

Table S1

Master Regulator	Expr Log Ratio	Activation z-score	p-value of overlap
PFDN5	0.785	-8.124	3.95E-23
FBXL14	-0.104	-7.347	1.19E-24
estrogen	NA	-7.316	3.05E-25
CD 437	NA	-7.208	1.99E-16
SGL 1776	NA	-7.1	2.96E-24
debio 1347	NA	-7.038	7E-25
derazantinib FGFR KI	NA	-7.038	7E-25
pemigatinib FGFR KI	NA	-7.038	7E-25
GABPB1	-0.139	-7.02	5.01E-29
ST1926	NA	-7.02	8.58E-16
procaine	NA	-6.908	3.33E-23
sirolimus	NA	-6.902	4.28E-18
5-fluorouracil	NA	-6.696	5.26E-15
ASP5878	NA	-6.665	2.64E-25
Erdafitinib	NA	-6.665	2.64E-25
3D185	NA	-6.602	6.3E-26
ARG1	1.866	-6.528	1.43E-27
PRN1371	NA	-6.465	3.34E-25
GW 273629	NA	-6.229	3.32E-32
nicotine	NA	-6.225	5.71E-25
Tripterygium wilfordii extract	NA	-6.224	5.21E-30
FBXO32	-1.097	-6.027	2.55E-25
S-methylthiocitrulline	NA	-5.95	7.37E-31
KDM5A	-0.665	-5.729	1.76E-11
RBL1	-0.343	-5.565	1.08E-32
RRAD	0.086	-5.498	0.0000273
vinorelbine	NA	-5.455	2.02E-14
alisertib	NA	-5.436	1.17E-26
DEGS1	0.148	-5.334	0.0000305
BACH1	-0.452	-5.178	2.03E-08
enalapril ACE inhib	NA	-5.138	1.09E-23
cinaciguat	NA	-5.124	4.18E-11
TLX1	NA	-5.112	1.11E-08
HUWE1	-0.812	-5.046	2.5E-24
FBXL14	-0.104	-4.838	1.6E-30
CRMP1	-0.452	-4.73	1.14E-24
FBXW7	-0.145	-4.683	8.24E-27
TRIM28	0.022	-4.587	3.18E-26
Danuserib	NA	-4.537	1.33E-28
atorvastatin	NA	-4.493	2.7E-23
KDM5B	-0.612	-4.472	0.0000105
ABT-089	NA	-4.445	5.58E-24
PFDN5	0.785	-4.431	4.86E-28
Candesartan	NA	-4.424	2.2E-23
AMG 900	NA	-4.406	1.7E-27
TTP607	NA	-4.406	1.7E-27
ACP-319	NA	-4.379	2.53E-25
SNS 314	NA	-4.363	2.73E-27
SIRT6	0.238	-4.259	1E-34
ELOVL5	-0.205	-4.206	4.55E-09
KDM2B	-0.508	-4.196	0.00000183

resveratrol	NA	-4.146	2.9E-23
BRCA1	-1.262	-4.103	4.33E-25
PML-RARA	NA	-4.098	0.00000248
RND3	0.124	-4.071	1.01E-32
MSRA	0.445	-4.061	0.00000218
rabeprazole	NA	-3.994	4.73E-26
BRL 26830	NA	-3.969	1.75E-13
YY1	-0.266	-3.961	1.38E-24
flumatinib	NA	-3.902	4.39E-26
radotinib	NA	-3.761	1.71E-24
KEAP1	-0.057	-3.674	0.00000121
LEP	-1.215	-3.669	9.62E-20
MXD1	-0.057	-3.658	1.59E-28
CPT1B	NA	-3.58	5.1E-24
warfarin	NA	-3.569	6.18E-24
SIRT7	0.509	-3.516	4.08E-26
Sb202190	NA	-3.503	1.19E-18
GNA12	-0.158	-3.5	0.00314
S-equol	NA	-3.474	3.77E-24
BACH1	-0.452	-3.441	0.00000624
WNT1	NA	-3.432	3.64E-16
