

図 7. 細胞剥離液の違いによる遊走能の変化

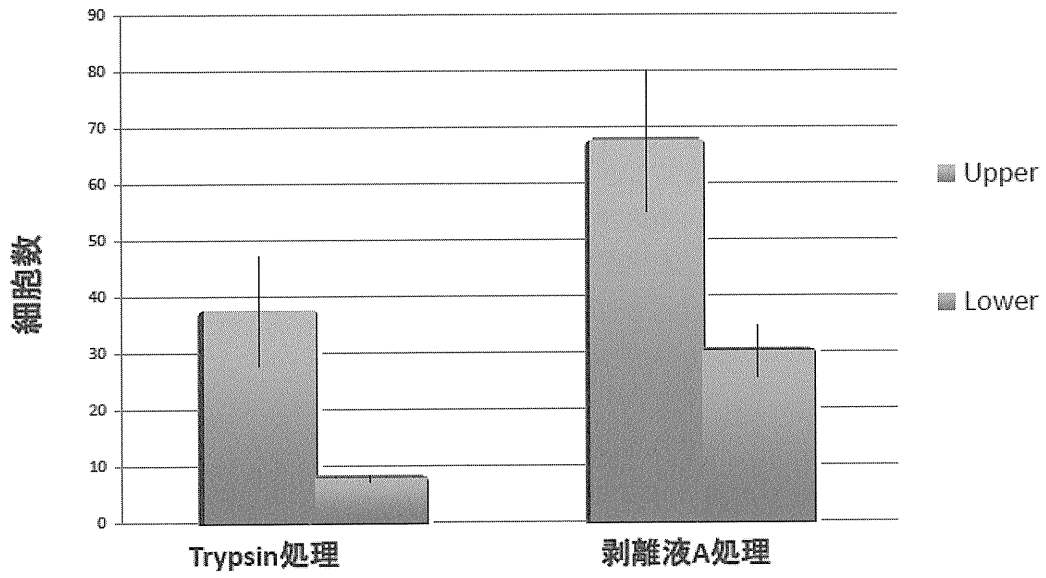


表1. 間葉系幹細胞における遺伝子発現の比較
(正常人に対する患者の発現)

Gene Symbol	Expression ratio	Regulation
FGF7	-6.6270857	down
SYNPO2	-5.2951736	down
FNDC1	-4.8707294	down
CH25H	-4.49634	down
FGF7	-4.431679	down
SYNPO2	-4.37348	down
PTGES	-4.246617	down
CHI3L1	-4.2237997	down
GABBR2	-4.020587	down
IFITM1	-3.9859824	down
PDE1C	-3.9811435	down
IFI44L	-3.9133918	down
LOC728613	-3.6662889	down
FLJ39632	-3.5558872	down
GREM2	-3.5420127	down
CSTA	-3.3662694	down
KRTAP1-5	-3.3469005	down
CHI3L1	-3.346696	down
FLJ39632	-3.2970815	down
PSG5	-3.2617884	down
GAS1	-3.2557042	down
KGFLP2	-3.2464433	down
IFITM1	-3.2279377	down
TNFAIP6	-3.1765437	down
GREM2	-3.1365469	down
AKR1C3	-3.0941358	down
EMX2	-3.0887809	down
LOC389834	-3.083444	down
FAM13C	-3.0588708	down
TNFAIP6	-2.9750025	down
KYNU	-2.926567	down
C1S	-2.91497	down
EFEMP1	-2.895284	down

ITGA8	-2.846769	down
HAS3	-2.7851083	down
SEPP1	-2.762626	down
LOC285758	-2.7428093	down
RAB27B	-2.7209363	down
GREM2	-2.6963768	down
CRISPLD2	-2.68466	down
HAS1	-2.656609	down
EFEMP1	-2.6010613	down
METTL7A	-2.600728	down
DBC1	-2.5616531	down
PPP1R3C	-2.5426114	down
LUM	-2.5416913	down
FAM20A	-2.5400105	down
KIAA1644	-2.537819	down
FAM20A	-2.5353084	down
MFAP5	-2.519789	down
CXCR7	-2.494831	down
VMO1	-2.4897797	down
C13orf15	-2.4797022	down
ISLR	-2.4628577	down
HEPH	-2.417249	down
CHRD1	-2.4077785	down
CARD16	-2.3953326	down
ANGPT1	-2.387529	down
IBSP	-2.3706164	down
HLA-DMA	-2.3606122	down
LRRC15	-2.3595004	down
MFAP5	-2.3589606	down
LEPR	-2.3497715	down
VAMP8	-2.3445356	down
COMP	-2.342191	down
ODZ2	-2.3299093	down
PTGES	-2.3228996	down
CRIP1	-2.3147364	down
OLFML3	-2.3066912	down
LEPR	-2.2962956	down

