | 39 | 17  | 0 Cramp1l       | Crm, cramped-like (Drosophila)  | MGI:1930190 |
| ENSMUST00000016088  | 39 | 6   | 0 Gatsl2        | GATS protein-like 2   | MGI:1933384 |
| ENSMUST00000138267  | 39 | 5   | 0 Ankrd42       | ankyrin repeat domain 42  | MGI:1921095 |
| ENSMUST00000150993  | 38 | 39  | 0 Snx29         | sorting nexin 29  | MGI:1921728 |
| ENSMUST000000056191 | 38 | 20  | 0 Tet3          | tet methylcytosine dioxygenase 3  | MGI:2446229 |
| ENSMUST00000118152  | 38 | 17  | 52 Cbx5         | chromobox 5   | MGI:109372  |
| ENSMUST000000060095 | 38 | 79  | 0 Tmtc1         | transmembrane and tetratricopeptide repeat containing 1                                   | MGI:3039590 |
| ENSMUST000000096433 | 38 | 30  | 2 Deptor        | DEP domain containing MTOR-interacting protein  | MGI:2146322 |
| ENSMUST000000109936 | 38 | 22  | 0 Clmn          | calmin  | MGI:2136957 |
| ENSMUST000000046011 | 38 | 21  | 0 Nol10         | nucleolar protein 10  | MGI:2684913 |
| ENSMUST00000102632  | 38 | 14  | 18 Sort1        | sortilin 1  | MGI:1338015 |
| ENSMUST00000184105  | 37 | 54  | 0 Pank2         | pantothenate kinase 2   | MGI:1921700 |
| ENSMUST00000152277  | 37 | 43  | 0 Ddb2          | damage specific DNA binding protein 2   | MGI:1355314 |
| ENSMUST00000131103  | 37 | 32  | 32 Actg1        | actin, gamma, cytoplasmic 1   | MGI:87906   |
| ENSMUST00000137430  | 37 | 26  | 0 Pik3cd        | phosphatidylinositol 3-kinase catalytic delta polypeptide                                 | MGI:1098211 |

|                     |    |    |     |               |   |             |
|---------------------|----|----|-----|---------------|---|-------------|
| ENSMUST00000045593  | 36 | 68 | 0   | Daglb         | diacylglycerol lipase, beta   | MGI:2442032 |
| ENSMUST00000147684  | 36 | 40 | 12  | Skp1a         | S-phase kinase-associated protein 1A                                      | MGI:103575  |
| ENSMUST00000179748  | 36 | 25 | 0   | Nudt5         | nudix (nucleoside diphosphate linked moiety X)-type motif 5               | MGI:1858232 |
| ENSMUST00000149168  | 36 | 81 | 0   | Slc6a9        | solute carrier family 6 (neurotransmitter transporter, glycine), member 9 | MGI:95760   |
| ENSMUST00000089622  | 36 | 43 | 0   | Tet3          | tet methylcytosine dioxygenase 3  | MGI:2446229 |
| ENSMUST00000113505  | 36 | 41 | 0   | Rsl24d1       | ribosomal L24 domain containing 1   | MGI:2681840 |
| ENSMUST00000002588  | 36 | 40 | 0   | Tiam1         | T cell lymphoma invasion and metastasis 1                                 | MGI:103306  |
| ENSMUST00000117269  | 36 | 26 | 0   | Traf3         | TNF receptor-associated factor 3  | MGI:108041  |
| ENSMUST00000030003  | 35 | 49 | 0   | Exosc3        | exosome component 3   | MGI:1913612 |
| ENSMUST00000177241  | 35 | 41 | 0   | Syngr2        | synaptogyrin 2  | MGI:1328324 |
| ENSMUST00000156725  | 35 | 34 | 0   | Fbxl18        | F-box and leucine-rich repeat protein 18                                  | MGI:2444450 |
| ENSMUST00000019907  | 35 | 31 | 0   | Fbxo5         | F-box protein 5   | MGI:1914391 |
| ENSMUST00000075946  | 34 | 58 | 0   | Eaf2          | ELL associated factor 2   | MGI:2146616 |
| ENSMUST00000117687  | 34 | 58 | 0   | Ppp2r2b       | protein phosphatase 2, regulatory subunit B, beta                         | MGI:1920180 |
| ENSMUST00000095899  | 34 | 47 | 0   | Syne1         | spectrin repeat containing, nuclear envelope 1                            | MGI:1927152 |
| ENSMUST00000050125  | 34 | 44 | 0   | 2900026A02Rik | RIKEN cDNA 2900026A02 gene  | MGI:1920194 |
| ENSMUST00000098817  | 34 | 42 | 0   | Vps37a        | vacuolar protein sorting 37A  | MGI:1261835 |
| ENSMUST00000127270  | 34 | 34 | 103 | Rpl23a        | ribosomal protein L23A  | MGI:3040672 |
| ENSMUST00000119109  | 34 | 32 | 0   | Etv3          | ets variant 3   | MGI:1350926 |
| ENSMUST00000014694  | 34 | 24 | 0   | Rbsn          | rabenosyn, RAB effector   | MGI:1925537 |
| ENSMUST000000147163 | 34 | 9  | 12  | Jmjd4         | jumonji domain containing 4   | MGI:2144404 |
| ENSMUST00000085144  | 33 | 59 | 0   | Gm13023       | predicted gene 13023  | MGI:3650478 |
| ENSMUST00000114740  | 33 | 45 | 0   | Maats1        | MYCBP-associated, testis expressed 1                                      | MGI:2443598 |
| ENSMUST00000057000  | 33 | 37 | 0   | Zc3h14        | zinc finger CCCH type containing 14                                       | MGI:1919824 |
| ENSMUST00000173955  | 33 | 32 | 0   | Wdfy3         | WD repeat and FYVE domain containing 3                                    | MGI:1096875 |
| ENSMUST00000033282  | 33 | 28 | 0   | Bccip         | BRCA2 and CDKN1A interacting protein                                      | MGI:1913415 |
| ENSMUST00000041124  | 33 | 18 | 0   | Zfp704        | zinc finger protein 704   | MGI:2180715 |
| ENSMUST00000065600  | 33 | 47 | 6   | BC048403      | cDNA sequence BC048403  | MGI:2670984 |
| ENSMUST00000138345  | 33 | 43 | 0   | Tcte2         | t-complex-associated testis expressed 2                                   | MGI:98641   |
| ENSMUST00000136748  | 33 | 30 | 0   | Rhbdd2        | rhomboid domain containing 2  | MGI:1915612 |
| ENSMUST00000021084  | 33 | 26 | 0   | Sumo2         | small ubiquitin-like modifier 2   | MGI:2158813 |
| ENSMUST00000103013  | 33 | 24 | 0   | Tbcd          | tubulin-specific chaperone d  | MGI:1919686 |
| ENSMUST00000152593  | 33 | 16 | 16  | Nfrkb         | nuclear factor related to kappa B binding protein                         | MGI:2442410 |
| ENSMUST00000120095  | 33 | 5  | 14  | Wdr31         | WD repeat domain 31   | MGI:1918604 |
| ENSMUST00000105754  | 32 | 59 | 0   | C87977        | expressed sequence C87977   | MGI:2140708 |
| ENSMUST00000144910  | 32 | 41 | 0   | Arl4a         | ADP-ribosylation factor-like 4A   | MGI:99437   |
| ENSMUST00000038463  | 32 | 26 | 0   | Raver2        | ribonucleoprotein, PTB-binding 2  | MGI:2443623 |
| ENSMUST00000133564  | 31 | 53 | 0   | Esr2          | estrogen receptor 2 (beta)  | MGI:109392  |
| ENSMUST00000119928  | 31 | 41 | 12  | Luc7l         | Luc7-like   | MGI:1914228 |
| ENSMUST00000122873  | 31 | 39 | 0   | Ube2l3        | ubiquitin-conjugating enzyme E2L 3  | MGI:109240  |
| ENSMUST00000098942  | 31 | 39 | 0   | Spc24         | SPC24, NDC80 kinetochore complex component, homolog (S. cerevisiae)       | MGI:1914879 |
| ENSMUST00000035007  | 31 | 37 | 0   | Cmtm6         | CKLF-like MARVEL transmembrane domain containing 6                        | MGI:2447165 |
| ENSMUST00000064067  | 31 | 33 | 0   | Smug1         | single-strand selective monofunctional uracil DNA glycosylase             | MGI:1918976 |

|                    |    |     |                 |   |             |
|--------------------|----|-----|-----------------|---|-------------|
| ENSMUST00000145300 | 31 | 31  | 20 Prdx5        | peroxiredoxin 5   | MGI:1859821 |
| ENSMUST00000057256 | 31 | 31  | 0 6030458C11Rik | RIKEN cDNA 6030458C11 gene  | MGI:1925127 |
| ENSMUST00000130032 | 31 | 29  | 0 Carm1         | coactivator-associated arginine methyltransferase 1                           | MGI:1913208 |
| ENSMUST00000179802 | 31 | 28  | 0 Cmtm4         | CKLF-like MARVEL transmembrane domain containing 4                            | MGI:2142888 |
| ENSMUST00000116595 | 31 | 23  | 0 Skp1a         | S-phase kinase-associated protein 1A  | MGI:103575  |
| ENSMUST00000125628 | 31 | 12  | 0 Srrd          | SRR1 domain containing  | MGI:1917368 |
| ENSMUST00000080817 | 30 | 32  | 0 Rnf169        | ring finger protein 169   | MGI:1920257 |
| ENSMUST00000020957 | 30 | 117 | 0 Adi1          | acireductone dioxygenase 1  | MGI:2144929 |
| ENSMUST00000133565 | 30 | 53  | 0 Tsc1          | tuberous sclerosis 1  | MGI:1929183 |
| ENSMUST00000102494 | 30 | 27  | 0 Nsrp1         | nuclear speckle regulatory protein 1  | MGI:2144305 |
| ENSMUST00000034388 | 30 | 15  | 0 Vps4a         | vacuolar protein sorting 4A   | MGI:1890520 |
| ENSMUST00000115351 | 30 | 10  | 0 Rab3d         | RAB3D, member RAS oncogene family   | MGI:97844   |
| ENSMUST00000047257 | 29 | 87  | 0 Katnal1       | katanin p60 subunit A-like 1  | MGI:2387638 |
| ENSMUST00000137526 | 29 | 41  | 0 Cbfa2t2       | core-binding factor, runt domain, alpha subunit 2, translocated to, 2 (human) | MGI:1333833 |
| ENSMUST00000172396 | 29 | 35  | 0 Ddx39         | DEAD (Asp-Glu-Ala-Asp) box polypeptide 39                                     | MGI:1915528 |
| ENSMUST00000071739 | 29 | 30  | 0 Gsk3a         | glycogen synthase kinase 3 alpha  | MGI:2152453 |
| ENSMUST00000115105 | 29 | 28  | 0 Rubcn         | RUN domain and cysteine-rich domain containing, Beclin 1-interacting protein  | MGI:1915160 |
| ENSMUST00000018353 | 29 | 24  | 0 Stk4          | serine/threonine kinase 4   | MGI:1929004 |
| ENSMUST00000035090 | 28 | 64  | 0 Fbxl2         | F-box and leucine-rich repeat protein 2                                       | MGI:1919429 |
| ENSMUST00000106193 | 28 | 45  | 0 Mtf1          | metal response element binding transcription factor 1                         | MGI:101786  |
| ENSMUST00000161124 | 28 | 36  | 0 Ermp1         | endoplasmic reticulum metalloproteinase 1                                     | MGI:106250  |
| ENSMUST00000168566 | 28 | 24  | 40 Zmat3        | zinc finger matrin type 3   | MGI:1195270 |
| ENSMUST00000173727 | 28 | 18  | 0 Lig3          | ligase III, DNA, ATP-dependent  | MGI:109152  |
| ENSMUST00000056623 | 28 | 4   | 0 Tmem72        | transmembrane protein 72  | MGI:2442707 |
| ENSMUST00000164553 | 27 | 50  | 0 Myadm         | myeloid-associated differentiation marker                                     | MGI:1355332 |
| ENSMUST00000107772 | 27 | 32  | 14 Tstd2        | thiosulfate sulfurtransferase (rhodanese)-like domain containing 2            | MGI:3039624 |
| ENSMUST00000021818 | 27 | 31  | 0 Cenpp         | centromere protein P  | MGI:1913586 |
| ENSMUST00000143199 | 27 | 27  | 0 Tor1a         | torsin family 1, member A (torsin A)  | MGI:1353568 |
| ENSMUST00000147804 | 27 | 27  | 0 Nepro         | nucleolus and neural progenitor protein                                       | MGI:2384836 |
| ENSMUST00000163371 | 27 | 20  | 0 Fam3c         | family with sequence similarity 3, member C                                   | MGI:107892  |
| ENSMUST00000002172 | 27 | 18  | 0 Acp2          | acid phosphatase 2, lysosomal   | MGI:87882   |
| ENSMUST00000054098 | 27 | 18  | 0 Slc35g1       | solute carrier family 35, member G1   | MGI:2444789 |
| ENSMUST00000000940 | 27 | 57  | 0 Nsun5         | NOL1/NOP2/Sun domain family, member 5   | MGI:2140844 |
| ENSMUST00000167760 | 27 | 46  | 0 Mier2         | MIER family member 2  | MGI:1917677 |
| ENSMUST00000032093 | 27 | 45  | 0 Prickle2      | prickle planar cell polarity protein 2  | MGI:1925144 |
| ENSMUST00000147277 | 27 | 24  | 135 Ipmk        | inositol polyphosphate multikinase  | MGI:1916968 |
| ENSMUST00000159161 | 27 | 24  | 0 P3h2          | prolyl 3-hydroxylase 2  | MGI:2146663 |
| ENSMUST00000052969 | 27 | 20  | 0 Ston2         | stonin 2  | MGI:1918272 |
| ENSMUST00000079869 | 27 | 19  | 0 Znr2          | zinc and ring finger 2  | MGI:1196246 |
| ENSMUST00000165413 | 26 | 77  | 0 Stk35         | serine/threonine kinase 35  | MGI:1914583 |
| ENSMUST00000061617 | 26 | 36  | 40 Zfp280b      | zinc finger protein 280B  | MGI:1927865 |
| ENSMUST00000181521 | 26 | 35  | 0 Map1lc3b      | microtubule-associated protein 1 light chain 3 beta                           | MGI:1914693 |
| ENSMUST00000110855 | 26 | 26  | 0 Lpgat1        | lysophosphatidylglycerol acyltransferase 1                                    | MGI:2446186 |



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| ENSMUST00000013882  | 26 | 20 | 0 Crbn      | cereblon  | MGI:1913277 |
| ENSMUST00000081619  | 26 | 20 | 0 Sh3pxd2a  | SH3 and PX domains 2A   | MGI:1298393 |
| ENSMUST00000129774  | 26 | 17 | 6 Gk5       | glycerol kinase 5 (putative)  | MGI:2443336 |
| ENSMUST00000171404  | 26 | 12 | 0 Gtf3c4    | general transcription factor IIIC, polypeptide 4                      | MGI:2138937 |
| ENSMUST00000102927  | 26 | 9  | 0 Pdpk1     | 3-phosphoinositide dependent protein kinase 1                         | MGI:1338068 |
| ENSMUST00000008537  | 26 | 9  | 0 Carhsp1   | calcium regulated heat stable protein 1                               | MGI:1196368 |
| ENSMUST00000111817  | 25 | 25 | 0 Gmfb      | glia maturation factor, beta  | MGI:1927133 |
| ENSMUST00000129974  | 25 | 24 | 0 Lrp1b     | low density lipoprotein-related protein 1B (deleted in tumors)        | MGI:2151136 |
| ENSMUST00000103181  | 25 | 23 | 0 Cds2      | CDP-diacylglycerol synthase (phosphatidate cytidyltransferase) 2      | MGI:1332236 |
| ENSMUST00000064257  | 25 | 22 | 56 Tchh     | trichohyalin  | MGI:2177944 |
| ENSMUST00000041616  | 25 | 20 | 0 Pdxk      | pyridoxal (pyridoxine, vitamin B6) kinase                             | MGI:1351869 |
| ENSMUST00000172485  | 25 | 18 | 0 Rnf8      | ring finger protein 8   | MGI:1929069 |
| ENSMUST00000134579  | 25 | 16 | 0 Knstrn    | kinetochore-localized astrin/SPAG5 binding                            | MGI:1289298 |
| ENSMUST00000166743  | 24 | 30 | 0 Mapk1ip1l | mitogen-activated protein kinase 1 interacting protein 1-like         | MGI:2444022 |
| ENSMUST00000179392  | 24 | 28 | 0 Dlgap5    | discs, large (Drosophila) homolog-associated protein 5                | MGI:2183453 |
| ENSMUST00000022296  | 24 | 25 | 0 Ube2e1    | ubiquitin-conjugating enzyme E2E 1                                    | MGI:107411  |
| ENSMUST00000107498  | 24 | 18 | 0 Gon4l     | gon-4-like (C.elegans)  | MGI:1917579 |
| ENSMUST00000152006  | 24 | 49 | 0 Arhgef11  | Rho guanine nucleotide exchange factor (GEF) 11                       | MGI:2441869 |
| ENSMUST00000137835  | 24 | 39 | 0 H2afy     | H2A histone family, member Y  | MGI:1349392 |
| ENSMUST00000135601  | 24 | 30 | 0 Al314180  | expressed sequence Al314180   | MGI:2140220 |
| ENSMUST00000106508  | 24 | 22 | 0 Gga3      | golgi associated, gamma adaptin ear containing, ARF binding protein 3 | MGI:2384159 |
| ENSMUST00000026662  | 24 | 16 | 0 Cbx2      | chromobox 2   | MGI:88289   |
| ENSMUST00000021592  | 24 | 15 | 0 Cdca7l    | cell division cycle associated 7 like                                 | MGI:2384982 |
| ENSMUST00000111427  | 24 | 12 | 67 Pou2f1   | POU domain, class 2, transcription factor 1                           | MGI:101898  |
| ENSMUST00000020649  | 24 | 12 | 0 Rad50     | RAD50 double strand break repair protein                              | MGI:109292  |
| ENSMUST00000109423  | 24 | 0  | 0 Ppara     | peroxisome proliferator activated receptor alpha                      | MGI:104740  |
| ENSMUST00000037401  | 23 | 46 | 0 Phf20     | PHD finger protein 20   | MGI:2444148 |
| ENSMUST00000042235  | 23 | 38 | 16 Eef1a1   | eukaryotic translation elongation factor 1 alpha 1                    | MGI:1096881 |
| ENSMUST00000161624  | 23 | 35 | 0 Fgd4      | FYVE, RhoGEF and PH domain containing 4                               | MGI:2183747 |
| ENSMUST00000180168  | 23 | 30 | 0 Gm7102    | predicted gene 7102   | MGI:3648735 |
| ENSMUST00000020034  | 23 | 23 | 0 Echdc1    | enoyl Coenzyme A hydratase domain containing 1                        | MGI:1277169 |
| ENSMUST00000079157  | 23 | 23 | 0 Eya3      | EYA transcriptional coactivator and phosphatase 3                     | MGI:109339  |
| ENSMUST00000145781  | 23 | 20 | 0 Lrrc45    | leucine rich repeat containing 45                                     | MGI:2387183 |
| ENSMUST00000042852  | 23 | 16 | 0 Fam210a   | family with sequence similarity 210, member A                         | MGI:1914000 |
| ENSMUST00000118729  | 23 | 13 | 0 Zfp740    | zinc finger protein 740   | MGI:1915994 |
| ENSMUST000000021800 | 23 | 11 | 0 Mcur1     | mitochondrial calcium uniporter regulator 1                           | MGI:1923387 |
| ENSMUST00000068240  | 23 | 5  | 14 Klhdc10  | kelch domain containing 10  | MGI:1924038 |
| ENSMUST00000091299  | 23 | 1  | 0 Cdk7      | cyclin-dependent kinase 7   | MGI:102956  |
| ENSMUST00000172314  | 22 | 59 | 0 Hbp1      | high mobility group box transcription factor 1                        | MGI:894659  |
| ENSMUST00000112691  | 22 | 32 | 0 Gnl3l     | guanine nucleotide binding protein-like 3 (nucleolar)-like            | MGI:2448557 |
| ENSMUST00000140700  | 22 | 20 | 0 Nudcd3    | NudC domain containing 3  | MGI:2144158 |
| ENSMUST00000078404  | 22 | 16 | 0 Pcbp2     | poly(rC) binding protein 2  | MGI:108202  |
| ENSMUST00000127617  | 22 | 16 | 0 Suv39h1   | suppressor of variegation 3-9 homolog 1 (Drosophila)                  | MGI:1099440 |

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| ENSMUST00000037548 | 22 | 15 | 0 Rnf146   | ring finger protein 146   | MGI:1915281 |
| ENSMUST00000107200 | 22 | 6  | 0 Cdc42se1 | CDC42 small effector 1  | MGI:1889510 |
| ENSMUST00000073782 | 21 | 37 | 0 Zfp937   | zinc finger protein 937   | MGI:3644476 |
| ENSMUST00000063988 | 21 | 36 | 36 Tbl1xr1 | transducin (beta)-like 1X-linked receptor 1   | MGI:2441730 |
| ENSMUST00000124745 | 21 | 35 | 0 Dda1     | DET1 and DDB1 associated 1  | MGI:1913748 |
| ENSMUST00000160942 | 21 | 27 | 4 Fam83a   | family with sequence similarity 83, member A  | MGI:2447773 |
| ENSMUST00000140438 | 21 | 16 | 0 Mrps25   | mitochondrial ribosomal protein S25   | MGI:1928140 |
| ENSMUST00000146430 | 21 | 15 | 0 Tbc1d14  | TBC1 domain family, member 14   | MGI:1098708 |
| ENSMUST00000030797 | 21 | 12 | 0 Vamp3    | vesicle-associated membrane protein 3   | MGI:1321389 |
| ENSMUST00000151396 | 21 | 6  | 0 Cpsf4l   | cleavage and polyadenylation specific factor 4-like                                 | MGI:1277182 |
| ENSMUST00000023561 | 21 | 5  | 0 Senp2    | SUMO/sentrin specific peptidase 2   | MGI:1923076 |
| ENSMUST00000109553 | 21 | 4  | 0 Tef      | thyrotroph embryonic factor   | MGI:98663   |
| ENSMUST00000181847 | 21 | 35 | 12 Cox4i1  | cytochrome c oxidase subunit IV isoform 1   | MGI:88473   |
| ENSMUST00000027505 | 21 | 26 | 0 Ing5     | inhibitor of growth family, member 5  | MGI:1922816 |
| ENSMUST00000091186 | 21 | 23 | 0 Intu     | inturned planar cell polarity protein   | MGI:2443752 |
| ENSMUST00000151649 | 21 | 21 | 0 Dhtkd1   | dehydrogenase E1 and transketolase domain containing 1                              | MGI:2445096 |
| ENSMUST00000141630 | 21 | 20 | 0 Tyms     | thymidylate synthase  | MGI:98878   |
| ENSMUST00000091853 | 21 | 16 | 0 Net1     | neuroepithelial cell transforming gene 1  | MGI:1927138 |
| ENSMUST00000029125 | 21 | 16 | 0 Armc1    | armadillo repeat containing 1   | MGI:1921502 |
| ENSMUST00000132602 | 21 | 15 | 0 Tomm34   | translocase of outer mitochondrial membrane 34                                      | MGI:1914395 |
| ENSMUST00000113975 | 21 | 14 | 38 Slc5a3  | solute carrier family 5 (inositol transporters), member 3                           | MGI:1858226 |
| ENSMUST00000139868 | 21 | 12 | 0 Edem2    | ER degradation enhancer, mannosidase alpha-like 2                                   | MGI:1915540 |
| ENSMUST00000072572 | 21 | 11 | 0 Alg11    | asparagine-linked glycosylation 11 (alpha-1,2-mannosyltransferase)                  | MGI:2142632 |
| ENSMUST00000164101 | 21 | 9  | 0 Ikbkg    | inhibitor of kappaB kinase gamma  | MGI:1338074 |
| ENSMUST00000020504 | 21 | 9  | 0 Hint1    | histidine triad nucleotide binding protein 1  | MGI:1321133 |
| ENSMUST00000040241 | 21 | 8  | 67 Ddx19b  | DEAD (Asp-Glu-Ala-Asp) box polypeptide 19b  | MGI:2148251 |
| ENSMUST00000041852 | 21 | 5  | 0 Pyroxd1  | pyridine nucleotide-disulphide oxidoreductase domain 1                              | MGI:2676395 |
| ENSMUST00000111136 | 21 | 0  | 0 Fbxo3    | F-box protein 3   | MGI:1929084 |
| ENSMUST00000120157 | 21 | 0  | 0 Ppt1     | palmitoyl-protein thioesterase 1  | MGI:1298204 |
| ENSMUST00000112121 | 20 | 55 | 4 Mlec     | malectin  | MGI:1924015 |
| ENSMUST00000032130 | 20 | 33 | 0 Aplf     | aprataxin and PNKP like factor  | MGI:1919353 |
| ENSMUST00000075845 | 20 | 32 | 0 Arhgap35 | Rho GTPase activating protein 35  | MGI:1929494 |
| ENSMUST00000138843 | 20 | 32 | 0 Slc11a2  | solute carrier family 11 (proton-coupled divalent metal ion transporters), member 2 | MGI:1345279 |
| ENSMUST00000001335 | 20 | 31 | 12 Pfdn5   | prefoldin 5   | MGI:1928753 |
| ENSMUST00000020683 | 20 | 31 | 0 Hus1     | HUS1 checkpoint clamp component   | MGI:1277962 |
| ENSMUST00000067918 | 20 | 27 | 0 Ppm1h    | protein phosphatase 1H (PP2C domain containing)                                     | MGI:2442087 |
| ENSMUST00000180476 | 20 | 20 | 0 Usp35    | ubiquitin specific peptidase 35   | MGI:2685339 |
| ENSMUST00000179996 | 20 | 16 | 0 Zfp994   | zinc finger protein 994   | MGI:3643318 |
| ENSMUST00000160874 | 20 | 13 | 0 Ubl5     | ubiquitin-like 5  | MGI:1913427 |
| ENSMUST00000078961 | 20 | 10 | 0 Kifc5b   | kinesin family member C5B   | MGI:2137414 |
| ENSMUST00000135495 | 20 | 8  | 16 Ccdc92  | coiled-coil domain containing 92  | MGI:106485  |
| ENSMUST00000035988 | 19 | 68 | 0 Txndc5   | thioredoxin domain containing 5   | MGI:2145316 |
| ENSMUST00000150124 | 19 | 35 | 0 Elmod2   | ELMO/CED-12 domain containing 2   | MGI:2445165 |

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| ENSMUST00000084241 | 19 | 29 | 0 Wasf2         | WAS protein family, member 2  | MGI:1098641 |
| ENSMUST00000159310 | 19 | 22 | 48 Hmga2        | high mobility group AT-hook 2                                       | MGI:101761  |
| ENSMUST00000034947 | 19 | 20 | 0 Ppib          | peptidylprolyl isomerase B  | MGI:97750   |
| ENSMUST00000146108 | 19 | 20 | 0 Wdr31         | WD repeat domain 31   | MGI:1918604 |
| ENSMUST00000022925 | 19 | 18 | 0 Eif3h         | eukaryotic translation initiation factor 3, subunit H               | MGI:1915385 |
| ENSMUST00000136267 | 19 | 17 | 0 Tmem135       | transmembrane protein 135   | MGI:1920009 |
| ENSMUST00000006424 | 19 | 16 | 0 Mob1b         | MOB kinase activator 1B   | MGI:1915723 |
| ENSMUST00000135574 | 19 | 16 | 0 Adarb2        | adenosine deaminase, RNA-specific, B2                               | MGI:2151118 |
| ENSMUST00000022494 | 19 | 15 | 22 Ebpl         | emopamil binding protein-like                                       | MGI:1915427 |
| ENSMUST00000148120 | 19 | 7  | 0 Trub2         | TruB pseudouridine (psi) synthase family member 2                   | MGI:2442186 |
| ENSMUST00000150504 | 19 | 6  | 0 0610010K14Rik | RIKEN cDNA 0610010K14 gene  | MGI:1915609 |
| ENSMUST00000154170 | 19 | 4  | 0 Stat3         | signal transducer and activator of transcription 3                  | MGI:103038  |
| ENSMUST00000154132 | 19 | 36 | 0 Vta1          | vesicle (multivesicular body) trafficking 1                         | MGI:1913451 |
| ENSMUST00000119015 | 19 | 32 | 0 Pptc7         | PTC7 protein phosphatase homolog                                    | MGI:2444593 |
| ENSMUST00000100308 | 19 | 26 | 0 Slc15a2       | solute carrier family 15 (H+/peptide transporter), member 2         | MGI:1890457 |
| ENSMUST00000024829 | 19 | 23 | 0 Abcg1         | ATP-binding cassette, sub-family G (WHITE), member 1                | MGI:107704  |
| ENSMUST00000085556 | 19 | 23 | 0 Rhpn2         | rhophilin, Rho GTPase binding protein 2                             | MGI:1289234 |
| ENSMUST00000023457 | 19 | 16 | 0 Senp5         | SUMO/sentrin specific peptidase 5                                   | MGI:2443596 |
| ENSMUST00000095035 | 19 | 12 | 0 Zbtb43        | zinc finger and BTB domain containing 43                            | MGI:1919084 |
| ENSMUST00000092907 | 19 | 9  | 0 Rpa1          | replication protein A1  | MGI:1915525 |
| ENSMUST00000105492 | 19 | 8  | 12 Rtn4ip1      | reticulon 4 interacting protein 1                                   | MGI:2178759 |
| ENSMUST00000049156 | 19 | 5  | 0 Tldc1         | TBC/LysM associated domain containing 1                             | MGI:1921597 |
| ENSMUST00000025675 | 19 | 5  | 0 Naa40         | N(alpha)-acetyltransferase 40, NatD catalytic subunit               | MGI:1918249 |
| ENSMUST00000163079 | 19 | 4  | 0 Zbtb37        | zinc finger and BTB domain containing 37                            | MGI:2444467 |
| ENSMUST00000139970 | 18 | 43 | 0 Ncoa2         | nuclear receptor coactivator 2                                      | MGI:1276533 |
| ENSMUST00000100309 | 18 | 30 | 0 Alg10b        | asparagine-linked glycosylation 10B (alpha-1,2-glucosyltransferase) | MGI:2146159 |
| ENSMUST00000111283 | 18 | 24 | 0 Coro1c        | coronin, actin binding protein 1C                                   | MGI:1345964 |
| ENSMUST00000101434 | 18 | 24 | 0 Fam220a       | family with sequence similarity 220, member A                       | MGI:1914488 |
| ENSMUST00000161637 | 18 | 18 | 26 Nrnx1        | neurexin I  | MGI:1096391 |
| ENSMUST00000057567 | 18 | 18 | 0 Il1f9         | interleukin 1 family, member 9                                      | MGI:2449929 |
| ENSMUST00000180046 | 18 | 18 | 0 Usp34         | ubiquitin specific peptidase 34                                     | MGI:109473  |
| ENSMUST00000004987 | 18 | 16 | 0 Srpk1         | serine/arginine-rich protein specific kinase 1                      | MGI:106908  |
| ENSMUST00000156921 | 18 | 14 | 2 Rpl27a        | ribosomal protein L27A  | MGI:1347076 |
| ENSMUST00000019660 | 18 | 14 | 0 Zkscan1       | zinc finger with KRAB and SCAN domains 1                            | MGI:1921820 |
| ENSMUST00000153256 | 18 | 13 | 0 Pdzk1         | PDZ domain containing 1   | MGI:1928901 |
| ENSMUST00000034074 | 18 | 12 | 0 N4bp1         | NEDD4 binding protein 1   | MGI:2136825 |
| ENSMUST00000027438 | 18 | 9  | 0 Ncl           | nucleolin   | MGI:97286   |
| ENSMUST00000120452 | 18 | 5  | 0 Dnaja4        | DnaJ heat shock protein family (Hsp40) member A4                    | MGI:1927638 |
| ENSMUST00000134903 | 18 | 5  | 0 Cyb5d1        | cytochrome b5 domain containing 1                                   | MGI:2685586 |
| ENSMUST00000033341 | 18 | 4  | 0 Tub           | tubby candidate gene  | MGI:2651573 |
| ENSMUST00000035987 | 18 | 0  | 0 Map3k9        | mitogen-activated protein kinase kinase kinase 9                    | MGI:2449952 |
| ENSMUST00000034469 | 17 | 41 | 0 EglN1         | egl-9 family hypoxia-inducible factor 1                             | MGI:1932286 |
| ENSMUST00000106312 | 17 | 39 | 0 Zfp553        | zinc finger protein 553   | MGI:2384725 |

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| ENSMUST00000159114 | 17 | 34 | 0 C130026I21Rik | RIKEN cDNA C130026I21 gene   | MGI:3612702 |
| ENSMUST00000061277 | 17 | 30 | 0 Oog4          | oogenesis 4  | MGI:2684051 |
| ENSMUST00000130481 | 17 | 30 | 0 Plcxd2        | phosphatidylinositol-specific phospholipase C, X domain containing 2 | MGI:3647874 |
| ENSMUST00000030119 | 17 | 26 | 0 Aptx          | aprataxin  | MGI:1913658 |
| ENSMUST00000129244 | 17 | 23 | 0 Rpia          | ribose 5-phosphate isomerase A                                       | MGI:103254  |
| ENSMUST00000133187 | 17 | 18 | 0 Uimc1         | ubiquitin interaction motif containing 1                             | MGI:103185  |
| ENSMUST00000174416 | 17 | 18 | 2 Gm2026        | predicted gene 2026  | MGI:3780195 |
| ENSMUST00000094476 | 17 | 18 | 0 Gm12185       | predicted gene 12185   | MGI:3652173 |
| ENSMUST00000049185 | 17 | 14 | 0 Ybey          | ybeY metalloproteinase   | MGI:2656825 |
| ENSMUST00000030471 | 17 | 14 | 0 Lrrc41        | leucine rich repeat containing 41                                    | MGI:2441984 |
| ENSMUST00000049530 | 17 | 13 | 0 A4galt        | alpha 1,4-galactosyltransferase                                      | MGI:3512453 |
| ENSMUST00000028981 | 17 | 5  | 0 Mapre1        | microtubule-associated protein, RP/EB family, member 1               | MGI:891995  |
| ENSMUST00000138634 | 17 | 5  | 0 Nup88         | nucleoporin 88   | MGI:104900  |
| ENSMUST00000107352 | 17 | 0  | 0 Snapin        | SNAP-associated protein  | MGI:1333745 |
| ENSMUST00000007959 | 16 | 31 | 0 Rhoa          | ras homolog family member A  | MGI:1096342 |
| ENSMUST00000058578 | 16 | 28 | 0 Pgrmc2        | progesterone receptor membrane component 2                           | MGI:1918054 |
| ENSMUST00000102694 | 16 | 20 | 0 Ptgfrn        | prostaglandin F2 receptor negative regulator                         | MGI:1277114 |
| ENSMUST00000137671 | 16 | 18 | 0 AA415398      | expressed sequence AA415398  | MGI:3035485 |
| ENSMUST00000094898 | 16 | 16 | 0 Ccnyl1        | cyclin Y-like 1  | MGI:2138614 |
| ENSMUST00000134967 | 16 | 15 | 0 Hsp90aa1      | heat shock protein 90, alpha (cytosolic), class A member 1           | MGI:96250   |
| ENSMUST00000030134 | 16 | 14 | 0 Rad23b        | RAD23 homolog B, nucleotide excision repair protein                  | MGI:105128  |
| ENSMUST00000033158 | 16 | 12 | 0 Ubfd1         | ubiquitin family domain containing 1                                 | MGI:107301  |
| ENSMUST00000052404 | 16 | 10 | 0 Epb41l5       | erythrocyte membrane protein band 4.1 like 5                         | MGI:103006  |
| ENSMUST00000136319 | 16 | 9  | 0 Usp50         | ubiquitin specific peptidase 50                                      | MGI:1922333 |
| ENSMUST00000075686 | 16 | 9  | 0 Ado           | 2-aminoethanethiol (cysteamine) dioxygenase                          | MGI:2685083 |
| ENSMUST00000160530 | 16 | 5  | 16 AW554918     | expressed sequence AW554918  | MGI:2147376 |
| ENSMUST00000067620 | 16 | 5  | 0 Chdh          | choline dehydrogenase  | MGI:1860776 |
| ENSMUST00000165924 | 16 | 4  | 30 Sp1          | trans-acting transcription factor 1                                  | MGI:98372   |
| ENSMUST00000000153 | 16 | 4  | 0 Gna12         | guanine nucleotide binding protein, alpha 12                         | MGI:95767   |
| ENSMUST00000028972 | 16 | 0  | 0 Pdr1          | p53 and DNA damage regulated 1                                       | MGI:1915809 |
| ENSMUST00000111300 | 16 | 57 | 0 Dedd          | death effector domain-containing                                     | MGI:1333874 |
| ENSMUST00000031838 | 16 | 45 | 0 Igf2bp3       | insulin-like growth factor 2 mRNA binding protein 3                  | MGI:1890359 |
| ENSMUST00000160807 | 16 | 31 | 0 Wbscr17       | Williams-Beuren syndrome chromosome region 17 homolog (human)        | MGI:2137594 |
| ENSMUST00000024727 | 16 | 23 | 0 Cdc5l         | cell division cycle 5-like (S. pombe)                                | MGI:1918952 |
| ENSMUST00000054368 | 16 | 18 | 0 Gimap1        | GTPase, IMAP family member 1   | MGI:109368  |
| ENSMUST00000153383 | 16 | 15 | 2 Txndc16       | thioredoxin domain containing 16                                     | MGI:1917811 |
| ENSMUST00000027297 | 16 | 13 | 0 Plekha7       | pleckstrin homology domain containing, family B (evectins) member 2  | MGI:2385825 |
| ENSMUST00000077338 | 16 | 13 | 0 Atp5sl        | ATP5S-like   | MGI:1913599 |
| ENSMUST00000179332 | 16 | 12 | 0 5730455P16Rik | RIKEN cDNA 5730455P16 gene   | MGI:1917841 |
| ENSMUST00000154507 | 16 | 8  | 0 Lpin2         | lipin 2  | MGI:1891341 |
| ENSMUST00000075896 | 16 | 5  | 0 Tsnax         | translin-associated factor X   | MGI:1855672 |
| ENSMUST00000047935 | 16 | 0  | 0 Tspyl4        | TSPY-like 4  | MGI:106393  |
| ENSMUST00000052413 | 16 | 0  | 0 Lcp2          | lymphocyte cytosolic protein 2                                       | MGI:1321402 |

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| ENSMUST00000133847 | 16 | 0  | 0 Rfc4      | replication factor C (activator 1) 4                        | MGI:2146571 |
| ENSMUST00000043616 | 15 | 41 | 0 Zyg11b    | zyg-II family member B, cell cycle regulator                | MGI:2685277 |
| ENSMUST00000130120 | 15 | 17 | 0 Jmjd6     | jumonji domain containing 6                                 | MGI:1858910 |
| ENSMUST00000163042 | 15 | 17 | 0 Ces2b     | carboxyesterase 2B  | MGI:2448547 |
| ENSMUST00000162626 | 15 | 16 | 0 Psma3     | proteasome (prosome, macropain) subunit, alpha type 3       | MGI:104883  |
| ENSMUST00000160660 | 15 | 10 | 0 Zfp346    | zinc finger protein 346                                     | MGI:1349417 |
| ENSMUST00000044622 | 15 | 8  | 0 Epg5      | ectopic P-granules autophagy protein 5 homolog (C. elegans) | MGI:1918673 |
| ENSMUST00000147545 | 15 | 8  | 0 Ccdc6     | coiled-coil domain containing 6                             | MGI:1923801 |
| ENSMUST00000172773 | 15 | 7  | 0 Psmc11    | proteasome (prosome, macropain) 26S subunit, non-ATPase, 11 | MGI:1916327 |
| ENSMUST00000113753 | 15 | 5  | 0 Tprkb     | Tp53rk binding protein                                      | MGI:1917036 |
| ENSMUST00000107353 | 15 | 1  | 0 Zfp592    | zinc finger protein 592                                     | MGI:2443541 |
| ENSMUST00000147563 | 15 | 0  | 0 Zdhhc3    | zinc finger, DHHC domain containing 3                       | MGI:1926134 |
| ENSMUST00000029270 | 14 | 53 | 0 Ccna2     | cyclin A2   | MGI:108069  |
| ENSMUST00000024981 | 14 | 29 | 0 Hn1l      | hematological and neurological expressed 1-like             | MGI:1196260 |
| ENSMUST00000167290 | 14 | 25 | 0 Smim7     | small integral membrane protein 7                           | MGI:1914068 |
| ENSMUST00000126246 | 14 | 24 | 4 Rpl35     | ribosomal protein L35                                       | MGI:1913739 |
| ENSMUST00000045110 | 14 | 24 | 0 Dstyk     | dual serine/threonine and tyrosine protein kinase           | MGI:1925064 |
| ENSMUST00000168493 | 14 | 22 | 0 Coro1c    | coronin, actin binding protein 1C                           | MGI:1345964 |
| ENSMUST00000022585 | 14 | 20 | 2 Gpalpp1   | GPALPP motifs containing 1                                  | MGI:1914717 |
| ENSMUST00000178661 | 14 | 20 | 0 Dlgap5    | discs, large (Drosophila) homolog-associated protein 5      | MGI:2183453 |
| ENSMUST00000024755 | 14 | 17 | 2 Clic5     | chloride intracellular channel 5                            | MGI:1917912 |
| ENSMUST00000030080 | 14 | 17 | 0 Snx30     | sorting nexin family member 30                              | MGI:2443882 |
| ENSMUST00000005508 | 14 | 15 | 1592 Tbl2   | transducin (beta)-like 2                                    | MGI:1351652 |
| ENSMUST00000015855 | 14 | 12 | 0 Prune1    | prune exopolyphosphatase                                    | MGI:1925152 |
| ENSMUST00000103129 | 14 | 12 | 0 Dsn1      | DSN1 homolog, MIS12 kinetochore complex component           | MGI:1914184 |
| ENSMUST00000097759 | 14 | 10 | 52 Prdm16   | PR domain containing 16                                     | MGI:1917923 |
| ENSMUST00000133849 | 14 | 7  | 0 Thoc6     | THO complex 6   | MGI:2677480 |
| ENSMUST00000060798 | 14 | 6  | 125 Unc119b | unc-119 lipid binding chaperone B                           | MGI:2147162 |
| ENSMUST00000102589 | 14 | 5  | 24 Eif4a1   | eukaryotic translation initiation factor 4A1                | MGI:95303   |
| ENSMUST00000065353 | 14 | 5  | 0 Yap1      | yes-associated protein 1                                    | MGI:103262  |
| ENSMUST00000079360 | 14 | 4  | 0 Ablim1    | actin-binding LIM protein 1                                 | MGI:1194500 |
| ENSMUST00000109418 | 14 | 0  | 0 Fitm2     | fat storage-inducing transmembrane protein 2                | MGI:2444508 |
| ENSMUST00000155551 | 13 | 36 | 14 Dcaf10   | DDB1 and CUL4 associated factor 10                          | MGI:2140179 |
| ENSMUST00000172044 | 13 | 29 | 0 Zbtb37    | zinc finger and BTB domain containing 37                    | MGI:2444467 |
| ENSMUST00000035395 | 13 | 22 | 0 Anapc15   | anaphase promoting complex C subunit 15                     | MGI:1922680 |
| ENSMUST00000142984 | 13 | 22 | 0 Hdac1     | histone deacetylase 1                                       | MGI:108086  |
| ENSMUST00000132091 | 13 | 20 | 0 Fanci     | Fanconi anemia, complementation group I                     | MGI:2384790 |
| ENSMUST00000152441 | 13 | 14 | 20 Rpl35    | ribosomal protein L35                                       | MGI:1913739 |
| ENSMUST00000182464 | 13 | 13 | 0 Gapdh     | glyceraldehyde-3-phosphate dehydrogenase                    | MGI:95640   |
| ENSMUST00000020490 | 13 | 7  | 0 Wdr82     | WD repeat domain containing 82                              | MGI:1924555 |
| ENSMUST00000067103 | 13 | 7  | 0 Taf8      | TATA-box binding protein associated factor 8                | MGI:1926879 |
| ENSMUST00000040023 | 13 | 6  | 0 Iffo2     | intermediate filament family orphan 2                       | MGI:2140675 |
| ENSMUST00000182743 | 13 | 6  | 0 Psmg3     | proteasome (prosome, macropain) assembly chaperone 3        | MGI:1913756 |

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|--------------------|----|----|-----------------|---|-------------|
| ENSMUST00000111729 | 13 | 4  | 42 Vps29        | VPS29 retromer complex component  | MGI:1928344 |
| ENSMUST00000037391 | 13 | 0  | 0 Cd99l2        | CD99 antigen-like 2   | MGI:2177151 |
| ENSMUST00000067190 | 13 | 0  | 0 Lifr          | leukemia inhibitory factor receptor   | MGI:96788   |
| ENSMUST00000124012 | 13 | 0  | 0 Sgms1         | sphingomyelin synthase 1  | MGI:2444110 |
| ENSMUST00000129510 | 13 | 0  | 0 Dmap1         | DNA methyltransferase 1-associated protein 1                                  | MGI:1913483 |
| ENSMUST00000176894 | 13 | 0  | 0 1110032A03Rik | RIKEN cDNA 1110032A03 gene  | MGI:1915971 |
| ENSMUST00000184276 | 13 | 0  | 0 Il6st         | interleukin 6 signal transducer   | MGI:96560   |
| ENSMUST00000109405 | 13 | 29 | 0 Ttpal         | tocopherol (alpha) transfer protein-like                                      | MGI:1923330 |
| ENSMUST00000162925 | 13 | 26 | 0 Sp140         | Sp140 nuclear body protein  | MGI:3702467 |
| ENSMUST00000041550 | 13 | 20 | 0 Mgl2          | macrophage galactose N-acetyl-galactosamine specific lectin 2                 | MGI:2385729 |
| ENSMUST00000147643 | 13 | 17 | 6 Ech51         | enoyl Coenzyme A hydratase, short chain, 1, mitochondrial                     | MGI:2136460 |
| ENSMUST00000028928 | 13 | 11 | 12 Gzf1         | GDNF-inducible zinc finger protein 1  | MGI:1921783 |
| ENSMUST00000080861 | 13 | 11 | 0 Rpl35         | ribosomal protein L35   | MGI:1913739 |
| ENSMUST00000102782 | 13 | 11 | 0 Gm2000        | predicted gene 2000   | MGI:3780170 |
| ENSMUST00000142806 | 13 | 9  | 2 Paip2b        | poly(A) binding protein interacting protein 2B                                | MGI:2386865 |
| ENSMUST00000062991 | 13 | 9  | 0 Grpel2        | GrpE-like 2, mitochondrial  | MGI:1334416 |
| ENSMUST00000100507 | 13 | 7  | 0 Eif3b         | eukaryotic translation initiation factor 3, subunit B                         | MGI:106478  |
| ENSMUST00000034427 | 13 | 5  | 12 Adat1        | adenosine deaminase, tRNA-specific 1  | MGI:1353631 |
| ENSMUST00000075657 | 13 | 5  | 0 Ap3s2         | adaptor-related protein complex 3, sigma 2 subunit                            | MGI:1337060 |
| ENSMUST00000146903 | 13 | 5  | 0 Sympk         | symplesin   | MGI:1915438 |
| ENSMUST00000023612 | 13 | 4  | 0 Ets2          | E26 avian leukemia oncogene 2, 3' domain                                      | MGI:95456   |
| ENSMUST00000034277 | 13 | 1  | 0 Emc8          | ER membrane protein complex subunit 8   | MGI:1343095 |
| ENSMUST00000003438 | 13 | 0  | 0 Mob3a         | MOB kinase activator 3A   | MGI:3050117 |
| ENSMUST00000112846 | 13 | 0  | 0 Mapk10        | mitogen-activated protein kinase 10   | MGI:1346863 |
| ENSMUST00000161075 | 13 | 0  | 0 Desi2         | desumoylating isopeptidase 2  | MGI:1926075 |
| ENSMUST00000176035 | 12 | 35 | 0 Amz1          | archaelysin family metalloproteinase 1  | MGI:2442258 |
| ENSMUST00000020706 | 12 | 30 | 0 Adcy1         | adenylate cyclase 1   | MGI:99677   |
| ENSMUST00000028914 | 12 | 30 | 0 Polr3f        | polymerase (RNA) III (DNA directed) polypeptide F                             | MGI:1924086 |
| ENSMUST00000064104 | 12 | 22 | 0 Cdc42se2      | CDC42 small effector 2  | MGI:1919979 |
| ENSMUST00000042438 | 12 | 20 | 0 Plekhg1       | pleckstrin homology domain containing, family G (with RhoGef domain) member 1 | MGI:2676551 |
| ENSMUST00000113820 | 12 | 14 | 115 Arpc2       | actin related protein 2/3 complex, subunit 2                                  | MGI:1923959 |
| ENSMUST00000023048 | 12 | 14 | 10 Mief1        | mitochondrial elongation factor 1   | MGI:2146020 |
| ENSMUST00000126991 | 12 | 13 | 4 Akr1b3        | aldo-keto reductase family 1, member B3 (aldose reductase)                    | MGI:1353494 |
| ENSMUST00000111557 | 12 | 12 | 2 Dennd5b       | DENN/MADD domain containing 5B  | MGI:2444273 |
| ENSMUST00000001042 | 12 | 10 | 0 Ilf2          | interleukin enhancer binding factor 2   | MGI:1915031 |
| ENSMUST00000028963 | 12 | 10 | 0 Tbc1d20       | TBC1 domain family, member 20   | MGI:1914481 |
| ENSMUST00000029316 | 12 | 9  | 0 Exosc8        | exosome component 8   | MGI:1916889 |
| ENSMUST00000084289 | 12 | 9  | 0 Ago4          | argonaute RISC catalytic subunit 4  | MGI:1924100 |
| ENSMUST00000039286 | 12 | 8  | 12 Atg5         | autophagy related 5   | MGI:1277186 |
| ENSMUST00000038434 | 12 | 7  | 0 Rpp25l        | ribonuclease P/MRP 25 subunit-like  | MGI:1917211 |
| ENSMUST00000025192 | 12 | 5  | 0 H2-Oa         | histocompatibility 2, O region alpha locus                                    | MGI:95924   |
| ENSMUST00000062357 | 12 | 5  | 0 4930539E08Rik | RIKEN cDNA 4930539E08 gene  | MGI:1925441 |
| ENSMUST00000052449 | 12 | 4  | 12 Ubn1         | ubiquitin 1   | MGI:1891307 |

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|--------------------|----|----|--------------------|--|-------------|
| ENSMUST00000122163 | 12 | 4  | 0 Kctd20           | potassium channel tetramerisation domain containing 20       | MGI:1914239 |
| ENSMUST00000042391 | 12 | 0  | 0 Fdxacb1          | ferredoxin-fold anticodon binding domain containing 1        | MGI:3584513 |
| ENSMUST00000080812 | 12 | 0  | 0 Zc3hc1           | zinc finger, C3HC type 1                                     | MGI:1916023 |
| ENSMUST00000114237 | 12 | 0  | 0 Acox3            | acyl-Coenzyme A oxidase 3, pristanoyl                        | MGI:1933156 |
| ENSMUST00000124482 | 12 | 0  | 0 Mrp17            | mitochondrial ribosomal protein L17                          | MGI:1351608 |
| ENSMUST00000041003 | 11 | 33 | 0 Tfb1m            | transcription factor B1, mitochondrial                       | MGI:2146851 |
| ENSMUST00000125624 | 11 | 25 | 0 Ino80e           | INO80 complex subunit E                                      | MGI:2141881 |
| ENSMUST00000089926 | 11 | 19 | 0 Mfap1a           | microfibrillar-associated protein 1A                         | MGI:1914782 |
| ENSMUST00000119746 | 11 | 19 | 0 Usf3             | upstream transcription factor family member 3                | MGI:2685454 |
| ENSMUST00000025193 | 11 | 18 | 0 Brd2             | bromodomain containing 2                                     | MGI:99495   |
| ENSMUST00000073724 | 11 | 14 | 0 Phf1             | PHD finger protein 1   | MGI:98647   |
| ENSMUST00000107894 | 11 | 13 | 0 Dgke             | diacylglycerol kinase, epsilon                               | MGI:1889276 |
| ENSMUST00000073456 | 11 | 9  | 0 Nsa2             | NSA2 ribosome biogenesis homolog                             | MGI:1913883 |
| ENSMUST00000028815 | 11 | 8  | 0 Slc23a2          | solute carrier family 23 (nucleobase transporters), member 2 | MGI:1859682 |
| ENSMUST00000161497 | 11 | 8  | 0 Sp140            | Sp140 nuclear body protein                                   | MGI:3702467 |
| ENSMUST00000028470 | 11 | 7  | 0 Timm10           | translocase of inner mitochondrial membrane 10               | MGI:1353429 |
| ENSMUST00000146362 | 11 | 7  | 0 Hnrnpu           | heterogeneous nuclear ribonucleoprotein U                    | MGI:1858195 |
| ENSMUST00000044564 | 11 | 5  | 0 Foxj3            | forkhead box J3  | MGI:2443432 |
| ENSMUST00000035295 | 11 | 5  | 26 Degs1           | delta(4)-desaturase, sphingolipid 1                          | MGI:1097711 |
| ENSMUST00000105718 | 11 | 5  | 0 Zfp933           | zinc finger protein 933                                      | MGI:1922865 |
| ENSMUST00000078717 | 11 | 3  | 32 Lrrc58          | leucine rich repeat containing 58                            | MGI:2443542 |
| ENSMUST00000142761 | 11 | 1  | 0 Akr1b3           | aldo-keto reductase family 1, member B3 (aldose reductase)   | MGI:1353494 |
| ENSMUST00000132654 | 11 | 1  | 0 Rcan3            | regulator of calcineurin 3                                   | MGI:1858220 |
| ENSMUST00000135967 | 11 | 1  | 0 Znfx1            | zinc finger, NFX1-type containing 1                          | MGI:2138982 |
| ENSMUST00000079866 | 11 | 0  | 500 Srsf1          | serine/arginine-rich splicing factor 1                       | MGI:98283   |
| ENSMUST00000026265 | 11 | 0  | 0 Bbs4             | Bardet-Biedl syndrome 4 (human)                              | MGI:2143311 |
| ENSMUST00000027623 | 11 | 0  | 0 Tsn              | translin   | MGI:109263  |
| ENSMUST00000100750 | 11 | 0  | 0 Mecp2            | methyl CpG binding protein 2                                 | MGI:99918   |
| ENSMUST00000144320 | 11 | 0  | 0 Senp5            | SUMO/sentrin specific peptidase 5                            | MGI:2443596 |
| ENSMUST00000033662 | 10 | 43 | 0 Pdha1            | pyruvate dehydrogenase E1 alpha 1                            | MGI:97532   |
| ENSMUST00000131784 | 10 | 37 | 8 Zfp866           | zinc finger protein 866                                      | MGI:3584369 |
| ENSMUST00000101295 | 10 | 28 | 101 9930111J21Rik2 | RIKEN cDNA 9930111J21 gene 2                                 | MGI:3711310 |
| ENSMUST00000119311 | 10 | 25 | 0 Auh              | AU RNA binding protein/enoyl-coenzyme A hydratase            | MGI:1338011 |
| ENSMUST00000023682 | 10 | 24 | 0 Donson           | downstream neighbor of SON                                   | MGI:1890621 |
| ENSMUST00000141626 | 10 | 22 | 0 Tbc1d14          | TBC1 domain family, member 14                                | MGI:1098708 |
| ENSMUST00000155555 | 10 | 22 | 0 Gabpb2           | GA repeat binding protein, beta 2                            | MGI:95612   |
| ENSMUST00000055262 | 10 | 21 | 12 Vti1b           | vesicle transport through interaction with t-SNAREs 1B       | MGI:1855688 |
| ENSMUST00000147040 | 10 | 18 | 8 Got2             | glutamic-oxaloacetic transaminase 2, mitochondrial           | MGI:95792   |
| ENSMUST00000155749 | 10 | 16 | 0 Ak4              | adenylate kinase 4   | MGI:87979   |
| ENSMUST00000041400 | 10 | 14 | 0 Ranbp10          | RAN binding protein 10                                       | MGI:1921584 |
| ENSMUST00000051221 | 10 | 14 | 0 Ankrd40          | ankyrin repeat domain 40                                     | MGI:1918702 |
| ENSMUST00000172847 | 10 | 14 | 0 Psmd11           | proteasome (prosome, macropain) 26S subunit, non-ATPase, 11  | MGI:1916327 |
| ENSMUST00000028279 | 10 | 13 | 67 Strbp           | spermatid perinuclear RNA binding protein                    | MGI:104626  |

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| ENSMUST00000131097 | 10 | 13 | 0 Rft1           | RFT1 homolog  | MGI:3607791 |
| ENSMUST00000032413 | 10 | 12 | 0 Etnk1          | ethanolamine kinase 1   | MGI:1922570 |
| ENSMUST00000118234 | 10 | 12 | 0 Pex26          | peroxisomal biogenesis factor 26                                      | MGI:1921293 |
| ENSMUST00000111945 | 10 | 11 | 8 Mapk8          | mitogen-activated protein kinase 8                                    | MGI:1346861 |
| ENSMUST00000131532 | 10 | 11 | 0 Kif24          | kinesin family member 24  | MGI:1918345 |
| ENSMUST00000106149 | 10 | 10 | 0 Ssx2ip         | synovial sarcoma, X breakpoint 2 interacting protein                  | MGI:2139150 |
| ENSMUST00000031131 | 10 | 9  | 0 Uchl1          | ubiquitin carboxy-terminal hydrolase L1                               | MGI:103149  |
| ENSMUST00000136059 | 10 | 8  | 0 Cdc42se2       | CDC42 small effector 2  | MGI:1919979 |
| ENSMUST00000077783 | 10 | 7  | 54 0610030E20Rik | RIKEN cDNA 0610030E20 gene  | MGI:1915614 |
| ENSMUST00000012314 | 10 | 7  | 6 Zfp729a        | zinc finger protein 729a  | MGI:3036250 |
| ENSMUST00000137496 | 10 | 7  | 6 Zfp738         | zinc finger protein 738   | MGI:3040706 |
| ENSMUST00000057885 | 10 | 6  | 10 Rpl9          | ribosomal protein L9  | MGI:1298373 |
| ENSMUST00000108336 | 10 | 6  | 0 Zfp60          | zinc finger protein 60  | MGI:99207   |
| ENSMUST00000058370 | 10 | 5  | 0 Ccdc137        | coiled-coil domain containing 137                                     | MGI:1914541 |
| ENSMUST00000028300 | 10 | 5  | 0 Nacc2          | nucleus accumbens associated 2, BEN and BTB (POZ) domain containing   | MGI:1915241 |
| ENSMUST00000129297 | 10 | 5  | 0 Thap7          | THAP domain containing 7  | MGI:1916259 |
| ENSMUST00000131831 | 10 | 5  | 0 Plbd2          | phospholipase B domain containing 2                                   | MGI:1919022 |
| ENSMUST00000035673 | 10 | 4  | 0 Vhl            | von Hippel-Lindau tumor suppressor                                    | MGI:103223  |
| ENSMUST00000127574 | 10 | 3  | 2 Ermap          | erythroblast membrane-associated protein                              | MGI:1349816 |
| ENSMUST00000096751 | 10 | 1  | 2 Ttc9c          | tetratricopeptide repeat domain 9C                                    | MGI:1917637 |
| ENSMUST00000094361 | 10 | 1  | 0 Hsp90aa1       | heat shock protein 90, alpha (cytosolic), class A member 1            | MGI:96250   |
| ENSMUST00000021864 | 10 | 1  | 52 Ssr1          | signal sequence receptor, alpha                                       | MGI:105082  |
| ENSMUST00000000356 | 10 | 0  | 0 Dazap2         | DAZ associated protein 2  | MGI:1344344 |
| ENSMUST00000007012 | 10 | 0  | 0 Sod2           | superoxide dismutase 2, mitochondrial                                 | MGI:98352   |
| ENSMUST00000030091 | 10 | 0  | 0 Pole3          | polymerase (DNA directed), epsilon 3 (p17 subunit)                    | MGI:1933378 |
| ENSMUST00000042701 | 10 | 0  | 0 Mxd4           | Max dimerization protein 4  | MGI:104991  |
| ENSMUST00000057557 | 10 | 0  | 0 Mcmbp          | minichromosome maintenance complex binding protein                    | MGI:1920977 |
| ENSMUST00000075159 | 10 | 0  | 0 Clock          | circadian locomotor output cycles kaput                               | MGI:99698   |
| ENSMUST00000079390 | 10 | 0  | 0 Lin28b         | lin-28 homolog B (C. elegans)   | MGI:3584032 |
| ENSMUST00000087409 | 10 | 0  | 0 Zbtb46         | zinc finger and BTB domain containing 46                              | MGI:1919397 |
| ENSMUST00000099277 | 10 | 0  | 0 Fcho2          | FCH domain only 2   | MGI:3505790 |
| ENSMUST00000129820 | 10 | 0  | 0 Lsm11          | U7 snRNP-specific Sm-like protein LSM11                               | MGI:1919540 |
| ENSMUST00000148782 | 10 | 0  | 0 Gga3           | golgi associated, gamma adaptin ear containing, ARF binding protein 3 | MGI:2384159 |
| ENSMUST00000153894 | 10 | 0  | 0 Faf2           | Fas associated factor family member 2                                 | MGI:1923827 |
| ENSMUST00000154881 | 10 | 0  | 0 Ino80e         | INO80 complex subunit E   | MGI:2141881 |
| ENSMUST00000055303 | 10 | 25 | 0 Mettl6         | methyltransferase like 6  | MGI:1914261 |
| ENSMUST00000033983 | 10 | 24 | 0 Mak16          | MAK16 homolog   | MGI:1915170 |
| ENSMUST00000046425 | 10 | 20 | 0 Txlna          | taxilin alpha   | MGI:105968  |
| ENSMUST00000128616 | 10 | 16 | 0 Malsu1         | mitochondrial assembly of ribosomal large subunit 1                   | MGI:1922843 |
| ENSMUST00000052138 | 10 | 14 | 24 Terf2ip       | telomeric repeat binding factor 2, interacting protein                | MGI:1929871 |
| ENSMUST00000103143 | 10 | 11 | 0 Fbxl20         | F-box and leucine-rich repeat protein 20                              | MGI:1919444 |
| ENSMUST00000161061 | 10 | 11 | 0 Fam173b        | family with sequence similarity 173, member B                         | MGI:1915323 |
| ENSMUST00000033290 | 10 | 10 | 0 Dhx32          | DEAH (Asp-Glu-Ala-His) box polypeptide 32                             | MGI:2141813 |



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| ENSMUST00000090178  | 10 | 9  | 36 Dnajb14      | DnaJ heat shock protein family (Hsp40) member B14             | MGI:1917854 |
| ENSMUST00000039812  | 10 | 9  | 0 Zmym5         | zinc finger, MYM-type 5                                       | MGI:3041170 |
| ENSMUST00000002198  | 10 | 8  | 0 Sf3a1         | splicing factor 3a, subunit 1                                 | MGI:1914715 |
| ENSMUST00000020288  | 10 | 8  | 0 Eif4ebp2      | eukaryotic translation initiation factor 4E binding protein 2 | MGI:109198  |
| ENSMUST000000087342 | 10 | 8  | 0 Rps28         | ribosomal protein S28   | MGI:1859516 |
| ENSMUST000000040962 | 10 | 7  | 0 Nudt19        | nudix (nucleoside diphosphate linked moiety X)-type motif 19  | MGI:94203   |
| ENSMUST000000052919 | 10 | 7  | 0 Ormdl3        | ORM1-like 3 (S. cerevisiae)                                   | MGI:1913862 |
| ENSMUST000000031810 | 10 | 6  | 0 Cep41         | centrosomal protein 41  | MGI:1891414 |
| ENSMUST000000177754 | 10 | 6  | 0 Dnmt1         | DNA methyltransferase (cytosine-5) 1                          | MGI:94912   |
| ENSMUST000000034465 | 10 | 5  | 0 2810004N23Rik | RIKEN cDNA 2810004N23 gene                                    | MGI:1913773 |
| ENSMUST000000136995 | 10 | 5  | 0 Naa30         | N(alpha)-acetyltransferase 30, NatC catalytic subunit         | MGI:1922259 |
| ENSMUST000000118592 | 10 | 5  | 0 Ccdc186       | coiled-coil domain containing 186                             | MGI:2445022 |
| ENSMUST000000141497 | 10 | 5  | 0 Ralgapb       | Ral GTPase activating protein, beta subunit (non-catalytic)   | MGI:2444531 |
| ENSMUST000000037418 | 10 | 4  | 0 Tmed8         | transmembrane p24 trafficking protein 8                       | MGI:1923480 |
| ENSMUST000000071106 | 10 | 4  | 0 Gpatch2l      | G patch domain containing 2 like                              | MGI:1917623 |
| ENSMUST000000106622 | 10 | 4  | 0 Tmem167b      | transmembrane protein 167B                                    | MGI:1914745 |
| ENSMUST000000060009 | 10 | 2  | 0 Exd1          | exonuclease 3'-5' domain containing 1                         | MGI:3045306 |
| ENSMUST000000146628 | 10 | 0  | 313 Desi1       | desumoylating isopeptidase 1                                  | MGI:106313  |
| ENSMUST000000032124 | 10 | 0  | 0 Mrpl19        | mitochondrial ribosomal protein L19                           | MGI:1926274 |
| ENSMUST000000033975 | 10 | 0  | 0 Ddhd2         | DDHD domain containing 2                                      | MGI:1919358 |
| ENSMUST000000036407 | 10 | 0  | 0 Fam160b1      | family with sequence similarity 160, member B1                | MGI:2147545 |
| ENSMUST000000049138 | 10 | 0  | 0 2410131K14Rik | RIKEN cDNA 2410131K14 gene                                    | MGI:1924042 |
| ENSMUST000000092645 | 10 | 0  | 0 Epb41l2       | erythrocyte membrane protein band 4.1 like 2                  | MGI:103009  |
| ENSMUST000000105365 | 10 | 0  | 0 Cirbp         | cold inducible RNA binding protein                            | MGI:893588  |
| ENSMUST000000108971 | 10 | 0  | 0 Dip2b         | disco interacting protein 2 homolog B                         | MGI:2145977 |
| ENSMUST000000109616 | 10 | 0  | 0 Cbx7          | chromobox 7   | MGI:1196439 |
| ENSMUST000000144843 | 10 | 0  | 0 Slain2        | SLAIN motif family, member 2                                  | MGI:1923241 |
| ENSMUST000000150813 | 10 | 0  | 0 Tbc1d14       | TBC1 domain family, member 14                                 | MGI:1098708 |
| ENSMUST000000136843 | 9  | 29 | 0 Eif3i         | eukaryotic translation initiation factor 3, subunit I         | MGI:1860763 |
| ENSMUST000000017859 | 9  | 28 | 0 Pgs1          | phosphatidylglycerophosphate synthase 1                       | MGI:1921701 |
| ENSMUST000000025704 | 9  | 20 | 0 Cdca5         | cell division cycle associated 5                              | MGI:1915099 |
| ENSMUST000000044423 | 9  | 18 | 0 Brip1         | BRCA1 interacting protein C-terminal helicase 1               | MGI:2442836 |
| ENSMUST000000046497 | 9  | 16 | 0 Dnph1         | 2'-deoxynucleoside 5'-phosphate N-hydrolase 1                 | MGI:3039376 |
| ENSMUST000000097830 | 9  | 14 | 0 Otud3         | OTU domain containing 3                                       | MGI:1920412 |
| ENSMUST000000129635 | 9  | 13 | 0 Lpin2         | lipin 2   | MGI:1891341 |
| ENSMUST000000092912 | 9  | 12 | 40 Mettl16      | methyltransferase like 16                                     | MGI:1914743 |
| ENSMUST000000152621 | 9  | 12 | 0 Ufc1          | ubiquitin-fold modifier conjugating enzyme 1                  | MGI:1913405 |
| ENSMUST000000049714 | 9  | 10 | 6 Synrg         | synergins, gamma  | MGI:1354742 |
| ENSMUST000000145126 | 9  | 10 | 0 Nsf           | N-ethylmaleimide sensitive fusion protein                     | MGI:104560  |
| ENSMUST000000171630 | 9  | 10 | 0 Coro1c        | coronin, actin binding protein 1C                             | MGI:1345964 |
| ENSMUST000000135850 | 9  | 9  | 0 Tcte2         | t-complex-associated testis expressed 2                       | MGI:98641   |
| ENSMUST000000022952 | 9  | 9  | 0 Osr2          | odd-skipped related 2   | MGI:1930813 |
| ENSMUST000000171143 | 9  | 9  | 0 Fam102b       | family with sequence similarity 102, member B                 | MGI:3036259 |

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|---------------------|---|----|------------|---|-------------|
| ENSMUST00000149511  | 9 | 8  | 0 Etfdh    | electron transferring flavoprotein, dehydrogenase                               | MGI:106100  |
| ENSMUST00000182037  | 9 | 7  | 0 Celf2    | CUGBP, Elav-like family member 2  | MGI:1338822 |
| ENSMUST00000061444  | 9 | 6  | 0 Mrps16   | mitochondrial ribosomal protein S16   | MGI:1913492 |
| ENSMUST00000047627  | 9 | 5  | 0 Gbbp1    | GC-rich promoter binding protein 1  | MGI:1920524 |
| ENSMUST00000132846  | 9 | 5  | 0 Ppia     | peptidylprolyl isomerase A  | MGI:97749   |
| ENSMUST00000179343  | 9 | 5  | 0 Purb     | purine rich element binding protein B   | MGI:1338779 |
| ENSMUST00000131487  | 9 | 5  | 0 Pogk     | pogo transposable element with KRAB domain                                      | MGI:1918842 |
| ENSMUST00000131656  | 9 | 5  | 0 Coa7     | cytochrome c oxidase assembly factor 7  | MGI:1917143 |
| ENSMUST00000148894  | 9 | 5  | 0 Luc7l    | Luc7-like   | MGI:1914228 |
| ENSMUST00000149157  | 9 | 5  | 0 Tbc1d14  | TBC1 domain family, member 14   | MGI:1098708 |
| ENSMUST00000018990  | 9 | 4  | 0 Pank3    | pantothenate kinase 3   | MGI:2387464 |
| ENSMUST00000107030  | 9 | 4  | 0 Patj     | PATJ, crumbs cell polarity complex component                                    | MGI:1277960 |
| ENSMUST00000112683  | 9 | 4  | 0 Tsr2     | TSR2 20S rRNA accumulation  | MGI:1916749 |
| ENSMUST00000135961  | 9 | 4  | 0 Mlxip    | MLX interacting protein   | MGI:2141183 |
| ENSMUST00000149359  | 9 | 4  | 0 Mkl2     | MKL/myocardin-like 2  | MGI:3050795 |
| ENSMUST00000132484  | 9 | 3  | 0 Spopl    | speckle-type POZ protein-like   | MGI:1924107 |
| ENSMUST00000154382  | 9 | 3  | 0 Clcn5    | chloride channel, voltage-sensitive 5   | MGI:99486   |
| ENSMUST00000006293  | 9 | 1  | 0 Crkl     | v-crk avian sarcoma virus CT10 oncogene homolog-like                            | MGI:104686  |
| ENSMUST00000109626  | 9 | 1  | 0 Cyld     | CYLD lysine 63 deubiquitinase   | MGI:1921506 |
| ENSMUST00000127939  | 9 | 0  | 28 Rnf114  | ring finger protein 114   | MGI:1933159 |
| ENSMUST000000048112 | 9 | 0  | 0 Sgsm1    | small G protein signaling modulator 1   | MGI:107320  |
| ENSMUST00000115588  | 9 | 0  | 0 Slc36a4  | solute carrier family 36 (proton/amino acid symporter), member 4                | MGI:2442595 |
| ENSMUST00000138063  | 9 | 0  | 0 Aass     | aminoadipate-semialdehyde synthase  | MGI:1353573 |
| ENSMUST00000142173  | 9 | 0  | 0 Arfp2    | ADP-ribosylation factor interacting protein 2                                   | MGI:1924182 |
| ENSMUST00000151854  | 9 | 0  | 0 Hspa4    | heat shock protein 4  | MGI:1342292 |
| ENSMUST00000152762  | 9 | 0  | 0 Ak2      | adenylate kinase 2  | MGI:87978   |
| ENSMUST00000152901  | 9 | 0  | 0 Gnb4     | guanine nucleotide binding protein (G protein), beta 4                          | MGI:104581  |
| ENSMUST00000166800  | 9 | 0  | 0 Slc6a20b | solute carrier family 6 (neurotransmitter transporter), member 20B              | MGI:1336891 |
| ENSMUST000000034973 | 8 | 31 | 22 Smad3   | SMAD family member 3  | MGI:1201674 |
| ENSMUST000000021428 | 8 | 27 | 0 Snw1     | SNW domain containing 1   | MGI:1913604 |
| ENSMUST000000027554 | 8 | 18 | 0 Cln8     | ceroid-lipofuscinosis, neuronal 8   | MGI:1349447 |
| ENSMUST00000108660  | 8 | 15 | 0 Cyb5d1   | cytochrome b5 domain containing 1   | MGI:2685586 |
| ENSMUST000000090541 | 8 | 14 | 22 Atp5g1  | ATP synthase, H+ transporting, mitochondrial F0 complex, subunit C1 (subunit 9) | MGI:107653  |
| ENSMUST00000130284  | 8 | 13 | 0 Ube2v1   | ubiquitin-conjugating enzyme E2 variant 1                                       | MGI:1913839 |
| ENSMUST000000004576 | 8 | 9  | 0 Tbccd1   | TBCC domain containing 1  | MGI:1917823 |
| ENSMUST00000126073  | 8 | 9  | 0 Adarb1   | adenosine deaminase, RNA-specific, B1   | MGI:891999  |
| ENSMUST00000131320  | 8 | 9  | 12 Asb7    | ankyrin repeat and SOCS box-containing 7  | MGI:2152835 |
| ENSMUST000000081335 | 8 | 8  | 0 Tgif2    | TGFB-induced factor homeobox 2  | MGI:1915299 |
| ENSMUST00000046502  | 8 | 7  | 0 Rad54l2  | RAD54 like 2 (S. cerevisiae)  | MGI:1933196 |
| ENSMUST00000130229  | 8 | 7  | 18 Acox1   | acyl-Coenzyme A oxidase 1, palmitoyl  | MGI:1330812 |
| ENSMUST00000116259  | 8 | 7  | 0 Map7     | microtubule-associated protein 7  | MGI:1328328 |
| ENSMUST00000125848  | 8 | 7  | 0 Dnlz     | DNL-type zinc finger  | MGI:106559  |
| ENSMUST00000101075  | 8 | 5  | 0 Ttc19    | tetratricopeptide repeat domain 19  | MGI:1920045 |

|                    |   |    |              |   |             |
|--------------------|---|----|--------------|---|-------------|
| ENSMUST00000034989 | 8 | 5  | 0 Me1        | malic enzyme 1, NADP(+)-dependent, cytosolic                        | MGI:97043   |
| ENSMUST00000086451 | 8 | 5  | 0 Nos1       | nitric oxide synthase 1, neuronal                                   | MGI:97360   |
| ENSMUST00000108433 | 8 | 4  | 244 Slc43a2  | solute carrier family 43, member 2                                  | MGI:2442746 |
| ENSMUST00000034766 | 8 | 4  | 0 Rora       | RAR-related orphan receptor alpha                                   | MGI:104661  |
| ENSMUST00000055117 | 8 | 4  | 0 Lemd2      | LEM domain containing 2   | MGI:2385045 |
| ENSMUST00000105502 | 8 | 4  | 0 Foxo3      | forkhead box O3   | MGI:1890081 |
| ENSMUST00000123721 | 8 | 3  | 0 Hhat       | hedgehog acyltransferase  | MGI:2444681 |
| ENSMUST00000056732 | 8 | 2  | 0 Mfap1b     | microfibrillar-associated protein 1B                                | MGI:3694697 |
| ENSMUST00000123296 | 8 | 1  | 0 Ndufab1    | NADH dehydrogenase (ubiquinone) 1, alpha/beta subcomplex, 1         | MGI:1917566 |
| ENSMUST00000169387 | 8 | 1  | 0 Inpp4b     | inositol polyphosphate-4-phosphatase, type II                       | MGI:2158925 |
| ENSMUST00000146897 | 8 | 0  | 129 Hsp90b1  | heat shock protein 90, beta (Grp94), member 1                       | MGI:98817   |
| ENSMUST00000131472 | 8 | 0  | 63 Nxn       | nucleoredoxin   | MGI:109331  |
| ENSMUST00000034612 | 8 | 0  | 0 Ddx25      | DEAD (Asp-Glu-Ala-Asp) box polypeptide 25                           | MGI:1353582 |
| ENSMUST00000087951 | 8 | 0  | 0 Vps37c     | vacuolar protein sorting 37C  | MGI:2147661 |
| ENSMUST00000128644 | 8 | 0  | 0 Tspan13    | tetraspanin 13  | MGI:1913359 |
| ENSMUST00000134821 | 8 | 0  | 0 Arl2       | ADP-ribosylation factor-like 2                                      | MGI:1928393 |
| ENSMUST00000162598 | 8 | 0  | 0 Pttg1ip    | pituitary tumor-transforming 1 interacting protein                  | MGI:2652132 |
| ENSMUST00000165576 | 8 | 0  | 0 Fam3c      | family with sequence similarity 3, member C                         | MGI:107892  |
| ENSMUST00000170489 | 8 | 0  | 0 Ddx6       | DEAD (Asp-Glu-Ala-Asp) box polypeptide 6                            | MGI:104976  |
| ENSMUST00000172832 | 8 | 0  | 0 Trim39     | tripartite motif-containing 39                                      | MGI:1890659 |
| ENSMUST00000018625 | 7 | 20 | 0 Appbp2     | amyloid beta precursor protein (cytoplasmic tail) binding protein 2 | MGI:1914134 |
| ENSMUST00000018315 | 7 | 18 | 81 Vmp1      | vacuole membrane protein 1  | MGI:1923159 |
| ENSMUST00000155325 | 7 | 18 | 0 Alyref     | Aly/REF export factor   | MGI:1341044 |
| ENSMUST00000140062 | 7 | 12 | 2 Robo2      | roundabout guidance receptor 2                                      | MGI:1890110 |
| ENSMUST00000122259 | 7 | 12 | 0 Sgpl1      | sphingosine phosphate lyase 1                                       | MGI:1261415 |
| ENSMUST00000040069 | 7 | 11 | 0 Colec12    | collectin sub-family member 12                                      | MGI:2152907 |
| ENSMUST00000167880 | 7 | 10 | 0 Sbf2       | SET binding factor 2  | MGI:1921831 |
| ENSMUST00000174699 | 7 | 10 | 0 H2-Q6      | histocompatibility 2, Q region locus 6                              | MGI:95935   |
| ENSMUST00000131520 | 7 | 9  | 1338 Fam206a | family with sequence similarity 206, member A                       | MGI:2677850 |
| ENSMUST00000074651 | 7 | 9  | 0 Grk4       | G protein-coupled receptor kinase 4                                 | MGI:95801   |
| ENSMUST00000134982 | 7 | 9  | 0 Gm14296    | predicted gene 14296  | MGI:3708667 |
| ENSMUST00000137271 | 7 | 9  | 0 Ccdc77     | coiled-coil domain containing 77                                    | MGI:1914450 |
| ENSMUST00000148952 | 7 | 9  | 0 Klhl20     | kelch-like 20   | MGI:2444855 |
| ENSMUST00000036872 | 7 | 9  | 12 Wipi2     | WD repeat domain, phosphoinositide interacting 2                    | MGI:1923831 |
| ENSMUST00000176692 | 7 | 9  | 0 Slc13a1    | solute carrier family 13 (sodium/sulfate symporters), member 1      | MGI:1859937 |
| ENSMUST00000014457 | 7 | 8  | 113 Cox6c    | cytochrome c oxidase subunit VIc                                    | MGI:104614  |
| ENSMUST00000129477 | 7 | 8  | 0 Mapk1      | mitogen-activated protein kinase 1                                  | MGI:1346858 |
| ENSMUST00000035725 | 7 | 7  | 0 Brk1       | BRICK1, SCAR/WAVE actin-nucleating complex subunit                  | MGI:1915406 |
| ENSMUST00000097776 | 7 | 7  | 0 Cnnm3      | cyclin M3   | MGI:2151055 |
| ENSMUST00000135935 | 7 | 7  | 8 Exosc8     | exosome component 8   | MGI:1916889 |
| ENSMUST00000025208 | 7 | 7  | 0 Dnajc18    | DnaJ heat shock protein family (Hsp40) member C18                   | MGI:1923844 |
| ENSMUST00000038404 | 7 | 7  | 0 Ccno       | cyclin O  | MGI:2145534 |
| ENSMUST00000068564 | 7 | 7  | 0 Rassf5     | Ras association (RalGDS/AF-6) domain family member 5                | MGI:1926375 |

|                    |   |    |     |               |   |             |
|--------------------|---|----|-----|---------------|---|-------------|
| ENSMUST00000144326 | 7 | 7  | 0   | Ranbp9        | RAN binding protein 9                                     | MGI:1928741 |
| ENSMUST00000147575 | 7 | 7  | 0   | Cpa6          | carboxypeptidase A6                                       | MGI:3045348 |
| ENSMUST00000182047 | 7 | 7  | 0   | Rnf4          | ring finger protein 4                                     | MGI:1201691 |
| ENSMUST00000174111 | 7 | 6  | 12  | Prc1          | protein regulator of cytokinesis 1                        | MGI:1858961 |
| ENSMUST00000024906 | 7 | 6  | 0   | Twsg1         | twisted gastrulation BMP signaling modulator 1            | MGI:2137520 |
| ENSMUST00000115066 | 7 | 6  | 0   | Dclre1c       | DNA cross-link repair 1C                                  | MGI:2441769 |
| ENSMUST00000165935 | 7 | 6  | 0   | Pphln1        | periphilin 1  | MGI:1917029 |
| ENSMUST00000025276 | 7 | 5  | 0   | 3110002H16Rik | RIKEN cDNA 3110002H16 gene                                | MGI:1916528 |
| ENSMUST00000113249 | 7 | 5  | 0   | Trnt1         | tRNA nucleotidyl transferase, CCA-adding, 1               | MGI:1917297 |
| ENSMUST00000107638 | 7 | 4  | 18  | Fktn          | fukutin   | MGI:2179507 |
| ENSMUST00000003912 | 7 | 4  | 0   | Calr          | calreticulin  | MGI:88252   |
| ENSMUST00000070742 | 7 | 4  | 0   | Mb21d1        | Mab-21 domain containing 1                                | MGI:2442261 |
| ENSMUST00000144668 | 7 | 4  | 0   | Dhdds         | dehydrodolichyl diphosphate synthase                      | MGI:1914672 |
| ENSMUST00000154645 | 7 | 4  | 0   | Fnip2         | folliculin interacting protein 2                          | MGI:2683054 |
| ENSMUST00000136448 | 7 | 3  | 0   | Ift80         | intraflagellar transport 80                               | MGI:1915509 |
| ENSMUST00000062967 | 7 | 3  | 163 | Ccdc64b       | coiled-coil domain containing 64B                         | MGI:2388267 |
| ENSMUST00000175806 | 7 | 1  | 0   | Pknox1        | Pbx/knotted 1 homeobox                                    | MGI:1201409 |
| ENSMUST00000086843 | 7 | 0  | 270 | Asb1          | ankyrin repeat and SOCS box-containing 1                  | MGI:1929735 |
| ENSMUST00000037644 | 7 | 0  | 24  | Cbl           | Casitas B-lineage lymphoma                                | MGI:88279   |
| ENSMUST00000027521 | 7 | 0  | 12  | Agap1         | ArfGAP with GTPase domain, ankyrin repeat and PH domain 1 | MGI:2653690 |
| ENSMUST00000041551 | 7 | 0  | 0   | Aagab         | alpha- and gamma-adaptin binding protein                  | MGI:1914189 |
| ENSMUST00000061720 | 7 | 0  | 0   | Zfp775        | zinc finger protein 775                                   | MGI:2683557 |
| ENSMUST00000105907 | 7 | 0  | 0   | Tmem222       | transmembrane protein 222                                 | MGI:1098568 |
| ENSMUST00000105911 | 7 | 0  | 0   | Gpr3          | G-protein coupled receptor 3                              | MGI:101908  |
| ENSMUST00000128212 | 7 | 0  | 0   | Ablim1        | actin-binding LIM protein 1                               | MGI:1194500 |
| ENSMUST00000129021 | 7 | 0  | 0   | Aptx          | aprataxin   | MGI:1913658 |
| ENSMUST00000137293 | 7 | 0  | 0   | Usp45         | ubiquitin specific petidase 45                            | MGI:101850  |
| ENSMUST00000150549 | 7 | 0  | 0   | Acox1         | acyl-Coenzyme A oxidase 1, palmitoyl                      | MGI:1330812 |
| ENSMUST00000161774 | 7 | 0  | 0   | Tra2b         | transformer 2 beta homolog (Drosophila)                   | MGI:106016  |
| ENSMUST00000169282 | 7 | 0  | 0   | Aph1c         | aph1 homolog C, gamma secretase subunit                   | MGI:1915568 |
| ENSMUST00000041618 | 7 | 29 | 0   | Taf4          | TATA-box binding protein associated factor 4              | MGI:2152346 |
| ENSMUST00000109790 | 7 | 18 | 0   | Asxl1         | additional sex combs like 1                               | MGI:2684063 |
| ENSMUST00000095517 | 7 | 14 | 0   | Cog8          | component of oligomeric golgi complex 8                   | MGI:2142885 |
| ENSMUST00000170176 | 7 | 14 | 0   | Wdr4          | WD repeat domain 4  | MGI:1889002 |
| ENSMUST00000106047 | 7 | 13 | 10  | Zbtb8os       | zinc finger and BTB domain containing 8 opposite strand   | MGI:1914356 |
| ENSMUST00000114823 | 7 | 13 | 0   | Mkrn1         | makorin, ring finger protein, 1                           | MGI:1859353 |
| ENSMUST00000147218 | 7 | 11 | 0   | Elk4          | ELK4, member of ETS oncogene family                       | MGI:102853  |
| ENSMUST00000169483 | 7 | 11 | 0   | Ptbp1         | polypyrimidine tract binding protein 1                    | MGI:97791   |
| ENSMUST00000060783 | 7 | 10 | 0   | Zfp768        | zinc finger protein 768                                   | MGI:2384582 |
| ENSMUST00000102578 | 7 | 9  | 0   | Ankrd13a      | ankyrin repeat domain 13a                                 | MGI:1915670 |
| ENSMUST00000125082 | 7 | 9  | 0   | Tmem245       | transmembrane protein 245                                 | MGI:2445107 |
| ENSMUST00000164853 | 7 | 9  | 0   | Ccdc24        | coiled-coil domain containing 24                          | MGI:2685874 |
| ENSMUST00000059093 | 7 | 9  | 0   | Coa6          | cytochrome c oxidase assembly factor 6                    | MGI:1915142 |

