

Table S1 Mitochondria-related mRNAs associated with prognosis in ccRCC				
Gene	HR	HR.95L	HR.95H	P
SDHB	0.453418185	0.313234542	0.656339015	2.77E-05
COQ7	0.236666738	0.141621191	0.395499743	3.79E-08
ATP5F1A	0.526679286	0.384099882	0.722184733	6.87E-05
OGDH	0.566215235	0.4398921	0.728814388	1.01E-05
SDHD	0.629785077	0.489412358	0.810419348	0.000325982
DBT	0.31046397	0.205676724	0.468637746	2.58E-08
DLAT	0.455392002	0.335934761	0.617327824	4.03E-07
LRPPRC	0.468498864	0.361314345	0.607479853	1.06E-08
NDUFS1	0.513429953	0.380057251	0.693606862	1.40E-05
ISCA1	0.511666923	0.362456975	0.722301014	0.000139344
SUCLA2	0.467448519	0.371065143	0.588867272	1.08E-10
IARS2	0.571071609	0.436833061	0.746561587	4.17E-05
IDH3A	0.584518702	0.427848706	0.798558247	0.000743587
COX11	0.524330743	0.357139098	0.769850468	0.000984719
ETFDH	0.461910045	0.350780748	0.608245722	3.78E-08
BCKDHA	0.444783856	0.322506202	0.613422865	7.83E-07
COX15	0.401161413	0.284345668	0.565967755	1.98E-07
AFG3L2	0.523973278	0.410322122	0.669103568	2.21E-07
HADHA	0.434293331	0.305767967	0.616842564	3.18E-06
AUH	0.495467241	0.389595122	0.630110011	1.03E-08
APOOL	0.437479374	0.332241762	0.576051011	3.89E-09
ACADM	0.559174888	0.470937869	0.663944388	3.27E-11
SLC25A4	0.485587096	0.375866842	0.627338163	3.24E-08
SAMM50	0.31380003	0.206921672	0.475885197	4.90E-08
ACO2	0.6308261	0.534136772	0.74501811	5.72E-08
FECH	0.455757996	0.332628365	0.62446674	1.01E-06
PRDX3	0.653293022	0.514728349	0.829159251	0.000464805
GHITM	0.556997977	0.413906972	0.749556705	0.000112072
SDHC	0.553857475	0.399538667	0.767780763	0.000391453
HADH	0.373103079	0.265137791	0.525032313	1.54E-08
ACAT1	0.624340197	0.529415805	0.736284557	2.17E-08
NDUFS4	0.457465073	0.328767346	0.636542212	3.49E-06
MRPL4	0.504359271	0.375416004	0.677590385	5.53E-06
HSDL2	0.523743853	0.410105068	0.668871577	2.19E-07
MRPS14	0.393868556	0.246981786	0.628112876	9.12E-05
OGDHL	0.816978722	0.727651915	0.91727132	0.000622468
GFM2	0.598980352	0.44938237	0.798379034	0.000472649
IBA57	0.26485534	0.16585271	0.42295571	2.65E-08
DAP3	2.339502578	1.521752838	3.596689406	0.000107333
SUCLG2	0.566577124	0.419475555	0.76526423	0.000211987
FDX1	0.483334864	0.327784984	0.71270071	0.000243207
ACADSB	0.487287618	0.396494636	0.59887121	8.28E-12
AKI3	0.597966039	0.442291169	0.808434373	0.00083154
MIPEP	0.45662018	0.330608376	0.630661546	1.96E-06
LYRM7	0.343333639	0.241913661	0.487272967	2.17E-09
PCCA	0.492011523	0.395973257	0.611342645	1.54E-10
MRPL49	0.518663861	0.399100755	0.674045833	9.09E-07
HIBADH	0.641362118	0.519333851	0.79206346	3.71E-05
SLC25A30	0.583680669	0.452818497	0.752361322	3.23E-05
ABCB7	0.431167413	0.310935526	0.59789031	4.57E-07
ALDH9A1	0.575605479	0.43914496	0.754469931	6.32E-05
ALDH6A1	0.576079031	0.487189218	0.681188838	1.12E-10
L2HGDH	0.504390956	0.37402798	0.680190387	7.26E-06
MRPL30	0.39149413	0.251990325	0.608228328	3.02E-05
