



**Figure S1** The negative and positive control of IHC. (A) Negative control: IHC staining of serous ovarian cancer tissue. Normal rabbit immunoglobulins were used as primary antibodies. (B) Positive control: IHC staining of SphK2 in human breast cancer tissue. The scale bar represents 60  $\mu$ m. IHC, immunohistochemistry.

**Table S1** 100 most significant changed genes of SKOV3 cells transfected with SphK2 shRNA

GeneSymbol	Normalized signal (log2) of NC1	Normalized signal (log2) of NC2	Normalized signal (log2) of NC3	Normalized signal (log2) of SphK2-1	Normalized signal (log2) of SphK2-2	Normalized signal (log2) of SphK2-3	Gene_ID	Accession
<i>CAPN13</i>	1.723441	1.821052	1.618743	6.354988	6.531311	6.218926	92291	AK074418
<i>STON1-GTF2A1L</i>	1.663951	1.801454	1.463038	6.213173	6.139173	6.350677	286749	NM_172311
<i>TMEM169</i>	1.699259	1.836763	1.769648	6.167417	6.093417	6.304921	92691	NM_138390
<i>SERPINA7</i>	1.658265	1.506262	1.457353	6.122579	6.23361	6.002284	6906	NM_000354
<i>FAM189A2</i>	1.962786	1.826724	2.060397	6.226503	6.137235	6.152502	9413	NM_004816
<i>OR2F1</i>	2.702354	2.903988	2.865853	6.808706	6.933034	6.906317	26211	NM_012369
<i>CRHR1</i>	1.984403	2.121907	1.879706	6.081669	5.992402	6.1927	1394	NM_004382
<i>CXCR2</i>	2.808716	2.946219	2.906327	6.876749	6.787482	6.98778	3579	NM_001557
<i>PLIN5</i>	1.710634	1.605937	1.59034	5.689104	5.584406	5.63021	440503	NM_001013706
<i>LHCGR</i>	1.621096	1.436671	1.452973	5.595267	5.506	5.536373	3973	NM_000233
<i>LRRC55</i>	1.689812	1.853311	1.600545	5.655633	5.779961	5.596739	219527	NM_001005210
<i>SPOCK2</i>	1.925069	2.062572	1.724156	5.848576	5.959607	5.98608	9806	NM_014767
<i>UGT3A1</i>	1.622032	1.548031	1.517334	5.456356	5.526745	5.593859	133688	NM_152404
<i>AXDND1</i>	2.172279	2.26989	2.242669	5.927011	5.806717	6.064515	126859	NM_144696
<i>DCAF12L1</i>	1.735571	1.873074	1.833181	5.389985	5.300718	5.501017	139170	NM_178470
<i>WDTC1</i>	1.791825	1.717825	1.687128	5.423995	5.494385	5.349995	23038	NM_015023
<i>PSD</i>	1.91226	2.009871	1.791966	5.438491	5.333794	5.575995	5662	NM_002779
<i>KRT17P5</i>	1.669043	1.484619	1.500921	5.160319	5.071052	5.25793	339240	NR_001443
<i>Inc-C14orf28-1</i>	1.686466	1.502042	1.518344	5.157382	5.068115	5.098488	Inc-C14orf28-1:3	
<i>MYOT</i>	1.798899	1.597987	1.709632	5.208702	5.33303	5.306313	9499	NM_006790
<i>CHRNA7</i>	3.026047	3.16355	2.921349	6.407561	6.318293	6.271499	1146	NM_005199
<i>RP1L1</i>	3.26524	3.113236	3.349304	6.599514	6.494816	6.479219	94137	NM_178857
<i>ZNF665</i>	2.859678	2.930067	2.75498	6.158239	6.228628	6.084238	79788	NM_024733
<i>GPR6</i>	1.879664	2.003992	1.711542	5.134558	5.191142	5.232169	2830	NM_005284
<i>PPP2R2B</i>	1.959794	1.855097	1.8395	5.212759	5.108062	5.350263	5521	NM_001271948
<i>COL19A1</i>	1.859919	1.997422	1.755221	5.084918	4.99565	4.948856	1310	NM_001858
<i>PPP1R3C</i>	1.831188	1.72649	1.710894	5.012698	4.908001	5.150202	5507	NM_005398
<i>SLC6A2</i>	1.822543	1.67054	1.62163	4.999193	5.110224	5.136697	6530	NM_001043
<i>KCNG4</i>	1.9361	2.060428	1.767977	5.055805	4.966538	5.153416	93107	NM_172347
<i>ZNF558</i>	2.949439	3.019828	2.844741	6.05615	6.126539	5.982149	148156	AK055494
<i>RPS4Y2</i>	1.724131	1.572128	1.808195	4.777621	4.888652	4.657327	140032	NM_001039567
<i>PRY2</i>	1.673558	1.771169	1.553264	4.721532	4.616835	4.859036	442862	NM_001002758
<i>TPMT</i>	1.6696	1.5956	1.73999	4.668473	4.594472	4.805976	7172	NM_000367
<i>ATP10B</i>	3.802994	3.900605	3.873383	6.787623	6.667328	6.925126	23120	NM_025153

