Supplementary Table S1. Mouse specific primer pairs used for real-time RT-PCR

Gene	Forward primer	Reverse primer
Tg 11ß-HSD2	5'-GCCCTGTTCATGACACAACCCAG-3'	5'-GCGAGGGGCAAAGAACAGATG-3'
Col1a1	5'-GGTCCTCGTGGTGCTGCT-3'	5'-ACCTTTGCCCCCTTCTTTG-3'
BSP	5'-ACCCCAAGCACAGACTTTTGA-3'	5'-CTTTCTGCATCTCCAGCCTTCT-3'
Osteocalcin	5'-AAGCCATACTGGTTTGATAGCTCG-3'	5'-GAGGGCAATAAGGTAGTGAACAGA-3'
M-CSF	5'-CTCTGGCTGGCTTGGCTTGG-3'	5'-GCAGAAGGATGAGGTTGTG-3'
RANKL	5'-TGGAAGGCTCATGGTTGGAT-3'	5'-CATTGATGGTGAGGTGTGCAA-3'
OPG	5'-AGCTGCTGAAGCTGTGGAA-3'	5'-GGTTCGAGTGGCCGAGAT-3'
ß-actin	5'-ATGGCTGGGGTGTTGAAGGT-3'	5'-ATCTGGCACCACACCTTCTACAA-3'

BSP, bone sialoprotein; M-CSF, macrophage colony-stimulating factor; RANKL, receptor activator of nuclear factor kappa B ligand; OPG, osteoprotegerin

Supplementary Table S2. Summary of microarray analysis comparing sorted Col3.6-HSD2 (TG)/GFP+ and wild type (WT)/GFP+ cells.

Specifications		Gene sets
Total number of gene sets		45992
Significantly expressed		10090
Differentially expressed		302
1.5-2 fold change	Up-regulated	8
	Down-regulated	130
2-5 fold change	Up-regulated	4
	Down-regulated	13
>5 fold change	Up-regulated	2
	Down-regulated	0

Supplementary Table S3. Selected genes showing significant changes in sorted Col3.6-HSD2 (TG)/GFP+ cells compared to wild type (WT)/GFP+ cells.

Gene name	Symbol	WT	TG	Trans. Diffscore
Hydroxysteroid 11-beta dehydrogenase type 2	Hsd11b2	-4	943	25
Cyclin D1	Ccnd1	364	203	-12
Cyclin D2	Ccnd2	4148	2852	-8
E2F transcription factor 1	E2f1	555	420	-9
Cyclin-dependent kinase inhibitor 2B	Cdkn2b	2002	932	-25
Histone 1 H2bc	Hist1h2bc	2117	1415	-10
Histone 1 H2bh	Hist1h2bh	905	687	-9
Histone 1 H2bj	Hist1h2bj	1533	1163	-8
Histone 1 H2bl	Hist1h2bl	1023	813	-8
Histone 1 H2bn	Hist1h2bn	886	608	-11
Histone 1 H4a	Hist1h4a	209	163	-8
Histone 1 H4f	Hist1h4f	108	66	-16
Histone 1 H4i	Hist1h4i	109	78	-10
Histone 1 H4j	Hist1h4j	152	117	-8
Histone 1 H4m	Hist1h4m	187	139	-10
A disintegrin and metalloproteinase domain 9 (meltrin gamma)	Adam9	174	90	-19
Integrin beta 5	Itgb5	1095	770	-9
Sphingosine-1-phosphate phosphatase 1	Sgpp1	106	64	-11
Secreted phosphoprotein 1	Spp1	3959	1692	-13
Annexin A1	Anxa1	194	112	-16
Caveolae protein	Cav1	1433	875	-16
Transforming growth factor beta 1 induced transcript 4	Tgfb1i4	165	96	-10
Matrix metalloproteinase 3	Mmp3	107	61	-13
Apolipoprotein D	Apod	1218	1573	9
cysteine and glycine-rich protein 1	Csrp1	66	1025	21

Supplementary Table S4: Microarray data

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Hydroxysteroid 11-beta dehydrogenase 1	Hsd11b1	39	33	-1	
Hydroxysteroid 11-beta dehydrogenase 2	Hsd11b2	-4	943	25	*

Osteoblast

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Procollagen type I alpha 1	Col1a1	15887	15918	0	
Integrin binding sialoprotein	Ibsp	37	14	-9	
Bone gamma carboxyglutamate protein 1	Bglap1	356	208	-14	*
Bone gamma-carboxyglutamate protein 2	Bglap2	563	379	-8	*
Bone gamma-carboxyglutamate protein related sequence 1	Bglap-rs1	342	214	-10	*

Cell cycle

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Cyclin D1	Ccnd1	364	203	-12	*
Cyclin D2	Ccnd2	4148	2852	-8	*
Cyclin D3	Ccnd3	4	8	2	
E2F transcription factor 1	E2f1	555	420	-9	*
Tissue inhibitor of metalloproteinase 3	Timp3	159	85	-8	*
Cyclin B1	Ccnb1	220	160	-2	
Cyclin E1	Ccne1	142	130	-2	
Cyclin-dependent kinase inhibitor 2B	Cdkn2b	2002	932	-25	*
Cyclin-dependent kinase inhibitor 1C	Cdkn1c	4193	7008	5	
Transformed mouse 3T3 cell double minute 2	Mdm2	2569	2470	-1	
Caspase 3 apoptosis related cysteine protease	Casp3	31	26	-2	
B-cell leukemia/lymphoma	Bcl2	55	59	1	