AFG1L	0.259423702	0.125379818	0.536774244	0.000275761
ATP5PB	0.402616919	0.280743212	0.577397339	7.59E-07
SLC25A13	0.541269265	0.398707193	0.734805949	8.30E-05
WARS2	0.375101197	0.262724738	0.535544954	6.77E-08
CBR4	0.511032766	0.353917741	0.737896008	0.000341508
MT-CO2	1.387739307	1.173126915	1.641612993	0.000131976
VWA8	0.423915694	0.315148425	0.570221844	1.40E-08
MCCC2	0.577531664	0.430335416	0.775076393	0.000254774
MMUT	0.501947467	0.399321468	0.630948445	3.50E-09
ATAD1	0.521230943	0.36018708	0.754279403	0.000549327
CLYBL	0.557666857	0.398703739	0.780008545	0.000646765
PNPLA8	0.528489864	0.384341226	0.726701997	8.69E-05
SLC30A9	0.482397654	0.369447152	0.628980336	8.51E-08
PDS2	0.483767684	0.342194802	0.683912119	3.94E-05
ABCB10	0.591603565	0.443400499	0.789342319	0.000359997
FAM210A	0.53132083	0.378271812	0.746299358	0.000264165
CPT1A	0.588974539	0.478301081	0.725256582	6.20E-07
MRPS30	0.450746818	0.295401167	0.687784512	0.000219067
NARS2	0.500962303	0.349408736	0.718251157	0.000169743
SLC25A24	0.56381941	0.446314636	0.712260593	1.54E-06
AKAP1	0.524151146	0.372261242	0.738015117	0.000215583
NOA1	0.513076734	0.359240573	0.732789541	0.000242996
SFXN1	0.561179347	0.404875574	0.777824793	0.000523546
EARS2	0.489564929	0.333647644	0.718344108	0.000261295
HSD17B4	0.574029742	0.428273877	0.769391184	0.000203936
MRPL50	0.471854352	0.348814329	0.63829525	1.10E-06
NBPL	0.345143952	0.212695546	0.560069779	1.68E-05
TFAM	0.54270971	0.388923825	0.757304671	0.000324129
MAIP1	0.507885582	0.363312238	0.709989197	7.37E-05
SLC25A46	0.473113118	0.336551129	0.665087719	1.66E-05
CROT	0.464258764	0.310594041	0.693948276	0.000182943
IMMP2L	0.472359465	0.331819787	0.672423627	3.15E-05
YME1L1	0.550788675	0.424933294	0.713919499	6.61E-06
ABCD3	0.519727015	0.389826314	0.692914153	8.20E-06
LDHD	0.719991059	0.611183965	0.848168726	8.50E-05
NNT	0.578875092	0.464270757	0.721769285	1.19E-06
TTC19	0.493919853	0.329696159	0.739944382	0.000625339
TCAIM	0.326994848	0.196569172	0.543959307	1.67E-05
TOMM70	0.611372706	0.456457455	0.818864017	0.000965668
MT-ND4	1.396797911	1.17782114	1.65648615	0.000122438
ALDH1L1	0.739162304	0.657068	0.831513498	4.86E-07
HADHB	0.516596224	0.385222306	0.69277312	1.03E-05
NMNAT3	0.575041062	0.413797456	0.799116134	0.000982021
HMGCS2	0.828462607	0.762870987	0.899693792	7.76E-06
OPA3	0.497996953	0.343138788	0.722742442	0.000243862
PHYH	0.615515134	0.481494872	0.786838869	0.000107337
HINT3	0.475701761	0.350460626	0.645699255	1.88E-06
CAT	0.630239192	0.533144676	0.745016235	6.37E-08
MICU2	0.535947006	0.384111512	0.747801576	0.000242599
PARS2	0.470779744	0.32363953	0.684816122	8.15E-05
ACSS3	0.616110803	0.506763264	0.749052958	1.18E-06
ACSL1	0.707566237	0.604795346	0.827800648	1.56E-05
FASN	1.483424639	1.241540211	1.772434465	1.41E-05
PINK1	0.476599899	0.394066361	0.57641932	2.20E-14
THNSL1	0.41159797	0.30133594	0.562206051	2.41E-08
FDPS	0.592127649	0.438276086	0.799986957	0.000640909
