

A genome-wide CRISPR screen identifies regulators of MAPK and MTOR pathways that mediate resistance to sorafenib in acute myeloid leukemia

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Supplementary Table 1: Normalized gene-level CRISPR results with RRA p-values ≤ 0.05 , tiers are shown

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
LZTR1	5	1.00	1.00	17994	3.01	9.2E-07	4.1E-06	1	5	3.01	Tier1
BIRC6	5	1.00	1.00	17992	1.99	1.2E-05	5.1E-05	5	5	1.99	Tier3
TSC2	4	0.97	0.97	17330	3.39	1.2E-05	4.9E-05	4	3	3.39	Tier1
TXNDC9	5	0.51	0.60	10419	3.17	1.1E-05	4.9E-05	3	4	3.17	Tier2
ZNHIT3	6	1.00	1.00	17993	1.96	7.2E-06	4.2E-05	2	6	1.96	Tier3
ABCB1	5	0.00	0.02	324	2.75	1.2E-04	5.4E-04	29	3	2.75	Tier1
ACTL6A	5	0.57	0.63	10949	0.98	1.2E-04	5.4E-04	31	3	0.98	Tier2
AP2S1	7	1.00	1.00	17922	1.76	3.3E-05	2.1E-04	7	6	1.76	Tier3
ATP8A2	5	0.15	0.29	5013	1.61	8.7E-05	4.0E-04	21	3	1.61	Tier2
C1orf52	5	0.95	0.95	17030	2.70	1.0E-04	4.7E-04	24	3	2.70	Tier2
CADM2	5	0.98	0.98	17499	2.81	6.7E-05	3.1E-04	17	4	2.81	Tier2
CDK1	5	1.00	1.00	17982	2.02	1.2E-04	5.3E-04	28	5	2.02	Tier2
CEP63	5	0.68	0.70	12239	2.86	7.0E-05	3.2E-04	18	4	2.86	Tier2
DHX15	5	1.00	1.00	17989	2.63	4.2E-05	2.0E-04	10	5	2.63	Tier1
EBNA1BP2	5	0.95	0.95	16936	2.15	5.7E-05	2.7E-04	11	4	2.15	Tier1
EXOSC8	5	1.00	1.00	17981	1.94	9.8E-05	4.5E-04	23	5	1.94	Tier3
HADH	5	0.22	0.36	6274	-0.34	2.9E-05	1.4E-04	6	2	-0.34	Singleton
HRC	5	1.00	1.00	17984	1.77	1.1E-04	4.8E-04	25	5	1.77	Tier3
LSM5	2	1.00	1.00	17988	3.55	6.7E-05	1.2E-04	16	2	3.55	Tier1
MAK	3	1.00	1.00	17987	2.33	7.6E-05	2.3E-04	19	3	2.33	Tier3
MAT2A	4	1.00	1.00	17991	2.64	5.8E-05	2.3E-04	12	4	2.64	Tier3
NPRL2	5	1.00	1.00	17874	1.96	4.2E-05	2.0E-04	9	4	1.96	Tier3
PIP5K1A	8	1.00	1.00	17986	1.27	7.9E-05	5.5E-04	20	8	1.27	Singleton
PPP1R8	13	0.83	0.92	14798	1.82	3.7E-05	3.3E-04	8	7	1.82	Tier3
PUS7	5	0.08	0.18	3207	2.03	1.1E-04	5.0E-04	27	4	2.03	Tier1
RSL1D1	4	1.00	1.00	17990	2.47	6.2E-05	2.5E-04	14	4	2.47	Tier3
SMARCB1	4	0.98	0.98	17470	2.61	1.3E-04	4.9E-04	32	3	2.61	Tier1
TMEM62	5	0.94	0.94	16783	2.89	5.9E-05	2.7E-04	13	4	2.89	Tier2
TNK2	5	1.00	1.00	17888	2.23	6.7E-05	3.1E-04	15	5	2.23	Tier1
TSC1	5	1.00	1.00	17985	2.12	9.3E-05	4.3E-04	22	5	2.12	Tier3
TTF2	5	1.00	1.00	17983	1.64	1.1E-04	5.0E-04	26	5	1.64	Tier3
ZNF816	3	0.47	0.48	10037	3.65	1.2E-04	3.8E-04	30	2	3.65	Tier2
NDST4	5	0.05	0.12	2278	-1.04	1.4E-04	6.6E-04	35	2	-1.04	Singleton
PIWIL2	5	0.98	0.98	17588	2.01	1.3E-04	6.2E-04	33	4	2.01	Tier3
SEPSECS	5	0.44	0.57	9813	1.01	1.4E-04	6.2E-04	34	3	1.01	Tier2
TAF7	5	0.94	0.94	16713	2.61	1.5E-04	6.7E-04	36	3	2.61	Tier2

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
TPK1	4	1.00	1.00	17979	1.99	1.8E-04	6.6E-04	40	4	1.99	Tier3
PNPO	5	0.61	0.65	11384	0.70	1.5E-04	6.9E-04	37	3	0.70	Tier2
GMNN	4	0.00	0.01	138	-0.32	2.1E-04	7.7E-04	44	1	-0.32	Unassigned
DUSP18	5	1.00	1.00	17980	2.02	1.7E-04	8.1E-04	38	5	2.02	Tier2
SCAF4	5	0.56	0.62	10865	2.66	1.7E-04	8.1E-04	39	4	2.66	Tier2
TUBE1	5	1.00	1.00	17978	2.23	1.8E-04	8.4E-04	41	5	2.23	Tier2
RPLP0	5	0.93	0.93	16592	0.60	2.0E-04	9.3E-04	42	2	0.60	Singleton
TRIP13	5	0.54	0.62	10741	2.08	2.1E-04	9.4E-04	43	4	2.08	Tier3
GOT1	5	0.18	0.31	5529	2.58	2.2E-04	1.0E-03	46	4	2.58	Tier2
RPL27A	4	1.00	1.00	17976	1.85	2.8E-04	1.0E-03	50	4	1.85	Tier3
ZDHHC24	5	1.00	1.00	17977	1.79	2.1E-04	9.8E-04	45	5	1.79	Tier3
UBTF	4	1.00	1.00	17975	1.78	2.9E-04	1.1E-03	52	4	1.78	Tier3
MANBAL	4	0.49	0.54	10280	1.19	3.0E-04	1.1E-03	53	2	1.19	Tier3
STAM	4	0.99	0.99	17681	2.59	3.1E-04	1.1E-03	54	3	2.59	Tier1
LTA4H	5	0.54	0.62	10716	1.06	2.6E-04	1.2E-03	47	3	1.06	Tier2
TP53BP1	5	0.30	0.44	7767	0.40	2.7E-04	1.2E-03	48	2	0.40	Tier2
TMTC4	5	0.99	0.99	17816	1.88	2.8E-04	1.3E-03	49	4	1.88	Tier3
IMPAD1	4	0.04	0.09	1810	1.77	3.6E-04	1.3E-03	59	2	1.77	Tier2
FAM92A1	5	0.05	0.12	2250	-0.49	3.1E-04	1.4E-03	55	2	-0.49	Tier2
KRT76	5	0.64	0.68	11838	1.95	3.2E-04	1.5E-03	56	3	1.95	Tier3
C6	3	1.00	1.00	17971	2.10	5.1E-04	1.5E-03	68	3	2.10	Tier3
MSL2	5	0.98	0.98	17442	1.83	3.3E-04	1.5E-03	57	4	1.83	Tier3
PNMA6C	1	1.00	1.00	17940	4.57	1.6E-03	1.6E-03	167	1	4.57	Singleton
PRUNE	5	0.94	0.94	16844	1.84	3.4E-04	1.6E-03	58	4	1.84	Tier3
DEFB114	1	1.00	1.00	17938	4.10	1.7E-03	1.6E-03	173	1	4.10	Singleton
UBE2Q2	5	0.44	0.57	9822	1.50	3.8E-04	1.7E-03	62	3	1.50	Tier2
UNK	5	0.98	0.98	17509	2.29	3.8E-04	1.7E-03	61	4	2.29	Tier3
UXS1	5	1.00	1.00	17974	1.57	3.7E-04	1.7E-03	60	5	1.57	Singleton
IMPDH2	4	0.99	0.99	17752	2.44	5.2E-04	1.9E-03	69	4	2.44	Tier1
TEX10	5	0.92	0.92	16375	2.38	4.1E-04	1.9E-03	63	4	2.38	Tier2
C15orf38-AP3S2	1	1.00	1.00	17929	4.55	2.0E-03	1.9E-03	200	1	4.55	Singleton
TMEM150A	5	0.97	0.98	17425	1.32	4.3E-04	2.0E-03	64	3	1.32	Tier3
CETN3	3	1.00	1.00	17969	2.26	7.1E-04	2.1E-03	81	3	2.26	Tier3
FAM127B	2	1.00	1.00	17955	3.07	1.1E-03	2.1E-03	121	2	3.07	Tier1
NDOR1	4	0.98	0.98	17533	2.17	5.8E-04	2.1E-03	73	3	2.17	Tier1
CCDC130	5	1.00	1.00	17972	1.53	4.9E-04	2.2E-03	67	5	1.53	Unassigned
FAM134C	5	1.00	1.00	17973	1.34	4.9E-04	2.2E-03	65	5	1.34	Tier3
TRAPP3L	3	1.00	1.00	17968	1.90	7.7E-04	2.2E-03	85	3	1.90	Tier3
ZNF37A	5	0.14	0.27	4744	-0.41	4.9E-04	2.2E-03	66	1	-0.41	Singleton

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
GRAMD3	3	1.00	1.00	17965	2.79	8.1E-04	2.4E-03	92	3	2.79	Tier3
COCH	5	0.37	0.51	8918	1.40	5.5E-04	2.5E-03	71	3	1.40	Tier3
PLAGL2	5	0.99	0.99	17829	2.39	5.4E-04	2.5E-03	70	4	2.39	Tier2
RCN1	3	1.00	1.00	17960	2.00	8.5E-04	2.5E-03	101	3	2.00	Tier3
RDX	16	0.20	0.47	5917	0.35	2.9E-04	2.4E-03	51	6	0.35	Tier3
GP5	5	0.83	0.83	14875	0.19	5.7E-04	2.6E-03	72	2	0.19	Tier2
AK6	3	0.92	0.92	16382	1.74	9.9E-04	2.9E-03	108	2	1.74	Tier3
CCL2	5	1.00	1.00	17901	1.78	6.1E-04	2.8E-03	76	5	1.78	Tier3
CLN3	4	1.00	1.00	17966	1.49	8.0E-04	2.9E-03	89	4	1.49	Unassigned
DCX	5	1.00	1.00	17970	1.81	6.3E-04	2.8E-03	78	5	1.81	Tier3
HSPB6	4	1.00	1.00	17967	1.48	7.9E-04	2.8E-03	88	4	1.48	Unassigned
PPIL4	5	0.96	0.96	17044	2.28	6.2E-04	2.8E-03	77	3	2.28	Tier2
PRH2	5	0.97	0.97	17287	2.03	5.8E-04	2.6E-03	74	4	2.03	Tier2
TBC1D7	4	0.26	0.38	6947	2.35	8.0E-04	2.9E-03	90	3	2.35	Tier1
XAB2	5	0.15	0.28	4995	1.70	6.1E-04	2.7E-03	75	4	1.70	Tier2
MAPK12	4	1.00	1.00	17963	1.50	8.4E-04	3.0E-03	96	4	1.50	Unassigned
RPSA	2	1.00	1.00	17942	2.62	1.5E-03	3.0E-03	158	2	2.62	Tier1
SUN2	5	0.81	0.81	14439	2.35	6.6E-04	3.0E-03	79	4	2.35	Tier2
WFDC1	5	0.67	0.69	12143	0.17	6.7E-04	3.0E-03	80	2	0.17	Tier2
AMBRA1	5	0.99	0.99	17813	1.68	8.6E-04	3.8E-03	103	4	1.68	Tier3
AVPR1A	5	1.00	1.00	17964	1.48	8.4E-04	3.8E-03	95	5	1.48	Tier2
C11orf65	4	0.80	0.80	14204	2.13	1.0E-03	3.7E-03	115	3	2.13	Tier1
C19orf40	4	0.42	0.49	9613	1.78	1.0E-03	3.7E-03	114	2	1.78	Tier2
CNOT6	5	0.75	0.76	13405	1.80	7.4E-04	3.3E-03	83	3	1.80	Tier3
COPS8	5	1.00	1.00	17902	1.68	8.4E-04	3.8E-03	97	5	1.68	Tier3
CYFIP1	5	0.83	0.83	14807	1.35	8.6E-04	3.8E-03	104	3	1.35	Tier2
DCBLD1	5	0.90	0.90	16006	1.26	7.2E-04	3.2E-03	82	3	1.26	Singleton
DNAH6	5	1.00	1.00	17961	1.47	8.5E-04	3.8E-03	100	5	1.47	Unassigned
ELMOD2	4	1.00	1.00	17956	1.78	1.1E-03	3.8E-03	120	4	1.78	Tier3
GABRR1	5	0.38	0.52	8942	2.24	8.0E-04	3.6E-03	91	4	2.24	Tier2
LMTK2	5	1.00	1.00	17962	1.46	8.5E-04	3.8E-03	99	5	1.46	Unassigned
NDNL2	5	0.41	0.55	9572	-0.05	8.3E-04	3.7E-03	94	2	-0.05	Tier2
PHKG1	5	0.78	0.78	13931	1.64	8.2E-04	3.7E-03	93	4	1.64	Tier3
TNFRSF14	5	1.00	1.00	17913	2.24	7.6E-04	3.4E-03	84	5	2.24	Tier2
UBQLN4	5	1.00	1.00	17897	1.63	8.5E-04	3.8E-03	98	5	1.63	Tier2
ZNF330	5	0.94	0.94	16798	2.06	8.6E-04	3.8E-03	102	4	2.06	Tier2
ZNF407	5	0.05	0.12	2147	0.49	7.8E-04	3.5E-03	87	2	0.49	Singleton
ZNF572	4	0.91	0.91	16178	1.86	9.3E-04	3.3E-03	105	2	1.86	Tier2
EFR3A	4	1.00	1.00	17954	1.37	1.1E-03	4.0E-03	124	4	1.37	Singleton

