

**Table S1 DDR genes of univariate Cox regression analysis in the TARGET group**

id	HR	HR. 95L	HR. 95H	pvalue
APLF	0.808887	0.414935	1.576869	0.533457
APTX	1.414176	0.82513	2.423731	0.207415
ASCC3	0.970074	0.607645	1.548674	0.898703
DNTT	4.886295	0.054842	435.3582	0.488594
LIG1	0.898845	0.572458	1.411321	0.643161
LIG3	0.876623	0.570566	1.346853	0.547863
LIG4	1.308924	0.816484	2.098364	0.263577
MRE11A	1.318522	0.862605	2.015407	0.201512
NBN	0.98776	0.674114	1.447338	0.949623
NHEJ1	1.697009	1.153403	2.496821	0.007267
PARG	1.080911	0.634419	1.841637	0.774736
PARP1	0.624183	0.42429	0.91825	0.016712
PARP3	0.841355	0.546719	1.294776	0.432222
PARPBP	0.884098	0.547	1.428938	0.615047
PNKP	1.136077	0.735297	1.755304	0.565457
POLB	0.847515	0.562018	1.278042	0.429875
POLL	1.457032	0.839823	2.527846	0.180577
POLM	0.894799	0.559078	1.432117	0.643198
PRKDC	0.906889	0.645218	1.274682	0.573648
RAD50	0.812622	0.484122	1.364025	0.432344
RNF168	0.708948	0.445497	1.128194	0.146748
RNF8	0.760106	0.496565	1.163516	0.206675
TP53BP1	0.819112	0.494744	1.356145	0.43794
XRCC1	0.962806	0.542979	1.707238	0.896804
XRCC2	0.987247	0.662637	1.470875	0.949688
XRCC3	1.28044	0.844518	1.941374	0.244364
XRCC4	0.784321	0.423557	1.452363	0.439637
XRCC5	0.878507	0.53706	1.437036	0.60593
XRCC6	0.709833	0.429361	1.173519	0.181498
UBE2A	0.832249	0.496982	1.393689	0.485149
EXO1	1.011269	0.620126	1.649124	0.964178
HMGB1	1.016339	0.701814	1.471822	0.931639
MLH1	0.569035	0.333616	0.970582	0.038493
MLH3	0.64123	0.407082	1.010056	0.055263
MSH2	0.87985	0.589141	1.314007	0.531635
MSH3	0.783978	0.435723	1.41058	0.416737
MSH6	0.821877	0.533929	1.265113	0.372725
PCNA	0.880313	0.61717	1.255652	0.481716
PMS1	1.447365	0.924122	2.266873	0.106259
PMS2	0.7496	0.432031	1.300602	0.305301
POLD1	0.870687	0.559099	1.355925	0.540072
POLD2	0.705431	0.427817	1.163192	0.171459
POLD3	1.151998	0.744644	1.782192	0.525055
POLD4	0.901076	0.579635	1.400774	0.643543
RFC1	0.703943	0.447284	1.107876	0.129213
RFC2	0.589791	0.34724	1.001768	0.050769
RFC3	0.911727	0.621822	1.336791	0.635993
RFC4	1.101447	0.734671	1.65133	0.640031
RFC5	0.811427	0.490339	1.342774	0.416163
RPA1	0.785073	0.48443	1.2723	0.325942
RPA2	0.821313	0.506886	1.330783	0.42404