|                     |   |   |                 |   |             |
|---------------------|---|---|-----------------|---|-------------|
| ENSMUST00000125019  | 7 | 8 | 10 Pak2         | p21 protein (Cdc42/Rac)-activated kinase 2  | MGI:1339984 |
| ENSMUST00000022294  | 7 | 8 | 0 Nkiras1       | NFKB inhibitor interacting Ras-like protein 1                                       | MGI:1916971 |
| ENSMUST00000108569  | 7 | 7 | 0 Vmn1r58       | vomeronasal 1 receptor 58   | MGI:3033473 |
| ENSMUST00000111460  | 7 | 6 | 0 Cacul1        | CDK2 associated, cullin domain 1  | MGI:1926082 |
| ENSMUST00000118286  | 7 | 6 | 0 Mfn1          | mitofusin 1   | MGI:1914664 |
| ENSMUST000000042942 | 7 | 5 | 0 Sec23ip       | Sec23 interacting protein   | MGI:2450915 |
| ENSMUST00000138652  | 7 | 5 | 0 Adam22        | a disintegrin and metallopeptidase domain 22  | MGI:1340046 |
| ENSMUST00000171297  | 7 | 5 | 0 F830016B08Rik | RIKEN cDNA F830016B08 gene  | MGI:3588218 |
| ENSMUST00000176176  | 7 | 5 | 0 Zfp169        | zinc finger protein 169   | MGI:1915161 |
| ENSMUST00000064718  | 7 | 5 | 14 Phc3         | polyhomeotic-like 3 (Drosophila)  | MGI:2181434 |
| ENSMUST00000071169  | 7 | 5 | 14 Rcc2         | regulator of chromosome condensation 2  | MGI:1919784 |
| ENSMUST00000077730  | 7 | 5 | 2 Pik3c2b       | phosphoinositide-3-kinase, class 2, beta polypeptide                                | MGI:2685045 |
| ENSMUST00000055261  | 7 | 5 | 0 Mob1a         | MOB kinase activator 1A   | MGI:2442631 |
| ENSMUST00000112144  | 7 | 5 | 0 Dync1i2       | dynein cytoplasmic 1 intermediate chain 2   | MGI:107750  |
| ENSMUST00000124678  | 7 | 5 | 0 Mlec          | malectin  | MGI:1924015 |
| ENSMUST00000139715  | 7 | 4 | 50 Psmd1        | proteasome (prosome, macropain) 26S subunit, non-ATPase, 1                          | MGI:1917497 |
| ENSMUST00000035106  | 7 | 4 | 0 Slc25a38      | solute carrier family 25, member 38   | MGI:2384782 |
| ENSMUST00000144643  | 7 | 4 | 0 Pdzd11        | PDZ domain containing 11  | MGI:1919871 |
| ENSMUST00000023554  | 7 | 3 | 0 Dirc2         | disrupted in renal carcinoma 2 (human)  | MGI:2387188 |
| ENSMUST00000105256  | 7 | 3 | 8 Ctdsp2        | CTD (carboxy-terminal domain, RNA polymerase II, polypeptide A) small phosphatase 2 | MGI:1098748 |
| ENSMUST00000177203  | 7 | 2 | 0 Sik2          | salt inducible kinase 2   | MGI:2445031 |
| ENSMUST00000056433  | 7 | 1 | 20 Gpr107       | G protein-coupled receptor 107  | MGI:2139054 |
| ENSMUST00000033827  | 7 | 1 | 0 Grk1          | G protein-coupled receptor kinase 1   | MGI:1345146 |
| ENSMUST00000171928  | 7 | 1 | 0 Naa16         | N(alpha)-acetyltransferase 16, NatA auxiliary subunit                               | MGI:1914147 |
| ENSMUST00000023189  | 7 | 0 | 16 Glyr1        | glyoxylate reductase 1 homolog (Arabidopsis)  | MGI:1921272 |
| ENSMUST00000002379  | 7 | 0 | 0 Cd320         | CD320 antigen   | MGI:1860083 |
| ENSMUST00000007005  | 7 | 0 | 0 Acat2         | acetyl-Coenzyme A acetyltransferase 2   | MGI:87871   |
| ENSMUST00000009774  | 7 | 0 | 0 Ppp2cb        | protein phosphatase 2 (formerly 2A), catalytic subunit, beta isoform                | MGI:1321161 |
| ENSMUST00000022535  | 7 | 0 | 0 Dcp1a         | decapping mRNA 1A   | MGI:1923151 |
| ENSMUST00000023087  | 7 | 0 | 0 Twf1          | twinfilin actin binding protein 1   | MGI:1100520 |
| ENSMUST00000043521  | 7 | 0 | 0 Sec22a        | SEC22 homolog A, vesicle trafficking protein  | MGI:2447876 |
| ENSMUST00000043923  | 7 | 0 | 0 Acat3         | acetyl-Coenzyme A acetyltransferase 3   | MGI:109182  |
| ENSMUST00000051431  | 7 | 0 | 0 Fbxo28        | F-box protein 28  | MGI:1261890 |
| ENSMUST00000075869  | 7 | 0 | 0 Fbxo40        | F-box protein 40  | MGI:2443753 |
| ENSMUST00000088001  | 7 | 0 | 0 Adnp          | activity-dependent neuroprotective protein  | MGI:1338758 |
| ENSMUST00000097228  | 7 | 0 | 0 Dio3          | deiodinase, iodothyronine type III  | MGI:1306782 |
| ENSMUST00000101347  | 7 | 0 | 0 Mat2b         | methionine adenosyltransferase II, beta   | MGI:1913667 |
| ENSMUST00000102977  | 7 | 0 | 0 Hist1h4i      | histone cluster 1, H4i  | MGI:2448432 |
| ENSMUST00000123367  | 7 | 0 | 0 Mansc4        | MANSC domain containing 4   | MGI:3645619 |
| ENSMUST00000126305  | 7 | 0 | 0 Ankrd42       | ankyrin repeat domain 42  | MGI:1921095 |
| ENSMUST00000130916  | 7 | 0 | 0 Becn1         | becclin 1, autophagy related  | MGI:1891828 |
| ENSMUST00000132025  | 7 | 0 | 0 Ppp1r12b      | protein phosphatase 1, regulatory (inhibitor) subunit 12B                           | MGI:1916417 |
| ENSMUST00000132519  | 7 | 0 | 0 Nploc4        | NPL4 homolog, ubiquitin recognition factor  | MGI:2679787 |

|                    |   |    |    |               |   |             |
|--------------------|---|----|----|---------------|---|-------------|
| ENSMUST00000133508 | 7 | 0  | 0  | Lancl1        | LanC (bacterial lantibiotic synthetase component C)-like 1                            | MGI:1336997 |
| ENSMUST00000173878 | 7 | 0  | 0  | Rbm38         | RNA binding motif protein 38  | MGI:1889294 |
| ENSMUST00000177604 | 7 | 0  | 0  | Ska1          | spindle and kinetochore associated complex subunit 1                                  | MGI:1913718 |
| ENSMUST00000134270 | 6 | 20 | 0  | Rps15a        | ribosomal protein S15A  | MGI:2389091 |
| ENSMUST00000038584 | 6 | 19 | 0  | Tlk1          | tousled-like kinase 1   | MGI:2441683 |
| ENSMUST00000021246 | 6 | 16 | 0  | Snx11         | sorting nexin 11  | MGI:1921729 |
| ENSMUST00000116365 | 6 | 16 | 0  | Dnajc5        | DnaJ heat shock protein family (Hsp40) member C5                                      | MGI:892995  |
| ENSMUST00000149717 | 6 | 16 | 6  | Dixdc1        | DIX domain containing 1   | MGI:2679721 |
| ENSMUST00000177165 | 6 | 16 | 6  | AA415398      | expressed sequence AA415398   | MGI:3035485 |
| ENSMUST00000125652 | 6 | 16 | 0  | Diablo        | diablo, IAP-binding mitochondrial protein   | MGI:1913843 |
| ENSMUST00000103172 | 6 | 14 | 0  | Dstn          | destrin   | MGI:1929270 |
| ENSMUST00000005964 | 6 | 13 | 12 | Adh5          | alcohol dehydrogenase 5 (class III), chi polypeptide                                  | MGI:87929   |
| ENSMUST00000067246 | 6 | 13 | 0  | Slc30a5       | solute carrier family 30 (zinc transporter), member 5                                 | MGI:1916298 |
| ENSMUST00000147835 | 6 | 13 | 0  | Rasl2-9       | RAS-like, family 2, locus 9   | MGI:104605  |
| ENSMUST00000033871 | 6 | 12 | 0  | Slc25a15      | solute carrier family 25 (mitochondrial carrier ornithine transporter), member 15     | MGI:1342274 |
| ENSMUST00000176683 | 6 | 12 | 8  | Rpl41         | ribosomal protein L41   | MGI:1915195 |
| ENSMUST00000032071 | 6 | 12 | 0  | Dusp11        | dual specificity phosphatase 11 (RNA/RNP complex 1-interacting)                       | MGI:1919352 |
| ENSMUST00000025109 | 6 | 9  | 0  | Sap130        | Sin3A associated protein  | MGI:1919782 |
| ENSMUST00000050672 | 6 | 9  | 0  | Sumo2         | small ubiquitin-like modifier 2   | MGI:2158813 |
| ENSMUST00000111131 | 6 | 9  | 0  | Cd59b         | CD59b antigen   | MGI:1888996 |
| ENSMUST00000029106 | 6 | 9  | 0  | Zbtb46        | zinc finger and BTB domain containing 46  | MGI:1919397 |
| ENSMUST00000131082 | 6 | 9  | 0  | Slc35a3       | solute carrier family 35 (UDP-N-acetylglucosamine (UDP-GlcNAc) transporter), member 3 | MGI:1917648 |
| ENSMUST00000144205 | 6 | 9  | 0  | Gapdh         | glyceraldehyde-3-phosphate dehydrogenase  | MGI:95640   |
| ENSMUST00000017908 | 6 | 8  | 0  | Zswim1        | zinc finger SWIM-type containing 1  | MGI:1919221 |
| ENSMUST00000032469 | 6 | 8  | 0  | Mbd4          | methyl-CpG binding domain protein 4   | MGI:1333850 |
| ENSMUST00000054220 | 6 | 8  | 0  | Rpl18a        | ribosomal protein L18A  | MGI:1924058 |
| ENSMUST00000123413 | 6 | 8  | 0  | Eif4a2        | eukaryotic translation initiation factor 4A2  | MGI:106906  |
| ENSMUST00000143972 | 6 | 8  | 0  | Tma16         | translation machinery associated 16   | MGI:1913532 |
| ENSMUST00000057844 | 6 | 7  | 0  | B230219D22Rik | RIKEN cDNA B230219D22 gene  | MGI:1925771 |
| ENSMUST00000114293 | 6 | 7  | 0  | Sapcd2        | suppressor APC domain containing 2  | MGI:1919330 |
| ENSMUST00000074515 | 6 | 7  | 0  | Rffl          | ring finger and FYVE like domain containing protein                                   | MGI:1914588 |
| ENSMUST00000130656 | 6 | 7  | 0  | Neil3         | nei like 3 (E. coli)  | MGI:2384588 |
| ENSMUST00000156138 | 6 | 6  | 50 | Dnal1         | dynein, axonemal, light chain 1   | MGI:1921462 |
| ENSMUST00000020285 | 6 | 6  | 0  | Sar1a         | secretion associated Ras related GTPase 1A  | MGI:98230   |
| ENSMUST00000150862 | 6 | 6  | 0  | Dpy19l3       | dpy-19-like 3 (C. elegans)  | MGI:2443952 |
| ENSMUST00000031250 | 6 | 5  | 0  | Nudt9         | nudix (nucleoside diphosphate linked moiety X)-type motif 9                           | MGI:1921417 |
| ENSMUST00000087699 | 6 | 5  | 0  | Wiz           | widely-interspaced zinc finger motifs   | MGI:1332638 |
| ENSMUST00000097896 | 6 | 5  | 0  | 4933427I04Rik | Riken cDNA 4933427I04 gene  | MGI:3613760 |
| ENSMUST00000119891 | 6 | 5  | 0  | BC026585      | cDNA sequence BC026585  | MGI:2448516 |
| ENSMUST00000127609 | 6 | 5  | 0  | Dhtkd1        | dehydrogenase E1 and transketolase domain containing 1                                | MGI:2445096 |
| ENSMUST00000001950 | 6 | 5  | 0  | Tollip        | toll interacting protein  | MGI:1891808 |
| ENSMUST00000038014 | 6 | 5  | 0  | Dnajc16       | DnaJ heat shock protein family (Hsp40) member C16                                     | MGI:2442146 |
| ENSMUST00000154755 | 6 | 5  | 0  | Hhat          | hedgehog acyltransferase  | MGI:2444681 |

|                     |   |   |                 |  |             |
|---------------------|---|---|-----------------|--|-------------|
| ENSMUST00000049584  | 6 | 4 | 12 Dnajc27      | DnaJ heat shock protein family (Hsp40) member C27                  | MGI:2443036 |
| ENSMUST00000018727  | 6 | 4 | 0 G3bp1         | GTPase activating protein (SH3 domain) binding protein 1           | MGI:1351465 |
| ENSMUST00000042732  | 6 | 4 | 0 Fbxo45        | F-box protein 45   | MGI:2447775 |
| ENSMUST000000102899 | 6 | 4 | 0 Med22         | mediator complex subunit 22  | MGI:98446   |
| ENSMUST000000130528 | 6 | 4 | 0 Raf1          | v-raf-leukemia viral oncogene 1                                    | MGI:97847   |
| ENSMUST000000176102 | 6 | 4 | 0 Zbtb25        | zinc finger and BTB domain containing 25                           | MGI:99197   |
| ENSMUST000000100847 | 6 | 3 | 20 Rpl37rt      | ribosomal protein L37, retrotransposed                             | MGI:3651519 |
| ENSMUST000000132390 | 6 | 3 | 0 Cdk14         | cyclin-dependent kinase 14   | MGI:894318  |
| ENSMUST00000015236  | 6 | 3 | 0 Edf1          | endothelial differentiation-related factor 1                       | MGI:1891227 |
| ENSMUST00000055241  | 6 | 3 | 0 Zfp106        | zinc finger protein 106  | MGI:1270153 |
| ENSMUST00000028741  | 6 | 2 | 0 Haus2         | HAUS augmin-like complex, subunit 2                                | MGI:1913546 |
| ENSMUST000000084116 | 6 | 2 | 0 Nol9          | nucleolar protein 9  | MGI:1921285 |
| ENSMUST000000074669 | 6 | 1 | 0 Hnrnpab       | heterogeneous nuclear ribonucleoprotein A/B                        | MGI:1330294 |
| ENSMUST000000151433 | 6 | 1 | 0 Usp36         | ubiquitin specific peptidase 36                                    | MGI:1919594 |
| ENSMUST00000014892  | 6 | 0 | 12 Tex261       | testis expressed gene 261  | MGI:1096575 |
| ENSMUST000000115634 | 6 | 0 | 12 Diaph1       | diaphanous related formin 1  | MGI:1194490 |
| ENSMUST000000160477 | 6 | 0 | 12 Wars         | tryptophanyl-tRNA synthetase                                       | MGI:104630  |
| ENSMUST000000067268 | 6 | 0 | 8 Pxn           | paxillin   | MGI:108295  |
| ENSMUST00000040474  | 6 | 0 | 6 Tbc1d24       | TBC1 domain family, member 24                                      | MGI:2443456 |
| ENSMUST00000010536  | 6 | 0 | 2 Gosr1         | golgi SNAP receptor complex member 1                               | MGI:1858260 |
| ENSMUST000000026978 | 6 | 0 | 2 Xiap          | X-linked inhibitor of apoptosis                                    | MGI:107572  |
| ENSMUST000000000590 | 6 | 0 | 0 Rdx           | radixin  | MGI:97887   |
| ENSMUST000000022419 | 6 | 0 | 0 Ppif          | peptidylprolyl isomerase F (cyclophilin F)                         | MGI:2145814 |
| ENSMUST000000022734 | 6 | 0 | 0 Dnajc3        | DnaJ heat shock protein family (Hsp40) member C3                   | MGI:107373  |
| ENSMUST000000027634 | 6 | 0 | 0 Dbi           | diazepam binding inhibitor   | MGI:94865   |
| ENSMUST000000031262 | 6 | 0 | 0 Coq2          | coenzyme Q2 4-hydroxybenzoate polyprenyltransferase                | MGI:1919133 |
| ENSMUST000000037748 | 6 | 0 | 0 Hnrnpu        | heterogeneous nuclear ribonucleoprotein U                          | MGI:1858195 |
| ENSMUST000000041126 | 6 | 0 | 0 Ss18l1        | synovial sarcoma translocation gene on chromosome 18-like 1        | MGI:2444061 |
| ENSMUST000000044189 | 6 | 0 | 0 Senp1         | SUMO1/sentrin specific peptidase 1                                 | MGI:2445054 |
| ENSMUST000000049676 | 6 | 0 | 0 Trpv3         | transient receptor potential cation channel, subfamily V, member 3 | MGI:2181407 |
| ENSMUST000000051906 | 6 | 0 | 0 Akap17b       | A kinase (PRKA) anchor protein 17B                                 | MGI:2443758 |
| ENSMUST000000054287 | 6 | 0 | 0 Zbtb39        | zinc finger and BTB domain containing 39                           | MGI:2443316 |
| ENSMUST000000055858 | 6 | 0 | 0 2410002F23Rik | RIKEN cDNA 2410002F23 gene   | MGI:1914226 |
| ENSMUST000000056512 | 6 | 0 | 0 Wdr41         | WD repeat domain 41  | MGI:2445123 |
| ENSMUST000000062125 | 6 | 0 | 0 1810026J23Rik | RIKEN cDNA 1810026J23 gene   | MGI:1917023 |
| ENSMUST000000075954 | 6 | 0 | 0 Taf1b         | TATA-box binding protein associated factor, RNA polymerase I, B    | MGI:109577  |
| ENSMUST000000084749 | 6 | 0 | 0 Ankrd6        | ankyrin repeat domain 6  | MGI:2154278 |
| ENSMUST000000097774 | 6 | 0 | 0 Camta1        | calmodulin binding transcription activator 1                       | MGI:2140230 |
| ENSMUST000000099514 | 6 | 0 | 0 Sgms1         | sphingomyelin synthase 1   | MGI:2444110 |
| ENSMUST000000106429 | 6 | 0 | 0 1810037I17Rik | RIKEN cDNA 1810037I17 gene   | MGI:1914954 |
| ENSMUST000000111331 | 6 | 0 | 0 Arhgap1       | Rho GTPase activating protein 1                                    | MGI:2445003 |
| ENSMUST000000114839 | 6 | 0 | 0 Dnajb6        | DnaJ heat shock protein family (Hsp40) member B6                   | MGI:1344381 |
| ENSMUST000000132962 | 6 | 0 | 0 Dnajc2        | DnaJ heat shock protein family (Hsp40) member C2                   | MGI:99470   |

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|--------------------|---|----|-----------------|--|-------------|
| ENSMUST00000133836 | 6 | 0  | 0 Ccdc86        | coiled-coil domain containing 86   | MGI:1277220 |
| ENSMUST00000147543 | 6 | 0  | 0 Timmdc1       | translocase of inner mitochondrial membrane domain containing 1              | MGI:1922139 |
| ENSMUST00000163844 | 6 | 0  | 0 Ctnnb1        | catenin (cadherin associated protein), beta 1                                | MGI:88276   |
| ENSMUST00000173253 | 6 | 0  | 0 Tubb5         | tubulin, beta 5 class I  | MGI:107812  |
| ENSMUST00000175726 | 6 | 0  | 0 9930021J03Rik | RIKEN cDNA 9930021J03 gene   | MGI:2444398 |
| ENSMUST00000185098 | 6 | 0  | 0 Dph5          | diphthamide biosynthesis 5   | MGI:1916990 |
| ENSMUST00000126805 | 5 | 18 | 0 Pradc1        | protease-associated domain containing 1                                      | MGI:1920577 |
| ENSMUST00000094363 | 5 | 17 | 0 Fam161a       | family with sequence similarity 161, member A                                | MGI:1921123 |
| ENSMUST00000183703 | 5 | 14 | 165 Erc1        | ELKS/RAB6-interacting/CAST family member 1                                   | MGI:2151013 |
| ENSMUST00000115808 | 5 | 14 | 0 Ammecn1       | AMME chromosomal region gene 1-like  | MGI:2442711 |
| ENSMUST00000146088 | 5 | 13 | 0 Ttc38         | tetratricopeptide repeat domain 38   | MGI:2146198 |
| ENSMUST00000131550 | 5 | 12 | 0 Usp49         | ubiquitin specific peptidase 49  | MGI:2685391 |
| ENSMUST00000056028 | 5 | 12 | 0 Sbk1          | SH3-binding kinase 1   | MGI:2135937 |
| ENSMUST00000119848 | 5 | 11 | 0 Eme2          | essential meiotic structure-specific endonuclease subunit 2                  | MGI:1919889 |
| ENSMUST00000166358 | 5 | 9  | 0 Ndrp4         | N-myc downstream regulated gene 4  | MGI:2384590 |
| ENSMUST00000147051 | 5 | 9  | 0 Spata2        | spermatogenesis associated 2   | MGI:2146885 |
| ENSMUST00000107994 | 5 | 7  | 0 Zfp976        | zinc finger protein 976  | MGI:3036263 |
| ENSMUST00000142809 | 5 | 7  | 0 Rbm18         | RNA binding motif protein 18   | MGI:1915139 |
| ENSMUST00000129449 | 5 | 7  | 0 Tmem170b      | transmembrane protein 170B   | MGI:3647046 |
| ENSMUST00000025983 | 5 | 6  | 0 Ccnj          | cyclin J   | MGI:2443297 |
| ENSMUST00000032185 | 5 | 6  | 0 Slc6a6        | solute carrier family 6 (neurotransmitter transporter, taurine), member 6    | MGI:98488   |
| ENSMUST00000043966 | 5 | 6  | 0 Mrpl47        | mitochondrial ribosomal protein L47  | MGI:1921850 |
| ENSMUST00000074339 | 5 | 5  | 0 Tars2         | threonyl-tRNA synthetase 2, mitochondrial (putative)                         | MGI:1919057 |
| ENSMUST00000121583 | 5 | 5  | 0 Nlrp4c        | NLR family, pyrin domain containing 4C                                       | MGI:1890518 |
| ENSMUST00000124409 | 5 | 5  | 0 Pgd           | phosphogluconate dehydrogenase   | MGI:97553   |
| ENSMUST00000177068 | 5 | 5  | 0 Chtf8         | CTF8, chromosome transmission fidelity factor 8                              | MGI:2443370 |
| ENSMUST00000035086 | 5 | 5  | 0 Pdcd6ip       | programmed cell death 6 interacting protein                                  | MGI:1333753 |
| ENSMUST00000076991 | 5 | 5  | 0 4930453N24Rik | RIKEN cDNA 4930453N24 gene   | MGI:1914859 |
| ENSMUST00000087210 | 5 | 5  | 0 Ppp1r10       | protein phosphatase 1, regulatory subunit 10                                 | MGI:1289273 |
| ENSMUST00000128725 | 5 | 5  | 0 Rps3          | ribosomal protein S3   | MGI:1350917 |
| ENSMUST00000165310 | 5 | 5  | 0 Ms4a6c        | membrane-spanning 4-domains, subfamily A, member 6C                          | MGI:2385644 |
| ENSMUST00000166393 | 5 | 5  | 0 Dusp12        | dual specificity phosphatase 12  | MGI:1890614 |
| ENSMUST00000176716 | 5 | 5  | 0 Rnf141        | ring finger protein 141  | MGI:1914400 |
| ENSMUST00000048371 | 5 | 4  | 474 Tsc22d1     | TSC22 domain family, member 1  | MGI:109127  |
| ENSMUST00000009411 | 5 | 4  | 0 Zfp212        | Zinc finger protein 212  | MGI:2682609 |
| ENSMUST00000027494 | 5 | 4  | 0 Ppp1r7        | protein phosphatase 1, regulatory (inhibitor) subunit 7                      | MGI:1913635 |
| ENSMUST00000046663 | 5 | 4  | 0 Dcbl2         | discoidin, CUB and LCCL domain containing 2                                  | MGI:1920629 |
| ENSMUST00000072602 | 5 | 4  | 0 Hvcn1         | hydrogen voltage-gated channel 1   | MGI:1921346 |
| ENSMUST00000107022 | 5 | 4  | 0 Hsd3b2        | hydroxy-delta-5-steroid dehydrogenase, 3 beta- and steroid delta-isomerase 2 | MGI:96234   |
| ENSMUST00000109586 | 5 | 4  | 0 Sertad2       | SERTA domain containing 2  | MGI:1931026 |
| ENSMUST00000132514 | 5 | 4  | 0 Tor1b         | torsin family 1, member B  | MGI:1353605 |
| ENSMUST00000132646 | 5 | 4  | 0 Kctd10        | potassium channel tetramerisation domain containing 10                       | MGI:2141207 |
| ENSMUST00000150835 | 5 | 4  | 0 Snrpb         | small nuclear ribonucleoprotein B  | MGI:98342   |



|                    |   |   |             |   |             |
|--------------------|---|---|-------------|---|-------------|
| ENSMUST00000141419 | 5 | 3 | 0 Ppp1r12b  | protein phosphatase 1, regulatory (inhibitor) subunit 12B                         | MGI:1916417 |
| ENSMUST00000174744 | 5 | 3 | 0 Rab11b    | RAB11B, member RAS oncogene family  | MGI:99425   |
| ENSMUST00000177255 | 5 | 3 | 0 Arhgap39  | Rho GTPase activating protein 39  | MGI:107858  |
| ENSMUST00000150095 | 5 | 3 | 0 Suv39h1   | suppressor of variegation 3-9 homolog 1 (Drosophila)                              | MGI:1099440 |
| ENSMUST00000161530 | 5 | 3 | 0 Pitpnm2   | phosphatidylinositol transfer protein, membrane-associated 2                      | MGI:1336192 |
| ENSMUST00000028017 | 5 | 1 | 0 Mettl13   | methyltransferase like 13   | MGI:1918699 |
| ENSMUST00000124694 | 5 | 1 | 155 Usp3    | ubiquitin specific peptidase 3  | MGI:2152450 |
| ENSMUST00000065103 | 5 | 1 | 0 Mrpl35    | mitochondrial ribosomal protein L35   | MGI:1913473 |
| ENSMUST00000108379 | 5 | 1 | 0 BC024978  | cDNA sequence BC024978  | MGI:3041247 |
| ENSMUST00000129577 | 5 | 0 | 83 Clk1     | CDC-like kinase 1   | MGI:107403  |
| ENSMUST00000142917 | 5 | 0 | 52 Ptprg    | protein tyrosine phosphatase, receptor type, G                                    | MGI:97814   |
| ENSMUST00000162916 | 5 | 0 | 46 Hnrnpu   | heterogeneous nuclear ribonucleoprotein U   | MGI:1858195 |
| ENSMUST00000180716 | 5 | 0 | 16 Senp1    | SUMO1/sentrin specific peptidase 1  | MGI:2445054 |
| ENSMUST00000092566 | 5 | 0 | 14 Slc16a10 | solute carrier family 16 (monocarboxylic acid transporters), member 10            | MGI:1919722 |
| ENSMUST00000163231 | 5 | 0 | 14 Arel1    | apoptosis resistant E3 ubiquitin protein ligase 1                                 | MGI:1915747 |
| ENSMUST00000101118 | 5 | 0 | 10 Rybp     | RING1 and YY1 binding protein   | MGI:1929059 |
| ENSMUST00000150230 | 5 | 0 | 2 Kif1b     | kinesin family member 1B  | MGI:108426  |
| ENSMUST00000000312 | 5 | 0 | 0 Cdh1      | cadherin 1  | MGI:88354   |
| ENSMUST00000009693 | 5 | 0 | 0 Srp14     | signal recognition particle 14  | MGI:107169  |
| ENSMUST00000015467 | 5 | 0 | 0 Slc39a1   | solute carrier family 39 (zinc transporter), member 1                             | MGI:1353474 |
| ENSMUST00000017900 | 5 | 0 | 0 Slc12a7   | solute carrier family 12, member 7  | MGI:1342283 |
| ENSMUST00000019734 | 5 | 0 | 0 Cyb561    | cytochrome b-561  | MGI:103253  |
| ENSMUST00000021933 | 5 | 0 | 0 Ctsl      | cathepsin L   | MGI:88564   |
| ENSMUST00000024486 | 5 | 0 | 0 Mrps23    | mitochondrial ribosomal protein S23   | MGI:1928138 |
| ENSMUST00000026410 | 5 | 0 | 0 Dnajc14   | DnaJ heat shock protein family (Hsp40) member C14                                 | MGI:1921580 |
| ENSMUST00000026469 | 5 | 0 | 0 Nab2      | Ngfi-A binding protein 2  | MGI:107563  |
| ENSMUST00000026816 | 5 | 0 | 0 Wdr73     | WD repeat domain 73   | MGI:1919218 |
| ENSMUST00000030306 | 5 | 0 | 0 Hook1     | hook microtubule tethering protein 1  | MGI:1925213 |
| ENSMUST00000030446 | 5 | 0 | 0 Urod      | uroporphyrinogen decarboxylase  | MGI:98916   |
| ENSMUST00000031588 | 5 | 0 | 0 Usp30     | ubiquitin specific peptidase 30   | MGI:2140991 |
| ENSMUST00000032196 | 5 | 0 | 0 Arl8b     | ADP-ribosylation factor-like 8B   | MGI:1914416 |
| ENSMUST00000035010 | 5 | 0 | 0 Stt3b     | STT3, subunit of the oligosaccharyltransferase complex, homolog B (S. cerevisiae) | MGI:1915542 |
| ENSMUST00000035481 | 5 | 0 | 0 Chchd5    | coiled-coil-helix-coiled-coil-helix domain containing 5                           | MGI:1913420 |
| ENSMUST00000038379 | 5 | 0 | 0 Cpsf7     | cleavage and polyadenylation specific factor 7                                    | MGI:1917826 |
| ENSMUST00000040344 | 5 | 0 | 0 Gns       | glucosamine (N-acetyl)-6-sulfatase  | MGI:1922862 |
| ENSMUST00000043138 | 5 | 0 | 0 Inpp5f    | inositol polyphosphate-5-phosphatase F  | MGI:2141867 |
| ENSMUST00000043305 | 5 | 0 | 0 Wdtd1     | WD and tetratricopeptide repeats 1  | MGI:2685541 |
| ENSMUST00000044730 | 5 | 0 | 0 Mllt6     | myeloid/lymphoid or mixed-lineage leukemia; translocated to, 6                    | MGI:1935145 |
| ENSMUST00000045487 | 5 | 0 | 0 Rhou      | ras homolog family member U   | MGI:1916831 |
| ENSMUST00000045665 | 5 | 0 | 0 Ppp1r12b  | protein phosphatase 1, regulatory (inhibitor) subunit 12B                         | MGI:1916417 |
| ENSMUST00000047186 | 5 | 0 | 0 Wipi1     | WD repeat domain, phosphoinositide interacting 1                                  | MGI:1261864 |
| ENSMUST00000047672 | 5 | 0 | 0 Cct2      | chaperonin containing Tcp1, subunit 2 (beta)                                      | MGI:107186  |
| ENSMUST00000048116 | 5 | 0 | 0 Slc7a1    | solute carrier family 7 (cationic amino acid transporter, y+ system), member 1    | MGI:88117   |

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|--------------------|---|---|------------|--|-------------|
| ENSMUST00000048418 | 5 | 0 | 0 Ipo8     | importin 8   | MGI:2444611 |
| ENSMUST00000049262 | 5 | 0 | 0 Sirpa    | signal-regulatory protein alpha                                  | MGI:108563  |
| ENSMUST00000050580 | 5 | 0 | 0 Uqcrh    | ubiquinol-cytochrome c reductase hinge protein                   | MGI:1913826 |
| ENSMUST00000051633 | 5 | 0 | 0 Ubiad1   | UbiA prenyltransferase domain containing 1                       | MGI:1918957 |
| ENSMUST00000053208 | 5 | 0 | 0 Lypd6    | LY6/PLAUR domain containing 6                                    | MGI:2443848 |
| ENSMUST00000054450 | 5 | 0 | 0 Pdcd2    | programmed cell death 2  | MGI:104643  |
| ENSMUST00000061552 | 5 | 0 | 0 Peak1    | pseudopodium-enriched atypical kinase 1                          | MGI:2442366 |
| ENSMUST00000063414 | 5 | 0 | 0 Tbc1d22a | TBC1 domain family, member 22a                                   | MGI:1289265 |
| ENSMUST00000065562 | 5 | 0 | 0 Socs4    | suppressor of cytokine signaling 4                               | MGI:1914546 |
| ENSMUST00000065887 | 5 | 0 | 0 Kif1bp   | KIF1 binding protein   | MGI:1919570 |
| ENSMUST00000070080 | 5 | 0 | 0 B4galt6  | UDP-Gal:betaGlcNAc beta 1,4-galactosyltransferase, polypeptide 6 | MGI:1928380 |
| ENSMUST00000071361 | 5 | 0 | 0 Zfp428   | zinc finger protein 428  | MGI:1916463 |
| ENSMUST00000072154 | 5 | 0 | 0 Pigh     | phosphatidylinositol glycan anchor biosynthesis, class H         | MGI:99463   |
| ENSMUST00000074144 | 5 | 0 | 0 Dcaf8    | DDB1 and CUL4 associated factor 8                                | MGI:91860   |
| ENSMUST00000093205 | 5 | 0 | 0 Fbxw11   | F-box and WD-40 domain protein 11                                | MGI:2144023 |
| ENSMUST00000096246 | 5 | 0 | 0 Ganab    | alpha glucosidase 2 alpha neutral subunit                        | MGI:1097667 |
| ENSMUST00000099173 | 5 | 0 | 0 Eif2s2   | eukaryotic translation initiation factor 2, subunit 2 (beta)     | MGI:1914454 |
| ENSMUST00000101265 | 5 | 0 | 0 Ltc4s    | leukotriene C4 synthase  | MGI:107498  |
| ENSMUST00000102521 | 5 | 0 | 0 Rap1gap2 | RAP1 GTPase activating protein 2                                 | MGI:3028623 |
| ENSMUST00000102650 | 5 | 0 | 0 Akap10   | A kinase (PRKA) anchor protein 10                                | MGI:1890218 |
| ENSMUST00000103084 | 5 | 0 | 0 Zfp334   | zinc finger protein 334  | MGI:2388656 |
| ENSMUST00000105873 | 5 | 0 | 0 Slc30a2  | solute carrier family 30 (zinc transporter), member 2            | MGI:106637  |
| ENSMUST00000111368 | 5 | 0 | 0 Nuf2     | NUF2, NDC80 kinetochore complex component                        | MGI:1914227 |
| ENSMUST00000111701 | 5 | 0 | 0 Sspn     | sarcospan  | MGI:1353511 |
| ENSMUST00000112201 | 5 | 0 | 0 Gorasp2  | golgi reassembly stacking protein 2                              | MGI:2135962 |
| ENSMUST00000115137 | 5 | 0 | 0 Pcyt1a   | phosphate cytidyltransferase 1, choline, alpha isoform           | MGI:88557   |
| ENSMUST00000120934 | 5 | 0 | 0 Ptpn2    | protein tyrosine phosphatase, non-receptor type 2                | MGI:97806   |
| ENSMUST00000123320 | 5 | 0 | 0 Ctsh     | cathepsin H  | MGI:107285  |
| ENSMUST00000123384 | 5 | 0 | 0 Angel2   | angel homolog 2 (Drosophila)                                     | MGI:1196310 |
| ENSMUST00000126175 | 5 | 0 | 0 Tlk2     | tousled-like kinase 2 (Arabidopsis)                              | MGI:1346023 |
| ENSMUST00000127759 | 5 | 0 | 0 Arfp2    | ADP-ribosylation factor interacting protein 2                    | MGI:1924182 |
| ENSMUST00000129005 | 5 | 0 | 0 Hsp90aa1 | heat shock protein 90, alpha (cytosolic), class A member 1       | MGI:96250   |
| ENSMUST00000129549 | 5 | 0 | 0 Pias4    | protein inhibitor of activated STAT 4                            | MGI:2136940 |
| ENSMUST00000132551 | 5 | 0 | 0 Degs1    | delta(4)-desaturase, sphingolipid 1                              | MGI:1097711 |
| ENSMUST00000133232 | 5 | 0 | 0 Ncoa2    | nuclear receptor coactivator 2                                   | MGI:1276533 |
| ENSMUST00000134457 | 5 | 0 | 0 Tle6     | transducin-like enhancer of split 6                              | MGI:2149593 |
| ENSMUST00000137531 | 5 | 0 | 0 Afdn     | afadin, adherens junction formation factor                       | MGI:1314653 |
| ENSMUST00000138142 | 5 | 0 | 0 Gin1     | gypsy retrotransposon integrase 1                                | MGI:2182036 |
| ENSMUST00000138343 | 5 | 0 | 0 Fzr1     | fizzy/cell division cycle 20 related 1 (Drosophila)              | MGI:1926790 |
| ENSMUST00000138862 | 5 | 0 | 0 Gabpb2   | GA repeat binding protein, beta 2                                | MGI:95612   |
| ENSMUST00000139734 | 5 | 0 | 0 Idua     | iduronidase, alpha-L-  | MGI:96418   |
| ENSMUST00000142490 | 5 | 0 | 0 S100pbp  | S100P binding protein  | MGI:1921898 |
| ENSMUST00000142971 | 5 | 0 | 0 Ankrd42  | ankyrin repeat domain 42   | MGI:1921095 |

|                     |   |    |                 |  |             |
|---------------------|---|----|-----------------|--|-------------|
| ENSMUST00000144099  | 5 | 0  | 0 Cdk5rap2      | CDK5 regulatory subunit associated protein 2   | MGI:2384875 |
| ENSMUST00000144778  | 5 | 0  | 0 Sfi1          | Sfi1 homolog, spindle assembly associated (yeast)                                    | MGI:1926137 |
| ENSMUST00000146623  | 5 | 0  | 0 Gpd1l         | glycerol-3-phosphate dehydrogenase 1-like  | MGI:1289257 |
| ENSMUST00000147987  | 5 | 0  | 0 Dnajc2        | DnaJ heat shock protein family (Hsp40) member C2                                     | MGI:99470   |
| ENSMUST00000148289  | 5 | 0  | 0 Cdk5rap1      | CDK5 regulatory subunit associated protein 1   | MGI:1914221 |
| ENSMUST00000148385  | 5 | 0  | 0 Smc4          | structural maintenance of chromosomes 4  | MGI:1917349 |
| ENSMUST00000151530  | 5 | 0  | 0 Ears2         | glutamyl-tRNA synthetase 2, mitochondrial  | MGI:1914667 |
| ENSMUST00000151971  | 5 | 0  | 0 S100pbp       | S100P binding protein  | MGI:1921898 |
| ENSMUST00000155301  | 5 | 0  | 0 Fbxl12        | F-box and leucine-rich repeat protein 12   | MGI:1354738 |
| ENSMUST00000159625  | 5 | 0  | 0 Wdr26         | WD repeat domain 26  | MGI:1923825 |
| ENSMUST00000159903  | 5 | 0  | 0 Wnk1          | WNK lysine deficient protein kinase 1  | MGI:2442092 |
| ENSMUST00000160579  | 5 | 0  | 0 Tra2b         | transformer 2 beta homolog (Drosophila)  | MGI:106016  |
| ENSMUST00000160826  | 5 | 0  | 0 Gm28048       | predicted gene, 28048  | MGI:5547784 |
| ENSMUST00000165123  | 5 | 0  | 0 Csnk1a1       | casein kinase 1, alpha 1   | MGI:1934950 |
| ENSMUST00000167103  | 5 | 0  | 0 Nrnx3         | neurexin III   | MGI:1096389 |
| ENSMUST00000172908  | 5 | 0  | 0 Naa25         | N(alpha)-acetyltransferase 25, NatB auxiliary subunit                                | MGI:2442563 |
| ENSMUST00000182287  | 5 | 0  | 0 Rpf2          | ribosome production factor 2 homolog   | MGI:1914489 |
| ENSMUST00000184704  | 5 | 0  | 0 1110065P20Rik | RIKEN cDNA 1110065P20 gene   | MGI:1916170 |
| ENSMUST00000029315  | 4 | 31 | 0 Supt20        | suppressor of Ty 20  | MGI:1929651 |
| ENSMUST00000028241  | 4 | 29 | 0 Stom          | stomatin   | MGI:95403   |
| ENSMUST000000100770 | 4 | 29 | 0 Ptpn11        | protein tyrosine phosphatase, non-receptor type 11                                   | MGI:99511   |
| ENSMUST00000031069  | 4 | 28 | 0 Sepsecs       | Sep (O-phosphoserine) tRNA:Sec (selenocysteine) tRNA synthase                        | MGI:1098791 |
| ENSMUST000000125468 | 4 | 22 | 0 Drap1         | Dr1 associated protein 1 (negative cofactor 2 alpha)                                 | MGI:1913806 |
| ENSMUST00000032754  | 4 | 16 | 0 Sema4b        | sema domain, immunoglobulin domain (Ig), transmembrane domain (TM) and short cytopla | MGI:107559  |
| ENSMUST00000036025  | 4 | 16 | 0 Ccdc93        | coiled-coil domain containing 93   | MGI:1918079 |
| ENSMUST00000023044  | 4 | 15 | 0 Fam83f        | family with sequence similarity 83, member F   | MGI:2146227 |
| ENSMUST000000114849 | 4 | 15 | 0 Uhrf1bp1      | UHRF1 (ICBP90) binding protein 1   | MGI:3041238 |
| ENSMUST000000098552 | 4 | 13 | 0 Tmod2         | tropomodulin 2   | MGI:1355335 |
| ENSMUST000000161018 | 4 | 13 | 0 Zfp346        | zinc finger protein 346  | MGI:1349417 |
| ENSMUST000000109099 | 4 | 12 | 57 Atmin        | ATM interactor   | MGI:2682328 |
| ENSMUST00000004428  | 4 | 12 | 0 Clcn5         | chloride channel, voltage-sensitive 5  | MGI:99486   |
| ENSMUST00000046404  | 4 | 12 | 0 Ubr7          | ubiquitin protein ligase E3 component n-recognin 7 (putative)                        | MGI:1913872 |
| ENSMUST000000021773 | 4 | 12 | 0 Gpld1         | glycosylphosphatidylinositol specific phospholipase D1                               | MGI:106604  |
| ENSMUST000000117757 | 4 | 12 | 0 Gapdh         | glyceraldehyde-3-phosphate dehydrogenase   | MGI:95640   |
| ENSMUST000000025590 | 4 | 11 | 0 Osbp          | oxysterol binding protein  | MGI:97447   |
| ENSMUST000000037375 | 4 | 11 | 0 Eps8l3        | EPS8-like 3  | MGI:2139743 |
| ENSMUST000000067680 | 4 | 11 | 0 Adam12        | a disintegrin and metallopeptidase domain 12 (meltrin alpha)                         | MGI:105378  |
| ENSMUST000000130263 | 4 | 10 | 0 Gabpb1        | GA repeat binding protein, beta 1  | MGI:95611   |
| ENSMUST000000164386 | 4 | 10 | 0 Gm20498       | predicted gene 20498   | MGI:5141963 |
| ENSMUST000000021028 | 4 | 9  | 0 Itgb3         | integrin beta 3  | MGI:96612   |
| ENSMUST000000030643 | 4 | 9  | 0 Extl1         | exostoses (multiple)-like 1  | MGI:1888742 |
| ENSMUST000000041683 | 4 | 9  | 0 Usp22         | ubiquitin specific peptidase 22  | MGI:2144157 |
| ENSMUST000000145255 | 4 | 9  | 0 Hsp90aa1      | heat shock protein 90, alpha (cytosolic), class A member 1                           | MGI:96250   |

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|--------------------|---|---|-----------------|---|-------------|
| ENSMUST00000168839 | 4 | 9 | 0 Myo9b         | myosin IXb  | MGI:106624  |
| ENSMUST00000142440 | 4 | 8 | 4 Rpl11         | ribosomal protein L11   | MGI:1914275 |
| ENSMUST00000142593 | 4 | 8 | 0 Bnip3l        | BCL2/adenovirus E1B interacting protein 3-like                    | MGI:1332659 |
| ENSMUST00000131351 | 4 | 7 | 8 AU019823      | expressed sequence AU019823                                       | MGI:2143205 |
| ENSMUST00000001485 | 4 | 7 | 0 Mrpl10        | mitochondrial ribosomal protein L10                               | MGI:1333801 |
| ENSMUST00000094463 | 4 | 7 | 0 Mn1           | meningioma 1  | MGI:1261813 |
| ENSMUST00000145593 | 4 | 7 | 0 Paip2b        | poly(A) binding protein interacting protein 2B                    | MGI:2386865 |
| ENSMUST00000145614 | 4 | 7 | 16 Mrps26       | mitochondrial ribosomal protein S26                               | MGI:1333830 |
| ENSMUST00000004473 | 4 | 7 | 0 Spic          | Spi-C transcription factor (Spi-1/PU.1 related)                   | MGI:1341168 |
| ENSMUST00000030849 | 4 | 7 | 0 Fam126a       | family with sequence similarity 126, member A                     | MGI:2149839 |
| ENSMUST00000059599 | 4 | 7 | 0 Utp23         | UTP23 small subunit processome component                          | MGI:1925831 |
| ENSMUST00000143592 | 4 | 7 | 0 Efcab6        | EF-hand calcium binding domain 6                                  | MGI:1924877 |
| ENSMUST00000044455 | 4 | 6 | 0 Zfp451        | zinc finger protein 451   | MGI:2137896 |
| ENSMUST00000049031 | 4 | 6 | 0 Fam63b        | family with sequence similarity 63, member B                      | MGI:2443086 |
| ENSMUST00000060894 | 4 | 6 | 0 Erich5        | glutamate rich 5  | MGI:2447772 |
| ENSMUST00000136126 | 4 | 6 | 0 Rapgef2       | Rap guanine nucleotide exchange factor (GEF) 2                    | MGI:2659071 |
| ENSMUST00000163995 | 4 | 6 | 0 Coro1c        | coronin, actin binding protein 1C                                 | MGI:1345964 |
| ENSMUST00000077376 | 4 | 5 | 0 2810006K23Rik | RIKEN cDNA 2810006K23 gene  | MGI:1919900 |
| ENSMUST00000102505 | 4 | 5 | 0 Myo1c         | myosin IC   | MGI:106612  |
| ENSMUST00000116371 | 4 | 5 | 0 Mrip          | myosin phosphatase Rho interacting protein                        | MGI:1349438 |
| ENSMUST00000128788 | 4 | 5 | 0 Ift20         | intraflagellar transport 20                                       | MGI:1915585 |
| ENSMUST00000131780 | 4 | 5 | 0 Pqlc1         | PQ loop repeat containing 1                                       | MGI:1914193 |
| ENSMUST00000159091 | 4 | 5 | 0 Rrnad1        | ribosomal RNA adenine dimethylase domain containing 1             | MGI:2387197 |
| ENSMUST00000042021 | 4 | 5 | 83 Tspyl5       | testis-specific protein, Y-encoded-like 5                         | MGI:2442458 |
| ENSMUST00000098312 | 4 | 5 | 16 Exoc8        | exocyst complex component 8                                       | MGI:2142527 |
| ENSMUST00000010434 | 4 | 5 | 0 AI597479      | expressed sequence AI597479                                       | MGI:2138299 |
| ENSMUST00000037099 | 4 | 5 | 0 Clic4         | chloride intracellular channel 4 (mitochondrial)                  | MGI:1352754 |
| ENSMUST00000066496 | 4 | 5 | 0 Nudcd3        | NudC domain containing 3  | MGI:2144158 |
| ENSMUST00000068975 | 4 | 5 | 0 Zfp180        | zinc finger protein 180   | MGI:1923701 |
| ENSMUST00000106102 | 4 | 5 | 0 Zmym1         | zinc finger, MYM domain containing 1                              | MGI:1915560 |
| ENSMUST00000143685 | 4 | 5 | 0 Fkbp5         | FK506 binding protein 5   | MGI:104670  |
| ENSMUST00000161123 | 4 | 5 | 0 Pcmt1         | protein-L-isoaspartate (D-aspartate) O-methyltransferase 1        | MGI:97502   |
| ENSMUST00000165443 | 4 | 5 | 0 Nup50         | nucleoporin 50  | MGI:1351502 |
| ENSMUST00000167004 | 4 | 5 | 0 Gpat4         | glycerol-3-phosphate acyltransferase 4                            | MGI:2142716 |
| ENSMUST00000144762 | 4 | 3 | 6 Tradd         | TNFRSF1A-associated via death domain                              | MGI:109200  |
| ENSMUST00000106478 | 4 | 2 | 12 Tmem69       | transmembrane protein 69  | MGI:3045357 |
| ENSMUST00000139843 | 4 | 1 | 40 Vcp          | valosin containing protein  | MGI:99919   |
| ENSMUST00000073837 | 4 | 0 | 315 Pou6f1      | POU domain, class 6, transcription factor 1                       | MGI:102935  |
| ENSMUST00000132329 | 4 | 0 | 71 Nfrkb        | nuclear factor related to kappa B binding protein                 | MGI:2442410 |
| ENSMUST00000139211 | 4 | 0 | 44 Sbds         | Shwachman-Bodian-Diamond syndrome homolog (human)                 | MGI:1913961 |
| ENSMUST00000172450 | 4 | 0 | 38 Pafah1b2     | platelet-activating factor acetylhydrolase, isoform 1b, subunit 2 | MGI:108415  |
| ENSMUST00000182763 | 4 | 0 | 30 Nktr         | natural killer tumor recognition sequence                         | MGI:97346   |
| ENSMUST00000004097 | 4 | 0 | 24 Cux1         | cut-like homeobox 1   | MGI:88568   |

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|--------------------|---|----|------------|--|-------------|
| ENSMUST00000023776 | 4 | 0  | 24 Slc4a8  | solute carrier family 4 (anion exchanger), member 8  | MGI:1928745 |
| ENSMUST00000037356 | 4 | 0  | 20 Pramef8 | PRAME family member 8  | MGI:2140473 |
| ENSMUST00000114754 | 4 | 0  | 14 Mapk14  | mitogen-activated protein kinase 14  | MGI:1346865 |
| ENSMUST00000138569 | 4 | 0  | 14 Atp11c  | ATPase, class VI, type 11C   | MGI:1859661 |
| ENSMUST00000028683 | 4 | 0  | 12 Pdia3   | protein disulfide isomerase associated 3   | MGI:95834   |
| ENSMUST00000032425 | 4 | 0  | 12 Emc3    | ER membrane protein complex subunit 3  | MGI:1913337 |
| ENSMUST00000098143 | 4 | 0  | 12 Nfx1    | nuclear transcription factor, X-box binding 1  | MGI:1921414 |
| ENSMUST00000165561 | 4 | 0  | 8 Smim13   | small integral membrane protein 13   | MGI:2652854 |
| ENSMUST00000025729 | 4 | 15 | 0 Tnks2    | tankyrase, TRF1-interacting ankyrin-related ADP-ribose polymerase 2                          | MGI:1921743 |
| ENSMUST00000002305 | 4 | 8  | 0 Kdm7a    | lysine (K)-specific demethylase 7A   | MGI:2443388 |
| ENSMUST00000072406 | 4 | 7  | 0 Prepl    | prolyl endopeptidase-like  | MGI:2441932 |
| ENSMUST00000124240 | 4 | 7  | 0 Tbc1d10b | TBC1 domain family, member 10b   | MGI:1915699 |
| ENSMUST00000094532 | 4 | 6  | 0 Gm20449  | predicted gene 20449   | MGI:5141914 |
| ENSMUST00000123781 | 4 | 5  | 81 Stk39   | serine/threonine kinase 39   | MGI:1858416 |
| ENSMUST00000015171 | 4 | 5  | 0 Galns    | galactosamine (N-acetyl)-6-sulfate sulfatase   | MGI:1355303 |
| ENSMUST00000127253 | 4 | 5  | 0 Mrpl48   | mitochondrial ribosomal protein L48  | MGI:1289321 |
| ENSMUST00000021559 | 4 | 5  | 0 Erh      | enhancer of rudimentary homolog (Drosophila)   | MGI:108089  |
| ENSMUST00000029213 | 4 | 5  | 0 Ocstamp  | osteoclast stimulatory transmembrane protein   | MGI:1921864 |
| ENSMUST00000059802 | 4 | 5  | 0 Rpl29    | ribosomal protein L29  | MGI:99687   |
| ENSMUST00000088313 | 4 | 5  | 0 Emd      | emerin   | MGI:108117  |
| ENSMUST00000139937 | 4 | 5  | 0 Camsap1  | calmodulin regulated spectrin-associated protein 1   | MGI:3036242 |
| ENSMUST00000146753 | 4 | 5  | 0 Arsk     | arylsulfatase K  | MGI:1924291 |
| ENSMUST00000080359 | 4 | 3  | 8 Rest     | RE1-silencing transcription factor   | MGI:104897  |
| ENSMUST00000147255 | 4 | 1  | 8 Sec24a   | Sec24 related gene family, member A (S. cerevisiae)  | MGI:1924621 |
| ENSMUST00000122807 | 4 | 1  | 2 Smarca5  | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily a,     | MGI:1935129 |
| ENSMUST00000034204 | 4 | 0  | 6 Nudt21   | nudix (nucleoside diphosphate linked moiety X)-type motif 21                                 | MGI:1915469 |
| ENSMUST00000126529 | 4 | 0  | 6 Myl12a   | myosin, light chain 12A, regulatory, non-sarcomeric  | MGI:1914518 |
| ENSMUST00000021467 | 3 | 14 | 0 Sav1     | salvador family WW domain containing 1   | MGI:1927144 |
| ENSMUST00000110613 | 3 | 13 | 0 Serinc4  | serine incorporator 4  | MGI:2441842 |
| ENSMUST00000025350 | 3 | 12 | 0 Dcp2     | decapping mRNA 2   | MGI:1917890 |
| ENSMUST00000099974 | 3 | 6  | 0 Cerkl    | ceramide kinase-like   | MGI:3037816 |
| ENSMUST00000153678 | 3 | 6  | 0 Gps1     | G protein pathway suppressor 1   | MGI:2384801 |
| ENSMUST00000007993 | 3 | 5  | 0 Rbm28    | RNA binding motif protein 28   | MGI:2655711 |
| ENSMUST00000040523 | 3 | 5  | 0 Adamts2  | a disintegrin-like and metalloproteinase (reprolysin type) with thrombospondin type 1 motif, | MGI:1347356 |
| ENSMUST00000125180 | 3 | 3  | 12 Stoml2  | stomatin (Epb7.2)-like 2   | MGI:1913842 |
| ENSMUST00000025482 | 3 | 2  | 28 Atp8b1  | ATPase, class I, type 8B, member 1   | MGI:1859665 |
| ENSMUST00000174882 | 3 | 0  | 20 Hnrnp1  | heterogeneous nuclear ribonucleoprotein L  | MGI:104816  |
| ENSMUST00000074233 | 3 | 0  | 12 Synm    | synemin, intermediate filament protein   | MGI:2661187 |
| ENSMUST00000178773 | 2 | 16 | 0 Dlgap5   | discs, large (Drosophila) homolog-associated protein 5                                       | MGI:2183453 |
| ENSMUST00000036719 | 2 | 15 | 6 Prex1    | phosphatidylinositol-3,4,5-trisphosphate-dependent Rac exchange factor 1                     | MGI:3040696 |
| ENSMUST00000060311 | 2 | 14 | 0 Hip1     | huntingtin interacting protein 1   | MGI:1099804 |
| ENSMUST00000046709 | 2 | 9  | 0 Supt16   | suppressor of Ty 16  | MGI:1890948 |
| ENSMUST00000085840 | 2 | 9  | 0 Ttbk2    | tau tubulin kinase 2   | MGI:2155779 |

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|--------------------|---|----|-----------------|--|-------------|
| ENSMUST00000126614 | 2 | 7  | 36 Eef1a1       | eukaryotic translation elongation factor 1 alpha 1         | MGI:1096881 |
| ENSMUST00000051377 | 2 | 7  | 16 Dpy19l3      | dpy-19-like 3 (C. elegans)                                 | MGI:2443952 |
| ENSMUST00000172997 | 2 | 7  | 4 Uncx          | UNC homeobox   | MGI:108013  |
| ENSMUST00000093802 | 2 | 5  | 0 Cep162        | centrosomal protein 162                                    | MGI:1925343 |
| ENSMUST00000142825 | 2 | 5  | 0 Ncstn         | nicastrin  | MGI:1891700 |
| ENSMUST00000160757 | 2 | 5  | 0 Abcb6         | ATP-binding cassette, sub-family B (MDR/TAP), member 6     | MGI:1921354 |
| ENSMUST00000147059 | 2 | 5  | 6 Rpl11         | ribosomal protein L11                                      | MGI:1914275 |
| ENSMUST00000108086 | 2 | 3  | 30 Hspa4l       | heat shock protein 4 like                                  | MGI:107422  |
| ENSMUST00000161577 | 2 | 1  | 52 Gstdc        | glutathione S-transferase, C-terminal domain containing    | MGI:1914803 |
| ENSMUST00000172790 | 2 | 1  | 16 Dap3         | death associated protein 3                                 | MGI:1929538 |
| ENSMUST00000038388 | 2 | 1  | 6 A230046K03Rik | RIKEN cDNA A230046K03 gene                                 | MGI:2441787 |
| ENSMUST00000100517 | 2 | 1  | 6 Sun1          | Sad1 and UNC84 domain containing 1                         | MGI:1924303 |
| ENSMUST00000040616 | 2 | 1  | 1085 Kctd7      | potassium channel tetramerisation domain containing 7      | MGI:2442265 |
| ENSMUST00000133426 | 2 | 0  | 14 Ddx5         | DEAD (Asp-Glu-Ala-Asp) box polypeptide 5                   | MGI:105037  |
| ENSMUST00000177768 | 2 | 0  | 14 Fam177a      | family with sequence similarity 177, member A              | MGI:1920635 |
| ENSMUST00000049740 | 2 | 0  | 12 Zbtb33       | zinc finger and BTB domain containing 33                   | MGI:1927290 |
| ENSMUST00000111334 | 2 | 0  | 12 Mpz          | myelin protein zero  | MGI:103177  |
| ENSMUST00000151118 | 2 | 0  | 12 Rpl23        | ribosomal protein L23                                      | MGI:1929455 |
| ENSMUST00000022610 | 1 | 7  | 0 Scara5        | scavenger receptor class A, member 5                       | MGI:1918395 |
| ENSMUST00000084117 | 1 | 5  | 4 H6pd          | hexose-6-phosphate dehydrogenase (glucose 1-dehydrogenase) | MGI:2140356 |
| ENSMUST00000034441 | 1 | 5  | 4 Aars          | alanyl-tRNA synthetase                                     | MGI:2384560 |
| ENSMUST00000092966 | 1 | 5  | 0 Dynl1c        | dynein light chain Tctex-type 1C                           | MGI:3807476 |
| ENSMUST00000177353 | 1 | 5  | 0 Tdg           | thymine DNA glycosylase                                    | MGI:108247  |
| ENSMUST00000182023 | 1 | 5  | 0 Mlir1         | mast cell immunoglobulin like receptor 1                   | MGI:2685731 |
| ENSMUST00000020301 | 1 | 3  | 89 Vsir         | V-set immunoregulatory receptor                            | MGI:1921298 |
| ENSMUST00000112311 | 1 | 2  | 10 Iscu         | iron-sulfur cluster assembly enzyme                        | MGI:1913633 |
| ENSMUST00000027071 | 1 | 2  | 8 Lactb2        | lactamase, beta 2  | MGI:2442551 |
| ENSMUST00000029677 | 1 | 2  | 8 Zbtb7b        | zinc finger and BTB domain containing 7B                   | MGI:102755  |
| ENSMUST00000133802 | 1 | 2  | 6 Rpl34         | ribosomal protein L34                                      | MGI:1915686 |
| ENSMUST00000001809 | 1 | 0  | 20 Pabpc1       | poly(A) binding protein, cytoplasmic 1                     | MGI:1349722 |
| ENSMUST00000057373 | 1 | 0  | 16 Rab11b       | RAB11B, member RAS oncogene family                         | MGI:99425   |
| ENSMUST00000170320 | 1 | 0  | 14 Agbl2        | ATP/GTP binding protein-like 2                             | MGI:2443254 |
| ENSMUST00000178684 | 1 | 0  | 14 Pblid2       | phenazine biosynthesis-like protein domain containing 2    | MGI:1914557 |
| ENSMUST00000041778 | 1 | 0  | 12 Zfp174       | zinc finger protein 174                                    | MGI:2686600 |
| ENSMUST00000133826 | 1 | 0  | 12 Btf3         | basic transcription factor 3                               | MGI:1202875 |
| ENSMUST00000084524 | 1 | 11 | 16 Prpf4        | pre-mRNA processing factor 4                               | MGI:1917302 |
| ENSMUST00000144588 | 1 | 11 | 0 Gapdh         | glyceraldehyde-3-phosphate dehydrogenase                   | MGI:95640   |
| ENSMUST00000044766 | 1 | 9  | 0 4930402H24Rik | RIKEN cDNA 4930402H24 gene                                 | MGI:1923029 |
| ENSMUST00000097975 | 1 | 5  | 10 Inpp5a       | inositol polyphosphate-5-phosphatase A                     | MGI:2686961 |
| ENSMUST00000160250 | 1 | 5  | 0 Pcmt1         | protein-L-isoaspartate (D-aspartate) O-methyltransferase 1 | MGI:97502   |
| ENSMUST00000159572 | 1 | 3  | 20 Nmrk1        | nicotinamide riboside kinase 1                             | MGI:2147434 |
| ENSMUST00000114585 | 1 | 3  | 8 Gm609         | predicted gene 609   | MGI:2685455 |
| ENSMUST00000183176 | 1 | 2  | 6 Mzf1          | myeloid zinc finger 1                                      | MGI:107457  |

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|--------------------|---|----|--------------------|--|-------------|
| ENSMUST00000156661 | 1 | 1  | 20 Fryl            | FRY like transcription coactivator                         | MGI:1919563 |
| ENSMUST00000134487 | 1 | 1  | 6 Fam221b          | family with sequence similarity 221, member B              | MGI:2441678 |
| ENSMUST00000097494 | 1 | 1  | 101 9930111J21Rik1 | RIKEN cDNA 9930111J21 gene 1                               | MGI:3041173 |
| ENSMUST00000037064 | 1 | 1  | 50 Slc25a37        | solute carrier family 25, member 37                        | MGI:1914962 |
| ENSMUST00000094451 | 1 | 1  | 24 Gpr157          | G protein-coupled receptor 157                             | MGI:2442046 |
| ENSMUST00000126923 | 1 | 1  | 12 Fbxl8           | F-box and leucine-rich repeat protein 8                    | MGI:1354697 |
| ENSMUST00000026220 | 1 | 1  | 10 Scd3            | stearyl-coenzyme A desaturase 3                            | MGI:1353437 |
| ENSMUST00000130108 | 1 | 1  | 8 Mkl1             | muskelin 1, intracellular mediator containing kelch motifs | MGI:1351638 |
| ENSMUST00000148516 | 1 | 1  | 8 Sirt1            | sirtuin 1  | MGI:2135607 |
| ENSMUST00000092406 | 1 | 1  | 6 2610028H24Rik    | RIKEN cDNA 2610028H24 gene                                 | MGI:1924214 |
| ENSMUST00000154241 | 1 | 1  | 6 Mpv17            | MpV17 mitochondrial inner membrane protein                 | MGI:97138   |
| ENSMUST00000075606 | 1 | 0  | 36 Ehbp11          | EH domain binding protein 1-like 1                         | MGI:3612340 |
| ENSMUST00000137494 | 1 | 0  | 32 Cwc22           | CWC22 spliceosome-associated protein                       | MGI:2136773 |
| ENSMUST00000153710 | 1 | 0  | 32 Gm6483          | predicted gene 6483  | MGI:3644574 |
| ENSMUST00000043342 | 1 | 0  | 18 Dph5            | diphthamide biosynthesis 5                                 | MGI:1916990 |
| ENSMUST00000047357 | 1 | 0  | 14 Cpsf2           | cleavage and polyadenylation specific factor 2             | MGI:1861601 |
| ENSMUST00000049242 | 1 | 0  | 10 Lrrc20          | leucine rich repeat containing 20                          | MGI:2387182 |
| ENSMUST00000017637 | 1 | 0  | 8 Igfbp4           | insulin-like growth factor binding protein 4               | MGI:96439   |
| ENSMUST00000028403 | 1 | 0  | 8 Cybrd1           | cytochrome b reductase 1                                   | MGI:2654575 |
| ENSMUST00000078752 | 1 | 0  | 8 Casc4            | cancer susceptibility candidate 4                          | MGI:2443129 |
| ENSMUST00000125424 | 1 | 0  | 8 Drg1             | developmentally regulated GTP binding protein 1            | MGI:1343297 |
| ENSMUST00000150748 | 1 | 0  | 8 Spns1            | spinster homolog 1   | MGI:1920908 |
| ENSMUST00000160785 | 1 | 0  | 8 Unkl             | unkempt family like zinc finger                            | MGI:1921404 |
| ENSMUST00000126683 | 1 | 0  | 6 Srp1             | serine/arginine-rich protein specific kinase 1             | MGI:106908  |
| ENSMUST00000142192 | 1 | 0  | 6 Sgpl1            | sphingosine phosphate lyase 1                              | MGI:1261415 |
| ENSMUST00000142348 | 1 | 0  | 6 Eif4a1           | eukaryotic translation initiation factor 4A1               | MGI:95303   |
| ENSMUST00000145013 | 1 | 0  | 6 Papog            | poly(A) polymerase gamma                                   | MGI:2442119 |
| ENSMUST00000130128 | 0 | 63 | 303 Rps20          | ribosomal protein S20                                      | MGI:1914677 |
| ENSMUST00000129857 | 0 | 53 | 416 Vps39          | VPS39 HOPS complex subunit                                 | MGI:2443189 |
| ENSMUST00000147891 | 0 | 37 | 34 Son             | Son DNA binding protein                                    | MGI:98353   |
| ENSMUST00000132102 | 0 | 26 | 0 Gtf3a            | general transcription factor III A                         | MGI:1913846 |
| ENSMUST00000126739 | 0 | 24 | 0 Hjurp            | Holliday junction recognition protein                      | MGI:2685821 |
| ENSMUST00000026227 | 0 | 22 | 0 Peo1             | progressive external ophthalmoplegia 1 (human)             | MGI:2137410 |
| ENSMUST00000148090 | 0 | 22 | 0 Ttc9c            | tetratricopeptide repeat domain 9C                         | MGI:1917637 |
| ENSMUST00000044857 | 0 | 20 | 0 Trappc5          | trafficking protein particle complex 5                     | MGI:1913932 |
| ENSMUST00000034982 | 0 | 19 | 0 Tfdp2            | transcription factor Dp 2                                  | MGI:107167  |
| ENSMUST00000120194 | 0 | 19 | 0 Fam104a          | family with sequence similarity 104, member A              | MGI:106351  |
| ENSMUST00000126505 | 0 | 19 | 0 Bnip1            | BCL2/adenovirus E1B interacting protein 1                  | MGI:109328  |
| ENSMUST00000059458 | 0 | 18 | 0 Maml1            | mastermind like 1 (Drosophila)                             | MGI:1890504 |
| ENSMUST00000066880 | 0 | 18 | 0 Capn12           | calpain 12   | MGI:1891369 |
| ENSMUST00000113827 | 0 | 17 | 0 Brwd1            | bromodomain and WD repeat domain containing 1              | MGI:1890651 |
| ENSMUST00000161204 | 0 | 16 | 0 Rdh11            | retinol dehydrogenase 11                                   | MGI:102581  |
| ENSMUST00000166972 | 0 | 16 | 0 Ap2a1            | adaptor-related protein complex 2, alpha 1 subunit         | MGI:101921  |

|                    |   |    |                 |   |             |
|--------------------|---|----|-----------------|---|-------------|
| ENSMUST00000171473 | 0 | 16 | 0 Hist2h4       | histone cluster 2, H4   | MGI:2140113 |
| ENSMUST00000130797 | 0 | 15 | 0 Utp18         | UTP18 small subunit processome component  | MGI:1923402 |
| ENSMUST00000146053 | 0 | 14 | 0 Rad51d        | RAD51 paralog D   | MGI:1261809 |
| ENSMUST00000049053 | 0 | 14 | 0 Fam168a       | family with sequence similarity 168, member A   | MGI:2442372 |
| ENSMUST00000123762 | 0 | 14 | 0 Tor1a         | torsin family 1, member A (torsin A)  | MGI:1353568 |
| ENSMUST00000178079 | 0 | 14 | 0 Rpl31         | ribosomal protein L31   | MGI:2149632 |
| ENSMUST00000168755 | 0 | 12 | 0 Slc25a44      | solute carrier family 25, member 44   | MGI:2444391 |
| ENSMUST00000056907 | 0 | 12 | 0 Smcr8         | Smith-Magenis syndrome chromosome region, candidate 8 homolog (human)                     | MGI:2444720 |
| ENSMUST00000068519 | 0 | 12 | 0 Susd6         | sushi domain containing 6   | MGI:2444661 |
| ENSMUST00000111606 | 0 | 12 | 0 Tdrd1         | tudor domain containing 1   | MGI:1933218 |
| ENSMUST00000041804 | 0 | 11 | 0 Lmtk2         | lemur tyrosine kinase 2   | MGI:3036247 |
| ENSMUST00000116456 | 0 | 11 | 0 Cyth3         | cytohesin 3   | MGI:1335107 |
| ENSMUST00000143720 | 0 | 11 | 0 Akap1         | A kinase (PRKA) anchor protein 1  | MGI:104729  |
| ENSMUST00000162234 | 0 | 11 | 0 Scyl3         | SCY1-like 3 (S. cerevisiae)   | MGI:1921385 |
| ENSMUST00000177974 | 0 | 11 | 0 Atp2a2        | ATPase, Ca++ transporting, cardiac muscle, slow twitch 2                                  | MGI:88110   |
| ENSMUST00000074608 | 0 | 10 | 0 1700029P11Rik | RIKEN cDNA 1700029P11 gene  | MGI:1913596 |
| ENSMUST00000092404 | 0 | 10 | 0 Srsf2         | serine/arginine-rich splicing factor 2  | MGI:98284   |
| ENSMUST00000152356 | 0 | 10 | 0 Atp6v0b       | ATPase, H+ transporting, lysosomal V0 subunit B   | MGI:1890510 |
| ENSMUST00000046929 | 0 | 9  | 0 Usp31         | ubiquitin specific peptidase 31   | MGI:1923429 |
| ENSMUST00000099454 | 0 | 9  | 0 Al606181      | expressed sequence Al606181   | MGI:2147586 |
| ENSMUST00000091268 | 0 | 9  | 12 Camsap1      | calmodulin regulated spectrin-associated protein 1  | MGI:3036242 |
| ENSMUST00000031345 | 0 | 9  | 2 Rchy1         | ring finger and CHY zinc finger domain containing 1                                       | MGI:1915348 |
| ENSMUST00000051493 | 0 | 9  | 0 Pld6          | phospholipase D family, member 6  | MGI:2687283 |
| ENSMUST00000089162 | 0 | 9  | 0 Edem1         | ER degradation enhancer, mannosidase alpha-like 1   | MGI:2180139 |
| ENSMUST00000097644 | 0 | 9  | 0 Hdac4         | histone deacetylase 4   | MGI:3036234 |
| ENSMUST00000097999 | 0 | 9  | 0 Fam53b        | family with sequence similarity 53, member B  | MGI:1925188 |
| ENSMUST00000137191 | 0 | 9  | 0 Whsc1         | Wolf-Hirschhorn syndrome candidate 1 (human)  | MGI:1276574 |
| ENSMUST00000112184 | 0 | 8  | 16 Sfmbt1       | Scm-like with four mbt domains 1  | MGI:1859609 |
| ENSMUST00000041589 | 0 | 8  | 0 Tob1          | transducer of ErbB-2.1  | MGI:1349721 |
| ENSMUST00000044252 | 0 | 8  | 0 Nubp2         | nucleotide binding protein 2  | MGI:1347072 |
| ENSMUST00000047203 | 0 | 8  | 0 Rnf126        | ring finger protein 126   | MGI:1917544 |
| ENSMUST00000058746 | 0 | 8  | 0 Cd151         | CD151 antigen   | MGI:1096360 |
| ENSMUST00000064635 | 0 | 8  | 0 Eef2kmt       | eukaryotic elongation factor 2 lysine methyltransferase                                   | MGI:1917761 |
| ENSMUST00000106100 | 0 | 8  | 0 Zzz3          | zinc finger, ZZ domain containing 3   | MGI:1920453 |
| ENSMUST00000112686 | 0 | 8  | 0 Cecr2         | cat eye syndrome chromosome region, candidate 2   | MGI:1923799 |
| ENSMUST00000146241 | 0 | 8  | 0 Dhdds         | dehydrodolichyl diphosphate synthase  | MGI:1914672 |
| ENSMUST00000111815 | 0 | 7  | 8 Rgs8          | regulator of G-protein signaling 8  | MGI:108408  |
| ENSMUST00000021940 | 0 | 7  | 0 Lman2         | lectin, mannose-binding 2   | MGI:1914140 |
| ENSMUST00000026154 | 0 | 7  | 0 Zdhhc16       | zinc finger, DHHC domain containing 16  | MGI:1921418 |
| ENSMUST00000052183 | 0 | 7  | 0 Snip1         | Smad nuclear interacting protein 1  | MGI:2156003 |
| ENSMUST00000056904 | 0 | 7  | 0 Ercc6l        | excision repair cross-complementing rodent repair deficiency complementation group 6 like | MGI:2654144 |
| ENSMUST00000073924 | 0 | 7  | 0 2810021J22Rik | RIKEN cDNA 2810021J22 gene  | MGI:1917194 |
| ENSMUST00000087215 | 0 | 7  | 0 Cnot9         | CCR4-NOT transcription complex, subunit 9   | MGI:1928902 |



|                     |   |   |                 |  |             |
|---------------------|---|---|-----------------|--|-------------|
| ENSMUST00000090522  | 0 | 7 | 0 Zfp597        | zinc finger protein 597                                    | MGI:1918313 |
| ENSMUST00000114863  | 0 | 7 | 0 D17Wsu92e     | DNA segment, Chr 17, Wayne State University 92, expressed  | MGI:106281  |
| ENSMUST00000148442  | 0 | 7 | 0 Zfp568        | zinc finger protein 568                                    | MGI:2142347 |
| ENSMUST00000159514  | 0 | 7 | 0 Naa50         | N(alpha)-acetyltransferase 50, NatE catalytic subunit      | MGI:1919367 |
| ENSMUST00000117849  | 0 | 7 | 12 Csnk1g1      | casein kinase 1, gamma 1                                   | MGI:2660884 |
| ENSMUST000000005952 | 0 | 7 | 0 Slc30a4       | solute carrier family 30 (zinc transporter), member 4      | MGI:1345282 |
| ENSMUST00000018383  | 0 | 7 | 0 Zcchc10       | zinc finger, CCHC domain containing 10                     | MGI:1196228 |
| ENSMUST00000024884  | 0 | 7 | 0 Eif2ak2       | eukaryotic translation initiation factor 2-alpha kinase 2  | MGI:1353449 |
| ENSMUST00000026538  | 0 | 7 | 0 Echs1         | enoyl Coenzyme A hydratase, short chain, 1, mitochondrial  | MGI:2136460 |
| ENSMUST00000035648  | 0 | 7 | 0 Atg12         | autophagy related 12                                       | MGI:1914776 |
| ENSMUST00000035812  | 0 | 7 | 0 Ttl           | tubulin tyrosine ligase                                    | MGI:1916987 |
| ENSMUST00000039127  | 0 | 7 | 0 Ubn2          | ubiquitin 2  | MGI:2444236 |
| ENSMUST00000070215  | 0 | 7 | 0 Npm3          | nucleoplasmin 3  | MGI:894653  |
| ENSMUST00000075872  | 0 | 7 | 0 Mysm1         | myb-like, SWIRM and MPN domains 1                          | MGI:2444584 |
| ENSMUST00000100785  | 0 | 7 | 0 Oas1e         | 2'-5' oligoadenylate synthetase 1E                         | MGI:2180856 |
| ENSMUST00000123950  | 0 | 7 | 0 Lmbr1l        | limb region 1 like   | MGI:1289247 |
| ENSMUST00000131563  | 0 | 7 | 0 Zp3           | zona pellucida glycoprotein 3                              | MGI:99215   |
| ENSMUST00000135969  | 0 | 7 | 0 Fbxl20        | F-box and leucine-rich repeat protein 20                   | MGI:1919444 |
| ENSMUST00000148612  | 0 | 7 | 0 Nudc          | nudC nuclear distribution protein                          | MGI:106014  |
| ENSMUST00000149692  | 0 | 7 | 0 Gm44503       | predicted readthrough transcript (NMD candidate), 44503    | MGI:5141975 |
| ENSMUST00000153316  | 0 | 7 | 0 Tsr1          | TSR1 20S rRNA accumulation                                 | MGI:2144566 |
| ENSMUST00000156196  | 0 | 7 | 0 Gas2l1        | growth arrest-specific 2 like 1                            | MGI:1926176 |
| ENSMUST00000166335  | 0 | 7 | 0 Elof1         | ELF1 homolog, elongation factor 1                          | MGI:1913376 |
| ENSMUST00000168634  | 0 | 7 | 0 Coro1c        | coronin, actin binding protein 1C                          | MGI:1345964 |
| ENSMUST00000145366  | 0 | 6 | 12 Sestd1       | SEC14 and spectrin domains 1                               | MGI:1916262 |
| ENSMUST00000136933  | 0 | 6 | 10 Uqcc1        | ubiquinol-cytochrome c reductase complex assembly factor 1 | MGI:1929472 |
| ENSMUST00000102549  | 0 | 6 | 6 Nipal3        | NIPA-like domain containing 3                              | MGI:1921802 |
| ENSMUST00000000284  | 0 | 6 | 0 Trim25        | tripartite motif-containing 25                             | MGI:102749  |
| ENSMUST00000020705  | 0 | 6 | 0 Pes1          | pescadillo ribosomal biogenesis factor 1                   | MGI:1890613 |
| ENSMUST00000022550  | 0 | 6 | 0 Extl3         | exostoses (multiple)-like 3                                | MGI:1860765 |
| ENSMUST00000025264  | 0 | 6 | 0 Wdr33         | WD repeat domain 33  | MGI:1921570 |
| ENSMUST00000031097  | 0 | 6 | 0 Tada2b        | transcriptional adaptor 2B                                 | MGI:3035274 |
| ENSMUST00000039088  | 0 | 6 | 0 Tex19.1       | testis expressed gene 19.1                                 | MGI:1920929 |
| ENSMUST00000055408  | 0 | 6 | 0 Ccdc64        | coiled-coil domain containing 64                           | MGI:1922915 |
| ENSMUST00000055485  | 0 | 6 | 0 Lsm14b        | LSM family member 14B                                      | MGI:3040677 |
| ENSMUST000000065291 | 0 | 6 | 0 9230110C19Rik | RIKEN cDNA 9230110C19 gene                                 | MGI:3045346 |
| ENSMUST00000122424  | 0 | 6 | 0 Fam20b        | family with sequence similarity 20, member B               | MGI:2443990 |
| ENSMUST00000125133  | 0 | 6 | 0 Ipo4          | importin 4   | MGI:1923001 |
| ENSMUST00000135432  | 0 | 6 | 0 Cenpu         | centromere protein U                                       | MGI:1919126 |
| ENSMUST00000140497  | 0 | 6 | 0 Zdhhc3        | zinc finger, DHHC domain containing 3                      | MGI:1926134 |
| ENSMUST00000154608  | 0 | 6 | 0 Slc35c2       | solute carrier family 35, member C2                        | MGI:2385166 |
| ENSMUST00000155177  | 0 | 6 | 0 BC017158      | cDNA sequence BC017158                                     | MGI:2384572 |
| ENSMUST00000156198  | 0 | 6 | 0 Rassf1        | Ras association (RalGDS/AF-6) domain family member 1       | MGI:1928386 |

|                    |   |   |             |  |             |
|--------------------|---|---|-------------|--|-------------|
| ENSMUST00000162997 | 0 | 6 | 0 Gan       | giant axonal neuropathy  | MGI:1890619 |
| ENSMUST00000166772 | 0 | 6 | 0 Vrtn      | vertebrae development associated   | MGI:3588197 |
| ENSMUST00000170912 | 0 | 6 | 0 Hnrnpd    | heterogeneous nuclear ribonucleoprotein D                                    | MGI:101947  |
| ENSMUST00000174264 | 0 | 6 | 0 Rnf169    | ring finger protein 169  | MGI:1920257 |
| ENSMUST00000179721 | 0 | 6 | 0 Phlpp2    | PH domain and leucine rich repeat protein phosphatase 2                      | MGI:2444928 |
| ENSMUST00000125595 | 0 | 5 | 4 Eri2      | exoribonuclease 2  | MGI:1918401 |
| ENSMUST00000147695 | 0 | 5 | 2 Lonrf2    | LON peptidase N-terminal domain and ring finger 2                            | MGI:1920209 |
| ENSMUST00000005504 | 0 | 5 | 0 Fbxo11    | F-box protein 11   | MGI:2147134 |
| ENSMUST00000024701 | 0 | 5 | 0 Pkmyt1    | protein kinase, membrane associated tyrosine/threonine 1                     | MGI:2137630 |
| ENSMUST00000026270 | 0 | 5 | 0 Sacm1l    | SAC1 suppressor of actin mutations 1-like (yeast)                            | MGI:1933169 |
| ENSMUST00000035113 | 0 | 5 | 0 Deb1      | differentially expressed in B16F10 1   | MGI:1349474 |
| ENSMUST00000042096 | 0 | 5 | 0 Emc1      | ER membrane protein complex subunit 1  | MGI:2443696 |
| ENSMUST00000043259 | 0 | 5 | 0 Pde3a     | phosphodiesterase 3A, cGMP inhibited   | MGI:1860764 |
| ENSMUST00000047036 | 0 | 5 | 0 Cd3eap    | CD3E antigen, epsilon polypeptide associated protein                         | MGI:1917583 |
| ENSMUST00000048016 | 0 | 5 | 0 Fut11     | fucosyltransferase 11  | MGI:1920318 |
| ENSMUST00000058702 | 0 | 5 | 0 Dedd2     | death effector domain-containing DNA binding protein 2                       | MGI:1914629 |
| ENSMUST00000065211 | 0 | 5 | 0 Srr       | serine racemase  | MGI:1351636 |
| ENSMUST00000084276 | 0 | 5 | 0 Zscan20   | zinc finger and SCAN domains 20  | MGI:2679268 |
| ENSMUST00000084968 | 0 | 5 | 0 Rcor1     | REST corepressor 1   | MGI:106340  |
| ENSMUST00000086599 | 0 | 5 | 0 Dao       | D-amino acid oxidase   | MGI:94859   |
| ENSMUST00000105501 | 0 | 5 | 0 Foxo3     | forkhead box O3  | MGI:1890081 |
| ENSMUST00000108055 | 0 | 5 | 0 Kif24     | kinesin family member 24   | MGI:1918345 |
| ENSMUST00000108789 | 0 | 5 | 0 Zfp512b   | zinc finger protein 512B   | MGI:2685478 |
| ENSMUST00000108872 | 0 | 5 | 0 Slc36a1   | solute carrier family 36 (proton/amino acid symporter), member 1             | MGI:2445299 |
| ENSMUST00000111035 | 0 | 5 | 0 Pop7      | processing of precursor 7, ribonuclease P family, (S. cerevisiae)            | MGI:1921347 |
| ENSMUST00000114700 | 0 | 5 | 0 Agbl5     | ATP/GTP binding protein-like 5   | MGI:2441745 |
| ENSMUST00000124499 | 0 | 5 | 0 Lcp1      | lymphocyte cytosolic protein 1   | MGI:104808  |
| ENSMUST00000127724 | 0 | 5 | 0 Slc23a2   | solute carrier family 23 (nucleobase transporters), member 2                 | MGI:1859682 |
| ENSMUST00000132186 | 0 | 5 | 0 Ssb       | Sjogren syndrome antigen B   | MGI:98423   |
| ENSMUST00000132265 | 0 | 5 | 0 Park7     | Parkinson disease (autosomal recessive, early onset) 7                       | MGI:2135637 |
| ENSMUST00000135480 | 0 | 5 | 0 Rubcn     | RUN domain and cysteine-rich domain containing, Beclin 1-interacting protein | MGI:1915160 |
| ENSMUST00000140187 | 0 | 5 | 0 Cdip1     | cell death inducing Trp53 target 1   | MGI:1913876 |
| ENSMUST00000144574 | 0 | 5 | 0 Anapc4    | anaphase promoting complex subunit 4   | MGI:1098673 |
| ENSMUST00000153712 | 0 | 5 | 0 Map4k5    | mitogen-activated protein kinase kinase kinase kinase 5                      | MGI:1925503 |
| ENSMUST00000153961 | 0 | 5 | 0 Akap1     | A kinase (PRKA) anchor protein 1   | MGI:104729  |
| ENSMUST00000156794 | 0 | 5 | 0 Pafah1b1  | platelet-activating factor acetylhydrolase, isoform 1b, subunit 1            | MGI:109520  |
| ENSMUST00000180542 | 0 | 5 | 0 Gm26620   | predicted gene, 26620  | MGI:5477114 |
| ENSMUST00000140982 | 0 | 5 | 172 Nipal3  | NIPA-like domain containing 3  | MGI:1921802 |
| ENSMUST00000032168 | 0 | 5 | 129 Sec61a1 | Sec61 alpha 1 subunit (S. cerevisiae)  | MGI:1858417 |
| ENSMUST00000153597 | 0 | 5 | 18 Whsc1l1  | Wolf-Hirschhorn syndrome candidate 1-like 1 (human)                          | MGI:2142581 |
| ENSMUST00000026173 | 0 | 5 | 14 Wdr45b   | WD repeat domain 45B   | MGI:1914090 |
| ENSMUST00000140593 | 0 | 5 | 14 Dhx32    | DEAH (Asp-Glu-Ala-His) box polypeptide 32                                    | MGI:2141813 |
| ENSMUST00000127610 | 0 | 5 | 6 Ankfy1    | ankyrin repeat and FYVE domain containing 1                                  | MGI:1337008 |

|                     |   |   |             |   |             |
|---------------------|---|---|-------------|---|-------------|
| ENSMUST00000001513  | 0 | 5 | 0 Tubb6     | tubulin, beta 6 class V   | MGI:1915201 |
| ENSMUST00000001884  | 0 | 5 | 0 Clpb      | ClpB caseinolytic peptidase B   | MGI:1100517 |
| ENSMUST00000002145  | 0 | 5 | 0 Hsf2bp    | heat shock transcription factor 2 binding protein   | MGI:1921627 |
| ENSMUST00000002818  | 0 | 5 | 0 Ykt6      | YKT6 v-SNARE homolog (S. cerevisiae)  | MGI:1927550 |
| ENSMUST000000007236 | 0 | 5 | 0 Syngn3    | synaptogyrin 3  | MGI:1341881 |
| ENSMUST000000016144 | 0 | 5 | 0 Plpp1     | phospholipid phosphatase 1  | MGI:108412  |
| ENSMUST000000021030 | 0 | 5 | 0 Mettl2    | methyltransferase like 2  | MGI:1289171 |
| ENSMUST000000022446 | 0 | 5 | 0 Eaf1      | ELL associated factor 1   | MGI:1921677 |
| ENSMUST000000022450 | 0 | 5 | 0 Fam208a   | family with sequence similarity 208, member A   | MGI:1921694 |
| ENSMUST000000023672 | 0 | 5 | 0 Rcan1     | regulator of calcineurin 1  | MGI:1890564 |
| ENSMUST000000024778 | 0 | 5 | 0 Med20     | mediator complex subunit 20   | MGI:1929648 |
| ENSMUST000000025861 | 0 | 5 | 0 Ovol1     | ovo like zinc finger 1  | MGI:1330290 |
| ENSMUST000000028825 | 0 | 5 | 0 Fam98b    | family with sequence similarity 98, member B  | MGI:1915465 |
| ENSMUST000000029759 | 0 | 5 | 0 Mettl14   | methyltransferase like 14   | MGI:2442926 |
| ENSMUST000000030464 | 0 | 5 | 0 Pik3r3    | phosphatidylinositol 3 kinase, regulatory subunit, polypeptide 3 (p55)                    | MGI:109277  |
| ENSMUST000000031513 | 0 | 5 | 0 Srsf9     | serine/arginine-rich splicing factor 9  | MGI:104896  |
| ENSMUST000000032138 | 0 | 5 | 0 Cnbp      | cellular nucleic acid binding protein   | MGI:88431   |
| ENSMUST000000032820 | 0 | 5 | 0 Zscan26   | zinc finger and SCAN domain containing 26   | MGI:3531417 |
| ENSMUST000000034472 | 0 | 5 | 0 Jam3      | junction adhesion molecule 3  | MGI:1933825 |
| ENSMUST000000036647 | 0 | 5 | 0 Ctdspl2   | CTD (carboxy-terminal domain, RNA polymerase II, polypeptide A) small phosphatase like    | MGI:1196405 |
| ENSMUST000000038096 | 0 | 5 | 0 Fn3krp    | fructosamine 3 kinase related protein   | MGI:2679256 |
| ENSMUST000000038600 | 0 | 5 | 0 Mrps2     | mitochondrial ribosomal protein S2  | MGI:2153089 |
| ENSMUST000000039734 | 0 | 5 | 0 Unkl      | unkempt family like zinc finger   | MGI:1921404 |
| ENSMUST000000051758 | 0 | 5 | 0 Vkorc11l  | vitamin K epoxide reductase complex, subunit 1-like 1                                     | MGI:1916818 |
| ENSMUST000000053705 | 0 | 5 | 0 B4gat1    | beta-1,4-glucuronyltransferase 1  | MGI:1919680 |
| ENSMUST000000063347 | 0 | 5 | 0 Arf2      | ADP-ribosylation factor 2   | MGI:99595   |
| ENSMUST000000074519 | 0 | 5 | 0 Txnip     | thioredoxin interacting protein   | MGI:1889549 |
| ENSMUST000000076803 | 0 | 5 | 0 Atg13     | autophagy related 13  | MGI:1196429 |
| ENSMUST000000077548 | 0 | 5 | 0 Cttnbp2nl | CTTNBP2 N-terminal like   | MGI:1933137 |
| ENSMUST000000087514 | 0 | 5 | 0 Lyar      | Ly1 antibody reactive clone   | MGI:107470  |
| ENSMUST000000099396 | 0 | 5 | 0 Nt5dc3    | 5'-nucleotidase domain containing 3   | MGI:3513266 |
| ENSMUST000000099571 | 0 | 5 | 0 Prmt2     | protein arginine N-methyltransferase 2  | MGI:1316652 |
| ENSMUST00000102645  | 0 | 5 | 0 Med19     | mediator complex subunit 19   | MGI:1914234 |
| ENSMUST00000107009  | 0 | 5 | 0 Nsf       | N-ethylmaleimide sensitive fusion protein   | MGI:104560  |
| ENSMUST00000108713  | 0 | 5 | 0 Epn2      | epsin 2   | MGI:1333766 |
| ENSMUST00000114993  | 0 | 5 | 0 Cnot4     | CCR4-NOT transcription complex, subunit 4   | MGI:1859026 |
| ENSMUST00000115403  | 0 | 5 | 0 Slco5a1   | solute carrier organic anion transporter family, member 5A1                               | MGI:2443431 |
| ENSMUST00000119299  | 0 | 5 | 0 Ogt       | O-linked N-acetylglucosamine (GlcNAc) transferase (UDP-N-acetylglucosamine:polypeptid     | MGI:1339639 |
| ENSMUST00000122091  | 0 | 5 | 0 Zwlch     | zwlch kinetochore protein   | MGI:1915264 |
| ENSMUST00000124510  | 0 | 5 | 0 Pik3cd    | phosphatidylinositol 3-kinase catalytic delta polypeptide                                 | MGI:1098211 |
| ENSMUST00000124550  | 0 | 5 | 0 Ppil3     | peptidylprolyl isomerase (cyclophilin)-like 3   | MGI:1917475 |
| ENSMUST00000124796  | 0 | 5 | 0 Rassf5    | Ras association (RalGDS/AF-6) domain family member 5                                      | MGI:1926375 |
| ENSMUST00000126639  | 0 | 5 | 0 Ywhag     | tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, gamma polypeptide | MGI:108109  |

