SUPPLEMENTARY DATA

Prostate-targeted radiosensitization via aptamer-shRNA chimeras in human tumor xenografts

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Supplemental Experimental Procedures

Materials. Unless otherwise noted, all DNA primers were purchased from Sigma-Aldrich, siRNAs were purchased from IDT and all cell culture products were purchased from Gibco BRL/LifeTechnologies.

Interferon assay. For evaluating of interferon β response, $2x10^5$ LNCaP cells were either transfected with siRNA DNA-PK or incubated with 400 nM A10-3-Con, A10-3-DNA-PK or Neg-DNA-PK, Poly(I:C) (invivogen) as a positive control, for 48 h before the secretion of interferon β into the cell culture supernatant was analyzed. Detection of interferon β was accomplished by using a commercially available sandwich interferon β ELISA kit (PBL) following manufacturer's

recommendations. The results obtained were compared to serial dilutions of an interferon β positive control provided with the kit.

RNA secondary structure. M-fold was used to predict the structures of Aptamer-shRNAs. The most stable structures with the lowest energies for each RNA oligo were compared.

PSMA cell-surface expression. PSMA cell-surface expression was determined by flow cytometry using antibodies specific to human PSMA (J591 from Neil Bander, Weill Medical College of Cornell University). PC3-PIP or PC3-Flu cells were trypsinized and washed three times in PBS. $1X10^6$ cells were resuspended in100 µl cell sorting buffer (1x PBS, 0.5% bovine serum albumin (BSA), 2 mmol/L EDTA) with a 1:5000 dilution of Human PSMA antibody J591 and incubated at $4C^0$ for 20 min. Cells were then washed in 1 ml cold cell sorting buffer and incubated at $4C^0$ for 20 min with a 1:1,000 dilution of Alexa Fluor 488 $F(ab')_2$ fragment of anti-human IgG (A11013; Invitrogen) in cell sorting buffer. Cells were washed and incubated at $4C^0$ for 20 min with 4% PFA(1ml). After fixation, cells were then resuspended in cell sorting buffer and analyzed by flow cytometry (Becton Dickson Calibur FACS Analytic cytometer).

Supplemental Figure 1.

Supplemental Figure 2.

Supplemental Figure 3.

Supplemental Figure 4.

Supplemental Figure 5

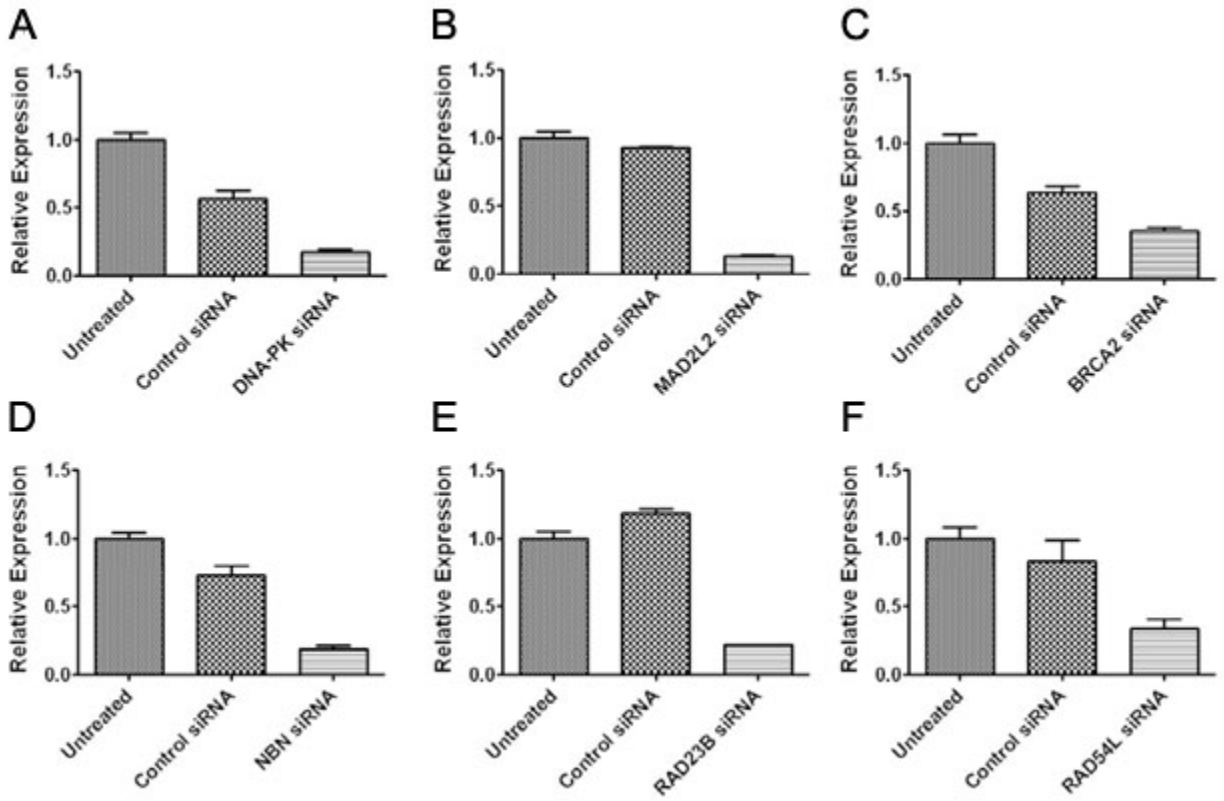
Supplemental Table 1. Screen data of DNA repair siRNA library

Supplemental Table 2. Primers for qPCR

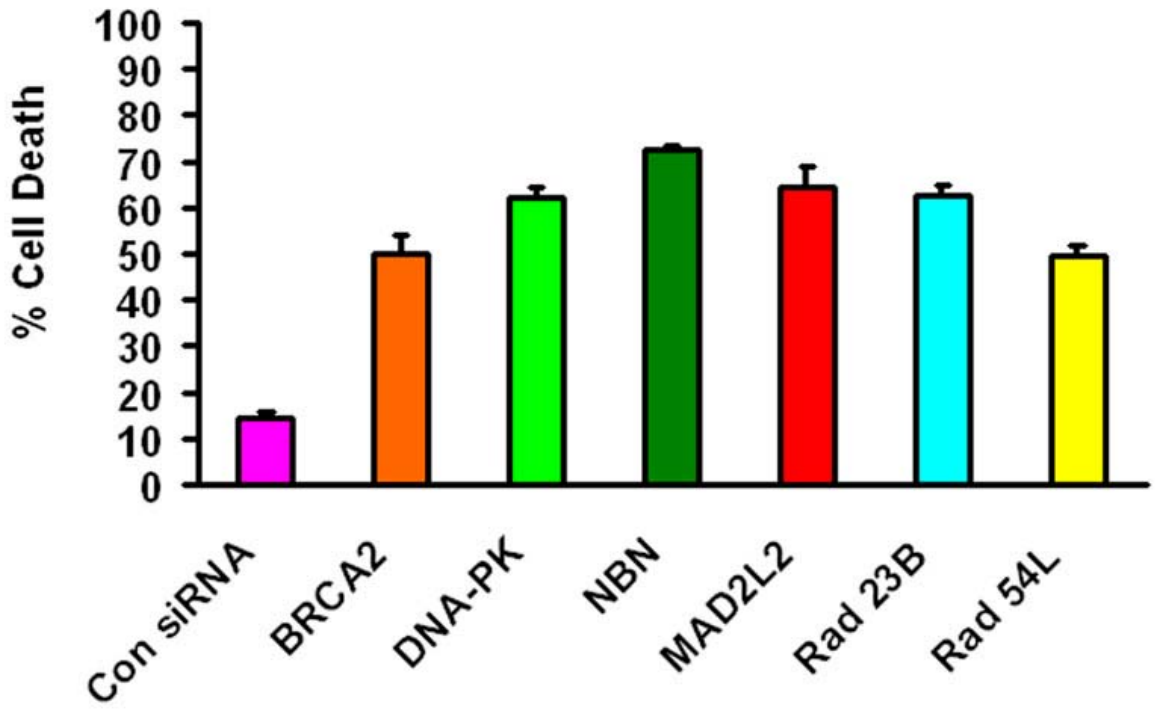
Supplemental Table 3. Primers and templates for aptamer-shRNAs synthesis

