**Table S3**. Comparison of the identified motif by different methods

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TF name | FCNGRU-double | FCNGRU-single | FCNA | FCN |
| Alx3  (UP00108) | *p*-value: 4.23e-08; *e*-value: 1.63e-05; *q*-value:2.63e-05; Overlap: 16; Offset: -1; Orientation: Normal | *p*-value: 7.86e-07; *e*-value: 1.41e-03; *q*-value:2.07e-03; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 8.39e-06; *e*-value: 3.24e-03; *q*-value:3.38e-03; Overlap: 13; Offset: -4; Orientation: Normal | *p*-value: 3.99e-06; *e*-value: 1.54e-05; *q*-value:2.49e-05; Overlap: 13; Offset: -4; Orientation: Normal |
| Aft1  (UP00344) | *p*-value: 7.56e-17; *e*-value: 6.73e-15; *q*-value:1.32e-14; Overlap: 21; Offset: 0; Orientation: Normal | *p*-value: 5.40e-11; *e*-value: 4.80e-09; *q*-value:9.49e-09; Overlap: 20; Offset: -1; Orientation: Normal | *p*-value: 4.00e-09; *e*-value: 3.56e-07; *q*-value:6.94e-05; Overlap: 21; Offset: 0; Orientation: Normal | p-value: 1.20e-07; e-value: 1.07e-05; q-value:2.05e-05; Overlap: 18; Offset: 3; Orientation: Normal |
| Barx1  (UP00108) | *p*-value: 4.48e-09; *e*-value: 1.73e-06; *q*-value:2.90e-06; Overlap: 15; Offset: -1; Orientation: Normal | *p*-value: 5.75e-08; *e*-value: 2.22e-05; *q*-value:3.79e-05; Overlap: 15; Offset: -1; Orientation: Normal | *p*-value: 7.64e-07; *e*-value: 2.95e-04; *q*-value:5.29e-04; Overlap: 14; Offset: 2; Orientation: Normal | *p*-value: 1.70e-06; *e*-value: 6.57e-04; *q*-value:1.20e-03; Overlap: 14; Offset: -2; Orientation: Normal |
| Bcl6b  (UP00108) | *p*-value: 5.59e-13; *e*-value: 2.16e-10; *q*-value:4.31e-10; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 1.13e-12; *e*-value: 4.37e-10; *q*-value:8.74e-10; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 5.96e-10; *e*-value: 2.30e-07; *q*-value:4.60e-07; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 1.27e-11; *e*-value: 4.92e-09; *q*-value:9.84e-09; Overlap: 16; Offset: 0; Orientation: Normal |
| Cdx1  (UP00240) | *p*-value: 2.29e-16; *e*-value: 8.85e-14; *q*-value:1.63e-13; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 2.10e-11; *e*-value: 8.10e-06; *q*-value:9.75e-06; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 3.90e-09; *e*-value: 1.51e-06; *q*-value:2.69e-06; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 3.75e-08; *e*-value: 1.45e-05; *q*-value:1.59e-05; Overlap: 16; Offset: 0; Orientation: Normal |
| Dbx1  (UP00255) | *p*-value: 1.79e-09; *e*-value: 6.92e-04; *q*-value:1.28e-03; Overlap: 16; Offset: 1; Orientation: Normal | *p*-value: 4.86e-08; *e*-value: 1.88e-03; *q*-value:3.58e-03; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 5.76e-06; *e*-value: 2.22e-03; *q*-value:4.18e-03; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 1.08e-04; *e*-value: 4.17e-02; *q*-value:2.58e-02; Overlap: 16; Offset: -1; Orientation: Normal |
