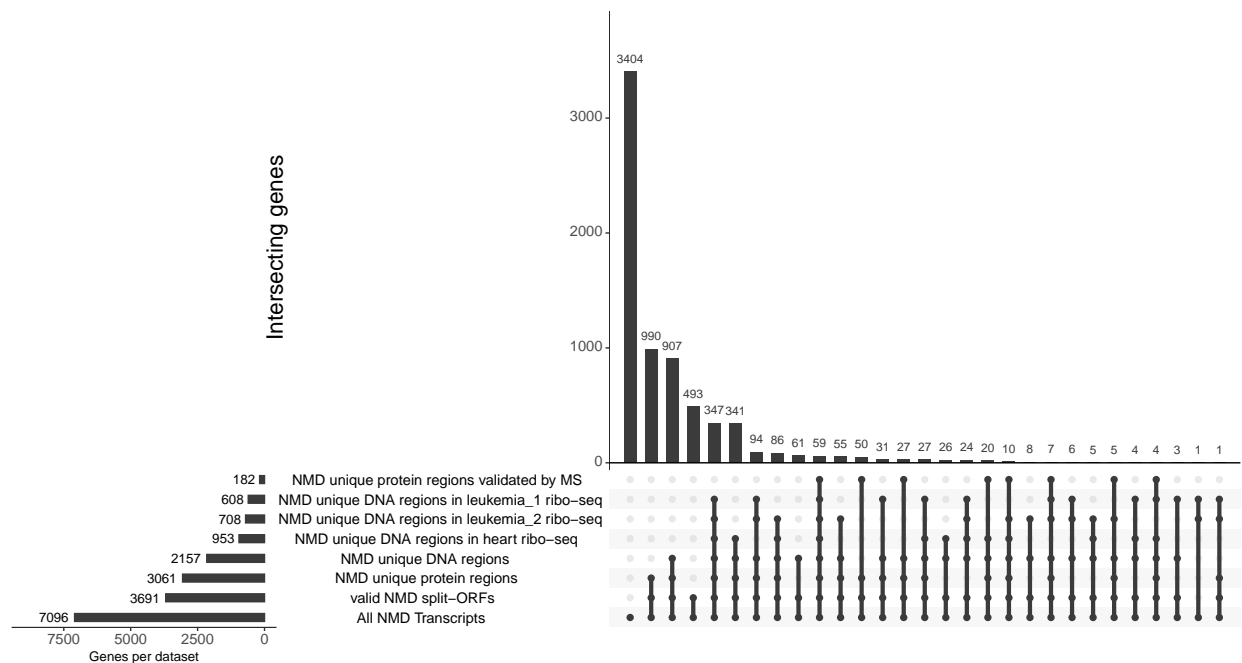# Gene Statistics
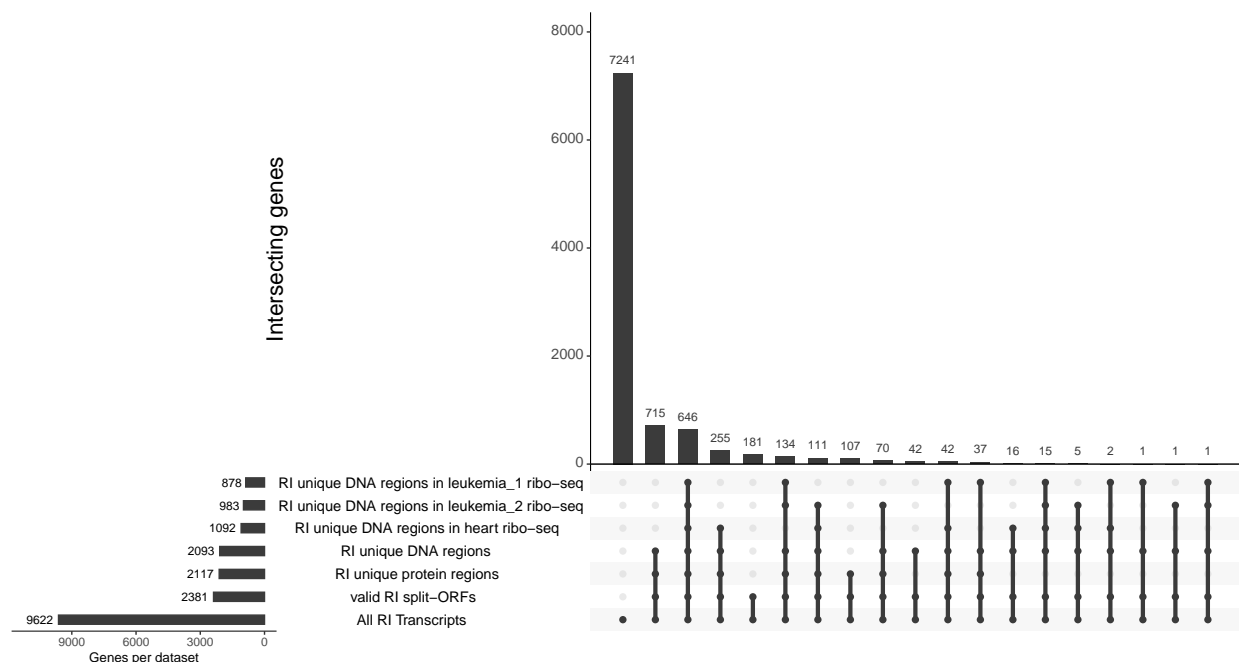
23 August 2021

Human statistics

Upsetplot showing the overlap of genes between the different result files for the NMD transcripts

The following genes were found in all datasets:

```
##  [1] "RUVBL2"    "TPM4"      "PPP4R1"    "SUGP2"     "TPM3"      "IL1RAP"
##  [7] "NT5C2"     "SAE1"      "NDUFA10"   "HAT1"      "DBNL"      "PDCD6IP"
## [13] "PSMD13"    "NCAPG2"    "GOSR1"     "CHCHD3"    "HSD17B4"   "XPO1"
## [19] "POLR2F"    "UBL4A"     "QTRT1"     "POLR1E"    "EIF3I"     "TIA1"
## [25] "EEF1AKMT2" "RAB7A"     "ZBTB80S"   "RHOC"      "IVD"       "LRSAM1"
## [31] "ATP6AP2"   "LASP1"     "SRSF6"     "DCUN1D5"   "HARS1"     "USP28"
## [37] "SPG7"      "NPEPPS"    "PKM"       "HMBS"      "ACAT1"     "VPS28"
## [43] "EIF3E"     "COQ6"      "PDLIM5"    "NDUFA13"   "LMNA"      "DHODH"
## [49] "EIF4A1"    "NUP85"     "ETHE1"     "SMARCA4"   "LSM4"      "VPS13C"
## [55] "ACTN2"     "BLVRB"     "LONP1"     "CAPZB"     "ETNK1"
```

Upsetplot showing the overlap of genes between the different result files for the RI transcripts