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|---------------------|---|---|------------|---|-------------|
| ENSMUST00000129129  | 0 | 5 | 0 Gramd2   | GRAM domain containing 2  | MGI:3528937 |
| ENSMUST00000129925  | 0 | 5 | 0 Mtmr11   | myotubularin related protein 11   | MGI:2652817 |
| ENSMUST00000132243  | 0 | 5 | 0 Tmem150a | transmembrane protein 150A  | MGI:2385244 |
| ENSMUST00000137339  | 0 | 5 | 0 Igfbp5   | insulin-like growth factor binding protein 5  | MGI:96440   |
| ENSMUST00000137815  | 0 | 5 | 0 Rars     | arginyl-tRNA synthetase   | MGI:1914297 |
| ENSMUST00000138401  | 0 | 5 | 0 Dek      | DEK oncogene (DNA binding)  | MGI:1926209 |
| ENSMUST00000139518  | 0 | 5 | 0 Slbp     | stem-loop binding protein   | MGI:108402  |
| ENSMUST00000140719  | 0 | 5 | 0 Zfp956   | zinc finger protein 956   | MGI:2141515 |
| ENSMUST00000140906  | 0 | 5 | 0 Pdpk1    | 3-phosphoinositide dependent protein kinase 1   | MGI:1338068 |
| ENSMUST00000141589  | 0 | 5 | 0 H2afy    | H2A histone family, member Y  | MGI:1349392 |
| ENSMUST00000147469  | 0 | 5 | 0 Dpf3     | D4, zinc and double PHD fingers, family 3   | MGI:1917377 |
| ENSMUST00000148130  | 0 | 5 | 0 Pttg1    | pituitary tumor-transforming gene 1   | MGI:1353578 |
| ENSMUST00000150285  | 0 | 5 | 0 Slc35d1  | solute carrier family 35 (UDP-glucuronic acid/UDP-N-acetylgalactosamine dual transporte | MGI:2140361 |
| ENSMUST00000152080  | 0 | 5 | 0 Slc35e1  | solute carrier family 35, member E1   | MGI:2142403 |
| ENSMUST00000152805  | 0 | 5 | 0 Add1     | adducin 1 (alpha)   | MGI:87918   |
| ENSMUST00000155625  | 0 | 5 | 0 Tmem245  | transmembrane protein 245   | MGI:2445107 |
| ENSMUST00000156187  | 0 | 5 | 0 Efcab6   | EF-hand calcium binding domain 6  | MGI:1924877 |
| ENSMUST00000161313  | 0 | 5 | 0 Akr1cl   | aldo-keto reductase family 1, member C-like   | MGI:1918111 |
| ENSMUST00000162926  | 0 | 5 | 0 Gstcd    | glutathione S-transferase, C-terminal domain containing                                 | MGI:1914803 |
| ENSMUST00000162937  | 0 | 5 | 0 Zfp957   | zinc finger protein 957   | MGI:2145729 |
| ENSMUST00000169712  | 0 | 5 | 0 Mtf2     | mitochondrial fission regulator 2   | MGI:1919054 |
| ENSMUST00000173665  | 0 | 5 | 0 Trim39   | tripartite motif-containing 39  | MGI:1890659 |
| ENSMUST00000174096  | 0 | 5 | 0 Calu     | calumenin   | MGI:1097158 |
| ENSMUST00000176195  | 0 | 5 | 0 Tdg      | thymine DNA glycosylase   | MGI:108247  |
| ENSMUST00000182172  | 0 | 5 | 0 Ccdc166  | coiled-coil domain containing 166   | MGI:1925902 |
| ENSMUST00000136960  | 0 | 4 | 56 Sh2b3   | SH2B adaptor protein 3  | MGI:893598  |
| ENSMUST00000129178  | 0 | 4 | 40 Hsp90b1 | heat shock protein 90, beta (Grp94), member 1   | MGI:98817   |
| ENSMUST00000032322  | 0 | 4 | 34 Lrp6    | low density lipoprotein receptor-related protein 6                                      | MGI:1298218 |
| ENSMUST00000037315  | 0 | 4 | 28 Abhd2   | abhydrolase domain containing 2   | MGI:1914344 |
| ENSMUST00000051396  | 0 | 4 | 16 Soat1   | sterol O-acyltransferase 1  | MGI:104665  |
| ENSMUST00000139623  | 0 | 3 | 50 H3f3b   | H3 histone, family 3B   | MGI:1101768 |
| ENSMUST00000036951  | 0 | 3 | 50 Pebp1   | phosphatidylethanolamine binding protein 1  | MGI:1344408 |
| ENSMUST00000154879  | 0 | 3 | 24 Ywhaz   | tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, zeta polypepti  | MGI:109484  |
| ENSMUST00000037472  | 0 | 3 | 6 Leng8    | leukocyte receptor cluster (LRC) member 8   | MGI:2142195 |
| ENSMUST00000021062  | 0 | 2 | 20 Ddx5    | DEAD (Asp-Glu-Ala-Asp) box polypeptide 5  | MGI:105037  |
| ENSMUST000000008907 | 0 | 2 | 14 Man1a2  | mannosidase, alpha, class 1A, member 2  | MGI:104676  |
| ENSMUST000000144271 | 0 | 2 | 8 Rangrf   | RAN guanine nucleotide release factor   | MGI:1889073 |
| ENSMUST00000031768  | 0 | 2 | 6 Dlx6     | distal-less homeobox 6  | MGI:101927  |
| ENSMUST00000045870  | 0 | 1 | 30 Rnf225  | ring finger protein 225   | MGI:1924198 |
| ENSMUST00000166711  | 0 | 1 | 12 Adsl    | adenylosuccinate lyase  | MGI:103202  |
| ENSMUST00000033583  | 0 | 1 | 8 Magt1    | magnesium transporter 1   | MGI:1914325 |
| ENSMUST00000125058  | 0 | 1 | 6 Cdk9     | cyclin-dependent kinase 9 (CDC2-related kinase)   | MGI:1328368 |
| ENSMUST00000167386  | 0 | 1 | 408 Actb   | actin, beta   | MGI:87904   |

|                    |   |   |                   |   |             |
|--------------------|---|---|-------------------|---|-------------|
| ENSMUST00000159761 | 0 | 1 | 127 Rsph14        | radial spoke head homolog 14 (Chlamydomonas)                                  | MGI:1918486 |
| ENSMUST00000135417 | 0 | 1 | 91 Rpl30          | ribosomal protein L30   | MGI:98037   |
| ENSMUST00000099178 | 0 | 1 | 28 Cbfa2t2        | core-binding factor, runt domain, alpha subunit 2, translocated to, 2 (human) | MGI:1333833 |
| ENSMUST00000164529 | 0 | 1 | 24 Lifr           | leukemia inhibitory factor receptor   | MGI:96788   |
| ENSMUST00000006579 | 0 | 1 | 20 Pfdn2          | prefoldin 2   | MGI:1276111 |
| ENSMUST00000136008 | 0 | 1 | 18 Ergic2         | ERGIC and golgi 2   | MGI:1914706 |
| ENSMUST00000017891 | 0 | 1 | 14 Ghdc           | GH3 domain containing   | MGI:1931556 |
| ENSMUST00000068830 | 0 | 1 | 14 Cnr2           | cannabinoid receptor 2 (macrophage)   | MGI:104650  |
| ENSMUST00000093110 | 0 | 1 | 10 Medag          | mesenteric estrogen dependent adipogenesis                                    | MGI:1917967 |
| ENSMUST00000100237 | 0 | 1 | 8 Ttf1            | transcription termination factor, RNA polymerase I                            | MGI:105044  |
| ENSMUST00000110399 | 0 | 1 | 8 Churc1          | churchill domain containing 1   | MGI:1923684 |
| ENSMUST00000014920 | 0 | 1 | 6 Nol3            | nucleolar protein 3 (apoptosis repressor with CARD domain)                    | MGI:1925938 |
| ENSMUST00000160708 | 0 | 1 | 6 Stxbp2          | syntaxin binding protein 2  | MGI:107370  |
| ENSMUST00000065496 | 0 | 0 | 367 Arhgap20      | Rho GTPase activating protein 20  | MGI:2445175 |
| ENSMUST00000142811 | 0 | 0 | 321 Mamdc4        | MAM domain containing 4   | MGI:2685841 |
| ENSMUST00000027760 | 0 | 0 | 194 Rgl1          | ral guanine nucleotide dissociation stimulator,-like 1                        | MGI:107484  |
| ENSMUST00000144359 | 0 | 0 | 141 Sfi1          | Sfi1 homolog, spindle assembly associated (yeast)                             | MGI:1926137 |
| ENSMUST00000053177 | 0 | 0 | 133 Wdfy3         | WD repeat and FYVE domain containing 3  | MGI:1096875 |
| ENSMUST00000029598 | 0 | 0 | 131 1700006A11Rik | RIKEN cDNA 1700006A11 gene  | MGI:1919074 |
| ENSMUST00000161122 | 0 | 0 | 115 Mob4          | MOB family member 4, phocein  | MGI:104899  |
| ENSMUST00000154635 | 0 | 0 | 113 Ftsj3         | FtsJ RNA methyltransferase homolog 3 (E. coli)                                | MGI:1860295 |
| ENSMUST00000048129 | 0 | 0 | 103 Piwil2        | piwi-like RNA-mediated gene silencing 2                                       | MGI:1930036 |
| ENSMUST00000128028 | 0 | 0 | 91 Calr           | calreticulin  | MGI:88252   |
| ENSMUST00000117202 | 0 | 0 | 89 Gm10600        | predicted gene 10600  | MGI:3710628 |
| ENSMUST00000091403 | 0 | 0 | 87 Arsb           | arylsulfatase B   | MGI:88075   |
| ENSMUST00000065856 | 0 | 0 | 85 Hunk           | hormonally upregulated Neu-associated kinase                                  | MGI:1347352 |
| ENSMUST00000146979 | 0 | 0 | 85 Canx           | calnexin  | MGI:88261   |
| ENSMUST00000147610 | 0 | 0 | 85 Chid1          | chitinase domain containing 1   | MGI:1915288 |
| ENSMUST00000114459 | 0 | 0 | 79 Hnrnpa2b1      | heterogeneous nuclear ribonucleoprotein A2/B1                                 | MGI:104819  |
| ENSMUST00000150019 | 0 | 0 | 75 Dcaf11         | DDB1 and CUL4 associated factor 11  | MGI:90168   |
| ENSMUST00000138665 | 0 | 0 | 71 Clu            | clusterin   | MGI:88423   |
| ENSMUST00000169504 | 0 | 0 | 69 Tdrd3          | tudor domain containing 3   | MGI:2444023 |
| ENSMUST00000026142 | 0 | 0 | 65 Maged1         | melanoma antigen, family D, 1   | MGI:1930187 |
| ENSMUST00000109123 | 0 | 0 | 65 4933414I15Rik  | RIKEN cDNA 4933414I15 gene  | MGI:1918374 |
| ENSMUST00000146888 | 0 | 0 | 59 Sfi1           | Sfi1 homolog, spindle assembly associated (yeast)                             | MGI:1926137 |
| ENSMUST00000052505 | 0 | 0 | 57 Tmem186        | transmembrane protein 186   | MGI:1913940 |
| ENSMUST00000123203 | 0 | 0 | 57 Scfd2          | Sec1 family domain containing 2   | MGI:2443446 |
| ENSMUST00000133199 | 0 | 0 | 57 Lins1          | lines homolog 1   | MGI:1919885 |
| ENSMUST00000109627 | 0 | 0 | 56 Cbx6           | chromobox 6   | MGI:3512628 |
| ENSMUST00000168855 | 0 | 0 | 54 Hmgcr          | 3-hydroxy-3-methylglutaryl-Coenzyme A reductase                               | MGI:96159   |
| ENSMUST00000182450 | 0 | 0 | 54 Rbm25          | RNA binding motif protein 25  | MGI:1914289 |
| ENSMUST00000029385 | 0 | 0 | 52 Serp1          | stress-associated endoplasmic reticulum protein 1                             | MGI:92638   |
| ENSMUST00000059231 | 0 | 0 | 52 Frat2          | frequently rearranged in advanced T cell lymphomas 2                          | MGI:2673967 |

|                     |   |   |            |   |             |
|---------------------|---|---|------------|---|-------------|
| ENSMUST00000097423  | 0 | 0 | 50 Rsph3a  | radial spoke 3A homolog (Chlamydomonas)                       | MGI:1914082 |
| ENSMUST00000030851  | 0 | 0 | 48 Tomm7   | translocase of outer mitochondrial membrane 7 homolog (yeast) | MGI:1913419 |
| ENSMUST00000021390  | 0 | 0 | 44 Galc    | galactosylceramidase  | MGI:95636   |
| ENSMUST00000026221  | 0 | 0 | 44 Scd2    | stearoyl-Coenzyme A desaturase 2                              | MGI:98240   |
| ENSMUST000000067700 | 0 | 0 | 44 Ccser2  | coiled-coil serine rich 2                                     | MGI:101859  |
| ENSMUST000000155583 | 0 | 0 | 42 Fbxo10  | F-box protein 10  | MGI:2686937 |
| ENSMUST00000028392  | 0 | 0 | 38 Dnajc10 | DnaJ heat shock protein family (Hsp40) member C10             | MGI:1914111 |
| ENSMUST00000035911  | 0 | 0 | 38 Rc3h1   | RING CCCH (C3H) domains 1                                     | MGI:2685397 |
| ENSMUST00000097921  | 0 | 0 | 38 Cdkn2c  | cyclin-dependent kinase inhibitor 2C (p18, inhibits CDK4)     | MGI:105388  |
| ENSMUST00000114217  | 0 | 0 | 38 Gm996   | predicted gene 996  | MGI:2685842 |
| ENSMUST00000120016  | 0 | 0 | 38 Zbtb9   | zinc finger and BTB domain containing 9                       | MGI:1918022 |
| ENSMUST00000154774  | 0 | 0 | 38 Calr    | calreticulin  | MGI:88252   |
| ENSMUST00000034097  | 0 | 0 | 36 Got2    | glutamatic-oxaloacetic transaminase 2, mitochondrial          | MGI:95792   |
| ENSMUST00000100497  | 0 | 0 | 36 Actb    | actin, beta   | MGI:87904   |
| ENSMUST00000129916  | 0 | 0 | 36 Parp12  | poly (ADP-ribose) polymerase family, member 12                | MGI:2143990 |
| ENSMUST00000130028  | 0 | 0 | 36 Rabi3   | RAB, member RAS oncogene family-like 3                        | MGI:1914907 |
| ENSMUST00000151120  | 0 | 0 | 36 Ctsd    | cathepsin D   | MGI:88562   |
| ENSMUST00000173167  | 0 | 0 | 36 H2-D1   | histocompatibility 2, D region locus 1                        | MGI:95896   |
| ENSMUST00000110384  | 0 | 0 | 34 Fam65b  | family with sequence similarity 65, member B                  | MGI:2444879 |
| ENSMUST00000017851  | 0 | 0 | 32 Serinc3 | serine incorporator 3   | MGI:1349457 |
| ENSMUST00000124826  | 0 | 0 | 32 Itgb1   | integrin beta 1 (fibronectin receptor beta)                   | MGI:96610   |
| ENSMUST00000130201  | 0 | 0 | 32 Mrpl15  | mitochondrial ribosomal protein L15                           | MGI:1351639 |
| ENSMUST00000133412  | 0 | 0 | 32 Psmb4   | proteasome (prosome, macropain) subunit, beta type 4          | MGI:1098257 |
| ENSMUST00000165293  | 0 | 0 | 32 Pum2    | pumilio RNA-binding family member 2                           | MGI:1931751 |
| ENSMUST00000171405  | 0 | 0 | 32 Mgat5   | mannoside acetylglucosaminyltransferase 5                     | MGI:894701  |
| ENSMUST00000026122  | 0 | 0 | 30 P4hb    | prolyl 4-hydroxylase, beta polypeptide                        | MGI:97464   |
| ENSMUST00000099691  | 0 | 0 | 30 Hk1     | hexokinase 1  | MGI:96103   |
| ENSMUST00000139578  | 0 | 0 | 30 Cops5   | COP9 signalosome subunit 5                                    | MGI:1349415 |
| ENSMUST00000162393  | 0 | 0 | 30 Gm28042 | predicted gene, 28042   | MGI:5547778 |
| ENSMUST00000019962  | 0 | 0 | 28 Cd164   | CD164 antigen   | MGI:1859568 |
| ENSMUST00000020909  | 0 | 0 | 28 Laptm4a | lysosomal-associated protein transmembrane 4A                 | MGI:108017  |
| ENSMUST00000022257  | 0 | 0 | 28 Atxn7   | ataxin 7  | MGI:2179277 |
| ENSMUST00000028238  | 0 | 0 | 28 Rab14   | RAB14, member RAS oncogene family                             | MGI:1915615 |
| ENSMUST00000049357  | 0 | 0 | 28 Pnrc1   | proline-rich nuclear receptor coactivator 1                   | MGI:1917838 |
| ENSMUST00000066532  | 0 | 0 | 28 Lipg    | lipase, endothelial   | MGI:1341803 |
| ENSMUST00000125028  | 0 | 0 | 28 Cth     | cystathionase (cystathionine gamma-lyase)                     | MGI:1339968 |
| ENSMUST00000165629  | 0 | 0 | 28 Actb    | actin, beta   | MGI:87904   |
| ENSMUST00000033611  | 0 | 0 | 26 Xkrx    | X-linked Kx blood group related, X-linked                     | MGI:3584011 |
| ENSMUST00000106969  | 0 | 0 | 26 Tomt    | transmembrane O-methyltransferase                             | MGI:3769724 |
| ENSMUST00000167149  | 0 | 0 | 26 Nfe2l1  | nuclear factor, erythroid derived 2,-like 1                   | MGI:99421   |
| ENSMUST00000176271  | 0 | 0 | 26 Pou6f1  | POU domain, class 6, transcription factor 1                   | MGI:102935  |
| ENSMUST00000025278  | 0 | 0 | 24 Mrpl27  | mitochondrial ribosomal protein L27                           | MGI:2137224 |
| ENSMUST00000028691  | 0 | 0 | 24 Arfgap2 | ADP-ribosylation factor GTPase activating protein 2           | MGI:1924288 |

|                     |   |   |             |   |             |
|---------------------|---|---|-------------|---|-------------|
| ENSMUST00000031866  | 0 | 0 | 24 Mtpn     | myotrophin  | MGI:99445   |
| ENSMUST00000062370  | 0 | 0 | 24 Wdr89    | WD repeat domain 89   | MGI:1919588 |
| ENSMUST00000066559  | 0 | 0 | 24 Mcm8     | minichromosome maintenance 8 homologous recombination repair factor | MGI:1913884 |
| ENSMUST00000077705  | 0 | 0 | 24 Cyp26b1  | cytochrome P450, family 26, subfamily b, polypeptide 1              | MGI:2176159 |
| ENSMUST00000078286  | 0 | 0 | 24 Rpl7l1   | ribosomal protein L7-like 1   | MGI:1913479 |
| ENSMUST000000105378 | 0 | 0 | 24 Med16    | mediator complex subunit 16   | MGI:2158394 |
| ENSMUST000000126017 | 0 | 0 | 24 Cenpo    | centromere protein O  | MGI:1923800 |
| ENSMUST000000137365 | 0 | 0 | 24 Col6a2   | collagen, type VI, alpha 2  | MGI:88460   |
| ENSMUST000000138790 | 0 | 0 | 24 Msi2     | musashi RNA-binding protein 2                                       | MGI:1923876 |
| ENSMUST000000154891 | 0 | 0 | 24 Phkg2    | phosphorylase kinase, gamma 2 (testis)                              | MGI:1916211 |
| ENSMUST000000155203 | 0 | 0 | 24 Zbtb10   | zinc finger and BTB domain containing 10                            | MGI:2139883 |
| ENSMUST000000162291 | 0 | 0 | 24 Nbeal1   | neurobeachin like 1   | MGI:2444343 |
| ENSMUST000000170209 | 0 | 0 | 24 Mms19    | MMS19 (MET18 <i>S. cerevisiae</i> )                                 | MGI:1919449 |
| ENSMUST000000179353 | 0 | 0 | 24 Sept2    | septin 2  | MGI:97298   |
| ENSMUST00000020399  | 0 | 0 | 22 Cpm      | carboxypeptidase M  | MGI:1917824 |
| ENSMUST00000039559  | 0 | 0 | 22 Thbs1    | thrombospondin 1  | MGI:98737   |
| ENSMUST00000056649  | 0 | 0 | 22 Gas2l1   | growth arrest-specific 2 like 1                                     | MGI:1926176 |
| ENSMUST00000091852  | 0 | 0 | 22 Mex3c    | mex3 RNA binding family member C                                    | MGI:2652843 |
| ENSMUST000000109152 | 0 | 0 | 22 Bcas1    | breast carcinoma amplified sequence 1                               | MGI:1924210 |
| ENSMUST000000126562 | 0 | 0 | 22 Rps9     | ribosomal protein S9  | MGI:1924096 |
| ENSMUST000000133374 | 0 | 0 | 22 Ppp1r12c | protein phosphatase 1, regulatory (inhibitor) subunit 12C           | MGI:1924258 |
| ENSMUST000000142502 | 0 | 0 | 22 Trim14   | tripartite motif-containing 14                                      | MGI:1921985 |
| ENSMUST000000176637 | 0 | 0 | 22 Gnb1     | guanine nucleotide binding protein (G protein), beta 1              | MGI:95781   |
| ENSMUST00000023869  | 0 | 0 | 20 Denr     | density-regulated protein   | MGI:1915434 |
| ENSMUST00000027455  | 0 | 0 | 20 Alpl2    | alkaline phosphatase, placental-like 2                              | MGI:108009  |
| ENSMUST00000034234  | 0 | 0 | 20 Coq9     | coenzyme Q9   | MGI:1915164 |
| ENSMUST00000036904  | 0 | 0 | 20 Rnf139   | ring finger protein 139   | MGI:1923091 |
| ENSMUST00000055128  | 0 | 0 | 20 Tapt1    | transmembrane anterior posterior transformation 1                   | MGI:2683537 |
| ENSMUST000000111596 | 0 | 0 | 20 Mlxip    | MLX interacting protein   | MGI:2141183 |
| ENSMUST000000117748 | 0 | 0 | 20 Ifnar1   | interferon (alpha and beta) receptor 1                              | MGI:107658  |
| ENSMUST000000130606 | 0 | 0 | 20 Capza2   | capping protein (actin filament) muscle Z-line, alpha 2             | MGI:106222  |
| ENSMUST000000138171 | 0 | 0 | 20 Zdhhc5   | zinc finger, DHHC domain containing 5                               | MGI:1923573 |
| ENSMUST000000141535 | 0 | 0 | 20 Slc25a39 | solute carrier family 25, member 39                                 | MGI:1196386 |
| ENSMUST000000144429 | 0 | 0 | 20 Flna     | filamin, alpha  | MGI:95556   |
| ENSMUST000000271108 | 0 | 0 | 18 Eef1b2   | eukaryotic translation elongation factor 1 beta 2                   | MGI:1929520 |
| ENSMUST00000050406  | 0 | 0 | 18 Pfkfb2   | 6-phosphofructo-2-kinase/fructose-2,6-biphosphatase 2               | MGI:107815  |
| ENSMUST00000077791  | 0 | 0 | 18 Zfp1     | zinc finger protein 1   | MGI:99154   |
| ENSMUST000000102852 | 0 | 0 | 18 Ptges    | prostaglandin E synthase  | MGI:1927593 |
| ENSMUST000000119985 | 0 | 0 | 18 Mrps17   | mitochondrial ribosomal protein S17                                 | MGI:1913508 |
| ENSMUST000000155272 | 0 | 0 | 18 Ppat     | phosphoribosyl pyrophosphate amidotransferase                       | MGI:2387203 |
| ENSMUST000000161550 | 0 | 0 | 18 Fndc3a   | fibronectin type III domain containing 3A                           | MGI:1196463 |
| ENSMUST000000163666 | 0 | 0 | 18 Eif4a1   | eukaryotic translation initiation factor 4A1                        | MGI:95303   |
| ENSMUST00000026703  | 0 | 0 | 16 Bach1    | BTB and CNC homology 1, basic leucine zipper transcription factor 1 | MGI:894680  |

|                    |   |   |                  |  |             |
|--------------------|---|---|------------------|--|-------------|
| ENSMUST00000033933 | 0 | 0 | 16 Saraf         | store-operated calcium entry-associated regulatory factor            | MGI:1915137 |
| ENSMUST00000038006 | 0 | 0 | 16 Acmsd         | amino carboxymuconate semialdehyde decarboxylase                     | MGI:2386323 |
| ENSMUST00000057288 | 0 | 0 | 16 Pdla6         | protein disulfide isomerase associated 6                             | MGI:1919103 |
| ENSMUST00000097742 | 0 | 0 | 16 Tmem88b       | transmembrane protein 88B  | MGI:2444329 |
| ENSMUST00000107389 | 0 | 0 | 16 Acly          | ATP citrate lyase  | MGI:103251  |
| ENSMUST00000113658 | 0 | 0 | 16 Gfpt1         | glutamine fructose-6-phosphate transaminase 1                        | MGI:95698   |
| ENSMUST00000114471 | 0 | 0 | 16 Cblb          | Casitas B-lineage lymphoma b   | MGI:2146430 |
| ENSMUST00000114998 | 0 | 0 | 16 Xpnpep2       | X-prolyl aminopeptidase (aminopeptidase P) 2, membrane-bound         | MGI:2180001 |
| ENSMUST00000117513 | 0 | 0 | 16 Slc29a3       | solute carrier family 29 (nucleoside transporters), member 3         | MGI:1918529 |
| ENSMUST00000129466 | 0 | 0 | 16 Tpm1          | tropomyosin 1, alpha   | MGI:98809   |
| ENSMUST00000130235 | 0 | 0 | 16 Ror2          | receptor tyrosine kinase-like orphan receptor 2                      | MGI:1347521 |
| ENSMUST00000137040 | 0 | 0 | 16 Sorcs2        | sortilin-related VPS10 domain containing receptor 2                  | MGI:1932289 |
| ENSMUST00000153584 | 0 | 0 | 16 Glb1l         | galactosidase, beta 1-like   | MGI:1921827 |
| ENSMUST00000164617 | 0 | 0 | 16 Nisch         | nischarin  | MGI:1928323 |
| ENSMUST00000168484 | 0 | 0 | 16 Mms19         | MMS19 (MET18 <i>S. cerevisiae</i> )                                  | MGI:1919449 |
| ENSMUST00000169104 | 0 | 0 | 16 Ldah          | lipid droplet associated hydrolase                                   | MGI:1916082 |
| ENSMUST00000007708 | 0 | 0 | 14 Ppp2r1a       | protein phosphatase 2, regulatory subunit A, alpha                   | MGI:1926334 |
| ENSMUST00000021286 | 0 | 0 | 14 Stx8          | syntaxin 8   | MGI:1890156 |
| ENSMUST00000021803 | 0 | 0 | 14 Nup153        | nucleoporin 153  | MGI:2385621 |
| ENSMUST00000022508 | 0 | 0 | 14 Ptpn20        | protein tyrosine phosphatase, non-receptor type 20                   | MGI:1196295 |
| ENSMUST00000024956 | 0 | 0 | 14 Rhoq          | ras homolog family member Q  | MGI:1931553 |
| ENSMUST00000025568 | 0 | 0 | 14 Tmem138       | transmembrane protein 138  | MGI:1920232 |
| ENSMUST00000029196 | 0 | 0 | 14 Slc2a10       | solute carrier family 2 (facilitated glucose transporter), member 10 | MGI:2156687 |
| ENSMUST00000032066 | 0 | 0 | 14 Tgfa          | transforming growth factor alpha                                     | MGI:98724   |
| ENSMUST00000032485 | 0 | 0 | 14 Mrpl51        | mitochondrial ribosomal protein L51                                  | MGI:1913743 |
| ENSMUST00000034400 | 0 | 0 | 14 Cyb5b         | cytochrome b5 type B   | MGI:1913677 |
| ENSMUST00000036691 | 0 | 0 | 14 Prrc2b        | proline-rich coiled-coil 2B  | MGI:1923304 |
| ENSMUST00000038558 | 0 | 0 | 14 Klf16         | Kruppel-like factor 16   | MGI:2153049 |
| ENSMUST00000042692 | 0 | 0 | 14 Tcp11         | t-complex protein 11   | MGI:98544   |
| ENSMUST00000043604 | 0 | 0 | 14 Gna11         | guanine nucleotide binding protein, alpha 11                         | MGI:95766   |
| ENSMUST00000044271 | 0 | 0 | 14 Nplc4         | NPL4 homolog, ubiquitin recognition factor                           | MGI:2679787 |
| ENSMUST00000049052 | 0 | 0 | 14 9130019O22Rik | RIKEN cDNA 9130019O22 gene   | MGI:1926171 |
| ENSMUST00000050248 | 0 | 0 | 14 Zbtb11        | zinc finger and BTB domain containing 11                             | MGI:2443876 |
| ENSMUST00000050658 | 0 | 0 | 14 Spz1          | spermatogenic leucine zipper 1                                       | MGI:1930801 |
| ENSMUST00000054487 | 0 | 0 | 14 Ajuba         | ajuba LIM protein  | MGI:1341886 |
| ENSMUST00000056758 | 0 | 0 | 14 Ppp3ca        | protein phosphatase 3, catalytic subunit, alpha isoform              | MGI:107164  |
| ENSMUST00000059199 | 0 | 0 | 14 Zfp764        | zinc finger protein 764  | MGI:2443580 |
| ENSMUST00000062684 | 0 | 0 | 14 Tmem64        | transmembrane protein 64   | MGI:2140359 |
| ENSMUST00000066277 | 0 | 0 | 14 Aldh3a2       | aldehyde dehydrogenase family 3, subfamily A2                        | MGI:1353452 |
| ENSMUST00000067425 | 0 | 0 | 14 Zfp747        | zinc finger protein 747  | MGI:2443581 |
| ENSMUST00000073857 | 0 | 0 | 14 Tgif2lx1      | TGFB-induced factor homeobox 2-like, X-linked 1                      | MGI:2387796 |
| ENSMUST00000075916 | 0 | 0 | 14 Zfp12         | zinc finger protein 12   | MGI:99157   |
| ENSMUST00000086674 | 0 | 0 | 14 Ankle2        | ankyrin repeat and LEM domain containing 2                           | MGI:1261856 |



|                     |   |   |                  |   |             |
|---------------------|---|---|------------------|---|-------------|
| ENSMUST00000094077  | 0 | 0 | 14 Kdm6b         | KDM1 lysine (K)-specific demethylase 6B   | MGI:2448492 |
| ENSMUST00000100375  | 0 | 0 | 14 Poldip3       | polymerase (DNA-directed), delta interacting protein 3                                  | MGI:1921076 |
| ENSMUST00000108314  | 0 | 0 | 14 Supt6         | suppressor of Ty 6  | MGI:107726  |
| ENSMUST00000108542  | 0 | 0 | 14 Inca1         | inhibitor of CDK, cyclin A1 interacting protein 1                                       | MGI:2144284 |
| ENSMUST00000117913  | 0 | 0 | 14 Naip2         | NLR family, apoptosis inhibitory protein 2  | MGI:1298226 |
| ENSMUST00000118115  | 0 | 0 | 14 N6amt1        | N-6 adenine-specific DNA methyltransferase 1 (putative)                                 | MGI:1915018 |
| ENSMUST00000121326  | 0 | 0 | 14 Srsf11        | serine/arginine-rich splicing factor 11   | MGI:1916457 |
| ENSMUST00000125923  | 0 | 0 | 14 Alkbh4        | alkB homolog 4, lysine demethylase  | MGI:1919291 |
| ENSMUST00000126605  | 0 | 0 | 14 Las1l         | LAS1-like (S. cerevisiae)   | MGI:1923380 |
| ENSMUST00000127704  | 0 | 0 | 14 Cdc14a        | CDC14 cell division cycle 14A   | MGI:2442676 |
| ENSMUST00000129028  | 0 | 0 | 14 Zmym4         | zinc finger, MYM-type 4   | MGI:1915035 |
| ENSMUST00000136203  | 0 | 0 | 14 Ldb1          | LIM domain binding 1  | MGI:894762  |
| ENSMUST00000136865  | 0 | 0 | 14 Zfp142        | zinc finger protein 142   | MGI:1924514 |
| ENSMUST00000137164  | 0 | 0 | 14 Ccdc67        | coiled-coil domain containing 67  | MGI:2443026 |
| ENSMUST00000137448  | 0 | 0 | 14 Alad          | aminolevulinate, delta-, dehydratase  | MGI:96853   |
| ENSMUST00000139859  | 0 | 0 | 14 Pdxdc1        | pyridoxal-dependent decarboxylase domain containing 1                                   | MGI:1920909 |
| ENSMUST00000141933  | 0 | 0 | 14 Stil          | Scf/Tal1 interrupting locus   | MGI:107477  |
| ENSMUST00000142558  | 0 | 0 | 14 Cdk4          | cyclin-dependent kinase 4   | MGI:88357   |
| ENSMUST00000142967  | 0 | 0 | 14 Surf1         | surfeit gene 1  | MGI:98443   |
| ENSMUST00000143438  | 0 | 0 | 14 Polr2e        | polymerase (RNA) II (DNA directed) polypeptide E  | MGI:1913670 |
| ENSMUST00000146064  | 0 | 0 | 14 Dhodh         | dihydroorotate dehydrogenase  | MGI:1928378 |
| ENSMUST00000147718  | 0 | 0 | 14 Crk           | v-crk avian sarcoma virus CT10 oncogene homolog   | MGI:88508   |
| ENSMUST00000152773  | 0 | 0 | 14 Acin1         | apoptotic chromatin condensation inducer 1  | MGI:1891824 |
| ENSMUST00000154845  | 0 | 0 | 14 Slc35d1       | solute carrier family 35 (UDP-glucuronic acid/UDP-N-acetylgalactosamine dual transporte | MGI:2140361 |
| ENSMUST00000160528  | 0 | 0 | 14 C4a           | complement component 4A (Rodgers blood group)   | MGI:98320   |
| ENSMUST00000161160  | 0 | 0 | 14 Hk1           | hexokinase 1  | MGI:96103   |
| ENSMUST00000163409  | 0 | 0 | 14 Klhl7         | kelch-like 7  | MGI:1196453 |
| ENSMUST00000165495  | 0 | 0 | 14 E430018J23Rik | RIKEN cDNA E430018J23 gene  | MGI:2141981 |
| ENSMUST00000168584  | 0 | 0 | 14 Glt8d1        | glycosyltransferase 8 domain containing 1   | MGI:1923735 |
| ENSMUST00000169622  | 0 | 0 | 14 Lrrc47        | leucine rich repeat containing 47   | MGI:1920196 |
| ENSMUST00000171063  | 0 | 0 | 14 Zfp385b       | zinc finger protein 385B  | MGI:2444734 |
| ENSMUST00000171999  | 0 | 0 | 14 Gcat          | glycine C-acetyltransferase (2-amino-3-ketobutyrate-coenzyme A ligase)                  | MGI:1349389 |
| ENSMUST00000173909  | 0 | 0 | 14 Ldhd          | lactate dehydrogenase D   | MGI:106428  |
| ENSMUST00000177101  | 0 | 0 | 14 Cfap53        | cilia and flagella associated protein 53  | MGI:1921703 |
| ENSMUST00000002914  | 0 | 0 | 12 Chaf1a        | chromatin assembly factor 1, subunit A (p150)   | MGI:1351331 |
| ENSMUST000000003061 | 0 | 0 | 12 Bcam          | basal cell adhesion molecule  | MGI:1929940 |
| ENSMUST000000004140 | 0 | 0 | 12 Gstm1         | glutathione S-transferase, mu 1   | MGI:95860   |
| ENSMUST00000018810  | 0 | 0 | 12 Cbx1          | chromobox 1   | MGI:105369  |
| ENSMUST00000019977  | 0 | 0 | 12 Ddo           | D-aspartate oxidase   | MGI:1925528 |
| ENSMUST00000020153  | 0 | 0 | 12 Hbs1l         | Hbs1-like (S. cerevisiae)   | MGI:1891704 |
| ENSMUST00000020831  | 0 | 0 | 12 Fam114a2      | family with sequence similarity 114, member A2  | MGI:1917629 |
| ENSMUST00000020846  | 0 | 0 | 12 Srebf1        | sterol regulatory element binding transcription factor 1                                | MGI:107606  |
| ENSMUST00000021536  | 0 | 0 | 12 Atp6v1d       | ATPase, H+ transporting, lysosomal V1 subunit D   | MGI:1921084 |

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|--------------------|---|---|------------------|--|-------------|
| ENSMUST00000023334 | 0 | 0 | 12 Nectin3       | nectin cell adhesion molecule 3  | MGI:1930171 |
| ENSMUST00000024724 | 0 | 0 | 12 Crisp2        | cysteine-rich secretory protein 2  | MGI:98815   |
| ENSMUST00000027146 | 0 | 0 | 12 Ikzf2         | IKAROS family zinc finger 2  | MGI:1342541 |
| ENSMUST00000030284 | 0 | 0 | 12 Rnf11         | ring finger protein 11   | MGI:1352759 |
| ENSMUST00000032768 | 0 | 0 | 12 Nr2f2         | nuclear receptor subfamily 2, group F, member 2  | MGI:1352452 |
| ENSMUST00000035721 | 0 | 0 | 12 Prpf18        | pre-mRNA processing factor 18  | MGI:1914479 |
| ENSMUST00000037182 | 0 | 0 | 12 Hook3         | hook microtubule tethering protein 3   | MGI:2443554 |
| ENSMUST00000038091 | 0 | 0 | 12 Sde2          | SDE2 telomere maintenance homolog (S. pombe)   | MGI:2384788 |
| ENSMUST00000040154 | 0 | 0 | 12 Cox6a1        | cytochrome c oxidase subunit VIa polypeptide 1   | MGI:103099  |
| ENSMUST00000045550 | 0 | 0 | 12 Xkr8          | X-linked Kx blood group related 8  | MGI:2685877 |
| ENSMUST00000045779 | 0 | 0 | 12 Ttyh2         | tweety family member 2   | MGI:2157091 |
| ENSMUST00000045994 | 0 | 0 | 12 Rbm34         | RNA binding motif protein 34   | MGI:1098653 |
| ENSMUST00000046689 | 0 | 0 | 12 2810474O19Rik | RIKEN cDNA 2810474O19 gene   | MGI:1914496 |
| ENSMUST00000047864 | 0 | 0 | 12 Eef2          | eukaryotic translation elongation factor 2   | MGI:95288   |
| ENSMUST00000049248 | 0 | 0 | 12 Malt1         | MALT1 paracaspase  | MGI:2445027 |
| ENSMUST00000050487 | 0 | 0 | 12 Cd74          | CD74 antigen (invariant polypeptide of major histocompatibility complex, class II antigen-as | MGI:96534   |
| ENSMUST00000053183 | 0 | 0 | 12 Arf3          | ADP-ribosylation factor 3  | MGI:99432   |
| ENSMUST00000056822 | 0 | 0 | 12 Acot6         | acyl-CoA thioesterase 6  | MGI:1921287 |
| ENSMUST00000057043 | 0 | 0 | 12 Tceanc2       | transcription elongation factor A (SII) N-terminal and central domain containing 2           | MGI:1913776 |
| ENSMUST00000058038 | 0 | 0 | 12 Zfp629        | zinc finger protein 629  | MGI:2444524 |
| ENSMUST00000060537 | 0 | 0 | 12 Kif1b         | kinesin family member 1B   | MGI:108426  |
| ENSMUST00000066412 | 0 | 0 | 12 Agtr1a        | angiotensin II receptor, type 1a   | MGI:87964   |
| ENSMUST00000072460 | 0 | 0 | 12 Mef2a         | myocyte enhancer factor 2A   | MGI:99532   |
| ENSMUST00000085192 | 0 | 0 | 12 Aldh6a1       | aldehyde dehydrogenase family 6, subfamily A1  | MGI:1915077 |
| ENSMUST00000089217 | 0 | 0 | 12 Uba1          | ubiquitin-like modifier activating enzyme 1  | MGI:98890   |
| ENSMUST00000096164 | 0 | 0 | 12 Fam189a2      | family with sequence similarity 189, member A2   | MGI:2685813 |
| ENSMUST00000097888 | 0 | 0 | 12 Ago1          | argonaute RISC catalytic subunit 1   | MGI:2446630 |
| ENSMUST00000097961 | 0 | 0 | 12 Alg6          | asparagine-linked glycosylation 6 (alpha-1,3,-glucosyltransferase)                           | MGI:2444031 |
| ENSMUST00000102598 | 0 | 0 | 12 Rbbp4         | retinoblastoma binding protein 4   | MGI:1194912 |
| ENSMUST00000106077 | 0 | 0 | 12 A3galt2       | alpha 1,3-galactosyltransferase 2 (isoglobotriaosylceramide synthase)                        | MGI:2685279 |
| ENSMUST00000106553 | 0 | 0 | 12 9030624J02Rik | RIKEN cDNA 9030624J02 gene   | MGI:1918767 |
| ENSMUST00000107302 | 0 | 0 | 12 Mlx           | MAX-like protein X   | MGI:108398  |
| ENSMUST00000108825 | 0 | 0 | 12 Gm12253       | predicted gene 12253   | MGI:3651568 |
| ENSMUST00000109859 | 0 | 0 | 12 Slc52a3       | solute carrier protein family 52, member 3   | MGI:1916948 |
| ENSMUST00000114251 | 0 | 0 | 12 Ptgsd         | prostaglandin D2 synthase (brain)  | MGI:99261   |
| ENSMUST00000114546 | 0 | 0 | 12 Zfp185        | zinc finger protein 185  | MGI:108095  |
| ENSMUST00000120004 | 0 | 0 | 12 Zfp607b       | zinc finger protein 607B   | MGI:2148237 |
| ENSMUST00000120129 | 0 | 0 | 12 Prr14l        | proline rich 14-like   | MGI:2443658 |
| ENSMUST00000122006 | 0 | 0 | 12 Ramp2         | receptor (calcitonin) activity modifying protein 2   | MGI:1859650 |
| ENSMUST00000123449 | 0 | 0 | 12 Psmf1         | proteasome (prosome, macropain) inhibitor subunit 1  | MGI:1346072 |
| ENSMUST00000125998 | 0 | 0 | 12 Calr          | calreticulin   | MGI:88252   |
| ENSMUST00000126386 | 0 | 0 | 12 Psmc3ip       | proteasome (prosome, macropain) 26S subunit, ATPase 3, interacting protein                   | MGI:1098610 |
| ENSMUST00000126489 | 0 | 0 | 12 Cops3         | COP9 signalosome subunit 3   | MGI:1349409 |

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|--------------------|---|---|------------|--|-------------|
| ENSMUST00000128010 | 0 | 0 | 12 Akr1a1  | aldo-keto reductase family 1, member A1 (aldehyde reductase)             | MGI:1929955 |
| ENSMUST00000129854 | 0 | 0 | 12 Serinc3 | serine incorporator 3  | MGI:1349457 |
| ENSMUST00000130187 | 0 | 0 | 12 Mtfr1l  | mitochondrial fission regulator 1-like                                   | MGI:1924074 |
| ENSMUST00000130834 | 0 | 0 | 12 Tmeff1  | transmembrane protein with EGF-like and two follistatin-like domains 1   | MGI:1926810 |
| ENSMUST00000130932 | 0 | 0 | 12 Brd3    | bromodomain containing 3   | MGI:1914632 |
| ENSMUST00000131193 | 0 | 0 | 12 Slc35b1 | solute carrier family 35, member B1                                      | MGI:1343133 |
| ENSMUST00000131524 | 0 | 0 | 12 Trna1ap | tRNA selenocysteine 1 associated protein 1                               | MGI:1919037 |
| ENSMUST00000131810 | 0 | 0 | 12 Dnajb12 | DnaJ heat shock protein family (Hsp40) member B12                        | MGI:1931881 |
| ENSMUST00000135563 | 0 | 0 | 12 Cfap206 | cilia and flagella associated protein 206                                | MGI:1916579 |
| ENSMUST00000136064 | 0 | 0 | 12 Ctrc    | chymotrypsin C (caldecrin)   | MGI:1923951 |
| ENSMUST00000136199 | 0 | 0 | 12 Dnajc7  | DnaJ heat shock protein family (Hsp40) member C7                         | MGI:1928373 |
| ENSMUST00000137104 | 0 | 0 | 12 Pdcd6ip | programmed cell death 6 interacting protein                              | MGI:1333753 |
| ENSMUST00000140842 | 0 | 0 | 12 Xaf1    | XIAP associated factor 1   | MGI:3772572 |
| ENSMUST00000141151 | 0 | 0 | 12 Ctnnd1  | catenin (cadherin associated protein), delta 1                           | MGI:105100  |
| ENSMUST00000141833 | 0 | 0 | 12 Elmod3  | ELMO/CED-12 domain containing 3  | MGI:2445168 |
| ENSMUST00000143903 | 0 | 0 | 12 Pld3    | phospholipase D family, member 3   | MGI:1333782 |
| ENSMUST00000144945 | 0 | 0 | 12 Slc4a11 | solute carrier family 4, sodium bicarbonate transporter-like, member 11  | MGI:2138987 |
| ENSMUST00000145312 | 0 | 0 | 12 Ctnnd1  | catenin (cadherin associated protein), delta 1                           | MGI:105100  |
| ENSMUST00000145421 | 0 | 0 | 12 Sec61a1 | Sec61 alpha 1 subunit (S. cerevisiae)                                    | MGI:1858417 |
| ENSMUST00000148162 | 0 | 0 | 12 Flot2   | flotillin 2  | MGI:103309  |
| ENSMUST00000148351 | 0 | 0 | 12 Ipo4    | importin 4   | MGI:1923001 |
| ENSMUST00000148769 | 0 | 0 | 12 Sclt1   | sodium channel and clathrin linker 1                                     | MGI:1914411 |
| ENSMUST00000149015 | 0 | 0 | 12 Nsmaf   | neutral sphingomyelinase (N-SMase) activation associated factor          | MGI:1341864 |
| ENSMUST00000151981 | 0 | 0 | 12 Psmb7   | proteasome (prosome, macropain) subunit, beta type 7                     | MGI:107637  |
| ENSMUST00000159159 | 0 | 0 | 12 Adh1    | alcohol dehydrogenase 1 (class I)  | MGI:87921   |
| ENSMUST00000159428 | 0 | 0 | 12 Pam     | peptidylglycine alpha-amidating monooxygenase                            | MGI:97475   |
| ENSMUST00000159441 | 0 | 0 | 12 H3f3a   | H3 histone, family 3A  | MGI:1097686 |
| ENSMUST00000159667 | 0 | 0 | 12 Arpp21  | cyclic AMP-regulated phosphoprotein, 21                                  | MGI:107562  |
| ENSMUST00000159840 | 0 | 0 | 12 Kcnab2  | potassium voltage-gated channel, shaker-related subfamily, beta member 2 | MGI:109239  |
| ENSMUST00000160002 | 0 | 0 | 12 Ccdc162 | coiled-coil domain containing 162  | MGI:1923223 |
| ENSMUST00000160681 | 0 | 0 | 12 Hcfc2   | host cell factor C2  | MGI:1915183 |
| ENSMUST00000160717 | 0 | 0 | 12 Pard3   | par-3 family cell polarity regulator                                     | MGI:2135608 |
| ENSMUST00000161259 | 0 | 0 | 12 Fxyd5   | FXDY domain-containing ion transport regulator 5                         | MGI:1201785 |
| ENSMUST00000161682 | 0 | 0 | 12 Eif4g2  | eukaryotic translation initiation factor 4, gamma 2                      | MGI:109207  |
| ENSMUST00000162174 | 0 | 0 | 12 Aig1    | androgen-induced 1   | MGI:1913503 |
| ENSMUST00000162748 | 0 | 0 | 12 Wars    | tryptophanyl-tRNA synthetase   | MGI:104630  |
| ENSMUST00000166664 | 0 | 0 | 12 Gm20498 | predicted gene 20498   | MGI:5141963 |
| ENSMUST00000167523 | 0 | 0 | 12 Gstm5   | glutathione S-transferase, mu 5  | MGI:1309466 |
| ENSMUST00000168382 | 0 | 0 | 12 Eif1a   | eukaryotic translation initiation factor 1A                              | MGI:95298   |
| ENSMUST00000168704 | 0 | 0 | 12 Slc2a3  | solute carrier family 2 (facilitated glucose transporter), member 3      | MGI:95757   |
| ENSMUST00000169740 | 0 | 0 | 12 Sbf2    | SET binding factor 2   | MGI:1921831 |
| ENSMUST00000170058 | 0 | 0 | 12 Gstm5   | glutathione S-transferase, mu 5  | MGI:1309466 |
| ENSMUST00000170752 | 0 | 0 | 12 Ifrd1   | interferon-related developmental regulator 1                             | MGI:1316717 |

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|--------------------|---|---|-------------|---|-------------|
| ENSMUST00000172175 | 0 | 0 | 12 Zbtb3    | zinc finger and BTB domain containing 3   | MGI:1922541 |
| ENSMUST00000172904 | 0 | 0 | 12 Gtf2i    | general transcription factor II I   | MGI:1202722 |
| ENSMUST00000173268 | 0 | 0 | 12 Ptbp3    | polypyrimidine tract binding protein 3  | MGI:1923334 |
| ENSMUST00000174363 | 0 | 0 | 12 Skiv2l   | superkiller viralicidic activity 2-like (S. cerevisiae)                             | MGI:1099835 |
| ENSMUST00000176138 | 0 | 0 | 12 Hbp1     | high mobility group box transcription factor 1                                      | MGI:894659  |
| ENSMUST00000178948 | 0 | 0 | 12 Gm21967  | predicted gene, 21967   | MGI:5439436 |
| ENSMUST00000179139 | 0 | 0 | 12 Ptrhd1   | peptidyl-tRNA hydrolase domain containing 1   | MGI:1916959 |
| ENSMUST00000181236 | 0 | 0 | 12 Metap2   | methionine aminopeptidase 2   | MGI:1929701 |
| ENSMUST00000184265 | 0 | 0 | 12 Cpne1    | copine I  | MGI:2386621 |
| ENSMUST00000184455 | 0 | 0 | 12 Fbxl4    | F-box and leucine-rich repeat protein 4   | MGI:2140367 |
| ENSMUST00000022246 | 0 | 0 | 10 Fgf10    | fibroblast growth factor 10   | MGI:1099809 |
| ENSMUST00000027368 | 0 | 0 | 10 Slc11a1  | solute carrier family 11 (proton-coupled divalent metal ion transporters), member 1 | MGI:1345275 |
| ENSMUST00000031349 | 0 | 0 | 10 Snrnp35  | small nuclear ribonucleoprotein 35 (U11/U12)  | MGI:1923417 |
| ENSMUST00000048197 | 0 | 0 | 10 Rhod     | ras homolog family member D   | MGI:108446  |
| ENSMUST00000062861 | 0 | 0 | 10 Rabggta  | Rab geranylgeranyl transferase, a subunit   | MGI:1860443 |
| ENSMUST00000065679 | 0 | 0 | 10 Slamf8   | SLAM family member 8  | MGI:1921998 |
| ENSMUST00000076099 | 0 | 0 | 10 Speer4f1 | spermatogenesis associated glutamate (E)-rich protein 4F1                           | MGI:1918185 |
| ENSMUST00000091505 | 0 | 0 | 10 Fam171a1 | family with sequence similarity 171, member A1                                      | MGI:2442917 |
| ENSMUST00000093923 | 0 | 0 | 10 Cdc27    | cell division cycle 27  | MGI:102685  |
| ENSMUST00000107167 | 0 | 0 | 10 Mpp3     | membrane protein, palmitoylated 3 (MAGUK p55 subfamily member 3)                    | MGI:1328354 |
| ENSMUST00000113805 | 0 | 0 | 10 Pnkd     | paroxysmal nonkinesigenic dyskinesia  | MGI:1930773 |
| ENSMUST00000138483 | 0 | 0 | 10 Eftud2   | elongation factor Tu GTP binding domain containing 2                                | MGI:1336880 |
| ENSMUST00000141116 | 0 | 0 | 10 Taf10    | TATA-box binding protein associated factor 10                                       | MGI:1346320 |
| ENSMUST00000153574 | 0 | 0 | 10 Sp100    | nuclear antigen Sp100   | MGI:109561  |
| ENSMUST00000156793 | 0 | 0 | 10 Pabpc1   | poly(A) binding protein, cytoplasmic 1  | MGI:1349722 |
| ENSMUST00000172782 | 0 | 0 | 10 H2-K1    | histocompatibility 2, K1, K region  | MGI:95904   |
| ENSMUST00000176483 | 0 | 0 | 10 Kdm2a    | lysine (K)-specific demethylase 2A  | MGI:1354736 |
| ENSMUST00000184744 | 0 | 0 | 10 Kctd12   | potassium channel tetramerisation domain containing 12                              | MGI:2145823 |
| ENSMUST00000004343 | 0 | 0 | 8 Wars2     | tryptophanyl tRNA synthetase 2 (mitochondrial)                                      | MGI:1917810 |
| ENSMUST00000018577 | 0 | 0 | 8 Nol11     | nucleolar protein 11  | MGI:1916229 |
| ENSMUST00000019723 | 0 | 0 | 8 Mydgf     | myeloid derived growth factor   | MGI:2156020 |
| ENSMUST00000022461 | 0 | 0 | 8 Dph3      | diphthamine biosynthesis 3  | MGI:1922658 |
| ENSMUST00000023762 | 0 | 0 | 8 Cers5     | ceramide synthase 5   | MGI:1919199 |
| ENSMUST00000025202 | 0 | 0 | 8 Kcnc1     | potassium voltage gated channel, Shaw-related subfamily, member 1                   | MGI:96667   |
| ENSMUST00000025563 | 0 | 0 | 8 Fth1      | ferritin heavy polypeptide 1  | MGI:95588   |
| ENSMUST00000032234 | 0 | 0 | 8 Cd163     | CD163 antigen   | MGI:2135946 |
| ENSMUST00000034607 | 0 | 0 | 8 Arcn1     | archain 1   | MGI:2387591 |
| ENSMUST00000039904 | 0 | 0 | 8 Camk2a    | calcium/calmodulin-dependent protein kinase II alpha                                | MGI:88256   |
| ENSMUST00000040907 | 0 | 0 | 8 Decr2     | 2-4-dienoyl-Coenzyme A reductase 2, peroxisomal                                     | MGI:1347059 |
| ENSMUST00000046266 | 0 | 0 | 8 Elmsan1   | ELM2 and Myb/SANT-like domain containing 1  | MGI:2685106 |
| ENSMUST00000051297 | 0 | 0 | 8 Tnp2      | transition protein 2  | MGI:98785   |
| ENSMUST00000054399 | 0 | 0 | 8 Ing1      | inhibitor of growth family, member 1  | MGI:1349481 |
| ENSMUST00000056136 | 0 | 0 | 8 Kcnj10    | potassium inwardly-rectifying channel, subfamily J, member 10                       | MGI:1194504 |

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|--------------------|---|---|-----------------|--|-------------|
| ENSMUST00000060673 | 0 | 0 | 8 Liph          | lipase, member H   | MGI:2388029 |
| ENSMUST00000090476 | 0 | 0 | 8 BC028528      | cDNA sequence BC028528   | MGI:2385885 |
| ENSMUST00000106921 | 0 | 0 | 8 Lepr          | leptin receptor  | MGI:104993  |
| ENSMUST00000108223 | 0 | 0 | 8 Zfp940        | zinc finger protein 940  | MGI:2446235 |
| ENSMUST00000113782 | 0 | 0 | 8 Mrps18b       | mitochondrial ribosomal protein S18B   | MGI:1914223 |
| ENSMUST00000119292 | 0 | 0 | 8 Ighmbp2       | immunoglobulin mu binding protein 2  | MGI:99954   |
| ENSMUST00000119960 | 0 | 0 | 8 Glyat         | glycine-N-acyltransferase  | MGI:2147502 |
| ENSMUST00000127175 | 0 | 0 | 8 Uqcrh         | ubiquinol-cytochrome c reductase hinge protein   | MGI:1913826 |
| ENSMUST00000133222 | 0 | 0 | 8 Syt12         | synaptotagmin XII  | MGI:2159601 |
| ENSMUST00000134408 | 0 | 0 | 8 Trpm7         | transient receptor potential cation channel, subfamily M, member 7                       | MGI:1929996 |
| ENSMUST00000135707 | 0 | 0 | 8 Aldoa         | aldolase A, fructose-bisphosphate  | MGI:87994   |
| ENSMUST00000138622 | 0 | 0 | 8 Zdhhc3        | zinc finger, DHHC domain containing 3  | MGI:1926134 |
| ENSMUST00000140679 | 0 | 0 | 8 Uba52         | ubiquitin A-52 residue ribosomal protein fusion product 1                                | MGI:98887   |
| ENSMUST00000142957 | 0 | 0 | 8 Pisd          | phosphatidylserine decarboxylase   | MGI:2445114 |
| ENSMUST00000146771 | 0 | 0 | 8 Furin         | furin (paired basic amino acid cleaving enzyme)  | MGI:97513   |
| ENSMUST00000147318 | 0 | 0 | 8 4833439L19Rik | RIKEN cDNA 4833439L19 gene   | MGI:1921162 |
| ENSMUST00000149983 | 0 | 0 | 8 Gclm          | glutamate-cysteine ligase, modifier subunit  | MGI:104995  |
| ENSMUST00000163568 | 0 | 0 | 8 Six2          | sine oculis-related homeobox 2   | MGI:102778  |
| ENSMUST00000176192 | 0 | 0 | 8 Atpaf1        | ATP synthase mitochondrial F1 complex assembly factor 1                                  | MGI:2180560 |
| ENSMUST00000178098 | 0 | 0 | 8 Dcun1d1       | DCN1, defective in cullin neddylation 1, domain containing 1 (S. cerevisiae)             | MGI:2150386 |
| ENSMUST00000183359 | 0 | 0 | 8 Pkp4          | plakophilin 4  | MGI:109281  |
| ENSMUST00000001706 | 0 | 0 | 6 Hoxc9         | homeobox C9  | MGI:96199   |
| ENSMUST00000005108 | 0 | 0 | 6 Kdm5a         | lysine (K)-specific demethylase 5A   | MGI:2136980 |
| ENSMUST00000020362 | 0 | 0 | 6 Kcnmb1        | potassium large conductance calcium-activated channel, subfamily M, beta member 1        | MGI:1334203 |
| ENSMUST00000021262 | 0 | 0 | 6 Alox8         | arachidonate 8-lipoxygenase  | MGI:1098228 |
| ENSMUST00000027489 | 0 | 0 | 6 Gpr35         | G protein-coupled receptor 35  | MGI:1929509 |
| ENSMUST00000029423 | 0 | 0 | 6 Serpini1      | serine (or cysteine) peptidase inhibitor, clade I, member 1                              | MGI:1194506 |
| ENSMUST00000029551 | 0 | 0 | 6 4933434E20Rik | RIKEN cDNA 4933434E20 gene   | MGI:1914027 |
| ENSMUST00000030128 | 0 | 0 | 6 Chmp5         | charged multivesicular body protein 5  | MGI:1924209 |
| ENSMUST00000035497 | 0 | 0 | 6 Oscp1         | organic solute carrier partner 1   | MGI:1916308 |
| ENSMUST00000043152 | 0 | 0 | 6 Utp6          | UTP6 small subunit processome component  | MGI:2445193 |
| ENSMUST00000044795 | 0 | 0 | 6 Nup133        | nucleoporin 133  | MGI:2442620 |
| ENSMUST00000046975 | 0 | 0 | 6 Pcgf3         | polycomb group ring finger 3   | MGI:1916837 |
| ENSMUST00000050884 | 0 | 0 | 6 Hmgn1         | high mobility group nucleosomal binding domain 1   | MGI:96120   |
| ENSMUST00000052441 | 0 | 0 | 6 Slc17a5       | solute carrier family 17 (anion/sugar transporter), member 5                             | MGI:1924105 |
| ENSMUST00000056144 | 0 | 0 | 6 Olfr1346      | olfactory receptor 1346  | MGI:3031180 |
| ENSMUST00000057893 | 0 | 0 | 6 Fzd2          | frizzled class receptor 2  | MGI:1888513 |
| ENSMUST00000067458 | 0 | 0 | 6 Sema5a        | sema domain, seven thrombospondin repeats (type 1 and type 1-like), transmembrane domain | MGI:107556  |
| ENSMUST00000068322 | 0 | 0 | 6 Sec14l3       | SEC14-like lipid binding 3   | MGI:3617848 |
| ENSMUST00000072612 | 0 | 0 | 6 4921528I07Rik | RIKEN cDNA 4921528I07 gene   | MGI:1924299 |
| ENSMUST00000092162 | 0 | 0 | 6 Lyz1          | lysozyme 1   | MGI:96902   |
| ENSMUST00000092163 | 0 | 0 | 6 Lyz2          | lysozyme 2   | MGI:96897   |
| ENSMUST00000094280 | 0 | 0 | 6 Chchd2        | coiled-coil-helix-coiled-coil-helix domain containing 2                                  | MGI:1261428 |

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|--------------------|---|---|------------|---|-------------|
| ENSMUST00000096065 | 0 | 0 | 6 Tigit    | T cell immunoreceptor with Ig and ITIM domains              | MGI:3642260 |
| ENSMUST00000096420 | 0 | 0 | 6 Gm14698  | predicted gene 14698  | MGI:3709613 |
| ENSMUST00000100789 | 0 | 0 | 6 Nadk2    | NAD kinase 2, mitochondrial                                 | MGI:1915896 |
| ENSMUST00000102844 | 0 | 0 | 6 Rps27a   | ribosomal protein S27A                                      | MGI:1925544 |
| ENSMUST00000108477 | 0 | 0 | 6 Tax1bp3  | Tax1 (human T cell leukemia virus type I) binding protein 3 | MGI:1923531 |
| ENSMUST00000110793 | 0 | 0 | 6 Rpap1    | RNA polymerase II associated protein 1                      | MGI:1916175 |
| ENSMUST00000112528 | 0 | 0 | 6 Zfp605   | zinc finger protein 605                                     | MGI:2444933 |
| ENSMUST00000114002 | 0 | 0 | 6 Itsn1    | intersectin 1 (SH3 domain protein 1A)                       | MGI:1338069 |
| ENSMUST00000117721 | 0 | 0 | 6 Zkscan3  | zinc finger with KRAB and SCAN domains 3                    | MGI:1919989 |
| ENSMUST00000120690 | 0 | 0 | 6 Tmem30a  | transmembrane protein 30A                                   | MGI:106402  |
| ENSMUST00000121770 | 0 | 0 | 6 Gadl1    | glutamate decarboxylase-like 1                              | MGI:1920998 |
| ENSMUST00000124858 | 0 | 0 | 6 Lsg1     | large 60S subunit nuclear export GTPase 1                   | MGI:107236  |
| ENSMUST00000127793 | 0 | 0 | 6 Uba52    | ubiquitin A-52 residue ribosomal protein fusion product 1   | MGI:98887   |
| ENSMUST00000131645 | 0 | 0 | 6 Chchd2   | coiled-coil-helix-coiled-coil-helix domain containing 2     | MGI:1261428 |
| ENSMUST00000132446 | 0 | 0 | 6 Tbrg4    | transforming growth factor beta regulated gene 4            | MGI:1100868 |
| ENSMUST00000133028 | 0 | 0 | 6 Pemt     | phosphatidylethanolamine N-methyltransferase                | MGI:104535  |
| ENSMUST00000133571 | 0 | 0 | 6 Soga1    | suppressor of glucose, autophagy associated 1               | MGI:2444575 |
| ENSMUST00000135084 | 0 | 0 | 6 Rabl6    | RAB, member RAS oncogene family-like 6                      | MGI:2442633 |
| ENSMUST00000135402 | 0 | 0 | 6 Bbip1    | BBSome interacting protein 1                                | MGI:1913610 |
| ENSMUST00000137944 | 0 | 0 | 6 Ncald    | neurocalcin delta   | MGI:1196326 |
| ENSMUST00000138334 | 0 | 0 | 6 Dnajc8   | DnaJ heat shock protein family (Hsp40) member C8            | MGI:1915848 |
| ENSMUST00000143817 | 0 | 0 | 6 Endov    | endonuclease V  | MGI:2444688 |
| ENSMUST00000146327 | 0 | 0 | 6 Pabpc1   | poly(A) binding protein, cytoplasmic 1                      | MGI:1349722 |
| ENSMUST00000148544 | 0 | 0 | 6 Gm9920   | predicted gene 9920   | MGI:3642228 |
| ENSMUST00000149086 | 0 | 0 | 6 Nphs1    | nephrosis 1, nephrin  | MGI:1859637 |
| ENSMUST00000150350 | 0 | 0 | 6 Rpl13a   | ribosomal protein L13A                                      | MGI:1351455 |
| ENSMUST00000151741 | 0 | 0 | 6 Ddx5     | DEAD (Asp-Glu-Ala-Asp) box polypeptide 5                    | MGI:105037  |
| ENSMUST00000153796 | 0 | 0 | 6 Nat9     | N-acetyltransferase 9 (GCN5-related, putative)              | MGI:1913426 |
| ENSMUST00000156129 | 0 | 0 | 6 Tecpr1   | tectonin beta-propeller repeat containing 1                 | MGI:1917631 |
| ENSMUST00000161170 | 0 | 0 | 6 Zfp9     | zinc finger protein 9                                       | MGI:99210   |
| ENSMUST00000162763 | 0 | 0 | 6 Stab1    | stabilin 1  | MGI:2178742 |
| ENSMUST00000166472 | 0 | 0 | 6 BC052040 | cDNA sequence BC052040                                      | MGI:3026886 |
| ENSMUST00000170643 | 0 | 0 | 6 Rhox9    | reproductive homeobox 9                                     | MGI:1890128 |
| ENSMUST00000174161 | 0 | 0 | 6 H2-T23   | histocompatibility 2, T region locus 23                     | MGI:95957   |
| ENSMUST00000176791 | 0 | 0 | 6 Pbx1     | pre B cell leukemia homeobox 1                              | MGI:97495   |
| ENSMUST00000184578 | 0 | 0 | 6 HnrnpII  | heterogeneous nuclear ribonucleoprotein L-like              | MGI:1919942 |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