HOXA10	0.218	-3.402	1.46E-29
STAT5A	-0.443	-3.374	9.52E-24
BIX 02189	NA	-3.366	2.1E-31
SRP54	-0.834	-3.342	4.45E-19
halothane	NA	-3.317	6.47E-15
AKR1B1	-1.963	-3.242	4.39E-21
PIM/FLT3 kinase inhibitor SEL24	NA	-3.229	3.5E-25
deoxycorticosterone acetate salt sens hypertension	NA	-3.208	1.97E-17
ECD	-0.028	-3.186	1.46E-19
CL 316243	NA	-3.162	0.000628
phenylephrine	NA	-3.154	1.86E-17
CCL7	NA	-3.108	0.00000364
PPIF	0.646	-3.108	2.15E-23
GSK690693	NA	-3.101	0.00000418
HOXB1	NA	-3.077	1.91E-27
LMO2	0.305	-3.069	1.64E-23
sepantronium	NA	-3.064	6.16E-27
RGS2	-0.16	-2.985	0.00133
CCL25	0.074	-2.959	4.21E-08
papaverine	NA	-2.937	0.00000035
PCGF2	0.379	-2.889	0.00000705
PTGDS	-0.245	-2.887	0.00000131
ruxolitinib	NA	-2.887	0.00000868
SKI-G-801	NA	-2.881	2.42E-26
RAP1B	0.104	-2.874	2.21E-08
BMS-345541	NA	-2.86	3.64E-29
CDC42	NA	-2.86	3.6E-18
YY1	-0.266	-2.844	1.85E-26
TRAP1	0.082	-2.837	0.00136
valproic acid	NA	-2.75	0.0000379
SAR1B	0.076	-2.73	1.73E-19

MICAL1	0.443	-2.707	3.8E-23
PD184352	NA	-2.704	7.31E-20
chelerythrine	NA	-2.699	1.25E-14
pimagedine	NA	-2.692	6.34E-19
l-asparaginase	NA	-2.673	0.000000259
ghrelin	NA	-2.668	0.0000714
interferon beta-1a	NA	-2.654	4.79E-18
TP73	NA	-2.648	3.63E-20
PISD	0.374	-2.646	0.00104
eplerenone	NA	-2.635	0.0000158
IDH1	0.216	-2.6	7.15E-08
RNF139	0.207	-2.596	1.91E-30
oseltamivir	NA	-2.573	7.85E-12
NDN	-0.398	-2.566	0.0000553
ERG	-0.225	-2.556	0.000172
St. John's wort	NA	-2.54	1.52E-20
ACTN4	-0.129	-2.525	0.0000115
FUT6	NA	-2.525	0.000000811
apomorphine	NA	-2.514	0.000000193
SIRT3	0.315	-2.5	0.000506
PAFAH1B1	-0.279	-2.498	1.57E-22
TRIM28	0.022	-2.498	5.08E-29
dalteparin	NA	-2.496	0.000409
E2F3	0.154	-2.478	5.63E-15
CREG1	0.338	-2.462	0.0000915
PPT1	0.122	-2.462	0.0000915
sobetirome	NA	-2.449	0.0000758
ST8SIA1	-0.308	-2.449	0.0249
GGT1	0.14	-2.447	6.74E-16
SOX4	-0.56	-2.44	0.000000267
alvespimycin	NA	-2.429	0.00000196
S-equol	NA	-2.428	3.13E-16
TP53BP1	-0.363	-2.428	6.42E-27
BI 847325	NA	-2.4	6.04E-08
HOXA1	0.853	-2.394	0.000000661
methadone	NA	-2.384	1.08E-17
HPRT1	0.071	-2.38	2.34E-14
GW501516	NA	-2.357	0.00000418
prazosin	NA	-2.357	1.56E-15
policosanol	NA	-2.355	7.88E-24
HOXA10	0.218	-2.333	0.000175