TGF pathway

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Transforming growth factor beta 1	Tgfb1	73	51	-6	
Transforming growth factor beta 2	Tgfb2	126	118	-1	
Transforming growth factor beta 3	Tgfb3	1782	1430	-4	
Transforming growth factor beta receptor 1	Tgfbr1	952	937	0	
Transforming growth factor beta receptor 2	Tgfbr2	4395	4060	-1	
Transforming growth factor beta 1 induced transcript 1	Tgfb1i1	856	827	-1	
Transforming growth factor beta 1 induced transcript 4	Tgfb1i4	165	96	-10	*
Mitogen activated protein kinase kinase 4	Map2k4	491	499	0	
Mitogen activated protein kinase kinase 3	Map2k3	1542	1457	-1	
Mitogen activated protein kinase 8	Mapk8	55	112	13	*
Mitogen activated protein kinase 9	Mapk9	856	927	1	
Mitogen activated protein kinase 14	Mapk14	440	483	1	

FGF pathway

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Fibroblast growth factor 1	Fgf1	-5	0	3	
Fibroblast growth factor 10	Fgf10	219	247	3	
fibroblast growth factor 11	Fgf11	-5	-3	1	

fibroblast growth factor 12	Fgf12	1	2	1	
fibroblast growth factor 13	Fgf13	4	4	0	
fibroblast growth factor 13	Fgf13	139	119	-4	
fibroblast growth factor 14	Fgf14	3	1	-1	
fibroblast growth factor 15	Fgf15	0	1	0	
fibroblast growth factor 16	Fgf16	-4	1	3	
fibroblast growth factor 17	Fgf17	1	0	0	
fibroblast growth factor 18	Fgf18	21	18	-1	
fibroblast growth factor 20	Fgf20	-6	-7	0	
fibroblast growth factor 21	Fgf21	175	235	2	
fibroblast growth factor 12	Fgf22	8	9	0	
fibroblast growth factor 23	Fgf23	11	13	1	
fibroblast growth factor 3	Fgf3	6	5	0	
fibroblast growth factor 4	Fgf4	-3	-3	0	
fibroblast growth factor 5	Fgf5	0	0	0	
fibroblast growth factor 6	Fgf6	-5	-3	1	
fibroblast growth factor 7	Fgf7	-9	-10	-1	
fibroblast growth factor 8	Fgf8	4	-8	-8	
fibroblast growth factor 9	Fgf9	65	57	-1	
fibroblast growth factor binding protein 1	Fgfbp1	-7	-10	-1	
Fibroblast growth factor receptor 1	Fgfr1	20	17	-1	
Fibroblast growth factor receptor 2	Fgfr2	3861	4211	1	
Fibroblast growth factor receptor 3	Fgfr3	7	12	2	
Fibroblast growth factor receptor 4	Fgfr4	-3	-2	0	
Fibroblast growth factor receptor-like 1 (Fgfrl1) mRNA.	Fgfrl1	256	251	0	

IGF Pathway

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Insulin-like growth factor 1	Igf1	844	898	1	
Insulin-like growth factor I receptor	Igf1r	77	70	-1	
Insulin-like growth factor binding protein 1	Igfbp1	-6	-10	-2	
Insulin-like growth factor binding protein 2	Igfbp2	625	793	3	
Insulin-like growth factor binding protein 3	Igfbp3	857	910	0	
Insulin-like growth factor binding protein 4	Igfbp4	8609	8046	-2	
Insulin-like growth factor binding protein 5	Igfbp5	7959	8830	1	
Insulin-like growth factor binding protein 6	Igfbp6	717	552	-2	
Insulin-like growth factor binding protein 7	Igfbp7	4759	3617	-9	*
Insulin-like growth factor 2	Igf2	13693	17244	5	
Insulin-like growth factor 2 binding protein 1	Igf2bp1	34	42	2	
Insulin-like growth factor 2 binding protein 3	Igf2bp3	37	68	4	
Insulin-like growth factor 2 receptor	Igf2r	1166	1304	1	

Wnt Pathway

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Catenin beta	Catnb	777	666	-3	
Dishevelled dsh homolog 1	Dvl1	557	523	-1	
Dishevelled 2 dsh homolog	Dvl2	0	0	0	
Frizzled homolog 1	Fzd1	33	18	-8	
Frizzled homolog 8	Fzd8	37	37	0	
Low density lipoprotein receptor-related protein 5	Lrp5	216	236	1	
Low density lipoprotein receptor-related protein 6	Lrp6	97	93	-1	

Transcription factor 1	Tcf1	3	-3	-2	
Wingless-related MMTV integration site 3A	Wnt3a	-4	-8	-2	
Wingless-related MMTV integration site 5A	Wnt5a	356	363	0	
Wingless-related MMTV integration site 9A	Wnt9a	537	528	0	
Wingless-related MMTV integration site 10B	Wnt10b	21	21	0	
Axin	Axin	828	901	2	
Casein kinase 1 alpha 1 (Csnk1a1)	Csnk1a1	-5	-6	0	
Dickkopf homolog 1 (Xenopus laevis)	Dkk1	2	3	0	
Frizzled-related protein	Frzb	11	10	0	
Glycogen synthase kinase 3 beta	Gsk3b	310	346	1	
Secreted frizzled-related sequence protein 1	Sfrp1	2917	3106	0	
Secreted frizzled-related sequence protein 2	Sfrp2	1033	989	0	

