Supplementary information

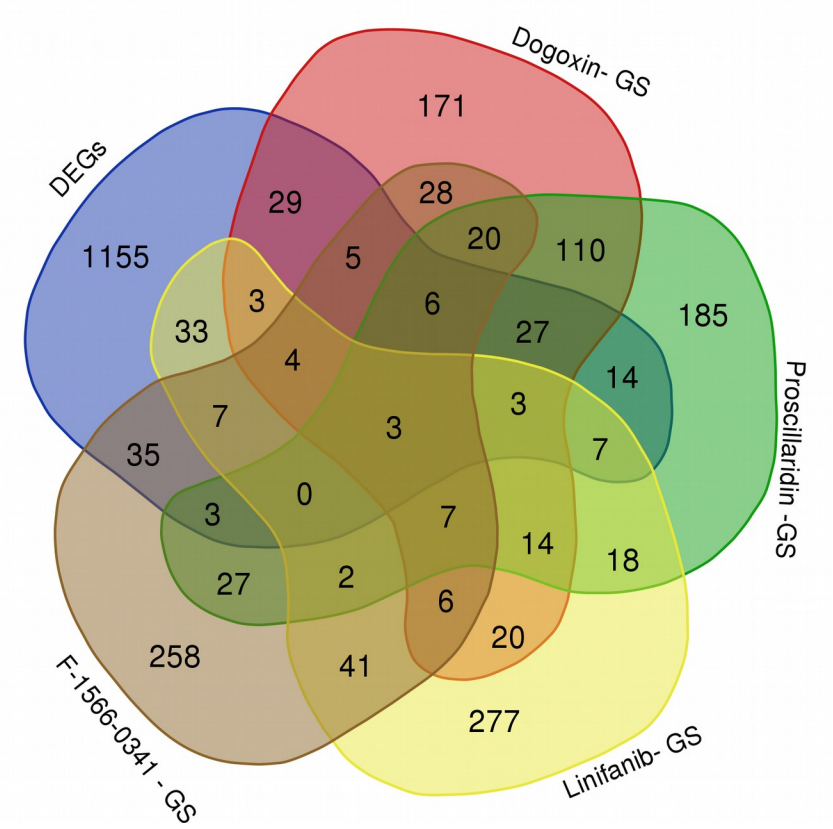
**Supplementary Table 1**. Top upregulated miRNAs of downregulated targets and their corresponding lncRNA

| **Micro RNA** | **mRNA** | **lncRNA** |
|---|---|---|
| hsa-miR-98-5p | 'STEAP3', 'DYRK3', 'CXCL8', 'UBXN2B', 'PRDM4', 'TMEM41B', 'ZFAND5', 'SLC2A3', 'BACH1', 'HK2', 'OLR1', 'SLC16A3', 'IL6R', 'CEP135', 'ZBTB37', 'SLC11A2', 'YOD1', 'FBXW2', 'TGFBR1', 'TET3', 'SLC20A1', 'GLO1', 'RGS16', 'NOLC1', 'STK4', 'CBL', 'THBS1', 'FOXO1', 'NRAS', 'CHST11', 'SLC17A5', 'CHML', 'STX3', 'IGF2BP2', 'MAPK6', 'PDZD8', 'SNX5', 'SLC19A2', 'LYN', 'CBX5', 'SLC31A1', 'C1GALT1', 'HMGA1', 'ARID3B', 'FAM104A', 'GDAP2', 'EIF2S3', 'STK17B', 'REL', 'ATP13A3', 'MXD1'] | XLOC_013024, TPTEP1, AC012314.20, RP11-54G14.1, LINC01287, MEG3, ERVH48-1, RP13-580B18.4, RP11-363G2.4, ERVH48-1, LINC01347, |
| hsa-miR-21-5p | ['PFKFB2', 'MTPN', 'SLC26A2', 'LPGAT1', 'IREB2', 'PTEN', 'DERL1', 'SNX30', 'FOXO3', 'FOXO1', 'PTAR1', 'PRRC1', 'BASP1', 'SLC17A5', 'TP53BP2', 'OLR1', 'E2F3', 'RAB11FIP2', 'PAG1', 'NKTR', 'NAA50', 'MAP3K2', 'TSNAX', 'SLC31A1', 'CCDC14', 'ATP11B', 'YOD1', 'FAM126B', 'FOXN2', 'PTBP3', 'CLCN5', 'ETNK1', 'MGAT4A', 'B3GNT5', 'GPD2', 'CCNG1', 'ZNF217', 'PTX3', 'TRIM38', 'RAPGEF6', 'FKBP5', 'MEGF9'] | Chr22-38_28785274-29006793.1, RP11-20A20.2, RP11-219J21.2, AC005235.1, RP11-6N13.4, LINC01079 |
| hsa-miR-29a-3p | ['CDC42SE1', 'WDR26', 'INSIG1', 'PTEN', 'FOXO3', 'GLDN', 'FAM102B', 'ZFP36', 'TDG', 'GLUL', 'KDM6B', 'RIOK3', 'CCDC14', 'IFRD1', 'FGG', 'ZFP91', 'FOS', 'PTP4A1', 'TET3', 'CDK2', 'ASXL2', 'REL', 'MDM2', 'MXD1', 'LIMS1'] | AC058791.1, AC083843.1, |
| hsa-let-7c-5p | ['DYRK3', 'GSK3A', 'CXCL8', 'UBXN2B', 'SLC20A1', 'GLO1', 'CCNC', 'FOXO3', 'STK4', 'CBL', 'BACH1', 'THBS1', 'DCAF7', 'NRAS', 'RICTOR', 'STX3', 'CNNM2', 'MAPK6', 'IL6R', 'PDZD8', 'LYN', 'CEP135', 'CBX5', 'ZBTB37', 'SLC11A2', 'HMGA1', 'YOD1', 'ARMC8', 'ARID3B', 'FAM104A', 'GATAD2B', 'FBXW2', 'TGFBR1', 'NUDT21', 'CCNG1', 'MXD1', 'BCL2L1'] | AC091729.9, CASC7, RP11-785H5.1, RP11-819C21.1, TRG-AS1, TTTY15, VTRNA2-1, XIST |