MGI database :<http://www.informatics.jax.org/>

**Supplemental Table 4. Protein coding gene transcripts with UTR region associated RapiRNAs.**

**RapiRNA reverse to 3' UTR**

| Ensembl ID         | oocyte | Normalized counts |       | Gene symbol      | Annotation  | MGI ID      |
|--------------------|--------|-------------------|-------|------------------|---|-------------|
|                    |        | zygote            | sperm |                  |   |             |
| ENSMUST00000090938 |        | 258               | 127   | 15962 Dap3       | death associated protein 3  | MGI:1929538 |
| ENSMUST00000151927 |        | 491               | 88    | 9344 Rsbn1       | rosbin, round spermatid basic protein 1   | MGI:2444993 |
| ENSMUST00000024543 |        | 77                | 130   | 621 Hes7         | hairy and enhancer of split 7 (Drosophila)  | MGI:2135679 |
| ENSMUST00000038863 |        | 2                 | 4     | 593 Lars2        | leucyl-tRNA synthetase, mitochondrial   | MGI:2142973 |
| ENSMUST00000143570 |        | 2                 | 3     | 369 Eef1a1       | eukaryotic translation elongation factor 1 alpha 1  | MGI:1096881 |
| ENSMUST00000133747 |        | 150               | 10    | 361 Trip4        | thyroid hormone receptor interactor 4   | MGI:1928469 |
| ENSMUST00000140438 |        | 340               | 373   | 323 Mrps25       | mitochondrial ribosomal protein S25   | MGI:1928140 |
| ENSMUST00000137243 |        | 249               | 181   | 220 Mst01        | misato 1, mitochondrial distribution and morphology regulator                                     | MGI:2385175 |
| ENSMUST00000182039 |        | 0                 | 1     | 174 Rln1         | relaxin 1   | MGI:97931   |
| ENSMUST00000102517 |        | 1                 | 4     | 155 Dll4         | delta-like 4 (Drosophila)   | MGI:1859388 |
| ENSMUST00000098545 |        | 28                | 80    | 151 Tlcd1        | TLC domain containing 1   | MGI:1915572 |
| ENSMUST00000060798 |        | 0                 | 0     | 133 Unc119b      | unc-119 lipid binding chaperone B   | MGI:2147162 |
| ENSMUST00000055990 |        | 13                | 16    | 123 Eef1a2       | eukaryotic translation elongation factor 1 alpha 2  | MGI:1096317 |
| ENSMUST00000156082 |        | 57                | 7     | 105 Pnpla8       | patatin-like phospholipase domain containing 8  | MGI:1914702 |
| ENSMUST00000020776 |        | 0                 | 0     | 101 Ccdc117      | coiled-coil domain containing 117   | MGI:2144383 |
| ENSMUST00000112642 |        | 0                 | 0     | 77 Evf5          | ecotropic viral integration site 5  | MGI:104736  |
| ENSMUST00000117202 |        | 0                 | 0     | 77 Gm10600       | predicted gene 10600  | MGI:3710628 |
| ENSMUST00000128015 |        | 197               | 150   | 75 Plekhg2       | pleckstrin homology domain containing, family G (with RhoGef domain) member 2                     | MGI:2141874 |
| ENSMUST00000044711 |        | 1584              | 2042  | 73 Snx22         | sorting nexin 22  | MGI:2685966 |
| ENSMUST00000177294 |        | 0                 | 0     | 65 Lrp5          | low density lipoprotein receptor-related protein 5  | MGI:1278315 |
| ENSMUST00000153758 |        | 0                 | 0     | 63 Erp29         | endoplasmic reticulum protein 29  | MGI:1914647 |
| ENSMUST00000110052 |        | 0                 | 0     | 59 Ocel1         | occludin/ELL domain containing 1  | MGI:1924340 |
| ENSMUST00000052172 |        | 47                | 17    | 56 Cxcr4         | chemokine (C-X-C motif) receptor 4  | MGI:109563  |
| ENSMUST00000139824 |        | 269               | 275   | 52 Radil         | Ras association and DIL domains   | MGI:2443088 |
| ENSMUST00000060824 |        | 0                 | 0     | 52 Serpina7      | serine (or cysteine) peptidase inhibitor, clade A (alpha-1 antiproteinase, antitrypsin), member 7 | MGI:3041197 |
| ENSMUST00000061617 |        | 0                 | 0     | 50 Zfp280b       | zinc finger protein 280B  | MGI:1927865 |
| ENSMUST00000159114 |        | 11                | 21    | 48 C130026I21Rik | RIKEN cDNA C130026I21 gene  | MGI:3612702 |
| ENSMUST00000108950 |        | 4                 | 0     | 48 6430548M08Rik | RIKEN cDNA 6430548M08 gene  | MGI:2443793 |
| ENSMUST00000155325 |        | 0                 | 0     | 48 Alyref        | Aly/REF export factor   | MGI:1341044 |
| ENSMUST00000144447 |        | 0                 | 0     | 44 Sfi1          | Sfi1 homolog, spindle assembly associated (yeast)   | MGI:1926137 |
| ENSMUST00000068705 |        | 0                 | 0     | 42 Mpz11         | myelin protein zero-like 1  | MGI:1915731 |
| ENSMUST00000112946 |        | 0                 | 0     | 42 Tmem40        | transmembrane protein 40  | MGI:2137870 |
| ENSMUST00000101114 |        | 58                | 49    | 40 Rin3          | Ras and Rab interactor 3  | MGI:2385708 |
| ENSMUST00000133767 |        | 0                 | 0     | 40 Wdr12         | WD repeat domain 12   | MGI:1927241 |
| ENSMUST00000161840 |        | 0                 | 0     | 40 Pygl          | liver glycogen phosphorylase  | MGI:97829   |
| ENSMUST00000168292 |        | 0                 | 0     | 40 Gm20721       | predicted gene, 20721   | MGI:5313030 |
| ENSMUST00000141363 |        | 1                 | 1     | 36 Pdlim2        | PDZ and LIM domain 2  | MGI:2384850 |
| ENSMUST00000154861 |        | 0                 | 0     | 36 Smtn          | smoothelin  | MGI:1354727 |
| ENSMUST00000020496 |        | 0                 | 0     | 34 Adarb1        | adenosine deaminase, RNA-specific, B1   | MGI:891999  |
| ENSMUST00000047196 |        | 0                 | 0     | 34 Wbscr27       | Williams Beuren syndrome chromosome region 27 (human)   | MGI:1933146 |
| ENSMUST00000127128 |        | 0                 | 0     | 34 Pold3         | polymerase (DNA-directed), delta 3, accessory subunit   | MGI:1915217 |
| ENSMUST00000123379 |        | 3                 | 3     | 32 Coro2b        | coronin, actin binding protein, 2B  | MGI:2444283 |
| ENSMUST00000133353 |        | 0                 | 0     | 32 Dhodh         | dihydroorotate dehydrogenase  | MGI:1928378 |
| ENSMUST00000143800 |        | 0                 | 0     | 32 Natd1         | N-acetyltransferase domain containing 1   | MGI:1344388 |
| ENSMUST00000145736 |        | 0                 | 0     | 30 Kihl20        | kelch-like 20   | MGI:2444855 |
| ENSMUST00000161254 |        | 0                 | 0     | 30 Nwd1          | NACHT and WD repeat domain containing 1   | MGI:2442268 |
| ENSMUST00000176566 |        | 0                 | 0     | 30 Ip6k1         | inositol hexaphosphate kinase 1   | MGI:1351633 |
| ENSMUST00000169347 |        | 462               | 640   | 28 Myo1h         | myosin 1H   | MGI:1914674 |
| ENSMUST00000028110 |        | 43                | 25    | 28 Spopl         | speckle-type POZ protein-like   | MGI:1924107 |

|                    |     |     |                  |   |             |
|--------------------|-----|-----|------------------|---|-------------|
| ENSMUST00000129522 | 21  | 7   | 28 Zfp523        | zinc finger protein 523   | MGI:2687278 |
| ENSMUST00000126477 | 0   | 0   | 28 Sirt6         | sirtuin 6   | MGI:1354161 |
| ENSMUST00000126535 | 0   | 0   | 28 Gm12216       | predicted gene 12216  | MGI:3650088 |
| ENSMUST00000128061 | 0   | 0   | 28 4932438A13Rik | RIKEN cDNA 4932438A13 gene  | MGI:2444631 |
| ENSMUST00000108846 | 1   | 4   | 26 Galnt10       | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 10 | MGI:1890480 |
| ENSMUST00000004770 | 0   | 1   | 26 Tyr           | tyrosinase  | MGI:98880   |
| ENSMUST00000177474 | 0   | 1   | 26 Zfp169        | zinc finger protein 169   | MGI:1915161 |
| ENSMUST00000095797 | 0   | 0   | 26 Spin1         | spindlin 1  | MGI:109242  |
| ENSMUST00000129816 | 0   | 0   | 26 Dpf2          | D4, zinc and double PHD fingers family 2  | MGI:109529  |
| ENSMUST00000150697 | 0   | 0   | 26 Tbrg4         | transforming growth factor beta regulated gene 4                                    | MGI:1100868 |
| ENSMUST00000182297 | 0   | 0   | 26 Zfp407        | zinc finger protein 407   | MGI:2685179 |
| ENSMUST00000127373 | 0   | 1   | 24 Wdr45b        | WD repeat domain 45B  | MGI:1914090 |
| ENSMUST00000064652 | 0   | 0   | 24 1110051M20Rik | RIKEN cDNA 1110051M20 gene  | MGI:1915079 |
| ENSMUST00000072155 | 0   | 0   | 24 Ccdc189       | coiled-coil domain containing 189   | MGI:2685012 |
| ENSMUST00000094807 | 0   | 0   | 24 Pnmal2        | PNMA-like 2   | MGI:3645856 |
| ENSMUST00000109488 | 0   | 0   | 24 Snhg11        | small nucleolar RNA host gene 11  | MGI:2441845 |
| ENSMUST00000119921 | 0   | 0   | 24 Nmnat1        | nicotinamide nucleotide adenyllyltransferase 1                                      | MGI:1913704 |
| ENSMUST00000133937 | 0   | 0   | 24 Zhx3          | zinc fingers and homeoboxes 3   | MGI:2444772 |
| ENSMUST00000139368 | 3   | 6   | 22 Arfp1         | ADP-ribosylation factor related protein 1   | MGI:1923938 |
| ENSMUST00000129160 | 6   | 4   | 22 Etv4          | ets variant 4   | MGI:99423   |
| ENSMUST00000123503 | 2   | 1   | 22 Anapc1        | anaphase promoting complex subunit 1  | MGI:103097  |
| ENSMUST00000040607 | 0   | 0   | 22 Lsm3          | LSM3 homolog, U6 small nuclear RNA and mRNA degradation associated                  | MGI:1914928 |
| ENSMUST00000044113 | 0   | 0   | 22 Ago2          | argonaute RISC catalytic subunit 2  | MGI:2446632 |
| ENSMUST00000106135 | 0   | 0   | 22 Dus1l         | dihydrouridine synthase 1-like (S. cerevisiae)                                      | MGI:1915980 |
| ENSMUST00000130916 | 0   | 0   | 22 Becn1         | beclin 1, autophagy related   | MGI:1891828 |
| ENSMUST00000068792 | 613 | 231 | 20 Tmem245       | transmembrane protein 245   | MGI:2445107 |
| ENSMUST00000134487 | 24  | 24  | 20 Fam221b       | family with sequence similarity 221, member B                                       | MGI:2441678 |
| ENSMUST00000039535 | 7   | 5   | 20 Wdr38         | WD repeat domain 38   | MGI:1923896 |
| ENSMUST00000030773 | 0   | 4   | 20 Xrcc2         | X-ray repair complementing defective repair in Chinese hamster cells 2              | MGI:1927345 |
| ENSMUST00000165680 | 4   | 3   | 20 Gm17509       | predicted gene, 17509   | MGI:4937143 |
| ENSMUST00000134564 | 1   | 1   | 20 Trim12a       | tripartite motif-containing 12A   | MGI:1923931 |
| ENSMUST00000061878 | 0   | 1   | 20 Klhdc9        | kelch domain containing 9   | MGI:1916124 |
| ENSMUST00000036161 | 0   | 0   | 20 Pi4ka         | phosphatidylinositol 4-kinase, catalytic, alpha polypeptide                         | MGI:2448506 |
| ENSMUST00000118627 | 0   | 0   | 20 Sfi1          | Sfi1 homolog, spindle assembly associated (yeast)                                   | MGI:1926137 |
| ENSMUST00000147599 | 0   | 0   | 20 Rdh13         | retinol dehydrogenase 13 (all-trans and 9-cis)                                      | MGI:1918732 |
| ENSMUST00000167456 | 0   | 0   | 20 Nabp2         | nucleic acid binding protein 2  | MGI:1917167 |
| ENSMUST00000170369 | 0   | 0   | 20 Racgap1       | Rac GTPase-activating protein 1   | MGI:1349423 |
| ENSMUST00000179695 | 0   | 0   | 20 Zfp799        | zinc finger protein 799   | MGI:2443934 |
| ENSMUST00000160943 | 7   | 12  | 18 Irf8          | interferon regulatory factor 8  | MGI:96395   |
| ENSMUST00000151397 | 6   | 3   | 18 Iqsec3        | IQ motif and Sec7 domain 3  | MGI:2677208 |
| ENSMUST00000130921 | 1   | 3   | 18 Ccnt1         | cyclin T1   | MGI:1328363 |
| ENSMUST00000025728 | 0   | 0   | 18 Frmd8         | FERM domain containing 8  | MGI:1914707 |
| ENSMUST00000088001 | 0   | 0   | 18 Adnp          | activity-dependent neuroprotective protein  | MGI:1338758 |
| ENSMUST00000148093 | 0   | 0   | 18 Poglut1       | protein O-glucosyltransferase 1   | MGI:2444232 |
| ENSMUST00000162410 | 0   | 0   | 18 Kctd18        | potassium channel tetramerisation domain containing 18                              | MGI:3603813 |
| ENSMUST00000165528 | 0   | 0   | 18 Mdga1         | MAM domain containing glycosylphosphatidylinositol anchor 1                         | MGI:1922012 |
| ENSMUST00000132091 | 78  | 62  | 16 Fanci         | Fanconi anemia, complementation group I   | MGI:2384790 |
| ENSMUST00000148165 | 5   | 1   | 16 Hemk1         | HemK methyltransferase family member 1  | MGI:1916786 |
| ENSMUST00000002291 | 1   | 1   | 16 Paxip1        | PAX interacting (with transcription-activation domain) protein 1                    | MGI:1890430 |
| ENSMUST00000160484 | 1   | 1   | 16 Agl           | amylo-1,6-glucosidase, 4-alpha-glucanotransferase                                   | MGI:1924809 |
| ENSMUST00000164617 | 1   | 0   | 16 Nisch         | nischarin   | MGI:1928323 |
| ENSMUST00000033611 | 0   | 0   | 16 Xkrx          | X-linked Kx blood group related, X-linked   | MGI:3584011 |
| ENSMUST00000054776 | 0   | 0   | 16 Plekhf2       | pleckstrin homology domain containing, family F (with FYVE domain) member 2         | MGI:1919051 |
| ENSMUST00000065537 | 0   | 0   | 16 Jmy           | junction-mediating and regulatory protein   | MGI:1913096 |
| ENSMUST00000087332 | 0   | 0   | 16 Gm16223       | predicted gene 16223  | MGI:3648966 |



|                     |    |    |                  |   |             |
|---------------------|----|----|------------------|---|-------------|
| ENSMUST00000099441  | 0  | 0  | 16 Slc35d2       | solute carrier family 35, member D2   | MGI:1917734 |
| ENSMUST00000101087  | 0  | 0  | 16 Srp72         | signal recognition particle 72  | MGI:1333795 |
| ENSMUST00000123031  | 0  | 0  | 16 Coro7         | coronin 7   | MGI:1926135 |
| ENSMUST00000126347  | 0  | 0  | 16 Thsd4         | thrombospondin, type I, domain containing 4   | MGI:2672033 |
| ENSMUST00000135563  | 0  | 0  | 16 Cfap206       | cilia and flagella associated protein 206   | MGI:1916579 |
| ENSMUST00000138166  | 0  | 0  | 16 Bbx           | bobby sox homolog (Drosophila)  | MGI:1917758 |
| ENSMUST00000144573  | 0  | 0  | 16 Ephb2         | Eph receptor B2   | MGI:99611   |
| ENSMUST00000162336  | 0  | 0  | 16 Rrp15         | ribosomal RNA processing 15 homolog (S. cerevisiae)                                 | MGI:1914473 |
| ENSMUST00000107773  | 4  | 11 | 14 Tmod1         | tropomodulin 1  | MGI:98775   |
| ENSMUST00000099329  | 24 | 4  | 14 Ube2n         | ubiquitin-conjugating enzyme E2N  | MGI:1934835 |
| ENSMUST00000136545  | 0  | 2  | 14 Ints8         | integrator complex subunit 8  | MGI:1919906 |
| ENSMUST00000134594  | 1  | 1  | 14 Lman2l        | lectin, mannose-binding 2-like  | MGI:2443010 |
| ENSMUST00000071093  | 8  | 0  | 14 Rims3         | regulating synaptic membrane exocytosis 3   | MGI:2443331 |
| ENSMUST00000002292  | 0  | 0  | 14 Rmnd5a        | required for meiotic nuclear division 5 homolog A                                   | MGI:1915727 |
| ENSMUST000000026092 | 0  | 0  | 14 3110040N11Rik | RIKEN cDNA 3110040N11 gene  | MGI:1914540 |
| ENSMUST00000097742  | 0  | 0  | 14 Tmem88b       | transmembrane protein 88B   | MGI:2444329 |
| ENSMUST00000105878  | 0  | 0  | 14 Catsper4      | cation channel, sperm associated 4  | MGI:3043288 |
| ENSMUST00000137245  | 0  | 0  | 14 Edc3          | enhancer of mRNA decapping 3  | MGI:2142951 |
| ENSMUST00000146321  | 0  | 0  | 14 Nudt3         | nudix (nucleotide diphosphate linked moiety X)-type motif 3                         | MGI:1928484 |
| ENSMUST00000154127  | 0  | 0  | 14 Ndufaf1       | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, assembly factor 1               | MGI:1916952 |
| ENSMUST00000154131  | 0  | 0  | 14 Cdk9          | cyclin-dependent kinase 9 (CDC2-related kinase)                                     | MGI:1328368 |
| ENSMUST00000155599  | 0  | 0  | 14 Rbm3          | RNA binding motif protein 3   | MGI:1099460 |
| ENSMUST00000155837  | 0  | 0  | 14 Rbm39         | RNA binding motif protein 39  | MGI:2157953 |
| ENSMUST00000174376  | 0  | 0  | 14 Znrf1         | zinc and ring finger 1  | MGI:2177308 |
| ENSMUST00000174499  | 0  | 0  | 14 Brsk2         | BR serine/threonine kinase 2  | MGI:1923020 |
| ENSMUST00000175999  | 0  | 0  | 14 Senp6         | SUMO/sentrin specific peptidase 6   | MGI:1922075 |
| ENSMUST00000182191  | 0  | 0  | 14 Smim1         | small integral membrane protein 1   | MGI:1916109 |
| ENSMUST00000042103  | 13 | 16 | 12 Myo16         | myosin XVI  | MGI:2685951 |
| ENSMUST00000000153  | 0  | 15 | 12 Gna12         | guanine nucleotide binding protein, alpha 12  | MGI:95767   |
| ENSMUST000000019722 | 4  | 12 | 12 Ubxn6         | UBX domain protein 6  | MGI:1913780 |
| ENSMUST00000143432  | 13 | 10 | 12 Col16a1       | collagen, type XVI, alpha 1   | MGI:1095396 |
| ENSMUST00000123159  | 2  | 2  | 12 Succlg1       | succinate-CoA ligase, GDP-forming, alpha subunit                                    | MGI:1927234 |
| ENSMUST00000127797  | 1  | 1  | 12 Mettl3        | methyltransferase like 3  | MGI:1927165 |
| ENSMUST00000127152  | 1  | 1  | 12 Anxa4         | annexin A4  | MGI:88030   |
| ENSMUST00000159719  | 0  | 1  | 12 Zcrrb1        | zinc finger CCHC-type and RNA binding motif 1                                       | MGI:1914447 |
| ENSMUST00000184776  | 6  | 0  | 12 Pigb          | phosphatidylinositol glycan anchor biosynthesis, class B                            | MGI:1891825 |
| ENSMUST00000107449  | 4  | 0  | 12 Bspry         | B-box and SPRY domain containing  | MGI:2177191 |
| ENSMUST00000156053  | 2  | 0  | 12 Btbd17        | BTB (POZ) domain containing 17  | MGI:1919264 |
| ENSMUST000000090178 | 1  | 0  | 12 Dnajb14       | DnaJ heat shock protein family (Hsp40) member B14                                   | MGI:1917854 |
| ENSMUST000000022460 | 0  | 0  | 12 Galnt15       | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 15 | MGI:1926004 |
| ENSMUST000000027810 | 0  | 0  | 12 Fh1           | fumarate hydratase 1  | MGI:95530   |
| ENSMUST000000038228 | 0  | 0  | 12 Tmx4          | thioredoxin-related transmembrane protein 4   | MGI:106558  |
| ENSMUST000000052514 | 0  | 0  | 12 Slc38a9       | solute carrier family 38, member 9  | MGI:1918839 |
| ENSMUST000000058060 | 0  | 0  | 12 Bod1          | biorientation of chromosomes in cell division 1                                     | MGI:1916806 |
| ENSMUST000000068880 | 0  | 0  | 12 Paqr8         | progesterone and adipoQ receptor family member VIII                                 | MGI:1921479 |
| ENSMUST000000070112 | 0  | 0  | 12 Ndufa8        | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 8                               | MGI:1915625 |
| ENSMUST000000080281 | 0  | 0  | 12 Rpl15         | ribosomal protein L15   | MGI:1913730 |
| ENSMUST000000098066 | 0  | 0  | 12 Pakap         | paralemmann A kinase anchor protein   | MGI:5141924 |
| ENSMUST00000100888  | 0  | 0  | 12 Gm16434       | predicted gene 16434  | MGI:3646563 |
| ENSMUST00000100895  | 0  | 0  | 12 Gm10406       | predicted gene 10406  | MGI:3711272 |
| ENSMUST00000105849  | 0  | 0  | 12 Luzp1         | leucine zipper protein 1  | MGI:107629  |
| ENSMUST00000106398  | 0  | 0  | 12 Rnf157        | ring finger protein 157   | MGI:2442484 |
| ENSMUST00000116280  | 0  | 0  | 12 Knop1         | lysine rich nucleolar protein 1   | MGI:1913606 |
| ENSMUST00000118152  | 0  | 0  | 12 Cbx5          | chromobox 5   | MGI:109372  |
| ENSMUST00000118544  | 0  | 0  | 12 Armt1         | acidic residue methyltransferase 1  | MGI:1920669 |

|                    |   |   |             |   |             |
|--------------------|---|---|-------------|---|-------------|
| ENSMUST00000127019 | 0 | 0 | 12 Rcn1     | reticulocalbin 1  | MGI:104559  |
| ENSMUST00000127598 | 0 | 0 | 12 Hnnpnm   | heterogeneous nuclear ribonucleoprotein M   | MGI:1926465 |
| ENSMUST00000128725 | 0 | 0 | 12 Rps3     | ribosomal protein S3  | MGI:1350917 |
| ENSMUST00000131808 | 0 | 0 | 12 Acsf2    | acyl-CoA synthetase family member 2   | MGI:2388287 |
| ENSMUST00000133157 | 0 | 0 | 12 Polr1e   | polymerase (RNA) I polypeptide E  | MGI:1929022 |
| ENSMUST00000136279 | 0 | 0 | 12 Cadps2   | Ca2+-dependent activator protein for secretion 2  | MGI:2443963 |
| ENSMUST00000137268 | 0 | 0 | 12 Mier3    | MIER family member 3  | MGI:2442317 |
| ENSMUST00000139700 | 0 | 0 | 12 Bend6    | BEN domain containing 6   | MGI:2444572 |
| ENSMUST00000140250 | 0 | 0 | 12 Tulp1    | tubby like protein 1  | MGI:109571  |
| ENSMUST00000141416 | 0 | 0 | 12 Whsc1    | Wolf-Hirschhorn syndrome candidate 1 (human)  | MGI:1276574 |
| ENSMUST00000155421 | 0 | 0 | 12 Pde6g    | phosphodiesterase 6G, cGMP-specific, rod, gamma   | MGI:97526   |
| ENSMUST00000164408 | 0 | 0 | 12 Gm3591   | predicted gene 3591   | MGI:3781768 |
| ENSMUST00000165744 | 0 | 0 | 12 Gm3739   | predicted gene 3739   | MGI:3781914 |
| ENSMUST00000166493 | 0 | 0 | 12 Gm6676   | predicted gene 6676   | MGI:3646103 |
| ENSMUST00000168124 | 0 | 0 | 12 Blmh     | bleomycin hydrolase   | MGI:1345186 |
| ENSMUST00000169214 | 0 | 0 | 12 Rbm28    | RNA binding motif protein 28  | MGI:2655711 |
| ENSMUST00000170480 | 0 | 0 | 12 Gm3002   | predicted gene 3002   | MGI:3781180 |
| ENSMUST00000170957 | 0 | 0 | 12 Ggps1    | geranylgeranyl diphosphate synthase 1   | MGI:1341724 |
| ENSMUST00000171404 | 0 | 0 | 12 Gtf3c4   | general transcription factor IIIC, polypeptide 4  | MGI:2138937 |
| ENSMUST00000172431 | 0 | 0 | 12 Gm3512   | predicted gene 3512   | MGI:3781689 |
| ENSMUST00000173250 | 0 | 0 | 12 Uggt1    | UDP-glucose glycoprotein glucosyltransferase 1  | MGI:2443162 |
| ENSMUST00000176541 | 0 | 0 | 12 Golph3l  | golgi phosphoprotein 3-like   | MGI:1917129 |
| ENSMUST00000181997 | 0 | 0 | 12 Slc26a2  | solute carrier family 26 (sulfate transporter), member 2  | MGI:892977  |
| ENSMUST00000113516 | 3 | 3 | 10 Kdr      | kinase insert domain protein receptor   | MGI:96683   |
| ENSMUST00000174479 | 0 | 3 | 10 Dtnb     | dystrobrevin, beta  | MGI:1203728 |
| ENSMUST00000177330 | 0 | 2 | 10 Lrp5     | low density lipoprotein receptor-related protein 5  | MGI:1278315 |
| ENSMUST00000052125 | 6 | 1 | 10 Pard6b   | par-6 family cell polarity regulator beta   | MGI:2135605 |
| ENSMUST00000175680 | 4 | 1 | 10 Rd3      | retinal degeneration 3  | MGI:1921273 |
| ENSMUST00000144012 | 2 | 1 | 10 Pip4k2b  | phosphatidylinositol-5-phosphate 4-kinase, type II, beta  | MGI:1934234 |
| ENSMUST00000014892 | 0 | 1 | 10 Tex261   | testis expressed gene 261   | MGI:1096575 |
| ENSMUST00000111557 | 0 | 1 | 10 Dennd5b  | DENN/MADD domain containing 5B  | MGI:2444273 |
| ENSMUST00000172832 | 0 | 1 | 10 Trim39   | tripartite motif-containing 39  | MGI:1890659 |
| ENSMUST00000112720 | 1 | 1 | 10 Apex2    | apurinic/apyrimidinic endonuclease 2  | MGI:1924872 |
| ENSMUST00000133357 | 1 | 1 | 10 Pramel5  | preferentially expressed antigen in melanoma like 5   | MGI:2156389 |
| ENSMUST00000115672 | 0 | 1 | 10 Birc3    | baculoviral IAP repeat-containing 3   | MGI:1197007 |
| ENSMUST00000137465 | 0 | 1 | 10 Dpf2     | D4, zinc and double PHD fingers family 2  | MGI:109529  |
| ENSMUST00000055557 | 1 | 0 | 10 Stx19    | syntaxin 19   | MGI:1915409 |
| ENSMUST00000113760 | 1 | 0 | 10 H2-T24   | histocompatibility 2, T region locus 24   | MGI:95958   |
| ENSMUST00000030336 | 0 | 0 | 10 Tnfrsf1b | tumor necrosis factor receptor superfamily, member 1b   | MGI:1314883 |
| ENSMUST00000036331 | 0 | 0 | 10 Neu3     | neuraminidase 3   | MGI:1355305 |
| ENSMUST00000055369 | 0 | 0 | 10 BC106179 | cDNA sequence BC106179  | MGI:3702726 |
| ENSMUST00000058464 | 0 | 0 | 10 Serpina9 | serine (or cysteine) peptidase inhibitor, clade A (alpha-1 antiproteinase, antitrypsin), member 9 | MGI:1919157 |
| ENSMUST00000066708 | 0 | 0 | 10 Dmp1     | dentin matrix protein 1   | MGI:94910   |
| ENSMUST00000071852 | 0 | 0 | 10 Comm7    | COMM domain containing 7  | MGI:1914197 |
| ENSMUST00000095467 | 0 | 0 | 10 Dpccr1   | diffuse panbronchiolitis critical region 1 (human)  | MGI:2685476 |
| ENSMUST00000101385 | 0 | 0 | 10 Plekha8  | pleckstrin homology domain containing, family A (phosphoinositide binding specific) member 8      | MGI:2681164 |
| ENSMUST00000102589 | 0 | 0 | 10 Eif4a1   | eukaryotic translation initiation factor 4A1  | MGI:95303   |
| ENSMUST00000103114 | 0 | 0 | 10 Stat3    | signal transducer and activator of transcription 3  | MGI:103038  |
| ENSMUST00000109626 | 0 | 0 | 10 Cyld     | CYLD lysine 63 deubiquitinase   | MGI:1921506 |
| ENSMUST00000125734 | 0 | 0 | 10 Zfand1   | zinc finger, AN1-type domain 1  | MGI:1913611 |
| ENSMUST00000129557 | 0 | 0 | 10 Med1     | mediator complex subunit 1  | MGI:1100846 |
| ENSMUST00000137158 | 0 | 0 | 10 Fam160a2 | family with sequence similarity 160, member A2  | MGI:1921599 |
| ENSMUST00000137256 | 0 | 0 | 10 Zfp91    | zinc finger protein 91  | MGI:104854  |
| ENSMUST00000137517 | 0 | 0 | 10 Gabra3   | gamma-aminobutyric acid (GABA) A receptor, subunit alpha 3  | MGI:95615   |
| ENSMUST00000153263 | 0 | 0 | 10 Cgn      | cingulin  | MGI:1927237 |

|                    |     |     |            |  |             |
|--------------------|-----|-----|------------|--|-------------|
| ENSMUST00000160913 | 0   | 0   | 10 Nae1    | NEDD8 activating enzyme E1 subunit 1                               | MGI:2384561 |
| ENSMUST00000167430 | 0   | 0   | 10 Gm3020  | predicted gene 3020  | MGI:3781198 |
| ENSMUST00000170123 | 0   | 0   | 10 Gm10409 | predicted gene 10409   | MGI:3710610 |
| ENSMUST00000137271 | 150 | 173 | 8 Ccdc77   | coiled-coil domain containing 77                                   | MGI:1914450 |
| ENSMUST00000165493 | 6   | 29  | 8 Nsun4    | NOL1/NOP2/Sun domain family, member 4                              | MGI:1919431 |
| ENSMUST00000073899 | 9   | 22  | 8 Syt7     | synaptotagmin VII  | MGI:1859545 |
| ENSMUST00000061203 | 2   | 4   | 8 Tmed5    | transmembrane p24 trafficking protein 5                            | MGI:1921586 |
| ENSMUST00000102606 | 4   | 2   | 8 Slc25a35 | solute carrier family 25, member 35                                | MGI:1919248 |
| ENSMUST00000028515 | 1   | 2   | 8 Chrna1   | cholinergic receptor, nicotinic, alpha polypeptide 1 (muscle)      | MGI:87885   |
| ENSMUST00000109558 | 1   | 2   | 8 Ndrp3    | N-myc downstream regulated gene 3                                  | MGI:1352499 |
| ENSMUST00000025965 | 0   | 2   | 8 Hells    | helicase, lymphoid specific  | MGI:106209  |
| ENSMUST00000132008 | 1   | 1   | 8 Ddx20    | DEAD (Asp-Glu-Ala-Asp) box polypeptide 20                          | MGI:1858415 |
| ENSMUST00000146339 | 0   | 1   | 8 Wbp2     | WW domain binding protein 2  | MGI:104709  |
| ENSMUST00000021066 | 1   | 1   | 8 Cacng4   | calcium channel, voltage-dependent, gamma subunit 4                | MGI:1859167 |
| ENSMUST00000057241 | 0   | 1   | 8 Zfp874a  | zinc finger protein 874a   | MGI:3040703 |
| ENSMUST00000099374 | 0   | 1   | 8 Gas2l3   | growth arrest-specific 2 like 3                                    | MGI:1918780 |
| ENSMUST00000162222 | 0   | 1   | 8 Tcerg1l  | transcription elongation regulator 1-like                          | MGI:1917821 |
| ENSMUST00000163867 | 0   | 1   | 8 Shc2     | SHC (Src homology 2 domain containing) transforming protein 2      | MGI:106180  |
| ENSMUST00000108670 | 1   | 0   | 8 Arhgef15 | Rho guanine nucleotide exchange factor (GEF) 15                    | MGI:3045246 |
| ENSMUST00000143370 | 1   | 0   | 8 Clic4    | chloride intracellular channel 4 (mitochondrial)                   | MGI:1352754 |
| ENSMUST00000173966 | 1   | 0   | 8 Tomm40   | translocase of outer mitochondrial membrane 40 homolog (yeast)     | MGI:1858259 |
| ENSMUST00000001002 | 0   | 0   | 8 Heatr6   | HEAT repeat containing 6   | MGI:1919790 |
| ENSMUST00000017153 | 0   | 0   | 8 Sdc4     | syndecan 4   | MGI:1349164 |
| ENSMUST00000020948 | 0   | 0   | 8 Abca8b   | ATP-binding cassette, sub-family A (ABC1), member 8b               | MGI:1351668 |
| ENSMUST00000022855 | 0   | 0   | 8 Brix1    | BRX1, biogenesis of ribosomes                                      | MGI:1915082 |
| ENSMUST00000024705 | 0   | 0   | 8 Slc25a27 | solute carrier family 25, member 27                                | MGI:1921261 |
| ENSMUST00000024709 | 0   | 0   | 8 Cd2ap    | CD2-associated protein   | MGI:1330281 |
| ENSMUST00000024884 | 0   | 0   | 8 Eif2ak2  | eukaryotic translation initiation factor 2-alpha kinase 2          | MGI:1353449 |
| ENSMUST00000029900 | 0   | 0   | 8 Atp6v0d2 | ATPase, H+ transporting, lysosomal V0 subunit D2                   | MGI:1924415 |
| ENSMUST00000044734 | 0   | 0   | 8 Rims4    | regulating synaptic membrane exocytosis 4                          | MGI:2674366 |
| ENSMUST00000065103 | 0   | 0   | 8 Mrpl35   | mitochondrial ribosomal protein L35                                | MGI:1913473 |
| ENSMUST00000097809 | 0   | 0   | 8 Rims1    | regulating synaptic membrane exocytosis 1                          | MGI:2152971 |
| ENSMUST00000099575 | 0   | 0   | 8 Grem1    | gremlin 1, DAN family BMP antagonist                               | MGI:1344337 |
| ENSMUST00000102494 | 0   | 0   | 8 Nsrp1    | nuclear speckle regulatory protein 1                               | MGI:2144305 |
| ENSMUST00000103181 | 0   | 0   | 8 Cds2     | CDP-diacylglycerol synthase (phosphatidate cytidylyltransferase) 2 | MGI:1332236 |
| ENSMUST00000108212 | 0   | 0   | 8 Zfp74    | zinc finger protein 74   | MGI:107784  |
| ENSMUST00000108546 | 0   | 0   | 8 Zfp329   | zinc finger protein 329  | MGI:1921283 |
| ENSMUST00000109736 | 0   | 0   | 8 Rnaseh2a | ribonuclease H2, large subunit                                     | MGI:1916974 |
| ENSMUST00000110260 | 0   | 0   | 8 Lzts3    | leucine zipper, putative tumor suppressor family member 3          | MGI:2656976 |
| ENSMUST00000115167 | 0   | 0   | 8 Zfp451   | zinc finger protein 451  | MGI:2137896 |
| ENSMUST00000122927 | 0   | 0   | 8 Zfp950   | zinc finger protein 950  | MGI:2652824 |
| ENSMUST00000123283 | 0   | 0   | 8 Arhgap4  | Rho GTPase activating protein 4                                    | MGI:2159577 |
| ENSMUST00000127793 | 0   | 0   | 8 Uba52    | ubiquitin A-52 residue ribosomal protein fusion product 1          | MGI:98887   |
| ENSMUST00000130036 | 0   | 0   | 8 Atp6v1a  | ATPase, H+ transporting, lysosomal V1 subunit A                    | MGI:1201780 |
| ENSMUST00000139984 | 0   | 0   | 8 Adnp     | activity-dependent neuroprotective protein                         | MGI:1338758 |
| ENSMUST00000147838 | 0   | 0   | 8 Mpp3     | membrane protein, palmitoylated 3 (MAGUK p55 subfamily member 3)   | MGI:1328354 |
| ENSMUST00000152708 | 0   | 0   | 8 Ccdc28b  | coiled coil domain containing 28B                                  | MGI:1913514 |
| ENSMUST00000154881 | 0   | 0   | 8 Ino80e   | INO80 complex subunit E  | MGI:2141881 |
| ENSMUST00000157037 | 0   | 0   | 8 Brwd1    | bromodomain and WD repeat domain containing 1                      | MGI:1890651 |
| ENSMUST00000160707 | 0   | 0   | 8 Reln     | reelin   | MGI:103022  |
| ENSMUST00000161014 | 0   | 0   | 8 Rrnad1   | ribosomal RNA adenine dimethylase domain containing 1              | MGI:2387197 |
| ENSMUST00000161226 | 0   | 0   | 8 Aut2     | autism susceptibility candidate 2                                  | MGI:1919847 |
| ENSMUST00000161830 | 0   | 0   | 8 Supv3l1  | suppressor of var1, 3-like 1 (S. cerevisiae)                       | MGI:2441711 |
| ENSMUST00000162031 | 0   | 0   | 8 Txndc9   | thioredoxin domain containing 9                                    | MGI:2138153 |
| ENSMUST00000163010 | 0   | 0   | 8 Cep295   | centrosomal protein 295  | MGI:2442521 |

|                    |     |     |                 |   |             |
|--------------------|-----|-----|-----------------|---|-------------|
| ENSMUST00000163558 | 0   | 0   | 8 Ndufaf2       | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, assembly factor 2               | MGI:1922847 |
| ENSMUST00000174162 | 0   | 0   | 8 Xlr3a         | X-linked lymphocyte-regulated 3A  | MGI:109506  |
| ENSMUST00000176657 | 0   | 0   | 8 Hmbox1        | homeobox containing 1   | MGI:2445066 |
| ENSMUST00000178174 | 0   | 0   | 8 Pou3f2        | POU domain, class 3, transcription factor 2   | MGI:101895  |
| ENSMUST00000182911 | 0   | 0   | 8 Sip1l3        | signal-induced proliferation-associated 1 like 3                                    | MGI:1921456 |
| ENSMUST00000149511 | 207 | 218 | 6 Etfdh         | electron transferring flavoprotein, dehydrogenase                                   | MGI:106100  |
| ENSMUST00000143603 | 73  | 57  | 6 Ncoa2         | nuclear receptor coactivator 2  | MGI:1276533 |
| ENSMUST00000110615 | 4   | 14  | 6 Serf2         | small EDRK-rich factor 2  | MGI:1337041 |
| ENSMUST00000081335 | 21  | 12  | 6 Tgif2         | TGFB-induced factor homeobox 2  | MGI:1915299 |
| ENSMUST00000168731 | 4   | 7   | 6 Usf2          | upstream transcription factor 2   | MGI:99961   |
| ENSMUST00000125801 | 4   | 4   | 6 Cdca8         | cell division cycle associated 8  | MGI:1196274 |
| ENSMUST00000126222 | 0   | 3   | 6 Zfp687        | zinc finger protein 687   | MGI:1925516 |
| ENSMUST00000028063 | 4   | 1   | 6 Pter          | phosphotriesterase related  | MGI:107372  |
| ENSMUST00000059362 | 0   | 1   | 6 Synb          | syncytin b  | MGI:3045308 |
| ENSMUST00000152101 | 3   | 1   | 6 Zc3hc1        | zinc finger, C3HC type 1  | MGI:1916023 |
| ENSMUST00000106860 | 2   | 1   | 6 Trim33        | tripartite motif-containing 33  | MGI:2137357 |
| ENSMUST00000150736 | 1   | 1   | 6 Cdkl3         | cyclin-dependent kinase-like 3  | MGI:2388268 |
| ENSMUST00000049185 | 1   | 1   | 6 Ybey          | ybeY metalloproteinase  | MGI:2656825 |
| ENSMUST00000060009 | 1   | 1   | 6 Exd1          | exonuclease 3'-5' domain containing 1   | MGI:3045306 |
| ENSMUST00000107894 | 1   | 1   | 6 Dgke          | diacylglycerol kinase, epsilon  | MGI:1889276 |
| ENSMUST00000111336 | 0   | 1   | 6 Sdhc          | succinate dehydrogenase complex, subunit C, integral membrane protein               | MGI:1913302 |
| ENSMUST00000113364 | 0   | 1   | 6 Pcdh11x       | protocadherin 11 X-linked   | MGI:2442849 |
| ENSMUST00000149929 | 0   | 1   | 6 Ticam2        | toll-like receptor adaptor molecule 2   | MGI:3040056 |
| ENSMUST00000171788 | 0   | 1   | 6 4931428F04Rik | RIKEN cDNA 4931428F04 gene  | MGI:1921606 |
| ENSMUST00000182356 | 2   | 0   | 6 Anks1b        | ankyrin repeat and sterile alpha motif domain containing 1B                         | MGI:1924781 |
| ENSMUST00000109102 | 1   | 0   | 6 Cdyl2         | chromodomain protein, Y chromosome-like 2   | MGI:1923046 |
| ENSMUST00000053681 | 1   | 0   | 6 Frrs1l        | ferric-chelate reductase 1 like   | MGI:2442704 |
| ENSMUST00000070805 | 1   | 0   | 6 Lrrc48        | leucine rich repeat containing 48   | MGI:1921915 |
| ENSMUST00000108086 | 1   | 0   | 6 Hspa4l        | heat shock protein 4 like   | MGI:107422  |
| ENSMUST00000131520 | 1   | 0   | 6 Fam206a       | family with sequence similarity 206, member A                                       | MGI:2677850 |
| ENSMUST00000135013 | 1   | 0   | 6 Poldip3       | polymerase (DNA-directed), delta interacting protein 3                              | MGI:1921076 |
| ENSMUST00000140187 | 1   | 0   | 6 Cdlp1         | cell death inducing Trp53 target 1  | MGI:1913876 |
| ENSMUST00000170233 | 1   | 0   | 6 Timm23        | translocase of inner mitochondrial membrane 23                                      | MGI:1858317 |
| ENSMUST00000005952 | 0   | 0   | 6 Slc30a4       | solute carrier family 30 (zinc transporter), member 4                               | MGI:1345282 |
| ENSMUST00000011285 | 0   | 0   | 6 Fgf11         | fibroblast growth factor 11   | MGI:109167  |
| ENSMUST00000014457 | 0   | 0   | 6 Cox6c         | cytochrome c oxidase subunit VIc  | MGI:104614  |
| ENSMUST00000022416 | 0   | 0   | 6 Anxa11        | annexin A11   | MGI:108481  |
| ENSMUST00000022497 | 0   | 0   | 6 Spryd7        | SPRY domain containing 7  | MGI:1913924 |
| ENSMUST00000025350 | 0   | 0   | 6 Dcp2          | decapping mRNA 2  | MGI:1917890 |
| ENSMUST00000028175 | 0   | 0   | 6 Cytip         | cytohesin 1 interacting protein   | MGI:2183535 |
| ENSMUST00000030021 | 0   | 0   | 6 Coro2a        | coronin, actin binding protein 2A   | MGI:1345966 |
| ENSMUST00000030201 | 0   | 0   | 6 Gne           | glucosamine (UDP-N-acetyl)-2-epimerase/N-acetylmannosamine kinase                   | MGI:1354951 |
| ENSMUST00000030533 | 0   | 0   | 6 Vwa5b1        | von Willebrand factor A domain containing 5B1                                       | MGI:1922968 |
| ENSMUST00000033541 | 0   | 0   | 6 Fundc2        | FUN14 domain containing 2   | MGI:1914641 |
| ENSMUST00000049248 | 0   | 0   | 6 Malt1         | MALT1 paracaspase   | MGI:2445027 |
| ENSMUST00000066640 | 0   | 0   | 6 Nanp          | N-acetylneuraminic acid phosphatase   | MGI:1914561 |
| ENSMUST00000074262 | 0   | 0   | 6 Calclrl       | calcitonin receptor-like  | MGI:1926944 |
| ENSMUST00000075052 | 0   | 0   | 6 Kcnh7         | potassium voltage-gated channel, subfamily H (eag-related), member 7                | MGI:2159566 |
| ENSMUST00000075872 | 0   | 0   | 6 Mysm1         | myb-like, SWIRM and MPN domains 1   | MGI:2444584 |
| ENSMUST00000096184 | 0   | 0   | 6 Gm5796        | predicted gene 5796   | MGI:3779522 |
| ENSMUST00000105718 | 0   | 0   | 6 Zfp933        | zinc finger protein 933   | MGI:1922865 |
| ENSMUST00000105778 | 0   | 0   | 6 Prdm2         | PR domain containing 2, with ZNF domain   | MGI:107628  |
| ENSMUST00000108556 | 0   | 0   | 6 Pld2          | phospholipase D2  | MGI:892877  |
| ENSMUST00000110480 | 0   | 0   | 6 Shc4          | SHC (Src homology 2 domain containing) family, member 4                             | MGI:2655364 |
| ENSMUST00000112636 | 0   | 0   | 6 Galnt13       | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 13 | MGI:2139447 |

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|--------------------|----|----|-----------------|---|-------------|
| ENSMUST00000112758 | 0  | 0  | 6 Gm3383        | predicted gene 3383   | MGI:3781561 |
| ENSMUST00000112778 | 0  | 0  | 6 2610042L04Rik | RIKEN cDNA 2610042L04 gene  | MGI:1914305 |
| ENSMUST00000113302 | 0  | 0  | 6 Tomm6         | translocase of outer mitochondrial membrane 6 homolog (yeast)                   | MGI:1913369 |
| ENSMUST00000115526 | 0  | 0  | 6 Tspan7        | tetraspanin 7   | MGI:1298407 |
| ENSMUST00000117134 | 0  | 0  | 6 Slc12a8       | solute carrier family 12 (potassium/chloride transporters), member 8            | MGI:2443672 |
| ENSMUST00000119792 | 0  | 0  | 6 Anapc7        | anaphase promoting complex subunit 7  | MGI:1929711 |
| ENSMUST00000125150 | 0  | 0  | 6 Ophn1         | oligophrenin 1  | MGI:2151070 |
| ENSMUST00000128208 | 0  | 0  | 6 Pla2r1        | phospholipase A2 receptor 1   | MGI:102468  |
| ENSMUST00000130995 | 0  | 0  | 6 Tor1aip1      | torsin A interacting protein 1  | MGI:3582693 |
| ENSMUST00000131955 | 0  | 0  | 6 Ndrp3         | N-myc downstream regulated gene 3   | MGI:1352499 |
| ENSMUST00000133564 | 0  | 0  | 6 Esr2          | estrogen receptor 2 (beta)  | MGI:109392  |
| ENSMUST00000135184 | 0  | 0  | 6 Mx1           | MX dynamin-like GTPase 1  | MGI:97243   |
| ENSMUST00000138463 | 0  | 0  | 6 Alpl          | alkaline phosphatase, liver/bone/kidney   | MGI:87983   |
| ENSMUST00000143182 | 0  | 0  | 6 Tmem87a       | transmembrane protein 87A   | MGI:2441844 |
| ENSMUST00000143312 | 0  | 0  | 6 Fkbp14        | FK506 binding protein 14  | MGI:2387639 |
| ENSMUST00000148012 | 0  | 0  | 6 Oscar         | osteoclast associated receptor  | MGI:2179720 |
| ENSMUST00000148809 | 0  | 0  | 6 Ddx18         | DEAD (Asp-Glu-Ala-Asp) box polypeptide 18                                       | MGI:1914192 |
| ENSMUST00000150468 | 0  | 0  | 6 Ctns          | cystinosis, nephropathic  | MGI:1932872 |
| ENSMUST00000161861 | 0  | 0  | 6 Fgd4          | FYVE, RhoGEF and PH domain containing 4   | MGI:2183747 |
| ENSMUST00000163325 | 0  | 0  | 6 Gm9602        | predicted gene 9602   | MGI:3780010 |
| ENSMUST00000163636 | 0  | 0  | 6 Gm8356        | predicted gene 8356   | MGI:3779798 |
| ENSMUST00000163790 | 0  | 0  | 6 Gm3558        | predicted gene 3558   | MGI:3781735 |
| ENSMUST00000164252 | 0  | 0  | 6 Mettl17       | methyltransferase like 17   | MGI:1098577 |
| ENSMUST00000164366 | 0  | 0  | 6 Gm3752        | predicted gene 3752   | MGI:3781927 |
| ENSMUST00000164484 | 0  | 0  | 6 Gm8237        | predicted gene 8237   | MGI:3644039 |
| ENSMUST00000164512 | 0  | 0  | 6 Gm2974        | predicted gene 2974   | MGI:3781152 |
| ENSMUST00000165193 | 0  | 0  | 6 Gm3468        | predicted gene 3468   | MGI:3781644 |
| ENSMUST00000165387 | 0  | 0  | 6 Mapre2        | microtubule-associated protein, RP/EB family, member 2                          | MGI:106271  |
| ENSMUST00000166618 | 0  | 0  | 6 Gm6356        | predicted gene 6356   | MGI:3646390 |
| ENSMUST00000166928 | 0  | 0  | 6 Gm3115        | predicted gene 3115   | MGI:3781291 |
| ENSMUST00000167923 | 0  | 0  | 6 Gm3696        | predicted gene 3696   | MGI:3781872 |
| ENSMUST00000168088 | 0  | 0  | 6 Gm6337        | predicted gene 6337   | MGI:3646283 |
| ENSMUST00000168480 | 0  | 0  | 6 Gm21560       | predicted gene, 21560   | MGI:5434915 |
| ENSMUST00000169555 | 0  | 0  | 6 Gm3755        | predicted gene 3755   | MGI:3781930 |
| ENSMUST00000170104 | 0  | 0  | 6 Gm3411        | predicted gene 3411   | MGI:3781589 |
| ENSMUST00000170207 | 0  | 0  | 6 Gm8108        | predicted gene 8108   | MGI:3779783 |
| ENSMUST00000170694 | 0  | 0  | 6 Gm2237        | predicted gene 2237   | MGI:3780407 |
| ENSMUST00000171428 | 0  | 0  | 6 Gm8206        | predicted gene 8206   | MGI:3779788 |
| ENSMUST00000171706 | 0  | 0  | 6 Gm3629        | predicted gene 3629   | MGI:3781805 |
| ENSMUST00000171906 | 0  | 0  | 6 Gm3667        | predicted gene 3667   | MGI:3781843 |
| ENSMUST00000171987 | 0  | 0  | 6 Gm8050        | predicted gene 8050   | MGI:3779779 |
| ENSMUST00000175700 | 0  | 0  | 6 Cyyr1         | cysteine and tyrosine-rich protein 1  | MGI:2152187 |
| ENSMUST00000176860 | 0  | 0  | 6 Bco1          | beta-carotene oxygenase 1   | MGI:1926923 |
| ENSMUST00000177786 | 0  | 0  | 6 Gm2956        | predicted gene 2956   | MGI:3781134 |
| ENSMUST00000178728 | 0  | 0  | 6 Gm3005        | predicted gene 3005   | MGI:3781183 |
| ENSMUST00000180867 | 0  | 0  | 6 Gm3194        | predicted gene 3194   | MGI:3781373 |
| ENSMUST00000180934 | 0  | 0  | 6 Gm3033        | predicted gene 3033   | MGI:3781211 |
| ENSMUST00000182242 | 0  | 0  | 6 Rbm6          | RNA binding motif protein 6   | MGI:1338037 |
| ENSMUST00000182747 | 0  | 0  | 6 Smchd1        | SMC hinge domain containing 1   | MGI:1921605 |
| ENSMUST00000183482 | 0  | 0  | 6 Htr1b         | 5-hydroxytryptamine (serotonin) receptor 1B                                     | MGI:96274   |
| ENSMUST00000029297 | 44 | 73 | 4 Slc7a11       | solute carrier family 7 (cationic amino acid transporter, y+ system), member 11 | MGI:1347355 |
| ENSMUST00000072602 | 89 | 55 | 4 Hvcn1         | hydrogen voltage-gated channel 1  | MGI:1921346 |
| ENSMUST00000174300 | 11 | 21 | 4 Yap1          | yes-associated protein 1  | MGI:103262  |
| ENSMUST00000127979 | 5  | 10 | 4 Zfp65         | zinc finger protein 65  | MGI:107769  |
| ENSMUST00000144139 | 5  | 9  | 4 Zdhhc21       | zinc finger, DHHC domain containing 21  | MGI:1915518 |

|                    |      |      |                  |  |             |
|--------------------|------|------|------------------|--|-------------|
| ENSMUST00000126755 | 12   | 9    | 4 Cpne5          | copine V   | MGI:2385908 |
| ENSMUST00000152520 | 3    | 7    | 4 Setd4          | SET domain containing 4  | MGI:2136890 |
| ENSMUST00000040789 | 9    | 7    | 4 Qpct           | glutaminy-peptide cyclotransferase (glutaminy cyclase)                   | MGI:1917786 |
| ENSMUST00000035840 | 3    | 7    | 4 Zdhhc5         | zinc finger, DHHC domain containing 5                                    | MGI:1923573 |
| ENSMUST00000044434 | 5    | 3    | 4 Crx            | cone-rod homeobox  | MGI:1194883 |
| ENSMUST00000150785 | 7    | 3    | 4 Mboat7         | membrane bound O-acyltransferase domain containing 7                     | MGI:1924832 |
| ENSMUST00000014911 | 6    | 3    | 4 Tbp            | TATA box binding protein   | MGI:101838  |
| ENSMUST00000119292 | 13   | 1    | 4 Ighmbp2        | immunoglobulin mu binding protein 2                                      | MGI:99954   |
| ENSMUST00000124939 | 5    | 0    | 4 Zbtb49         | zinc finger and BTB domain containing 49                                 | MGI:1922329 |
| ENSMUST00000172608 | 53   | 56   | 2 Kifc1          | kinesin family member C1   | MGI:109596  |
| ENSMUST00000101295 | 21   | 26   | 2 9930111J21Rik2 | RIKEN cDNA 9930111J21 gene 2   | MGI:3711310 |
| ENSMUST00000142809 | 10   | 15   | 2 Rbm18          | RNA binding motif protein 18   | MGI:1915139 |
| ENSMUST00000177768 | 24   | 14   | 2 Fam177a        | family with sequence similarity 177, member A                            | MGI:1920635 |
| ENSMUST00000144910 | 8    | 12   | 2 Arl4a          | ADP-ribosylation factor-like 4A  | MGI:99437   |
| ENSMUST00000127251 | 16   | 12   | 2 Gm14443        | predicted gene 14443   | MGI:3652324 |
| ENSMUST00000050859 | 11   | 12   | 2 Cmah           | cytidine monophospho-N-acetylneuraminic acid hydroxylase                 | MGI:103227  |
| ENSMUST00000047762 | 7    | 11   | 2 Gata6          | GATA binding protein 6   | MGI:107516  |
| ENSMUST00000027056 | 4    | 10   | 2 Prex2          | phosphatidylinositol-3,4,5-trisphosphate-dependent Rac exchange factor 2 | MGI:1923385 |
| ENSMUST00000099007 | 10   | 8    | 2 Gm14296        | predicted gene 14296   | MGI:3708667 |
| ENSMUST00000180100 | 21   | 2    | 2 Gm10097        | predicted gene 10097   | MGI:3642295 |
| ENSMUST00000175892 | 67   | 1    | 2 Ros1           | Ros1 proto-oncogene  | MGI:97999   |
| ENSMUST00000171691 | 10   | 1    | 2 Mdga1          | MAM domain containing glycosylphosphatidylinositol anchor 1              | MGI:1922012 |
| ENSMUST00000034863 | 7    | 0    | 2 Csk            | c-src tyrosine kinase  | MGI:88537   |
| ENSMUST00000072777 | 1849 | 1896 | 0 Hmga2          | high mobility group AT-hook 2  | MGI:101761  |
| ENSMUST00000113385 | 1233 | 1700 | 0 Sp140          | Sp140 nuclear body protein   | MGI:3702467 |
| ENSMUST00000161494 | 1302 | 1496 | 0 Glcci1         | glucocorticoid induced transcript 1                                      | MGI:2179717 |
| ENSMUST00000147835 | 1135 | 1473 | 0 Rasl2-9        | RAS-like, family 2, locus 9  | MGI:104605  |
| ENSMUST00000117687 | 816  | 1466 | 0 Ppp2r2b        | protein phosphatase 2, regulatory subunit B, beta                        | MGI:1920180 |
| ENSMUST00000161685 | 1142 | 1394 | 0 C130026I21Rik  | RIKEN cDNA C130026I21 gene   | MGI:3612702 |
| ENSMUST00000031628 | 965  | 1330 | 0 Ptdc1          | pentatricopeptide repeat domain 1  | MGI:1919049 |
| ENSMUST00000034279 | 1122 | 1023 | 0 Gse1           | genetic suppressor element 1, coiled-coil protein                        | MGI:1098275 |
| ENSMUST00000047978 | 748  | 847  | 0 Rabif          | RAB interacting factor   | MGI:2138605 |
| ENSMUST00000130032 | 566  | 705  | 0 Carm1          | coactivator-associated arginine methyltransferase 1                      | MGI:1913208 |
| ENSMUST00000102581 | 402  | 568  | 0 Kctd10         | potassium channel tetramerisation domain containing 10                   | MGI:2141207 |
| ENSMUST00000103195 | 355  | 462  | 0 Znhit3         | zinc finger, HIT type 3  | MGI:3051596 |
| ENSMUST00000163949 | 252  | 408  | 0 Mest           | mesoderm specific transcript   | MGI:96968   |
| ENSMUST00000129762 | 388  | 384  | 0 Crybg3         | beta-gamma crystallin domain containing 3                                | MGI:2676311 |
| ENSMUST00000029270 | 252  | 345  | 0 Ccna2          | cyclin A2  | MGI:108069  |
| ENSMUST00000029165 | 255  | 331  | 0 1110008F13Rik  | RIKEN cDNA 1110008F13 gene   | MGI:1914638 |
| ENSMUST00000115365 | 274  | 321  | 0 Tmem243        | transmembrane protein 243, mitochondrial                                 | MGI:3606159 |
| ENSMUST00000033662 | 327  | 296  | 0 Pdha1          | pyruvate dehydrogenase E1 alpha 1  | MGI:97532   |
| ENSMUST00000029164 | 253  | 296  | 0 Sla2           | Src-like-adaptor 2   | MGI:1925049 |
| ENSMUST00000032775 | 246  | 290  | 0 Lrrc28         | leucine rich repeat containing 28  | MGI:1915689 |
| ENSMUST00000143681 | 195  | 282  | 0 Rbbp7          | retinoblastoma binding protein 7   | MGI:1194910 |
| ENSMUST00000159592 | 221  | 278  | 0 Ssh1           | slingshot homolog 1 (Drosophila)   | MGI:2686240 |
| ENSMUST00000172314 | 272  | 265  | 0 Hbp1           | high mobility group box transcription factor 1                           | MGI:894659  |
| ENSMUST00000131950 | 178  | 259  | 0 Sp110          | Sp110 nuclear body protein   | MGI:1923364 |
| ENSMUST00000130528 | 139  | 251  | 0 Raf1           | v-raf-leukemia viral oncogene 1  | MGI:97847   |
| ENSMUST00000031288 | 244  | 244  | 0 Tfip11         | tufelin interacting protein 11   | MGI:1930075 |
| ENSMUST00000048774 | 198  | 242  | 0 Copg2          | coatamer protein complex, subunit gamma 2                                | MGI:1858683 |
| ENSMUST00000146526 | 244  | 237  | 0 Gins2          | GINS complex subunit 2 (Psf2 homolog)                                    | MGI:1921019 |
| ENSMUST00000053819 | 64   | 221  | 0 Srsf4          | serine/arginine-rich splicing factor 4                                   | MGI:1890577 |
| ENSMUST00000112370 | 258  | 210  | 0 Mfsd4a         | major facilitator superfamily domain containing 4A                       | MGI:2442786 |
| ENSMUST00000112316 | 122  | 204  | 0 Txlng          | taxilin gamma  | MGI:3590652 |
| ENSMUST00000162594 | 101  | 202  | 0 Bud31          | BUD31 homolog  | MGI:2141291 |

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|---------------------|-----|-----|-----------------|--|-------------|
| ENSMUST00000023062  | 129 | 201 | 0 Tomm22        | translocase of outer mitochondrial membrane 22 homolog (yeast) | MGI:2450248 |
| ENSMUST00000159292  | 187 | 199 | 0 Osgep         | O-sialoglycoprotein endopeptidase                              | MGI:1913496 |
| ENSMUST00000174507  | 167 | 194 | 0 Kifc1         | kinesin family member C1                                       | MGI:109596  |
| ENSMUST00000078218  | 138 | 193 | 0 Serhl         | serine hydrolase-like  | MGI:1890404 |
| ENSMUST00000131532  | 196 | 192 | 0 Kif24         | kinesin family member 24                                       | MGI:1918345 |
| ENSMUST00000025279  | 203 | 184 | 0 Npc1          | Niemann-Pick type C1   | MGI:1097712 |
| ENSMUST00000014640  | 149 | 178 | 0 Ankrd28       | ankyrin repeat domain 28                                       | MGI:2145661 |
| ENSMUST00000149604  | 75  | 178 | 0 Syna          | syncytin a   | MGI:2684898 |
| ENSMUST00000145259  | 168 | 177 | 0 Ncaph2        | non-SMC condensin II complex, subunit H2                       | MGI:1289164 |
| ENSMUST00000154951  | 172 | 174 | 0 Tspan18       | tetraspanin 18   | MGI:1917186 |
| ENSMUST00000165665  | 157 | 172 | 0 Arhgef12      | Rho guanine nucleotide exchange factor (GEF) 12                | MGI:1916882 |
| ENSMUST00000075724  | 124 | 172 | 0 Rfxank        | regulatory factor X-associated ankyrin-containing protein      | MGI:1333865 |
| ENSMUST00000034187  | 110 | 169 | 0 Mmp2          | matrix metalloproteinase 2                                     | MGI:97009   |
| ENSMUST00000058139  | 150 | 169 | 0 Slc38a6       | solute carrier family 38, member 6                             | MGI:3648156 |
| ENSMUST00000113917  | 138 | 164 | 0 Pigp          | phosphatidylinositol glycan anchor biosynthesis, class P       | MGI:1860433 |
| ENSMUST00000176035  | 85  | 164 | 0 Amz1          | archaelysin family metalloproteinase 1                         | MGI:2442258 |
| ENSMUST00000116492  | 132 | 163 | 0 Ubp1          | upstream binding protein 1                                     | MGI:104889  |
| ENSMUST00000078404  | 141 | 160 | 0 Pcbp2         | poly(rC) binding protein 2                                     | MGI:108202  |
| ENSMUST00000018184  | 154 | 156 | 0 Rrp7a         | ribosomal RNA processing 7 homolog A (S. cerevisiae)           | MGI:1922028 |
| ENSMUST00000111289  | 87  | 155 | 0 Nit1          | nitrilase 1  | MGI:1350916 |
| ENSMUST00000117971  | 147 | 151 | 0 Bcl7a         | B cell CLL/lymphoma 7A   | MGI:1924295 |
| ENSMUST00000125203  | 110 | 150 | 0 Optn          | optineurin   | MGI:1918898 |
| ENSMUST00000162626  | 132 | 148 | 0 Psma3         | proteasome (prosome, macropain) subunit, alpha type 3          | MGI:104883  |
| ENSMUST00000034947  | 131 | 148 | 0 Ppiib         | peptidylprolyl isomerase B                                     | MGI:97750   |
| ENSMUST00000020579  | 125 | 148 | 0 Hmnr          | hyaluronan mediated motility receptor (RHAMM)                  | MGI:104667  |
| ENSMUST00000030471  | 154 | 146 | 0 Lrrc41        | leucine rich repeat containing 41                              | MGI:2441984 |
| ENSMUST00000132484  | 104 | 145 | 0 Spopl         | speckle-type POZ protein-like                                  | MGI:1924107 |
| ENSMUST000000009157 | 147 | 142 | 0 Dynl1         | dynein light chain LC8-type 1                                  | MGI:1861457 |
| ENSMUST00000141419  | 115 | 142 | 0 Ppp1r12b      | protein phosphatase 1, regulatory (inhibitor) subunit 12B      | MGI:1916417 |
| ENSMUST00000035090  | 130 | 141 | 0 Fbxl2         | F-box and leucine-rich repeat protein 2                        | MGI:1919429 |
| ENSMUST00000139970  | 127 | 141 | 0 Ncoa2         | nuclear receptor coactivator 2                                 | MGI:1276533 |
| ENSMUST00000039949  | 93  | 136 | 0 Eme1          | essential meiotic structure-specific endonuclease 1            | MGI:3576783 |
| ENSMUST00000125019  | 114 | 133 | 0 Pak2          | p21 protein (Cdc42/Rac)-activated kinase 2                     | MGI:1339984 |
| ENSMUST00000060108  | 113 | 128 | 0 1810030O07Rik | RIKEN cDNA 1810030O07 gene                                     | MGI:1916405 |
| ENSMUST00000153970  | 148 | 118 | 0 Fbxo22        | F-box protein 22   | MGI:1926014 |
| ENSMUST00000122873  | 110 | 116 | 0 Ube2l3        | ubiquitin-conjugating enzyme E2L 3                             | MGI:109240  |
| ENSMUST00000115699  | 77  | 112 | 0 Ube2l3        | ubiquitin-conjugating enzyme E2L 3                             | MGI:109240  |
| ENSMUST00000156725  | 75  | 112 | 0 Fbxl18        | F-box and leucine-rich repeat protein 18                       | MGI:2444450 |
| ENSMUST00000085876  | 120 | 111 | 0 Ifi208        | interferon activated gene 208                                  | MGI:2442822 |
| ENSMUST00000071739  | 87  | 108 | 0 Gsk3a         | glycogen synthase kinase 3 alpha                               | MGI:2152453 |
| ENSMUST00000155756  | 74  | 108 | 0 Srrd          | SRR1 domain containing   | MGI:1917368 |
| ENSMUST00000112725  | 34  | 106 | 0 Apex2         | apurinic/apyrimidinic endonuclease 2                           | MGI:1924872 |
| ENSMUST00000109769  | 104 | 104 | 0 Cdc14b        | CDC14 cell division cycle 14B                                  | MGI:2441808 |
| ENSMUST00000071555  | 70  | 102 | 0 Actg1         | actin, gamma, cytoplasmic 1                                    | MGI:87906   |
| ENSMUST00000091299  | 78  | 101 | 0 Cdk7          | cyclin-dependent kinase 7                                      | MGI:102956  |
| ENSMUST00000026704  | 58  | 99  | 0 Cct8          | chaperonin containing Tcp1, subunit 8 (theta)                  | MGI:107183  |
| ENSMUST00000136126  | 82  | 99  | 0 Rapgef2       | Rap guanine nucleotide exchange factor (GEF) 2                 | MGI:2659071 |
| ENSMUST00000163995  | 75  | 97  | 0 Coro1c        | coronin, actin binding protein 1C                              | MGI:1345964 |
| ENSMUST00000051401  | 73  | 96  | 0 Cldn4         | claudin 4  | MGI:1313314 |
| ENSMUST00000099061  | 73  | 95  | 0 Cass4         | Cas scaffolding protein family member 4                        | MGI:2444482 |
| ENSMUST00000043966  | 62  | 94  | 0 Mrpl47        | mitochondrial ribosomal protein L47                            | MGI:1921850 |
| ENSMUST00000132102  | 85  | 92  | 0 Gtf3a         | general transcription factor III A                             | MGI:1913846 |
| ENSMUST00000000940  | 59  | 90  | 0 Nsun5         | NOL1/NOP2/Sun domain family, member 5                          | MGI:2140844 |
| ENSMUST00000002839  | 71  | 87  | 0 Ppp2r5d       | protein phosphatase 2, regulatory subunit B', delta            | MGI:2388481 |
| ENSMUST00000004646  | 61  | 86  | 0 Coro1c        | coronin, actin binding protein 1C                              | MGI:1345964 |

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|---------------------|----|----|-----------------|---|-------------|
| ENSMUST00000038434  | 81 | 85 | 0 Rpp25l        | ribonuclease P/MRP 25 subunit-like  | MGI:1917211 |
| ENSMUST00000164890  | 52 | 85 | 0 Lpar2         | lysophosphatidic acid receptor 2  | MGI:1858422 |
| ENSMUST00000184123  | 39 | 85 | 0 Ccpg1os       | cell cycle progression 1, opposite strand   | MGI:3648770 |
| ENSMUST00000123229  | 57 | 84 | 0 Rps6          | ribosomal protein S6  | MGI:98159   |
| ENSMUST00000178218  | 47 | 84 | 0 Dhx33         | DEAH (Asp-Glu-Ala-His) box polypeptide 33   | MGI:2445102 |
| ENSMUST00000139147  | 44 | 84 | 0 Rad54l        | RAD54 like (S. cerevisiae)  | MGI:894697  |
| ENSMUST00000121902  | 75 | 82 | 0 1700030K09Rik | RIKEN cDNA 1700030K09 gene  | MGI:1919504 |
| ENSMUST00000025241  | 50 | 81 | 0 Ercc3         | excision repair cross-complementing rodent repair deficiency, complementation group 3 | MGI:95414   |
| ENSMUST00000119015  | 56 | 81 | 0 Pptc7         | PTC7 protein phosphatase homolog  | MGI:2444593 |
| ENSMUST00000164853  | 36 | 81 | 0 Ccdc24        | coiled-coil domain containing 24  | MGI:2685874 |
| ENSMUST00000107498  | 44 | 80 | 0 Gon4l         | gon-4-like (C.elegans)  | MGI:1917579 |
| ENSMUST00000160571  | 14 | 79 | 0 Mina          | myc induced nuclear antigen   | MGI:1914264 |
| ENSMUST00000176692  | 66 | 79 | 0 Slc13a1       | solute carrier family 13 (sodium/sulfate symporters), member 1                        | MGI:1859937 |
| ENSMUST00000128788  | 68 | 78 | 0 Ift20         | intraflagellar transport 20   | MGI:1915585 |
| ENSMUST00000111300  | 44 | 77 | 0 Dedd          | death effector domain-containing  | MGI:1333874 |
| ENSMUST00000021239  | 62 | 76 | 0 Lrrc59        | leucine rich repeat containing 59   | MGI:2138133 |
| ENSMUST000000091701 | 33 | 76 | 0 Hist1h3a      | histone cluster 1, H3a  | MGI:2668828 |
| ENSMUST00000153256  | 58 | 75 | 0 Pdzk1         | PDZ domain containing 1   | MGI:1928901 |
| ENSMUST00000002845  | 54 | 75 | 0 Mea1          | male enhanced antigen 1   | MGI:96957   |
| ENSMUST000000024702 | 86 | 74 | 0 Paqr4         | progesterin and adipoQ receptor family member IV                                      | MGI:1923748 |
| ENSMUST00000132846  | 53 | 72 | 0 Ppia          | peptidylprolyl isomerase A  | MGI:97749   |
| ENSMUST00000046839  | 64 | 72 | 0 Gfer          | growth factor, erv1 (S. cerevisiae)-like (augmenter of liver regeneration)            | MGI:107757  |
| ENSMUST00000156187  | 97 | 69 | 0 Efcab6        | EF-hand calcium binding domain 6  | MGI:1924877 |
| ENSMUST00000100775  | 69 | 69 | 0 Rad1          | RAD1 checkpoint DNA exonuclease   | MGI:1316678 |
| ENSMUST00000035988  | 57 | 68 | 0 Txndc5        | thioredoxin domain containing 5   | MGI:2145316 |
| ENSMUST00000103172  | 47 | 67 | 0 Dstn          | desmin  | MGI:1929270 |
| ENSMUST00000031613  | 78 | 66 | 0 Aimp2         | aminoacyl tRNA synthetase complex-interacting multifunctional protein 2               | MGI:2385237 |
| ENSMUST00000006675  | 31 | 66 | 0 Mtif3         | mitochondrial translational initiation factor 3                                       | MGI:1923616 |
| ENSMUST00000110613  | 52 | 65 | 0 Serinc4       | serine incorporator 4   | MGI:2441842 |
| ENSMUST000000057343 | 47 | 61 | 0 Ptbp1         | polypyrimidine tract binding protein 1  | MGI:97791   |
| ENSMUST00000160510  | 54 | 60 | 0 Tbce          | tubulin-specific chaperone E  | MGI:1917680 |
| ENSMUST00000135531  | 64 | 58 | 0 Nrg4          | neuregulin 4  | MGI:1933833 |
| ENSMUST00000109207  | 47 | 58 | 0 Ube2v1        | ubiquitin-conjugating enzyme E2 variant 1   | MGI:1913839 |
| ENSMUST00000111171  | 27 | 57 | 0 Pom121        | nuclear pore membrane protein 121   | MGI:2137624 |
| ENSMUST00000136329  | 45 | 56 | 0 Tuba1a        | tubulin, alpha 1A   | MGI:98869   |
| ENSMUST00000113249  | 24 | 55 | 0 Trnt1         | tRNA nucleotidyl transferase, CCA-adding, 1   | MGI:1917297 |
| ENSMUST00000059372  | 37 | 54 | 0 Rnf24         | ring finger protein 24  | MGI:1261771 |
| ENSMUST00000021818  | 44 | 53 | 0 Cenpp         | centromere protein P  | MGI:1913586 |
| ENSMUST00000184105  | 27 | 53 | 0 Pank2         | pantothenate kinase 2   | MGI:1921700 |
| ENSMUST00000100487  | 27 | 53 | 0 Eif2ak1       | eukaryotic translation initiation factor 2 alpha kinase 1                             | MGI:1353448 |
| ENSMUST00000124499  | 57 | 51 | 0 Lcp1          | lymphocyte cytosolic protein 1  | MGI:104808  |
| ENSMUST00000112810  | 57 | 49 | 0 Gtdc1         | glycosyltransferase-like domain containing 1  | MGI:2444269 |
| ENSMUST00000161624  | 48 | 49 | 0 Fgd4          | FYVE, RhoGEF and PH domain containing 4   | MGI:2183747 |
| ENSMUST00000008812  | 28 | 49 | 0 Rps18         | ribosomal protein S18   | MGI:98146   |
| ENSMUST00000023846  | 24 | 49 | 0 Lrrc71        | leucine rich repeat containing 71   | MGI:1921735 |
| ENSMUST000000075946 | 29 | 49 | 0 Eaf2          | ELL associated factor 2   | MGI:2146616 |
| ENSMUST00000166737  | 27 | 49 | 0 Zfp488        | zinc finger protein 488   | MGI:2686052 |
| ENSMUST00000111518  | 61 | 47 | 0 Fmo1          | flavin containing monooxygenase 1   | MGI:1310002 |
| ENSMUST00000155990  | 18 | 47 | 0 Ebp41         | erythrocyte membrane protein band 4.1   | MGI:95401   |
| ENSMUST000000066880 | 42 | 45 | 0 Capn12        | calpain 12  | MGI:1891369 |
| ENSMUST000000089185 | 34 | 45 | 0 Zdhc14        | zinc finger, DHHC domain containing 14  | MGI:2653229 |
| ENSMUST00000139734  | 26 | 45 | 0 Idua          | iduronidase, alpha-L-   | MGI:96418   |
| ENSMUST00000147891  | 23 | 45 | 0 Son           | Son DNA binding protein   | MGI:98353   |
| ENSMUST00000128616  | 16 | 45 | 0 Malsu1        | mitochondrial assembly of ribosomal large subunit 1                                   | MGI:1922843 |
| ENSMUST00000002172  | 37 | 43 | 0 Acp2          | acid phosphatase 2, lysosomal   | MGI:87882   |



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|--------------------|----|----|-----------------|---|-------------|
| ENSMUST00000040069 | 36 | 42 | 0 Colec12       | collectin sub-family member 12  | MGI:2152907 |
| ENSMUST00000091186 | 38 | 41 | 0 Intu          | inturned planar cell polarity protein   | MGI:2443752 |
| ENSMUST00000174512 | 25 | 41 | 0 Zfp101        | zinc finger protein 101   | MGI:107547  |
| ENSMUST00000015017 | 50 | 41 | 0 Surf2         | surfeit gene 2  | MGI:98444   |
| ENSMUST00000115706 | 31 | 39 | 0 YdjC          | YdjC homolog (bacterial)  | MGI:1916351 |
| ENSMUST00000033665 | 10 | 39 | 0 Map3k15       | mitogen-activated protein kinase kinase kinase 15                                     | MGI:2448588 |
| ENSMUST00000131316 | 10 | 39 | 0 Exosc9        | exosome component 9   | MGI:1355319 |
| ENSMUST00000153383 | 29 | 37 | 0 Txndc16       | thioredoxin domain containing 16  | MGI:1917811 |
| ENSMUST00000037548 | 27 | 37 | 0 Rnf146        | ring finger protein 146   | MGI:1915281 |
| ENSMUST00000065716 | 33 | 37 | 0 Eml5          | echinoderm microtubule associated protein like 5                                      | MGI:2442513 |
| ENSMUST00000164980 | 31 | 37 | 0 Coro1c        | coronin, actin binding protein 1C   | MGI:1345964 |
| ENSMUST00000112969 | 36 | 35 | 0 Paqr3         | progesterone and adipoQ receptor family member III                                    | MGI:2679683 |
| ENSMUST00000108060 | 28 | 35 | 0 Ubap1         | ubiquitin-associated protein 1  | MGI:2149543 |
| ENSMUST00000037375 | 41 | 35 | 0 Eps8l3        | EPS8-like 3   | MGI:2139743 |
| ENSMUST00000058437 | 22 | 34 | 0 Rpl7          | ribosomal protein L7  | MGI:98073   |
| ENSMUST00000116468 | 22 | 32 | 0 Mphosph8      | M-phase phosphoprotein 8  | MGI:1922589 |
| ENSMUST00000117263 | 19 | 32 | 0 Rad9b         | RAD9 checkpoint clamp component B   | MGI:2385231 |
| ENSMUST00000177486 | 36 | 31 | 0 Ercc1         | excision repair cross-complementing rodent repair deficiency, complementation group 1 | MGI:95412   |
| ENSMUST00000173492 | 22 | 31 | 0 Kifc1         | kinesin family member C1  | MGI:109596  |
| ENSMUST00000070223 | 18 | 31 | 0 Khdc1c        | KH domain containing 1C   | MGI:3583007 |
| ENSMUST00000154832 | 38 | 30 | 0 Gga3          | golgi associated, gamma adaptin ear containing, ARF binding protein 3                 | MGI:2384159 |
| ENSMUST00000020649 | 27 | 30 | 0 Rad50         | RAD50 double strand break repair protein  | MGI:109292  |
| ENSMUST00000143214 | 20 | 30 | 0 Ppil4         | peptidylprolyl isomerase (cyclophilin)-like 4   | MGI:1914668 |
| ENSMUST00000160488 | 20 | 30 | 0 Slirp         | SRA stem-loop interacting RNA binding protein   | MGI:1916394 |
| ENSMUST00000184704 | 0  | 30 | 0 1110065P20Rik | RIKEN cDNA 1110065P20 gene  | MGI:1916170 |
| ENSMUST00000142200 | 58 | 30 | 0 Fbxo5         | F-box protein 5   | MGI:1914391 |
| ENSMUST00000034700 | 31 | 29 | 0 Yipf2         | Yip1 domain family, member 2  | MGI:1922016 |
| ENSMUST00000023285 | 27 | 29 | 0 Tymp          | thymidine phosphorylase   | MGI:1920212 |
| ENSMUST00000169838 | 11 | 29 | 0 Tiam2         | T cell lymphoma invasion and metastasis 2   | MGI:1344338 |
| ENSMUST00000044532 | 5  | 29 | 0 Dock3         | dedicator of cyto-kinesis 3   | MGI:2429763 |
| ENSMUST00000094532 | 27 | 28 | 0 Gm20449       | predicted gene 20449  | MGI:5141914 |
| ENSMUST00000138240 | 27 | 28 | 0 Tacc3         | transforming, acidic coiled-coil containing protein 3                                 | MGI:1341163 |
| ENSMUST00000125652 | 22 | 28 | 0 Diablo        | diablo, IAP-binding mitochondrial protein   | MGI:1913843 |
| ENSMUST00000159645 | 13 | 28 | 0 Vprbp         | Vpr (HIV-1) binding protein   | MGI:2445220 |
| ENSMUST00000033290 | 33 | 28 | 0 Dhx32         | DEAH (Asp-Glu-Ala-His) box polypeptide 32   | MGI:2141813 |
| ENSMUST00000064941 | 30 | 28 | 0 Nr1d1         | nuclear receptor subfamily 1, group D, member 1                                       | MGI:2444210 |
| ENSMUST00000007959 | 13 | 28 | 0 Rhoa          | ras homolog family member A   | MGI:1096342 |
| ENSMUST00000022294 | 52 | 27 | 0 Nkiras1       | NFKB inhibitor interacting Ras-like protein 1   | MGI:1916971 |
| ENSMUST00000102632 | 45 | 26 | 0 Sort1         | sortilin 1  | MGI:1338015 |
| ENSMUST00000151243 | 21 | 26 | 0 Hfe           | hemochromatosis   | MGI:109191  |
| ENSMUST00000136748 | 17 | 26 | 0 Rhbdd2        | rhomboid domain containing 2  | MGI:1915612 |
| ENSMUST00000143363 | 14 | 26 | 0 Sp110         | Sp110 nuclear body protein  | MGI:1923364 |
| ENSMUST00000025193 | 13 | 25 | 0 Brd2          | bromodomain containing 2  | MGI:99495   |
| ENSMUST00000067399 | 33 | 24 | 0 B3gnt1        | UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase-like 1                    | MGI:2441705 |
| ENSMUST00000087699 | 17 | 24 | 0 Wiz           | widely-interspaced zinc finger motifs   | MGI:1332638 |
| ENSMUST00000150124 | 16 | 24 | 0 Elmod2        | ELMO/CED-12 domain containing 2   | MGI:2445165 |
| ENSMUST00000161497 | 15 | 24 | 0 Sp140         | Sp140 nuclear body protein  | MGI:3702467 |
| ENSMUST00000174296 | 14 | 24 | 0 Rora          | RAR-related orphan receptor alpha   | MGI:104661  |
| ENSMUST00000109539 | 18 | 23 | 0 Ahsa2         | AHA1, activator of heat shock protein ATPase 2  | MGI:1916133 |
| ENSMUST00000162512 | 36 | 22 | 0 Gtpbp8        | GTP-binding protein 8 (putative)  | MGI:1913317 |
| ENSMUST00000106969 | 14 | 22 | 0 Tomt          | transmembrane O-methyltransferase   | MGI:3769724 |
| ENSMUST00000004473 | 12 | 22 | 0 Spic          | Spi-C transcription factor (Spi-1/PU.1 related)                                       | MGI:1341168 |
| ENSMUST00000098842 | 4  | 22 | 0 Tti2          | TELO2 interacting protein 2   | MGI:2384576 |
| ENSMUST00000124048 | 24 | 22 | 0 Ccdc30        | coiled-coil domain containing 30  | MGI:1920582 |
| ENSMUST00000111118 | 25 | 21 | 0 Tcp111        | t-complex 11 like 1   | MGI:2444263 |

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|---------------------|----|----|-----------------|---|-------------|
| ENSMUST00000143977  | 24 | 21 | 0 Camsap1       | calmodulin regulated spectrin-associated protein 1  | MGI:3036242 |
| ENSMUST00000117721  | 22 | 21 | 0 Zkscan3       | zinc finger with KRAB and SCAN domains 3  | MGI:1919989 |
| ENSMUST00000029738  | 18 | 21 | 0 Gpr89         | G protein-coupled receptor 89   | MGI:1914799 |
| ENSMUST00000040523  | 14 | 21 | 0 Adamts2       | a disintegrin-like and metallopeptidase (reprolysin type) with thrombospondin type 1 motif, 2 | MGI:1347356 |
| ENSMUST00000148952  | 17 | 20 | 0 Khl20         | kelch-like 20   | MGI:2444855 |
| ENSMUST00000073889  | 13 | 20 | 0 Polg          | polymerase (DNA directed), gamma  | MGI:1196389 |
| ENSMUST00000052457  | 12 | 20 | 0 Mtss1l        | metastasis suppressor 1-like  | MGI:3039591 |
| ENSMUST00000123766  | 14 | 20 | 0 Lpcat1        | lysophosphatidylcholine acyltransferase 1   | MGI:2384812 |
| ENSMUST000000026243 | 19 | 19 | 0 Mgea5         | meningioma expressed antigen 5 (hyaluronidase)  | MGI:1932139 |
| ENSMUST00000136448  | 16 | 19 | 0 Ifit80        | intraflagellar transport 80   | MGI:1915509 |
| ENSMUST00000152653  | 0  | 19 | 0 Cog1          | component of oligomeric golgi complex 1   | MGI:1333873 |
| ENSMUST00000152277  | 27 | 18 | 0 Ddb2          | damage specific DNA binding protein 2   | MGI:1355314 |
| ENSMUST00000160835  | 20 | 18 | 0 Tmem55b       | transmembrane protein 55b   | MGI:2448501 |
| ENSMUST00000041550  | 17 | 18 | 0 Mgl2          | macrophage galactose N-acetyl-galactosamine specific lectin 2                                 | MGI:2385729 |
| ENSMUST00000074515  | 24 | 18 | 0 Rffl          | ring finger and FYVE like domain containing protein   | MGI:1914588 |
| ENSMUST00000087342  | 16 | 18 | 0 Rps28         | ribosomal protein S28   | MGI:1859516 |
| ENSMUST00000136174  | 13 | 18 | 0 Rps6          | ribosomal protein S6  | MGI:98159   |
| ENSMUST00000021368  | 11 | 18 | 0 Nemf          | nuclear export mediator factor  | MGI:1918305 |
| ENSMUST00000025270  | 4  | 18 | 0 Riok3         | RIO kinase 3  | MGI:1914128 |
| ENSMUST00000068045  | 0  | 18 | 0 Actn4         | actin alpha 4   | MGI:1890773 |
| ENSMUST00000141384  | 20 | 17 | 0 Cep85         | centrosomal protein 85  | MGI:1917262 |
| ENSMUST00000165733  | 17 | 17 | 0 Abcc10        | ATP-binding cassette, sub-family C (CFTR/MRP), member 10                                      | MGI:2386976 |
| ENSMUST00000116517  | 7  | 17 | 0 Cdv3          | carnitine deficiency-associated gene expressed in ventricle 3                                 | MGI:2448759 |
| ENSMUST000000023812 | 27 | 16 | 0 Map3k12       | mitogen-activated protein kinase kinase kinase 12   | MGI:1346881 |
| ENSMUST00000134270  | 10 | 16 | 0 Rps15a        | ribosomal protein S15A  | MGI:2389091 |
| ENSMUST00000170912  | 4  | 16 | 0 Hnrnpd        | heterogeneous nuclear ribonucleoprotein D   | MGI:101947  |
| ENSMUST00000098817  | 15 | 16 | 0 Vps37a        | vacuolar protein sorting 37A  | MGI:1261835 |
| ENSMUST00000180531  | 12 | 16 | 0 Senp1         | SUMO1/sentrin specific peptidase 1  | MGI:2445054 |
| ENSMUST00000031838  | 10 | 16 | 0 Igf2bp3       | insulin-like growth factor 2 mRNA binding protein 3   | MGI:1890359 |
| ENSMUST00000179285  | 8  | 16 | 0 Hist4h4       | histone cluster 4, H4   | MGI:2448443 |
| ENSMUST00000018875  | 5  | 16 | 0 Ap2b1         | adaptor-related protein complex 2, beta 1 subunit   | MGI:1919020 |
| ENSMUST00000139305  | 25 | 15 | 0 Hdac1         | histone deacetylase 1   | MGI:108086  |
| ENSMUST00000084806  | 24 | 15 | 0 Dnah11        | dynein, axonemal, heavy chain 11  | MGI:1100864 |
| ENSMUST00000145300  | 15 | 15 | 0 Prdx5         | peroxiredoxin 5   | MGI:1859821 |
| ENSMUST00000091259  | 9  | 15 | 0 Slc7a14       | solute carrier family 7 (cationic amino acid transporter, y+ system), member 14               | MGI:3040688 |
| ENSMUST00000127617  | 0  | 15 | 0 Suv39h1       | suppressor of variegation 3-9 homolog 1 (Drosophila)  | MGI:1099440 |
| ENSMUST00000044260  | 30 | 14 | 0 Usp37         | ubiquitin specific peptidase 37   | MGI:2442483 |
| ENSMUST00000106545  | 15 | 14 | 0 Cyp4x1        | cytochrome P450, family 4, subfamily x, polypeptide 1   | MGI:1932403 |
| ENSMUST00000105256  | 13 | 14 | 0 Ctdsp2        | CTD (carboxy-terminal domain, RNA polymerase II, polypeptide A) small phosphatase 2           | MGI:1098748 |
| ENSMUST00000173955  | 10 | 14 | 0 Wdfy3         | WD repeat and FYVE domain containing 3  | MGI:1096875 |
| ENSMUST00000144326  | 0  | 14 | 0 Ranbp9        | RAN binding protein 9   | MGI:1928741 |
| ENSMUST00000141184  | 19 | 14 | 0 Aldh1l2       | aldehyde dehydrogenase 1 family, member L2  | MGI:2444680 |
| ENSMUST000000005841 | 14 | 14 | 0 Cctf          | CCCTC-binding factor  | MGI:109447  |
| ENSMUST00000150504  | 5  | 14 | 0 0610010K14Rik | RIKEN cDNA 0610010K14 gene  | MGI:1915609 |
| ENSMUST00000119848  | 4  | 14 | 0 Eme2          | essential meiotic structure-specific endonuclease subunit 2                                   | MGI:1919889 |
| ENSMUST000000054462 | 0  | 14 | 0 Tbc1d8        | TBC1 domain family, member 8  | MGI:1927225 |
| ENSMUST00000125005  | 12 | 13 | 0 Rpl7          | ribosomal protein L7  | MGI:98073   |
| ENSMUST00000159161  | 11 | 13 | 0 P3h2          | prolyl 3-hydroxylase 2  | MGI:2146663 |
| ENSMUST00000065865  | 10 | 13 | 0 Thoc7         | THO complex 7   | MGI:1913481 |
| ENSMUST00000177007  | 10 | 13 | 0 B230118H07Rik | RIKEN cDNA B230118H07 gene  | MGI:1915420 |
| ENSMUST00000131082  | 7  | 13 | 0 Slc35a3       | solute carrier family 35 (UDP-N-acetylglucosamine (UDP-GlcNAc) transporter), member 3         | MGI:1917648 |
| ENSMUST00000162109  | 0  | 13 | 0 Ppp4r1        | protein phosphatase 4, regulatory subunit 1   | MGI:1917601 |
| ENSMUST00000173877  | 12 | 12 | 0 Slco1a6       | solute carrier organic anion transporter family, member 1a6                                   | MGI:1351906 |
| ENSMUST00000177203  | 12 | 12 | 0 Sik2          | salt inducible kinase 2   | MGI:2445031 |
| ENSMUST00000038211  | 10 | 12 | 0 Slfn9         | schlafen 9  | MGI:2445121 |