Supplemental Table 4. Aptamer-shRNAs siRNA sequences

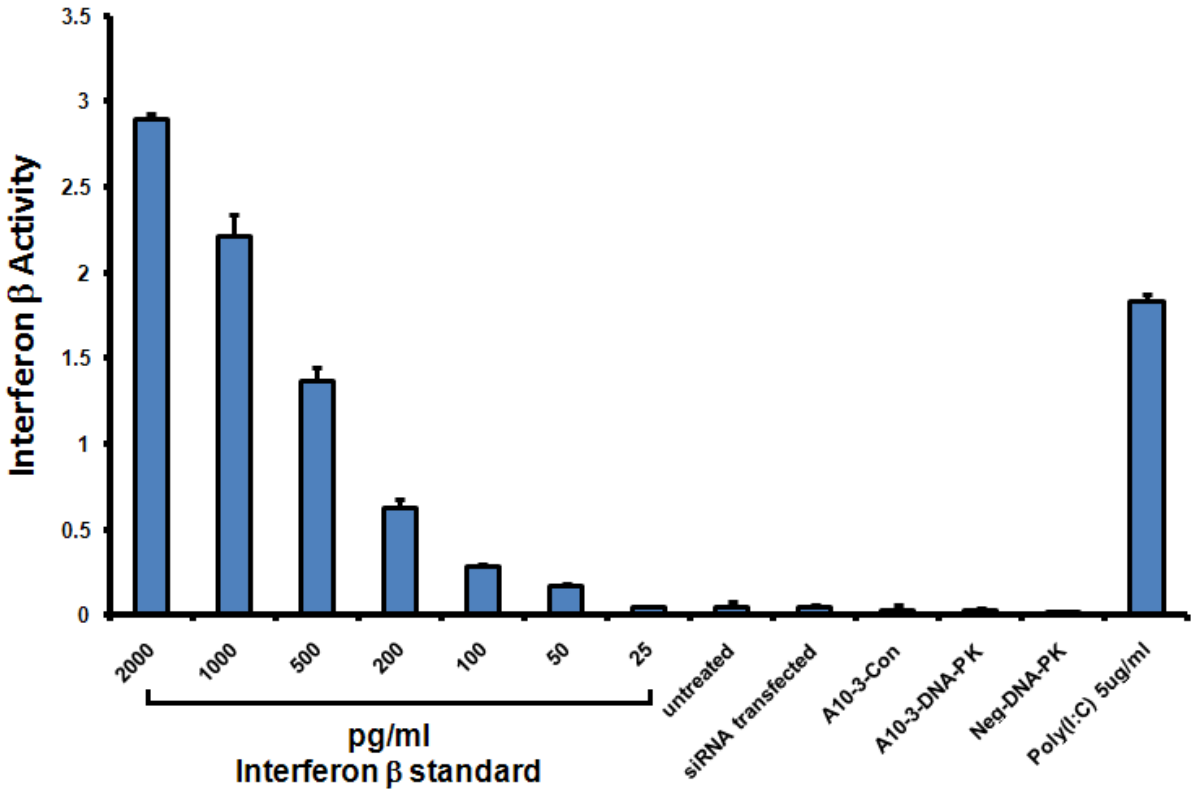
Supplemental Table 5. siRNA sequences



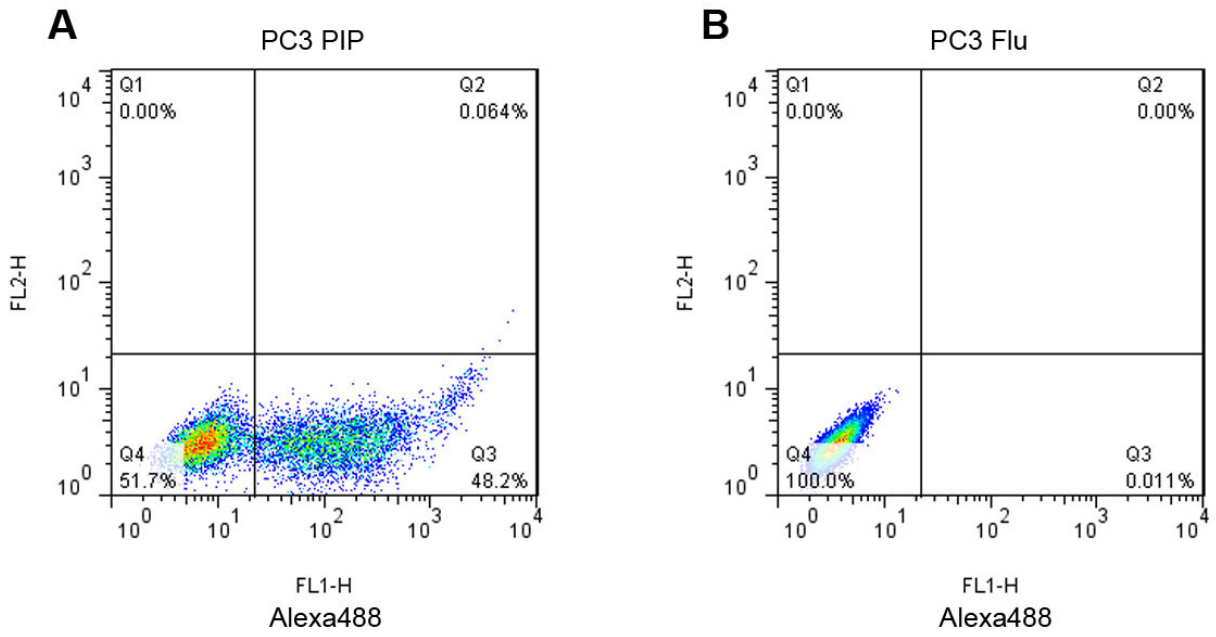
Supplemental Figure 1. siRNA-mediated knock-down. DU145 cells were transfected with Candidate siRNAs (5 nM), 48 hrs later the mRNA level of target genes were evaluated by qRT-PCR. Data are normalized to GAPDH mRNA. (**A**) DNA-PK, (**B**) MAD2L2, (**C**) BRCA2, (**D**) NBN, (**E**) Rad23B, and (**F**) RAD54L. Columns represent mean± S.E.M, n=3.



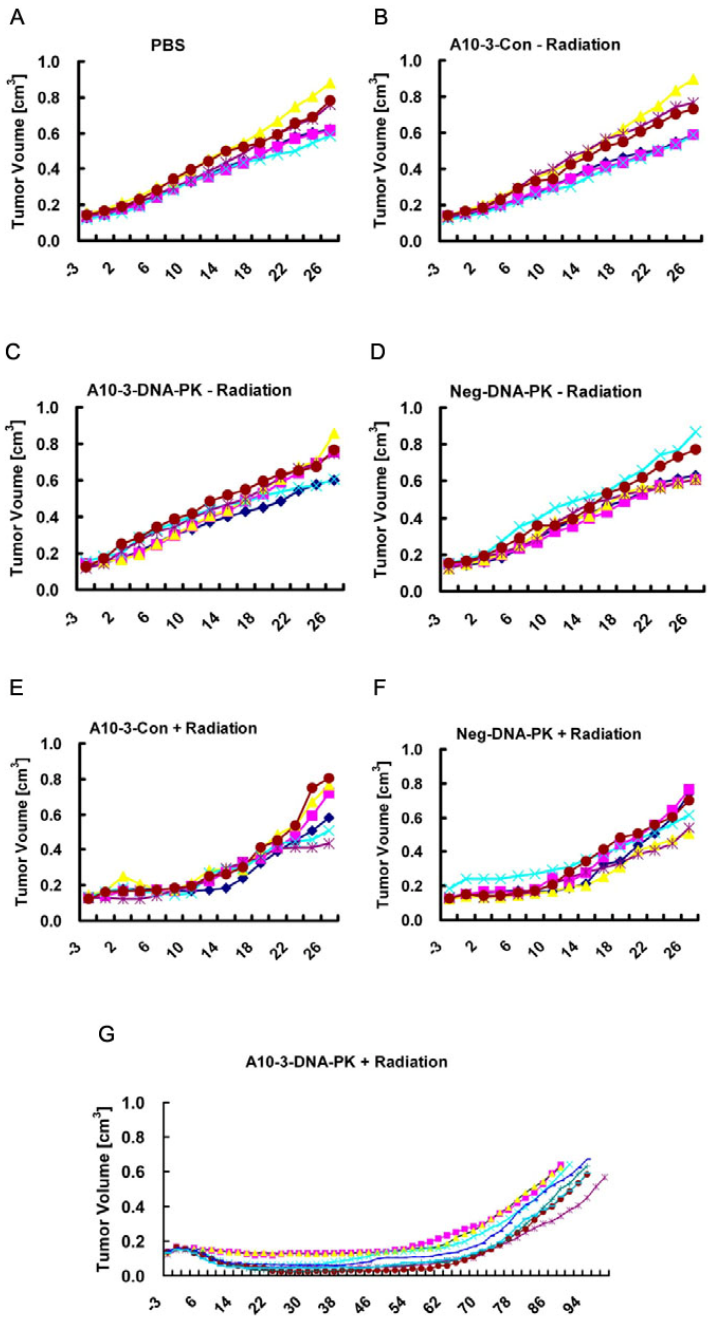
Supplemental Figure 2. siRNA-mediated radiation sensitization. LNCaP cells were seeded in 6-well plates at $2x10^5$cells per well. After 24 hr, cells were either transfected with 100 nM of DNA-PK, BRCA2, NBN, MAD2L2, RAD23B, RAD54L siRNAs or control siRNAs separately using HiPerfectTransfection Reagent, 48 hr later, cells were seeded in 96 well plate at 2000 cells per well. 24hr later, cells were then irradiated with Gy IR using a Gammacell 40 (Nordion, Ottawa, ONT, Canada) 137Cs radiator at approximately 0.6 Gy/min. Cell viability was assessed after 12 days by MTS. means ± S.E.M, n=3



