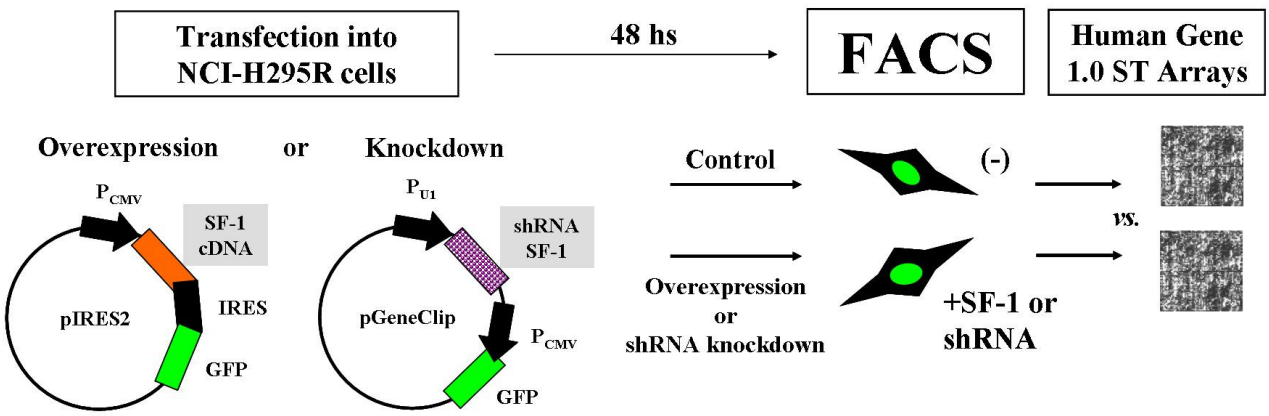
Supplemental Methods & Results

Overview of experimental design for SF-1 overexpression or knockdown



Patients' characteristics

43 patients with unexplained adrenal insufficiency were studied. Associated features included:

	46,XY (n=40)	**46,XX** (n=3)
Gonadal abnormalities e.g., microphallus, mild hypospadias, ambiguous genitalia and complete underandrogenization	15	-
Cardiac abnormalities	2	1
IUGR	8	-
Skeletal / IMAGe IUGR, Metaphyseal Dysplasia, Adrenal Hypoplasia Congenita and Genital Anomalies	3	-
Renal abnormalities	2	-

Other features: brain abnormalities (1) and short stature (1).

All patients have been previously screened for mutations in *NR5A1* (SF-1) and *NR0B1* (DAX1).

Amplification and sequencing protocol

PCR reactions were performed using MegaMix (Microzone Ltd., Haywards Heath, UK) and 0.5 ul of forward and reverse primers (25 uM, details below) in 20 ul reaction volume, for 35 cycles and with an annealing temperature of 55°C. Amplicons were purified using Microclean (Microzone Ltd.) and then subjected to direct sequencing using dye terminator sequencing kits (BigDye® Terminator v1.1, Applied Biosystems, Warrington, UK) in an automated capillary based sequencer (MegaBACE1000; Amersham Biosciences Inc., Piscataway, NJ). Sequencher version 4.1 (Genecodes Corp., Ann Arbor, MI) was used to analyze the data.

Primers were designed using Primer3Plus (Untergasser et al., Nucleic Acids Res 2007;35:W71-W74) for the entire coding region of *SOAT1* (Ensembl transcript ENST00000367619):

Exon	Forward primer	Reverse primer
2	5'-CCATGCGGAACTGTGAGAC-3'	5'-AAGGACTTATTGTCTAATTGCTTTG-3'
3	5'-TGCACCACAGTTTACGCAGT-3'	5'-CAGCAACTGATGAATGGCTTA-3'
4	5'-TGCTTTTACTCCTGCGAACTC-3'	5'-ACCAGGGTGTGAACTCAAGC-3'
5	5'-TCCTAGTAGTGAAAAGGTCATTGG-3'	5'-CAGATACAGAACTCATTACATGTCCA-3'
6	5'-TGAGATGTTTTTGGAGAGTGGA-3'	5'-CAGGGCAAAGGAATATCACC-3'
7	5'-AAGGTTGAAAGTTTGGTGTTTGA-3'	5'-TGAAAATTTATCCAAGTTAATACAGC-3'
8	5'-TCAGGATTTTCTGACTTTACTGG-3'	5'-GGGTGAAATATCCAGCCAAT-3'
9	5'-ATTCCGGAGATCAGGAAAAA-3'	5'-CCATTTGAGGCTTCTCAGGT-3'
10	5'-TGTGAGGGTCTTTATTCAAGTTCA-3'	5'-TGCATAATGTCAACAGAAAGCAT-3'
11	5'-AAATGGAATACATATGCGAACA-3'	5'-TGCAAAAGAGGTCAAGATGG-3'
12	5'-ACAAAATAATCCCAGCTAAATAAAAT-3'	5'-TTGTGTGAAAGGCTGGTGAC-3'
13	5'-TCTGTCACCAGTGTATGAACCA-3'	5'-TGAGCAATTAAATATAACTTCTTCCAG-3'
14	5'-CAATAGGTGCCTTTGGCATA-3'	5'-TCAAAGTCAATATTCTGACCATCTG-3'
15	5'-CGAACTTCTGACCTCTGATAACTGTA-3'	5'-CCAACTCTCACAAACAGAGAATAAAC-3'
16	5'-TGGTGGGAGGCATTTTAGAG-3'	5'-GCCTGGAGTGGTCCAAATAA-3'

Mutational analysis of C2CD2

Overexpression of SF-1 in NCI-H295R adrenal cells resulted in significant greater than two-fold increase in transcript levels of 108 genes (Supplemental Table 1A). In order to identify which of these target genes were more likely to be involved in human adrenal development and function, we investigated expression patterns using the publicly available expression databases GNF (Su et al., Proc Natl Acad Sci U S A 2002;99:4465-70) and eGenetics (Kelso et al., Genome Res 2003;13:1222-30) through the BioMart portal (www.biomart.org). A subset of 14 genes had documented expression in human fetal and adult adrenal glands according to both databases. Within this subset, C2 calcium-dependent domain containing 2 (*C2CD2*, Entrez Gene ID 25966) emerged as a potentially relevant novel SF-1 target gene since differential expression had also been reported in response to stable SF-1 overexpression in adrenal cells (Doghman et al., Mol Endocrinol 2007; 21:2968-87). *C2CD2*, previously referred to as *C21orf25*, is located at 21q22.3. This gene comprises 14 exons and encodes for a 696-amino acid protein of unknown function, predicted to be involved in Ca^{+2}-mediated signaling (C2 domain PFAM identifier PF00168, http://pfam.sanger.ac.uk).

Direct sequencing of the entire coding region of *C2CD2* (NM_015500.1, Ensembl GRCh37 transcript ENST00000380486) was undertaken in the same cohort of 43 patients with adrenal insufficiency of unknown etiology. Primer sequences are available on request.

Two novel non-synonymous coding sequence changes were identified. A heterozygous c.1252A>C (p.418T>P) variant was present in two patients, but analysis of 461 control individuals (Human Random Control British Caucasian DNA Panels 1 to 5; Health Protection Agency Culture Collections, UK) revealed that this substitution was present in 6/922 (0.6%) control alleles. A heterozygous c.1913G>A (p.638R>Q) variant was identified in a patient who presented neo-natally with severe hypospadias and adrenal agenesis. None of 944 British Caucasian control alleles analyzed harbored this variant. However, this change was found in an unaffected parent suggesting that this very rare allelic variant is unlikely to be related to the observed phenotype.

Supplemental Table 1A

Transcripts differentially expressed following SF-1 overexpression in NCI-H295R adrenal cells