| hsa-let-7b-5p | ['FAM49B', 'EIF4A1', 'CCNK', 'STEAP3', 'DYRK3', 'GSK3A', 'LPGAT1', 'CXCL8', 'UBXN2B', 'PRDM4', 'RBPJ', 'BACH1', 'DCAF7', 'HS2ST1', 'ELK4', 'TXNL4A', 'IL6R', 'SLC30A7', 'BNIP3L', 'CEP135', 'ZBTB37', 'IFRD1', 'SLC11A2', 'HAUS6', 'YOD1', 'FBXW2', 'TGFBR1', 'MTPN', 'IDI1', 'USP15', 'WDR26', 'CBFB', 'SLC20A1', 'GLO1', 'NOLC1', 'DDX21', 'STK4', 'THBS1', 'GSPT1', 'NRAS', 'ATXN1L', 'E2F3', 'STX3', 'IGF2BP2', 'RBM12', 'MAPK6', 'PDZD8', 'SLC38A5', 'NAA50', 'LYN', 'CBX5', 'ERAP2', 'RIOK3', 'EIF2AK1', 'EAF1', 'C1GALT1', 'HMGA1', 'NUP153', 'ARID3B', 'FAM104A', 'MOB1B', 'CCNG1', 'MXD1'] | AC005879.11, AC009404.2, AC084082.3, AC091729.9, AC124997.1, |

| | | |
|---|---|---|
| hsa-miR-128-3p | ['LIN54', 'FAM49B', 'SLC26A2', 'CCNK', 'DYRK3', 'INO80D', 'PDE3B', 'PTEN', 'GLRX', 'LITAF', 'DCAF7', 'UGCG', 'ARL5B', 'FAM213B', 'DDI2', 'ZNF800', 'RICTOR', 'E2F3', 'S1PR2', 'CNNM2', 'MAPK6', 'DCAF12', 'NAA50', 'NUS1', 'GDF15', 'CD300A', 'ZBTB37', 'HMGA1', 'FOXN2', 'ELL2', 'KBTBD11', 'TGFBR1', 'MOB1B', 'ETF1', 'DCP2', 'SDK2'] | Chr22-38_28785274-29006793.1, LOC401463, RP11-15H20.6, LINC00475, AC006116.21, TTTY10, CTC-360G5.9, ERVH48-1, RP1-71H24.6, ERVH48-1, MIR3179-1, TTTY10, MIR4313, LINC00609 |
| hsa-miR-181a-5p | ['PFKFB2', 'CCNK', 'TMF1', 'INO80D', 'LPGAT1', 'TFRC', 'ZFAND6', 'RGS16', 'PTEN', 'HSPA13', 'ZFP36L2', 'ELK4', 'NRAS', 'RASSF1', 'SLC19A2', 'NAA50', 'SRGN', 'H2AFY', 'FBXO34', 'YOD1', 'FOS', 'ATP2B1', 'TBX4', 'GATAD2B', 'DUSP6', 'TGFBR1', 'PTBP3', 'MOB1B', 'SLC25A37', 'KLF6', 'ZNF439', 'CCNG1', 'RLIM', 'TAB3', 'KRAS', 'RCOR1', 'ATG2B'] | Chr22-38_28785274-29006793.1, ZNF883, LINC00680, RP11-798G7.8, RP11-212D3.4, AC000403.4, AC004158.3, AC005618.6 |