Table S1 (continued)

Table S1 (continued)

GeneSymbol	Normalized signal (log2) of NC1	Normalized signal (log2) of NC2	Normalized signal (log2) of NC3	Normalized signal (log2) of SphK2-1	Normalized signal (log2) of SphK2-2	Normalized signal (log2) of SphK2-3	Gene_ID	Accession
<i>LINC00977</i>	1.753568	1.569143	1.585445	4.737893	4.648626	4.678999	728724	NR_033916
<i>CALCA</i>	2.448535	2.546146	2.343838	5.431335	5.607658	5.295273	796	NM_001033952
<i>GRM3</i>	1.720528	1.844856	1.552405	4.693338	4.749921	4.790949	2913	NM_000840
<i>DHRS4-AS1</i>	6.203654	6.341158	6.301265	9.17191	9.082642	9.282941	55449	NR_023921
<i>MMRN2</i>	2.360667	2.524166	2.2714	5.310428	5.434756	5.408039	79812	NM_024756
<i>TMEM229B</i>	1.886745	2.024249	1.957134	4.805802	4.731801	4.943305	161145	XR_245666
<i>Inc-WDR7-6</i>	2.97997	3.143469	3.13053	5.881037	5.79177	5.822144	Inc-WDR7-6:1	
<i>HS3ST3B1</i>	1.925637	2.049965	1.757514	4.753639	4.664371	4.85125	9953	NM_006041
<i>KANK3</i>	2.119384	2.243712	1.951261	4.915372	4.826104	5.012982	256949	NM_198471
<i>IL3</i>	1.795209	1.919537	1.627086	4.570705	4.481438	4.668316	3562	NM_000588
<i>LOC102724794</i>	2.389774	2.553272	2.540333	5.144572	5.2689	5.085679	102724794	BC009926
<i>CYP26A1</i>	1.758812	1.896316	1.856423	4.471999	4.382732	4.583031	1592	NM_057157
<i>GPC3</i>	2.455046	2.579374	2.286923	5.167371	5.223955	5.264982	2719	NM_004484
<i>KIF26A</i>	3.871365	3.68694	3.703242	6.515574	6.426307	6.613185	26153	NM_015656
<i>RSBN1L</i>	5.618802	5.466799	5.702866	8.253452	8.364483	8.133158	222194	BM468849
<i>OR7E47P</i>	1.740766	1.9424	1.904265	4.371512	4.49584	4.469123	26628	NR_120438
<i>KIAA1024L</i>	4.577214	4.39279	4.409092	1.7674	1.678133	1.865011	100127206	NM_001257308
<i>GABRR3</i>	5.933716	6.058045	6.031327	3.114626	3.171209	3.040625	200959	NM_001105580
<i>ATP13A4</i>	4.451427	4.549038	4.521816	1.629519	1.509225	1.767023	84239	NM_032279
<i>CD300LG</i>	5.173277	5.021274	5.06858	2.342911	2.519234	2.20685	146894	NM_145273
<i>MUC15</i>	4.515982	4.315069	4.426715	1.667706	1.792034	1.765317	143662	NM_145650
<i>COBLL1</i>	4.641321	4.778824	4.536623	1.789184	1.699916	1.653122	22837	NM_014900
<i>GPR1-AS</i>	4.620425	4.744753	4.452302	1.738813	1.795397	1.836424	101669764	NR_104359
<i>AIM1L</i>	4.768345	4.865956	4.838735	1.869546	1.749252	1.764849	55057	NM_001039775
<i>EIF1AY</i>	4.597503	4.735006	4.695113	1.692469	1.603202	1.618469	9086	NM_004681
<i>LINC00950</i>	5.974328	5.789904	5.806205	3.066059	2.976792	3.007166	92973	NR_024006
<i>KCNS2</i>	4.556707	4.681035	4.388585	1.643771	1.554503	1.741382	3788	NM_020697
<i>FAM84B</i>	5.05626	4.920198	5.15387	2.12875	2.039483	2.05475	157638	NM_174911
<i>TMEM86A</i>	6.237049	6.374553	6.307438	3.308936	3.234936	3.44644	144110	NM_153347
<i>DCANP1</i>	4.575955	4.713459	4.673566	1.642116	1.552848	1.753147	140947	NM_130848
<i>AVPR1A</i>	4.703392	4.801003	4.773781	1.757399	1.637105	1.894903	140947	NM_130848
<i>LOC643659</i>	4.565467	4.728966	4.4762	1.599728	1.724056	1.540834	643659	AK056971
<i>SPHK2</i>	11.1287	11.2662	10.92778	8.114125	8.225156	8.251628	56848	NM_020126
<i>XLOC_I2_000001</i>	4.821869	4.747869	4.717172	1.806649	1.877038	1.732648	TCONS_I2_00001923	