| E2f2  (UP00001) | *p*-value: 2.37e-07; *e*-value: 9.16e-05; *q*-value:1.81e-04; Overlap: 14; Offset: 1; Orientation: Normal | *p*-value: 3.97e-06; *e*-value: 1.53e-03; *q*-value:3.02e-03; Overlap: 14; Offset: 1; Orientation: Normal | *p*-value: 1.50e-05; *e*-value: 5.77e-03; *q*-value:1.15e-02; Overlap: 15; Offset: 0; Orientation: Normal | *p*-value: 1.17e-04; *e*-value: 4.51e-02; *q*-value:5.74e-02; Overlap: 13; Offset: -2; Orientation: Normal |
| Egr1  (UP00007) | *p*-value: 3.03e-05; *e*-value: 6.72e-01; *q*-value:6.72e-01; Overlap: 13; Offset: 1; Orientation: Normal | *p*-value: 9.18e-03; *e*-value: 3.54e+00; *q*-value:1.00e+00; Overlap: 13; Offset: 1; Orientation: Normal | *p*-value: 8.64e-03; *e*-value: 3.34e+00; *q*-value:1.00e+00; Overlap: 13; Offset: 1; Orientation: Normal | *p*-value: 2.42e-02; *e*-value: 9.32e+00; *q*-value:1.00e+00; Overlap: 13; Offset: 1; Orientation: Normal |
| Gata3  (UP00032) | *p*-value: 1.93e-10; *e*-value: 7.46e-06; *q*-value:1.49e-05; Overlap: 21; Offset: -1; Orientation: Normal | *p*-value: 5.57e-08; *e*-value: 2.15e-05; *q*-value:4.30e-05; Overlap: 21; Offset: -1; Orientation: Normal | *p*-value: 9.21e-07; *e*-value: 3.55e-04; *q*-value:7.11e-04; Overlap: 20; Offset: 2; Orientation: Normal | *p*-value: 4.60e-07; *e*-value: 1.78e-04; *q*-value:3.55e-04; Overlap: 21; Offset: -1; Orientation: Normal |
| Gzf3  (UP00347) | *p*-value: 1.78e-08; *e*-value: 1.58e-06; *q*-value:3.13e-06; Overlap: 20; Offset: 0; Orientation: Normal | *p*-value: 1.10e-7; *e*-value: 9.78e-06; *q*-value:1.94e-05; Overlap: 20; Offset: 0; Orientation: Normal | *p*-value: 3.21e-06; *e*-value: 2.85e-04; *q*-value:5.67e-04; Overlap: 19; Offset: -1; Orientation: Normal | *p*-value: 4.51e-05; *e*-value: 4.02e-03; *q*-value:3.94e-03; Overlap: 16; Offset: -4; Orientation: Normal |
| Hoxa1  (UP00264) | *p*-value: 3.07e-06; *e*-value: 1.19e-03; *q*-value:1.16e-03; Overlap: 15; Offset: -1; Orientation: Normal | *p*-value: 2.64e-05; *e*-value: 1.02e-02; *q*-value:9.01e-03; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 3.47e-04; *e*-value: 1.34e-01; *q*-value:5.89e-02; Overlap: 15; Offset: -1; Orientation: Normal | *p*-value: 6.50e-03; *e*-value: 2.51e+00; *q*-value:5.35e-02; Overlap: 14; Offset: -2; Orientation: Normal |
| Irf3  (UP00086) | *p*-value: 2.64e-11; *e*-value: 1.02e-05; *q*-value:2.03e-05; Overlap: 13; Offset: -1; Orientation: Normal | *p*-value: 2.24e-8; *e*-value: 8.66e-08; *q*-value:1.73e-07; Overlap: 14; Offset: 0; Orientation: Normal | *p*-value: 9.35e-07; *e*-value: 3.61e-06; *q*-value:7.21e-06; Overlap: 14; Offset: 0; Orientation: Normal | None |