BMP signaling activator

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Bone morphogenetic protein 1	Bmp1	309	321	0	
Bone morphogenetic protein 10	Bmp10	7	6	0	
Bone morphogenetic protein 15	Bmp15	17	17	0	
Bone morphogenetic protein 2	Bmp2	-4	-3	0	
BMP2 inducible kinase	Bmp2k	12	11	-1	
Bone morphogenetic protein 3	Bmp3	14	17	1	
Bone morphogenetic protein 4	Bmp4	2381	2799	3	
Bone morphogenetic protein 5	Bmp5	-2	-5	-1	
Bone morphogenetic protein 6	Bmp6	-4	-11	-4	
Bone morphogenetic protein 7	Bmp7	2	3	0	
Bone morphogenetic protein 8a	Bmp8a	3	2	-1	
Bone morphogenetic protein 8b	Bmp8b	-1	-1	0	
BMP-binding endothelial regulator	Bmper	2039	1611	-4	
Bone morphogenetic protein receptor type 1A	Bmpr1a	127	80	-10	*
Bone morphogenetic protein receptor type 1B	Bmpr1b	33	23	-4	
Bone morphogenic protein receptor type II (serine/threonine kinase)	Bmpr2	5	0	-3	
SMAD family member 1	Smad1	231	162	-7	*
SMAD family member 2	Smad2	257	245	-1	
SMAD family member 3	Smad3	2003	2030	0	
SMAD family member 5	Smad5	764	750	0	

BMP signaling inhibitor

Name	Symbol	WT	TG	Trans. Diffscore	Sig
SMAD family member 4	Smad4	2942	2958	0	
SMAD family member 6	Smad6	301	264	-1	
SMAD family member 7	Smad7	-8	-13	-2	
Follistatin (Fst) mRNA.	Fst	637	519	-2	
Similar to Follistatin-related protein 1 precursor (TGF-beta-inducible protein TSC-36) (Fstl) mRNA.	Fstl	402	439	2	
Follistatin-like 1 (Fstl1) mRNA.	Fstl1	5847	5841	0	
Ferberus 1 homolog (Xenopus laevis) (Cer1) mRNA.	Cer1	-1	-1	0	
Growth differentiation factor 10 (Gdf10) mRNA.	Gdf10	1536	2009	2	
Snail homolog 2 (Drosophila) (Snai2) mRNA.	Snai2	901	860	-1	
Twisted gastrulation homolog 1 (Drosophila) (Twsg1) mRNA.	Twsg1	1863	1820	0	

Integrin Pathway

Name	Symbol	WT	TG	Trans. Diffscore	Sig
A disintegrin and metalloprotease domain 23 (Adam23) mRNA.	Adam23	581	603	1	
A disintegrin and metalloproteinase domain 9 (meltrin gamma) (Adam9) mRNA.	Adam9	174	90	-19	*
Integrin alpha 2b (Itga2b) mRNA.	Itga2b	0	1	0	
Integrin alpha 3 (Itga3) mRNA.	Itga3	31	21	-4	
Integrin alpha 4	Itga4	4	1	-2	
Integrin alpha 6	Itga6	3	0	-1	
Integrin alpha X	Itgax	-1	-5	-2	
Integrin beta 5 (Itgb5) mRNA.	Itgb5	1095	770	-9	*
Integrin beta-like 1 (Itgbl1) mRNA.	Itgbl1	35	23	-4	
Sphingosine-1-phosphate phosphatase 1 (Sgpp1) mRNA.	Sgpp1	106	64	-11	*
Secreted phosphoprotein 1 (Spp1) mRNA.	Spp1	3959	1692	-13	*
Transglutaminase 2 C polypeptide (Tgm2) mRNA.	Tgm2	97	62	-3	

NF-kB Pathway

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Procollagen type II alpha 1 (Col2a1) mRNA.	Col2a1	64	150	4	
Procollagen type V alpha 2 (Col5a2) mRNA.	Col5a2	51	37	-5	
Procollagen type III alpha 1 (Col3a1) mRNA.	Col3a1	468	371	-3	
Procollagen type XI alpha 1	Col11a1	4	4	0	
Discoidin domain receptor family member 1 (Ddr1) mRNA.	Ddr1	296	253	-3	
Nuclear factor of kappa light polypeptide gene enhancer in B-cells 2 p49/p100 (Nfkb2) mRNA.	Nfkb2	44	27	-7	
B-cell leukemia/lymphoma 3 (Bcl3) mRNA.	Bcl3	41	26	-6	
Nuclear factor of kappa light chain gene enhancer in B-cells 1 p105 (Nfkb1) mRNA.	Nfkb1	565	555	0	
Inhibitor of kappaB kinase beta (Ikbkb) mRNA.	Ikbkb	974	1028	1	
Inhibitor of kappaB kinase gamma (Ikbkg) mRNA.	Ikbkg	325	307	-1	