The following genes were found in all datasets:

```
##   [1] "PRR29"      "MAU2"       "RBM23"      "SSRP1"
##   [5] "INTS11"     "OTUB1"      "ANAPC5"     "HNRNPU"
##   [9] "CDK11A"     "RNASET2"    "SUN1"       "PARP1"
##  [13] "NAA40"      "WASH6P"     "TPM3"       "PHLDB1"
##  [17] "HAGHL"      "CCDC9B"     "PMPCA"      "CDK10"
##  [21] "INTS3"      "SSR2"       "CTSL"       "PHGDH"
##  [25] "HYI"        "GBP3"       "LMNA"       "GPS1"
##  [29] "MCOLN1"     "TIAL1"      "ZMYM5"      "ZNF446"
##  [33] "GSTM5"      "GRHPR"      "KMT2A"      "ATXN2"
##  [37] "WDR26"      "TPCN1"      "FADS3"      "WDR90"
##  [41] "DDX47"      "IFFO1"      "CDC40"      "TUBB6"
##  [45] "FIG4"       "SLC2A1"     "FIBP"       "CENPT"
##  [49] "ATG4B"      "SEPTIN7"    "EXOC7"      "CDK16"
##  [53] "NDUFA9"     "EIF4A1"     "WBP2"       "ATAD3A"
##  [57] "CTSB"       "RPL13"      "DDT"        "RABL2A"
##  [61] "MORN1"      "CCNL2"      "DPF2"       "BAG6"
##  [65] "CYP4F8"     "PPP1R37"    "METTL3"     "TPT1"
##  [69] "SLC35B1"    "RBM5"       "CCNDBP1"    "TPP1"
##  [73] "NDUFS7"     "MLH1"       "TMEM107"    "RPL28"
##  [77] "UBE2T"      "RAF1"       "GUSB"       "SYVN1"
##  [81] "COMMD3"     "MRPL28"     "IFRD2"      "CEACAM19"
##  [85] "ALG3"       "FLNA"       "ANKRD13D"   "TTC31"
##  [89] "FAM136A"    "RUSC1"      "PISD"       "HDLBP"
##  [93] "PUSL1"      "SETDB1"     "TKT"        "AAMP"
##  [97] "PABPC4"     "TRAPPC4"    "DDX1"       "SGSM3"
## [101] "RPS9"       "RBM39"      "MEI1"       "SCLY"
```
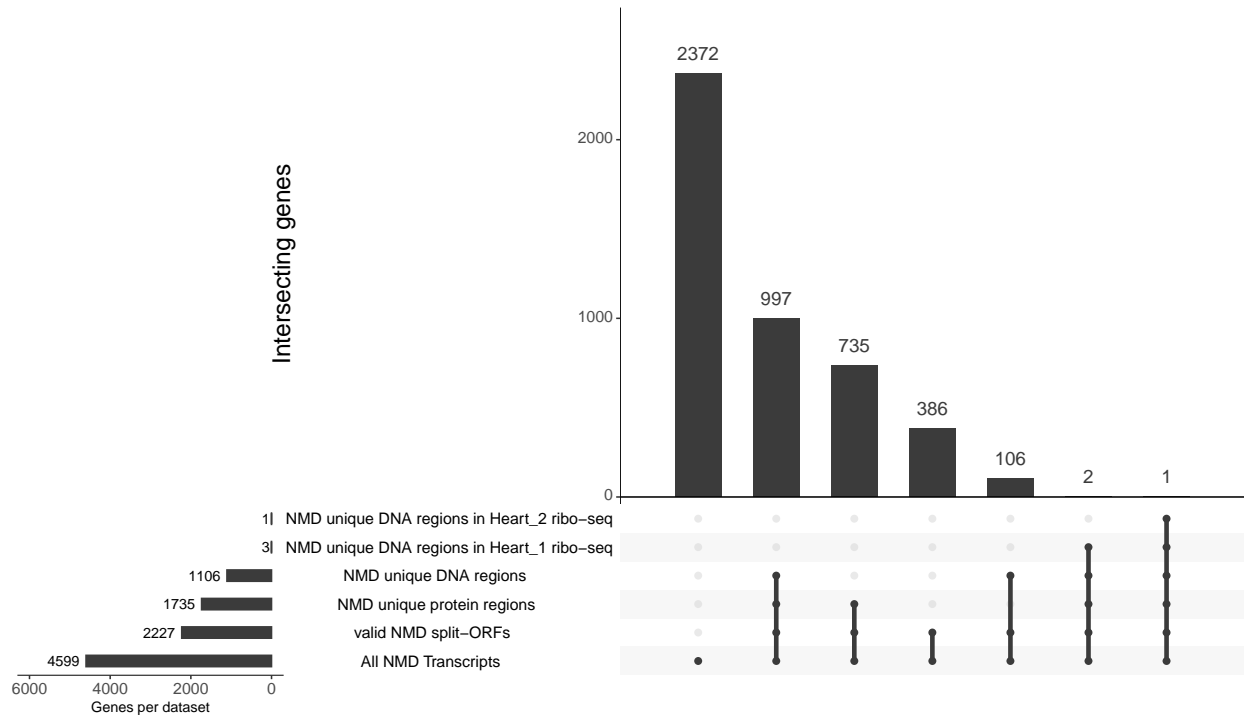
```
## [105] "PI4KA"      "FASTK"      "SLC5A6"     "POLR1C"
## [109] "IDE"        "USP34"      "TTLL3"      "BIRC6"
## [113] "UROD"       "CYB5RL"     "XPO1"       "IDH3B"
## [117] "DDX39B"     "PMM1"       "RNPEPL1"    "RAD54L2"
## [121] "DENND4B"    "OGT"        "FBXW5"      "DPAGT1"
## [125] "UFD1"       "SMTN"       "TECPR1"     "PYCR2"
## [129] "FXR1"       "CERS2"      "NCL"        "CDCA3"
## [133] "AUP1"       "PIK3CA"     "SBDS"       "NCBP2"
## [137] "TSC2"       "ACTB"       "HAX1"       "AXIN1"
## [141] "PSMC2"      "ASCC2"      "BUD23"      "DNAJC10"
## [145] "ADAM9"      "SLC2A11"    "EIF4A2"     "HSPD1"
## [149] "IMPDH2"     "PDHB"       "ATG2A"      "FCGRT"
## [153] "APEH"       "PFKL"       "VDAC2"      "PTBP2"
## [157] "CC2D1B"     "DCTN1"      "UNC45A"     "PLXNB2"
## [161] "SPCS1"      "AKR1C2"     "MAN2B1"     "STAT3"
## [165] "TRIP6"      "U2AF1"      "PARK7"      "NPRL2"
## [169] "METTL26"    "CLK3"       "SLC11A1"    "EIF1"
## [173] "TPM2"       "DPM2"       "NOL10"      "COPS6"
## [177] "ARPC3"      "SF3B1"      "NELFCD"     "NOC2L"
## [181] "SMARCD3"    "INTS1"      "DBN1"       "PPM1G"
## [185] "MSL3"       "RHOC"       "ATP13A1"    "NFS1"
## [189] "CBWD1"      "CARS1"      "BRAT1"      "PTK7"
## [193] "PWP2"       "P4HTM"      "LIMS2"      "ADGRL2"
## [197] "TANC1"      "ASL"        "NONO"       "TSPAN4"
## [201] "POLR3GL"    "GLA"        "PMPCB"      "WSB1"
## [205] "DRG2"       "NAGK"       "PCCB"       "NOM1"
## [209] "PICK1"      "GARS1"      "ZSCAN25"    "CD55"
## [213] "MAPK12"     "PSMD11"     "BRD2"       "FAM50A"
## [217] "CPNE1"      "ADSL"       "ATG16L1"    "ATAD3B"
## [221] "DYNC1LI1"   "PES1"       "WRAP53"     "TWF2"
## [225] "MRPL2"      "RPL10"      "COMT"       "CASP2"
## [229] "NIT2"       "PSEN2"      "EIF2B5"     "MAP2K7"
## [233] "SMYD2"      "GNB2"       "EXOSC10"    "ARAP1"
## [237] "CSNK2B"     "COG2"       "RPL13A"     "YDJC"
## [241] "GSTP1"      "RWDD2B"     "KRTCAP2"    "PRPF31"
## [245] "STARD3"     "USP11"      "EIF2D"      "PSMB4"
## [249] "PIGO"       "CTNNB1"     "UBXN11"     "L3MBTL2"
## [253] "HTRA2"      "DNAJC2"     "GAPDH"      "ATP6V0B"
## [257] "MITD1"      "PITRM1"     "ALAD"       "CNNM3"
## [261] "NSUN5"      "EIF3I"      "CCDC180"    "TMEM41A"
## [265] "RNF123"     "STARD3NL"   "GRIPAP1"    "AP5Z1"
## [269] "KMT2C"      "ADAMTS1"    "RASA4B"     "GPC1"
## [273] "VCP"        "PREB"       "PPP2R5D"    "TBCE"
## [277] "CCDC115"    "WDR6"       "JMJD4"      "HADHA"
## [281] "SLC25A1"    "ACO2"       "FBXO9"      "TRO"
## [285] "PTGES2"     "FBXO7"      "MAP4K4"     "MPV17"
## [289] "ACOT8"      "SMARCB1"    "CTSA"       "EIF4H"
## [293] "C1orf174"   "OXA1L"      "KCNT1"      "ADAM17"
## [297] "NDUFS2"     "NDUFA10"    "CTPS1"      "TMEM147"
## [301] "GMPPA"      "TFG"        "AKT2"       "KDM6A"
## [305] "LLGL1"      "RPS12"      "ATP6AP2"    "TXNIP"
## [309] "EEF1A1"     "LRWD1"      "DIABLO"     "UPF3B"
## [313] "ATP6AP1"    "RAB7A"      "NOTCH2"     "ZGPAT"
## [317] "GMPPB"      "NDUFAF3"    "NF1"        "TIA1"
```

```
## [321] "DSN1"       "DHX57"      "ANKHD1-EIF4EBP3" "BET1L"
## [325] "IGF2R"      "KRI1"       "MCM5"            "DDX3X"
## [329] "CDK5RAP2"   "WDR27"      "DHX34"           "EPC1"
## [333] "MPST"       "CAPZB"      "GBF1"            "DOT1L"
## [337] "HNRNPA3"    "DPH2"       "MRPL43"          "HSPA8"
## [341] "COQ6"       "HNRNPH1"    "PPP1R16A"        "TMEM63B"
## [345] "BCKDHA"     "ASAH1"      "SHMT2"           "HADH"
## [349] "HARS1"      "CTCF"       "MAN2C1"          "ITGA5"
## [353] "RPL18"      "COX4I1"     "CCDC81"          "IKBKB"
## [357] "SMARCC2"    "STAT2"      "PLCB2"           "CTU2"
## [361] "RELA"       "AAAS"       "SMG1"            "TRPT1"
## [365] "CNPY2"      "SC5D"       "SCARB2"          "COQ9"
## [369] "MYL6"       "PLK1"       "NPEPPS"          "PHB2"
## [373] "CPLANE1"    "BTF3"       "SLC38A9"         "SIDT2"
## [377] "MED17"      "G3BP2"      "ESPL1"           "CTSH"
## [381] "KRT8"       "CLN3"       "KDM2B"           "KATNB1"
## [385] "SPATA20"    "DYNC1H1"    "DDX41"           "GTF2H2"
## [389] "TMED9"      "STING1"     "WDR70"           "PNP"
## [393] "RPL4"       "WDR83"      "RPLP0"           "DDX24"
## [397] "CHD8"       "SNRPA1"     "CWC15"           "PFDN5"
## [401] "MCRS1"      "EIF3F"      "ATXN2L"          "PPP2R2A"
## [405] "ACSF2"      "SLC30A9"    "ALDOA"           "KIF5A"
## [409] "CHMP1A"     "VPS11"      "PIDD1"           "FBXL6"
## [413] "CLCN7"      "RACK1"      "HNRNPA1"         "CTSC"
## [417] "ACAD8"      "GGH"        "NUBP2"           "PSMD13"
## [421] "ZFPL1"      "ACAD10"     "SCFD1"           "LETMD1"
## [425] "C17orf58"   "CDAN1"      "OS9"             "TCF25"
## [429] "PHKG2"      "GINS3"      "DGKZ"            "ILVBL"
## [433] "TSG101"     "SLC37A4"    "C17orf49"        "MAEA"
## [437] "HTT"        "NECAP1"     "CIAO3"           "SORD"
## [441] "PRKAG1"     "ORC6"       "DDX46"           "GALNS"
## [445] "RNH1"       "CIAO2B"     "CYC1"            "NDUFV1"
## [449] "GAK"        "BID"        "RPS2"            "AGA"
## [453] "LARS1"      "FHOD1"      "LMF2"            "POLD4"
## [457] "SDCBP"      "CD151"      "LRRC57"          "PPP4C"
## [461] "C2CD5"      "SLC25A3"    "SPG7"            "KIF22"
## [465] "CAPN1"      "ITGA3"      "RPL6"            "VPS33B"
## [469] "NAGPA"      "RARG"       "ZNF195"          "NDUFS3"
## [473] "MRPS18C"    "FIP1L1"     "CS"              "HNRNPD"
## [477] "SART1"      "GPAA1"      "ARFGAP2"         "MRPS11"
## [481] "CDIPT"      "MARCHF6"    "ABHD14A-ACY1"    "CSK"
## [485] "SELENOS"    "TGFBI"      "RUSF1"           "NEK9"
## [489] "PPP1CA"     "AARS1"      "MTHFD1"          "DCTN2"
## [493] "RPS14"      "FKBP2"      "SCAMP2"          "TONSL"
## [497] "HSPA9"      "CD82"       "GATM"            "RHPN2"
## [501] "DCAF13"     "GSTZ1"      "PDCD6"           "COPB2"
## [505] "NUDT8"      "REEP5"      "EDC4"            "BCKDK"
## [509] "PABPC1"     "KIAA0586"   "RPS6KA4"         "NADSYN1"
## [513] "ATP6V1B2"   "PTGR2"      "RNASEH2C"        "CHORDC1"
## [517] "AFTPH"      "MVB12A"     "RNASEK"          "MED13L"
## [521] "MARK2"      "ZNF419"     "RBM25"           "EIF3E"
## [525] "TNIP2"      "GRSF1"      "BRMS1"           "ARHGAP1"
## [529] "NSMCE1"     "NDUFB9"     "KIF2A"           "G3BP1"
## [533] "HK1"        "CERS4"      "CAPN15"          "ACAD9"
```

```
## [537] "MRPL17"      "NIPBL"        "CYBC1"        "RPAIN"
## [541] "HM13"        "CNDP2"        "TECR"         "ARHGEF1"
## [545] "HDDC2"       "GALK1"        "MINK1"        "ARL16"
## [549] "ELP1"        "EIF3G"        "GPX4"         "NDUFAF8"
## [553] "GSS"         "STXBP2"       "LAS1L"        "SPAG5"
## [557] "AP2A1"       "KIAA0100"     "CORO7"        "ACD"
## [561] "ZZEF1"       "NAPA"         "PLEKHJ1"      "GIPC1"
## [565] "TBCD"        "ECH1"         "SGTA"         "PIH1D1"
## [569] "RPL27"       "PSMB6"        "HGS"          "TMEM205"
## [573] "STK11"       "HEXD"         "MKS1"         "SLC12A4"
## [577] "DDX5"        "CSNK2A1"      "DDX39A"       "DNMT1"
## [581] "SLC25A39"    "GFAP"         "GGA3"         "SYNRG"
## [585] "TMEM94"      "MFN2"         "ALDH16A1"     "TSEN54"
## [589] "KPNA2"       "U2AF1L5"      "PMF1"         "SMARCA4"
## [593] "GABRD"       "DPP9"         "MTMR2"        "PTBP1"
## [597] "PSMC4"       "EFTUD2"       "NOP56"        "SPPL2B"
## [601] "SAFB"        "FAM98C"       "RPS11"        "NOSIP"
## [605] "TNFRSF12A"   "CARM1"        "TUBB4B"       "DHX8"
## [609] "QTRT1"       "SEPTIN4"      "UNC13D"       "CIRBP"
## [613] "TMEM259"     "ISYNA1"       "ACTG1"        "MIF4GD"
## [617] "CNOT3"       "PIGT"         "ACAP1"        "RUVBL2"
## [621] "VPS4B"       "ILF3"         "RPL19"        "TRIM8"
## [625] "ARHGDIA"     "NMT1"         "REX1BD"       "EMG1"
## [629] "PPT1"        "PLEKHH3"      "RAVER1"       "YIF1B"
## [633] "RIPK1"       "ZNF213"       "SLC52A1"      "SYNCRIP"
## [637] "XAB2"        "CDC37"        "ZNF396"       "SPNS1"
## [641] "TXNDC17"     "ARHGAP35"     "PABIR3"       "CAMLG"
## [645] "CCDC27"      "HOXA2"
```
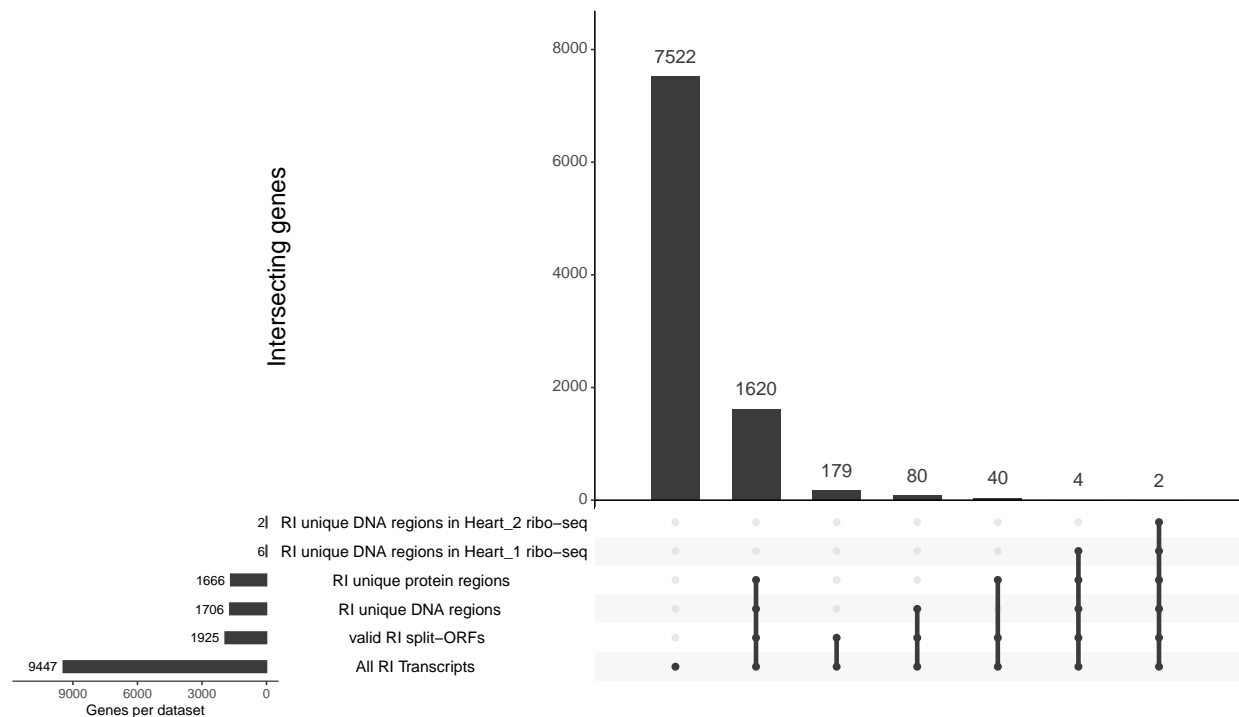
Mouse statistics

