**Table S4**: The results of KEGG pathway analysis of 2343 target mRNAs of 25 DE-miRNAs via DAVID

|  |  |  |  |
| --- | --- | --- | --- |
| Term | Count | PValue | Genes |
| Axon guidance | 59 | 5.72E-12 | ROBO2, GSK3B, NRP1, BMPR2, LRRC4, PIK3CD, PIK3CB, ROBO1, PPP3CA, RGS3, CFL2, PLXNC1, EPHB2, NEO1, SEMA6C, EPHA4, TRPC3, UNC5B, PDPK1, SEMA6D, UNC5C, PIK3CA, MET, EPHA3, CAMK2B, SEMA3A, CAMK2A, GNAI3, PIK3R3, SEMA3F, PIK3R1, EFNA5, MYL12B, CDC42, PARD6B, NRAS, PPP3R1, PLXNA2, PAK6, LRIG2, SRGAP3, PAK3, SRGAP1, PLXNA4, PAK4, NTNG2, SEMA4A, FZD3, SEMA4B, LIMK2, SEMA4C, NFATC3, NFATC2, SEMA4F, PTPN11, SEMA4G, SSH1, CXCL12, PLXNB1 |
| Pathways in cancer | 117 | 4.11E-10 | RB1, FZD10, ETS1, CRKL, IGF1R, CCND2, CCND1, TFG, FGF9, PIM2, IL6R, SKP1, PDGFRB, PDGFRA, DAPK1, MITF, EML4, COL4A2, CCNE2, COL4A1, COL4A4, COL4A6, TP53, NOTCH1, EPAS1, TCF7, PDGFB, PDGFA, PIK3R3, TGFA, PIK3R1, STK4, PLD1, RASGRP1, FOXO1, BCL2L11, DVL3, SMAD2, ZBTB17, STAT5B, FZD3, CREBBP, TGFB2, SMAD3, FZD5, FZD4, WNT3A, FZD8, IGF1, ESR1, CXCL12, CDK6, SP1, CDK4, GNAQ, FGFR3, BCL2L1, GSK3B, CDKN1A, CDKN1B, PTEN, PIK3CD, FASLG, PIK3CB, BBC3, CASP7, CASP3, ITGAV, POLK, JAK1, APPL1, NCOA1, EDN1, APAF1, CHUK, PLEKHG5, IL13, WNT9B, FOS, TGFBR1, IFNG, PIK3CA, TRAF3, KIT, ITGA6, CRK, MET, CAMK2B, PTGER4, RALA, RALB, CAMK2A, LEF1, LRP5, GNAI3, ADCY3, DLL1, CDC42, NRAS, MAPK8, GNG2, GNG5, ERBB2, E2F2, E2F3, RUNX1T1, TCF7L2, ARNT2, EGLN2, LAMB3, TXNRD1, PML, MAPK10, RPS6KB1, IL2RB, CCDC6, FAS |
| MAPK signaling pathway | 76 | 1.20E-09 | FASLG, IL1RAP, DUSP16, IGF1R, CRKL, RPS6KA4, ELK4, PPP3CA, RPS6KA3, DUSP10, FGF9, CASP3, STMN1, KDR, MAP3K9, MAP3K5, PDGFRB, MAP2K4, PDGFRA, MEF2C, CHUK, DUSP1, IL1R1, CACNA2D2, FOS, DUSP8, NGF, TGFBR1, DUSP6, DUSP7, IL1A, PPM1A, CACNB4, RASA2, KIT, RAPGEF2, MET, TP53, CRK, PDGFB, PDGFA, TGFA, STK4, EFNA5, NLK, CACNA1E, RASGRP1, RAP1B, CDC42, CACNA1I, NRAS, PPP3R1, MAPK8, RAP1A, MAPK7, ERBB3, ERBB4, ERBB2, NTF3, MAP4K3, MAP4K4, MAP3K2, ANGPT4, MAP3K3, TGFB2, MAP3K1, BDNF, INSR, NFATC3, IGF1, MAPK14, MAPK10, TAOK1, FAS, TAB2, FGFR3 |
