

SUPPLEMENTARY MATERIAL

Article

BRAF, TERT and HLA-G status in the papillary thyroid carcinoma: A clinicopathological association study

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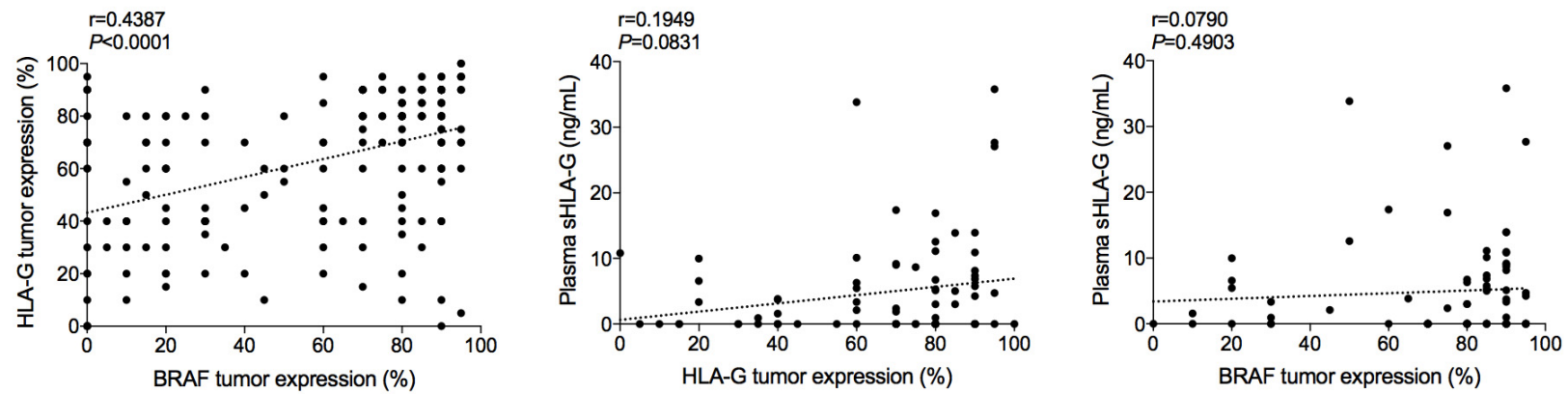


Figure S1. Correlation analysis between (i) HLA-G and BRAF tissue expression in papillary thyroid carcinoma (PTC) specimens based on the percentage (%) of stained thyroid tumor cells (left) ($n = 181$); (ii) soluble HLA-G (sHLA-G) plasma levels in PTC patients and HLA-G expression in PTC specimens based on the percentage (%) of stained thyroid tumor cells (middle) ($n = 80$) and (iii) sHLA-G plasma levels in PTC patients and BRAF expression in PTC specimens based on the percentage (%) of stained thyroid tumor cells (right) ($n = 78$). Spearman correlation coefficient (r) and p -values are shown.

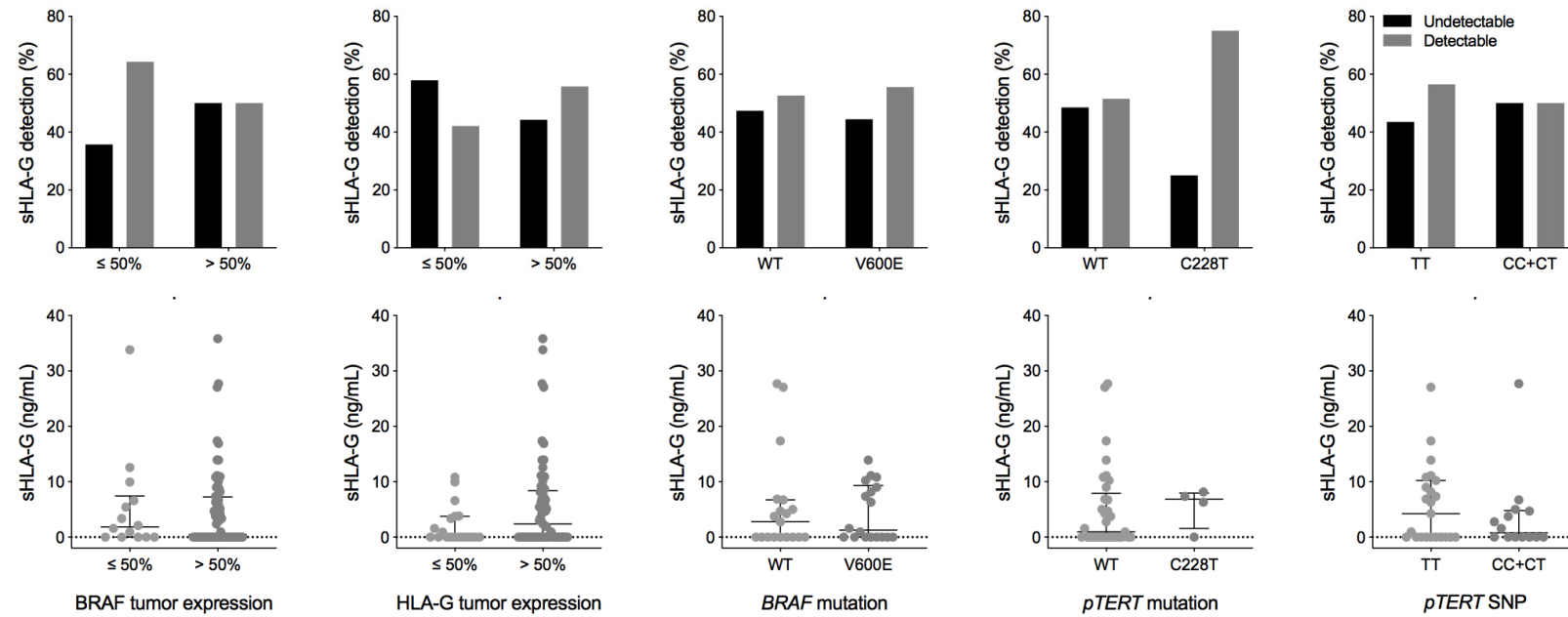


Figure S2. Plasma soluble HLA-G (sHLA-G) detection frequency (top) and levels (bottom) in papillary thyroid carcinoma (PTC) according to (i) the magnitude of HLA-G and BRAF tumor expression, and (ii) BRAF^{V600E} and *TERT* promoter mutations. Top: Comparisons were made by using Chi-Squared (χ^2) test. Bottom: Each dot represents one plasma sample. Results are shown as median with interquartile range. Comparisons were made by using unpaired Mann-Whitney test. No significant difference (p-value below 0.0500) was observed. *pTERT*: *TERT* promoter.

Table S1. Most significant enriched pathways related to the differentially expressed miRNAs in papillary thyroid carcinoma (PTC) tumor area compared with non-tumoral adjacent area, according to the KEGG database.