Table S1 (continued)

Table S1 (continued)

GeneSymbol	Normalized signal (log2) of NC1	Normalized signal (log2) of NC2	Normalized signal (log2) of NC3	Normalized signal (log2) of SphK2-1	Normalized signal (log2) of SphK2-2	Normalized signal (log2) of SphK2-3	Gene_ID	Accession
<i>CACNB2</i>	4.92142	5.01903	4.816722	1.801885	1.978208	1.665823	783	AK128769
<i>AGBL4</i>	4.918867	5.016478	4.989257	1.758832	1.869863	1.654134	84871	AK027348
<i>SZT2</i>	5.466478	5.603982	5.536867	2.260969	2.186968	2.398472	23334	NM_015284
<i>PDE5A</i>	5.870075	5.765377	6.033573	2.64736	2.542663	2.588466	8654	NM_001083
<i>ANO4</i>	5.864137	5.961748	5.934527	2.63483	2.514535	2.530132	121601	NM_178826
<i>TRPV3</i>	4.885111	4.81111	4.9555	1.649519	1.575518	1.787022	162514	NM_145068
<i>CTNND2</i>	4.930207	5.06771	4.825509	1.650221	1.560953	1.761252	1501	NM_001332
<i>LOC100505915</i>	5.401384	5.564882	5.551943	2.083278	1.994011	2.024384	100505915	NR_125434
<i>LOC101927770</i>	5.182151	5.34565	5.332711	1.862326	1.986654	1.803432	101927770	NR_110051
<i>PSG11</i>	8.099883	8.197494	7.979589	4.453627	4.348929	4.59113	5680	NM_002785
<i>MSR1</i>	5.382703	5.546202	5.293436	1.729903	1.854232	1.827514	4481	NM_138715
<i>LOC101929172</i>	6.799461	6.96296	6.950021	3.145706	3.270034	3.086812	101929172	NR_104677
<i>GS1-24F4.2</i>	5.341271	5.465599	5.173148	1.648424	1.705008	1.746035	100652791	NR_045217
<i>SYTL1</i>	5.372369	5.509873	5.442759	1.668484	1.594483	1.805987	84958	NM_032872
<i>LOC100131541</i>	5.566218	5.729717	5.716778	1.808116	1.718849	1.749222	100131541	AY358248
<i>SLC7A14</i>	5.420327	5.268324	5.219414	1.649379	1.76041	1.786882	57709	NM_020949
<i>SLC16A12</i>	6.502291	6.350288	6.301378	2.689233	2.800265	2.568939	387700	NM_213606
<i>ENAM</i>	5.457047	5.594551	5.554658	1.617998	1.52873	1.543997	10117	NM_031889
<i>EHD3</i>	5.696453	5.833956	5.794064	1.709446	1.620179	1.635446	30845	NM_014600
<i>PON1</i>	5.733017	5.628319	5.612722	1.70984	1.605143	1.847344	5444	NM_000446
<i>LOC284412</i>	5.739756	5.903255	5.890316	1.705748	1.830076	1.646855	284412	NR_029390
<i>Inc-ARFGEF2-2</i>	5.854138	5.669713	5.686015	1.678698	1.589431	1.619804	-	AK126019
<i>C21orf62</i>	5.925917	6.023528	5.996307	1.745434	1.921757	1.609373	56245	NM_019596