| hsa-miR-19b-3p | ['WDR26', 'LPGAT1', 'SLC35D1', 'SLC44A1', 'ZFAND5', 'PTEN', 'DERL1', 'IKZF1', 'STK4', 'THBS1', 'MTMR6', 'DCAF7', 'RASSF1', 'ZNF800', 'ENPP4', 'PLXNC1', 'S1PR2', 'MBNL3', 'CCNL1', 'SNX5', 'NDEL1', 'SLC30A7', 'NUS1', 'CBX5', 'PAPD4', 'ARMC8', 'ELL2', 'GATAD2B', 'PATL1', 'PTP4A1', 'MOB1B', 'CPD', 'RLIM', 'ATP6V1B2', 'ZNF217', 'KIAA0907', 'WDFY2', 'MXD1', 'RAPGEF6', 'RCOR1', 'DCP2', 'ATG2B', 'TLR2'] | CTD-2334D19.1, chr22-38_28785274-29006793.1, CTC-529L17.1, RP11-523G9.3, RP11-141C7.4, RP11-475A13.2, RFX3-AS1, AC004448.5, AC002064.5, AC008269.2, AL132709.8 |
| hsa-miR-29c-3p | ['CDC42SE1', 'KDM6B', 'WDR26', 'RIOK3', 'INSIG1', 'IFRD1', 'FGG', 'PTEN', 'ZFP91', 'DDX21', 'FOS', 'FAM126B', 'GLDN', 'PTP4A1', 'FAM102B', 'TDG', 'TET3', 'ASXL2', 'REL', 'MDM2', 'MXD1', 'DCAF12', 'LIMS1'] | Chr22-38_28785274-29006793.1, H19, RP11-272L13.3, LINC00377, AC058791.1, AC083843.1, AC113331.9, AP000350.5, |
| hsa-miR-124-3p | ['ZNF451', 'CXCL8', 'SLC44A1', 'UBXN2B', 'NCF2', 'PDE3B', 'SNX13', 'RBPJ', 'LITAF', 'HS2ST1', 'FAM102B', 'ARL5B', 'RASSF1', 'DDI2', 'CDC27', 'SLC16A6', 'PIM1', 'DLEU1', 'CPNE3', 'IL6R', 'SLC30A7', 'ZBTB37', 'HAUS6', 'IRAK3', 'PTBP3', 'UHMK1', 'PTP4A1', 'RAB31', 'ELF4', 'MMP19', 'FAR1', 'ZNF678', 'CACUL1', 'BIRC2', 'MTPN', 'SLC26A2', 'INO80D', 'ROCK1', 'FAM35A', 'CBL', 'SAMSN1', 'MTMR6', 'ZFP36L2', 'BLOC1S6', 'NRAS', 'CHSY1', 'G3BP1', 'SLC17A5', 'CNNM2', 'SLC38A5', 'OSBPL8', 'WTAP', 'SLC31A1', | AC005592.3, AC018647.3, AC073043.1, AC096772.6, AL022344.7, C14orf132, C1orf132, chr22-38_28785274-29006793.1, LINC01410, RP11-764K9.1, |

| | | |
|---|---|---|
| | 'HMGA1', 'RAB27A', 'FHDC1', 'MYO19', 'SNX18', 'KLF6', 'GNPDA1', 'TTLL3', 'KCNS3', 'CDK2', 'TRIM38', 'SLC25A36', 'IL18R1'] | LINC01410, CTC-360G5.9, RP11-473M20.9, LINC00960, CTC-459F4.3, LINC01410, LINC00643, |