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
ZNF596	3	0.19	0.29	5745	0.57	1.4E-03	4.1E-03	148	1	0.57	Singleton
BCLAF1	3	1.00	1.00	17944	1.64	1.5E-03	4.2E-03	154	3	1.64	Singleton
MMD	5	0.98	0.98	17552	1.87	9.4E-04	4.2E-03	106	4	1.87	Tier3
NLGN4X	5	0.71	0.72	12747	0.78	9.5E-04	4.2E-03	107	3	0.78	Singleton
BRDT	5	0.47	0.58	10052	2.00	1.0E-03	4.6E-03	113	4	2.00	Tier2
CARS	5	1.00	1.00	17957	1.18	1.1E-03	4.7E-03	119	5	1.18	Tier2
CCDC136	5	0.83	0.83	14741	0.75	1.0E-03	4.5E-03	112	3	0.75	Singleton
CNGA1	4	1.00	1.00	17949	1.77	1.3E-03	4.6E-03	137	4	1.77	Tier3
CNOT3	5	0.99	0.99	17835	1.71	1.1E-03	4.7E-03	118	4	1.71	Tier2
CNST	5	0.96	0.96	17161	0.88	9.9E-04	4.4E-03	109	3	0.88	Tier2
FAM122A	5	1.00	1.00	17959	1.73	1.0E-03	4.6E-03	116	5	1.73	Tier3
GNPNAT1	2	0.96	0.96	17174	2.81	2.2E-03	4.4E-03	217	2	2.81	Singleton
MOXD1	5	0.88	0.88	15601	1.46	1.0E-03	4.4E-03	110	4	1.46	Tier2
NEURL1	5	1.00	1.00	17904	1.54	1.0E-03	4.5E-03	111	5	1.54	Tier3
PITRM1	4	0.98	0.98	17623	2.27	1.3E-03	4.5E-03	134	3	2.27	Tier3
SMC2	5	1.00	1.00	17958	1.72	1.0E-03	4.7E-03	117	5	1.72	Tier2
EXOSC10	5	0.84	0.84	14891	2.14	1.1E-03	4.8E-03	122	4	2.14	Tier2
SCN4B	10	0.13	0.31	4498	0.32	7.7E-04	4.9E-03	86	4	0.32	Tier2
SRPK1	5	0.92	0.92	16300	2.19	1.1E-03	4.9E-03	123	3	2.19	Tier2
TSTD2	5	0.59	0.64	11243	-0.13	1.1E-03	5.0E-03	125	2	-0.13	Tier2
AIFM1	5	1.00	1.00	17952	1.26	1.2E-03	5.4E-03	129	5	1.26	Singleton
ARHGEF38	5	0.99	0.99	17710	1.45	1.2E-03	5.3E-03	126	4	1.45	Tier3
DHODH	5	0.16	0.30	5209	0.55	1.2E-03	5.5E-03	130	2	0.55	Tier2
DNAJC16	4	0.81	0.81	14508	0.37	1.6E-03	5.7E-03	165	1	0.37	Singleton
KLF11	5	1.00	1.00	17951	1.14	1.3E-03	5.6E-03	132	5	1.14	Unassigned
MTIF2	4	0.38	0.47	9054	1.95	1.6E-03	5.6E-03	161	3	1.95	Tier3
PDE4D	4	0.05	0.11	2102	1.14	1.6E-03	5.6E-03	160	2	1.14	Tier2
PICALM	4	1.00	1.00	17941	1.33	1.6E-03	5.6E-03	162	4	1.33	Singleton
PPAN	5	1.00	1.00	17953	1.17	1.2E-03	5.3E-03	127	5	1.17	Tier3
STAG2	5	0.83	0.84	14877	2.23	1.2E-03	5.3E-03	128	3	2.23	Tier2
TARDBP	3	0.89	0.89	15773	2.68	2.0E-03	5.7E-03	202	2	2.68	Tier2
TMC4	5	1.00	1.00	17896	1.91	1.3E-03	5.6E-03	131	5	1.91	Tier3
TMEM168	3	0.14	0.22	4626	2.10	2.0E-03	5.6E-03	199	2	2.10	Tier2
ZNF589	5	0.94	0.94	16778	1.67	1.3E-03	5.6E-03	133	4	1.67	Tier3
AQP3	5	0.81	0.81	14489	0.44	1.3E-03	5.8E-03	135	2	0.44	Singleton
RPS4X	3	0.99	0.99	17790	1.26	2.0E-03	5.8E-03	205	3	1.26	Singleton
TMED8	5	1.00	1.00	17950	1.01	1.3E-03	5.8E-03	136	5	1.01	Tier3
CLC	5	0.13	0.26	4483	0.97	1.4E-03	6.0E-03	142	3	0.97	Tier2
DRAP1	5	1.00	1.00	17948	1.60	1.3E-03	6.0E-03	140	5	1.60	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
KANSL2	5	0.15	0.28	4950	0.53	1.4E-03	6.0E-03	143	2	0.53	Singleton
NANOGNB	4	0.90	0.90	15957	0.88	1.6E-03	5.8E-03	170	2	0.88	Singleton
SLC25A21	5	1.00	1.00	17947	1.05	1.3E-03	6.0E-03	141	5	1.05	Tier3
TRAPP8	5	0.89	0.89	15794	2.21	1.3E-03	5.9E-03	138	3	2.21	Tier2
PIK3C2G	5	0.16	0.29	5132	0.72	1.4E-03	6.1E-03	144	3	0.72	Tier2
PGBD1	4	0.26	0.38	6916	0.07	1.7E-03	6.2E-03	178	2	0.07	Singleton
ATCAY	5	1.00	1.00	17946	1.12	1.4E-03	6.2E-03	146	5	1.12	Unassigned
MYRF	5	0.72	0.73	12818	1.65	1.5E-03	6.5E-03	153	4	1.65	Tier3
SMARCC1	5	1.00	1.00	17945	1.19	1.5E-03	6.5E-03	152	5	1.19	Unassigned
SNRPD3	5	0.99	0.99	17782	1.79	1.5E-03	6.4E-03	150	3	1.79	Tier3
TMEM246	5	0.81	0.81	14332	1.52	1.5E-03	6.4E-03	151	4	1.52	Tier3
AARS2	5	1.00	1.00	17943	1.37	1.5E-03	6.7E-03	155	5	1.37	Tier3
DEFB123	3	0.37	0.41	8924	2.61	2.4E-03	6.8E-03	230	2	2.61	Tier2
EIF4E	3	1.00	1.00	17924	2.11	2.3E-03	6.6E-03	227	3	2.11	Tier2
GRB2	5	0.09	0.20	3588	0.75	1.5E-03	6.7E-03	157	4	0.75	Singleton
RIOK1	4	0.25	0.38	6858	0.55	1.9E-03	6.7E-03	191	2	0.55	Tier3
ZNF675	4	0.81	0.81	14326	1.92	1.9E-03	6.7E-03	193	3	1.92	Tier3
CLRN1	7	0.92	0.92	16378	1.76	1.3E-03	6.9E-03	139	6	1.76	Tier3
CXorf56	7	0.98	0.98	17615	0.59	1.4E-03	7.3E-03	147	3	0.59	Tier2
FASTKD2	5	1.00	1.00	17939	1.65	1.6E-03	7.2E-03	171	5	1.65	Tier3
MRPL32	5	0.96	0.96	17055	1.69	1.6E-03	7.2E-03	169	4	1.69	Tier2
MRPL51	5	0.77	0.77	13659	2.13	1.6E-03	7.0E-03	163	4	2.13	Tier2
MRPS10	5	0.11	0.23	4032	2.15	1.7E-03	7.3E-03	172	3	2.15	Tier2
NR2C1	4	1.00	1.00	17930	2.31	2.0E-03	7.0E-03	197	4	2.31	Tier3
RAB20	5	0.92	0.93	16466	1.32	1.7E-03	7.3E-03	174	3	1.32	Tier2
SF3B14	5	1.00	1.00	17937	1.49	1.7E-03	7.3E-03	175	5	1.49	Tier2
TMEM11	5	0.73	0.74	13000	1.48	1.6E-03	7.0E-03	164	4	1.48	Tier2
U2AF1L4	5	0.95	0.95	17016	0.48	1.6E-03	7.1E-03	168	2	0.48	Tier2
ZNF345	3	0.32	0.37	8084	0.12	2.5E-03	7.1E-03	236	1	0.12	Singleton
ZNF552	4	0.41	0.49	9543	1.25	2.0E-03	7.3E-03	207	2	1.25	Tier2
ABHD13	4	0.01	0.02	584	-0.22	2.2E-03	7.8E-03	215	2	-0.22	Tier2
C1orf131	5	0.96	0.96	17096	2.10	1.9E-03	8.1E-03	188	3	2.10	Tier2
C5orf15	3	0.50	0.51	10327	-0.19	2.9E-03	8.1E-03	264	1	-0.19	Singleton
CCDC90B	7	0.94	0.94	16790	1.52	1.4E-03	7.4E-03	149	6	1.52	Tier3
CDC42EP4	5	0.68	0.70	12351	2.05	1.7E-03	7.5E-03	177	4	2.05	Tier2
CFHR4	6	0.72	0.75	12812	1.48	1.6E-03	8.0E-03	166	4	1.48	Tier3
COPS7A	5	1.00	1.00	17934	1.48	1.8E-03	7.9E-03	183	5	1.48	Unassigned
CREB5	5	1.00	1.00	17933	1.20	1.8E-03	7.9E-03	184	5	1.20	Singleton
DENND1A	5	0.17	0.31	5405	1.05	1.9E-03	8.1E-03	190	4	1.05	Tier2

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
DZIP3	5	0.06	0.14	2576	1.15	1.9E-03	8.1E-03	189	3	1.15	Tier2
ERCC8	5	1.00	1.00	17932	1.15	1.8E-03	8.0E-03	186	5	1.15	Unassigned
MYL3	5	1.00	1.00	17931	1.06	1.8E-03	8.1E-03	187	5	1.06	Singleton
NT5M	5	1.00	1.00	17935	1.04	1.8E-03	7.8E-03	182	5	1.04	Unassigned
PFN1	5	0.48	0.58	10122	1.99	1.8E-03	8.0E-03	185	3	1.99	Tier3
RAB4A	5	1.00	1.00	17936	0.98	1.7E-03	7.5E-03	176	5	0.98	Unassigned
RPUSD4	5	0.86	0.86	15260	2.04	1.8E-03	7.6E-03	179	3	2.04	Tier2
SKAP2	1	0.99	0.99	17796	3.55	7.9E-03	7.9E-03	583	1	3.55	Singleton
SLC7A5	5	0.49	0.59	10211	1.80	1.8E-03	7.7E-03	181	4	1.80	Tier3
VPS36	5	0.36	0.50	8693	1.42	1.8E-03	7.7E-03	180	4	1.42	Singleton
WDR70	4	0.54	0.57	10725	0.83	2.3E-03	8.1E-03	221	3	0.83	Singleton
MYB	5	0.27	0.41	7179	1.79	1.9E-03	8.2E-03	192	3	1.79	Tier3
CDH23	10	0.94	0.94	16725	1.13	1.4E-03	8.4E-03	145	8	1.13	Unassigned
TMEM64	5	0.90	0.90	15929	0.31	1.9E-03	8.4E-03	196	2	0.31	Singleton
BRCA2	5	0.99	0.99	17777	2.05	2.1E-03	9.0E-03	211	4	2.05	Tier2
C4BPB	4	0.81	0.81	14356	2.18	2.4E-03	8.5E-03	229	3	2.18	Tier2
CDC47	5	1.00	1.00	17928	1.20	2.0E-03	8.8E-03	203	5	1.20	Unassigned
GEMIN5	5	1.00	1.00	17919	1.80	2.1E-03	8.9E-03	209	5	1.80	Tier3
IFNGR2	5	0.77	0.77	13758	1.77	2.1E-03	8.9E-03	208	4	1.77	Tier2
KLHL41	5	0.14	0.27	4782	2.08	2.1E-03	9.0E-03	210	3	2.08	Tier2
RGPD2	1	0.99	0.99	17779	3.43	8.8E-03	8.8E-03	631	1	3.43	Singleton
TAF2	4	0.74	0.74	13115	1.88	2.4E-03	8.6E-03	231	3	1.88	Tier2
TFIP11	5	1.00	1.00	17915	2.07	2.0E-03	8.6E-03	201	5	2.07	Tier2
TMEM198	5	0.81	0.81	14324	2.04	2.0E-03	8.8E-03	204	3	2.04	Tier2
TUBD1	9	0.23	0.44	6387	0.28	1.5E-03	8.9E-03	156	4	0.28	Tier2
WDR89	5	0.68	0.70	12275	2.01	2.0E-03	8.9E-03	206	3	2.01	Tier2
YARS	4	0.50	0.55	10398	2.25	2.5E-03	8.7E-03	233	3	2.25	Tier3
ATP6AP2	4	0.94	0.94	16801	1.21	2.6E-03	9.1E-03	239	2	1.21	Tier3
RAB14	4	1.00	1.00	17878	1.72	2.6E-03	9.2E-03	243	4	1.72	Tier2
RBFOX1	5	1.00	1.00	17927	1.34	2.1E-03	9.3E-03	212	5	1.34	Tier3
ESAM	5	0.89	0.89	15901	1.57	2.2E-03	9.4E-03	213	4	1.57	Singleton
FBXW8	5	0.83	0.83	14709	2.04	2.2E-03	9.4E-03	214	3	2.04	Tier2
GTPBP4	4	0.71	0.71	12718	1.97	2.7E-03	9.5E-03	248	3	1.97	Tier2
PRAMEF11	1	0.99	0.99	17761	3.43	9.6E-03	9.5E-03	669	1	3.43	Singleton
HMGA2	4	0.18	0.29	5545	0.49	2.8E-03	9.7E-03	251	2	0.49	Singleton
RXRB	5	0.24	0.38	6620	-0.04	2.2E-03	9.7E-03	216	2	-0.04	Tier2
TRA2B	7	0.16	0.32	5083	1.03	1.9E-03	9.6E-03	195	4	1.03	Tier2
EXOSC6	5	0.57	0.63	10978	1.51	2.3E-03	9.8E-03	219	4	1.51	Unassigned
PSMB2	5	0.98	0.98	17579	2.08	2.2E-03	9.8E-03	218	4	2.08	Tier2

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
ECSIT	12	0.72	0.86	12942	0.92	1.5E-03	1.0E-02	159	9	0.92	Tier3
KAL1	4	1.00	1.00	17916	1.17	2.8E-03	9.9E-03	261	4	1.17	Unassigned
LATS1	5	0.27	0.40	7099	-0.38	2.3E-03	9.9E-03	220	1	-0.38	Singleton
NOP16	5	0.58	0.64	11108	2.04	2.3E-03	1.0E-02	223	4	2.04	Tier2
SNRNP25	5	0.63	0.67	11695	1.47	2.3E-03	1.0E-02	222	4	1.47	Tier2
DNASE1	5	0.69	0.71	12417	0.33	2.3E-03	1.0E-02	226	2	0.33	Tier2
GNB1L	5	1.00	1.00	17926	1.49	2.3E-03	1.0E-02	224	5	1.49	Unassigned
TMEM160	5	1.00	1.00	17925	1.20	2.3E-03	1.0E-02	225	5	1.20	Unassigned
HMHA1	5	0.99	0.99	17747	1.62	2.4E-03	1.0E-02	228	4	1.62	Tier2
AFAP1L1	4	0.69	0.69	12387	1.79	3.0E-03	1.0E-02	269	3	1.79	Tier3
ARL2BP	4	1.00	1.00	17911	1.63	3.0E-03	1.1E-02	270	4	1.63	Tier2
EXOC6	5	1.00	1.00	17923	1.10	2.4E-03	1.1E-02	232	5	1.10	Unassigned
INTS6	8	0.00	0.00	27	-1.75	1.9E-03	1.1E-02	194	3	-1.75	Tier3
EIF3F	4	1.00	1.00	17909	1.55	3.1E-03	1.1E-02	274	4	1.55	Tier3
GPI	5	0.97	0.98	17426	1.96	2.5E-03	1.1E-02	234	3	1.96	Tier3
CCDC84	4	0.11	0.21	4089	-0.88	3.1E-03	1.1E-02	275	1	-0.88	Singleton
TAZ	5	0.31	0.45	7898	1.35	2.5E-03	1.1E-02	235	3	1.35	Tier2
VPS33A	5	1.00	1.00	17921	1.72	2.5E-03	1.1E-02	237	5	1.72	Tier3
ALDH1L1	5	0.92	0.92	16359	0.67	2.6E-03	1.1E-02	240	2	0.67	Singleton
MED30	5	0.28	0.41	7235	1.44	2.6E-03	1.1E-02	241	4	1.44	Tier3
STX4	4	0.08	0.16	3126	0.58	3.1E-03	1.1E-02	281	2	0.58	Tier2
ACOT9	3	0.98	0.98	17624	2.39	4.3E-03	1.2E-02	353	3	2.39	Tier2
C5orf51	4	0.13	0.23	4568	0.57	3.4E-03	1.2E-02	300	2	0.57	Singleton
CDX4	5	0.99	0.99	17853	1.99	2.7E-03	1.2E-02	247	4	1.99	Tier3
CNIH3	5	0.60	0.65	11274	0.10	2.6E-03	1.1E-02	244	2	0.10	Singleton
COPG1	5	0.99	0.99	17792	1.74	2.8E-03	1.2E-02	257	4	1.74	Tier3
CXCR3	5	0.77	0.77	13630	1.96	2.8E-03	1.2E-02	252	4	1.96	Tier3
DROSHA	5	0.98	0.98	17459	1.60	2.6E-03	1.1E-02	242	4	1.60	Tier3
GNB5	5	0.98	0.98	17441	1.52	2.8E-03	1.2E-02	260	4	1.52	Tier2
METTL23	6	0.03	0.10	1725	-0.76	2.5E-03	1.2E-02	238	1	-0.76	Singleton
MORC1	5	1.00	1.00	17917	1.40	2.8E-03	1.2E-02	259	5	1.40	Tier2
NPHP3	4	0.92	0.92	16402	1.31	3.2E-03	1.1E-02	290	3	1.31	Singleton
NUDCD3	5	1.00	1.00	17918	1.42	2.8E-03	1.2E-02	258	5	1.42	Tier2
PDCD4	5	0.48	0.58	10144	-0.13	2.7E-03	1.2E-02	246	2	-0.13	Tier2
RHOD	5	1.00	1.00	17920	1.34	2.7E-03	1.2E-02	245	5	1.34	Singleton
SET	2	0.99	0.99	17839	1.99	6.2E-03	1.2E-02	473	2	1.99	Tier3
SNX18	5	0.96	0.96	17158	0.86	2.8E-03	1.2E-02	256	3	0.86	Singleton
SURF2	5	0.61	0.65	11408	0.63	2.7E-03	1.2E-02	250	2	0.63	Tier2
UBOX5	5	0.91	0.92	16292	1.42	2.8E-03	1.2E-02	255	4	1.42	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
VAV2	5	0.97	0.97	17329	1.62	2.8E-03	1.2E-02	253	4	1.62	Tier3
VPS18	5	0.88	0.88	15600	1.82	2.7E-03	1.2E-02	249	4	1.82	Tier3
CLEC2D	11	0.05	0.15	2080	0.69	2.0E-03	1.2E-02	198	5	0.69	Tier2
ARHGAP39	5	1.00	1.00	17912	1.21	2.9E-03	1.3E-02	268	5	1.21	Unassigned
CDKL3	5	0.85	0.85	15213	0.58	2.9E-03	1.2E-02	263	2	0.58	Tier2
DBI	6	0.93	0.93	16622	1.52	2.8E-03	1.3E-02	254	5	1.52	Tier2
LACRT	5	1.00	1.00	17914	1.17	2.9E-03	1.3E-02	267	5	1.17	Unassigned
PDSS2	4	0.56	0.59	10895	1.48	3.6E-03	1.3E-02	307	2	1.48	Tier2
PRKCE	5	0.94	0.94	16770	1.69	2.9E-03	1.3E-02	266	3	1.69	Tier3
SEC61B	5	0.59	0.64	11231	1.94	2.9E-03	1.2E-02	262	4	1.94	Tier3
WDR25	5	0.89	0.89	15789	1.54	2.9E-03	1.2E-02	265	4	1.54	Tier2
C16orf13	5	1.00	1.00	17906	1.14	3.2E-03	1.4E-02	289	5	1.14	Unassigned
CALY	5	0.92	0.92	16462	1.39	3.2E-03	1.4E-02	286	4	1.39	Unassigned
CDADC1	4	0.43	0.50	9728	1.72	3.8E-03	1.3E-02	317	2	1.72	Tier2
CTC1	5	1.00	1.00	17910	1.24	3.1E-03	1.3E-02	273	5	1.24	Unassigned
DNASE1L3	5	0.37	0.51	8884	1.90	3.2E-03	1.4E-02	288	3	1.90	Tier3
ETV1	5	1.00	1.00	17908	1.26	3.1E-03	1.3E-02	279	5	1.26	Singleton
FAM213B	5	1.00	1.00	17907	1.05	3.2E-03	1.4E-02	285	5	1.05	Unassigned
HIGD1C	5	0.09	0.20	3508	-0.74	3.1E-03	1.3E-02	282	2	-0.74	Singleton
HIST1H2BG	5	0.78	0.78	13838	1.97	3.2E-03	1.4E-02	291	3	1.97	Tier3
KPNA3	4	1.00	1.00	17894	1.38	3.9E-03	1.4E-02	322	4	1.38	Tier3
MAGEA8	5	0.28	0.41	7252	0.77	3.2E-03	1.4E-02	283	3	0.77	Tier2
MAPK8IP3	5	0.46	0.58	9976	1.82	3.1E-03	1.3E-02	280	4	1.82	Tier3
MBD3L3	1	0.99	0.99	17659	3.13	1.4E-02	1.4E-02	894	1	3.13	Singleton
PPIPSK2	5	0.54	0.62	10713	0.09	3.3E-03	1.4E-02	293	2	0.09	Tier2
PSMA7	5	0.96	0.96	17182	1.41	3.2E-03	1.4E-02	292	4	1.41	Singleton
RAB33B	5	0.72	0.73	12894	0.52	3.3E-03	1.4E-02	295	2	0.52	Tier2
RABGGTB	5	0.20	0.34	5939	2.00	3.0E-03	1.3E-02	272	4	2.00	Tier3
SENP1	4	1.00	1.00	17895	1.48	3.9E-03	1.3E-02	320	4	1.48	Unassigned
SHFM1	2	0.95	0.95	16889	2.65	6.8E-03	1.3E-02	510	2	2.65	Singleton
SPIC	4	0.28	0.41	7357	1.84	4.0E-03	1.4E-02	331	3	1.84	Tier3
SPICE1	5	0.15	0.28	4916	0.37	3.0E-03	1.3E-02	271	2	0.37	Singleton
STOML2	5	1.00	1.00	17905	1.35	3.3E-03	1.4E-02	294	5	1.35	Tier3
TARS	4	0.95	0.95	16906	1.63	3.7E-03	1.3E-02	314	2	1.63	Tier2
TM4SF20	5	0.99	0.99	17687	1.35	3.1E-03	1.3E-02	276	4	1.35	Singleton
TMEM121	5	0.88	0.88	15604	1.36	3.1E-03	1.3E-02	278	4	1.36	Tier3
TMEM82	4	0.48	0.53	10169	1.83	4.0E-03	1.4E-02	329	3	1.83	Tier2
RPS16	4	1.00	1.00	17890	1.26	4.0E-03	1.4E-02	333	4	1.26	Unassigned
RALBP1	4	0.07	0.15	2795	1.81	4.0E-03	1.4E-02	334	3	1.81	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
CENPU	4	0.03	0.07	1456	0.26	4.0E-03	1.4E-02	336	2	0.26	Tier2
COX411	5	1.00	1.00	17898	1.53	3.4E-03	1.4E-02	296	5	1.53	Singleton
CRIPAK	3	0.99	0.99	17864	1.36	5.2E-03	1.4E-02	412	3	1.36	Unassigned
NNMT	5	0.76	0.76	13507	-0.10	3.4E-03	1.4E-02	298	2	-0.10	Tier2
AUTS2	5	1.00	1.00	17900	0.81	3.5E-03	1.5E-02	304	5	0.81	Unassigned
C10orf11	4	1.00	1.00	17884	1.42	4.2E-03	1.5E-02	349	4	1.42	Tier3
C14orf166	4	1.00	1.00	17883	1.59	4.3E-03	1.5E-02	350	4	1.59	Tier2
CCDC178	5	0.21	0.35	6107	1.99	3.5E-03	1.5E-02	302	3	1.99	Tier3
CCDC62	4	0.32	0.44	8064	0.77	4.3E-03	1.5E-02	351	2	0.77	Singleton
DYNC1LI2	4	0.52	0.55	10488	1.30	4.3E-03	1.5E-02	358	2	1.30	Tier2
GEMIN7	5	0.88	0.88	15683	0.68	3.5E-03	1.5E-02	303	2	0.68	Tier2
GPR75	5	0.10	0.22	3835	1.46	3.6E-03	1.5E-02	306	4	1.46	Tier3
MCSR	4	1.00	1.00	17886	1.31	4.2E-03	1.5E-02	345	4	1.31	Unassigned
MRPS24	5	0.94	0.94	16789	1.71	3.5E-03	1.5E-02	301	4	1.71	Tier2
PPCS	7	0.88	0.88	15589	0.99	3.1E-03	1.5E-02	277	5	0.99	Tier2
SDSL	5	0.79	0.79	13990	0.92	3.6E-03	1.5E-02	305	4	0.92	Tier2
SPRED1	5	1.00	1.00	17903	1.33	3.4E-03	1.5E-02	299	5	1.33	Unassigned
THOC2	4	0.92	0.92	16438	1.50	4.2E-03	1.5E-02	346	3	1.50	Tier3
ZNF83	3	0.99	0.99	17750	2.26	5.4E-03	1.5E-02	423	3	2.26	Tier2
TMPO	4	1.00	1.00	17880	1.18	4.4E-03	1.5E-02	362	4	1.18	Unassigned
HTR7	5	1.00	1.00	17899	1.17	3.6E-03	1.5E-02	309	5	1.17	Unassigned
PLEKHM1	5	0.52	0.60	10509	0.46	3.6E-03	1.5E-02	310	2	0.46	Tier2
NOL9	4	0.98	0.98	17618	1.67	4.5E-03	1.5E-02	366	3	1.67	Tier2
CRYGC	5	0.99	0.99	17837	1.03	3.7E-03	1.6E-02	313	3	1.03	Tier2
FZD10	4	0.27	0.40	7183	1.74	4.5E-03	1.6E-02	372	3	1.74	Tier3
GABARAPL2	5	0.87	0.87	15479	1.98	3.7E-03	1.6E-02	311	4	1.98	Tier3
GTF2H4	4	0.96	0.96	17230	2.07	4.5E-03	1.6E-02	368	3	2.07	Tier2
PSMB3	5	0.23	0.37	6505	1.23	3.7E-03	1.6E-02	312	3	1.23	Tier2
ZNF207	5	0.99	0.99	17669	1.33	3.7E-03	1.6E-02	315	4	1.33	Singleton
ZNF813	4	0.98	0.98	17617	1.48	4.6E-03	1.6E-02	373	3	1.48	Singleton
ABCC9	5	1.00	1.00	17892	1.33	3.9E-03	1.7E-02	325	5	1.33	Tier3
CACNA1S	5	1.00	1.00	17881	1.40	4.0E-03	1.7E-02	332	4	1.40	Tier3
CDK16	5	0.06	0.14	2594	1.93	3.9E-03	1.6E-02	321	3	1.93	Tier3
CENPE	4	0.06	0.15	2693	1.73	4.7E-03	1.6E-02	381	3	1.73	Tier3
CFHR3	4	0.99	0.99	17821	2.01	4.8E-03	1.7E-02	386	4	2.01	Tier2
CLINT1	5	0.12	0.25	4300	-0.13	3.8E-03	1.6E-02	318	2	-0.13	Singleton
DCLRE1B	5	0.85	0.85	15061	1.39	3.9E-03	1.7E-02	326	4	1.39	Tier2
HOOK2	4	1.00	1.00	17873	1.01	4.8E-03	1.7E-02	388	4	1.01	Unassigned
HYOU1	5	1.00	1.00	17891	1.40	4.0E-03	1.7E-02	327	5	1.40	Unassigned