<i>SLC9C2</i>	6.592031	6.440028	6.391118	2.364139	2.47517	2.501642	284525	NM_178527
<i>Inc-PRMT8-2</i>	5.965704	6.129202	6.116263	1.730351	1.641084	1.671458	-	BX096603
<i>CKM</i>	5.93621	6.073713	5.831512	1.698426	1.609159	1.562365	1158	NM_001824
<i>ZNF729</i>	6.886741	6.95713	6.782043	2.459713	2.530103	2.385713	100287226	NM_001242680
<i>OR51A7</i>	6.135948	6.337582	6.299447	1.651183	1.775511	1.748794	119687	NM_001004749
<i>NBEAL2</i>	6.147131	5.946218	6.057864	1.643982	1.76831	1.741593	23218	NM_015175
<i>OPRM1</i>	6.384385	6.586019	6.547884	1.753117	1.877445	1.850728	4988	NM_000914
<i>SCGB1D2</i>	6.390669	6.238666	6.474733	1.601543	1.712574	1.481249	10647	NM_006551
<i>LNX1</i>	6.436681	6.600179	6.58724	1.602565	1.513298	1.543671	84708	NM_032622

SphK2, sphingosine kinase 2; shRNA, short hairpin RNA; NC, negative control; ID, identification.

**Table S2** HALLMARK\_MYC\_TARGETS\_V1 (GSEA details)

Name	Probe	Rank metric score	Running ES	Core enrichment
row_0	UBA2	0.75295496	-0.051006	No
row_1	SMARCC1	0.441985309	-0.100376	No
row_2	SNRPD1	0.38816756	-0.111042	No
row_3	HNRNPU	0.275371343	-0.1672	No
row_4	MRPS18B	0.232058719	-0.192292	No
row_5	MYC	0.22204265	-0.195249	No
row_6	RRM1	0.207781792	-0.203505	No
row_7	TUFM	0.141880929	-0.272709	No
row_8	HNRNPA1	0.139995366	-0.271861	No
row_9	CCT2	0.138858914	-0.269999	No
row_10	UBE2L3	0.135779649	-0.270392	No
row_11	XRCC6	0.134474739	-0.268882	No
row_12	TOMM70A	0.134389117	-0.265936	No
row_13	NHP2	0.132905856	-0.264562	No
row_14	RANBP1	0.132039443	-0.262614	No
row_15	AP3S1	0.130847111	-0.260744	No
row_16	TRIM28	0.127579734	-0.261233	No
row_17	GSPT1	0.125280172	-0.261529	No
row_18	PSMA6	0.123724453	-0.260324	No
row_19	PSMD8	0.119761556	-0.261892	No
row_20	POLE3	0.109567322	-0.270549	No
row_21	IMPDH2	0.1076736	-0.271015	No
row_22	NCBP2	0.107079968	-0.269313	No
row_23	PSMA2	0.106365785	-0.267528	No
row_24	CAD	0.104962997	-0.26677	No
row_25	CCNA2	0.103091829	-0.266601	No
row_26	XPO1	0.102699079	-0.264408	No
row_27	HNRNPD	0.101317599	-0.263239	No
row_28	RPL22	0.100557022	-0.261345	No
row_29	H2AFZ	0.09926755	-0.260622	No
row_30	YWHAQ	0.085262917	-0.276851	No
row_31	PRPF31	0.075119957	-0.289997	No
row_32	GNB2L1	0.06710469	-0.299911	No
row_33	SNRPA1	0.063945368	-0.302707	No
row_34	HNRNPC	0.056119565	-0.312088	No