XG	-2.2653115	down
COL12A1	-2.2611322	down
LEPR	-2.2480538	down
PSMB9	-2.2392895	down
MFAP5	-2.2364311	down
SERPING1	-2.23342	down
IFI44	-2.2308073	down
IGF2	-2.2290597	down
FLRT3	-2.2185612	down
COL14A1	-2.2080941	down
CCL26	-2.205564	down
SLC1A3	-2.2043204	down
RUNX2	-2.2034872	down
CSGALNACT1	-2.200272	down
LEPR	-2.1971903	down
DCN	-2.1951456	down
CASP1	-2.1947818	down
IL7	-2.189579	down
CLEC3B	-2.1768794	down
KIAA1644	-2.1749954	down
TSPAN18	-2.174964	down
CEBPD	-2.1718423	down
CASP1	-2.1604733	down
KCTD12	-2.1588635	down
PAPPA	-2.1568818	down
CYP1B1	-2.1455402	down
COL12A1	-2.1379972	down
PAPPA	-2.131206	down
CFI	-2.1280959	down
KCTD12	-2.112905	down
EPSTI1	-2.1090868	down
GALNTL2	-2.0965285	down
AK3L1	-2.0942297	down
DCN	-2.0847178	down
STAT4	-2.0718906	down
PAPPA	-2.0715008	down
APOBEC3G	-2.0679018	down

IGFBP2	-2.0655553	down
CEBPD	-2.0572963	down
LAMA4	-2.0548043	down
CHN1	-2.0324974	down
CYP1B1	-2.0234995	down
DCN	-2.018405	down
GMFG	-2.0168834	down
ECM2	-2.015172	down
C4orf18	-2.0135124	down
SLIT3	-2.0100503	down
PITX2	-2.007446	down
HLA-DPA1	-2.0049853	down
TRIM22	-1.9990761	down
DCN	-1.9983476	down
FBXO32	-1.9966478	down
MPPED2	-1.9932969	down
PDE1C	-1.9929008	down
EMX2OS	-1.9730945	down
PDE1C	-1.9725845	down
RUNX2	-1.9641584	down
ALX1	-1.9565766	down
C4orf18	-1.9534007	down
GALNTL2	-1.9406227	down
PPP1R3C	-1.936289	down
CYP1B1	-1.9341704	down
FIBIN	-1.9326632	down
C13orf31	-1.9308656	down
SYNPO2	-1.9306135	down
RSPO3	-1.9075794	down
CDH6	-1.906865	down
C4orf31	-1.9040035	down
MXRA5	-1.8976618	down
IL1R1	-1.8827217	down
ANK3	-1.882636	down
IGFBP3	-1.8697543	down
AK3L1	-1.8677205	down
B4GALT1	-1.8632158	down

LBH	-1.8618776	down
COL12A1	-1.8561305	down
HLA-DPB1	-1.8553271	down
ZNF423	-1.8534101	down
PLAC9	-1.8516424	down
MATN2	-1.8346286	down
DLX1	-1.83	down
IFI30	-1.8223152	down
IGFBP4	-1.813247	down
CYGB	-1.810156	down
KCNE4	-1.8095226	down
CASP1	-1.805438	down
EYA1	-1.8048834	down
C13orf31	-1.7986627	down
DNAJC6	-1.7928407	down
DDIT4	-1.7839432	down
PRKD1	-1.7813946	down
C4orf32	-1.7799115	down
KCNJ15	-1.732474	down
SERPINF1	-1.7292356	down
NMNAT2	-1.7234586	down
GPM6B	-1.7199657	down
PAPPA	-1.7180856	down
PNPLA3	-1.7146634	down
PAPPA	-1.706894	down
HNMT	-1.7041742	down
CCDC113	-1.7026644	down
RORA	-1.7005438	down
GBP2	-1.7000533	down
DDIT4L	-1.6994178	down
NFASC	-1.6910309	down
COL12A1	-1.6908697	down
HNMT	-1.6849675	down
C1S	-1.6772025	down
C10orf54	-1.6704394	down
TXNIP	-1.6663607	down
C10orf54	-1.6660224	down