| FoxO signaling pathway | 43 | 4.68E-09 | CDKN1A, CDKN1B, PRKAA2, SETD7, PTEN, PRKAG2, PIK3CD, PIK3R3, IRS2, FASLG, FOXO4, PIK3CB, PIK3R1, STK4, NLK, FOXO1, GRM1, IGF1R, NRAS, MAPK8, BCL2L11, CCND2, CCND1, S1PR1, RAG1, IL10, PLK3, TGFB2, CREBBP, SMAD3, CHUK, PDPK1, INSR, IGF1, MAPK14, FBXO32, TGFBR1, KLF2, MAPK10, RBL2, PIK3CA, C8ORF44-SGK3, SGK3 |
| PI3K-Akt signaling pathway | 85 | 5.71E-09 | GSK3B, CDKN1A, CDKN1B, ITGB3, PTEN, PIK3CD, PPP2R2A, FASLG, PIK3CB, IGF1R, GHR, RPTOR, CCND2, IBSP, FGF9, CCND1, PPP2R5E, CREB3L2, KDR, TNR, ITGB8, ITGAV, IL6R, YWHAG, JAK1, MAGI1, PDGFRB, PDGFRA, CHUK, PDPK1, TSC1, NGF, OSMR, PRLR, RBL2, COL4A2, PIK3CA, CCNE2, COL4A1, COL4A4, DDIT4, KIT, COL4A6, ITGA8, COL6A6, ITGA6, SGK3, ITGA5, MET, TP53, PHLPP2, PRKAA2, PDGFB, PDGFA, PIK3R3, TGFA, PIK3R1, EFNA5, THBS1, NRAS, BCL2L11, GNG2, ERBB3, GNG5, ERBB4, ERBB2, NTF3, ANGPT4, LAMB3, BDNF, INSR, IGF1, COL1A1, CDK6, COL1A2, RPS6KB1, C8ORF44-SGK3, CDK4, IL2RB, COL9A1, PKN2, COL9A2, PIK3AP1, FGFR3, BCL2L1 |
| Focal adhesion | 56 | 1.05E-08 | GSK3B, ITGB3, PTEN, PIK3CD, PIK3CB, ARHGAP5, IGF1R, CRKL, CCND2, IBSP, CCND1, KDR, TNR, ITGB8, ITGAV, PDGFRB, VAV3, PDGFRA, PPP1R12A, PDPK1, COL4A2, PIK3CA, COL4A1, COL4A4, COL4A6, ITGA8, COL6A6, ITGA6, ITGA5, PPP1R12B, MET, CRK, PPP1R12C, PDGFB, PDGFA, PIK3R3, PIK3R1, THBS1, MYL12B, RAP1B, CDC42, MAPK8, RAP1A, ERBB2, PAK6, PIP5K1C, PAK3, PAK4, LAMB3, IGF1, MAPK10, COL1A1, DIAPH1, COL1A2, COL9A1, COL9A2 |
| Pancreatic cancer | 30 | 1.44E-08 | RB1, CDKN1A, RALA, RALB, PIK3CD, PIK3R3, TGFA, PIK3CB, PIK3R1, PLD1, CDC42, MAPK8, CCND1, ERBB2, E2F2, E2F3, POLK, JAK1, SMAD2, TGFB2, SMAD3, CHUK, TGFBR1, MAPK10, CDK6, PIK3CA, RPS6KB1, CDK4, TP53, BCL2L1 |
