

Supplemental TablesTable S1. **PCR primers for human adipogenic and osteogenic specific genes**

Gene Name	Accession No.	Primer Pairs (5'-3')	Product Size (bp)
PPAR γ	NM_138712	Forward: ATAAAGTCCTTCCCGCTGAC Reverse: CTCAAACCTGGGCTCCATAA	441
FABP4	NM_001442	Forward: AAGTAGGAGTGGGCTTTG Reverse: AGGTTATGGTGCTCTTGAC	192
RUNX2	NM_001015051	Forward: GGAATGCCTCTGCTGTTATG Reverse: GTGGACGAGGCAAGAGTTT	426
Osteocalcin	NM_199173	Forward: GCAGCGAGGTAGTGAAGAGA Reverse: CTCCTGAAAGCCGATGTG	149
GAPDH	NM_002046	Forward: AACAGCGACACCCACTCCTC Reverse: GGAGGGGAGATTCAGTGTGGT	258

Abbreviations: PPAR γ , peroxisome proliferator-activated receptor gamma; FABP4, fatty acid binding protein 4; RUNX2, runt related transcription factor 2; Osteocalcin, gamma-carboxyglutamic acid-containing protein; GAPDH, Glyceraldehyde-3-phosphate dehydrogenase.

Table S2. PCR primers for human genes of Ca²⁺ signals and transporters

Gene Name	Accession No.	Primer Pairs (5'-3')	Product Size (bp)
IP3R1	NM_002222	Forward: TGACGAGAACCTGCCCTAT Reverse: TCCTTCGCCATCTTGCT	430
IP3R2	NM_002223	Forward: GCAATCGTGTCTGTTCCA Reverse: TCTTCAAGTCTCAGCATCG	332
IP3R3	NM_002224	Forward: GCCTACTATGAGAACCACACG Reverse: CAGAAGAGCAATGAGATGAGAG	389
RyR1	NM_000540	Forward: TGACTACCATCAGCACGACA Reverse: ACGAAGACGGCAGGAAATA	297
RYR2	NM_001035	Forward: TTTACCAGCACCCCTAATCTC Reverse: CAGCCAAATAACGAACTACC	348
RYR3	NM_001036	Forward: TCTGCTGTCTGGGTCTATCTC Reverse: CCAAATGTCTTATGCGTCAC	262
SERCA1	NM_004320	Forward: GTGATCCGCCAGCTAATG Reverse: CGAATGTCAGGTCCGTCT	361
SERCA2	NM_001681	Forward: CGCTACCTCATCTCGTCCA Reverse: TCGGGTATGGGGATTCAA	406
SERCA3	NM_174958	Forward: GATGGAGTGAACGACGCA Reverse: CCAGGTATCGGAAGAAGAG	409
NCX1	BC098308	Forward: GTCGCACTTGGAACATCA Reverse: CCAGGGAGGAGAAGAAAA	373
NCX2	NM_015063	Forward: CGGTGGATAAACTCATCAAGAA Reverse: CAGGGCAACGAAGACAACA	359
NCX3	NM_182936	Forward: GAGATGGGAAAGCCAGTAT Reverse: ATGCCACGAAAACAACAG	430
PMCA1	NM_001682	Forward: GCTGGAGGTGAAGAGGAA Reverse: GCACTGCGACCACTAAAA	418
PMCA2	NM_001683	Forward: ACGGATGTTGGTACTGC Reverse: CACGGACTTCTCCTTCTTGT	214
PMCA3	NM_021949	Forward: TGGTCCTCTACTTTGTGATTG Reverse: TGGTGGTATAGGCACTGTTG	417
PMCA4	NM_001684	Forward: CTGTGCGTAATGAAGTGC Reverse: AGTCCCGGTAAGCTATG	279

Abbreviations: IP3R: inositol 1, 4, 5-trisphosphate receptor; RyR: ryanodine receptor; SERCA: sarco/endoplasmic reticulum Ca²⁺ ATPase; NCX: Na⁺-Ca²⁺ exchanger; PMCA: plasma membrane Ca²⁺ ATPase.