RPA3	0.693288	0.438699	1.095624	0.116685
RPA4	0.694626	0.202199	2.386296	0.562799
ALKBH1	0.631431	0.380298	1.048403	0.075528
ALKBH2	1.511692	0.837848	2.72748	0.169941
ALKBH3	0.810408	0.470939	1.394577	0.447823
APEX1	0.748435	0.487327	1.149444	0.185596
APEX2	0.613833	0.402856	0.935301	0.023132
APITD1	0.887974	0.524183	1.504244	0.658642
ATM	1.25615	0.852339	1.851275	0.249109
ATR	0.972144	0.573892	1.646762	0.916331
ATRIP	0.830125	0.456509	1.509514	0.541701
ATRX	0.994794	0.686721	1.441072	0.977977
BARD1	0.932814	0.609325	1.428042	0.748894
BLM	1.094866	0.728597	1.645259	0.662717
BRCA1	0.837367	0.544609	1.287499	0.418713
BRCA2	0.965076	0.559592	1.664376	0.898274
BRE	0.669007	0.432193	1.03558	0.071368
BRIP1	0.800321	0.542846	1.179918	0.260746
CCNH	0.748567	0.445903	1.256669	0.273246
CDK7	1.119139	0.624922	2.004206	0.704977
CETN2	0.601671	0.370676	0.976616	0.039811
CHAF1A	0.747961	0.492929	1.134941	0.172255
CHEK1	1.222345	0.821737	1.818255	0.321719
CHEK2	0.996224	0.632227	1.569788	0.98699
CLK2	1.659449	1.071279	2.570546	0.023309
CUL3	0.868697	0.533118	1.415509	0.572038
CUL4A	1.024869	0.707304	1.485014	0.896706
CUL5	1.040383	0.701075	1.543909	0.844163
DCLRE1A	1.489653	0.921163	2.408982	0.104138
DCLRE1B	0.643577	0.406128	1.019853	0.060618
DCLRE1C	1.017091	0.67555	1.531307	0.935304
DDB1	0.847213	0.455995	1.574074	0.599869
DDB2	0.699963	0.438899	1.116312	0.13415
DMC1	1.214073	0.937127	1.572864	0.141994
DNA2	1.154346	0.770164	1.73017	0.486956
DUT	0.843558	0.527367	1.349328	0.477795
EID3	1.125385	0.76272	1.660491	0.551719
EME1	0.891797	0.568539	1.398851	0.618069
EME2	1.485856	0.938125	2.353385	0.091462
ERCC1	0.774742	0.457875	1.310895	0.34154
ERCC2	0.584954	0.369163	0.926883	0.022415
ERCC3	1.148637	0.662079	1.992762	0.622029
ERCC4	1.032941	0.773586	1.379248	0.826103
ERCC5	1.019183	0.658181	1.578189	0.932127
ERCC6	1.096799	0.6178	1.947178	0.752383
ERCC8	0.753975	0.452434	1.256488	0.278478
FAAP100	0.94019	0.573398	1.541612	0.806888
FAAP24	0.655802	0.408952	1.051655	0.079956
FAAP20	0.824482	0.541574	1.255177	0.36809
FAM175A	1.163697	0.778185	1.740191	0.460259
FAN1	1.305438	0.835024	2.040862	0.242351
FANCA	0.914545	0.647739	1.291248	0.611752
FANCB	1.000885	0.609333	1.644043	0.997214
FANCC	1.678589	1.059093	2.66045	0.027503

FANCD2	1.034103	0.778524	1.373585	0.81691
FANCE	1.188508	0.813348	1.73671	0.372178
FANCF	0.571782	0.298617	1.094828	0.091678
FANCG	1.124767	0.67121	1.884807	0.65532
FANCI	0.983425	0.69088	1.399844	0.926078
FANCL	0.924321	0.622137	1.373282	0.696835
FANCM	1.210289	0.697974	2.098644	0.496754
FEN1	0.923239	0.637879	1.336256	0.672024
GADD45A	0.774704	0.575717	1.042468	0.091917
GADD45G	1.325795	0.991587	1.772645	0.057047
GEN1	1.032434	0.638135	1.67037	0.896543
GTF2H1	0.917753	0.563958	1.493497	0.729753
GTF2H2	0.817	0.566094	1.179113	0.280249
GTF2H3	0.838985	0.541992	1.29872	0.430983
GTF2H4	1.063457	0.641265	1.763606	0.811579
GTF2H5	0.498597	0.275966	0.900834	0.021111
H2AFX	0.899085	0.631767	1.279514	0.554603
HELQ	0.991467	0.57284	1.716024	0.975575
HES1	0.75713	0.561014	1.021802	0.068918
HFM1	0.699031	0.340584	1.434727	0.32906
HLTF	1.113455	0.780606	1.588232	0.553129
HMGB2	1.113372	0.813012	1.524697	0.50319
HUS1	0.865501	0.540323	1.386378	0.547903
INO80	0.97426	0.58868	1.612393	0.919195
KAT5	0.982572	0.569068	1.696542	0.949694
MAD2L2	0.66964	0.425822	1.053065	0.082543
MBD4	0.711069	0.399685	1.265043	0.246011
MDC1	1.000331	0.661507	1.512699	0.99875
MGMT	1.049813	0.745711	1.477927	0.780578
MMS19	1.489764	0.853045	2.601738	0.161143
MNAT1	1.100808	0.689696	1.756974	0.68723
MPG	0.792457	0.486348	1.291232	0.350379
MPLKIP	0.867889	0.469456	1.604475	0.651313
MRPL40	0.622639	0.385513	1.005617	0.052738
MUS81	1.250514	0.781416	2.001222	0.351413
MUTYH	1.046606	0.636862	1.719969	0.857366
NABP2	0.865944	0.514668	1.456979	0.587681
NEIL1	1.238523	0.87803	1.747024	0.222903
NEIL2	1.24117	0.749502	2.055368	0.401173
NEIL3	0.992423	0.636757	1.546749	0.973203
NFATC2IP	1.109362	0.68236	1.803572	0.675534
NSMCE1	0.662844	0.36418	1.206443	0.178379
NSMCE2	1.207988	0.77439	1.884368	0.404888
NSMCE3	1.020055	0.624205	1.66694	0.93684
NSMCE4A	1.155658	0.72645	1.838454	0.54136
NTHL1	1.004717	0.67803	1.488807	0.98129
NUDT1	1.304026	0.888573	1.913726	0.174991
NUDT15	0.994263	0.587651	1.68222	0.982891
NUDT18	0.991485	0.649721	1.513023	0.968368
RRM1	0.81549	0.564819	1.177411	0.276401
RRM2	0.873559	0.631541	1.208322	0.414101
OGG1	0.812133	0.489965	1.34614	0.419612
PALB2	0.712251	0.41614	1.219065	0.215887
PARP2	0.786015	0.496341	1.244749	0.304633