FC, fold change; adj.P-Val, Benjamini-Hochberg-corrected P-value

Transcript Cluster ID	FC	adj.P-Val	Gene Symbol
7972946	12.4	0.00000751	RASA3
7935116	12.3	0.00000751	RBP4
8039353	9	0.00000978	TNNI3
8071642	6.36	0.00000751	IGLV6-57
8095110	6.15	0.000903	KIT
8141737	5.35	0.0000978	MYL10
8114249	5.17	0.000656	CXCL14
8056113	4.38	0.000128	CD302
8056113	4.38	0.000128	LY75
7920285	4.29	0.000402	S100A2
8116653	4.06	0.000073	BPHL
8116649	4.06	0.000073	TUBB2A
8116649	4.06	0.000073	TUBB2B
8036079	3.61	0.0000974	DMKN
7991323	3.61	0.000329	PEX11A
7934993	3.56	0.000903	NUDT9P1
8069508	3.53	0.0171	C21orf81
8069508	3.53	0.0171	LOC375010
8103951	3.51	0.00121	ACSL1
8087691	3.51	0.000168	CACNA2D2
7951662	3.41	0.000588	CRYAB
8066214	3.36	0.00028	TGM2
8158671	3.29	0.00316	ASS1
8104930	3.16	0.000888	SLC1A3
7920278	3.14	0.00278	S100A3
8158995	3.03	0.0272	LCN1
8101828	3.03	0.00354	TSPAN5
8123407	3.01	0.000244	MLLT4
8053741	2.97	0.000423	ANKRD20A1
8053741	2.97	0.000423	ANKRD20A2
8053741	2.97	0.000423	ANKRD20A3
8053741	2.97	0.000423	ANKRD20A4
8053741	2.97	0.000423	ANKRD20B
8080184	2.93	0.000306	ALAS1
8155591	2.89	0.00255	CCDC29
8155591	2.89	0.00255	RP11-195B21.3
8155414	2.81	0.00455	LOC100289454
8160531	2.69	0.00544	C9orf72
8037053	2.69	0.000959	CEACAM7
7942064	2.68	0.00917	GAL
8171653	2.66	0.000588	MAP3K15
8171653	2.66	0.000588	PDHA1
7904408	2.6	0.00808	HSD3B2
8161415	2.6	0.00598	LOC100289026
8123246	2.58	0.00647	SLC22A3
8058238	2.53	0.00171	ALS2CR11
8172043	2.53	0.000423	SRPX
7970381	2.5	0.00164	LOC100287836
7970381	2.5	0.00164	LOC643166
7970381	2.5	0.00164	LOC728897
8033233	2.5	0.00207	TUBB4
7902883	2.48	0.000631	LRRC8D
7990333	2.46	0.00598	CYP11A1
8079588	2.46	0.0249	NDUFB1P1
8022420	2.46	0.00026	ZNF519
7972487	2.45	0.00115	DOCK9
7914342	2.43	0.00593	FABP3
8162652	2.41	0.00188	CTSL2
8097335	2.41	0.00138	HSPA4L
8018038	2.39	0.00219	ABCA5
8080487	2.39	0.00138	PRKCD
8155602	2.38	0.00133	ANKRD20A5
8155602	2.38	0.00133	LOC100290156
7908940	2.35	0.000888	ATP2B4
8164293	2.33	0.000765	AK1
7952526	2.33	0.000746	CDON
7990774	2.33	0.00138	RASGRF1
8155665	2.31	0.0031	PGM5
7970763	2.3	0.00864	FLT1
8169580	2.3	0.00546	IL13RA1
8070538	2.27	0.000656	C2CD2
7930025	2.27	0.00339	ELOVL3
8075838	2.27	0.0105	PVALB
8069505	2.23	0.00237	C21orf15
8041781	2.23	0.00125	EPAS1
7952805	2.23	0.0108	LOC283174
7932584	2.23	0.00662	PRTFDC1
8066590	2.22	0.0047	TNNC2
8040430	2.2	0.00401	VSNL1
7913237	2.19	0.000888	CAMK2N1
8010978	2.17	0.0124	LOC100130876
8039977	2.17	0.00128	SNTG2
7933437	2.16	0.00532	PTPN20A
7933437	2.16	0.00532	PTPN20B
8164967	2.16	0.00158	VAV2
8097435	2.14	0.0307	C4orf33
8054513	2.14	0.0047	LOC151009
8054513	2.14	0.0047	LOC440894
8069565	2.08	0.00128	BTG3
7979269	2.07	0.00663	GCH1
7950883	2.07	0.0293	OR7E13P
7933442	2.07	0.00788	PTPN20C
7905147	2.06	0.0208	C1orf54
8151101	2.06	0.00439	MYBL1
8147548	2.06	0.00784	POP1
7928046	2.06	0.00092	TSPAN15
8164235	2.04	0.00231	C9orf117
7926105	2.04	0.0031	GATA3
8164235	2.04	0.00231	PTRH1
8164235	2.04	0.00231	TTC16
8079407	2.03	0.00689	CCRL2
8020339	2.03	0.00383	MC5R
8150253	2.03	0.00491	STAR
8150691	2.01	0.00948	EFCAB1
7976451	2.01	0.0118	PPP4R4
8017843	2.01	0.0497	SLC16A6
8069178	2	0.00249	ADARB1
7974737	2	0.0272	LRRC9
8108873	1.99	0.00451	ARHGAP26
8083415	1.98	0.00689	AADAC
8170513	1.97	0.00272	FATE1
7947270	1.97	0.0202	KCNA4
8023259	1.95	0.0249	SNORD58A
8143054	1.94	0.00662	AKR1B1
8147132	1.94	0.0416	CA2
8174891	1.93	0.00384	MIR220A
8020955	1.93	0.00128	MOCOS
7909586	1.93	0.0113	PPP2R5A
7928308	1.92	0.00504	DDIT4
8019046	1.92	0.00291	EIF4A3
8008237	1.92	0.0108	ITGA3
7905548	1.92	0.0245	SPRR3
8075239	1.92	0.00228	THOC5

7986446	1.91	0.00788	ALDH1A3
7917912	1.91	0.00188	DPYD
8109194	1.88	0.00575	SLC26A2
7985213	1.87	0.0118	CHRNA5
7947599	1.87	0.00555	CHST1
8112649	1.87	0.00632	FAM169A
7934852	1.87	0.00403	GLUD1
7934852	1.87	0.00403	GLUD2
8147439	1.87	0.00569	PLEKHF2
8139118	1.87	0.0157	TRGV5P
8071671	1.86	0.00558	GNAZ
8160637	1.84	0.00567	B4GALT1
7984298	1.84	0.00751	DIS3L
7927363	1.84	0.00294	FAM25A
7927363	1.84	0.00294	FAM25B
7927363	1.84	0.00294	FAM25C
7927363	1.84	0.00294	FAM25G
8021187	1.84	0.0372	SKA1
8020702	1.84	0.00451	TAF4B
8107307	1.83	0.0204	CAMK4
7964997	1.83	0.0352	CAPS2
8068383	1.83	0.0121	CLIC6
7930304	1.83	0.002	GSTO1
8143341	1.83	0.0108	JHDM1D
8044212	1.83	0.00302	SULT1C2
8145954	1.83	0.00138	TACC1
8137709	1.83	0.0241	ZFAND2A
8053744	1.82	0.00344	FLJ43315
7967727	1.82	0.00662	GALNT9
8088285	1.82	0.0453	HESX1
7981750	1.82	0.00221	LOC400968
7981427	1.81	0.00555	CKB
8061013	1.81	0.00384	ISM1
7989146	1.81	0.0146	MNS1
8020814	1.81	0.0122	RNF138
8037079	1.8	0.00458	ATP1A3
8133770	1.79	0.0066	CCDC146
7911096	1.79	0.0164	EFCAB2
8099246	1.79	0.00378	GRPEL1
8164848	1.79	0.0323	LCN1L1
8163535	1.78	0.0146	AMBP
8026971	1.78	0.0219	IFI30
8070557	1.78	0.00221	ZNF295
8166184	1.77	0.007	CA5B
8096744	1.77	0.00234	CYP2U1
7905220	1.77	0.00455	ECM1
7919642	1.77	0.0479	HIST2H2AB
7912994	1.76	0.0422	IFFO2
8156848	1.76	0.0242	NR4A3
8146717	1.75	0.0205	C8orf44
8164607	1.75	0.00932	FNBP1
8039607	1.75	0.0045	PEG3
8076998	1.75	0.00576	PLXNB2
8146717	1.75	0.0205	SGK3
8144786	1.75	0.0397	SLC7A2
8127987	1.75	0.0187	SNORD50A
8013771	1.75	0.0465	TLCD1
8039607	1.75	0.0045	ZIM2
8086880	1.74	0.00615	CDC25A
8008706	1.74	0.0232	DYNLL2
8107164	1.74	0.0216	HISPPD1
8146649	1.74	0.0402	MTFR1
8084717	1.74	0.00517	ST6GAL1
7959312	1.74	0.0125	TMEM120B
8105456	1.73	0.00583	C5orf35
8041487	1.73	0.00451	CCDC75
8047854	1.73	0.0183	CCNYL1
7993776	1.73	0.00215	LOC81691
7909866	1.73	0.0117	MOSC2
7900540	1.73	0.0111	RIMKLA
7930714	1.72	0.00244	ATRNL1
8044700	1.72	0.043	DPP10
8047127	1.72	0.0338	MYO1B
8112033	1.71	0.00948	ARL15
7939341	1.71	0.00932	CD44
7949916	1.71	0.00727	CHKA
8034315	1.71	0.0314	ZNF823
7940147	1.7	0.00237	FAM111B
7991577	1.7	0.0498	LOC440313
7986214	1.7	0.00583	SLCO3A1
8156706	1.7	0.017	TMOD1
8034379	1.7	0.0108	ZNF442
8101228	1.69	0.00294	CNOT6L
8083272	1.69	0.00959	GYG1
7924888	1.69	0.0251	HIST3H2A
7929388	1.69	0.00656	PLCE1
7909877	1.68	0.00645	MOSC1
7956658	1.68	0.0157	SLC16A7
8046340	1.67	0.0161	DYNC1I2
7917707	1.67	0.0491	EVI5
8155268	1.67	0.00588	POLR1E
8150138	1.67	0.0149	TEX15
8113577	1.67	0.0086	TRIM36
8035847	1.67	0.0286	ZNF675
8091629	1.66	0.0309	C3orf33
8070730	1.66	0.0197	DNMT3L
8096361	1.66	0.0246	HERC5
8095303	1.66	0.00821	LPHN3
8092177	1.66	0.00529	NCEH1
8127989	1.66	0.0247	SNORD50B
7944667	1.66	0.0108	SORL1
8065089	1.65	0.0277	KIF16B
7936559	1.65	0.00756	PDZD8
7971723	1.65	0.044	RP11-327P2.4
8157144	1.64	0.00675	C9orf6
7916356	1.64	0.00756	HSPB11
8157144	1.64	0.00675	IKBKAP
7914878	1.64	0.0164	LOC100289612
8039545	1.64	0.0275	NLRP11
8173825	1.64	0.0395	RPS6KA6
8019877	1.64	0.0103	SMCHD1
8088106	1.64	0.00756	TKT
8066461	1.64	0.00662	TOMM34
8104234	1.64	0.0228	TRIP13
8080511	1.63	0.0063	CACNA1D
8153939	1.63	0.0302	DGAT1
8044111	1.63	0.0432	MRPS9
8011407	1.63	0.0379	TAX1BP3
7955063	1.63	0.00576	TMEM106C
7928558	1.63	0.00591	ZMIZ1
7970428	1.63	0.0193	ZMYM5
7995976	1.62	0.00738	CPNE2
8006736	1.62	0.0181	DUSP14
8094609	1.62	0.00854	FAM114A1
8133540	1.62	0.0299	GATS
8133540	1.62	0.0299	GATSL1
8133540	1.62	0.0299	GATSL2
8043981	1.62	0.0314	IL1R2
7970577	1.62	0.0117	MIPEP
7985662	1.62	0.00848	PDE8A
8107563	1.62	0.0244	PRR16
8113938	1.61	0.0235	ACSL6
8054702	1.61	0.0464	CKAP2L
8113938	1.61	0.0235	LOC728637
7909529	1.61	0.0279	RCOR3
8078014	1.61	0.00891	SLC6A6
7907702	1.61	0.0114	SOAT1
7951207	1.61	0.00828	TMEM123
8115261	1.6	0.0222	CCDC69
8109528	1.6	0.0255	CYFIP2
7972912	1.6	0.012	DCUN1D2
8071063	1.6	0.00451	psiTPTE22
8158998	1.6	0.00625	RPL7A
8158998	1.6	0.00625	SNORD36A
8158998	1.6	0.00625	SNORD36C
8039340	1.6	0.0372	TNNT1
8140752	1.59	0.0236	ABCB4
8058258	1.59	0.0203	ALS2CR4
7974653	1.59	0.0272	KIAA0586
7921882	1.59	0.0398	OLFML2B