ZFP36	1.761	-2.333	0.0000365
HOXA4	-0.264	-2.324	0.000000268
diazepam	NA	-2.321	0.00000655
PIN4	0.926	-2.321	0.0000842
FGF9	0.519	-2.292	1.23E-09
STAT5B	-0.357	-2.292	0.000002
ASAH2	-0.518	-2.25	0.000077
NUS1	-0.136	-2.25	0.000128
PDE2A	NA	-2.242	6.51E-19
pitavastatin	NA	-2.242	2.63E-08
firsocostat	NA	-2.236	0.0000351

HOXA4	-0.264	-2.236	0.00000882
pertuzumab	NA	-2.236	4.09E-12
propylthiouracil	NA	-2.236	0.0000258
SAT1	0.611	-2.236	0.0107
vinorelbine	NA	-2.236	0.0152
GNL2	0.224	-2.233	1.04E-12
LIPE	-1.448	-2.228	2.89E-08
bezafibrate	NA	-2.227	9.02E-08
HOXA5	-0.21	-2.223	2.24E-23
pyrilamine	NA	-2.219	1.5E-14
GnRH analog	NA	-2.213	0.000163
almotriptan	NA	-2.209	3.12E-09
pregnenolone carbonitrile	NA	-2.2	1.49E-19
PND-1186	NA	-2.183	0.000000774
PHLPP2	-0.634	-2.18	1.62E-11
IGF1	-0.316	-2.176	1.92E-19
PELI1	-0.036	-2.155	1.46E-22
tetraethylammonium	NA	-2.138	0.0000695
sorafenib analog BB2	NA	-2.121	1.97E-13
BCAR1	0.081	-2.111	2.1E-10
FAAH	0.132	-2.111	0.0000562
silicon dioxide	NA	-2.108	3.9E-20
beta-escin	NA	-2.092	2.26E-28
dihematoporphyrin ether	NA	-2.092	3.31E-28
N-Ac-Leu-Leu-norleucinal	NA	-2.078	1.09E-26
FASN	-4.417	-2.065	0.0000415
valpromide	NA	-2.05	4.16E-17
DNM2	-0.037	-2.034	3.91E-15
inolitazone	NA	-2.03	1.07E-09
BDTX-189	NA	-2.023	7.76E-13
sapitinib	NA	-2.023	7.76E-13
CGAS	-0.487	-2.02	3.87E-16
rigosertib PLK1 / PI3K/Akt inhib	NA	-2.02	0.000000427
STAT5A	-0.443	-2.019	9.91E-18
SIRT1 inhibitor III	NA	-2.018	4.64E-09
fludrocortisone	NA	-2.01	1.11E-22
continuous erythropoietin receptor activator	NA	-2	0.000108
FH	0.288	-2	0.002
MSH2	-0.01	-2	0.0000273
pentobarbital	NA	-2	0.000199
ST8SIA4	-0.555	-2	0.000117
TXNRD1	-0.081	-2	0.0000061
ACACB	-1.535	2	0.000199
DNMT3A	0.038	2	0.000000233
namitecan	NA	2	0.0193
pCPT-cAMP	NA	2	0.000448
PFDN5	0.785	2	0.002
PT-2385	NA	2	0.00426
zileuton	NA	2.012	0.0000242
AZD6482	NA	2.014	8.8E-09
EGF	0.575	2.03	1.63E-13
EAF2	0.403	2.058	0.000000139

SP600125	NA	2.076	5.2E-17
FKBP4	0.166	2.093	5.14E-18
iohexol	NA	2.109	0.0000915
antilymphocyte serum	NA	2.111	0.00000272
SESN2	-0.406	2.115	1.32E-08
ID3	0.745	2.12	1.89E-08
PRKN	0.18	2.121	0.0272
STUB1	0.013	2.121	0.0000394
SPDEF	NA	2.138	0.00434
chlorogenic acid	NA	2.155	5.2E-21