Upsetplot showing the overlap of genes between the different result files for the NMD transcripts

The following genes were found in all datasets:

```
## [1] "Tpm1"
```

Upsetplot showing the overlap of genes between the different result files for the RI transcripts
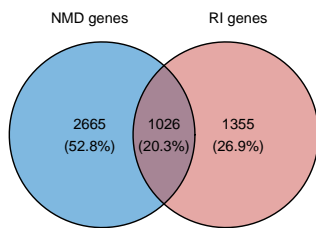

The following genes were found in all datasets:

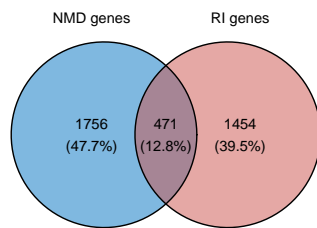```
[1] "Tcf7l2" "Zc3h14"
```

Overlap between NMD and RI genes



split−ORF enconding Genes in human NMD vs RI



split−ORF enconding Genes in mouse NMD vs RI

**The following are the overlaping human genes:**

```
##    [1] "PAPLN"      "FAM135A"    "COMT"       "RNASET2"
##    [5] "RUVBL2"     "PPP2R5D"    "PTK7"       "SLC2A11"
##    [9] "PFDN5"      "P2RX7"      "SLC25A37"   "NGLY1"
```

```
##  [13] "PPP4R1"    "VWA3A"      "GRM2"      "CAPN10"
##  [17] "PIK3R5"    "TBRG1"      "CHFR"      "MEIS2"
##  [21] "SCFD1"     "FCAMR"      "MPPE1"     "FOXP1"
##  [25] "CRTC2"     "TMEM184A"   "MAPK10"    "MUC4"
##  [29] "DCAF11"    "KLK11"      "HDDC2"     "STARD5"
##  [33] "DDX39A"    "SLC26A6"    "CYP4F8"    "DCDC1"
##  [37] "TRIOBP"    "MPDU1"      "AASS"      "TPM3"
##  [41] "ABHD11"    "TTLL6"      "CCDC144A"  "CCDC17"
##  [45] "DTNB"      "RBM39"      "KLF8"      "HLA-C"
##  [49] "CERKL"     "FAM189A2"   "SLC11A1"   "FGD2"
##  [53] "NARF"      "ECHDC2"     "ATAD3A"    "IKBKB"
##  [57] "CUTA"      "CIBAR1"     "PARVG"     "PAQR6"
##  [61] "CCDC66"    "CASP2"      "NUP35"     "CHIA"
##  [65] "NT5C1B"    "YDJC"       "MICALL2"   "ADAM9"
##  [69] "TCAIM"     "LETMD1"     "TTC7A"     "CPNE1"
##  [73] "DIS3L2"    "ECI2"       "GCC2"      "IFT140"
##  [77] "DGKA"      "RASSF1"     "NDUFA10"   "AMT"
##  [81] "HDAC10"    "EIF2B4"     "RANBP17"   "MITD1"
##  [85] "DBNL"      "SLC22A17"   "DPAGT1"    "TTC5"
##  [89] "CLK1"      "GAD1"       "ZNF692"    "DEPDC5"
##  [93] "POMT1"     "TRMU"       "LZTR1"     "SBDS"
##  [97] "MBTD1"     "SPATA6L"    "SEPTIN5"   "MMS19"
## [101] "WT1"       "TNFRSF25"   "SREBF1"    "ALG3"
## [105] "RBCK1"     "ARHGAP4"    "MPV17"     "IFRD2"
## [109] "PSMD13"    "METTL8"     "SMPD4"     "ADAMTS6"
## [113] "PPIL3"     "HYDIN"      "CBWD5"     "MKS1"
## [117] "MST1R"     "CATSPERG"   "LPO"       "UQCRC1"
## [121] "ZSCAN25"   "NPHP4"      "BICD1"     "PAPOLG"
## [125] "MTO1"      "TANGO2"     "THUMPD2"   "EOGT"
## [129] "LRRIQ3"    "ACAA1"      "SERHL2"    "CDCA7"
## [133] "CYB5RL"    "NCAPG2"     "BPHL"      "GUSB"
## [137] "CPLANE1"   "GPD2"       "AP4M1"     "DAZAP2"
## [141] "CHRNA7"    "AIFM1"      "SLC5A9"    "POLE"
## [145] "ACTB"      "SHPRH"      "PISD"      "IGFN1"
## [149] "WDR6"      "OSBPL9"     "EIF4A2"    "SULT1C2"
## [153] "CYP3A43"   "HSD17B4"    "DNAJC10"   "NPRL2"
## [157] "NFS1"      "WAC"        "SLC26A5"   "TBX2"
## [161] "BUD23"     "ATP6AP1"    "CHRD"      "HSF4"
## [165] "MTA1"      "SCARF1"     "HPS4"      "TSPAN32"
## [169] "TBXAS1"    "TBC1D10A"   "VPS50"     "FKBP1B"
## [173] "DCTN1"     "SYT8"       "FLNA"      "LMBR1L"
## [177] "DQX1"      "NCBP2"      "LRRC23"    "TTLL3"
## [181] "TTC21A"    "RANBP1"     "RHBDF1"    "ALS2CL"
## [185] "SLC5A2"    "ITPRID2"    "HAUS5"     "RAF1"
## [189] "GDI1"      "NEU4"       "TTC31"     "ZNF74"
## [193] "ETV1"      "RGL4"       "CCDC150"   "PRPF39"
## [197] "LMBR1"     "MAP4K2"     "ATG16L2"   "ABCA7"
## [201] "DPP4"      "NKTR"       "TSC2"      "XPO1"
## [205] "QARS1"     "CHTF18"     "SELENBP1"  "DDX11"
## [209] "CFAP69"    "ZNF655"     "CLDN15"    "MZB1"
## [213] "KLK3"      "LTO1"       "PON3"      "PROM2"
## [217] "AKR1B1"    "STRC"       "ZDHHC19"   "MSH5"
## [221] "FGGY"      "CYP11A1"    "MED15"     "QTRT1"
## [225] "ABCD4"     "GORASP1"    "TKT"       "ACAD11"
```

