

Supplementary Methods

Microarray data preprocessing and differentially expressed genes selection: After hybridization, the Illumina HumanWG-6 BeadChip was analyzed by the Gene Expression Module of BeadStudio Software (Illumina). Raw intensity and present/absent call of each probe was obtained for the 6 hybridized samples and exported in 1 comma-separated file. We used R [1] and BioConductor Lumi package [2] to examine the quality control information and perform pre-processing on the raw data. Variance stabilizing transformation (VST) and robust spline normalization (RSN) were applied on the raw data to generate normalized and comparable data among samples. After normalization, we used inverse VST to transform intensity data back to the raw scale before computing ratios between samples.

We performed statistical analysis to select differentially expressed genes between cell lines shCNTL and shHDAC3, using ratios to make comparisons. A ratio is derived by dividing the intensity of the test sample over the intensity of the control sample. Probes whose ratio is greater than 2 fold are considered up-regulated and probes whose ratio is less than 0.5 fold are considered down-regulated.

Pattern-based Clustering: We used Pattern-based Clustering as an approach to perform functional analysis by grouping genes with similar expression pattern into groups. Pattern-based Clustering uses non-numeric parameters assigned for each fold change pattern to group genes in order to avoid assigning pre-defined clustering number and common inconsistency problems in distance-based clustering algorithms such as K-means.

Finding over-represented Gene Ontology (GO) terms: Pattern-based Clustering generates patterns based on the input genes and their expression data. For some interesting patterns, we used R and GOstats package [3] to find over-represented Gene Ontology terms in Biological Process hierarchy. This functional analysis will find if certain GO Biological Processes are associated with a certain expression pattern. It may also find if certain genes in this cluster are involved together in an over-represented GO Biological Process.

Given a set of genes, GOstats performs functional analysis based on the association of Gene Ontology (GO) terms to genes. It uses a Hypergeometrical model to find over-represented GO terms for the given set of genes compared to the universe. We used BioConductor illuminaHumanv2 library as the universe as it matches with the Illumina chip used in this experiment. We tested two gene lists, genes upregulated by in shHD3 cells compared to shCNTL, and genes downregulated by shHD3 compared to shCNTL.

1. Ross Ihaka and Robert Gentleman. R: A language for data analysis and graphics. *Journal of Computational and Graphical Statistics*, 5(3):299-314, 1996.
2. Du P, Kibbe WA and Lin SM. lumi: a pipeline for processing Illumina microarray. *Bioinformatics*. 2008 May 8.
3. Falcon S, Gentleman R. Using GOstats to test gene lists for GO term association. *Bioinformatics*. 2007 Jan 15;23(2):257-8.

Supplemental Table 1: The following genes show at least a two-fold increase in expression in the shHD3 cell line compared to the shCNTL cell line.