| Max  (UP00060) | *p*-value: 5.64e-08; *e*-value: 2.18e-05; *q*-value:4.34e-05; Overlap: 13; Offset: -3; Orientation: Normal | *p*-value: 2.10e-06; *e*-value: 8.10e-04; *q*-value:1.620e-03; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 1.52e-08; *e*-value: 5.87e-06; *q*-value:1.17e-05; Overlap: 14; Offset: 2; Orientation: Normal | None |
| Mrg1  (UP00226) | *p*-value: 7.34e-09; *e*-value: 2.83e-05; *q*-value:2.81e-05; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 1.30e-07; *e*-value: 5.01e-05; *q*-value:3.16e-05; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 1.64e-06; *e*-value: 6.34e-04; *q*-value:3.46e-04; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 6.60e-05; *e*-value: 2.55e-02; *q*-value:2.54e-02; Overlap: 13; Offset: -3; Orientation: Normal |
| Mtf1  (UP00097) | *p*-value: 3.14e-07; *e*-value: 1.21e-04; *q*-value:2.42e-04; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 6.06e-06; *e*-value: 2.34e-03; *q*-value:4.68e-03; Overlap: 13; Offset: -3; Orientation: Normal | *p*-value: 2.48e-05; *e*-value: 9.58e-03; *q*-value:1.92e-02; Overlap: 14; Offset: -2; Orientation: Normal | *p*-value: 2.45e-02; *e*-value: 9.45e+00; *q*-value:1.00e+00; Overlap: 16; Offset: 0; Orientation: Reverse complement |
| Myb  (UP00092) | *p*-value: 7.52e-12; *e*-value: 2.90e-09; *q*-value:5.80e-09; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 1.55e-09; *e*-value: 5.99e-07; *q*-value:1.20e-07; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 1.53e-08; *e*-value: 5.91e-06; *q*-value:6.73e-06; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 6.04e-08; *e*-value: 2.33e-01; *q*-value:4.66e-05; Overlap: 16; Offset: -1; Orientation: Normal |
| Oaf1  (UP00298) | *p*-value: 3.22e-12; *e*-value: 2.86e-10; *q*-value:5.21e-10; Overlap: 21; Offset: 0; Orientation: Normal | *p*-value: 8.29e-11; *e*-value: 7.38e-09; *q*-value:1.40e-08; Overlap: 20; Offset: 1; Orientation: Normal | *p*-value: 5.52e-10; *e*-value: 4.91e-08; *q*-value:9.16e-08; Overlap: 20; Offset: -1; Orientation: Normal | *p*-value: 1.46e-09; *e*-value: 1.30e-07; *q*-value:2.35e-07; Overlap: 20; Offset: -1; Orientation: Normal |
| Otx1  (UP00229) | *p*-value: 2.96e-07; *e*-value: 1.14e-04; *q*-value:2.10e-04; Overlap: 15; Offset: 2; Orientation: Normal | *p*-value: 9.20e-09; *e*-value: 3.55e-06; *q*-value:6.50e-06; Overlap: 16; Offset: 1; Orientation: Normal | *p*-value: 1.23e-07; *e*-value: 4.74e-05; *q*-value:8.90e-05; Overlap: 16; Offset: -1; Orientation: Normal | *p*-value: 5.32e-09; *e*-value: 2.05e-06; *q*-value:3.81e-06; Overlap: 16; Offset: 1; Orientation: Norma |
| Pbx1  (UP00185) | *p*-value: 9.60e-10; *e*-value: 3.70e-06; *q*-value:7.35e-06; Overlap: 15; Offset: -2; Orientation: Normal | *p*-value: 3.14e-09; *e*-value: 1.21e-06; *q*-value:2.42e-06; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 2.80e-08; *e*-value: 1.08e-05; *q*-value:2.16e-05; Overlap: 16; Offset: -1; Orientation: Normal | *p*-value: 7.14e-07; *e*-value: 2.76e-04; *q*-value:5.48e-04; Overlap: 16; Offset: -1; Orientation: Normal |