Table S3. PCR primers for human specific genes related to cADP ribose

Gene name	Accession No.	Primer Pairs (5'-3')	Product Size (bp)
CD38	NM_001775	Forward: CTGTCTTGGCGTCAGTATCC Reverse: TAGCCTAGCAGCGTGTCCCT	383
BST-1	NM_004334	Forward: ACACTTGCGGGACATCTT Reverse: TAGGCTCCTGTTGGCTCT	477
Cx43	NM_000165	Forward: CAGTCTGCCTTTCGTTGT Reverse: AAGATGGTTTTCTCCGTG	482
ENT1	NM_004955	Forward: GTGCCTTCGGCTACTTTAT Reverse: CGATGCTGGACTTGACCT	345
ENT2	NM_001532	Forward: TGGGGTACTTTATCACGC Reverse: CTGGGGACTACTGGGAAT	185
CNT1	NM_004213	Forward: GCCTGTAGCCTTCTTGATG Reverse: CTGAACTCTGGATTGACGC	486
CNT2	NM_004212	Forward: CTGGAGGACAGTGTTTTTCG Reverse: CAGTGGTGCCCATAGTGAT	305
CNT3	NM_022127	Forward: ATAATCGCCACTTACGCT Reverse: TTCCTCCTGGGATGACTT	331
TPRM2-S	NM_001001188	Forward: GTGCGAGGAGATGCGGCAGTAG Reverse: CAGGATGTTGGTGAAGAGCAGGTA	602
TPRM2-L	NM_003307	Forward: TCGGACCCAACCACACGCTGTA Reverse: CGTCATTCTGGTCCTGGAAGTG	339

Abbreviations: BST-1: bone marrow stroma antigen-1; CNT: concentrative nucleoside transporter; ENT: equilibrative nucleoside transporter; Cx43: connexin 43; TRPM2-S: short form of TRPM2; TRPM2-L: full-length isoform of TRPM2; GAPDH: Glyceraldehyde-3-phosphate dehydrogenase.

Table S4. **SiRNA sequences of TRPM2 (NM_003307)**

ID	SiRNA sequence (5'->3')	Target exon
A	Sense: GUGAAAAAGUACGGUCCGAtt Antisense: UCGGACGUACUUUUUCACctt	1
B	Sense: GGCUGGAGAAGUUCAUAUAUCtt Antisense: GAUAUGAACUUCUCCAGCCtg	4
C	Sense: GGAAGAGCAUAAAGAAGAUtt Antisense: AUCUUCUUUAUGCUCUUCctg	25

Table S5 **Flow cytometry mark results-human bone marrow MSCs**

Panel No	Antibody	Expected Result on MSCs	Whole Bone Marrow (% Gated)	240L P2 (% Gated)
1	CD34 PE	Neg	1.2	0.08
	CD36 FITC	Neg	19.5	0.25
	CD45 ECD	Neg	95.8	0.18
	CD117 PC5	Neg	2.6	0.62
2	CD44 FITC	>Importnt Pos	93.3	88.78
	CD90 PC5	>Importnt Pos	2.1	99.85
	CD166 PE	>Importnt Pos	0.7	98.68
3	CD49b FITC	>Importnt Pos	3.6	1.63
	CD105 PE	>Importnt Pos	0.8	98.86
4	CD29 PC5	< Importnt Pos	43.1	99.81
	CD49c PE	<Importnt Pos	0.2	99.32
	CD147 FITC	< Importnt Pos	46.9	99.23
5	CD59 FITC	<Importnt Pos	45.9	99.50
	CD184 PE	Dim on MSCs	20.4	0.36
6	CD49f PC5	Dim on MSCs	0.2	12.76
	CD 106 PE	Dim on MSCs	3.1	0.76
	HLA-1:ABC FITC	Dim on MSCs	94.6	99.46