Other genes with altered expression

Name	Symbol	WT	TG	Trans. Diffscore	Sig
Runt related transcription factor 1	Runx1	74	43	-14	
Annexin A1	Anxa1	194	112	-16	*
caveolae protein	Cav1	1433	875	-16	*
Matrix metalloproteinase 3	Mmp3	107	61	-13	*
Apolipoprotein D	Apod	1218	1573	9	*
Mus musculus ATP-binding cassette sub-family F (GCN20) member 2 (Abcf2) mRNA.	Abcf2	437	300	-9	*
Mus musculus acyl-Coenzyme A dehydrogenase short/branched chain (Acadsb) mRNA.	Acadsb	334	209	-13	*
Mus musculus a disintegrin-like and metalloprotease (reprolysin type) with thrombospondin type 1 motif 2 (Adamts2) mRNA.	Adamts2	298	184	-10	*
Mus musculus cDNA sequence AF155546 (AF155546) mRNA.	AF155546	189	130	-7	*
Mus musculus expressed sequence AI838661 (AI838661) mRNA.	AI838661	136	86	-10	*
Mus musculus aldo-keto reductase family 1 member B3 (aldose reductase) (Akr1b3) mRNA.	Akr1b3	306	201	-11	*
Mus musculus aldehyde dehydrogenase family 3 subfamily A1 (Aldh3a1) mRNA.	Aldh3a1	79	56	-8	
Mus musculus aldehyde dehydrogenase family 6 subfamily A1 (Aldh6a1) mRNA.	Aldh6a1	210	134	-8	*

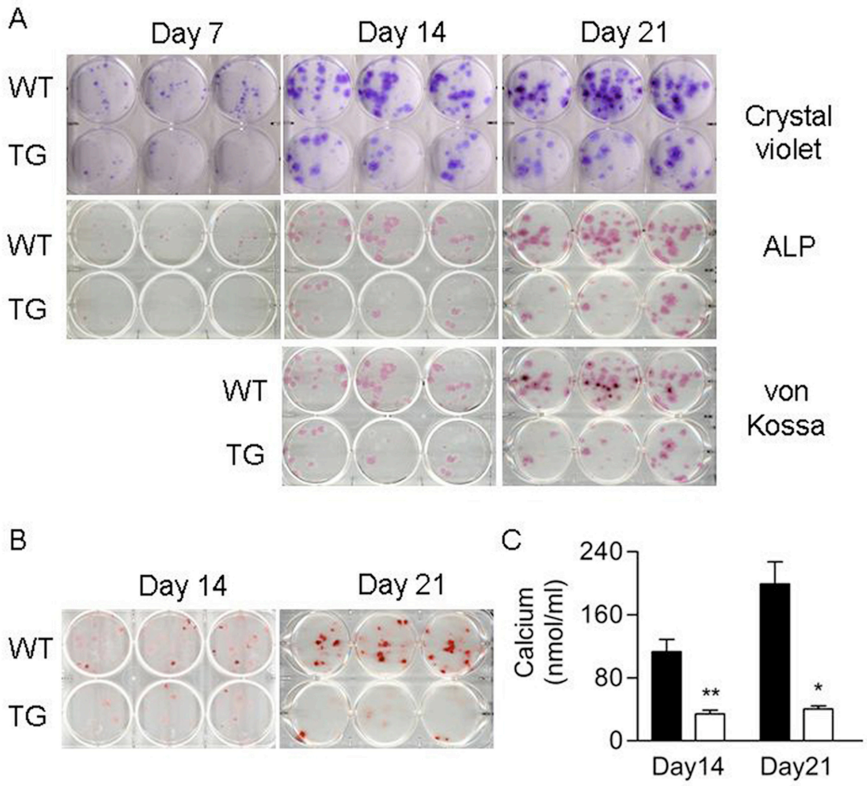
Mus musculus actin related protein 2/3 complex subunit 5-like (Arpc5l) mRNA.	Arpc5l	77	44	-9	
Mus musculus N-acylsphingosine amidohydrolase 1 (Asah1) mRNA.	Asah1	231	149	-10	*
Mus musculus argininosuccinate synthetase 1 (Ass1) mRNA.	Ass1	271	189	-8	*
Mus musculus ATPase H+ transporting lysosomal accessory protein 2 (Atp6ap2) mRNA.	Atp6ap2	189	120	-11	*
Mus musculus ATPase H+ transporting V1 subunit A isoform 1 (Atp6v1a1) mRNA.	Atp6v1a1	277	179	-11	*
Mus musculus ATPase Cu++ transporting alpha polypeptide (Atp7a) mRNA.	Atp7a	201	142	-7	*
Mus musculus expressed sequence AW822216 (AW822216) mRNA.	AW822216	69	40	-9	
Mus musculus breast carcinoma amplified sequence 2 (Bcas2) mRNA.	Bcas2	70	33	-12	
Mus musculus catenin src (Catns) mRNA.	Catns	226	170	-10	*
Mus musculus chemokine (C-C motif) ligand 8 (Ccl8) mRNA.	Ccl8	168	101	-8	*
Mus musculus CDC42 effector protein (Rho GTPase binding) 3 (Cdc42ep3) mRNA.	Cdc42ep3	159	90	-9	*
Mus musculus carbohydrate sulfotransferase 12 (Chst12) mRNA.	Chst12	116	84	-9	*
Mus musculus collectin sub-family member 12 (Colec12) mRNA.	Colec12	110	80	-9	*
Mus musculus copine II (Cpne2) mRNA.	Cpne2	142	108	-8	*
Mus musculus carnitine palmitoyltransferase 2 (Cpt2) mRNA.	Cpt2	192	118	-10	*
Mus musculus carnitine palmitoyltransferase 2 (Cpt2) mRNA.	Cpt2	1050	743	-8	*
Mus musculus cysteine and glycine-rich protein 1 (Csrp1) mRNA.	Csrp1	66	1025	21	*
Mus musculus cathepsin B (Ctsb) mRNA.	Ctsb	355	268	-10	*
Mus musculus DNA segment Chr 11 Brigham & Womens Genetics 0434 expressed (D11Bwg0434e) mRNA.	D11Bwg0434e	537	368	-11	*
Mus musculus DNA segment Chr 17 Wayne State University 94 expressed (D17Wsu94e) mRNA.	D17Wsu94e	81	51	-11	
Mus musculus DNA segment Chr 19 ERATO Doi 721 expressed (D19Ertd721e) mRNA.	D19Ertd721e	1529	1105	-7	*
Mus musculus dystroglycan 1 (Dag1) mRNA.	Dag1	899	549	-12	*
Mus musculus DAZ associated protein 2 (Dazap2) mRNA.	Dazap2	575	389	-8	*
Mus musculus discoidin CUB and LCCL domain containing 1 (Dcbld1) mRNA.	Dcbld1	90	62	-8	
Mus musculus DEAD/H (Asp-Glu-Ala-Asp/His) box polypeptide 3 X-linked (Ddx3x) mRNA.	Ddx3x	83	43	-12	
Mus musculus DEAH (Asp-Glu-Ala-His) box polypeptide 15 (Dhx15) mRNA.	Dhx15	672	457	-8	*
Mus musculus dynein cytoplasmic light chain 1 (Dnclc1) mRNA.	Dnclc1	114	61	-14	*
Mus musculus dipeptidylpeptidase 7 (Dpp7) mRNA.	Dpp7	1344	939	-8	*
Mus musculus deoxythymidylate kinase (Dtymk) mRNA.	Dtymk	224	137	-8	*
Mus musculus RIKEN cDNA E030024M05 gene (E030024M05Rik) mRNA.	E030024M05Rik	128	86	-7	*
Mus musculus endothelial differentiation lysophosphatidic acid G-protein-coupled receptor 2 (Edg2) mRNA.	Edg2	470	327	-9	*
Mus musculus embryonic ectoderm development (Eed) mRNA.	Eed	111	70	-9	*
Mus musculus EGL nine homolog 3 (C. elegans) (Egln3) mRNA.	Egln3	83	47	-10	
Mus musculus excision repair cross-complementing rodent repair deficiency complementation group 1 (Ercc1) mRNA.	Ercc1	1969	1532	-7	*
Mus musculus excision repair cross-complementing rodent repair deficiency complementation group 1 (Ercc1) mRNA.	Ercc1	441	350	-7	*
Mus musculus endothelial cell-specific molecule 1 (Esm1) mRNA.	Esm1	74	43	-11	
Mus musculus coagulation factor III (F3) mRNA.	F3	437	223	-9	*
Mus musculus fatty acid synthase (Fasn) mRNA.	Fasn	553	374	-8	*
Mus musculus four and a half LIM domains 2 (Fhl2) mRNA.	Fhl2	346	268	-8	*
Mus musculus retinoblastoma-like 2 (Rbl2) mRNA.	Fts	160	116	-8	*
Mus musculus glucosaminyl (N-acetyl) transferase 2 I-branching enzyme (Gcnt2) transcript variant 3 mRNA.	Gcnt2	112	74	-7	*
Mus musculus GLE1 RNA export mediator-like (yeast (Gle1l)	Gle1l	83	51	-9	

