

Supplemental file

Table 1 Twelve types of cancer and their known genes

<i>Cancer</i>	<i>OMIM id</i>	<i>The symbol of known genes^Δ</i>
Bladder Cancer	#109800	BRCA1,CDH1,BRCA2,CHEK2,BRIP1,ESR1,TP53,RET ,RPS27A,UBB,UBC,TRAF2,TF
Breast cancer	#114480	TP53,ESR1,EGFR,CHEK2,AR,BRCA1,BRCA2,CDH1, BARD1,CRYAB,RAD51,TERT,MYC,ITGB3,INSR,ER BB2,JAK2,RPS27A,UBB,UBC,TRAF2,GRB2,ABL1,R B1,ZNF217, LRE4
Esophageal carcinoma	#133239	TP53,APC,CDKN2A,TF,RPS27A,UBB,UBC,GRB2,RP L4,HIST2H4A,YWHAZ,HIST1H4J,HIST1H4C,SMAD2
Glioma of brain	#137800	APC,BRCA2,TP53,CDKN2A,CHEK2,HIST1H4I,HIST 1H4A,HIST1H4D,HIST1H4F,YWHAB,SMAD2,MYC, YEATS4
Hepataocellular carcinoma	#114550	BRCA2,CDH1,CHEK2,TP53,ESR1,ALB,AQP9,CTNN B1,FN1,GNAS,HBB,IRS1,MSH6,NR5A1,RB1,RET,TG FBR2,TSHR
Hereditary nonpolyposis colorectal cancer	#609310	BRCA2,MLH1,MSH2,TGFBR2,TP53,ESR1
Juvenile myelomonocytic leukemia	#607785	HRAS, PTPN11
Lung cancer	#211980	BRCA1,BRCA2,BRAF,ABCA1,CHEK2,TP53,ESR1,C DH1,HIST1H4A,HIST1H4D,HIST1H4J,HIST1H4C,CR YAB,NRAS,RB1,TERT,XPC,CD55,MEN1,PCSK9,NOS 3,NF1
Medulloblastoma	#155255	APC,BRCA2,CTNNB1,DMBT1,RB1,TP53,SUFU,PTC H2
Pancreatic carcinoma	#260350	ALB,BRCA2,CDH1,TP53,CLPTM1,GNAS,IRS1,HRAS ,NRAS,MSH6,HIST1H4I,MYC
Prostate cancer	#176807	RNASEL,ELAC2,MSR1,CHEK2,EPHB2,CDH1,BRCA 2,PTEN,MXI1,CD82,MAD1L1,KLF6,ATBF1,AR,HPC X,PCAP,HIP1
Thyroid carcinoma	#188550	PRKAR1A,RET,TG,TPR,TP53,TSHR,TPM3,NTRK1

^Δ known disease genes that clearly associated with 12 types of cancers were collected from the Online Mendelian Inheritance in Man (OMIM) database. [#] A number sign (#) is used with this entry because of evidence that several genes are involved in the origin and/or progression of this neoplasm, which could be verified by the NCBI PubMed center.

Table2 Selected candidate genes of prostate cancer and their source

<i>source</i>	<i>Gene Symbol</i>
the experimental dataset supported by Kim et al	ABCB1,ABCB5,ABCC2,ABCC5,ABCC6,ABCF3,ABHD1,ACAA2,ACADSB,ACIN1,ACLY,ACTA2,ACVR2B,ADHFE1,AEBP1,AGT,AGTR1,AGXT2,AKAP11,ALG3,ALOX5AP,AMD1,AMOTL2,AMPH,AMY1A,ANAPC13,ANGPT2,ANK3,ANKRA2,ANKRD1,ANKRD17,ANKRD31,ANKRD6,ANXA13,AOC2,AP1S1,APCS,APOB,APOD,ARF1,ARFGAP1,ARHGAP19,ARL4A,ARNT,ARV1,ASXL2,ATAD1,ATAD2,ATF6,ATP11B,ATP1A2,ATP1B3,ATP2C1,ATP5E,ATP5J2,ATP6V0A1,ATP6V1C1,ATP6V1C2,ATP7B,ATPAF1,ATR,B3GNT5,B4GALT3,BAALC,BAG4,BBX,BCL2,BCL2L2,BECN1,BLZF1,BMP7,BMPER,BMPR1A,BNIP3L,BRAF,BRF2,BTAF1,BTF3,BUB3,BVES,C10orf18,C10orf88,C13orf1,C13orf18,C14orf119,C1GALT1,C20orf11,C20orf177,C2orf18,C3orf1,C5orf4,C6,C6orf105,C6orf162,C6orf165,C7orf16,C7orf23,C7orf25,C7orf28B,C7orf36,C9orf5,CA13,CA2,CA8,CABLES2,CALB1,CASP2,CASP8AP2,CASR,CBX3,CCL13,CCL2,CCL7,CCNC,CCNE2,CCNG1,CCNJ,CCR6,CD160,CD1C,CD1D,CD47,CD48,CD5L,CD83,CD86,CDADC1,CDC14A,CDC2,CDC2L5,CDCA2,CDGAP,CDH19,CDH3,CDK7,CDKN2C,CDR2,CGA,CGREF1,CHN2,CHST2,CLDN1,CLDN11,CLN8,CNGB3,CNOT4,CNR1,CNTNAP1,COBRA1,COG2,COG3,COG6,COG7,COL4A3BP,COMMD2,COMMD5,COMMD6,COPB2,COPG2,COX15,COX6C,CP,CPA3,CPA4,CPA6,CPB2,CPN2,CPNE3,CPNE4,CPSF1,CREBL2,CRH,CRHBP,CROT,CRP,CSMD1,CSMD3,CSTF1,CTCF,CTDSPL,CTSC,CTSK,CXCL1,CYB5A,CYFIP2,CYP24A1,CYP26A1,CYP2C8,CYP2C9,CYP2J2,CYP4A11,CYP4B1,CYP4X1,DAB2,DACH1,DBC1,DCK,DCTN6,DDHD2,DDR2,DDX1,DDX56,DEXI,DFNA5,DGKI,DKFZP586I1420,DLEU1,DLG1,DMD,DNAH11,DNMBP,DNMT3A,DOCK2,DOCK5,DPEP2,DPP7,DPT,DPYS,DPYSL5,DRG1,DTNB,DUSP12,E2F5,EBPL,EDN3,EDNRB,EEF2K,EHHADH,EIF2B4,EIF2C2,EIF2S3,EIF4A2,EIF5A2,ELAC1,ELF1,ELMO1,ELP3,EMILIN1,EMP2,ENC1,ENPP2,ENSA,ENTPD1,EPB41L4B,EPC2,EPHA7,ERO1L,ETV1,ETV5,MECOM,EXOSC8,EXT1,EXTL2,F2R,F2RL2,F5,FAAH,FABP4,FABP5,FAM35A,FBXL4,FBXO18,FBXO25,FBXO32,FCER1G,FCGR2A,FCGR2B,FCGR3A,FDFT1,FECH,FETUB,FGF12,FGFR1,FGFR2,FGL1,FGL2,FILIP1,FKBP14,FKBP1B,FKBP9,FMO1,FMO5,FXR1,FYB,FYN,FZD3,FZD6,GABRA1,GABRG2,GARS,GAS7,GATA4,GC,GCH1,GDAP1,GDI2,GEM,GLCCI1,GLI3,GLUD1,GNAS,GNB4,GNPAT,GNRH1,GOLGB1,GORASP1,GPNMB,GPR161,GPR19,GPR88,GPRC5B,GREB1,GRIK2,GRSF1,GSR,GTF2E2,GTF2F2,GTF2H2,GTF3C2,GYG1,HACE1,HADHA,HADHB,HCLS1,HDAC9,HELLS,HEXB,HFE2,HIPK2,HIVEP1,HMGB1,HMGN3,HOXA1,HOXA13,HOXA2,HOXA4,HRG,HSD17B7,HSF2,HSPH1,HTR2A,HTR3A,ICA1,IFIT1,IF