TXNIP	-1.6572932	down
KCNE4	-1.65091	down
TMEM119	-1.6506052	down
HLA-B	-1.6499625	down
KLHL24	-1.6478975	down
FGFR2	-1.6467346	down
FLG	-1.635263	down
FBXO32	-1.6285357	down
FAM69A	-1.625239	down
SELENBP1	-1.6231549	down
FGFR2	-1.6186644	down
C9orf150	-1.6174408	down
DAPK1	-1.6055124	down
CASP1	-1.6042904	down
ABCA8	-1.6018443	down
EPB41L3	4.6858325	up
HHIP	4.187505	up
MMP1	3.429496	up
PMAIP1	3.3087811	up
F2RL2	3.271791	up
ARHGAP29	3.1703122	up
C21orf7	3.1079311	up
ZIC1	3.0545745	up
KRT19	3.0405636	up
IGF2BP3	2.9981537	up
SERPINB2	2.9770584	up
RGS4	2.9675915	up
KRT18	2.9626029	up
RGS4	2.9449441	up
SOX11	2.9157734	up
IGF2BP3	2.9085767	up
RGS4	2.8938322	up
NOX4	2.7911212	up
NRK	2.7418187	up
SLC38A1	2.7346072	up
SCN9A	2.6538067	up
ZNF185	2.527327	up

EVI1	2.4477136	up
SLC38A1	2.4420533	up
ERG	2.3228912	up
B3GNT5	2.3139205	up
PDE10A	2.3098402	up
CD24	2.2918384	up
EREG	2.2524314	up
CNKSR2	2.2403278	up
F2RL1	2.2313328	up
HOPX	2.2051044	up
RBM24	2.2046072	up
IL11	2.202087	up
CD24	2.1858206	up
FAR2	2.1701326	up
NCAM1	2.1627078	up
TTMA	2.0979335	up
ADAMTS3	2.0869226	up
MAMDC2	2.0779276	up
SCN9A	2.064746	up
RNF128	2.0598826	up
GABRB1	2.0595875	up
ANXA10	2.0465956	up
CD24	2.0432534	up
LOC100192378	2.0361996	up
ITGA2	2.029052	up
FRMD5	2.0215516	up
SEMA3A	1.9937958	up
SHISA2	1.9870186	up
DNER	1.9533433	up
CTSC	1.9409256	up
LOC646576	1.9327499	up
HOXD10	1.929519	up
ABLIM1	1.9002343	up
THBD	1.8840907	up
S1PR3	1.8805375	up
CYTIP	1.8803141	up
ZFPM2	1.8776238	up

EPHA5	1.8698347	up
CTSC	1.8460684	up
STC1	1.8271173	up
C9orf167	1.7977136	up
FGF5	1.7825127	up
STC1	1.7760961	up
C8orf84	1.7721088	up
TMSB15A	1.7695352	up
TAGLN3	1.7571099	up
PLCB1	1.7299329	up
CPE	1.7261347	up
HMGA2	1.7251885	up
TSLP	1.722193	up
TMEM158	1.7219472	up
NR2F2	1.7175049	up
GULP1	1.7172681	up
AFF3	1.6990526	up
NR2F2	1.6954763	up
UBASH3B	1.6750433	up
TRHDE	1.6585965	up
FGD4	1.652035	up
AMPH	1.650739	up
TCEAL7	1.6472143	up
NR2F2	1.6444749	up
CPE	1.6441238	up
NCAM1	1.6439979	up
GULP1	1.6386324	up
HMGA2	1.6320051	up
CLGN	1.6263299	up
KBTBD8	1.6183357	up
SERPINB7	1.6108506	up
TMEFF2	1.6073548	up
DCHS1	1.6047909	up
NR2F2	1.6027765	up
FGF5	1.5968024	up
CAMK4	1.5917554	up