mRNA.					
Mus musculus GDP-mannose pyrophosphorylase A (Gmppa) mRNA.	Gmppa	126	92	-7	*
Mus musculus GNAS (guanine nucleotide binding protein alpha stimulating) complex locus (Gnas) mRNA.	Gnas	463	321	-8	*
Mus musculus glucose phosphate isomerase 1 (Gpi1) mRNA.	Gpi1	68	45	-8	
Mus musculus G-protein coupled receptor 88 (Gpr88) mRNA.	Gpr88	214	158	-9	*
Mus musculus glutathione S-transferase mu 1 (Gstm1) mRNA.	Gstm1	777	583	-9	*
Mus musculus glutathione S-transferase mu 6 (Gstm6) mRNA.	Gstm6	222	165	-10	*
Mus musculus hydroxyacyl-Coenzyme A dehydrogenase/3-ketoacyl-Coenzyme A thiolase/enoyl-Coenzyme A hydratase (trifunctional protein) beta subunit (Hadhb) mRNA.	Hadhb	685	488	-7	*
Mus musculus HESB like domain containing 2 (Hbld2) mRNA.	Hbld2	157	97	-10	*
Mus musculus histone deacetylase 2 (Hdac2) mRNA.	Hdac2	707	469	-8	*
Mus musculus histone 1 H2bc (Hist1h2bc) mRNA.	Hist1h2bc	2117	1415	-10	*
Mus musculus histone 1 H2bh (Hist1h2bh) mRNA.	Hist1h2bh	905	687	-9	*
Mus musculus histone 1 H2bj (Hist1h2bj) mRNA.	Hist1h2bj	1533	1163	-8	*
Mus musculus histone 1 H2bl (Hist1h2bl) mRNA.	Hist1h2bl	1023	813	-8	*
Mus musculus histone 1 H2bn (Hist1h2bn) mRNA.	Hist1h2bn	886	608	-11	*
Mus musculus histone 1 H4a (Hist1h4a) mRNA.	Hist1h4a	209	163	-8	*
Mus musculus histone 1 H4f (Hist1h4f) mRNA.	Hist1h4f	108	66	-16	*
Mus musculus histone 1 H4i (Hist1h4i) mRNA.	Hist1h4i	109	78	-10	*
Mus musculus histone 1 H4j (Hist1h4j) mRNA.	Hist1h4j	152	117	-8	*
Mus musculus histone 1 H4m (Hist1h4m) mRNA.	Hist1h4m	187	139	-10	*
Mus musculus hematological and neurological expressed sequence 1 (Hn1) mRNA.	Hn1	329	201	-11	*
Mus musculus heterogeneous nuclear ribonucleoprotein K (Hnrpk) mRNA.	Hnrpk	112	75	-11	*
Mus musculus heat shock protein 8 (Hspa8) mRNA.	Hspa8	1720	1084	-8	*
Mus musculus heat shock protein 1 alpha (Hspca) mRNA.	Hspca	145	56	-27	*
Mus musculus heat shock protein 1 (chaperonin) (Hspd1) mRNA.	Hspd1	90	53	-11	
Mus musculus isocitrate dehydrogenase 2 (NADP+) mitochondrial (Idh2) mRNA.	Idh2	192	112	-9	*
Mus musculus interferon alpha responsive gene (Ifrg15) mRNA.	Ifrg15	92	66	-8	
Mus musculus inhibin beta-B (Inhbb) mRNA.	Inhbb	179	80	-10	*
Mus musculus insulin induced gene 2 (Insig2) mRNA.	Insig2	92	64	-7	
Mus musculus immunoglobulin superfamily containing leucine-rich repeat (Islr) mRNA.	Islr	753	1078	9	*
Mus musculus kidney cell line derived transcript 1 (Kdt1) mRNA.	Kdt1	179	111	-11	*
	Kng1	96	61	-12	
Mus musculus karyopherin (importin) beta 1 (Kpnb1) mRNA.	Kpnb1	132	63	-16	*
	Lmo7	100	56	-8	*
Mus musculus hypothetical LOC223653 (LOC223653) mRNA.	LOC223653	89	115	7	*
Mus musculus similar to Alpha enolase (2-phospho-D-glycerate hydro-lyase) (Non-neural enolase) (NNE) (Enolase 1) (LOC229810) mRNA.	LOC229810	147	96	-7	*
Mus musculus similar to elongation factor 1 alpha (LOC245251) mRNA.	LOC245251	12464	16960	14	*
Mus musculus similar to adenine nucleotide translocase (LOC277856) mRNA.	LOC277856	222	140	-11	*
Mus musculus similar to Ab2-450 (LOC383249) mRNA.	LOC383249	131	83	-12	*
Mus musculus similar to adenine nucleotide translocase (LOC384206) mRNA.	LOC384206	306	199	-10	*
Mus musculus similar to Ac1147 (LOC385086) mRNA.	LOC385086	4805	6900	12	*
Mus musculus similar to RNP particle component (LOC386124) mRNA.	LOC386124	101	198	15	*
Mus musculus leucine rich repeat containing 15 (Lrrc15) mRNA.	Lrrc15	534	355	-16	*
Mus musculus LSM2 homolog U6 small nuclear RNA associated (S.	Lsm2	231	177	-8	*