IT2,IFIT5,IGJ,IGSF11,IL15RA,IL1RAP,IL6,IL7R,IMAA,IMPA1,IMPG1,I
NHBA,INMT,IQCB1,ITGA10,ITGB1BP1,ITGB5,ITSN2,JARID2,AIMP2,J
UB,KBTBD2,KBTBD6,KCNH2,KCNJ10,KCNK3,KCNMB3,KCNQ3,KC
NS2,KCNV1,KCTD4,KDEL2,KHDRBS3,KIAA0087,KIAA0196,KIAA0
226,KIAA0564,FAM190B,KIAA1383,KIF13B,KIF5C,KIFAP3,KL,KLF12,
KLHL11,KNG1,KPNA3,KRT6A,LAMA4,LARGE,LCPI,LCP2,LGALS3,L
HFP,LIFR,LIG3,LIMK2,LIPA,LIPG,LIPH,LITAF,LMAN1,LMO7,LOC151
658,LOC285972,LOC90520,LPIN1,LRCH1,LRCH3,LRP6,LRRC15,LRRF
IP2,LSM1,LSM11,LUC7L2,LY6E,MAGEF1,MAN1B1,MANEA,MAP1B,
MAP3K7,MAPK4,MAPKAP1,MATN2,MBD2,MCL1,MCM5,MDN1,ME1,
MEOX2,MET,MFN1,C7orf70,MKLN1,MLH1,MLLT4,MMP14,MMP16,M
MP9,MPP6,MRPL48,MRPS21,MRPS24,MRPS31,MRPS33,MSC,MTIF3,
MTSS1,MTUS1,MYC,MYCN,MYH1,MYH9,MYO5B,MYO6,MYST3,NC
AM1,NCBP2,NCOA1,NCOA2,NDE1,NDEL1,NDFIP2,NDUFB2,NDUFB5
,NEDD4L,NEFL,NET1,NFAT5,NFATC3,NFE2L3,NFIA,NIT1,NOL7,NPC
1L1,NQO1,NR1I3,NRG1,NT5C3,NT5E,NTAN1,NUBP1,NUDT15,NUP15
5,NUPL2,OCLN,ODC1,OGDH,OLFM1,OPA1,ORC3L,ORC4L,OSBPL3,O
SR1,LPAR6,PABPN1,PAK2,PANK1,PANK3,PARD6A,PBX3,PCCB,PCDH
21,PCDH9,PCK1,PDAP1,PDE7A,PDE8B,PDGFRL,PDK3,PEX11B,PEX1
2,PFDN4,PFN2,PGCP,PGM3,PHC3,PHF10,PIAS2,PIGM,PIGN,PIK3CA,P
IK3R1,PILRA,PILRB,PKIA,PKIB,PLCE1,PLK1,PLOD2,PLSCR1,PMAIP
1,PMP2,PNOC,POLK,POLR2J,POLR2J2,POLR2K,POLR3C,POLR3E,PO
P1,POPDC3,POU4F1,PPIL6,PPM1G,PDP1,PPP2R2A,PPP2R3A,PRDX4,P
RCAA1,PRKAB2,PRKCQ,PRLR,PRMT6,PROSC,PRRG1,PRSS2,PSMA7,
PSMC6,PSME3,PTCD2,PTDSS1,PTK2,PTP4A3,PTPN12,PTTG1,PVT1,P
XMP3,RAB22A,RAB25,RAB27B,RABIF,RAC1,RAE1,RAI14,RANBP10,
RAPGEF5,RBM17,RBM23,RBM27,RBM8A,RBM9,RBP1,RBP4,RBPMS,
RCBTB1,RDH10,RFC3,RFC4,RGNEF,RGS4,RGS5,RHOBTB1,RIMS2,R
NASET2,RNF11,RNF13,ROCK2,RP9,RPA3,RPL17,RPL21,RPL30,RPS15
A,RPS6KA2,RRAGD,RRM2,RRM2B,RRN3,RRS1,RTTN,RYK,SCARA3,
SCD,SCEL,SCRN1,SDC2,SDHC,SDHD,SEC63,SELE,SELL,SELT,SENP2
,SENP5,SENP6,SERP1,SERPINB3,SERPINI1,SETDB2,SFMBT2,SFRS12,
SGCD,SH3BGR2,SH3RF2,SH3RF2,SIAH2,SIRT5,SKIL,SKP2,SLA,SLAMF8,SL
C12A4,SLC13A3,SLC16A10,SLC30A3,SLC30A8,SLC37A3,SLC41A3,SL
C4A4,SLC5A6,SLC7A2,SLC7A7,SLC9A9,SLCO2A1,SLIT1,SLITRK3,SL
ITRK6,SLU7,SMA5,SMAD2,SMAD4,SMG1,SMURF1,SNAP91,SNX13,S
NX4,SOCS1,SOCS6,SORBS1,SOX30,SPAG11B,SPATA13,SPATA6,SPG20
,SPTA1,SR140,SRPRB,SSBP1,SST,STK10,STK17A,SULT1E1,SUPT16H,
SURF1,SYNCRIP,TAZ,TBC1D7,TBP,TBRG4,TCEB1,TCERG1,TCF4,TC
TE3,TERF1,TFDP2,TFRC,THAP11,THBS2,THPO,TIMP3,TM4SF4,TNFR
SF11B,TNFSF10,TNIK,TNKS2,TNPO1,TOP2A,TOX,TP53I3,TPD52,TRA
2A,TRGV9,TRIB2,TRIM35,TRIM4,TRIM5,TRIM6,TRIP6,TRPS1,TRPV6
,TSGA14,TSPYL1,TTC14,TUBB1,TUBE1,TUBG1,TUBG2,TXNL1,UAP1
,UBE2J1,UCP2,UGT2B15,UGT2B4,UQCRB,UQCRC2,USP12,USP13,UF