IDI1	0.487161864	0.355747149	0.667121808	7.34E-06
MTFR1	0.626639466	0.477108617	0.823034852	0.000779132
BCL2L13	0.535970466	0.380007668	0.755943537	0.000378555
MMADHC	0.583706072	0.452947282	0.752212879	3.18E-05
OSBPL1A	0.475425451	0.380529409	0.593986571	5.93E-11
FASTKD2	0.47338096	0.328570867	0.682012789	5.97E-05
PEX11B	0.444583343	0.286722725	0.68935711	0.000292094
PLPBP	0.557842128	0.42916973	0.725092704	1.28E-05
SCP2	0.521553319	0.420194287	0.64736212	3.55E-09
MUL1	0.497388284	0.368424108	0.67148069	5.09E-06
BID	3.309418258	2.287455375	4.787961911	2.14E-10
SYNJ2BP	0.440281439	0.324847732	0.596734184	1.24E-07
VPS13D	0.446012974	0.319692615	0.622246383	2.01E-06
TRMT5	0.419007553	0.279430816	0.628303391	2.57E-05
FBXL4	0.479713999	0.347140699	0.662917143	8.55E-06
RMDN3	0.369238014	0.234524559	0.58133234	1.69E-05
TMLHE	0.357823793	0.240985658	0.531309074	3.48E-07
TOMM20	0.493834499	0.38567863	0.632320521	2.22E-08
MMAA	0.342747129	0.235578064	0.49867373	2.18E-08
MIEF1	0.524812317	0.380184488	0.724458723	8.87E-05
USP30	0.453215298	0.288984517	0.710778932	0.000567026
METTL15	0.293172979	0.172446609	0.49841743	5.85E-06
GLUD2	0.374344468	0.272757083	0.513767705	1.18E-09
OXC7	3.280753256	1.66375885	6.469292065	0.000604787
EFHD1	0.752808148	0.644617275	0.879157493	0.000334623
SPTLC2	0.514406491	0.383572658	0.68986679	9.02E-06
EXD2	0.446806356	0.314730506	0.634307499	6.60E-06
PREPL	0.535585405	0.403866825	0.71026315	1.45E-05
NBR1	0.505060166	0.395204139	0.645453193	4.80E-08
FKBP10	1.475553027	1.275853903	1.706509444	1.58E-07
MIGA1	0.397441389	0.292247715	0.540499207	4.05E-09
BCL2A1	1.306404397	1.125991076	1.515724668	0.000423606
PRKN	0.593704265	0.481903783	0.731442182	9.92E-07
ALKBH1	0.476546907	0.310934952	0.730368048	0.000668317
STX17	0.507411798	0.390589912	0.659174046	3.74E-07
TRMT61B	0.457383249	0.328873741	0.636108666	3.35E-06
SPIRE1	0.698644287	0.57403198	0.85030377	0.000346585
SNAP29	0.373087468	0.218008818	0.63847995	0.000322312
PDK4	0.745662043	0.684266957	0.812565735	2.16E-11
CPT2	0.454595404	0.359344227	0.575094758	4.98E-11
ECHDC3	0.741423083	0.64406978	0.853491663	3.10E-05
HIBCH	0.435962818	0.33283079	0.57105167	1.66E-09
ACADL	0.701883013	0.62049592	0.793945209	1.81E-08
PDK2	0.573288847	0.467943007	0.702350708	7.85E-08
SLC25A42	0.59600799	0.484741113	0.73281493	9.18E-07
ACAA2	0.584106041	0.497581131	0.685676859	4.93E-11
DHTKD1	0.651600709	0.536939765	0.790746954	1.44E-05
HSD17B8	0.538866184	0.432245508	0.671786657	3.88E-08
BPHL	0.483125258	0.360249378	0.647912334	1.18E-06
ACSM5	0.768861703	0.673508588	0.877714594	1.00E-04
MTARC2	0.617084229	0.514906280	0.739538464	1.72E-07
ECI2	0.435755899	0.312208862	0.608192869	1.04E-06
EHHADH	0.657566641	0.58534203	0.738702956	1.64E-12
ACOT13	0.508382385	0.348952258	0.740653324	0.000425593
GATM	0.761216467	0.689183148	0.840778698	7.48E-08
CHDH	0.637024713	0.54527293	0.744215351	1.3