cerevisiae) (Lsm2) mRNA.					
Mus musculus lumican (Lum) mRNA.	Lum	1769	1238	-8	*
Mus musculus lysophospholipase 1 (Lypla1) mRNA.	Lypla1	68	45	-10	
Mus musculus mannose-6-phosphate receptor cation dependent (M6pr) mRNA.	M6pr	962	712	-7	*
Mus musculus microtubule-associated protein 1 light chain 3 beta (Map1lc3b) mRNA.	Map1lc3b	845	582	-8	*
Mus musculus malate dehydrogenase 2 NAD (mitochondrial) (Mdh2) mRNA.	Mdh2	79	51	-7	
Mus musculus matrix gamma-carboxyglutamate (gla) protein (Mglap) mRNA.	Mglap	9928	7619	-7	*
Mus musculus mitochondrial ribosomal protein S25 (Mrps25) mRNA.	Mrps25	121	84	-8	*
Mus musculus microtubule-associated protein 1 B (Mtap1b) mRNA.	Mtap1b	143	82	-8	*
	Mtrf1l	77	40	-10	
Mus musculus nascent polypeptide-associated complex alpha polypeptide (Naca) mRNA.	Naca	386	254	-8	*
Mus musculus nanos homolog 1 (Drosophila) (Nanos1) mRNA.	Nanos1	78	58	-7	
Mus musculus nucleosome assembly protein 1-like 1 (Nap1l1) mRNA.	Nap1l1	73	40	-10	
Mus musculus NADH dehydrogenase (ubiquinone) 1 alpha subcomplex 6 (B14) (Ndufa6) mRNA.	Ndufa6	126	81	-8	*
Mus musculus naked cuticle 2 homolog (Drosophila) (Nkd2) mRNA.	Nkd2	307	214	-8	*
Mus musculus naked cuticle 2 homolog (Drosophila) (Nkd2) mRNA.	Nkd2	178	141	-7	*
Mus musculus Niemann Pick type C2 (Npc2) mRNA.	Npc2	1027	689	-9	*
Mus musculus nucleoplasmin 3 (Npm3) mRNA.	Npm3	709	1030	8	*
Mus musculus natriuretic peptide receptor 2 (Npr2) mRNA.	Npr2	611	440	-9	*
Mus musculus nucleoporin 62 (Nup62) mRNA.	Nup62	136	88	-14	*
Mus musculus nuclear transport factor 2 (Nutf2) mRNA.	Nutf2	208	135	-8	*
Mus musculus osteoclast inhibitory lectin (Ocil) mRNA.	Ocil	1875	1299	-10	*
Mus musculus oxidation resistance 1 (Oxr1) mRNA.	Oxr1	207	138	-9	*
Mus musculus poly A binding protein cytoplasmic 1 (Pabpc1) mRNA.	Pabpc1	2231	1417	-10	*
Mus musculus phosphoribosylaminoimidazole carboxylase phosphoribosylaminoribosylaminoimidazole succinocarboxamide synthetase (Paics) mRNA.	Paics	160	98	-8	*
Mus musculus progesterone receptor membrane component 1 (Pgrmc1) mRNA.	Pgrmc1	69	33	-14	
Mus musculus pleckstrin homology-like domain family A member 3 (Phlda3) mRNA.	Phlda3	159	105	-12	*
Mus musculus phosphatidylinositol 3 kinase regulatory subunit polypeptide 3 (p55) (Pik3r3) mRNA.	Pik3r3	514	382	-8	*
Mus musculus phosphatidylinositol transfer protein membrane-associated 2 (Pitpnm2) mRNA.	Pitpnm2	144	110	-7	*
Mus musculus protein kinase inhibitor gamma (Pkig) mRNA.	Pkig	73	53	-7	
Mus musculus pyruvate kinase muscle (Pkm2) mRNA.	Pkm2	253	163	-14	*
Mus musculus procollagen lysine 2-oxoglutarate 5-dioxygenase 2 (Plod2) mRNA.	Plod2	74	43	-8	
Mus musculus plastin 3 (T-isoform) (Pls3) mRNA.	Pls3	833	558	-8	*
Mus musculus polymerase (RNA) II (DNA directed) polypeptide G (Polr2g) mRNA.	Polr2g	329	213	-8	*
Mus musculus protective protein for beta-galactosidase (Ppgb) mRNA.	Ppgb	229	150	-10	*
Mus musculus protein phosphatase 4 regulatory subunit 1 (Ppp4r1) mRNA.	Ppp4r1	81	45	-11	
Mus musculus peroxiredoxin 6 (Prdx6) mRNA.	Prdx6	130	91	-8	*
Mus musculus protease (prosome macropain) 26S subunit ATPase 5 (Psmc5) mRNA.	Psmc5	833	635	-10	*
Mus musculus proteasome (prosome macropain) 26S subunit non-ATPase 10 (Psmd10) mRNA.	Psmd10	79	55	-8	
Mus musculus proteasome (prosome macropain) 26S subunit non-	Psmd14	103	64	-9	*