Table S2 (continued)

Table S2 (continued)

Name	Probe	Rank metric score	Running ES	Core enrichment
row_35	RPS5	0.055559836	-0.311363	No
row_36	PSMD7	0.05439749	-0.311359	No
row_37	RPL34	0.052501261	-0.312691	No
row_38	XPOT	0.052221946	-0.311896	No
row_39	CLNS1A	0.052013975	-0.310858	No
row_40	PCNA	0.045902282	-0.317307	No
row_41	NDUFAB1	0.045787055	-0.316318	No
row_42	NOLC1	0.045039382	-0.31619	No
row_43	IFRD1	0.044070806	-0.316432	No
row_44	IARS	0.036820859	-0.324833	No
row_45	SNRPB2	0.03491557	-0.326434	No
row_46	NME1	0.028353699	-0.33459	No
row_47	PSMB2	0.026027661	-0.337444	No
row_48	HSPD1	0.025041765	-0.338585	No
row_49	HNRNPA3	0.025041739	-0.33799	No
row_50	GNL3	0.024733359	-0.337799	No
row_51	MRPL23	0.020495223	-0.341876	No
row_52	MCM7	0.020237211	-0.341841	No
row_53	RAN	0.019865079	-0.342163	No
row_54	HSPE1	0.017159631	-0.345128	No
row_55	CDK4	0.015760908	-0.346886	No
row_56	PSMA1	0.015633628	-0.346763	No
row_57	PPM1G	0.014878112	-0.347203	No
row_58	RPLP0	0.013469636	-0.348619	No
row_59	CSTF2	0.009877304	-0.353246	No
row_60	PSMD14	0.00620796	-0.357513	No
row_61	RPL14	0.004616383	-0.359437	No
row_62	PPIA	0.002007276	-0.362763	No
row_63	SRSF2	-0.014217941	-0.385741	No
row_64	PGK1	-0.018825812	-0.391197	No
row_65	RPL18	-0.019023182	-0.390893	No
row_66	RPS3	-0.021245448	-0.392819	No
row_67	RSL1D1	-0.021759583	-0.393244	No
row_68	RPS10	-0.026557757	-0.399012	No
row_69	PSMC4	-0.03433685	-0.408912	No

Table S2 (continued)

Table S2 (continued)