PARP4	0.793188	0.507383	1.239984	0.309447
PAXIP1	1.163894	0.724623	1.869455	0.53018
PER1	0.978394	0.772517	1.239136	0.856205
POLA1	0.821976	0.520444	1.298209	0.400498
POLE	1.173784	0.805041	1.711428	0.404948
POLE2	1.061295	0.718705	1.567192	0.764842
POLE3	0.832203	0.508779	1.361223	0.464399
POLE4	0.697379	0.439593	1.106334	0.125823
POLG	1.715017	1.070807	2.746791	0.024791
POLH	1.154725	0.805124	1.656129	0.434281
POLI	1.385245	0.85347	2.248353	0.187247
POLK	1.083821	0.666719	1.761863	0.745413
POLN	0.959683	0.635603	1.449004	0.844801
POLQ	1.221516	0.761114	1.960417	0.4071
PPP4C	0.565691	0.340488	0.939847	0.027844
PPP4R1	0.713677	0.456513	1.115709	0.138958
PPP4R2	1.034481	0.689115	1.552934	0.870085
PPP4R4	1.053339	0.616483	1.799761	0.849209
PRPF19	0.749748	0.453811	1.23867	0.26085
RAD1	0.701622	0.441834	1.114158	0.133142
RAD17	0.770466	0.465529	1.275147	0.310389
RAD18	0.874923	0.557606	1.372816	0.561004
RAD23A	1.511288	0.978162	2.334983	0.062816
RAD23B	0.879396	0.557689	1.386682	0.580204
RAD51	0.585109	0.36043	0.949846	0.03015
RAD51B	0.892457	0.601405	1.324366	0.572096
RAD51C	0.680641	0.449561	1.0305	0.069066
RAD51D	0.879967	0.505679	1.531291	0.65098
RAD52	1.159745	0.863452	1.55771	0.324833
RAD54B	0.941711	0.633114	1.400726	0.766876
RAD54L	0.755208	0.490387	1.163037	0.20252
RAD9A	1.375459	0.893056	2.118442	0.147987
RBBP8	1.117558	0.743803	1.67912	0.592599
RBX1	0.780273	0.470538	1.293891	0.336305
RDM1	1.227653	0.746913	2.017814	0.41852
RECQL	0.807957	0.579617	1.126253	0.208262
RECQL4	0.946098	0.687526	1.301916	0.733723
RECQL5	1.166815	0.723593	1.881524	0.526831
REV1	1.26242	0.794833	2.005081	0.323546
REV3L	1.136179	0.764888	1.687703	0.527138
RIF1	1.1589	0.784578	1.711812	0.45871
RMI1	0.930924	0.612283	1.415391	0.737751
RMI2	0.572041	0.378099	0.865464	0.008195
RNMT	1.051126	0.629966	1.753851	0.84861
RRM2B	1.18617	0.776138	1.812823	0.430158
RTEL1	1.054704	0.670799	1.658321	0.817573
SETMAR	0.582035	0.35103	0.965061	0.035922
SHFM1	0.909202	0.671035	1.231901	0.539076
SHPRH	1.366778	0.889438	2.100295	0.154029
SLX1A	0.821851	0.554131	1.218916	0.329267
SLX1B	1.047855	0.83529	1.314513	0.686136
SLX4	0.540325	0.274129	1.065015	0.075399
SMARCAD1	1.035586	0.676413	1.585481	0.872163
SMC5	1.402822	0.926417	2.124215	0.109837