ATPase 14 (Psmd14) mRNA.					
Mus musculus RAB27A member RAS oncogene family (Rab27a) mRNA.	Rab27a	668	441	-9	*
Mus musculus RAB33B member of RAS oncogene family (Rab33b) mRNA.	Rab33b	186	121	-8	*
Mus musculus RAB34 member of RAS oncogene family (Rab34) mRNA.	Rab34	919	615	-13	*
Mus musculus retinoblastoma binding protein 7 (Rbbp7) mRNA.	Rbbp7	116	72	-8	*
Mus musculus ring finger and CHY zinc finger domain containing 1 (Rchy1) mRNA.	Rchy1	83	54	-9	
Mus musculus ral guanine nucleotide dissociation stimulator-like 1 (Rgl1) mRNA.	Rgl1	226	80	-25	*
Mus musculus regulator of G-protein signalling 10 (Rgs10) mRNA.	Rgs10	244	152	-12	*
Mus musculus regulator of G-protein signaling 19 interacting protein 1 (Rgs19ip1) mRNA.	Rgs19ip1	80	57	-7	
Mus musculus Ras and Rab interactor 2 (Rin2) mRNA.	Rin2	82	50	-11	
Mus musculus retroviral integration site 2 (Ris2) mRNA.	Ris2	395	267	-12	*
Mus musculus ribonuclease RNase A family 4 (Rnase4) mRNA.	Rnase4	641	458	-8	*
Mus musculus ring finger protein 11 (Rnf11) mRNA.	Rnf11	488	316	-9	*
Mus musculus ring finger protein 7 (Rnf7) mRNA.	Rnf7	938	685	-7	*
Mus musculus arginyl aminopeptidase (aminopeptidase B) (Rnpep) mRNA.	Rnpep	711	539	-8	*
Mus musculus ribosomal protein L41 (Rpl41) mRNA.	Rpl41	25711	33323	11	*
Mus musculus RNA polymerase 1-1 (Rpo1-1) mRNA.	Rpo1-1	124	81	-7	*
Mus musculus S100 calcium binding protein A4 (S100a4) mRNA.	S100a4	713	422	-11	*
	Scfd1	123	76	-9	*
Mus musculus sodium channel voltage-gated type I beta polypeptide (Scn1b) mRNA.	Scn1b	252	193	-7	*
Mus musculus scotin gene (Scotin) mRNA.	Scotin	129	93	-9	*
Mus musculus succinate dehydrogenase complex subunit D integral membrane protein (Sdhd) mRNA.	Sdhd	89	36	-17	
Mus musculus SEC63-like (S. cerevisiae) (Sec63) mRNA.	Sec63	99	66	-8	
	Sepx1	117	88	-8	*
	Sepx1	293	230	-8	*
Mus musculus sphingosine-1-phosphate phosphatase 1 (Sgpp1) mRNA.	Sgpp1	106	64	-11	*
	Slc35b4	971	775	-7	*
	Slc7a6	71	42	-11	
Mus musculus small nuclear ribonucleoprotein polypeptide A (Snrpa) mRNA.	Snrpa	138	93	-13	*
Mus musculus small nuclear ribonucleoprotein polypeptide A (Snrpa) mRNA.	Snrpa	139	105	-8	*
Mus musculus sorting nexin 7 (Snx7) mRNA.	Snx7	226	150	-8	*
Mus musculus synovial sarcoma translocation Chromosome 18 (Ss18) mRNA.	Ss18	124	74	-11	*
Mus musculus suppression of tumorigenicity 13 (St13) mRNA.	St13	86	49	-11	
Mus musculus beta galactoside alpha 26 sialyltransferase 1 (St6gal1) mRNA.	St6gal1	317	230	-10	*
Mus musculus serine/threonine kinase 17b (apoptosis-inducing) (Stk17b) mRNA.	Stk17b	181	107	-12	*
Mus musculus sulfatase 1 (Sulf1) mRNA.	Sulf1	1083	769	-9	*
Mus musculus sulfatase 1 (Sulf1) mRNA.	Sulf1	644	475	-8	*
Mus musculus synaptophysin-like protein (Sypl) transcript variant 1 mRNA.	Sypl	815	567	-9	*
Mus musculus TAR (HIV) RNA binding protein 2 (Tarbp2) mRNA.	Tarbp2	295	202	-9	*
Mus musculus t-complex-associated-testis-expressed 1-like (Tcte1l) mRNA.	Tcte1l	355	202	-14	*
Mus musculus telomerase binding protein p23 (Tebp) mRNA.	Tebp	104	68	-8	*