	M1, VAPB, VPS41, WASF1, WDR7, WFDC2, WISP1, WRN, WWP1, XK, YKT6, YWHAB, YWHAQ, ZBTB10, ZBTB24, ZCCHC2, ZDHHC19, ZDHHC21, ZDHHC4, ZFP90, ZFX, ZHX1, ZNF292, ZNF510, ZNF517, ZNF532, ZNRF2, ZRANB1, EIF2A
Gene Prospector	BRCA2, BRCA1, AR, VDR, SRD5A2, GSTM1, RNASEL, GSTP1, GSTT1, MSR1, CYP17A1, KLK3, ELAC2, TNF, IGF1, CYP3A4, ESR2, HNF1B, ESR1, CYP1A1, MSMB, CDH1, TCF2, KLK2, OGG1, ERG, MTHFR, HPC3, CYP19A1, CFH, ARMS2, ETV1, C2, NOS3, PTGS2, VEGFA, KLF6, CHEK2, TP53, HIF1A, HSD17B1, MMP9, VEGF, CTBP2, JAZF1, LMTK2, MMP2, DAB2IP, CYP1B1, EGF, EHBP1, ASMD, SOD2, CDH13, NUDT10, ERBB4, TNRC6B, GSPT2, IL16, LTA, NOS2, NOS2A, NUDT11, HIF1AN, CPNE3, MAGED1, XRCC1, COMT, NATA2, IL10, IGFBP3, IL6, CYP3A5, ATM, TGFB1, PTEN, RNASE1, UGT2B17, CDKN1A, CDKN1B, CYP1A2, CYP2E1, CYP11A1, AMACR, HSD3B1, HSD3B2, IL1B, UGT2B15, AKR1C3, NAT1, TLR6, NQO1, EPHX1, FGFR4, IL8, MDM2, SHBG, SULT1A1, TLR1, TLR4, TLR10, NBN, TCF7L2, CRP, CYP2D6, CYP27B1, ACE, GPX1, GSTA1, GSTM3, HLA-A, IGFBP1, IL1RN, INS, LEP, LHB, MLH1, MTR, SERPINE1, PON1, PPARG, CCND1, BCL2, CYP3A43, ARL11, CCER5, CRY2, CSNK1E, CYP24A1, EPHB2, ERBB2, ERCC1, ERCC2, ERCC4, GNAS, MSH6, APC, HPN, HSD17B4, ID3, IGF2, IL1A, IL4, IRS1, LEPR, MC1R, MMP1, MPO, MSH2, MTRR, NKX3-1, NPAS2, PER1, PGR, ABCB1, CCL5, CXCL12, SLC22A3, SOD1, SULT1A2, TGFBR1, THBS1, TMPRSS2, TYR, XRCC3, COL18A1, NCOA3, CAT, CBS, TNFRSF10A, PER3, ADIPOQ, GDF15, CYP2C19, APOE, CDKN2A, DLC1, NCOA2, SH2B2, CFTR, ALDH1L1, LZTS1, TIRAP, SERPINA3, CCR2, PARP1, CX3CR1, CYP2C8, CYP2C9, CYP11B2, CYP27A1, DHFR, DNMT3B, EGFR, AHR, EMP3, EPHX2, ERCC5, ERCC6, EZH2, FHIT, SEC14L2, XRCC6, TES, GC, GCNT2, GHR, GNMT, GNRH1, SLCO1B3, NR3C1, GSTA2, HFE, HLA-B, HLA-C, HLA-DRB1, APEX1, HSD17B3, HSD17B2, HSPA1L, ICAM1, IGF1R, IL2, IL2RB, IL8RA, IL8RB, IL18, IRAK1, ITGA2, ITGB3, LIG4, LPL, LRP2, ARNT, SMAD3, MGMT, MIF, MMP7, MSH3, MTHFD1, ND3, MUC1, MYC, MYH11, ATBF1, ZFH3, TNFRSF11B, PAH, IRAK4, CPA4, PGK1, SERPINB10, PLAU, PODXL, UGT1A9, PPARA, UGT1A4, MED1, EPDR1, PRKDC, PRL, KLK10, PSAP, AHRR, BARD1, RAD51, RAD52, ABCE1, RXRA, RXRB, VPS52, BGLAP, CCL2, SEPP1, SHMT1, SOD3, COX1, AURKA, SULT2A1, TCF20, TH, THRA, ICAM5, TLR5, TTPA, TYMS, XPC, VKORC1, BRIP1, CASP8, BCAS1, CAV1, CAV2, NCOA1, IRS2, AIP, SART1, ABCG2, GSTO1, HPCX, CAPN10, AGT, PTPN22, GNB3, RET, CYP7B1

Table 3 The prioritization result of ranked prostate cancer candidate genes

<i>Rank</i>	<i>Gene symbol</i>	<i>Entrez Gene ID</i>	<i>Rank</i>	<i>Gene symbol</i>	<i>Entrez Gene ID</i>
1	YWHAB	7529	420	RHOBTB1	9886
2	SMAD2	4087	421	CAV2	858
3	MYC	4609	422	CREBL2	1389
4	HLA-B	3106	423	ATP7B	540
5	TGFBR1	7046	424	GSTO1	9446
6	SMAD4	4089	425	TLR1	7096
7	ACTA2	59	426	GORASP1	64689
8	PLSCR1	5359	427	GSTM3	2947
9	COPB2	9276	428	FCER1G	2207
10	CBS	875	429	IRAK4	51135
11	EIF2S3	1968	430	LTA	4049
12	TBP	6908	431	CCR2	729230
13	CDC2	983	432	IL8	3576
14	SMAD3	4088	433	CP	1356
15	CFTR	1080	434	LEP	3952
16	NR3C1	2908	435	CCNG1	900
17	ERBB2	2064	436	ELF1	1997
18	SKIL	6498	437	NTAN1	123803
19	PSMA7	5688	438	IL2	3558
20	OGDH	4967	439	TYMS	7298
21	YWHAQ	10971	440	CTCF	10664
22	RRM2	6241	441	DOK5	55816
23	PSMC6	5706	442	RPA3	6119
24	CHEK2	11200	443	IL1A	3552
25	CSNK1E	1454	444	PABPN1	8106
26	SOD1	6647	445	PIGM	93183
27	SMURF1	57154	446	UQCRC2	7385
28	PTP4A3	11156	447	ENSA	2029
29	IRS1	3667	448	KRT6A	3853
30	GCH1	2643	449	SNAP91	9892
31	XRCC6	2547	450	FABP4	2167
32	TNIK	23043	451	ICA1	3382
33	SUPT16H	11198	452	UQCRB	7381
34	ME1	4199	453	PTTG1	9232
35	NEDD4L	23327	454	ELMO1	9844
36	RBPMS	11030	455	CYB5A	1528
37	DDX56	54606	456	APOD	347
38	CAV1	857	457	OPA1	4976
39	RAD51	5888	458	RAI14	26064