| Phd1  (UP00298) | *p*-value: 1.51e-06; *e*-value: 1.35e-04; *q*-value:2.66e-04; Overlap: 20; Offset: 1; Orientation: Normal | *p*-value: 5.22e-05; *e*-value: 4.65e-03; *q*-value:9.22e-03; Overlap: 21; Offset: 0; Orientation: Normal | None | *p*-value: 1.97e-03; *e*-value: 1.75e-01; *q*-value:1.74e-01; Overlap: 18; Offset: 3; Orientation: Normal |
| Pitx1  (UP00153) | *p*-value: 6.49e-09; *e*-value: 2.50e-06; *q*-value:4.94e-06; Overlap: 16; Offset: -1; Orientation: Normal | *p*-value: 7.01e-08; *e*-value: 3.05e-05; *q*-value:6.04e-05; Overlap: 15; Offset: -2; Orientation: Normal | *p*-value: 1.02e-06; *e*-value: 3.94e-10; *q*-value:7.82e-04; Overlap: 15; Offset: -2; Orientation: Normal | *p*-value: 6.96e-05; *e*-value: 2.69e-02; *q*-value:5.33e-02; Overlap: 16; Offset: -1; Orientation: Normal |
| Rara  (UP00048) | *p*-value: 8.54e-11; *e*-value: 3.30e-07; *q*-value:6.59e-07; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 2.14e-09; *e*-value: 8.25e-07; *q*-value:1.65e-06; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 6.66e-09; *e*-value: 2.57e-07; *q*-value:5.14e-07; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 6.45e-07; *e*-value: 2.49e-04; *q*-value:4.98e-04; Overlap: 14; Offset: -2; Orientation: Normal |
| Rph1  (UP00348) | *p*-value: 2.26e-06; *e*-value: 2.02e-03; *q*-value:1.94e-01; Overlap: 18; Offset: 3; Orientation: Normal | *p*-value: 1.56e-04; *e*-value: 1.39e+00; *q*-value:7.44e-01; Overlap: 19; Offset: 2; Orientation: Normal | *p*-value: 7.11e-02; *e*-value: 6.33e+00; *q*-value:9.99e-01; Overlap: 14; Offset: 7; Orientation: Reverse Complement | *p*-value: 2.77e-02; *e*-value: 2.47e+00; *q*-value:9.30e-01; Overlap: 18; Offset: 3; Orientation: Normal |
| Sox1  (UP00069) | *p*-value: 2.73e-10; *e*-value: 1.05e-07; *q*-value:2.03e-07; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 1.75e-08; *e*-value: 6.74e-06; *q*-value:1.280e-05; Overlap: 16; Offset: 0; Orientation: Normal | *p*-value: 8.78e-08; *e*-value: 3.39e-05; *q*-value:6.57e-05; Overlap: 15; Offset: -1; Orientation: Normal | *p*-value: 4.14e-06; *e*-value: 1.60e-03; *q*-value:3.09e-03; Overlap: 15; Offset: -1; Orientation: Normal |
| Srf  (UP00077) | *p*-value: 1.31e-13; *e*-value: 5.05e-08; *q*-value:1.01e-07; Overlap: 14; Offset: 0; Orientation: Normal | *p*-value: 1.54e-10; *e*-value: 5.94e-08; *q*-value:1.19e-07; Overlap: 14; Offset: 0; Orientation: Normal | *p*-value: 2.94e-8; *e*-value: 1.13e-07; *q*-value:2.27e-07; Overlap: 14; Offset: 0; Orientation: Normal | *p*-value: 1.87e-08; *e*-value: 7.22e-06; *q*-value:1.44e-05; Overlap: 13; Offset: 1; Orientation: Normal |