KEGG ID	Pathway	P-value	FDR	All target genes within the pathway (including the genes of interest in <i>bold</i>)
				hsa-miR-486-5p
hsa04150	mTOR signaling pathway	5.06e-04	0.1431	<i>PRKCA, PIK3CG, BRAF, IGF1, RPS6KB1, RICTOR, PTEN, PRKCB, DDIT4, RPS6KA6, RPS6KA3, PDPK1, EIF4E, CAB39, MLST8, PIK3R3, EIF4E2, PIK3R1</i>
hsa04910	Insulin signaling pathway	0.0059	0.2840	<i>PRKAG3, PHKB, PRKAG2, MKNK1, FOXO1, RHOQ, ELK1, RPS6KB1, PPP1R3E, PDPK1, PPP1R3B, SORBS1, PIK3R3, RAPGEF1, PIK3R1, SHC4, PIK3CG, BRAF, PRKAB1, PPARGC1A, G6PC, EIF4E, CRKL, PRKAR1A, ARAF, PTPN1, CRK, EIF4E2, CALM2</i>
hsa04068	FoxO signaling pathway	0.0075	0.2840	<i>PRKAG3, PRKAG2, FOXO1, FASLG, PTEN, IL10, IGF1R, PDPK1, FBXO25, PIK3R3, AGAP2, PIK3R1, PIK3CG, BRAF, SGK3, TGFBF1, PRKAB1, IGF1, SMAD2, C8ORF44-SGK3, SIRT1, STK4, BCL2L11, STAT3, G6PC, ARAF, MDM2, FBXO32</i>
hsa05214	Glioma	0.0125	0.3409	<i>PRKCA, PIK3CG, BRAF, IGF1, CDK4, PTEN, PRKCB, IGF1R, PLCG1, ARAF, MDM2, PIK3R3, CAMK2A, PIK3R1, CALM2, SHC4</i>
hsa04012	ErbB signaling pathway	0.0202	0.3409	<i>PRKCA, PIK3CG, NRG4, BRAF, ELK1, RPS6KB1, PRKCB, PTK2, CRKL, PLCG1, ARAF, NRG1, PIK3R3, MAP2K7, CAMK2A, MYC, CRK, PIK3R1, SHC4</i>
hsa04722	Neurotrophin signaling pathway	0.0228	0.3409	<i>PIK3CG, BRAF, FASLG, KIDINS220, IRAK4, CDC42, RPS6KA6, PDPK1, RPS6KA3, CRKL, PSEN1, PLCG1, MAP3K1, SORT1, RAP1A, NGFR, PIK3R3, MAP2K7, CAMK2A, RAPGEF1, CRK, CALM2, PIK3R1, SHC4</i>
hsa04015	Rap1 signaling pathway	0.0287	0.3799	<i>F2RL3, GNAI3, FGF7, FGF9, EFNA1, CSF1, EFNA3, FPR1, FGF13, IGF1R, CDC42, PFN2, RAPGEF5, PDGFC, PIK3R3, RAPGEF1, PIK3R1, MAP2K6, FGF4, PRKCA, PIK3CG, FLT1, MAGI2, BRAF, GRIN2A, IGF1, PRKCB, CRKL, PLCG1, RAP1A, GNAS, PARD6G, NGFR, CRK, PRKD3, CALM2, F2R</i>
hsa05220	Chronic myeloid leukemia	0.0305	0.3799	<i>PIK3CG, CTBP2, BRAF, TGFBF1, MECOM, CDK4, CRKL, GAB2, HDAC1, ARAF, MDM2, PIK3R3, MYC, CRK, PIK3R1, SHC4</i>
hsa05200	Pathways in cancer	0.0402	0.4647	<i>F2RL3, FGF7, FGF9, ARNT2, FASLG, FOXO1, FGF13, PTEN, CXCL12, CDC42, RARA, TPR, WNT6, MYC, FGF4, PRKCA, PIK3CG, CTBP2, BRAF, ROCK2, RXRB, RUNX1T1, FADD, CTNNA1, CDK4, MECOM, STK4, PRKCB, CRKL, MDM2, GNB4, GNAS, LAMC2, WNT9A, DCC, GNAI3, WNT5B, XIAP, GNG12, TPM3, RBX1, IGF1R, PTK2, PIK3R3, TRAF4, PIK3R1, APC, COL4A4, MSH3, VHL, TGFBF1, ITGA2, IGF1, SMAD2, BIRC3, STAT3, PLCG1, HDAC1, ETS1, ARAF, CRK, F2R</i>
hsa05223	Non-small cell lung cancer	0.0410	0.4647	<i>PRKCA, PIK3CG, FHIT, PDPK1, BRAF, PLCG1, RXRB, ARAF, PIK3R3, CDK4, STK4, PIK3R1, PRKCB</i>
				hsa-miR-138-1-3p
hsa05166	HTLV-I infection	0.0410	0.5924	<i>IL1R2, E2F2, ADCY2, ADCY7, CRTC1, ELK1, CTNNB1, ATF2, XBP1, PIK3R3, NFATC2, HLA-DOB, FZD9, PIK3CG, KAT2B, EGR2, CREB1, TP53, SMAD2, FZD2, FZD5, FZD4, FZD7, HLA-G, DVL1, POLD3, ETS1, CCND2</i>
				hsa-miR-138-5p
hsa05166	HTLV-I infection	0.0035	0.0363	<i>E2F2, ADCY1, E2F3, NRP1, PDGFB, STAT5B, NFKB1, AKT1, WNT1, WNT3, CDKN2B, SLC2A1, IL15RA, PRKACA, PRKACB, FOSL1, MYC, TERT, AKT3, AKT2, DLG1, ICAM1, RELA, POLE, HLA-DQA2, CCND1, EP300, CCND3, CCND2, LCK, WNT9B, PDGFRB, ANAPC7, WNT9A, ITGAL, IL1R1, XIAP, CREM, MRAS, PPP3R2, ATF1, TNFRSF1A, KRAS, MAP3K3, PPP3CB, HLA-DPB1, HLA-DOA, PIK3R3, NFATC2, TCF3, PIK3R1, NFATC1, DVL2, DVL3, VAC14, CREB1, SMAD4, SMAD3, SMAD2, VDAC2, CDKN1A, GSK3B, IKBKG, TP53INP1</i>
				hsa-miR-9-5p
hsa05200	Pathways in cancer	4.20e-11	9.95e-09	<i>GNAI3, FGF18, ADCY1, FGF14, MMP9, ADCY5, ADCY6, FGF10, FOXO1, FGF12, LPAR1, MMP2, CXCL12, MMP1, TGFB2, WNT4, CDKN2A, RALB, PRKACB, WNT6, RET, BRAF, ROCK1, PIK3CB, RXRA, CTNNA1, CTNNA3, JUP, CCDC6, EP300, JUN, VEGFA, PDGFRB, LAMC2, LAMC1, FGFR1, GNAI1, ARNT, ITGAV, RAC1, NKX3-1, RUNX1, TRAF3, FN1, TCF7, EPAS1, TGFBF1, TGFBF2, MET, SMAD4, ITGA3, LAMA4, HDAC2, ITGA6, ETS1, FGF5, PPARD, E2F3, FGF9, SPI1, NFKB1, PTEN, CCNE2, CDC42, CCNE1, PLCB4, CXCR4, PAX8, RHOA, PLCB1, AKT3, PRKCA, AR, HSP90AA1, RUNX1T1, TP53, CDK6, ARHGEF12, RAD51, DAPK1, CCND1, GNAQ, MDM2, GNAS, DCC, EGLN3, KITLG, CDH1, SUFU, TCF7L1, TPM3, IGF1R, SOS1, BCL2, RASGRP1, SOS2, PIK3R3, WNT8A, FZD8, COL4A2, IL6, COL4A1, MSH2, CBL, IGF1, FZD3, FZD5, RALGDS, FZD6, ADCY9, GSK3B, JAK1, PTCH1</i>