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
KRTAP19-6	3	0.99	0.99	17843	1.88	6.0E-03	1.7E-02	457	3	1.88	Tier3
MOCS2	8	0.33	0.54	8241	0.51	3.2E-03	1.6E-02	287	3	0.51	Tier2
NF1	4	0.99	0.99	17741	1.98	4.6E-03	1.6E-02	379	4	1.98	Tier2
NUP43	4	0.96	0.96	17108	1.78	4.8E-03	1.7E-02	389	3	1.78	Tier3
RAD23B	5	1.00	1.00	17893	1.00	3.9E-03	1.6E-02	324	5	1.00	Singleton
RBM34	5	0.79	0.79	14110	1.60	4.0E-03	1.7E-02	328	3	1.60	Tier3
SEC14L1	5	0.00	0.01	196	-2.53	3.9E-03	1.6E-02	323	1	-2.53	Singleton
SF3B5	5	0.98	0.99	17635	1.70	3.8E-03	1.6E-02	319	4	1.70	Tier3
TADA2B	3	0.81	0.81	14410	0.54	6.0E-03	1.6E-02	454	1	0.54	Singleton
TPI1	9	0.98	0.98	17437	1.07	3.2E-03	1.7E-02	284	5	1.07	Tier2
VPS45	3	0.98	0.98	17589	2.23	6.1E-03	1.7E-02	462	3	2.23	Tier2
AKR1C1	4	0.96	0.96	17143	1.47	5.5E-03	1.9E-02	428	2	1.47	Tier2
ARPP19	5	0.68	0.70	12355	1.28	4.6E-03	1.9E-02	378	4	1.28	Tier2
C5orf22	5	0.19	0.32	5656	0.58	4.4E-03	1.8E-02	363	2	0.58	Singleton
C9orf43	5	0.83	0.83	14716	1.69	4.6E-03	1.9E-02	377	4	1.69	Tier3
C9orf64	5	0.97	0.97	17326	0.57	4.4E-03	1.8E-02	360	1	0.57	Singleton
CCDC110	3	0.57	0.57	10980	1.58	6.4E-03	1.7E-02	483	2	1.58	Singleton
CCNI	5	0.00	0.01	174	1.41	4.2E-03	1.7E-02	342	4	1.41	Unassigned
CHMP4C	4	0.12	0.21	4296	-0.27	5.4E-03	1.9E-02	418	2	-0.27	Singleton
CPNE4	4	0.47	0.52	10016	1.67	5.5E-03	1.9E-02	429	3	1.67	Tier3
CPSF7	5	0.82	0.82	14534	1.65	4.7E-03	1.9E-02	382	3	1.65	Tier3
DNMT3A	10	0.13	0.31	4494	1.27	3.4E-03	1.9E-02	297	6	1.27	Tier3
ENTPD8	5	0.26	0.40	7043	1.36	4.3E-03	1.8E-02	359	4	1.36	Unassigned
ERCC1	5	0.89	0.89	15786	1.15	4.2E-03	1.8E-02	348	4	1.15	Singleton
FKBPL	5	0.85	0.85	15066	1.14	4.6E-03	1.9E-02	375	4	1.14	Tier2
GPR65	5	0.72	0.73	12932	1.84	4.3E-03	1.8E-02	357	3	1.84	Tier3
IBA57	5	0.90	0.90	15972	1.86	4.4E-03	1.8E-02	364	4	1.86	Tier3
ITGAM	5	0.24	0.37	6563	0.21	4.6E-03	1.9E-02	374	2	0.21	Tier2
KIF16B	5	1.00	1.00	17889	1.23	4.0E-03	1.7E-02	335	5	1.23	Singleton
NAA25	4	0.99	0.99	17691	1.62	5.1E-03	1.8E-02	409	4	1.62	Singleton
NDUFA1	4	0.23	0.35	6517	0.92	5.0E-03	1.7E-02	396	2	0.92	Tier2
PAGE4	4	0.38	0.47	8947	0.40	5.5E-03	1.9E-02	430	2	0.40	Singleton
PARD6B	3	0.21	0.30	6030	1.24	6.8E-03	1.9E-02	512	2	1.24	Singleton
PEX11A	5	0.38	0.52	8987	1.91	4.3E-03	1.8E-02	354	3	1.91	Tier3
PGK2	5	0.02	0.06	1108	-0.67	4.1E-03	1.7E-02	340	1	-0.67	Singleton
PIGC	4	0.27	0.39	7105	0.94	5.4E-03	1.9E-02	425	2	0.94	Tier2
PIM1	5	0.99	0.99	17767	1.85	4.6E-03	1.9E-02	380	4	1.85	Tier3
PLG	8	0.66	0.78	12012	1.31	3.7E-03	1.9E-02	316	5	1.31	Tier3
POLE2	3	0.99	0.99	17831	1.98	6.4E-03	1.8E-02	489	3	1.98	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
POLR3A	5	0.87	0.87	15501	1.87	4.5E-03	1.9E-02	371	4	1.87	Tier3
PRKRIP1	5	1.00	1.00	17885	1.42	4.2E-03	1.8E-02	347	5	1.42	Tier3
PSMA2	5	0.11	0.23	3992	0.01	4.5E-03	1.9E-02	367	2	0.01	Singleton
PUS3	4	0.99	0.99	17868	1.46	5.1E-03	1.8E-02	404	4	1.46	Unassigned
RAB2B	5	0.45	0.57	9898	1.32	4.1E-03	1.7E-02	341	4	1.32	Tier2
RASSF3	5	0.08	0.18	3206	-0.20	4.4E-03	1.8E-02	365	2	-0.20	Tier2
RBM17	4	0.81	0.81	14449	1.56	5.6E-03	1.9E-02	433	3	1.56	Tier2
RD3	5	0.91	0.91	16264	1.35	4.4E-03	1.8E-02	361	4	1.35	Tier2
RHOG	5	0.19	0.32	5701	0.95	4.5E-03	1.9E-02	369	3	0.95	Tier3
RIOK2	4	0.90	0.90	15944	2.00	5.6E-03	1.9E-02	437	3	2.00	Tier2
ROBO2	5	1.00	1.00	17887	1.22	4.1E-03	1.7E-02	339	5	1.22	Singleton
SLC41A1	5	0.22	0.36	6314	1.30	4.3E-03	1.8E-02	355	4	1.30	Unassigned
SPCS2	4	0.38	0.47	9006	1.26	5.2E-03	1.8E-02	411	2	1.26	Tier2
SPRTN	5	0.90	0.90	15964	1.89	4.1E-03	1.7E-02	338	4	1.89	Tier3
TBCD	5	0.96	0.96	17224	1.83	4.5E-03	1.9E-02	370	3	1.83	Tier3
TCTN3	4	0.97	0.97	17294	1.60	5.1E-03	1.8E-02	408	3	1.60	Tier2
TGM1	4	1.00	1.00	17871	1.50	4.9E-03	1.7E-02	393	4	1.50	Singleton
THAP11	5	0.92	0.92	16338	1.53	4.6E-03	1.9E-02	376	4	1.53	Unassigned
TM6SF1	5	0.68	0.70	12341	-0.04	4.1E-03	1.7E-02	337	2	-0.04	Singleton
TMPRSS15	4	0.12	0.22	4307	1.92	5.3E-03	1.8E-02	416	3	1.92	Tier2
UBFD1	5	0.83	0.84	14878	0.93	4.2E-03	1.8E-02	344	3	0.93	Tier2
USP9Y	4	0.99	0.99	17859	1.07	5.5E-03	1.9E-02	426	4	1.07	Unassigned
ARID2	5	0.28	0.41	7228	1.47	4.7E-03	1.9E-02	384	3	1.47	Tier2
DEPDC5	5	0.99	0.99	17783	1.34	4.7E-03	1.9E-02	383	4	1.34	Tier2
PACRGL	7	0.07	0.19	2962	-0.58	4.2E-03	1.9E-02	343	1	-0.58	Singleton
SMURF2	4	0.99	0.99	17851	1.16	5.7E-03	1.9E-02	442	4	1.16	Singleton
CHRM3	5	0.84	0.84	15013	0.49	4.8E-03	1.9E-02	385	2	0.49	Singleton
NCAPD3	5	0.13	0.26	4563	1.83	4.8E-03	2.0E-02	387	3	1.83	Tier3
SLK	5	0.97	0.97	17311	1.32	4.8E-03	2.0E-02	390	4	1.32	Unassigned
TEN1	5	0.99	0.99	17744	1.82	4.9E-03	2.0E-02	391	4	1.82	Tier3
MMP16	5	0.00	0.01	261	-1.42	4.9E-03	2.0E-02	392	1	-1.42	Singleton
C10orf12	4	0.93	0.93	16579	1.72	6.0E-03	2.0E-02	452	3	1.72	Tier3
CDKAL1	5	0.71	0.72	12759	0.79	4.9E-03	2.0E-02	394	3	0.79	Singleton
GLB1L3	5	0.37	0.51	8805	0.66	5.0E-03	2.0E-02	399	2	0.66	Singleton
GZMB	5	0.14	0.27	4771	1.82	5.1E-03	2.0E-02	402	3	1.82	Tier3
IQCH	9	0.27	0.49	7191	0.87	4.0E-03	2.1E-02	330	7	0.87	Tier3
LRRC49	5	0.24	0.38	6661	1.40	5.1E-03	2.1E-02	405	4	1.40	Singleton
MBL2	5	0.02	0.06	1156	-0.91	5.1E-03	2.0E-02	401	1	-0.91	Unassigned
MCM6	5	0.98	0.98	17614	1.67	4.9E-03	2.0E-02	395	4	1.67	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
PSMD2	5	0.08	0.18	3282	1.42	5.0E-03	2.0E-02	398	4	1.42	Unassigned
PTPN6	5	0.35	0.49	8590	1.34	5.1E-03	2.0E-02	403	4	1.34	Tier3
PUSL1	5	0.22	0.35	6227	0.25	5.1E-03	2.1E-02	407	2	0.25	Singleton
RBM6	5	0.01	0.02	399	1.17	5.0E-03	2.0E-02	397	3	1.17	Unassigned
RPS6KA6	3	0.74	0.74	13111	2.22	7.5E-03	2.0E-02	552	2	2.22	Tier2
ABL1	5	0.64	0.68	11823	0.29	6.1E-03	2.4E-02	464	2	0.29	Singleton
AICDA	5	0.77	0.77	13669	0.62	7.1E-03	2.7E-02	527	2	0.62	Tier2
ALDH1A2	5	0.98	0.98	17522	0.71	7.2E-03	2.7E-02	531	3	0.71	Tier2
ANAPC11	9	0.40	0.62	9407	0.92	4.3E-03	2.2E-02	352	5	0.92	Tier2
ATP6AP1	5	0.89	0.89	15874	1.50	6.3E-03	2.4E-02	481	3	1.50	Singleton
BOLA3	6	0.05	0.14	2295	0.01	5.6E-03	2.3E-02	435	2	0.01	Singleton
C11orf52	4	0.72	0.72	12817	0.06	7.7E-03	2.6E-02	570	1	0.06	Singleton
C12orf5	5	0.67	0.69	12161	1.76	5.8E-03	2.3E-02	448	3	1.76	Tier3
C16orf59	5	0.27	0.40	7107	0.31	5.2E-03	2.1E-02	414	2	0.31	Singleton
C1QTNF6	5	0.99	0.99	17771	1.32	6.2E-03	2.4E-02	469	4	1.32	Unassigned
C4orf26	4	0.61	0.62	11447	1.66	6.5E-03	2.2E-02	491	3	1.66	Singleton
C5orf63	5	0.29	0.43	7580	0.18	5.6E-03	2.2E-02	440	2	0.18	Singleton
C6orf163	4	0.55	0.58	10797	0.96	7.2E-03	2.5E-02	535	2	0.96	Tier3
C6orf201	5	0.13	0.26	4519	0.30	5.7E-03	2.3E-02	445	2	0.30	Tier2
C6orf62	5	0.01	0.04	769	-1.48	7.2E-03	2.7E-02	530	2	-1.48	Tier2
CAPG	5	0.99	0.99	17763	1.52	5.6E-03	2.2E-02	439	4	1.52	Singleton
CBFA2T2	5	0.99	0.99	17705	1.68	6.0E-03	2.3E-02	458	4	1.68	Tier3
CCT8	5	0.99	0.99	17671	0.52	6.9E-03	2.6E-02	514	2	0.52	Tier2
CD164	5	0.89	0.89	15747	1.40	5.4E-03	2.1E-02	421	4	1.40	Unassigned
CDH15	4	0.99	0.99	17826	1.52	6.6E-03	2.2E-02	497	4	1.52	Singleton
CDS2	5	0.17	0.30	5356	0.00	6.5E-03	2.5E-02	492	2	0.00	Tier2
CEACAM19	5	0.99	0.99	17820	1.34	6.9E-03	2.6E-02	516	4	1.34	Tier3
CIRH1A	5	0.04	0.11	2044	1.45	5.8E-03	2.3E-02	446	4	1.45	Tier2
COG2	4	0.20	0.32	5946	1.94	7.1E-03	2.4E-02	528	3	1.94	Tier2
CYP4A11	3	0.91	0.91	16285	2.14	9.5E-03	2.5E-02	662	2	2.14	Tier2
DCDC1	4	0.99	0.99	17824	1.37	6.7E-03	2.3E-02	501	4	1.37	Unassigned
DCLRE1C	5	0.08	0.18	3185	0.04	6.8E-03	2.6E-02	509	2	0.04	Tier2
DDX23	5	0.31	0.44	7778	1.80	6.7E-03	2.5E-02	503	3	1.80	Tier3
DHRS12	5	0.99	0.99	17686	1.39	6.4E-03	2.4E-02	487	4	1.39	Tier2
DPH6	6	0.58	0.68	11113	1.60	6.0E-03	2.5E-02	455	4	1.60	Tier3
DYNC1H1	5	0.66	0.68	11997	1.13	6.8E-03	2.6E-02	506	3	1.13	Tier2
ECHDC1	13	0.15	0.38	5017	1.30	3.6E-03	2.2E-02	308	8	1.30	Tier2
EEF1E1	4	0.99	0.99	17788	1.66	7.7E-03	2.6E-02	571	4	1.66	Tier3
EMC2	4	0.99	0.99	17808	1.50	7.4E-03	2.5E-02	547	4	1.50	Unassigned