8105778	1.59	0.00654	PIK3R1
8147796	1.59	0.0212	RIMS2
8017582	1.59	0.00893	TEX2
8020973	1.58	0.0193	FHOD3
7956271	1.58	0.0495	HSD17B6
8159441	1.58	0.00593	PHPT1
8135734	1.57	0.0318	C7orf58
7924450	1.57	0.0101	DUSP10
8155630	1.57	0.0464	LOC100133920
8155630	1.57	0.0464	LOC286297
8070961	1.57	0.0101	LSS
8155630	1.57	0.0464	MTHFD1L
8111892	1.57	0.00756	OXCT1
7903203	1.57	0.0246	SNX7
7903239	1.56	0.0145	AGL
8155327	1.56	0.0108	ALDH1B1
8034837	1.56	0.021	DNAJB1
8081676	1.56	0.0337	GTPBP8
7929282	1.56	0.0236	HHEX
8050537	1.56	0.00946	MATN3
7933010	1.56	0.036	PARD3
7929132	1.56	0.0303	PCGF5
7933619	1.56	0.0149	SGMS1
8047174	1.56	0.00985	SLC39A10
7943297	1.55	0.0236	CEP57
8068593	1.55	0.0105	ETS2
8057045	1.55	0.0147	FKBP7
8070720	1.55	0.0449	ICOSLG
8043431	1.55	0.0496	IGKC
8043431	1.55	0.0496	IGKV1-33
8043431	1.55	0.0496	IGKV1D-33
8043431	1.55	0.0496	LOC100291464
8043431	1.55	0.0496	LOC652694
8013068	1.55	0.00948	PLD6
8158059	1.55	0.0372	STXBP1
7979611	1.55	0.0218	ZBTB25
7964460	1.54	0.0118	DDIT3
7954185	1.54	0.0216	DERA
8109912	1.54	0.0269	KCNIP1
7960730	1.54	0.0123	LPCAT3
8175256	1.54	0.0145	MGC16121
8126860	1.54	0.0293	MUT
7936050	1.53	0.0164	CYP17A1
8127787	1.53	0.0221	IBTK
7943376	1.53	0.0487	KIAA1377
7981460	1.53	0.0301	PPP1R13B
7991283	1.53	0.0255	RHCG
7929816	1.53	0.0255	SCD
8107920	1.53	0.00583	SLC22A5
8162086	1.52	0.0285	AGTPBP1
8022380	1.52	0.0221	CEP76
8001564	1.52	0.0194	DOK4
7972336	1.52	0.0264	DZIP1
8105121	1.52	0.0254	GHR
8157727	1.52	0.044	GPR21
7958158	1.52	0.0128	HCFC2
7931479	1.52	0.0213	INPP5A
8112331	1.52	0.0203	ISCA1
8112331	1.52	0.0203	ISCA1L
7931728	1.52	0.0416	LARP4B
8034762	1.52	0.0139	PRKACA
7924092	1.52	0.0106	SLC30A1
8052861	1.52	0.0302	SNRPG
7979698	1.51	0.0146	ATP6V1D
8071649	1.51	0.00738	BMS1
8131583	1.51	0.0173	BZW2
7955107	1.51	0.02	C12orf68
7971950	1.51	0.0335	DACH1
7919591	1.51	0.0241	FAM72A
7919591	1.51	0.0241	FAM72B
7919591	1.51	0.0241	FAM72C
7919591	1.51	0.0241	FAM72D
8148448	1.51	0.025	KHDRBS3
8071649	1.51	0.00738	LOC96610
7983228	1.51	0.015	MAP1A
8013908	1.51	0.0132	NUFIP2
7989759	1.51	0.0289	PARP16
8093398	1.51	0.0276	PCGF3
8082314	1.51	0.02	PLXNA1
8066275	1.51	0.0411	PRO0628
8001748	1.51	0.0286	SNORA50
7962358	1.51	0.0484	YAF2
8069131	1.5	0.0134	C21orf30
8114425	1.5	0.0251	CDC25C
8081997	1.5	0.0246	FBXO40
7944769	1.5	0.0148	GRAMD1B
8098985	1.5	0.0118	HAUS3
8042283	1.5	0.0488	HSPC159
8080911	1.5	0.0338	KBTBD8
8103646	1.5	0.0208	NEK1
7903227	1.5	0.0243	PALMD
8098985	1.5	0.0118	POLN
8135323	1.5	0.0372	RINT1
8082797	1.5	0.042	TF
7985134	1.49	0.0323	ACSBG1
8081645	1.49	0.0291	C3orf52
8024566	1.49	0.0411	GNA11
8056837	1.49	0.0132	GPR155
7985134	1.49	0.0323	IDH3A
8060736	1.49	0.0144	MIR103-2
8060736	1.49	0.0144	MIR103-2AS
8033069	1.49	0.0079	NDUFA11
8060736	1.49	0.0144	PANK2
8113881	1.49	0.0103	RAPGEF6
7918622	1.49	0.0108	SLC16A1
7923824	1.49	0.0284	SLC41A1
8093993	1.49	0.0203	TADA2B
7987892	1.49	0.0305	ZFP106
8065032	1.48	0.00919	ESF1
7974166	1.48	0.0359	FANCM
8050719	1.48	0.00875	ITSN2
8164698	1.48	0.0234	MED27
7978628	1.48	0.0211	PPP2R3C
7932420	1.48	0.0347	PTPLA
8169365	1.48	0.00854	TMEM164
8157947	1.48	0.0193	ZBTB34
7942858	1.47	0.0145	ANKRD42
7991581	1.47	0.0204	CHSY1
8144669	1.47	0.0125	FDFT1
8162777	1.47	0.0168	GABBR2
8068866	1.47	0.0204	NDUFV3
8068866	1.47	0.0204	PKNOX1
8069711	1.47	0.0348	RNF160
7914202	1.47	0.0213	SNHG12
8175023	1.47	0.0126	ZDHHC9
7996012	1.46	0.0124	ARL2BP
8147424	1.46	0.0314	C8orf38
8165046	1.46	0.02	CAMSAP1
8172708	1.46	0.0432	NUDT11
7952785	1.46	0.0182	OPCML
8059996	1.46	0.0142	PER2
7944302	1.46	0.0123	PHLDB1
7977003	1.46	0.0146	RCOR1
8066513	1.46	0.0212	SDC4
8172280	1.46	0.0407	SLC9A7
8019842	1.46	0.0124	TYMS
7931168	1.45	0.0468	ACADSB
8164200	1.45	0.0299	ANGPTL2
8044375	1.45	0.0333	BCL2L11
7954132	1.45	0.0468	C12orf60
7969096	1.45	0.0106	CDADC1
8148728	1.45	0.0158	CYC1
8067864	1.45	0.0151	hCG_2042718
7987642	1.45	0.0162	NDUFAF1
8123936	1.45	0.0348	NEDD9
8046804	1.45	0.0144	NUP35
7953218	1.45	0.031	RAD51AP1
7929116	1.45	0.0109	RPP30
8108099	1.45	0.0266	SEC24A
7915472	1.45	0.0231	SLC2A1