Supplemental Figure 3. Evaluation of interferon response. $2x10^5$ LNCaP cells were either transfected with DNA-PK siRNA or incubated with 400 nM A10-3-Con, A10-3-DNA-PK or Neg-DNA-PK for 48 h before the secretion of interferon β into the cell culture supernatant was analyzed. Cells were separately treated with 5 µg/ml Poly(I:C) (invivogen) as a positive control. Detection of interferon β was accomplished by using a commercially available sandwich interferon β ELISA kit (PBL) following manufacturer's recommendations. 25-2,000 pg/ml of interferon-beta standard was used as a positive control for assay integrity. means ± S.E.M, n=3



Supplemental Figure 4. PSMA cell-surface expression. PSMA positive PC3-PIP cells and PSMA negative PC3-Flu cells were incubated with Anti-PSMA (J591) antibody and stained with secondary antibody conjugated with Alexa488. PSMA expression was then determined by flow cytometry. 48.2% of PC3-PIP (A) cells expressed PSMA when compared to PC3-Flu (B) cells.



Supplemental Figure 5. Individual LNCaP tumor growth curves. (**A-G**), Established LNCaP tumors were intratumorally injected with 200 pmol Aptamer-shRNAs on days -3 and day -2. On day 0, animals were divided into groups that received either 6 Gy radiation (+R) or no radiation (-R). Tumors were measured every other day until reaching four times the volume at time of radiation. (**A**) PBS(-R) (n=6); (**B**) A10-3-Con (-R) (n=6);(**C**) A10-3-DNA-PK(-R) (n=6); (**D**) Neg-DNA-PK(-R) (n=6); (**E**)A10-3-Con(+R) (n=6); (**F**)Neg-DNA-PK(+R) (n=6); (**G**) A10-3-DNA-PK(+R) (n=8).

Supplemental Table 1

	0 Gy Avg	0 Gy St dev	6 Gy Avg	6 Gy St dev	Relative Sensitization
control siRNA	1	0.124472004	1	0.094211712	0.00%
ACLY	1.860022981	0.121168192	1.495426898	0.442145785	19.60%
ACLY	1.336293046	0.125416099	1.016535256	0.152135228	23.93%
AHCY	1.647376301	0.074640222	2.111917098	0.261125426	-28.20%
AHCY	2.065322609	0.029588199	2.424329804	0.104705175	-17.38%
AKT1	1.026513645	0.043308969	1.297762747	0.15662083	-26.42%
AKT1	1.165931683	0.039687706	1.559469303	0.020034444	-33.75%
AKT2	1.062967649	0.05816065	1.359677419	0.119615338	-27.91%
AKT2	1.220621724	0.177839016	1.418938606	0.023089508	-16.25%
ALKBH2	0.992821292	0.041468292	1.044196918	0.198307671	-5.17%
ALKBH2	1.134315823	0.090214712	1.2873918	0.182010182	-13.50%
ALKBH3	1.840593335	0.072838311	1.821536382	0.208577626	1.04%
ALKBH3	0.654305512	0.097023714	0.509484118	0.060718889	22.13%
APEX1	0.758026278	0.040990649	0.815590223	0.027601053	-7.59%
APEX1	0.826198015	0.027713131	0.846079577	0.040360728	-2.41%
APEX1	1.019446955	0.078334922	1.447086368	0.062142199	-41.95%
APEX2	0.99622068	0.166587825	0.913306046	0.090975723	8.32%
APEX2	1.077546042	0.066916344	1.029546624	0.234397258	4.45%
AR	1.057364902	0.108014404	1.334313215	0.051292945	-26.19%
AR	0.826369058	0.078424208	0.969927159	0.058317607	-17.37%
ARMET	0.464436401	0.041606696	0.499541479	0.035553201	-7.56%
ARMET	1.083684937	0.078618231	1.215325773	0.059524345	-12.15%
ATM	1.811971169	0.297400989	1.717774273	0.609641954	5.20%
ATM	1.879487447	0.047891941	1.301148907	0.172167965	30.77%
ATR	0.827678681	0.021027422	0.839313521	0.253657593	-1.41%
ATR	1.139033091	0.041048611	1.133949574	0.102873886	0.45%
BIRC2	1.041596304	0.044036623	1.047771889	0.067265294	-0.59%
BIRC2	0.689337914	0.103040786	0.686322809	0.037473851	0.44%
BIRC4	1.093635358	0.028595307	1.275185987	0.125032344	-16.60%
BIRC4	1.212271201	0.150139005	1.339478988	0.04263207	-10.49%
BIRC5	0.965236126	0.037132307	1.044786146	0.021190889	-8.24%
BIRC5	1.152700945	0.045995234	1.30989525	0.031959076	-13.64%
BLM	0.838862632	0.026110645	0.843013703	0.118823653	-0.49%
BLM	0.731519295	0.04504036	0.857191253	0.005359138	-17.18%
BRCA1	0.933036602	0.04001633	1.032488101	0.024911891	-10.66%
BRCA1	0.891096529	0.036928642	0.850381964	0.030689307	4.57%
BRCA2	1.963229917	0.170562503	1.35791845	0.222474753	30.83%
BRCA2	1.704899196	0.066633739	1.498715927	0.254634012	12.09%
C18orf37	1.001514005	0.113452665	1.140479212	0.19351858	-13.88%
C18orf37	0.819561715	0.067014617	0.959145082	0.072471853	-17.03%
CANX	1.552491382	0.344356396	1.886911467	0.886718735	-21.54%
CANX	1.215057203	0.01066571	1.524633072	0.071152097	-25.48%
CARM1	0.526865164	0.051063897	0.72835447	0.41977691	-38.24%
CARM1	1.064868324	0.032061914	1.198975598	0.049979816	-12.59%

CBX3	1.207602411	0.028772199	1.164993539	0.165527336	3.53%
CBX3	0.950717211	0.035486509	1.000646911	0.120997246	-5.25%
CCNH	1.123477774	0.141124798	1.094947326	0.152009453	2.54%
CCNH	1.098082345	0.0691399	1.069784607	0.112084229	2.58%
CCT4	0.405966926	0.021478927	0.527947393	0.083764296	-30.05%
CCT4	0.294367014	0.011728925	0.43405131	0.051809487	-47.45%
CCT5	1.010978024	0.037455863	1.12570176	0.0223163	-11.35%
CCT5	0.381291368	0.065450694	0.434632848	0.06932378	-13.99%
CDC2	1.306876615	0.110871263	1.173740185	0.011830356	10.19%
CDC2	0.578121415	0.052542672	0.685739452	0.015592135	-18.62%
CDK7	1.484940283	0.19507667	1.660103627	0.105763156	-11.80%
CDK7	0.623245935	0.11527591	0.65857175	0.076873494	-5.67%
CDKN1A	1.100953046	0.028537044	1.264711005	0.090780349	-14.87%
CDKN1A	1.128535104	0.014977281	1.305665447	0.092554062	-15.70%
CDKN2A	0.877570938	0.145223487	1.143704475	0.042522887	-30.33%
CDKN2A	0.778022772	0.104083061	0.88371488	0.097923994	-13.58%
CDKN2B	1.116985966	0.033413553	1.305789853	0.035445274	-16.90%
CDKN2B	1.097556241	0.077339843	1.221293324	0.03406237	-11.27%
CDKN2C	1.088782779	0.082766972	1.427483765	0.158641889	-31.11%
CDKN2C	1.194103146	0.075179945	1.537956259	0.098110371	-28.80%
CDKN2D	0.572041383	0.033747449	0.705033465	0.0791769	-23.25%
CDKN2D	1.117529455	0.106303492	1.512876017	0.154025732	-35.38%
CDKN3	1.163690536	0.043745101	1.085933481	0.142287485	6.68%
CDKN3	0.719730449	0.037050282	0.728734707	0.213212127	-1.25%
CETN2	0.623747687	0.06176773	0.616511679	0.052325066	1.16%
CETN2	0.930421083	0.084747927	1.028270407	0.02810361	-10.52%
CHEK1	0.991817264	0.142118845	1.447037621	0.830679326	-45.90%
CHEK1	1.002715972	0.03867027	0.836629872	0.029912339	16.56%
CHEK2	1.28579161	0.105754821	1.399794586	0.037026965	-8.87%
CHEK2	0.720797198	0.041990255	0.814099632	0.047447296	-12.94%
CKS2	1.811205126	0.194266251	1.917503942	0.247453229	-5.87%
CKS2	1.46840071	0.068376853	1.039062852	0.16501012	29.24%
CLU	1.138744929	0.079983171	1.345226543	0.0921184	-18.13%
CLU	1.067741998	0.151957353	1.400636959	0.095978125	-31.18%
COL1A2	0.359429204	0.053593975	0.458834443	0.011955923	-27.66%
COL1A2	1.266232009	0.094068616	1.210780903	0.181226478	4.38%
COPB2	0.239756844	0.037202802	0.299693574	0.054748087	-25.00%
COPB2	1.149373113	0.048861171	1.251403521	0.034123819	-8.88%
CRIP2	0.652390404	0.139328733	0.577607569	0.146551051	11.46%
CRIP2	1.095512621	0.068560075	1.149935575	0.109379194	-4.97%
DCLRE1A	1.591281033	0.111652076	1.091732372	0.418836143	31.39%
DCLRE1A	1.052335445	0.05026272	1.12643005	0.040626099	-7.04%
DCLRE1B	0.833270011	0.105735905	0.906439419	0.111711577	-8.78%
DCLRE1B	0.685756564	0.043878988	0.654767496	0.136268103	4.52%
DCLRE1C	0.993012287	0.055026948	1.133835933	0.175782264	-14.18%
DCLRE1C	1.005726043	0.097130704	1.145355925	0.128195999	-13.88%
DDB1	0.770155555	0.039104923	0.851262767	0.012161393	-10.53%