40	RPL30	6156	459	CD1D	912
41	BCL2	596	460	NDE1	54820
42	PTK2	5747	461	PMAIP1	5366
43	CASP8	841	462	SH3RF2	153769
44	DLG1	1739	463	EIF2C2	27161
45	RXRA	6256	464	HRG	3273
46	DMD	1756	465	TIMP3	7078
47	MTHFD1	4522	466	C6orf165	154313
48	MYO5B	4645	467	CCL13	6357
49	MDM2	4193	468	AKAP11	11215
50	NCOA1	8648	469	RPS6KA2	6196
51	MAP3K7	6885	470	GABRG2	2566
52	CDKN1A	1026	471	UAP1	6675
53	ABCE1	6059	472	SGCD	6444
54	TOP2A	7153	473	DCK	1633
55	MCM5	4174	474	HSF2	3298
56	RPS15A	6210	475	DOCK2	1794
57	GARS	2617	476	NOS2	4843
58	ABCF3	55324	477	PPP2R2A	5520
59	TRIP6	7205	478	EDNRB	1910
60	TUBB1	81027	479	LIMK2	3985
61	ERCC2	2068	480	TNFRSF11B	4982
62	RNF11	26994	481	NRG1	3084
63	COPG2	26958	482	BAG4	9530
64	PGK1	5230	483	CHN2	1124
65	SHBG	6462	484	MYH1	4619
66	ADHFE1	137872	485	DPYSL5	56896
67	BARD1	580	486	POP1	10940
68	PAK2	5062	487	EXT1	2131
69	LSM1	27257	488	FAM190B	54462
70	PRKDC	5591	489	CXCL12	6387
71	PLK1	5347	490	EPHA7	2045
72	MSH2	4436	491	PEX12	5193
73	TNPO1	3842	492	IL18	3606
74	ATR	545	493	COL18A1	80781
75	HMGB1	3146	494	MSC	9242
76	NCOA3	8202	495	ERG	2078
77	CDH1	999	496	CASR	846
78	AURKA	6790	497	RYK	6259
79	NCOA2	10499	498	ATF6	22926
80	ATP6V1C1	528	499	MYST3	7994
81	IRAK1	3654	500	PDK3	5165
82	CCND1	595	501	EPDR1	54749
83	HIF1A	3091	502	EMILIN1	11117

84	IGF1R	3480	503	LITAF	9516
85	BTAF1	9044	504	SENP2	59343
86	MAGED1	9500	505	GABRA1	2554
87	RRS1	23212	506	IL15RA	3601
88	CTBP2	1488	507	CASP8AP2	9994
89	PARP1	142	508	ABCC2	1244
90	BRF2	55290	509	SOX30	11063
91	LUC7L2	51631	510	CSTF1	1477
92	CDKN1B	1027	511	ANXA13	312
93	SFRS12	140890	512	ERO1L	30001
94	ZHX1	11244	513	LMO7	4008
95	PFN2	5217	514	NQO1	1728
96	MSH3	4437	515	ITGB1BP1	9270
97	ESR2	2100	516	LCP1	3936
98	LRP2	4036	517	CYP11A1	1583
99	CDK7	1022	518	C7orf36	57002
100	RFC4	5984	519	KIAA0226	9711
101	HSPA1L	3305	520	DUSP12	11266
102	SOD2	6648	521	PHF10	55274
103	VDR	7421	522	CROT	54677
104	TCERG1	10915	523	RRAGD	58528
105	GOLGB1	2804	524	INMT	11185
106	GDI2	2665	525	CXCL1	2919
107	RAC1	5879	526	PRSS2	5645
108	SHMT1	6470	527	HNF1B	6928
109	CDKN2A	1029	528	IFIT1	3434
110	MET	4233	529	PKIA	5569
111	HSD17B7	51478	530	HOXA13	3209
112	ITGB3	3690	531	COBRA1	25920
113	ATM	472	532	TAZ	6901
114	FGFR1	2260	533	CRY2	1408
115	CDC14A	8556	534	AMY1A	276
116	EIF2B4	8890	535	TCF20	6942
117	ERBB4	2066	536	GEM	2669
118	SOCS1	8651	537	IL4	3565
119	RPL17	6139	538	PIGN	23556
120	POLR2J	5439	539	TRIM35	23087
121	PSME3	10197	540	PDAP1	11333
122	IRS2	8660	541	ICAM5	7087
123	CCNC	892	542	CNR1	1268
124	PTPN12	5782	543	ABCB1	5243
125	HLA-C	3107	544	CA8	767
126	POLR2K	5440	545	EDN3	1908
127	MED1	5469	546	COX1	4512

128	MLLT4	4301	547	FAAH	2166
129	PPARG	5468	548	SERPINB3	6317
130	CCR5	1234	549	NDFIP2	54602
131	MYH9	4627	550	PTGS2	5743
132	APC	324	551	GNPAT	8443
133	WWP1	11059	552	COMT	1312
134	TUBG1	7283	553	KCNJ10	3766
135	FECH	2235	554	MTSS1	9788
136	RET	5979	555	SDHC	6391
137	THRA	7067	556	SART1	9092
138	THBS1	7057	557	DDR2	4921
139	KHDRBS3	10656	558	PPM1G	5496
140	MSH6	2956	559	SR140	23350
141	PPARA	5465	560	VAPB	9217
142	ORC4L	5000	561	FBXO18	84893
143	HIPK2	28996	562	RAPGEF5	9771
144	RFC3	5983	563	RAB22A	57403
145	TCEB1	6921	564	TPD52	7163
146	APEX1	328	565	AKR1C3	8644
147	MLH1	4292	566	MDN1	23195
148	TGFB1	7040	567	ZRANB1	54764
149	SRPRB	58477	568	TBRG4	9238
150	LCP2	3937	569	B4GALT3	8703
151	PGR	5241	570	CTSK	1513
152	PTEN	5728	571	BGLAP	632
153	GHR	2690	572	SST	6750
154	SKP2	6502	573	IGFBP1	3484
155	LIPA	3988	574	CALB1	793
156	EPHB2	2048	575	HLA-DRB1	3123
157	MMP2	4313	576	XK	7504
158	GLUD1	2746	577	KCNQ3	3786
159	GNB4	59345	578	NKX3-1	4824
160	MMP9	4318	579	FZD3	7976
161	BRAF	673	580	COMMD2	51122
162	MIF	4282	581	EPC2	26122
163	MAP1B	4131	582	SLC30A3	7781
164	NDEL1	81565	583	NFATC3	4775
165	ARNT	405	584	CABLES2	81928
166	IGFBP3	3486	585	FHIT	2272
167	SCD	6319	586	ALG3	10195
168	ARF1	375	587	ABCG2	9429
169	NCBP2	22916	588	TXNL1	9352
170	PARD6A	50855	589	GTF3C2	2976
171	WRN	7486	590	CLDN11	5010

172	PRKCQ	5588	591	SLU7	10569
173	TERF1	7013	592	RGS5	8490
174	EXOSC8	11340	593	HELLS	3070
175	IL2RB	3560	594	PRDX4	10549
176	DTNB	1838	595	PDP1	54704
177	MPP6	51678	596	SPG20	23111
178	KNG1	3827	597	UCP2	7351
179	IL16	3603	598	OSBPL3	26031
180	ITGB5	3693	599	YKT6	10652
181	AHR	196	600	RP9	6100
182	DAB2	1601	601	JUB	84962
183	MCL1	4170	602	CDR2	1039
184	BRCA2	675	603	C20orf11	54994
185	SDC2	6383	604	LHB	3972
186	DLEU1	10301	605	POLR3E	55718
187	GAS7	8522	606	SSBP1	6742
188	AMPH	273	607	CD86	942
189	PIK3CA	5290	608	GSTT1	2952
190	RXRB	6257	609	CPA4	51200
191	GNAS	2778	610	SDHD	6392
192	ATP5J2	9551	611	GNB3	2784
193	COG3	83548	612	DPT	1805
194	WASF1	8936	613	TRA2A	29896
195	CBX3	11335	614	RAB27B	5874
196	GTF2F2	2963	615	C2	717
197	SH2B2	10603	616	CCR6	1235
198	PIAS2	9063	617	NFE2L3	9603
199	MUC1	4582	618	BAALC	79870
200	HLA-A	3105	619	ZBTB24	9841
201	IL8RB	3579	620	NFIA	4774
202	TLR4	7099	621	BRIP1	83990
203	OCLN	4950	622	ERCC1	2067
204	NBN	4683	623	JARID2	3720
205	AIMP2	7965	624	HMG3	9324
206	ELAC2	60528	625	ERCC4	2072
207	ID3	3399	626	ANKRD1	27063
208	ATP6V0A1	535	627	RNASEL	6041
209	COG6	57511	628	RBM17	84991
210	ACLY	47	629	POU4F1	5457
211	FDFT1	2222	630	RRM2B	50484
212	PXMP3	5828	631	ANKRA2	57763
213	DRG1	4733	632	PILRA	29992
214	GTF2E2	2961	633	AMD1	262
215	CASP2	835	634	PLCE1	51196