7965769	1.45	0.0365	SLC5A8
8157381	1.45	0.031	ZNF618
8089527	1.44	0.0224	ATG3
8137874	1.44	0.0442	CARD11
7942123	1.44	0.0425	CCND1
8152582	1.44	0.036	DSCC1
7976698	1.44	0.0213	EML1
8010050	1.44	0.0276	FAM100B
8095907	1.44	0.0133	FRAS1
7944603	1.44	0.0445	GRIK4
7960177	1.44	0.0208	SLC6A12
7953508	1.44	0.0224	TPI1
8128977	1.44	0.0393	TUBE1
8162940	1.43	0.0179	ABCA1
7973850	1.43	0.0458	AKAP6
8019357	1.43	0.0397	DCXR
7949995	1.43	0.015	MRPL21
8071676	1.43	0.02	RAB36
8130151	1.43	0.0233	RAET1E
8148966	1.43	0.04	RPL23AP53
8094301	1.43	0.0224	SLIT2
8132097	1.42	0.043	AQP1
8168958	1.42	0.0372	ARMCX5
8047265	1.42	0.0417	C2orf47
8047265	1.42	0.0417	C2orf60
8132097	1.42	0.043	FAM188B
8026541	1.42	0.0229	FAM32A
8001764	1.42	0.0346	GOT2
8132097	1.42	0.043	INMT
7978846	1.42	0.0463	POLE2
8008754	1.42	0.0264	RAD51C
8121794	1.42	0.0262	SMPDL3A
7978570	1.42	0.0176	SNX6
8035808	1.42	0.0318	ZNF100
8175076	1.42	0.0457	ZNF280C
7922095	1.41	0.0193	BRP44
7977058	1.41	0.032	EIF5
8018793	1.41	0.0359	JMJD6
8040340	1.41	0.0302	LPIN1
8093086	1.41	0.0242	PCYT1A
8145136	1.41	0.0311	PPP3CC
8081786	1.41	0.0487	QTRTD1
7933999	1.41	0.0322	RUFY2
8061075	1.41	0.0213	SNRPB2
8175039	1.4	0.0203	ELF4
8024485	1.4	0.0249	GADD45B
7963438	1.4	0.0215	KRT71
7954591	1.4	0.0262	MRPS35
7965048	1.4	0.0382	NAP1L1
8001082	1.4	0.0236	SLC6A10P
8001082	1.4	0.0236	SLC6A8
7927981	1.4	0.0213	SUPV3L1
8100231	1.4	0.0483	TEC
8142912	1.4	0.0359	TMEM209
8025998	1.4	0.0439	ZNF136
7974587	1.39	0.0429	ACTR10
7991516	1.39	0.0325	ADAMTS17
7986350	1.39	0.0419	ARRDC4
8097373	1.39	0.0335	C4orf29
8158418	1.39	0.0483	C9orf114
8005661	1.39	0.0239	CYTSB
8158418	1.39	0.0483	ENDOG
8098021	1.39	0.02	GRIA2
7930208	1.39	0.047	INA
7971620	1.39	0.0213	KPNA3
7939767	1.39	0.0411	MADD
8168215	1.39	0.0323	MED12
8072328	1.39	0.0377	MTP18
8113981	1.39	0.0309	P4HA2
8155673	1.39	0.0462	PIP5K1B
8153223	1.39	0.0278	PTK2
8013616	1.39	0.0262	SARM1
8072328	1.39	0.0377	SEC14L2
8013616	1.39	0.0262	SLC46A1
8154059	1.39	0.0291	SMARCA2

7937465	1.39	0.0398	TALDO1
8013616	1.39	0.0262	TMEM199
7903803	1.38	0.0393	AHCYL1
8161829	1.38	0.0495	C9orf41
7972936	1.38	0.0491	FAM70B
7983890	1.38	0.0329	GCOM1
8115410	1.38	0.0363	GEMIN5
7983890	1.38	0.0329	GRINL1A
8045349	1.38	0.042	MGAT5
7973314	1.38	0.0197	OXA1L
8107100	1.38	0.0215	RGMB
8020508	1.38	0.0372	RIOK3
8101366	1.38	0.0386	SCD5
8136039	1.37	0.0292	ATP6V1F
7936706	1.37	0.0363	C10orf119
8006123	1.37	0.0307	CPD
8164535	1.37	0.0201	CRAT
8135114	1.37	0.0286	CUX1
7983350	1.37	0.0402	EIF3J
7948612	1.37	0.0379	FADS1
8096753	1.37	0.046	HADH
8057719	1.37	0.0317	HIBCH
7897561	1.37	0.0363	KIF1B
8037913	1.37	0.0491	NAPA
7932094	1.37	0.0389	PHYH
8060418	1.37	0.0284	SIRPA
8029219	1.37	0.0356	TMEM145
8090772	1.37	0.0214	TOPBP1
8089234	1.37	0.0236	ZBTB11
7930380	1.36	0.0243	ADD3
8152668	1.36	0.0487	ATAD2
7967127	1.36	0.0349	CAMKK2
8098500	1.36	0.0355	CDKN2AIP
8086028	1.36	0.0424	GLB1
7951589	1.36	0.0456	LOC120364
7990620	1.36	0.0432	TSPAN3
7954701	1.35	0.0483	C12orf72
8082846	1.35	0.037	EPHB1
8164343	1.35	0.0397	FAM102A
7957126	1.35	0.0432	KCNMB4
8152764	1.35	0.0362	MTSS1
7900201	1.35	0.0261	UTP11L
8074780	1.35	0.042	YPEL1
8130732	1.34	0.0406	BRP44L
7978923	1.34	0.0366	C14orf138
8074939	1.34	0.0299	CHCHD10
8015835	1.34	0.0425	DUSP3
8138857	1.34	0.0352	GGCT
7931393	1.34	0.0445	GLRX3
8096385	1.34	0.0495	HERC3
8111677	1.34	0.0397	LIFR
8106098	1.34	0.0416	MAP1B
8152597	1.34	0.0443	MRPL13
7939087	1.33	0.0388	C11orf46
7942783	1.33	0.036	C11orf67
7930682	1.33	0.037	FAM160B1
7942783	1.33	0.036	INTS4
8074791	1.33	0.0319	MAPK1
8050591	1.33	0.0335	NDUFAF2
8018652	1.33	0.0489	RNF157
8146550	1.33	0.0382	SDCBP
7912928	1.33	0.0397	SDHB
8061114	1.32	0.0432	DSTN
7992987	1.32	0.0416	HMOX2
8150225	1.32	0.047	RAB11FIP1
7951077	1.32	0.0474	SESN3
7971644	1.31	0.0401	C13orf1
8046408	1.31	0.0397	PDK1
8097570	1.31	0.0394	USP38
7998886	1.3	0.0488	PKMYT1
7934196	1.3	0.0443	PSAP
8157933	1.3	0.0443	ZBTB43
8029437	-1.3	0.0491	PVR
7965723	-1.3	0.0447	PXK
7965723	-1.3	0.0447	UHRF1BP1L

