

## **Supplemental material**

### **Hypoxia-Inducible Factor-1 $\alpha$ – Mediated Upregulation of CD99 Promotes the Proliferation of Placental Mesenchymal Stem Cells by Regulating ERK 1/2**

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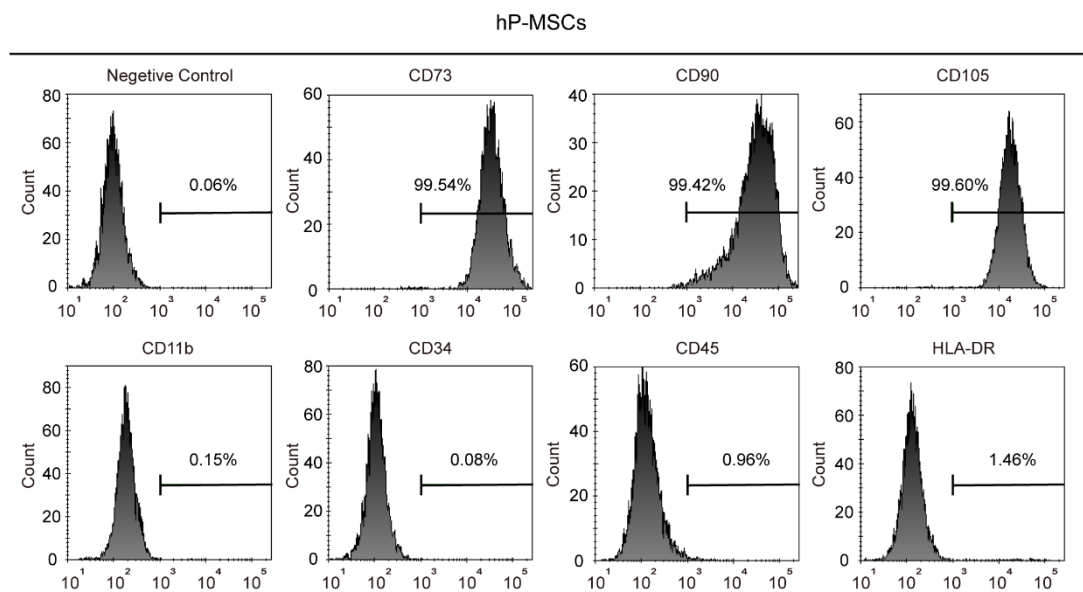
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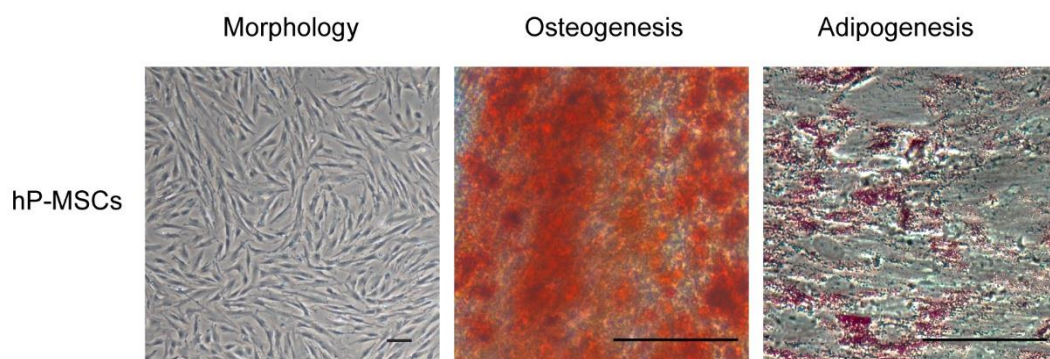
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**Supplementary Figure 1.** Immunophenotypic analysis of human placental-derived MSCs.



Analysis of surface antigens (CD73, CD90, CD105, CD11b, CD19, CD34, CD45, and HLA-DR) on hP-MSCs.

**Supplementary Figure 2.** Differentiation analysis of human placental-derived MSCs.



Morphology ( $\times 4$ ), osteogenesis ( $\times 20$ ), and adipogenesis ( $\times 20$ ) of hP-MSCs. (scale bars, 100  $\mu\text{m}$ ).