216	EIF2A	83939	635	MAPK4	5596
217	ARFGAP1	55738	636	KIF13B	23303
218	PRKAB2	5565	637	ABHD1	84696
219	RAE1	8480	638	ATAD2	29028
220	HSPH1	10808	639	KIAA0087	9808
221	FGFR2	2263	640	CDH3	1001
222	KIF5C	3800	641	LZTS1	11178
223	C2orf18	54978	642	NIT1	4817
224	GSR	2936	643	PANK1	53354
225	ATP2C1	27032	644	TLR6	10333
226	PRKAA1	5562	645	CTSC	1075
227	RRN3	54700	646	COG2	22796
228	HTR2A	3356	647	UBE2J1	51465
229	VPS52	6293	648	ACE	1636
230	PSAP	5660	649	LSM11	134353
231	GLI3	2737	650	SLIT1	6585
232	SULT1E1	6783	651	PCCB	5096
233	GATA4	2626	652	BMPER	168667
234	BMP7	655	653	COG7	91949
235	RIMS2	9699	654	SEC14L2	23541
236	MMP14	4323	655	NDUFB5	4711
237	ZFHX3	463	656	MTR	4548
238	FGFR4	2264	657	MAN1B1	11253
239	TLR5	7100	658	NT5E	4907
240	ORC3L	23595	659	SLC12A4	6560
241	ITSN2	50618	660	C14orf119	55017
242	PBX3	5090	661	SELT	51714
243	HSD17B4	3295	662	OLFM1	10439
244	MYO6	4646	663	CPB2	1361
245	SORBS1	10580	664	MFN1	55669
246	CDKN2C	1031	665	PON1	5444
247	FCGR2B	2213	666	HFE	3077
248	NEFL	4747	667	SERPINI1	5274
249	SERPINA3	12	668	TRIM5	85363
250	PFDN4	5203	669	C6	729
251	FXR1	8087	670	WISP1	8840
252	DNMT3B	1789	671	RBP4	5950
253	PRLR	5618	672	THBS2	7058
254	VPS41	27072	673	MC1R	4157
255	HCLS1	3059	674	IL10	3586
256	SNX4	8723	675	FZD6	8323
257	PAH	5053	676	PRMT6	55170
258	AGTR1	185	677	C7orf16	10842
259	SEC63	11231	678	PODXL	5420

260	AGT	183	679	ANGPT2	285
261	CCL5	6352	680	UFM1	51569
262	TFRC	7037	681	KLF12	11278
263	SERPINE1	5054	682	DNAH11	8701
264	IGF2	3481	683	C10orf18	54906
265	MMP1	4312	684	ZDHHC4	55146
266	MEOX2	4223	685	MAPKAP1	79109
267	BMPR1A	657	686	SENP6	26054
268	EEF2K	29904	687	PKIB	5570
269	BECN1	8678	688	EIF5A2	56648
270	XRCC3	7517	689	ANKRD6	22881
271	LIG4	3981	690	SLC41A3	54946
272	CPNE4	131034	691	NFAT5	10725
273	DACH1	1602	692	LRRFIP2	9209
274	LEPR	3953	693	ENC1	8507
275	TNFRSF10A	8797	694	LMTK2	22853
276	IL1RAP	3556	695	GPNMB	10457
277	FYB	2533	696	FGF12	2257
278	APOB	338	697	HEXB	3074
279	LAMA4	3910	698	PRL	5617
280	ITGA2	3673	699	BCAS1	8537
281	INS	3630	700	TRIB2	28951
282	APOE	348	701	CSMD1	64478
283	MMP7	4316	702	FKBP9	11328
284	PLAU	5328	703	ZNF510	22869
285	HOXA1	3198	704	GDAP1	54332
286	SELL	6402	705	SNX13	23161
287	EIF4A2	1974	706	HTR3A	3359
288	KLK3	354	707	CDC2L5	8621
289	FABP5	2171	708	MRPS31	10240
290	PROSC	11212	709	DAB2IP	153090
291	ERCC6	2074	710	GPX1	2876
292	NOS3	4846	711	CYP19A1	1588
293	MYH11	4629	712	NUPL2	11097
294	KIFAP3	22920	713	CYP17A1	1586
295	DHFR	1719	714	ACAA2	10449
296	F2R	2149	715	FBXO25	26260
297	TCF4	6925	716	ATP1B3	483
298	TIRAP	114609	717	OSR1	130497
299	CD47	961	718	IL1RN	3557
300	TNF	7124	719	DEXI	28955
301	RABIF	5877	720	C10orf88	80007
302	LPL	4023	721	NUDT11	55190
303	VEGFA	7422	722	SH3BGRL2	83699

304	NR1I3	9970	723	EPHX2	2053
305	XRCC1	7515	724	IGJ	3512
306	CCL7	6354	725	DPP7	29952
307	DNMT3A	1788	726	SLC22A3	6581
308	HDAC9	9734	727	LY6E	4061
309	CNOT4	4850	728	ALDH1L1	10840
310	GTF2H2	2966	729	RNASE1	6035
311	CA2	760	730	PHC3	80012
312	KPNA3	3839	731	BLZF1	8548
313	HADHA	3030	732	CYP2D6	1565
314	PGM3	5238	733	DCTN6	10671
315	TP53I3	9540	734	GSTM1	2944
316	SIAH2	6478	735	WDR7	23335
317	ACVR2B	93	736	NET1	10276
318	F2RL2	2151	737	DBC1	1620
319	NCAM1	4684	738	MPO	4353
320	USP13	8975	739	HPN	3249
321	TCF7L2	6934	740	GNRH1	2796
322	MBD2	8932	741	MMP16	4325
323	IGF1	3479	742	ADIPOQ	9370
324	IL7R	3575	743	CRH	1392
325	TFDP2	7029	744	IFIT2	3433
326	KLK2	3817	745	HOXA2	3199
327	TH	7054	746	ABCB5	340273
328	AP1S1	1174	747	NAT2	10
329	RAD52	5893	748	ARL4A	10124
330	ANK3	288	749	TTPA	7274
331	CYP1A2	1544	750	TTC14	151613
332	LRP6	4040	751	ETV5	2119
333	IL6	3569	752	PCK1	5105
334	SLA	6503	753	PNOC	5368
335	SOCS6	9306	754	PCDH9	5101
336	BNIP3L	665	755	TRPS1	7227
337	LGALS3	3958	756	IQCB1	9657
338	RAB25	57111	757	ARL11	115761
339	SMG1	23049	758	JAZF1	221895
340	INHBA	3624	759	DGKI	9162
341	CYP3A4	1576	760	RNF13	11342
342	MATN2	4147	761	ARHGAP19	84986
343	XPC	7508	762	PLOD2	5352
344	COX15	1355	763	CAPN10	11132
345	COL4A3BP	10087	764	KCTD4	386618
346	RBM9	23543	765	DLC1	10395
347	PTPN22	26191	766	ENTPD1	953