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
ENTPD7	5	0.98	0.98	17583	1.82	7.0E-03	2.6E-02	521	4	1.82	Tier3
EXOC5	5	0.19	0.32	5720	0.83	7.1E-03	2.7E-02	526	4	0.83	Singleton
FABP4	5	0.96	0.96	17212	1.76	5.5E-03	2.2E-02	431	4	1.76	Tier2
FANCC	4	0.96	0.96	17099	1.93	7.6E-03	2.6E-02	560	3	1.93	Tier2
GAPDH	5	0.99	0.99	17685	0.69	6.9E-03	2.6E-02	515	2	0.69	Tier2
GPR116	5	0.19	0.33	5778	0.81	6.2E-03	2.4E-02	468	3	0.81	Tier2
GPX2	5	0.99	0.99	17799	1.51	5.6E-03	2.2E-02	436	4	1.51	Unassigned
JOSD1	5	0.98	0.98	17516	1.79	6.6E-03	2.5E-02	500	4	1.79	Tier3
KEAP1	5	0.99	0.99	17828	1.46	6.4E-03	2.4E-02	486	4	1.46	Tier3
KLC4	5	0.65	0.68	11955	0.99	5.9E-03	2.3E-02	449	3	0.99	Tier2
KLRF2	3	0.06	0.11	2416	-1.37	9.4E-03	2.5E-02	659	1	-1.37	Singleton
KRTAP19-8	3	0.80	0.80	14284	0.57	8.7E-03	2.4E-02	625	1	0.57	Singleton
KRTAP9-6	2	0.10	0.15	3763	0.48	1.4E-02	2.7E-02	901	1	0.48	Singleton
LMNB1	5	0.87	0.87	15470	1.15	7.1E-03	2.6E-02	524	4	1.15	Tier2
LONP2	5	0.90	0.90	15962	0.83	5.7E-03	2.2E-02	441	3	0.83	Tier2
LRSAM1	5	0.74	0.74	13169	1.61	6.0E-03	2.3E-02	453	4	1.61	Tier3
LYRM4	4	0.99	0.99	17801	1.61	7.7E-03	2.6E-02	572	4	1.61	Tier3
MATN3	5	0.72	0.73	12832	0.72	7.2E-03	2.7E-02	532	3	0.72	Tier2
MMP9	5	0.93	0.93	16485	1.75	6.8E-03	2.6E-02	505	3	1.75	Tier3
MRAS	8	0.21	0.40	6025	1.33	4.3E-03	2.1E-02	356	6	1.33	Tier2
MRPS31	4	0.06	0.13	2447	1.65	6.8E-03	2.3E-02	511	3	1.65	Tier3
MTMR11	5	0.36	0.50	8637	1.69	7.0E-03	2.6E-02	518	3	1.69	Tier3
MTPN	5	0.65	0.68	11849	1.78	5.6E-03	2.2E-02	438	4	1.78	Tier3
NDRG3	4	0.92	0.92	16403	1.64	8.0E-03	2.7E-02	584	3	1.64	Tier2
NFKB2	5	0.52	0.60	10532	1.28	5.4E-03	2.1E-02	420	4	1.28	Unassigned
NIPA2	4	0.11	0.21	4104	-0.57	6.5E-03	2.2E-02	495	1	-0.57	Singleton
NIPAL4	5	0.96	0.96	17190	1.57	5.5E-03	2.2E-02	427	3	1.57	Tier2
NOP56	5	0.17	0.30	5354	1.84	5.6E-03	2.2E-02	434	4	1.84	Tier3
NRSN2	5	0.99	0.99	17651	1.73	6.8E-03	2.6E-02	513	3	1.73	Tier3
OSBPL10	5	0.48	0.58	10124	1.22	5.9E-03	2.3E-02	450	3	1.22	Singleton
PLCXD2	4	0.76	0.76	13490	1.68	6.2E-03	2.1E-02	472	3	1.68	Tier3
PPAT	5	0.84	0.84	14984	0.97	6.0E-03	2.3E-02	456	3	0.97	Tier2
PPIA	1	0.98	0.98	17514	2.83	2.1E-02	2.1E-02	1252	1	2.83	Singleton
PPP1R12A	4	0.99	0.99	17809	1.57	7.4E-03	2.5E-02	546	4	1.57	Tier2
PSMA6	4	0.96	0.96	17125	1.75	7.9E-03	2.7E-02	579	3	1.75	Tier2
PTGES2	5	0.62	0.66	11567	1.26	5.8E-03	2.3E-02	447	3	1.26	Singleton
RACGAP1	5	0.37	0.51	8846	1.69	6.2E-03	2.4E-02	470	3	1.69	Singleton
RAD51	5	0.37	0.51	8903	1.35	5.4E-03	2.1E-02	422	3	1.35	Tier2
RAD51B	4	0.97	0.97	17352	1.56	7.4E-03	2.5E-02	545	3	1.56	Unassigned

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
RASSF6	4	0.98	0.98	17463	1.52	6.5E-03	2.2E-02	496	2	1.52	Tier2
RNASEH2B	4	0.89	0.89	15828	1.49	7.9E-03	2.7E-02	581	2	1.49	Tier2
RNF111	5	0.94	0.94	16759	1.42	5.4E-03	2.1E-02	417	4	1.42	Tier2
RNF4	5	0.95	0.95	16930	1.28	6.3E-03	2.4E-02	478	4	1.28	Tier2
RNF8	5	0.88	0.88	15716	0.80	6.3E-03	2.4E-02	479	3	0.80	Tier2
RPL14	5	0.87	0.87	15496	1.25	7.0E-03	2.6E-02	520	4	1.25	Singleton
RPL3L	5	0.95	0.95	17035	0.51	6.4E-03	2.4E-02	485	2	0.51	Singleton
RPL4	2	0.99	0.99	17704	1.78	1.2E-02	2.3E-02	795	2	1.78	Unassigned
RPS27L	4	0.40	0.48	9349	1.98	6.4E-03	2.2E-02	488	3	1.98	Tier2
RRP1	4	0.86	0.86	15272	1.39	7.0E-03	2.4E-02	519	2	1.39	Tier2
SCYL1	5	0.24	0.38	6684	1.27	5.7E-03	2.2E-02	443	4	1.27	Unassigned
SERP2	4	0.05	0.12	2266	-0.09	6.2E-03	2.1E-02	466	2	-0.09	Singleton
SESTD1	5	0.70	0.71	12502	0.36	6.3E-03	2.4E-02	477	2	0.36	Tier2
SETD2	5	0.06	0.14	2557	-0.43	7.1E-03	2.6E-02	525	1	-0.43	Singleton
SH3BGRL	5	0.97	0.97	17416	1.89	5.2E-03	2.1E-02	413	3	1.89	Tier3
SH3GL1	6	0.99	0.99	17641	1.27	5.0E-03	2.1E-02	400	5	1.27	Singleton
SHOX	5	0.08	0.18	3196	-0.80	6.3E-03	2.4E-02	476	2	-0.80	Singleton
SLC25A29	5	0.99	0.99	17785	1.32	6.3E-03	2.4E-02	475	4	1.32	Singleton
SLC35G2	4	0.99	0.99	17814	1.29	7.0E-03	2.4E-02	522	4	1.29	Singleton
SLC52A3	5	0.19	0.32	5627	0.48	6.1E-03	2.4E-02	461	2	0.48	Tier2
SLMO2	4	0.99	0.99	17728	1.05	7.5E-03	2.5E-02	558	4	1.05	Singleton
SNRPA	5	0.94	0.94	16760	1.20	7.1E-03	2.6E-02	523	4	1.20	Singleton
SNX31	4	0.99	0.99	17797	1.06	7.9E-03	2.7E-02	577	4	1.06	Singleton
SRRM1	5	0.05	0.11	2117	1.30	7.2E-03	2.7E-02	534	4	1.30	Singleton
SSR4	5	0.40	0.54	9293	1.21	6.4E-03	2.4E-02	484	4	1.21	Unassigned
ST3GAL4	5	0.65	0.68	11948	1.60	6.5E-03	2.5E-02	494	4	1.60	Singleton
SULT1C4	5	0.10	0.22	3817	1.78	6.2E-03	2.4E-02	465	3	1.78	Tier3
TAAR6	5	0.14	0.27	4725	0.96	6.1E-03	2.3E-02	460	3	0.96	Tier3
TAF3	4	0.82	0.82	14548	1.56	6.7E-03	2.3E-02	504	3	1.56	Singleton
TIA1	5	0.80	0.80	14254	1.41	5.4E-03	2.1E-02	419	4	1.41	Singleton
TIPIN	5	0.07	0.16	2946	1.62	6.1E-03	2.4E-02	463	4	1.62	Tier2
TMEM249	4	0.96	0.96	17235	1.83	6.3E-03	2.2E-02	480	3	1.83	Tier2
TMIGD2	5	0.84	0.84	14917	1.47	5.9E-03	2.3E-02	451	4	1.47	Tier3
TMOD2	5	0.74	0.75	13259	1.33	5.5E-03	2.2E-02	432	4	1.33	Tier2
TMX1	4	0.99	0.99	17838	1.11	6.2E-03	2.1E-02	474	4	1.11	Unassigned
TOP1	4	0.79	0.79	14050	0.65	7.3E-03	2.5E-02	537	2	0.65	Singleton
TPP2	4	0.29	0.42	7551	1.45	7.8E-03	2.6E-02	576	2	1.45	Tier2
TRDMT1	5	0.88	0.88	15628	1.09	6.2E-03	2.4E-02	467	3	1.09	Tier2
TRPV3	5	0.88	0.88	15717	1.28	6.5E-03	2.5E-02	493	4	1.28	Unassigned

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
TTC27	5	0.96	0.96	17242	1.80	5.4E-03	2.2E-02	424	4	1.80	Tier3
TWISTNB	5	0.82	0.82	14641	0.47	6.8E-03	2.6E-02	508	2	0.47	Singleton
UBE2E2	5	0.85	0.86	15223	1.13	6.7E-03	2.5E-02	502	3	1.13	Tier3
UBE2I	5	0.99	0.99	17860	1.79	7.2E-03	2.7E-02	533	4	1.79	Tier3
UBE2L3	6	0.99	0.99	17806	1.06	5.1E-03	2.1E-02	406	5	1.06	Singleton
USP27X	4	0.99	0.99	17803	0.95	7.7E-03	2.6E-02	564	4	0.95	Singleton
VPS13A	3	0.99	0.99	17753	1.37	9.8E-03	2.6E-02	677	3	1.37	Unassigned
VPS37B	5	0.95	0.95	17007	1.21	6.1E-03	2.3E-02	459	4	1.21	Tier3
WNT5A	5	0.13	0.26	4428	-0.63	6.6E-03	2.5E-02	499	1	-0.63	Singleton
ZBTB21	5	0.48	0.58	10166	0.40	5.7E-03	2.3E-02	444	2	0.40	Tier2
ZMYND11	5	0.96	0.96	17213	1.80	6.6E-03	2.5E-02	498	3	1.80	Tier3
ZNF217	5	0.99	0.99	17768	1.83	6.8E-03	2.6E-02	507	4	1.83	Tier3
ZNF440	5	0.89	0.89	15783	0.61	5.2E-03	2.1E-02	410	2	0.61	Singleton
ZNF492	5	0.12	0.24	4206	0.90	6.4E-03	2.5E-02	490	4	0.90	Singleton
ZNF563	3	0.99	0.99	17764	1.72	9.6E-03	2.6E-02	665	3	1.72	Tier3
ZNF581	4	0.93	0.93	16569	1.80	7.7E-03	2.6E-02	567	3	1.80	Tier2
ZNF701	6	0.99	0.99	17657	1.49	6.4E-03	2.6E-02	482	5	1.49	Tier3
ZNF770	4	0.49	0.54	10288	0.46	7.2E-03	2.4E-02	529	2	0.46	Singleton
HDAC3	5	0.99	0.99	17780	1.38	7.2E-03	2.7E-02	536	3	1.38	Singleton
ABCA6	5	0.32	0.45	7949	1.28	7.5E-03	2.8E-02	553	3	1.28	Singleton
ACTR8	5	0.20	0.34	5952	1.29	7.4E-03	2.7E-02	542	4	1.29	Tier3
ARL8B	5	0.06	0.13	2450	-0.98	7.5E-03	2.8E-02	557	2	-0.98	Tier2
CLTC	5	0.27	0.41	7170	1.26	7.5E-03	2.8E-02	554	3	1.26	Tier2
CPSF3L	5	0.46	0.58	9999	1.27	7.5E-03	2.8E-02	549	4	1.27	Tier3
CRTAC1	5	0.93	0.93	16657	1.20	7.5E-03	2.8E-02	550	4	1.20	Unassigned
EIF2B3	5	0.39	0.53	9172	0.24	7.4E-03	2.7E-02	544	2	0.24	Singleton
FAM19A4	5	0.12	0.24	4193	-0.33	7.3E-03	2.7E-02	539	2	-0.33	Singleton
GABARAPL1	5	0.99	0.99	17683	1.71	7.5E-03	2.8E-02	555	3	1.71	Tier3
GADD45G	5	0.99	0.99	17863	1.34	7.5E-03	2.8E-02	551	4	1.34	Tier3
KIAA0895	5	0.94	0.94	16847	1.42	7.4E-03	2.7E-02	540	3	1.42	Tier2
NPBWR1	5	0.99	0.99	17846	1.29	7.4E-03	2.8E-02	548	4	1.29	Tier2
POT1	5	0.02	0.07	1213	-0.39	7.5E-03	2.8E-02	556	2	-0.39	Tier2
PRMT3	5	0.04	0.11	1985	1.81	7.4E-03	2.7E-02	543	3	1.81	Tier3
SLC35A1	4	0.99	0.99	17789	1.10	8.3E-03	2.8E-02	594	4	1.10	Unassigned
TLCD1	5	0.97	0.97	17375	0.83	7.5E-03	2.8E-02	559	4	0.83	Tier2
ZNHIT6	5	0.08	0.18	3138	0.91	7.4E-03	2.7E-02	541	4	0.91	Tier2
PPP1CB	4	0.72	0.72	12862	0.66	8.3E-03	2.8E-02	595	2	0.66	Singleton
INPPL1	5	0.94	0.94	16746	0.51	7.6E-03	2.8E-02	561	2	0.51	Tier2
KCNIP2	5	0.97	0.97	17413	1.20	7.6E-03	2.8E-02	563	4	1.20	Singleton