**Supplementary Figure 3. Human CD99 promoter sequence.**

human CD99 Promotor sequence

TTTTACAACCTCTTCTCTGACCCCTAGCACCGGAAGGGTTCCTGTTCAAAT  
AAGAACTTGAGTCTTCACAATTCTTATCTTAACCCAGACATTTCTTCTATT  
GATCCCAGGACTTTAAAGAAACCCAAGCAATGCCAATCAGAAAATTCTAA  
AATCTACTATAAGCTGGAAGCCTCCTGCTTTGGGTTGTCCCGCCTTCTGG  
ACAAAACCAATGTGTCTCTTAAATTCATTGATGTCTCATGCCTCCCTAAAA  
CGTATAACACCAAGTGCACCCCGACCACCTTGAAGACACGTTCTCGGGA  
CCTCCTGAGGGCTGTGTCTATGGGCCATGGTCACTCATATTTGGCTCAGAATA  
AATCTCTTCAAATATGTTAGAGTTGGACTCCTTTCTTTTTTTCTTTTTTCT  
TTCTTTTTTTTGGAGACGGAGTCTCGCTCTGTCAACCAGGCTGGAGTGCAG  
TGGCCTGATCTTGGCTCACTGCAACCTCCATCTCCCCGGTTCAGCGATTCT  
CTTGGCTCGGCCTCCTGAGTAGCTGGGACTACAGGTGCACACCACCACAC  
GCGTCTAATTTGTATTTTGAAGAGACAGGGTTTACCTTGTGGTCAAGG  
TGGTCTCCAATTCCTGACCTCAGGTGATCCACCCGCTCGGTCTCCCAAAG  
CGCTGGGATTCCAGGCGTGAGCCACCCGCGCCGGCCTAGTTTGACTCTTTT  
CGTGACAGTTTGAAGTGTGGAATGCAAGAATATTAGGGTATTATTGTCAG  
GCTGCAAAGTTGTTCCACTACCTGCGGGAAAATGGATACAATTTAGGCT  
TAGGTGTTAACAAGATAACATTGTTAAGTGTGGGAAGGGCGACAACCTGACT  
GCAGCTGTGGCCAGTGGCGCGGGAGGGTGTCTAAACTCAAAGCCACTGG  
AAGGCGAGTCGCCCATGACCAGACTAGGGCCAGGTGCCAGATAGAA  
GGCACCTCGTTCCTATTGCCCTCACTAACTCCCGTACCAGGAGTCCCC  
ACTCCAACCTGTCTCGGGATTCTGGGGAGAACTGCCCCAGCGCAGA  
GGTACTCCAAGGGTGTCTTGGTCCGGCGCAAAGGGTTCGTCCGCCACC  
CTCCCGCTGCCACCCCGCCTCGGACGCTCTAGAAAGGACTTGGGACG  
GGGGTTGCCTGTGGAGCGGGGCCTAGGCTTCTGAGCAGGGAGAGGATT  
GCACTTTGTCCCTTGGGGAACCTCCCTGAGGTGAGCAGCGGGAGGGGGC  
CCCCATACTTTCCAGCAGGGGAGCCGGGAGTTTCTCTGCTCCCACTGC  
AGAGCAGGGGAGGGTCCCTGCTAGGGGCGGAGAAGGGGCTGCAGGGGCG  
AGTGGGGAGGGGGCTACACGTTTCCAAGAAGGGCGGCAGTTTCTGTGTCG  
CTACAGTTGCAGGCGTGCATTTAGGAGGCTGTAGACAGGGAGGGACCCGC  
ACTTTCCCGAGCAGGGGAGCTGTGGGAAAGTTTGTTTTTTTGCTCCCACT  
GGAGACAGGGGGTGAAGGGCGGAGAAGTGGCTGCAGGGGCGAGTGGG  
GAGAGGGGGCTCTATGTTTCCAAGAAGGGCGGCAGTTTGTGCCACTACA  
GTTAAGGGCCGCCCTCGGGCTGCATTCAGAGGGCTGTAAACCGGGAGGG  
ACCCGCACTTTCCCAGAACGTTGTAGTTCACTTTGCTTCGGGTCCGGCGCC  
GCCCTGGCTACGGCCCTGTGGGTGGGTGAGGGGGCGTGGGCAGTTTCTG  
AGAAGGGGCGGGGCGTGTACCGTACTCCCTCGGCGTGCCTGGGCCACC  
CCCGCCGCTACCCCTCTGTCTCCTCCCGGGCCCGCGCTTCCCGCCCC  
TTCTGTGGCGCGTGGAGGCCGGGGCGGGGCGCAGCCGGCGCTGA  
GCTTGCAGGGCCGCTCCCTCACCCGCCCTTCGAGTCCCGGGCTTCGC  
CCCACCAGGGCCGTTGGGAGTACTGTCTGCTGCCGCTTCGCCACGCCCT  
GCACTCCGGGACCGTCCCTGCGCGCTCTGGGCGCACC