GENEID	SYMBOL				
		9564	BCAR1	7464	CORO2A
		55653	BCAS4	23406	COTL1
		440603	BCL2L15	1384	CRAT
10157	AASS	606	BCL8	51232	CRIM1
83451	ABHD11	627	BDNF	1396	CRIP1
57406	ABHD6	51272	BET1L	10491	CRTAP
79575	ABHD8	8553	BHLHB2	1437	CSF2
32	ACACB	644	BLVRA	1465	CSRP1
28976	ACAD9	91653	BOC	1469	CST1
39	ACAT2	26580	BSCL2	1474	CST6
48	ACO1	682	BSG	1490	CTGF
10965	ACOT2	121551	BTBD11	115908	CTHRC1
23597	ACOT9	59285	CACNG6	8727	CTNNAL1
2180	ACSL1	59285	CACNG6	1499	CTNNB1
2182	ACSL4	23705	CADM1	1509	CTSD
84532	ACSS1	199731	CADM4	1514	CTSL1
59	ACTA2	8536	CAMK1	1515	CTSL2
71	ACTG1	55450	CAMK2N1	1522	CTSZ
90	ACVR1	10486	CAP2	404093	CUEDC1
91	ACVR1B	726	CAPN5	1525	CXADR
11095	ADAMT8	64170	CARD9	58191	CXCL16
133	ADM	117144	CATSPER1	80777	CYB5B
147	ADRA1B	874	CBR3	51700	CYB5R2
27125	AFF4	11335	CBX3	1535	CYBA
375790	AGRN	11335	CBX3	54205	CYCS
79026	AHNAK	83643	CCDC3	26999	CYFIP2
9590	AKAP12	892	CCNC	1592	CYP26A1
9590	AKAP12	896	CCND3	1593	CYP27A1
80709	AKNA	151195	CCNYL1	1595	CYP51A1
214	ALCAM	908	CCT6A	3491	CYR61
220	ALDH1A3	283316	CD163L1	1601	DAB2
56052	ALG1	967	CD63	1605	DAG1
55849	ALG13	970	CD70	1611	DAP
242	ALOX12B	972	CD74	79007	DBNDD1
57679	ALS2	975	CD81	28988	DBNL
154796	AMOT	4267	CD99	51473	DCDC2
27063	ANKRD1	978	CDA	50807	DDEF1
29123	ANKRD11	991	CDC20	55616	DDEF1L1
302	ANXA2	10602	CDC42EP3	1649	DDIT3
302	ANXA2	148170	CDC42EP5	57706	DENND1A
305	ANXA2P3	1001	CDH3	51009	DERL2
308	ANXA5	1024	CDK8	1606	DGKA
1174	AP1S1	1025	CDK9	1718	DHCR24
1174	AP1S1	1040	CDS1	1717	DHCR7
8905	AP1S2	634	CEACAM1	10202	DHRS2
27301	APEX2	634	CEACAM1	11083	DIDO1
334	APLP2	1048	CEACAM5	84925	DIRC2
9582	APOBEC3B	4680	CEACAM6	22943	DKK1
200316	APOBEC3F	1088	CEACAM8	27122	DKK3
60489	APOBEC3G	64411	CENTD3	1742	DLG4
348	APOE	79959	CEP76	65989	DLK2
377	ARF3	1675	CFD	3300	DNAJB2
378	ARF4	51142	CHCHD2	10049	DNAJB6
9411	ARHGAP29	51142	CHCHD2	22845	DOLK
23370	ARHGEF18	27243	CHMP2A	11072	DUSP14
50650	ARHGEF3	10370	CITED2	1847	DUSP5
84159	ARID5B	1164	CKS2	1848	DUSP6
406	ARNTL	23155	CLCC1	140735	DYNLL2
10552	ARPC1A	137075	CLDN23	83658	DYNLRB1
10095	ARPC1B	1366	CLDN7	83658	DYNLRB1
81873	ARPC5L	25932	CLIC4	10682	EBP
432	ASGR1	79745	CLIP4	1902	EDG2
253982	ASPHD1	64084	CLSTN2	1906	EDN1
467	ATF3	134147	CMBL	1917	EEF1A2
522	ATP5J	146223	CMTM4	30008	EFEMP2
526	ATP6V1B2	152189	CMTM8	1949	EFNB3
51382	ATP6V1D	154043	CNKSR3	1956	EGFR
6310	ATXN1	1265	CNN2	1958	EGR1
9212	AURKB	1305	COL13A1	10938	EHD1
60370	AVPI1	80781	COL18A1	30844	EHD4
64651	AXUD1	1299	COL9A3	27102	EIF2AK1
2683	B4GALT1	9276	COPB2	1973	EIF4A1
8702	B4GALT4	10980	COPS6	317649	EIF4E3
11285	B4GALT7	80219	COQ10B	1983	EIF5
9531	BAG3	23603	CORO1C	56648	EIF5A2
55973	BCAP29				
				114794	ELFN2
				2014	EMP3
				8507	ENC1
				9583	ENTPD4
				2034	EPAS1
				54749	EPDR1
				94240	EPSTI1
				54206	ERRFI1
				2109	ETFB
				2113	ETS1
				51010	EXOSC3
				51010	EXOSC3
				23086	EXPH5
				7430	EZR
				3992	FADS1
				3995	FADS3
				83641	FAM107B
				91523	FAM113B
				158293	FAM120AOS
				116224	FAM122A
				116496	FAM129A
				116496	FAM129A
				64855	FAM129B
				81566	FAM130A1
				201158	FAM18B2
				56975	FAM20C
				51063	FAM26B
				131583	FAM43A
				404636	FAM45A
				115572	FAM46B
				54478	FAM64A
				79567	FAM65A
				81610	FAM83D
				137392	FAM92A1
				2189	FANCG
				22992	FBXL11
				84961	FBXL20
				26232	FBXO2
				9638	FEZ1
				9637	FEZ2
				2258	FGF13
				2280	FKBP1A
				64838	FNDC4
				2353	FOS
				2296	FOXC1
				2297	FOXD1
				55810	FOXJ2
				2495	FTH1
				2517	FUCA1
				79443	FYCO1
				2535	FZD2
				8324	FZD7
				23710	GABARAPL1
				4616	GADD45B
				10912	GADD45G
				2584	GALK1
				11226	GALNT6
				2593	GAMT
				2624	GATA2
				2635	GBP3
				2730	GCLM
				2700	GJA3
				2766	GMPR
				2767	GNA11
				2790	GNG10
				2790	GNG10
				2790	GNG10
				2791	GNG11
				51280	GOLM1
				9570	GOSR2
				2817	GPC1
				56834	GPR137
				7107	GPR137B
				283554	GPR137C
				27239	GPR162