KEGG ID	Pathway	P-value	FDR	All target genes within the pathway (including the genes of interest in <i>bold</i>)
hsa04510	Focal invasion	2.26e-08	2.68e-06	TLN1, PTEN, VCL, PAK6, CDC42, PDPK1, ARHGAP5, PAK2, PAK3, PAK4, RHOA, PDGFC, SHC1, SHC2, AKT3, PRKCA, PARVG, ROCK1, BRAF , PIK3CB, MYLK4, ACTN2, FLNB, CCND1, JUN, VEGFA, PDGFRB, LAMC2, LAMC1, COL1A1, PARVA, CAV2, DIAPH1, TNC, PPP1R12B, ITGB4, SRC, IGF1R, BCL2, COL27A1, ITGAV, SOS1, RAC1, SOS2, PPP1R12A, TNN, PIK3R3, THBS2, FN1, COL4A2, VAV3, FLT1, COL4A1, MET, ITGA1, IGF1, ITGA3, ITGA4, CAPN2, COL5A1, LAMA4, ITGA6, GSK3B, RAP1B, MYLK
hsa05215	Prostate cancer	5.97e-06	2.94e-04	TLN1, PTEN, VCL, PAK6, CDC42, PDPK1, ARHGAP5, PAK2, PAK3, PAK4, RHOA, PDGFC, SHC1, SHC2, AKT3, PRKCA, PARVG, ROCK1, BRAF , PIK3CB, MYLK4, ACTN2, FLNB, CCND1, JUN, VEGFA, PDGFRB, LAMC2, LAMC1, COL1A1, PARVA, CAV2, DIAPH1, TNC, PPP1R12B, ITGB4, SRC, IGF1R, BCL2, COL27A1, ITGAV, SOS1, RAC1, SOS2, PPP1R12A, TNN, PIK3R3, THBS2, FN1, COL4A2, VAV3, FLT1, COL4A1, MET, ITGA1, IGF1, ITGA3, ITGA4, CAPN2, COL5A1, LAMA4, ITGA6, GSK3B, RAP1B, MYLK
hsa04810	Regulation of actin cytoskeleton	7.45e-06	2.94e-04	TLN1, PTEN, VCL, PAK6, CDC42, PDPK1, ARHGAP5, PAK2, PAK3, PAK4, RHOA, PDGFC, SHC1, SHC2, AKT3, PRKCA, PARVG, ROCK1, BRAF , PIK3CB, MYLK4, ACTN2, FLNB, CCND1, JUN, VEGFA, PDGFRB, LAMC2, LAMC1, COL1A1, PARVA, CAV2, DIAPH1, TNC, PPP1R12B, ITGB4, SRC, IGF1R, BCL2, COL27A1, ITGAV, SOS1, RAC1, SOS2, PPP1R12A, TNN, PIK3R3, THBS2, FN1, COL4A2, VAV3, FLT1, COL4A1, MET, ITGA1, IGF1, ITGA3, ITGA4, CAPN2, COL5A1, LAMA4, ITGA6, GSK3B, RAP1B, MYLK
hsa04010	MAPK signaling pathway	1.42e-05	4.80e-04	MEF2C, FGF5, FGF18, FGF9, FGF14, FGF10, NFKB1, FGF12, DAXX, TGFB2, MAP3K7, CDC42, PAK2, MAP3K8, PRKACB, RAPGEF2, MAP2K7, AKT3, PRKCA, BRAF , TP53, CACNG3, FLNB, STK3, RASGRF2, ARRB1, JUN, PDGFRB, STMN1, MAP3K14, FGFR1, MRAS, MKNK2, PPM1A, DUSP10, CACNB2, MAPKAPK2, PPM1B, SRF, ATF2, MAP3K3, ELK4, MAP3K2, SOS1, MAP3K1, RASGRP1, SOS2, RAC1, NFATC3, TAOK1, MAP2K3, TGFBF1, NF1, TGFBF2, TAB2, RPS6KA6, RPS6KA3, RPS6KA4, DUSP1, RPS6KA2, NTRK2, CACNA1E, RAP1B, DUSP8, CACNA1A, CACNA1B, DUSP6
hsa04722	Neurotrophin signaling pathway	2.59e-5	7.69e-04	ZNF274, NFKB1, MAPKAPK2, FOXO3, CDC42, PDPK1, MAP3K3, BCL2, SOS1, MAP3K1, RAC1, SOS2, RHOA, SH2B3, SHC1, SH2B1, CALML5, PIK3R3, FRS2, SHC2, MAP2K7, AKT3, ARHGDIA, BRAF , PIK3CB, TP53, PTPN11, NTRK3, RPS6KA6, RPS6KA3, PSEN1, CAMK4, RPS6KA2, JUN, GSK3B, NTRK2, SORT1, RAP1B