Supplemental figures

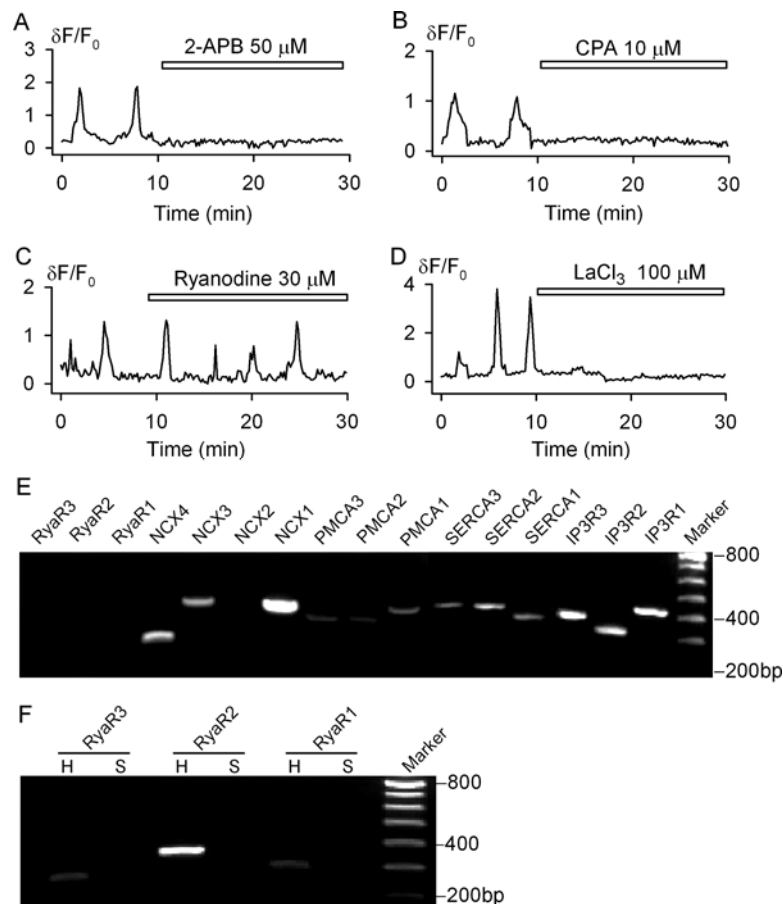


Figure S1. Ca^{2+} signaling pathways in human MSCs.

A. The IP3Rs blocker 2-APB suppressed spontaneous Ca^{2+}_i oscillations (n=27). **B.** SERCAs inhibitor CPA abolished Ca^{2+}_i oscillations (n=27). **C.** RyRs blocker showed no significant effect on Ca^{2+}_i oscillations (n=24). **D.** LaCl_3 , a SOC entry blocker blocked Ca^{2+}_i oscillations (n=25). **E.** RT-PCR results show significant mRNAs for IP3R1-3, SERCA1-3, PMCA1-3, NCX1, NCX3 and NCX4, but not for RyRs. **F.** Messenger RNAs for RyR1-3 were detectible human SH-SY5Y neuroblastoma cells (H), but not in stem cells (S) using three primers of RyRs in E.

Abbreviations: IP3R: IP3 receptor; SERCA: sarco/endoplasmic reticulum Ca^{2+} -ATPase; PMCA: plasma membrane Ca^{2+} -ATPase. NCX: Na^+ - Ca^{2+} exchanger; RyR: ryanodine receptor; H: total RNA extracted from human SH-SY5Y neuroblastoma cells; S: human mesenchymal stem cells.