2874	GPS2	547	KIF1A	4240	MFGE8	8974	P4HA2
63940	GPSM3	1316	KLF6	84879	MFSD2	11252	PACSIN2
2878	GPX3	687	KLF9	8190	MIA	51702	PAD13
2934	GSN	114818	KLHL29	4276	MICA	23022	PALLD
404672	GTF2H5	51088	KLHL5	4277	MICB	5064	PALM
51454	GULP1	5650	KLK7	11043	MID2	56666	PANX2
8908	GYG2	3838	KPNA2	4286	MITF	89932	PAPLN
57493	HEG1	3858	KRT10	79083	MLPH	5069	PAPPA
55008	HERC6	3860	KRT13	4318	MMP9	139135	PASD1
84667	HES7	3875	KRT18	25843	MOBKL3	219988	PATL1
3074	HEXB	25984	KRT23	79710	MORC4	10135	PBEF1
55733	HHAT	3885	KRT34	56180	MOSPD1	8850	PCAF
84278	HIATL2	390792	KRT39	64398	MPP5	27344	PCSK1N
84278	HIATL2	3887	KRT81	6150	MRPL23	5125	PCSK5
3091	HIF1A	81872	KRTAP2-1	64975	MRPL41	9124	PDLIM1
84681	HINT2	81872	KRTAP2-1	740	MRPL49	27295	PDLIM3
3092	HIP1	83896	KRTAP3-1	253827	MSRB3	81572	PDRG1
3006	HIST1H1C	8270	LAGE3	4487	MSX1	8682	PEA15
3012	HIST1H2AE	3920	LAMP2	4489	MT1A	5216	PFN1
8336	HIST1H2AM	3920	LAMP2	4493	MT1E	5223	PGAM1
8347	HIST1H2BC	27074	LAMP3	4493	MT1E	5223	PGAM1
8344	HIST1H2BE	10314	LANCL1	4494	MT1F	5230	PGK1
85236	HIST1H2BK	55323	LARP6	4495	MT1G	5236	PGM1
8337	HIST2H2AA3	91012	LASS5	4500	MT1L	5238	PGM3
8349	HIST2H2BE	26524	LATS2	4501	MT1X	79142	PHF23
8370	HIST2H4A	81606	LBH	4502	MT2A	23612	PHLDA3
3105	HLA-A	3934	LCN2	4599	MX1	90102	PHLDB2
3145	HMBS	10536	LEPREL2	4606	MYBPC2	29085	PHPT1
3146	HMGB1	54741	LEPROT	26579	MYEOV	5291	PIK3CB
3157	HMGCS1	137994	LETM2	4628	MYH10	5292	PIMI
3190	HNRPK	3958	LGALS3	4637	MYL6	65018	PINK1
3203	HOXA6	5641	LGMN	4642	MYO1D	26207	PITPNC1
3212	HOXB2	89884	LHX4	127294	MYOM3	7941	PLA2G7
3224	HOXC8	26468	LHX6	162417	NAGS	5327	PLAT
3237	HOXD11	51474	LIMA1	54187	NANS	5360	PLTP
11145	HRASLS3	22998	LIMCH1	4676	NAP1L4	5376	PMP22
3269	HRH1	3984	LIMK1	8774	NAPG	10687	PNMA2
8739	HRK	3987	LIMS1	81565	NDEL1	57104	PNPLA2
3303	HSPA1A	3987	LIMS1	4693	NDP	375775	PNPLA7
26353	HSPB8	3987	LIMS1	55967	NDUFA12	5430	POLR2A
3384	ICAM2	3987	LIMS1	4702	NDUFA8	5439	POLR2J
3398	ID2	96626	LIMS3	10529	NEBL	5441	POLR2L
3417	IDH1	96626	LIMS3	26012	NELF	51371	POMP
3422	IDI1	9388	LIPG	9603	NFE2L3	8496	PPFIBP1
3423	IDS	9516	LITAF	4781	NFIB	5480	PPIC
3423	IDS	4005	LMO2	4781	NFIB	5493	PPL
8870	IER3	114783	LMTK3	4784	NFIX	152926	PPMIK
51278	IER5	84171	LOXL4	4814	NINJ1	54704	PPM2C
3430	IFI35	23175	LPIN1	28512	NKIRAS1	51400	PPME1
8519	IFITM1	115399	LRRC56	4824	NKX3-1	5499	PPP1CA
10410	IFITM3	22949	LTB4DH	51701	NLK	81706	PPP1R14C
3475	IFRD1	4053	LTBP2	9397	NMT2	23645	PPP1R15A
3597	IL13RA1	7798	LUZP1	54433	NOLA1	130814	PQLC3
11009	IL24	4061	LY6E	4864	NPC1	5547	PRCP
3638	INSIG1	4066	LYL1	10577	NPC2	25824	PRDX5
3638	INSIG1	57226	LYRM2	4885	NPTX2	144165	PRICKLE1
10788	IQGAP2	11178	LZTS1	1728	NQO1	5558	PRIM2
3659	IRF1	10226	M6PRBP1	4835	NQO2	51422	PRKAG2
3665	IRF7	23499	MACF1	7025	NR2F1	5583	PRKCH
79191	IRX3	9935	MAFB	4900	NRGN	10544	PROCR
122961	ISCA2	114569	MAL2	56675	NRIP3	9128	PRPF4
9636	ISG15	256691	MAMDC2	51559	NT5DC3	54458	PRR13
3675	ITGA3	4128	MAOA	4907	NT5E	54458	PRR13
3682	ITGAE	9020	MAP3K14	4908	NTF3	51450	PRRX2
3685	ITGAV	5601	MAPK9	9891	NUAK1	11098	PRSS23
3706	ITPKA	79109	MAPKAP1	4521	NUDT1	9265	PSCD3
3710	ITPR3	57574	MAR4	64359	NXN	5680	PSG11
221895	JAZF1	4082	MARCKS	4939	OAS2	5670	PSG2
57158	JPH2	90411	MCFD2	64859	OBFC2A	5672	PSG4
3764	KCNJ8	4199	ME1	4957	ODF2	11168	PSIP1
3775	KCNK1	10025	MED16	169611	OLFML2A	5682	PSMA1
3785	KCNQ2	219541	MED19	4973	OLR1	5688	PSMA7
65987	KCTD14	9442	MED27	220064	ORAOV1	5694	PSMB6
11014	KDEL2	4212	MEIS2	29948	OSGIN1	5696	PSMB8
10656	KHDRBS3	9833	MELK	26578	OSTF1	5696	PSMB8