ANG	0.478	2.165	3.15E-24
FTO	-0.155	2.173	1.36E-08
PRPF6	-0.038	2.179	1.09E-18
TRRAP	-0.699	2.186	7.32E-29
BHLHA15	NA	2.187	9.68E-12
atorvastatin	NA	2.2	2.89E-12
clozapine	NA	2.226	0.00000125
4-hydroxytamoxifen	NA	2.236	2.2E-09
ANGPTL3 - coincides with ANGPT2 exp	0.331	2.236	0.000758
GRP	NA	2.236	0.000335
LIF	NA	2.236	4.8E-09
PAX8	0.131	2.236	0.0000162
bisindolylmaleimide iv	NA	2.243	2.05E-18
Doxorubicin	NA	2.249	1.18E-26
ENPP2	-0.173	2.25	0.000117
GSK2636771	NA	2.25	0.0000913
TGX-221	NA	2.25	0.000128
TNKS2	-0.294	2.258	2.6E-12
TNKS	-0.679	2.258	2.09E-12
AT13148	NA	2.287	0.0000604
tegaserod	NA	2.29	5.63E-22
ABTL0812	NA	2.309	0.00706
BI 860585	NA	2.309	0.00706
DS-3078a	NA	2.309	0.00706
LXI-15029	NA	2.309	0.00706
finasteride	NA	2.312	0.0000104
MYCN	-0.204	2.313	4.23E-21
CREM	0.082	2.324	3.05E-09
dec-RVKR-CMK	NA	2.325	0.0000222
HIC1	-0.305	2.325	0.0000144
prexasertib	NA	2.333	0.0000206
HNF4A	-0.007	2.335	1.15E-08
barbiturate	NA	2.357	5.58E-09
pergolide	NA	2.408	9.51E-16
cyclosporin A	NA	2.425	0.0000432
wortmannin - inhibits DNA repair	NA	2.429	4.15E-21
temsirolimus	NA	2.44	0.000000244
PCYT2	0.628	2.449	0.00601
MSC2363318A	NA	2.462	0.0000842
azathioprine	NA	2.496	1.06E-14
NRF1	-0.02	2.5	0.00135
FGF19	NA	2.53	0.000862

TAF4	0.025	2.546	4.92E-17
FOXO3 - senescence inducer	-0.645	2.565	8.36E-15
ALOX5	-0.197	2.61	4.36E-26
MBOAT7	0.002	2.646	0.0000502
fluoxetine	NA	2.65	2.79E-17
dutasteride	NA	2.654	0.0000195
tyrphostin AG 1478	NA	2.657	3.62E-17
bromodeoxyuridine	NA	2.66	1.03E-24
stallimycin - DNA damage inducer	NA	2.664	2.15E-24
NRF1 - antioxidant	-0.02	2.668	0.000812
PDGF receptor tyrosine kinase inhibitor IV	NA	2.668	0.0000714
gemopatrilat	NA	2.677	2.98E-11
omapatrilat	NA	2.677	2.98E-11
thiorphan	NA	2.677	4.5E-11
AZD8055	NA	2.708	2.52E-09
Esrra	0.245	2.711	0.000542
adaphostin	NA	2.736	4.6E-16
PITX2	-0.698	2.746	0.000765
RUNX2	-0.119	2.817	8.94E-12
captopril - ACE inhibitor	NA	2.828	0.00225
FGF19	NA	2.828	0.000000155
MARCHF8	-0.048	2.828	1.24E-20
FOXO1	-0.471	2.853	0.0000773
mirdametinib MEK inh	NA	2.862	2.58E-19
EHD4	-0.387	2.87	8.14E-31
bardoxolone methyl - inhibits NfKB and thus SASP	NA	2.878	5.19E-14
dalfampridine	NA	2.887	6.43E-09