Name	Probe	Rank metric score	Running ES	Core enrichment
row_70	HDGF	-0.035441697	-0.409905	No
row_71	PSMA7	-0.035912897	-0.409597	No
row_72	FBL	-0.035930786	-0.408792	No
row_73	HPRT1	-0.037053823	-0.4093	No
row_74	TRA2B	-0.039255165	-0.410996	No
row_75	RRP9	-0.040565018	-0.411917	No
row_76	UBE2E1	-0.040684555	-0.411198	No
row_77	LSM2	-0.054305311	-0.428956	No
row_78	CDK2	-0.054875091	-0.428247	No
row_79	TXNL4A	-0.065190256	-0.44029	No
row_80	GLO1	-0.065689772	-0.439225	No
row_81	TFDP1	-0.067489475	-0.439505	No
row_82	VBP1	-0.072169319	-0.443147	No
row_83	C1QBP	-0.078820862	-0.450054	No
row_84	PTGES3	-0.083282806	-0.453829	No
row_85	LSM7	-0.084112555	-0.452673	No
row_86	SSBP1	-0.084295653	-0.450768	No
row_87	EPRS	-0.085567839	-0.450421	No
row_88	TCP1	-0.11050456	-0.476567	No
row_89	SNRPG	-0.115020134	-0.478992	No
row_90	COPS5	-0.11821723	-0.480051	No
row_91	APEX1	-0.11884474	-0.477722	No
row_92	RPL6	-0.122988902	-0.479511	No
row_93	YWHAE	-0.124661528	-0.477787	No
row_94	DDX18	-0.130250916	-0.48119	No
row_95	GOT2	-0.131161422	-0.478965	No
row_96	HDDC2	-0.132284909	-0.476663	No
row_97	SRPK1	-0.146622136	-0.487118	Yes
row_98	NOP56	-0.148529723	-0.485174	Yes
row_99	EIF4G2	-0.149976537	-0.483048	Yes
row_100	RUVBL2	-0.151623368	-0.481428	Yes
row_101	FAM120A	-0.157058418	-0.483201	Yes
row_102	DHX15	-0.160647944	-0.482954	Yes
row_103	ODC1	-0.161853611	-0.480693	Yes
row_104	PSMC6	-0.163321689	-0.478398	Yes

Table S2 (continued)

Table S2 (continued)

Name	Probe	Rank metric score	Running ES	Core enrichment
row_105	VDAC3	-0.169090107	-0.479786	Yes
row_106	SSB	-0.171148852	-0.477751	Yes
row_107	EIF2S1	-0.17292048	-0.475575	Yes
row_108	PSMD3	-0.174922407	-0.473947	Yes
row_109	MCM6	-0.177651942	-0.472552	Yes
row_110	CBX3	-0.178819522	-0.469194	Yes
row_111	PWP1	-0.183310106	-0.468705	Yes
row_112	ORC2	-0.192079425	-0.471382	Yes
row_113	HNRNPA2B1	-0.193108097	-0.467635	Yes
row_114	SRSF3	-0.19625476	-0.465797	Yes
row_115	KPNA2	-0.19806917	-0.462924	Yes
row_116	EIF2S2	-0.200332135	-0.459501	Yes
row_117	ILF2	-0.204584301	-0.458408	Yes
row_118	SNRPD3	-0.204796284	-0.453738	Yes
row_119	CCT5	-0.20759435	-0.450986	Yes
row_120	RNPS1	-0.209443837	-0.447198	Yes
row_121	MAD2L1	-0.214259252	-0.445924	Yes
row_122	TYMS	-0.215162262	-0.441454	Yes
row_123	POLD2	-0.225046277	-0.442851	Yes
row_124	RPS6	-0.225984603	-0.438471	Yes
row_125	BUB3	-0.228153363	-0.434982	Yes
row_126	STARD7	-0.229092807	-0.430677	Yes
row_127	EEF1B2	-0.231023133	-0.426773	Yes
row_128	DEK	-0.231684506	-0.421662	Yes
row_129	HSP90AB1	-0.232376978	-0.416733	Yes
row_130	PHB2	-0.236070171	-0.413403	Yes
row_131	PSMD1	-0.23623085	-0.408036	Yes
row_132	SYNCRIP	-0.239132211	-0.404583	Yes
row_133	PHB	-0.23959583	-0.399036	Yes
row_134	PSMA4	-0.241566703	-0.394931	Yes
row_135	PRDX3	-0.243438482	-0.39093	Yes
row_136	NAP1L1	-0.243779406	-0.385383	Yes
row_137	TARDBP	-0.245692894	-0.380832	Yes
row_138	SERBP1	-0.248633698	-0.376856	Yes
row_139	U2AF1	-0.25003773	-0.371855	Yes

Table S2 (continued)



Table S2 (continued)