| Human papillomavirus infection | 78 | 2.98E-08 | RB1, GSK3B, CDKN1A, CDKN1B, MAML2, ITGB3, PTEN, PIK3CD, PPP2R2A, CHD4, FASLG, PIK3CB, FZD10, RBPJ, LFNG, CCND2, IBSP, CCND1, PPP2R5E, CASP3, CREB3L2, TNR, ITGB8, ITGAV, JAK1, MAGI1, PDGFRB, HES7, CHUK, WNT9B, TSC1, RBL2, COL4A2, PIK3CA, CCNE2, COL4A1, TRAF3, COL4A4, IRF1, COL4A6, ATP6V1B2, ITGA8, COL6A6, ITGA6, ITGA5, MAML3, TP53, PTGER4, NOTCH1, TCF7, PIK3R3, PIK3R1, THBS1, FOXO1, CDC42, PARD6B, NRAS, ATP6V0A2, DVL3, HES2, ATP6V1C1, TCF7L2, FZD3, CREBBP, FZD5, LAMB3, FZD4, WNT3A, FZD8, COL1A1, DLG2, CDK6, COL1A2, RPS6KB1, CDK4, COL9A1, FAS, COL9A2 |
| Proteoglycans in cancer | 55 | 3.41E-08 | CDKN1A, ITGB3, PIK3CD, FASLG, PIK3CB, FZD10, IGF1R, CCND1, CASP3, KDR, ITGAV, VAV3, PPP1R12A, PDPK1, WNT9B, GAB1, ANK2, FRS2, HSPG2, PIK3CA, CTTN, ITGA5, PPP1R12B, MET, TP53, PPP1R12C, CAMK2B, DDX5, CAMK2A, ITPR1, PIK3R3, PIK3R1, THBS1, CDC42, NRAS, ERBB3, ERBB4, ERBB2, SMAD2, TGFB2, FZD3, FZD5, FZD4, WNT3A, RDX, FZD8, MSN, PTPN11, IGF1, MAPK14, ESR1, COL1A1, COL1A2, RPS6KB1, FAS |
| Prostate cancer | 34 | 3.70E-08 | RB1, GSK3B, CDKN1A, CDKN1B, TCF7, LEF1, PTEN, PDGFB, TMPRSS2, PDGFA, PIK3CD, PIK3R3, TGFA, PIK3CB, PIK3R1, FOXO1, IGF1R, NRAS, CCND1, ERBB2, CREB3L2, E2F2, E2F3, PDGFRB, TCF7L2, PDGFRA, CREBBP, CHUK, PDPK1, IGF1, ZEB1, PIK3CA, CCNE2, TP53 |
| EGFR tyrosine kinase inhibitor resistance | 29 | 1.58E-07 | GSK3B, PTEN, PDGFB, PDGFA, PIK3CD, PIK3R3, TGFA, PIK3CB, PIK3R1, IGF1R, NRAS, BCL2L11, ERBB3, ERBB2, KDR, IL6R, JAK1, PDGFRB, PDGFRA, GAB1, NRG1, NRG2, IGF1, PIK3CA, RPS6KB1, AXL, MET, FGFR3, BCL2L1 |
| ErbB signaling pathway | 30 | 2.39E-07 | CAMK2B, GSK3B, CDKN1A, CDKN1B, CAMK2A, PIK3CD, PIK3R3, TGFA, CBLB, PIK3CB, PIK3R1, CRKL, NRAS, MAPK8, ERBB3, ERBB4, ERBB2, ABL2, PAK6, PAK3, PAK4, MAP2K4, STAT5B, GAB1, NRG1, NRG2, MAPK10, PIK3CA, RPS6KB1, CRK |
| Renal cell carcinoma | 26 | 4.68E-07 | CDKN1A, EPAS1, PDGFB, PIK3CD, PIK3R3, TGFA, PIK3CB, PIK3R1, ETS1, CRKL, RAP1B, CDC42, NRAS, RAP1A, PAK6, PAK3, PAK4, ARNT2, TGFB2, CREBBP, EGLN2, GAB1, PTPN11, PIK3CA, MET, CRK |
| Signaling pathways regulating pluripotency of stem cells | 41 | 5.31E-07 | GSK3B, BMPR2, HOXD1, TCF7, PIK3CD, PIK3R3, FZD10, PIK3CB, PIK3R1, ACVR1B, IGF1R, NRAS, ACVR1C, DVL3, SMARCAD1, HOXA1, OTX1, JARID2, SKIL, JAK1, SMAD2, ZFHX3, FZD3, SMAD3, FZD5, FZD4, WNT3A, PCGF3, WNT9B, FZD8, LIFR, IGF1, MAPK14, KLF4, ISL1, ACVR2A, REST, PIK3CA, KAT6A, HAND1, FGFR3 |