SMC6	0.911404	0.613655	1.353622	0.645752
SMUG1	0.781909	0.472828	1.293034	0.33776
SPO11	2.77572	0.229019	33.64178	0.422537
STRA13	0.908538	0.58953	1.400168	0.663806
SWSAP1	0.905029	0.502626	1.629594	0.73947
TCEA1	1.029328	0.711837	1.488427	0.877912
TCEB1	0.768196	0.441716	1.335984	0.350297
TCEB2	0.651619	0.409842	1.036027	0.07024
TCEB3	0.755683	0.458166	1.246397	0.272534
TDG	1.366534	0.852737	2.189905	0.194331
TDP1	0.819026	0.512679	1.308427	0.403575
TELO2	0.842054	0.510205	1.389746	0.501271
TOP3A	0.908485	0.666346	1.238613	0.543937
TOP3B	0.961589	0.610535	1.514499	0.865799
TOPBP1	1.250819	0.814785	1.920197	0.306144
TP53	1.08858	0.948453	1.24941	0.227352
TREX1	0.681682	0.469897	0.98892	0.043523
TREX2	0.886532	0.438953	1.790486	0.737008
TYMS	0.922079	0.660188	1.28786	0.634148
UBE2B	1.080752	0.615151	1.898759	0.787095
UBE2N	0.916536	0.602402	1.39448	0.683989
UBE2T	0.881121	0.631135	1.230124	0.457241
UBE2V2	0.993013	0.682027	1.445801	0.97082
UIMC1	1.1406	0.659311	1.973224	0.638057
UNG	0.9619	0.607591	1.52282	0.868376
USP1	0.929065	0.675182	1.278414	0.651428
UVSSA	0.912645	0.570913	1.458927	0.702529
WDR48	1.07382	0.653281	1.765075	0.778795
WRN	1.194592	0.742624	1.921633	0.463502
XAB2	0.71987	0.47256	1.096606	0.125883
XPA	1.434467	0.822658	2.501277	0.203437
XPC	0.735537	0.441321	1.225899	0.238598
ZSWIM7	0.809457	0.620795	1.055455	0.118446
PTEN	1.196826	0.821066	1.744551	0.350033
TDP2	0.666789	0.420739	1.056733	0.084513
ENDOV	0.6086	0.368718	1.004546	0.05211
SPRTN	1.294189	0.734654	2.279884	0.372054
RNF4	0.771341	0.485243	1.226123	0.27225
SMARCA4	1.249236	0.806366	1.935336	0.319077
IDH1	0.904888	0.604043	1.355569	0.62791
SOX4	0.66345	0.486231	0.905261	0.009662
WEE1	0.969049	0.677579	1.3859	0.863258
RAD9B	1.221762	0.781817	1.909273	0.379209
AEN	0.852329	0.524285	1.38563	0.519276
PLK3	0.753321	0.484309	1.171758	0.208849
EXO5	0.672165	0.402381	1.12283	0.129158
CDC5L	0.883734	0.618651	1.262401	0.496945
BCAS2	0.82862	0.559664	1.226827	0.347764
PLRG1	0.871781	0.568089	1.337823	0.530015
YWHAB	0.575434	0.354831	0.933188	0.025073
YWHAG	0.803733	0.520916	1.240096	0.323428
YWHAE	0.880025	0.557529	1.389067	0.583143
CDC25A	0.841005	0.548698	1.289032	0.426778
CDC25B	0.700558	0.466618	1.051784	0.086079

CDC25C	0.866783	0.540978	1.388805	0.55224
BABAM1	0.625773	0.362781	1.079417	0.091945
BRCC3	0.764666	0.460965	1.268457	0.298773
TTK	1.036503	0.725118	1.481607	0.844074
SMARCC1	1.001214	0.646007	1.551734	0.995669
SWI5	0.56547	0.35985	0.888583	0.013428
MORF4L1	0.950763	0.608734	1.484969	0.824362
RNF169	1.149164	0.704928	1.873351	0.577109
HERC2	0.829037	0.514812	1.335055	0.440555