| hsa-miR-192-5p | ['CD83', 'PRDM4', 'SNX13', 'ZXDC', 'SLC16A6', 'PIM1', 'SLC39A8', 'ENPP4', 'EMB', 'UPP1', 'IL6R', 'FADS1', 'CSGALNACT2', 'IFRD1', 'ENTPD7', 'FOS', 'FAM126B', 'FBXW2', 'B3GNT5', 'EHBP1L1', 'IDI1', 'SLC26A2', 'STXBP4', 'INSIG1', 'UBA5', 'ARHGAP19', 'OGFRL1', 'BLOC1S6', 'PRRC1', 'TDG', 'NPHP3', 'CHML', 'MBNL3', 'RAB11FIP2', 'SLC19A2', 'CEP78', 'NAA50', 'OSBPL8', 'PCGF5', 'CCDC14', 'H3F3A', 'EAF1', 'RAB27A', 'DDHD1', 'FHDC1', 'ELL2', 'KBTBD11', 'NCEH1', 'KCNS3', 'STK17B', 'CRLF3', 'LIMS1'] | AC011747.4, C1orf132, CASC7, CTC-273B12.8, chr22-38_28785274-29006793.1, RP11-268G12.3, RP11-757G1.6, RP11-216M21.7, FAM183CP |
| hsa-miR-27a-3p | ['LIN54', 'FAM49B', 'SLC26A2', 'CCNK', 'DYRK3', 'INO80D', 'DERL1', 'NOLC1', 'LITAF', 'DCAF7', 'FOXO1', 'ZFP36L2', 'UGCG', 'NRAS', 'ZFP36', 'ARL5B', 'DDI2', 'CDC27', 'OLR1', 'ZNF800', 'TRIM27', 'HMGN1', 'NAA50', 'NUS1', 'ZBTB37', 'FOXN2', 'ELL2', 'TGFBR1', 'NUDT21', 'KRAS'] | AC013394.2, AC018647.3, AC018647.3, chr22-38_28785274-29006793.1, RP13-554M15.8, TTTY10, LINC00475, CTD-2017D11.1 |
| hsa-let-7g-5p | ['DYRK3', 'CXCL8', 'UBXN2B', 'SLC20A1', 'GLO1', 'STK4', 'BACH1', 'THBS1', 'STX3', 'MAPK6', 'IL6R', 'PDZD8', 'LYN', 'CEP135', 'CBX5', 'SLC11A2', 'ZBTB37', 'HMGA1', 'YOD1', 'ARID3B', 'FAM104A', 'FBXW2', 'TGFBR1', 'KRAS', 'MXD1', 'BCL2L1'] | AC009404.2, AC084082.3, AC091729.9, AC124997.1, chr22-38_28785274-29006793.1, TPTEP1, AC012314.20, RP11-54G14.1, MEG3, LINC01287, ERVH48-1, |
| hsa-miR-218-5p | ['PANK3', 'TFRC', 'COX15', 'RBPJ', 'FOXO3', 'CBL', 'GLDN', 'GSPT1', 'BLOC1S6', 'FAM102B', 'NRAS', 'ZXDC', 'NAMPT', 'PIP4K2A', 'RICTOR', 'EMB', 'FNIP1', 'CNNM2', 'RIMKLB', 'PDZD8', 'FADS1', 'STARD4', 'PNPLA8', 'SLC11A2', 'HPS4', 'HMGA1', 'MBOAT2', 'ZFP91', 'FOXN2', 'NAMPTP1', 'ELL2', 'FAM104A', 'FBXW2', 'PTP4A1', 'RIT1', 'EIF2S3', 'ETNK1', 'MDM2', 'SPOPL', 'AVL9', 'CACUL1', 'SLC25A36', 'DCP2', 'SNTB1', 'BCL2L1'] | Chr22-38_28785274-29006793.1, RP11-586K12.10, RP11-1437A8.4, RP11-679B19.2, RP11-599B13.3, RP11-508N22.9, RP11-403B2.6, AC005618.6, AC007246.3, AC018647.3, AC018647.3, |

**Drug perturbation signatures**




**Supplementary figure 1.** Venn diagram that represents the common genes from the gene signature patterns reversed by the drug perturbagens.