| p53 signaling pathway | 27 | 5.41E-07 | CDKN1A, STEAP3, PTEN, RCHY1, PPM1D, THBS1, BBC3, CCND2, SESN3, CCND1, ZMAT3, CASP3, SESN1, SESN2, ZNF385A, RRM2, APAF1, IGF1, CDK6, CCNE2, CDK4, CCNG1, FAS, MDM4, TP53, BCL2L1, TP73 |
| AGE-RAGE signaling pathway in diabetic complications | 32 | 9.81E-07 | CDKN1B, PIK3CD, PIK3R3, PIK3CB, PIK3R1, FOXO1, CDC42, NRAS, MAPK8, CCND1, CASP3, SMAD2, EGR1, STAT5B, TGFB2, EDN1, SMAD3, PRKCE, MAPK14, TGFBR1, MAPK10, COL1A1, DIAPH1, IL1A, COL3A1, COL1A2, COL4A2, PIK3CA, COL4A1, CDK4, COL4A4, COL4A6 |
| Colorectal cancer | 29 | 1.13E-06 | GSK3B, CDKN1A, RALA, RALB, TCF7, LEF1, PIK3CD, PIK3R3, TGFA, PIK3CB, PIK3R1, BBC3, NRAS, MAPK8, BCL2L11, CCND1, CASP3, POLK, APPL1, SMAD2, TCF7L2, TGFB2, SMAD3, FOS, TGFBR1, MAPK10, PIK3CA, RPS6KB1, TP53 |
| Breast cancer | 41 | 1.15E-06 | RB1, GSK3B, CDKN1A, NOTCH1, TCF7, LEF1, LRP5, PTEN, PIK3CD, PIK3R3, FZD10, PIK3CB, PIK3R1, DLL1, IGF1R, NRAS, FGF9, CCND1, ERBB2, DVL3, E2F2, E2F3, POLK, NCOA1, TCF7L2, FZD3, FZD5, FZD4, WNT3A, WNT9B, FZD8, IGF1, FOS, ESR1, CDK6, PIK3CA, RPS6KB1, SP1, CDK4, KIT, TP53 |
| Hepatocellular carcinoma | 45 | 1.24E-06 | RB1, SMARCD1, GSK3B, CDKN1A, TCF7, LEF1, LRP5, PTEN, PIK3CD, PIK3R3, TGFA, FZD10, PIK3CB, PIK3R1, IGF1R, NRAS, CCND1, DVL3, E2F2, E2F3, POLK, SMAD2, TCF7L2, TGFB2, SMARCC1, PBRM1, FZD3, SMAD3, FZD5, FZD4, WNT3A, TXNRD1, GAB1, WNT9B, FZD8, ARID1A, ARID1B, TGFBR1, CDK6, PIK3CA, RPS6KB1, CDK4, MET, TP53, BCL2L1 |
| Ras signaling pathway | 57 | 1.33E-06 | PIK3CD, FASLG, PIK3CB, ETS1, ETS2, IGF1R, FGF9, KDR, PDGFRB, PDGFRA, KSR1, CHUK, RALGAPA1, GAB1, GAB2, NGF, ZAP70, PIK3CA, RASA2, KIT, MET, RALA, RAB5B, RALB, PDGFB, PDGFA, PIK3R3, PLA2G3, TGFA, PIK3R1, FOXO4, STK4, EFNA5, PLD1, RASGRP1, RAP1B, CDC42, NRAS, MAPK8, RAP1A, GNG2, GNG5, NTF3, ABL2, PAK6, PAK3, PAK4, ANGPT4, PLA2G2C, BDNF, INSR, PTPN11, IGF1, MAPK10, RGL1, FGFR3, BCL2L1 |