LMO4	0.483	2.959	1.88E-23
CREB1	-0.154	2.967	2.03E-14
PRL	NA	2.994	0.0000332
HES5	NA	3.011	1.79E-22
teriflunomide	NA	3.029	0.000000109
BT2	NA	3.051	0.00000427
AZD-7451	NA	3.077	4.52E-13
CREBBP	-0.429	3.118	2.49E-27
indinavir	NA	3.154	4.23E-10
misoprostol	NA	3.197	1.62E-24
SP4	-0.54	3.266	3.35E-23
bexarotene	NA	3.286	1.55E-08
curcumin	NA	3.289	5.82E-19
everolimus	NA	3.311	3.83E-15
fenoterol (promote renin release)	NA	3.311	1.62E-14
AREG	NA	3.317	0.00000343
mycophenolic acid	NA	3.341	6.99E-09
WWTR1	-0.209	3.384	6.33E-17
simvastatin	NA	3.421	8.61E-18
PF4	0.751	3.464	4.09E-10
OSI-461	NA	3.485	2.36E-24
captopril	NA	3.544	5.49E-08
eflornithine	NA	3.727	2.52E-08
ZIC5	NA	3.735	1.1E-24
RAD21	-0.294	3.788	1.68E-30

pantoprazole	NA	3.795	0.00000115
TRERF1	-0.167	3.796	0.00000071
BCAT1	-2.297	3.807	1.44E-08
CINK4	NA	3.878	0.000000198
cloprostenol	NA	3.881	1E-24
SIRT3	0.315	3.903	2.04E-20
lycopene	NA	3.973	1.65E-15
posaconazole	NA	4.01	9.96E-08
4-hydroxytamoxifen	NA	4.028	3.52E-29
KLF3	-0.318	4.036	0.000248
cholestyramine	NA	4.162	3.87E-24
IDEC-132	NA	4.185	9.27E-16
NFE2L2 - antioxidant	0.2	4.196	0.00000372
ZMIZ1	-0.328	4.233	1.38E-28
BCR-ABL1	NA	4.302	6.43E-23
CDX1	NA	4.308	7.61E-08
ALDH3A1 - metabolizes ROS byproducts	-3.105	4.388	0.0000206
cisatracurium	NA	4.456	1.88E-23
pipecuronium	NA	4.456	1.88E-23
PARP16	0.209	4.491	4.3E-21
CGP 74514A	NA	4.571	6.47E-11
MYC	0.114	4.579	1.05E-24
blinatumomab	NA	4.65	4.69E-28
MYCL	-0.773	4.707	0.00000163
rocuronium	NA	4.807	4.72E-25
BTG2	-0.114	5.014	3.05E-10
SCGB3A1	NA	5.199	2.89E-08
acyclic retinoid	NA	5.246	2.15E-10
EPAS1	-0.318	5.288	2.4E-27
fulvestrant	NA	5.331	4.36E-17
Slfn1	NA	5.361	1.26E-09
DDX5	0.322	5.396	9.96E-18
SU 9516	NA	5.409	9.05E-09
RB1 - senescence	-0.465	5.506	0.0000525
enflurane	NA	5.541	1.52E-22
epothilone B	NA	5.578	0.0000276
PAPOLA	-0.359	5.588	0.0000404
doxazosin - alpha blocker	NA	5.735	0.0000155
PAX5	1.508	5.979	1.88E-13
IKZF1	-0.092	6.136	7.1E-13
ERG	-0.225	6.174	1.49E-24
sapropterin	NA	6.229	3.32E-32
NOS2	-0.057	6.695	3.74E-27
DEK-NUP214	NA	7.068	2.84E-23
enzastaurin	NA	7.178	6.96E-23
MLXIPL	0.185	7.333	4.13E-57
MYCN	-0.204	7.509	2.66E-19
MYC	0.114	7.535	1.86E-22
TRRAP	-0.699	7.636	8.76E-23