Table S2 Mitochondria-related LncRNAs associated with prognosis in ccRCC

Gene	HR	HR.95L	HR.95H	P
<i>ZKSCAN2-DT</i>	2.137825	1.615627	2.828805	1.05E-07
<i>PDXDC2P-NPIPB14P</i>	2.21111	1.630371	2.998708	3.32E-07
<i>AC009120.2</i>	1.690878	1.351617	2.115294	4.29E-06
<i>AC006435.2</i>	1.767423	1.387303	2.251695	4.04E-06
<i>AC008870.2</i>	2.916664	2.064713	4.120151	1.25E-09
<i>PTOV1-AS2</i>	1.515849	1.278437	1.79735	1.70E-06
<i>RUSC1-AS1</i>	1.681486	1.324073	2.135377	2.02E-05
<i>AL135999.1</i>	1.829772	1.419069	2.359341	3.18E-06

ccRCC, clear cell renal cell carcinoma; LncRNAs, long non-coding RNAs; HR, hazard ratio; 95L, the lower limit of the 95% confidence; 95H, the higher limit of the 95% confidence.

Table S3 Clinical information varied between the high and low risk groups in risk all database

Covariates	Risk	Total	High	Low	Chi	P
Age	<=65	320(65.44%)	152(63.6%)	168(67.2%)	0.5506	0.46
Age	>65	169(34.56%)	87(36.4%)	82(32.8%)		
Gender	FEMALE	166(33.95%)	77(32.22%)	89(35.6%)	0.4817	0.49
Gender	MALE	323(66.05%)	162(67.78%)	161(64.4%)		
Grade	G1-2	221(45.19%)	83(34.73%)	138(55.2%)	19.8564	<0.001
Grade	G3-4	268(54.81%)	156(65.27%)	112(44.8%)		
Stage	Stage I-II	289(59.1%)	110(46.03%)	179(71.6%)	32.0138	<0.001
Stage	Stage III-IV	200(40.9%)	129(53.97%)	71(28.4%)		
T	T1-2	306(62.58%)	121(50.63%)	185(74%)	27.513	<0.001
T	T3-4	183(37.42%)	118(49.37%)	65(26%)		
M	M0	412(84.25%)	184(76.99%)	228(91.2%)	17.548	<0.001
M	M1	77(15.75%)	55(23.01%)	22(8.8%)		
N	N0	232(47.44%)	113(47.28%)	119(47.6%)	3.5917	0.058
N	N1	14(2.86%)	11(4.6%)	3(1.2%)		
N	unknown	243(49.69%)	115(48.12%)	128(51.2%)		

Table S4 Clinical information varied between the high and low risk groups in risk train database