hsa05218	Melanoma	3.89e-04	0.0057	FGF5, FGF18, FGFR1, E2F3, BRAF , FGF9, FGF14, PIK3CB, MET, TP53, IGF1, FGF10, CDH1, CDK6, FGF12, PTEN, IGF1R, CCND1, CDKN2A, MDM2, PDGFRB, PDGFC, PIK3R3, AKT3
hsa05211	Renal cell carcinoma	3.29e-04	0.0051	BRAF , EPAS1, PIK3CB, MET, EGLN3, PTPN11, ARNT, TGFB2, PAK6, CDC42, EP300, PAK2, PAK3, ETS1, JUN, SOS1, PAK4, RAC1, SOS2, VEGFA, RAP1B, PIK3R3, AKT3
hsa04015	Rap1 signaling pathway	6.53e-05	0.0015	FGF18, FGF5, ADCY1, TLN1, FGF14, FGF9, EFNA1, ADCY5, ADCY6, FGF10, LPAR1, FGF12, CDC42, PLCB4, RHOA, RALB, PDGFC, AFDN, RAPGEF2, PLCB1, ANGPT2, AKT3, PRKCA, MAGI1, BRAF , PIK3CB, GRIN2A, SIPA1L3, GNAQ, VEGFA, PDGFRB, EFNA5, GNAS, PRKD3, FGFR1, DRD2, GNAI1, CSF1, MRAS, KITLG, CDH1, SRC, IGF1R, CNR1, P2RY1, RAC1, CALML5, PIK3R3, GNAO1, FLT1, MAP2K3, MET, IGF1, RALGDS, ADCY9, RAP1B
hsa05205	Proteoglycans in cancer	3.08e-05	8.12e-04	MMP9, MMP2, IQGAP1, SDC2, TGFB2, CDC42, WNT4, PDPK1, CD44, ANK2, ANK3, RHOA, PRKACB, WNT6, FRS2, AKT3, TWIST1, PRKCA, ROCK1, BRAF , PIK3CB, TP53, ESR1, ARHGEF12, FLNB, CCND1, SDC1, VEGFA, MDM2, CAV2, FGFR1, PPP1R12B, MRAS, RDX, SRC, IGF1R, ITGAV, SOS1, RAC1, SOS2, PPP1R12A, PIK3R3, WNT8A, FN1, FZD8, MET, CBL, IGF1, IGF2, FZD3, FZD5, FZD6, PTPN11, PTCH1, SLC9A1
hsa05220	Chronic myeloid leukemia	4.87e-04	0.0067	E2F3, BRAF , PIK3CB, TGFBF1, CBL, TGFBF2, TP53, SMAD4, NFKB1, CDK6, PTPN11, TGFB2, CCND1, HDAC2, CDKN2A, GAB2, SOS1, SOS2, MDM2, SHC1, PIK3R3, RUNX1, SHC2, AKT3
hsa05212	Pancreatic cancer	7.15e-04	0.0089	E2F3, BRAF , PIK3CB, ARHGEF6, TGFBF1, TGFBF2, TP53, SMAD4, NFKB1, CDK6, RALGDS, RAD51, TGFB2, CDC42, CCND1, CDKN2A, RAC1, VEGFA, RALB, JAK1, PIK3R3, AKT3
hsa05210	Colorectal cancer	0.0025	0.0215	DCC, TCF7, BRAF , MSH2, PIK3CB, TGFBF1, TGFBF2, TP53, SMAD4, TCF7L1, RALGDS, TGFB2, CCND1, JUN, BCL2, GSK3B, RAC1, RHOA, PIK3R3, AKT3
hsa05214	Glioma	0.0045	0.0347	PRKCA, E2F3, BRAF , PIK3CB, TP53, IGF1, CDK6, PTEN, IGF1R, CCND1, CDKN2A, SOS1, SOS2, MDM2, PDGFRB, SHC1, CALML5, PIK3R3, SHC2, AKT3
hsa05213	Endometrial cancer	0.0051	0.0369	TCF7, BRAF , PIK3CB, TP53, CDH1, FOXO3, CTNNA1, PTEN, CTNNA3, TCF7L1, PDPK1, CCND1, GSK3B, SOS1, SOS2, PIK3R3, AKT3
hsa05216	Thyroid cancer	0.0107	0.0652	CCDC6, CCND1, TCF7, RET, BRAF , RXRA, PAX8, TP53, CDH1, TCF7L1, TPM3