**Supplementary Table 2. The gene signatures identified from the drug perturbagens**

| Names of Signatures | total | Common genes |
|---|---|---|
| DEGs Dogoxin- GS F-1566-0341 - GS Linifanib- GS Proscillaridin -GS | 3 | GADD45B SAT1 NUPL1 |
| DEGs Dogoxin- GS Linifanib- GS Proscillaridin - GS | 3 | RPS27L UGCG ID3 |
| DEGs Dogoxin- GS F-1566-0341 - GS Proscillaridin -GS | 6 | NR4A2 PER1 FOSB PSPH INHBA CLU |
| DEGs Dogoxin- GS F-1566-0341 - GS Linifanib- GS | 4 | PHYH SLC2A3 GLUL STK17B |
| Dogoxin- GS F-1566-0341 - GS Linifanib- GS Proscillaridin -GS | 7 | HSPA8 IL8 HMOX1 FOXJ3 MAFF STEAP1 ATP1B1 |
| DEGs Dogoxin- GS Proscillaridin -GS | 27 | ZNF331 PIP4K2B LDLR TAF1D WSB1 AREG RGS1 THBS1 METTL13 HNRNPA1 RGS16 TIPARP PPARG FBXW2 ABCC4 DUSP1 PER2 IL6 NUP98 ITGB1BP1 CCNL1 DUSP6 KIAA0907 FOS JUNB RNASET2 JUN |
| DEGs Dogoxin- GS Linifanib- GS | 3 | CHST15 ALOX5 UCHL1 |

| | | |
|---|---|---|
| DEGs Dogoxin- GS F-1566-0341 - GS | 5 | PTGS2 TPD52L1 BHLHE40 INSIG1 RAD51C |
| DEGs Linifanib- GS Proscillaridin -GS | 7 | CD99 NDRG1 CPE ETS2 KLF6 RAB31 STXBP2 |
| DEGs F-1566-0341 - GS Proscillaridin -GS | 3 | KLHL9 TNFAIP3 RIOK3 |
| DEGs F-1566-0341 - GS Linifanib- GS | 7 | CST3 FOXO1 JUP BNIP3L SIK1 CFD CSGALNACT2 |
| Dogoxin- GS Linifanib- GS Proscillaridin -GS | 14 | JUND HLA-DQA1 BRD2 HMGCS1 RYBP FAM129A SCD5 EMP1 ARPP19 HNRNPH3 TXNIP RGS2 TIMM9 KCNJ15 |
| Dogoxin- GS F-1566-0341 - GS Proscillaridin -GS | 20 | SNAPC1 KLF4 WNT5A ENPP2 PPP1R15A EGFR NR4A1 PMAIP1 SULF1 TXNL4B CLEC11A ATF3 HBEGF EGR1 SERPINB2 GABPB1 EGR3 FOSL2 HSPH1 AKR1C3 |
| Dogoxin- GS F-1566-0341 - GS Linifanib- GS | 6 | MSMB CHI3L1 CLIC5 CXCL14 FBLN1 CD24 |
| F-1566-0341 - GS Linifanib- GS Proscillaridin -GS | 2 | SEL1L3 CRK |
| DEGs Dogoxin- GS | 29 | C5AR1 HES1 ATP1A1 AKIRIN1 ZFP36 SGK1 OLR1 MKKS CD302 PIK3C2B SLC26A2 SLC35D1 MINA CRIP1 ZNF32 PSMB3 NDEL1 DSP CRYAB KRAS ARL4C NUPR1 ZBTB43 PFKFB3 BST2 EIF4A1 SLC1A4 JARID2 HMGA1 |
| DEGs Proscillaridin -GS | 14 | IRAK1 SORL1 TRA2B PHLDA1 CD300A DIXDC1 CD83 GLRX TLK2 THYN1 STC1 VEGFC H1F0 IL1R2 |
| DEGs Linifanib- GS | 33 | CXCR4 UQCR11 OSBPL8 TRIM2 LAMP3 PDZRN3 FN1 IER3 NGFRAP1 RUNX1T1 FKBP5 LRIG1 MME ICAM2 NAP1L1 PLCB4 AQP3 IGFBP6 HBB PLVAP MYL6B PLA2G2A ZFP36L2 TRAPPC2L CD9 TMEM41B METTL9 SLC16A6 DR1 KLF10 SFRP1 ATP2B1 MAMLD1 |