Covariates	Risk	Total	High	Low	Chi	P
Age	<=65	156(63.67%)	76(62.3%)	80(65.04%)	0.0986	0.75
Age	>65	89(36.33%)	46(37.7%)	43(34.96%)		
Gender	FEMALE	92(37.55%)	46(37.7%)	46(37.4%)	0	1
Gender	MALE	153(62.45%)	76(62.3%)	77(62.6%)		
Grade	G1-2	109(44.49%)	41(33.61%)	68(55.28%)	10.7935	0.001
Grade	G3-4	136(55.51%)	81(66.39%)	55(44.72%)		
Stage	Stage I-II	153(62.45%)	62(50.82%)	91(73.98%)	13.0442	<0.001
Stage	Stage III-IV	92(37.55%)	60(49.18%)	32(26.02%)		
T	T1-2	162(66.12%)	66(54.1%)	96(78.05%)	14.6333	<0.001
T	T3-4	83(33.88%)	56(45.9%)	27(21.95%)		
M	M0	209(85.31%)	99(81.15%)	110(89.43%)	2.7244	0.10
M	M1	36(14.69%)	23(18.85%)	13(10.57%)		
N	N0	125(51.02%)	66(54.1%)	59(47.97%)	0	1
N	N1	6(2.45%)	3(2.46%)	3(2.44%)		
N	unknown	114(46.53%)	53(43.44%)	61(49.59%)		

Table S5 Clinical information varied between the high and low risk groups in risk test database.

Covariates	Risk	Total	High	Low	Chi	P
Age	<=65	164(67.21%)	76(64.96%)	88(69.29%)	0.341	0.56
Age	>65	80(32.79%)	41(35.04%)	39(30.71%)		
Gender	FEMALE	74(30.33%)	31(26.5%)	43(33.86%)	1.2333	0.27
Gender	MALE	170(69.67%)	86(73.5%)	84(66.14%)		
Grade	G1-2	112(45.9%)	42(35.9%)	70(55.12%)	8.3024	0.004
Grade	G3-4	132(54.1%)	75(64.1%)	57(44.88%)		
Stage	Stage I-II	136(55.74%)	48(41.03%)	88(69.29%)	18.5923	<0.001
Stage	Stage III-IV	108(44.26%)	69(58.97%)	39(30.71%)		
T	T1-2	144(59.02%)	55(47.01%)	89(70.08%)	12.4636	<0.001
T	T3-4	100(40.98%)	62(52.99%)	38(29.92%)		
M	M0	203(83.2%)	85(72.65%)	118(92.91%)	16.467	<0.001
M	M1	41(16.8%)	32(27.35%)	9(7.09%)		
N	N0	107(43.85%)	47(40.17%)	60(47.24%)	7.2671	0.007
N	N1	8(3.28%)	8(6.84%)	0(0%)		
N	unknown	129(52.87%)	62(52.99%)	67(52.76%)		