sequence marked in yellow: putative HIF-1 $\alpha$  binding sites  
A:relative to transcription start site (TSS)

The yellow shadow sequences are the putative HIF-1 $\alpha$  binding site. The green shadow “A” site is shown relative to the transcription start site (TSS).

**Supplementary Table 1.** Specific sequences of siRNAs (5'→3').

HIF-1 $\alpha$ #1 sense	CUGAUGACCAGCAACUUGA
HIF-1 $\alpha$ #1 antisense	UCAAGUUGCUGGUCAUCAG
HIF-1 $\alpha$ #2 sense	CGUUGUGAGUGGUUAUUAUU
HIF-1 $\alpha$ #2 antisense	AAUAAUACCACUCACAACG
HIF-1 $\alpha$ #3 sense	CCUCAGUGUGGGUUAUAGA

HIF-1 $\alpha$ #3 antisense	UCUUAUACCCACACUGAGG
CD99#1 sense	GUUUCAGGUGGAGAAGGAA
CD99#1 antisense	UUCCUUCUCCACCUGAAAC
CD99#2 sense	GAUGGUGGUUUCGAUUUAU
CD99#2 antisense	AUAAAUCGAAACCACCAUC
CD99#3 sense	AGCUGUUCAGCGUACUCUU
CD99#3 antisense	AAGAGUACGCUGAACAGCU

**Supplementary Table 2.** Differentially expressed genes in hP-MSCs between hypoxia and normoxia.

Gene	Fold Change	p Value	Regulation
ACP5	2.756161799	0.00109664	Up
AJM1	0.370835682	0.004994244	Down
AK4	8.577190243	2.56E-33	Up
AKR1B10	0.394163324	0.016424971	Down
ALDH1A1	0.43449652	4.76E-51	Down
ANKRD37	2.614057047	1.21E-09	Up
AQP3	0.438616508	0.005591077	Down
ARID3C	2.145839622	0.026337477	Up
BTBD16	3.452284095	0.008713065	Up
C1QC	0	0.016700324	Down
C4orf47	3.969880654	0.006366557	Up
C5orf46	5.180793591	1.41E-30	Up
C6orf223	3.358192338	0.047673845	Up
CA9	9.092268285	0.004565016	Up
CALML6	3.407946838	0.010881208	Up
CAPN6	3.902472255	0.00933846	Up
CARD17	2.218996786	0.001513351	Up
CD14	0.332766318	0.013674054	Down
CD27	Inf	0.023169479	Up
CD99	7.853653254	0.000387137	Up
CKMT2	6.072884506	0.004954375	Up
COL28A1	3.168794075	0.000200649	Up
CSF2	3.762744016	0.002005156	Up
DCT	0.136379379	0.013356579	Down
DIRAS2	0.367795025	0.019143579	Down
DRD1	2.520205296	0.019332623	Up
EGLN3	2.531008825	0.008908123	Up