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
KIAA1429	5	0.33	0.46	8132	-0.38	7.6E-03	2.8E-02	562	2	-0.38	Singleton
CCDC74B	3	0.99	0.99	17721	1.34	1.1E-02	2.9E-02	724	3	1.34	Unassigned
CLTB	5	0.96	0.96	17245	1.18	7.7E-03	2.8E-02	568	4	1.18	Unassigned
ELP5	5	0.96	0.96	17234	1.71	7.8E-03	2.9E-02	575	4	1.71	Tier3
FAM105A	4	0.16	0.26	5043	1.40	8.5E-03	2.8E-02	604	3	1.40	Singleton
MDN1	5	0.25	0.38	6724	1.24	7.8E-03	2.8E-02	573	4	1.24	Singleton
MTRF1	3	0.23	0.31	6414	1.18	1.1E-02	2.8E-02	717	2	1.18	Singleton
OTX1	5	0.96	0.96	17239	1.20	7.7E-03	2.8E-02	569	4	1.20	Unassigned
PLGLB2	1	0.97	0.97	17373	2.64	2.8E-02	2.8E-02	1579	1	2.64	Singleton
PRAMEF22	2	0.79	0.79	14078	1.89	1.5E-02	2.9E-02	960	1	1.89	Singleton
SLC6A6	5	0.19	0.32	5743	1.08	7.8E-03	2.9E-02	574	3	1.08	Singleton
TDP1	4	0.89	0.89	15880	1.53	8.6E-03	2.9E-02	612	2	1.53	Tier2
TMEM207	5	0.99	0.99	17656	0.53	7.9E-03	2.9E-02	578	1	0.53	Singleton
TMPRSS13	5	0.06	0.14	2553	1.73	7.7E-03	2.8E-02	566	3	1.73	Tier3
FFAR3	5	0.99	0.99	17649	1.57	7.9E-03	2.9E-02	580	4	1.57	Unassigned
ILF2	5	0.03	0.09	1665	0.44	7.9E-03	2.9E-02	582	2	0.44	Singleton
CAMSAP3	5	0.76	0.76	13570	1.73	8.0E-03	2.9E-02	585	4	1.73	Tier3
NCBP2	6	0.75	0.77	13427	1.38	7.3E-03	2.9E-02	538	4	1.38	Tier3
PDILT	5	0.65	0.68	11880	0.23	8.0E-03	2.9E-02	586	2	0.23	Singleton
RAB27A	4	0.99	0.99	17748	1.65	8.7E-03	2.9E-02	620	4	1.65	Tier3
RSRC1	5	0.76	0.76	13547	1.69	8.0E-03	2.9E-02	587	3	1.69	Tier3
GOLGA7	5	0.55	0.62	10770	0.70	8.2E-03	3.0E-02	591	3	0.70	Tier2
POLR3D	5	0.89	0.89	15740	1.70	8.2E-03	3.0E-02	589	3	1.70	Tier3
TMEM50B	5	0.84	0.84	15008	0.72	8.2E-03	3.0E-02	590	3	0.72	Tier2
ZP2	5	0.84	0.84	15046	1.74	8.1E-03	3.0E-02	588	3	1.74	Tier3
NLRC4	5	0.94	0.94	16846	1.64	8.2E-03	3.0E-02	592	4	1.64	Tier3
ABLIM3	5	0.22	0.35	6222	0.73	8.7E-03	3.1E-02	622	3	0.73	Tier2
ABRA	5	0.09	0.19	3454	-0.76	8.3E-03	3.0E-02	600	2	-0.76	Tier3
ABT1	5	0.99	0.99	17866	1.06	8.4E-03	3.0E-02	603	4	1.06	Tier2
ARHGEF9	5	0.08	0.17	3123	-0.11	8.7E-03	3.1E-02	624	2	-0.11	Singleton
ASPHD2	5	0.88	0.88	15665	1.20	8.9E-03	3.2E-02	633	3	1.20	Singleton
ATPAF1	13	0.34	0.60	8348	0.56	5.3E-03	3.0E-02	415	5	0.56	Tier2
C19orf24	5	0.60	0.65	11341	1.15	8.5E-03	3.1E-02	605	4	1.15	Singleton
CCNA2	5	0.75	0.75	13344	1.77	8.9E-03	3.2E-02	635	3	1.77	Tier3
CIAO1	5	0.99	0.99	17867	1.52	8.7E-03	3.1E-02	623	4	1.52	Tier2
DCAKD	5	0.29	0.43	7534	1.73	8.3E-03	3.0E-02	593	4	1.73	Tier3
DCTN2	5	0.61	0.66	11463	0.38	8.7E-03	3.1E-02	618	2	0.38	Singleton
DLGAP2	5	0.76	0.77	13605	1.18	8.6E-03	3.1E-02	614	3	1.18	Tier2
DYNC1I2	5	0.35	0.49	8567	1.61	8.9E-03	3.2E-02	636	3	1.61	Tier2

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
FAM208A	5	0.45	0.57	9895	1.20	8.6E-03	3.1E-02	610	4	1.20	Singleton
GPHA2	5	0.96	0.96	17087	1.19	8.3E-03	3.0E-02	597	4	1.19	Tier2
KAZALD1	5	0.65	0.68	11896	1.32	8.8E-03	3.2E-02	630	3	1.32	Tier2
KCTD21	5	0.33	0.47	8224	0.66	8.5E-03	3.1E-02	607	2	0.66	Singleton
LEPROTL1	5	0.99	0.99	17769	1.43	8.6E-03	3.1E-02	615	4	1.43	Tier3
MLLT10	7	0.34	0.52	8365	0.16	6.9E-03	3.1E-02	517	2	0.16	Tier2
NAGA	5	0.99	0.99	17653	1.21	8.9E-03	3.2E-02	637	4	1.21	Tier2
NUAK1	5	0.54	0.61	10699	1.69	8.6E-03	3.1E-02	613	3	1.69	Tier3
PRKRIR	5	0.14	0.27	4748	-0.43	8.6E-03	3.1E-02	617	1	-0.43	Singleton
PSG11	2	0.98	0.98	17595	1.57	1.7E-02	3.2E-02	1052	2	1.57	Unassigned
PTPLB	5	0.91	0.91	16234	1.28	8.4E-03	3.0E-02	601	4	1.28	Tier3
RASGEF1B	5	0.34	0.48	8333	1.74	8.9E-03	3.2E-02	634	3	1.74	Tier3
RBM25	5	0.26	0.39	6955	0.46	8.3E-03	3.0E-02	598	2	0.46	Tier2
RNASE3	5	0.34	0.48	8395	-0.09	8.3E-03	3.0E-02	596	2	-0.09	Tier2
RPGRIP1	4	0.99	0.99	17773	1.25	9.0E-03	3.0E-02	640	4	1.25	Unassigned
SLC13A4	5	0.87	0.87	15519	1.68	8.8E-03	3.2E-02	628	3	1.68	Tier3
SLC22A13	5	0.71	0.72	12754	1.73	8.8E-03	3.1E-02	626	3	1.73	Tier3
SNF8	5	0.83	0.83	14767	1.24	8.7E-03	3.1E-02	621	4	1.24	Tier2
SYNDIG1L	5	0.83	0.83	14833	0.66	8.6E-03	3.1E-02	611	2	0.66	Singleton
TCERG1	4	0.89	0.89	15883	1.49	9.4E-03	3.1E-02	655	3	1.49	Tier2
TIPARP	5	0.79	0.79	14024	1.32	8.7E-03	3.1E-02	619	3	1.32	Tier2
TIPRL	2	0.98	0.98	17593	2.38	1.7E-02	3.2E-02	1053	2	2.38	Singleton
TSPAN8	5	0.63	0.66	11612	1.51	8.6E-03	3.1E-02	616	4	1.51	Tier3
UQCRB	5	0.01	0.03	676	1.76	8.4E-03	3.0E-02	602	3	1.76	Tier3
VPS8	5	0.28	0.42	7395	1.72	8.8E-03	3.1E-02	627	3	1.72	Tier3
VWA9	5	0.83	0.83	14846	0.28	8.5E-03	3.1E-02	609	2	0.28	Tier2
XRCC2	5	0.01	0.02	441	-0.38	8.5E-03	3.1E-02	606	2	-0.38	Singleton
ZNF335	5	0.93	0.93	16571	0.88	8.5E-03	3.1E-02	608	3	0.88	Tier2
ZNF653	5	0.92	0.92	16356	1.41	8.8E-03	3.2E-02	629	4	1.41	Tier2
ABCC2	5	0.33	0.47	8177	0.63	9.1E-03	3.2E-02	641	2	0.63	Tier2
ARHGEF40	5	0.94	0.94	16854	0.48	9.3E-03	3.3E-02	652	2	0.48	Tier2
C12orf65	5	0.92	0.92	16445	1.15	9.3E-03	3.3E-02	654	3	1.15	Tier2
C1QTNF5	5	0.99	0.99	17849	1.24	9.3E-03	3.3E-02	653	4	1.24	Unassigned
C21orf33	5	0.93	0.93	16610	1.37	9.0E-03	3.2E-02	638	4	1.37	Singleton
CYP7A1	5	0.99	0.99	17742	1.57	9.4E-03	3.3E-02	657	4	1.57	Unassigned
DNAJA4	4	0.99	0.99	17751	1.48	9.9E-03	3.3E-02	681	4	1.48	Unassigned
FGGY	5	0.03	0.08	1484	-0.30	9.2E-03	3.3E-02	644	2	-0.30	Unassigned
GPR141	5	0.91	0.91	16206	1.30	9.3E-03	3.3E-02	651	4	1.30	Unassigned
MMD2	5	0.95	0.95	16990	1.68	9.2E-03	3.3E-02	646	3	1.68	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
MTX2	4	0.99	0.99	17754	1.37	9.8E-03	3.3E-02	676	4	1.37	Tier3
NMRK2	5	0.03	0.08	1546	-0.34	9.3E-03	3.3E-02	650	2	-0.34	Tier2
P4HA1	5	0.36	0.50	8667	-0.01	9.4E-03	3.3E-02	658	1	-0.01	Singleton
PHOX2A	5	0.98	0.98	17485	1.13	9.4E-03	3.3E-02	656	4	1.13	Unassigned
POTED	4	0.99	0.99	17760	1.04	9.6E-03	3.2E-02	670	4	1.04	Unassigned
PRIMPOL	4	0.02	0.06	1276	0.24	9.6E-03	3.2E-02	667	2	0.24	Unassigned
PXMP2	5	0.93	0.93	16501	0.74	9.3E-03	3.3E-02	649	3	0.74	Singleton
RGS7	4	0.99	0.99	17757	1.28	9.7E-03	3.2E-02	672	4	1.28	Unassigned
S100A7A	2	0.98	0.98	17584	1.75	1.7E-02	3.2E-02	1082	2	1.75	Singleton
SLC8A3	11	0.97	0.97	17264	0.96	6.2E-03	3.3E-02	471	8	0.96	Tier3
SLCO6A1	5	0.65	0.68	11847	1.69	9.2E-03	3.3E-02	648	3	1.69	Tier3
TM2D1	5	0.60	0.65	11261	1.16	9.2E-03	3.3E-02	645	3	1.16	Singleton
TMEM210	5	0.90	0.90	16030	1.64	9.2E-03	3.3E-02	647	4	1.64	Tier3
TMEM212	4	0.17	0.27	5280	1.53	9.7E-03	3.3E-02	675	3	1.53	Unassigned
WIPI1	5	0.98	0.98	17527	1.67	9.1E-03	3.2E-02	643	3	1.67	Tier3
ZNF259	5	0.12	0.24	4178	1.69	9.0E-03	3.2E-02	639	3	1.69	Tier3
MRPS12	5	0.94	0.94	16756	1.52	9.4E-03	3.3E-02	661	4	1.52	Tier2
SMS	5	0.87	0.87	15497	1.71	9.4E-03	3.3E-02	660	3	1.71	Tier2
KIAA1683	5	0.73	0.73	12945	1.26	9.5E-03	3.3E-02	663	4	1.26	Unassigned
GSTA3	4	0.85	0.85	15063	1.09	1.0E-02	3.4E-02	688	2	1.09	Tier2
KRTAP10-10	4	0.99	0.99	17745	1.00	1.0E-02	3.4E-02	685	4	1.00	Unassigned
MRGPRX3	5	0.28	0.42	7328	0.59	9.5E-03	3.4E-02	664	2	0.59	Singleton
PPP4C	5	0.68	0.70	12332	-0.13	9.6E-03	3.4E-02	668	1	-0.13	Singleton
PMVK	5	0.85	0.85	15075	0.78	9.6E-03	3.4E-02	671	3	0.78	Tier2
GRAPL	4	0.93	0.93	16552	1.63	1.0E-02	3.4E-02	694	3	1.63	Tier3
RFK	4	0.42	0.49	9632	1.23	1.0E-02	3.4E-02	693	3	1.23	Singleton
SCGN	5	0.21	0.35	6113	0.18	9.7E-03	3.4E-02	674	2	0.18	Tier2
TCP10L	5	0.95	0.95	16996	1.33	9.7E-03	3.4E-02	673	4	1.33	Tier2
LMBRD1	4	0.41	0.49	9550	0.11	1.0E-02	3.4E-02	697	1	0.11	Singleton
CHMP3	5	0.20	0.33	5866	1.04	9.8E-03	3.5E-02	678	3	1.04	Singleton
NHSL1	5	0.97	0.97	17335	1.24	9.8E-03	3.5E-02	680	3	1.24	Tier2
WDR53	5	0.95	0.95	17017	1.17	9.8E-03	3.5E-02	679	4	1.17	Singleton
HIST2H2BE	1	0.97	0.97	17256	2.40	3.5E-02	3.5E-02	1846	1	2.40	Singleton
CLPSL2	6	0.60	0.69	11323	0.58	8.9E-03	3.5E-02	632	3	0.58	Tier2
FRMD7	5	0.07	0.16	2890	-0.35	1.0E-02	3.5E-02	683	1	-0.35	Singleton
KRTAP4-8	2	0.98	0.98	17556	1.61	1.9E-02	3.5E-02	1138	2	1.61	Unassigned
SMARCD2	5	0.98	0.98	17498	1.16	9.9E-03	3.5E-02	682	4	1.16	Singleton
ALDOC	5	0.83	0.83	14781	0.94	1.0E-02	3.5E-02	687	3	0.94	Tier2
ARL3	5	0.57	0.63	10998	1.33	1.1E-02	3.6E-02	712	3	1.33	Tier2

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
C19orf18	5	0.13	0.26	4545	1.64	1.0E-02	3.6E-02	709	3	1.64	Tier3
CDC20	5	0.46	0.57	9933	1.70	1.1E-02	3.6E-02	711	3	1.70	Tier3
CDH24	5	0.93	0.93	16558	1.37	1.0E-02	3.6E-02	703	4	1.37	Singleton
CNFN	5	0.89	0.89	15908	1.10	1.0E-02	3.6E-02	691	4	1.10	Unassigned
CYCS	2	0.50	0.50	10355	1.44	1.9E-02	3.6E-02	1162	1	1.44	Singleton
CYP3A43	2	0.98	0.98	17540	1.91	1.9E-02	3.6E-02	1171	2	1.91	Singleton
ERCC3	5	0.63	0.66	11617	1.66	1.0E-02	3.6E-02	701	3	1.66	Tier3
F7	5	0.62	0.66	11553	1.68	1.1E-02	3.7E-02	715	3	1.68	Tier2
FAM43B	5	0.86	0.86	15315	1.66	1.0E-02	3.6E-02	690	3	1.66	Tier2
FGD6	5	0.72	0.73	12903	1.28	1.0E-02	3.6E-02	708	4	1.28	Tier3
GANAB	5	0.99	0.99	17819	1.34	1.0E-02	3.6E-02	705	4	1.34	Unassigned
GRID1	5	0.66	0.68	11974	1.09	1.1E-02	3.7E-02	713	4	1.09	Unassigned
IGDCC4	5	0.21	0.34	6012	1.12	1.0E-02	3.6E-02	700	4	1.12	Unassigned
KLF3	5	0.95	0.95	16975	1.30	1.0E-02	3.5E-02	686	4	1.30	Singleton
KRTAP19-4	3	0.99	0.99	17676	1.13	1.4E-02	3.6E-02	863	3	1.13	Unassigned
LRAT	5	0.28	0.42	7374	-0.23	1.0E-02	3.5E-02	684	2	-0.23	Tier2
NR1D1	5	0.79	0.79	14003	0.61	1.0E-02	3.6E-02	704	2	0.61	Tier2
PALM2	5	0.37	0.51	8888	1.63	1.0E-02	3.6E-02	698	4	1.63	Unassigned
PGS1	5	0.44	0.57	9806	0.75	1.0E-02	3.5E-02	689	3	0.75	Tier3
PKD1L2	5	0.86	0.86	15304	1.21	1.0E-02	3.6E-02	707	4	1.21	Tier2
PRDX6	5	0.31	0.45	7903	0.60	1.0E-02	3.6E-02	695	2	0.60	Singleton
PRPF19	5	0.74	0.74	13159	1.27	1.0E-02	3.6E-02	692	4	1.27	Tier2
RMI1	4	0.22	0.34	6260	1.23	1.1E-02	3.7E-02	736	2	1.23	Tier2
SAFB2	5	0.87	0.87	15431	1.18	1.0E-02	3.6E-02	699	4	1.18	Unassigned
SERPINA1	5	0.41	0.55	9531	0.85	1.0E-02	3.6E-02	702	3	0.85	Tier3
SPAG11A	4	0.99	0.99	17725	1.30	1.1E-02	3.6E-02	720	4	1.30	Singleton
SYCP2L	5	0.99	0.99	17694	1.70	1.0E-02	3.6E-02	710	4	1.70	Tier3
TACR1	5	0.02	0.05	1028	-0.83	1.0E-02	3.6E-02	696	2	-0.83	Unassigned
TMCO2	5	0.17	0.30	5243	-0.44	1.0E-02	3.6E-02	706	1	-0.44	Singleton
TMX3	4	0.84	0.84	15004	0.88	1.1E-02	3.6E-02	733	2	0.88	Tier3
VARS2	4	0.99	0.99	17732	1.46	1.1E-02	3.5E-02	714	4	1.46	Unassigned
B3GALNT1	4	0.69	0.69	12367	1.46	1.1E-02	3.7E-02	739	3	1.46	Unassigned
AARS	5	0.78	0.78	13852	0.15	1.5E-02	4.8E-02	923	2	0.15	Singleton
ABAT	5	0.26	0.40	7009	1.64	1.1E-02	3.8E-02	732	3	1.64	Singleton
ACTR3	4	0.07	0.15	2805	1.69	1.1E-02	3.7E-02	748	3	1.69	Tier2
ACVR2B	5	0.96	0.96	17058	1.47	1.1E-02	3.8E-02	741	4	1.47	Unassigned
ADD3	5	0.91	0.91	16258	1.62	1.2E-02	4.2E-02	806	3	1.62	Tier3
ADPGK	5	0.97	0.97	17390	1.19	1.5E-02	4.8E-02	919	4	1.19	Tier3
AKAP3	4	0.99	0.99	17698	1.06	1.2E-02	4.1E-02	807	4	1.06	Singleton