5700	PSMC1	6307	SC4MOL	8676	STX11	27075	TSPAN13
5700	PSMC1	6341	SCO1	6809	STX3	26262	TSPAN17
5700	PSMC1	9805	SCRN1	6836	SURF4	7106	TSPAN4
5700	PSMC1	6385	SDC4	64420	SUSD1	7846	TUBA1A
5701	PSMC2	10807	SDDCAG3	55061	SUSD4	10376	TUBA1B
9861	PSMD6	113675	SDSL	51111	SUV420H1	7280	TUBB2A
5721	PSME2	23480	SEC61G	6840	SVIL	7280	TUBB2A
5732	PTGER2	8293	SERF1A	57586	SYT13	7280	TUBB2A
113091	PTH2	5265	SERPINA1	94121	SYTL4	347733	TUBB2B
9200	PTPLA	5054	SERPINE1	6890	TAP1	84617	TUBB6
5770	PTPN1	871	SERPINH1	6892	TAPBP	57045	TWSG1
5771	PTPN2	6431	SFRS6	8887	TAX1BP1	7295	TXN
284119	PTRF	23677	SH3BP4	55357	TBC1D2	51271	UBAP1
138428	PTRH1	6456	SH3GL2	23102	TBC1D2B	55833	UBAP2
25945	PVRL3	30011	SH3KBP1	6926	TBX3	84959	UBASH3B
29108	PYCARD	153769	SH3RF2	6919	TCEA2	7314	UBB
25797	QPCT	6470	SHMT1	85012	TCEAL3	80019	UBTD1
23475	QPRT	6470	SHMT1	23424	TDRD7	23197	UBXD8
25837	RAB26	54414	SIAE	8463	TEAD2	7345	UCHL1
11031	RAB31	26037	SIPA1L1	7016	TESK1	7357	UGCG
5865	RAB3B	57568	SIPA1L2	7022	TFAP2C	90249	UNC5A
5879	RAC1	8935	SKAP2	7041	TGFB111	7378	UPP1
5880	RAC2	26503	SLC17A5	7052	TGM2	10090	UST
5887	RAD23B	6507	SLC1A3	7052	TGM2	9724	UTP14C
5891	RAGE	55186	SLC25A36	7057	THBS1	7421	VDR
2889	RAPGEF1	5172	SLC26A4	84321	THOC3	7425	VGf
10411	RAPGEF3	222962	SLC29A4	7074	TIAM1	7433	VIPR1
51655	RASD1	6513	SLC2A1	7077	TIMP2	57617	VPS18
25780	RASGRP3	81031	SLC2A10	7082	TJP1	137492	VPS37A
11186	RASSF1	154091	SLC2A12	7088	TLE1	155382	VPS37D
92400	RBM18	6515	SLC2A3	7108	TM7SF2	284415	VSTM1
5936	RBM4	6515	SLC2A3	84314	TMEM107	7450	VWF
5939	RBM52	6515	SLC2A3	57146	TMEM159	8976	WASL
116362	RBP7	11182	SLC2A6	84141	TMEM166	51186	WBP5
348093	RBPM52	29988	SLC2A8	196527	TMEM16F	282809	WDR51B
54542	RC3H2	7780	SLC30A2	374395	TMEM179B	10406	WFDC2
5962	RDX	347734	SLC35B2	55076	TMEM45A	8838	WISP3
9185	REPS2	84102	SLC41A2	120224	TMEM45B	7474	WNT5A
5982	RFC2	124935	SLC43A2	55092	TMEM51	7475	WNT6
9827	RGP1	57153	SLC44A2	113452	TMEM54	126374	WTIP
8787	RGS9	6508	SLC4A3	26022	TMEM98	23286	WWC1
57414	RHBDD2	6526	SLC5A3	56937	TMEPAI	7508	XPC
64285	RHBDF1	9056	SLC7A7	56937	TMEPAI	7525	YES1
6009	RHEB	23428	SLC7A8	259236	TMIE	7529	YWHAB
388	RHOB	6578	SLCO2A1	7126	TNFAIP1	7532	YWHAG
389	RHOC	6594	SMARCA1	7127	TNFAIP2	79413	ZBED2
23433	RHOQ	6604	SMARCD3	51330	TNFRSF12A	79683	ZDHHC14
23433	RHOQ	6609	SMPD1	8743	TNFSF10	677	ZFP36L1
60626	RIC8A	23583	SMUG1	7137	TNNI3	23414	ZFPM2
8780	RIOK3	692084	SNORD13	146691	TOM1L2	79038	ZFYVE21
8737	RIPK1	6627	SNRPA1	146691	TOM1L2	7586	ZKSCAN1
6017	RLBP1	6631	SNRPC	10953	TOMM34	9205	ZMYM5
390	RND3	29887	SNX10	94241	TP53INP1	10771	ZMYND11
54476	RNF216	28966	SNX24	58476	TP53INP2	84225	ZMYND15
54476	RNF216	401548	SNX30	7162	TPBG	7696	ZNF137
4920	ROR2	54345	SOX18	7168	TPM1	7568	ZNF20
6209	RPS15	53340	SPA17	8460	TPST1	7551	ZNF3
6231	RPS26	6676	SPAG4	7186	TRAF2	282890	ZNF311
6237	RRAS	9789	SPCS2	9697	TRAM2	57567	ZNF319
22800	RRAS2	8878	SQSTM1	10475	TRIM38	22891	ZNF365
83597	RTP3	6727	SRP14	7205	TRIP6	163059	ZNF433
112611	RWDD2A	6733	SRPK2	7220	TRPC1	51710	ZNF44
23429	RYBP	54434	SSH1	51393	TRPV2	58499	ZNF462
57167	SALL4	30815	ST6GALNAC6	59341	TRPV4	57573	ZNF471
23034	SAMD4A	55620	STAP2	8848	TSC22D1	57711	ZNF529
79685	SAP30L	6773	STAT2	1831	TSC22D3	339559	ZNF642
112483	SAT2	6778	STAT6	81628	TSC22D4	57169	ZNFX1
51119	SBDS	6780	STAU1	128553	TSHZ2	10467	ZNHIT1
51119	SBDS	56977	STOX2	57616	TSHZ3		