Name	Probe	Rank metric score	Running ES	Core enrichment
row_140	PCBP1	-0.250153869	-0.365908	Yes
row_141	PRPS2	-0.251016259	-0.360437	Yes
row_142	CUL1	-0.25416702	-0.355734	Yes
row_143	NPM1	-0.26072982	-0.353356	Yes
row_144	VDAC1	-0.262458354	-0.347762	Yes
row_145	RFC4	-0.266047537	-0.344067	Yes
row_146	G3BP1	-0.269299239	-0.340244	Yes
row_147	CDC20	-0.273317069	-0.336178	Yes
row_148	NOP16	-0.278643012	-0.333225	Yes
row_149	EXOSC7	-0.280433416	-0.327501	Yes
row_150	EIF3B	-0.281347871	-0.321458	Yes
row_151	MCM5	-0.288626343	-0.319061	Yes
row_152	SET	-0.296802521	-0.316272	Yes
row_153	CNBP	-0.29850772	-0.310218	Yes
row_154	ABCE1	-0.300362378	-0.303921	Yes
row_155	CYC1	-0.306511402	-0.299859	Yes
row_156	USP1	-0.306835771	-0.292614	Yes
row_157	ERH	-0.307143658	-0.285511	Yes
row_158	CDC45	-0.309706509	-0.27934	Yes
row_159	NCBP1	-0.311334372	-0.272931	Yes
row_160	PABPC4	-0.31315735	-0.26628	Yes
row_161	KPNB1	-0.313886315	-0.258818	Yes
row_162	MRPL9	-0.314340293	-0.251693	Yes
row_163	SRSF7	-0.314915717	-0.244753	Yes
row_164	SNRPD2	-0.317407101	-0.238497	Yes
row_165	CCT7	-0.31781745	-0.231091	Yes
row_166	EIF3J	-0.328673124	-0.228635	Yes
row_167	KARS	-0.336773813	-0.225144	Yes
row_168	RPS2	-0.339905143	-0.218006	Yes
row_169	AIMP2	-0.356947273	-0.217111	Yes
row_170	LDHA	-0.361901045	-0.210938	Yes
row_171	CANX	-0.374194205	-0.207053	Yes
row_172	EIF1AX	-0.399766922	-0.206033	Yes
row_173	EIF3D	-0.403767079	-0.197923	Yes
row_174	SLC25A3	-0.413684905	-0.190916	Yes

Table S2 (continued)

Table S2 (continued)

Name	Probe	Rank metric score	Running ES	Core enrichment
row_175	RAD23B	-0.417804658	-0.182225	Yes
row_176	PSMB3	-0.417925298	-0.17229	Yes
row_177	ACP1	-0.424158156	-0.164141	Yes
row_178	PABPC1	-0.424715102	-0.154442	Yes
row_179	HDAC2	-0.438016325	-0.147799	Yes
row_180	CCT4	-0.450546712	-0.140413	Yes
row_181	SF3B3	-0.470833033	-0.134727	Yes
row_182	DDX21	-0.476490498	-0.12459	Yes
row_183	SRM	-0.481136769	-0.114343	Yes
row_184	COX5A	-0.495382637	-0.106932	Yes
row_185	CCT3	-0.516387105	-0.09937	Yes
row_186	ETF1	-0.526386082	-0.089039	Yes
row_187	PA2G4	-0.558176398	-0.081872	Yes
row_188	EIF4E	-0.61265403	-0.076733	Yes
row_189	EIF4A1	-0.617235363	-0.062805	Yes
row_190	MCM2	-0.631449163	-0.050572	Yes
row_191	EIF4H	-0.653316855	-0.038762	Yes
row_192	DUT	-0.661347389	-0.023883	Yes
row_193	PRDX4	-0.684686899	-0.011774	Yes
row_194	SNRPA	-0.703109384	0.0027078	Yes
row_195	SRSF1	-0.735901058	0.0154889	Yes
row_196	MCM4	-0.753878117	0.0311778	Yes
row_197	HNRNPR	-0.772973239	0.0470725	Yes
row_198	SF3A1	-0.793221414	0.0635974	Yes

GSEA, Gene set enrichment analysis; ES, enrichment score.