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
ALG5	4	0.88	0.88	15651	1.64	1.3E-02	4.2E-02	818	3	1.64	Tier2
ALG9	5	0.46	0.58	9991	1.30	1.4E-02	4.6E-02	876	4	1.30	Unassigned
ARF4	3	0.11	0.18	3973	1.90	1.8E-02	4.6E-02	1088	2	1.90	Tier3
ARHGAP44	5	0.97	0.97	17385	1.12	1.3E-02	4.4E-02	845	4	1.12	Singleton
ARL14	4	0.99	0.99	17689	1.20	1.3E-02	4.2E-02	819	4	1.20	Singleton
ARMC6	5	0.43	0.56	9681	1.18	1.2E-02	3.9E-02	764	4	1.18	Tier2
ARRDC3	5	0.47	0.58	10057	1.61	1.2E-02	4.2E-02	804	3	1.61	Tier3
ASB14	5	0.76	0.77	13601	0.33	1.5E-02	4.9E-02	938	2	0.33	Tier2
ATG7	5	0.90	0.90	15968	1.24	1.3E-02	4.3E-02	828	4	1.24	Tier2
ATP10A	5	0.90	0.90	15983	0.99	1.5E-02	4.9E-02	924	3	0.99	Tier2
B4GALT7	5	0.99	0.99	17697	1.03	1.5E-02	4.9E-02	945	4	1.03	Unassigned
BDP1	3	0.98	0.98	17596	1.34	1.7E-02	4.4E-02	1051	3	1.34	Unassigned
BMS1	5	0.12	0.25	4352	0.34	1.2E-02	4.2E-02	798	2	0.34	Singleton
BRPF1	5	0.93	0.93	16496	1.14	1.1E-02	3.7E-02	716	4	1.14	Singleton
C10orf118	5	0.37	0.51	8876	0.73	1.5E-02	5.0E-02	946	2	0.73	Tier3
C11orf31	5	0.56	0.62	10833	0.50	1.3E-02	4.2E-02	814	2	0.50	Singleton
C3orf80	5	0.74	0.75	13245	1.13	1.5E-02	4.9E-02	928	4	1.13	Singleton
C5orf49	4	0.60	0.62	11325	0.14	1.1E-02	3.8E-02	759	1	0.14	Singleton
CAND2	5	0.98	0.98	17627	1.20	1.5E-02	4.9E-02	935	4	1.20	Singleton
CAPZA2	3	0.58	0.58	11060	1.34	1.9E-02	4.8E-02	1121	2	1.34	Singleton
CASP2	6	0.37	0.52	8889	1.07	9.6E-03	3.7E-02	666	3	1.07	Tier3
CCDC150	5	0.96	0.96	17151	0.21	1.1E-02	3.9E-02	756	2	0.21	Tier2
CCDC64	5	0.23	0.36	6418	1.09	1.4E-02	4.7E-02	899	3	1.09	Tier2
CD151	5	0.80	0.80	14301	1.49	1.2E-02	4.1E-02	793	4	1.49	Tier3
CD3G	4	0.67	0.67	12144	1.12	1.5E-02	4.7E-02	940	2	1.12	Tier3
CD46	5	0.78	0.78	13811	0.58	1.3E-02	4.4E-02	835	2	0.58	Tier3
CDH11	5	0.97	0.97	17340	1.18	1.3E-02	4.2E-02	811	4	1.18	Unassigned
CGRRF1	5	0.91	0.91	16136	1.03	1.4E-02	4.7E-02	884	4	1.03	Unassigned
CHP1	5	0.27	0.41	7132	1.09	1.3E-02	4.4E-02	842	4	1.09	Unassigned
CLASRP	5	0.17	0.30	5283	1.17	1.5E-02	4.8E-02	920	4	1.17	Singleton
CMPK1	5	0.99	0.99	17731	1.47	1.1E-02	3.7E-02	726	4	1.47	Tier2
COMMD10	4	0.93	0.93	16649	1.55	1.4E-02	4.5E-02	906	3	1.55	Tier2
COQ10B	5	0.98	0.98	17559	1.21	1.1E-02	3.7E-02	721	4	1.21	Unassigned
CORO6	4	0.78	0.78	13880	1.34	1.5E-02	4.7E-02	933	3	1.34	Singleton
CST8	5	0.99	0.99	17652	1.50	1.4E-02	4.7E-02	900	4	1.50	Tier2
CSTF3	8	0.99	0.99	17869	1.29	1.1E-02	4.7E-02	738	5	1.29	Tier3
CTSZ	5	0.98	0.98	17466	1.56	1.4E-02	4.6E-02	877	3	1.56	Tier3
DBH	5	0.49	0.59	10224	1.60	1.1E-02	3.9E-02	757	3	1.60	Unassigned
DDX6	4	0.92	0.92	16441	1.68	1.4E-02	4.4E-02	875	3	1.68	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
DEFB108B	2	0.94	0.94	16851	2.10	2.7E-02	5.0E-02	1533	2	2.10	Singleton
DENND2C	5	0.57	0.63	10985	1.58	1.5E-02	4.9E-02	927	3	1.58	Tier3
DHRS11	5	0.36	0.50	8755	0.91	1.4E-02	4.6E-02	883	3	0.91	Tier2
DIRAS1	5	0.95	0.95	16896	1.56	1.4E-02	4.8E-02	915	3	1.56	Singleton
DIRAS2	4	0.37	0.46	8781	0.75	1.2E-02	4.0E-02	781	2	0.75	Singleton
DOCK10	4	0.66	0.66	12021	0.13	1.6E-02	5.0E-02	1012	1	0.13	Singleton
DOK1	5	0.34	0.48	8376	0.26	1.4E-02	4.8E-02	914	2	0.26	Singleton
DUSP27	5	0.98	0.98	17515	1.07	1.1E-02	3.9E-02	760	4	1.07	Unassigned
DUSP3	5	0.92	0.92	16448	0.71	1.5E-02	4.9E-02	936	3	0.71	Singleton
ECH1	5	0.78	0.78	13875	1.15	1.4E-02	4.5E-02	868	4	1.15	Unassigned
EEA1	5	0.23	0.36	6380	0.34	1.2E-02	4.1E-02	782	1	0.34	Singleton
EIF2S2	4	0.13	0.22	4433	1.04	1.6E-02	4.9E-02	987	2	1.04	Tier2
EPN1	4	0.05	0.11	2119	-0.35	1.2E-02	4.0E-02	791	2	-0.35	Singleton
ESRP1	5	0.56	0.63	10915	0.96	1.3E-02	4.3E-02	831	3	0.96	Tier2
ETHE1	5	0.93	0.93	16534	1.06	1.2E-02	4.0E-02	765	4	1.06	Singleton
FAM21B	1	0.96	0.96	17149	2.36	4.0E-02	4.0E-02	2061	1	2.36	Singleton
FAM96B	5	0.95	0.95	16948	1.38	1.1E-02	3.9E-02	751	4	1.38	Tier3
FANCA	5	0.17	0.30	5244	1.13	1.1E-02	3.8E-02	737	3	1.13	Tier3
FBXO39	5	0.87	0.87	15434	1.50	1.2E-02	4.0E-02	775	3	1.50	Tier2
FBXO48	5	0.14	0.27	4650	0.38	1.2E-02	4.1E-02	787	2	0.38	Tier2
FBXW4	5	0.55	0.62	10810	1.10	1.2E-02	4.0E-02	769	3	1.10	Singleton
FCER1G	5	0.99	0.99	17856	1.20	1.1E-02	3.8E-02	730	4	1.20	Singleton
FEN1	5	0.68	0.70	12303	1.22	1.3E-02	4.3E-02	820	3	1.22	Tier2
FIP1L1	4	0.38	0.47	9053	0.82	1.6E-02	4.9E-02	1001	2	0.82	Tier2
FRYL	5	0.03	0.08	1562	-0.93	1.2E-02	4.2E-02	802	2	-0.93	Singleton
FTSJ3	5	0.92	0.92	16404	1.55	1.1E-02	3.7E-02	718	4	1.55	Tier2
FZD4	4	0.77	0.77	13638	1.32	1.4E-02	4.6E-02	911	2	1.32	Tier2
GAB2	4	0.25	0.37	6766	1.62	1.1E-02	3.8E-02	753	3	1.62	Tier3
GBAS	4	0.52	0.55	10487	1.18	1.3E-02	4.3E-02	841	2	1.18	Tier2
GCNT3	5	0.22	0.36	6289	0.62	1.3E-02	4.3E-02	833	2	0.62	Tier2
GCOM1	5	0.76	0.76	13505	1.53	1.5E-02	4.9E-02	939	3	1.53	Tier3
GJB5	5	0.28	0.42	7391	1.03	1.5E-02	4.9E-02	925	4	1.03	Singleton
GNB2L1	5	0.25	0.39	6791	1.73	1.1E-02	3.7E-02	719	3	1.73	Tier2
GPR135	5	0.10	0.22	3836	0.41	1.4E-02	4.6E-02	878	2	0.41	Tier2
GPR180	5	0.29	0.43	7600	1.60	1.2E-02	4.2E-02	809	3	1.60	Tier3
GPX7	4	0.99	0.99	17696	1.00	1.3E-02	4.1E-02	813	4	1.00	Unassigned
GSTM3	5	0.03	0.08	1565	-0.82	1.4E-02	4.6E-02	879	2	-0.82	Tier2
GTF2A1L	4	0.91	0.91	16170	0.58	1.3E-02	4.3E-02	836	2	0.58	Singleton
GZMK	5	0.99	0.99	17762	1.44	1.4E-02	4.5E-02	870	4	1.44	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
HBM	5	0.98	0.98	17604	1.15	1.5E-02	4.9E-02	941	4	1.15	Unassigned
HDAC9	5	0.89	0.89	15893	0.94	1.3E-02	4.5E-02	850	3	0.94	Singleton
HEPN1	5	0.01	0.03	580	-0.98	1.4E-02	4.6E-02	872	1	-0.98	Singleton
HIST1H4H	4	0.38	0.47	9079	1.08	1.3E-02	4.3E-02	854	2	1.08	Singleton
HJURP	5	0.17	0.30	5247	1.13	1.5E-02	4.8E-02	917	4	1.13	Singleton
HNRNPA1	4	0.95	0.95	16921	1.64	1.1E-02	3.8E-02	761	3	1.64	Tier3
HPS6	5	0.40	0.54	9416	0.11	1.5E-02	4.8E-02	918	2	0.11	Singleton
HYAL1	15	0.49	0.75	10257	0.70	8.3E-03	4.7E-02	599	8	0.70	Tier3
IGIP	3	0.98	0.98	17612	1.16	1.6E-02	4.2E-02	1003	3	1.16	Unassigned
IKBKAP	5	0.79	0.79	13986	1.61	1.3E-02	4.4E-02	837	4	1.61	Tier2
IL25	5	0.75	0.76	13428	-0.41	1.4E-02	4.7E-02	897	2	-0.41	Tier2
INIP	5	0.14	0.27	4743	0.66	1.4E-02	4.8E-02	913	2	0.66	Singleton
INO80B	5	0.95	0.95	16912	1.65	1.2E-02	4.2E-02	801	4	1.65	Tier3
INVS	4	0.90	0.90	15937	1.80	1.4E-02	4.4E-02	874	3	1.80	Tier2
IPPK	5	0.83	0.83	14849	1.24	1.5E-02	4.9E-02	943	3	1.24	Singleton
JADE3	5	0.87	0.87	15494	1.30	1.3E-02	4.4E-02	834	4	1.30	Tier2
KCNH7	5	0.32	0.46	8001	0.29	1.5E-02	4.9E-02	934	2	0.29	Tier2
KCNK1	5	0.01	0.03	541	1.17	1.4E-02	4.7E-02	886	4	1.17	Unassigned
KNOP1	5	0.85	0.85	15116	0.27	1.2E-02	4.1E-02	790	2	0.27	Singleton
KRIT1	5	0.19	0.32	5648	-0.38	1.1E-02	3.7E-02	727	2	-0.38	Singleton
KRTAP20-1	3	0.98	0.98	17631	1.14	1.5E-02	4.0E-02	950	3	1.14	Unassigned
KRTAP5-1	3	0.98	0.98	17625	1.97	1.5E-02	4.0E-02	954	3	1.97	Tier3
LCE5A	4	0.27	0.39	7052	0.71	1.6E-02	5.0E-02	1013	2	0.71	Tier2
LDB1	5	0.93	0.93	16497	1.62	1.3E-02	4.3E-02	825	3	1.62	Singleton
LDLRAP1	5	0.05	0.12	2196	1.64	1.2E-02	4.1E-02	792	3	1.64	Tier2
LGR5	5	0.91	0.91	16217	0.77	1.3E-02	4.3E-02	823	4	0.77	Tier2
LIN28A	5	0.95	0.95	16983	1.17	1.2E-02	4.1E-02	786	4	1.17	Unassigned
LOH12CR1	4	0.71	0.71	12765	0.79	1.4E-02	4.6E-02	916	2	0.79	Tier2
LRRC16A	5	0.95	0.95	16992	1.71	1.1E-02	3.8E-02	745	3	1.71	Tier3
LRRC6	4	0.77	0.77	13707	1.42	1.6E-02	4.9E-02	998	3	1.42	Unassigned
LSG1	5	0.44	0.57	9794	1.14	1.5E-02	5.0E-02	947	3	1.14	Tier2
LTC4S	5	0.45	0.57	9914	1.58	1.2E-02	4.2E-02	810	3	1.58	Tier3
MAP1LC3A	5	0.83	0.83	14711	1.23	1.1E-02	3.8E-02	729	4	1.23	Tier2
MARS	5	0.23	0.36	6351	1.61	1.2E-02	4.0E-02	770	3	1.61	Tier3
MAU2	5	0.32	0.45	7955	0.92	1.4E-02	4.7E-02	904	3	0.92	Tier2
MBD2	5	0.13	0.27	4607	1.58	1.4E-02	4.7E-02	902	3	1.58	Unassigned
MBNL2	5	0.91	0.91	16133	1.60	1.1E-02	3.8E-02	743	3	1.60	Tier2
MBOAT1	5	0.34	0.48	8424	-0.14	1.3E-02	4.3E-02	816	2	-0.14	Singleton
MCTP1	5	0.97	0.97	17316	1.10	1.2E-02	4.2E-02	794	3	1.10	Tier2