Supplemental Table 2: The following genes show at least a two-fold decrease in expression in the shHD3 cell line compared to the shCNTL cell line.

GENEID	SYMBOL				
		10384	BTN3A3	114788	CSMD3
		28969	BZW2	1459	CSNK2A2
29974	A1CF	765	CA6	1473	CST5
21	ABCA3	768	CA9	8530	CST7
5243	ABCB1	81617	CAB39L	1075	CTSC
23456	ABCB10	56997	CABC1	8451	CUL4A
22	ABCB7	57010	CABP4	51076	CUTC
9619	ABCG1	775	CACNA1C	6372	CXCL6
84448	ABLM2	93589	CACNA2D4	1528	CYB5A
22885	ABLM3	790	CAD	1571	CYP2E1
52	ACPI	93664	CADPS2	1573	CYP2J2
71	ACTG1	797	CALCB	4051	CYP4F3
81	ACTN4	91860	CALML4	1602	DACH1
203102	ADAM32	79012	CAMKV	168002	DACT2
171019	ADAMTS19	823	CAPN1	1621	DBH
9719	ADAMTSL2	79587	CARS2	167227	DCP2
55256	ADI1	84733	CBX2	79016	DDA1
84890	ADO	8535	CBX4	1652	DDT
158	ADSL	57639	CCDC146	1653	DDX1
159	ADSS	84318	CCDC77	10212	DDX39
122622	ADSSL1	55704	CCDC88A	1666	DECR1
84632	AFAP1L2	84142	CCDC98	1670	DEFA5
55326	AGPAT5	8900	CCNA1	1677	DFFB
25909	AHCTF1	57820	CCNB1IP1	1725	DHPS
54806	AHI1	894	CCND2	27121	DKK4
130872	AHSA2	7203	CT3	10301	DLEU1
150209	AIFM3	4179	CD46	10683	DLL3
10270	AKAP8	961	CD47	1747	DLX3
8644	AKR1C3	968	CD68	25981	DNAH1
213	ALB	8881	CD16	8632	DNAH17
8854	ALDH1A2	8317	CDC7	56521	DNAJC12
217	ALDH2	1009	CDH11	56521	DNAJC12
121642	ALKBH2	1010	CDH12	285126	DNAJC5G
84266	ALKBH7	1012	CDH13	57572	DOCK6
150864	ALS2CR13	1015	CDH17	1800	DPEP1
55608	ANKRD10	1021	CDK6	1803	DPP4
157567	ANKRD46	4680	CEACAM6	1809	DPYSL3
84168	ANTXR1	1054	CEBPG	51514	DTL
118429	ANTXR2	27440	CECR5	1846	DUSP4
301	ANXA1	11033	CENTA1	54808	DYM
307	ANXA4	9702	CEP57	8798	DYRK4
341	APOC1	64781	CERK	144455	E2F7
344	APOC2	84952	CGNL1	1880	EBI2
55082	ARGLU1	10669	CGREF1	1891	ECH1
9938	ARHGAP25	9557	CHD1L	51295	ECSIT
27237	ARHGEF16	80205	CHD9	10913	EDAR
9181	ARHGEF2	1122	CHML	9170	EDG4
8874	ARHGEF7	1124	CHN2	80820	EPDP1
10124	ARL4A	140578	CHODL	1948	EFNB2
64801	ARV1	1131	CHRM3	1959	EGR2
259266	ASPM	55847	CISD1	23301	EHBP1
79058	ASPSR1	9076	CLDN1	83939	EIF2A
79058	ASPSR1	5010	CLDN11	27161	EIF2C2
445	ASS1	125875	CLDND2	1968	EIF2S3
22809	ATF5	6320	CLEC11A	8664	EIF3D
55101	ATP5SL	1195	CLK1	51386	EIF3EIP
50617	ATP6V0A4	119467	CLRN3	8666	EIF3G
57198	ATP8B2	171425	CLYBL	8667	EIF3H
374868	ATP9B	1266	CNN3	27335	EIF3K
10331	B3GNT3	1690	COCH	1994	ELAVL1
8703	B4GALT3	22796	COG2	1999	ELF3
80115	BAIAP2L2	1307	COL16A1	55250	ELP2
29994	BAZZB	1282	COL4A1	30817	EMR2
590	BCHE	1291	COL6A1	2027	ENO3
53335	BCL11A	1294	COL7A1	22875	ENPP4
64919	BCL11B	170622	COMMD6	2051	EPHB6
632	BGLAP	1312	COMT	2053	EPHX2
274	BIN1	64708	COPS7B	2058	EPRS
54841	BIVM	1353	COX11	2059	EPS8
640	BLK	9167	COX7A2L	79574	EPS8L3
649	BMP1	1374	CPT1A	2071	ERCC3
652	BMP4	8738	CRADD	2073	ERCC5
653	BMP5	8804	CREG1	157697	ERICHI
118663	BTBD16	1429	CRYZ	2104	ESRRG
694	BTG1	8531	CSDA	51466	EVL
				2135	EXTL2
				158584	FAAH2
				2171	FABP5
				2171	FABP5
				2172	FABP6
				51011	FAHD2A
				23017	FAIM2
				58489	FAM108C1
				285016	FAM150B
				9917	FAM20B
				64762	FAM59A
				157638	FAM84B
				147965	FAM98C
				26233	FBXL6
				23403	FBXO46
				84261	FBXW9
				2224	FDP5
				55612	FERMT1
				2242	FES
				152273	FGD5
				2248	FGF3
				2254	FGF9
				53834	FGFRL1
				85462	FHDC1
				84929	FIBCD1
				2318	FLNC
				23767	FLRT3
				114793	FMNL2
				2328	FMO3
				3171	FOXA3
				2303	FOXC2
				3344	FOXN2
				23401	FRAT2
				6624	FSCN1
				2526	FUT4
				2530	FUT8
				5349	FXYD3
				11211	FZD10
				51083	GAL
				9514	GAL3ST1
				2581	GALC
				50614	GALNT9
				374378	GALNTL4
				2621	GAS6
				2621	GAS6
				2632	GBE1
				9245	GCNT3
				79153	GDPD3
				79833	GEMIN6
				2697	GJA1
				2705	GJB1
				57165	GJC2
				23127	GLT25D2
				2781	GNAZ
				8443	GNPAT
				23015	GOLGA8A
				23015	GOLGA8A
				27333	GOLIM4
				55204	GOLPH3L
				55094	GPATCH1
				2852	GPER
				10243	GPHN
				221188	GPR114
				166647	GPR125
				2859	GPR35
				84059	GPR98
				2877	GPX2
				2918	GRM8
				2941	GSTA4
				373156	GSTK1
				119391	GSTO2
				9569	GTF2IRD1
				9569	GTF2IRD1
				2976	GTF3C2
				84705	GTPBP3