348	ICAM1	3383	767	CTDSPL	10217
349	CPSF1	29894	768	ITGA10	8515
350	AIP	9049	769	ELP3	55140
351	RPL21	6144	770	EHBP1	23301
352	RBM8A	9939	771	CYP2E1	1571
353	HIF1AN	55662	772	CYP2C8	1558
354	HADHB	3032	773	CYP2C9	1559
355	SELE	6401	774	ABCC6	368
356	SYNCRIP	10492	775	MSR1	4481
357	SPTA1	6708	776	MKLN1	4289
358	TNFSF10	8743	777	RANBP10	57610
359	TUBG2	27175	778	C5orf4	10826
360	BUB3	9184	779	CYP1B1	1545
361	ODC1	4953	780	EZH2	2146
362	FCGR3A	2214	781	POLK	51426
363	DNMBP	23268	782	GLCCI1	113263
364	CRP	1401	783	FKBP1B	2281
365	KLF6	1316	784	COMMD5	28991
366	BCL2L2	599	785	THPO	7066
367	NPAS2	4862	786	LIPG	9388
368	CGA	1081	787	SCEL	8796
369	MYCN	4613	788	TNRC6B	23112
370	IMPA1	3612	789	FGL2	10875
371	RGS4	5999	790	PDE8B	8622
372	GNMT	27232	791	POLR3C	10623
373	HIVEP1	3096	792	FAM35A	54537
374	LIFR	3977	793	HSD3B2	3284
375	CCNJ	54619	794	TYR	7299
376	CAT	847	795	LRCH3	84859
377	BTF3	689	796	FBXL4	26235
378	CNTNAP1	8506	797	FBXO32	114907
379	MTHFR	4524	798	GRSF1	2926
380	EGF	1950	799	KDEL2	11014
381	ROCK2	9475	800	EHHADH	1962
382	RBM23	55147	801	CPNE3	8895
383	FCGR2A	2212	802	KLK10	5655
384	TLR10	81793	803	CYP1A1	1543
385	IL8RA	3577	804	SOD3	6649
386	ACIN1	22985	805	CYP4B1	1580
387	F5	2153	806	DPYS	1807
388	APCS	325	807	AGXT2	64902
389	CCL2	6347	808	NUDT10	170685
390	E2F5	1875	809	EMP3	2014
391	MECOM	2122	810	TNKS2	80351

392	PER3	8863	811	DFNA5	1687
393	CLDN1	9076	812	COX6C	1345
394	ATAD1	84896	813	WFDC2	10406
395	PPP2R3A	5523	814	CYP24A1	1591
396	LIG3	3980	815	ALOX5AP	241
397	TRPV6	55503	816	IFIT5	24138
398	NUP155	9631	817	MRPS33	51650
399	RBP1	5947	818	DPEP2	64174
400	NUBP1	4682	819	CD5L	922
401	GYG1	2992	820	SETDB2	83852
402	AMOTL2	51421	821	PEX11B	8799
403	CD48	962	822	TSPYL1	7259
404	MGMT	4255	823	ZNF292	23036
405	TES	26136	824	MRPS24	64951
406	KCNH2	3757	825	SLC7A7	9056
407	CFH	3075	826	PILRB	29990
408	ETV1	2115	827	TRIM6	117854
409	GC	2638	828	LARGE	9215
410	OGG1	4968	829	HACE1	57531
411	PER1	5187	830	CDH13	1012
412	LMAN1	3998	831	CDH19	28513
413	ERCC5	2073	832	CRHBP	1393
414	CCNE2	9134	833	CX3CR1	1524
415	KCNK3	3777	834	EBPL	84650
416	GRIK2	2898	835	AMACR	23600
417	DDX1	1653	836	GSTA2	2939
418	GSTP1	2950	837	GSTA1	2938
419	IL1B	3553	838	MTRR	4552

Table 4 Summary of GO Biological Process and KEGG pathways enrichment results of different ranked thresholds

Table 4-1-1 The GO Biological Process enrichment results of the top50 genes

<i>Go term</i>	<i>Gene Counts</i>	<i>P-value*</i>	<i>BenjaminiFDR#</i>
regulation of cell proliferation	19	5.97E-12	3.37E-10
programmed cell death	14	1.82E-08	3.01E-07
cell cycle	12	1.51E-05	1.19E-04
cell communication	10	5.92E-04	0.00318
signal transduction	22	1.57E-06	1.50E-05
apoptosis	14	1.51E-08	2.54E-07
protein modification process	15	5.76E-05	3.93E-04
cell activation	13	4.65E-11	1.85E-09

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* # *Benjamini–Hochberg–Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-1-2 The enrichment results of KEGG pathways of the top 50 genes

<i>Pathways</i>	<i>Gene Symbol</i>	<i>P-value*</i>	<i>BenjaminiFDR#</i>
p53 signaling pathway	CCND1, FAS, CDKN1A, CASP3, TP53	0.00182	0.00389
Cell cycle	CCND1, EP300, CDKN1A, TP53, MYC	0.0156	0.0274
TGF-beta signaling pathway	IFNG, EP300, MAPK3, TNF, SP1, MYC, MAPK1	5.37E-05	1.86E-04
Wnt signaling pathway	JUN, CCND1, MAPK8, EP300, TP53, MYC	0.00660	0.0126
Focal adhesion	CCND1, JUN, SRC, HRAS, BCL2, MAPK8, EGFR, AKT1, VEGFA, GRB2, MAPK3, ACTB, MAPK1	2.07E-08	1.70E-07
Adherens junction	SRC, EGFR, EP300, MAPK3, ACTB, MAPK1	2.98E-04	8.14E-04

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* # *Benjamini–Hochberg–Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-2-1 The GO Biological Process enrichment results of the top150 genes

<i>Go term</i>	<i>Gene Counts</i>	<i>P-value*</i>	<i>BenjaminiFDR[#]</i>
regulation of cell proliferation	46	1.97E-20	3.59E-18
programmed cell death	30	4.91E-20	7.27E-18
cell cycle	26	1.02E-06	1.05E-05
cell communication	16	0.0295	0.116
signal transduction	57	7.75E-09	1.25E-07
apoptosis	30	1.14E-11	3.51E-10
protein modification process	42	5.06E-09	8.63E-08
cell activation	23	1.01E-12	3.94E-11

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* # *Benjamini–Hochberg–Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-2-2 The enrichment results of KEGG pathways of the top150 genes