KEGG ID	Pathway	P-value	FDR	All target genes within the pathway (including the genes of interest in <i>bold</i>)
hsa04068	FoxO signaling pathway	0.0165	0.0791	RAG1, FOXO1, FOXO3, PTEN, TGFBR2, IGF1R, PDPK1, SLC2A4, SOS1, SOS2, BCL6, PRKAA1, PIK3R3, AKT3, IL6, BRAF , SGK3, PIK3CB, TGFBR1, TGFBR2, SMAD4, IGF1, HOMER1, SIRT1, BCL2L11, SOD2, CCND1, EP300, PLK2, FOXG1, SETD7, MDM2
hsa04024	cAMP signaling pathway	0.0166	0.0791	PPARA, ATP1B1, ADCY1, GNAI1, DRD2, ADCY5, ADCY6, PDE3B, OXTR, NFKB1, GABBR2, ATP2B2, ATP2B3, ATP2B4, RAC1, PPP1R12A, RHOA, CREB3L2, AFDN, PRKACB, CALML5, HCAR3, PIK3R3, HCAR2, AKT3, HCN2, PLD1, VAV3, BRAF , ROCK1, PIK3CB, CREB1, GRIN2A, PDE4D, CREB5, EP300, ADCY9, CAMK4, GRIA1, JUN, PTCH1, RAP1B, GNAS, SLC9A1
hsa05219	Bladder cancer	0.0216	0.0920	E2F3, CCND1, CDKN2A, BRAF , MMP9, VEGFA, TP53, MDM2, CDH1, MMP2, SRC, MMP1, DAPK1
hsa04150	mTOR signaling pathway	0.0332	0.1213	PRKAA1, PDPK1, PTEN, PIK3R3, BRAF , PRKCA, TSC1, PIK3CB, IGF1, RPS6KA3, RPS6KA6, RPS6KA2, AKT3, ULK2, RICTOR, EIF4E
				hsa-miR-708-3p
hsa04150	mTOR signaling pathway	0.0101	1.0000	EIF4E, BRAF , TSC1, PRKAA2, MLST8, AKT3, PIK3R1, RPTOR
hsa04068	FoxO signaling pathway	0.0244	1.0000	PRKAG3, IGF1R, BRAF , SGK3, CCND2, SOS1, SMAD2, PRKAA2, C8ORF44-SGK3, AKT3, PIK3R1, BCL2L11
hsa04010	MAPK signaling pathway	0.0361	1.0000	BRAF , CACNG8, TAOK3, MAP2K4, GNG12, DUSP5, CDC42, PAK2, RASGRP3, SOS1, DUSP16, CACNA1H, RAP1B, FAS, MAP3K14, TRAF6, FGF2, AKT3
hsa05200	Pathways in cancer	0.0391	1.0000	GNA13, HSP90AB1, AR, APC2, BRAF , FLT3, SMAD2, GNG12, TPM3, CCNE2, EDNRB, CCDC6, IGF1R, CDC42, RASGRP3, LPAR5, SOS1, GNB4, PTCH1, FAS, TRAF6, FGF2, AKT3, PIK3R1, TRAF3
				hsa-miR-222-3p
hsa04012	ErbB signaling pathway	1.64e-07	3.63-05	NRG4, ERBB4, ERBB3, STAT5A, SRC, PTK2, PAK2, PAK3, GAB1, PAK5, TGFA, CAMK2B, SHC1, PAK1, SHC3, NRG1, MYC, AKT3, PIK3R1, PRKCA, EGFR, MAP2K1, BRAF , PIK3CB, MAP2K4, PIK3CD, CBL, MAPK10, MAPK1, CDKN1B, CRKL, GSK3B, PLCG2, MAPK3, ABL2
hsa04510	Focal adhesion	5.51e-06	5.83e-04	TLN1, PDGFA, VTN, PTEN, VCL, ACTG1, PAK2, PAK3, PAK5, ILK, RHOA, PDGFC, SHC1, ZYX, PDGFD, PAK1, SHC3, AKT3, PRKCA, EGFR, BRAF , PIK3CB, MYLK4, PIK3CD, FLNB, FLNA, VEGFB, MAPK1, CRKL, RASGRF1, CCND2, MAPK3, LAMC2, PARVA, ITGA10, ITGB3, SRC, PTK2, COL6A6, COL6A5, ITGB8, BCL2, THBS1, THBS2, PIK3R1, COL4A4, ACTB, COL4A1, MAP2K1, IGF1, MAPK10, BIRC3, VAV2, COL5A2, COL4A6, KDR, GSK3B, RAP1A, RAP1B
hsa05205	Proteoglycans in cancer	9.57e-06	5.83e-04	VTN, HOXD10, SDC2, ACTG1, CTTN, WNT3, ANK1, ANK2, TIAM1, HPSE, ANK3, GAB1, RHOA, PAK1, MSN, MYC, FRS2, AKT3, PRKCA, EGFR, BRAF , PIK3CB, PIK3CD, TP53, ESR1, ARHGEF12, FLNB, FLNA, MAPK1, SDC1, MAPK3, WNT9B, MDM2, ERBB4, ERBB3, MRAS, RDX, ITGB3, TIMP3, SRC, PTK2, EZR, HPSE2, CAMK2B, THBS1, PIK3R1, ACTB, FZD9, MAP2K1, CBL, IGF1, ITPR2, KDR, PTPN11, EIF4B, MAPK14, PLCG2
hsa04015	Rap1 signaling pathway	1.05e-05	5.83e04	FGF5, ADCY1, TLN1, ADCY2, EFNA1, PDGFA, EFNA3, FGF12, ACTG1, PLCB4, GRIN2B, TIAM1, RHOA, RAPGEF5, RALA, PDGFC, PDGFD, RAPGEF2, INSR, AKT3, ANGPT4, PRKCA, EGFR, MAGI2, MAGI1, BRAF , PIK3CB, PIK3CD, SIPA1L2, VEGFB, MAPK1, CRKL, KRIT1, MAPK3, GNAI3, GNAI2, MRAS, CSF1, KITLG, CDH1, ITGB3, KIT, SRC, PFN1, CNR1, THBS1, PIK3R1, ACTB, PARD6B, GNAO1, MAP2K1, IGF1, KDR, RASSF5, MAPK14, RAP1A, RAP1B, PARD6G, CALM1
hsa05213	Endometrial cancer	7.59e-05	0.0028	EGFR, MAP2K1, BRAF , PIK3CB, PIK3CD, TP53, CDH1, FOXO3, TCF7L2, PTEN, CTNNA3, CTNNA2, MAPK1, CASP9, GSK3B, ILK, MAPK3, AXIN2, MYC, PIK3R1, AKT3
hsa04722	Neurotrophin signaling pathway	8.02e-05	0.0028	FOXO3, BCL2, GAB1, RHOA, CAMK2B, SHC1, TRAF6, SHC3, FRS2, AKT3, PIK3R1, IRAK2, IRAK1, NTF3, BRAF , MAP2K1, PIK3CB, PIK3CD, TP53, MAPK10, KIDINS220, YWHAE, TP73, PTPN11, MAPK1, CRKL, RPS6KA1, PSEN1, MAPK14, GSK3B, PLCG2, NTRK2, MAPK3, SORT1, RAP1A, RAP1B, CALM1
hsa05214	Glioma	1.03e-04	0.0028	PRKCA, E2F1, EGFR, E2F2, MAP2K1, BRAF , PIK3CB, PDGFA, PIK3CD, TP53, IGF1, CDK6, PTEN, MAPK1, PLCG2, MAPK3, TGFA, MDM2, CAMK2B, SHC1, SHC3, PIK3R1, AKT3, CALM1
hsa05200	Pathways in cancer	2.58e-04	0.0052	E2F1, FGF5, E2F2, ADCY1, PPARG, ADCY2, PDGFA, GNA11, STAT5A, MITF, FOXO1, FGF12, GLI2, CXCL12, PTEN, MMP1, EDNRA, FOS, WNT3, PLCB4, CASP9, CDKN2B, RHOA, TGFA, RALA, MYC, AKT3, EGFR, PRKCA, PTGER2, HSP90AA1, BRAF , PIK3CB, PIK3CD, CYCS, TP53, RUNX1T1, CDK6, DAPK2, ARHGEF12, CTNNA3, RAD51, CTNNA2, VEGFB, MAPK1, CRKL, EP300, MAPK3, WNT9B, MDM2, LAMC2, TRAF2, CKS1B, GNAI3, GNAI2, PML, TFG, KITLG, CDH1, KIT, GNG12, ZBTB16, TCF7L2, TPM3, ARNT, PTK2, BCL2, RASGRP1, TRAF6, AXIN2, PIK3R1, TRAF3, COL4A4, FZD9, DVL2, COL4A1, MAP2K1, TGFBR1, CBL, SMAD4, IGF1, BIRC5, MAPK10, BIRC3, COL4A6, RASSF5, CDKN1B, ETS1, GSK3B, PLCG2