**Table S3** HALLMARK\_MYC\_TARGETS\_V2 (GSEA details)

Name	Probe	Rank metric score	Running ES	Core enrichment
row_0	MYC	0.22204265	-0.23330317	No
row_1	SORD	0.147695452	-0.3013698	No
row_2	MPHOSPH10	0.142654836	-0.29727072	No
row_3	MYBBP1A	0.100131452	-0.34115317	No
row_4	RABEPK	0.076708563	-0.36774597	No
row_5	NOLC1	0.045039382	-0.40718013	No
row_6	WDR74	0.042263422	-0.40828314	No
row_7	HSPD1	0.025041765	-0.42954922	No
row_8	GNL3	0.024733359	-0.42827404	No
row_9	IPO4	0.020873915	-0.43101102	No
row_10	HSPE1	0.017159631	-0.4348436	No
row_11	CDK4	0.015760908	-0.4358668	No
row_12	TMEM97	-0.003955827	-0.46135676	No
row_13	PLK1	-0.005095467	-0.4626284	No
row_14	PPRC1	-0.011475308	-0.47104335	No
row_15	FARSA	-0.031356916	-0.49556538	No
row_16	SLC19A1	-0.038516253	-0.50259405	No
row_17	RRP9	-0.040565018	-0.50258344	No
row_18	NDUFAF4	-0.080790021	-0.54914	No
row_19	TBRG4	-0.100404747	-0.56580997	No
row_20	PPAN	-0.119243138	-0.5789049	No
row_21	DDX18	-0.130250916	-0.5817764	Yes
row_22	IMP4	-0.136173263	-0.5777336	Yes
row_23	UTP20	-0.145401374	-0.57649803	Yes
row_24	NOP56	-0.148529723	-0.5690842	Yes
row_25	RCL1	-0.151270196	-0.56148	Yes
row_26	GRWD1	-0.166755065	-0.56610096	Yes
row_27	RRP12	-0.173035681	-0.5603343	Yes
row_28	NIP7	-0.173853666	-0.5494367	Yes
row_29	MAP3K6	-0.17443873	-0.53790724	Yes
row_30	CBX3	-0.178819522	-0.52971894	Yes
row_31	HK2	-0.197324991	-0.53187096	Yes
row_32	NOP2	-0.198687613	-0.51914924	Yes
row_33	NOC4L	-0.214178205	-0.51658326	Yes
row_34	PHB	-0.23959583	-0.51934516	Yes

Table S3 (continued)

Table S3 (continued)

Name	Probe	Rank metric score	Running ES	Core enrichment
row_35	BYSL	-0.248257443	-0.50884444	Yes
row_36	NPM1	-0.26072982	-0.49777272	Yes
row_37	EXOSC5	-0.26488322	-0.4816831	Yes
row_38	DCTPP1	-0.271444321	-0.46755153	Yes
row_39	NOP16	-0.278643012	-0.45311677	Yes
row_40	PRMT3	-0.280235976	-0.4344825	Yes
row_41	MCM5	-0.288626343	-0.4196497	Yes
row_42	TFB2M	-0.295468986	-0.40266645	Yes
row_43	SUPV3L1	-0.314724982	-0.39104506	Yes
row_44	AIMP2	-0.356947273	-0.38629338	Yes
row_45	TCOF1	-0.368350565	-0.3653299	Yes
row_46	LAS1L	-0.396683842	-0.3479152	Yes
row_47	SRM	-0.481136769	-0.33877108	Yes
row_48	UNG	-0.481530875	-0.30541116	Yes
row_49	PUS1	-0.486822188	-0.27321076	Yes
row_50	WDR43	-0.487907529	-0.23950633	Yes
row_51	MRTO4	-0.540132403	-0.21384856	Yes
row_52	PA2G4	-0.558176398	-0.17846371	Yes
row_53	PES1	-0.568203509	-0.14060867	Yes
row_54	SLC29A2	-0.696943164	-0.113710806	Yes
row_55	PLK4	-0.704164445	-0.06571903	Yes
row_56	MCM4	-0.753878117	-0.020135336	Yes
row_57	DUSP2	-1.268203259	0.031331763	Yes

GSEA, Gene set enrichment analysis; ES, enrichment score.