```
## [229] "MYLK"             "NEPRO"        "DMKN"         "APBB3"
## [233] "CDK5RAP2"         "EIF3I"        "TOX4"         "CCNL1"
## [237] "BRD9"             "ING4"         "DLG4"         "RHBG"
## [241] "SKIV2L"           "TTC19"        "PHYKPL"       "LAS1L"
## [245] "NF1"              "CCNL2"        "PMPCB"        "NOP56"
## [249] "PORCN"            "ST3GAL3"      "RNF123"       "PNLIPRP1"
## [253] "SLC22A5"          "PAXIP1"       "IL17RC"       "FAM136A"
## [257] "APTX"             "SUPT20H"      "CCDC30"       "PHF20L1"
## [261] "HEMK1"            "FBXW5"        "TIA1"         "COG4"
## [265] "SEC31B"           "L3MBTL1"      "DNAH1"        "IDH3B"
## [269] "NUP205"           "PGAP2"        "NECAP1"       "IDE"
## [273] "COG2"             "TSNAXIP1"     "PDE8A"        "CYP2J2"
## [277] "MLH1"             "STRIP1"       "NECAP2"       "YWHAB"
## [281] "GMPPA"            "WDTC1"        "FANCI"        "PREB"
## [285] "ABHD14A-ACY1"     "SLC37A3"      "RABL6"        "HLA-DQB1"
## [289] "CYP2C8"           "RXRB"         "ABCA2"        "NEBL"
## [293] "DHX34"            "ASZ1"         "MSTO1"        "PTBP2"
## [297] "GARS1"            "PDHB"         "NAGK"         "ATXN2"
## [301] "NEU1"             "CDK11A"       "RAB7A"        "RHOC"
## [305] "HDAC7"            "METTL26"      "LILRB2"       "SZT2"
## [309] "BRD2"             "SSX2IP"       "AMD1"         "ABCB8"
## [313] "SH2D6"            "SEC14L2"      "C1orf159"     "PABPC4"
## [317] "IFFO1"            "DLG5"         "CLEC7A"       "OSBPL5"
## [321] "GRHL1"            "TAMM41"       "CCDC24"       "GNAS"
## [325] "PRKAG2"           "INTS3"        "CFAP91"       "LRSAM1"
## [329] "JMJD7-PLA2G4B"    "NPHP3"        "ACOT8"        "DOCK8"
## [333] "DDX3X"            "C16orf86"     "ATRX"         "ABTB1"
## [337] "SLCO2A1"          "EYA1"         "GBP3"         "HMCN2"
## [341] "GPR89B"           "CLK3"         "PCBP4"        "MSL3"
## [345] "PATJ"             "PABIR3"       "ACY1"         "C2"
## [349] "SFI1"             "PCCB"         "CTC1"         "ZFAND2B"
## [353] "SDF4"             "DDX39B"       "KRT13"        "ALKBH6"
## [357] "DRG2"             "STK19"        "CAMKV"        "RAD52"
## [361] "MIB2"             "TMEM191C"     "ROBO2"        "GLB1L3"
## [365] "CACNA2D4"         "SMARCD3"      "MEGF11"       "PFN2"
## [369] "CCDC27"           "ASCC2"        "ATXN7L2"      "RABL2A"
## [373] "MYO1G"            "AGBL5"        "NCF1"         "KCNT1"
## [377] "U2AF1"            "TOR2A"        "PIGT"         "VCPKMT"
## [381] "WDR26"            "TERT"         "GLYCTK"       "FRMD1"
## [385] "LRP8"             "ALDH3A2"      "CCDC183"      "DPH2"
## [389] "ST6GAL1"          "DEPDC1"       "BRAF"         "UGP2"
## [393] "RGSL1"            "CTPS1"        "ADPGK"        "SLC35B1"
## [397] "RACK1"            "TAF1C"        "SPATA20"      "SLC25A3"
## [401] "CTSH"             "RPLP0"        "RNF175"       "RELT"
## [405] "POLR3E"           "TMEM260"      "MUS81"        "MMS22L"
## [409] "ZFAND1"           "MACF1"        "HARS1"        "RBM25"
## [413] "TGFB1I1"          "RPAIN"        "B4GALNT1"     "DNAAF1"
## [417] "ELAPOR1"          "RPS6KB2"      "RNH1"         "ABCC12"
## [421] "MRPL46"           "WDR83"        "STRA6"        "DIABLO"
## [425] "ADGRB1"           "VEZT"         "PFKM"         "MFSD8"
## [429] "PRKAG1"           "SLCO1A2"      "NTRK1"        "SRSF5"
## [433] "TLE3"             "MED17"        "GLOD4"        "DDX41"
## [437] "CENATAC"          "HNF1A"        "BEST1"        "SMARCC2"
## [441] "CLN3"             "GLG1"         "SHMT2"        "SPG7"
```

9

```
## [445] "BBS1"       "CORO7"     "ALDH1L2"   "RABGGTA"
## [449] "PARP6"      "TPM1"      "OTUD6B"    "GATB"
## [453] "NR1I3"      "DYRK4"     "PHB2"      "SCHIP1"
## [457] "SLX1A"      "RAB26"     "ESRP2"     "WDR97"
## [461] "IL10RA"     "ADGRG3"    "SLC17A3"   "PHLDB1"
## [465] "SCAMP2"     "RSL24D1"   "VPS51"     "XRRA1"
## [469] "SFXN1"      "ACAD8"     "CSPP1"     "NMT1"
## [473] "RCE1"       "SLC30A9"   "ULK3"      "MLST8"
## [477] "GSDMB"      "SH3TC1"    "ARHGEF9"   "ZFR"
## [481] "GDPD5"      "IPO4"      "RHOT2"     "COPG1"
## [485] "GLYATL1"    "CLN6"      "NDUFV1"    "MOK"
## [489] "CARD8"      "RGL3"      "PIDD1"     "CC2D2A"
## [493] "IDH3A"      "UCHL1"     "SH3BP2"    "HMBS"
## [497] "FANCA"      "HEXA"      "SORD"      "MRPS22"
## [501] "PPT1"       "FOXRED1"   "TMEM116"   "PPP4C"
## [505] "MAP3K12"    "CYP2F1"    "CCS"       "RNASEK"
## [509] "DIS3L"      "RPL13"     "GTF2H2"    "TBC1D10C"
## [513] "LRRC49"     "TM7SF2"    "NPEPPS"    "CLK4"
## [517] "GLA"        "SULT1A1"   "POLG"      "OS9"
## [521] "ADSS1"      "USP6"      "TRAPPC4"   "HNRNPD"
## [525] "GALT"       "WDR90"     "PARP8"     "RPL18"
## [529] "BFAR"       "PSTPIP1"   "ACAD9"     "CES4A"
## [533] "B4GALT7"    "SLC38A9"   "INO80E"    "DCTN2"
## [537] "C1orf141"   "FUS"       "IFT172"    "VPS28"
## [541] "STARD9"     "CDK2AP2"   "PABPC1"    "ANXA2"
## [545] "ERAP2"      "MAPKBP1"   "CCNDBP1"   "ITGB2"
## [549] "CDK10"      "MMP19"     "NAALAD2"   "RPS2"
## [553] "CIAO3"      "SLC9A5"    "COMMD4"    "HNRNPH1"
## [557] "P2RX4"      "CENPT"     "MTUS1"     "ZAN"
## [561] "LETM2"      "CYP4F12"   "EPS8L2"    "CDAN1"
## [565] "CARS1"      "GSTP1"     "TIAL1"     "GALNT10"
## [569] "LTA4H"      "OXLD1"     "PKD1"      "ANAPC5"
## [573] "C2CD5"      "UBAP1L"    "COQ6"      "SLC15A3"
## [577] "ZXDC"       "VPS13B"    "GABRG2"    "IQCK"
## [581] "ELP1"       "FAXDC2"    "TRIM41"    "NFASC"
## [585] "NOX5"       "PTPN21"    "MAEA"      "IFT122"
## [589] "MTFMT"      "KLHDC4"    "FIP1L1"    "CEP120"
## [593] "TMEM106C"   "AQP7"      "NUP54"     "DENND3"
## [597] "ATXN2L"     "GAS8"      "MTHFD1"    "SYNE2"
## [601] "TEP1"       "MINK1"     "OGFOD2"    "RIC8A"
## [605] "DOC2A"      "VIRMA"     "ADCY4"     "ITGA3"
## [609] "ZNF276"     "ARHGAP6"   "DNHD1"     "MAN1B1"
## [613] "CCDC189"    "DDX5"      "ABCC8"     "RCHY1"
## [617] "ABHD16A"    "NAGPA"     "GALNS"     "CUL9"
## [621] "IRF9"       "GRSF1"     "DGKZ"      "NAA25"
## [625] "ZZEF1"      "NUDCD1"    "CDK18"     "PHF21A"
## [629] "SKP2"       "FCSK"      "FGFR1"     "ABCE1"
## [633] "ARFGAP2"    "GSTZ1"     "NAA40"     "MTMR10"
## [637] "ACSM1"      "CNTROB"    "NEK9"      "INTS11"
## [641] "SPEF2"      "TMC2"      "CTU2"      "RELA"
## [645] "NDST4"      "NSMCE1"    "MYEF2"     "DNAH10"
## [649] "METTL3"     "SLTM"      "RPL8"      "PSMA3"
## [653] "RDH11"      "RAPGEF3"   "WDR19"     "CPNE6"
## [657] "SLC47A2"    "RPAP1"     "SAAL1"     "DOCK2"
```

```
## [661] "CNOT2"      "ZFYVE26"    "VPS33B"     "MAN2A2"
## [665] "REEP5"      "NDRG2"      "ARFIP2"     "TATDN1"
## [669] "SH3GL3"     "DHRS1"      "KDM2B"      "TNFRSF12A"
## [673] "ANKRD33"    "GPAA1"      "FAN1"       "IBTK"
## [677] "PDE1B"      "CTSB"       "TRAPPC6B"   "AVIL"
## [681] "CCDC38"     "BCKDK"      "DENND4C"    "TMEM175"
## [685] "RAD50"      "RIN1"       "EIF3E"      "CIITA"
## [689] "CDK4"       "NCAM1"      "DHODH"      "SEPTIN1"
## [693] "EIF2B5"     "TRIO"       "IFT43"      "NADSYN1"
## [697] "SGSH"       "FHOD1"      "AP2A2"      "PPOX"
## [701] "ANGPTL4"    "MTHFR"      "ERCC3"      "PNKP"
## [705] "ASAH1"      "SGCE"       "DENND1C"    "ATP6AP2"
## [709] "KIFBP"      "PIH1D1"     "LRRC37B"    "ST3GAL5"
## [713] "GGA3"       "RMC1"       "ADAM17"     "COPA"
## [717] "SMARCE1"    "PHGDH"      "TBCE"       "HDAC8"
## [721] "LIAS"       "CCDC88A"    "KCNMA1"     "DNMT1"
## [725] "CHD4"       "EIF4A1"     "EZH1"       "PIGN"
## [729] "CEP78"      "TCF4"       "HNRNPUL1"   "HEATR9"
## [733] "GIT1"       "DPH1"       "RTTN"       "KDM5B"
## [737] "ATG4D"      "CNOT3"      "SAFB"       "MLLT10"
## [741] "HERC2"      "NOMO3"      "GIPC1"      "RTN2"
## [745] "WDR27"      "TRIM8"      "SCARB2"     "DOCK7"
## [749] "ANKS3"      "HADHA"      "CACNB4"     "GATD3A"
## [753] "KLK4"       "CD55"       "CARD14"     "MED13L"
## [757] "HEATR6"     "CNTN2"      "CIRBP"      "PCSK4"
## [761] "FLT3LG"     "CARM1"      "ACSL6"      "SCN1A"
## [765] "ACADVL"     "PIGA"       "CBWD1"      "SYMPK"
## [769] "CSNK2A1"    "ARID1B"     "PDE4C"      "EHMT1"
## [773] "TSC1"       "DDX49"      "CACNA1D"    "AKAP8L"
## [777] "TRPV1"      "CDK5RAP3"   "SAMHD1"     "DNAJC7"
## [781] "TBK1"       "GNAO1"      "STXBP2"     "FKTN"
## [785] "PLXDC1"     "THOC1"      "TOP3A"      "TRPM4"
## [789] "HM13"       "KIAA0586"   "GPS1"       "SMARCB1"
## [793] "TAZ"        "U2AF1L4"    "MANBA"      "CLCN2"
## [797] "PRPS1"      "CYP3A5"     "SUCLA2"     "ZNF213"
## [801] "RHPN2"      "HSPH1"      "VPS4B"      "RMND1"
## [805] "RAB15"      "STAT6"      "RANBP3"     "TSEN54"
## [809] "MYT1L"      "HDAC6"      "KLK15"      "LLGL2"
## [813] "STING1"     "SMARCA4"    "DHX57"      "TACC3"
## [817] "CDC37"      "PSMC5"      "HEXD"       "HSD11B1L"
## [821] "GFAP"       "VPS13D"     "SLC2A1"     "EPHB6"
## [825] "TNFRSF13B"  "EPOR"       "FCGRT"      "CCDC120"
## [829] "NRG1"       "ATP9B"      "RORC"       "CTNNB1"
## [833] "POLD1"      "AP5Z1"      "WNK4"       "FLOT2"
## [837] "PSG11"      "KLK2"       "ATP5F1A"    "PSMC3IP"
## [841] "ENOSF1"     "KLK1"       "CC2D1A"     "SLC1A7"
## [845] "ARHGAP21"   "EFHC1"      "KIAA0100"   "CYP4F2"
## [849] "DHPS"       "COQ8B"      "EML2"       "TMEM259"
## [853] "DPY19L3"    "NPRL3"      "PGAP3"      "CSF3"
## [857] "CYBC1"      "ADAR"       "NIBAN3"     "DNAJA3"
## [861] "MOGS"       "WRN"        "DMPK"       "ISYNA1"
## [865] "PAX6"       "USE1"       "FRMPD2"     "GSS"
## [869] "OSBPL7"     "MALT1"      "HECTD4"     "DYNC1H1"
## [873] "MYO19"      "SCN2A"      "NAPA"       "DDX52"
```