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
MED23	5	0.03	0.08	1541	-0.24	1.3E-02	4.3E-02	832	2	-0.24	Singleton
MEN1	5	0.78	0.78	13797	1.26	1.2E-02	4.1E-02	779	4	1.26	Tier3
MFAP1	5	0.63	0.67	11706	0.48	1.1E-02	3.8E-02	740	2	0.48	Tier2
MGAT3	5	0.81	0.81	14312	0.61	1.2E-02	4.1E-02	789	2	0.61	Singleton
MIA2	5	0.03	0.08	1442	-1.29	1.5E-02	4.9E-02	932	1	-1.29	Singleton
MPHOSPH8	5	0.05	0.12	2289	0.18	1.1E-02	3.7E-02	723	2	0.18	Singleton
MPP5	5	0.57	0.63	11022	1.67	1.3E-02	4.5E-02	846	3	1.67	Tier3
MRPL1	4	0.13	0.23	4616	1.65	1.6E-02	4.9E-02	991	3	1.65	Tier3
MSRB3	5	0.90	0.90	15976	1.13	1.2E-02	4.0E-02	767	4	1.13	Unassigned
MUM1	5	0.98	0.98	17482	0.50	1.3E-02	4.2E-02	812	1	0.50	Singleton
MYBL2	5	0.76	0.76	13513	1.56	1.4E-02	4.8E-02	912	3	1.56	Tier3
MZF1	5	0.02	0.06	1192	-0.60	1.1E-02	3.9E-02	750	2	-0.60	Unassigned
NAA35	5	0.25	0.38	6728	-0.58	1.1E-02	3.7E-02	722	2	-0.58	Tier2
NAV1	5	0.38	0.52	9076	0.79	1.2E-02	4.1E-02	785	3	0.79	Tier2
NDFIP2	4	0.69	0.69	12457	1.66	1.4E-02	4.5E-02	898	3	1.66	Tier2
NDUFA4	3	0.82	0.82	14543	1.88	1.6E-02	4.2E-02	1010	2	1.88	Tier3
NEK8	5	0.93	0.93	16520	0.81	1.1E-02	3.8E-02	742	3	0.81	Singleton
NELFE	5	0.70	0.71	12508	0.28	1.5E-02	4.8E-02	921	2	0.28	Singleton
NGLY1	4	0.18	0.29	5530	1.52	1.4E-02	4.5E-02	910	3	1.52	Singleton
NINJ2	5	0.99	0.99	17775	1.61	1.2E-02	4.2E-02	796	3	1.61	Unassigned
NIPBL	5	0.99	0.99	17807	1.39	1.4E-02	4.7E-02	885	4	1.39	Singleton
NMNAT2	5	0.98	0.98	17599	1.26	1.3E-02	4.5E-02	857	4	1.26	Singleton
NRIP3	5	0.96	0.96	17061	1.65	1.2E-02	4.0E-02	776	3	1.65	Tier3
NSUN4	5	0.79	0.79	13993	-0.36	1.4E-02	4.6E-02	880	1	-0.36	Singleton
NT5E	4	0.57	0.59	10984	1.10	1.6E-02	5.0E-02	1011	2	1.10	Singleton
NUP88	4	0.13	0.22	4413	1.40	1.3E-02	4.3E-02	848	3	1.40	Singleton
ORC4	4	0.15	0.25	4918	1.75	1.2E-02	3.9E-02	777	3	1.75	Tier2
PAFAH1B1	4	0.65	0.66	11927	1.41	1.5E-02	4.8E-02	969	3	1.41	Singleton
PBX3	5	0.85	0.85	15139	0.60	1.1E-02	3.9E-02	749	2	0.60	Singleton
PDCD5	4	0.43	0.50	9732	1.68	1.6E-02	4.9E-02	989	3	1.68	Tier2
PDE4B	5	0.18	0.31	5531	0.39	1.3E-02	4.3E-02	821	1	0.39	Singleton
PDRG1	5	0.83	0.83	14779	0.17	1.1E-02	3.8E-02	744	1	0.17	Singleton
PECR	5	0.78	0.78	13869	1.06	1.3E-02	4.5E-02	856	4	1.06	Tier2
PHTF1	4	0.53	0.56	10585	1.46	1.4E-02	4.5E-02	891	3	1.46	Tier2
PHYHIP	5	0.16	0.29	5089	-0.02	1.5E-02	4.9E-02	944	2	-0.02	Tier2
PIAS1	5	0.84	0.84	14971	-0.41	1.4E-02	4.6E-02	882	2	-0.41	Singleton
PIDD	5	0.88	0.88	15711	1.05	1.3E-02	4.4E-02	844	4	1.05	Tier3
PIK3R5	5	0.97	0.97	17263	1.09	1.2E-02	4.1E-02	788	4	1.09	Tier2
PLA2G4A	5	0.99	0.99	17723	1.45	1.1E-02	3.7E-02	725	4	1.45	Tier3

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
PLCD4	5	0.99	0.99	17734	1.45	1.4E-02	4.7E-02	890	4	1.45	Singleton
POMP	5	0.48	0.58	10161	0.21	1.2E-02	4.0E-02	771	2	0.21	Tier2
PPAN-P2RY11	1	0.95	0.95	17019	2.22	4.7E-02	4.7E-02	2341	1	2.22	Singleton
PPP2R5A	5	0.14	0.27	4736	1.32	1.3E-02	4.3E-02	824	4	1.32	Tier2
PRPF8	5	0.99	0.99	17717	1.04	1.5E-02	5.0E-02	951	4	1.04	Unassigned
PSMA1	4	0.09	0.17	3411	-0.66	1.6E-02	4.8E-02	972	1	-0.66	Singleton
PTPN1	5	0.96	0.96	17226	1.52	1.4E-02	4.7E-02	903	4	1.52	Tier2
RAB1A	5	0.02	0.06	1070	1.60	1.1E-02	3.9E-02	752	3	1.60	Unassigned
RAB22A	4	0.77	0.77	13765	1.33	1.2E-02	4.1E-02	800	2	1.33	Tier2
RAB9B	5	0.12	0.24	4160	0.76	1.3E-02	4.5E-02	858	3	0.76	Singleton
RABL3	4	0.18	0.29	5534	0.56	1.6E-02	4.9E-02	985	2	0.56	Tier2
RAD1	4	0.00	0.00	14	-2.94	1.5E-02	4.7E-02	949	1	-2.94	Unassigned
RAF1	5	0.41	0.55	9495	0.19	1.4E-02	4.7E-02	907	2	0.19	Singleton
RANBP1	5	0.07	0.16	2867	0.12	1.3E-02	4.3E-02	822	2	0.12	Tier2
RANBP3	5	0.23	0.37	6486	1.61	1.4E-02	4.7E-02	896	3	1.61	Tier2
RASA3	5	0.73	0.73	12954	1.56	1.4E-02	4.6E-02	871	3	1.56	Unassigned
RASL11B	5	0.48	0.58	10167	1.62	1.2E-02	4.1E-02	780	4	1.62	Tier3
RBM45	5	0.20	0.34	5927	0.93	1.3E-02	4.4E-02	843	3	0.93	Singleton
RHD	5	0.05	0.13	2391	-0.55	1.4E-02	4.7E-02	892	2	-0.55	Singleton
ROCK1	5	0.78	0.78	13802	1.67	1.3E-02	4.3E-02	829	3	1.67	Tier3
RPH3A	5	0.85	0.85	15059	1.39	1.1E-02	3.8E-02	746	3	1.39	Tier2
RPL32	2	0.13	0.17	4469	0.38	2.6E-02	4.7E-02	1468	1	0.38	Singleton
RPL35A	3	0.03	0.07	1568	-1.82	1.6E-02	4.3E-02	1022	1	-1.82	Singleton
RPS29	2	0.74	0.74	13194	1.70	2.0E-02	3.8E-02	1218	1	1.70	Singleton
RRAGA	5	0.85	0.85	15076	1.58	1.3E-02	4.5E-02	855	3	1.58	Singleton
RRM2	5	0.22	0.35	6158	1.33	1.4E-02	4.5E-02	864	4	1.33	Tier2
SACM1L	5	0.96	0.96	17237	0.56	1.5E-02	5.0E-02	948	2	0.56	Singleton
SARS	5	0.40	0.54	9378	0.66	1.2E-02	4.0E-02	774	2	0.66	Singleton
SDAD1	5	0.00	0.01	125	-1.61	1.3E-02	4.5E-02	851	2	-1.61	Tier3
SERPINB1	5	0.02	0.06	1107	1.56	1.5E-02	4.9E-02	929	4	1.56	Unassigned
SERPINE2	5	0.82	0.82	14680	1.27	1.3E-02	4.3E-02	826	4	1.27	Singleton
SF3A3	4	0.98	0.98	17550	1.56	1.2E-02	4.1E-02	797	3	1.56	Unassigned
SFTPB	5	0.99	0.99	17678	1.27	1.3E-02	4.4E-02	839	4	1.27	Unassigned
SGSM2	5	0.96	0.96	17144	1.09	1.4E-02	4.6E-02	881	4	1.09	Unassigned
SIAH1	4	0.81	0.81	14491	1.18	1.2E-02	4.1E-02	803	2	1.18	Tier2
SIPA1L2	5	0.50	0.60	10366	0.02	1.4E-02	4.7E-02	908	2	0.02	Singleton
SLC16A6	5	0.02	0.06	1054	-1.00	1.3E-02	4.4E-02	838	2	-1.00	Unassigned
SLC25A11	5	0.98	0.98	17505	1.07	1.1E-02	3.8E-02	747	4	1.07	Tier3
SLC35A2	5	0.35	0.49	8456	0.97	1.1E-02	3.9E-02	755	3	0.97	Tier2

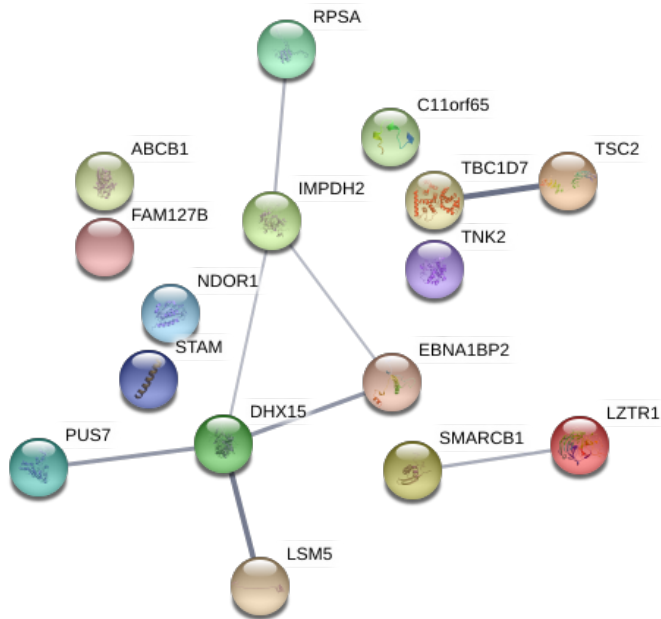
Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
SLC35A3	5	0.00	0.02	374	-1.81	1.1E-02	3.9E-02	763	2	-1.81	Singleton
SLC38A2	5	0.99	0.99	17726	1.21	1.1E-02	3.8E-02	735	4	1.21	Tier3
SMARCA1	5	0.35	0.49	8525	0.34	1.4E-02	4.5E-02	865	2	0.34	Singleton
SMCO4	3	0.97	0.97	17297	1.87	1.6E-02	4.3E-02	1014	3	1.87	Tier3
SNX9	4	0.52	0.56	10540	0.51	1.5E-02	4.7E-02	930	2	0.51	Singleton
SPAST	5	0.03	0.08	1435	0.31	1.2E-02	4.0E-02	766	2	0.31	Unassigned
SPATA31A3	1	0.96	0.96	17201	2.35	3.8E-02	3.8E-02	1980	1	2.35	Singleton
SRFBP1	5	0.71	0.72	12733	1.65	1.2E-02	4.1E-02	784	3	1.65	Tier3
SRP19	4	0.99	0.99	17702	1.43	1.2E-02	4.1E-02	799	4	1.43	Tier3
SRP54	4	0.00	0.01	224	-1.28	1.6E-02	4.9E-02	983	2	-1.28	Singleton
SSBP2	4	0.23	0.35	6442	1.24	1.1E-02	3.8E-02	758	2	1.24	Tier2
SSX2	3	0.20	0.30	5949	1.44	1.7E-02	4.4E-02	1047	2	1.44	Tier3
SUB1	4	0.00	0.01	192	-2.54	1.6E-02	4.9E-02	997	1	-2.54	Singleton
SUMO2	2	0.85	0.85	15220	1.94	2.2E-02	4.0E-02	1296	1	1.94	Singleton
SYNGR3	5	0.94	0.94	16838	1.29	1.3E-02	4.5E-02	860	4	1.29	Unassigned
TAAR8	5	0.30	0.44	7673	1.63	1.3E-02	4.5E-02	862	4	1.63	Unassigned
TAGLN2	5	0.92	0.92	16308	0.75	1.4E-02	4.7E-02	895	3	0.75	Tier2
TDGF1	3	0.99	0.99	17660	1.47	1.4E-02	3.7E-02	893	3	1.47	Unassigned
TKT	5	0.93	0.93	16639	1.06	1.4E-02	4.7E-02	889	4	1.06	Unassigned
TMED7-TICAM2	2	0.97	0.97	17396	1.45	2.7E-02	4.9E-02	1513	2	1.45	Unassigned
TMEM109	5	0.65	0.68	11966	1.21	1.2E-02	4.2E-02	805	3	1.21	Tier2
TMEM192	5	0.30	0.44	7665	1.66	1.2E-02	4.2E-02	808	3	1.66	Tier2
TMEM50A	4	0.80	0.80	14293	1.34	1.5E-02	4.8E-02	959	2	1.34	Tier2
TNFRSF17	5	0.21	0.34	6005	1.60	1.3E-02	4.5E-02	861	3	1.60	Tier3
TNS4	5	0.12	0.24	4215	1.59	1.4E-02	4.6E-02	873	3	1.59	Tier3
TOX4	5	0.21	0.34	6077	1.17	1.4E-02	4.7E-02	905	3	1.17	Tier2
TRIM45	5	0.97	0.97	17407	1.11	1.3E-02	4.5E-02	849	4	1.11	Unassigned
TSFM	5	0.94	0.94	16859	1.34	1.2E-02	4.1E-02	783	4	1.34	Tier3
TSPAN13	5	0.92	0.92	16457	1.54	1.2E-02	4.0E-02	773	4	1.54	Tier3
TTC17	4	0.44	0.50	9773	1.64	1.3E-02	4.2E-02	817	3	1.64	Tier3
TYR	4	0.95	0.95	16885	1.48	1.3E-02	4.3E-02	859	3	1.48	Singleton
UBA2	4	0.07	0.15	2865	0.31	1.5E-02	4.6E-02	922	2	0.31	Tier2
UBE3D	5	0.20	0.34	5933	1.37	1.1E-02	3.9E-02	762	4	1.37	Singleton
UGCG	5	0.04	0.11	2006	1.55	1.4E-02	4.7E-02	909	3	1.55	Tier3
UNC13D	5	0.99	0.99	17832	1.46	1.3E-02	4.4E-02	840	4	1.46	Singleton
UQCC2	5	0.58	0.64	11083	1.58	1.3E-02	4.5E-02	847	3	1.58	Unassigned
UROD	5	0.01	0.02	512	1.17	1.2E-02	4.0E-02	772	3	1.17	Unassigned
USF2	5	0.98	0.98	17549	1.18	1.4E-02	4.5E-02	869	4	1.18	Tier2
VASH1	5	0.21	0.34	5979	-0.44	1.1E-02	3.9E-02	754	1	-0.44	Singleton

Gene ID	Num	neg score	neg p-value	neg rank	neg lfc	pos score	pos p-value	pos rank	pos goodsgrna	pos lfc	Tiers
VPREB1	5	0.84	0.84	14963	1.27	1.3E-02	4.5E-02	853	4	1.27	Tier2
WNT6	4	0.40	0.48	9368	-0.23	1.5E-02	4.6E-02	926	1	-0.23	Singleton
WNT7A	5	0.54	0.61	10654	1.15	1.1E-02	3.8E-02	728	4	1.15	Singleton
WNT8A	5	0.43	0.56	9696	1.72	1.1E-02	3.8E-02	731	4	1.72	Tier2
XPO4	5	0.99	0.99	17855	1.01	1.5E-02	4.9E-02	931	4	1.01	Tier2
ZDHHC6	5	0.95	0.95	16957	0.44	1.3E-02	4.5E-02	852	2	0.44	Tier2
ZFP2	5	0.58	0.64	11072	1.63	1.2E-02	4.0E-02	778	4	1.63	Tier2
ZIC4	11	0.02	0.06	941	0.87	7.7E-03	4.0E-02	565	6	0.87	Tier3
ZNF285	5	0.25	0.38	6745	1.16	1.4E-02	4.5E-02	866	4	1.16	Tier2
ZNF468	7	0.09	0.22	3339	-0.28	9.1E-03	3.8E-02	642	2	-0.28	Tier2
ZNF556	5	0.82	0.82	14545	1.38	1.4E-02	4.7E-02	888	4	1.38	Tier2
ZNF683	5	0.77	0.77	13645	0.50	1.2E-02	4.0E-02	768	2	0.50	Tier2
ZSWIM2	5	0.99	0.99	17661	1.60	1.3E-02	4.3E-02	827	4	1.60	Unassigned

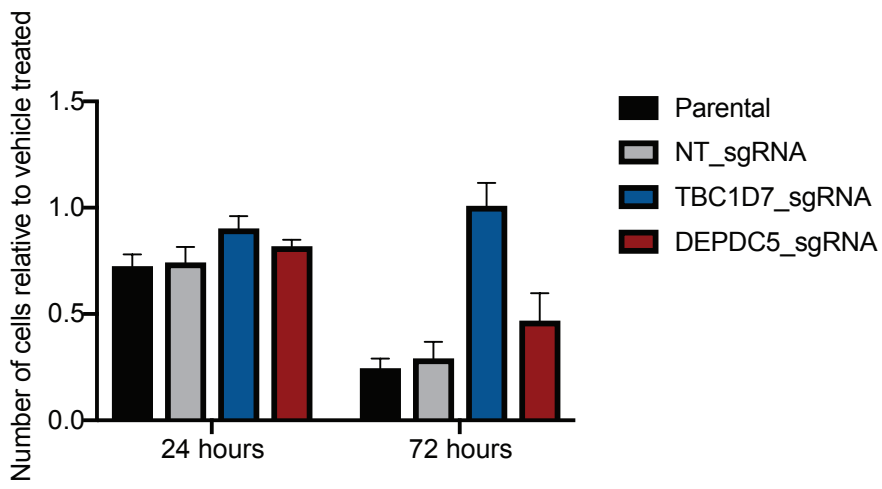
Supplementary Table 2. GSEA analyses for combined tiers 1,2,3.