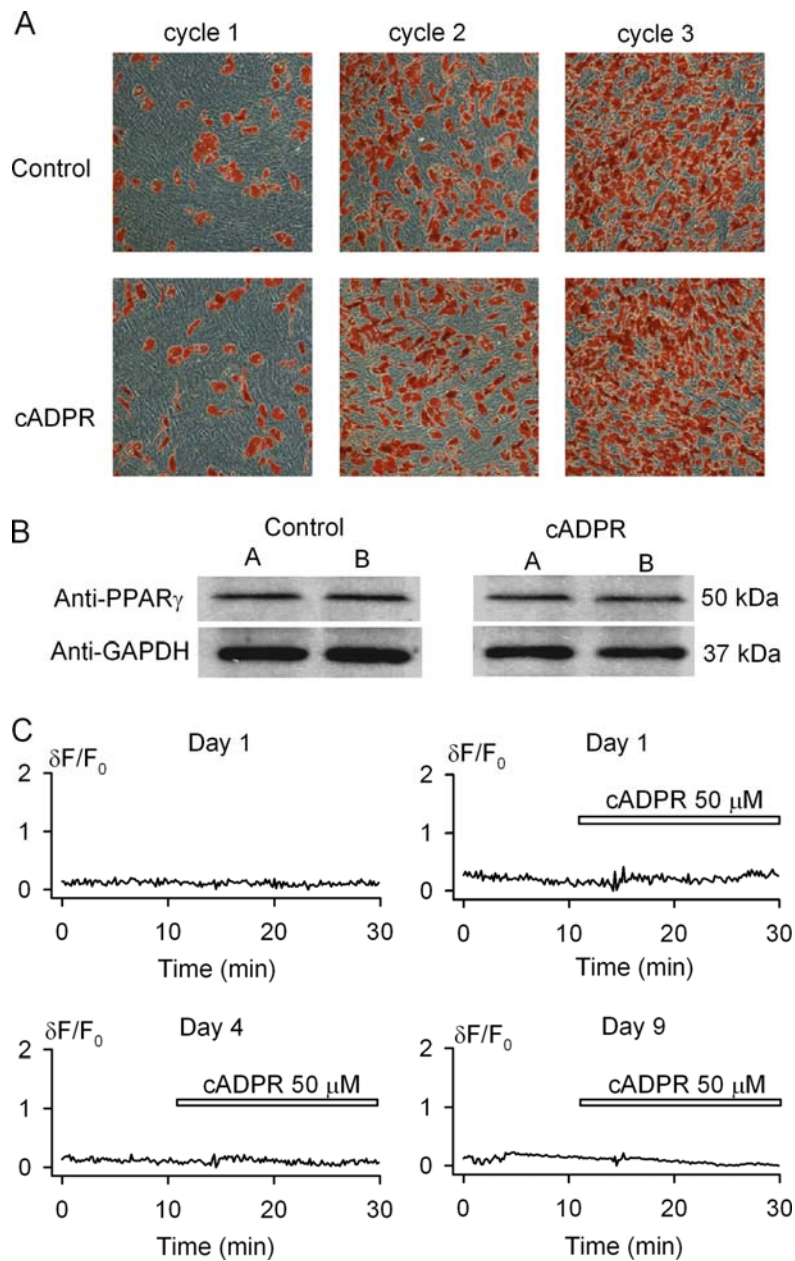


Figure S2. **Effects of cADP ribose on adipogenesis in human MSCs.**

A. Images showing adipogenic differentiation of human MSCs at induction cycle 1, 2 and 3. cADP-ribose showed no significant effect on adipogenesis in human MSCs. Similar results were obtained in a total of 3 experiments. **B.** No difference was found in PPAR γ protein expression in the differentiated adipocytes (day 9) with and without the treatment of 50 μ M cADPR. **C.** No spontaneous Ca $^{2+}_i$ oscillations were observed during adipogenesis on day 1, day 4 and day 9. cADP-ribose did not initiate Ca $^{2+}_i$ transient or Ca $^{2+}_i$ oscillations in these cells (n=32 for each).