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|--------------------|----|----|-----------------|--|-------------|
| ENSMUST00000123582 | 9  | 12 | 0 Jmjd8         | jumonji domain containing 8  | MGI:1919356 |
| ENSMUST00000059472 | 0  | 12 | 0 Mat2a         | methionine adenosyltransferase II, alpha                                     | MGI:2443731 |
| ENSMUST00000166358 | 0  | 12 | 0 NdrG4         | N-myc downstream regulated gene 4  | MGI:2384590 |
| ENSMUST00000114740 | 15 | 12 | 0 Maats1        | MYCBP-associated, testis expressed 1   | MGI:2443598 |
| ENSMUST00000182200 | 9  | 12 | 0 Rbm4b         | RNA binding motif protein 4B   | MGI:1913954 |
| ENSMUST00000181521 | 6  | 12 | 0 Map1lc3b      | microtubule-associated protein 1 light chain 3 beta                          | MGI:1914693 |
| ENSMUST00000111803 | 21 | 11 | 0 Recql         | RecQ protein-like  | MGI:103021  |
| ENSMUST00000145781 | 16 | 11 | 0 Lrrc45        | leucine rich repeat containing 45  | MGI:2387183 |
| ENSMUST00000043923 | 11 | 11 | 0 Acat3         | acetyl-Coenzyme A acetyltransferase 3  | MGI:109182  |
| ENSMUST00000015981 | 10 | 11 | 0 Sqstm1        | sequestosome 1   | MGI:107931  |
| ENSMUST00000093819 | 0  | 11 | 0 Pigb          | phosphatidylinositol glycan anchor biosynthesis, class B                     | MGI:1891825 |
| ENSMUST00000105692 | 23 | 10 | 0 Ctnnbp1       | catenin beta interacting protein 1   | MGI:1915756 |
| ENSMUST00000020034 | 22 | 10 | 0 Echdc1        | enoyl Coenzyme A hydratase domain containing 1                               | MGI:1277169 |
| ENSMUST00000107352 | 12 | 10 | 0 Snapin        | SNAP-associated protein  | MGI:1333745 |
| ENSMUST00000033282 | 10 | 10 | 0 Bccip         | BRCA2 and CDKN1A interacting protein   | MGI:1913415 |
| ENSMUST00000133849 | 6  | 10 | 0 Thoc6         | THO complex 6  | MGI:2677480 |
| ENSMUST00000170117 | 5  | 10 | 0 Smpd4         | sphingomyelin phosphodiesterase 4  | MGI:1924876 |
| ENSMUST00000133432 | 1  | 10 | 0 Gorasp2       | golgi reassembly stacking protein 2  | MGI:2135962 |
| ENSMUST00000029316 | 0  | 10 | 0 Exosc8        | exosome component 8  | MGI:1916889 |
| ENSMUST00000051377 | 13 | 9  | 0 Dpy19l3       | dpy-19-like 3 (C. elegans)   | MGI:2443952 |
| ENSMUST00000142825 | 10 | 9  | 0 Ncstn         | nicastatin   | MGI:1891700 |
| ENSMUST00000060095 | 7  | 9  | 0 Tmtc1         | transmembrane and tetratricopeptide repeat containing 1                      | MGI:3039590 |
| ENSMUST00000149168 | 7  | 9  | 0 Slc6a9        | solute carrier family 6 (neurotransmitter transporter, glycine), member 9    | MGI:95760   |
| ENSMUST00000019987 | 4  | 9  | 0 Traf3ip2      | TRAF3 interacting protein 2  | MGI:2143599 |
| ENSMUST00000043962 | 4  | 9  | 0 Cdc16         | CDC16 cell division cycle 16   | MGI:1917207 |
| ENSMUST00000029315 | 17 | 9  | 0 Supt20        | suppressor of Ty 20  | MGI:1929651 |
| ENSMUST00000162587 | 15 | 9  | 0 Bace1         | beta-site APP cleaving enzyme 1  | MGI:1346542 |
| ENSMUST00000173186 | 13 | 9  | 0 Psmc11        | proteasome (prosome, macropain) 26S subunit, non-ATPase, 11                  | MGI:1916327 |
| ENSMUST00000177974 | 11 | 9  | 0 Atp2a2        | ATPase, Ca++ transporting, cardiac muscle, slow twitch 2                     | MGI:88110   |
| ENSMUST00000092406 | 10 | 9  | 0 2610028H24Rik | RIKEN cDNA 2610028H24 gene   | MGI:1924214 |
| ENSMUST00000135574 | 7  | 9  | 0 Adarb2        | adenosine deaminase, RNA-specific, B2  | MGI:2151118 |
| ENSMUST00000169681 | 5  | 9  | 0 Eif4b         | eukaryotic translation initiation factor 4B                                  | MGI:95304   |
| ENSMUST00000180646 | 2  | 9  | 0 Rpgrip1       | retinitis pigmentosa GTPase regulator interacting protein 1                  | MGI:1932134 |
| ENSMUST00000030993 | 0  | 9  | 0 Nelfa         | negative elongation factor complex member A, Whsc2                           | MGI:1346098 |
| ENSMUST00000147040 | 23 | 8  | 0 Got2          | glutamic-oxaloacetic transaminase 2, mitochondrial                           | MGI:95792   |
| ENSMUST00000174699 | 10 | 8  | 0 H2-Q6         | histocompatibility 2, Q region locus 6                                       | MGI:95935   |
| ENSMUST00000155669 | 10 | 8  | 0 Ms4a6d        | membrane-spanning 4-domains, subfamily A, member 6D                          | MGI:1916024 |
| ENSMUST00000022925 | 9  | 8  | 0 Eif3h         | eukaryotic translation initiation factor 3, subunit H                        | MGI:1915385 |
| ENSMUST00000045840 | 7  | 8  | 0 Gpr26         | G protein-coupled receptor 26  | MGI:2441758 |
| ENSMUST00000110000 | 7  | 8  | 0 Naa20         | N(alpha)-acetyltransferase 20, NatB catalytic subunit                        | MGI:1915127 |
| ENSMUST00000123495 | 4  | 8  | 0 Haus8         | 4HAUS augmin-like complex, subunit 8   | MGI:1923728 |
| ENSMUST00000107022 | 2  | 8  | 0 Hsd3b2        | hydroxy-delta-5-steroid dehydrogenase, 3 beta- and steroid delta-isomerase 2 | MGI:96234   |
| ENSMUST00000014647 | 0  | 8  | 0 Pkd2l2        | polycystic kidney disease 2-like 2   | MGI:1858231 |
| ENSMUST00000100196 | 0  | 8  | 0 Alg1          | asparagine-linked glycosylation 1 (beta-1,4-mannosyltransferase)             | MGI:2384774 |
| ENSMUST00000162234 | 0  | 8  | 0 Scyl3         | SCY1-like 3 (S. cerevisiae)  | MGI:1921385 |
| ENSMUST00000166972 | 0  | 8  | 0 Ap2a1         | adaptor-related protein complex 2, alpha 1 subunit                           | MGI:101921  |
| ENSMUST00000115808 | 18 | 7  | 0 Ammecr1l      | AMME chromosomal region gene 1-like  | MGI:2442711 |
| ENSMUST00000141116 | 14 | 7  | 0 Taf10         | TATA-box binding protein associated factor 10                                | MGI:1346320 |
| ENSMUST00000053926 | 9  | 7  | 0 Pick1         | protein interacting with C kinase 1  | MGI:894645  |
| ENSMUST00000056639 | 9  | 7  | 0 Gm5065        | predicted gene 5065  | MGI:3643170 |
| ENSMUST00000143178 | 8  | 7  | 0 Tmed7         | transmembrane p24 trafficking protein 7                                      | MGI:1913926 |
| ENSMUST00000121393 | 7  | 7  | 0 Gm4631        | predicted gene 4631  | MGI:3782813 |
| ENSMUST00000130656 | 5  | 7  | 0 Neil3         | nei like 3 (E. coli)   | MGI:2384588 |
| ENSMUST00000021246 | 4  | 7  | 0 Snx11         | sorting nexin 11   | MGI:1921729 |
| ENSMUST00000044051 | 4  | 7  | 0 Timm8b        | translocase of inner mitochondrial membrane 8B                               | MGI:1353424 |

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|--------------------|----|---|-----------------|---|-------------|
| ENSMUST00000137428 | 2  | 7 | 0 Tcpi11i       | t-complex 11 like 1   | MGI:2444263 |
| ENSMUST00000125762 | 1  | 7 | 0 Trim30a       | tripartite motif-containing 30A   | MGI:98178   |
| ENSMUST00000107302 | 0  | 7 | 0 Mlx           | MAX-like protein X  | MGI:108398  |
| ENSMUST00000171561 | 0  | 7 | 0 Mms19         | MMS19 (MET18 <i>S. cerevisiae</i> )   | MGI:1919449 |
| ENSMUST00000043138 | 19 | 7 | 0 Inpp5f        | inositol polyphosphate-5-phosphatase F  | MGI:2141867 |
| ENSMUST00000114853 | 10 | 7 | 0 Prkcq         | protein kinase C, theta   | MGI:97601   |
| ENSMUST00000135677 | 6  | 7 | 0 Pigx          | phosphatidylinositol glycan anchor biosynthesis, class X                      | MGI:1919334 |
| ENSMUST00000173727 | 6  | 7 | 0 Lig3          | ligase III, DNA, ATP-dependent  | MGI:109152  |
| ENSMUST00000021084 | 4  | 7 | 0 Sumo2         | small ubiquitin-like modifier 2   | MGI:2158813 |
| ENSMUST00000022875 | 0  | 7 | 0 Ank           | progressive ankylosis   | MGI:3045421 |
| ENSMUST00000042438 | 0  | 7 | 0 Plekhg1       | pleckstrin homology domain containing, family G (with RhoGef domain) member 1 | MGI:2676551 |
| ENSMUST00000065211 | 0  | 7 | 0 Srr           | serine racemase   | MGI:1351636 |
| ENSMUST00000068508 | 0  | 7 | 0 Spsb3         | splA/ryanodine receptor domain and SOCS box containing 3                      | MGI:1891471 |
| ENSMUST00000074608 | 0  | 7 | 0 1700029P11Rik | RIKEN cDNA 1700029P11 gene  | MGI:1913596 |
| ENSMUST00000139937 | 0  | 7 | 0 Camsap1       | calmodulin regulated spectrin-associated protein 1                            | MGI:3036242 |
| ENSMUST00000026013 | 10 | 6 | 0 Maoa          | monoamine oxidase A   | MGI:96915   |
| ENSMUST00000114445 | 9  | 6 | 0 Cbx3          | chromobox 3   | MGI:108515  |
| ENSMUST00000094476 | 8  | 6 | 0 Gm12185       | predicted gene 12185  | MGI:3652173 |
| ENSMUST00000144061 | 8  | 6 | 0 Samd8         | sterile alpha motif domain containing 8                                       | MGI:1914880 |
| ENSMUST00000037472 | 6  | 6 | 0 Leng8         | leukocyte receptor cluster (LRC) member 8                                     | MGI:2142195 |
| ENSMUST00000153915 | 6  | 6 | 0 Cd209c        | CD209c antigen  | MGI:2157945 |
| ENSMUST00000045562 | 5  | 6 | 0 Cox15         | cytochrome c oxidase assembly protein 15                                      | MGI:1920112 |
| ENSMUST00000151372 | 5  | 6 | 0 Icmt          | isoprenylcysteine carboxyl methyltransferase                                  | MGI:1888594 |
| ENSMUST00000172676 | 4  | 6 | 0 Fap           | fibroblast activation protein   | MGI:109608  |
| ENSMUST00000099972 | 3  | 6 | 0 Itga4         | integrin alpha 4  | MGI:96603   |
| ENSMUST00000119891 | 3  | 6 | 0 BC026585      | cDNA sequence BC026585  | MGI:2448516 |
| ENSMUST00000171066 | 3  | 6 | 0 Tnfrsf22      | tumor necrosis factor receptor superfamily, member 22                         | MGI:1930270 |
| ENSMUST00000026893 | 0  | 6 | 0 Tgm4          | transglutaminase 4 (prostate)   | MGI:3027002 |
| ENSMUST00000031099 | 0  | 6 | 0 Grpel1        | GrpE-like 1, mitochondrial  | MGI:1334417 |
| ENSMUST00000045142 | 0  | 6 | 0 Ctnnal1       | catenin (cadherin associated protein), alpha-like 1                           | MGI:1859649 |
| ENSMUST00000055454 | 0  | 6 | 0 Prr3          | proline-rich polypeptide 3  | MGI:1922460 |
| ENSMUST00000125473 | 0  | 6 | 0 Alkbh3        | alkB homolog 3, alpha-ketoglutarate-dependent dioxygenase                     | MGI:1916363 |
| ENSMUST00000136335 | 0  | 6 | 0 Primpol       | primase and polymerase (DNA-directed)   | MGI:3603756 |
| ENSMUST00000146897 | 0  | 6 | 0 Hsp90b1       | heat shock protein 90, beta (Grp94), member 1                                 | MGI:98817   |
| ENSMUST00000143199 | 10 | 5 | 0 Tor1a         | torsin family 1, member A (torsin A)  | MGI:1353568 |
| ENSMUST00000021880 | 7  | 5 | 0 Ctla2a        | cytotoxic T lymphocyte-associated protein 2 alpha                             | MGI:88554   |
| ENSMUST00000099473 | 7  | 5 | 0 Wdr76         | WD repeat domain 76   | MGI:1926186 |
| ENSMUST00000108569 | 7  | 5 | 0 Vmn1r58       | vomeroneural 1 receptor 58  | MGI:3033473 |
| ENSMUST00000112249 | 6  | 5 | 0 Cacna1d       | calcium channel, voltage-dependent, L type, alpha 1D subunit                  | MGI:88293   |
| ENSMUST00000050125 | 5  | 5 | 0 2900026A02Rik | RIKEN cDNA 2900026A02 gene  | MGI:1920194 |
| ENSMUST00000145126 | 5  | 5 | 0 Nsf           | N-ethylmaleimide sensitive fusion protein                                     | MGI:104560  |
| ENSMUST00000147575 | 5  | 5 | 0 Cpa6          | carboxypeptidase A6   | MGI:3045348 |
| ENSMUST00000019854 | 4  | 5 | 0 Mrpl24        | mitochondrial ribosomal protein L24   | MGI:1914957 |
| ENSMUST00000090219 | 4  | 5 | 0 Bmf           | BCL2 modifying factor   | MGI:2176433 |
| ENSMUST00000174662 | 4  | 5 | 0 Rps18         | ribosomal protein S18   | MGI:98146   |
| ENSMUST00000063481 | 3  | 5 | 0 9830107B12Rik | RIKEN cDNA 9830107B12 gene  | MGI:3608415 |
| ENSMUST00000092404 | 2  | 5 | 0 Srsf2         | serine/arginine-rich splicing factor 2  | MGI:98284   |
| ENSMUST00000142761 | 2  | 5 | 0 Akr1b3        | aldo-keto reductase family 1, member B3 (aldose reductase)                    | MGI:1353494 |
| ENSMUST00000023189 | 0  | 5 | 0 Glyr1         | glyoxylate reductase 1 homolog ( <i>Arabidopsis</i> )                         | MGI:1921272 |
| ENSMUST00000032566 | 0  | 5 | 0 Qpct1         | glutaminyl-peptide cyclotransferase-like                                      | MGI:1914619 |
| ENSMUST00000101075 | 0  | 5 | 0 Ttc19         | tetratricopeptide repeat domain 19  | MGI:1920045 |
| ENSMUST00000132253 | 0  | 5 | 0 Ost4          | oligosaccharyltransferase complex subunit 4 (non-catalytic)                   | MGI:1914945 |
| ENSMUST00000153316 | 0  | 5 | 0 Tsr1          | TSR1 20S rRNA accumulation  | MGI:2144566 |
| ENSMUST00000038584 | 13 | 5 | 0 Tlk1          | tousled-like kinase 1   | MGI:2441683 |
| ENSMUST00000071991 | 10 | 5 | 0 Dppa5a        | developmental pluripotency associated 5A                                      | MGI:101800  |

|                     |    |   |                 |   |             |
|---------------------|----|---|-----------------|---|-------------|
| ENSMUST00000020484  | 7  | 5 | 0 Txnrd1        | thioredoxin reductase 1   | MGI:1354175 |
| ENSMUST00000111131  | 7  | 5 | 0 Cd59b         | CD59b antigen   | MGI:1888996 |
| ENSMUST00000059599  | 7  | 5 | 0 Utp23         | UTP23 small subunit processome component  | MGI:1925831 |
| ENSMUST00000154132  | 6  | 5 | 0 Vta1          | vesicle (multivesicular body) trafficking 1   | MGI:1913451 |
| ENSMUST00000069580  | 5  | 5 | 0 Rnf181        | ring finger protein 181   | MGI:1913760 |
| ENSMUST00000032080  | 4  | 5 | 0 Pradc1        | protease-associated domain containing 1   | MGI:1920577 |
| ENSMUST00000047028  | 4  | 5 | 0 Lgalsl        | lectin, galactoside binding-like  | MGI:1916114 |
| ENSMUST00000100063  | 4  | 5 | 0 Scn9a         | sodium channel, voltage-gated, type IX, alpha   | MGI:107636  |
| ENSMUST00000146108  | 4  | 5 | 0 Wdr31         | WD repeat domain 31   | MGI:1918604 |
| ENSMUST00000147277  | 4  | 5 | 0 Ipmk          | inositol polyphosphate multikinase  | MGI:1916968 |
| ENSMUST00000148090  | 4  | 5 | 0 Ttc9c         | tetratricopeptide repeat domain 9C  | MGI:1917637 |
| ENSMUST00000170347  | 4  | 5 | 0 Ccdc125       | coiled-coil domain containing 125   | MGI:1923291 |
| ENSMUST00000061169  | 4  | 5 | 0 Gal3st3       | galactose-3-O-sulfotransferase 3  | MGI:3617843 |
| ENSMUST00000159520  | 4  | 5 | 0 Glis3         | GLIS family zinc finger 3   | MGI:2444289 |
| ENSMUST00000007993  | 3  | 5 | 0 Rbm28         | RNA binding motif protein 28  | MGI:2655711 |
| ENSMUST00000078976  | 2  | 5 | 0 Zfp706        | zinc finger protein 706   | MGI:1915286 |
| ENSMUST00000160116  | 1  | 5 | 0 Impg2         | interphotoreceptor matrix proteoglycan 2  | MGI:3044955 |
| ENSMUST00000018744  | 0  | 5 | 0 Shmt1         | serine hydroxymethyltransferase 1 (soluble)   | MGI:98299   |
| ENSMUST00000022281  | 0  | 5 | 0 Skiv2l2       | superkiller viralicidic activity 2-like 2 (S. cerevisiae)                                   | MGI:1919448 |
| ENSMUST000000041003 | 0  | 5 | 0 Tfb1m         | transcription factor B1, mitochondrial  | MGI:2146851 |
| ENSMUST00000054002  | 0  | 5 | 0 Socs3         | suppressor of cytokine signaling 3  | MGI:1201791 |
| ENSMUST00000055858  | 0  | 5 | 0 2410002F23Rik | RIKEN cDNA 2410002F23 gene  | MGI:1914226 |
| ENSMUST00000097974  | 0  | 5 | 0 Nkx6-2        | NK6 homeobox 2  | MGI:1352738 |
| ENSMUST00000102578  | 0  | 5 | 0 Ankrd13a      | ankyrin repeat domain 13a   | MGI:1915670 |
| ENSMUST00000112201  | 0  | 5 | 0 Gorasp2       | golgi reassembly stacking protein 2   | MGI:2135962 |
| ENSMUST00000115154  | 0  | 5 | 0 Gnptg         | N-acetylglucosamine-1-phosphotransferase, gamma subunit                                     | MGI:2147006 |
| ENSMUST00000124020  | 0  | 5 | 0 Lctf          | lactase-like  | MGI:2183549 |
| ENSMUST00000125628  | 0  | 5 | 0 Srrd          | SRR1 domain containing  | MGI:1917368 |
| ENSMUST00000146175  | 0  | 5 | 0 Nr2c2         | nuclear receptor subfamily 2, group C, member 2   | MGI:1352466 |
| ENSMUST00000156460  | 0  | 5 | 0 Cpsf3l        | cleavage and polyadenylation specific factor 3-like   | MGI:1919207 |
| ENSMUST00000086002  | 13 | 4 | 0 Cd247         | CD247 antigen   | MGI:88334   |
| ENSMUST00000031367  | 13 | 4 | 0 Slc15a4       | solute carrier family 15, member 4  | MGI:2140796 |
| ENSMUST00000151280  | 13 | 4 | 0 Hacd4         | 3-hydroxyacyl-CoA dehydratase 4   | MGI:1914025 |
| ENSMUST00000048657  | 10 | 4 | 0 Sec24c        | Sec24 related gene family, member C (S. cerevisiae)   | MGI:1919746 |
| ENSMUST00000023672  | 9  | 4 | 0 Rcan1         | regulator of calcineurin 1  | MGI:1890564 |
| ENSMUST00000179865  | 7  | 4 | 0 Canx          | calnexin  | MGI:88261   |
| ENSMUST00000022296  | 7  | 4 | 0 Ube2e1        | ubiquitin-conjugating enzyme E2E 1  | MGI:107411  |
| ENSMUST00000067664  | 6  | 4 | 0 Ywhae         | tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, epsilon polypeptide | MGI:894689  |
| ENSMUST00000111738  | 5  | 4 | 0 Tctn1         | tectonic family member 1  | MGI:3603820 |
| ENSMUST00000044423  | 10 | 3 | 0 Brip1         | BRCA1 interacting protein C-terminal helicase 1   | MGI:2442836 |
| ENSMUST00000038169  | 7  | 3 | 0 Mif           | macrophage migration inhibitory factor  | MGI:96982   |
| ENSMUST00000029213  | 5  | 3 | 0 Ocstamp       | osteoclast stimulatory transmembrane protein  | MGI:1921864 |
| ENSMUST00000113787  | 5  | 3 | 0 Sfxn5         | sideroflexin 5  | MGI:2137681 |
| ENSMUST00000141630  | 5  | 3 | 0 Tysm          | thymidylate synthase  | MGI:98878   |
| ENSMUST00000126739  | 15 | 2 | 0 Hjurp         | Holliday junction recognition protein   | MGI:2685821 |
| ENSMUST00000090031  | 5  | 2 | 0 Gng5          | guanine nucleotide binding protein (G protein), gamma 5                                     | MGI:109164  |
| ENSMUST00000123299  | 6  | 1 | 0 Myo1b         | myosin IB   | MGI:107752  |
| ENSMUST00000089926  | 5  | 1 | 0 Mfap1a        | microfibrillar-associated protein 1A  | MGI:1914782 |
| ENSMUST00000124844  | 5  | 1 | 0 Myh9          | myosin, heavy polypeptide 9, non-muscle   | MGI:107717  |
| ENSMUST00000125081  | 31 | 0 | 0 Gk            | glycerol kinase   | MGI:106594  |
| ENSMUST00000144643  | 27 | 0 | 0 Pdzd11        | PDZ domain containing 11  | MGI:1919871 |
| ENSMUST00000134697  | 24 | 0 | 0 Drap1         | Dr1 associated protein 1 (negative cofactor 2 alpha)  | MGI:1913806 |
| ENSMUST00000001042  | 17 | 0 | 0 Ilf2          | interleukin enhancer binding factor 2   | MGI:1915031 |
| ENSMUST00000153947  | 15 | 0 | 0 Ubxn6         | UBX domain protein 6  | MGI:1913780 |
| ENSMUST00000000449  | 13 | 0 | 0 Mkrr2         | makorin, ring finger protein, 2   | MGI:1914277 |

|                    |    |   |                 |  |             |
|--------------------|----|---|-----------------|--|-------------|
| ENSMUST00000159893 | 10 | 0 | 0 Tbce          | tubulin-specific chaperone E   | MGI:1917680 |
| ENSMUST00000021087 | 9  | 0 | 0 Mif4gd        | MIF4G domain containing  | MGI:1916924 |
| ENSMUST00000132804 | 9  | 0 | 0 Ubxn6         | UBX domain protein 6   | MGI:1913780 |
| ENSMUST00000184112 | 8  | 0 | 0 Trim14        | tripartite motif-containing 14   | MGI:1921985 |
| ENSMUST00000132092 | 7  | 0 | 0 1110051M20Rik | RIKEN cDNA 1110051M20 gene   | MGI:1915079 |
| ENSMUST00000007005 | 7  | 0 | 0 Acat2         | acetyl-Coenzyme A acetyltransferase 2  | MGI:87871   |
| ENSMUST00000021773 | 7  | 0 | 0 Gpld1         | glycosylphosphatidylinositol specific phospholipase D1                       | MGI:106604  |
| ENSMUST00000025264 | 7  | 0 | 0 Wdr33         | WD repeat domain 33  | MGI:1921570 |
| ENSMUST00000040960 | 7  | 0 | 0 Slc6a20a      | solute carrier family 6 (neurotransmitter transporter), member 20A           | MGI:2143217 |
| ENSMUST00000048698 | 7  | 0 | 0 Taf6          | TATA-box binding protein associated factor 6                                 | MGI:109129  |
| ENSMUST00000062991 | 7  | 0 | 0 Grpel2        | GrpE-like 2, mitochondrial   | MGI:1334416 |
| ENSMUST00000103107 | 7  | 0 | 0 Cntd1         | cyclin N-terminal domain containing 1  | MGI:1923965 |
| ENSMUST00000126319 | 7  | 0 | 0 Tbl3          | transducin (beta)-like 3   | MGI:2384863 |
| ENSMUST00000129956 | 7  | 0 | 0 Prpf39        | pre-mRNA processing factor 39  | MGI:104602  |
| ENSMUST00000046549 | 6  | 0 | 0 Apobec2       | apolipoprotein B mRNA editing enzyme, catalytic polypeptide 2                | MGI:1343178 |
| ENSMUST00000106308 | 6  | 0 | 0 Dnah17        | dynein, axonemal, heavy chain 17   | MGI:1917176 |
| ENSMUST00000126805 | 6  | 0 | 0 Pradc1        | protease-associated domain containing 1                                      | MGI:1920577 |
| ENSMUST00000144843 | 6  | 0 | 0 Slain2        | SLAIN motif family, member 2   | MGI:1923241 |
| ENSMUST00000147755 | 6  | 0 | 0 Rapgef1       | Rap guanine nucleotide exchange factor (GEF) 1                               | MGI:104580  |
| ENSMUST00000018645 | 5  | 0 | 0 Ncor1         | nuclear receptor co-repressor 1  | MGI:1349717 |
| ENSMUST00000026409 | 5  | 0 | 0 Ormdl2        | ORM1-like 2 (S. cerevisiae)  | MGI:1914094 |
| ENSMUST00000029748 | 5  | 0 | 0 Fcgr1         | Fc receptor, IgG, high affinity I  | MGI:95498   |
| ENSMUST00000030003 | 5  | 0 | 0 Exosc3        | exosome component 3  | MGI:1913612 |
| ENSMUST00000039928 | 5  | 0 | 0 Plekhh1       | pleckstrin homology domain containing, family H (with MyTH4 domain) member 1 | MGI:2144989 |
| ENSMUST00000049167 | 5  | 0 | 0 Phf12         | PHD finger protein 12  | MGI:1924057 |
| ENSMUST00000075317 | 5  | 0 | 0 Pdzd2         | PDZ domain containing 2  | MGI:1922394 |
| ENSMUST00000106193 | 5  | 0 | 0 Mtf1          | metal response element binding transcription factor 1                        | MGI:101786  |
| ENSMUST00000109255 | 5  | 0 | 0 Prickle1      | prickle planar cell polarity protein 1                                       | MGI:1916034 |
| ENSMUST00000130451 | 5  | 0 | 0 Erp29         | endoplasmic reticulum protein 29   | MGI:1914647 |
| ENSMUST00000181377 | 5  | 0 | 0 Slc35a5       | solute carrier family 35, member A5  | MGI:1921352 |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

MGI database :<http://www.informatics.jax.org/>

**Supplemental Table 4. Protein coding gene transcripts with UTR region associated RapiRNAs.**  
**RapiRNA sense to 5'UTR**

| Ensembl ID         | Normalized counts |        |       | Gene symbol                              | Annotation   | MGID         |
|--------------------|-------------------|--------|-------|--|--|--------------|
|                    | oocyte            | zygote | sperm |  |  |              |
| ENSMUST00000123183 |                   | 20614  | 19608 | 2028 Rpl5                                | ribosomal protein L5   | MGID:102854  |
| ENSMUST00000114361 |                   | 15537  | 16575 | 0 Kifc1                                  | kinesin family member C1   | MGID:109596  |
| ENSMUST00000150745 |                   | 5215   | 3727  | 12737 Nop56                              | NOP56 ribonucleoprotein  | MGID:1914384 |
| ENSMUST00000140984 |                   | 3870   | 2401  | 12179 Hspa8                              | heat shock protein 8   | MGID:105384  |
| ENSMUST00000097293 |                   | 3650   | 4234  | 0 Ppp4r1                                 | protein phosphatase 4, regulatory subunit 1                                | MGID:1917601 |
| ENSMUST00000147590 |                   | 3437   | 3566  | 0 Set                                    | SET nuclear oncogene   | MGID:1860267 |
| ENSMUST00000172911 |                   | 3070   | 4403  | 0 Prc1                                   | protein regulator of cytokinesis 1   | MGID:1858961 |
| ENSMUST00000142269 |                   | 1959   | 806   | 1711 Rack1                               | receptor for activated C kinase 1  | MGID:101849  |
| ENSMUST00000048962 |                   | 1605   | 1973  | 0 Kif4                                   | kinesin family member 4  | MGID:108389  |
| ENSMUST00000125824 |                   | 1560   | 1818  | 14 Set                                   | SET nuclear oncogene   | MGID:1860267 |
| ENSMUST00000144826 |                   | 1152   | 1245  | 0 Noct                                   | nocturnin  | MGID:109382  |
| ENSMUST00000129673 |                   | 965    | 996   | 579 Rpl7a                                | ribosomal protein L7A  | MGID:1353472 |
| ENSMUST00000182940 |                   | 819    | 1241  | 0 Ppp4r1                                 | protein phosphatase 4, regulatory subunit 1                                | MGID:1917601 |
| ENSMUST00000075666 |                   | 819    | 915   | 0 Upf1                                   | UPF1 regulator of nonsense transcripts homolog (yeast)                     | MGID:107995  |
| ENSMUST00000038831 |                   | 773    | 876   | 2 Hexdc                                  | hexosaminidase (glycosyl hydrolase family 20, catalytic domain) containing | MGID:3605542 |
| ENSMUST00000151732 |                   | 684    | 689   | 0 Tulp4                                  | tubby like protein 4   | MGID:1916092 |
| ENSMUST00000135020 |                   | 675    | 342   | 751 Eif4a2                               | eukaryotic translation initiation factor 4A2                               | MGID:106906  |
| ENSMUST00000177549 |                   | 657    | 707   | 0 Kcnk13                                 | potassium channel, subfamily K, member 13                                  | MGID:2384976 |
| ENSMUST00000160840 |                   | 625    | 616   | 0 Bud31                                  | BUD31 homolog  | MGID:2141291 |
| ENSMUST00000127292 |                   | 597    | 661   | 0 Tomm22                                 | translocase of outer mitochondrial membrane 22 homolog (yeast)             | MGID:2450248 |
| ENSMUST00000105364 |                   | 588    | 984   | 2161 Ndufs7                              | NADH dehydrogenase (ubiquinone) Fe-S protein 7                             | MGID:1922656 |
| ENSMUST00000167111 |                   | 572    | 327   | 450 Rabggtb                              | Rab geranylgeranyl transferase, b subunit                                  | MGID:99537   |
| ENSMUST00000165153 |                   | 483    | 638   | 0 Ptbp1                                  | polypyrimidine tract binding protein 1                                     | MGID:97791   |
| ENSMUST00000086338 |                   | 464    | 701   | 0 Vmn1r65                                | vomerolateral 1 receptor 65  | MGID:3033475 |
| ENSMUST00000165127 |                   | 434    | 403   | 0 Hsp90ab1                               | heat shock protein 90 alpha (cytosolic), class B member 1                  | MGID:96247   |
| ENSMUST00000141705 |                   | 355    | 462   | 0 Myo19                                  | myosin XIX   | MGID:1913446 |
| ENSMUST00000160124 |                   | 353    | 405   | 0 Ubl5                                   | ubiquitin-like 5   | MGID:1913427 |
| ENSMUST00000162408 |                   | 295    | 526   | 0 Ppp4r1                                 | protein phosphatase 4, regulatory subunit 1                                | MGID:1917601 |
| ENSMUST00000135025 |                   | 277    | 369   | 4 Eef1g                                  | eukaryotic translation elongation factor 1 gamma                           | MGID:1914410 |
| ENSMUST00000152694 |                   | 268    | 396   | 0 Myo1h                                  | myosin 1H  | MGID:1914674 |
| ENSMUST00000116400 |                   | 263    | 229   | 0 Kansl2                                 | KAT8 regulatory NSL complex subunit 2                                      | MGID:1916862 |
| ENSMUST00000114001 |                   | 255    | 321   | 71 Itsn1                                 | intersectin 1 (SH3 domain protein 1A)                                      | MGID:1338069 |
| ENSMUST00000030454 |                   | 251    | 271   | 0 Prdx1                                  | peroxiredoxin 1  | MGID:99523   |
| ENSMUST00000120204 |                   | 246    | 257   | 1576 Adgrb2                              | adhesion G protein-coupled receptor B2                                     | MGID:2451244 |
| ENSMUST00000162788 |                   | 240    | 334   | 0 Ppp4r1                                 | protein phosphatase 4, regulatory subunit 1                                | MGID:1917601 |
| ENSMUST00000162145 |                   | 231    | 357   | 0 Me3                                    | malic enzyme 3, NADP(+)-dependent, mitochondrial                           | MGID:1916679 |
| ENSMUST00000152551 |                   | 225    | 234   | 0 1110008F13R RIKEN cDNA 1110008F13 gene |  | MGID:1914638 |
| ENSMUST00000150942 |                   | 211    | 426   | 0 Hirip3                                 | HIRA interacting protein 3   | MGID:2142364 |
| ENSMUST00000148085 |                   | 205    | 290   | 0 Eif4a2                                 | eukaryotic translation initiation factor 4A2                               | MGID:106906  |
| ENSMUST00000156294 |                   | 204    | 134   | 0 Cyb5d2                                 | cytochrome b5 domain containing 2  | MGID:2684848 |
| ENSMUST00000127123 |                   | 203    | 184   | 0 3110002H16F RIKEN cDNA 3110002H16 gene |  | MGID:1916528 |
| ENSMUST00000075453 |                   | 192    | 29    | 93 Rpl21                                 | ribosomal protein L21  | MGID:1278340 |
| ENSMUST00000176015 |                   | 186    | 137   | 0 Uchl1                                  | ubiquitin carboxy-terminal hydrolase L1                                    | MGID:103149  |
| ENSMUST00000172017 |                   | 183    | 191   | 0 Aen                                    | apoptosis enhancing nuclease   | MGID:1915298 |
| ENSMUST00000067947 |                   | 179    | 225   | 0 Rock1                                  | Rho-associated coiled-coil containing protein kinase 1                     | MGID:107927  |

|                    |     |     |                |  |             |
|--------------------|-----|-----|----------------|--|-------------|
| ENSMUST00000090749 | 175 | 181 | 0 Ppia         | peptidylprolyl isomerase A   | MGI:97749   |
| ENSMUST00000058997 | 175 | 91  | 63 Zbtb7c      | zinc finger and BTB domain containing 7C   | MGI:2443302 |
| ENSMUST00000018556 | 174 | 32  | 75 Kansl1      | KAT8 regulatory NSL complex subunit 1  | MGI:1923969 |
| ENSMUST00000176394 | 168 | 171 | 0 4930562C15F  | RIKEN cDNA 4930562C15 gene   | MGI:1926059 |
| ENSMUST00000131538 | 164 | 350 | 34 Tbr1        | T-box brain gene 1   | MGI:107404  |
| ENSMUST00000135371 | 162 | 179 | 0 Cul4a        | cullin 4A  | MGI:1914487 |
| ENSMUST00000156961 | 162 | 179 | 0 Cdca5        | cell division cycle associated 5   | MGI:1915099 |
| ENSMUST00000137540 | 155 | 206 | 0 Gclm         | glutamate-cysteine ligase, modifier subunit  | MGI:104995  |
| ENSMUST00000167645 | 154 | 156 | 0 Serhl        | serine hydrolase-like  | MGI:1890404 |
| ENSMUST00000068225 | 145 | 137 | 0 Nusap1       | nucleolar and spindle associated protein 1   | MGI:2675669 |
| ENSMUST00000136963 | 130 | 35  | 91 Plekha1     | pleckstrin homology domain containing, family A (phosphoinositide binding specific) me | MGI:2442213 |
| ENSMUST00000134412 | 125 | 137 | 20 Serf2       | small EDRK-rich factor 2   | MGI:1337041 |
| ENSMUST00000125230 | 110 | 152 | 0 Myo1h        | myosin 1H  | MGI:1914674 |
| ENSMUST00000156444 | 110 | 107 | 0 Zfp707       | zinc finger protein 707  | MGI:1916270 |
| ENSMUST00000145978 | 107 | 59  | 0 Ppm1f        | protein phosphatase 1F (PP2C domain containing)  | MGI:1918464 |
| ENSMUST00000145132 | 105 | 82  | 0 Ttl4         | tubulin tyrosine ligase-like family, member 4  | MGI:1914784 |
| ENSMUST00000019464 | 101 | 169 | 0 Noxo1        | NADPH oxidase organizer 1  | MGI:1919143 |
| ENSMUST00000175908 | 94  | 124 | 0 Ip6k1        | inositol hexaphosphate kinase 1  | MGI:1351633 |
| ENSMUST00000123007 | 93  | 110 | 0 Trim24       | tripartite motif-containing 24   | MGI:109275  |
| ENSMUST00000041761 | 90  | 143 | 153 Prss23     | protease, serine 23  | MGI:1923703 |
| ENSMUST00000125881 | 90  | 105 | 30 Ppif        | peptidylprolyl isomerase F (cyclophilin F)   | MGI:2145814 |
| ENSMUST00000031024 | 89  | 46  | 1267 Mrpl33    | mitochondrial ribosomal protein L33  | MGI:2137225 |
| ENSMUST00000088407 | 87  | 112 | 0 Khdc1a       | KH domain containing 1A  | MGI:2676610 |
| ENSMUST00000163812 | 86  | 47  | 0 Prc1         | protein regulator of cytokinesis 1   | MGI:1858961 |
| ENSMUST00000157047 | 86  | 16  | 486 Ppan       | peter pan homolog (Drosophila)   | MGI:2178445 |
| ENSMUST00000109132 | 85  | 46  | 0 Rtfdc1       | replication termination factor 2 domain containing 1                                   | MGI:1913654 |
| ENSMUST00000134818 | 83  | 43  | 44 1810032O08F | RIKEN cDNA 1810032O08 gene   | MGI:1913543 |
| ENSMUST00000070223 | 81  | 112 | 0 Khdc1c       | KH domain containing 1C  | MGI:3583007 |
| ENSMUST00000151671 | 76  | 81  | 0 Clec12a      | C-type lectin domain family 12, member a   | MGI:3040968 |
| ENSMUST00000142031 | 75  | 61  | 117 Eif4a2     | eukaryotic translation initiation factor 4A2   | MGI:106906  |
| ENSMUST00000166543 | 74  | 105 | 0 Ralbp1       | ralA binding protein 1   | MGI:108466  |
| ENSMUST00000159986 | 73  | 55  | 1765 Wtap      | Wilms tumour 1-associating protein   | MGI:1926395 |
| ENSMUST00000093019 | 70  | 88  | 0 Fam83g       | family with sequence similarity 83, member G   | MGI:1916890 |
| ENSMUST00000002121 | 69  | 70  | 0 Supt6        | suppressor of Ty 6   | MGI:107726  |
| ENSMUST00000163764 | 67  | 68  | 97 Jade1       | jade family PHD finger 1   | MGI:1925835 |
| ENSMUST00000147549 | 67  | 1   | 2 BC030499     | cDNA sequence BC030499   | MGI:2652869 |
| ENSMUST00000095273 | 67  | 79  | 0 Nr2c2ap      | nuclear receptor 2C2-associated protein  | MGI:1922942 |
| ENSMUST00000074976 | 66  | 70  | 12 Hist2h2aa2  | histone cluster 2, H2aa2   | MGI:2448283 |
| ENSMUST00000025904 | 65  | 88  | 12 Prdx5       | peroxiredoxin 5  | MGI:1859821 |
| ENSMUST00000136269 | 65  | 46  | 0 Rpl7a        | ribosomal protein L7A  | MGI:1353472 |
| ENSMUST00000027931 | 64  | 79  | 0 Nek2         | NIMA (never in mitosis gene a)-related expressed kinase 2                              | MGI:109359  |
| ENSMUST00000133321 | 64  | 39  | 2 Nr2c2        | nuclear receptor subfamily 2, group C, member 2  | MGI:1352466 |
| ENSMUST00000182335 | 64  | 72  | 0 Dst          | dystonin   | MGI:104627  |
| ENSMUST00000136692 | 64  | 43  | 0 Cdca3        | cell division cycle associated 3   | MGI:1315198 |
| ENSMUST00000176717 | 63  | 20  | 0 Ccdc137      | coiled-coil domain containing 137  | MGI:1914541 |
| ENSMUST00000136954 | 62  | 99  | 0 1700010I14Ri | RIKEN cDNA 1700010I14 gene   | MGI:1914181 |
| ENSMUST00000153779 | 62  | 94  | 12 Actl6a      | actin-like 6A  | MGI:1861453 |
| ENSMUST00000167159 | 61  | 66  | 0 Ip6k1        | inositol hexaphosphate kinase 1  | MGI:1351633 |
| ENSMUST00000156687 | 61  | 53  | 0 Plekhhb2     | pleckstrin homology domain containing, family B (evectins) member 2                    | MGI:2385825 |
| ENSMUST00000152719 | 61  | 93  | 0 Bbs9         | Bardet-Biedl syndrome 9 (human)  | MGI:2442833 |
| ENSMUST00000149863 | 60  | 28  | 456 Cmc4       | C-x(9)-C motif containing 4  | MGI:5637812 |



|                    |    |    |               |   |             |
|--------------------|----|----|---------------|---|-------------|
| ENSMUST00000100131 | 59 | 79 | 0 AW554918    | expressed sequence AW554918   | MGI:2147376 |
| ENSMUST00000073833 | 56 | 81 | 0 Zfp111      | zinc finger protein 111   | MGI:1929114 |
| ENSMUST00000180548 | 55 | 87 | 0 Map1lc3b    | microtubule-associated protein 1 light chain 3 beta                                   | MGI:1914693 |
| ENSMUST00000022816 | 55 | 57 | 14 Sub1       | SUB1 homolog (S. cerevisiae)  | MGI:104811  |
| ENSMUST00000106291 | 54 | 51 | 0 Ube2d3      | ubiquitin-conjugating enzyme E2D 3  | MGI:1913355 |
| ENSMUST00000129311 | 53 | 47 | 113 Rpl13     | ribosomal protein L13   | MGI:105922  |
| ENSMUST00000156896 | 53 | 81 | 0 Zfp276      | zinc finger protein (C2H2 type) 276   | MGI:1888495 |
| ENSMUST00000177333 | 52 | 64 | 0 Tsc22d1     | TSC22 domain family, member 1   | MGI:109127  |
| ENSMUST00000141465 | 52 | 43 | 0 Zfp740      | zinc finger protein 740   | MGI:1915994 |
| ENSMUST00000135398 | 51 | 89 | 0 Adcy1       | adenylate cyclase 1   | MGI:99677   |
| ENSMUST00000078816 | 51 | 58 | 0 9130023H24F | RIKEN cDNA 9130023H24 gene  | MGI:2442738 |
| ENSMUST00000137098 | 50 | 54 | 4 Pyroxd1     | pyridine nucleotide-disulphide oxidoreductase domain 1                                | MGI:2676395 |
| ENSMUST00000063492 | 49 | 30 | 0 Rspo2       | R-spondin 2   | MGI:1922667 |
| ENSMUST00000140056 | 46 | 66 | 0 Hnrmph1     | heterogeneous nuclear ribonucleoprotein H1  | MGI:1891925 |
| ENSMUST00000041555 | 45 | 62 | 10 Mvb12b     | multivesicular body subunit 12B   | MGI:1919793 |
| ENSMUST00000175659 | 45 | 40 | 0 Mia2        | melanoma inhibitory activity 2  | MGI:2159614 |
| ENSMUST00000106857 | 45 | 12 | 234 Mier1     | MEIR1 treanscription regulator  | MGI:1918398 |
| ENSMUST00000079496 | 44 | 39 | 2 Ube2s       | ubiquitin-conjugating enzyme E2S  | MGI:1925141 |
| ENSMUST00000040307 | 44 | 14 | 61 March9     | membrane-associated ring finger (C3HC4) 9   | MGI:2446144 |
| ENSMUST00000128626 | 44 | 46 | 0 Eef1g       | eukaryotic translation elongation factor 1 gamma                                      | MGI:1914410 |
| ENSMUST00000143318 | 42 | 62 | 0 Csrp2bp     | cysteine and glycine-rich protein 2 binding protein                                   | MGI:1917264 |
| ENSMUST00000132676 | 41 | 68 | 0 Pgs1        | phosphatidylglycerophosphate synthase 1   | MGI:1921701 |
| ENSMUST00000049348 | 40 | 44 | 0 Traip       | TRAF-interacting protein  | MGI:1096377 |
| ENSMUST00000129023 | 39 | 58 | 0 Ercc3       | excision repair cross-complementing rodent repair deficiency, complementation group 3 | MGI:95414   |
| ENSMUST00000177592 | 38 | 91 | 0 Ddi2        | DNA-damage inducible protein 2  | MGI:1917244 |
| ENSMUST00000147898 | 38 | 38 | 12 Psmd11     | proteasome (prosome, macropain) 26S subunit, non-ATPase, 11                           | MGI:1916327 |
| ENSMUST00000105929 | 37 | 61 | 0 Th          | tyrosine hydroxylase  | MGI:98735   |
| ENSMUST00000177654 | 37 | 26 | 0 Pik3cd      | phosphatidylinositol 3-kinase catalytic delta polypeptide                             | MGI:1098211 |
| ENSMUST00000128375 | 37 | 16 | 87 Nfrkb      | nuclear factor related to kappa B binding protein                                     | MGI:2442410 |
| ENSMUST00000174043 | 36 | 37 | 0 Cyb5r4      | cytochrome b5 reductase 4   | MGI:2386848 |
| ENSMUST00000025379 | 36 | 9  | 139 Dpysl3    | dihydropyrimidinase-like 3  | MGI:1349762 |
| ENSMUST00000134632 | 35 | 26 | 0 Ran         | RAN, member RAS oncogene family   | MGI:1333112 |
| ENSMUST00000023213 | 35 | 18 | 0 Hgh1        | HGH1 homolog  | MGI:1930628 |
| ENSMUST00000136680 | 34 | 32 | 0 Etv3        | ets variant 3   | MGI:1350926 |
| ENSMUST00000036113 | 33 | 39 | 36 Tbc1d16    | TBC1 domain family, member 16   | MGI:2652878 |
| ENSMUST00000139414 | 33 | 24 | 0 Tbcd        | tubulin-specific chaperone d  | MGI:1919686 |
| ENSMUST00000025704 | 33 | 21 | 0 Cdca5       | cell division cycle associated 5  | MGI:1915099 |
| ENSMUST00000031680 | 33 | 21 | 0 Ing3        | inhibitor of growth family, member 3  | MGI:1919027 |
| ENSMUST00000116560 | 33 | 18 | 0 Cfl1        | cofilin 1, non-muscle   | MGI:101757  |
| ENSMUST00000055673 | 32 | 20 | 161 Kcns3     | potassium voltage-gated channel, delayed-rectifier, subfamily S, member 3             | MGI:1098804 |
| ENSMUST00000133296 | 31 | 66 | 0 Gtf3a       | general transcription factor III A  | MGI:1913846 |
| ENSMUST00000026269 | 31 | 55 | 20 Limd1      | LIM domains containing 1  | MGI:1352502 |
| ENSMUST00000024817 | 31 | 45 | 0 Rnf8        | ring finger protein 8   | MGI:1929069 |
| ENSMUST00000168805 | 31 | 41 | 12 Pfdn5      | prefoldin 5   | MGI:1928753 |
| ENSMUST00000132011 | 31 | 29 | 0 Carm1       | coactivator-associated arginine methyltransferase 1                                   | MGI:1913208 |
| ENSMUST00000152617 | 28 | 46 | 0 Phf20       | PHD finger protein 20   | MGI:2444148 |
| ENSMUST0000003038  | 28 | 34 | 2 Ap2a2       | adaptor-related protein complex 2, alpha 2 subunit                                    | MGI:101920  |
| ENSMUST00000025444 | 28 | 34 | 2 Cxxc1       | CXXC finger 1 (PHD domain)  | MGI:1921572 |
| ENSMUST00000088086 | 27 | 23 | 8 Sulf2       | sulfatase 2   | MGI:1919293 |
| ENSMUST00000124131 | 27 | 18 | 0 Acp2        | acid phosphatase 2, lysosomal   | MGI:87882   |
| ENSMUST00000135615 | 27 | 7  | 30 Srrm3      | serine/arginine repetitive matrix 3   | MGI:1920309 |

|                     |    |    |                |  |             |
|---------------------|----|----|----------------|--|-------------|
| ENSMUST00000131863  | 27 | 57 | 0 Nsun5        | NOL1/NOP2/Sun domain family, member 5                    | MGI:2140844 |
| ENSMUST00000073151  | 27 | 30 | 0 Nlrp9b       | NLR family, pyrin domain containing 9B                   | MGI:2675377 |
| ENSMUST00000120161  | 27 | 28 | 0 Myo5b        | myosin VB  | MGI:106598  |
| ENSMUST00000105543  | 27 | 24 | 14 Phacr2      | phosphatase and actin regulator 2                        | MGI:2446138 |
| ENSMUST00000044660  | 26 | 37 | 0 Armc5        | armadillo repeat containing 5                            | MGI:2384586 |
| ENSMUST00000135333  | 26 | 21 | 0 Abhd2        | abhydrolase domain containing 2                          | MGI:1914344 |
| ENSMUST00000167004  | 26 | 18 | 0 Gpat4        | glycerol-3-phosphate acyltransferase 4                   | MGI:2142716 |
| ENSMUST00000178486  | 25 | 37 | 0 Kmt2d        | lysine (K)-specific methyltransferase 2D                 | MGI:2682319 |
| ENSMUST00000099207  | 25 | 30 | 0 Zcchc3       | zinc finger, CCHC domain containing 3                    | MGI:1915167 |
| ENSMUST00000037748  | 25 | 28 | 0 Hnmpu        | heterogeneous nuclear ribonucleoprotein U                | MGI:1858195 |
| ENSMUST00000016400  | 25 | 18 | 8 Ctsz         | cathepsin Z  | MGI:1891190 |
| ENSMUST00000023351  | 25 | 9  | 0 Mzt2         | mitotic spindle organizing protein 2                     | MGI:1922845 |
| ENSMUST00000126786  | 24 | 18 | 18 Trappc3     | trafficking protein particle complex 3                   | MGI:1351486 |
| ENSMUST00000077577  | 24 | 17 | 0 Tuba1b       | tubulin, alpha 1B  | MGI:107804  |
| ENSMUST00000024905  | 23 | 58 | 0 Ralbp1       | ralA binding protein 1                                   | MGI:108466  |
| ENSMUST00000055341  | 23 | 36 | 0 Gfod1        | glucose-fructose oxidoreductase domain containing 1      | MGI:2145304 |
| ENSMUST00000052236  | 23 | 29 | 4 Fbxo10       | F-box protein 10   | MGI:2686937 |
| ENSMUST00000126285  | 23 | 27 | 0 4930555F03R  | RIKEN cDNA 4930555F03 gene                               | MGI:1922609 |
| ENSMUST00000132347  | 23 | 20 | 38 Trapp       | transformation/transcription domain-associated protein   | MGI:2153272 |
| ENSMUST00000055858  | 23 | 7  | 28 2410002F23R | RIKEN cDNA 2410002F23 gene                               | MGI:1914226 |
| ENSMUST00000055433  | 22 | 39 | 117 Spsb4      | splA/ryanodine receptor domain and SOCS box containing 4 | MGI:2183445 |
| ENSMUST00000140482  | 22 | 37 | 0 Tbc1d20      | TBC1 domain family, member 20                            | MGI:1914481 |
| ENSMUST00000115096  | 22 | 28 | 2 Plxna4       | plexin A4  | MGI:2179061 |
| ENSMUST00000174303  | 22 | 27 | 20 Rpl27a      | ribosomal protein L27A                                   | MGI:1347076 |
| ENSMUST00000155201  | 22 | 22 | 0 Nrk          | Nik related kinase                                       | MGI:1351326 |
| ENSMUST00000129547  | 22 | 22 | 0 Skint8       | selection and upkeep of intraepithelial T cells 8        | MGI:3651523 |
| ENSMUST00000001927  | 22 | 18 | 81 Ltbp1       | latent transforming growth factor beta binding protein 1 | MGI:109151  |
| ENSMUST00000098645  | 21 | 35 | 0 Dda1         | DET1 and DDB1 associated 1                               | MGI:1913748 |
| ENSMUST00000110888  | 21 | 34 | 0 Tsc22d1      | TSC22 domain family, member 1                            | MGI:109127  |
| ENSMUST000000002133 | 21 | 24 | 0 Sdf2         | stromal cell derived factor 2                            | MGI:108019  |
| ENSMUST00000110842  | 21 | 18 | 0 Knstrn       | kinetochore-localized astrin/SPAG5 binding               | MGI:1289298 |
| ENSMUST00000160315  | 21 | 4  | 0 Ppm1h        | protein phosphatase 1H (PP2C domain containing)          | MGI:2442087 |
| ENSMUST00000181026  | 21 | 29 | 0 Cox4i1       | cytochrome c oxidase subunit IV isoform 1                | MGI:88473   |
| ENSMUST00000181651  | 20 | 20 | 0 Usp35        | ubiquitin specific peptidase 35                          | MGI:2685339 |
| ENSMUST00000093508  | 20 | 19 | 0 Sp110        | Sp110 nuclear body protein                               | MGI:1923364 |
| ENSMUST00000063470  | 20 | 12 | 1021 Ptpr      | protein tyrosine phosphatase, receptor type, R           | MGI:109559  |
| ENSMUST00000116621  | 20 | 8  | 0 Ndubf11      | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 11    | MGI:1349919 |
| ENSMUST00000132846  | 19 | 34 | 0 Ppia         | peptidylprolyl isomerase A                               | MGI:97749   |
| ENSMUST00000135776  | 19 | 22 | 0 Lrc8d        | leucine rich repeat containing 8D                        | MGI:1922368 |
| ENSMUST00000155649  | 19 | 20 | 0 Rnf168       | ring finger protein 168                                  | MGI:1917488 |
| ENSMUST00000150858  | 19 | 18 | 0 Kctd20       | potassium channel tetramerisation domain containing 20   | MGI:1914239 |
| ENSMUST00000146694  | 19 | 14 | 0 Gtdc1        | glycosyltransferase-like domain containing 1             | MGI:2444269 |
| ENSMUST00000145643  | 19 | 12 | 0 Crebl2       | cAMP responsive element binding protein-like 2           | MGI:1889385 |
| ENSMUST00000179797  | 19 | 5  | 103 Gm20594    | predicted gene, 20594                                    | MGI:5295700 |
| ENSMUST00000161595  | 19 | 1  | 0 Ubl5         | ubiquitin-like 5   | MGI:1913427 |
| ENSMUST00000071296  | 19 | 28 | 61 2410002F23R | RIKEN cDNA 2410002F23 gene                               | MGI:1914226 |
| ENSMUST00000148042  | 19 | 22 | 0 Zmynd19      | zinc finger, MYND domain containing 19                   | MGI:1914437 |
| ENSMUST00000180786  | 19 | 14 | 38 Slc46a1     | solute carrier family 46, member 1                       | MGI:1098733 |
| ENSMUST00000140939  | 19 | 13 | 0 Rad51        | RAD51 recombinase  | MGI:97890   |
| ENSMUST00000143830  | 19 | 9  | 0 Col25a1      | collagen, type XXV, alpha 1                              | MGI:1924268 |
| ENSMUST00000001092  | 19 | 5  | 0 Zfp276       | zinc finger protein (C2H2 type) 276                      | MGI:1888495 |

|                    |    |    |                |   |             |
|--------------------|----|----|----------------|---|-------------|
| ENSMUST00000154429 | 18 | 47 | 0 Ubl5         | ubiquitin-like 5  | MGI:1913427 |
| ENSMUST00000061772 | 18 | 35 | 0 Rbm15        | RNA binding motif protein 15  | MGI:2443205 |
| ENSMUST00000149353 | 18 | 28 | 0 Mmp16        | matrix metalloproteinase 16   | MGI:1276107 |
| ENSMUST00000117423 | 18 | 24 | 0 Kif2a        | kinesin family member 2A  | MGI:108390  |
| ENSMUST00000061047 | 18 | 21 | 4 Phlpp1       | PH domain and leucine rich repeat protein phosphatase 1               | MGI:2138327 |
| ENSMUST00000129181 | 18 | 18 | 0 Sdhb         | succinate dehydrogenase complex, subunit B, iron sulfur (lp)          | MGI:1914930 |
| ENSMUST00000108817 | 18 | 17 | 0 Hist3h2a     | histone cluster 3, H2a  | MGI:2448458 |
| ENSMUST00000140193 | 18 | 11 | 0 Blmh         | bleomycin hydrolase   | MGI:1345186 |
| ENSMUST00000152407 | 18 | 9  | 0 Rps2         | ribosomal protein S2  | MGI:105110  |
| ENSMUST00000171216 | 17 | 35 | 0 Ptbp1        | polypyrimidine tract binding protein 1                                | MGI:97791   |
| ENSMUST0000023599  | 17 | 21 | 0 Eif4a2       | eukaryotic translation initiation factor 4A2                          | MGI:106906  |
| ENSMUST00000142430 | 17 | 20 | 0 Sgip1        | SH3-domain GRB2-like (endophilin) interacting protein 1               | MGI:1920344 |
| ENSMUST00000139789 | 17 | 18 | 167 Ttyh1      | tweety family member 1  | MGI:1889007 |
| ENSMUST00000148665 | 17 | 4  | 0 Sf3a2        | splicing factor 3a, subunit 2   | MGI:104912  |
| ENSMUST00000173914 | 16 | 45 | 0 Prc1         | protein regulator of cytokinesis 1                                    | MGI:1858961 |
| ENSMUST00000115277 | 16 | 26 | 0 Dpy19l1      | dpy-19-like 1 (C. elegans)  | MGI:1915685 |
| ENSMUST00000155187 | 16 | 20 | 0 Lrrc45       | leucine rich repeat containing 45                                     | MGI:2387183 |
| ENSMUST00000155436 | 16 | 15 | 0 Epn1         | epsin 1   | MGI:1333763 |
| ENSMUST00000049385 | 16 | 9  | 8 Eif1         | eukaryotic translation initiation factor 1                            | MGI:105125  |
| ENSMUST00000135334 | 16 | 8  | 0 Limch1       | LIM and calponin homology domains 1                                   | MGI:1924819 |
| ENSMUST00000125685 | 16 | 1  | 2 Fam169b      | family with sequence similarity 169, member B                         | MGI:3644026 |
| ENSMUST00000061437 | 16 | 0  | 0 Adrm1        | adhesion regulating molecule 1  | MGI:1929289 |
| ENSMUST00000149669 | 16 | 0  | 0 Wsb2         | WD repeat and SOCS box-containing 2                                   | MGI:2144041 |
| ENSMUST00000160609 | 16 | 31 | 0 Wbscr17      | Williams-Beuren syndrome chromosome region 17 homolog (human)         | MGI:2137594 |
| ENSMUST00000036407 | 16 | 28 | 4 Fam160b1     | family with sequence similarity 160, member B1                        | MGI:2147545 |
| ENSMUST00000152640 | 16 | 16 | 0 Fam63a       | family with sequence similarity 63, member A                          | MGI:1922257 |
| ENSMUST00000134058 | 16 | 13 | 0 B3galt5      | UDP-Gal:betaGlcNAc beta 1,3-galactosyltransferase, polypeptide 5      | MGI:2136878 |
| ENSMUST00000054145 | 16 | 8  | 0 Dcaf5        | DDB1 and CUL4 associated factor 5                                     | MGI:2444785 |
| ENSMUST00000156565 | 16 | 8  | 0 Lpin2        | lipin 2   | MGI:1891341 |
| ENSMUST00000148060 | 16 | 0  | 0 Ubfd1        | ubiquitin family domain containing 1                                  | MGI:107301  |
| ENSMUST00000135345 | 15 | 24 | 0 Rpl21        | ribosomal protein L21   | MGI:1278340 |
| ENSMUST00000148425 | 15 | 20 | 0 Znr2         | zinc and ring finger 2  | MGI:1196246 |
| ENSMUST00000088257 | 15 | 15 | 0 Trmt112      | tRNA methyltransferase 11-2   | MGI:1914924 |
| ENSMUST00000136464 | 15 | 14 | 0 Esrb         | estrogen related receptor, beta                                       | MGI:1346832 |
| ENSMUST00000112289 | 15 | 9  | 0 Zrsr2        | zinc finger (CCCH type), RNA binding motif and serine/arginine rich 2 | MGI:103287  |
| ENSMUST00000128068 | 15 | 7  | 0 Tmem132c     | transmembrane protein 132C  | MGI:2443061 |
| ENSMUST00000145199 | 14 | 21 | 0 Snx30        | sorting nexin family member 30  | MGI:2443882 |
| ENSMUST00000146748 | 14 | 8  | 0 Bach2        | BTB and CNC homology, basic leucine zipper transcription factor 2     | MGI:894679  |
| ENSMUST00000132592 | 14 | 7  | 0 Tmem132c     | transmembrane protein 132C  | MGI:2443061 |
| ENSMUST00000149695 | 14 | 7  | 0 Ilk          | integrin linked kinase  | MGI:1195267 |
| ENSMUST00000115489 | 14 | 7  | 0 Thoc6        | THO complex 6   | MGI:2677480 |
| ENSMUST00000008573 | 14 | 4  | 0 Herpud2      | HERPUD family member 2  | MGI:1915393 |
| ENSMUST00000002087 | 14 | 0  | 34 Pnck        | pregnancy upregulated non-ubiquitously expressed CaM kinase           | MGI:1347357 |
| ENSMUST00000156561 | 14 | 0  | 0 D230025D16F1 | RIKEN cDNA D230025D16 gene  | MGI:2443049 |
| ENSMUST00000045008 | 13 | 23 | 0 Nat8f2       | N-acetyltransferase 8 (GCN5-related) family member 2                  | MGI:2136446 |
| ENSMUST00000161242 | 13 | 18 | 0 Rnf8         | ring finger protein 8   | MGI:1929069 |
| ENSMUST00000160119 | 13 | 14 | 0 Sp140        | Sp140 nuclear body protein  | MGI:3702467 |
| ENSMUST00000084599 | 13 | 12 | 0 Rbhd2        | rhomboid domain containing 2  | MGI:1915612 |
| ENSMUST00000176499 | 13 | 12 | 0 Cdca7l       | cell division cycle associated 7 like                                 | MGI:2384982 |
| ENSMUST00000146074 | 13 | 9  | 0 Zfp568       | zinc finger protein 568   | MGI:2142347 |
| ENSMUST00000175658 | 13 | 12 | 0 Popdc3       | popeye domain containing 3  | MGI:1930153 |

|                    |    |    |   |  |             |
|--------------------|----|----|---|--|-------------|
| ENSMUST00000134403 | 13 | 11 | 12 Rpl26                                | ribosomal protein L26  | MGI:106022  |
| ENSMUST00000102811 | 13 | 10 | 32 Rpl12                                | ribosomal protein L12  | MGI:98002   |
| ENSMUST00000002765 | 13 | 9  | 0 Prkd1                                 | protein kinase D1  | MGI:99879   |
| ENSMUST00000115352 | 13 | 6  | 0 Tceb1                                 | transcription elongation factor B (SIII), polypeptide 1                          | MGI:1915173 |
| ENSMUST00000107148 | 13 | 4  | 0 Focad                                 | focadhesin   | MGI:2676921 |
| ENSMUST00000156359 | 13 | 3  | 0 Rplp0                                 | ribosomal protein, large, P0   | MGI:1927636 |
| ENSMUST00000126803 | 13 | 0  | 32 Faap20                               | Fanconi anemia core complex associated protein 20                                | MGI:1914763 |
| ENSMUST00000118157 | 13 | 0  | 0 Ankrd42                               | ankyrin repeat domain 42   | MGI:1921095 |
| ENSMUST00000127819 | 12 | 26 | 0 Nfu1                                  | NFU1 iron-sulfur cluster scaffold  | MGI:1913290 |
| ENSMUST00000134538 | 12 | 22 | 0 Pif1                                  | PIF1 5'-to-3' DNA helicase   | MGI:2143057 |
| ENSMUST00000140480 | 12 | 15 | 0 4932438A13FRIKEN cDNA 4932438A13 gene |  | MGI:2444631 |
| ENSMUST00000154487 | 12 | 5  | 0 Cbfa2t2                               | core-binding factor, runt domain, alpha subunit 2, translocated to, 2 (human)    | MGI:1333833 |
| ENSMUST00000174670 | 12 | 5  | 0 H2-Oa                                 | histocompatibility 2, O region alpha locus                                       | MGI:95924   |
| ENSMUST00000164916 | 12 | 0  | 0 Ccdc58                                | coiled-coil domain containing 58   | MGI:2146423 |
| ENSMUST00000176089 | 12 | 0  | 0 Pcgf1                                 | polycomb group ring finger 1   | MGI:1917087 |
| ENSMUST00000143395 | 11 | 28 | 0 Traf3                                 | TNF receptor-associated factor 3   | MGI:108041  |
| ENSMUST00000088092 | 11 | 22 | 0 Ttc9c                                 | tetratricopeptide repeat domain 9C   | MGI:1917637 |
| ENSMUST00000094216 | 11 | 20 | 12 Mesdc1                               | mesoderm development candidate 1   | MGI:1891420 |
| ENSMUST00000035106 | 11 | 14 | 0 Slc25a38                              | solute carrier family 25, member 38  | MGI:2384782 |
| ENSMUST00000143716 | 11 | 12 | 0 Nsun2                                 | NOL1/NOP2/Sun domain family member 2   | MGI:107252  |
| ENSMUST00000129632 | 11 | 11 | 0 Tcp1                                  | t-complex protein 1  | MGI:98535   |
| ENSMUST00000156173 | 11 | 9  | 0 Gga3                                  | golgi associated, gamma adaptin ear containing, ARF binding protein 3            | MGI:2384159 |
| ENSMUST00000090300 | 11 | 8  | 0 Marf1                                 | meiosis arrest female 1  | MGI:2444505 |
| ENSMUST00000179592 | 11 | 4  | 26 Fgfr1                                | fibroblast growth factor receptor 1  | MGI:95522   |
| ENSMUST00000137919 | 11 | 4  | 0 Ttc23                                 | tetratricopeptide repeat domain 23   | MGI:1914259 |
| ENSMUST00000167227 | 11 | 4  | 0 Vrtn                                  | vertebrae development associated   | MGI:3588197 |
| ENSMUST00000132983 | 11 | 0  | 500 Srsf1                               | serine/arginine-rich splicing factor 1   | MGI:98283   |
| ENSMUST00000127300 | 11 | 0  | 280 Calm1                               | calmodulin 1   | MGI:88251   |
| ENSMUST00000112840 | 11 | 0  | 0 Fbxl17                                | F-box and leucine-rich repeat protein 17   | MGI:1354704 |
| ENSMUST00000129134 | 10 | 18 | 0 Rhbdd2                                | rhomboid domain containing 2   | MGI:1915612 |
| ENSMUST00000137621 | 10 | 16 | 0 Mklm1                                 | muskelin 1, intracellular mediator containing kelch motifs                       | MGI:1351638 |
| ENSMUST00000107543 | 10 | 12 | 0 Bglap3                                | bone gamma-carboxyglutamate protein 3  | MGI:88155   |
| ENSMUST00000176005 | 10 | 9  | 0 Abhd5                                 | abhydrolase domain containing 5  | MGI:1914719 |
| ENSMUST00000169838 | 10 | 9  | 12 Tiam2                                | T cell lymphoma invasion and metastasis 2  | MGI:1344338 |
| ENSMUST00000152651 | 10 | 9  | 0 Casp4                                 | caspase 4, apoptosis-related cysteine peptidase                                  | MGI:107700  |
| ENSMUST00000132720 | 10 | 7  | 0 Psmc2                                 | proteasome (prosome, macropain) 26S subunit, ATPase 2                            | MGI:109555  |
| ENSMUST00000143185 | 10 | 5  | 0 Snx30                                 | sorting nexin family member 30   | MGI:2443882 |
| ENSMUST00000109995 | 10 | 5  | 0 Slc35e4                               | solute carrier family 35, member E4  | MGI:2144150 |
| ENSMUST00000142666 | 10 | 5  | 0 Thap7                                 | THAP domain containing 7   | MGI:1916259 |
| ENSMUST00000156746 | 10 | 3  | 2 Ermap                                 | erythroblast membrane-associated protein   | MGI:1349816 |
| ENSMUST00000107202 | 10 | 0  | 0 Ccdc171                               | coiled-coil domain containing 171  | MGI:1922152 |
| ENSMUST00000133585 | 10 | 0  | 0 Hmgxb4                                | HMG box domain containing 4  | MGI:1918073 |
| ENSMUST00000141012 | 10 | 0  | 0 Arhgap1                               | Rho GTPase activating protein 1  | MGI:2445003 |
| ENSMUST00000141915 | 10 | 0  | 0 Faf2                                  | Fas associated factor family member 2  | MGI:1923827 |
| ENSMUST00000123032 | 10 | 20 | 0 Cflar                                 | CASP8 and FADD-like apoptosis regulator  | MGI:1336166 |
| ENSMUST00000044207 | 10 | 18 | 0 Sart1                                 | squamous cell carcinoma antigen recognized by T cells 1                          | MGI:1309453 |
| ENSMUST00000122856 | 10 | 16 | 0 Clec16a                               | C-type lectin domain family 16, member A   | MGI:1921624 |
| ENSMUST00000133984 | 10 | 13 | 0 Ssbp2                                 | single-stranded DNA binding protein 2  | MGI:1914220 |
| ENSMUST00000160146 | 10 | 11 | 0 Fam173b                               | family with sequence similarity 173, member B                                    | MGI:1915323 |
| ENSMUST00000021197 | 10 | 9  | 0 Blmh                                  | bleomycin hydrolase  | MGI:1345186 |
| ENSMUST00000139638 | 10 | 6  | 0 Slc25a11                              | solute carrier family 25 (mitochondrial carrier oxoglutarate carrier), member 11 | MGI:1915113 |

|                    |    |    |               |   |             |
|--------------------|----|----|---------------|---|-------------|
| ENSMUST00000134984 | 10 | 5  | 0 Naa30       | N(alpha)-acetyltransferase 30, NatC catalytic subunit                         | MGI:1922259 |
| ENSMUST00000134010 | 10 | 1  | 0 Mical1      | microtubule associated monooxygenase, calponin and LIM domain containing 1    | MGI:2385847 |
| ENSMUST00000144883 | 10 | 0  | 0 Stk11       | serine/threonine kinase 11  | MGI:1341870 |
| ENSMUST00000155507 | 9  | 28 | 0 Pgs1        | phosphatidylglycerophosphate synthase 1                                       | MGI:1921701 |
| ENSMUST00000034973 | 9  | 27 | 0 Smad3       | SMAD family member 3  | MGI:1201674 |
| ENSMUST00000114913 | 9  | 13 | 4 Adcy5       | adenylate cyclase 5   | MGI:99673   |
| ENSMUST00000079012 | 9  | 10 | 0 March8      | membrane-associated ring finger (C3HC4) 8                                     | MGI:1919029 |
| ENSMUST00000127215 | 9  | 9  | 4 Prdx2       | peroxiredoxin 2   | MGI:109486  |
| ENSMUST00000147076 | 9  | 9  | 0 Rrp1b       | ribosomal RNA processing 1 homolog B (S. cerevisiae)                          | MGI:1919712 |
| ENSMUST00000071991 | 9  | 8  | 0 Dppa5a      | developmental pluripotency associated 5A                                      | MGI:101800  |
| ENSMUST00000137685 | 9  | 8  | 0 Mycbp       | MYC binding protein   | MGI:1891750 |
| ENSMUST00000133032 | 9  | 5  | 0 Luc7l       | Luc7-like   | MGI:1914228 |
| ENSMUST00000142623 | 9  | 4  | 0 Nlrp14      | NLR family, pyrin domain containing 14  | MGI:1924108 |
| ENSMUST00000039088 | 9  | 1  | 8 Tex19.1     | testis expressed gene 19.1  | MGI:1920929 |
| ENSMUST00000141982 | 9  | 0  | 0 Ak2         | adenylate kinase 2  | MGI:87978   |
| ENSMUST00000149564 | 9  | 0  | 0 2700049A03F | RIKEN cDNA 2700049A03 gene  | MGI:1924217 |
| ENSMUST00000174326 | 9  | 0  | 0 Lsm2        | LSM2 homolog, U6 small nuclear RNA and mRNA degradation associated            | MGI:90676   |
| ENSMUST00000160092 | 8  | 22 | 0 Mapk15      | mitogen-activated protein kinase 15   | MGI:2652894 |
| ENSMUST00000022053 | 8  | 18 | 0 Trip13      | thyroid hormone receptor interactor 13  | MGI:1916966 |
| ENSMUST00000052332 | 8  | 16 | 28 Abi2       | abl-interactor 2  | MGI:106913  |
| ENSMUST00000135109 | 8  | 15 | 0 Cecr2       | cat eye syndrome chromosome region, candidate 2                               | MGI:1923799 |
| ENSMUST00000176734 | 8  | 14 | 0 Otud7a      | OTU domain containing 7A  | MGI:2158505 |
| ENSMUST00000069041 | 8  | 13 | 30 Ap1s2      | adaptor-related protein complex 1, sigma 2 subunit                            | MGI:1889383 |
| ENSMUST00000020490 | 8  | 13 | 0 Wdr82       | WD repeat domain containing 82  | MGI:1924555 |
| ENSMUST00000159234 | 8  | 12 | 0 Sp140       | Sp140 nuclear body protein  | MGI:3702467 |
| ENSMUST00000160454 | 8  | 9  | 34 Tmbim6     | transmembrane BAX inhibitor motif containing 6                                | MGI:99682   |
| ENSMUST00000063574 | 8  | 9  | 0 Tsr3        | TSR3 20S rRNA accumulation  | MGI:1915577 |
| ENSMUST00000144652 | 8  | 9  | 0 Ppig        | peptidyl-prolyl isomerase G (cyclophilin G)                                   | MGI:2445173 |
| ENSMUST00000183265 | 8  | 7  | 0 Rnf4        | ring finger protein 4   | MGI:1201691 |
| ENSMUST00000058135 | 8  | 7  | 12 Gm527      | predicted gene 527  | MGI:2685373 |
| ENSMUST00000146420 | 8  | 5  | 0 Mob1a       | MOB kinase activator 1A   | MGI:2442631 |
| ENSMUST00000061222 | 8  | 4  | 0 Kbtbd7      | kelch repeat and BTB (POZ) domain containing 7                                | MGI:2685141 |
| ENSMUST00000139386 | 8  | 4  | 0 Huwe1       | HECT, UBA and WWE domain containing 1   | MGI:1926884 |
| ENSMUST00000035813 | 8  | 3  | 6 Ppp1r9a     | protein phosphatase 1, regulatory (inhibitor) subunit 9A                      | MGI:2442401 |
| ENSMUST00000155347 | 8  | 3  | 34 Gss        | glutathione synthetase  | MGI:95852   |
| ENSMUST00000144693 | 8  | 2  | 0 Angel2      | angel homolog 2 (Drosophila)  | MGI:1196310 |
| ENSMUST00000121048 | 8  | 0  | 0 Mrpl24      | mitochondrial ribosomal protein L24   | MGI:1914957 |
| ENSMUST00000149838 | 8  | 0  | 0 Tulp4       | tubby like protein 4  | MGI:1916092 |
| ENSMUST00000162895 | 8  | 0  | 0 Pttg1ip     | pituitary tumor-transforming 1 interacting protein                            | MGI:2652132 |
| ENSMUST00000125458 | 7  | 21 | 0 Mogat1      | monoacylglycerol O-acyltransferase 1  | MGI:1915643 |
| ENSMUST00000116586 | 7  | 12 | 2 Robo2       | roundabout guidance receptor 2  | MGI:1890110 |
| ENSMUST00000093121 | 7  | 11 | 0 Skp1a       | S-phase kinase-associated protein 1A  | MGI:103575  |
| ENSMUST00000102638 | 7  | 9  | 0 Ampd2       | adenosine monophosphate deaminase 2   | MGI:88016   |
| ENSMUST00000124751 | 7  | 9  | 0 Pcsk2       | proprotein convertase subtilisin/kexin type 2                                 | MGI:97512   |
| ENSMUST00000135573 | 7  | 8  | 0 Prdx1       | peroxiredoxin 1   | MGI:99523   |
| ENSMUST00000029316 | 7  | 7  | 8 Exosc8      | exosome component 8   | MGI:1916889 |
| ENSMUST00000135647 | 7  | 7  | 0 Cbfa2t2     | core-binding factor, runt domain, alpha subunit 2, translocated to, 2 (human) | MGI:1333833 |
| ENSMUST00000167635 | 7  | 6  | 0 Serhl       | serine hydrolase-like   | MGI:1890404 |
| ENSMUST00000171975 | 7  | 5  | 0 Arih1       | ariadne RBR E3 ubiquitin protein ligase 1                                     | MGI:1344363 |
| ENSMUST00000029694 | 7  | 3  | 4 Arhgef2     | rho/rac guanine nucleotide exchange factor (GEF) 2                            | MGI:103264  |
| ENSMUST00000183311 | 7  | 2  | 0 Nktr        | natural killer tumor recognition sequence                                     | MGI:97346   |