7918749	-1.31	0.0497	DENND2C
7990151	-1.31	0.0459	PKM2
8079869	-1.31	0.0498	RBM5
8079869	-1.31	0.0498	RBM6
8102619	-1.32	0.047	ANXA5
8154934	-1.32	0.036	IL11RA
7923453	-1.32	0.0467	KDM5B
7932495	-1.33	0.0438	C10orf114
8167234	-1.33	0.0359	RBM3
8001373	-1.33	0.0491	SNX20
8132245	-1.34	0.047	FLJ20712
8171229	-1.34	0.0396	PNPLA4
7985695	-1.35	0.0358	AKAP13
7919825	-1.35	0.0475	ARNT
7935660	-1.35	0.0487	DNMBP
8164165	-1.35	0.0327	HSPA5
7900228	-1.35	0.0359	NDUFS5
8055404	-1.35	0.0422	UBXN4
7942342	-1.36	0.0293	INPPL1
7962000	-1.36	0.0498	PTHLH
8039013	-1.36	0.0386	ZNF321
7927747	-1.36	0.0328	ZNF365
8116983	-1.37	0.0319	CD83
7955376	-1.37	0.0427	DIP2B
8132860	-1.37	0.0405	EGFR
8027521	-1.37	0.0364	GPATCH1
7985248	-1.37	0.0342	KIAA1024
7906954	-1.37	0.0346	PBX1
8074817	-1.37	0.0462	PI4KA
8019939	-1.37	0.0329	TGIF1
8161701	-1.37	0.0299	TMEM2
8074817	-1.37	0.0462	TOP3B
8146024	-1.38	0.0363	ADAM32
8156610	-1.38	0.0382	CDC14B
8156610	-1.38	0.0382	HABP4
8142232	-1.38	0.0307	LAMB4
8040927	-1.38	0.0249	NRBP1
7920725	-1.38	0.0372	SCAMP3
8013741	-1.38	0.0272	SDF2
8029969	-1.38	0.0327	SEPW1
8167185	-1.38	0.0468	TIMP1
8136067	-1.38	0.0446	TSPAN33
7990054	-1.38	0.0227	UACA
8112746	-1.38	0.0229	WDR41
7981273	-1.39	0.0416	CCDC85C
7933877	-1.39	0.0416	JMJD1C
7995806	-1.39	0.0226	MT1A
8132387	-1.39	0.0432	POU6F2
8166402	-1.39	0.0432	SMS
8157216	-1.39	0.0438	UGCG
7946635	-1.39	0.0359	ZBED5
8131815	-1.4	0.0272	KLHL7
7991602	-1.4	0.0255	PCSK6
7955078	-1.4	0.0454	PFKM
8163402	-1.4	0.047	ROD1
7970975	-1.4	0.048	SOHLH2
7963713	-1.41	0.0416	ATP5G2
8170247	-1.41	0.0396	CXorf18
8152491	-1.41	0.0422	EXT1
8041995	-1.41	0.0234	SPTBN1
8043100	-1.41	0.0254	TMSB10
7944803	-1.41	0.0166	VWA5A
8056060	-1.42	0.0233	BAZ2B
8163599	-1.42	0.0411	DFNB31
8044933	-1.42	0.0247	GLI2
8077376	-1.42	0.02	ITPR1
7995813	-1.42	0.0204	MT1DP
8023481	-1.42	0.0243	NARS
7961540	-1.42	0.0207	RERG
8018558	-1.43	0.0216	ACOX1
8122827	-1.43	0.0347	C6orf97
8116998	-1.43	0.0247	JARID2
8018209	-1.43	0.0259	NAT9
7943892	-1.43	0.0496	NCAM1
8160857	-1.43	0.0201	SIGMAR1
8096301	-1.43	0.0456	SPP1
8020630	-1.43	0.0181	TTC39C
8167069	-1.43	0.032	UBA1
8100870	-1.44	0.0236	ADAMTS3
8177560	-1.44	0.015	BDP1
8115543	-1.44	0.0144	EBF1
7904303	-1.44	0.0272	IGSF2
8122013	-1.44	0.0361	L3MBTL3
7984704	-1.44	0.0326	NEO1
8150276	-1.44	0.0363	PPAPDC1B
8064808	-1.44	0.0286	SLC23A2
7962537	-1.44	0.0286	SLC38A2
8045933	-1.44	0.0375	TANK
8096675	-1.44	0.0211	TET2
8174893	-1.44	0.0221	THOC2
8122336	-1.45	0.0246	C6orf115
8012931	-1.45	0.0318	CDRT1
8134699	-1.45	0.0445	COPS6
8012931	-1.45	0.0318	FBXW10
8062041	-1.46	0.0481	ACSS2
8081431	-1.46	0.0401	ALCAM
7961964	-1.46	0.0126	C12orf11
8083223	-1.46	0.0118	C3orf58
8047381	-1.46	0.0219	CFLAR
7972750	-1.46	0.0145	COL4A1
7980680	-1.46	0.0394	FOXN3
8106769	-1.46	0.0203	LOC645181
8007828	-1.46	0.0216	MAPT
7958884	-1.46	0.048	OAS1
8104788	-1.46	0.021	RAI14
7984364	-1.46	0.0135	SMAD3
7927964	-1.46	0.0299	SRGN
8121838	-1.46	0.0297	TPD52L1
8038792	-1.47	0.0126	ETFB
8142194	-1.47	0.0132	LAMB1
8139534	-1.47	0.0244	PKD1L1
8141688	-1.47	0.0302	PLOD3
8016994	-1.47	0.0363	RNF43
8109001	-1.47	0.0427	SPINK5
8022356	-1.47	0.0227	SPIRE1
8056583	-1.48	0.0491	ABCB11
8150988	-1.48	0.0222	ASPH
8032863	-1.48	0.0215	C19orf10
7917885	-1.48	0.0123	CNN3
8114920	-1.48	0.0235	DPYSL3
8040725	-1.48	0.0432	DPYSL5
7986293	-1.48	0.02	MCTP2
8107722	-1.48	0.0146	MEGF10
8161056	-1.48	0.0146	TLN1
7921970	-1.49	0.00819	ALDH9A1
8108478	-1.49	0.0236	C5orf32
8174527	-1.49	0.0498	CAPN6
7969060	-1.49	0.0117	FNDC3A
7955873	-1.49	0.0132	HOXC4
7955873	-1.49	0.0132	HOXC5
7955873	-1.49	0.0132	HOXC6
7922268	-1.49	0.0447	KIFAP3
7901140	-1.49	0.0352	MAST2
7921121	-1.49	0.0324	MRPL24
8100298	-1.49	0.0211	OCIAD2
7977615	-1.49	0.029	RNASE1
8095545	-1.49	0.0098	RUFY3
7990632	-1.49	0.0331	SGK269
8057056	-1.49	0.0286	TTN
8101260	-1.5	0.0139	ANTXR2
7904254	-1.5	0.00959	ATP1A1
7920737	-1.5	0.0116	CLK2
8155096	-1.5	0.00939	CREB3
7928354	-1.5	0.0498	FAM149B1
7984524	-1.5	0.0359	PAQR5
7906564	-1.5	0.0148	PEA15
7907611	-1.5	0.02	RASAL2
8162264	-1.51	0.0114	AUH
7980390	-1.51	0.0249	C14orf148
7923596	-1.51	0.0173	ETNK2

8101449	-1.51	0.0128	HPSE
7989365	-1.51	0.0354	RORA
8113666	-1.51	0.047	SEMA6A
8072160	-1.51	0.0171	ZNRF3
8069676	-1.52	0.0206	ADAMTS1
8171493	-1.52	0.0468	CTPS2
7939365	-1.52	0.0133	FJX1
7972055	-1.52	0.0171	KCTD12
8102232	-1.52	0.0138	LEF1
8049530	-1.52	0.031	LRRFIP1
8044133	-1.52	0.0123	NCK2
8054227	-1.52	0.00848	REV1
7944011	-1.52	0.0109	REXO2
8103630	-1.52	0.0197	SH3RF1
8085486	-1.52	0.0426	XPC
7932243	-1.53	0.0151	FAM171A1
8027778	-1.53	0.00808	FXYD5
7969003	-1.53	0.00959	ITM2B
7930533	-1.53	0.0236	LOC143188
8087447	-1.53	0.048	MST1
8039389	-1.53	0.0299	PTPRH
8037505	-1.53	0.0379	TRAPPC6A
8008609	-1.54	0.00765	ANKFN1
7907370	-1.54	0.0178	DNM3
8106354	-1.54	0.00808	IQGAP2
7990457	-1.54	0.0439	MAN2C1
8047228	-1.54	0.0349	MOBKL3
8164077	-1.54	0.00766	NR5A1
7979615	-1.54	0.0121	SPTB
8073081	-1.55	0.0112	APOBEC3F
7951807	-1.55	0.0125	CADM1
7916045	-1.55	0.00848	EPS15
8015806	-1.55	0.0357	ETV4
8089596	-1.55	0.0164	WDR52
7907861	-1.55	0.00622	XPR1
7927732	-1.56	0.00997	ARID5B
8141150	-1.56	0.0115	ASNS
8038126	-1.56	0.0416	CA11
8170166	-1.56	0.00662	HTATSF1
8054281	-1.56	0.011	LONRF2
8102800	-1.56	0.0119	SLC7A11
7924508	-1.56	0.0225	SUSD4
8102904	-1.56	0.00689	UCP1
7969204	-1.56	0.037	WDFY2
7969438	-1.57	0.0491	LMO7
8041383	-1.57	0.011	LTBP1
8156043	-1.57	0.0108	PSAT1
7897877	-1.57	0.0133	TNFRSF1B
8092970	-1.58	0.00756	APOD
8102263	-1.58	0.0218	COL25A1
8141328	-1.58	0.0229	CYP3A5
8141328	-1.58	0.0229	CYP3A5P2
7906400	-1.58	0.0118	IFI16
8091255	-1.58	0.02	PAQR9
7938231	-1.58	0.0338	PPFIBP2
8051547	-1.58	0.00662	PRKD3
7950743	-1.58	0.0291	RAB30
8069744	-1.58	0.00549	RWDD2B
8097098	-1.58	0.0112	USP53
8056005	-1.59	0.00762	ACVR1
7979963	-1.59	0.0318	DPF3
8104592	-1.59	0.00435	FBXL7
8127109	-1.59	0.00516	ICK
7951614	-1.59	0.00587	PPP2R1B
8102678	-1.59	0.0106	TRPC3
8005638	-1.6	0.00378	ALDH3A2
7957759	-1.6	0.0148	APAF1
7906900	-1.6	0.0194	DDR2
7995776	-1.6	0.00726	MT3
7984276	-1.6	0.0101	SLC24A1
8023121	-1.6	0.00891	ST8SIA5
7922382	-1.61	0.026	ANKRD45
8004167	-1.61	0.0242	FAM64A
7963187	-1.61	0.0173	LIMA1
8055711	-1.61	0.02	NEB
8087935	-1.61	0.00576	NT5DC2
7981947	-1.61	0.0419	SNORD109A
7981947	-1.61	0.0419	SNORD109B
7979824	-1.62	0.0106	ACTN1
7909332	-1.62	0.00788	CD55
8097753	-1.62	0.042	DCLK2
8149835	-1.62	0.0103	LOC100129717
8170420	-1.62	0.0128	MAMLD1
8106068	-1.62	0.00546	MCCC2
8149835	-1.62	0.0103	NEFL
7909967	-1.63	0.00509	CAPN2
8065758	-1.63	0.0375	FLJ38773
8108251	-1.63	0.0101	NPY6R
7943760	-1.63	0.00604	SIK2
8122464	-1.63	0.0119	UTRN
7916862	-1.64	0.00414	GPR177
8152280	-1.64	0.00759	LRP12
7897953	-1.64	0.0229	SNORA59A
7897953	-1.64	0.0229	SNORA59B
7897953	-1.64	0.0229	VPS13D
8057418	-1.64	0.0347	ZNF385B
7962579	-1.66	0.0249	AMIGO2
7965686	-1.66	0.0481	ANKS1B
7947230	-1.66	0.0279	BDNF
8130553	-1.66	0.0427	FLJ27255
7957298	-1.66	0.0276	NAV3
7962367	-1.66	0.0117	ZCRB1
7907601	-1.67	0.0192	FAM5B
7982299	-1.67	0.0262	LOC390561
8143367	-1.67	0.00403	SLC37A3
8131600	-1.67	0.0395	TSPAN13
8078397	-1.68	0.0277	CMTM8
8121429	-1.68	0.0229	FIG4
7904726	-1.68	0.00854	TXNIP
7985310	-1.69	0.00782	FAM108C1
8166408	-1.69	0.00662	PHEX
7979455	-1.69	0.0146	RTN1
8081219	-1.69	0.0189	ST3GAL6
8134257	-1.7	0.0105	GNG11
8134420	-1.7	0.0386	TAC1
8005475	-1.7	0.0125	TRIM16
8005475	-1.7	0.0125	TRIM16L
8017766	-1.71	0.00451	APOH
7979959	-1.71	0.00615	C14orf57
7956930	-1.71	0.0189	DYRK2
7971197	-1.71	0.00917	ELF1
8083901	-1.71	0.00371	FNDC3B
8130556	-1.71	0.0121	SOD2
8174092	-1.72	0.0086	ARMCX2
7953603	-1.72	0.0132	C1S
8102862	-1.72	0.0098	MAML3
8078330	-1.72	0.00662	RBMS3
8156060	-1.72	0.00782	TLE4
8146000	-1.73	0.0031	ADAM9
8120719	-1.73	0.0194	CD109
8056222	-1.73	0.0109	DPP4
8013319	-1.73	0.0101	GRAP
8063437	-1.73	0.00188	LOC100288461
7905606	-1.73	0.0132	NPR1
8063437	-1.73	0.00188	TSHZ2
7966135	-1.74	0.0083	CORO1C
8139207	-1.74	0.00355	INHBA
8045637	-1.74	0.00673	KIF5C
8148049	-1.74	0.00654	NOV
8051573	-1.75	0.00491	CDC42EP3
7909661	-1.75	0.00357	RPS6KC1
7985317	-1.76	0.015	KIAA1199
8076403	-1.76	0.00276	NAGA
7922756	-1.76	0.0139	NMNAT2
8022747	-1.77	0.0269	B4GALT6
8061211	-1.77	0.00272	DTD1
8154916	-1.77	0.00451	GALT
8114900	-1.77	0.0279	PPP2R2B
7917052	-1.77	0.0113	SLC44A5
8057887	-1.77	0.00433	STK17B