DDB1	0.856499544	0.079866395	0.988878107	0.085105856	-15.46%
DDB2	1.157631626	0.048063944	1.282426357	0.041339678	-10.78%
DDB2	1.0688876	0.068378244	1.271354761	0.058499126	-18.94%
DMC1	1.033828469	0.072739098	1.060052321	0.022626912	-2.54%
DMC1	1.033586095	0.055406574	1.105989614	0.035412173	-7.01%
DNMT1	1.735506111	0.026980137	1.486776301	0.172839324	14.33%
DNMT1	1.533166197	0.172790108	1.286821356	0.450139636	16.07%
DNMT3A	0.745025161	0.032365367	0.74117926	0.015546111	0.52%
DNMT3A	0.821945885	0.076881199	0.901400816	0.046183218	-9.67%
DNMT3A	1.094108079	0.145429841	1.472372529	0.0492144	-34.57%
DNMT3B	1.043382053	0.091970002	1.356821179	0.129786815	-30.04%
DNMT3B	0.959238339	0.035026724	1.163096216	0.206177031	-21.25%
DOT1L	0.583786444	0.025379453	0.780671239	0.192908096	-33.73%
DOT1L	1.264805019	0.061232483	1.299605738	0.091357589	-2.75%
DUT	1.10487393	0.037379504	1.497847777	0.123138745	-35.57%
DUT	0.792367864	0.048672338	0.918140877	0.177527823	-15.87%
DVL3	0.405515512	0.033604624	0.807163776	0.447926414	-99.05%
DVL3	0.980367716	0.064516677	1.146382414	0.082073988	-16.93%
E2F5	1.061978463	0.080035003	1.159404162	0.06011161	-9.17%
E2F5	1.156427726	0.059250675	1.443308203	0.064070848	-24.81%
EHMT1	0.892199404	0.038581048	0.918137288	0.168632819	-2.91%
EHMT1	0.76504688	0.036265048	0.84316615	0.105879905	-10.21%
EIF4A3	0.195084885	0.023282535	0.219374175	0.014285702	-12.45%
EIF4A3	0.267511379	0.011053333	0.420766657	0.064542057	-57.29%
ERCC1	0.392806156	0.075434221	0.429691372	0.074023734	-9.39%
ERCC1	1.744733452	0.185704447	1.267447623	0.342173015	27.36%
ERCC2	0.786482816	0.218273403	0.800450552	0.333277067	-1.78%
ERCC2	0.961999238	0.043331064	1.025028308	0.065354518	-6.55%
ERCC3	0.53626519	0.16759708	0.39288128	0.079007759	26.74%
ERCC3	0.856012603	0.069645025	0.913240405	0.059447555	-6.69%
ERCC4	1.017000796	0.063861889	1.283862403	0.134446188	-26.24%
ERCC4	1.060316471	0.060040828	1.061301784	0.090313161	-0.09%
ERCC5	0.998164548	0.031775952	1.090282365	0.039962071	-9.23%
ERCC5	0.987503633	0.008047825	0.978894592	0.077568635	0.87%
ERCC6	0.920310931	0.046930892	0.990726641	0.012528521	-7.65%
ERCC6	0.923288667	0.029801806	0.946897817	0.056996782	-2.56%
ERCC8	0.863625935	0.009022114	0.915053272	0.10272711	-5.95%
ERCC8	0.96050001	0.06268134	1.215247195	0.160933046	-26.52%
EXO1	0.785190963	0.010413493	0.86552501	0.096729266	-10.23%
EXO1	0.835987091	0.037022998	0.908938462	0.109179185	-8.73%
EZH2	1.357805388	0.025484382	1.674783819	0.106377867	-23.34%
EZH2	1.125274171	0.044033774	1.231793188	0.064529549	-9.47%
FANCA	0.921970535	0.091443109	1.06678112	0.124781298	-15.71%
FANCA	0.877016246	0.152461723	0.922047225	0.075566524	-5.13%
FANCC	0.867300301	0.013956345	0.945706923	0.102383262	-9.04%
FANCC	1.012032132	0.056223141	1.073991644	0.032935617	-6.12%
FANCD2	0.867092552	0.148666839	0.977216821	0.05624289	-12.70%

FANCD2	1.034065102	0.064945126	1.093802095	0.063329712	-5.78%
FANCE	0.990079983	0.022110333	1.122779275	0.057955865	-13.40%
FANCE	1.078944635	0.05420914	1.17105931	0.106630156	-8.54%
FANCF	0.876489393	0.045808435	1.004861358	0.043934195	-14.65%
FANCF	0.888939874	0.054700626	0.958432847	0.037646362	-7.82%
FANCG	1.039463649	0.05237549	0.751350098	0.040050399	27.72%
FANCG	1.138147374	0.09357871	1.254812312	0.084518567	-10.25%
FAP	0.783324921	0.092675649	0.8783136	0.034157238	-12.13%
FAP	0.934107282	0.066698723	1.015109169	0.053117056	-8.67%
FEN1	1.956370347	0.101173521	1.916197342	0.327589619	2.05%
FEN1	0.9836917	0.039574795	0.856409355	0.080129664	12.94%
FLJ35220	0.909145138	0.090843227	1.037163135	0.021970932	-14.08%
FLJ35220	0.892304869	0.044923291	0.961159951	0.038823588	-7.72%
G3BP1	1.152515685	0.131429656	1.113507604	0.060789059	3.38%
G3BP1	1.137040226	0.01768681	1.253652718	0.04649044	-10.26%
GTF2H1	1.028694835	0.006924532	1.075376322	0.043473843	-4.54%
GTF2H1	1.201796039	0.104581252	1.431037339	0.059869531	-19.07%
GTF2H2	1.024306638	0.079546063	1.116590528	0.076126393	-9.01%
GTF2H2	0.900765209	0.072862706	0.978856741	0.035748865	-8.67%
GTF2H3	1.264952639	0.094175773	1.507106649	0.019866063	-19.14%
GTF2H3	1.121294132	0.027453019	1.338203625	0.196008137	-19.34%
GTF2H4	0.827905295	0.15953647	1.114360042	0.056431067	-34.60%
GTF2H4	0.958792698	0.03563308	1.38280437	0.024077758	-44.22%
H2AFX	0.909705991	0.791921993	1.579365868	0.180969505	-73.61%
H2AFX	1.433854103	0.068855513	1.807606931	0.036722217	-26.07%
H2AFZ	1.43657509	0.113374705	1.54629421	0.409551322	-7.64%
H2AFZ	1.892370904	0.085788012	1.956431629	0.470600702	-3.39%
HDAC1	1.076726189	0.035884843	1.162361046	0.080159851	-7.95%
HDAC1	1.378250707	0.121219923	1.776364179	0.029219212	-28.89%
HDAC10	1.167302251	0.093962651	1.316469536	0.186286463	-12.78%
HDAC10	1.265100258	0.040689297	1.405360633	0.063882576	-11.09%
HDAC11	0.526505315	0.021192524	0.631193628	0.041775621	-19.88%
HDAC11	1.048976836	0.056671452	1.080258483	0.137293172	-2.98%
HDAC2	0.993750769	0.030449241	1.12066395	0.245415742	-12.77%
HDAC2	1.390134088	0.062017949	1.54527383	0.113485364	-11.16%
HDAC4	0.953083342	0.083100984	1.03145133	0.039446365	-8.22%
HDAC4	0.918648939	0.080711928	0.964058412	0.062250727	-4.94%
HDAC6	1.118438681	0.042367796	1.235008611	0.07702996	-10.42%
HDAC6	1.164950309	0.070419053	1.199467669	0.164185371	-2.96%
HLTF	1.368384795	0.083804062	1.726567936	0.0217327	-26.18%
HLTF	0.986074548	0.070984414	1.009376139	0.074536946	-2.36%
HNRNPA2B1	0.922302866	0.166113356	1.051784117	0.346638883	-14.04%
HNRNPA2B1	1.235354902	0.105006002	1.528973263	0.123246142	-23.77%
HSP90B1	1.770152164	0.100831368	1.929218292	0.6011219	-8.99%
HSP90B1	0.687175737	0.133561854	0.609191259	0.048822099	11.35%
HSPD1	0.906482962	0.08775712	1.101746016	0.10132525	-21.54%
HSPD1	1.05752245	0.040245058	1.131597257	0.144315988	-7.00%