表 2. 骨芽細胞に対する遺伝子発現の比較
(患者+保因者に対する患者の発現)

Gene Symbol	Expression ratio (Log)	Regulation
FLJ39632	-4.6572037	down
NTM	-3.604592	down
CSTA	-3.471492	down
SLC16A6	-3.3009987	down
KYNU	-3.154925	down
KIAA1644	-3.1402838	down
NOG	-3.1215985	down
LOC729993	-3.0229683	down
SLC16A6	-2.9339054	down
TAC1	-2.8278875	down
PSAT1	-2.8241644	down
GDF15	-2.745882	down
TRIB3	-2.696486	down
ENPP5	-2.6881003	down
PSAT1	-2.6805859	down
LYPD6B	-2.6799138	down
VMO1	-2.645458	down
TNFAIP6	-2.6059015	down
APOD	-2.599581	down
KCNJ2	-2.566865	down
SESN2	-2.5003295	down
HLA-DPA1	-2.4368534	down
PAPPA	-2.4291456	down
CCL2	-2.411984	down
HAS1	-2.3992476	down
MT1M	-2.3859923	down
ASNS	-2.3620496	down
APOB	-2.331869	down
PDE1C	-2.2779994	down
FOXO1	-2.269046	down
FGF7	-2.25402	down
XG	-2.2379706	down
FOS	-2.2352011	down
FOXO1	-2.2321348	down
CCDC113	-2.2319674	down

KGFLP2	-2.2316844	down
PRDM1	-2.21444	down
SLC22A15	-2.2127042	down
SPATA18	-2.2106833	down
LOC389834	-2.2007766	down
SESN2	-2.1781962	down
PAPPA	-2.1701179	down
KIAA1644	-2.1660807	down
PNPLA3	-2.1639588	down
GDNF	-2.1506999	down
MME	-2.1454546	down
PSPH	-2.1268969	down
PAPPA	-2.1213646	down
LONRF3	-2.117931	down
OLAH	-2.1086714	down
FGF7	-2.1024942	down
VDR	-2.1013298	down
FGF7	-2.096735	down
TRIM22	-2.094482	down
CLDN11	-2.093773	down
FAM43A	-2.0833564	down
FHOD3	-2.0759125	down
STEAP1	-2.0747728	down
PITX2	-2.0632184	down
GPAM	-2.0614333	down
PDE1C	-2.0554533	down
OLAH	-2.054286	down
STEAP2	-2.048866	down
EMX2	-2.0472233	down
BEND7	-2.046397	down
LAMP3	-2.0384936	down
ICAM2	-2.0384128	down
SLC7A11	-2.0296628	down
EYA4	-2.025419	down
DHRS3	-2.0052207	down
ANKRD29	-2.0039692	down
PAPPA	-2.001419	down

PAPPA	-1.9996549	down
HLA-DPB1	-1.9911216	down
NAV2	-1.9886574	down
COMP	-1.977247	down
OLAH	-1.952694	down
LRRC2	-1.9411873	down
DMD	-1.9311717	down
GPAM	-1.9248027	down
ENPP4	-1.9142027	down
VDR	-1.9101183	down
GCLC	-1.8996301	down
GDPD1	-1.8986876	down
C4orf32	-1.8954647	down
PLGLB1	-1.8925813	down
GABBR2	-1.890343	down
NMNAT2	-1.890176	down
FAM167A	-1.8889236	down
IL1RL1	-1.8682718	down
ARRDC4	-1.8525903	down
TBX15	-1.8469918	down
SLC7A11	-1.8435066	down
KRTAP1-5	-1.8432566	down
PPAPDC1A	-1.8301661	down
GCLC	-1.8285723	down
SLFN5	-1.8211591	down
G0S2	-1.8141425	down
VAMP8	-1.7761616	down
STAT1	-1.7669549	down
TUBE1	-1.7459142	down
FAM84B	-1.7448951	down
DLX1	-1.7364595	down
ALX1	-1.7241108	down
JMY	-1.7233901	down
NR1D2	-1.7211269	down
RSPO3	-1.7006199	down
TNFRSF10B	-1.6818295	down
FLJ39632	-1.6752818	down