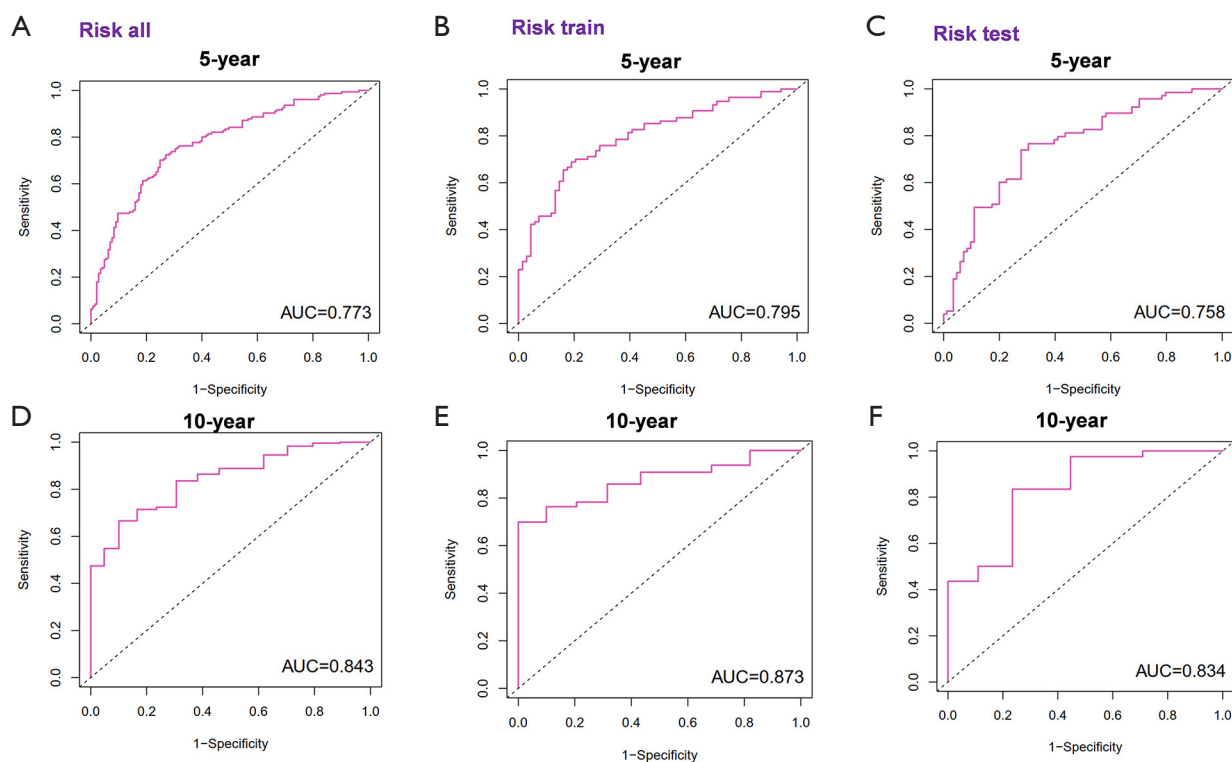


Figure S1 ROC curve of the prognosis signature in the risk all database (A,D), risk train database (B,E), and risk test database (C,F) for 5 and 10 years.