HSPE1	0.793203106	0.193945844	0.848884884	0.070819712	-7.02%
HSPE1	0.651833281	0.040807423	0.75791845	0.098718014	-16.27%
HUS1	2.100630245	0.106357851	2.471908087	0.44322413	-17.67%
HUS1	0.966569717	0.050318208	1.073796416	0.053323535	-11.09%
IARS	1.631393851	0.211565456	1.701419239	0.097191131	-4.29%
IARS	1.405236951	0.173116431	1.407794548	0.334264592	-0.18%
IFNGR2	0.535583595	0.452033381	0.707441455	0.54022995	-32.09%
IFNGR2	1.027375072	0.135597374	1.136661522	0.008499378	-10.64%
IGF1R	0.939071022	0.080118676	1.292851633	0.2689938	-37.67%
IGF1R	1.283545876	0.239291152	1.374337538	0.055778733	-7.07%
ILF2	0.763082645	0.053578429	0.826544991	0.029521512	-8.32%
ILF2	1.015317243	0.022874379	0.949965331	0.056634536	6.44%
ITGB3	0.864865389	0.015373447	1.119827822	0.159795099	-29.48%
ITGB3	0.709136435	0.167351123	0.687492225	0.169761376	3.05%
KDELR2	1.089923814	0.011828729	1.174998322	0.157686543	-7.81%
KDELR2	1.15283249	0.023051809	1.13945738	0.094693411	1.16%
KIAA0101	1.125698118	0.039174475	1.104860352	0.167193939	1.85%
KIAA0101	0.991867078	0.125229112	0.975964768	0.098017306	1.60%
KPNA2	0.66307224	0.067796131	0.680810339	0.040902805	-2.68%
KPNA2	0.856375901	0.019620509	0.900824906	0.031907025	-5.19%
LDHA	1.235070859	0.159647246	0.916062176	0.090692611	25.83%
LDHA	1.583899161	0.114930832	1.439513404	0.210851066	9.12%
LIG1	1.316863401	0.218038446	1.658301419	0.344683257	-25.93%
LIG1	1.817995056	0.116370189	2.256273936	0.168285885	-24.11%
LIG3	0.515364744	0.014590155	0.797800086	0.066154726	-54.80%
LIG3	0.312289334	0.02141388	0.582248285	0.056561565	-86.45%
LIG4	1.188668258	0.218374363	1.233783683	0.058202656	-3.80%
LIG4	1.134882276	0.031025365	1.376651489	0.108683022	-21.30%
MAD2L2	1.131775126	0.100003295	0.969817447	0.080246876	14.31%
MAD2L2	0.584499938	0.097607811	0.488520028	0.078809175	16.42%
MAPK1	1.090312669	0.01643541	1.508818939	0.07590002	-38.38%
MAPK1	1.149358395	0.021244124	1.542611863	0.020252454	-34.22%
MBD1	1.032162891	0.033178014	1.324550272	0.193153997	-28.33%
MBD1	0.825928298	0.009873938	1.0271205	0.178708358	-24.36%
MBD2	0.884241604	0.132033611	1.060563894	0.149834619	-19.94%
MBD2	1.020128496	0.065484971	1.340125899	0.125954093	-31.37%
MBD3	0.712131816	0.033331493	0.867946051	0.051206979	-21.88%
MBD3	0.882666995	0.200837669	1.022959944	0.051471831	-15.89%
MBD4	1.103881301	0.046525652	1.240466125	0.053908808	-12.37%
MBD4	0.94057725	0.053769515	0.775530599	0.063311909	17.55%
MCL1	0.904772996	0.055246785	1.083750093	0.151223466	-19.78%
MCL1	1.134726994	0.056068185	1.530243089	0.118152703	-34.86%
MCM3	1.123037853	0.164055084	1.152653828	0.271277652	-2.64%
MCM3	0.900477914	0.074173861	0.750922633	0.220000661	16.61%
MECP2	1.028622167	0.156557379	0.739761207	0.07149122	28.08%
MECP2	1.138672484	0.098527939	1.118347585	0.264519109	1.78%
MGMT	0.832090224	0.061160229	0.659307969	0.151432941	20.76%

MGMT	0.937411095	0.031078032	0.971289192	0.030613894	-3.61%
MLH1	1.341202688	0.12140842	1.141833746	0.296881041	14.86%
MLH1	1.042796302	0.064639691	1.075865839	0.134241881	-3.17%
MLH3	1.026020567	0.076563554	1.017453438	0.105029182	0.83%
MLH3	0.926041342	0.041804849	0.87786498	0.024686386	5.20%
MLL	0.937778186	0.038073653	0.936090926	0.047482141	0.18%
MLL	0.984291592	0.013820563	1.0191236	0.021751586	-3.54%
MMP9	1.013177628	0.139768588	1.053814668	0.194962418	-4.01%
MMP9	1.036513428	0.079869992	1.105124248	0.144166699	-6.62%
MMS19	1.009518287	0.0758167	1.110000224	0.155881203	-9.95%
MMS19	0.997996299	0.039405677	1.075850738	0.061939209	-7.80%
MNAT1	0.868856972	0.016039672	0.91034436	0.122152111	-4.77%
MNAT1	0.955903272	0.03020709	1.031251588	0.022277812	-7.88%
MPG	1.127739281	0.025061122	1.396432037	0.17750059	-23.83%
MPG	1.004017935	0.024471619	1.260481202	0.195839574	-25.54%
MRE11A	0.756796654	0.137423182	0.929066031	0.060433439	-22.76%
MRE11A	1.056120064	0.060981219	1.422158169	0.127685446	-34.66%
MRPL3	1.511925903	0.203105158	1.303717053	0.065137095	13.77%
MRPL3	0.79346283	0.082893271	0.921088595	0.034167244	-16.08%
MRPS12	0.794995335	0.031077941	0.863983604	0.097011025	-8.68%
MRPS12	0.67566038	0.022143849	0.751410133	0.075278165	-11.21%
MSH2	1.048071347	0.059056559	0.974792547	0.045328435	6.99%
MSH2	0.97716411	0.060961516	1.115703773	0.187484054	-14.18%
MSH3	0.849364634	0.087060425	0.950763344	0.074436738	-11.94%
MSH3	1.096343617	0.035353941	1.234489087	0.092999264	-12.60%
MSH4	0.98332814	0.032249944	1.071687947	0.023182138	-8.99%
MSH4	0.865517122	0.030142067	0.979364336	0.092463868	-13.15%
MSH5	0.997166094	0.028414811	1.120972357	0.127389282	-12.42%
MSH5	1.033211048	0.07621348	1.30280411	0.030119616	-26.09%
MSH6	0.963906497	0.033863944	1.069180702	0.190779091	-10.92%
MSH6	0.928860949	0.05137645	0.981435371	0.081732297	-5.66%
MTHFD2	0.64122458	0.138498582	0.828580375	0.116876916	-29.22%
MTHFD2	0.848636791	0.15836051	0.851948637	0.059538097	-0.39%
MUTYH	0.982433665	0.11341215	1.162797641	0.169143086	-18.36%
MUTYH	0.648789767	0.081549299	0.768405862	0.110945125	-18.44%
NBN	1.493506041	0.211299898	1.236494706	0.429566775	17.21%
NBN	0.865246004	0.405302674	0.523090786	0.046915698	39.54%
NCBP2	0.76796654	0.043102805	0.61892456	0.097193977	19.41%
NCBP2	1.132921835	0.072889009	1.321688935	0.00044993	-16.66%
NEIL1	1.4067659	0.089279444	1.798562104	0.030132906	-27.85%
NEIL1	1.366096691	0.146802815	1.891230163	0.109594132	-38.44%
NEIL2	0.92867283	0.054608129	1.044941627	0.013051774	-12.52%
NEIL2	1.065787196	0.119529982	1.215825231	0.105074406	-14.08%
NEIL3	1.114399408	0.095004343	1.172068264	0.170227137	-5.17%
NEIL3	0.815445326	0.012160387	0.837034402	0.005685218	-2.65%
NFKB1	0.89081698	0.093046762	1.038117987	0.172160929	-16.54%
NFKB1	1.267047109	0.196696199	1.311910627	0.108812065	-3.54%