```
##  [877] "IZUMO1"      "STARD3"          "SF3B1"       "TPP1"
##  [881] "CTSA"        "STAT2"           "ATP7B"       "MYO15A"
##  [885] "GCDH"        "GRM4"            "ADSL"        "SLC1A2"
##  [889] "HADH"        "PTBP1"           "ZNF317"      "NOL11"
##  [893] "GABRA1"      "ALDH16A1"        "KCNN4"       "POLR1C"
##  [897] "MKNK2"       "CD22"            "GSTT4"       "LIN37"
##  [901] "DNM1"        "EIF3F"           "KCNQ3"       "CLN5"
##  [905] "AP2A1"       "ALDH3B1"         "SLC27A1"     "NSMAF"
##  [909] "PLEKHH3"     "TIMM50"          "HNRNPU"      "HSPA9"
##  [913] "CNKSR2"      "CTCF"            "TEKT1"       "U2AF1L5"
##  [917] "CAMTA2"      "SLC7A10"         "FARSA"       "GALK1"
##  [921] "LONP1"       "SPTBN4"          "ARMH1"       "STRADA"
##  [925] "CPT1C"       "RGR"             "ERBB2"       "KCP"
##  [929] "DDB2"        "ICAM3"           "NAT9"        "AP3B2"
##  [933] "FIG4"        "TWF2"            "MTMR2"       "RIPK1"
##  [937] "CIT"         "CEP104"          "TRIM2"       "NDUFS2"
##  [941] "IMPDH2"      "MKRN2"           "JAK1"        "LMNA"
##  [945] "CTSF"        "LAMB1"           "NPM1"        "CEP41"
##  [949] "PSEN2"       "UNC45A"          "CAPZB"       "CEP290"
##  [953] "PARP1"       "MARK3"           "SYNE1"       "CTSL"
##  [957] "AARS1"       "ADGRL2"          "OBSCN"       "GBF1"
##  [961] "COPB2"       "STAT3"           "PTGES2"      "TFG"
##  [965] "CTSC"        "PITRM1"          "NCL"         "MARK1"
##  [969] "PCSK6"       "SERPING1"        "HSPD1"       "BRPF1"
##  [973] "IGF2R"       "DDX1"            "ACO2"        "TNNT2"
##  [977] "G3BP2"       "CAPN3"           "G3BP1"       "SYNCRIP"
##  [981] "LARS1"       "HNRNPA2B1"       "MYH11"       "CTSK"
##  [985] "CAST"        "ADAMTS1"         "RPL19"       "HGS"
##  [989] "TNK2"        "NONO"            "XKR8"        "ASL"
##  [993] "GPSM2"       "HSPA12A"         "BAG6"        "HEY1"
##  [997] "KCNAB2"      "CHMP1A"          "SRP54"       "SGTA"
## [1001] "MYO6"        "PLAT"            "PAFAH1B1"    "GMPPB"
## [1005] "MFN2"        "CCHCR1"          "EPC1"        "EML6"
## [1009] "VCP"         "KIF5C"           "PPIG"        "PIK3CA"
## [1013] "KDM6A"       "EEF1A2"          "MARK2"       "TERF1"
## [1017] "ITGB1"       "CSNK2B"          "DDHD1"       "CAMK2A"
## [1021] "EFCAB14"     "GATM"            "ODAD1"       "ACP2"
## [1025] "MYO7A"       "PSMC2"
```

And the overlaping mouse genes:

```
##   [1] "Srpk1"      "Srsf6"           "Pfdn5"       "Ttyh1"
##   [5] "Vldlr"      "Slc4a3"          "Arfip2"      "Zdhhc3"
##   [9] "Becn1"      "Tmem241"         "Ptbp1"       "Dhx33"
##  [13] "Slit2"      "Ulk4"            "Chid1"       "Sf1"
##  [17] "Rpl12"      "Gtpbp3"          "Tyw5"        "Tmem44"
##  [21] "Pofut1"     "Meis1"           "Phykpl"      "Fance"
##  [25] "Aasdh"      "D230025D16Rik"   "Tial1"       "Ptgr2"
##  [29] "Ikbkb"      "Map4k2"          "Cit"         "Hdac5"
##  [33] "Pnkp"       "Arid3b"          "Mical1"      "Idh2"
##  [37] "Mpdu1"      "Sdccag8"         "Clk4"        "Pld5"
##  [41] "Dtx2"       "Ankrd42"         "Tia1"        "Tfe3"
##  [45] "Uspl1"      "Pde10a"          "Ankrd24"     "Dock7"
```
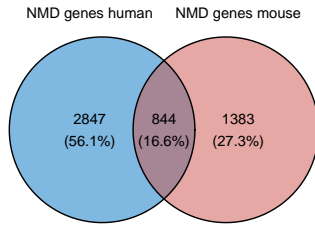
```
##  [49] "Htra2"    "Tesc"       "Pcdh15"    "Slc25a22"
##  [53] "Abcc1"    "Bcas2"      "Camk2d"    "Pidd1"
##  [57] "Ccnl1"    "Slc35c2"    "Rpl10a"    "Mtmr11"
##  [61] "Tsc1"     "Eml1"       "Ankrd16"   "Mrps11"
##  [65] "Tcirg1"   "Prpf39"     "Matk"      "Rasgrp2"
##  [69] "Cul7"     "Piezo1"     "Mus81"     "Gtf2h2"
##  [73] "Agbl3"    "Dph7"       "Mindy3"    "C2cd3"
##  [77] "Dgkq"     "Nol9"       "Dhodh"     "Nhlrc3"
##  [81] "Mboat7"   "Manba"      "Osgepl1"   "Mmp12"
##  [85] "Nfrkb"    "Cdk5rap3"   "Polg"      "Zfp523"
##  [89] "Sfi1"     "Clk2"       "Mthfsd"    "Eif4a2"
##  [93] "Guf1"     "Pcsk4"      "Rnf207"    "Tarbp2"
##  [97] "Arhgap4"  "Prpf38b"    "Chka"      "Mtmr2"
## [101] "Sccpdh"   "Uckl1"      "Tmem67"    "Nfxl1"
## [105] "Spic"     "Clcn2"      "Nr1i3"     "Cdc7"
## [109] "Carm1"    "Vwa5b2"     "Piezo2"    "Dlx1"
## [113] "Jmjd8"    "Stx1a"      "Rptor"     "Arhgap6"
## [117] "Ddx39a"   "Brat1"      "Ing3"      "Uqcc1"
## [121] "Ift122"   "Ap4m1"      "Sez6"      "Atp2b2"
## [125] "Per3"     "Dnajc8"     "Donson"    "Hps5"
## [129] "Napb"     "Dcaf11"     "Ilk"       "Coq6"
## [133] "Plcg1"    "Rhpn1"      "Afap1l1"   "Iqck"
## [137] "Ubfd1"    "Cpne1"      "Dnajc11"   "Zfp326"
## [141] "Fastk"    "Spns1"      "Lrrc49"    "Parl"
## [145] "Tm9sf1"   "Clk1"       "Uimc1"     "Taf1c"
## [149] "Brd2"     "Cyb5rl"     "Prss44"    "Ankrd54"
## [153] "Hipk1"    "Lrrc45"     "Pstk"      "Rab4b"
## [157] "Foxred1"  "Chrd"       "Ebf4"      "Sympk"
## [161] "Zfp688"   "Luc7l"      "Pisd"      "Eme2"
## [165] "Nop56"    "Iffo1"      "Trnau1ap"  "Ehmt2"
## [169] "Med24"    "Acer3"      "Rasal3"    "Tmem82"
## [173] "Dmpk"     "Ahcyl1"     "Lmf1"      "Usp21"
## [177] "Sema6c"   "Wdr91"      "Nt5c1b"    "St7"
## [181] "Dguok"    "Gria3"      "Rcn2"      "Ctu2"
## [185] "Large2"   "Pigt"       "Tbc1d17"   "Nrip2"
## [189] "Sat1"     "Rnf167"     "Lrrc14"    "Rhbdd2"
## [193] "Plcd4"    "Trpm5"      "Rhbdf1"    "Zfp687"
## [197] "Jmjd4"    "Ankzf1"     "Ank3"      "Gpc2"
## [201] "Polq"     "Slc6a20b"   "Tubgcp6"   "Serbp1"
## [205] "Uba7"     "Mutyh"      "Stk16"     "Fes"
## [209] "Tars2"    "Sharpin"    "Nemp2"     "Dclre1a"
## [213] "Cpsf4"    "Tor2a"      "Gipr"      "Usp7"
## [217] "Arfrp1"   "Lmo7"       "Ppp1r9a"   "Emc8"
## [221] "Ibtk"     "Xpnpep3"    "Msh5"      "Tubgcp3"
## [225] "Fkbp14"   "Fam133b"    "Mdm2"      "Rbm5"
## [229] "Vmn2r10"  "Dop1a"      "Ccdc150"   "Arpp21"
## [233] "Slc2a8"   "Abcc10"     "Birc6"     "Rapgef3"
## [237] "Gramd1a"  "Kif14"      "Fn1"       "Gusb"
## [241] "Ncoa4"    "Qars"       "Evi5l"     "Mettl17"
## [245] "Tgfb1i1"  "Slc30a9"    "Adamts10"  "Hacl1"
## [249] "Aftph"    "Adck5"      "Ppat"      "Catsperg2"
## [253] "Alox5"    "Armc2"      "Abhd12b"   "Ptcd3"
## [257] "Rit1"     "Rrnad1"     "Traf3ip3"  "Ipo7"
## [261] "C2cd5"    "Opa1"       "Hddc2"     "Zfp263"
```
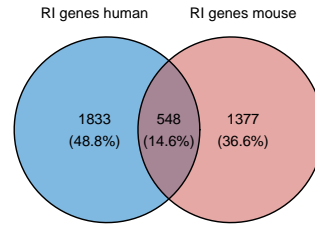
```
## [265] "Dph2"        "Trip12"         "Plaur"     "Traf7"
## [269] "Smox"        "Slc25a40"       "Gtf2ird1"  "Dis3l2"
## [273] "Slc25a37"    "Nbeal1"         "Pfkfb4"    "Mr1"
## [277] "Fam227a"     "Slc26a6"        "Chtf18"    "Pear1"
## [281] "Phc1"        "Adgrb1"         "Tmem147"   "Wdr35"
## [285] "Clasrp"      "Tra2a"          "Col27a1"   "Snx17"
## [289] "Pif1"        "Ankrd13c"       "Tbce"      "L3mbtl2"
## [293] "Ms4a6b"      "Rps13"          "Hyou1"     "Parp6"
## [297] "Exosc9"      "Eef1aknmt"      "Fuz"       "Exog"
## [301] "Kdm5d"       "Pigk"           "Gria2"     "Nob1"
## [305] "Sike1"       "Relb"           "Rpgrip1"   "Fam71e1"
## [309] "Mccc1"       "Tubgcp5"        "Farsa"     "Rusc2"
## [313] "Tcf12"       "Arhgef4"        "Aup1"      "Mmp16"
## [317] "Gbp6"        "Gstk1"          "Fbxw17"    "Ccdc163"
## [321] "Catsperg1"   "Meis3"          "Cacna1f"   "Plekhg4"
## [325] "Immt"        "Bub3"           "Smpd2"     "Actr5"
## [329] "Blmh"        "Iqca1l"         "Tm7sf2"    "Hnrnpll"
## [333] "Ceacam1"     "Bscl2"          "Gpatch2"   "Slc2a3"
## [337] "Atrip"       "Psma3"          "Crtc2"     "Psmd13"
## [341] "Krit1"       "Polrmt"         "H2-T3"     "Cse1l"
## [345] "Bud23"       "Robo3"          "Celf2"     "Apbb2"
## [349] "Il17re"      "Ythdc1"         "Slc50a1"   "Dnase1"
## [353] "Vps9d1"      "Rbm38"          "Agbl5"     "Gnb4"
## [357] "Map11"       "Zbtb48"         "Uggt1"     "Vmn2r116"
## [361] "Epb41l3"     "Gfus"           "Tbc1d10c"  "Rnf31"
## [365] "Nudt13"      "Dennd6b"        "E4f1"      "Carmil3"
## [369] "Vmn2r23"     "Cdk10"          "Vmn2r120"  "Gpr137"
## [373] "Slc30a10"    "Yeats2"         "Cenpt"     "Dop1b"
## [377] "Slc22a17"    "Malt1"          "Cpsf1"     "Cep72"
## [381] "Mau2"        "Vmn2r65"        "Vmn2r76"   "Kif15"
## [385] "Capn15"      "Atad2b"         "Flt3l"     "Vmn2r67"
## [389] "Vmn2r124"    "Clcn4"          "Hspa13"    "Trpm4"
## [393] "Nfkb2"       "Lrrc73"         "Akap8"     "Abcd4"
## [397] "Parn"        "Vmn2r113"       "Acy1"      "Nckap1l"
## [401] "Tmed1"       "Ilf3"           "Anks3"     "Naa40"
## [405] "Nars"        "Ushbp1"         "Vmn2r3"    "Dis3"
## [409] "Acd"         "Gga1"           "Phf20l1"   "Gns"
## [413] "Rpl18a"      "Tecpr2"         "BC004004"  "Ccdc134"
## [417] "Tmem143"     "Rgl3"           "Cnot10"    "Npas4"
## [421] "Proz"        "Ddx11"          "Slc17a4"   "Smpd4"
## [425] "Zdhhc17"     "Coro1b"         "Dpp3"      "Vmn2r114"
## [429] "Ankrd1"      "Ssh3"           "Tfdp1"     "Adcy6"
## [433] "Vmn2r84"     "Vac14"          "Adgrg3"    "Sfxn2"
## [437] "H2-Eb1"      "Khnyn"          "Cdk20"     "Psmb9"
## [441] "Riok3"       "Zfp90"          "Pkd1"      "Slc25a28"
## [445] "Armc12"      "Irf7"           "Cfap20"    "Cuta"
## [449] "Slc44a2"     "Cep192"         "Tubgcp2"   "Mfsd7a"
## [453] "Ggt5"        "C030006K11Rik"  "Slc7a6"    "Vmn2r8"
## [457] "Trpm3"       "Casp1"          "Kifc2"     "Atl2"
## [461] "Dnajc7"      "Vps13a"         "Cyp2d9"    "Rrp1"
## [465] "Vmn2r4"      "Enkd1"          "Dock9"     "Fastkd3"
## [469] "Vmn2r79"     "Tube1"          "Klhl17"
```

Overlap between human and mouse genes

split−ORF enconding Genes in human and mouse (NMD)

split−ORF enconding Genes in human and mouse (RI)

The following are the overlaping NMD genes:

```
##   [1] "FAM135A"  "ARHGEF10L" "LRRC74A" "RNF170"  "RNF8"    "ALKBH8"
##   [7] "ST8SIA1"  "TMEM33"    "KCTD20"  "TM6SF1"  "PFDN5"   "SLC25A12"
##  [13] "SLC25A17" "SLC25A37"  "LARS2"   "SLC6A5"  "ENGASE"  "PPP4R1"
##  [19] "VWA3A"    "RETREG2"   "AGBL3"   "SS18"    "ACER3"   "CFAP298"
##  [25] "HNRNPLL"  "ATP8A2"    "FAM126B" "PDGFC"   "CHFR"    "MPHOSPH9"
##  [31] "RAD1"     "SH3TC2"    "FOXP1"   "CRTC2"   "VWF"     "MDM2"
##  [37] "MAPK10"   "PTDSS1"    "DCAF11"  "ANKRD11" "PANK2"   "BSCL2"
##  [43] "TERB1"    "HDDC2"     "NSD2"    "TTLL9"   "USHBP1"  "DDX39A"
##  [49] "SLC26A6"  "SETD2"     "SCNN1A"  "MPDU1"   "DCUN1D2" "AGL"
##  [55] "UQCC1"    "ABHD11"    "PRKN"    "SETD3"   "ESR2"    "XYLT2"
##  [61] "PLD5"     "SLC50A1"   "SLC30A10" "DAW1"   "ICA1"    "DFFB"
##  [67] "TAF1"     "KLRD1"     "DTNB"    "RBM39"   "SLC15A4" "NR3C2"
##  [73] "CUL2"     "RXFP1"     "SNX27"   "PBX3"    "GLI2"    "FGD2"
##  [79] "RBM38"    "N4BP2L1"   "ECHDC2"  "ERC1"    "NCSTN"   "TARS2"
##  [85] "MLXIPL"   "ST7L"      "IKBKB"   "SEPSECS" "KANSL3"  "CUTA"
##  [91] "IL1RAP"   "FUZ"       "NT5C2"   "PTCH1"   "CASP2"   "PCDH15"
##  [97] "SHARPIN"  "NEMP2"     "HNRNPL"  "NT5C1B"  "PFKFB2"  "TCAIM"
## [103] "LETMD1"   "PAX5"      "HACL1"   "CPNE1"   "DIS3L2"  "NLRC4"
## [109] "EXOG"     "DGKA"      "RASSF1"  "ATF2"    "NDUFA10" "AIPL1"
## [115] "ERCC8"    "FSIP2"     "FOXP2"   "CLASRP"  "RANBP17" "DMTF1"
## [121] "SLC22A17" "FKBP14"    "ABHD12B" "DPAGT1"  "PHYHD1"  "TTC5"
## [127] "SLC35F5"  "CLK1"      "UEVLD"   "HAUS2"   "FAM133B" "DEPDC5"
## [133] "SNCAIP"   "ARID5A"    "CLIP4"   "LZTR1"   "IL17RE"  "SETMAR"
## [139] "SPATA6L"  "SEPTIN5"   "MMS19"   "RNF216"  "IL31RA"  "IMMT"
## [145] "DCLK2"    "ALG3"      "LMO3"    "ATG9A"   "ARHGAP4" "DPP8"
## [151] "SENP2"    "SLC26A3"   "PSMD13"  "COPS7B"  "SMARCAD1" "METTL8"
## [157] "SMPD4"    "DNA2"      "ADAMTS6" "RAB4B"   "PIAS2"   "SLC35F6"
## [163] "MST1R"    "TCTN1"     "APH1B"   "FAM76B"  "CLCN6"   "ZSCAN25"
## [169] "MTMR14"   "PBRM1"     "WDR35"   "BICD1"   "MTO1"    "TANGO2"
## [175] "THUMPD2"  "RASGRP1"   "ESCO1"   "DNMT3A"  "SLC7A6"  "RAD18"
## [181] "PLEKHG4"  "NFAT5"     "PKP4"    "CYB5RL"  "LMAN2L"  "TBL2"
## [187] "LUC7L"    "SRSF7"     "GUSB"    "HMGXB4"  "GART"    "DGUOK"
## [193] "CFL2"     "RSRC2"     "AP4M1"   "CNOT10"  "EIF4G1"  "NWD1"
## [199] "PISD"     "KLHL18"    "IGFN1"   "OSBPL9"  "RNF181"  "EIF4A2"
## [205] "DONSON"   "CHCHD3"    "BRPF3"   "CHEK2"   "TPH1"    "THOC2"
## [211] "BUD23"    "ENPP3"     "SLC4A3"  "DECR2"   "PARL"    "CHRD"
## [217] "C2CD3"    "HSF4"      "POU6F2"  "LIMK1"   "TSPAN32" "PSMG1"
```