KEGG ID	Pathway	P-value	FDR	All target genes within the pathway (including the genes of interest in <i>bold</i>)
hsa05210	Colorectal cancer	4.07e-04	0.0061	MAP2K1, BRAF , PIK3CB, TGFBR1, CYCS, PIK3CD, TP53, SMAD4, BIRC5, MAPK10, TCF7L2, MAPK1, FOS, CASP9, GSK3B, BCL2, MAPK3, RHOA, AXIN2, MYC, PIK3R1, AKT3
hsa05215	Prostate cancer	4.08e-04	0.0061	E2F1, E2F2, PDGFA, FOXO1, TCF7L2, PTEN, CASP9, BCL2, TGFA, PDGFC, PDGFD, PIK3R1, AKT3, EGFR, HSP90AA1, MAP2K1, BRAF , PIK3CB, CREB1, PIK3CD, TP53, IGF1, MAPK1, CDKN1B, EP300, GSK3B, MAPK3, MDM2
hsa04068	FoxO signaling pathway	4.12e-04	0.0061	PRKAG3, FOXO1, FOXO3, IL7R, PTEN, LOC400927-CSNK1E, CDKN2B, PRKAA1, INSR, AKT3, PIK3R1, IRS4, EGFR, BRAF , MAP2K1, PIK3CB, NLK, TGFBR1, PRKAB2, PIK3CD, SMAD4, IGF1, MAPK10, GRM1, SIRT1, BCL2L11, SOD2, MAPK1, TNFSF10, EP300, CDKN1B, CSNK1E, PLK1, CCND2, MAPK14, MAPK3, MDM2, GADD45B
hsa05223	Non-small cell lung cancer	7.40e-04	0.0082	PRKCA, E2F1, EGFR, FHIT, E2F2, BRAF , MAP2K1, PIK3CB, PIK3CD, TP53, CDK6, FOXO3, MAPK1, RASSF5, CASP9, PLCG2, MAPK3, TGFA, PIK3R1, AKT3
hsa05218	Melanoma	0.0011	0.0100	E2F1, EGFR, FGF5, E2F2, MAP2K1, BRAF , PIK3CB, PDGFA, MITF, PIK3CD, TP53, IGF1, CDH1, CDK6, FGF12, PTEN, MAPK1, MAPK3, MDM2, PDGFC, PDGFD, PIK3R1, AKT3
hsa05220	Chronic myeloid leukemia	0.0014	0.0114	E2F1, E2F2, MAP2K1, BRAF , PIK3CB, TGFBR1, STAT5A, CBL, PIK3CD, TP53, SMAD4, CDK6, PTPN11, MAPK1, CRKL, CDKN1B, MAPK3, MDM2, SHC1, SHC3, MYC, AKT3, PIK3R1
hsa05211	Renal cell carcinoma	0.0026	0.0181	MAP2K1, BRAF , PIK3CB, PIK3CD, PTPN11, ARNT, MAPK1, EP300, CRKL, PAK2, PAK3, ETS1, GAB1, PAK5, MAPK3, TGFA, RAP1A, RAP1B, PAK1, PIK3R1, AKT3
hsa04024	cAMP signaling pathway	0.0027	0.0184	PPARA, ATP1B1, ADCY1, GNAI3, ADCY2, GNAI2, ADCYAP1R1, FFAR2, ATP1B4, GABBR1, GABBR2, CNGB1, VIPR2, EDNRA, FOS, ATP2B3, ATP2B4, GRIN2B, TIAM1, PDE4B, RHOA, CAMK2B, PAK1, HCN4, AKT3, PIK3R1, PTGER2, BRAF , MAP2K1, PIK3CB, CREB1, PIK3CD, PDE3A, PDE4D, ATP1A1, GRIA4, MAPK10, VAV2, CACNA1S, MAPK1, EP300, GRIA1, CHRM1, MAPK3, RAP1A, RYR2, RAP1B, CALM1
hsa05219	Bladder cancer	0.0033	0.0219	EGFR, E2F1, E2F2, BRAF , MAP2K1, TP53, CDH1, DAPK2, SRC, MMP1, MAPK1, MAPK3, MDM2, THBS1, MYC
hsa04010	MAPK signaling pathway	0.0036	0.0230	FGF5, PDGFA, FGF12, DAXX, FOS, PAK2, PAK1, RAPGEF2, MYC, AKT3, PRKCA, EGFR, BRAF , TP53, FLNB, FLNA, MAPK1, CRKL, RASGRF1, MAPK3, STMN1, GADD45B, TRAF2, IL1R1, MRAS, PPP3R1, PPM1A, CACNB2, CACNB3, GNG12, CACNB4, PPM1B, ATF2, ELK4, MAP3K2, RASGRP1, DUSP16, PPP3CB, TRAF6, NFATC3, HSPA8, MAP2K1, NTF3, TAOK1, NLK, TGFBR1, MAP2K4, MAPK10, CACNA1S, DUSP4, DUSP3, RPS6KA1, MAPK14, NTRK2, MAPK8IP2, RAP1A, RAP1B, PLA2G4C
hsa05212	Pancreatic cancer	0.0051	0.0299	E2F1, EGFR, E2F2, BRAF , MAP2K1, PIK3CB, TGFBR1, PIK3CD, TP53, SMAD4, CDK6, MAPK10, RAD51, MAPK1, CASP9, MAPK3, TGFA, RALA, PIK3R1, AKT3
hsa04910	Insulin signaling pathway	0.0054	0.0302	PRKAG3, EXOC7, FOXO1, RHOQ, PRKAR2A, FASN, PRKAA1, SHC1, SHC3, INSR, AKT3, PIK3R1, IRS4, BRAF , MAP2K1, SOCS3, PIK3CB, PHKG2, PRKAB2, PIK3CD, CBL, SOCS1, ACACA, SOCS4, MAPK10, PPARGC1A, MAPK1, CRKL, EIF4E, TSC1, GSK3B, MAPK3, EIF4E2, PYGB, CALM1
hsa04150	mTOR signaling pathway	0.0076	0.0364	PRKCA, BRAF , PIK3CB, PIK3CD, IGF1, RRAGD, PTEN, DDIT4, EIF4B, MAPK1, EIF4E, RPS6KA1, TSC1, MAPK3, PRKAA1, EIF4E2, PIK3R1, AKT3
hsa04810	Regulation of actin cytoskeleton	0.0218	0.0769	CHRM1, SRC, ITGB3, PDGFA, BRK1, PIK3CD, PIK3CB, PIK3R1, EGFR, ACTB, ACTG1, CRKL, MYLK4, FGF5, PAK1, PDGFD, PDGFC, PIP5K1A, MAPK1, ITGB8, PAK3, PAK2, WASF2, PAK5, MAPK3, MAP2K1, ARHGEF12, RDX, MSN, BRAF , ARPC4, SSH2, GNG12, RHOA, PTK2, VAV2, ENAH, TIAM1, MRAS, ABI2, ITGA10, EZR, PFN1, ARHGEF7, FGF12, VCL
hsa05221	Acute myeloid leukemia	0.0269	0.0881	STAT5A, TCF7L2, MAP2K1, ZBTB16, PIK3CD, BRAF , PIK3CB, PIK3R1, PML, MYC, KIT, AKT3, MAPK1, PPARD, MAPK3, RUNX1T1
hsa05216	Thyroid cancer	0.0326	0.1020	TCF7L2, MAP2K1, TFG, TPM3, CDH1, MYC, MAPK1, BRAF , TP53, MAPK3
hsa04062	Chemokine signaling pathway	0.0423	0.1269	CX3CR1, GSK3B, CXCL9, CCL11, SHC3, SHC1, SRC, GNAI3, PIK3CD, ADCY2, ADCY1, PIK3CB, PIK3R1, FOXO3, CXCL14, GNAI2, CRKL, RAP1B, PAK1, RAP1A, CCL5, AKT3, GRK6, MAPK1, JAK3, MAPK3, CCR1, LYN, MAP2K1, CCL22, STAT2, BRAF , GNG12, RHOA, PTK2, VAV2, TIAM1, PLCB4, CXCL12, CCL28
				hsa-miR-146b-3p
hsa04015	Rap1 signaling pathway	1.38e-04	0.0109	ADCY1, ADCY2, PDGFB, PGF, FGF14, BCAR1, FGF17, ADCY5, ADCY6, FGF12, CTNNB1, ACTG1, GRIN2B, PDGFD, RAPGEF3, ANGPT2, AKT2, PRKCA, BRAF , PRKCI, SIPA1L3, PRKCB, MAPK1, CRKL, NGFR, GNAI3, GNAI2, ADORA2A, DRD2, MRAS, CSF1, ITGB3, PFN2, KRAS, RASGRP3, PIK3R3, PIK3R1, GNAO1, MAP2K1, MAP2K3, MET, RAF1, HGF, RALGDS, RASSF5, PLCG1, ADCY9, CALM3, CALM1