<i>Pathways</i>	<i>Gene Symbol</i>	<i>P-value*</i>	<i>BenjaminiFDR[#]</i>
Prostate cancer	HRAS, IKBKG, RAF1, EGFR, EP300, RELA, IGF1, CDKN1A, EGF, CTNNB1, CREBBP, AR, INS, CCND1, ERBB2, PTEN, BCL2, CDK2, RB1, CREB1, AKT1, TP53, GRB2, MAPK3, NFKBIA, MAPK1	8.59E-20	4.60E-18
p53 signaling pathway	CCND1, CYCS, FAS, CHEK2, PTEN, CDK2, CDKN2A, IGF1, CDKN1A, CASP3, TP53, CDK1	1.03E-06	4.09E-06
Cell cycle	CCND1, CHEK2, EP300, CDK2, CDKN2A, RB1, ABL1, CDKN1A, TP53, CDK1, SKP1, CREBBP, SMAD3, HDAC1, SMAD4, PCNA, MYC	9.21E-08	4.69E-07
TGF-beta signaling pathway	IFNG, RHOA, CREBBP, EP300, SMAD3, MAPK3, TNF, SMAD4, SP1, MYC, SKP1, MAPK1	1.49E-05	4.69E-05
Wnt signaling pathway	CCND1, CSNK2A1, JUN, CSNK2A2, MAPK8, PRKCA, EP300, TP53, SKP1, CTNNB1, RHOA, CREBBP, SMAD3, SMAD4, RAC1, MYC	8.84E-06	2.96E-05
Focal adhesion	JUN, HRAS, MAPK8, RAF1, EGFR, PRKCA, IGF1, EGF, CTNNB1, VEGFA, RHOA, ACTB, CCND1, ERBB2, SRC, PTK2, PTEN, BCL2, AKT1, ITGB1, GRB2, MAPK3, FYN, ACTG1, RAC1, CDC42, MAPK1	4.89E-12	5.23E-11
Adherens junction	CSNK2A1, SRC, ERBB2, CSNK2A2, EGFR, EP300, CTNNB1, RHOA, CREBBP, SMAD3, MAPK3, SMAD4, FYN, ACTG1, ACTB, RAC1, CDC42, CDH1, MAPK1	4.01E-13	5.37E-12
ErbB signaling pathway	JUN, HRAS, PTK2, SRC, ERBB2, MAPK8, RAF1, PRKCA, EGFR, ABL1, EGF, CDKN1A, AKT1, PLCG1, GRB2, MAPK3, STAT5A, MYC, MAPK1	6.18E-12	6.01E-11

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* [#] *Benjamini-Hochberg-Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-3-1 The GO Biological Process enrichment results of the top200 genes

<i>Go term</i>	<i>Gene Counts</i>	<i>P-value*</i>	<i>BenjaminiFDR[#]</i>
regulation of cell proliferation	56	4.88E-23	7.85E-21
programmed cell death	35	8.30E-12	1.80E-10
cell cycle	33	5.76E-08	6.56E-07
cell communication	22	0.00552	0.0272
signal transduction	75	1.99E-11	4.05E-10
apoptosis	34	2.58E-11	5.11E-10
protein modification process	53	1.74E-10	2.90E-09
cell activation	31	1.74E-17	9.92E-16

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* # *Benjamini–Hochberg–Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-3-2 The enrichment results of KEGG pathways of the top200 genes

<i>Pathways</i>	<i>Gene Symbol</i>	<i>P-value*</i>	<i>BenjaminiFDR[#]</i>
<i>Prostate cancer</i>	HRAS, IKBKG, RAF1, EGFR, EP300, RELA, IGF1, CDKN1A, EGF, CTNNB1, CREBBP, AR, INS, CCND1, ERBB2, PTEN, BCL2, CDK2, RB1, CREB1, AKT1, TP53, GRB2, MAPK3, NFKBIA, MAPK1	6.55E-23	3.63E-21
<i>p53 signaling pathway</i>	CCND1, CYCS, FAS, CHEK2, PTEN, CDK2, CDKN2A, IGF1, CDKN1A, CASP3, TP53, CDK1	1.21E-05	3.71E-05
<i>Cell cycle</i>	CCND1, CHEK2, EP300, CDK2, CDKN2A, RB1, ABL1, CDKN1A, TP53, CDK1, SKP1, CREBBP, SMAD3, HDAC1, SMAD4, PCNA, MYC	1.09E-07	4.66E-07
<i>TGF-beta signaling pathway</i>	IFNG, RHOA, CREBBP, EP300, SMAD3, MAPK3, TNF, SMAD4, SP1, MYC, SKP1, MAPK1	5.88E-06	1.92E-05
<i>Wnt signaling pathway</i>	CCND1, CSNK2A1, JUN, CSNK2A2, MAPK8, PRKCA, EP300, TP53, SKP1, CTNNB1, RHOA, CREBBP, SMAD3, SMAD4, RAC1, MYC	1.20E-05	3.71E-05
<i>Focal adhesion</i>	JUN, HRAS, MAPK8, RAF1, EGFR, PRKCA, IGF1, EGF, CTNNB1, VEGFA, RHOA, ACTB, CCND1, ERBB2, SRC, PTK2, PTEN, BCL2, AKT1, ITGB1, GRB2, MAPK3, FYN, ACTG1, RAC1, CDC42, MAPK1	1.10E-11	8.12E-11
<i>Adherens junction</i>	CSNK2A1, SRC, ERBB2, CSNK2A2, EGFR, EP300, CTNNB1, RHOA, CREBBP, SMAD3, MAPK3, SMAD4, FYN, ACTG1, ACTB, RAC1, CDC42, CDH1, MAPK1	3.07E-12	2.62E-11
<i>ErbB signaling pathway</i>	JUN, HRAS, PTK2, SRC, ERBB2, MAPK8, RAF1, PRKCA, EGFR, ABL1, EGF, CDKN1A, AKT1, PLCG1, GRB2, MAPK3, STAT5A, MYC, MAPK1	5.66E-13	5.71E-12

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* [#] *Benjamini-Hochberg-Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-4-1 The GO Biological Process enrichment results of the top300 genes

<i>Go term</i>	<i>Gene Counts</i>	<i>P-value*</i>	<i>BenjaminiFDR[#]</i>
regulation of cell proliferation	80	1.85E-30	5.82E-28
programmed cell death	49	1.10E-14	3.42E-13
cell cycle	45	6.79E-09	8.82E-08
cell communication	37	3.63E-05	2.64E-04
signal transduction	94	1.97E-08	2.40E-07
DNA repair	12	0.0434	0.172
apoptosis	46	4.83E-13	1.09E-11
protein modification process	70	2.85E-10	4.25E-09
cell activation	39	6.66E-19	3.12E-17
cell growth	5	0.0490	0.189
anti-apoptosis	29	3.71E-14	1.06E-12

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* # *Benjamini–Hochberg–Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-4-2 The enrichment results of KEGG pathways of the top300 genes