```
## [223] "SERPINB13" "SPOPL"      "SUMF2"      "MDFIC"      "DTX2"       "FLNA"
## [229] "ING3"       "XYLB"       "E2F6"       "TTLL3"      "XPNPEP3"    "RASGRP2"
## [235] "RHBDF1"     "KCTD10"     "FRMD5"      "SLC5A2"     "HAUS5"      "TEX35"
## [241] "AGPAT4"     "NR4A2"      "OXSR1"      "SMDT1"      "TMEM39B"    "CCDC150"
## [247] "OGG1"       "PRPF39"     "BOLL"       "MAP4K2"     "ATG16L2"    "PPIL2"
## [253] "ARPC1A"     "SLC25A40"   "CELF6"      "BBS9"       "CHTF18"     "SELENBP1"
## [259] "DDX11"      "CFAP69"     "COLEC11"    "ARMC9"      "CCNT1"      "GLS2"
## [265] "MIEF1"      "ATP13A4"    "SNX17"      "PON3"       "TARDBP"     "CTTNBP2"
## [271] "MBOAT7"     "P2RX6"      "HELB"       "GRIP2"      "CAPZA2"     "MSH5"
## [277] "TAF6"       "PIEZO1"     "UGGT1"      "QTRT1"      "ABCD4"      "NEPRO"
## [283] "MAPK14"     "ATL2"       "SFXN2"      "CCNL1"      "DCAF8"      "SON"
## [289] "ACSS2"      "ATP11A"     "PAXBP1"     "REPS1"      "PHYKPL"     "RSBN1"
## [295] "FAS"        "TTC26"      "NOP56"      "DNAI4"      "PORCN"      "TESC"
## [301] "SLC2A2"     "KCNK2"      "EZH2"       "ICMT"       "TRMT11"     "PHF20L1"
## [307] "SEC22C"     "TIA1"       "COG4"       "KPNA1"      "U2SURP"     "PGAP2"
## [313] "PFKFB3"     "RABL3"      "SF1"        "CLCN1"      "MLH1"       "TMEM222"
## [319] "SCAI"       "FANCI"      "DUSP12"     "SERINC4"    "EBF4"       "SLC37A3"
## [325] "KIF15"      "TMEM241"    "SNRPB"      "EIF2A"      "ATP2B2"     "ERCC6L2"
## [331] "ABHD18"     "ZBTB41"     "GK5"        "PTBP2"      "ARIH2"      "TTLL11"
## [337] "GABBR1"     "MUTYH"      "UBA3"       "ZFAND4"     "CREM"       "ADCY10"
## [343] "RAD51C"     "UBE3B"      "ZGRF1"      "TUBGCP2"    "SZT2"       "CD200"
## [349] "SAMD7"      "BRD2"       "MITF"       "PABPC4"     "IFFO1"      "RHBDD2"
## [355] "LUC7L2"     "GNAS"       "B4GALT2"    "SLC9C1"     "IRF7"       "DNAJC25"
## [361] "ABRAXAS1"   "NPHP3"      "ACOT8"      "FAM71F1"    "TMF1"       "PIK3CB"
## [367] "ABTB1"      "SLCO2A1"    "B4GALT4"    "ERMP1"      "HMCN2"      "ABHD10"
## [373] "ALDH7A1"    "CLASP2"     "TYW5"       "TRPC4"      "ACY1"       "DIS3"
## [379] "CCDC154"    "AKAP1"      "SFI1"       "SLC30A6"    "CTC1"       "ACP1"
## [385] "GOLGA1"     "SRPK2"      "TSC22D2"    "LY9"        "ARPP21"     "CRHR2"
## [391] "SRSF6"      "RAD52"      "SLC38A6"    "ANKUB1"     "ADAMTS18"   "CPA6"
## [397] "NFXL1"      "CCDC28B"    "CYP4B1"     "INTS7"      "ARF4"       "MYO1G"
## [403] "TTC14"      "COL4A3"     "AGBL5"      "PFKFB4"     "MIER3"      "U2AF1"
## [409] "SLC49A4"    "TOR2A"      "PIGT"       "VCPKMT"     "ABHD12"     "MED24"
## [415] "CSAD"       "WDR26"      "TERT"       "KMT5C"      "STAG1"      "DPH2"
## [421] "PDZD7"      "BMP1"       "SLC35B1"    "TAF1C"      "SLC25A3"    "NPAS4"
## [427] "CYP2R1"     "CNIH2"      "MFSD10"     "SART3"      "P4HA3"      "RELT"
## [433] "PRDM4"      "TMEM260"    "MUS81"      "MMS22L"     "DTNBP1"     "SNTG1"
## [439] "RAD51"      "SLC9B1"     "TARBP2"     "RBM25"      "TGFB1I1"    "RPAIN"
## [445] "B4GALNT1"   "VAC14"      "SLC36A4"    "ELAPOR1"    "PSMA6"      "RPS6KB2"
## [451] "ADAM18"     "TMEM161B"   "ABCC12"     "DIABLO"     "SYT9"       "FASTKD3"
## [457] "RAB35"      "ADGRB1"     "VEZT"       "SEZ6"       "HAL"        "MTHFSD"
## [463] "LIN54"      "CEP192"     "EXOSC9"     "FBXO22"     "GLOD4"      "HNF1A"
## [469] "AASDH"      "NUP107"     "ADCK5"      "GLG1"       "PDE2A"      "PRMT9"
## [475] "RIC1"       "UFSP2"      "SLC25A32"   "PKNOX1"     "MYO5C"      "SYT7"
## [481] "BBS1"       "ELOVL7"     "SSH3"       "STAU2"      "SLC25A36"   "PANK4"
## [487] "POLK"       "TMEM126A"   "MICAL3"     "CORO1C"     "MINAR1"     "PARP6"
## [493] "TPM1"       "OTUD6B"     "OPRM1"      "NR1I3"      "ASTE1"      "RNF10"
## [499] "YARS2"      "WASHC4"     "UIMC1"      "FBXW10"     "TM9SF1"     "USP33"
## [505] "IL10RA"     "ADGRG3"     "LRP5"       "GIN1"       "FBXO28"     "PSMA8"
## [511] "TEC"        "PXMP2"      "RCE1"       "SLC30A9"    "SH3TC1"     "IPO4"
## [517] "COL27A1"    "ALKBH1"     "DNASE1"     "KLHL8"      "DIO1"       "RGL3"
## [523] "PIDD1"      "ISL2"       "FAM214A"    "ALDH1L1"    "TMPRSS4"    "POLB"
## [529] "PPT1"       "FOXRED1"    "RC3H2"      "NDUFB8"     "NEK11"      "SOAT2"
## [535] "PDE4DIP"    "TOMM20L"    "GTF2H2"     "CHPT1"      "TBC1D10C"   "SERGEF"
## [541] "MMAA"       "CIAPIN1"    "NEURL4"     "LRRC49"     "TM7SF2"     "SCNN1B"
```

```
## [547] "POC1B"     "CLK4"       "POLG"       "KLHDC1"     "GABRA2"     "BCL7C"
## [553] "HNRNPD"     "PARP8"      "PHC1"       "PPM1A"      "BRSK2"      "DTWD2"
## [559] "DHX33"      "STARD9"     "CDK2AP2"    "RNF212"     "TRPC7"      "MKRN2OS"
## [565] "SLC22A1"    "NCKAP1L"    "ITGB2"      "TK2"        "CDK10"      "ARHGEF40"
## [571] "MDGA2"      "ZBTB49"     "CENPT"      "SENP1"      "TFDP1"      "DCTD"
## [577] "PAK1"       "TIAL1"      "RCOR3"      "CNOT1"      "METTL17"    "ATF1"
## [583] "CEP57"      "PKD1"       "TAPT1"      "ANAPC5"     "C2CD5"      "COQ6"
## [589] "MBD4"       "IQCK"       "KCTD9"      "PTPN21"     "PPP2R1B"    "KANSL2"
## [595] "IFT122"     "TFE3"       "KLHDC4"     "ZDHHC11"    "ENPP1"      "CDK8"
## [601] "TNFRSF8"    "DENND3"     "BCLAF1"     "MCCC1"      "MRPL13"     "TMEM68"
## [607] "SYNE2"      "TEP1"       "MTRR"       "RIC8A"      "DOC2A"      "ARHGAP6"
## [613] "ERN2"       "KDM3B"      "HAPLN3"     "DDX5"       "HNRNPDL"    "KIF27"
## [619] "LMF1"       "ABHD16A"    "CCPG1"      "HIKESHI"    "CYB561A3"   "DGKZ"
## [625] "NOX4"       "NAA25"      "PRIMPOL"    "FCSK"       "GAS2"       "RXYLT1"
## [631] "LUC7L3"     "BDP1"       "NAA40"      "MTMR10"     "IL6ST"      "ATP8A1"
## [637] "CNTROB"     "INTS11"     "BTBD10"     "TDG"        "CTU2"       "RELA"
## [643] "CASP1"      "YLPM1"      "PTPN22"     "LRRK1"      "ATG10"      "PBX4"
## [649] "TMEM231"    "METTL3"     "SLTM"       "RIPK2"      "PSMA3"      "RAPGEF3"
## [655] "RPAP1"      "METTL16"    "CMAS"       "ATP8B4"     "DOCK2"      "ASH2L"
## [661] "LRRC36"     "CNOT2"      "NEDD4"      "MAP2K3"     "VPS33B"     "MAN2A2"
## [667] "ZW10"       "GORAB"      "ARFIP2"     "TATDN1"     "SH3GL3"     "KDM2B"
## [673] "USP7"       "DAGLA"      "GPAA1"      "FAM172A"    "IBTK"       "GLMN"
## [679] "CORO1B"     "TRAPPC6B"   "ZFP90"      "PAIP1"      "AREL1"      "DYNC2H1"
## [685] "RNF41"      "INPP4B"     "DHODH"      "PPARGC1A"   "EDC3"       "NADSYN1"
## [691] "SGSH"       "DUS2"       "CDH10"      "RPTOR"      "HRAS"       "PHRF1"
## [697] "EFCAB1"     "ANGPTL4"    "SLC29A3"    "ENTPD1"     "OPA1"       "PNKP"
## [703] "DENND1C"    "BLMH"       "FGFR2"      "RAD51D"     "GGA3"       "ADAMTS10"
## [709] "ADAM17"     "ADGRV1"     "CDH8"       "TBCE"       "KCNMA1"     "TUBGCP3"
## [715] "ASPSCR1"    "CEP78"      "ALG9"       "CFTR"       "RTTN"       "EPB41L3"
## [721] "TMED1"      "FOXP3"      "DOCK7"      "ANKS3"      "SAFB2"      "SMURF2"
## [727] "TBC1D17"    "PARN"       "COL11A1"    "PCSK4"      "CARM1"      "SCN1A"
## [733] "CARMIL1"    "PIGA"       "MAP4K1"     "SYMPK"      "TSC1"       "PDE10A"
## [739] "DUSP22"     "CACNA1D"    "LGI1"       "SLC35B3"    "CDK5RAP3"   "SAMHD1"
## [745] "DNAJC7"     "TBK1"       "GNAO1"      "FKTN"       "TRPM4"      "SYT6"
## [751] "CELF2"      "PITPNA"     "FAM71E2"    "U2AF1L4"    "MANBA"      "CLCN2"
## [757] "WDR62"      "CCDC163"    "DGKH"       "SHMT1"      "STING1"     "PSMC5"
## [763] "GIPR"       "SLC2A1"     "RNF114"     "ATP9B"      "MAP2K4"     "CEP89"
## [769] "CTNNB1"     "WNK4"       "FLOT2"      "MYNN"       "AGO1"       "PARG"
## [775] "TTC27"      "SPAST"      "DHPS"       "COQ8B"      "CRLF3"      "EML2"
## [781] "GRAMD1A"    "NPRL3"      "ODF4"       "ROCK1"      "ARFRP1"     "ATCAY"
## [787] "DMPK"       "SMARCA2"    "WIZ"        "RIT2"       "MALT1"      "POU6F1"
## [793] "SCLT1"      "AKAP8"      "XKR5"       "CDC25C"     "GRM4"       "ADSL"
## [799] "BORA"       "PTBP1"      "TPCN2"      "PCGF6"      "CD22"       "PER1"
## [805] "ANK3"       "AANAT"      "SLF2"       "SAMD8"      "CBARP"      "PLEKHH3"
## [811] "TUBE1"      "CAMTA2"     "VRK3"       "SLC7A10"    "FARSA"      "LONP1"
## [817] "FECH"       "KCP"        "DOCK9"      "KCNH6"      "ATRIP"      "TBC1D24"
## [823] "PIEZO2"     "MTMR2"      "CIT"        "NDE1"       "MSH3"       "CEP41"
## [829] "UNC45A"     "OBSCN"      "NFKB1"      "B3GALNT2"   "CLCN4"      "CAPN3"
## [835] "DLG1"       "SYNCRIP"    "CEP126"     "SHANK3"     "ATP6V0A2"   "POLG2"
## [841] "ITGB1"      "DDHD1"      "ABCC1"      "MYO7A"
```

And the overlaping RI genes:

```
##   [1] "ESRP2"     "MAU2"      "SLC22A17"  "CPT1C"     "SFI1"      "PLCH2"
##   [7] "SRPK1"     "GDPD3"     "NAA40"     "PHF20L1"   "HAGHL"     "VPS16"
##  [13] "MCOLN1"    "PCSK4"     "ODF2"      "FIBP"      "GRK2"      "CENPT"
##  [19] "PKD1"      "SEPTIN7"   "DIS3L2"    "MYD88"     "EIF4A1"    "TMEM191C"
##  [25] "RBM5"      "L3MBTL1"   "HPS3"      "CRIP1"     "SYVN1"     "SCART1"
##  [31] "STAB1"     "XPO5"      "SIRT2"     "RUSC1"     "PISD"      "TKT"
##  [37] "ENTPD8"    "ILKAP"     "AP4M1"     "CFAP65"    "ARHGAP30"  "UROD"
##  [43] "PLCD4"     "IDH3B"     "CHRD"      "ZBP1"      "MSTO1"     "TMEM176A"
##  [49] "IBTK"      "EHMT2"     "DLG3"      "SH3GLB2"   "NCL"       "ACTB"
##  [55] "TAMM41"    "CLK1"      "BUD23"     "CPNE6"     "MICAL1"    "DALRD3"
##  [61] "CUL9"      "CDK20"     "ADAM15"    "TNRC6A"    "CCDC78"    "TRABD"
##  [67] "SUSD2"     "FASTK"     "NPRL2"     "CLK3"      "CFAP410"   "HDAC7"
##  [73] "RGL3"      "PPOX"      "PEAR1"     "BIRC6"     "SKIV2L"    "IL12A"
##  [79] "APEH"      "CHTF18"    "BRAT1"     "P4HTM"     "PCK1"      "ADGRL2"
##  [85] "NONO"      "PMPCB"     "ARHGEF25"  "SMARCD3"   "ING4"      "TPM3"
##  [91] "CUTA"      "ANKZF1"    "CD55"      "TAZ"       "GUSB"      "FAHD2A"
##  [97] "MAPK12"    "ATP13A1"   "BRD2"      "FAM50A"    "HPS4"      "TWF2"
## [103] "ALKBH6"    "NAA10"     "ARHGAP4"   "TOR2A"     "YEATS2"    "DPF1"
## [109] "ZFAND2B"   "RAF1"      "AUP1"      "GSTK1"     "RALGDS"    "SLC11A1"
## [115] "ADAM33"    "YDJC"      "GRIA2"     "TTC21A"    "SLC27A3"   "MAN2B1"
## [121] "USP11"     "MAP4K2"    "L3MBTL2"   "DNAJC2"    "SYT8"      "GAPDH"
## [127] "SYNE1"     "HDAC10"    "RHBDF1"    "GPC2"      "NSUN5"     "CCDC150"
## [133] "STARD3NL"  "RAB24"     "AP5Z1"     "CCNL1"     "CDK10"     "FGFR1"
## [139] "TIAL1"     "KDM5D"     "GDI1"      "TBCE"      "WDR91"     "WIPI2"
## [145] "DST"       "VILL"      "PICK1"     "PDHB"      "CCDC24"    "ATG4B"
## [151] "PLXNA3"    "AIFM3"     "PLOD3"     "TECPR1"    "ATG16L1"   "DVL3"
## [157] "PRPF39"    "TMEM131"   "HDAC6"     "PLEKHG5"   "MEIS1"     "NDUFS2"
## [163] "JMJD4"     "DYNC1LI1"  "NELFCD"    "ARHGEF33"  "TMEM147"   "NUP35"
## [169] "CHKB"      "RAPGEF3"   "ASZ1"      "ABCD4"     "RPS12"     "SLC20A1"
## [175] "IFFO1"     "FUS"       "SNRNP200"  "NT5C1B"    "MTMR11"    "CFAP44"
## [181] "TRIOBP"    "AAMP"      "DNAH10"    "EEF1A1"    "LRWD1"     "PGGHG"
## [187] "CAMKV"     "FN1"       "EIF4A2"    "RORC"      "POMT1"     "GBP5"
## [193] "GMPPB"     "NOC2L"     "DIP2A"     "CRIP3"     "STK16"     "TTYH1"
## [199] "RNF123"    "ARHGEF4"   "CPNE1"     "HEMK1"     "RGS11"     "BET1L"
## [205] "TRAF3IP3"  "ABCB8"     "TRPV6"     "KRI1"      "RNF207"    "SLC26A6"
## [211] "PHYKPL"    "TOGARAM2"  "RNPEPL1"   "PLEKHG3"   "PARP9"     "PCED1A"
## [217] "COL3A1"    "ZDHHC3"    "PSMD11"    "SMPD4"     "CC2D1B"    "ARHGEF16"
## [223] "TIA1"      "MEN1"      "HTRA2"     "ARHGAP6"   "PTCD3"     "EXOSC8"
## [229] "GLT8D1"    "FDPS"      "PYCR2"     "TAP1"      "SLC2A3"    "CRTC2"
## [235] "IFRD2"     "CYB5RL"    "AGBL5"     "CNTN2"     "ATXN2"     "ZBTB48"
## [241] "MAPK15"    "HAX1"      "KCNT1"     "MANBA"     "RHPN1"     "SLC9A5"
## [247] "MAN2C1"    "ADCY4"     "IKBKB"     "EML6"      "TCTN2"     "ADGRB1"
## [253] "SPSB3"     "RASA4"     "ISCA2"     "UBR5"      "WDR90"     "KIF21B"
## [259] "FANCA"     "EPS8L2"    "ARFIP2"    "CTSH"      "TAOK3"     "DGCR8"
## [265] "MXD3"      "VPS13B"    "WDR83"     "TCIRG1"    "TSPYL2"    "ROBO3"
## [271] "VPS28"     "IFT122"    "PIDD1"     "TUBGCP6"   "VWA5B2"    "PSME2"
## [277] "ANO9"      "PPP1R16A"  "LTK"       "PAN2"      "MORF4L1"   "ABCC8"
## [283] "ZFYVE26"   "ARHGAP9"   "CIAO3"     "TAF1C"     "NAE1"      "INO80E"
## [289] "OGFOD2"    "TGFB1I1"   "SEPTIN1"   "CCDC33"    "P2RX4"     "PSMA3"
## [295] "FHOD1"     "PCK2"      "HSPA8"     "POLE"      "SLC25A37"  "PITPNM1"
## [301] "CLK4"      "APBB3"     "SIRT7"     "PUSL1"     "NPEPL1"    "FADS3"
## [307] "MARK3"     "FIP1L1"    "DDX11"     "LMBR1L"    "GPT"       "RCCD1"
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## [313] "PFDN5"     "COG2"       "SLC15A3"   "ACAD10"    "RUSF1"      "PAPLN"
## [319] "DHRS1"     "LMF2"       "NR1I3"     "CTSF"      "DENND6B"    "SRSF5"
## [325] "STAG3"     "CIT"        "SLC18A2"   "ERCC3"     "HIP1R"      "GFUS"
## [331] "CPM"       "RACK1"      "NUDT8"     "PPP1CA"    "IRF9"       "MOK"
## [337] "MYG1"      "DCAF11"     "AAAS"      "WDR19"     "LRRC49"     "DDX23"
## [343] "MUS81"     "CCNL2"      "NPEPPS"    "DCTN2"     "PTGR2"      "DDX47"
## [349] "ADCY6"     "RHOT2"      "C2CD5"     "COQ6"      "CHD8"       "TRIO"
## [355] "AFTPH"     "RABGGTA"    "LARGE2"    "DNAJB5"    "COPG1"      "PHB2"
## [361] "KIF22"     "CCDC14"     "CTU2"      "SAAL1"     "SNX32"      "ADGRG3"
## [367] "TLE3"      "SETDB1"     "EMSY"      "RAB26"     "TM7SF2"     "CARMIL3"
## [373] "MED13L"    "POLG"       "ALDOA"     "ZFYVE16"   "DPH2"       "ALDH6A1"
## [379] "SPG7"      "CCDC180"    "SLC30A9"   "GTF2H2"    "TRA2A"      "PSMD13"
## [385] "CEP164"    "CYC1"       "DRAP1"     "MFGE8"     "DGAT1"      "MTFMT"
## [391] "CYP11A1"   "ADPGK"      "ODAD1"     "FOXRED1"   "STAT2"      "IQCK"
## [397] "CD19"      "ILK"        "PSTPIP1"   "KLRK1"     "PKD2"       "HTT"
## [403] "TBC1D10C"  "CAPN15"     "STAT6"     "BRD9"      "MRPS11"     "ACAD9"
## [409] "ATXN7L2"   "PPIA"       "OSGEPL1"   "FBXL6"     "CERS4"      "ZXDC"
## [415] "NSMAF"     "ARHGAP32"   "BECN1"     "GBF1"      "TRMT1"      "EME2"
## [421] "STUB1"     "ARHGEF1"    "LIAS"      "CDK5RAP3"  "DMPK"       "PNKP"
## [427] "RUNDC3A"   "LAS1L"      "ACD"       "RASGRP4"   "TRIM2"      "NPC1"
## [433] "DDX49"     "USE1"       "AP3D1"     "REC8"      "TPP1"       "RMC1"
## [439] "PSMC3IP"   "ZFPL1"      "SLC25A42"  "SCFD1"     "MPDU1"      "MTMR2"
## [445] "NOP56"     "SAFB"       "LIG3"      "FAM98C"    "GCDH"       "HADH"
## [451] "DDX39A"    "TNFRSF12A"  "ATR"       "ZZEF1"     "TOX4"       "CXXC1"
## [457] "ACADVL"    "CYBC1"      "SMARCB1"   "AKAP8L"    "RAP1GAP"    "PTBP1"
## [463] "RAB15"     "GSS"        "SEPTIN4"   "OSBPL7"    "PAFAH1B1"   "NIBAN3"
## [469] "NUP205"    "PARP6"      "TNK2"      "FARSA"     "POLD1"      "MSH5"
## [475] "SLC6A1"    "ISYNA1"     "ATG4D"     "CLUH"      "TMEM259"    "MAST1"
## [481] "CARM1"     "DHODH"      "PSMC4"     "DUS1L"     "DUS3L"      "SHFL"
## [487] "RASAL3"    "E4F1"       "ANKS3"     "GRB7"      "CLCN2"      "COPA"
## [493] "ARRDC2"    "THOC1"      "ALDH16A1"  "IZUMO1"    "PLEKHJ1"    "TMC4"
## [499] "IZUMO4"    "ACP2"       "PIGT"      "UBXN6"     "RHBDF2"     "DCXR"
## [505] "NUBP1"     "MALT1"      "TSC1"      "PPP2R5D"   "CAMKK1"     "CARMIL2"
## [511] "XAB2"      "EVI5L"      "MPPE1"     "DPP9"      "HDDC2"      "DOCK7"
## [517] "CEP120"    "ILF3"       "MZF1"      "SPNS1"     "ATRX"       "CORO7"
## [523] "ACY1"      "SLC27A1"    "PSMB8"     "STRN4"     "RIOK3"      "CCDC39"
## [529] "SFTPD"     "ECH1"       "ZAN"       "DNAJC7"    "FBXW7"      "PDE4C"
## [535] "GREB1L"    "CUL7"       "AIFM1"     "TRPM4"     "KIF12"      "SYMPK"
## [541] "SLC25A11"  "RANBP3"     "CNOT3"     "PLAUR"     "SPAG5"      "TEDC2"
## [547] "DVL1"      "EMG1"
```