geneSet	description	normalizedEn	pValue	size	userId
hsa03018	RNA degradation	1.72759804	0.00104932	12	CNOT3;CNOT6;EXOSC10;EXOSC8;LSM5
hsa05168	Herpes simplex infection	1.65370929	0.00205973	14	CCL2;CDK1;IFNGR2;SRPK1;TNFRSF14
hsa04910	Insulin signaling pathway	1.61328357	0.00539374	9	EIF4E;PHKG1;TSC1;TSC2
hsa05231	Choline metabolism in cancer	1.5763168	0.0030896	14	TSC1;TSC2
hsa04211	Longevity regulating pathway	1.59041059	0.00661521	7	EIF4E;TSC1;TSC2
hsa04640	Hematopoietic cell lineage	-1.0538121	0.36082474	7	CD3G;GP5;HLA-DQA1;ITGA2;ITGA3;ITGAM;TFRC
hsa03010	Ribosome	1.33807098	0.07331976	14	MRPL1;MRPL17;MRPL32;MRPS10;MRPS12;RPL19;RPL27A;RPS13;RPS27L;RPSA
hsa04115	p53 signaling pathway	1.3442413	0.07724426	13	CDK1;TSC2
hsa04150	mTOR signaling pathway	1.47487899	0.01004016	24	EIF4E;FZD10;NPRL2;RPS6KA6;SLC7A5;TBC1D7;TSC1;TSC2
hsa03022	Basal transcription factors	1.34659342	0.11135857	7	GTF2H4;TAF2;TAF7
hsa04216	Ferroptosis	-1.003018	0.46666666	9	ACSL4;ATG7;FTL;MAP1LC3A;MAP1LC3C;SLC39A14;SLC40A1;STEAP3;TFRC
hsa04919	Thyroid hormone signaling pathway	1.34742967	0.09284952	10	TSC2
hsa01524	Platinum drug resistance	-1.0668721	0.34782608	8	ABCC2;AKT2;BBC3;BIRC5;CASP9;GSTA3;GSTM3;GSTO2
hsa04012	ErbB signaling pathway	-1.1045096	0.28571428	5	ABL2;AKT2;JUN;MAP2K2;PRKCB
hsa05160	Hepatitis C	-1.154562	0.23913043	6	AKT2;CLDN14;CLDN4;IRF3;NR1H3;RIPK1
hsa04370	VEGF signaling pathway	-0.6652701	0.96350364	6	AKT2;CASP9;MAP2K2;PLA2G4A;PLA2G4C;PRKCB
hsa04730	Long-term depression	-0.7126874	0.91538461	6	LYN;MAP2K2;PLA2G4A;PLA2G4C;PRKCB;PRKG2
hsa04514	Cell adhesion molecules (CAMs)	-1.2628601	0.17142857	8	CLDN14;CLDN4;HLA-DQA1;ITGAM;MPZL1;NRXN1;PTPRC;SELL
hsa04620	Toll-like receptor signaling pathway	-1.2985066	0.12380952	7	AKT2;FOS;IRF3;JUN;MAP2K2;RIPK1;TICAM2
hsa04917	Prolactin signaling pathway	-1.1642552	0.22222222	5	AKT2;CCND2;CYP17A1;FOS;MAP2K2

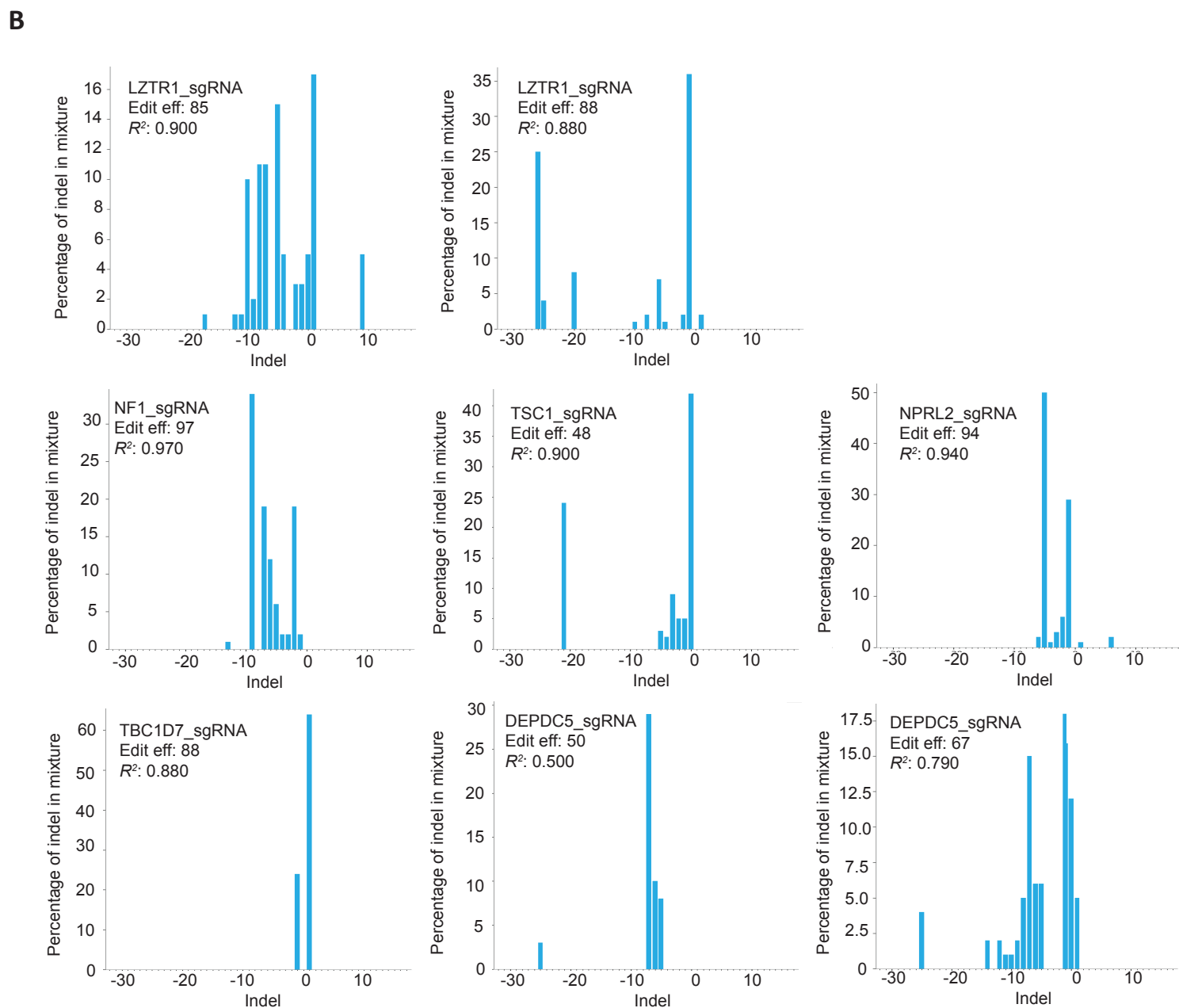
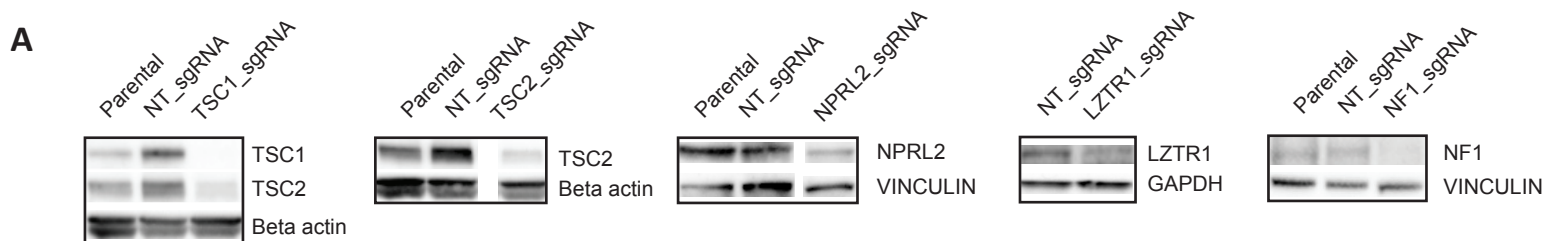
Supplementary Figure 1. String Network analyses of Tier 1 candidates



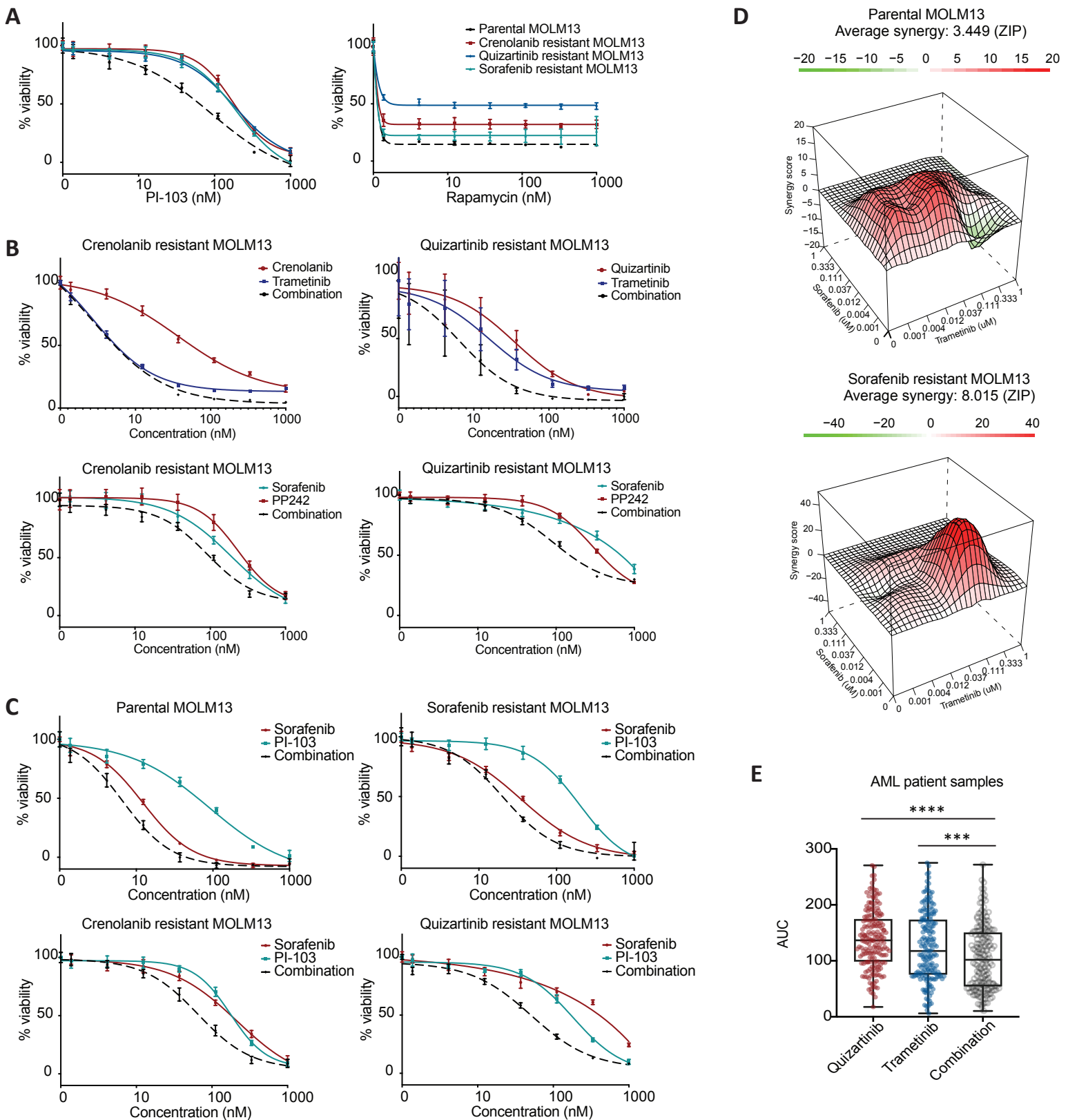
#term ID	term description	observed gene	background g	false discover	matching proteins in your network (IDs)	matching proteins in your network (labels)
HSA-8953854	Metabolism of RNA	5	652	0.0125	ENSP00000336741,ENSP00000346067,	DHX15,EBNA1BP2,LSM5,PUS7,RPSA
HSA-8854214	TBC/RABGAPs	2	43	0.0282	ENSP00000219476,ENSP00000475727	TBC1D7,TSC2



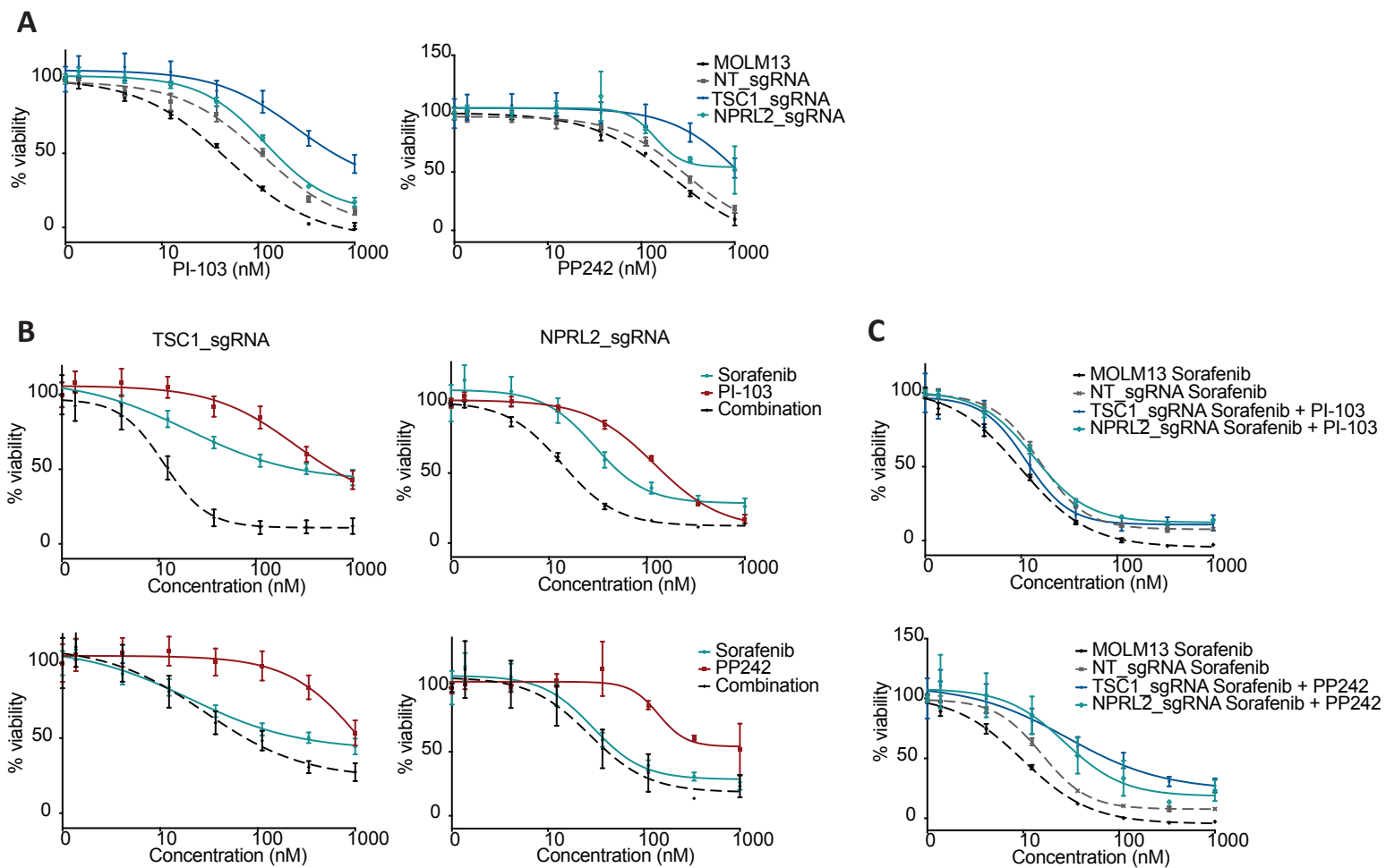
Supplementary figure 2 Sorafenib sensitivity in TBC1D7 and DEPDC5 deficient MOLM13 cells. Cells were treated with 50nM sorafenib or vehicle alone (DMSO) for indicated times and the number of viable cells were determined using Guava® ViaCount™ (Luminex). Histogram represents number of viable cells in sorafenib treated cultures relative to vehicle alone.



Supplementary figure 3 Validation of sgRNA efficiency using Western blot analysis and ICE assay. **A.** Immunoblot analysis of protein lysates from MOLM13 parental and MOLM13 transduced with non-targeting control, TSC1, TSC2, NPRL2, LZTR1, and NF1 sgRNAs using indicated antibodies. **B.** Analyses for sgRNA effectiveness in MOLM13 cells inactivated for LZTR1, TSC1, NF1 and NPRL2 individually using corresponding sgRNAs. Chromatograms were analyzed for percent of various deletions using ICE assay.



Supplementary figure 4. Evaluation of sensitivity to MTOR inhibitors and combination of FLT3 and trametinib or FLT3 and MTOR inhibitors. **A.** FLT3i-resistant MOLM13 cell lines described in Fig 3A were tested for sensitivity to MTOR inhibitors, PI-103 and rapamycin, in 72 hour drug sensitivity assays as described in Fig 3A. **B, C.** Dose response curves of indicated single agents or their combination on parental and FLT3 inhibitor resistant MOLM13 cells. Drug combinations were tested at equimolar concentrations and sensitivity was assessed as in Fig 3A. **D.** Surface plots generated by R_SynergyFinder for the combination of sorafenib and trametinib on parental (top) or sorafenib resistant (bottom) MOLM13 cells. **E.** Scatter plots showing sensitivity to quizartinib, trametinib, or their combination as area under the dose response curve (AUC) in ex vivo AML patient samples (n =181). AUCs were analyzed using a one-way ANOVA/Friedman test: *** denotes p < 0.0001, ****, p < 0.00001, n.s.



Supplementary figure 5. Evaluation of sensitivity to MTOR inhibitors and combination of FLT3 and MTOR inhibitors in TSC1 and NPRL2 deficient cells. **A.** Sensitivity to MTOR inhibitors, PI-103 and PP242, of TSC1 and NPRL2 deficient MOLM13 cell lines were determined in 72 hour drug sensitivity assays as in Fig 3A. **B, C.** Dose response curves of indicated single agents or their combination on TSC1 and NPRL2 deficient MOLM13 cells. Drug combinations were tested at equimolar concentrations and sensitivity was assessed as in Fig 3A.