KEGG ID	Pathway	P-value	FDR	All target genes within the pathway (including the genes of interest in <i>bold</i>)
hsa05223	Non-small cell lung cancer	2.71e-04	0.0133	<i>PRKCA, FHIT, E2F2, BRAF, MAP2K1, TP53, RAF1, CDK6, PRKCB, MAPK1, RASSF5, CCND1, KRAS, PLCG1, CASP9, PLCG2, PIK3R3, PIK3R1, AKT2</i>
hsa05210	Colorectal cancer	3.69e-04	0.0133	<i>BRAF, MAP2K1, MSH2, TP53, TGFB3, RAF1, SMAD3, BIRC5, SMAD2, RALGDS, CTNNB1, MAPK1, CCND1, KRAS, CASP9, GSK3B, MAPK9, PIK3R3, PIK3R1, AKT2</i>
hsa04012	ErbB signaling pathway	3.92e-04	0.0133	<i>PRKCA, ERBB4, BRAF, MAP2K1, MAP2K4, CBL, RAF1, PRKCB, MAPK1, KRAS, CRKL, CDKN1B, PLCG1, EREG, PAK3, GSK3B, PLCG2, MAPK9, PIK3R3, SHC3, NRG1, NRG2, ABL2, PIK3R1, AKT2</i>
hsa05214	Glioma	7.12e-04	0.0188	<i>PRKCA, E2F2, PDGFB, BRAF, MAP2K1, TP53, RAF1, CDK6, PRKCB, MAPK1, CCND1, KRAS, PLCG1, PLCG2, CALM3, PIK3R3, SHC3, PIK3R1, AKT2, CALM1</i>
hsa05212	Pancreatic cancer	7.12e-04	0.0188	<i>E2F2, BRAF, MAP2K1, RELA, TP53, TGFB3, RAF1, SMAD3, BRCA2, SMAD2, CDK6, RALGDS, MAPK1, CCND1, KRAS, CASP9, MAPK9, PIK3R3, PIK3R1, AKT2</i>
hsa05200	Pathways in cancer	0.0010	0.0210	<i>GNAI3, E2F2, ADCY1, PPARD, ADCY2, PDGFB, PGF, FGF14, ADCY5, FGF17, ADCY6, ARNT2, TGFB3, FGF12, MMP2, CXCL12, CTNNB1, CCNE1, CASP9, PRKACA, NOS2, WNT6, AKT2, PRKCA, AR, PTGER3, HSP90AA1, BRAF, RELA, TP53, CDK6, CTNNA1, ARHGEF12, PRKCB, MAPK1, CCND1, CRKL, MAPK9, WNT9A, TRAF1, GNAI3, GNAI2, PML, CXCL8, GNG12, ZBTB16, BDKRB2, SUFU, TPM3, ARNT, KRAS, RASGRP3, PIK3R3, PIK3R1, TRAF3, MAP2K1, MSH2, MET, CBL, RAF1, SMAD3, BRCA2, BIRC5, SMAD2, FZD2, HGF, RALGDS, GNGT1, RASSF5, WNT7B, FZD10, CDKN1B, ADCY9, PLCG1, GSK3B, PLCG2</i>
hsa05215	Prostate cancer	0.0027	0.0353	<i>E2F2, AR, HSP90AA1, MAP2K1, BRAF, PDGFB, RELA, TP53, RAF1, CREB5, CTNNB1, CCNE1, MAPK1, CCND1, KRAS, CDKN1B, CASP9, GSK3B, CREB3L2, PDGFD, PIK3R3, PIK3R1, AKT2</i>
hsa04722	Neurotrophin signaling pathway	0.0048	0.0457	<i>IRAK3, KRAS, SH2B1, SHC3, PIK3R3, PIK3R1, ARHGDIB, AKT2, IRAK1, MAP2K1, BRAF, RELA, TP53, RAF1, KIDINS220, NTRK3, RPS6KA6, MAPK1, CRKL, PLCG1, GSK3B, PLCG2, PSEN2, MAPK9, CALM3, SORT1, NGFR, CALM1</i>
hsa05218	Melanoma	0.0054	0.0481	<i>E2F2, PDGFB, BRAF, MAP2K1, FGF14, FGF17, MET, TP53, RAF1, CDK6, HGF, FGF12, MAPK1, CCND1, KRAS, PDGFD, PIK3R3, PIK3R1, AKT2</i>
hsa05220	Chronic myeloid leukemia	0.0063	0.0506	<i>E2F2, BRAF, MAP2K1, RELA, CBL, TP53, TGFB3, RAF1, CDK6, MAPK1, CCND1, CRKL, KRAS, CDKN1B, GAB2, PIK3R3, SHC3, PIK3R1, AKT2</i>
hsa04150	mTOR signaling pathway	0.0088	0.0594	<i>PRKCA, CAB39L, BRAF, RICTOR, RPTOR, EIF4E1B, PRKCB, RPS6KA6, MAPK1, TSC1, PRKAA1, CAB39, MLST8, PIK3R3, PIK3R1, AKT2</i>
hsa04024	cAMP signaling pathway	0.0093	0.0599	<i>PPARA, ADCY1, GNAI3, ADCY2, GNAI2, ADORA2A, DRD2, ADCY5, ADCY6, GRIN3A, VIPR2, GRIN2B, CREB3L2, PRKACA, RAPGEF3, HCAR3, PIK3R3, HCAR2, PIK3R1, AKT2, PLD1, PTGER3, MAP2K1, BRAF, RELA, RAF1, PDE4D, CREB5, NPY1R, SSTR5, MAPK1, ADCY9, GRIA1, GIPR, MAPK9, ABCC4, CALM3, GHSR, GLP1R, CALM1</i>
hsa04062	Chemokine signaling pathway	0.0158	0.0899	<i>ADCY1, GNAI3, ADCY2, GNAI2, FGR, CCR1, BCAR1, ADCY5, ADCY6, CXCL8, CXCR2, GNG12, CXCL12, CCL28, CCL24, CCL22, KRAS, CXCR5, PRKACA, SHC3, PIK3R3, PIK3R1, AKT2, BRAF, MAP2K1, RELA, RAF1, CCL4L2, CCL17, CCR9, MAPK1, GNGT1, CCR7, CRKL, ADCY9, CCR4, GSK3B</i>
hsa05213	Endometrial cancer	0.0189	0.1000	<i>BRAF, MAP2K1, TP53, RAF1, CTNNA1, CTNNB1, MAPK1, CCND1, KRAS, CASP9, GSK3B, PIK3R3, PIK3R1, AKT2</i>
hsa04810	Regulation of actin cytoskeleton	0.0234	0.1188	<i>GNAI3, ENAH, PDGFB, FGF14, MRAS, PPP1R12B, BCAR1, FGF17, WASF2, PIP5K1C, ABI2, RDX, GNG12, FGF12, PIP5K1A, ITGB3, BDKRB2, VCL, ACTG1, PFN2, KRAS, PAK3, ITGB6, PIKFYVE, PDGFD, PIK3R3, PIK3R1, BRAF, MAP2K1, LIMK1, ARHGEF7, BAIAP2, MYLK4, RAF1, ARHGEF12, MAPK1, CRKL, SCIN, CYFIP2, PIP4K2C</i>
hsa05205	Proteoglycans in cancer	0.0282	0.1323	<i>CAV3, ERBB4, MRAS, PPP1R12B, RDX, ITGB3, MMP2, PDCD4, CTNNB1, ACTG1, CTTN, KRAS, CD44, PRKACA, WNT6, PIK3R3, PIK3R1, AKT2, PRKCA, MAP2K1, BRAF, CBL, MET, TP53, RAF1, FZD2, HGF, ARHGEF12, PRKCB, ITPR2, MAPK1, CCND1, SDC1, WNT7B, FZD10, PLCG1, PLCG2, WNT9A</i>
hsa05211	Renal cell carcinoma	0.0283	0.1323	<i>PDGFB, BRAF, MAP2K1, ARNT2, MET, TGFB3, RAF1, HGF, ARNT, MAPK1, CRKL, KRAS, PAK3, PIK3R3, PIK3R1, AKT2</i>
hsa04910	Insulin signaling pathway	0.0296	0.1329	<i>G6PC2, PPP1R3E, PRKAR2A, KRAS, GYS1, PRKACA, PRKAA1, SHC3, PIK3R3, TRIP10, PIK3R1, AKT2, MAP2K1, BRAF, CBL, PRKAB1, PRKCI, RAF1, RPTOR, EIF4E1B, MAPK1, G6PC, CRKL, TSC1, GSK3B, MAPK9, CALM3, CALM1</i>
hsa05221	Acute myeloid leukemia	0.0338	0.1411	<i>MAPK1, CCND1, PPARD, KRAS, MAP2K1, BRAF, RELA, PML, RAF1, PIM2, ZBTB16, PIK3R3, PIK3R1, AKT2</i>
				hsa-miR-31-5p

