**Table S1**. The accession numbers of selected datasets selected from FANTOM

|  |  |
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| **Cell type** | **Accession number** |
| Mesenchymal stem cells | CNhs11344.11536-120A6 |
| CNhs12100.11616-122A5 |
| CNhs12126.11697-123A5 |
| Non-mesenchymal lineages | CNhs11051.11376-118A8 |
| CNhs11969.11327-117E4 |
| CNhs12494.11259-116F8 |
| CNhs11371.11336-117F4 |
| CNhs12017.11408-118E4 |
| CNhs11373.11339-117F7 |
| CNhs12021.11411-118E7 |
| CNhs11083.11281-116I3 |
| CNhs12053.11451-119A2 |
| CNhs12056.11455-119A6 |
| CNhs12060.11459-119B1 |
| CNhs12338.11494-119E9 |
| CNhs12726.11574-120E8 |
| CNhs13815.11655-122E8 |
| CNhs11311.11276-116H7 |
| CNhs11980.11353-117H3 |
| CNhs12035.11425-118G3 |
| CNhs12639.11763-123H8 |
| CNhs12640.11765-123I1 |

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| **Table S2.** The list of genes identified as hub in the each lineage network (Based on the Betweenness centrality and Degree). |
| **Cell lineages** |
|  **Osteocyte** |  **Chondrocyte** |  **Adipocyte** | **Myocyte** | **Neurocyte** | **Tenocyte** |
| TGFB1BIRC5IL6FGF2CDK1BMP2DCNRUNX2AURKACOL2A1CENPAFOXM1TWIST1PPARGSP1CCNB1CTNNB1PLK1SHMT2TCF3BMP4CDC20RRAGDMAD2L1SPP1CCL2AURKBSTAT3HAND1PTGDSFOXO1RARRES3CXCL12CCNA2MMP1ANXA1SP7MYBL2TOP2AIL1BHIST1H4ACDC25AZBTB16MEN1NCOR2BMP7ITGA5MYL9MCM7CDC45SMAD5SMAD1CHI3L2ITGA11ACTA2FMODMFAP2HIST1H1BMCM2PTGS2COL1A1SLPIMSX1MSX2COL15A1CCNB2HSPB2EGR2NRGNHIST4H4UBE2CZBED1IBSPITGB3BPCOL14A1ATF4AGTASF1BCRYABOGNGDF2ADIPOQKRT6APTTG1RAC2KLF10CHN1SFRP4HIST1H2BMIGFBP5TRIP13PTK2BSAA1C1SPTGISELNHIST1H1ACXCL6PRELPSLC17A9HIST1H2AIHIST1H2ALHIST1H3AHIST1H2BBHIST1H2BHHIST1H2BLHIST1H2BOHIST1H3BHIST1H3EHIST1H3CHIST1H3FHIST1H3IHIST1H3JHIST1H3HHIST1H3DHIST1H3GHIST1H4HHIST1H2BGHIST1H2BCHIST1H2BEHIST1H2BFHIST1H2BIHIST1H4BHIST1H4CHIST1H4DHIST1H4EHIST1H4FHIST1H4IHIST1H4JHIST1H4KHIST1H4LHIST2H4AHIST2H4BKIF2CCDCA8ZWINTSPC24CDCA5COL11A1CDT1COL3A1MCM5KIF18B | MMP2SMAD3FOXO3IGF1CBX5SOX9CCNG2FAPMCM2IL6CD55ASF1BBMP2MMP13ADD3COL2A1RASD2TGFB1ITGB1NGEFFGF2ACANRHOJIL1BGDF5MMP9CILPCXCL12KCTD16FLNCPCDH1TMSB15ACD44MAP3K8HIST4H4SCRG1DCNKYGMDSDEFB1NKX3-2HIST1H3JHIST1H3BHIST1H3ATMEM59LCDCA8MFAP5FGFR3SCG5GAS7KALRNBARX2EFEMP1CDK2AP1C15orf48CA9CLULECT1PTHHPDTRAF4EPB41L3PTGS2NT5ENOD2COL3A1NNATFGF1IGFBP5ARHGEF2UBDFNDC1FOXO1SHC4NFATC2HLA-FNFATC3CTGFEGR2CCL5PENKMLPHLSP1COL10A1ANGPTL7HIST1H2AIHIST1H2AEHIST1H2ABLPAR4C2SYBULUMNRN1KIAA1199S100BPOSTNSDK2ERGMMP1HHIPL2HIST1H2BCHIST1H2BHHIST1H2BGHIST1H2BFHIST1H2BEHIST1H1DCOL11A1IGFBP3COL14A1HIST1H4HHIST1H4ACOL5A1SERPINE2HIST2H4BHIST2H4AHIST1H4LHIST1H4KHIST1H4JHIST1H4IHIST1H4FHIST1H4EHIST1H4DHIST1H4CHIST1H4BCOL9A3COL9A2CXCL10ADORA1TGM2HIST1H3IHIST1H3HHIST1H3GHIST1H3FHIST1H3EHIST1H3DHIST1H3CFMODCRYAB | PPARGFABP4MYBL2CEBPASIRT1PPARGC1AFOXO1FOXM1LEPOAS1PBX1CENPAWNT3ASREBF1UCP1IGF1 PLK1BMP2SOX11EBF1ADIPOQHIST1H1ADDIT3BIRC5DLK1LIMS2CD36NFYBTPM1LIMD2LEF1KIAA0040CCNB2MMP2HIST1H4ACITNEDD4LE2F1SLC16A3MYCBP2HIST1H2BELRP1RBP4HIST1H4BBMP4GPR133MCM7GPC4HS2ST1TCF7L2HIST4H4COMPSPC25KRT5MXD3TEAD4GREM1HIST1H3HUBE2CCD24LMO7SLC7A2LIMS1PITX1RRM2EPHA2MMP1NCAPD2NCAPHUTYHTR2APLA2G2ASLC2A4ADRA2AAPOERETNDAB1BGLAPSLC14A1SMPD1EDNRBKRT16ACTC1CPA4RHOUNBL1SLPIAMBRA1CTSKDNAJC15DLK2DUTZEB1MND1NTMPLXDC2PSG4IGF1LGALS12MFAP5LPLGATA2CDC25AWNT11WNT2BCDC20FGF7LDLRKIF18BNOGFYNACVRL1ADIPOR1ADIPOR2CENPMESPL1CDC25CCYB5ACENPOCFDPLIN1ITGA3PROK1RPS4Y1EBF2KCNJ8ABCC9SGCGPEX19ACACBALK7ALOX15BAOC2AOC3 | FHL2BMP4IL1BMYOGACTA1LEF1MYOD1RAC2EYA2SIX1PAX3MEF2DMEF2ARUNX2MSX1SNAI1IL6FGF8TGM2LBX1CXCL12WNT3AMEF2CTWIST1KRT19MYF5PRRX2ACTN2MYH3CAV3TGFB1ZYXFAR2PAX7NPYSIPA1GPRC5BBCAR1TMEM246PDE4DIPMYL1TPM3LRRC49CCL2FAM65BGSTM1HOXA7SAPCD2CH25HCKMGALNT3MMP1ARHGAP9MYO5BITGA3ACTC1KCNIP3SPP1CAMK2N1HOXC10RUNX1SMG9SLC16A3TTNEPHA2SHROOM2ERCC1NCOA7CLDN5KRTAP1-5SYNPO2LALYREFCDKN2AJAG1CNR1IGF2IL32HEPHNEBPOLR2LACTA2ALDH1A1E2F2FGF5ARHGDIBMYF6NME2GJB2FAM178BIRX2TNNT2CD36CST6CORINDNAJB12FTMTGATMGSTO2SOX7NAGATNNI2TNNT3MYO18BFOSL1TNS1MYL4CACNG1CXCL6DLX2CNN1MYO1CADD3CCL28CHRNDCOL13A1DESDLX5COX6A2DPF1FOXC2PAX9TRIM72PENKHIP1RCHRNA1RAPSNTNNI1ADRA1BCASQ2BGLAPEPHA7 | STAT3SOX2FGF2BDNFVEGFCRAC2NEUROD1NEUROG3PAX6MMP1ASCL1NEUROG1A2MHDAC9 BMP2IGF1DRD4HAND2SOX1EGR2PBX1CTNND1HDAC9MMP7SIX1CUX2SERPINE1DLC1OLR1HES5PPARGWDR47DTX1TUBA1AADORA1STAT6ACTN2ASTN1SLC1A2ARHGAP21CPA4ATP8A2GDNFARHGEF7GDF5CNTN1FN1CSMD2RND1ANKS1BGPR19CELF2INALPAR1SPI1BDKRB1COL1A2MAD1L1MT1EPOU2F1KIAA1522SOX6LMO1C1QBHOXA10CHRNB2TWIST1ITGA10NCAM1ALOX5APHOXC6NEUROG2ABCA2LRP10ELMOD1SNCGTENC1NTMPLEKHB1EYA2LMO2LRRN2EPB41SLC17A6KIF5ASCN3BCST6FGFR2PTGS1TRAM2NAGAS100A9CPEB3SOX5BCANNGFCD24PIANPC1orf61ZFP64IGF2GLI2CXCL5CDKN2AKLHDC8APTX3PF4DNAH10TAC3P2RY6NCKAP1LNEFMSSBP3ANPEPDLG2RHOURHOFDUX4CPNE7HOXA9FXYD2C7orf10ZIC2NELL2MPPED2NID2CAMK1DDSCAML1 | IGF1EGR1FGF2TGFB3EGFRCOL1A1BMP4MYLKGDF5KCNK2HIST1H3HIL6MAPK3ETV5OAS1MMP2PAX1NFATC1CCL2SOX11TNMDGATA6FOXQ1KRT14IGFBP3CDH4CTGFTHY1PPARGMLPHCCL11PRR11PDE1CBARX1VGFPTHLHOLFML1HPDFSD1FAM188BNCAPD2DIO3DCNSHROOM2QPCTCSTANBL1RBPJSCUBE1FAM65BPDLIM1ADORA1ADRA1BAUNIPSAPCD2SLC2A5CCDC80BATFSERPINE2EGFL6TGFBR1TNXBSSC5DSCN9AC2CYFIP2MCM7CDCA7APOL3LIMS2SLC37A2KCNJ12DDX39AEFEMP1FHL1NEXNTMSB15ATMEFF2RPS6KA1MMP1CARD9FN1SCRG1PIK3R1PLXDC1NLGN1NR2F1LEF1HOXA5CHATSCDCLUPALMDSMAD9FGF7IL32ACTA2KCNA4ALDH3A1OGNHIST1H2AGHIST1H2BHHIST1H2AHHIST1H2AIHIST1H2AKHIST1H2ALHIST1H2AMHIST3H2BBHIST1H2BGHIST1H2BCHIST1H2BEHIST1H2BFHIST1H2BIPF4FGF9NFYBFMODHIST1H1ANTRK2RPS3AACVRL1COL3A1PRELPTNCIGFBP5RPS7RPS26WNT2CDC25ACOL15A1COL8A2COL5A1DLX2FGF18RUNX3CHST2TNS1RAD23BOMDVCANADRA2ACCKAR |

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a.



b.



c.



d.



e.



f.

**Figure S1**.Distribution of clustering coefficients in tenocytes (a), osteocytes (b), adipocites (c), chondrocytes (d) myocyte (e) and neurocyte (f) miRNA- gPPI networks.