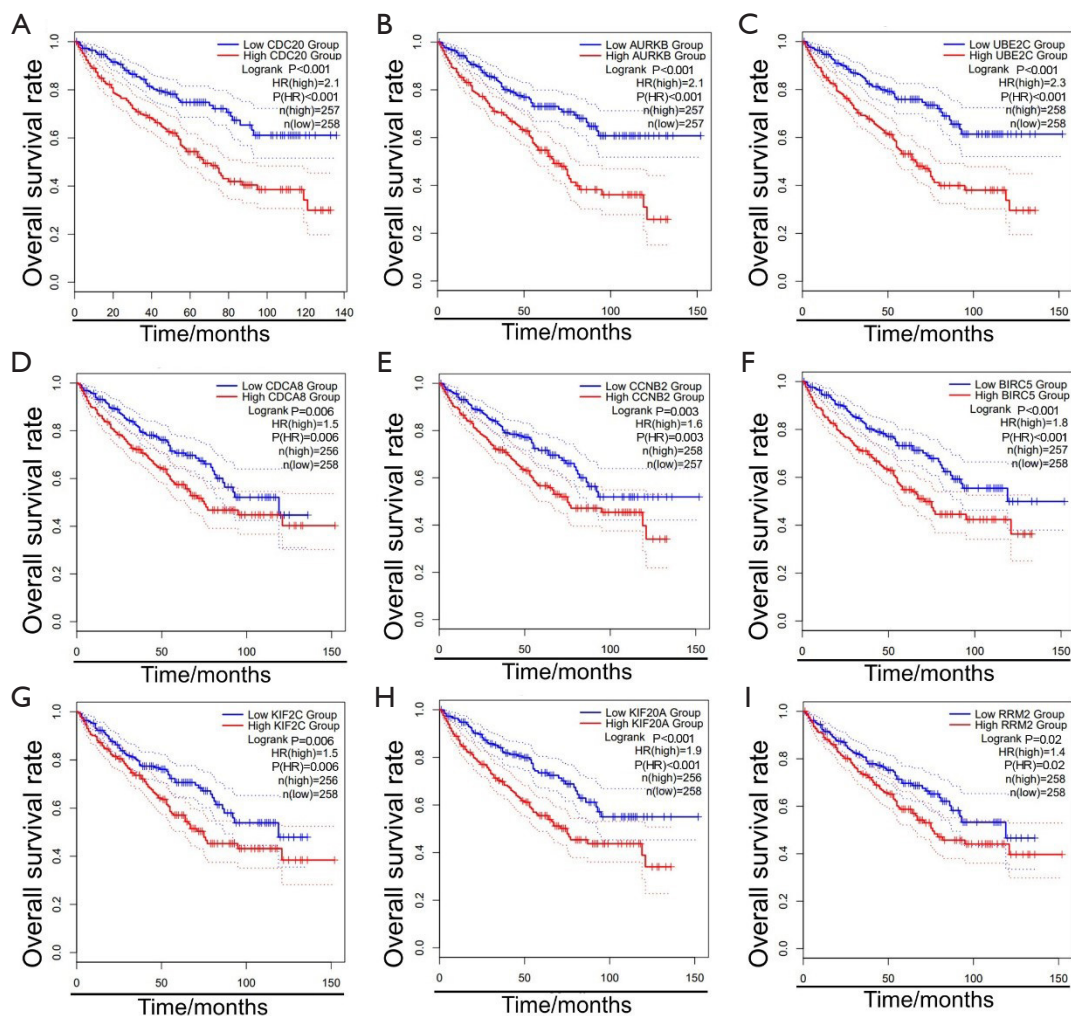


Figure S2 The implications of high and low levels of (A) *CDC20*, (B) *AURKB*, (C) *UBE2C*, (D) *CDCA8*, (E) *CCNB2*, (F) *BIRC5*, (G) *KIF2C*, (H) *KIF20A*, and (I) *RRM2* on the overall survival rate of ccRCC patients.

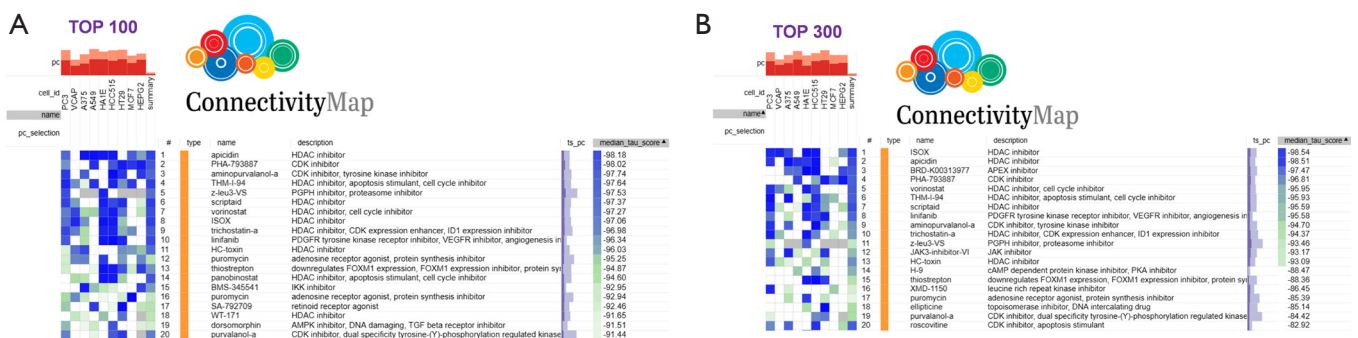


Figure S3 The results of potential drugs that target the reversal of DEGs between HRG and LRG using Connectivity Map. (A) Outcomes of possible drugs that target the reversal of the top 100 DEGs between HRG and LRG employing Connectivity Map. (B) The results of potential drugs that target the reversal of the top 300 DEGs between HRG and LRG using Connectivity Map.