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|--------------------|---|----|--------------|---|-------------|
| ENSMUST00000150222 | 7 | 0  | 42 Sacs      | sacsin  | MGI:1354724 |
| ENSMUST00000154278 | 7 | 0  | 38 Sh3bp5l   | SH3 binding domain protein 5 like                                   | MGI:1933124 |
| ENSMUST00000105916 | 7 | 0  | 12 Ahdc1     | AT hook, DNA binding motif, containing 1                            | MGI:2444218 |
| ENSMUST00000066296 | 7 | 0  | 0 Fam179b    | family with sequence similarity 179, member B                       | MGI:2684313 |
| ENSMUST00000119576 | 7 | 0  | 0 Mrps17     | mitochondrial ribosomal protein S17                                 | MGI:1913508 |
| ENSMUST00000149405 | 7 | 0  | 0 BC004004   | cDNA sequence BC004004  | MGI:2136782 |
| ENSMUST00000153092 | 7 | 0  | 0 Arf2       | ADP-ribosylation factor 2   | MGI:99595   |
| ENSMUST00000166960 | 7 | 0  | 0 U2af1l4    | U2 small nuclear RNA auxiliary factor 1-like 4                      | MGI:2678374 |
| ENSMUST00000031345 | 7 | 22 | 0 Rchy1      | ring finger and CHY zinc finger domain containing 1                 | MGI:1915348 |
| ENSMUST00000058438 | 7 | 21 | 0 Dcaf7      | DDB1 and CUL4 associated factor 7                                   | MGI:1919083 |
| ENSMUST00000125060 | 7 | 21 | 0 Cds2       | CDP-diacylglycerol synthase (phosphatidate cytidylyltransferase) 2  | MGI:1332236 |
| ENSMUST00000108257 | 7 | 18 | 0 Pla2g4c    | phospholipase A2, group IVC (cytosolic, calcium-independent)        | MGI:1196403 |
| ENSMUST00000059099 | 7 | 16 | 0 Pdzd11     | PDZ domain containing 11  | MGI:1919871 |
| ENSMUST00000132581 | 7 | 14 | 0 Klhdc10    | kelch domain containing 10  | MGI:1924038 |
| ENSMUST00000128514 | 7 | 12 | 0 Gm15800    | predicted gene 15800  | MGI:3647820 |
| ENSMUST00000129001 | 7 | 9  | 0 Ankrd13a   | ankyrin repeat domain 13a   | MGI:1915670 |
| ENSMUST00000171970 | 7 | 9  | 0 Bmp6       | bone morphogenetic protein 6  | MGI:88182   |
| ENSMUST00000175986 | 7 | 7  | 0 Fam65b     | family with sequence similarity 65, member B                        | MGI:2444879 |
| ENSMUST00000021631 | 7 | 6  | 8 Ppp4r4     | protein phosphatase 4, regulatory subunit 4                         | MGI:1921771 |
| ENSMUST00000056045 | 7 | 5  | 0 Fam185a    | family with sequence similarity 185, member A                       | MGI:2140983 |
| ENSMUST00000162364 | 7 | 5  | 0 Mob4       | MOB family member 4, phocein  | MGI:104899  |
| ENSMUST00000106919 | 7 | 5  | 0 B020004J07 | RIKEN cDNA B020004J07 gene  | MGI:3588238 |
| ENSMUST00000149946 | 7 | 4  | 50 Psmd1     | proteasome (prosome, macropain) 26S subunit, non-ATPase, 1          | MGI:1917497 |
| ENSMUST00000022650 | 7 | 3  | 16 Pibf1     | progesterone immunomodulatory binding factor 1                      | MGI:1261910 |
| ENSMUST00000162778 | 7 | 3  | 0 Pias3      | protein inhibitor of activated STAT 3                               | MGI:1913126 |
| ENSMUST00000174755 | 7 | 1  | 28 Hnrmpl    | heterogeneous nuclear ribonucleoprotein L                           | MGI:104816  |
| ENSMUST00000156465 | 7 | 1  | 20 Dab2ip    | disabled 2 interacting protein                                      | MGI:1916851 |
| ENSMUST00000125224 | 7 | 0  | 14 Eif4enif1 | eukaryotic translation initiation factor 4E nuclear import factor 1 | MGI:1921453 |
| ENSMUST00000141115 | 7 | 0  | 2 Tnrc6c     | trinucleotide repeat containing 6C                                  | MGI:2443265 |
| ENSMUST00000025563 | 7 | 0  | 0 Fth1       | ferritin heavy polypeptide 1  | MGI:95588   |
| ENSMUST00000027438 | 7 | 0  | 0 Ncl        | nucleolin   | MGI:97286   |
| ENSMUST00000032884 | 7 | 0  | 0 Anapc15    | anaphase promoting complex C subunit 15                             | MGI:1922680 |
| ENSMUST00000041984 | 7 | 0  | 0 Akap7      | A kinase (PRKA) anchor protein 7                                    | MGI:1859150 |
| ENSMUST00000062629 | 7 | 0  | 0 Npm2       | nucleophosmin/nucleoplasmin 2                                       | MGI:1890811 |
| ENSMUST00000123892 | 7 | 0  | 0 C8b        | complement component 8, beta polypeptide                            | MGI:88236   |
| ENSMUST00000130430 | 7 | 0  | 0 Rbm38      | RNA binding motif protein 38  | MGI:1889294 |
| ENSMUST00000132360 | 7 | 0  | 0 Msantd3    | Myb/SANT-like DNA-binding domain containing 3                       | MGI:1913915 |
| ENSMUST00000137557 | 7 | 0  | 0 Atp6v1a    | ATPase, H+ transporting, lysosomal V1 subunit A                     | MGI:1201780 |
| ENSMUST00000138613 | 7 | 0  | 0 Dync1i2    | dynein cytoplasmic 1 intermediate chain 2                           | MGI:107750  |
| ENSMUST00000148514 | 7 | 0  | 0 Dgcr6      | DiGeorge syndrome critical region gene 6                            | MGI:1202877 |
| ENSMUST00000149371 | 7 | 0  | 0 Xpo1       | exportin 1  | MGI:2144013 |
| ENSMUST00000152527 | 7 | 0  | 0 Noxo1      | NADPH oxidase organizer 1   | MGI:1919143 |
| ENSMUST00000037974 | 6 | 16 | 2 Ptpm       | protein tyrosine phosphatase, receptor type, M                      | MGI:102694  |
| ENSMUST00000114937 | 6 | 16 | 6 Usp6nl     | USP6 N-terminal like  | MGI:2138893 |
| ENSMUST00000148148 | 6 | 16 | 0 Raver2     | ribonucleoprotein, PTB-binding 2                                    | MGI:2443623 |
| ENSMUST00000154707 | 6 | 14 | 50 Ankrd24   | ankyrin repeat domain 24  | MGI:1890394 |
| ENSMUST00000127823 | 6 | 12 | 0 Camsap1    | calmodulin regulated spectrin-associated protein 1                  | MGI:3036242 |
| ENSMUST00000180140 | 6 | 10 | 0 Hcfc1r1    | host cell factor C1 regulator 1 (XPO1-dependent)                    | MGI:2663619 |
| ENSMUST00000121185 | 6 | 9  | 0 Sumo2      | small ubiquitin-like modifier 2                                     | MGI:2158813 |
| ENSMUST00000124026 | 6 | 9  | 0 Folr1      | folate receptor 1 (adult)   | MGI:95568   |
| ENSMUST00000128084 | 6 | 7  | 4 Ildr1      | immunoglobulin-like domain containing receptor 1                    | MGI:2146574 |

|                    |   |    |            |   |             |
|--------------------|---|----|------------|---|-------------|
| ENSMUST00000129214 | 6 | 7  | 0 Sapcd2   | suppressor APC domain containing 2  | MGI:1919330 |
| ENSMUST00000151561 | 6 | 7  | 0 Ak4      | adenylate kinase 4  | MGI:87979   |
| ENSMUST00000059462 | 6 | 7  | 0 Chmp3    | charged multivesicular body protein 3                                     | MGI:1913950 |
| ENSMUST00000134204 | 6 | 6  | 0 Pip5k1   | phosphatidylinositol-4-phosphate 5-kinase-like 1                          | MGI:2448520 |
| ENSMUST00000055549 | 6 | 5  | 0 B3gnt2   | UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 2             | MGI:1889505 |
| ENSMUST00000134770 | 6 | 5  | 0 Alkbh5   | alkB homolog 5, RNA demethylase   | MGI:2144489 |
| ENSMUST00000100464 | 6 | 5  | 0 Arhgap8  | Rho GTPase activating protein 8   | MGI:1920417 |
| ENSMUST00000151410 | 6 | 5  | 0 Fbxw7    | F-box and WD-40 domain protein 7  | MGI:1354695 |
| ENSMUST00000137019 | 6 | 3  | 0 Jakmip1  | janus kinase and microtubule interacting protein 1                        | MGI:1923321 |
| ENSMUST00000032927 | 6 | 3  | 6 Stard10  | START domain containing 10  | MGI:1860093 |
| ENSMUST00000144395 | 6 | 3  | 0 Edf1     | endothelial differentiation-related factor 1                              | MGI:1891227 |
| ENSMUST00000131696 | 6 | 2  | 0 Nol9     | nucleolar protein 9   | MGI:1921285 |
| ENSMUST00000155805 | 6 | 1  | 69 Rps16   | ribosomal protein S16   | MGI:98118   |
| ENSMUST00000114256 | 6 | 1  | 14 Lingo1  | leucine rich repeat and Ig domain containing 1                            | MGI:1915522 |
| ENSMUST00000126446 | 6 | 0  | 14 Nek2    | NIMA (never in mitosis gene a)-related expressed kinase 2                 | MGI:109359  |
| ENSMUST00000125007 | 6 | 0  | 8 Pxn      | paxillin  | MGI:108295  |
| ENSMUST00000150635 | 6 | 0  | 2 Xiap     | X-linked inhibitor of apoptosis   | MGI:107572  |
| ENSMUST00000002048 | 6 | 0  | 0 Taco1    | translational activator of mitochondrially encoded cytochrome c oxidase I | MGI:1917457 |
| ENSMUST00000027538 | 6 | 0  | 0 Asb1     | ankyrin repeat and SOCS box-containing 1                                  | MGI:1929735 |
| ENSMUST00000032078 | 6 | 0  | 0 Cct7     | chaperonin containing Tcp1, subunit 7 (eta)                               | MGI:107184  |
| ENSMUST00000035804 | 6 | 0  | 0 Cdo1     | cysteine dioxygenase 1, cytosolic   | MGI:105925  |
| ENSMUST00000048263 | 6 | 0  | 0 Wapl     | WAPL cohesin release factor   | MGI:2675859 |
| ENSMUST00000052529 | 6 | 0  | 0 Ppp1r15b | protein phosphatase 1, regulatory (inhibitor) subunit 15b                 | MGI:2444211 |
| ENSMUST00000068613 | 6 | 0  | 0 Fam72a   | family with sequence similarity 72, member A                              | MGI:1919669 |
| ENSMUST00000124242 | 6 | 0  | 0 Tchp     | trichoplein, keratin filament binding                                     | MGI:1925082 |
| ENSMUST00000125743 | 6 | 0  | 0 Ptpa     | protein phosphatase 2 protein activator                                   | MGI:1346006 |
| ENSMUST00000141315 | 6 | 0  | 0 Cul4a    | cullin 4A   | MGI:1914487 |
| ENSMUST00000146946 | 6 | 0  | 0 Heatr3   | HEAT repeat containing 3  | MGI:2444491 |
| ENSMUST00000162417 | 6 | 0  | 0 Rnf8     | ring finger protein 8   | MGI:1929069 |
| ENSMUST00000166404 | 6 | 0  | 0 Thop1    | thimet oligopeptidase 1   | MGI:1354165 |
| ENSMUST00000173375 | 6 | 0  | 0 Tyw1     | tRNA-yW synthesizing protein 1 homolog (S. cerevisiae)                    | MGI:2141161 |
| ENSMUST00000177196 | 6 | 0  | 0 Cyth3    | cytohesin 3   | MGI:1335107 |
| ENSMUST00000147684 | 5 | 26 | 0 Skp1a    | S-phase kinase-associated protein 1A                                      | MGI:103575  |
| ENSMUST00000074519 | 5 | 19 | 0 Txnip    | thioredoxin interacting protein   | MGI:1889549 |
| ENSMUST00000080537 | 5 | 15 | 2 Rac1     | RAS-related C3 botulinum substrate 1                                      | MGI:97845   |
| ENSMUST00000133070 | 5 | 15 | 2 Zfp652   | zinc finger protein 652   | MGI:2442221 |
| ENSMUST00000068767 | 5 | 14 | 0 Nlrp4a   | NLR family, pyrin domain containing 4A                                    | MGI:2443697 |
| ENSMUST00000097622 | 5 | 10 | 0 Fam53c   | family with sequence similarity 53, member C                              | MGI:1913556 |
| ENSMUST00000133158 | 5 | 10 | 0 Ttc38    | tetratricopeptide repeat domain 38  | MGI:2146198 |
| ENSMUST00000159755 | 5 | 9  | 0 Nat8f4   | N-acetyltransferase 8 (GCN5-related) family member 4                      | MGI:1922791 |
| ENSMUST00000139834 | 5 | 9  | 42 Pxn     | paxillin  | MGI:108295  |
| ENSMUST00000134175 | 5 | 9  | 0 Dpp6     | dipeptidylpeptidase 6   | MGI:94921   |
| ENSMUST00000169378 | 5 | 8  | 0 Gpaa1    | GPI anchor attachment protein 1   | MGI:1202392 |
| ENSMUST00000123824 | 5 | 7  | 0 Aen      | apoptosis enhancing nuclease  | MGI:1915298 |
| ENSMUST00000042365 | 5 | 5  | 26 Cdk13   | cyclin-dependent kinase 13  | MGI:1916812 |
| ENSMUST00000144434 | 5 | 5  | 6 Rpl10    | ribosomal protein L10   | MGI:105943  |
| ENSMUST00000144935 | 5 | 5  | 0 Clec10a  | C-type lectin domain family 10, member A                                  | MGI:96975   |
| ENSMUST00000029546 | 5 | 5  | 12 Jtb     | jumping translocation breakpoint  | MGI:1346082 |
| ENSMUST00000032918 | 5 | 5  | 0 Gm42742  | predicted gene 42742  | MGI:5662879 |
| ENSMUST00000107547 | 5 | 5  | 0 Al481877 | expressed sequence Al481877   | MGI:2140313 |
| ENSMUST00000119746 | 5 | 5  | 0 Usf3     | upstream transcription factor family member 3                             | MGI:2685454 |

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|--------------------|---|----|-------------|---|-------------|
| ENSMUST00000175981 | 5 | 5  | 0 Rnf141    | ring finger protein 141   | MGI:1914400 |
| ENSMUST00000064099 | 5 | 4  | 0 Ppp6r1    | protein phosphatase 6, regulatory subunit 1                     | MGI:2442163 |
| ENSMUST00000123158 | 5 | 4  | 0 Pofut1    | protein O-fucosyltransferase 1                                  | MGI:2153207 |
| ENSMUST00000155213 | 5 | 4  | 0 Tor1b     | torsin family 1, member B                                       | MGI:1353605 |
| ENSMUST00000021322 | 5 | 3  | 2 Fmn1      | formin-like 1   | MGI:1888994 |
| ENSMUST00000161230 | 5 | 3  | 0 Mgst2     | microsomal glutathione S-transferase 2                          | MGI:2448481 |
| ENSMUST00000176559 | 5 | 3  | 0 Pid1      | phosphotyrosine interaction domain containing 1                 | MGI:2138391 |
| ENSMUST00000130989 | 5 | 2  | 2 Hagh      | hydroxyacyl glutathione hydrolase                               | MGI:95745   |
| ENSMUST00000133106 | 5 | 2  | 0 Galt      | galactose-1-phosphate uridyl transferase                        | MGI:95638   |
| ENSMUST00000128582 | 5 | 1  | 0 Dnajc11   | DnaJ heat shock protein family (Hsp40) member C11               | MGI:2443386 |
| ENSMUST00000034868 | 5 | 0  | 79 Clk1     | CDC-like kinase 1   | MGI:107403  |
| ENSMUST00000151092 | 5 | 0  | 18 Tnks1bp1 | tankyrase 1 binding protein 1                                   | MGI:2446193 |
| ENSMUST00000123096 | 5 | 0  | 16 Ddx3x    | DEAD/H (Asp-Glu-Ala-Asp/His) box polypeptide 3, X-linked        | MGI:103064  |
| ENSMUST00000028384 | 5 | 0  | 0 Dusp19    | dual specificity phosphatase 19                                 | MGI:1915332 |
| ENSMUST00000031740 | 5 | 0  | 0 Mepce     | methylphosphate capping enzyme                                  | MGI:106477  |
| ENSMUST00000032335 | 5 | 0  | 0 Atf7ip    | activating transcription factor 7 interacting protein           | MGI:1858965 |
| ENSMUST00000035295 | 5 | 0  | 0 Degs1     | delta(4)-desaturase, sphingolipid 1                             | MGI:1097711 |
| ENSMUST00000071093 | 5 | 0  | 0 Rims3     | regulating synaptic membrane exocytosis 3                       | MGI:2443331 |
| ENSMUST00000075924 | 5 | 0  | 0 Krr1      | KRR1, small subunit (SSU) processome component, homolog (yeast) | MGI:1289274 |
| ENSMUST00000087215 | 5 | 0  | 0 Cnot9     | CCR4-NOT transcription complex, subunit 9                       | MGI:1928902 |
| ENSMUST00000100443 | 5 | 0  | 0 Myo18a    | myosin XVIIIa   | MGI:2667185 |
| ENSMUST00000102899 | 5 | 0  | 0 Med22     | mediator complex subunit 22                                     | MGI:98446   |
| ENSMUST00000106891 | 5 | 0  | 0 Dcaf7     | DDB1 and CUL4 associated factor 7                               | MGI:1919083 |
| ENSMUST00000127842 | 5 | 0  | 0 Ctsh      | cathepsin H   | MGI:107285  |
| ENSMUST00000132893 | 5 | 0  | 0 Sfi1      | Sfi1 homolog, spindle assembly associated (yeast)               | MGI:1926137 |
| ENSMUST00000133422 | 5 | 0  | 0 Afdn      | afadin, adherens junction formation factor                      | MGI:1314653 |
| ENSMUST00000133519 | 5 | 0  | 0 Arfp2     | ADP-ribosylation factor interacting protein 2                   | MGI:1924182 |
| ENSMUST00000134941 | 5 | 0  | 0 Snx29     | sorting nexin 29  | MGI:1921728 |
| ENSMUST00000136485 | 5 | 0  | 0 Gorasp2   | golgi reassembly stacking protein 2                             | MGI:2135962 |
| ENSMUST00000137808 | 5 | 0  | 0 Uqcrc2    | ubiquinol cytochrome c reductase core protein 2                 | MGI:1914253 |
| ENSMUST00000138071 | 5 | 0  | 0 Wsb2      | WD repeat and SOCS box-containing 2                             | MGI:2144041 |
| ENSMUST00000139496 | 5 | 0  | 0 Phka2     | phosphorylase kinase alpha 2                                    | MGI:97577   |
| ENSMUST00000140364 | 5 | 0  | 0 Adck2     | aarF domain containing kinase 2                                 | MGI:1889336 |
| ENSMUST00000141448 | 5 | 0  | 0 Hook1     | hook microtubule tethering protein 1                            | MGI:1925213 |
| ENSMUST00000142075 | 5 | 0  | 0 Inpp5f    | inositol polyphosphate-5-phosphatase F                          | MGI:2141867 |
| ENSMUST00000142248 | 5 | 0  | 0 Luzp1     | leucine zipper protein 1  | MGI:107629  |
| ENSMUST00000149118 | 5 | 0  | 0 Chchd5    | coiled-coil-helix-coiled-coil-helix domain containing 5         | MGI:1913420 |
| ENSMUST00000150817 | 5 | 0  | 0 Dcbld2    | discoidin, CUB and LCCL domain containing 2                     | MGI:1920629 |
| ENSMUST00000151492 | 5 | 0  | 0 Foxk2     | forkhead box K2   | MGI:1916087 |
| ENSMUST00000151983 | 5 | 0  | 0 Ufsp2     | UFM1-specific peptidase 2                                       | MGI:1913679 |
| ENSMUST00000155732 | 5 | 0  | 0 Zfp369    | zinc finger protein 369   | MGI:2176229 |
| ENSMUST00000169273 | 5 | 0  | 0 Ndst1     | N-deacetylase/N-sulfotransferase (heparan glucosaminyl) 1       | MGI:104719  |
| ENSMUST00000171284 | 5 | 0  | 0 Mettl4    | methyltransferase like 4  | MGI:1924031 |
| ENSMUST00000137464 | 4 | 20 | 0 Fus       | fused in sarcoma  | MGI:1353633 |
| ENSMUST00000124718 | 4 | 16 | 0 Tlcd2     | TLC domain containing 2   | MGI:1917141 |
| ENSMUST00000134932 | 4 | 14 | 0 Spsb3     | splA/ryanodine receptor domain and SOCS box containing 3        | MGI:1891471 |
| ENSMUST00000160310 | 4 | 13 | 0 Zfp346    | zinc finger protein 346   | MGI:1349417 |
| ENSMUST00000127140 | 4 | 9  | 0 Itgb3     | integrin beta 3   | MGI:96612   |
| ENSMUST00000052876 | 4 | 7  | 0 Eva1b     | eva-1 homolog B (C. elegans)                                    | MGI:1922063 |
| ENSMUST00000078459 | 4 | 7  | 6 Memo1     | mediator of cell motility 1                                     | MGI:1924140 |
| ENSMUST00000173393 | 4 | 7  | 0 Rbm38     | RNA binding motif protein 38                                    | MGI:1889294 |



|                    |   |    |             |   |             |
|--------------------|---|----|-------------|---|-------------|
| ENSMUST00000138682 | 4 | 6  | 0 Rcc2      | regulator of chromosome condensation 2                              | MGI:1919784 |
| ENSMUST00000135550 | 4 | 5  | 14 Cdk11b   | cyclin-dependent kinase 11B   | MGI:88353   |
| ENSMUST00000137925 | 4 | 5  | 10 Tspan33  | tetraspanin 33  | MGI:1919012 |
| ENSMUST00000108107 | 4 | 5  | 0 Spry1     | sprouty homolog 1 (Drosophila)                                      | MGI:1345139 |
| ENSMUST00000137360 | 4 | 5  | 0 Cdc16     | CDC16 cell division cycle 16  | MGI:1917207 |
| ENSMUST00000146836 | 4 | 5  | 0 C87977    | expressed sequence C87977   | MGI:2140708 |
| ENSMUST00000173731 | 4 | 5  | 12 Ddx39b   | DEAD (Asp-Glu-Ala-Asp) box polypeptide 39B                          | MGI:99240   |
| ENSMUST00000140468 | 4 | 5  | 0 Ccnbdp1   | cyclin D-type binding-protein 1                                     | MGI:109595  |
| ENSMUST00000142149 | 4 | 5  | 0 Timeless  | timeless circadian clock 1  | MGI:1321393 |
| ENSMUST00000169536 | 4 | 5  | 0 Zfyve27   | zinc finger, FYVE domain containing 27                              | MGI:1919602 |
| ENSMUST00000006914 | 4 | 1  | 10 B4galnt1 | beta-1,4-N-acetyl-galactosaminyl transferase 1                      | MGI:1342057 |
| ENSMUST00000028817 | 4 | 0  | 91 Pcna     | proliferating cell nuclear antigen                                  | MGI:97503   |
| ENSMUST00000180020 | 4 | 0  | 36 Hnmpf    | heterogeneous nuclear ribonucleoprotein F                           | MGI:2138741 |
| ENSMUST00000144050 | 4 | 0  | 8 Foxn4     | forkhead box N4   | MGI:2151057 |
| ENSMUST00000145008 | 4 | 0  | 6 Ifnar1    | interferon (alpha and beta) receptor 1                              | MGI:107658  |
| ENSMUST00000147615 | 4 | 16 | 0 Khdc1b    | KH domain containing 1B   | MGI:2138477 |
| ENSMUST00000139846 | 4 | 5  | 0 Eif1      | eukaryotic translation initiation factor 1                          | MGI:105125  |
| ENSMUST00000145793 | 4 | 5  | 0 Ncaph2    | non-SMC condensin II complex, subunit H2                            | MGI:1289164 |
| ENSMUST00000159392 | 4 | 3  | 12 Adh5     | alcohol dehydrogenase 5 (class III), chi polypeptide                | MGI:87929   |
| ENSMUST00000170054 | 4 | 3  | 115 Baz2a   | bromodomain adjacent to zinc finger domain, 2A                      | MGI:2151152 |
| ENSMUST00000138134 | 4 | 3  | 18 Gramd4   | GRAM domain containing 4  | MGI:2676308 |
| ENSMUST00000027752 | 4 | 2  | 8 Lamc1     | laminin, gamma 1  | MGI:99914   |
| ENSMUST00000108293 | 4 | 2  | 8 Tmem67    | transmembrane protein 67  | MGI:1923928 |
| ENSMUST00000127239 | 4 | 2  | 8 Trmt2a    | TRM2 tRNA methyltransferase 2A                                      | MGI:96270   |
| ENSMUST00000048431 | 4 | 0  | 10 Naif1    | nuclear apoptosis inducing factor 1                                 | MGI:1918504 |
| ENSMUST00000138748 | 3 | 10 | 0 Prdx2     | peroxiredoxin 2   | MGI:109486  |
| ENSMUST00000029105 | 3 | 6  | 22 Zgpat    | zinc finger, CCCH-type with G patch domain                          | MGI:2449939 |
| ENSMUST00000137683 | 3 | 5  | 0 Dync1i2   | dynein cytoplasmic 1 intermediate chain 2                           | MGI:107750  |
| ENSMUST00000151126 | 3 | 5  | 0 Paip2     | polyadenylate-binding protein-interacting protein 2                 | MGI:1915119 |
| ENSMUST00000017197 | 3 | 5  | 0 Nap1l1    | nucleosome assembly protein 1-like 1                                | MGI:1855693 |
| ENSMUST00000176100 | 3 | 5  | 0 Pcgf1     | polycomb group ring finger 1  | MGI:1917087 |
| ENSMUST00000087614 | 3 | 3  | 6 Aebp2     | AE binding protein 2  | MGI:1338038 |
| ENSMUST00000127306 | 3 | 2  | 30 Enho     | energy homeostasis associated                                       | MGI:1916888 |
| ENSMUST00000139793 | 3 | 1  | 20 Abhd13   | abhydrolase domain containing 13                                    | MGI:1916154 |
| ENSMUST00000024829 | 3 | 1  | 8 Abcg1     | ATP-binding cassette, sub-family G (WHITE), member 1                | MGI:107704  |
| ENSMUST00000136063 | 3 | 0  | 75 Csnk2a1  | casein kinase 2, alpha 1 polypeptide                                | MGI:88543   |
| ENSMUST00000116436 | 3 | 0  | 69 Ahr      | aryl-hydrocarbon receptor   | MGI:105043  |
| ENSMUST00000173578 | 3 | 0  | 20 Hnmp1    | heterogeneous nuclear ribonucleoprotein L                           | MGI:104816  |
| ENSMUST00000182327 | 3 | 0  | 0 Hnmp1     | heterogeneous nuclear ribonucleoprotein R                           | MGI:1891692 |
| ENSMUST00000153008 | 2 | 12 | 0 Edf1      | endothelial differentiation-related factor 1                        | MGI:1891227 |
| ENSMUST00000055535 | 2 | 7  | 4 Prtg      | protogenin  | MGI:2444710 |
| ENSMUST00000174552 | 2 | 7  | 4 Dip2c     | disco interacting protein 2 homolog C                               | MGI:1920179 |
| ENSMUST00000104942 | 2 | 7  | 0 AK157302  | cDNA sequence AK157302  | MGI:3574096 |
| ENSMUST00000112618 | 2 | 6  | 123 Gpd2    | glycerol phosphate dehydrogenase 2, mitochondrial                   | MGI:99778   |
| ENSMUST00000147055 | 2 | 6  | 0 Mbd5      | methyl-CpG binding domain protein 5                                 | MGI:2138934 |
| ENSMUST00000175930 | 2 | 5  | 0 Mettl23   | methyltransferase like 23   | MGI:1921569 |
| ENSMUST00000147382 | 2 | 4  | 14 Dlg1     | discs, large homolog 1 (Drosophila)                                 | MGI:107231  |
| ENSMUST00000029651 | 2 | 1  | 52 Gstcd    | glutathione S-transferase, C-terminal domain containing             | MGI:1914803 |
| ENSMUST00000022954 | 2 | 1  | 16 Khdrbs3  | KH domain containing, RNA binding, signal transduction associated 3 | MGI:1313312 |
| ENSMUST00000131284 | 2 | 1  | 14 Zgpat    | zinc finger, CCCH-type with G patch domain                          | MGI:2449939 |
| ENSMUST00000025827 | 2 | 1  | 6 Minpp1    | multiple inositol polyphosphate histidine phosphatase 1             | MGI:1336159 |

|                    |   |    |                |   |             |
|--------------------|---|----|----------------|---|-------------|
| ENSMUST00000062117 | 2 | 1  | 6 Rap2a        | RAS related protein 2a  | MGI:97855   |
| ENSMUST00000155229 | 2 | 1  | 2 Susd4        | sushi domain containing 4   | MGI:2138351 |
| ENSMUST00000163320 | 2 | 0  | 20 Cic         | capicua transcriptional repressor                                 | MGI:1918972 |
| ENSMUST00000029673 | 2 | 0  | 18 Efna3       | ephrin A3   | MGI:106644  |
| ENSMUST00000125565 | 2 | 0  | 12 Mpz         | myelin protein zero   | MGI:103177  |
| ENSMUST00000117966 | 2 | 0  | 10 Nfic        | nuclear factor I/C  | MGI:109591  |
| ENSMUST00000069476 | 2 | 0  | 6 Ldoc1l       | leucine zipper, down-regulated in cancer 1-like                   | MGI:2675858 |
| ENSMUST00000075641 | 2 | 0  | 6 Npm1         | nucleophosmin 1   | MGI:106184  |
| ENSMUST00000159774 | 1 | 8  | 6 Abhd18       | abhydrolase domain containing 18                                  | MGI:1915468 |
| ENSMUST00000044415 | 1 | 5  | 2 Npepl1       | aminopeptidase-like 1   | MGI:2448523 |
| ENSMUST00000140979 | 1 | 5  | 2 Satb1        | special AT-rich sequence binding protein 1                        | MGI:105084  |
| ENSMUST00000044005 | 1 | 5  | 4 Atf7ip2      | activating transcription factor 7 interacting protein 2           | MGI:1922579 |
| ENSMUST00000124894 | 1 | 5  | 0 Dynlt1c      | dynein light chain Tctex-type 1C                                  | MGI:3807476 |
| ENSMUST00000178113 | 1 | 5  | 0 Tle3         | transducin-like enhancer of split 3                               | MGI:104634  |
| ENSMUST00000018971 | 1 | 2  | 32 Brsk2       | BR serine/threonine kinase 2                                      | MGI:1923020 |
| ENSMUST00000040580 | 1 | 2  | 32 Syde1       | synapse defective 1, Rho GTPase, homolog 1 (C. elegans)           | MGI:1918959 |
| ENSMUST00000141619 | 1 | 2  | 8 Dync1i2      | dynein cytoplasmic 1 intermediate chain 2                         | MGI:107750  |
| ENSMUST00000131612 | 1 | 1  | 22 0610010F05R | RIKEN cDNA 0610010F05 gene  | MGI:1918925 |
| ENSMUST00000134215 | 1 | 1  | 22 Numbl       | numb-like   | MGI:894702  |
| ENSMUST00000129488 | 1 | 1  | 14 Arid4b      | AT rich interactive domain 4B (RBP1-like)                         | MGI:2137512 |
| ENSMUST00000014022 | 1 | 1  | 10 Rnf170      | ring finger protein 170   | MGI:1924983 |
| ENSMUST00000141291 | 1 | 1  | 10 Epb41       | erythrocyte membrane protein band 4.1                             | MGI:95401   |
| ENSMUST00000131842 | 1 | 1  | 6 Pld1         | phospholipase D1  | MGI:109585  |
| ENSMUST00000125299 | 1 | 0  | 12 Gcn1l1      | GCN1 general control of amino-acid synthesis 1-like 1 (yeast)     | MGI:2444248 |
| ENSMUST00000118735 | 1 | 0  | 4 Dnajc5b      | DnaJ heat shock protein family (Hsp40) member C5 beta             | MGI:1913576 |
| ENSMUST00000113753 | 1 | 13 | 0 Tprkb        | Tp53rk binding protein  | MGI:1917036 |
| ENSMUST00000085614 | 1 | 12 | 6 Usp12        | ubiquitin specific peptidase 12                                   | MGI:1270128 |
| ENSMUST00000155360 | 1 | 3  | 16 Itch        | itchy, E3 ubiquitin protein ligase                                | MGI:1202301 |
| ENSMUST00000151151 | 1 | 3  | 6 Arid4b       | AT rich interactive domain 4B (RBP1-like)                         | MGI:2137512 |
| ENSMUST00000046038 | 1 | 3  | 8 Slc25a28     | solute carrier family 25, member 28                               | MGI:2180509 |
| ENSMUST00000174078 | 1 | 2  | 38 Iffo2       | intermediate filament family orphan 2                             | MGI:2140675 |
| ENSMUST00000022813 | 1 | 2  | 8 Efs          | embryonal Fyn-associated substrate                                | MGI:105311  |
| ENSMUST00000129163 | 1 | 1  | 14 Pomt1       | protein-O-mannosyltransferase 1                                   | MGI:2138994 |
| ENSMUST00000141230 | 1 | 1  | 10 Iffo1       | intermediate filament family orphan 1                             | MGI:2444516 |
| ENSMUST00000091458 | 1 | 1  | 6 Nr2f1        | nuclear receptor subfamily 2, group F, member 1                   | MGI:1352451 |
| ENSMUST00000148728 | 1 | 1  | 28 Tia1        | cytotoxic granule-associated RNA binding protein 1                | MGI:107914  |
| ENSMUST00000050918 | 1 | 1  | 16 Camk2n1     | calcium/calmodulin-dependent protein kinase II inhibitor 1        | MGI:1913509 |
| ENSMUST00000109488 | 1 | 1  | 14 Snhg11      | small nucleolar RNA host gene 11                                  | MGI:2441845 |
| ENSMUST00000184180 | 1 | 1  | 12 Nedd4       | neural precursor cell expressed, developmentally down-regulated 4 | MGI:97297   |
| ENSMUST00000028866 | 1 | 1  | 10 Zc3h8       | zinc finger CCCH type containing 8                                | MGI:1930128 |
| ENSMUST00000112513 | 1 | 1  | 8 Cnksr2       | connector enhancer of kinase suppressor of Ras 2                  | MGI:2661175 |
| ENSMUST00000059042 | 1 | 0  | 52 Gtf2i       | general transcription factor II I                                 | MGI:1202722 |
| ENSMUST00000081728 | 1 | 0  | 34 Ctnnd2      | catenin (cadherin associated protein), delta 2                    | MGI:1195966 |
| ENSMUST00000033142 | 1 | 0  | 32 Ptpn5       | protein tyrosine phosphatase, non-receptor type 5                 | MGI:97807   |
| ENSMUST00000098845 | 1 | 0  | 22 Epn1        | epsin 1   | MGI:1333763 |
| ENSMUST00000125031 | 1 | 0  | 22 Atp11a      | ATPase, class VI, type 11A  | MGI:1354735 |
| ENSMUST00000176741 | 1 | 0  | 12 Pkib        | protein kinase inhibitor beta, cAMP dependent, testis specific    | MGI:101937  |
| ENSMUST00000144696 | 1 | 0  | 10 Mtch2       | mitochondrial carrier 2   | MGI:1929260 |
| ENSMUST00000133001 | 1 | 0  | 8 Gm6483       | predicted gene 6483   | MGI:3644574 |
| ENSMUST00000153739 | 1 | 0  | 8 Nnat         | neuronatin  | MGI:104716  |
| ENSMUST00000162399 | 1 | 0  | 6 Car7         | carbonic anhydrase 7  | MGI:103100  |

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|--------------------|---|----|----|----------|--|-------------|
| ENSMUST00000065482 | 0 | 24 | 0  | Mllt11   | myeloid/lymphoid or mixed-lineage leukemia; translocated to, 11  | MGI:1929671 |
| ENSMUST00000131032 | 0 | 22 | 0  | Hif1an   | hypoxia-inducible factor 1, alpha subunit inhibitor              | MGI:2442345 |
| ENSMUST00000131362 | 0 | 19 | 0  | Bnip1    | BCL2/adenovirus E1B interacting protein 1                        | MGI:109328  |
| ENSMUST00000136094 | 0 | 18 | 0  | Rrp1b    | ribosomal RNA processing 1 homolog B (S. cerevisiae)             | MGI:1919712 |
| ENSMUST00000120016 | 0 | 15 | 38 | Zbtb9    | zinc finger and BTB domain containing 9                          | MGI:1918022 |
| ENSMUST00000181172 | 0 | 14 | 12 | Cox4i1   | cytochrome c oxidase subunit IV isoform 1                        | MGI:88473   |
| ENSMUST00000120854 | 0 | 14 | 0  | Acad11   | acyl-Coenzyme A dehydrogenase family, member 11                  | MGI:2143169 |
| ENSMUST00000036805 | 0 | 12 | 0  | Plekhj1  | pleckstrin homology domain containing, family J member 1         | MGI:1925920 |
| ENSMUST00000127894 | 0 | 12 | 0  | Aven     | apoptosis, caspase activation inhibitor                          | MGI:1921518 |
| ENSMUST00000022867 | 0 | 12 | 0  | Laptm4b  | lysosomal-associated protein transmembrane 4B                    | MGI:1890494 |
| ENSMUST00000041133 | 0 | 12 | 0  | Fam110c  | family with sequence similarity 110, member C                    | MGI:1918813 |
| ENSMUST00000107042 | 0 | 11 | 0  | Fam168a  | family with sequence similarity 168, member A                    | MGI:2442372 |
| ENSMUST00000162075 | 0 | 11 | 0  | Txndc5   | thioredoxin domain containing 5                                  | MGI:2145316 |
| ENSMUST00000162920 | 0 | 11 | 0  | Scyl3    | SCY1-like 3 (S. cerevisiae)                                      | MGI:1921385 |
| ENSMUST00000182052 | 0 | 11 | 0  | Gapdh    | glyceraldehyde-3-phosphate dehydrogenase                         | MGI:95640   |
| ENSMUST00000145086 | 0 | 10 | 0  | Map1lc3a | microtubule-associated protein 1 light chain 3 alpha             | MGI:1915661 |
| ENSMUST00000022856 | 0 | 9  | 0  | Rad1     | RAD1 checkpoint DNA exonuclease                                  | MGI:1316678 |
| ENSMUST00000037248 | 0 | 9  | 0  | Hirip3   | HIRA interacting protein 3                                       | MGI:2142364 |
| ENSMUST00000109444 | 0 | 9  | 0  | Col4a3bp | collagen, type IV, alpha 3 (Goodpasture antigen) binding protein | MGI:1915268 |
| ENSMUST00000128199 | 0 | 9  | 0  | Ppp1r26  | protein phosphatase 1, regulatory subunit 26                     | MGI:2685193 |
| ENSMUST00000162744 | 0 | 9  | 0  | Slc4a8   | solute carrier family 4 (anion exchanger), member 8              | MGI:1928745 |
| ENSMUST00000065330 | 0 | 7  | 0  | Clk3     | CDC-like kinase 3  | MGI:1098670 |
| ENSMUST00000133791 | 0 | 7  | 0  | Lpcat1   | lysophosphatidylcholine acyltransferase 1                        | MGI:2384812 |
| ENSMUST00000149212 | 0 | 7  | 0  | Socs7    | suppressor of cytokine signaling 7                               | MGI:2651588 |
| ENSMUST00000155377 | 0 | 7  | 0  | Cox7b    | cytochrome c oxidase subunit VIIb                                | MGI:1913392 |
| ENSMUST00000031081 | 0 | 7  | 0  | Pi4k2b   | phosphatidylinositol 4-kinase type 2 beta                        | MGI:1914323 |
| ENSMUST00000037146 | 0 | 7  | 0  | Gas2l1   | growth arrest-specific 2 like 1                                  | MGI:1926176 |
| ENSMUST00000110564 | 0 | 7  | 0  | Mtif3    | mitochondrial translational initiation factor 3                  | MGI:1923616 |
| ENSMUST00000144692 | 0 | 7  | 0  | Mettl16  | methyltransferase like 16  | MGI:1914743 |
| ENSMUST00000145157 | 0 | 7  | 0  | Nol12    | nucleolar protein 12   | MGI:2146285 |
| ENSMUST00000153822 | 0 | 7  | 0  | Phf20    | PHD finger protein 20  | MGI:2444148 |
| ENSMUST00000151813 | 0 | 6  | 16 | Ptpn12   | protein tyrosine phosphatase, non-receptor type 12               | MGI:104673  |
| ENSMUST00000091466 | 0 | 6  | 0  | Ttc37    | tetratricopeptide repeat domain 37                               | MGI:2679923 |
| ENSMUST00000102845 | 0 | 6  | 0  | Rps27a   | ribosomal protein S27A   | MGI:1925544 |
| ENSMUST00000117442 | 0 | 6  | 0  | Slmo2    | slowmo homolog 2 (Drosophila)                                    | MGI:1913640 |
| ENSMUST00000127968 | 0 | 6  | 0  | Hells    | helicase, lymphoid specific                                      | MGI:106209  |
| ENSMUST00000144129 | 0 | 6  | 0  | Rassf1   | Ras association (RalGDS/AF-6) domain family member 1             | MGI:1928386 |
| ENSMUST00000149754 | 0 | 6  | 0  | Arhgap20 | Rho GTPase activating protein 20                                 | MGI:2445175 |
| ENSMUST00000169637 | 0 | 6  | 0  | Pfdn5    | prefoldin 5  | MGI:1928753 |
| ENSMUST00000172361 | 0 | 6  | 0  | Hnrmpd   | heterogeneous nuclear ribonucleoprotein D                        | MGI:101947  |
| ENSMUST00000029142 | 0 | 5  | 0  | Eif6     | eukaryotic translation initiation factor 6                       | MGI:1196288 |
| ENSMUST00000034270 | 0 | 5  | 0  | Map1lc3b | microtubule-associated protein 1 light chain 3 beta              | MGI:1914693 |
| ENSMUST00000109733 | 0 | 5  | 0  | Prdx2    | peroxiredoxin 2  | MGI:109486  |
| ENSMUST00000129399 | 0 | 5  | 0  | Tsc22d4  | TSC22 domain family, member 4                                    | MGI:1926079 |
| ENSMUST00000131159 | 0 | 5  | 0  | Elk4     | ELK4, member of ETS oncogene family                              | MGI:102853  |
| ENSMUST00000133248 | 0 | 5  | 0  | Cmas     | cytidine monophospho-N-acetylneuraminic acid synthetase          | MGI:1337124 |
| ENSMUST00000138629 | 0 | 5  | 0  | Anapc4   | anaphase promoting complex subunit 4                             | MGI:1098673 |
| ENSMUST00000139748 | 0 | 5  | 0  | Dhcr7    | 7-dehydrocholesterol reductase                                   | MGI:1298378 |
| ENSMUST00000144621 | 0 | 5  | 0  | Cmah     | cytidine monophospho-N-acetylneuraminic acid hydroxylase         | MGI:103227  |
| ENSMUST00000157074 | 0 | 5  | 0  | Zcchc4   | zinc finger, CCHC domain containing 4                            | MGI:1926046 |
| ENSMUST00000171211 | 0 | 5  | 0  | Map4k5   | mitogen-activated protein kinase kinase kinase kinase 5          | MGI:1925503 |

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|---------------------|---|---|--------------|---|-------------|
| ENSMUST00000171920  | 0 | 5 | 1818 Tmem110 | transmembrane protein 110   | MGI:1921500 |
| ENSMUST000000021052 | 0 | 5 | 0 Smarcd2    | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily | MGI:1933621 |
| ENSMUST00000043983  | 0 | 5 | 0 Igsf3      | immunoglobulin superfamily, member 3  | MGI:1926158 |
| ENSMUST00000107817  | 0 | 5 | 0 Zbtb5      | zinc finger and BTB domain containing 5   | MGI:1924601 |
| ENSMUST00000122059  | 0 | 5 | 0 Pik3cd     | phosphatidylinositol 3-kinase catalytic delta polypeptide                             | MGI:1098211 |
| ENSMUST00000123533  | 0 | 5 | 0 Mrps2      | mitochondrial ribosomal protein S2  | MGI:2153089 |
| ENSMUST00000124733  | 0 | 5 | 0 Ubfd1      | ubiquitin family domain containing 1  | MGI:107301  |
| ENSMUST00000130830  | 0 | 5 | 0 Gm20517    | predicted gene 20517  | MGI:5141982 |
| ENSMUST00000130861  | 0 | 5 | 0 Narfl      | nuclear prelamin A recognition factor-like  | MGI:1914813 |
| ENSMUST00000131693  | 0 | 5 | 0 Eif4enif1  | eukaryotic translation initiation factor 4E nuclear import factor 1                   | MGI:1921453 |
| ENSMUST00000136214  | 0 | 5 | 0 Mettl2     | methyltransferase like 2  | MGI:1289171 |
| ENSMUST00000138589  | 0 | 5 | 0 Trrap      | transformation/transcription domain-associated protein                                | MGI:2153272 |
| ENSMUST00000138662  | 0 | 5 | 0 Rps19      | ribosomal protein S19   | MGI:1333780 |
| ENSMUST00000140570  | 0 | 5 | 0 Ctdspl2    | CTD (carboxy-terminal domain, RNA polymerase II, polypeptide A) small phosphatase li  | MGI:1196405 |
| ENSMUST00000142318  | 0 | 5 | 0 Srsf9      | serine/arginine-rich splicing factor 9  | MGI:104896  |
| ENSMUST00000142658  | 0 | 5 | 0 Tdg        | thymine DNA glycosylase   | MGI:108247  |
| ENSMUST00000142722  | 0 | 5 | 0 Elavl4     | ELAV (embryonic lethal, abnormal vision, Drosophila)-like 4 (Hu antigen D)            | MGI:107427  |
| ENSMUST00000143224  | 0 | 5 | 0 Gramd2     | GRAM domain containing 2  | MGI:3528937 |
| ENSMUST00000147245  | 0 | 5 | 0 Mtmr11     | myotubularin related protein 11   | MGI:2652817 |
| ENSMUST00000148105  | 0 | 5 | 0 March5     | membrane-associated ring finger (C3HC4) 5   | MGI:1915207 |
| ENSMUST00000148125  | 0 | 5 | 0 Clns1a     | chloride channel, nucleotide-sensitive, 1A  | MGI:109638  |
| ENSMUST00000148288  | 0 | 5 | 0 Smg9       | smg-9 homolog, nonsense mediated mRNA decay factor (C. elegans)                       | MGI:1919247 |
| ENSMUST00000148354  | 0 | 5 | 0 Trim28     | tripartite motif-containing 28  | MGI:109274  |
| ENSMUST00000150153  | 0 | 5 | 0 Hnrmph1    | heterogeneous nuclear ribonucleoprotein H1  | MGI:1891925 |
| ENSMUST00000151036  | 0 | 5 | 0 Srsf5      | serine/arginine-rich splicing factor 5  | MGI:98287   |
| ENSMUST00000159566  | 0 | 5 | 0 Akr1cl     | aldo-keto reductase family 1, member C-like   | MGI:1918111 |
| ENSMUST00000160531  | 0 | 5 | 0 Cfap45     | cilia and flagella associated protein 45  | MGI:1919120 |
| ENSMUST00000161649  | 0 | 5 | 0 Zfp957     | zinc finger protein 957   | MGI:2145729 |
| ENSMUST00000168806  | 0 | 5 | 0 Dtnb       | dystrobrevin, beta  | MGI:1203728 |
| ENSMUST00000170531  | 0 | 5 | 0 Rad1       | RAD1 checkpoint DNA exonuclease   | MGI:1316678 |
| ENSMUST00000172198  | 0 | 5 | 0 Smad2      | SMAD family member 2  | MGI:108051  |
| ENSMUST00000155936  | 0 | 4 | 79 Tdrd7     | tudor domain containing 7   | MGI:2140279 |
| ENSMUST00000125422  | 0 | 4 | 6 Zc3h15     | zinc finger CCCH-type containing 15   | MGI:1919747 |
| ENSMUST00000140965  | 0 | 1 | 42 Ncbp2     | nuclear cap binding protein subunit 2   | MGI:1915342 |
| ENSMUST00000133540  | 0 | 1 | 20 Pkd2      | polycystic kidney disease 2   | MGI:1099818 |
| ENSMUST00000132143  | 0 | 1 | 14 Ttc25     | tetratricopeptide repeat domain 25  | MGI:1921657 |
| ENSMUST00000142786  | 0 | 1 | 8 Ttf1       | transcription termination factor, RNA polymerase I                                    | MGI:105044  |
| ENSMUST00000106554  | 0 | 1 | 85 Grin2c    | glutamate receptor, ionotropic, NMDA2C (epsilon 3)                                    | MGI:95822   |
| ENSMUST00000147264  | 0 | 1 | 20 Mtg2      | mitochondrial ribosome associated GTPase 2  | MGI:106565  |
| ENSMUST00000149711  | 0 | 1 | 20 Spag5     | sperm associated antigen 5  | MGI:1927470 |
| ENSMUST00000135018  | 0 | 1 | 18 Atg2a     | autophagy related 2A  | MGI:1916291 |
| ENSMUST00000110612  | 0 | 1 | 16 Hypk      | huntingtin interacting protein K  | MGI:1914943 |
| ENSMUST00000128400  | 0 | 1 | 14 Dnase2a   | deoxyribonuclease II alpha  | MGI:1329019 |
| ENSMUST00000141839  | 0 | 1 | 14 Nudcd2    | NudC domain containing 2  | MGI:1277103 |
| ENSMUST00000151626  | 0 | 1 | 14 Mdn1      | midasin AAA ATPase 1  | MGI:1926159 |
| ENSMUST00000171187  | 0 | 1 | 14 Apc       | adenomatosis polyposis coli   | MGI:88039   |
| ENSMUST00000138549  | 0 | 1 | 12 Nudt5     | nudix (nucleoside diphosphate linked moiety X)-type motif 5                           | MGI:1858232 |
| ENSMUST00000133699  | 0 | 1 | 10 Slc25a43  | solute carrier family 25, member 43   | MGI:2684854 |
| ENSMUST00000008826  | 0 | 1 | 8 Rpl10      | ribosomal protein L10   | MGI:105943  |
| ENSMUST00000154324  | 0 | 1 | 6 Qars       | glutamyl-tRNA synthetase  | MGI:1915851 |
| ENSMUST00000163774  | 0 | 1 | 6 Smim19     | small integral membrane protein 19  | MGI:2142501 |

|                    |   |   |                      |  |             |
|--------------------|---|---|----------------------|--|-------------|
| ENSMUST00000017065 | 0 | 0 | 428 Srsf6            | serine/arginine-rich splicing factor 6   | MGI:1915246 |
| ENSMUST00000094693 | 0 | 0 | 428 Srsf5            | serine/arginine-rich splicing factor 5   | MGI:98287   |
| ENSMUST00000056941 | 0 | 0 | 214 4933402P03FRIKEN | cDNA 4933402P03 gene   | MGI:1918293 |
| ENSMUST00000117236 | 0 | 0 | 169 Dcaf11           | DDB1 and CUL4 associated factor 11   | MGI:90168   |
| ENSMUST00000135580 | 0 | 0 | 133 Prim1            | DNA primase, p49 subunit   | MGI:97757   |
| ENSMUST00000142315 | 0 | 0 | 131 Sfi1             | Sfi1 homolog, spindle assembly associated (yeast)  | MGI:1926137 |
| ENSMUST00000162930 | 0 | 0 | 115 Mob4             | MOB family member 4, phocein   | MGI:104899  |
| ENSMUST00000068958 | 0 | 0 | 91 Cdc42ep3          | CDC42 effector protein (Rho GTPase binding) 3  | MGI:2384718 |
| ENSMUST00000056406 | 0 | 0 | 77 Fam78a            | family with sequence similarity 78, member A   | MGI:2443569 |
| ENSMUST00000161933 | 0 | 0 | 75 Grhl2             | grainyhead-like 2 (Drosophila)   | MGI:2182543 |
| ENSMUST00000152903 | 0 | 0 | 71 Clu               | clusterin  | MGI:88423   |
| ENSMUST00000162936 | 0 | 0 | 71 Pdla6             | protein disulfide isomerase associated 6   | MGI:1919103 |
| ENSMUST00000137686 | 0 | 0 | 63 Pmpca             | peptidase (mitochondrial processing) alpha   | MGI:1918568 |
| ENSMUST00000151488 | 0 | 0 | 61 Yipf3             | Yip1 domain family, member 3   | MGI:106280  |
| ENSMUST00000132715 | 0 | 0 | 59 Hnrmph1           | heterogeneous nuclear ribonucleoprotein H1   | MGI:1891925 |
| ENSMUST00000132181 | 0 | 0 | 57 Lins1             | lines homolog 1  | MGI:1919885 |
| ENSMUST00000164609 | 0 | 0 | 54 Morf4l2           | mortality factor 4 like 2  | MGI:1927167 |
| ENSMUST00000182840 | 0 | 0 | 54 Rbm25             | RNA binding motif protein 25   | MGI:1914289 |
| ENSMUST00000025161 | 0 | 0 | 46 Tapbp             | TAP binding protein  | MGI:1201689 |
| ENSMUST00000131531 | 0 | 0 | 46 Ctdnep1           | CTD nuclear envelope phosphatase 1   | MGI:1914431 |
| ENSMUST00000135833 | 0 | 0 | 44 Lym2              | LYR motif containing 2   | MGI:1917573 |
| ENSMUST00000128698 | 0 | 0 | 42 Tvp23b            | trans-golgi network vesicle protein 23B  | MGI:1914760 |
| ENSMUST00000126621 | 0 | 0 | 40 Gm42420           | predicted gene, 42420  | MGI:5649067 |
| ENSMUST00000041965 | 0 | 0 | 38 Cdc42bpb          | CDC42 binding protein kinase beta  | MGI:2136459 |
| ENSMUST00000066889 | 0 | 0 | 36 Gpsm1             | G-protein signalling modulator 1 (AGS3-like, C. elegans)                                 | MGI:1915089 |
| ENSMUST00000096222 | 0 | 0 | 36 Kat6b             | K(lysine) acetyltransferase 6B   | MGI:1858746 |
| ENSMUST00000123902 | 0 | 0 | 36 Ppfibp1           | PTPRF interacting protein, binding protein 1 (liprin beta 1)                             | MGI:1914783 |
| ENSMUST00000151668 | 0 | 0 | 36 Chmp4b            | charged multivesicular body protein 4B   | MGI:1922858 |
| ENSMUST00000156458 | 0 | 0 | 36 Tmc8              | transmembrane channel-like gene family 8   | MGI:2669037 |
| ENSMUST00000010239 | 0 | 0 | 34 Slc3a2            | solute carrier family 3 (activators of dibasic and neutral amino acid transport), member | MGI:96955   |
| ENSMUST00000133568 | 0 | 0 | 34 Ppp1cc            | protein phosphatase 1, catalytic subunit, gamma isoform                                  | MGI:104872  |
| ENSMUST00000135517 | 0 | 0 | 32 Grn               | granulin   | MGI:95832   |
| ENSMUST00000021692 | 0 | 0 | 30 Yy1               | YY1 transcription factor   | MGI:99150   |
| ENSMUST00000027050 | 0 | 0 | 30 Cops5             | COP9 signalosome subunit 5   | MGI:1349415 |
| ENSMUST00000134380 | 0 | 0 | 30 Pla2g4b           | phospholipase A2, group IVB (cytosolic)  | MGI:2384819 |
| ENSMUST00000147070 | 0 | 0 | 30 Ogfr              | opioid growth factor receptor  | MGI:1919325 |
| ENSMUST00000153841 | 0 | 0 | 30 2810417H13FRIKEN  | cDNA 2810417H13 gene   | MGI:1915276 |
| ENSMUST00000175874 | 0 | 0 | 30 Ip6k1             | inositol hexaphosphate kinase 1  | MGI:1351633 |
| ENSMUST00000044783 | 0 | 0 | 28 Eif4g1            | eukaryotic translation initiation factor 4, gamma 1                                      | MGI:2384784 |
| ENSMUST00000100497 | 0 | 0 | 28 Actb              | actin, beta  | MGI:87904   |
| ENSMUST00000050063 | 0 | 0 | 26 Arf6              | ADP-ribosylation factor 6  | MGI:99435   |
| ENSMUST00000120425 | 0 | 0 | 26 Mettl10           | methyltransferase like 10  | MGI:1919346 |
| ENSMUST00000139405 | 0 | 0 | 26 Frs3              | fibroblast growth factor receptor substrate 3  | MGI:2135965 |
| ENSMUST00000142519 | 0 | 0 | 26 Yif1b             | Yip1 interacting factor homolog B (S. cerevisiae)  | MGI:1924504 |
| ENSMUST00000145466 | 0 | 0 | 26 Hspa5             | heat shock protein 5   | MGI:95835   |
| ENSMUST00000152541 | 0 | 0 | 26 Lbp               | lipopolysaccharide binding protein   | MGI:1098776 |
| ENSMUST00000074950 | 0 | 0 | 24 Hnrmph2           | heterogeneous nuclear ribonucleoprotein H2   | MGI:1201779 |
| ENSMUST00000139974 | 0 | 0 | 24 Col1a1            | collagen, type I, alpha 1  | MGI:88467   |
| ENSMUST00000143626 | 0 | 0 | 24 Gabrb2            | gamma-aminobutyric acid (GABA) A receptor, subunit beta 2                                | MGI:95620   |
| ENSMUST00000084501 | 0 | 0 | 22 Pappa             | pregnancy-associated plasma protein A  | MGI:97479   |
| ENSMUST00000124323 | 0 | 0 | 22 Gsn               | gelsolin   | MGI:95851   |

|                      |   |   |                     |  |             |
|----------------------|---|---|---------------------|--|-------------|
| ENSMUST00000141991   | 0 | 0 | 22 Cpm              | carboxypeptidase M   | MGI:1917824 |
| ENSMUST00000151890   | 0 | 0 | 22 Tollip           | toll interacting protein   | MGI:1891808 |
| ENSMUST00000153438   | 0 | 0 | 22 Cntd1            | cyclin N-terminal domain containing 1                                    | MGI:1923965 |
| ENSMUST00000171203   | 0 | 0 | 22 Ehd1             | EH-domain containing 1   | MGI:1341878 |
| ENSMUST00000029047   | 0 | 0 | 20 Snx16            | sorting nexin 16   | MGI:1921968 |
| ENSMUST00000035840   | 0 | 0 | 20 Zdhhc5           | zinc finger, DHHC domain containing 5                                    | MGI:1923573 |
| ENSMUST000000041052  | 0 | 0 | 20 Hist1h1t         | histone cluster 1, H1t   | MGI:1888530 |
| ENSMUST000000065418  | 0 | 0 | 20 Rab13            | RAB13, member RAS oncogene family  | MGI:1927232 |
| ENSMUST000000082430  | 0 | 0 | 20 Gpx3             | glutathione peroxidase 3   | MGI:105102  |
| ENSMUST000000131780  | 0 | 0 | 20 Pqlc1            | PQ loop repeat containing 1  | MGI:1914193 |
| ENSMUST00000150047   | 0 | 0 | 20 Tpt1             | tumor protein, translationally-controlled 1                              | MGI:104890  |
| ENSMUST00000161208   | 0 | 0 | 20 Coq9             | coenzyme Q9  | MGI:1915164 |
| ENSMUST00000166897   | 0 | 0 | 20 Tomm70a          | translocase of outer mitochondrial membrane 70 homolog A (yeast)         | MGI:106295  |
| ENSMUST00000180554   | 0 | 0 | 20 Ssh2             | slingshot homolog 2 (Drosophila)   | MGI:2679255 |
| ENSMUST00000048688   | 0 | 0 | 18 Fbxo38           | F-box protein 38   | MGI:2444639 |
| ENSMUST000000060987  | 0 | 0 | 18 Oaz1             | ornithine decarboxylase antizyme 1                                       | MGI:109433  |
| ENSMUST000000062674  | 0 | 0 | 18 Rps15            | ribosomal protein S15  | MGI:98117   |
| ENSMUST00000126567   | 0 | 0 | 18 Arhgap20         | Rho GTPase activating protein 20   | MGI:2445175 |
| ENSMUST00000135346   | 0 | 0 | 18 Aspcr1           | alveolar soft part sarcoma chromosome region, candidate 1 (human)        | MGI:1916188 |
| ENSMUST00000139628   | 0 | 0 | 18 Atg16l1          | autophagy related 16-like 1 (S. cerevisiae)                              | MGI:1924290 |
| ENSMUST00000148553   | 0 | 0 | 18 Eef1b2           | eukaryotic translation elongation factor 1 beta 2                        | MGI:1929520 |
| ENSMUST00000153710   | 0 | 0 | 18 Gm6483           | predicted gene 6483  | MGI:3644574 |
| ENSMUST000000001547  | 0 | 0 | 16 Col1a1           | collagen, type I, alpha 1  | MGI:88467   |
| ENSMUST000000044702  | 0 | 0 | 16 Frmpd3           | FERM and PDZ domain containing 3   | MGI:3646547 |
| ENSMUST0000000113764 | 0 | 0 | 16 Odf2             | outer dense fiber of sperm tails 2                                       | MGI:1098824 |
| ENSMUST00000114751   | 0 | 0 | 16 Htatsf1          | HIV TAT specific factor 1  | MGI:1919709 |
| ENSMUST00000128073   | 0 | 0 | 16 Atp5a1           | ATP synthase, H+ transporting, mitochondrial F1 complex, alpha subunit 1 | MGI:88115   |
| ENSMUST00000131915   | 0 | 0 | 16 Ehmt2            | euchromatic histone lysine N-methyltransferase 2                         | MGI:2148922 |
| ENSMUST00000134975   | 0 | 0 | 16 Pmm2             | phosphomannomutase 2   | MGI:1859214 |
| ENSMUST00000139764   | 0 | 0 | 16 Usp9x            | ubiquitin specific peptidase 9, X chromosome                             | MGI:894681  |
| ENSMUST00000155247   | 0 | 0 | 16 Sdcbp            | syndecan binding protein   | MGI:1337026 |
| ENSMUST00000159426   | 0 | 0 | 16 Clcn7            | chloride channel, voltage-sensitive 7                                    | MGI:1347048 |
| ENSMUST00000163418   | 0 | 0 | 16 Ripk1            | receptor (TNFRSF)-interacting serine-threonine kinase 1                  | MGI:108212  |
| ENSMUST00000032413   | 0 | 0 | 14 Etnk1            | ethanolamine kinase 1  | MGI:1922570 |
| ENSMUST00000040423   | 0 | 0 | 14 Cd59a            | CD59a antigen  | MGI:109177  |
| ENSMUST000000062153  | 0 | 0 | 14 Rilpl1           | Rab interacting lysosomal protein-like 1                                 | MGI:1922945 |
| ENSMUST000000066986  | 0 | 0 | 14 Zfp142           | zinc finger protein 142  | MGI:1924514 |
| ENSMUST00000106491   | 0 | 0 | 14 Cdc14a           | CDC14 cell division cycle 14A  | MGI:2442676 |
| ENSMUST00000114577   | 0 | 0 | 14 Vma21            | VMA21 vacuolar H+-ATPase homolog (S. cerevisiae)                         | MGI:1914298 |
| ENSMUST00000123204   | 0 | 0 | 14 Col3a1           | collagen, type III, alpha 1  | MGI:88453   |
| ENSMUST00000128539   | 0 | 0 | 14 Clu              | clusterin  | MGI:88423   |
| ENSMUST00000128931   | 0 | 0 | 14 Cbx7             | chromobox 7  | MGI:1196439 |
| ENSMUST00000130820   | 0 | 0 | 14 Dvl2             | dishevelled segment polarity protein 2                                   | MGI:106613  |
| ENSMUST00000133715   | 0 | 0 | 14 Clint1           | clathrin interactor 1  | MGI:2144243 |
| ENSMUST00000140921   | 0 | 0 | 14 Dcbld1           | discoidin, CUB and LCCL domain containing 1                              | MGI:1913936 |
| ENSMUST00000143834   | 0 | 0 | 14 Ykt6             | YKT6 v-SNARE homolog (S. cerevisiae)                                     | MGI:1927550 |
| ENSMUST00000145670   | 0 | 0 | 14 Cdk4             | cyclin-dependent kinase 4  | MGI:88357   |
| ENSMUST00000153596   | 0 | 0 | 14 Eif3f            | eukaryotic translation initiation factor 3, subunit F                    | MGI:1913335 |
| ENSMUST00000159500   | 0 | 0 | 14 Rdh11            | retinol dehydrogenase 11   | MGI:102581  |
| ENSMUST00000160822   | 0 | 0 | 14 A130010J15FRIKEN | cDNA A130010J15 gene   | MGI:2441776 |
| ENSMUST00000176766   | 0 | 0 | 14 Cfap53           | cilia and flagella associated protein 53                                 | MGI:1921703 |

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|---------------------|---|---|------------|---|-------------|
| ENSMUST00000179201  | 0 | 0 | 14 Bsg     | basigin   | MGI:88208   |
| ENSMUST00000184618  | 0 | 0 | 14 Zbtb11  | zinc finger and BTB domain containing 11  | MGI:2443876 |
| ENSMUST00000006496  | 0 | 0 | 12 Rps9    | ribosomal protein S9  | MGI:1924096 |
| ENSMUST00000009831  | 0 | 0 | 12 Fxyd5   | FXD domain-containing ion transport regulator 5                                     | MGI:1201785 |
| ENSMUST00000011055  | 0 | 0 | 12 Apip    | APAF1 interacting protein   | MGI:1926788 |
| ENSMUST00000021243  | 0 | 0 | 12 Slc35b1 | solute carrier family 35, member B1   | MGI:1343133 |
| ENSMUST000000024717 | 0 | 0 | 12 Tbc1d5  | TBC1 domain family, member 5  | MGI:1919488 |
| ENSMUST00000034136  | 0 | 0 | 12 Gpt2    | glutamic pyruvate transaminase (alanine aminotransferase) 2                         | MGI:1915391 |
| ENSMUST00000036977  | 0 | 0 | 12 Mtg1    | mitochondrial ribosome-associated GTPase 1  | MGI:2685015 |
| ENSMUST00000037776  | 0 | 0 | 12 Srsf3   | serine/arginine-rich splicing factor 3  | MGI:98285   |
| ENSMUST00000050551  | 0 | 0 | 12 Cited1  | Cbp/p300-interacting transactivator with Glu/Asp-rich carboxy-terminal domain 1     | MGI:108023  |
| ENSMUST00000050997  | 0 | 0 | 12 Rfesd   | Rieske (Fe-S) domain containing   | MGI:2145198 |
| ENSMUST00000055688  | 0 | 0 | 12 Phf13   | PHD finger protein 13   | MGI:2446217 |
| ENSMUST00000062356  | 0 | 0 | 12 Marcks1 | MARCKS-like 1   | MGI:97143   |
| ENSMUST00000064846  | 0 | 0 | 12 Gm21685 | predicted gene, 21685   | MGI:5435040 |
| ENSMUST00000070990  | 0 | 0 | 12 Elmod3  | ELMO/CED-12 domain containing 3   | MGI:2445168 |
| ENSMUST00000085290  | 0 | 0 | 12 Phyhd1  | phytanoyl-CoA dioxygenase domain containing 1                                       | MGI:3612860 |
| ENSMUST00000088610  | 0 | 0 | 12 Romo1   | reactive oxygen species modulator 1   | MGI:1914317 |
| ENSMUST00000093955  | 0 | 0 | 12 Supt4a  | suppressor of Ty 4A   | MGI:107416  |
| ENSMUST00000099270  | 0 | 0 | 12 Thbd    | thrombomodulin  | MGI:98736   |
| ENSMUST00000117095  | 0 | 0 | 12 Pld3    | phospholipase D family, member 3  | MGI:1333782 |
| ENSMUST00000124006  | 0 | 0 | 12 Myh10   | myosin, heavy polypeptide 10, non-muscle  | MGI:1930780 |
| ENSMUST00000126248  | 0 | 0 | 12 Rpn2    | ribophorin II   | MGI:98085   |
| ENSMUST00000128746  | 0 | 0 | 12 Acs1    | acyl-CoA synthetase long-chain family member 1                                      | MGI:102797  |
| ENSMUST00000129019  | 0 | 0 | 12 Aff4    | AF4/FMR2 family, member 4   | MGI:2136171 |
| ENSMUST00000130231  | 0 | 0 | 12 Thap1   | THAP domain containing, apoptosis associated protein 1                              | MGI:1921004 |
| ENSMUST00000131039  | 0 | 0 | 12 Sccpdh  | saccharopine dehydrogenase (putative)   | MGI:1924486 |
| ENSMUST00000132034  | 0 | 0 | 12 Ost4    | oligosaccharyltransferase complex subunit 4 (non-catalytic)                         | MGI:1914945 |
| ENSMUST00000136353  | 0 | 0 | 12 Flot2   | flotillin 2   | MGI:103309  |
| ENSMUST00000138229  | 0 | 0 | 12 Ramp2   | receptor (calcitonin) activity modifying protein 2                                  | MGI:1859650 |
| ENSMUST00000139746  | 0 | 0 | 12 Cbx2    | chromobox 2   | MGI:88289   |
| ENSMUST00000142000  | 0 | 0 | 12 Ift140  | intraflagellar transport 140  | MGI:2146906 |
| ENSMUST00000148573  | 0 | 0 | 12 Dnase2a | deoxyribonuclease II alpha  | MGI:1329019 |
| ENSMUST00000149061  | 0 | 0 | 12 Trim28  | tripartite motif-containing 28  | MGI:109274  |
| ENSMUST00000149411  | 0 | 0 | 12 Mix     | MAX-like protein X  | MGI:108398  |
| ENSMUST00000151451  | 0 | 0 | 12 Bckdk   | branched chain ketoacid dehydrogenase kinase  | MGI:1276121 |
| ENSMUST00000153225  | 0 | 0 | 12 Rcbt1   | regulator of chromosome condensation (RCC1) and BTB (POZ) domain containing protein | MGI:1918580 |
| ENSMUST00000153252  | 0 | 0 | 12 Polr1e  | polymerase (RNA) I polypeptide E  | MGI:1929022 |
| ENSMUST00000155819  | 0 | 0 | 12 March11 | membrane-associated ring finger (C3HC4) 11  | MGI:3608327 |
| ENSMUST00000156186  | 0 | 0 | 12 Nkiras1 | NFkB inhibitor interacting Ras-like protein 1                                       | MGI:1916971 |
| ENSMUST00000160025  | 0 | 0 | 12 Amt     | aminomethyltransferase  | MGI:3646700 |
| ENSMUST00000160406  | 0 | 0 | 12 Tkt     | transketolase   | MGI:105992  |
| ENSMUST00000161046  | 0 | 0 | 12 Usp7    | ubiquitin specific peptidase 7  | MGI:2182061 |
| ENSMUST00000162827  | 0 | 0 | 12 Zfp949  | zinc finger protein 949   | MGI:1918890 |
| ENSMUST00000167379  | 0 | 0 | 12 Cic     | capicua transcriptional repressor   | MGI:1918972 |
| ENSMUST00000171535  | 0 | 0 | 12 Dync1h1 | dynein cytoplasmic 1 heavy chain 1  | MGI:103147  |
| ENSMUST00000173269  | 0 | 0 | 12 Neu1    | neuraminidase 1   | MGI:97305   |
| ENSMUST00000173351  | 0 | 0 | 12 Bag6    | BCL2-associated athanogene 6  | MGI:1919439 |
| ENSMUST00000177195  | 0 | 0 | 12 Zc3h18  | zinc finger CCH-type containing 18  | MGI:1923264 |
| ENSMUST00000182860  | 0 | 0 | 12 Atg7    | autophagy related 7   | MGI:1921494 |
| ENSMUST00000184314  | 0 | 0 | 12 Entpd4  | ectonucleoside triphosphate diphosphohydrolase 4                                    | MGI:1914714 |

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|----------------------|---|---|---------------|---|-------------|
| ENSMUST00000055947   | 0 | 0 | 10 Samd14     | sterile alpha motif domain containing 14  | MGI:2384945 |
| ENSMUST00000111978   | 0 | 0 | 10 Taok3      | TAO kinase 3  | MGI:3041177 |
| ENSMUST00000117202   | 0 | 0 | 10 Gm10600    | predicted gene 10600  | MGI:3710628 |
| ENSMUST00000131511   | 0 | 0 | 10 Slc11a1    | solute carrier family 11 (proton-coupled divalent metal ion transporters), member 1     | MGI:1345275 |
| ENSMUST00000132275   | 0 | 0 | 10 Rpl13      | ribosomal protein L13   | MGI:105922  |
| ENSMUST00000133854   | 0 | 0 | 10 Exosc9     | exosome component 9   | MGI:1355319 |
| ENSMUST00000138597   | 0 | 0 | 10 Slc25a16   | solute carrier family 25 (mitochondrial carrier, Graves disease autoantigen), member 16 | MGI:1920382 |
| ENSMUST00000140144   | 0 | 0 | 10 Mid2       | midline 2   | MGI:1344333 |
| ENSMUST00000146832   | 0 | 0 | 10 Snrk       | SNF related kinase  | MGI:108104  |
| ENSMUST00000181991   | 0 | 0 | 10 Rnf4       | ring finger protein 4   | MGI:1201691 |
| ENSMUST00000182710   | 0 | 0 | 10 Gemin2     | gem (nuclear organelle) associated protein 2  | MGI:1913853 |
| ENSMUST00000023684   | 0 | 0 | 8 Gart        | phosphoribosylglycinamide formyltransferase   | MGI:95654   |
| ENSMUST00000026989   | 0 | 0 | 8 4833439L19R | RIKEN cDNA 4833439L19 gene  | MGI:1921162 |
| ENSMUST00000090568   | 0 | 0 | 8 Ptpz1       | protein tyrosine phosphatase, receptor type Z, polypeptide 1                            | MGI:97816   |
| ENSMUST00000097855   | 0 | 0 | 8 Ccr5        | chemokine (C-C motif) receptor 5  | MGI:107182  |
| ENSMUST00000103224   | 0 | 0 | 8 Trpm7       | transient receptor potential cation channel, subfamily M, member 7                      | MGI:1929996 |
| ENSMUST00000105584   | 0 | 0 | 8 Acap3       | ArfGAP with coiled-coil, ankyrin repeat and PH domains 3                                | MGI:2153589 |
| ENSMUST00000106003   | 0 | 0 | 8 Rplp2       | ribosomal protein, large P2   | MGI:1914436 |
| ENSMUST00000123064   | 0 | 0 | 8 Myo1c       | myosin IC   | MGI:106612  |
| ENSMUST00000134636   | 0 | 0 | 8 Rplp2       | ribosomal protein, large P2   | MGI:1914436 |
| ENSMUST00000136815   | 0 | 0 | 8 Wbscr27     | Williams Beuren syndrome chromosome region 27 (human)                                   | MGI:1933146 |
| ENSMUST00000138059   | 0 | 0 | 8 Get4        | golgi to ER traffic protein 4   | MGI:1914854 |
| ENSMUST00000138874   | 0 | 0 | 8 Slc25a10    | solute carrier family 25 (mitochondrial carrier, dicarboxylate transporter), member 10  | MGI:1353497 |
| ENSMUST00000139555   | 0 | 0 | 8 Dnajc11     | DnaJ heat shock protein family (Hsp40) member C11                                       | MGI:2443386 |
| ENSMUST00000140272   | 0 | 0 | 8 Zbtb8os     | zinc finger and BTB domain containing 8 opposite strand                                 | MGI:1914356 |
| ENSMUST00000142406   | 0 | 0 | 8 Osbp17      | oxysterol binding protein-like 7  | MGI:1918490 |
| ENSMUST00000142555   | 0 | 0 | 8 Hba-a1      | hemoglobin alpha, adult chain 1   | MGI:96015   |
| ENSMUST00000147010   | 0 | 0 | 8 Hba-a2      | hemoglobin alpha, adult chain 2   | MGI:96016   |
| ENSMUST00000150407   | 0 | 0 | 8 Tax1bp3     | Tax1 (human T cell leukemia virus type I) binding protein 3                             | MGI:1923531 |
| ENSMUST00000151452   | 0 | 0 | 8 Pkp4        | plakophilin 4   | MGI:109281  |
| ENSMUST00000151642   | 0 | 0 | 8 Plod3       | procollagen-lysine, 2-oxoglutarate 5-dioxygenase 3                                      | MGI:1347008 |
| ENSMUST00000154448   | 0 | 0 | 8 Foxp2       | forkhead box P2   | MGI:2148705 |
| ENSMUST00000155657   | 0 | 0 | 8 Tmem80      | transmembrane protein 80  | MGI:1918698 |
| ENSMUST00000159925   | 0 | 0 | 8 Ubn2        | ubiquitin 2   | MGI:2444236 |
| ENSMUST00000171691   | 0 | 0 | 8 Mdga1       | MAM domain containing glycosylphosphatidylinositol anchor 1                             | MGI:1922012 |
| ENSMUST00000000310   | 0 | 0 | 6 Pemt        | phosphatidylethanolamine N-methyltransferase  | MGI:104535  |
| ENSMUST00000000756   | 0 | 0 | 6 Rpl13       | ribosomal protein L13   | MGI:105922  |
| ENSMUST000000003645  | 0 | 0 | 6 Ercc1       | excision repair cross-complementing rodent repair deficiency, complementation group 1   | MGI:95412   |
| ENSMUST0000000021738 | 0 | 0 | 6 Gpr137b     | G protein-coupled receptor 137B   | MGI:1891463 |
| ENSMUST000000046071  | 0 | 0 | 6 Klhdc8a     | kelch domain containing 8A  | MGI:2442630 |
| ENSMUST000000060444  | 0 | 0 | 6 Zfp3        | zinc finger protein 3   | MGI:99177   |
| ENSMUST000000065797  | 0 | 0 | 6 Chst1       | carbohydrate (keratan sulfate Gal-6) sulfotransferase 1                                 | MGI:1924219 |
| ENSMUST000000094280  | 0 | 0 | 6 Chchd2      | coiled-coil-helix-coiled-coil-helix domain containing 2                                 | MGI:1261428 |
| ENSMUST000000099739  | 0 | 0 | 6 Tbc1d32     | TBC1 domain family, member 32   | MGI:2442827 |
| ENSMUST00000105937   | 0 | 0 | 6 Dnajc8      | DnaJ heat shock protein family (Hsp40) member C8  | MGI:1915848 |
| ENSMUST00000110551   | 0 | 0 | 6 Sord        | sorbitol dehydrogenase  | MGI:98266   |
| ENSMUST00000111045   | 0 | 0 | 6 Bdnf        | brain derived neurotrophic factor   | MGI:88145   |
| ENSMUST00000111757   | 0 | 0 | 6 Tor1aip2    | torsin A interacting protein 2  | MGI:3582695 |
| ENSMUST00000113385   | 0 | 0 | 6 Sp140       | Sp140 nuclear body protein  | MGI:3702467 |
| ENSMUST00000115231   | 0 | 0 | 6 Rpl39       | ribosomal protein L39   | MGI:1914498 |
| ENSMUST00000120112   | 0 | 0 | 6 Tmem30c     | transmembrane protein 30C   | MGI:1918277 |



|                    |   |   |            |  |             |
|--------------------|---|---|------------|--|-------------|
| ENSMUST00000122303 | 0 | 0 | 6 Magi3    | membrane associated guanylate kinase, WW and PDZ domain containing 3 | MGI:1923484 |
| ENSMUST00000124156 | 0 | 0 | 6 Hsp90aa1 | heat shock protein 90, alpha (cytosolic), class A member 1           | MGI:96250   |
| ENSMUST00000130409 | 0 | 0 | 6 Dcbld2   | discoidin, CUB and LCCL domain containing 2                          | MGI:1920629 |
| ENSMUST00000131741 | 0 | 0 | 6 Bsdcl    | BSD domain containing 1  | MGI:1913466 |
| ENSMUST00000134266 | 0 | 0 | 6 Kansl1   | KAT8 regulatory NSL complex subunit 1                                | MGI:1923969 |
| ENSMUST00000138577 | 0 | 0 | 6 Mdn1     | midasin AAA ATPase 1   | MGI:1926159 |
| ENSMUST00000144262 | 0 | 0 | 6 Ncbp3    | nuclear cap binding subunit 3  | MGI:1914124 |
| ENSMUST00000145043 | 0 | 0 | 6 Rps21    | ribosomal protein S21  | MGI:1913731 |
| ENSMUST00000145299 | 0 | 0 | 6 Myl9     | myosin, light polypeptide 9, regulatory                              | MGI:2138915 |
| ENSMUST00000147327 | 0 | 0 | 6 Gse1     | genetic suppressor element 1, coiled-coil protein                    | MGI:1098275 |
| ENSMUST00000147485 | 0 | 0 | 6 Tbc1d10a | TBC1 domain family, member 10a                                       | MGI:2144164 |
| ENSMUST00000148861 | 0 | 0 | 6 Sympk    | symplekin  | MGI:1915438 |
| ENSMUST00000151947 | 0 | 0 | 6 Tpst2    | protein-tyrosine sulfotransferase 2                                  | MGI:1309516 |
| ENSMUST00000152678 | 0 | 0 | 6 Csdcl    | cold shock domain containing C2, RNA binding                         | MGI:2146027 |
| ENSMUST00000156386 | 0 | 0 | 6 Kif4     | kinesin family member 4  | MGI:108389  |
| ENSMUST00000159656 | 0 | 0 | 6 Rb1cc1   | RB1-inducible coiled-coil 1  | MGI:1341850 |
| ENSMUST00000162942 | 0 | 0 | 6 Nxph1    | neurexophilin 1  | MGI:107492  |
| ENSMUST00000163210 | 0 | 0 | 6 Kif5b    | kinesin family member 5B   | MGI:1098268 |
| ENSMUST00000166123 | 0 | 0 | 6 Eif5     | eukaryotic translation initiation factor 5                           | MGI:95309   |
| ENSMUST00000171719 | 0 | 0 | 6 Ccr2     | chemokine (C-C motif) receptor 2                                     | MGI:106185  |
| ENSMUST00000173788 | 0 | 0 | 6 H2-Q7    | histocompatibility 2, Q region locus 7                               | MGI:95936   |
| ENSMUST00000182032 | 0 | 0 | 6 Rbm25    | RNA binding motif protein 25   | MGI:1914289 |
| ENSMUST00000184297 | 0 | 0 | 6 Hnrpnl   | heterogeneous nuclear ribonucleoprotein L-like                       | MGI:1919942 |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