SLFN5	-1.6690414	down
STC2	-1.6560638	down
C13orf15	-1.6475675	down
BEX2	-1.6449754	down
UNC5B	-1.6401469	down
PNPLA3	-1.6338573	down
SLFN5	-1.6123998	down
PHLDA1	-1.6065218	down
ACTG2	5.981242	up
EPB41L3	5.17698	up
S100A4	5.1497993	up
PDGFD	4.8992643	up
EPB41L3	4.6167765	up
ITM2A	4.339079	up
EPB41L3	3.9945538	up
ACAN	3.9590344	up
ACAN	3.8855674	up
IGF2BP3	3.8840468	up
ANGPT2	3.798163	up
C8orf84	3.773931	up
RGS5	3.6699686	up
ACAN	3.665284	up
PCDH7	3.5986552	up
IGF2BP3	3.5480764	up
CPE	3.4289591	up
RGS5	3.3803866	up
PRSS35	3.2733114	up
SAMD5	3.273093	up
TMSB15A	3.2424898	up
HHIP	3.2134707	up
HOPX	3.2069886	up
CPE	3.0860507	up
LPPR4	3.047389	up
C5orf13	3.0210066	up
ANGPT2	3.01476	up
CD24	3.0113444	up
PDGFD	2.9951525	up

AMPH	2.9844158	up
C5orf13	2.9705365	up
SOX11	2.9537172	up
CD24	2.9250045	up
HHIP	2.8976762	up
WFDC1	2.8812988	up
SYTL2	2.8737764	up
SYTL2	2.8708792	up
SPP1	2.870356	up
HES4	2.8509612	up
SOX11	2.8483415	up
ITM2A	2.8376088	up
SPARCL1	2.8286319	up
CDH8	2.824225	up
C8orf84	2.822146	up
FAM84A	2.8079164	up
EDNRA	2.773004	up
EDNRA	2.7652323	up
PCDH7	2.7435603	up
CD24	2.7423573	up
FABP3	2.7416883	up
PEG10	2.719198	up
GPR126	2.7051306	up
SCN3A	2.6826236	up
HOXD10	2.6813397	up
ACTA2	2.6547976	up
COL1A1	2.6481428	up
HHIP	2.6181147	up
ANGPT2	2.5981839	up
AGTR1	2.5823615	up
MPP7	2.5541651	up
JAG1	2.5339003	up
ANGPT2	2.53186	up
COL21A1	2.5285656	up
SLITRK4	2.5260346	up
RASGRP2	2.5105894	up
HEYL	2.5037177	up

LOC645638	2.4919827	up
SCN9A	2.47616	up
MEST	2.474679	up
FAM38B	2.469701	up
AGTR1	2.466749	up
VSNL1	2.430847	up
MRAP2	2.4072154	up
MAP2	2.3961427	up
RGS5	2.3930979	up
LMNB1	2.3626537	up
CSRP2	2.3515887	up
MMP16	2.3464677	up
MYH11	2.331388	up
PDE8B	2.3171206	up
SPC25	2.3122163	up
ACTA2	2.3101392	up
PDE10A	2.3092673	up
CCNE2	2.300645	up
TSPAN13	2.295783	up
ZIC1	2.292586	up
CD24	2.2912269	up
JAG1	2.290716	up
COL5A3	2.2768717	up
EPHA5	2.2753167	up
MCM10	2.2749896	up
H19	2.2596202	up
ZNF804A	2.2566772	up
HOTAIR	2.255763	up
SUSD2	2.2515798	up
JAG1	2.250449	up
TRIM36	2.243387	up
RGS4	2.2398858	up
RGS4	2.210958	up
JAG1	2.2004662	up
CORIN	2.1961064	up
PTN	2.1876173	up
TOX	2.187332	up