| DEGs F-1566-0341 - GS | 35 | GDF15 MITF CSF3R QDPR CHST11 MRPL15 SERTAD2 OSBPL10 ELF1 IRS2 BCL6 NAMPT CRIP2 PPIC SLC19A2 FGG CKB TNFRSF11B NCF2 HDAC9 SRGN PTX3 PELI1 IFRD1 SNX7 RORA DDIT4 PDZD8 IFI30 HK2 CAP2 PTP4A1 SGCE GPRC5B FOXO3 |
| Dogoxin- GS Proscillaridin -GS | 110 | UGT2B17 MREG BRCA1 C1ORF63 PPP3CA FBXO11 HSPD1 ADH5 SERPING1 SRSF11 DUSP5 ID1 EZR FGFR3 FCGBP UBXN7 OLFML2A PDGFD GPATCH8 THY1 SQLE IMPA2 NET1 XPOT NR4A3 LCMT2 POP4 LINC00094 EFEMP1 TBC1D16 COMMD8 MTF2 KDM5B AXL NRN1 SPRY1 C14ORF132 TSC22D2 TRAK2 C2ORF43 PSMG1 RPRD1A KLF5 APOLD1 TRA2A TMEM87A GAS1 RELB LOC100506935 DLC1 PLEKHF1 PCBP2 ASF1A ST6GAL1 COL11A1 NAT1 CYR61 C6ORF62 |

| | | |
|---|---|---|
| Dogoxin- GS Linifanib- GS | 20 | IER2 GNAI3 GPR116 SMAD3 TSC22D3 IGFBP7 GTF3A ECM1 PLAGL1 ARPC5 TSPYL2 TUFT1 CHL1 TMEM14A SDC4 FHL2 KIF2C ADO GPRC5A RRS1 NXF1 TRIAP1 FANCF CCL2 RGS5 TLE1 PLK2 HNRPDL FAM198B DNMBP NQO1 PSAT1 IQGAP1 LTF H1FX MRP63 C19ORF2 SERPINE1 PTBP2 PDS5A WSB2 CSRP2 QRSL1 ARID4B KCTD12 LRRC16A KHDRBS1 ANXA4 YTHDC1 CRISPLD2 FOSL1 CBR1 |
| Dogoxin- GS F-1566-0341 - GS | 28 | CPD C3ORF14 BMP2 TMEM5 NBEA TACSTD2 NRGN TM9SF3 DOK5 RNF11 CLGN SOX4 TRIM22 CD59 SERPINE2 CYTL1 SEPX1 GPX3 STC2 ACTA2 |
| Linifanib- GS Proscillaridin - GS | 18 | C20ORF103 TF SDC2 TNFAIP6 GAL CA12 FASTKD5 LGALS3 AKAP12 ID2 RAPGEF2 AKR1C1 CFLAR PLEKHA5 MACF1 FBN2 COL15A1 ELF3 AKR1C2 MAPT MFSD10 BTBD3 MSX1 CHIC2 TXNDC9 CADM1 AHNAK2 UAP1 |
| F-1566-0341 - GS Proscillaridin -GS | 27 | TCF4 CADPS2 C1ORF115 STAB1 TBL1XR1 SRPX PDE4DIP SPON1 CDC42 HPGD CAMK2N1 ECI2 NFIB SCGB2A2 GALE POP5 SPARC PMEPA1 |
| F-1566-0341 - GS Linifanib- GS | 41 | COL4A5 CEACAM6 ELANE FABP5 ARIH1 IFI16 CSRP1 TYRP1 EIF5A CCNA2 CLCN3 DNAJB1 TIMP3 CD55 DCLK1 DNAJC12 B3GNT1 AZU1 FAM46A PRTN3 PROM1 RSRC2 FAM70A CDKN2A RBP1 TGFBI CTSC G3BP1 KIAA1199 PDIA3 HNRNPR EIF1AX TOX3 KDM6A KRT17 BAG3 SST TSPYL5 PDZK1IP1 NKX3-1 XIST CCDC56 CDKN1A CALD1 KCNJ16 LAPTM4B KLK6 S100P LAMP1 PLK1 TNFSF10 CD36 KIF5B COL6A2 ABCC3 HSPA1A SFRP4 KRT14 CDH1 SECISBP2L BICC1 DKK1 DEPTOR KLK10 SCNN1A ENC1 KRT5 LCN2 |

**3. Supplementary python code using bioinfokit.**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    "from pathlib import Path"
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/home/shankar/Desktop/covid/GEO2R.GSE155241.results\n"
     ]
    }
   ],
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    "df = pd.read_csv(input_path,sep = \"\\t\")\n",
    "#print(df[\"P.Value\"].head())\n",