MGI database :<http://www.informatics.jax.org/>

**Supplemental Table 4. Protein coding gene transcripts with UTR region associated RapiRNAs.****RapiRNA reverse to 5'UTR**

| Ensembl ID         | Normalized counts |        |       | Gene symbol | Annotation  | MGI ID      |
|--------------------|-------------------|--------|-------|-------------|---|-------------|
|                    | oocyte            | zygote | sperm |             |   |             |
| ENSMUST00000059099 | 1605              | 1973   | 0     | Pdzd11      | PDZ domain containing 11  | MGI:1919871 |
| ENSMUST00000140162 | 6909              | 1396   | 4162  | Yipf1       | Yip1 domain family, member 1  | MGI:1915532 |
| ENSMUST00000024905 | 1298              | 1156   | 0     | Ralbp1      | ralA binding protein 1  | MGI:108466  |
| ENSMUST00000132011 | 566               | 705    | 0     | Carm1       | coactivator-associated arginine methyltransferase 1                                   | MGI:1913208 |
| ENSMUST00000059042 | 736               | 647    | 89    | Gtf2i       | general transcription factor II I   | MGI:1202722 |
| ENSMUST00000152694 | 462               | 640    | 28    | Myo1h       | myosin 1H   | MGI:1914674 |
| ENSMUST00000120161 | 365               | 411    | 0     | Myo5b       | myosin VB   | MGI:106598  |
| ENSMUST00000167645 | 296               | 399    | 0     | Serhl       | serine hydrolase-like   | MGI:1890404 |
| ENSMUST00000127292 | 221               | 321    | 0     | Tomm22      | translocase of outer mitochondrial membrane 22 homolog (yeast)                        | MGI:2450248 |
| ENSMUST00000026094 | 275               | 268    | 95    | Hdgfrp3     | hepatoma-derived growth factor, related protein 3                                     | MGI:1352760 |
| ENSMUST00000127123 | 275               | 254    | 0     | 3110002H16R | RIKEN cDNA 3110002H16 gene  | MGI:1916528 |
| ENSMUST00000133296 | 167               | 246    | 0     | Gtf3a       | general transcription factor III A  | MGI:1913846 |
| ENSMUST00000166543 | 153               | 246    | 0     | Ralbp1      | ralA binding protein 1  | MGI:108466  |
| ENSMUST00000125230 | 98                | 185    | 0     | Myo1h       | myosin 1H   | MGI:1914674 |
| ENSMUST00000184139 | 201               | 181    | 361   | Bend7       | BEN domain containing 7   | MGI:2443100 |
| ENSMUST00000055549 | 181               | 178    | 0     | B3gnt2      | UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 2                         | MGI:1889505 |
| ENSMUST00000147362 | 197               | 150    | 75    | Plekha2     | pleckstrin homology domain containing, family G (with RhoGef domain) member 2         | MGI:2141874 |
| ENSMUST00000097293 | 84                | 141    | 0     | Ppp4r1      | protein phosphatase 4, regulatory subunit 1   | MGI:1917601 |
| ENSMUST00000116400 | 20                | 112    | 0     | Kansl2      | KAT8 regulatory NSL complex subunit 2   | MGI:1916862 |
| ENSMUST00000135776 | 104               | 110    | 0     | Lrrc8d      | leucine rich repeat containing 8D   | MGI:1922368 |
| ENSMUST00000152579 | 111               | 109    | 0     | Fstl1       | folliculin-like 1   | MGI:102793  |
| ENSMUST00000034973 | 78                | 106    | 0     | Smad3       | SMAD family member 3  | MGI:1201674 |
| ENSMUST00000182335 | 66                | 104    | 0     | Dst         | dystonin  | MGI:104627  |
| ENSMUST00000162145 | 93                | 99     | 0     | Me3         | malic enzyme 3, NADP(+)-dependent, mitochondrial                                      | MGI:1916679 |
| ENSMUST00000035773 | 277               | 97     | 105   | Sos2        | son of sevenless homolog 2 (Drosophila)   | MGI:98355   |
| ENSMUST00000177333 | 64                | 97     | 0     | Tsc22d1     | TSC22 domain family, member 1   | MGI:109127  |
| ENSMUST00000135333 | 102               | 94     | 0     | Abhd2       | abhydrolase domain containing 2   | MGI:1914344 |
| ENSMUST00000125381 | 83                | 92     | 0     | Plxna2      | plexin A2   | MGI:107684  |
| ENSMUST00000131863 | 59                | 90     | 0     | Nsun5       | NOL1/NOP2/Sun domain family, member 5   | MGI:2140844 |
| ENSMUST00000088257 | 65                | 88     | 12    | Trmt112     | tRNA methyltransferase 11-2   | MGI:1914924 |
| ENSMUST00000129023 | 60                | 85     | 0     | Ercc3       | excision repair cross-complementing rodent repair deficiency, complementation group 3 | MGI:95414   |
| ENSMUST00000160840 | 67                | 85     | 0     | Bud31       | BUD31 homolog   | MGI:2141291 |
| ENSMUST00000090749 | 63                | 85     | 0     | Ppia        | peptidylprolyl isomerase A  | MGI:97749   |
| ENSMUST00000095273 | 57                | 84     | 0     | Nr2c2ap     | nuclear receptor 2C2-associated protein   | MGI:1922942 |
| ENSMUST00000110888 | 56                | 82     | 0     | Tsc22d1     | TSC22 domain family, member 1   | MGI:109127  |
| ENSMUST00000142430 | 71                | 76     | 0     | Sgip1       | SH3-domain GRB2-like (endophilin) interacting protein 1                               | MGI:1920344 |

|                    |     |    |               |   |             |
|--------------------|-----|----|---------------|---|-------------|
| ENSMUST00000159234 | 49  | 76 | 0 Sp140       | Sp140 nuclear body protein  | MGI:3702467 |
| ENSMUST00000172911 | 45  | 68 | 0 Prc1        | protein regulator of cytokinesis 1  | MGI:1858961 |
| ENSMUST00000002133 | 69  | 65 | 0 Sdf2        | stromal cell derived factor 2   | MGI:108019  |
| ENSMUST00000044660 | 51  | 63 | 0 Armc5       | armadillo repeat containing 5   | MGI:2384586 |
| ENSMUST00000165153 | 46  | 63 | 0 Ptbp1       | polypyrimidine tract binding protein 1  | MGI:97791   |
| ENSMUST00000063492 | 45  | 62 | 240 Rspo2     | R-spondin 2   | MGI:1922667 |
| ENSMUST00000059946 | 36  | 59 | 0 Henmt1      | HEN1 methyltransferase homolog 1 (Arabidopsis)                                      | MGI:1913965 |
| ENSMUST00000000828 | 78  | 54 | 0 Txnrd3      | thioredoxin reductase 3   | MGI:2386711 |
| ENSMUST00000144512 | 38  | 51 | 6 Al314180    | expressed sequence Al314180   | MGI:2140220 |
| ENSMUST00000144826 | 50  | 50 | 2 Noct        | nocturnin   | MGI:109382  |
| ENSMUST00000027931 | 75  | 49 | 0 Nek2        | NIMA (never in mitosis gene a)-related expressed kinase 2                           | MGI:109359  |
| ENSMUST00000163320 | 53  | 48 | 117 Cic       | capicua transcriptional repressor   | MGI:1918972 |
| ENSMUST00000093019 | 28  | 48 | 0 Fam83g      | family with sequence similarity 83, member G  | MGI:1916890 |
| ENSMUST00000124131 | 37  | 43 | 0 Acp2        | acid phosphatase 2, lysosomal   | MGI:87882   |
| ENSMUST00000137540 | 30  | 43 | 0 Gclm        | glutamate-cysteine ligase, modifier subunit   | MGI:104995  |
| ENSMUST00000046864 | 65  | 40 | 0 Vav3        | vav 3 oncogene  | MGI:1888518 |
| ENSMUST00000119672 | 52  | 39 | 12 Pde4d      | phosphodiesterase 4D, cAMP specific   | MGI:99555   |
| ENSMUST00000145430 | 87  | 39 | 284 Ccne2     | cyclin E2   | MGI:1329034 |
| ENSMUST00000074519 | 26  | 37 | 0 Txnip       | thioredoxin interacting protein   | MGI:1889549 |
| ENSMUST00000078816 | 26  | 37 | 0 9130023H24F | RIKEN cDNA 9130023H24 gene  | MGI:2442738 |
| ENSMUST00000147590 | 17  | 37 | 0 Set         | SET nuclear oncogene  | MGI:1860267 |
| ENSMUST00000034382 | 19  | 35 | 6 Zfp90       | zinc finger protein 90  | MGI:104786  |
| ENSMUST00000124718 | 24  | 34 | 2 Tlcd2       | TLC domain containing 2   | MGI:1917141 |
| ENSMUST00000173914 | 31  | 34 | 0 Prc1        | protein regulator of cytokinesis 1  | MGI:1858961 |
| ENSMUST00000112680 | 353 | 32 | 16 Epb41l3    | erythrocyte membrane protein band 4.1 like 3  | MGI:103008  |
| ENSMUST00000152370 | 22  | 32 | 0 Mphosph8    | M-phase phosphoprotein 8  | MGI:1922589 |
| ENSMUST00000120794 | 16  | 32 | 6 Cpsf3l      | cleavage and polyadenylation specific factor 3-like                                 | MGI:1919207 |
| ENSMUST00000111808 | 91  | 31 | 174 Neurl1a   | neuralized E3 ubiquitin protein ligase 1A   | MGI:1334263 |
| ENSMUST00000176723 | 36  | 31 | 0 Ercc1       | excision repair cross-complementing rodent repair deficiency, complementation group | MGI:95412   |
| ENSMUST00000160119 | 20  | 31 | 0 Sp140       | Sp140 nuclear body protein  | MGI:3702467 |
| ENSMUST00000107543 | 31  | 30 | 2 Bglap3      | bone gamma-carboxyglutamate protein 3   | MGI:88155   |
| ENSMUST00000038831 | 18  | 30 | 0 Hexdc       | hexosaminidase (glycosyl hydrolase family 20, catalytic domain) containing          | MGI:3605542 |
| ENSMUST00000093508 | 17  | 30 | 0 Sp110       | Sp110 nuclear body protein  | MGI:1923364 |
| ENSMUST00000019924 | 0   | 29 | 0 Hey2        | hairy/enhancer-of-split related with YRPW motif 2                                   | MGI:1341884 |
| ENSMUST00000132846 | 20  | 28 | 0 Ppia        | peptidylprolyl isomerase A  | MGI:97749   |
| ENSMUST00000028600 | 48  | 27 | 0 Hipk3       | homeodomain interacting protein kinase 3  | MGI:1314882 |
| ENSMUST00000151732 | 27  | 27 | 0 Tulp4       | tubby like protein 4  | MGI:1916092 |
| ENSMUST00000025490 | 88  | 26 | 730 Prrc1     | proline-rich coiled-coil 1  | MGI:1916106 |
| ENSMUST00000109995 | 36  | 26 | 0 Slc35e4     | solute carrier family 35, member E4   | MGI:2144150 |
| ENSMUST00000125824 | 32  | 26 | 0 Set         | SET nuclear oncogene  | MGI:1860267 |
| ENSMUST00000132484 | 43  | 25 | 28 Spopl      | speckle-type POZ protein-like   | MGI:1924107 |
| ENSMUST00000029013 | 61  | 25 | 18 Rae1       | ribonucleic acid export 1   | MGI:1913929 |

|                    |    |    |                |   |             |
|--------------------|----|----|----------------|---|-------------|
| ENSMUST00000001092 | 19 | 25 | 0 Zfp276       | zinc finger protein (C2H2 type) 276                                     | MGI:1888495 |
| ENSMUST00000037248 | 11 | 25 | 0 Hirip3       | HIRA interacting protein 3  | MGI:2142364 |
| ENSMUST00000002121 | 21 | 24 | 0 Supt6        | suppressor of Ty 6  | MGI:107726  |
| ENSMUST00000041133 | 12 | 21 | 0 Fam110c      | family with sequence similarity 110, member C                           | MGI:1918813 |
| ENSMUST00000099128 | 16 | 20 | 0 Gm5148       | predicted gene 5148   | MGI:3646006 |
| ENSMUST00000117423 | 16 | 20 | 0 Kif2a        | kinesin family member 2A  | MGI:108390  |
| ENSMUST00000130765 | 25 | 19 | 44 Slc45a4     | solute carrier family 45, member 4                                      | MGI:2146236 |
| ENSMUST00000042753 | 30 | 19 | 0 Rbm48        | RNA binding motif protein 48  | MGI:2442653 |
| ENSMUST00000106888 | 10 | 19 | 0 Olfr613      | olfactory receptor 613  | MGI:3030447 |
| ENSMUST00000001867 | 7  | 19 | 0 Evx2         | even-skipped homeobox 2   | MGI:95462   |
| ENSMUST00000022867 | 4  | 19 | 0 Laptm4b      | lysosomal-associated protein transmembrane 4B                           | MGI:1890494 |
| ENSMUST00000151633 | 13 | 18 | 0 C330021F23F  | RIKEN cDNA C330021F23 gene  | MGI:3612471 |
| ENSMUST00000147615 | 8  | 18 | 0 Khdc1b       | KH domain containing 1B   | MGI:2138477 |
| ENSMUST00000032078 | 5  | 18 | 0 Cct7         | chaperonin containing Tcp1, subunit 7 (eta)                             | MGI:107184  |
| ENSMUST00000161766 | 22 | 18 | 188 Zmiz1      | zinc finger, MIZ-type containing 1                                      | MGI:3040693 |
| ENSMUST00000174439 | 21 | 18 | 0 Coro2b       | coronin, actin binding protein, 2B                                      | MGI:2444283 |
| ENSMUST00000021148 | 17 | 18 | 0 Ube2g1       | ubiquitin-conjugating enzyme E2G 1                                      | MGI:1914378 |
| ENSMUST00000029482 | 8  | 18 | 0 Gpsm2        | G-protein signalling modulator 2 (AGS3-like, C. elegans)                | MGI:1923373 |
| ENSMUST00000070080 | 7  | 18 | 0 B4galt6      | UDP-Gal:betaGlcNAc beta 1,4-galactosyltransferase, polypeptide 6        | MGI:1928380 |
| ENSMUST00000063717 | 12 | 17 | 222 Phtf1      | putative homeodomain transcription factor 1                             | MGI:1332671 |
| ENSMUST00000106190 | 0  | 17 | 30 1110065P20R | RIKEN cDNA 1110065P20 gene  | MGI:1916170 |
| ENSMUST00000106044 | 7  | 16 | 2 Lrrc7        | leucine rich repeat containing 7  | MGI:2676665 |
| ENSMUST00000030905 | 6  | 16 | 2 Ssu72        | Ssu72 RNA polymerase II CTD phosphatase homolog (yeast)                 | MGI:1916241 |
| ENSMUST00000067947 | 12 | 16 | 0 Rock1        | Rho-associated coiled-coil containing protein kinase 1                  | MGI:107927  |
| ENSMUST00000020017 | 10 | 16 | 0 Aim1         | absent in melanoma 1  | MGI:109544  |
| ENSMUST00000172361 | 0  | 16 | 0 Hnmpd        | heterogeneous nuclear ribonucleoprotein D                               | MGI:101947  |
| ENSMUST00000180548 | 7  | 16 | 10 Map1lc3b    | microtubule-associated protein 1 light chain 3 beta                     | MGI:1914693 |
| ENSMUST00000067190 | 6  | 16 | 6 Lifr         | leukemia inhibitory factor receptor                                     | MGI:96788   |
| ENSMUST00000138290 | 6  | 16 | 6 Stam2        | signal transducing adaptor molecule (SH3 domain and ITAM motif) 2       | MGI:1929100 |
| ENSMUST00000152551 | 19 | 16 | 0 1110008F13R  | RIKEN cDNA 1110008F13 gene  | MGI:1914638 |
| ENSMUST00000048962 | 7  | 16 | 0 Kif4         | kinesin family member 4   | MGI:108389  |
| ENSMUST00000032570 | 0  | 16 | 0 Dmwd         | dystrophin myotonia-containing WD repeat motif                          | MGI:94907   |
| ENSMUST00000134175 | 22 | 15 | 0 Dpp6         | dipeptidylpeptidase 6   | MGI:94921   |
| ENSMUST00000150817 | 21 | 15 | 0 Dcbl2        | discoidin, CUB and LCCL domain containing 2                             | MGI:1920629 |
| ENSMUST00000150942 | 17 | 15 | 0 Hirip3       | HIRA interacting protein 3  | MGI:2142364 |
| ENSMUST00000025904 | 15 | 15 | 0 Prdx5        | peroxiredoxin 5   | MGI:1859821 |
| ENSMUST00000088407 | 7  | 15 | 0 Khdc1a       | KH domain containing 1A   | MGI:2676610 |
| ENSMUST00000134412 | 4  | 14 | 6 Serf2        | small EDRK-rich factor 2  | MGI:1337041 |
| ENSMUST00000081314 | 4  | 14 | 0 Blm          | Bloom syndrome, RecQ helicase-like                                      | MGI:1328362 |
| ENSMUST00000170167 | 0  | 14 | 0 Pfdn4        | prefoldin 4   | MGI:1923512 |
| ENSMUST00000159514 | 7  | 14 | 0 Naa50        | N(alpha)-acetyltransferase 50, NatE catalytic subunit                   | MGI:1919367 |
| ENSMUST00000099747 | 9  | 13 | 4 B3galnt2     | UDP-GalNAc:betaGlcNAc beta 1,3-galactosaminyltransferase, polypeptide 2 | MGI:2145517 |

|                    |    |    |               |  |             |
|--------------------|----|----|---------------|--|-------------|
| ENSMUST00000151832 | 0  | 13 | 0 Txnip       | thioredoxin interacting protein                                      | MGI:1889549 |
| ENSMUST00000110047 | 5  | 12 | 0 Tc2n        | tandem C2 domains, nuclear   | MGI:1921663 |
| ENSMUST00000002765 | 0  | 12 | 0 Prkd1       | protein kinase D1  | MGI:99879   |
| ENSMUST00000148665 | 0  | 12 | 0 Sf3a2       | splicing factor 3a, subunit 2  | MGI:104912  |
| ENSMUST00000183332 | 14 | 12 | 0 Rbm4b       | RNA binding motif protein 4B   | MGI:1913954 |
| ENSMUST00000075666 | 6  | 12 | 0 Upf1        | UPF1 regulator of nonsense transcripts homolog (yeast)               | MGI:107995  |
| ENSMUST00000146387 | 4  | 12 | 0 Cit         | citron   | MGI:105313  |
| ENSMUST00000106923 | 27 | 11 | 56 Rhog       | ras homolog family member G  | MGI:1928370 |
| ENSMUST00000147898 | 13 | 11 | 0 Psmd11      | proteasome (prosome, macropain) 26S subunit, non-ATPase, 11          | MGI:1916327 |
| ENSMUST00000044207 | 10 | 11 | 0 Sart1       | squamous cell carcinoma antigen recognized by T cells 1              | MGI:1309453 |
| ENSMUST00000134932 | 5  | 11 | 0 Spsb3       | splA/ryanodine receptor domain and SOCS box containing 3             | MGI:1891471 |
| ENSMUST00000023351 | 0  | 11 | 0 Mzt2        | mitotic spindle organizing protein 2                                 | MGI:1922845 |
| ENSMUST00000048263 | 0  | 11 | 0 Wapl        | WAPL cohesin release factor  | MGI:2675859 |
| ENSMUST00000135517 | 48 | 10 | 65 Grn        | granulin   | MGI:95832   |
| ENSMUST00000081497 | 0  | 10 | 14 Pop5       | processing of precursor 5, ribonuclease P/MRP family (S. cerevisiae) | MGI:2151221 |
| ENSMUST00000097867 | 13 | 10 | 12 Col16a1    | collagen, type XVI, alpha 1  | MGI:1095396 |
| ENSMUST00000029090 | 6  | 10 | 4 Gid8        | GID complex subunit 8  | MGI:1923675 |
| ENSMUST00000135506 | 27 | 10 | 0 Surf2       | surfeit gene 2   | MGI:98444   |
| ENSMUST00000115489 | 6  | 10 | 0 Thoc6       | THO complex 6  | MGI:2677480 |
| ENSMUST00000170401 | 5  | 10 | 0 Smpd4       | sphingomyelin phosphodiesterase 4                                    | MGI:1924876 |
| ENSMUST00000155649 | 0  | 10 | 0 Rnf168      | ring finger protein 168  | MGI:1917488 |
| ENSMUST00000175930 | 0  | 10 | 0 Mettl23     | methyltransferase like 23  | MGI:1921569 |
| ENSMUST00000029374 | 11 | 9  | 24 Nbea       | neurobeachin   | MGI:1347075 |
| ENSMUST00000137360 | 4  | 9  | 12 Cdc16      | CDC16 cell division cycle 16   | MGI:1917207 |
| ENSMUST00000058109 | 11 | 9  | 0 Mrps7       | mitochondrial ribosomal protein S7                                   | MGI:1354367 |
| ENSMUST00000148906 | 9  | 9  | 0 Rasgrp2     | RAS, guanyl releasing protein 2                                      | MGI:1333849 |
| ENSMUST00000149564 | 7  | 9  | 0 2700049A03F | RIKEN cDNA 2700049A03 gene   | MGI:1924217 |
| ENSMUST00000162848 | 7  | 9  | 0 Lss         | lanosterol synthase  | MGI:1336155 |
| ENSMUST00000155945 | 4  | 9  | 0 Traf3ip2    | TRAF3 interacting protein 2  | MGI:2143599 |
| ENSMUST00000013807 | 9  | 9  | 50 Pten       | phosphatase and tensin homolog                                       | MGI:109583  |
| ENSMUST00000159970 | 15 | 9  | 14 Bace1      | beta-site APP cleaving enzyme 1                                      | MGI:1346542 |
| ENSMUST00000162920 | 1  | 9  | 8 Scyl3       | SCY1-like 3 (S. cerevisiae)  | MGI:1921385 |
| ENSMUST00000129547 | 7  | 9  | 0 Skint8      | selection and upkeep of intraepithelial T cells 8                    | MGI:3651523 |
| ENSMUST00000132676 | 7  | 9  | 0 Pgs1        | phosphatidylglycerophosphate synthase 1                              | MGI:1921701 |
| ENSMUST00000096753 | 6  | 9  | 0 Hnrnpul2    | heterogeneous nuclear ribonucleoprotein U-like 2                     | MGI:1915943 |
| ENSMUST00000180901 | 2  | 9  | 0 Rpgr1       | retinitis pigmentosa GTPase regulator interacting protein 1          | MGI:1932134 |
| ENSMUST00000040330 | 0  | 9  | 0 Cep44       | centrosomal protein 44   | MGI:3525111 |
| ENSMUST00000142885 | 32 | 8  | 20 Relt       | RELT tumor necrosis factor receptor                                  | MGI:2443373 |
| ENSMUST00000138701 | 10 | 8  | 0 Echdc2      | enoyl Coenzyme A hydratase domain containing 2                       | MGI:1289238 |
| ENSMUST00000019464 | 10 | 8  | 0 Noxo1       | NADPH oxidase organizer 1  | MGI:1919143 |
| ENSMUST00000031862 | 7  | 8  | 0 Cbx3        | chromobox 3  | MGI:108515  |
| ENSMUST00000124608 | 7  | 8  | 0 Lcp1        | lymphocyte cytosolic protein 1                                       | MGI:104808  |

|                    |    |   |               |  |             |
|--------------------|----|---|---------------|--|-------------|
| ENSMUST00000174043 | 7  | 8 | 0 Cyb5r4      | cytochrome b5 reductase 4                                | MGI:2386848 |
| ENSMUST00000169399 | 5  | 8 | 0 Rsl24d1     | ribosomal L24 domain containing 1                        | MGI:2681840 |
| ENSMUST00000144806 | 4  | 8 | 0 Ostm1       | osteopetrosis associated transmembrane protein 1         | MGI:2655574 |
| ENSMUST00000162578 | 0  | 8 | 0 Ndrg4       | N-myc downstream regulated gene 4                        | MGI:2384590 |
| ENSMUST00000139678 | 9  | 7 | 0 Vwf         | Von Willebrand factor                                    | MGI:98941   |
| ENSMUST00000034270 | 7  | 7 | 0 Map1lc3b    | microtubule-associated protein 1 light chain 3 beta      | MGI:1914693 |
| ENSMUST00000014072 | 4  | 7 | 0 Thap8       | THAP domain containing 8                                 | MGI:1922879 |
| ENSMUST00000123007 | 4  | 7 | 0 Trim24      | tripartite motif-containing 24                           | MGI:109275  |
| ENSMUST00000149411 | 0  | 7 | 0 Mlx         | MAX-like protein X                                       | MGI:108398  |
| ENSMUST00000145313 | 21 | 7 | 34 Zfp523     | zinc finger protein 523                                  | MGI:2687278 |
| ENSMUST00000062740 | 2  | 7 | 4 Acp1        | acid phosphatase 1, soluble                              | MGI:87881   |
| ENSMUST00000142075 | 19 | 7 | 0 Inpp5f      | inositol polyphosphate-5-phosphatase F                   | MGI:2141867 |
| ENSMUST00000180140 | 14 | 7 | 0 Hcfc1r1     | host cell factor C1 regulator 1 (XPO1-dependent)         | MGI:2663619 |
| ENSMUST00000152378 | 7  | 7 | 0 Rtbdn       | retbindin  | MGI:2443686 |
| ENSMUST00000093819 | 0  | 7 | 0 Pigb        | phosphatidylinositol glycan anchor biosynthesis, class B | MGI:1891825 |
| ENSMUST00000145387 | 0  | 7 | 0 Kbtbd8      | kelch repeat and BTB (POZ) domain containing 8           | MGI:2661430 |
| ENSMUST00000063976 | 7  | 6 | 238 Opa3      | optic atrophy 3  | MGI:2686271 |
| ENSMUST00000135803 | 4  | 6 | 77 Ralgds     | ral guanine nucleotide dissociation stimulator           | MGI:107485  |
| ENSMUST00000044060 | 6  | 6 | 6 Cd209c      | CD209c antigen   | MGI:2157945 |
| ENSMUST00000141537 | 10 | 6 | 0 Rnf167      | ring finger protein 167                                  | MGI:1917760 |
| ENSMUST00000127723 | 6  | 6 | 0 Leng8       | leukocyte receptor cluster (LRC) member 8                | MGI:2142195 |
| ENSMUST00000138952 | 0  | 6 | 0 Lrrc41      | leucine rich repeat containing 41                        | MGI:2441984 |
| ENSMUST00000148219 | 0  | 6 | 0 Drap1       | Dr1 associated protein 1 (negative cofactor 2 alpha)     | MGI:1913806 |
| ENSMUST00000034905 | 1  | 5 | 18 Gclc       | glutamate-cysteine ligase, catalytic subunit             | MGI:104990  |
| ENSMUST00000025019 | 7  | 5 | 16 Arhgdig    | Rho GDP dissociation inhibitor (GDI) gamma               | MGI:108430  |
| ENSMUST00000049813 | 11 | 5 | 12 Yod1       | YOD1 deubiquitinase                                      | MGI:2442596 |
| ENSMUST00000049655 | 1  | 5 | 4 Tmem215     | transmembrane protein 215                                | MGI:2444167 |
| ENSMUST00000053699 | 1  | 5 | 2 Secisbp2l   | SECIS binding protein 2-like                             | MGI:1917604 |
| ENSMUST00000080204 | 7  | 5 | 0 Sp140       | Sp140 nuclear body protein                               | MGI:3702467 |
| ENSMUST00000132373 | 7  | 5 | 0 Wdr76       | WD repeat domain 76                                      | MGI:1926186 |
| ENSMUST00000039922 | 0  | 5 | 0 Sufu        | suppressor of fused homolog (Drosophila)                 | MGI:1345643 |
| ENSMUST00000043204 | 0  | 5 | 0 Fbxo33      | F-box protein 33   | MGI:1917861 |
| ENSMUST00000059271 | 0  | 5 | 0 Stt7l       | suppression of tumorigenicity 7-like                     | MGI:2386964 |
| ENSMUST00000170420 | 0  | 5 | 0 Dusp12      | dual specificity phosphatase 12                          | MGI:1890614 |
| ENSMUST00000064637 | 8  | 5 | 8 Rnf103      | ring finger protein 103                                  | MGI:109483  |
| ENSMUST00000044216 | 1  | 5 | 4 Shd         | src homology 2 domain-containing transforming protein D  | MGI:1099461 |
| ENSMUST00000099207 | 19 | 5 | 0 Zcchc3      | zinc finger, CCHC domain containing 3                    | MGI:1915167 |
| ENSMUST00000138630 | 10 | 5 | 0 BC048403    | cDNA sequence BC048403                                   | MGI:2670984 |
| ENSMUST00000112810 | 8  | 5 | 0 Gtdc1       | glycosyltransferase-like domain containing 1             | MGI:2444269 |
| ENSMUST00000031421 | 7  | 5 | 0 Arpc3       | actin related protein 2/3 complex, subunit 3             | MGI:1928375 |
| ENSMUST00000161675 | 7  | 5 | 0 A530032D15F | RIKEN cDNA A530032D15Rik gene                            | MGI:3037746 |
| ENSMUST00000086556 | 6  | 5 | 0 Elk4        | ELK4, member of ETS oncogene family                      | MGI:102853  |

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|--------------------|----|---|------------|---|-------------|
| ENSMUST00000020608 | 0  | 5 | 0 Ppp2ca   | protein phosphatase 2 (formerly 2A), catalytic subunit, alpha isoform | MGI:1321159 |
| ENSMUST00000050970 | 0  | 5 | 0 Polr1d   | polymerase (RNA) I polypeptide D                                      | MGI:108403  |
| ENSMUST00000061772 | 0  | 5 | 0 Rbm15    | RNA binding motif protein 15  | MGI:2443205 |
| ENSMUST00000063682 | 0  | 5 | 0 Pfdn4    | prefoldin 4   | MGI:1923512 |
| ENSMUST00000086216 | 0  | 5 | 0 Anapc5   | anaphase-promoting complex subunit 5                                  | MGI:1929722 |
| ENSMUST00000129001 | 0  | 5 | 0 Ankrd13a | ankyrin repeat domain 13a   | MGI:1915670 |
| ENSMUST00000134678 | 0  | 5 | 0 Cpsf3l   | cleavage and polyadenylation specific factor 3-like                   | MGI:1919207 |
| ENSMUST00000136485 | 0  | 5 | 0 Gorasp2  | golgi reassembly stacking protein 2                                   | MGI:2135962 |
| ENSMUST00000052838 | 5  | 4 | 75 Mib1    | mindbomb E3 ubiquitin protein ligase 1                                | MGI:2443157 |
| ENSMUST00000036805 | 17 | 4 | 0 Plekhj1  | pleckstrin homology domain containing, family J member 1              | MGI:1925920 |
| ENSMUST00000137748 | 11 | 4 | 0 Dnase1   | deoxyribonuclease I   | MGI:103157  |
| ENSMUST00000152640 | 10 | 4 | 0 Fam63a   | family with sequence similarity 63, member A                          | MGI:1922257 |
| ENSMUST00000065482 | 6  | 4 | 0 Mllt11   | myeloid/lymphoid or mixed-lineage leukemia; translocated to, 11       | MGI:1929671 |
| ENSMUST00000138549 | 6  | 4 | 0 Nudt5    | nudix (nucleoside diphosphate linked moiety X)-type motif 5           | MGI:1858232 |
| ENSMUST00000020343 | 5  | 4 | 0 Rab21    | RAB21, member RAS oncogene family                                     | MGI:894308  |
| ENSMUST00000176793 | 5  | 4 | 0 Baz1b    | bromodomain adjacent to zinc finger domain, 1B                        | MGI:1353499 |
| ENSMUST00000042471 | 7  | 3 | 16 Dis3    | DIS3 homolog, exosome endoribonuclease and 3'-5' exoribonuclease      | MGI:1919912 |
| ENSMUST00000171256 | 8  | 3 | 6 Smad2    | SMAD family member 2  | MGI:108051  |
| ENSMUST00000102963 | 3  | 3 | 4 Dnaic1   | dynein, axonemal, intermediate chain 1                                | MGI:1916172 |
| ENSMUST00000131769 | 10 | 3 | 2 Pde4a    | phosphodiesterase 4A, cAMP specific                                   | MGI:99558   |
| ENSMUST00000074694 | 3  | 3 | 2 Gnai1    | guanine nucleotide binding protein (G protein), alpha inhibiting 1    | MGI:95771   |
| ENSMUST00000138456 | 6  | 3 | 0 Eml1     | echinoderm microtubule associated protein like 1                      | MGI:1915769 |
| ENSMUST00000114937 | 3  | 3 | 36 Usp6nl  | USP6 N-terminal like  | MGI:2138893 |
| ENSMUST00000048043 | 3  | 3 | 32 Coro2b  | coronin, actin binding protein, 2B                                    | MGI:2444283 |
| ENSMUST00000027706 | 1  | 3 | 4 Lrrn2    | leucine rich repeat protein 2, neuronal                               | MGI:106037  |
| ENSMUST00000118710 | 7  | 3 | 8 Mboat7   | membrane bound O-acyltransferase domain containing 7                  | MGI:1924832 |
| ENSMUST00000135025 | 8  | 3 | 0 Eef1g    | eukaryotic translation elongation factor 1 gamma                      | MGI:1914410 |
| ENSMUST00000144129 | 7  | 3 | 0 Rassf1   | Ras association (RalGDS/AF-6) domain family member 1                  | MGI:1928386 |
| ENSMUST00000110973 | 6  | 3 | 0 Zfp738   | zinc finger protein 738   | MGI:3040706 |
| ENSMUST00000034280 | 2  | 2 | 319 Zdhhc7 | zinc finger, DHHC domain containing 7                                 | MGI:2142662 |
| ENSMUST00000134215 | 5  | 2 | 107 Numb1  | numb-like   | MGI:894702  |
| ENSMUST00000028763 | 4  | 2 | 54 Tyro3   | TYRO3 protein tyrosine kinase 3                                       | MGI:104294  |
| ENSMUST00000052457 | 1  | 2 | 32 Mtss1l  | metastasis suppressor 1-like  | MGI:3039591 |
| ENSMUST00000173409 | 3  | 2 | 12 Suc1g1  | succinate-CoA ligase, GDP-forming, alpha subunit                      | MGI:1927234 |
| ENSMUST00000095143 | 4  | 2 | 8 Rbm12b2  | RNA binding motif protein 12 B2                                       | MGI:1924854 |
| ENSMUST00000146416 | 4  | 2 | 8 Rbm12b1  | RNA binding motif protein 12 B1                                       | MGI:1919647 |
| ENSMUST00000002678 | 1  | 2 | 8 Tgfb1    | transforming growth factor, beta 1                                    | MGI:98725   |
| ENSMUST00000054674 | 15 | 2 | 0 Hjurp    | Holliday junction recognition protein                                 | MGI:2685821 |
| ENSMUST00000027249 | 2  | 1 | 54 Chst10  | carbohydrate sulfotransferase 10                                      | MGI:2138283 |
| ENSMUST00000069106 | 12 | 1 | 52 Epm2a   | epilepsy, progressive myoclonic epilepsy, type 2 gene alpha           | MGI:1341085 |
| ENSMUST00000069456 | 4  | 1 | 46 Ncor1   | nuclear receptor co-repressor 1                                       | MGI:1349717 |
| ENSMUST00000042779 | 4  | 1 | 10 Zbtb1   | zinc finger and BTB domain containing 1                               | MGI:2442326 |

|                    |   |   |               |  |             |
|--------------------|---|---|---------------|--|-------------|
| ENSMUST00000182881 | 0 | 1 | 10 Rbm25      | RNA binding motif protein 25   | MGI:1914289 |
| ENSMUST00000106312 | 7 | 1 | 8 Zfp553      | zinc finger protein 553  | MGI:2384725 |
| ENSMUST00000070368 | 2 | 1 | 6 Siah2       | seven in absentia 2  | MGI:108062  |
| ENSMUST00000183157 | 1 | 1 | 6 Zfp532      | zinc finger protein 532  | MGI:3036282 |
| ENSMUST00000182969 | 3 | 1 | 91 Sh3d19     | SH3 domain protein D19   | MGI:1350923 |
| ENSMUST00000075077 | 4 | 1 | 77 Med21      | mediator complex subunit 21  | MGI:1347064 |
| ENSMUST00000174525 | 1 | 1 | 48 H2-Q10     | histocompatibility 2, Q region locus 10  | MGI:95929   |
| ENSMUST00000153735 | 1 | 1 | 36 Pdlim2     | PDZ and LIM domain 2   | MGI:2384850 |
| ENSMUST00000145328 | 0 | 1 | 32 Sertad2    | SERTA domain containing 2  | MGI:1931026 |
| ENSMUST00000020717 | 1 | 1 | 28 Arf5       | ADP-ribosylation factor 5  | MGI:99434   |
| ENSMUST00000035346 | 4 | 1 | 20 Nol4l      | nucleolar protein 4-like   | MGI:1918765 |
| ENSMUST00000108808 | 1 | 1 | 20 Arfrp1     | ADP-ribosylation factor related protein 1  | MGI:1923938 |
| ENSMUST00000131598 | 1 | 1 | 16 Naa25      | N(alpha)-acetyltransferase 25, NatB auxiliary subunit                                    | MGI:2442563 |
| ENSMUST00000042564 | 1 | 1 | 14 Ghitm      | growth hormone inducible transmembrane protein   | MGI:1913342 |
| ENSMUST00000136629 | 0 | 1 | 14 Ddx51      | DEAD (Asp-Glu-Ala-Asp) box polypeptide 51  | MGI:1916913 |
| ENSMUST00000149907 | 0 | 1 | 12 Copg1      | coatomer protein complex, subunit gamma 1  | MGI:1858696 |
| ENSMUST00000013262 | 1 | 1 | 10 Zkscan17   | zinc finger with KRAB and SCAN domains 17  | MGI:2679270 |
| ENSMUST00000119166 | 1 | 1 | 8 Zcchc2      | zinc finger, CCHC domain containing 2  | MGI:2444114 |
| ENSMUST00000135597 | 1 | 1 | 8 Top3b       | topoisomerase (DNA) III beta   | MGI:1333803 |
| ENSMUST00000160436 | 0 | 1 | 8 Tcerg1l     | transcription elongation regulator 1-like  | MGI:1917821 |
| ENSMUST00000132058 | 1 | 1 | 6 Akap9       | A kinase (PRKA) anchor protein (yotiao) 9  | MGI:2178217 |
| ENSMUST00000145839 | 1 | 1 | 6 Nf1         | neurofibromatosis 1  | MGI:97306   |
| ENSMUST00000040506 | 0 | 1 | 6 Fam13b      | family with sequence similarity 13, member B   | MGI:2447834 |
| ENSMUST00000125122 | 0 | 1 | 6 Zzef1       | zinc finger, ZZ-type with EF hand domain 1   | MGI:2444286 |
| ENSMUST00000056660 | 2 | 0 | 315 Tmem229b  | transmembrane protein 229B   | MGI:2444389 |
| ENSMUST00000028081 | 2 | 0 | 184 Plxdc2    | plexin domain containing 2   | MGI:1914698 |
| ENSMUST00000031058 | 0 | 0 | 109 Mapre3    | microtubule-associated protein, RP/EB family, member 3                                   | MGI:2140967 |
| ENSMUST00000159846 | 0 | 0 | 103 Cyb5a     | cytochrome b5 type A (microsomal)  | MGI:1926952 |
| ENSMUST00000043211 | 0 | 0 | 75 Coq10a     | coenzyme Q10A  | MGI:2684847 |
| ENSMUST00000151053 | 0 | 0 | 65 Dnaic2     | dynein, axonemal, intermediate chain 2   | MGI:2685574 |
| ENSMUST00000126424 | 0 | 0 | 57 Tdp1       | tyrosyl-DNA phosphodiesterase 1  | MGI:1920036 |
| ENSMUST00000141527 | 0 | 0 | 54 Mtss1l     | metastasis suppressor 1-like   | MGI:3039591 |
| ENSMUST00000155002 | 0 | 0 | 46 Fgfr3      | fibroblast growth factor receptor 3  | MGI:95524   |
| ENSMUST00000060987 | 0 | 0 | 38 Oaz1       | ornithine decarboxylase antizyme 1   | MGI:109433  |
| ENSMUST00000165123 | 9 | 0 | 36 Csnk1a1    | casein kinase 1, alpha 1   | MGI:1934950 |
| ENSMUST00000098853 | 0 | 0 | 34 Kmt5c      | lysine methyltransferase 5C  | MGI:2385262 |
| ENSMUST00000105675 | 0 | 0 | 32 Park7      | Parkinson disease (autosomal recessive, early onset) 7                                   | MGI:2135637 |
| ENSMUST00000144630 | 0 | 0 | 32 Sfpq       | splicing factor proline/glutamine rich (polypyrimidine tract binding protein associated) | MGI:1918764 |
| ENSMUST00000167504 | 0 | 0 | 32 Tma7       | translational machinery associated 7   | MGI:1913417 |
| ENSMUST00000123066 | 0 | 0 | 30 Enpp6      | ectonucleotide pyrophosphatase/phosphodiesterase 6                                       | MGI:2445171 |
| ENSMUST00000121435 | 0 | 0 | 28 Gm12216    | predicted gene 12216   | MGI:3650088 |
| ENSMUST00000123916 | 0 | 0 | 28 4932438A13 | RIKEN cDNA 4932438A13 gene   | MGI:2444631 |



|                    |   |   |   |             |
|--------------------|---|---|---|-------------|
| ENSMUST00000168972 | 0 | 0 | 28 1700024B05FRIKEN cDNA 1700024B05 gene                                | MGI:1922768 |
| ENSMUST00000032884 | 0 | 0 | 26 Anapc15 anaphase promoting complex C subunit 15                      | MGI:1922680 |
| ENSMUST00000162302 | 0 | 0 | 26 Stac3 SH3 and cysteine rich domain 3                                 | MGI:3606571 |
| ENSMUST00000123183 | 0 | 0 | 24 Rpl5 ribosomal protein L5  | MGI:102854  |
| ENSMUST00000125129 | 0 | 0 | 24 Fip111 FIP1 like 1 (S. cerevisiae)                                   | MGI:1914149 |
| ENSMUST00000180086 | 0 | 0 | 24 H1f0 H1 histone family, member 0                                     | MGI:95893   |
| ENSMUST00000106344 | 1 | 0 | 22 Tnrc6c trinucleotide repeat containing 6C                            | MGI:2443265 |
| ENSMUST00000130856 | 0 | 0 | 22 Slx4ip SLX4 interacting protein                                      | MGI:1921493 |
| ENSMUST00000134164 | 0 | 0 | 22 Trim63 tripartite motif-containing 63                                | MGI:2447992 |
| ENSMUST00000140283 | 0 | 0 | 22 Fmo5 flavin containing monooxygenase 5                               | MGI:1310004 |
| ENSMUST00000141291 | 0 | 0 | 22 Epb41 erythrocyte membrane protein band 4.1                          | MGI:95401   |
| ENSMUST00000173875 | 1 | 0 | 20 Sra1 steroid receptor RNA activator 1                                | MGI:1344414 |
| ENSMUST00000117202 | 0 | 0 | 20 Gm10600 predicted gene 10600   | MGI:3710628 |
| ENSMUST00000172238 | 0 | 0 | 20 Nabp2 nucleic acid binding protein 2                                 | MGI:1917167 |
| ENSMUST00000180308 | 0 | 0 | 20 Flg filaggrin  | MGI:95553   |
| ENSMUST00000140236 | 0 | 0 | 18 Use1 unconventional SNARE in the ER 1 homolog (S. cerevisiae)        | MGI:1914273 |
| ENSMUST00000159203 | 0 | 0 | 18 Rbm22 RNA binding motif protein 22                                   | MGI:1914060 |
| ENSMUST00000006027 | 0 | 0 | 16 Reep5 receptor accessory protein 5                                   | MGI:1270152 |
| ENSMUST00000097844 | 0 | 0 | 16 Srsf10 serine/arginine-rich splicing factor 10                       | MGI:1333805 |
| ENSMUST00000132860 | 0 | 0 | 16 Srp72 signal recognition particle 72                                 | MGI:1333795 |
| ENSMUST00000148125 | 0 | 0 | 16 Clns1a chloride channel, nucleotide-sensitive, 1A                    | MGI:109638  |
| ENSMUST00000150355 | 0 | 0 | 16 Clpb ClpB caseinolytic peptidase B                                   | MGI:1100517 |
| ENSMUST00000151833 | 0 | 0 | 16 Rnmt RNA (guanine-7-) methyltransferase                              | MGI:1915147 |
| ENSMUST00000185036 | 1 | 0 | 14 1110065P20R RIKEN cDNA 1110065P20 gene                               | MGI:1916170 |
| ENSMUST00000084949 | 0 | 0 | 14 Impad1 inositol monophosphatase domain containing 1                  | MGI:1915720 |
| ENSMUST00000105993 | 0 | 0 | 14 Nkain1 Na+/K+ transporting ATPase interacting 1                      | MGI:1914399 |
| ENSMUST00000147687 | 0 | 0 | 14 Spata5 spermatogenesis associated 5                                  | MGI:1927170 |
| ENSMUST00000156896 | 0 | 0 | 14 Zfp276 zinc finger protein (C2H2 type) 276                           | MGI:1888495 |
| ENSMUST00000147600 | 3 | 0 | 12 Crb2 crumbs family member 2  | MGI:2679260 |
| ENSMUST00000018506 | 2 | 0 | 12 Kpna2 karyopherin (importin) alpha 2                                 | MGI:103561  |
| ENSMUST00000119797 | 2 | 0 | 12 Rabgef1 RAB guanine nucleotide exchange factor (GEF) 1               | MGI:1929459 |
| ENSMUST00000033498 | 1 | 0 | 12 Timm17b translocase of inner mitochondrial membrane 17b              | MGI:1343176 |
| ENSMUST00000080723 | 1 | 0 | 12 Tax1bp1 Tax1 (human T cell leukemia virus type I) binding protein 1  | MGI:1289308 |
| ENSMUST00000131964 | 1 | 0 | 12 Cuedc1 CUE domain containing 1                                       | MGI:2144281 |
| ENSMUST00000048565 | 0 | 0 | 12 Trim60 tripartite motif-containing 60                                | MGI:2387430 |
| ENSMUST00000062904 | 0 | 0 | 12 Dnajc11 DnaJ heat shock protein family (Hsp40) member C11            | MGI:2443386 |
| ENSMUST00000079618 | 0 | 0 | 12 St8sia5 ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 5 | MGI:109243  |
| ENSMUST00000120331 | 0 | 0 | 12 Isg20 interferon-stimulated protein                                  | MGI:1928895 |
| ENSMUST00000127680 | 0 | 0 | 12 2810474O19FRIKEN cDNA 2810474O19 gene                                | MGI:1914496 |
| ENSMUST00000130730 | 0 | 0 | 12 Cdca7 cell division cycle associated 7                               | MGI:1914203 |
| ENSMUST00000134528 | 0 | 0 | 12 Nfrkb nuclear factor related to kappa B binding protein              | MGI:2442410 |
| ENSMUST00000136369 | 0 | 0 | 12 Pex12 peroxisomal biogenesis factor 12                               | MGI:2144177 |

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|--------------------|---|---|---------------|--|-------------|
| ENSMUST00000138593 | 0 | 0 | 12 Tmem134    | transmembrane protein 134  | MGI:1914240 |
| ENSMUST00000140193 | 0 | 0 | 12 Blmh       | bleomycin hydrolase  | MGI:1345186 |
| ENSMUST00000144249 | 0 | 0 | 12 Ptpn1      | protein tyrosine phosphatase, non-receptor type 1                          | MGI:97805   |
| ENSMUST00000145679 | 0 | 0 | 12 Anp32a     | acidic (leucine-rich) nuclear phosphoprotein 32 family, member A           | MGI:108447  |
| ENSMUST00000146448 | 0 | 0 | 12 Sync       | syncollin  | MGI:1916078 |
| ENSMUST00000148288 | 0 | 0 | 12 Smg9       | smg-9 homolog, nonsense mediated mRNA decay factor (C. elegans)            | MGI:1919247 |
| ENSMUST00000181745 | 0 | 0 | 12 Gm26657    | predicted gene, 26657  | MGI:5477151 |
| ENSMUST00000183807 | 0 | 0 | 12 Nipal3     | NIPA-like domain containing 3  | MGI:1921802 |
| ENSMUST00000143783 | 2 | 0 | 10 Lhx2       | LIM homeobox protein 2   | MGI:96785   |
| ENSMUST00000046506 | 0 | 0 | 10 Clcf1      | cardiotrophin-like cytokine factor 1                                       | MGI:1930088 |
| ENSMUST00000070219 | 0 | 0 | 10 Pard6g     | par-6 family cell polarity regulator gamma                                 | MGI:2135606 |
| ENSMUST00000121114 | 0 | 0 | 10 Slc43a1    | solute carrier family 43, member 1   | MGI:1931352 |
| ENSMUST00000144123 | 0 | 0 | 10 Tubgcp4    | tubulin, gamma complex associated protein 4                                | MGI:1196293 |
| ENSMUST00000148941 | 0 | 0 | 10 Arid4b     | AT rich interactive domain 4B (RBP1-like)                                  | MGI:2137512 |
| ENSMUST00000149695 | 0 | 0 | 10 Ilk        | integrin linked kinase   | MGI:1195267 |
| ENSMUST00000176141 | 0 | 0 | 10 Zhx3       | zinc fingers and homeoboxes 3  | MGI:2444772 |
| ENSMUST00000144280 | 1 | 0 | 8 Herc1       | HECT and RLD domain containing E3 ubiquitin protein ligase family member 1 | MGI:2384589 |
| ENSMUST00000025364 | 1 | 0 | 8 Yipf5       | Yip1 domain family, member 5   | MGI:1914430 |
| ENSMUST00000052125 | 1 | 0 | 8 Pard6b      | par-6 family cell polarity regulator beta                                  | MGI:2135605 |
| ENSMUST00000090247 | 1 | 0 | 8 Trio        | triple functional domain (PTPRF interacting)                               | MGI:1927230 |
| ENSMUST00000138553 | 1 | 0 | 8 Hmgb1       | high mobility group box 1  | MGI:96113   |
| ENSMUST00000057330 | 0 | 0 | 8 Kif3a       | kinesin family member 3A   | MGI:107689  |
| ENSMUST00000088001 | 0 | 0 | 8 Adnp        | activity-dependent neuroprotective protein                                 | MGI:1338758 |
| ENSMUST00000093121 | 0 | 0 | 8 Skp1a       | S-phase kinase-associated protein 1A                                       | MGI:103575  |
| ENSMUST00000113902 | 0 | 0 | 8 Fam90a1b    | family with sequence similarity 90, member A1B                             | MGI:1921682 |
| ENSMUST00000126235 | 0 | 0 | 8 Pogz        | pogo transposable element with ZNF domain                                  | MGI:2442117 |
| ENSMUST00000135399 | 0 | 0 | 8 Usp16       | ubiquitin specific peptidase 16  | MGI:1921362 |
| ENSMUST00000136146 | 0 | 0 | 8 Fam45a      | family with sequence similarity 45, member A                               | MGI:1915144 |
| ENSMUST00000138149 | 0 | 0 | 8 Xlr3b       | X-linked lymphocyte-regulated 3B   | MGI:109505  |
| ENSMUST00000142393 | 0 | 0 | 8 Lztr1       | leucine-zipper-like transcriptional regulator, 1                           | MGI:1914113 |
| ENSMUST00000143443 | 0 | 0 | 8 Rpl10a      | ribosomal protein L10A   | MGI:1343877 |
| ENSMUST00000148707 | 0 | 0 | 8 Mmgt2       | membrane magnesium transporter 2   | MGI:2448491 |
| ENSMUST00000160146 | 0 | 0 | 8 Fam173b     | family with sequence similarity 173, member B                              | MGI:1915323 |
| ENSMUST00000161075 | 0 | 0 | 8 Desi2       | desumoylating isopeptidase 2   | MGI:1926075 |
| ENSMUST00000183545 | 0 | 0 | 8 Zfp280d     | zinc finger protein 280D   | MGI:2384583 |
| ENSMUST00000184968 | 0 | 0 | 8 Zfp280d     | zinc finger protein 280D   | MGI:2384583 |
| ENSMUST00000018407 | 0 | 0 | 6 Tbx5        | T-box 5  | MGI:102541  |
| ENSMUST00000025909 | 0 | 0 | 6 Gpr137      | G protein-coupled receptor 137   | MGI:2147529 |
| ENSMUST00000065360 | 0 | 0 | 6 Zic1        | zinc finger protein of the cerebellum 1                                    | MGI:106683  |
| ENSMUST00000086421 | 0 | 0 | 6 Nck2        | non-catalytic region of tyrosine kinase adaptor protein 2                  | MGI:1306821 |
| ENSMUST00000092646 | 0 | 0 | 6 Med23       | mediator complex subunit 23  | MGI:1917458 |
| ENSMUST00000098786 | 0 | 0 | 6 1700029J07R | RIKEN cDNA 1700029J07 gene   | MGI:1916729 |

|                     |    |   |            |  |             |
|---------------------|----|---|------------|--|-------------|
| ENSMUST00000101294  | 0  | 0 | 6 Gpr174   | G protein-coupled receptor 174                                       | MGI:2685222 |
| ENSMUST00000101558  | 0  | 0 | 6 Magi2    | membrane associated guanylate kinase, WW and PDZ domain containing 2 | MGI:1354953 |
| ENSMUST00000102926  | 0  | 0 | 6 Anp32b   | acidic (leucine-rich) nuclear phosphoprotein 32 family, member B     | MGI:1914878 |
| ENSMUST00000108476  | 0  | 0 | 6 Ctns     | cystinosis, nephropathic   | MGI:1932872 |
| ENSMUST00000113306  | 0  | 0 | 6 B3gnt7   | UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 7        | MGI:2384394 |
| ENSMUST00000113343  | 0  | 0 | 6 Cldn34c1 | claudin 34C1   | MGI:1920311 |
| ENSMUST000001127608 | 0  | 0 | 6 Gpn3     | GPN-loop GTPase 3  | MGI:1289326 |
| ENSMUST00000130456  | 0  | 0 | 6 Tyro3    | TYRO3 protein tyrosine kinase 3                                      | MGI:104294  |
| ENSMUST00000133547  | 0  | 0 | 6 Anxa11   | annexin A11  | MGI:108481  |
| ENSMUST00000134506  | 0  | 0 | 6 Paqr7    | progesterin and adipoQ receptor family member VII                    | MGI:1919154 |
| ENSMUST00000137143  | 0  | 0 | 6 Mfsd13a  | major facilitator superfamily domain containing 13a                  | MGI:1922396 |
| ENSMUST00000137544  | 0  | 0 | 6 Pes1     | pescadillo ribosomal biogenesis factor 1                             | MGI:1890613 |
| ENSMUST00000138302  | 0  | 0 | 6 Wbp1l    | WW domain binding protein 1 like                                     | MGI:107577  |
| ENSMUST00000138498  | 0  | 0 | 6 Bud13    | BUD13 homolog  | MGI:2443443 |
| ENSMUST00000138800  | 0  | 0 | 6 Pdpf     | pancreatic progenitor cell differentiation and proliferation factor  | MGI:1913746 |
| ENSMUST00000141115  | 0  | 0 | 6 Tnrc6c   | trinucleotide repeat containing 6C                                   | MGI:2443265 |
| ENSMUST00000142149  | 0  | 0 | 6 Timeless | timeless circadian clock 1   | MGI:1321393 |
| ENSMUST00000143716  | 0  | 0 | 6 Nsun2    | NOL1/NOP2/Sun domain family member 2                                 | MGI:107252  |
| ENSMUST00000149055  | 0  | 0 | 6 Taz      | tafazzin   | MGI:109626  |
| ENSMUST00000149982  | 0  | 0 | 6 Tspan7   | tetraspanin 7  | MGI:1298407 |
| ENSMUST00000150047  | 0  | 0 | 6 Tpt1     | tumor protein, translationally-controlled 1                          | MGI:104890  |
| ENSMUST00000155161  | 0  | 0 | 6 Kdm6a    | lysine (K)-specific demethylase 6A                                   | MGI:1095419 |
| ENSMUST00000159725  | 0  | 0 | 6 Inpp1    | inositol polyphosphate-1-phosphatase                                 | MGI:104848  |
| ENSMUST00000161843  | 0  | 0 | 6 Gfm2     | G elongation factor, mitochondrial 2                                 | MGI:2444783 |
| ENSMUST00000163697  | 0  | 0 | 6 Mtdh     | metadherin   | MGI:1914404 |
| ENSMUST00000166408  | 0  | 0 | 6 Mettl17  | methyltransferase like 17  | MGI:1098577 |
| ENSMUST00000173788  | 0  | 0 | 6 H2-Q7    | histocompatibility 2, Q region locus 7                               | MGI:95936   |
| ENSMUST00000179797  | 0  | 0 | 6 Gm20594  | predicted gene, 20594  | MGI:5295700 |
| ENSMUST00000134538  | 19 | 0 | 0 Pif1     | PIF1 5'-to-3' DNA helicase   | MGI:2143057 |
| ENSMUST00000066475  | 16 | 0 | 0 Cers3    | ceramide synthase 3  | MGI:2681008 |
| ENSMUST00000181601  | 14 | 0 | 0 Gm26566  | predicted gene, 26566  | MGI:5477060 |
| ENSMUST00000034561  | 13 | 0 | 0 Alg9     | asparagine-linked glycosylation 9 (alpha 1,2 mannosyltransferase)    | MGI:1924753 |
| ENSMUST00000065353  | 7  | 0 | 0 Yap1     | yes-associated protein 1   | MGI:103262  |
| ENSMUST00000114848  | 7  | 0 | 0 Taf11    | TATA-box binding protein associated factor 11                        | MGI:1916026 |
| ENSMUST00000126015  | 7  | 0 | 0 Eps15    | epidermal growth factor receptor pathway substrate 15                | MGI:104583  |
| ENSMUST00000129632  | 7  | 0 | 0 Tcp1     | t-complex protein 1  | MGI:98535   |
| ENSMUST00000116621  | 6  | 0 | 0 Ndubf11  | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 11                | MGI:1349919 |
| ENSMUST00000137719  | 6  | 0 | 0 Rapgef1  | Rap guanine nucleotide exchange factor (GEF) 1                       | MGI:104580  |
| ENSMUST00000023344  | 5  | 0 | 0 Slc35a5  | solute carrier family 35, member A5                                  | MGI:1921352 |
| ENSMUST00000106783  | 5  | 0 | 0 Timm10b  | translocase of inner mitochondrial membrane 10B                      | MGI:1315196 |
| ENSMUST00000107394  | 5  | 0 | 0 Mesp2    | mesoderm posterior 2   | MGI:1096325 |
| ENSMUST00000147549  | 5  | 0 | 0 BC030499 | cDNA sequence BC030499   | MGI:2652869 |

ENSMUST00000162075

5

0

0 Txndc5

thioredoxin domain containing 5

MGI:2145316

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

MGI database :<http://www.informatics.jax.org/>

**Supplemental Table 5. Protein coding gene transcripts with UTR region associated NRapiRNAs.**

**NRapiRNAs sense to 3'UTRs**

| Ensembl ID         | oocyte | Normalized counts |       | Gene symbol | Annotation   | MGI ID      |
|--------------------|--------|-------------------|-------|-------------|--|-------------|
|                    |        | zygote            | sperm |             |  |             |
| ENSMUST00000068792 |        | 957               | 1004  | 0 Tmem245   | transmembrane protein 245  | MGI:2445107 |
| ENSMUST00000166172 |        | 573               | 558   | 0 Abl2      | v-abl Abelson murine leukemia viral oncogene 2 (arg, Abelson-related gene) | MGI:87860   |
| ENSMUST00000146175 |        | 568               | 673   | 452 Nr2c2   | nuclear receptor subfamily 2, group C, member 2                            | MGI:1352466 |
| ENSMUST00000054674 |        | 491               | 452   | 0 Hjurp     | Holliday junction recognition protein                                      | MGI:2685821 |
| ENSMUST00000089622 |        | 373               | 277   | 0 Tet3      | tet methylcytosine dioxygenase 3   | MGI:2446229 |
| ENSMUST00000146409 |        | 355               | 288   | 0 Slc26a2   | solute carrier family 26 (sulfate transporter), member 2                   | MGI:892977  |
| ENSMUST00000151372 |        | 267               | 226   | 0 Icmt      | isoprenylcysteine carboxyl methyltransferase                               | MGI:1888594 |
| ENSMUST00000109769 |        | 266               | 277   | 0 Cdc14b    | CDC14 cell division cycle 14B  | MGI:2441808 |
| ENSMUST00000118728 |        | 258               | 313   | 500 Nemp1   | nuclear envelope integral membrane protein 1                               | MGI:2446113 |
| ENSMUST00000105502 |        | 242               | 330   | 0 Foxo3     | forkhead box O3  | MGI:1890081 |
| ENSMUST00000105849 |        | 240               | 252   | 0 Luzp1     | leucine zipper protein 1   | MGI:107629  |
| ENSMUST00000027373 |        | 222               | 223   | 30 Ppm1f    | protein phosphatase 1F (PP2C domain containing)                            | MGI:1918464 |
| ENSMUST00000093162 |        | 207               | 146   | 0 Atxn1l    | ataxin 1-like  | MGI:3694797 |
| ENSMUST00000150993 |        | 182               | 26    | 0 Snx29     | sorting nexin 29   | MGI:1921728 |
| ENSMUST00000161790 |        | 168               | 168   | 668 Eif4g2  | eukaryotic translation initiation factor 4, gamma 2                        | MGI:109207  |
| ENSMUST00000067620 |        | 167               | 176   | 0 Chdh      | choline dehydrogenase  | MGI:1860776 |
| ENSMUST00000112121 |        | 156               | 106   | 0 Mlec      | malectin   | MGI:1924015 |
| ENSMUST00000041124 |        | 152               | 169   | 0 Zfp704    | zinc finger protein 704  | MGI:2180715 |
| ENSMUST00000130643 |        | 151               | 160   | 0 Srpk1     | serine/arginine-rich protein specific kinase 1                             | MGI:106908  |
| ENSMUST00000179802 |        | 144               | 120   | 0 Cmtm4     | CKLF-like MARVEL transmembrane domain containing 4                         | MGI:2142888 |
| ENSMUST00000111816 |        | 144               | 91    | 0 Trim71    | tripartite motif-containing 71   | MGI:2685973 |
| ENSMUST00000040455 |        | 141               | 177   | 0 Hif1an    | hypoxia-inducible factor 1, alpha subunit inhibitor                        | MGI:2442345 |
| ENSMUST00000171404 |        | 125               | 175   | 67 Gtf3c4   | general transcription factor IIIC, polypeptide 4                           | MGI:2138937 |
| ENSMUST00000128260 |        | 104               | 62    | 52 Ramp2    | receptor (calcitonin) activity modifying protein 2                         | MGI:1859650 |
| ENSMUST00000067103 |        | 101               | 107   | 0 Taf8      | TATA-box binding protein associated factor 8                               | MGI:1926879 |
| ENSMUST00000056623 |        | 98                | 116   | 0 Tmem72    | transmembrane protein 72   | MGI:2442707 |
| ENSMUST00000102484 |        | 95                | 54    | 0 Ddi2      | DNA-damage inducible protein 2   | MGI:1917244 |
| ENSMUST00000133565 |        | 94                | 61    | 0 Tsc1      | tuberous sclerosis 1   | MGI:1929183 |
| ENSMUST00000123766 |        | 79                | 70    | 0 Lpcat1    | lysophosphatidylcholine acyltransferase 1                                  | MGI:2384812 |
| ENSMUST00000057627 |        | 78                | 74    | 0 Spata2    | spermatogenesis associated 2   | MGI:2146885 |
| ENSMUST00000116365 |        | 73                | 39    | 0 Dnajc5    | DnaJ heat shock protein family (Hsp40) member C5                           | MGI:892995  |
| ENSMUST00000030080 |        | 70                | 70    | 0 Snx30     | sorting nexin family member 30   | MGI:2443882 |
| ENSMUST00000020776 |        | 69                | 102   | 95 Ccdc117  | coiled-coil domain containing 117  | MGI:2144383 |
| ENSMUST00000110766 |        | 69                | 49    | 0 Fbxl18    | F-box and leucine-rich repeat protein 18                                   | MGI:2444450 |
| ENSMUST00000020706 |        | 68                | 53    | 0 Adcy1     | adenylate cyclase 1  | MGI:99677   |
| ENSMUST00000174483 |        | 67                | 39    | 0 Dnmt3a    | DNA methyltransferase 3A   | MGI:1261827 |
| ENSMUST00000030757 |        | 67                | 36    | 0 Fbxo42    | F-box protein 42   | MGI:1924992 |
| ENSMUST00000102899 |        | 64                | 68    | 0 Med22     | mediator complex subunit 22  | MGI:98446   |
| ENSMUST00000084241 |        | 64                | 43    | 0 Wasf2     | WAS protein family, member 2   | MGI:1098641 |
| ENSMUST00000155749 |        | 62                | 79    | 0 Ak4       | adenylate kinase 4   | MGI:87979   |
| ENSMUST00000107009 |        | 61                | 93    | 0 Nsf       | N-ethylmaleimide sensitive fusion protein                                  | MGI:104560  |
| ENSMUST00000071093 |        | 61                | 64    | 0 Rims3     | regulating synaptic membrane exocytosis 3                                  | MGI:2443331 |
| ENSMUST00000125082 |        | 60                | 106   | 0 Tmem245   | transmembrane protein 245  | MGI:2445107 |
| ENSMUST00000103181 |        | 60                | 82    | 0 Cds2      | CDP-diacylglycerol synthase (phosphatidate cytidyltransferase) 2           | MGI:1332236 |
| ENSMUST00000146430 |        | 60                | 75    | 0 Tbc1d14   | TBC1 domain family, member 14  | MGI:1098708 |
| ENSMUST00000147218 |        | 59                | 70    | 0 Elk4      | ELK4, member of ETS oncogene family  | MGI:102853  |
| ENSMUST00000044113 |        | 58                | 128   | 161 Ago2    | argonaute RISC catalytic subunit 2   | MGI:2446632 |
| ENSMUST00000111178 |        | 58                | 49    | 0 Efr3b     | EFR3 homolog B   | MGI:2444851 |
| ENSMUST00000112877 |        | 58                | 114   | 0 Nr6a1     | nuclear receptor subfamily 6, group A, member 1                            | MGI:1352459 |
| ENSMUST00000080817 |        | 58                | 58    | 0 Rnf169    | ring finger protein 169  | MGI:1920257 |
| ENSMUST00000085614 |        | 57                | 43    | 0 Usp12     | ubiquitin specific peptidase 12  | MGI:1270128 |
| ENSMUST00000073337 |        | 55                | 35    | 12 Cramp1l  | Crm, cramped-like (Drosophila)   | MGI:1930190 |
| ENSMUST00000080537 |        | 53                | 16    | 0 Carhsp1   | calcium regulated heat stable protein 1                                    | MGI:1196368 |
| ENSMUST00000069557 |        | 52                | 60    | 0 Smad5     | SMAD family member 5   | MGI:1328787 |
| ENSMUST00000168124 |        | 52                | 29    | 0 Blmh      | bleomycin hydrolase  | MGI:1345186 |
| ENSMUST00000134579 |        | 52                | 15    | 0 Knstrn    | kinetochore-localized astrin/SPAG5 binding                                 | MGI:1289298 |

|                     |    |    |            |   |             |
|---------------------|----|----|------------|---|-------------|
| ENSMUST00000034973  | 50 | 99 | 0 Smad3    | SMAD family member 3  | MGI:1201674 |
| ENSMUST00000052404  | 47 | 46 | 0 Epb41l5  | erythrocyte membrane protein band 4.1 like 5  | MGI:103006  |
| ENSMUST00000085245  | 47 | 18 | 0 Slc39a9  | solute carrier family 39 (zinc transporter), member 9                                     | MGI:1914820 |
| ENSMUST00000118234  | 47 | 47 | 0 Pex26    | peroxisomal biogenesis factor 26  | MGI:1921293 |
| ENSMUST00000034405  | 47 | 28 | 0 Mre11a   | MRE11A homolog A, double strand break repair nuclease                                     | MGI:1100512 |
| ENSMUST00000037644  | 44 | 68 | 111 Cbl    | Casitas B-lineage lymphoma  | MGI:88279   |
| ENSMUST00000095035  | 44 | 60 | 0 Zbtb43   | zinc finger and BTB domain containing 43  | MGI:1919084 |
| ENSMUST00000136139  | 44 | 32 | 0 Gabpb2   | GA repeat binding protein, beta 2   | MGI:95612   |
| ENSMUST00000167290  | 43 | 18 | 0 Smim7    | small integral membrane protein 7   | MGI:1914068 |
| ENSMUST00000129635  | 43 | 18 | 0 Lpin2    | lipin 2   | MGI:1891341 |
| ENSMUST00000123399  | 42 | 47 | 16 Uhmk1   | U2AF homology motif (UHM) kinase 1  | MGI:1341908 |
| ENSMUST00000153961  | 41 | 16 | 0 Akap1    | A kinase (PRKA) anchor protein 1  | MGI:104729  |
| ENSMUST00000118152  | 39 | 28 | 24 Cbx5    | chromobox 5   | MGI:109372  |
| ENSMUST00000035336  | 39 | 25 | 0 Il17rd   | interleukin 17 receptor D   | MGI:2159727 |
| ENSMUST00000024906  | 38 | 24 | 0 Twsg1    | twisted gastrulation BMP signaling modulator 1  | MGI:2137520 |
| ENSMUST000000161779 | 38 | 51 | 0 Hipk2    | homeodomain interacting protein kinase 2  | MGI:1314872 |
| ENSMUST00000045540  | 38 | 14 | 0 Socs7    | suppressor of cytokine signaling 7  | MGI:2651588 |
| ENSMUST00000144377  | 37 | 27 | 0 Pdp1r    | pyruvate dehydrogenase phosphatase regulatory subunit                                     | MGI:2442188 |
| ENSMUST00000170984  | 36 | 20 | 0 Ston2    | stonin 2  | MGI:1918272 |
| ENSMUST00000028350  | 36 | 12 | 0 Zmynd19  | zinc finger, MYND domain containing 19  | MGI:1914437 |
| ENSMUST00000023048  | 35 | 15 | 12 Mief1   | mitochondrial elongation factor 1   | MGI:2146020 |
| ENSMUST00000112896  | 34 | 33 | 0 Tmem164  | transmembrane protein 164   | MGI:2148020 |
| ENSMUST00000103143  | 34 | 18 | 0 Fbxl20   | F-box and leucine-rich repeat protein 20  | MGI:1919444 |
| ENSMUST00000079157  | 33 | 37 | 0 Eya3     | EYA transcriptional coactivator and phosphatase 3   | MGI:109339  |
| ENSMUST00000103129  | 33 | 33 | 0 Dsn1     | DSN1 homolog, MIS12 kinetochore complex component   | MGI:1914184 |
| ENSMUST00000055808  | 32 | 26 | 0 Ywhag    | tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, gamma polypeptide | MGI:108109  |
| ENSMUST00000025350  | 32 | 13 | 0 Dcp2     | decapping mRNA 2  | MGI:1917890 |
| ENSMUST00000105690  | 31 | 15 | 0 Pik3cd   | phosphatidylinositol 3-kinase catalytic delta polypeptide                                 | MGI:1098211 |
| ENSMUST00000096386  | 30 | 9  | 26 Rnf41   | ring finger protein 41  | MGI:1914838 |
| ENSMUST00000052455  | 29 | 42 | 0 Pigm     | phosphatidylinositol glycan anchor biosynthesis, class M                                  | MGI:1914806 |
| ENSMUST00000004428  | 29 | 24 | 0 Clcn5    | chloride channel, voltage-sensitive 5   | MGI:99486   |
| ENSMUST00000028963  | 29 | 5  | 0 Tbc1d20  | TBC1 domain family, member 20   | MGI:1914481 |
| ENSMUST00000052332  | 28 | 20 | 0 Abi2     | abl-interactor 2  | MGI:106913  |
| ENSMUST00000079869  | 28 | 10 | 0 Znrf2    | zinc and ring finger 2  | MGI:1196246 |
| ENSMUST00000177236  | 27 | 47 | 18 Rnf141  | ring finger protein 141   | MGI:1914400 |
| ENSMUST00000026269  | 27 | 30 | 0 Limd1    | LIM domains containing 1  | MGI:1352502 |
| ENSMUST00000026991  | 27 | 11 | 0 Faf2     | Fas associated factor family member 2   | MGI:1923827 |
| ENSMUST00000038229  | 27 | 0  | 0 Neil2    | nei like 2 (E. coli)  | MGI:2686058 |
| ENSMUST00000141112  | 27 | 0  | 0 AU02252  | expressed sequence AU02252  | MGI:2140466 |
| ENSMUST00000142938  | 27 | 7  | 0 Mtmr14   | myotubularin related protein 14   | MGI:1916075 |
| ENSMUST00000058438  | 24 | 49 | 0 Dcaf7    | DDB1 and CUL4 associated factor 7   | MGI:1919083 |
| ENSMUST00000115351  | 24 | 25 | 0 Rab3d    | RAB3D, member RAS oncogene family   | MGI:97844   |
| ENSMUST00000110240  | 24 | 22 | 0 Gfra4    | glial cell line derived neurotrophic factor family receptor alpha 4                       | MGI:1341873 |
| ENSMUST00000103111  | 24 | 18 | 28 Zhx3    | zinc fingers and homeoboxes 3   | MGI:2444772 |
| ENSMUST00000060798  | 24 | 14 | 0 Unc119b  | unc-119 lipid binding chaperone B   | MGI:2147162 |
| ENSMUST00000149359  | 24 | 22 | 0 Mkl2     | MKL/myocardin-like 2  | MGI:3050795 |
| ENSMUST00000161494  | 23 | 22 | 14 Glcc1   | glucocorticoid induced transcript 1   | MGI:2179717 |
| ENSMUST00000109586  | 23 | 8  | 0 Sertad2  | SERTA domain containing 2   | MGI:1931026 |
| ENSMUST00000153018  | 22 | 38 | 0 Sirt7    | sirtuin 7   | MGI:2385849 |
| ENSMUST00000140705  | 22 | 23 | 0 Ccdc186  | coiled-coil domain containing 186   | MGI:2445022 |
| ENSMUST00000133598  | 22 | 16 | 0 Zfp512b  | zinc finger protein 512B  | MGI:2685478 |
| ENSMUST00000055261  | 22 | 12 | 0 Mob1a    | MOB kinase activator 1A   | MGI:2442631 |
| ENSMUST00000144169  | 22 | 11 | 0 Efcab6   | EF-hand calcium binding domain 6  | MGI:1924877 |
| ENSMUST00000064104  | 22 | 0  | 0 Cdc42se2 | CDC42 small effector 2  | MGI:1919979 |
| ENSMUST00000090219  | 21 | 0  | 0 Bmf      | BCL2 modifying factor   | MGI:2176433 |
| ENSMUST00000167004  | 21 | 17 | 0 Gpat4    | glycerol-3-phosphate acyltransferase 4  | MGI:2142716 |
| ENSMUST00000005508  | 21 | 14 | 1844 Tbl2  | transducin (beta)-like 2  | MGI:1351652 |
| ENSMUST00000155990  | 20 | 37 | 0 Epb41    | erythrocyte membrane protein band 4.1   | MGI:95401   |
| ENSMUST00000031069  | 20 | 34 | 0 Sepsecs  | Sep (O-phosphoserine) tRNA:Sec (selenocysteine) tRNA synthase                             | MGI:1098791 |
| ENSMUST00000051401  | 20 | 22 | 0 Cldn4    | claudin 4   | MGI:1313314 |
| ENSMUST00000147737  | 20 | 14 | 0 Mphosph9 | M-phase phosphoprotein 9  | MGI:2443138 |

|                    |    |    |                 |  |             |
|--------------------|----|----|-----------------|--|-------------|
| ENSMUST00000165924 | 20 | 14 | 40 Sp1          | trans-acting transcription factor 1  | MGI:98372   |
| ENSMUST00000136748 | 20 | 14 | 0 Rhbdd2        | rhomboid domain containing 2   | MGI:1915612 |
| ENSMUST00000117849 | 20 | 11 | 0 Csnk1g1       | casein kinase 1, gamma 1   | MGI:2660884 |
| ENSMUST00000084891 | 20 | 9  | 0 Pacs2         | phosphofurin acidic cluster sorting protein 2  | MGI:1924399 |
| ENSMUST00000114849 | 19 | 26 | 0 Uhrf1bp1      | UHRF1 (ICBP90) binding protein 1   | MGI:3041238 |
| ENSMUST00000109553 | 19 | 17 | 0 Tef           | thyrotroph embryonic factor  | MGI:98663   |
| ENSMUST00000100750 | 19 | 10 | 0 Mecp2         | methyl CpG binding protein 2   | MGI:99918   |
| ENSMUST00000025675 | 19 | 0  | 0 Naa40         | N(alpha)-acetyltransferase 40, NatD catalytic subunit  | MGI:1918249 |
| ENSMUST00000009256 | 19 | 19 | 28 Bcl2l13      | BCL2-like 13 (apoptosis facilitator)   | MGI:2136959 |
| ENSMUST00000109102 | 19 | 12 | 0 Cdy12         | chromodomain protein, Y chromosome-like 2  | MGI:1923046 |
| ENSMUST00000031810 | 19 | 5  | 0 Cep41         | centrosomal protein 41   | MGI:1891414 |
| ENSMUST00000110066 | 18 | 12 | 0 Gpr68         | G protein-coupled receptor 68  | MGI:2441763 |
| ENSMUST00000033158 | 18 | 10 | 0 Ubfd1         | ubiquitin family domain containing 1   | MGI:107301  |
| ENSMUST00000030773 | 18 | 9  | 0 Xrcc2         | X-ray repair complementing defective repair in Chinese hamster cells 2                       | MGI:1927345 |
| ENSMUST00000132404 | 18 | 7  | 0 Ept1          | ethanolaminephosphotransferase 1 (CDP-ethanolamine-specific)                                 | MGI:107898  |
| ENSMUST00000030626 | 18 | 6  | 0 Tmem50a       | transmembrane protein 50A  | MGI:1919067 |
| ENSMUST00000068519 | 18 | 0  | 0 Susd6         | sushi domain containing 6  | MGI:2444661 |
| ENSMUST00000010597 | 17 | 24 | 0 Kansl3        | KAT8 regulatory NSL complex subunit 3  | MGI:1918055 |
| ENSMUST00000022550 | 17 | 15 | 0 Extl3         | exostoses (multiple)-like 3  | MGI:1860765 |
| ENSMUST00000056654 | 17 | 10 | 0 Fam109a       | family with sequence similarity 109, member A  | MGI:2442708 |
| ENSMUST00000066496 | 17 | 0  | 0 Nudcd3        | NudC domain containing 3   | MGI:2144158 |
| ENSMUST00000146628 | 16 | 9  | 210 Desi1       | desumoylating isopeptidase 1   | MGI:106313  |
| ENSMUST00000169707 | 16 | 9  | 0 Ccnt1         | cyclin T1  | MGI:1328363 |
| ENSMUST00000031131 | 16 | 9  | 0 Uchl1         | ubiquitin carboxy-terminal hydrolase L1  | MGI:103149  |
| ENSMUST00000045665 | 16 | 8  | 0 Ppp1r12b      | protein phosphatase 1, regulatory (inhibitor) subunit 12B                                    | MGI:1916417 |
| ENSMUST00000071874 | 16 | 5  | 0 Ano6          | anoctamin 6  | MGI:2145890 |
| ENSMUST00000110204 | 16 | 4  | 0 Esrrb         | estrogen related receptor, beta  | MGI:1346832 |
| ENSMUST00000151211 | 16 | 4  | 0 Guk1          | guanylate kinase 1   | MGI:95871   |
| ENSMUST00000084512 | 16 | 20 | 67 Tacc1        | transforming, acidic coiled-coil containing protein 1  | MGI:2443510 |
| ENSMUST00000171654 | 16 | 7  | 0 Thsd4         | thrombospondin, type I, domain containing 4  | MGI:2672033 |
| ENSMUST00000117269 | 16 | 4  | 0 Traf3         | TNF receptor-associated factor 3   | MGI:108041  |
| ENSMUST00000034234 | 16 | 0  | 0 Coq9          | coenzyme Q9  | MGI:1915164 |
| ENSMUST00000040105 | 16 | 0  | 0 Specc1l       | sperm antigen with calponin homology and coiled-coil domains 1-like                          | MGI:1921642 |
| ENSMUST00000127270 | 15 | 37 | 32 Rpl23a       | ribosomal protein L23A   | MGI:3040672 |
| ENSMUST00000055341 | 15 | 31 | 0 Gfod1         | glucose-fructose oxidoreductase domain containing 1  | MGI:2145304 |
| ENSMUST00000129816 | 15 | 14 | 0 Dpf2          | D4, zinc and double PHD fingers family 2   | MGI:109529  |
| ENSMUST00000129883 | 15 | 12 | 0 Mtmr14        | myotubularin related protein 14  | MGI:1916075 |
| ENSMUST00000043338 | 15 | 10 | 0 Sft2d2        | SFT2 domain containing 2   | MGI:1917362 |
| ENSMUST00000097759 | 15 | 7  | 0 Prdm16        | PR domain containing 16  | MGI:1917923 |
| ENSMUST00000090785 | 15 | 4  | 0 Otud7b        | OTU domain containing 7B   | MGI:2654703 |
| ENSMUST00000118592 | 15 | 0  | 0 Ccdc186       | coiled-coil domain containing 186  | MGI:2445022 |
| ENSMUST0000010536  | 14 | 12 | 50 Gosr1        | golgi SNAP receptor complex member 1   | MGI:1858260 |
| ENSMUST00000130481 | 14 | 11 | 0 Plcxd2        | phosphatidylinositol-specific phospholipase C, X domain containing 2                         | MGI:3647874 |
| ENSMUST00000102487 | 14 | 9  | 0 Szrd1         | SUZ RNA binding domain containing 1  | MGI:1098672 |
| ENSMUST00000060108 | 13 | 26 | 0 1810030O07Rik | RIKEN cDNA 1810030O07 gene   | MGI:1916405 |
| ENSMUST00000037418 | 13 | 26 | 14 Tmed8        | transmembrane p24 trafficking protein 8  | MGI:1923480 |
| ENSMUST00000127691 | 13 | 17 | 0 Surf6         | surfeit gene 6   | MGI:98447   |
| ENSMUST00000105608 | 13 | 16 | 0 Slc35e2       | solute carrier family 35, member E2  | MGI:2444240 |
| ENSMUST00000032998 | 13 | 13 | 418 Rps3        | ribosomal protein S3   | MGI:1350917 |
| ENSMUST00000049053 | 13 | 9  | 0 Fam168a       | family with sequence similarity 168, member A  | MGI:2442372 |
| ENSMUST00000101385 | 13 | 5  | 0 Plekha8       | pleckstrin homology domain containing, family A (phosphoinositide binding specific) member 8 | MGI:2681164 |
| ENSMUST00000032272 | 13 | 0  | 0 Adipor2       | adiponectin receptor 2   | MGI:93830   |
| ENSMUST00000108789 | 13 | 0  | 0 Zfp512b       | zinc finger protein 512B   | MGI:2685478 |
| ENSMUST00000110615 | 13 | 29 | 0 Serf2         | small EDRK-rich factor 2   | MGI:1337041 |
| ENSMUST00000056907 | 13 | 19 | 0 Smcr8         | Smith-Magenis syndrome chromosome region, candidate 8 homolog (human)                        | MGI:2444720 |
| ENSMUST00000040023 | 13 | 8  | 0 Iffo2         | intermediate filament family orphan 2  | MGI:2140675 |
| ENSMUST00000172044 | 13 | 7  | 65 Zbtb37       | zinc finger and BTB domain containing 37   | MGI:2444467 |
| ENSMUST00000028928 | 13 | 6  | 0 Gzf1          | GDNF-inducible zinc finger protein 1   | MGI:1921783 |
| ENSMUST00000129449 | 13 | 0  | 16 Tmem170b     | transmembrane protein 170B   | MGI:3647046 |
| ENSMUST00000065329 | 13 | 0  | 0 Tmem248       | transmembrane protein 248  | MGI:1918917 |
| ENSMUST00000109221 | 13 | 0  | 0 B4galt5       | UDP-Gal:betaGlcNAc beta 1,4-galactosyltransferase, polypeptide 5                             | MGI:1927169 |

|                     |    |    |            |   |             |
|---------------------|----|----|------------|---|-------------|
| ENSMUST00000068240  | 12 | 18 | 0 Kihdc10  | kelch domain containing 10  | MGI:1924038 |
| ENSMUST000000110836 | 12 | 9  | 0 Mafk     | v-maf musculoaponeurotic fibrosarcoma oncogene family, protein K (avian)                  | MGI:99951   |
| ENSMUST000000106193 | 12 | 9  | 0 Mtf1     | metal response element binding transcription factor 1                                     | MGI:101786  |
| ENSMUST000000140535 | 12 | 9  | 0 Slc11a2  | solute carrier family 11 (proton-coupled divalent metal ion transporters), member 2       | MGI:1345279 |
| ENSMUST000000078470 | 12 | 7  | 0 Kcnh1    | potassium voltage-gated channel, subfamily H (eag-related), member 1                      | MGI:1341721 |
| ENSMUST000000028426 | 12 | 0  | 0 Cers6    | ceramide synthase 6   | MGI:2442564 |
| ENSMUST000000085217 | 12 | 0  | 0 Gk5      | glycerol kinase 5 (putative)  | MGI:2443336 |
| ENSMUST000000102549 | 12 | 0  | 0 Nipal3   | NIPA-like domain containing 3   | MGI:1921802 |
| ENSMUST000000114690 | 12 | 0  | 0 Zbtb20   | zinc finger and BTB domain containing 20  | MGI:1929213 |
| ENSMUST000000126739 | 11 | 16 | 0 Hjurp    | Holliday junction recognition protein   | MGI:2685821 |
| ENSMUST00000014694  | 11 | 15 | 0 Rbsn     | rabenosyn, RAB effector   | MGI:1925537 |
| ENSMUST000000144061 | 11 | 14 | 0 Samd8    | sterile alpha motif domain containing 8   | MGI:1914880 |
| ENSMUST000000138843 | 11 | 9  | 0 Slc11a2  | solute carrier family 11 (proton-coupled divalent metal ion transporters), member 2       | MGI:1345279 |
| ENSMUST000000035987 | 11 | 9  | 0 Map3k9   | mitogen-activated protein kinase kinase kinase 9  | MGI:2449952 |
| ENSMUST000000086843 | 11 | 7  | 1792 Asb1  | ankyrin repeat and SOCS box-containing 1  | MGI:1929735 |
| ENSMUST000000014640 | 11 | 0  | 0 Ankrd28  | ankyrin repeat domain 28  | MGI:2145661 |
| ENSMUST000000062991 | 11 | 0  | 0 Grpel2   | GrpE-like 2, mitochondrial  | MGI:1334416 |
| ENSMUST000000065537 | 11 | 0  | 0 Jmy      | junction-mediating and regulatory protein   | MGI:1913096 |
| ENSMUST000000069718 | 11 | 0  | 0 Fto      | fat mass and obesity associated   | MGI:1347093 |
| ENSMUST000000092912 | 11 | 0  | 0 Mettl16  | methyltransferase like 16   | MGI:1914743 |
| ENSMUST000000126639 | 11 | 0  | 0 Ywhag    | tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, gamma polypeptide | MGI:108109  |
| ENSMUST000000161630 | 11 | 0  | 0 Zfp263   | zinc finger protein 263   | MGI:1921370 |
| ENSMUST000000162512 | 10 | 20 | 0 Gtpbp8   | GTP-binding protein 8 (putative)  | MGI:1913317 |
| ENSMUST000000098312 | 10 | 18 | 16 Exoc8   | exocyst complex component 8   | MGI:2142527 |
| ENSMUST000000115137 | 10 | 15 | 0 Pcyt1a   | phosphate cytidyltransferase 1, choline, alpha isoform                                    | MGI:88557   |
| ENSMUST000000153894 | 10 | 15 | 0 Faf2     | Fas associated factor family member 2   | MGI:1923827 |
| ENSMUST000000160660 | 10 | 15 | 0 Zfp346   | zinc finger protein 346   | MGI:1349417 |
| ENSMUST000000063982 | 10 | 10 | 0 Fzd5     | frizzled class receptor 5   | MGI:108571  |
| ENSMUST000000139147 | 10 | 9  | 0 Rad54l   | RAD54 like (S. cerevisiae)  | MGI:894697  |
| ENSMUST000000155647 | 10 | 9  | 0 Ech3     | enoyl Coenzyme A hydratase, short chain, 1, mitochondrial                                 | MGI:2136460 |
| ENSMUST000000108527 | 10 | 7  | 0 Dhx33    | DEAH (Asp-Glu-Ala-His) box polypeptide 33   | MGI:2445102 |
| ENSMUST000000098950 | 10 | 6  | 0 Elavl1   | ELAV (embryonic lethal, abnormal vision)-like 1 (Hu antigen R)                            | MGI:1100851 |
| ENSMUST000000168566 | 10 | 5  | 73 Zmat3   | zinc finger matrin type 3   | MGI:1195270 |
| ENSMUST000000029106 | 10 | 5  | 0 Zbtb46   | zinc finger and BTB domain containing 46  | MGI:1919397 |
| ENSMUST000000175806 | 10 | 5  | 0 Pknox1   | Pbx/knotted 1 homeobox  | MGI:1201409 |
| ENSMUST000000037315 | 10 | 5  | 0 Abhd2    | abhydrolase domain containing 2   | MGI:1914344 |
| ENSMUST000000070524 | 10 | 0  | 12 Tgoln1  | trans-golgi network protein   | MGI:105080  |
| ENSMUST00000017981  | 10 | 0  | 0 Nkiras2  | NFKB inhibitor interacting Ras-like protein 2   | MGI:1919216 |
| ENSMUST000000035010 | 10 | 0  | 0 Stt3b    | STT3, subunit of the oligosaccharyltransferase complex, homolog B (S. cerevisiae)         | MGI:1915542 |
| ENSMUST000000099490 | 10 | 0  | 0 Nsd1     | nuclear receptor-binding SET-domain protein 1   | MGI:1276545 |
| ENSMUST000000108971 | 10 | 0  | 0 Dip2b    | disco interacting protein 2 homolog B   | MGI:2145977 |
| ENSMUST000000165066 | 10 | 14 | 0 Ino80d   | INO80 complex subunit D   | MGI:3027003 |
| ENSMUST000000028300 | 10 | 9  | 0 Nacc2    | nucleus accumbens associated 2, BEN and BTB (POZ) domain containing                       | MGI:1915241 |
| ENSMUST000000114280 | 10 | 9  | 0 Rgs12    | regulator of G-protein signaling 12   | MGI:1918979 |
| ENSMUST000000112184 | 10 | 8  | 0 Sfmbt1   | Scm-like with four mbt domains 1  | MGI:1859609 |
| ENSMUST000000026902 | 10 | 5  | 0 Rassf3   | Ras association (RalGDS/AF-6) domain family member 3                                      | MGI:2179722 |
| ENSMUST000000119746 | 10 | 5  | 0 Usf3     | upstream transcription factor family member 3   | MGI:2685454 |
| ENSMUST000000034982 | 10 | 4  | 0 Tfdp2    | transcription factor Dp 2   | MGI:107167  |
| ENSMUST000000037480 | 10 | 4  | 0 Wipf2    | WAS/WASL interacting protein family, member 2   | MGI:1924462 |
| ENSMUST000000164980 | 10 | 4  | 0 Coro1c   | coronin, actin binding protein 1C   | MGI:1345964 |
| ENSMUST000000033871 | 10 | 0  | 0 Slc25a15 | solute carrier family 25 (mitochondrial carrier ornithine transporter), member 15         | MGI:1342274 |
| ENSMUST000000051674 | 10 | 0  | 0 Lin28a   | lin-28 homolog A (C. elegans)   | MGI:1890546 |
| ENSMUST000000060009 | 10 | 0  | 0 Exd1     | exonuclease 3'-5' domain containing 1   | MGI:3045306 |
| ENSMUST000000084968 | 10 | 0  | 0 Rcor1    | REST corepressor 1  | MGI:106340  |
| ENSMUST000000089185 | 10 | 0  | 0 Zdhhc14  | zinc finger, DHHC domain containing 14  | MGI:2653229 |
| ENSMUST000000111160 | 10 | 0  | 0 Akt3     | thymoma viral proto-oncogene 3  | MGI:1345147 |
| ENSMUST000000128708 | 10 | 0  | 0 Tulp3    | tubby-like protein 3  | MGI:1329045 |
| ENSMUST000000178727 | 10 | 0  | 0 Gm21992  | predicted gene 21992  | MGI:5439461 |
| ENSMUST000000146053 | 9  | 32 | 0 Rad51d   | RAD51 paralog D   | MGI:1261809 |
| ENSMUST000000097999 | 9  | 23 | 0 Fam53b   | family with sequence similarity 53, member B  | MGI:1925188 |
| ENSMUST00000017783  | 9  | 16 | 0 Rab11fp4 | RAB11 family interacting protein 4 (class II)   | MGI:2442920 |