3033	HADH	93273	LEMD1	4684	NCAM1	10419	PRMT5
84264	HAGHL	55214	LEPREL1	54820	NDE1	5629	PROX1
84264	HAGHL	25875	LETMD1	4701	NDUFA7	55615	PRR5
3038	HAS3	3955	LFNG	81831	NETO2	5638	PRRG1
1839	HBEGF	1939	LGTN	4793	NFKBIB	5645	PRSS2
3049	HBQ1	4008	LMO7	152518	NFXL1	84249	PSD2
9759	HDAC4	23266	LPHN2	4815	NINJ2	58155	PTBP2
54497	HEATR5B	9404	LPXN	8508	NIPSNAP1	55037	PTCD3
50865	HEBP1	78999	LRFN4	85409	NKD2	5728	PTEN
388585	HES5	26018	LRIG1	1482	NKX2-5	5730	PTGDS
55502	HES6	91355	LRP5L	349565	NMNAT3	5791	PTPRE
28996	HIPK2	10128	LRPPRC	23530	NNT	5799	PTPRN2
28996	HIPK2	9684	LRRC14	28987	NOB1	23369	PUM2
80201	HKDC1	51691	LSM8	4862	NPAS2	5828	PXMP3
3134	HLA-F	4048	LTA4H	7181	NR2C1	22841	RAB11FIP2
3134	HLA-F	1241	LTB4R	7182	NR2C2	55647	RAB20
3131	HLF	8425	LTBP4	4929	NR4A2	84932	RAB2B
6927	HNF1A	4060	LUM	4923	NTSR1	25782	RAB3GAP2
3174	HNF4G	57149	LYRM1	83540	NUF2	9910	RABGAP1L
3178	HNRNPA1	8216	LZTR1	55746	NUP133	5886	RAD23A
9987	HNRPDL	28992	MACROD1	23225	NUP210	10635	RAD51AP1
9987	HNRPDL	4094	MAF	79991	OBFC1	3843	RANBP5
3189	HNRPH3	10892	MALT1	5016	OVGP1	5910	RAP1GDS1
84842	HPDL	4121	MAN1A1	5018	OXA1L	5911	RAP2A
51170	HSD17B11	4124	MAN2A1	5032	P2RY11	51195	RAPGEFL1
80270	HSD3B7	4123	MAN2C1	5034	P4HB	5921	RASA1
3312	HSPA8	79694	MANEA	8761	PABPC4	166824	RASSF6
3312	HSPA8	256714	MAP7D2	9182	PAMCI	282996	RBM20
5654	HTRA1	7867	MAPKAPK3	85315	PAQR8	23029	RBM34
3397	IDI1	65108	MARCKSL1	7849	PAX8	27316	RBMX
3476	IGBP1	4144	MAT2A	80714	PBX4	27288	RBMXL2
150084	IGSF5	10150	MBNL2	5092	PCBD1	5955	RCN2
55540	IL17RB	129642	MBOAT2	54039	PCBP3	55758	RCOR3
7850	IL1R2	4157	MC1R	5095	PCCA	92241	RCSDB
3556	IL1RAP	57192	MCOLN1	57526	PCDH19	5973	RENBP
53832	IL20RA	79772	MCTP1	51585	PCF11	64864	RFXDC2
53833	IL20RB	4233	MET	55795	PCID2	93587	RG9MTD2
3576	IL8	25840	METTL7A	55251	PCMTD2	56963	RGMA
83943	IMMP2L	51108	METTL9	84306	PDCD2L	8786	RGS11
3613	IMPA2	4242	MFNG	5138	PDE2A	6004	RGS16
3615	IMPDH2	4248	MGAT3	8622	PDE8B	9028	RHBDL1
3625	INHBB	4255	MGMT	118987	PDZD8	23504	RIMBP2
83729	INHBE	4257	MGST1	57162	PELI1	9610	RIN1
3635	INPP5D	4258	MGST2	5184	PEPD	114804	RNF157
124152	IQCK	142678	MIB2	8864	PER2	388591	RNF207
8660	IRS2	57708	MIER1	25796	PGLS	6092	ROBO2
153572	IRX2	4282	MIF	11331	PHB2	9475	ROCK2
3688	ITGB1	145282	MIPOL1	22822	PHLDA1	22934	RPIA
3688	ITGB1	407975	MIRH1	84457	PHYHIPL	4736	RPL10A
3691	ITGB4	8195	MKKS	10464	PIBF1	6137	RPL13
3695	ITGB7	23609	MKRN2	8544	PIR	23521	RPL13A
182	JAG1	64757	MOSC1	51365	PLA1A	23521	RPL13A
3714	JAG2	9585	MPHOSPH1	59338	PLEKHA1	9045	RPL14
56704	JPH1	64981	MRPL34	22874	PLEKHA6	6141	RPL18
131096	KCNH8	84311	MRPL45	25894	PLEKHG4	6142	RPL18A
3759	KCNJ2	84311	MRPL45	5352	PLOD2	6142	RPL18A
3790	KCNS3	65005	MRPL9	5408	PNLIPRP2	6146	RPL22
57582	KCNT1	60488	MRPS35	29944	PNMA3	6147	RPL23A
55605	KIF21A	10232	MSLN	84968	PNMA6A	6157	RPL27A
22920	KIFAP3	4488	MSX2	5409	PNMT	6158	RPL28
9365	KL	10797	MTHFD2	5411	PNN	6164	RPL34
10365	KLF2	441024	MTHFD2L	10908	PNPLA6	25873	RPL36
688	KLF5	56667	MUC13	55703	POLR3B	25873	RPL36
11012	KLK11	118430	MUCL1	5454	POU3F2	6166	RPL36AL
3821	KLRC1	139221	MUM1L1	5468	PPARG	6129	RPL7
10219	KLRG1	4084	MXD1	10450	PPIE	85495	RPPH1
22914	KLRK1	4602	MYB	5500	PPP1CB	6206	RPS12
3872	KRT17	23077	MYCBP2	84152	PPP1R1B	6187	RPS2
56983	KTELC1	57644	MYH7B	90673	PPP1R3E	6228	RPS23
3914	LAMB3	25924	MYRIP	5522	PPP2R2C	6228	RPS23
10319	LAMC3	4661	MYT1	639	PRDM1	6232	RPS27
51056	LAP3	4664	NAB1	56978	PRDM8	6232	RPS27
253782	LASS6	4673	NAP1L1	10113	PREB	6235	RPS29
3930	LBR	4677	NARS	5553	PRG2	6189	RPS3A
286256	LCN12	4678	NASP	5578	PRKCA	6189	RPS3A