<i>Pathways</i>	<i>Gene Symbol</i>	<i>P-value*</i>	<i>BenjaminiFDR[#]</i>
Prostate cancer	HRAS, IKBKG, E2F1, CHUK, RAF1, EGFR, EP300, RELA, IGF1, CDKN1B, CDKN1A, EGF, CTNNB1, CREBBP, AR, INS, CCND1, ERBB2, PTEN, BCL2, MAP2K1, CDK2, MDM2, IKBKB, RB1, CREB1, AKT1, TP53, GRB2, MAPK3, NFKB1, NFKBIA, PIK3R1, MAPK1	4.57E-21	1.35E-19
p53 signaling pathway	CCND1, PTEN, CASP8, CHEK2, CDK2, CDKN2A, MDM2, IGF1, CDKN1A, TP53, CASP3, CDK1, CYCS, FAS, ATM, CCNB1	6.65E-07	2.31E-06
Cell cycle	CHEK2, E2F1, EP300, CDKN2A, CDKN1B, CDKN1A, CDK1, SKP1, TGFB1, CREBBP, PCNA, CCND1, CDK2, MDM2, RB1, ABL1, TP53, CUL1, ATM, SMAD3, HDAC1, YWHAZ, SMAD4, CCNB1, YWHAG, CCNH, MYC, SMAD2	2.70E-11	1.87E-10
TGF-beta signaling pathway	EP300, TNF, BMP4, BMP2, SP1, SKP1, IFNG, TGFB1, CUL1, PPP2CB, RHOA, CREBBP, SMAD3, MAPK3, SMAD4, MYC, MAPK1, SMAD2	9.82E-07	3.31E-06
Wnt signaling pathway	JUN, CSNK2A1, CCND1, CSNK2A2, RAC2, MAPK8, PRKCA, EP300, PRKACA, RUVBL1, TP53, CTNNB1, SKP1, CUL1, PPP2CB, RHOA, CREBBP, SMAD3, SMAD4, RAC1, MYC, SMAD2	1.77E-05	4.85E-05
Focal adhesion	JUN, HRAS, MAPK8, RAF1, EGFR, PRKCA, SHC1, IGF1, EGF, CTNNB1, VEGFA, RHOA, ACTB, CCND1, ERBB2, SRC, PTK2, PTEN, RAC2, BCL2, MAP2K1, AKT1, ITGB1, GRB2, MAPK3, FYN, ACTG1, RAC1, PIK3R1, CDC42, MAPK1	3.52E-08	1.54E-07
Adherens junction	CSNK2A1, SRC, ERBB2, RAC2, CSNK2A2, EGFR, EP300, CTNNB1, RHOA, CREBBP, SMAD3, MAPK3, SMAD4, FYN, INSR, ACTG1, ACTB, PTPN6, RAC1, CDC42, CDH1, MAPK1, SMAD2	6.16E-12	5.59E-11
ErbB signaling pathway	JUN, HRAS, PTK2, SRC, ERBB2, MAPK8, RAF1, PRKCA, EGFR, SHC1, MAP2K1, CBL, ABL1, CDKN1B, EGF, CDKN1A, AKT1, PLCG1, GRB2, MAPK3, STAT5A, PIK3R1, MYC, MAPK1	2.16E-11	1.60E-10

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* # *Benjamini-Hochberg-Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-5-1 The GO Biological Process enrichment results of the top350 genes

<i>Go term</i>	<i>Gene Counts</i>	<i>P-value*</i>	<i>BenjaminiFDR[#]</i>
regulation of cell proliferation	88	6.44E-31	1.75E-28
programmed cell death	53	3.50E-14	1.07E-12
cell cycle	51	2.61E-09	3.60E-08
cell communication	47	3.49E-07	3.65E-06
signal transduction	107	2.06E-08	2.55E-07
DNA repair	16	0.00624	0.0313
apoptosis	50	1.10E-12	2.47E-11
protein modification process	77	1.30E-09	1.86E-08
cell activation	42	7.79E-19	3.85E-17
cell growth	6	0.0234	0.102
anti-apoptosis	31	6.07E-14	1.77E-12

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* # *Benjamini-Hochberg-Yekutieli procedure controls the false discovery rate (FDR).*

Table 4-5-2 The enrichment results of KEGG pathways of the top350 genes

<i>Pathways</i>	<i>Gene Symbol</i>	<i>P-value*</i>	<i>BenjaminiFDR[#]</i>
Prostate cancer	HRAS, IKBKG, E2F1, CHUK, RAF1, EGFR, EP300, RELA, IGF1, CDKN1B, CDKN1A, EGF, CTNNB1, CREBBP, AR, INS, CCND1, ERBB2, PTEN, BCL2, MAP2K1, CDK2, MDM2, HSP90AA2, IKBKB, RB1, CREB1, AKT1, TP53, GRB2, MAPK3, NFKB1, NFKBIA, PIK3R1, MAPK1	7.64E-20	1.85E-18
p53 signaling pathway	CCND1, PTEN, CASP8, CHEK2, CDK2, CDKN2A, MDM2, IGF1, CDKN1A, TP53, CASP3, CDK1, CYCS, FAS, GADD45A, ATM, CCNB1	9.87E-07	3.73E-06
Cell cycle	CHEK2, E2F1, EP300, CDKN2A, CDKN1B, CDKN1A, CDK1, SKP1, TGFB1, GADD45A, CREBBP, PLK1, PCNA, CCND1, CDK2, MDM2, RB1, ABL1, TP53, CUL1, ATM, SMAD3, HDAC1, YWHAZ, SMAD4, HDAC2, CCNB1, YWHAG, MAD2L1, CCNH, MYC, SMAD2	1.24E-12	1.67E-11
TGF-beta signaling pathway	EP300, TNF, BMP4, BMP2, SP1, SKP1, IFNG, TGFB1, CUL1, PPP2CB, RHOA, CREBBP, SMAD3, MAPK3, SMAD4, MYC, MAPK1, SMAD2	9.18E-06	2.78E-05
Wnt signaling pathway	JUN, CSNK2A1, CCND1, CSNK2A2, RAC2, MAPK8, PRKCA, EP300, PRKACA, RUVBL1, TP53, CTNNB1, SKP1, CUL1, PPP2CB, RHOA, CREBBP, SMAD3, SMAD4, RAC1, MYC, SMAD2	1.93E-04	4.75E-04
Focal adhesion	JUN, HRAS, MAPK8, RAF1, EGFR, PRKCA, SHC1, IGF1, EGF, CTNNB1, VEGFA, RHOA, ACTB, CCND1, ERBB2, SRC, PTK2, PTEN, RAC2, BCL2, MAP2K1, ITGB3, AKT1, ITGB1, GRB2, MAPK3, FYN, ACTG1, RAC1, PIK3R1, CDC42, MAPK1	4.13E-07	1.66E-06
Adherens junction	CSNK2A1, SRC, ERBB2, RAC2, CSNK2A2, EGFR, EP300, CTNNB1, RHOA, CREBBP, SMAD3, MAPK3, SMAD4, FYN, INSR, ACTG1, ACTB, PTPN6, RAC1, CDC42, CDH1, MAPK1, SMAD2	1.58E-10	1.36E-09
ErbB signaling pathway	JUN, HRAS, PTK2, SRC, ERBB2, MAPK8, RAF1, PRKCA, EGFR, SHC1, MAP2K1, CBL, ABL1, CDKN1B, EGF, CDKN1A, AKT1, PLCG1, GRB2, MAPK3, STAT5A, PIK3R1, MYC, MAPK1	5.99E-10	4.26E-09

* *P-values were obtained using the gene list included in PPI network as a background list based on fisher's exact test.* [#] *Benjamini-Hochberg-Yekutieli procedure controls the false discovery rate (FDR).*