

**Supplemental Table S3.** Top Upstream Regulators

Upstream regulator	Expression log ratio	Molecule type	Predicted activation state	Activation z-score	P value of overlap	Target molecules in dataset
CTNNB1	-0.389	Transcription regulator			0.000115	BMP4, CCND1, LEF1, PLS3, PTCH1, TOB2, TSC22D1, UGCG, VCAN
RARB		Ligand-dependent nuclear receptor		-1	0.00015	ARHGAP4, HOXA5, IFI27, IGFBP6
PGR	-0.667	Ligand-dependent nuclear receptor		-1.287	0.00024	CCND1, CDKN1C, FKBP5, ID1, IFI27, KRT18, UGCG, VCAN
GLI1		Transcription regulator	Inhibited	-2.607	0.00025	CCND1, NAV3, NR2F2, NREP, PDZRN3, PTCH1, SESN3
MAFB	-0.326	Transcription regulator		-1.342	0.000265	ALCAM, FBLN5, GATM, OLFML3, SLC7A8
CLOCK	-0.514	Transcription regulator		1.134	0.000349	CCND1, ITM2C, KANK2, NR1D1, PER3, SERINC5, TAF9B
NR3C1	-0.462	Ligand-dependent nuclear receptor		-1.103	0.000681	C1QTNF1, CDC42EP3, CDKN1C, FKBP5, MAOA, NAV3, NGFR, PIK3R1, PLAGL1, PRKCD, RBMS3, STK17B, TIMP3
TCF7L2	-0.681	Transcription regulator			0.000747	ADGRG1, CAMK2N1, CCND1, STK17B
HDAC7	-0.321	Transcription regulator			0.000775	CCND1, RPRM
KHDRBS1	-0.333	Transcription regulator			0.000775	CCND1, SMN1/SMN2
ESR2		Ligand-dependent nuclear receptor		-1.153	0.00147	BMP4, C3, CCND1, FBLN1
IRF2	-0.329	Transcription regulator	Inhibited	-2	0.00162	C1QTNF1, CCND1, CES1, FGG, ID1
SREBF1	0.147	Transcription regulator			0.0017	ADGRG1, BHLHE41, MDK, PCK2, PLS3, SORBS3
PRDM5	-0.793	Transcription regulator			0.00216	DKK3, EMID1, ISLR, NREP, SIK1/SIK1B
HLX		Transcription regulator			0.00223	CDKN1C, CLDN1, ELK1
DYRK1B	-0.337	Kinase			0.00265	CCND1, SOD3
RXRG		Ligand-dependent nuclear receptor			0.00265	IGFBP6, TIMP3
MYOCD		Transcription regulator		-1.103	0.00341	ECM2, LMOD1, SIK1/SIK1B, TNNC1
RARG	-0.98	Ligand-dependent nuclear receptor			0.00351	HOXA5, IGFBP6
HMGA1		Transcription regulator			0.00438	CCND1, ELK1, KITLG
SPDEF		Transcription regulator	Activated	2	0.00442	CD34, COL16A1, DKK3, LEF1
NUPR1	-0.377	Transcription regulator		-0.277	0.00498	ADGRG1, AVPI1, CAMK2N1, CARMIL1, GRAMD2B, KANK2, NGFR, NR1D1, PER3, PHLDA1, PIK3R1, SIK1/SIK1B, SYTL2
HIC1		Transcription regulator			0.00499	CCND1, CDKN1C, CDO1, NOV
AR		Ligand-dependent nuclear receptor		-1.281	0.00595	CCND1, FKBP5, LMOD1, MAOA, PLS3, PRKCD, VCAN
HAND2		Transcription regulator			0.00806	ECM2, SIK1/SIK1B, TNNC1
ETV5	-0.841	Transcription regulator			0.00806	ALCAM, CCND1, CLDN1
CBX5	-0.69	Transcription regulator	Activated	2.219	0.00849	LEF1, RORA, SELENBP1, SLC7A8, SYTL2
TCF4	-0.515	Transcription regulator			0.0087	CCND1, LEF1, VCAN
TBX5		Transcription regulator			0.00937	ECM2, SIK1/SIK1B, TNNC1