6189	RPS3A	79677	SMC6	26277	TINF2	337867	UBAC2
54665	RSBN1	54471	SMCR7L	80213	TM2D3	7325	UBE2E2
861	RUNX1	64094	SMOC2	51768	TM7SF3	56893	UBQLN4
864	RUNX3	56950	SMYD2	9375	TM9SF2	51506	UFC1
57402	S100A14	56950	SMYD2	79905	TMC7	55757	UGCGL2
140576	S100A16	64754	SMYD3	55002	TMCO3	65110	UPF3A
6286	S100P	27044	SND1	11018	TMED1	65110	UPF3A
148418	SAMD13	6641	SNTB1	83935	TMEM133	7385	UQCRC2
25813	SAMM50	8435	SOAT2	55260	TMEM143	7386	UQCRFS1
54938	SARS2	6653	SORL1	25907	TMEM158	7388	UQCRH
9522	SCAMP1	25928	SOSTDC1	81615	TMEM163	7392	USF2
51097	SCCPDH	6659	SOX4	55365	TMEM176A	10083	USH1C
10371	SEMA3A	10290	SOX4	129787	TMEM18	8615	USO1
6405	SEMA3F	56848	SPHK2	55161	TMEM33	7417	VDAC2
26135	SERPBP1	139886	SPIN4	79188	TMEM43	9686	VGLL4
1992	SERPINB1	84501	SPIRE2	83604	TMEM47	7428	VHL
5268	SERPINB5	6693	SPN	128338	TMEM77	7429	VIL1
5274	SERPINI1	201305	SPNS3	64699	TMPRSS3	51160	VPS28
2810	SFN	10252	SPRY1	56649	TMPRSS4	51028	VPS36
10147	SFRS14	10253	SPRY2	84899	TMTC4	7447	VSNL1
25957	SFRS18	23635	SSBP2	8764	TNFRSF14	23559	WBP1
6432	SFRS7	29101	SSU72	8718	TNFRSF25	84219	WDR24
9047	SH2D2A	6767	ST13	23043	TNIK	253769	WDR27
9644	SH3PXD2A	6767	ST13	10188	TNK2	55339	WDR33
54436	SH3TC1	6767	ST13	9804	TOMM20	55255	WDR41
26751	SH3YL1	7982	ST7	56993	TOMM22	10238	WDR68
23309	SIN3B	10809	STARD10	9868	TOMM70A	256764	WDR72
8631	SKAP1	6788	STK3	7155	TOP2B	7456	WIPF1
6502	SKP2	23012	STK38L	27324	TOX3	65125	WNK1
122060	SLAIN1	29091	STXBP6	27010	TPK1	7476	WNT7A
84068	SLC10A7	55959	SULF2	80305	TRABD	56949	XAB2
6558	SLC12A2	10388	SYCP2	7188	TRAF5	7494	XBP1
117247	SLC16A10	6857	SYT1	28951	TRIB2	7504	XK
6510	SLC1A5	90019	SYT8	89870	TRIM15	55432	YOD1
65010	SLC26A6	9014	TAF1B	89870	TRIM15	284273	ZADH2
10998	SLC27A5	6894	TARBP1	8805	TRIM24	201501	ZBTB7C
7781	SLC30A3	6905	TBCE	51592	TRIM33	84524	ZC3H8
340146	SLC35D3	6996	TDG	114088	TRIM9	11244	ZHX1
54407	SLC38A2	54997	TESC	11078	TRIOBP	10781	ZNF266
57181	SLC39A10	7027	TFDP1	55503	TRPV6	84449	ZNF333
283375	SLC39A5	7032	TFF2	203062	TSNARE1	57541	ZNF398
126969	SLC44A3	7033	TFF3	7102	TSPAN7	22847	ZNF507
85414	SLC45A3	23483	TGDS	7103	TSPAN8	84450	ZNF512
8884	SLC5A6	7039	TGFA	706	TSPO	126231	ZNF573
6545	SLC7A4	7049	TGFBR3	7267	TTC3	51545	ZNF581
28231	SLCO4A1	7051	TGM1	23170	TLL12	55657	ZNF692
133482	SLCO6A1	9333	TGM5	79861	TUBAL3	57116	ZNF695
6590	SLPI	79896	THNSL1	10426	TUBGCP3	7552	ZNF711
6597	SMARCA4	80745	THUMPD2	286319	TUSC1	57643	ZSWIM5
6598	SMARCB1	26520	TIMM9	55236	UBA6		