|                     |   |    |                 |   |             |
|---------------------|---|----|-----------------|---|-------------|
| ENSMUST00000079573  | 9 | 12 | 0 Itpr2         | inositol 1,4,5-triphosphate receptor 2  | MG1:99418   |
| ENSMUST000000182172 | 9 | 10 | 0 Ccdc166       | coiled-coil domain containing 166   | MG1:1925902 |
| ENSMUST000000057717 | 9 | 9  | 0 Zfp319        | zinc finger protein 319   | MG1:1890618 |
| ENSMUST000000097228 | 9 | 7  | 0 Dio3          | deiodinase, iodothyronine type III  | MG1:1306782 |
| ENSMUST000000160326 | 9 | 4  | 0 Usp7          | ubiquitin specific peptidase 7  | MG1:2182061 |
| ENSMUST000000057062 | 9 | 3  | 0 Brox          | BRO1 domain and CAAX motif containing   | MG1:1918928 |
| ENSMUST000000028981 | 9 | 0  | 16 Mapre1       | microtubule-associated protein, RP/EB family, member 1                                  | MG1:891995  |
| ENSMUST000000046587 | 9 | 0  | 0 Scamp5        | secretory carrier membrane protein 5  | MG1:1928948 |
| ENSMUST000000133438 | 9 | 0  | 0 Pithd1        | PITH (C-terminal proteasome-interacting domain of thioredoxin-like) domain containing 1 | MG1:1913443 |
| ENSMUST000000147380 | 8 | 14 | 0 Ccna2         | cyclin A2   | MG1:108069  |
| ENSMUST000000075869 | 8 | 8  | 0 Fbxo40        | F-box protein 40  | MG1:2443753 |
| ENSMUST000000146673 | 8 | 8  | 0 Gm16314       | predicted gene 16314  | MG1:3833934 |
| ENSMUST000000002305 | 8 | 4  | 0 Kdm7a         | lysine (K)-specific demethylase 7A  | MG1:2443388 |
| ENSMUST000000055241 | 8 | 0  | 0 Zfp106        | zinc finger protein 106   | MG1:1270153 |
| ENSMUST000000133397 | 8 | 0  | 0 Bcl2l2        | BCL2-like 2   | MG1:108052  |
| ENSMUST000000155555 | 8 | 0  | 0 Gabpb2        | GA repeat binding protein, beta 2   | MG1:95612   |
| ENSMUST000000127287 | 7 | 16 | 0 Nrras         | negative regulator of reactive oxygen species   | MG1:2445095 |
| ENSMUST000000109936 | 7 | 15 | 0 Clmn          | calmin  | MG1:2136957 |
| ENSMUST000000001562 | 7 | 13 | 0 Tulp3         | tubby-like protein 3  | MG1:1329045 |
| ENSMUST000000030464 | 7 | 13 | 0 Pik3r3        | phosphatidylinositol 3 kinase, regulatory subunit, polypeptide 3 (p55)                  | MG1:109277  |
| ENSMUST00000016088  | 7 | 10 | 0 Gatsl2        | GATS protein-like 2   | MG1:1933384 |
| ENSMUST000000150733 | 7 | 9  | 0 Tbc1d14       | TBC1 domain family, member 14   | MG1:1098708 |
| ENSMUST000000150862 | 7 | 7  | 0 Dpy19l3       | dpy-19-like 3 (C. elegans)  | MG1:2443952 |
| ENSMUST000000018727 | 7 | 6  | 0 G3bp1         | GTPase activating protein (SH3 domain) binding protein 1                                | MG1:1351465 |
| ENSMUST000000033074 | 7 | 6  | 0 Vkorc1        | vitamin K epoxide reductase complex, subunit 1  | MG1:106442  |
| ENSMUST000000058383 | 7 | 6  | 0 Paip2b        | poly(A) binding protein interacting protein 2B  | MG1:2386865 |
| ENSMUST000000132747 | 7 | 5  | 0 Ndufv1        | NADH dehydrogenase (ubiquinone) flavoprotein 1  | MG1:107851  |
| ENSMUST000000070681 | 7 | 4  | 0 Gid4          | GID complex subunit 4, VID24 homolog  | MG1:1914021 |
| ENSMUST000000049032 | 7 | 0  | 0 Gmeb2         | glucocorticoid modulatory element binding protein 2                                     | MG1:2652836 |
| ENSMUST000000077783 | 7 | 0  | 0 0610030E20Rik | RIKEN cDNA 0610030E20 gene  | MG1:1915614 |
| ENSMUST000000079413 | 7 | 0  | 0 Fkbp5         | FK506 binding protein 5   | MG1:104670  |
| ENSMUST000000101347 | 7 | 0  | 0 Mat2b         | methionine adenosyltransferase II, beta   | MG1:1913667 |
| ENSMUST000000107415 | 7 | 0  | 0 Zfp618        | zinc finger protein 618   | MG1:1919950 |
| ENSMUST000000129533 | 7 | 0  | 0 Sub1          | SUB1 homolog (S. cerevisiae)  | MG1:104811  |
| ENSMUST000000147022 | 7 | 0  | 0 Zfp687        | zinc finger protein 687   | MG1:1925516 |
| ENSMUST000000162654 | 7 | 0  | 0 Dars2         | aspartyl-tRNA synthetase 2 (mitochondrial)  | MG1:2442510 |
| ENSMUST000000163844 | 7 | 0  | 0 Ctnnb1        | catenin (cadherin associated protein), beta 1   | MG1:88276   |
| ENSMUST000000100857 | 7 | 17 | 0 Dusp16        | dual specificity phosphatase 16   | MG1:1917936 |
| ENSMUST000000070673 | 7 | 16 | 0 Rab31         | RAB31, member RAS oncogene family   | MG1:1914603 |
| ENSMUST000000035007 | 7 | 15 | 0 Cmtm6         | CKLF-like MARVEL transmembrane domain containing 6                                      | MG1:2447165 |
| ENSMUST000000037915 | 7 | 15 | 0 Msl1          | male-specific lethal 1 homolog (Drosophila)   | MG1:1921276 |
| ENSMUST000000049020 | 7 | 13 | 0 Irgq          | immunity-related GTPase family, Q   | MG1:2667176 |
| ENSMUST000000035220 | 7 | 7  | 0 Prkar2a       | protein kinase, cAMP dependent regulatory, type II alpha                                | MG1:108025  |
| ENSMUST000000137671 | 7 | 5  | 0 AA415398      | expressed sequence AA415398   | MG1:3035485 |
| ENSMUST000000097888 | 7 | 5  | 0 Ago1          | argonaute RISC catalytic subunit 1  | MG1:2446630 |
| ENSMUST000000177125 | 7 | 4  | 12 Fam107b      | family with sequence similarity 107, member B   | MG1:1913790 |
| ENSMUST000000125049 | 7 | 4  | 0 Stard7        | START domain containing 7   | MG1:2139090 |
| ENSMUST000000156138 | 7 | 0  | 57 Dnal1        | dynein, axonemal, light chain 1   | MG1:1921462 |
| ENSMUST000000021666 | 7 | 0  | 0 Abcd4         | ATP-binding cassette, sub-family D (ALD), member 4                                      | MG1:1349217 |
| ENSMUST000000034385 | 7 | 0  | 0 Has3          | hyaluronan synthase 3   | MG1:109599  |
| ENSMUST000000064571 | 7 | 0  | 0 Afap1         | actin filament associated protein 1   | MG1:1917542 |
| ENSMUST000000065482 | 7 | 0  | 0 Mllt11        | myeloid/lymphoid or mixed-lineage leukemia; translocated to, 11                         | MG1:1929671 |
| ENSMUST000000114754 | 7 | 0  | 0 Mapk14        | mitogen-activated protein kinase 14   | MG1:1346865 |
| ENSMUST000000135515 | 7 | 0  | 0 Fam195b       | family with sequence similarity 195, member B   | MG1:2384752 |
| ENSMUST000000147875 | 7 | 0  | 0 Lym9          | LYR motif containing 9  | MG1:1913524 |
| ENSMUST000000156898 | 7 | 0  | 0 Arpc4         | actin related protein 2/3 complex, subunit 4  | MG1:1915339 |
| ENSMUST000000165628 | 7 | 0  | 0 Taf5l         | TATA-box binding protein associated factor 5 like                                       | MG1:1919039 |
| ENSMUST000000027629 | 6 | 10 | 0 Tfcp2l1       | transcription factor CP2-like 1   | MG1:2444691 |
| ENSMUST000000063976 | 6 | 9  | 0 Opa3          | optic atrophy 3   | MG1:2686271 |
| ENSMUST000000123831 | 6 | 8  | 0 Gga3          | golgi associated, gamma adaptin ear containing, ARF binding protein 3                   | MG1:2384159 |
| ENSMUST000000124678 | 6 | 8  | 0 Mlec          | malectin  | MG1:1924015 |

|                     |   |    |                 |   |             |
|---------------------|---|----|-----------------|---|-------------|
| ENSMUST00000033341  | 6 | 6  | 0 Tub           | tubby candidate gene  | MGI:2651573 |
| ENSMUST00000042025  | 6 | 6  | 0 Antxr1        | anthrax toxin receptor 1  | MGI:1916788 |
| ENSMUST00000045153  | 6 | 5  | 0 Pik3ip1       | phosphoinositide-3-kinase interacting protein 1                                     | MGI:1917016 |
| ENSMUST00000062357  | 6 | 5  | 0 4930539E08Rik | RIKEN cDNA 4930539E08 gene  | MGI:1925441 |
| ENSMUST00000019660  | 6 | 4  | 0 Zkscan1       | zinc finger with KRAB and SCAN domains 1  | MGI:1921820 |
| ENSMUST00000043616  | 6 | 4  | 0 Zyg11b        | zyg-II family member B, cell cycle regulator  | MGI:2685277 |
| ENSMUST00000001240  | 6 | 0  | 0 Agpat3        | 1-acylglycerol-3-phosphate O-acyltransferase 3                                      | MGI:1336186 |
| ENSMUST00000022535  | 6 | 0  | 0 Dcp1a         | decapping mRNA 1A   | MGI:1923151 |
| ENSMUST00000026624  | 6 | 0  | 0 Tm9sf2        | transmembrane 9 superfamily member 2  | MGI:1915309 |
| ENSMUST00000027766  | 6 | 0  | 0 Coq8a         | coenzyme Q8A  | MGI:1914676 |
| ENSMUST00000028914  | 6 | 0  | 0 Polr3f        | polymerase (RNA) III (DNA directed) polypeptide F                                   | MGI:1924086 |
| ENSMUST00000029217  | 6 | 0  | 0 Ndufb5        | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 5                                | MGI:1913296 |
| ENSMUST00000029783  | 6 | 0  | 0 Snx27         | sorting nexin family member 27  | MGI:1923992 |
| ENSMUST00000030243  | 6 | 0  | 0 Prkaa2        | protein kinase, AMP-activated, alpha 2 catalytic subunit                            | MGI:1336173 |
| ENSMUST00000031628  | 6 | 0  | 0 Ptccl         | pentatricopeptide repeat domain 1   | MGI:1919049 |
| ENSMUST00000048359  | 6 | 0  | 0 Tango6        | transport and golgi organization 6  | MGI:2142786 |
| ENSMUST00000090300  | 6 | 0  | 0 Marf1         | meiosis arrest female 1   | MGI:2444505 |
| ENSMUST000000105256 | 6 | 0  | 0 Ctdsp2        | CTD (carboxy-terminal domain, RNA polymerase II, polypeptide A) small phosphatase 2 | MGI:1098748 |
| ENSMUST000000107405 | 6 | 0  | 0 Adar          | adenosine deaminase, RNA-specific   | MGI:1889575 |
| ENSMUST000000114397 | 6 | 0  | 0 Whsc1         | Wolf-Hirschhorn syndrome candidate 1 (human)  | MGI:1276574 |
| ENSMUST000000125624 | 6 | 0  | 0 Ino80e        | INO80 complex subunit E   | MGI:2141881 |
| ENSMUST000000127939 | 6 | 0  | 0 Rnf114        | ring finger protein 114   | MGI:1933159 |
| ENSMUST000000131308 | 6 | 0  | 0 Xrcc2         | X-ray repair complementing defective repair in Chinese hamster cells 2              | MGI:1927345 |
| ENSMUST000000139073 | 6 | 0  | 0 Ddx56         | DEAD (Asp-Glu-Ala-Asp) box polypeptide 56   | MGI:1277172 |
| ENSMUST000000141645 | 6 | 0  | 0 Gabpb2        | GA repeat binding protein, beta 2   | MGI:95612   |
| ENSMUST000000147545 | 6 | 0  | 0 Ccdc6         | coiled-coil domain containing 6   | MGI:1923801 |
| ENSMUST000000160301 | 6 | 0  | 0 Ciapin1       | cytokine induced apoptosis inhibitor 1  | MGI:1922083 |
| ENSMUST000000161075 | 6 | 0  | 0 Desi2         | desumoylating isopeptidase 2  | MGI:1926075 |
| ENSMUST00000030849  | 5 | 25 | 0 Fam126a       | family with sequence similarity 126, member A                                       | MGI:2149839 |
| ENSMUST00000046929  | 5 | 14 | 0 Usp31         | ubiquitin specific peptidase 31   | MGI:1923429 |
| ENSMUST000000152080 | 5 | 14 | 0 Slc35e1       | solute carrier family 35, member E1   | MGI:2142403 |
| ENSMUST00000095254  | 5 | 13 | 0 Tom1l2        | target of myb1-like 2 (chicken)   | MGI:2443306 |
| ENSMUST000000103114 | 5 | 12 | 0 Stat3         | signal transducer and activator of transcription 3                                  | MGI:103038  |
| ENSMUST000000135589 | 5 | 11 | 0 Lpin2         | lipin 2   | MGI:1891341 |
| ENSMUST000000107894 | 5 | 10 | 0 Dgke          | diacylglycerol kinase, epsilon  | MGI:1889276 |
| ENSMUST000000179332 | 5 | 9  | 0 5730455P16Rik | RIKEN cDNA 5730455P16 gene  | MGI:1917841 |
| ENSMUST000000156725 | 5 | 7  | 0 Fbxl18        | F-box and leucine-rich repeat protein 18  | MGI:2444450 |
| ENSMUST000000129021 | 5 | 6  | 0 Aptx          | aprataxin   | MGI:1913658 |
| ENSMUST00000004097  | 5 | 5  | 77 Cux1         | cut-like homeobox 1   | MGI:88568   |
| ENSMUST000000114225 | 5 | 5  | 0 Gng12         | guanine nucleotide binding protein (G protein), gamma 12                            | MGI:1336171 |
| ENSMUST000000182743 | 5 | 5  | 0 Psmg3         | proteasome (prosome, macropain) assembly chaperone 3                                | MGI:1913756 |
| ENSMUST00000048565  | 5 | 5  | 0 Trim60        | tripartite motif-containing 60  | MGI:2387430 |
| ENSMUST00000055485  | 5 | 5  | 0 Lsm14b        | LSM family member 14B   | MGI:3040677 |
| ENSMUST00000072837  | 5 | 5  | 0 Foxk1         | forkhead box K1   | MGI:1347488 |
| ENSMUST000000171292 | 5 | 5  | 0 Ralgps2       | Ral GEF with PH domain and SH3 binding motif 2                                      | MGI:1925505 |
| ENSMUST000000179474 | 5 | 5  | 0 Fam160a2      | family with sequence similarity 160, member A2                                      | MGI:1921599 |
| ENSMUST00000077078  | 5 | 4  | 0 Rnf185        | ring finger protein 185   | MGI:1922078 |
| ENSMUST00000078800  | 5 | 4  | 0 NfyA          | nuclear transcription factor-Y alpha  | MGI:97316   |
| ENSMUST00000002145  | 5 | 0  | 0 Hsf2bp        | heat shock transcription factor 2 binding protein                                   | MGI:1921627 |
| ENSMUST00000020630  | 5 | 0  | 0 Hspa4         | heat shock protein 4  | MGI:1342292 |
| ENSMUST000000021800 | 5 | 0  | 0 Mcur1         | mitochondrial calcium uniporter regulator 1   | MGI:1923387 |
| ENSMUST00000022916  | 5 | 0  | 0 Lrp12         | low density lipoprotein-related protein 12  | MGI:2443132 |
| ENSMUST00000026862  | 5 | 0  | 0 Larp1b        | La ribonucleoprotein domain family, member 1B                                       | MGI:1914604 |
| ENSMUST00000027505  | 5 | 0  | 0 Ing5          | inhibitor of growth family, member 5  | MGI:1922816 |
| ENSMUST00000028102  | 5 | 0  | 0 Kif5c         | kinesin family member 5C  | MGI:1098269 |
| ENSMUST00000031531  | 5 | 0  | 0 Psmg3         | proteasome (prosome, macropain) assembly chaperone 3                                | MGI:1913756 |
| ENSMUST00000034377  | 5 | 0  | 0 Pla2g15       | phospholipase A2, group XV  | MGI:2178076 |
| ENSMUST00000034775  | 5 | 0  | 0 Fem1b         | feminization 1 homolog b (C. elegans)   | MGI:1335087 |
| ENSMUST00000036691  | 5 | 0  | 0 Prcc2b        | proline-rich coiled-coil 2B   | MGI:1923304 |
| ENSMUST00000037299  | 5 | 0  | 0 Ythdf1        | YTH domain family 1   | MGI:1917431 |
| ENSMUST00000042503  | 5 | 0  | 0 Usp6nl        | USP6 N-terminal like  | MGI:2138893 |

|                    |   |    |     |               |   |             |
|--------------------|---|----|-----|---------------|---|-------------|
| ENSMUST00000044009 | 5 | 0  | 0   | Camk1d        | calcium/calmodulin-dependent protein kinase ID                      | MG1:2442190 |
| ENSMUST00000045923 | 5 | 0  | 0   | Limd2         | LIM domain containing 2   | MG1:1915053 |
| ENSMUST00000047835 | 5 | 0  | 0   | Scaf11        | SR-related CTD-associated factor 11                                 | MG1:1919443 |
| ENSMUST00000050125 | 5 | 0  | 0   | 2900026A02Rik | RIKEN cDNA 2900026A02 gene  | MG1:1920194 |
| ENSMUST00000059372 | 5 | 0  | 0   | Rnf24         | ring finger protein 24  | MG1:1261771 |
| ENSMUST00000061457 | 5 | 0  | 0   | Csmp2         | cysteine-serine-rich nuclear protein 2                              | MG1:2386852 |
| ENSMUST00000062117 | 5 | 0  | 0   | Rap2a         | RAS related protein 2a  | MG1:97855   |
| ENSMUST00000067744 | 5 | 0  | 0   | Cggbp1        | CGG triplet repeat binding protein 1                                | MG1:2146370 |
| ENSMUST00000074991 | 5 | 0  | 0   | Tmem184b      | transmembrane protein 184b  | MG1:2445179 |
| ENSMUST00000075159 | 5 | 0  | 0   | Clock         | circadian locomotor output cycles kaput                             | MG1:99698   |
| ENSMUST00000077737 | 5 | 0  | 0   | Brd3          | bromodomain containing 3  | MG1:1914632 |
| ENSMUST00000102590 | 5 | 0  | 0   | Kpna6         | karyopherin (importin) alpha 6                                      | MG1:1100836 |
| ENSMUST00000106617 | 5 | 0  | 0   | Cpsf4l        | cleavage and polyadenylation specific factor 4-like                 | MG1:1277182 |
| ENSMUST00000111171 | 5 | 0  | 0   | Pom121        | nuclear pore membrane protein 121                                   | MG1:2137624 |
| ENSMUST00000111417 | 5 | 0  | 0   | Zfp664        | zinc finger protein 664   | MG1:2442505 |
| ENSMUST00000113829 | 5 | 0  | 0   | Brwd1         | bromodomain and WD repeat domain containing 1                       | MG1:1890651 |
| ENSMUST00000114855 | 5 | 0  | 0   | Hipk2         | homeodomain interacting protein kinase 2                            | MG1:1314872 |
| ENSMUST00000118286 | 5 | 0  | 0   | Mfn1          | mitofusin 1   | MG1:1914664 |
| ENSMUST00000119166 | 5 | 0  | 0   | Zcchc2        | zinc finger, CCHC domain containing 2                               | MG1:2444114 |
| ENSMUST00000120129 | 5 | 0  | 0   | Prr14l        | proline rich 14-like  | MG1:2443658 |
| ENSMUST00000127569 | 5 | 0  | 0   | Usp3          | ubiquitin specific peptidase 3                                      | MG1:2152450 |
| ENSMUST00000128674 | 5 | 0  | 0   | Nacc2         | nucleus accumbens associated 2, BEN and BTB (POZ) domain containing | MG1:1915241 |
| ENSMUST00000133492 | 5 | 0  | 0   | Iqsec1        | IQ motif and Sec7 domain 1  | MG1:1196356 |
| ENSMUST00000135013 | 5 | 0  | 0   | Poldip3       | polymerase (DNA-directed), delta interacting protein 3              | MG1:1921076 |
| ENSMUST00000143720 | 5 | 0  | 0   | Akap1         | A kinase (PRKA) anchor protein 1                                    | MG1:104729  |
| ENSMUST00000144726 | 5 | 0  | 0   | Haus8         | 4HAUS augmin-like complex, subunit 8                                | MG1:1923728 |
| ENSMUST00000146903 | 5 | 0  | 0   | Sympk         | symplekin   | MG1:1915438 |
| ENSMUST00000147695 | 5 | 0  | 0   | Lonrf2        | LON peptidase N-terminal domain and ring finger 2                   | MG1:1920209 |
| ENSMUST00000153143 | 5 | 0  | 0   | Tftpt         | TCF3 (E2A) fusion partner   | MG1:1916964 |
| ENSMUST00000156708 | 5 | 0  | 0   | Ccdc186       | coiled-coil domain containing 186                                   | MG1:2445022 |
| ENSMUST00000156711 | 5 | 0  | 0   | Tor1b         | torsin family 1, member B   | MG1:1353605 |
| ENSMUST00000156847 | 5 | 0  | 0   | Mtx1          | metaxin 1   | MG1:103025  |
| ENSMUST00000176663 | 5 | 0  | 0   | Sik2          | salt inducible kinase 2   | MG1:2445031 |
| ENSMUST00000184105 | 5 | 0  | 0   | Pank2         | pantothenate kinase 2   | MG1:1921700 |
| ENSMUST00000028279 | 4 | 24 | 75  | Strbp         | spermatid perinuclear RNA binding protein                           | MG1:104626  |
| ENSMUST00000079681 | 4 | 20 | 0   | Cyb5d2        | cytochrome b5 domain containing 2                                   | MG1:2684848 |
| ENSMUST00000074846 | 4 | 19 | 0   | Hsph1         | heat shock 105kDa/110kDa protein 1                                  | MG1:105053  |
| ENSMUST00000107717 | 4 | 17 | 246 | Zfp652        | zinc finger protein 652   | MG1:2442221 |
| ENSMUST00000054145 | 4 | 14 | 0   | Dcaf5         | DDB1 and CUL4 associated factor 5                                   | MG1:2444785 |
| ENSMUST00000160209 | 4 | 14 | 0   | Cfap206       | cilia and flagella associated protein 206                           | MG1:1916579 |
| ENSMUST00000040241 | 4 | 10 | 32  | Ddx19b        | DEAD (Asp-Glu-Ala-Asp) box polypeptide 19b                          | MG1:2148251 |
| ENSMUST00000074515 | 4 | 10 | 0   | Rflf          | ring finger and FYVE like domain containing protein                 | MG1:1914588 |
| ENSMUST00000072727 | 4 | 9  | 0   | Nap1l4        | nucleosome assembly protein 1-like 4                                | MG1:1316687 |
| ENSMUST00000049156 | 4 | 8  | 0   | Tlhc1         | TBC/LysM associated domain containing 1                             | MG1:1921597 |
| ENSMUST00000032124 | 4 | 7  | 0   | Mrpl19        | mitochondrial ribosomal protein L19                                 | MG1:1926274 |
| ENSMUST00000105492 | 4 | 7  | 0   | Rtn4ip1       | reticulum 4 interacting protein 1                                   | MG1:2178759 |
| ENSMUST00000179163 | 4 | 7  | 0   | Mlst8         | MTOR associated protein, LST8 homolog (S. cerevisiae)               | MG1:1929514 |
| ENSMUST00000115403 | 4 | 5  | 0   | Slco5a1       | solute carrier organic anion transporter family, member 5A1         | MG1:2443431 |
| ENSMUST00000145309 | 4 | 5  | 0   | Ccna2         | cyclin A2   | MG1:108069  |
| ENSMUST00000154507 | 4 | 5  | 0   | Lpin2         | lipin 2   | MG1:1891341 |
| ENSMUST00000135961 | 4 | 5  | 0   | Mlxip         | MLX interacting protein   | MG1:2141183 |
| ENSMUST00000060537 | 4 | 0  | 20  | Kif1b         | kinesin family member 1B  | MG1:108426  |
| ENSMUST00000114884 | 4 | 0  | 14  | Rbm33         | RNA binding motif protein 33  | MG1:1919670 |
| ENSMUST00000137494 | 1 | 0  | 6   | Cwc22         | CWC22 spliceosome-associated protein                                | MG1:2136773 |
| ENSMUST00000111427 | 0 | 22 | 0   | Pou2f1        | POU domain, class 2, transcription factor 1                         | MG1:101898  |
| ENSMUST00000069097 | 0 | 18 | 0   | Ago3          | argonaute RISC catalytic subunit 3                                  | MG1:2446634 |
| ENSMUST00000132654 | 0 | 18 | 0   | Rcan3         | regulator of calcineurin 3  | MG1:1858220 |
| ENSMUST00000061455 | 0 | 14 | 0   | Fam46c        | family with sequence similarity 46, member C                        | MG1:1921895 |
| ENSMUST00000081619 | 0 | 14 | 0   | Sh3pxd2a      | SH3 and PX domains 2A   | MG1:1298393 |
| ENSMUST00000105911 | 0 | 12 | 0   | Gpr3          | G-protein coupled receptor 3  | MG1:101908  |
| ENSMUST00000135469 | 0 | 12 | 0   | Zak           | sterile alpha motif and leucine zipper containing kinase AZK        | MG1:2443258 |

|                      |   |    |    |             |   |             |
|----------------------|---|----|----|-------------|---|-------------|
| ENSMUST00000036570   | 0 | 11 | 0  | Appl1       | adaptor protein, phosphotyrosine interaction, PH domain and leucine zipper containing 1 | MG1:1920243 |
| ENSMUST00000017908   | 0 | 10 | 0  | Zswim1      | zinc finger SWIM-type containing 1  | MG1:1919221 |
| ENSMUST000000021817  | 0 | 10 | 0  | lppk        | inositol 1,3,4,5,6-pentakisphosphate 2-kinase   | MG1:1922928 |
| ENSMUST000000067918  | 0 | 10 | 0  | Ppm1h       | protein phosphatase 1H (PP2C domain containing)   | MG1:2442087 |
| ENSMUST000000115105  | 0 | 10 | 0  | Rubcn       | RUN domain and cysteine-rich domain containing, Beclin 1-interacting protein            | MG1:1915160 |
| ENSMUST000000119928  | 0 | 10 | 0  | Luc7l       | Luc7-like   | MG1:1914228 |
| ENSMUST000000154881  | 0 | 10 | 0  | Ino80e      | INO80 complex subunit E   | MG1:2141881 |
| ENSMUST000000002172  | 0 | 9  | 0  | Acp2        | acid phosphatase 2, lysosomal   | MG1:87882   |
| ENSMUST000000060762  | 0 | 9  | 0  | Zfp397      | zinc finger protein 397   | MG1:1916506 |
| ENSMUST000000058735  | 0 | 9  | 0  | Ubqln1      | ubiquilin 1   | MG1:1860276 |
| ENSMUST000000103191  | 0 | 9  | 0  | Rpl22       | ribosomal protein L22   | MG1:99262   |
| ENSMUST000000147755  | 0 | 9  | 0  | Rapgef1     | Rap guanine nucleotide exchange factor (GEF) 1  | MG1:104580  |
| ENSMUST000000169020  | 0 | 9  | 0  | Glg1        | golgi apparatus protein 1   | MG1:104967  |
| ENSMUST000000174734  | 0 | 9  | 0  | Kmt2c       | lysine (K)-specific methyltransferase 2C  | MG1:2444959 |
| ENSMUST000000113975  | 0 | 8  | 12 | Slc5a3      | solute carrier family 5 (inositol transporters), member 3                               | MG1:1858226 |
| ENSMUST000000046386  | 0 | 8  | 0  | Zcchc14     | zinc finger, CCHC domain containing 14  | MG1:2159407 |
| ENSMUST000000110208  | 0 | 8  | 0  | Ap5s1       | adaptor-related protein 5 complex, sigma 1 subunit                                      | MG1:1916846 |
| ENSMUST000000154541  | 0 | 7  | 22 | Vcp         | valosin containing protein  | MG1:99919   |
| ENSMUST000000034469  | 0 | 7  | 0  | Egln1       | egl-9 family hypoxia-inducible factor 1   | MG1:1932286 |
| ENSMUST000000042732  | 0 | 7  | 0  | Fbxo45      | F-box protein 45  | MG1:2447775 |
| ENSMUST000000044058  | 0 | 7  | 0  | Mul1        | mitochondrial ubiquitin ligase activator of NFKB 1                                      | MG1:1915600 |
| ENSMUST0000000081291 | 0 | 7  | 0  | Cyhr1       | cysteine and histidine rich 1   | MG1:1859320 |
| ENSMUST000000150088  | 0 | 7  | 0  | D5Erttd579e | DNA segment, Chr 5, ERATO Doi 579, expressed  | MG1:1261849 |
| ENSMUST000000156194  | 0 | 7  | 0  | Tfpt        | TCF3 (E2A) fusion partner   | MG1:1916964 |
| ENSMUST000000020830  | 0 | 7  | 0  | Mfap3       | microfibrillar-associated protein 3   | MG1:1924068 |
| ENSMUST000000022544  | 0 | 7  | 0  | Hmbox1      | homeobox containing 1   | MG1:2445066 |
| ENSMUST000000025983  | 0 | 7  | 0  | Ccnj        | cyclin J  | MG1:2443297 |
| ENSMUST000000032185  | 0 | 7  | 0  | Slc6a6      | solute carrier family 6 (neurotransmitter transporter, taurine), member 6               | MG1:98488   |
| ENSMUST000000056336  | 0 | 7  | 0  | Oprd1       | opioid receptor, delta 1  | MG1:97438   |
| ENSMUST000000149847  | 0 | 7  | 0  | Slc12a9     | solute carrier family 12 (potassium/chloride transporters), member 9                    | MG1:1933532 |
| ENSMUST000000150552  | 0 | 7  | 0  | Zfp512b     | zinc finger protein 512B  | MG1:2685478 |
| ENSMUST000000159592  | 0 | 7  | 0  | Ssh1        | slingshot homolog 1 (Drosophila)  | MG1:2686240 |
| ENSMUST000000174300  | 0 | 7  | 0  | Yap1        | yes-associated protein 1  | MG1:103262  |
| ENSMUST000000175816  | 0 | 7  | 0  | Usp2        | ubiquitin specific peptidase 2  | MG1:1858178 |
| ENSMUST0000000021971 | 0 | 6  | 0  | Slc25a48    | solute carrier family 25, member 48   | MG1:2145373 |
| ENSMUST0000000030190 | 0 | 6  | 0  | Rgp1        | RAB6A GEF complex partner 1   | MG1:1915956 |
| ENSMUST000000044622  | 0 | 6  | 0  | Epg5        | ectopic P-granules autophagy protein 5 homolog (C. elegans)                             | MG1:1918673 |
| ENSMUST000000105963  | 0 | 6  | 0  | Taf12       | TATA-box binding protein associated factor 12   | MG1:1913714 |
| ENSMUST000000126017  | 0 | 6  | 0  | Cenpo       | centromere protein O  | MG1:1923800 |
| ENSMUST000000132383  | 0 | 6  | 0  | D5Erttd579e | DNA segment, Chr 5, ERATO Doi 579, expressed  | MG1:1261849 |
| ENSMUST000000137009  | 0 | 6  | 0  | Polr3c      | polymerase (RNA) III (DNA directed) polypeptide C                                       | MG1:1921664 |
| ENSMUST000000137140  | 0 | 6  | 0  | Unc119b     | unc-119 lipid binding chaperone B   | MG1:2147162 |
| ENSMUST000000142131  | 0 | 6  | 0  | Surf6       | surfeit gene 6  | MG1:98447   |
| ENSMUST000000149964  | 0 | 6  | 0  | Kcnq2       | potassium voltage-gated channel, subfamily Q, member 2                                  | MG1:1309503 |
| ENSMUST000000174096  | 0 | 6  | 0  | Calu        | calumenin   | MG1:1097158 |
| ENSMUST000000002487  | 0 | 5  | 36 | Braf        | Braf transforming gene  | MG1:88190   |
| ENSMUST000000163139  | 0 | 5  | 14 | Plxna1      | plexin A1   | MG1:107685  |
| ENSMUST0000000002891 | 0 | 5  | 0  | Top3a       | topoisomerase (DNA) III alpha   | MG1:1197527 |
| ENSMUST000000033665  | 0 | 5  | 0  | Map3k15     | mitogen-activated protein kinase kinase kinase 15                                       | MG1:2448588 |
| ENSMUST000000034441  | 0 | 5  | 0  | Aars        | alanyl-tRNA synthetase  | MG1:2384560 |
| ENSMUST0000000044711 | 0 | 5  | 0  | Snx22       | sorting nexin 22  | MG1:2685966 |
| ENSMUST0000000051377 | 0 | 5  | 0  | Dpy19l3     | dpy-19-like 3 (C. elegans)  | MG1:2443952 |
| ENSMUST000000054555  | 0 | 5  | 0  | Zfp41       | zinc finger protein 41  | MG1:99186   |
| ENSMUST0000000060253 | 0 | 5  | 0  | Fem1a       | feminization 1 homolog a (C. elegans)   | MG1:1335089 |
| ENSMUST000000110206  | 0 | 5  | 0  | Ap5s1       | adaptor-related protein 5 complex, sigma 1 subunit                                      | MG1:1916846 |
| ENSMUST000000110855  | 0 | 5  | 0  | Lpgat1      | lysophosphatidylglycerol acyltransferase 1  | MG1:2446186 |
| ENSMUST000000123915  | 0 | 5  | 0  | Prdx4       | peroxiredoxin 4   | MG1:1859815 |
| ENSMUST000000128665  | 0 | 5  | 0  | Surf1       | surfeit gene 1  | MG1:98443   |
| ENSMUST000000129129  | 0 | 5  | 0  | Gramd2      | GRAM domain containing 2  | MG1:3528937 |
| ENSMUST000000147471  | 0 | 5  | 0  | Psmid6      | proteasome (prosome, macropain) 26S subunit, non-ATPase, 6                              | MG1:1913663 |
| ENSMUST000000152285  | 0 | 5  | 0  | Zer1        | zyg-11 related, cell cycle regulator  | MG1:2442511 |

|                    |   |   |                 |   |             |
|--------------------|---|---|-----------------|---|-------------|
| ENSMUST00000172457 | 0 | 5 | 0 Rps15a        | ribosomal protein S15A  | MGi:2389091 |
| ENSMUST00000176035 | 0 | 5 | 0 Amz1          | archaelysin family metallopeptidase 1                             | MGi:2442258 |
| ENSMUST00000006625 | 0 | 5 | 0 Rbm14         | RNA binding motif protein 14                                      | MGi:1929092 |
| ENSMUST00000016672 | 0 | 5 | 0 Mapkapk2      | MAP kinase-activated protein kinase 2                             | MGi:109298  |
| ENSMUST00000020343 | 0 | 5 | 0 Rab21         | RAB21, member RAS oncogene family                                 | MGi:894308  |
| ENSMUST00000020804 | 0 | 5 | 0 Gdpd1         | glycerophosphodiester phosphodiesterase domain containing 1       | MGi:1913819 |
| ENSMUST00000023335 | 0 | 5 | 0 Nectin3       | nectin cell adhesion molecule 3                                   | MGi:1930171 |
| ENSMUST00000030284 | 0 | 5 | 0 Rnf11         | ring finger protein 11  | MGi:1352759 |
| ENSMUST00000035682 | 0 | 5 | 0 Ypel1         | yippee-like 1 (Drosophila)  | MGi:1913303 |
| ENSMUST00000038404 | 0 | 5 | 0 Ccno          | cyclin O  | MGi:2145534 |
| ENSMUST00000044730 | 0 | 5 | 0 Mllt6         | myeloid/lymphoid or mixed-lineage leukemia; translocated to, 6    | MGi:1935145 |
| ENSMUST00000044795 | 0 | 5 | 0 Nup133        | nucleoporin 133   | MGi:2442620 |
| ENSMUST00000048145 | 0 | 5 | 0 Rbfox2        | RNA binding protein, fox-1 homolog (C. elegans) 2                 | MGi:1933973 |
| ENSMUST00000064718 | 0 | 5 | 0 Phc3          | polyhomeotic-like 3 (Drosophila)                                  | MGi:2181434 |
| ENSMUST00000065601 | 0 | 5 | 0 Btrc          | beta-transducin repeat containing protein                         | MGi:1338871 |
| ENSMUST00000070173 | 0 | 5 | 0 Pgpep1        | pyroglutamyl-peptidase I  | MGi:1913772 |
| ENSMUST00000090433 | 0 | 5 | 0 Sec14l1       | SEC14-like lipid binding 1  | MGi:1921386 |
| ENSMUST00000106061 | 0 | 5 | 0 S100pbp       | S100P binding protein   | MGi:1921898 |
| ENSMUST00000107503 | 0 | 5 | 0 Syt11         | synaptotagmin XI  | MGi:1859547 |
| ENSMUST00000108862 | 0 | 5 | 0 Arfgap1       | ADP-ribosylation factor GTPase activating protein 1               | MGi:2183559 |
| ENSMUST00000109241 | 0 | 5 | 0 Snx18         | sorting nexin 18  | MGi:2137642 |
| ENSMUST00000115151 | 0 | 5 | 0 Ubxn7         | UBX domain protein 7  | MGi:2146388 |
| ENSMUST00000116286 | 0 | 5 | 0 Stk40         | serine/threonine kinase 40  | MGi:1921428 |
| ENSMUST00000117276 | 0 | 5 | 0 Slc39a3       | solute carrier family 39 (zinc transporter), member 3             | MGi:2147269 |
| ENSMUST00000127740 | 0 | 5 | 0 Dot1l         | DOT1-like, histone H3 methyltransferase (S. cerevisiae)           | MGi:2143886 |
| ENSMUST00000131487 | 0 | 5 | 0 Pogk          | pogo transposable element with KRAB domain                        | MGi:1918842 |
| ENSMUST00000135836 | 0 | 5 | 0 Nfe2l1        | nuclear factor, erythroid derived 2,-like 1                       | MGi:99421   |
| ENSMUST00000137459 | 0 | 5 | 0 Tcte2         | t-complex-associated testis expressed 2                           | MGi:98641   |
| ENSMUST00000141116 | 0 | 5 | 0 Taf10         | TATA-box binding protein associated factor 10                     | MGi:1346320 |
| ENSMUST00000142610 | 0 | 5 | 0 Lrrc14        | leucine rich repeat containing 14                                 | MGi:2445060 |
| ENSMUST00000146526 | 0 | 5 | 0 Gins2         | GIN5 complex subunit 2 (Psf2 homolog)                             | MGi:1921019 |
| ENSMUST00000147401 | 0 | 5 | 0 Prmt3         | protein arginine N-methyltransferase 3                            | MGi:1919224 |
| ENSMUST00000153713 | 0 | 5 | 0 6820408C15Rik | RIKEN cDNA 6820408C15 gene  | MGi:3045333 |
| ENSMUST00000154019 | 0 | 5 | 0 Rab3d         | RAB3D, member RAS oncogene family                                 | MGi:97844   |
| ENSMUST00000165258 | 0 | 5 | 0 Xpnpep3       | X-prolyl aminopeptidase 3, mitochondrial                          | MGi:2445217 |
| ENSMUST00000133412 | 0 | 4 | 26 Psmb4        | proteasome (prosome, macropain) subunit, beta type 4              | MGi:1098257 |
| ENSMUST00000065496 | 0 | 0 | 4310 Arhgap20   | Rho GTPase activating protein 20                                  | MGi:2445175 |
| ENSMUST00000040616 | 0 | 0 | 745 Kctd7       | potassium channel tetramerisation domain containing 7             | MGi:2442265 |
| ENSMUST00000053177 | 0 | 0 | 389 Wdfy3       | WD repeat and FYVE domain containing 3                            | MGi:1096875 |
| ENSMUST00000125595 | 0 | 0 | 133 Eri2        | exoribonuclease 2   | MGi:1918401 |
| ENSMUST00000142811 | 0 | 0 | 107 Mamdc4      | MAM domain containing 4   | MGi:2685841 |
| ENSMUST00000142917 | 0 | 0 | 105 Ptpg        | protein tyrosine phosphatase, receptor type, G                    | MGi:97814   |
| ENSMUST00000088592 | 0 | 0 | 44 Elnf2        | leucine rich repeat and fibronectin type III, extracellular 2     | MGi:3608416 |
| ENSMUST00000129854 | 0 | 0 | 44 Serinc3      | serine incorporator 3   | MGi:1349457 |
| ENSMUST00000149356 | 0 | 0 | 44 Kat7         | K(lysine) acetyltransferase 7                                     | MGi:2182799 |
| ENSMUST00000049584 | 0 | 0 | 42 Dnajc27      | DnaJ heat shock protein family (Hsp40) member C27                 | MGi:2443036 |
| ENSMUST00000173955 | 0 | 0 | 38 Wdfy3        | WD repeat and FYVE domain containing 3                            | MGi:1096875 |
| ENSMUST00000035911 | 0 | 0 | 36 Rc3h1        | RING CCCH (C3H) domains 1   | MGi:2685397 |
| ENSMUST00000001547 | 0 | 0 | 30 Col1a1       | collagen, type I, alpha 1   | MGi:88467   |
| ENSMUST00000018737 | 0 | 0 | 30 Sparc        | secreted acidic cysteine rich glycoprotein                        | MGi:98373   |
| ENSMUST00000064257 | 0 | 0 | 30 Tchh         | trichohyalin  | MGi:2177944 |
| ENSMUST00000094441 | 0 | 0 | 30 Tchp         | trichoplein, keratin filament binding                             | MGi:1925082 |
| ENSMUST00000049948 | 0 | 0 | 24 Asrgl1       | asparaginase like 1   | MGi:1913764 |
| ENSMUST00000142482 | 0 | 0 | 24 Dpm1         | dolichol-phosphate (beta-D) mannosyltransferase 1                 | MGi:1330239 |
| ENSMUST00000108433 | 0 | 0 | 22 Slc43a2      | solute carrier family 43, member 2                                | MGi:2442746 |
| ENSMUST00000030427 | 0 | 0 | 20 Tceb3        | transcription elongation factor B (SIII), polypeptide 3           | MGi:1351315 |
| ENSMUST00000033929 | 0 | 0 | 20 Tnks         | tankyrase, TRF1-interacting ankyrin-related ADP-ribose polymerase | MGi:1341087 |
| ENSMUST00000050000 | 0 | 0 | 18 Stxbp1       | syntaxin binding protein 1  | MGi:107363  |
| ENSMUST00000041616 | 0 | 0 | 16 Pdxk         | pyridoxal (pyridoxine, vitamin B6) kinase                         | MGi:1351869 |
| ENSMUST00000072460 | 0 | 0 | 16 Mef2a        | myocyte enhancer factor 2A  | MGi:99532   |
| ENSMUST00000019514 | 0 | 0 | 14 Calm3        | calmodulin 3  | MGi:103249  |

|                     |   |   |               |  |             |
|---------------------|---|---|---------------|--|-------------|
| ENSMUST00000023686  | 0 | 0 | 14 Tmem50b    | transmembrane protein 50B  | MGI:1925225 |
| ENSMUST00000044672  | 0 | 0 | 14 Cdk19      | cyclin-dependent kinase 19   | MGI:1925584 |
| ENSMUST000000123296 | 0 | 0 | 14 Ndufab1    | NADH dehydrogenase (ubiquinone) 1, alpha/beta subcomplex, 1  | MGI:1917566 |
| ENSMUST000000155203 | 0 | 0 | 14 Zbtb10     | zinc finger and BTB domain containing 10   | MGI:2139883 |
| ENSMUST000000173482 | 0 | 0 | 14 Sra1       | steroid receptor RNA activator 1   | MGI:1344414 |
| ENSMUST000000024660 | 0 | 0 | 12 Smoc2      | SPARC related modular calcium binding 2  | MGI:1929881 |
| ENSMUST000000034400 | 0 | 0 | 12 Cyb5b      | cytochrome b5 type B   | MGI:1913677 |
| ENSMUST000000035346 | 0 | 0 | 12 Nol4l      | nucleolar protein 4-like   | MGI:1918765 |
| ENSMUST000000038228 | 0 | 0 | 12 Tmx4       | thioredoxin-related transmembrane protein 4  | MGI:106558  |
| ENSMUST000000047425 | 0 | 0 | 12 Sntb2      | syntrophin, basic 2  | MGI:101771  |
| ENSMUST000000053666 | 0 | 0 | 12 Slc12a6    | solute carrier family 12, member 6   | MGI:2135960 |
| ENSMUST000000079545 | 0 | 0 | 12 St6galnac2 | ST6 (alpha-N-acetyl-neuraminy-2,3-beta-galactosyl-1,3)-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2 | MGI:107553  |
| ENSMUST000000102781 | 0 | 0 | 12 Jak1       | Janus kinase 1   | MGI:96628   |
| ENSMUST000000107937 | 0 | 0 | 12 Atp8b5     | ATPase, class I, type 8B, member 5   | MGI:2444287 |
| ENSMUST000000109790 | 0 | 0 | 12 Asxl1      | additional sex combs like 1  | MGI:2684063 |
| ENSMUST000000112272 | 0 | 0 | 12 Wnt5a      | wingless-type MMTV integration site family, member 5A  | MGI:98958   |
| ENSMUST000000115222 | 0 | 0 | 12 Zbtb44     | zinc finger and BTB domain containing 44   | MGI:1925123 |
| ENSMUST000000118544 | 0 | 0 | 12 Armt1      | acidic residue methyltransferase 1   | MGI:1920669 |
| ENSMUST000000123952 | 0 | 0 | 12 Cfap74     | cilia and flagella associated protein 74   | MGI:1917130 |
| ENSMUST000000129466 | 0 | 0 | 12 Tpm1       | tropomyosin 1, alpha   | MGI:98809   |
| ENSMUST000000133371 | 0 | 0 | 12 Stox1      | storkhead box 1  | MGI:2684909 |
| ENSMUST000000137090 | 0 | 0 | 12 Tmem234    | transmembrane protein 234  | MGI:1924049 |
| ENSMUST000000154774 | 0 | 0 | 12 Calr       | calreticulin   | MGI:88252   |
| ENSMUST000000159840 | 0 | 0 | 12 Kcnab2     | potassium voltage-gated channel, shaker-related subfamily, beta member 2                                     | MGI:109239  |
| ENSMUST000000165117 | 0 | 0 | 12 Cdk6       | cyclin-dependent kinase 6  | MGI:1277162 |
| ENSMUST000000167281 | 0 | 0 | 12 Serpinf1   | serine (or cysteine) peptidase inhibitor, clade F, member 1  | MGI:108080  |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

MGI database :<http://www.informatics.jax.org/>

**Supplemental Table 5. Protein coding gene transcripts with UTR region associated NRapiRNAs.****NRapiRNA reverse to 3'UTRs**

| Ensembl ID          | Normalized counts |        |       | Gene symbol | Annotation  | MGI ID      |
|---------------------|-------------------|--------|-------|-------------|---|-------------|
|                     | oocyte            | zygote | sperm |             |   |             |
| ENSMUST00000129522  | 46                | 49     | 400   | Zfp523      | zinc finger protein 523   | MGI:2687278 |
| ENSMUST00000140438  | 472               | 597    | 357   | Mrps25      | mitochondrial ribosomal protein S25   | MGI:1928140 |
| ENSMUST00000133371  | 0                 | 0      | 54    | Stox1       | storkhead box 1   | MGI:2684909 |
| ENSMUST00000098545  | 32                | 22     | 32    | Tlcd1       | TLC domain containing 1   | MGI:1915572 |
| ENSMUST00000161840  | 0                 | 0      | 30    | Pygl        | liver glycogen phosphorylase  | MGI:97829   |
| ENSMUST00000126970  | 0                 | 0      | 28    | Abcb9       | ATP-binding cassette, sub-family B (MDR/TAP), member 9                              | MGI:1861729 |
| ENSMUST00000028110  | 7                 | 6      | 26    | Spopl       | speckle-type POZ protein-like   | MGI:1924107 |
| ENSMUST00000128015  | 0                 | 0      | 16    | Plekha7     | pleckstrin homology domain containing, family G (with RhoGef domain) member 2       | MGI:2141874 |
| ENSMUST00000020496  | 0                 | 0      | 14    | Adarb1      | adenosine deaminase, RNA-specific, B1   | MGI:891999  |
| ENSMUST00000130125  | 0                 | 0      | 14    | Coro7       | coronin 7   | MGI:1926135 |
| ENSMUST00000053177  | 0                 | 0      | 12    | Wdfy3       | WD repeat and FYVE domain containing 3  | MGI:1096875 |
| ENSMUST00000121442  | 0                 | 0      | 12    | Iqcc        | IQ motif containing C   | MGI:2446212 |
| ENSMUST00000133157  | 0                 | 0      | 12    | Polr1e      | polymerase (RNA) I polypeptide E  | MGI:1929022 |
| ENSMUST00000044711  | 58                | 88     | 0     | Snx22       | sorting nexin 22  | MGI:2685966 |
| ENSMUST00000072777  | 82                | 74     | 0     | Hmga2       | high mobility group AT-hook 2   | MGI:101761  |
| ENSMUST00000145259  | 8                 | 32     | 0     | Ncapd2      | non-SMC condensin II complex, subunit H2  | MGI:1289164 |
| ENSMUST00000110613  | 13                | 29     | 0     | Serinc4     | serine incorporator 4   | MGI:2441842 |
| ENSMUST00000019722  | 23                | 21     | 0     | Ubxn6       | UBX domain protein 6  | MGI:1913780 |
| ENSMUST00000162587  | 12                | 21     | 0     | Bace1       | beta-site APP cleaving enzyme 1   | MGI:1346542 |
| ENSMUST00000153947  | 16                | 20     | 0     | Ubxn6       | UBX domain protein 6  | MGI:1913780 |
| ENSMUST00000019987  | 7                 | 11     | 0     | Traf3ip2    | TRAF3 interacting protein 2   | MGI:2143599 |
| ENSMUST00000137243  | 70                | 10     | 0     | Msto1       | misato 1, mitochondrial distribution and morphology regulator                       | MGI:2385175 |
| ENSMUST00000030471  | 10                | 9      | 0     | Lrrc41      | leucine rich repeat containing 41   | MGI:2441984 |
| ENSMUST00000126739  | 10                | 9      | 0     | Hjrp        | Holliday junction recognition protein   | MGI:2685821 |
| ENSMUST00000152277  | 0                 | 9      | 0     | Ddb2        | damage specific DNA binding protein 2   | MGI:1355314 |
| ENSMUST00000004646  | 4                 | 5      | 0     | Coro1c      | coronin, actin binding protein 1C   | MGI:1345964 |
| ENSMUST00000033662  | 0                 | 5      | 0     | Pdha1       | pyruvate dehydrogenase E1 alpha 1   | MGI:97532   |
| ENSMUST00000162512  | 10                | 4      | 0     | Gtpbp8      | GTP-binding protein 8 (putative)  | MGI:1913317 |
| ENSMUST00000112249  | 9                 | 4      | 0     | Cacna1d     | calcium channel, voltage-dependent, L type, alpha 1D subunit                        | MGI:88293   |
| ENSMUST00000117687  | 6                 | 4      | 0     | Ppp2r2b     | protein phosphatase 2, regulatory subunit B, beta                                   | MGI:1920180 |
| ENSMUST00000061013  | 4                 | 4      | 0     | Mroh2a      | maestro heat-like repeat family member 2A   | MGI:3705228 |
| ENSMUST000000091701 | 0                 | 4      | 0     | Hist1h3a    | histone cluster 1, H3a  | MGI:2668828 |
| ENSMUST00000106308  | 0                 | 4      | 0     | Dnah17      | dynein, axonemal, heavy chain 17  | MGI:1917176 |
| ENSMUST00000078218  | 0                 | 2      | 0     | Serhl       | serine hydrolase-like   | MGI:1890404 |
| ENSMUST00000131950  | 0                 | 1      | 0     | Sp110       | Sp110 nuclear body protein  | MGI:1923364 |
| ENSMUST00000159114  | 0                 | 1      | 0     | C130026I21R | RIKEN cDNA C130026I21 gene  | MGI:3612702 |
| ENSMUST00000108846  | 16                | 0      | 0     | Galnt10     | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 10 | MGI:1890480 |
| ENSMUST00000145781  | 10                | 0      | 0     | Lrrc45      | leucine rich repeat containing 45   | MGI:2387183 |
| ENSMUST00000021773  | 9                 | 0      | 0     | Gpld1       | glycosylphosphatidylinositol specific phospholipase D1                              | MGI:106604  |

|                     |   |   |                |   |             |
|---------------------|---|---|----------------|---|-------------|
| ENSMUST00000109207  | 7 | 0 | 0 Ube2v1       | ubiquitin-conjugating enzyme E2 variant 1                 | MGI:1913839 |
| ENSMUST00000162594  | 6 | 0 | 0 Bud31        | BUD31 homolog   | MGI:2141291 |
| ENSMUST00000000940  | 5 | 0 | 0 Nsun5        | NOL1/NOP2/Sun domain family, member 5                     | MGI:2140844 |
| ENSMUST000000034560 | 5 | 0 | 0 Ppp2r1b      | protein phosphatase 2, regulatory subunit A, beta         | MGI:1920949 |
| ENSMUST00000075724  | 5 | 0 | 0 Rfxank       | regulatory factor X-associated ankyrin-containing protein | MGI:1333865 |
| ENSMUST00000123788  | 5 | 0 | 0 Tmem216      | transmembrane protein 216                                 | MGI:1920020 |
| ENSMUST00000029738  | 4 | 0 | 0 Gpr89        | G protein-coupled receptor 89                             | MGI:1914799 |
| ENSMUST00000109539  | 4 | 0 | 0 Ahsa2        | AHA1, activator of heat shock protein ATPase 2            | MGI:1916133 |
| ENSMUST00000180697  | 4 | 0 | 0 E030030I06R1 | RIKEN cDNA E030030I06 gene                                | MGI:2442914 |
| ENSMUST00000161494  | 2 | 0 | 0 Glcci1       | glucocorticoid induced transcript 1                       | MGI:2179717 |
| ENSMUST00000113385  | 1 | 0 | 0 Sp140        | Sp140 nuclear body protein                                | MGI:3702467 |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

MGI database :<http://www.informatics.jax.org/>



**Supplemental Table 5. Protein coding gene transcripts with UTR region associated NRapiRNAs.**  
**NRapiRNA population sense to 5'UTR**

| Ensembl ID         | Normalized counts |        |       | Gene symbol | Annotation   | MGI ID      |
|--------------------|-------------------|--------|-------|-------------|--|-------------|
|                    | oocyte            | zygote | sperm |             |  |             |
| ENSMUST00000135020 | 5990              | 6985   | 5627  | Eif4a2      | eukaryotic translation initiation factor 4A2             | MGI:106906  |
| ENSMUST00000075453 | 2313              | 1522   | 6015  | Rpl21       | ribosomal protein L21                                    | MGI:1278340 |
| ENSMUST00000123183 | 2163              | 1687   | 797   | Rpl5        | ribosomal protein L5                                     | MGI:102854  |
| ENSMUST00000142269 | 876               | 654    | 492   | Rack1       | receptor for activated C kinase 1                        | MGI:101849  |
| ENSMUST00000157047 | 698               | 517    | 15195 | Ppan        | peter pan homolog (Drosophila)                           | MGI:2178445 |
| ENSMUST00000129311 | 320               | 244    | 872   | Rpl13       | ribosomal protein L13                                    | MGI:105922  |
| ENSMUST00000123529 | 104               | 57     | 52    | Vps25       | vacuolar protein sorting 25                              | MGI:106354  |
| ENSMUST00000116400 | 70                | 80     | 0     | Kansl2      | KAT8 regulatory NSL complex subunit 2                    | MGI:1916862 |
| ENSMUST00000133774 | 61                | 93     | 0     | Nsf         | N-ethylmaleimide sensitive fusion protein                | MGI:104560  |
| ENSMUST00000001927 | 60                | 29     | 476   | Ltbp1       | latent transforming growth factor beta binding protein 1 | MGI:109151  |
| ENSMUST00000140482 | 54                | 20     | 14    | Tbc1d20     | TBC1 domain family, member 20                            | MGI:1914481 |
| ENSMUST00000133791 | 52                | 55     | 0     | Lpcat1      | lysophosphatidylcholine acyltransferase 1                | MGI:2384812 |
| ENSMUST00000148060 | 51                | 48     | 0     | Ubfd1       | ubiquitin family domain containing 1                     | MGI:107301  |
| ENSMUST00000145978 | 51                | 35     | 0     | Ppm1f       | protein phosphatase 1F (PP2C domain containing)          | MGI:1918464 |
| ENSMUST00000148148 | 42                | 30     | 0     | Raver2      | ribonucleoprotein, PTB-binding 2                         | MGI:2443623 |
| ENSMUST00000176015 | 40                | 32     | 0     | Uchl1       | ubiquitin carboxy-terminal hydrolase L1                  | MGI:103149  |
| ENSMUST00000135398 | 38                | 28     | 0     | Adcy1       | adenylate cyclase 1                                      | MGI:99677   |
| ENSMUST00000143185 | 36                | 60     | 0     | Snx30       | sorting nexin family member 30                           | MGI:2443882 |
| ENSMUST00000162573 | 33                | 18     | 0     | Mff         | mitochondrial fission factor                             | MGI:1922984 |
| ENSMUST00000058135 | 33                | 18     | 22    | Gm527       | predicted gene 527                                       | MGI:2685373 |
| ENSMUST00000155732 | 32                | 37     | 0     | Zfp369      | zinc finger protein 369                                  | MGI:2176229 |
| ENSMUST00000145643 | 31                | 38     | 0     | Crebl2      | cAMP responsive element binding protein-like 2           | MGI:1889385 |
| ENSMUST00000170077 | 28                | 20     | 0     | Ston2       | stonin 2   | MGI:1918272 |
| ENSMUST00000149212 | 27                | 24     | 0     | Socs7       | suppressor of cytokine signaling 7                       | MGI:2651588 |
| ENSMUST00000183157 | 27                | 21     | 0     | Zfp532      | zinc finger protein 532                                  | MGI:3036282 |
| ENSMUST00000147684 | 27                | 12     | 0     | Skp1a       | S-phase kinase-associated protein 1A                     | MGI:103575  |
| ENSMUST00000063492 | 25                | 10     | 0     | Rspo2       | R-spondin 2  | MGI:1922667 |
| ENSMUST00000138167 | 24                | 14     | 0     | Aen         | apoptosis enhancing nuclease                             | MGI:1915298 |
| ENSMUST00000054145 | 24                | 14     | 0     | Dcaf5       | DDB1 and CUL4 associated factor 5                        | MGI:2444785 |
| ENSMUST00000156891 | 21                | 0      | 0     | Ypel3       | yippee-like 3 (Drosophila)                               | MGI:1913340 |
| ENSMUST00000106857 | 21                | 0      | 127   | Mier1       | MEIR1 treanscription regulator                           | MGI:1918398 |
| ENSMUST00000055858 | 20                | 21     | 18    | 2410002F23R | RIKEN cDNA 2410002F23 gene                               | MGI:1914226 |
| ENSMUST00000182822 | 19                | 9      | 0     | Ccdc74a     | coiled-coil domain containing 74A                        | MGI:1919565 |
| ENSMUST00000136702 | 19                | 28     | 0     | Smad5       | SMAD family member 5                                     | MGI:1328787 |
| ENSMUST00000100540 | 19                | 12     | 0     | Tsc22d4     | TSC22 domain family, member 4                            | MGI:1926079 |
| ENSMUST00000177333 | 17                | 18     | 0     | Tsc22d1     | TSC22 domain family, member 1                            | MGI:109127  |
| ENSMUST00000124733 | 17                | 7      | 0     | Ubfd1       | ubiquitin family domain containing 1                     | MGI:107301  |
| ENSMUST00000128081 | 16                | 16     | 0     | Fto         | fat mass and obesity associated                          | MGI:1347093 |
| ENSMUST00000106891 | 16                | 0      | 0     | Dcaf7       | DDB1 and CUL4 associated factor 7                        | MGI:1919083 |

|                    |    |    |               |   |                    |
|--------------------|----|----|---------------|---|--------------------|
| ENSMUST00000084599 | 16 | 14 | 0 Rhbdd2      | rhomboid domain containing 2  | MGI:1915612        |
| ENSMUST00000161208 | 16 | 0  | 0 Coq9        | coenzyme Q9   | MGI:1915164        |
| ENSMUST00000136836 | 13 | 18 | 0 Skap1       | src family associated phosphoprotein 1  | MGI:1925723        |
| ENSMUST00000134412 | 13 | 29 | 0 Serf2       | small EDRK-rich factor 2  | MGI:1337041        |
| ENSMUST00000136733 | 13 | 6  | 0 Nek2        | NIMA (never in mitosis gene a)-related expressed kinase 2                               | MGI:109359         |
| ENSMUST00000139834 | 12 | 1  | 26 Pxn        | paxillin  | MGI:108295         |
| ENSMUST00000127300 | 12 | 0  | 0 Calm1       | calmodulin 1  | MGI:88251          |
| ENSMUST00000148859 | 11 | 12 | 0 Entpd2      | ectonucleoside triphosphate diphosphohydrolase 2  | MGI:1096863        |
| ENSMUST00000174130 | 11 | 8  | 0 Rxrb        | retinoid X receptor beta  | MGI:98215          |
| ENSMUST00000122889 | 11 | 0  | 0 Mga         | MAX gene associated   | MGI:1352483        |
| ENSMUST00000141915 | 10 | 15 | 0 Faf2        | Fas associated factor family member 2   | MGI:1923827        |
| ENSMUST00000160310 | 10 | 15 | 0 Zfp346      | zinc finger protein 346   | MGI:1349417        |
| ENSMUST00000109995 | 10 | 0  | 0 Slc35e4     | solute carrier family 35, member E4   | MGI:2144150        |
| ENSMUST00000134322 | 10 | 0  | 0 Rac3        | RAS-related C3 botulinum substrate 3  | MGI:2180784        |
| ENSMUST00000098845 | 10 | 14 | 0 Epn1        | epsin 1   | MGI:1333763        |
| ENSMUST00000031345 | 10 | 14 | 0 Rchy1       | ring finger and CHY zinc finger domain containing 1                                     | MGI:1915348        |
| ENSMUST00000071296 | 10 | 0  | 0 2410002F23F | RIKEN cDNA 2410002F23 gene  | MGI:1914226        |
| ENSMUST00000097228 | 10 | 0  | 0 Dio3        | deiodinase, iodothyronine type III  | MGI:1306782        |
| ENSMUST00000154669 | 9  | 9  | 0 Pex16       | peroxisomal biogenesis factor 16  | MGI:1338829        |
| ENSMUST00000123404 | 9  | 0  | 0 Pithd1      | PITH (C-terminal proteasome-interacting domain of thioredoxin-like) domain containing 1 | MGI:1913443        |
| ENSMUST00000133629 | 9  | 0  | 0 Sfmbt1      | Scm-like with four mbt domains 1  | MGI:1859609        |
| ENSMUST00000175634 | 8  | 5  | 0 Tgif2       | TGFB-induced factor homeobox 2  | MGI:1915299        |
| ENSMUST00000060834 | 8  | 4  | 0 Alkbh6      | alkB homolog 6  | MGI:2142037        |
| ENSMUST00000097622 | 7  | 5  | 0 Fam53c      | family with sequence similarity 53, member C  | MGI:1913556        |
| ENSMUST00000022816 | 7  | 0  | 0 Sub1        | SUB1 homolog (S. cerevisiae)  | MGI:104811         |
| ENSMUST00000035430 | 7  | 0  | 0 Dars2       | aspartyl-tRNA synthetase 2 (mitochondrial)  | MGI:2442510        |
| ENSMUST00000125830 | 7  | 0  | 0 Pygo2       | pygopus 2   | MGI:1916161        |
| ENSMUST00000128221 | 7  | 0  | 0 Txnip       | thioredoxin interacting protein   | MGI:1889549        |
| ENSMUST00000139295 | 7  | 0  | 0 Atp5b       | ATP synthase, H <sup>+</sup> transporting mitochondrial F1 complex, beta subunit        | MGI:107801         |
| ENSMUST00000156911 | 7  | 0  | 0 Ctnnb1      | catenin (cadherin associated protein), beta 1   | MGI:88276          |
| ENSMUST00000140193 | 7  | 12 | 0 Blmh        | bleomycin hydrolase   | MGI:1345186        |
| ENSMUST00000151561 | 7  | 7  | 0 Ak4         | adenylate kinase 4  | MGI:87979          |
| ENSMUST00000075724 | 7  | 7  | 0 Rfxank      | regulatory factor X-associated ankyrin-containing protein                               | MGI:1333865        |
| ENSMUST00000048565 | 7  | 0  | 0 Trim60      | tripartite motif-containing 60  | MGI:2387430        |
| ENSMUST00000137917 | 7  | 0  | 0 Rrp1b       | ribosomal RNA processing 1 homolog B (S. cerevisiae)                                    | MGI:1919712        |
| ENSMUST00000156547 | 7  | 0  | 0 Ssbp2       | single-stranded DNA binding protein 2   | MGI:1914220        |
| ENSMUST00000159469 | 7  | 0  | 0 Zfp263      | zinc finger protein 263   | MGI:1921370        |
| ENSMUST00000124932 | 6  | 25 | 0 Naa38       | N(alpha)-acetyltransferase 38, NatC auxiliary subunit                                   | MGI:1925554        |
| ENSMUST00000036158 | 6  | 7  | 0 Slc35a4     | solute carrier family 35, member A4   | MGI:1915093        |
| ENSMUST00000052090 | 6  | 0  | 0 Gpr3        | G-protein coupled receptor 3  | MGI:101908         |
| ENSMUST00000107798 | 6  | 0  | 0 Dcaf10      | DDB1 and CUL4 associated factor 10  | MGI:2140179        |
| ENSMUST00000126602 | 6  | 0  | 0 Rrp1b       | ribosomal RNA processing 1 homolog B (S. cerevisiae)                                    | MGI:1919712        |
| ENSMUST00000154960 | 6  | 0  | 0 Stard3      | START domain containing 3   | MGI:1929618        |
| ENSMUST00000142842 | 5  | 11 | 0 Lpin2       | lipin 2   | MGI:1891341        |
| ENSMUST00000078409 | 5  | 7  | 0             |   | No associated gene |
| ENSMUST00000163723 | 5  | 7  | 0 Mpped1      | metallophosphoesterase domain containing 1  | MGI:106316         |

|                    |   |    |                |   |             |
|--------------------|---|----|----------------|---|-------------|
| ENSMUST00000088561 | 5 | 4  | 0 Pex26        | peroxisomal biogenesis factor 26  | MGI:1921293 |
| ENSMUST00000141016 | 5 | 4  | 0 Msl1         | male-specific lethal 1 homolog (Drosophila)   | MGI:1921276 |
| ENSMUST00000023048 | 5 | 0  | 0 Mief1        | mitochondrial elongation factor 1   | MGI:2146020 |
| ENSMUST00000078975 | 5 | 0  | 0 G6pc3        | glucose 6 phosphatase, catalytic, 3   | MGI:1915651 |
| ENSMUST00000095273 | 5 | 0  | 0 Nr2c2ap      | nuclear receptor 2C2-associated protein   | MGI:1922942 |
| ENSMUST00000096239 | 5 | 0  | 0 Tut1         | terminal uridylyl transferase 1, U6 snRNA-specific                                    | MGI:1917294 |
| ENSMUST00000106101 | 5 | 0  | 0 Zzz3         | zinc finger, ZZ domain containing 3   | MGI:1920453 |
| ENSMUST00000108532 | 5 | 0  | 0 6330408A02F  | RIKEN cDNA 6330408A02 gene  | MGI:2447816 |
| ENSMUST00000110071 | 5 | 0  | 0 Haus8        | 4HAUS augmin-like complex, subunit 8  | MGI:1923728 |
| ENSMUST00000111417 | 5 | 0  | 0 Zfp664       | zinc finger protein 664   | MGI:2442505 |
| ENSMUST00000127539 | 5 | 0  | 0 Mbtd1        | mbt domain containing 1   | MGI:2143977 |
| ENSMUST00000130899 | 5 | 0  | 0 Odf2         | outer dense fiber of sperm tails 2  | MGI:1098824 |
| ENSMUST00000133544 | 5 | 0  | 0 Tor1b        | torsin family 1, member B   | MGI:1353605 |
| ENSMUST00000144826 | 5 | 0  | 0 Noct         | nocturnin   | MGI:109382  |
| ENSMUST00000150759 | 5 | 0  | 0 Unk          | unkempt family zinc finger  | MGI:2442456 |
| ENSMUST00000155137 | 5 | 0  | 0 Cep89        | centrosomal protein 89  | MGI:1919390 |
| ENSMUST00000175874 | 5 | 0  | 0 Ip6k1        | inositol hexaphosphate kinase 1   | MGI:1351633 |
| ENSMUST00000142213 | 4 | 7  | 0 Ercc3        | excision repair cross-complementing rodent repair deficiency, complementation group 3 | MGI:95414   |
| ENSMUST00000154278 | 4 | 5  | 0 Sh3bp5l      | SH3 binding domain protein 5 like   | MGI:1933124 |
| ENSMUST00000136590 | 4 | 5  | 0 Arfgap1      | ADP-ribosylation factor GTPase activating protein 1                                   | MGI:2183559 |
| ENSMUST00000026221 | 4 | 0  | 30 Scd2        | stearoyl-Coenzyme A desaturase 2  | MGI:98240   |
| ENSMUST00000129334 | 4 | 0  | 12 9030624J02R | RIKEN cDNA 9030624J02 gene  | MGI:1918767 |
| ENSMUST00000035569 | 0 | 12 | 0 Nbeal1       | neurobeachin like 1   | MGI:2444343 |
| ENSMUST00000124131 | 0 | 9  | 0 Acp2         | acid phosphatase 2, lysosomal   | MGI:87882   |
| ENSMUST00000138709 | 0 | 9  | 0 Tcp1         | t-complex protein 1   | MGI:98535   |
| ENSMUST00000145866 | 0 | 9  | 0 Clec16a      | C-type lectin domain family 16, member A  | MGI:1921624 |
| ENSMUST00000146752 | 0 | 9  | 0 Phka2        | phosphorylase kinase alpha 2  | MGI:97577   |
| ENSMUST00000074856 | 0 | 7  | 0 Arhgef7      | Rho guanine nucleotide exchange factor (GEF7)   | MGI:1860493 |
| ENSMUST00000035106 | 0 | 7  | 0 Slc25a38     | solute carrier family 25, member 38   | MGI:2384782 |
| ENSMUST00000065353 | 0 | 7  | 0 Yap1         | yes-associated protein 1  | MGI:103262  |
| ENSMUST00000134242 | 0 | 6  | 0 Icmt         | isoprenylcysteine carboxyl methyltransferase  | MGI:1888594 |
| ENSMUST00000138523 | 0 | 6  | 0 Calu         | calumenin   | MGI:1097158 |
| ENSMUST00000017908 | 0 | 5  | 0 Zswim1       | zinc finger SWIM-type containing 1  | MGI:1919221 |
| ENSMUST00000020776 | 0 | 5  | 0 Ccdc117      | coiled-coil domain containing 117   | MGI:2144383 |
| ENSMUST00000061372 | 0 | 5  | 0 Tspy1        | testis-specific protein, Y-encoded-like 1   | MGI:1298395 |
| ENSMUST00000062861 | 0 | 5  | 0 Rabggt       | Rab geranylgeranyl transferase, a subunit   | MGI:1860443 |
| ENSMUST00000131159 | 0 | 5  | 0 Elk4         | ELK4, member of ETS oncogene family   | MGI:102853  |
| ENSMUST00000134086 | 0 | 5  | 0 Ap5s1        | adaptor-related protein 5 complex, sigma 1 subunit                                    | MGI:1916846 |
| ENSMUST00000141465 | 0 | 5  | 0 Zfp740       | zinc finger protein 740   | MGI:1915994 |
| ENSMUST00000143224 | 0 | 5  | 0 Gramd2       | GRAM domain containing 2  | MGI:3528937 |
| ENSMUST00000143395 | 0 | 5  | 0 Traf3        | TNF receptor-associated factor 3  | MGI:108041  |
| ENSMUST00000146069 | 0 | 5  | 0 Csnk1g1      | casein kinase 1, gamma 1  | MGI:2660884 |
| ENSMUST00000156565 | 0 | 5  | 0 Lpin2        | lipin 2   | MGI:1891341 |
| ENSMUST00000173731 | 0 | 5  | 0 Ddx39b       | DEAD (Asp-Glu-Ala-Asp) box polypeptide 39B  | MGI:99240   |
| ENSMUST00000031131 | 0 | 5  | 0 Uchl1        | ubiquitin carboxy-terminal hydrolase L1   | MGI:103149  |
| ENSMUST00000031740 | 0 | 5  | 0 Mepce        | methylphosphate capping enzyme  | MGI:106477  |

|                    |   |   |                |  |             |
|--------------------|---|---|----------------|--|-------------|
| ENSMUST00000081775 | 0 | 5 | 0 Nfe2l1       | nuclear factor, erythroid derived 2,-like 1                                  | MGI:99421   |
| ENSMUST00000127208 | 0 | 5 | 0 Lrrc14       | leucine rich repeat containing 14  | MGI:2445060 |
| ENSMUST00000139314 | 0 | 5 | 0 Arhgap1      | Rho GTPase activating protein 1  | MGI:2445003 |
| ENSMUST00000141315 | 0 | 5 | 0 Cul4a        | cullin 4A  | MGI:1914487 |
| ENSMUST00000153489 | 0 | 5 | 0 Ypel1        | yippee-like 1 (Drosophila)   | MGI:1913303 |
| ENSMUST00000068958 | 0 | 0 | 529 Cdc42ep3   | CDC42 effector protein (Rho GTPase binding) 3                                | MGI:2384718 |
| ENSMUST00000094693 | 0 | 0 | 157 Srsf5      | serine/arginine-rich splicing factor 5                                       | MGI:98287   |
| ENSMUST00000105364 | 0 | 0 | 117 Ndufs7     | NADH dehydrogenase (ubiquinone) Fe-S protein 7                               | MGI:1922656 |
| ENSMUST00000136849 | 0 | 0 | 65 Rack1       | receptor for activated C kinase 1  | MGI:101849  |
| ENSMUST00000126621 | 0 | 0 | 61 Gm42420     | predicted gene, 42420  | MGI:5649067 |
| ENSMUST00000134684 | 0 | 0 | 46 Rnf43       | ring finger protein 43   | MGI:2442609 |
| ENSMUST00000124242 | 0 | 0 | 30 Tchp        | trichoplein, keratin filament binding  | MGI:1925082 |
| ENSMUST00000134818 | 0 | 0 | 20 1810032O08F | RIKEN cDNA 1810032O08 gene   | MGI:1913543 |
| ENSMUST00000174303 | 0 | 0 | 20 Rpl27a      | ribosomal protein L27A   | MGI:1347076 |
| ENSMUST00000017065 | 0 | 0 | 18 Srsf6       | serine/arginine-rich splicing factor 6                                       | MGI:1915246 |
| ENSMUST00000042594 | 0 | 0 | 18 Mlc1        | megalencephalic leukoencephalopathy with subcortical cysts 1 homolog (human) | MGI:2157910 |
| ENSMUST00000035773 | 0 | 0 | 16 Sos2        | son of sevenless homolog 2 (Drosophila)                                      | MGI:98355   |
| ENSMUST00000056907 | 0 | 0 | 16 Smcr8       | Smith-Magenis syndrome chromosome region, candidate 8 homolog (human)        | MGI:2444720 |
| ENSMUST00000163972 | 0 | 0 | 16 Polr2m      | polymerase (RNA) II (DNA directed) polypeptide M                             | MGI:107282  |
| ENSMUST00000019576 | 0 | 0 | 14 Ddx39       | DEAD (Asp-Glu-Ala-Asp) box polypeptide 39                                    | MGI:1915528 |
| ENSMUST00000113582 | 0 | 0 | 14 Mgl1        | monoglyceride lipase   | MGI:1346042 |
| ENSMUST00000133217 | 0 | 0 | 14 Mnt         | max binding protein  | MGI:109150  |
| ENSMUST00000140803 | 0 | 0 | 14 Bgn         | biglycan   | MGI:88158   |
| ENSMUST00000030361 | 0 | 0 | 12 Tmem59      | transmembrane protein 59   | MGI:1929278 |
| ENSMUST00000051589 | 0 | 0 | 12 Aasdhpt     | aminoadipate-semialdehyde dehydrogenase-phosphopantetheinyl transferase      | MGI:1914868 |
| ENSMUST00000132715 | 0 | 0 | 12 Hnrnp1      | heterogeneous nuclear ribonucleoprotein H1                                   | MGI:1891925 |
| ENSMUST00000137896 | 0 | 0 | 12 Slc12a6     | solute carrier family 12, member 6   | MGI:2135960 |
| ENSMUST00000138478 | 0 | 0 | 12 Naa30       | N(alpha)-acetyltransferase 30, NatC catalytic subunit                        | MGI:1922259 |
| ENSMUST00000108923 | 0 | 0 | 10 Zfp931      | zinc finger protein 931  | MGI:2441662 |
| ENSMUST00000145043 | 0 | 0 | 6 Rps21        | ribosomal protein S21  | MGI:1913731 |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

MGI database :<http://www.informatics.jax.org/>

# Supplemental Table 5. Protein coding gene transcripts with UTR region associated NRapiRNAs.

## NRapiRNA reverse to 5'UTR

| Ensembl ID         | Normalized counts |        |       | Gene symbol | Annotation  | MGI ID      |
|--------------------|-------------------|--------|-------|-------------|---|-------------|
|                    | oocyte            | zygote | sperm |             |   |             |
| ENSMUST00000145313 | 46                | 49     | 400   | Zfp523      | zinc finger protein 523   | MGI:2687278 |
| ENSMUST00000163320 | 158               | 99     | 349   | Cic         | capicua transcriptional repressor   | MGI:1918972 |
| ENSMUST00000035773 | 61                | 59     | 50    | Sos2        | son of sevenless homolog 2 (Drosophila)                                       | MGI:98355   |
| ENSMUST00000074694 | 24                | 12     | 44    | Gnai1       | guanine nucleotide binding protein (G protein), alpha inhibiting 1            | MGI:95771   |
| ENSMUST00000123183 | 0                 | 0      | 30    | Rpl5        | ribosomal protein L5  | MGI:102854  |
| ENSMUST00000031354 | 0                 | 0      | 28    | Abcb9       | ATP-binding cassette, sub-family B (MDR/TAP), member 9                        | MGI:1861729 |
| ENSMUST00000132484 | 7                 | 6      | 26    | Spopl       | speckle-type POZ protein-like   | MGI:1924107 |
| ENSMUST00000180308 | 0                 | 0      | 22    | Flg         | filaggrin   | MGI:95553   |
| ENSMUST00000024832 | 0                 | 0      | 16    | Rsph1       | radial spoke head 1 homolog (Chlamydomonas)                                   | MGI:1194909 |
| ENSMUST00000147362 | 0                 | 0      | 16    | Plekkg2     | pleckstrin homology domain containing, family G (with RhoGef domain) member 2 | MGI:2141874 |
| ENSMUST00000071841 | 0                 | 0      | 12    | Klhd3       | kelch domain containing 3   | MGI:2651568 |
| ENSMUST00000093100 | 0                 | 0      | 12    | Dnaaf1      | dynein, axonemal assembly factor 1  | MGI:1915520 |
| ENSMUST00000139122 | 0                 | 0      | 12    | Smim14      | small integral membrane protein 14  | MGI:1915802 |
| ENSMUST00000159970 | 24                | 31     | 0     | Bace1       | beta-site APP cleaving enzyme 1   | MGI:1346542 |
| ENSMUST00000116400 | 25                | 26     | 0     | Kansl2      | KAT8 regulatory NSL complex subunit 2   | MGI:1916862 |
| ENSMUST00000059946 | 27                | 22     | 0     | Henmt1      | HEN1 methyltransferase homolog 1 (Arabidopsis)                                | MGI:1913965 |
| ENSMUST00000001092 | 13                | 20     | 0     | Zfp276      | zinc finger protein (C2H2 type) 276   | MGI:1888495 |
| ENSMUST00000093019 | 0                 | 12     | 0     | Fam83g      | family with sequence similarity 83, member G                                  | MGI:1916890 |
| ENSMUST00000155945 | 7                 | 11     | 0     | Traf3ip2    | TRAF3 interacting protein 2   | MGI:2143599 |
| ENSMUST00000054674 | 10                | 9      | 0     | Hjrp        | Holliday junction recognition protein   | MGI:2685821 |
| ENSMUST00000165281 | 10                | 5      | 0     | Cdca8       | cell division cycle associated 8  | MGI:1196274 |
| ENSMUST00000181601 | 0                 | 5      | 0     | Gm26566     | predicted gene, 26566   | MGI:5477060 |
| ENSMUST00000177333 | 7                 | 5      | 0     | Tsc22d1     | TSC22 domain family, member 1   | MGI:109127  |
| ENSMUST00000149695 | 0                 | 5      | 0     | Ilk         | integrin linked kinase  | MGI:1195267 |
| ENSMUST00000055549 | 9                 | 0      | 0     | B3gnt2      | UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 2                 | MGI:1889505 |
| ENSMUST00000148219 | 8                 | 0      | 0     | Drp1        | Dr1 associated protein 1 (negative cofactor 2 alpha)                          | MGI:1913806 |
| ENSMUST00000037248 | 6                 | 0      | 0     | Hirp3       | HIRA interacting protein 3  | MGI:2142364 |
| ENSMUST00000131863 | 5                 | 0      | 0     | Nsun5       | NOL1/NOP2/Sun domain family, member 5   | MGI:2140844 |
| ENSMUST00000147549 | 5                 | 0      | 0     | BC030499    | cDNA sequence BC030499  | MGI:2652869 |

piRNA expression was calculated using HTseq software. Counts were normalized using DESeq R package.

Ensembl ID obtained from ensembl database: [http://www.ensembl.org/Mus\\_musculus/Info/Index](http://www.ensembl.org/Mus_musculus/Info/Index)

MGI database :<http://www.informatics.jax.org/>