KEGG ID	Pathway	P-value	FDR	All target genes within the pathway (including the genes of interest in <i>bold</i>)
hsa05200	Pathways in cancer	3.04e-05	0.0080	ADCY3, GNA13, FGF19, F2RL3, PDGFB, STAT5B, ADCY6, CXCL12, CTNNB1, WNT1, RALB, RALA, GNG3, GNG7, EGFR, RET, BRAF , ROCK2, RXRB, FGF23, FADD, STK4, CTNNA3, CTNNA2, CCDC6, JUN, VEGFA, PDGFRB, MAPK8, FGFR3, GNAI3, KRAS, ITGAV, RAC1, AXIN1, TGFBR2, MET, SMAD4, ITGA2, SMAD2, HDAC2, ETS1, PLCG2, ABL1, FGF5, E2F2, FGF7, FGF9, MITE, MLH1, GLI2, GLI3, PTEN, EDNRA, CCNE2, EDNRB, CDC42, CASP3, CASP9, RHOA, HHIP, PLCB1, MYC, AR, PTGER3, RUNX1T1, CDK6, ARHGEF12, CDK2, PRKCB, GNAQ, NCOA4, WNT9B, DCC, EGLN3, PML, KITLG, EGLN1, CDH1, KIT, ZBTB16, TCF7L1, SUFU, TPM3, IGF1R, SOS1, PIK3R1, CEBPA, COL4A2, CBL, FZD1, FZD3, BAD, MAPK10, BIRC3, STAT1, FZD4, HSP90B1, GSK3B, JAK1, CRK
hsa04510	Focal adhesion	5.51e-04	0.0209	PDGFB, TLN2, PTEN, CTNNB1, PAK6, CDC42, PDPK1, ARHGAP5, ILK, RHOA, PDGFC, PAK1, SHC4, EGFR, BRAF , ROCK2, MYLK4, PPP1CC, PPP1CB, FLNA, PRKCB, CCND2, JUN, VEGFA, PDGFRB, MAPK8, PARVA, DIAPH1, PPP1R12B, PPP1R12C, ITGA11, SRC, IGF1R, DOCK1, ITGB8, ITGAV, SOS1, RAC1, THBS2, PIK3R1, COL4A2, FLT1, VAV3, MET, ITGA2, BAD, MAPK10, BIRC3, COL5A1, ITGA5, ITGA8, GSK3B, RAP1A, RAP1B, CRK, MYLK
hsa05213	Endometrial cancer	8.07e-04	0.0238	EGFR, BRAF , MLH1, CDH1, BAD, FOXO3, PTEN, CTNNA3, TCF7L1, CTNNB1, CTNNA2, PDPK1, KRAS, CASP9, GSK3B, SOS1, ILK, MYC, PIK3R1, AXIN1
hsa04810	Regulation of actin cytoskeleton	9.09e-04	0.0241	GNA13, FGF19, FGF5, FGF7, PDGFB, FGF9, WASF1, WASF2, PIP5K1A, PAK6, CDC42, TIAM1, RHOA, PDGFC, PAK1, EGFR, LIMK2, BRAF , ROCK2, ARHGEF7, MYLK4, FGF23, PPP1CC, ARHGEF12, PPP1CB, PDGFRB, FGFR3, SSH1, DIAPH1, DIAPH2, PPP1R12B, PPP1R12C, SSH2, ITGA11, RDX, ARPC5, SRC, PFN2, DOCK1, KRAS, ITGAX, ITGB8, ITGAV, SOS1, RAC1, PIKFYVE, PIK3R1, VAV3, ITGA2, ITGA5, ITGA8, CYFIP1, PIP4K2A, CRK, MYLK, PIP4K2B
hsa04012	ErbB signaling pathway	0.0013	0.0263	CAMK2G, STAT5B, SRC, PAK6, KRAS, SOS1, CAMK2D, PAK1, MYC, PIK3R1, SHC4, EGFR, BRAF , CBL, MAP2K4, MAPK10, BAD, PRKCB, NCK2, EREG, JUN, GSK3B, PLCG2, HBEGF, MAPK8, ABL1, ABL2, CRK
hsa05205	Proteoglycans in cancer	0.0025	0.0452	TLR4, SDC4, SDC2, CTNNB1, CDC42, WNT1, CASP3, PDPK1, TIAM1, RHOA, NUDT16L1, PAK1, FRS2, MYC, EGFR, BRAF , ROCK2, PPP1CC, ARHGEF12, PPP1CB, FLNA, PRKCB, SDC1, VEGFA, WNT9B, PPP1R12B, CAMK2G, PPP1R12C, RDX, TIMP3, SRC, IGF1R, KRAS, ITGAV, SOS1, RAC1, CAMK2D, PIK3R1, MET, CBL, FZD1, ITGA2, FZD3, DDX5, FZD4, PTPN11, EIF4B, ITGA5, MAPK14, PLCG2, HBEGF, PLAUI
hsa05210	Colorectal cancer	0.0033	0.0561	DCC, BRAF , TGFBR2, SMAD4, MLH1, SMAD2, BAD, MAPK10, TCF7L1, CTNNB1, CASP3, KRAS, CASP9, JUN, GSK3B, RAC1, RHOA, MAPK8, MYC, PIK3R1, AXIN1
hsa04722	Neurotrophin signaling pathway	0.0040	0.0561	CAMK2G, MAPKAPK2, FOXO3, CDC42, PDPK1, KRAS, MAP3K3, MAP3K1, SOS1, RAC1, CAMK2D, RHOA, SH2B3, FRS2, PIK3R1, SHC4, IRAK1, NTF3, BRAF , MAPK10, BAD, YWHAE, PTPN11, NTRK3, JUN, MAPK14, GSK3B, PLCG2, RAP1A, MAPK8, RAP1B, ABL1, CRK, CALM1
hsa04010	MAPK signaling pathway	0.0042	0.0561	FGF19, FGF5, FGF7, PDGFB, FGF9, MAP3K7, CDC42, CASP3, MAP3K4, MAP3K8, PAK1, MYC, MAP2K6, EGFR, BRAF , CACNG4, FGF23, CACNG3, STK4, FLNA, PRKCB, MAP4K4, JUN, PDGFRB, MAPK8, STMN1, MAP3K14, MAP3K13, IL1R1, FGFR3, CACNB1, PPP3R2, CACNB2, CACNB3, PPM1B, MAPKAPK2, SRF, KRAS, MAP3K3, MAP3K1, SOS1, RAC1, PPP3CA, NFATC3, RASA1, CACNA2D1, NTF3, TAOK1, MAP2K4, TGFBR2, NF1, MAPK10, DUSP3, MAPK14, MAPK8IP2, RAP1A, CACNA1E, RAP1B, CRK, DUSP7, CACNA1B, DUSP6
hsa04015	Rap1 signaling pathway	0.0044	0.0568	FGF19, ADCY3, FGF5, F2RL3, FGF7, PDGFB, TLN2, FGF9, ADCY6, CTNNB1, CDC42, GRIN2B, TIAM1, RHOA, RALB, RAPGEF5, RALA, PDGFC, PLCB1, MAP2K6, ANGPT4, EGFR, MAGI2, BRAF , FGF23, PRKCB, GNAQ, VEGFA, PDGFRB, LCP2, GNAI3, FGFR3, CSF1, FPR1, KITLG, CDH1, KIT, APBB1IP, SRC, IGF1R, PFN2, KRAS, CNR1, RAC1, TEK, PIK3R1, FLT1, MET, MAPK14, RAP1A, RAP1B, CRK, CALM1
hsa05212	Pancreatic cancer	0.0133	0.1370	EGFR, E2F2, BRAF , TGFBR2, SMAD4, SMAD2, CDK6, BAD, MAPK10, STAT1, CDC42, KRAS, CASP9, VEGFA, RAC1, RALB, RALA, JAK1, MAPK8, PIK3R1
hsa05216	Thyroid cancer	0.0211	0.2068	CCDC6, RET, KRAS, BRAF , RXRB, NCOA4, CDH1, MYC, TCF7L1, CTNNB1, TPM3
hsa05211	Renal cell carcinoma	0.0315	0.2641	PDGFB, BRAF , MET, EGLN3, EGLN1, PTPN11, PAK6, CDC42, KRAS, ETS1, JUN, SOS1, RAC1, VEGFA, RAP1A, RAP1B, PAK1, CRK, PIK3R1
hsa05218	Melanoma	0.0333	0.2687	FGF19, EGFR, FGF5, E2F2, FGF7, PDGFB, BRAF , FGF9, MITE, MET, FGF23, CDH1, CDK6, BAD, PTEN, IGF1R, KRAS, PDGFRB, PDGFC, PIK3R1

FDR: False Discovery Rate. The hsa-miR-874-3p miRNA is absence since no significant enriched functional pathway involving the TERT gene target was found.