ENPP3	0	0.025238584	Down
ERICH5	0.391070748	0.049808445	Down
EVI2A	2.267262832	0.000216933	Up
EYA2	2.04089973	0.014301214	Up
FABP3	3.795415919	5.87E-12	Up
FAM180A	2.661155855	1.12E-23	Up
FGF14	0.072012817	0.024381451	Down
FHIT	3.115971664	0.012779693	Up
FLVCR2	3.342032443	0.000659993	Up
FOLR1	5.195878685	0.022655319	Up
FTCD	2.623185698	0.044027926	Up
GKN1	Inf	0.028280716	Up
GLDC	4.140246682	0.009613149	Up
GPNMB	2.061725869	6.90E-20	Up
GPR146	4.107008037	0.045850137	Up
GUCY2D	18.95647724	0.000278696	Up
HES4	0.498338535	0.047440131	Down
HHIPL2	0.342634607	0.032364397	Down
HIF3A	2.416316453	1.50E-05	Up
HSF4	2.035652244	0.007272865	Up
IL20	31.01976446	0.007288524	Up
INHBB	4.597149928	0.043366938	Up
ITGAM	0.047086185	0.043111865	Down
JAKMIP2	2.034486845	0.015922484	Up
KCNJ15	9.485618545	0.005512287	Up
KCNS2	0.106357791	0.007815613	Down
KLHL41	2.107458109	0.023482394	Up
LAMP5	Inf	0.016867298	Up
LHX4	0.288465111	0.022224169	Down
LMO3	0.36136438	0.006554471	Down
LOC100130705	2.314950183	0.008376628	Up
LPAR2	2.511028468	0.005532916	Up
LRRC63	2.654194634	0.029368916	Up
LTK	2.123904213	0.024375386	Up
LYVE1	3.344769318	0.023254743	Up
MEOX1	2.201938875	0.012816692	Up
MMP13	0.030567318	0.008118411	Down
MMP9	3.613664394	0.003798223	Up
MSANTD1	2.28992414	0.017716972	Up
MTNR1A	0	0.039069207	Down
MYH11	0.366460335	6.32E-05	Down
MYH15	2.000412968	0.04018285	Up
NBPF6	0.284518234	0.031784658	Down

NDUFA4L2	2.484049011	1.03E-08	Up
NUP210	2.142337944	0.036012764	Up
P2RX7	2.764749834	7.07E-06	Up
PCSK9	3.386329867	7.55E-08	Up
PDE4C	3.529886227	0.046592669	Up
PDF	0.287680114	0.008211145	Down
PIK3R5	16.27652505	0.010813016	Up
PLCG2	2.338695033	0.03302275	Up
PLCXD1	2.1080242	0.000437692	Up
PLIN4	0.394770037	0.007484616	Down
PNMA2	2.306065483	0.017971876	Up
PPFIA4	4.979164209	4.29E-13	Up
PPP1R3G	2.073881005	0.001780646	Up
PPP2R3B	2.796913581	0.006592715	Up
PRCD	2.331798735	0.007480525	Up
PRR15	0.463118326	8.82E-07	Down
PRSS2	Inf	0.038237265	Up
RASAL3	0.039642878	0.020781767	Down
RASL11B	0.36091179	8.66E-05	Down
RTN4R	2.005784847	0.039341238	Up
S100A1	32.28708068	0.005116307	Up
SCHIP1	3.945719906	0.033952474	Up
SH2B2	0.493627065	0.033775484	Down
SIGLEC15	3.662828198	0.030964096	Up
SLA	2.634363915	0.032869767	Up
SLC13A5	Inf	0.032311946	Up
SNAP25	0.388162374	0.042349711	Down
SOX7	0.199901598	0.008156481	Down
SPHKAP	3.221389092	0.011815348	Up
SULT1B1	2.638379981	0.010858572	Up
SUPT20HL2	3.144942299	0.034468634	Up
TCAF2	2.506415037	6.77E-06	Up
TEC	4.732591252	0.034115745	Up
TG	2.600812891	0.000832616	Up
TMC7	2.709952474	0.035635406	Up
TMEM178A	0.447533173	0.049412627	Down
TMEM247	0.160644469	0.03532558	Down
TNFRSF4	0.169682209	0.020135379	Down
TXNIP	0.255463949	9.36E-65	Down
USH1C	Inf	0.039958179	Up
VASH2	4.051761622	0.000270053	Up
VSIG2	6.545400641	0.047972226	Up
WFDC3	2.233515404	0.003351471	Up