Supplemental Table 3: The following Gene Ontology categories are over-represented in the list of genes that show at least a two-fold increase in expression in the shHD3 cell line compared to the shCNTL cell line.

Genes Up-regulated by shHD3			
Count	Total	OddsRatio	Term
113	2315	1.46	Cellular component organization and biogenesis
83	1840	1.39	Developmental process
80	1535	1.54	Cell differentiation
72	1486	1.40	System development
53	965	1.60	Negative regulation of cellular process
42	770	1.60	Anatomical structure morphogenesis
41	719	1.65	Cell death
39	671	1.68	Apoptosis
29	348	2.49	Localization of cell
27	399	1.97	Cell morphogenesis
27	458	1.69	Regulation of programmed cell death
24	364	1.91	Intracellular protein transport
19	205	2.76	Cell migration
18	268	1.93	Protein complex assembly
17	227	2.18	Embryonic development
16	206	2.26	Skeletal development
15	181	2.43	Actin cytoskeleton organization and biogenesis
15	197	2.21	Negative regulation of apoptosis
12	144	2.43	Anatomical structure formation

Supplemental Table 4: The following Gene Ontology categories are over-represented in the list of genes that show at least a two-fold decrease in expression in the shHD3 cell line compared to the shCNTL cell line.

Genes Up-regulated by shHD3			
Count	Size	OddsRatio	Term
201	6203	1.34	Metabolic process
112	2925	1.36	Protein metabolic process
109	2782	1.40	Cellular macromolecule metabolic process
60	1181	1.81	Biosynthetic process
25	358	2.50	Translation
23	400	1.98	Regulation of cell proliferation
9	114	2.74	Protein amino acid glycosylation