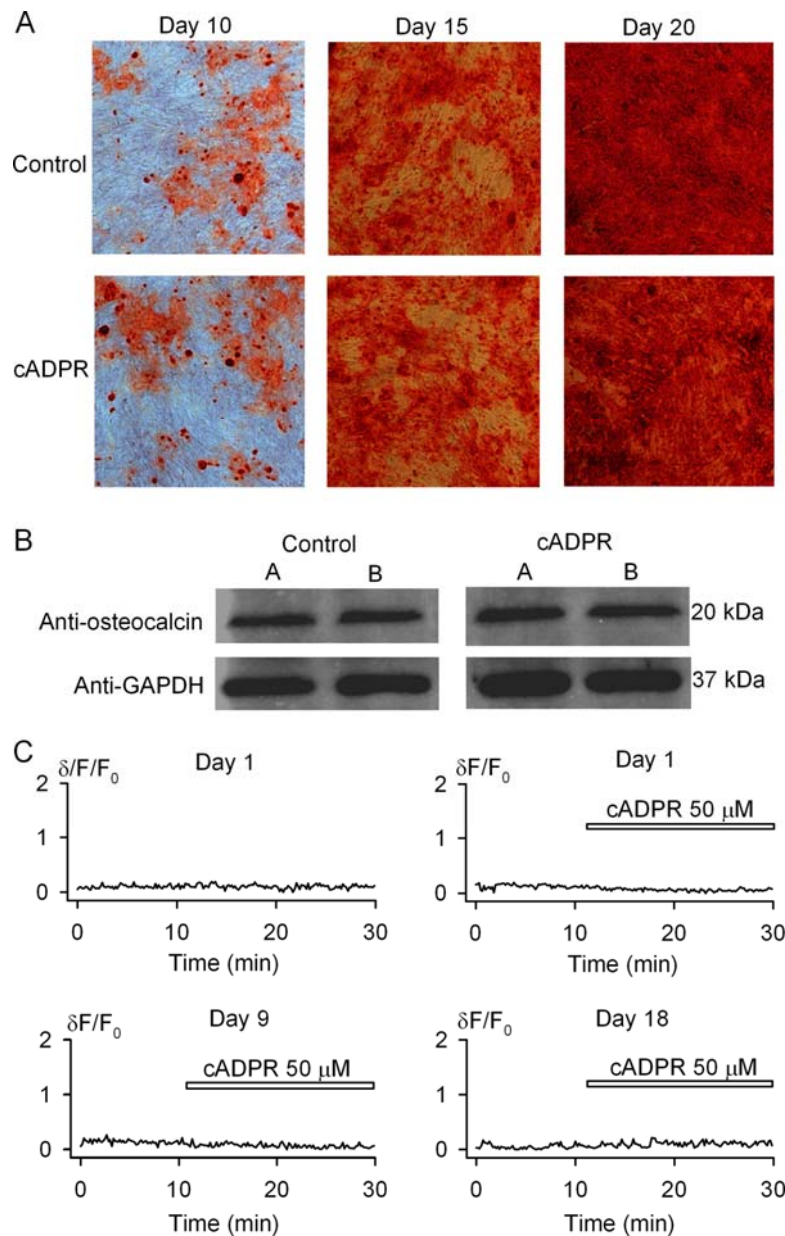


Figure S3. **Effects of cADP ribose on osteogenesis in human MSCs.**

A. Images showing the osteogenesis on day 10, day 15 and day 20 by Alizarin red S staining. cADP ribose had no significant effect on osteogenesis in human MSCs. Similar results were obtained in a total of 3 experiments. **B.** No difference was found in osteocalcin protein expression in the differentiated osteocytes (day 18) with and without the treatment of 50 μ M cADPR. **C.** No spontaneous Ca^{2+}_i oscillations were observed during osteogenesis on day 1, day 9 and day 18. Cyclic ADP ribose did not initiate Ca^{2+}_i transient or Ca^{2+}_i oscillations in these cells (n=32 for each).