NME1	1.294944028	0.02940933	1.556969155	0.029324398	-20.23%
NME1	1.270070119	0.074679937	1.41467051	0.071370835	-11.39%
NONO	1.21936697	0.183332247	1.063708042	0.193841121	12.77%
NONO	1.84397089	0.062994624	1.693174138	0.199637423	8.18%
NTHL1	1.001350369	0.131660656	1.147143805	0.028701554	-14.56%
NTHL1	0.574183719	0.115223842	0.645347702	0.083707156	-12.39%
NUDT1	0.733691246	0.02877895	0.802191846	0.043445081	-9.34%
NUDT1	0.764389177	0.059789195	0.806341786	0.004894415	-5.49%
NUP205	0.662804988	0.079274607	0.800806452	0.040496562	-20.82%
NUP205	0.730562082	0.081662056	0.909885536	0.09129767	-24.55%
OGG1	1.345697704	0.198202209	1.414246971	0.036288628	-5.09%
OGG1	0.769677206	0.070479563	0.904829439	0.120057041	-17.56%
OGT	0.80438673	0.049329366	0.922861934	0.006202001	-14.73%
OGT	0.787301772	0.148415465	1.006394466	0.153674726	-27.83%
PAFAH1B3	1.340924127	0.194142412	1.888533453	0.766722412	-40.84%
PAFAH1B3	1.699745813	0.053856671	1.745167831	0.189695117	-2.67%
PAICS	0.763027884	0.056611495	0.800057591	0.007461821	-4.85%
PAICS	0.979213509	0.037642874	1.002134255	0.028226997	-2.34%
PARP1	1.494063164	0.097813841	1.335751295	0.318840968	10.60%
PARP1	1.343744559	0.052759186	1.841450777	0.909471525	-37.04%
PARP2	1.069814409	0.577670361	1.261365172	0.855459643	-17.91%
PARP2	1.041099685	0.038000202	1.139920347	0.203874733	-9.49%
PCNA	0.239193013	0.024341727	0.40204751	0.062477143	-68.08%
PCNA	0.285742404	0.044824887	0.364907398	0.101843788	-27.71%
PIK3CB	1.113006852	0.11716295	1.551939489	0.212096704	-39.44%
PIK3CB	1.118131175	0.090924768	1.541290339	0.154474956	-37.85%
PLK1	0.202583655	0.019092656	0.228835323	0.036005583	-12.96%
PLK1	0.258539643	0.034356536	0.296868664	0.058995452	-14.83%
PMS1	0.846372688	0.08377974	1.010688212	0.030975732	-19.41%
PMS1	0.920999098	0.045914146	1.013652455	0.055106511	-10.06%
PMS2	0.846212077	0.085815047	1.029160757	0.194627073	-21.62%
PMS2	1.02962014	0.026774353	1.363986962	0.148601365	-32.47%
PMS2L3	1.042924273	0.02122765	1.436602497	0.037274537	-37.75%
PMS2L3	0.730327128	0.046156347	0.849869927	0.113296622	-16.37%
PNKP	0.757307392	0.027266692	0.840811694	0.040156354	-11.03%
PNKP	0.900686765	0.020236289	1.062638684	0.031067462	-17.98%
POLB	1.692921063	0.031845939	1.971705339	0.359410185	-16.47%
POLB	0.718136491	0.102179626	0.606477685	0.091200501	15.55%
POLD1	1.171269172	0.091136261	1.289896889	0.133305242	-10.13%
POLD1	0.65189128	0.083766021	0.635923235	0.019171176	2.45%
POLE	0.36006371	0.015961676	0.404298934	0.015887855	-12.29%
POLE	0.470378449	0.078029927	0.493576979	0.046345196	-4.93%
POLG	0.944969905	0.221379113	1.073833009	0.220369446	-13.64%
POLG	0.779944631	0.066445735	0.809255213	0.060983479	-3.76%
POLH	1.177088124	0.071660795	1.268782572	0.107372389	-7.79%
POLH	0.909068661	0.063508841	0.921845622	0.03107983	-1.41%
POLH	1.00422917	0.019700222	1.425858481	0.056130679	-41.99%

POLI	1.365580022	0.056515253	1.609846602	0.113150911	-17.89%
POLI	1.350941075	0.067718606	1.484974986	0.095899691	-9.92%
POLK	1.084093984	0.037743481	1.247390915	0.114134048	-15.06%
POLK	1.392372986	0.057872984	1.782824769	0.097741764	-28.04%
POLL	0.713837777	0.065188911	0.804749564	0.081876458	-12.74%
POLL	0.685357684	0.034839121	0.795568881	0.008595048	-16.08%
POLM	1.03348222	0.062915947	1.069833275	0.064646037	-3.52%
POLM	1.072140854	0.030338963	1.096462458	0.039015514	-2.27%
POLN	0.776518454	0.040834685	0.894710097	0.023406799	-15.22%
POLN	0.831107848	0.033379191	0.814895743	0.051254906	1.95%
POLN	0.977173324	0.136833629	1.430306972	0.053064726	-46.37%
POLN	1.070522321	0.10944335	1.474115505	0.026108428	-37.70%
POLQ	1.817925415	0.038128927	1.969002027	0.204668642	-8.31%
POLQ	1.079758319	0.030115834	1.120026551	0.068909376	-3.73%
PPP2R5C	0.780877652	0.033221846	0.838660501	0.081104022	-7.40%
PPP2R5C	0.743679163	0.014577188	0.781763979	0.053803136	-5.12%
PRDX2	0.53556403	0.053850774	0.469370175	0.070958632	12.36%
PRDX2	1.306975028	0.070782665	1.613391644	0.183006563	-23.44%
PRDX4	0.955348037	0.052991499	0.908832674	0.134937811	4.87%
PRDX4	0.681417345	0.049799999	0.858149366	0.395648804	-25.94%
PRKDC	1.831923117	0.152474241	1.346834873	0.258136718	26.48%
PRKDC	1.154253282	0.586521468	0.782879027	0.072359299	32.17%
PRMT1	0.666284281	0.021117386	0.722716263	0.055869548	-8.47%
PRMT1	0.391012405	0.05150105	0.486118875	0.027183459	-24.32%
PSMA1	0.479104796	0.02879132	0.547809211	0.02634527	-14.34%
PSMA1	0.349269202	0.002616508	0.423552537	0.016236708	-21.27%
PSMC4	0.251666872	0.034694173	0.331279197	0.020436708	-31.63%
PSMC4	1.407651618	0.106571263	1.728920253	0.060840825	-22.82%
PSME2	0.944288633	0.070159459	1.05595252	0.054089041	-11.83%
PSME2	0.785637616	0.051126589	0.85705361	0.04163169	-9.09%
PTMA	1.092683317	0.168241686	1.213737726	0.157280281	-11.08%
PTMA	1.177508049	0.097012191	1.190297256	0.255281267	-1.09%
RAD1	0.825203812	0.092998017	0.867506818	0.068775224	-5.13%
RAD1	0.718548769	0.06679937	0.792198113	0.093348839	-10.25%
RAD17	0.792180976	0.057811504	0.84131985	0.103258346	-6.20%
RAD17	1.072846911	0.048075596	1.352243039	0.202140925	-26.04%
RAD18	2.044047495	0.111956878	2.491777427	0.415969557	-21.90%
RAD18	0.957394135	0.12954875	1.024520714	0.087694526	-7.01%
RAD23A	0.723549761	0.083643221	0.651144065	0.138278479	10.01%
RAD23A	1.100861845	0.075767502	1.223847547	0.065045321	-11.17%
RAD23B	1.588948083	0.088358794	1.44217166	0.314714968	9.24%
RAD23B	1.044117135	0.140404355	0.772065781	0.2128863	26.06%
RAD50	0.974337547	0.024550727	0.921468799	0.122931539	5.43%
RAD50	1.272432033	0.033422429	1.686015307	0.05132537	-32.50%
RAD51	0.511182187	0.131272877	0.559586522	0.035667246	-9.47%
RAD51	0.925017955	0.147411912	0.798785798	0.137513654	13.65%
RAD51C	0.768457762	0.093630788	0.724393177	0.052532638	5.73%