8129458	-1.78	0.00644	ARHGAP18
8055465	-1.78	0.00257	CXCR4
7950804	-1.79	0.0452	CCDC89
8094533	-1.79	0.00505	FLJ16686
7903092	-1.79	0.00756	FNBP1L
7955963	-1.79	0.023	MUCL1
8150537	-1.79	0.0193	SLC20A2
8107594	-1.79	0.0117	SNCAIP
8130211	-1.79	0.00485	SYNE1
8021685	-1.8	0.0135	CCDC102B
7925320	-1.8	0.021	NID1
8151149	-1.81	0.00403	ARFGEF1
7912112	-1.81	0.00561	DNAJC11
7912112	-1.81	0.00561	THAP3
8101971	-1.82	0.00269	PPP3CA
7975482	-1.82	0.00403	RGS6
7917516	-1.83	0.033	GBP1
7917516	-1.83	0.033	GBP3
8151816	-1.83	0.0314	GEM
7918902	-1.84	0.00166	CD58
7943867	-1.85	0.0162	BCO2
8089464	-1.85	0.0207	LOC151760
8173551	-1.85	0.00239	PHKA1
7983527	-1.85	0.00237	SEMA6D
8102415	-1.86	0.0179	CAMK2D
8103415	-1.87	0.0142	C4orf18
8162531	-1.88	0.00237	MT1G
8162531	-1.88	0.00237	MT1P1
8162531	-1.88	0.00237	MT1X
8106019	-1.88	0.0103	PMCHL1
8106019	-1.88	0.0103	PMCHL2
8092726	-1.89	0.00552	CLDN1
8056457	-1.89	0.0122	SCN1A
8004545	-1.9	0.00442	ATP1B2
8142585	-1.9	0.00172	CADPS2
8117054	-1.9	0.00168	CAP2
8051066	-1.9	0.0216	MPV17
7909681	-1.9	0.0156	PROX1
8122634	-1.9	0.00485	SAMD5
8083246	-1.91	0.00234	CPB1
8117243	-1.91	0.00517	LRRC16A
8167965	-1.91	0.00152	MSN
7971150	-1.92	0.0127	LHFP
8095362	-1.92	0.00344	MT2A
7947165	-1.92	0.0098	SLC5A12
8102523	-1.93	0.002	FABP2
8098204	-1.94	0.00624	CPE
7917347	-1.94	0.00228	DDAH1
8169145	-1.94	0.0227	MUM1L1
8107133	-1.94	0.00228	PAM
8168875	-1.95	0.0086	ARMCX3
8029988	-1.95	0.00177	ELSPBP1
8127072	-1.95	0.0021	GSTA1
7983564	-1.95	0.00544	SLC12A1
8148304	-1.95	0.0029	TRIB1
7984517	-1.96	0.00125	GLCE
7925511	-1.96	0.0359	PLD5
8059279	-1.98	0.00245	EPHA4
8168472	-2	0.00414	ATP7A
8089082	-2	0.00116	DCBLD2
8121749	-2	0.000909	GJA1
8122807	-2.01	0.00351	AKAP12
8055911	-2.01	0.00587	LOC100129449
8072735	-2.03	0.00326	APOL1
8174937	-2.03	0.000888	ODZ1
7907893	-2.04	0.000959	MR1
8002303	-2.04	0.00588	NQO1
8102792	-2.04	0.00689	PCDH18
7951351	-2.04	0.00159	PDGFD
8060854	-2.04	0.00219	PLCB1
8009301	-2.04	0.0128	PRKCA
7932254	-2.06	0.00403	ITGA8
8046646	-2.06	0.00171	OSBPL6
7962559	-2.06	0.00689	SLC38A4
7974080	-2.07	0.00149	MIA2
8092959	-2.07	0.00174	PPP1R2
8112865	-2.07	0.00354	SERINC5
8145611	-2.08	0.0327	FZD3
8099524	-2.08	0.0132	LDB2
7932765	-2.08	0.00629	MPP7
8021635	-2.08	0.0108	SERPINB10
8021635	-2.08	0.0108	SERPINB2
7968872	-2.1	0.0236	DNAJC15
7968015	-2.1	0.0118	TNFRSF19
7984569	-2.11	0.00225	LRRC49
7912157	-2.13	0.00171	ERRFI1
8128956	-2.13	0.00284	FYN
8092707	-2.13	0.000888	LEPREL1
8147516	-2.13	0.00504	MATN2
7910611	-2.14	0.00125	KCNK1
8148040	-2.14	0.0121	MAL2
8088247	-2.16	0.00155	ARHGEF3
7995525	-2.16	0.00181	NKD1
8109490	-2.16	0.00283	SGCD
7961083	-2.17	0.00125	CLEC2B
8104901	-2.17	0.00662	IL7R
8161044	-2.17	0.00493	TPM2
7962312	-2.19	0.00919	ABCD2
8103206	-2.19	0.00126	FBXW7
7968417	-2.19	0.0018	FRY
8156923	-2.19	0.000888	RP11-35N6.1
8088560	-2.2	0.00355	ADAMTS9
7942503	-2.2	0.000631	PPME1
8101952	-2.22	0.00155	DDIT4L
7925876	-2.22	0.001	PFKP
8149825	-2.22	0.00932	STC1
8063115	-2.23	0.00383	MMP9
7979044	-2.23	0.000645	NIN
8046124	-2.25	0.00451	DHRS9
8176133	-2.27	0.000694	G6PD
7995843	-2.27	0.000888	NUP93
7961269	-2.27	0.00188	PRB4
7961269	-2.27	0.00188	PRH1
8037283	-2.27	0.00788	PSG1
8037283	-2.27	0.00788	PSG4
8116921	-2.28	0.00238	EDN1
8135218	-2.3	0.0157	LRRC17
7960947	-2.33	0.000903	A2M
8155849	-2.33	0.00614	ANXA1
8174239	-2.33	0.00239	BEX2
8149629	-2.33	0.000631	GFRA2
8119052	-2.33	0.000588	PNPLA1
8060895	-2.33	0.0367	RNU105B
8101762	-2.36	0.00635	SNCA
8045736	-2.38	0.000311	FMNL2
8166784	-2.38	0.00715	TSPAN7
7930194	-2.39	0.000519	CNNM2
8179819	-2.39	0.000888	DDAH2
7963986	-2.39	0.000816	RAB13
8100827	-2.43	0.0108	IGJ
7904361	-2.45	0.000888	FAM46C
8089329	-2.45	0.0014	MYH15
7977933	-2.45	0.00148	SLC7A8
7961142	-2.5	0.0115	OLR1
7979204	-2.51	0.000781	FERMT2
7974090	-2.53	0.00244	CTAGE5
8131666	-2.53	0.00108	ITGB8
7950764	-2.55	0.00504	DLG2
7958253	-2.66	0.000888	C12orf75
8129573	-2.68	0.00221	MOXD1
8138289	-2.69	0.000888	ETV1
7962375	-2.69	0.00115	PRICKLE1
7905544	-2.73	0.00738	SPRR1A
7935058	-2.77	0.000442	MYOF
7954559	-2.81	0.00163	PPFIBP1
7917954	-2.87	0.0049	FRRS1
8112220	-2.87	0.000631	PDE4D
8105302	-2.89	0.00645	FST
7933872	-2.91	0.00026	EGR2
8175492	-2.93	0.000378	ATP11C