Mus musculus testis expressed gene 261 (Tex261) mRNA.	Tex261	347	221	-10	*
Mus musculus testis expressed gene 27 (Tex27) mRNA.	Tex27	1373	1014	-8	*
Mus musculus transmembrane 4 superfamily member 8 (Tm4sf8) mRNA.	Tm4sf8	408	302	-9	*
Mus musculus tumor protein D52-like 2 (Tpd52l2) mRNA.	Tpd52l2	238	169	-8	*
Mus musculus translocated promoter region (Tpr) mRNA.	Tpr	844	532	-13	*
Mus musculus tweety homolog 2 (Drosophila) (Ttyh2) mRNA.	Ttyh2	593	467	-8	*
	Txndc7	93	57	-9	
Mus musculus ubiquitin-conjugating enzyme E2 variant 1 (Ube2v1) mRNA.	Ube2v1	279	203	-9	*
	Uck1	258	168	-11	*
Mus musculus ubiquinol-cytochrome c reductase binding protein (Uqcrb) mRNA.	Uqcrb	167	105	-9	*
Mus musculus ubiquitin specific protease 1 (Usp1) mRNA.	Usp1	86	47	-10	
Mus musculus vesicle-associated membrane protein associated protein A (Vapa) mRNA.	Vapa	156	96	-9	*
Mus musculus vesicle-associated membrane protein associated protein B and C (Vapb) mRNA.	Vapb	518	797	14	*
Mus musculus vacuolar protein sorting 29 (S. pombe) (Vps29) mRNA.	Vps29	217	137	-9	*
Mus musculus WAS protein family member 2 (Wasf2) mRNA.	Wasf2	535	375	-8	*
Y box protein 3	Ybx3	506	330	-12	*
Mus musculus zinc finger CCHC domain containing 6 (Zcchc6) mRNA.	Zcchc6	229	142	-10	*
Mus musculus zinc finger protein 148 (Zfp148) mRNA.	Zfp148	359	228	-9	*
Mus musculus zinc finger protein 313 (Zfp313) mRNA.	Zfp313	157	107	-8	*
Mus musculus zinc finger protein 346 (Zfp346) mRNA.	Zfp346	73	37	-14	



Supplementary Figure 1. Cell growth and differentiation were reduced in female Col3.6-HSD2 (TG) bone marrow stromal cell cultures. A) Crystal violet, alkaline phosphatase (ALP), von Kossa staining in bone marrow stromal cell cultures from 7-week-old wild type (WT) and TG mice. B) Alizarin red staining in day 14 and day 21 bone marrow stromal cultures from 7-week-old WT and TG mice. C) Quantification of alizarin red staining. Each value is the mean ± SD for 3 samples per group and each experiment has been performed at least twice with similar results. Black bars, WT; White bars, TG. *Different than WT, *$p<0.05$, **$p<0.01$.