RAD51C	0.717585157	0.073467415	0.673763911	0.026263698	6.11%
RAD51L1	0.817873018	0.094902225	1.194446518	0.211469443	-46.04%
RAD51L1	1.201168501	0.170081516	1.232813316	0.056555848	-2.63%
RAD51L3	0.70513791	0.149672924	0.646015277	0.136603096	8.38%
RAD51L3	0.979560939	0.032141582	1.16006071	0.155376595	-18.43%
RAD52	1.030707118	0.042929649	1.185290239	0.242449811	-15.00%
RAD52	0.937906403	0.037925306	1.214674927	0.165845884	-29.51%
RAD54B	1.352737114	0.064491212	1.583341616	0.166379203	-17.05%
RAD54B	1.113199656	0.057171838	1.272206209	0.152437673	-14.28%
RAD54L	0.972644924	0.053778984	0.819365228	0.367401917	15.76%
RAD54L	0.776457272	0.164819999	0.686010468	0.009817277	11.65%
RAD9A	0.850043592	0.014605471	0.923031319	0.039630503	-8.59%
RAD9A	0.660196699	0.019886843	0.618815319	0.033428832	6.27%
RBM4	0.994264213	0.084276284	1.069414096	0.065704696	-7.56%
RBM4	1.012618731	0.035887922	1.050866406	0.061712412	-3.78%
RECQL4	0.998043697	0.040026929	1.101089376	0.024145818	-10.32%
RECQL4	0.945621689	0.029731666	0.995334036	0.029924898	-5.26%
REV1	1.058741041	0.054179002	1.246378509	0.147637522	-17.72%
REV1	0.973667809	0.0044165	0.918140643	0.023286175	5.70%
REV3L	0.875296349	0.039583261	0.964191947	0.026776987	-10.16%
REV3L	0.848988207	0.044018351	0.812998628	0.026009492	4.24%
RFC4	0.751851396	0.069120099	1.080011927	0.161376804	-43.65%
RFC4	0.539180711	0.045344645	0.609647815	0.102207721	-13.07%
RPA1	0.474494591	0.027492229	0.56901295	0.108270301	-19.92%
RPA1	0.396088704	0.047348825	0.535485025	0.104865168	-35.19%
RPA2	0.542762303	0.016064604	0.619293655	0.099365573	-14.10%
RPA2	0.969049084	0.064344594	0.940927012	0.462411173	2.90%
RPA3	0.781107083	0.063542864	0.791808527	0.050814142	-1.37%
RPA3	0.817204301	0.045263551	0.819672409	0.029970272	-0.30%
RPA4	1.090301582	0.080537699	1.252547733	0.031526223	-14.88%
RPA4	1.060783906	0.089242319	1.165631955	0.063527532	-9.88%
RPL13	0.982410581	0.015371703	1.045761587	0.03335435	-6.45%
RPL13	1.134950313	0.01694113	1.14710476	0.133957623	-1.07%
RPL27	0.317302885	0.021821095	0.424388826	0.050024839	-33.75%
RPL27	0.404767142	0.047657271	0.588718155	0.072362476	-45.45%
RPL35	0.260419931	0.010107865	0.425816625	0.17020649	-63.51%
RPL35	0.346634632	0.053329427	0.43852219	0.033930958	-26.51%
RRM2B	1.835265852	0.088012263	2.067402568	0.263075495	-12.65%
RRM2B	1.732616038	0.311187984	1.787474656	0.143368398	-3.17%
SDHC	0.746738249	0.063002438	0.71617799	0.058123403	4.09%
SDHC	0.839902721	0.064063922	0.795450311	0.065602835	5.29%
SDHC	1.072763419	0.061501225	1.397684703	0.047562692	-30.29%
SETD7	1.268470907	0.138721625	1.657721234	0.068811337	-30.69%
SETD7	0.91142822	0.188260736	1.046449988	0.189063493	-14.81%
SETD8	0.328771893	0.060194006	0.308267628	0.052808991	6.24%
SETD8	1.725512727	0.107258939	1.267312458	0.291727995	26.55%
SMARCA4	1.083999862	0.03674433	1.058021944	0.028473389	2.40%

SMARCA4	1.052491257	0.101614772	1.248526024	0.102740888	-18.63%
SMUG1	0.469722694	0.070949326	0.543709877	0.025514302	-15.75%
SMUG1	0.814282874	0.046241008	0.907566441	0.012424282	-11.46%
SND1	1.120638285	0.08028654	1.164821401	0.01387382	-3.94%
SND1	0.764382411	0.048384332	0.866380371	0.060316309	-13.34%
SNRPE	0.250774748	0.04218319	0.254021176	0.034499364	-1.29%
SNRPE	1.093036945	0.058778876	1.176291437	0.094178192	-7.62%
SNRPF	0.360808144	0.044821314	0.393053766	0.030910898	-8.94%
SNRPF	0.458969565	0.216341599	0.373257585	0.02361055	18.67%
SOX4	1.368212572	0.065414864	1.668455753	0.146408279	-21.94%
SOX4	1.126756059	0.144170173	1.208726767	0.143286316	-7.27%
SPO11	0.962674423	0.053744433	1.072683613	0.024790567	-11.43%
SPO11	0.938592847	0.039822107	1.099918004	0.082286484	-17.19%
SSBP1	1.114802047	0.190161168	1.027618833	0.079890785	7.82%
SSBP1	2.017305616	0.105782625	1.961883307	0.321744314	2.75%
SSR1	0.923155753	0.048337445	0.964801735	0.032101674	-4.51%
SSR1	0.902292785	0.018146642	0.923065196	0.043842017	-2.30%
SSR1	1.178185433	0.371732748	1.469901145	0.040405264	-24.76%
SUV39H1	1.130696475	0.046219036	1.220559619	0.112912001	-7.95%
SUV39H1	1.034445311	0.014717011	0.986652438	0.081736941	4.62%
SUV39H2	1.156991741	0.084704866	1.140530989	0.310941747	1.42%
SUV39H2	1.066428043	0.076814973	1.08658212	0.224213368	-1.89%
TARS	1.092703313	0.135950105	1.185712049	0.181531826	-8.51%
TARS	1.315167917	0.160206793	1.513997946	0.436690366	-15.12%
TDG	1.043664473	0.059542555	0.94854697	0.131023792	9.11%
TDG	1.965110206	0.130389798	2.049921153	0.455489286	-4.32%
TDP1	1.364669701	0.084413264	1.605672067	0.071219197	-17.66%
TDP1	1.120892628	0.016110377	1.1483347	0.159712848	-2.45%
TGIF1	1.080145189	0.098050022	1.461869573	0.227788929	-35.34%
TGIF1	0.948912052	0.041567691	1.074693339	0.210315008	-13.26%
TMEM30A	0.9571411	0.045285335	1.170162012	0.181927153	-22.26%
TMEM30A	1.328010825	0.160492727	1.59742239	0.102380157	-20.29%
TOP2A	0.709872223	0.068846446	0.758393165	0.084125223	-6.84%
TOP2A	0.690695675	0.081985123	0.734594824	0.030496926	-6.36%
TP53BP1	1.65385285	0.098191519	1.349628295	0.498273727	18.39%
TP53BP1	1.145060761	0.03948085	1.156386574	0.164304495	-0.99%
TPX2	0.345317843	0.044176878	0.49504574	0.10285601	-43.36%
TPX2	0.847127517	0.017319157	0.964526158	0.058915548	-13.86%
TRAF4	0.75428712	0.120454756	0.769903588	0.070453027	-2.07%
TRAF4	0.58248247	0.180237487	0.938872875	0.305702298	-61.18%
TRDMT1	1.013820144	0.055052864	1.27108059	0.056221051	-25.38%
TRDMT1	1.003455036	0.064872547	1.369734518	0.192587955	-36.50%
TREX1	0.803082358	0.163382387	0.895175537	0.096258278	-11.47%
TREX1	1.003493857	0.032700862	1.246846309	0.153152632	-24.25%
TREX2	1.114725058	0.078651636	0.794619488	0.317513264	28.72%
TREX2	0.604256366	0.064314841	0.970910778	0.077896404	-60.68%
TSTA3	0.904537183	0.129294758	0.790154108	0.331863616	12.65%