7961320	-3.07	0.000253	PRB3
8122222	-3.1	0.000307	PDE7B
7961306	-3.1	0.000222	PRB1
7961306	-3.1	0.000222	PRB2
8154491	-3.12	0.000253	ADAMTSL1
8037949	-3.12	0.00138	SULT2A1
7902687	-3.14	0.000904	CYR61
8088192	-3.14	0.000311	ERC2
8171624	-3.16	0.00587	GPR64
7957140	-3.16	0.000888	LGR5
7956009	-3.16	0.000128	METTL7B
7922474	-3.27	0.000631	KIAA0040
8089011	-3.34	0.000247	PROS1
8168622	-3.39	0.00237	KLHL4
7926545	-3.48	0.000247	PLXDC2
8171297	-3.56	0.000311	MID1
7956759	-3.56	0.000222	SRGAP1
7910022	-3.61	0.00493	CNIH3
8056257	-3.61	0.000888	FAP
7965322	-3.63	0.00205	KITLG
7964834	-3.84	0.000413	CPM
8161884	-3.92	0.000903	PRUNE2
7920123	-3.92	0.00738	S100A10
8121712	-3.94	0.000073	SLC35F1
8122660	-3.97	0.000247	UST
8055688	-4.17	0.00112	RND3
7957966	-4.2	0.00387	MYBPC1
7957570	-4.32	0.000222	PLXNC1
8105040	-4.44	0.000073	OSMR
8077270	-4.5	0.000631	CHL1
8092134	-4.53	0.000247	PLD1
8163637	-5.54	0.0000325	TNC
7909789	-5.82	0.0000265	TGFB2
8166593	-5.86	0.000128	IL1RAPL1
8091243	-7.36	0.0000265	PCOLCE2

Supplemental Table 1B

Functional annotation enrichment analysis of transcripts differentially expressed following SF-1 overexpression in NCI-H295R adrenal cells (fold change >1.5 or <-1.5 only; key results are shown)

	Category	Term	P-value	Genes
Transcript levels increased by SF-1 overexpression	SP_PIR_KEYWORDS	Steroidogenesis	0.0006	HSD3B2, CYP17A1, CYP11A1, STAR
	GOTERM_BP_FAT	Regulation of system process	0.0020	TF, FLT1, TNNC2, EPAS1, STAR, STXBP1, KIT, TNNI3, PLCE1, TNNT1, SLC1A3, RASGRF1, PRKACA, SLC22A5
	GOTERM_BP_FAT	Cellular hormone metabolic process	0.0029	RBP4, CYP17A1, CYP11A1, STAR, ALDH1A3, HSD17B6
	GOTERM_BP_FAT	Lipid biosynthetic process	0.0030	HSD3B2, CHKA, CYP11A1, STAR, SCD, LSS, SGMS1, LPCAT3, PLCE1, CYP17A1, DGAT1, ELOVL3, FABP3, HSD17B6
	GOTERM_BP_FAT	Glutamine family amino acid biosynthetic process	0.0036	SLC1A3, ASS1, GLUD2, GLUD1
	SP_PIR_KEYWORDS	Microtubule	0.0046	HAUS3, CEP57, TUBB2B, TUBB2A, DYNLL2, MAP1A, KIF16B, SKA1, PTPN20B, DYNC1I2, PTPN20A, TUBB4
	SP_PIR_KEYWORDS	Transit peptide	0.0050	GRPEL1, CYP11A1, STAR, GLUD2, GLUD1, CA5B, MOSC2, MOSC1, MIPEP, MTHFD1L, ISCA1, MUT, ALAS1, MRPS9, ALDH1B1, OXCT1, PDHA1
	GOTERM_MF_FAT	Molybdenum ion binding	0.0060	MOCOS, MOSC2, MOSC1
	GOTERM_BP_FAT	Response to drug	0.0102	SLC1A3, ACSL1, STAR, ALDH1A3, ATP1A3, FABP3, SLC22A5, GAL, DDIT3, ABCB4
	GOTERM_BP_FAT	Folic acid and derivative biosynthetic process	0.0113	LOC286297, MTHFD1L, GCH1
	GOTERM_BP_FAT	Regulation of hormone levels	0.0132	RBP4, CYP17A1, DGAT1, CYP11A1, STAR, ALDH1A3, HSD17B6, GAL
	GOTERM_BP_FAT	Steroid biosynthetic process	0.0136	HSD3B2, CYP17A1, CYP11A1, STAR, HSD17B6, LSS
	SP_PIR_KEYWORDS	Cholesterol metabolism	0.0148	SOAT1, MUT, CYP11A1, SORL1
Transcript levels decreased by SF-1 overexpression	GOTERM_MF_FAT	Cytoskeletal protein binding	0.0001	FMNL2, LIMA1, CAP2, MYH15, MYBPC1, UTRN, SNCA, IQGAP2, LMO7, ACTN1, FXYD5, KLHL4, CAPN2, TPM2, ARFGEF1, CORO1C, NCK2, SYNE1, NEB, CXCR4, FYN, MSN, CDC42EP3, SPTB
	GOTERM_MF_FAT	Actin binding	0.0001	FMNL2, LIMA1, CAP2, MYH15, MYBPC1, UTRN, IQGAP2, LMO7, ACTN1, FXYD5, KLHL4, TPM2, CORO1C, SYNE1, NEB, CXCR4, MSN, SPTB
	GOTERM_BP_FAT	Regulation of apoptosis	0.0002	SH3RF1, CADM1, MMP9, SNCA, STK17B, ASNS, ITM2B, TGFB2, PRUNE2, PEA15, BDNF, APOH, TNFRSF19, DYRK2, DDAH2, NQO1, NEFL, ADAM9, PRKCA, TXNIP, ARHGEF3, ANXA1, ACTN1, IFI16, SOD2, ATP7A, INHBA, AMIGO2, SERPINB2, APAF1, ACVR1
	GOTERM_BP_FAT	Catecholamine metabolic process	0.0004	ATP7A, SNCAIP, SNCA, NPR1, MOXD1, TGFB2
	GOTERM_BP_FAT	Ion homeostasis	0.0006	PRKCA, SCN1A, EGR2, SNCA, EDN1, SLC7A8, TAC1, NPR1, SOD2, ATP7A, CD55, SERINC5, CXCR4, MT2A, CLDN1, CAMK2D, STC1, PPP3CA, MT3
	GOTERM_BP_FAT	Regulation of locomotion	0.0009	PRKCA, PLD1, CREB3, CXCR4, MMP9, SNCA, EDN1, APOH, TAC1, ADAM9, TRIB1, TGFB2
	GOTERM_BP_FAT	Response to toxin	0.0009	PRKCA, ATP7A, SLC7A8, TRIM16, NQO1, NEFL, SLC7A11
	GOTERM_BP_FAT	Positive regulation of secretion	0.0009	PRKCA, INHBA, CADM1, SNCA, EDN1, TAC1, TRIM16, ADAM9, TGFB2
	SP_PIR_KEYWORDS	Metal-thiolate cluster	0.0009	MT2A, MT1G, MT1X, MT3
	GOTERM_MF_FAT	Cytokine binding	0.0010	A2M, TNFRSF1B, CXCR4, OSMR, TNFRSF19, TRIM16, IL7R, GFRA2, ACVR1

Functional annotation enrichment analysis was performed using the Database for Annotation, Visualization and Integrated Discovery (DAVID) v6.7 (http://david.abcc.ncifcrf.gov/) (Huang et al., Nat Protoc 2009;4:44-57 & Dennis et al., Genome Biol 2003;4:P3). P-values correspond to the EASE score, a modified Fisher's exact test to measure significance of gene enrichment in annotation terms. SP_PIR, Protein Information Resource; GOTERM_XX_FAT, Gene Ontology database term set curated by DAVID; BP, biological process; MF, molecular function.