C10orf116	2.1855578	up
C5orf13	2.159309	up
MATN2	2.1571708	up
AGT	2.1558278	up
SAMD5	2.1428502	up
LOC440416	2.1420603	up
CSRP2	2.137638	up
TCEAL7	2.1304038	up
CLIC3	2.130169	up
GUCY1B3	2.127604	up
RGS4	2.1275828	up
RNF128	2.115013	up
COL3A1	2.110143	up
CCNE2	2.1051304	up
CDCA7	2.1008427	up
ABCA13	2.0974298	up
ENPP2	2.0931525	up
FILIP1L	2.0838852	up
SULT1B1	2.0799608	up
STK32B	2.0796726	up
LRRN3	2.065235	up
CORIN	2.0638394	up
FILIP1L	2.0604758	up
FABP3	2.057302	up
GRIK2	2.0549788	up
RNF182	2.052228	up
NUF2	2.0464365	up
CORIN	2.0443017	up
ENPP2	2.0429373	up
APOE	2.0404315	up
HAPLN1	2.0397334	up
FBLN2	2.0310767	up
PTN	2.030874	up
MALL	2.0226235	up
KRT19	2.0199184	up
CDC6	2.008013	up
LRRN3	1.9985317	up

COL1A1	1.9976801	up
hCG_1806964	1.9953718	up
NID2	1.9879053	up
LMO3	1.9536343	up
PTN	1.9470105	up
NRXN3	1.9435273	up
PDGFRL	1.94129	up
MYH11	1.9375919	up
EPHA3	1.9257846	up
CSPG4	1.9229517	up
LDLR	1.919019	up
CDC6	1.9165678	up
RCAN2	1.9153495	up
SLMAP	1.9108014	up
LOC401074	1.9018041	up
MGP	1.8972518	up
KIF15	1.8944725	up
FRY	1.8882077	up
SCN9A	1.8825454	up
RRM2	1.880571	up
SCD	1.8779885	up
SCD	1.8715795	up
COL11A1	1.8715703	up
TMEM35	1.8557668	up
GPX3	1.8158017	up
STARD4	1.8154162	up
HAPLN1	1.7950096	up
CSPG4	1.7913525	up
SPC24	1.7628753	up
ADORA2B	1.7622141	up
CLEC3B	1.7568097	up
FBN2	1.7513611	up
CDC2	1.7447565	up
NCAPG	1.7413552	up
HEY1	1.7370042	up
APOE	1.7235858	up
hCG_1806964	1.715286	up

HAPLN1	1.714395	up
CD24	1.6989367	up
RRM2	1.6989362	up
SHCBP1	1.6940725	up
NCAPG	1.6931963	up
PBK	1.687549	up
MEOX2	1.6858082	up
COL3A1	1.6854002	up
ST7L	1.6761765	up
B3GALT2	1.673868	up
PAG1	1.6653371	up
COL4A5	1.6627076	up
LOC654433	1.6604205	up
CNN1	1.6411002	up
BAALC	1.637033	up
TET1	1.6351764	up
LMOD1	1.6296072	up
ACAT2	1.6275375	up
C2orf40	1.6193972	up
ANLN	1.6114354	up
B3GALT2	1.5868864	up

表3. 間葉系幹細胞の機能別遺伝子発現

Function	Gene	Regulation (Patient to Normal)
Hedhog	HHIP	UP
Inflammation	IGFBP4	down
	IGF2 /// INS-IGF2	down
	TNFAIP6	down
	SCN9A	up
	CD24	up
	B4GALT1	down
	NOX4	up
	EVI1	up
	CCL26	down
	EVI1	up
	S1PR3	up
	SCN9A	up
Osteoblast	IFI44L	down
	SHOX2	down
	RUNX2	down
Surface receptor	IFITM1	down
	IL1R1	down
	STC1	up
	IL7R	down
	NPPB	up
	CD24	up
	LEPR	down
	IFITM1	down
	CD24	up

Cell adhesion	CYTIP	up
	CD24	up
	NCAM1	up
	COL14A1	down
	NFASC	down
	ITGA8	down
	B4GALT1	down
	FLRT3	down
	DCHS1	up
	CD24	up
	COL12A1	down
	ITGA2	up
	NCAM1	up
	COL12A1	down
	IBSP	down
	Cell signaling	IGF2 /// INS-IGF2
FGFR2		down
STC1		up
EREG		up
TNFAIP6		down
IL7		down
IL11		up
FGFR2		down
FGF5		up
PGF		down
TRHDE		up
CCL26		down
Skeletal	IGFBP4	down
	KRT18	up
	KRT19	up
	IGF2 /// INS-IGF2	down
	GAS1	down
	CLEC3B	down