TSTA3	0.73016857	0.172535519	0.864076584	0.205934855	-18.34%
TUBB	0.811779371	0.068025776	0.805962282	0.048349847	0.72%
TUBB	0.957394135	0.077029388	0.939713404	0.141855363	1.85%
UBE2A	0.791691522	0.033880413	0.786828599	0.056549419	0.61%
UBE2A	1.36456453	0.181344495	1.344878207	0.055772107	1.44%
UBE2A	1.020187963	0.067432635	1.40991155	0.07672793	-38.20%
UBE2B	1.077871265	0.026494129	1.126469095	0.066458707	-4.51%
UBE2B	1.014317371	0.020335035	1.135801023	0.048036463	-11.98%
UBE2N	0.923202105	0.100131378	1.107473351	0.028225986	-19.96%
UBE2N	1.045687476	0.024308099	1.22086213	0.084046203	-16.75%
UBE2S	1.144693955	0.040318695	1.221230625	0.187321024	-6.69%
UBE2S	0.978823812	0.06026047	1.158156076	0.15539387	-18.32%
UBE2V2	1.610606219	0.109388676	1.593872494	0.224505875	1.04%
UBE2V2	0.947681867	0.057566223	1.10214361	0.036703067	-16.30%
UNG	0.726633042	0.040307347	0.806248551	0.061815077	-10.96%
UNG	1.121411518	0.055191263	1.315767212	0.047598982	-17.33%
WRN	1.088721752	0.182807012	0.989637306	0.345886214	9.10%
WRN	0.989820297	0.061506019	1.149818437	0.06864358	-16.16%
XAB2	0.205523006	0.031549473	0.244671095	0.014958665	-19.05%
XAB2	0.27561039	0.052777351	0.370596524	0.117461503	-34.46%
XPA	1.022956269	0.050251198	1.032232244	0.084341859	-0.91%
XPA	1.006665282	0.022237175	1.125727227	0.043821683	-11.83%
XPC	1.013901873	0.058506357	0.981179962	0.042709163	3.23%
XPC	1.019112912	0.036188718	1.140291281	0.01786393	-11.89%
XRCC1	0.393049897	0.030277741	0.365307502	0.062157112	7.06%
XRCC1	0.996953014	0.123844963	0.975635469	0.003643983	2.14%
XRCC2	0.598558446	0.087284639	0.596891192	0.057007034	0.28%
XRCC2	1.121637062	0.026148695	1.111026512	0.093941714	0.95%
XRCC3	1.478139993	0.029208955	1.932478548	0.027419033	-30.74%
XRCC3	0.503628983	0.004624957	0.469668356	0.013361831	6.74%
XRCC4	1.015334149	0.01682787	1.197805479	0.181934329	-17.97%
XRCC4	1.054678856	0.02970874	1.198054291	0.211292253	-13.59%
XRCC5	1.064328421	0.080256697	0.931825807	0.618120205	12.45%
XRCC5	0.248575256	0.049170377	0.625690577	0.629193334	-151.71%
XRCC6	0.972196254	0.069516122	1.048572879	0.021400333	-7.86%
XRCC6	0.8919705	0.151343437	0.818378822	0.105603542	8.25%
ZDHHC17	1.244753352	0.097540066	1.332637577	0.169147293	-7.06%
ZDHHC17	1.258531185	0.057937462	1.293708379	0.021835192	-2.80%

Primers for q-PCR		
Name	**Forward**	**Reverse**
DNA-PK	AGAAGGCGGCTTACCTGAGT	GACATTTTTGTCAGCCAATCTTT
BRCA2	GCGCGGTTTTTGTCAGCTTA	TGGTCCTAAATCTGCTTTGTTGC
ATM	TGGATCCAGCTATTTGGTTTGA	CCAAGTATGTAACCAACAATAGAAGAAGTAG
MAD2L2	CGAGTTCCTGGAGGTGGCTGTGCATC	CTTGACGCAGTGCAGCGTGTCCTGGATA
RAD23B	ATGGTAGACAAAACTATAATCCAGCATC	GCCACATCTCCCAACCCA
NBN	ATGGAGGCCATATTTCCATGAC	CAAGCAGCCAGAACTTGGAAG
RAD54L	CGAAGCCGTAGCAGTGACAAAG	ATGGACATCGTGCCATCCAG
GAPDH	TCGCTCTCTGCTCCTCCTGTTC	CGCCCAATACGACCAAATCC

Ni et al **Supplementary Table 2**

Primers and templates for aptamer-shRNAs synthesis			
1st PCR primers			
Name	**Forward**	**Reverse**	**Name**
A10-3 Temlate primer	TAATACGACTCACTATAGGGAGGACGATGCGGATCA GCCATGTTTACGTCACTCCTTGTCAATCCTCATCGGC	AATTCTCCGAACGTGTCACGTCAAGCTTCATACGTGA CACGTTCGGAGAATTGCCGATGAGGATTGACAAG	**Con-siRNA-loop primer**
		TTCGGCTAACTCGCCAGTTTACAAGCTTCATTAAACT GGCGAGTTAGCCGAAGCCGATGAGGATTGACAAG	**DNA-PK-loop primer**
		CAGGACACAATTACAACTAAACAAGCTTCATTTTAGT TGTAATTGTGTCCTGGCCGATGAGGATTGACAAG	**BRCA2-loop primer**
		AGGCTATTCAGTGTGCGAGACAAGCTTCATTCTCGC ACACTGAATAGCCTTGCCGATGAGGATTGACAAG	**ATM-loop primer**
Neg Temlate primer	TAATACGACTCACTATACAGGCATGCCTAGCTAAGCA GCCCATGGCTTATGCGCGGAATATTGGCTTCCGTTC	TTCGGCTAACTCGCCAGTTTACAAGCTTCATTAAACT GGCGAGTTAGCCGAAGAACGGAAGCCAATATTCC	**Neg-DNA-PK-loop primer**
		CAGGACACAATTACAACTAAACAAGCTTCATTTTAGT TGTAATTGTGTCCTGGAACGGAAGCCAATATTCC	**Neg-BRCA2-loop primer**
		AAGGCTATTCAGTGTGCGAGACAAGCTTCATTCTCG CACACTGAATAGCCTTGAACGGAAGCCAATATTCC	**Neg-ATM-loop primer**
2nd PCR primers			
Name	**Forward**	**Reverse**	**Name**
A10-3 5'-primer	TAATACGACTCACTATAGGGAGGACGATGCGG	AATTCTCCGAACGTGTCACGTCAAGC	**Con-loop 2nd primer**
		TTCGGCTAACTCGCCAGTTTACAAGC	**DNA-PK-loop 2nd primer**
Neg 5'-primer	TAATACGACTCACTATACAGGCATGCCTAGCT	CAGGACACAATTACAACTAAACAAGC	**BRCA2-loop 2nd primer**
		AAGGCTATTCAGTGTGCGAGACAAGC	**ATM-loop 2nd primer**

Ni et al **Supplementary Table 3**

Aptamer-shRNA	
Name	
A10-3-Con	GGGAGGACGAUGCGGAUCAGCCAUGUUUACGUCACUCCUUGUCAAUCCUCAUCG GCAAUUCUCCGAACGUGUCACGUAUGAAGCUUGACGUGACACGUUCGGAGAAUU
A10-3-DNA-PK	GGGAGGACGAUGCGGAUCAGCCAUGUUUACGUCACUCCUUGUCAAUCCUCAUCG GCUUCGGCUAACUCGCCAGUUUAAUGAAGCUUGUAAACUGGCGAGUUAGCCGAA
A10-3-BRCA2	GGGAGGACGAUGCGGAUCAGCCAUGUUUACGUCACUCCUUGUCAAUCCUCAUCG GCCAGGACACAAUUACAACUAAAAUGAAGCUUGUUUAGUUGUAAUUGUGUCCUG
A10-3-ATM	GGGAGGACGAUGCGGAUCAGCCAUGUUUACGUCACUCCUUGUCAAUCCUCAUCG GCAAGGCUAUUCAGUGUGCGAGAAUGAAGCUUGUCUCGCACACUGAAUAGCCUU
Neg-DNA-PK	CAGGCAUGCCUAGCUAAGCAGCCCAUGGCUUAUGCGCGGAAUAUUGGCUUCCGU UCUUCGGCUAACUCGCCAGUUUAAUGAAGCUUGUAAACUGGCGAGUUAGCCGAA
Neg-BRCA2	CAGGCAUGCCUAGCUAAGCAGCCCAUGGCUUAUGCGCGGAAUAUUGGCUUCCGU UCCAGGACACAAUUACAACUAAAAUGAAGCUUGUUUAGUUGUAAUUGUGUCCUG
Neg-ATM	CAGGCAUGCCUAGCUAAGCAGCCCAUGGCUUAUGCGCGGAAUAUUGGCUUCCGU UCAAGGCUAUUCAGUGUGCGAGAAUGAAGCUUGUCUCGCACACUGAAUAGCCUU

Ni et al **Supplementary Table 4**

siRNA		
Name	**sense**	**anti-sense**
DNA-PK	UUCGGCUAACUCGCCAGUUUA	UAAACUGGCGAGUUAGCCGAA
BRCA2	CAGGACACAAUUACAACUAAA	UUUAGUUGUAAUUGUGUCCUG
ATM	AAGGCUAUUCAGUGUGCGAGA	UCUCGCACACUGAAUAGCCUU
Con siRNA	AAUUCUCCGAACGUGUCACGU	ACGUGACACGUUCGGAGAAUU

Ni et al **Supplementary Table 5**