| Tea1  (UP00333) | *p*-value: 7.85e-08; *e*-value: 6.99e-06; *q*-value:1.26e-05; Overlap: 18; Offset: -2; Orientation: Normal | *p*-value: 3.89e-06; *e*-value: 3.47e-04; *q*-value:6.56e-04; Overlap: 18; Offset: -2; Orientation: Normal | *p*-value: 7.30e-06; *e*-value: 6.50e-04; *q*-value:1.14e-03; Overlap: 18; Offset: -2; Orientation: Normal | *p*-value: 5.30e-02; *e*-value: 4.72e+00; *q*-value:8.85e-01; Overlap: 12; Offset: -8; Orientation: Reverse Complement |
| Usv1  (UP00343) | *p*-value: 1.62e-12; *e*-value: 1.44e-10; *q*-value:2.58e-10; Overlap: 20; Offset: 0; Orientation: Normal | *p*-value: 5.31e-11; *e*-value: 4.72e-09; *q*-value:8.77e-09; Overlap: 19; Offset: -1; Orientation: Normal | *p*-value: 7.27e-10; *e*-value: 6.47e-08; *q*-value:1.19e-07; Overlap: 18; Offset: -2; Orientation: Normal | *p*-value: 3.03e-09; *e*-value: 2.70e-07; *q*-value:5.09e-07; Overlap: 18; Offset: -2; Orientation: Normal |
| dYap1  (UP00327) | *p*-value: 5.45e-07; *e*-value: 4.85e-05; *q*-value:9.53e-05; Overlap: 17; Offset: 3; Orientation: Normal | *p*-value: 7.03e-04; *e*-value: 6.25e-02; *q*-value:1.25e-01; Overlap: 17; Offset: -3; Orientation: Normal | *p*-value: 1.03e-02; *e*-value: 9.13e-01; *q*-value:5.38e-01; Overlap: 16; Offset: -4; Orientation: Normal | *p*-value: 2.57e-06; *e*-value: 2.29e-04; *q*-value:4.49e-04; Overlap: 19; Offset: -1; Orientation: Normal |
| Zbtb3  (UP00327) | *p*-value: 2.33e-08; *e*-value: 8.98e-04; *q*-value:1.80e-03; Overlap: 15; Offset: -2; Orientation: Normal | *p*-value: 5.53e-06; *e*-value: 2.13e-03; *q*-value:4.27e-03; Overlap: 15; Offset: 2; Orientation: Normal | None | *p*-value: 4.07e-04; *e*-value: 1.57e-01; *q*-value:3.14e-01; Overlap: 15; Offset: -2; Orientation: Normal |
| Nrg1  (UP00270) | *p*-value: 4.59e-13; *e*-value: 4.09e-11; *q*-value:8.17e-11; Overlap: 19; Offset: 1; Orientation: Normal | *p*-value: 1.65e-08; *e*-value: 1.47e-06; *q*-value:2.93e-06; Overlap: 20; Offset: 0; Orientation: Normal | *p*-value: 3.46e-06; *e*-value: 3.08e-04; *q*-value:6.16e-04; Overlap: 18; Offset: -2; Orientation: Normal | *p*-value: 7.73e-03; *e*-value: 6.88e-05; *q*-value:1.37e-04; Overlap: 19; Offset: 1; Orientation: Normal |
| Rax  (UP00270) | *p*-value: 4.91e-14; *e*-value: 1.89e-11; *q*-value:3.11e-11; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 5.01e-13; *e*-value: 1.93e-10; *q*-value:3.21e-10; Overlap: 17; Offset: 0; Orientation: Normal | *p*-value: 7.19e-12; *e*-value: 2.78e-09; *q*-value:4.69e-09; Overlap: 17; Offset: 0; Orientation: Normal | None |
| Zic1  (UP00270) | *p*-value: 1.24e-14; *e*-value: 4.78e-09; *q*-value:9.36e-09; Overlap: 14; Offset: 0; Orientation: Normal | *p*-value: 6.45e-11; *e*-value: 2.49e-08; *q*-value:4.87e-08; Overlap: 14; Offset: 0; Orientation: Normal | *p*-value: 4.71e-11; *e*-value: 1.82e-08; *q*-value:3.54e-08; Overlap: 14; Offset: 0; Orientation: Normal | *p*-value: 1.37e-09; *e*-value: 5.30e-07; *q*-value:1.04e-06; Overlap: 13; Offset: 1; Orientation: Normal |