Supplemental Table 2

Transcripts differentially expressed following SF-1 knockdown with shRNA in NCI-H295R adrenal cells

FC, fold change; adj.P-Val, Benjamini-Hochberg-corrected P-value

Transcript Cluster ID	FC	adj.P-Val	Gene Symbol
7907601	-1.76	0.00165	FAM5B
8128043	-1.67	0.0218	CNR1
7924342	-1.51	0.00251	SLC30A10
8150253	-1.49	0.0197	STAR
7903358	-1.44	0.0357	VCAM1
8129573	-1.41	0.0494	MOXD1
8078619	-1.4	0.0146	ITGA9
8040430	-1.37	0.0197	VSNL1
7990333	-1.36	0.0264	CYP11A1
7907702	-1.35	0.047	SOAT1
8170671	-1.34	0.0357	ATP2B3
7967544	-1.31	0.0205	SCARB1
7991602	-1.3	0.0157	PCSK6
8114030	-1.3	0.0198	KIF3A
8139921	-1.3	0.00837	CALN1
8148049	-1.29	0.0148	NOV
8039607	-1.28	0.0121	ZIM2
8039607	-1.28	0.0121	PEG3
8161919	-1.28	0.0148	TLE1
8044391	-1.27	0.0437	MERTK
8152764	-1.25	0.0264	MTSS1
8100714	-1.2	0.0357	YTHDC1
8114050	-1.2	0.0264	SEPT8
8095870	1.2	0.0327	CCNG2
8162610	1.2	0.0357	CDC14B
7901720	1.23	0.0357	PRKAA2
7945245	1.23	0.0418	NTM
7972487	1.24	0.0392	DOCK9
8106820	1.24	0.0214	POLR3G
7968015	1.25	0.0405	TNFRSF19
8168472	1.25	0.0317	ATP7A
7970569	1.26	0.0494	SACS
8161701	1.26	0.0454	TMEM2
8090433	1.27	0.0361	MGLL
8102249	1.27	0.0357	AGXT2L1
7902965	1.28	0.0454	BTBD8
8058091	1.28	0.0361	SATB2
8156610	1.28	0.0218	HABP4
8156610	1.28	0.0218	CDC14B
7952309	1.29	0.0437	BLID
8102800	1.29	0.0124	SLC7A11
8081810	1.3	0.022	GAP43
8155849	1.3	0.0258	ANXA1
7943760	1.31	0.0437	SIK2
7983527	1.32	0.0264	SEMA6D
8067055	1.33	0.0176	ATP9A
8083779	1.34	0.0357	SERPINI1
8166593	1.37	0.0218	IL1RAPL1
8094789	1.38	0.0184	LIMCH1
7924309	1.39	0.00248	ESRRG
8129482	1.39	0.0168	SAMD3
8162533	1.39	0.00837	PTCH1
8088919	1.4	0.0176	ROBO1
8111998	1.41	0.0148	HCN1
8135774	1.41	0.0146	PTPRZ1
8063458	1.42	0.0157	DOK5
7962000	1.43	0.0361	PTHLH
7922343	1.44	0.0148	TNFSF4
7917503	1.45	0.0148	GBP3
7954926	1.45	0.0197	PDZRN4
8157153	1.46	0.0197	AKAP2
8157153	1.46	0.0197	PALM2-AKAP2
8157153	1.46	0.0197	PALM2
8085914	1.47	0.0418	SLC4A7
8104746	1.47	0.00165	NPR3
8163637	1.47	0.0176	TNC
8046380	1.48	0.0148	ITGA6
8150529	1.5	0.0148	DKK4
8122807	1.52	0.0357	AKAP12
8095736	1.53	0.00837	AREG
8104758	1.53	0.0357	C5orf23
7909789	1.54	0.00837	TGFB2
7901993	1.55	0.00625	CACHD1
8106098	1.57	0.00165	MAP1B
8028737	1.58	0.0197	LGALS13
8142718	1.58	0.00165	GRM8
7927631	1.59	0.00837	DKK1
8102415	1.6	0.00748	CAMK2D
8015133	1.65	0.00625	KRT23
8095744	1.78	0.00251	AREG
8122202	1.95	0.000191	MYB
8091715	2.07	0.000191	LXN

Supplemental Table 3

Overlap: transcripts differentially expressed following both SF-1 overexpression and knockdown in NCI-H295R adrenal cells

	Transcript Cluster ID	SF-1 Overexpression		SF-1 Knockdown		Entrez Gene ID	Gene Symbol	Gene Title	Gene locus
		FC	adj.P	FC	adj.P				
Positively regulated by SF-1	7990333	2.46	0.006	-1.36	0.0264	1583	*CYP11A1*	cytochrome P450, family 11, subfamily A, polypeptide 1	15q24.3
	8040430	2.2	0.004	-1.37	0.0197	7447	*VSNL1*	visinin-like 1	2p24.2
	8150253	2.03	0.0049	-1.49	0.0197	6770	*STAR*	steroidogenic acute regulatory protein	8p12
	8039607	1.75	0.0045	-1.28	0.0121	23619	*ZIM2*	zinc finger, imprinted 2	19q13.33
	8039607	1.75	0.0045	-1.28	0.0121	5178	*PEG3*	paternally expressed 3	19q13.33
	7907702	1.61	0.0114	-1.35	0.047	6646	*SOAT1*	sterol O-acyltransferase 1	1q25.3
	8152764	1.35	0.0362	-1.25	0.0264	9788	*MTSS1*	metastasis suppressor 1	8q24.13
Negatively regulated by SF-1	7962000	-1.36	0.0498	1.43	0.0361	5744	*PTHLH*	parathyroid hormone-like hormone	12p11.22
	8161701	-1.37	0.0299	1.26	0.0454	23670	*TMEM2*	transmembrane protein 2	9q21.13
	8156610	-1.38	0.0382	1.28	0.0218	22927	*HABP4*	hyaluronan binding protein 4	9q22.33
	8156610	-1.38	0.0382	1.28	0.0218	8555	*CDC14B*	CDC14 cell division cycle 14 homolog B (S. cerevisiae)	9q22.33
	8102800	-1.56	0.0119	1.29	0.0124	23657	*SLC7A11*	solute carrier family 7, (cationic amino acid transporter, y+ system) member 11	4q28.3
	7943760	-1.63	0.006	1.31	0.0437	23235	*SIK2*	salt-inducible kinase 2	11q23.1
	7983527	-1.85	0.0024	1.32	0.0264	80031	*SEMA6D*	sema domain, transmembrane domain (TM), and cytoplasmic domain, (semaphorin) 6D	15q21.2
	8102415	-1.86	0.0179	1.6	0.0075	817	*CAMK2D*	calcium/calmodulin-dependent protein kinase II delta	4q26
	8168472	-2	0.0041	1.25	0.0317	538	*ATP7A*	ATPase, Cu++ transporting, alpha polypeptide	Xq21.1
	8122807	-2.01	0.0035	1.52	0.0357	9590	*AKAP12*	A kinase (PRKA) anchor protein 12	6q25.1
	7968015	-2.1	0.0118	1.25	0.0405	55504	*TNFRSF19*	tumor necrosis factor receptor superfamily, member 19	13q12.12
	8155849	-2.33	0.0061	1.3	0.0258	301	*ANXA1*	annexin A1	9q21.13
	8163637	-5.54	3E-05	1.47	0.0176	3371	*TNC*	tenascin C	9q33.1
	7909789	-5.82	3E-05	1.54	0.0084	7042	*TGFB2*	transforming growth factor, beta 2	1q41
	8166593	-5.86	0.0001	1.37	0.0218	11141	*IL1RAPL1*	interleukin 1 receptor accessory protein-like 1	Xp21.3-p21.2

Transcript cluster IDs from Affymetrix for GeneChip Human Gene 1.0ST arrays

FC, fold change; adj.P, Benjamini-Hochberg-corrected P-value

Supplemental Table 4

Characteristics of genes positively regulated by SF-1

Gene Symbol	Adrenal expression		Selected Gene Ontology annotation: biological processes (evidence)	MIM: morbidity	Mouse model / Adrenal phenotype
	eGenetics (fetal to adult)	GNF (fetal)			
CYP11A1	Y	Y	C21-steroid hormone biosynthetic process (IDA)	Congenital Adrenal Insufficiency	**Y / Y**
VSNL1	Y	Y	*calcium-mediated signaling; CNS development (in rat; TAS)*		N
STAR	Y		Regulation of steroid biosynthetic process (IEA)	Lipoid Congenital Adrenal Hyperplasia	**Y / Y**
ZIM2	Y		DNA-dependent regulation of transcription (NAS)		N
PEG3	Y		DNA-dependent regulation of transcription (NAS)		Y / N
SOAT1			Cholesterol esterification, cholesterol metabolic process (IDA)		**Y / Y**
MTSS1	Y	Y	Actin cytoskeleton organization (TAS), cell adhesion (NAS), signal transduction (IEA)		Y / N

Adrenal expression was investigated through BioMart (www.biomart.org) based on two publicly available datasets, eGenetics (Kelso et al., Genome Res 2003;13:1222-30) and GNF (Su et al., Proc Natl Acad Sci U S A 2002;99:4465-70).

Gene ontology annotation was gathered at AmiGO (www.geneontology.org). Evidence codes: IDA, Inferred from direct assay; TAS, Traceable author statement; IEA, Inferred from electronic annotation; NAS, Non-traceable author statement.

Human morbidity was investigated through OMIM (NCBI Entrez portal) and mouse data through Mouse Genomic Informatics (www.informatics.jax.org).

CNS: central nervous system; MIM: Mendelian Inheritance in Man.