    "visuz.gene_exp.volcano(df=df, lfc='logFC',
pv='P.Value',figtype=\"pdf\",color=(\"green\",\"black\",\"blue\"),dotsize=4,show = False,
ar=0,pv_thr = 0.05, lfc_thr = 0.5, axxlabel = \"logFC\", axylabel = \"P Value\", figname =
plot_name)\n",
```

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   ],
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    "#print(plot_name)\n",
    "df = pd.read_csv(input_path,sep = \"\\t\")\n",
    "#print(df[\"P.Value\"].head())\n",
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ar=0,pv_thr = 0.05, lfc_thr = 0.5, axxlabel = \"logFC\", axylabel = \"P Value\", figname =
plot_name)\n",
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**4. Supplementary Differentially expressed genes**

**GSE150316 - upregulated**

| gene_symbol | logFC | P.Value |
|---|---|---|
| PLVAP | 2.62702613361235 | 1.03623906322859E-06 |
| ACKR1 | 3.74666564897533 | 1.82748584057831E-05 |
| LAG3 | 3.57886301778186 | 2.09869203044746E-05 |
| C1GALT1C1 | 1.65140489729596 | 3.11998634381925E-05 |
| CLEC3B | 2.5640368122042 | 5.28984828021773E-05 |
| FOLR2 | 3.17570331446718 | 0.000104901020724 |
| LINC00493 | 1.95258359041048 | 0.000111984180695 |
| SNORD116-2 | 2.44917408876943 | 0.000148831663155 |
| CADM3 | 2.74929156582393 | 0.000165105749246 |
| RAMP2 | 1.87758070529686 | 0.000190298882704 |
| MUC3A | 2.96118050673952 | 0.000204542707555 |
| HTRA3 | 1.63970199727579 | 0.000208474329469 |
| MGST2 | 1.64783031725101 | 0.000214035039344 |
| MMRN2 | 1.85668428748573 | 0.000225307973395 |
| AKAP2 | 2.32880783109264 | 0.00031926387897 |
| IGFBP6 | 2.22312544856588 | 0.000370664414874 |
| ICAM2 | 1.77823403998494 | 0.000491104134012 |
| ABCA9 | 2.30426122674453 | 0.000528267532388 |
| FXYD6 | 1.98523437061622 | 0.00058256130138 |
| RNU1-28P | 2.76926299016039 | 0.000593226511508 |
| PSMB10 | 1.64510854481827 | 0.000608770411652 |
| ZNF321 | 1.4827521135223 | 0.00068700143122 |
| PLA2G2A | 2.71540670145428 | 0.000712923605217 |
| HIGD2A | 1.75998431985654 | 0.000790854867235 |
| ORF1b | 6.52584782896435 | 0.000791378836921 |
| FBXO8 | 1.10864347078184 | 0.000809653477865 |
| THYN1 | 1.5554547747768 | 0.000812146190323 |
| TCEA3 | 2.15341505354088 | 0.000913719397671 |
| RARG | 1.30061061961008 | 0.000953058295538 |
| HIST1H3G | 2.99193030763847 | 0.000961230553319 |
| LAMTOR2 | 0.935270114840041 | 0.00101020842311 |
| RP11-644F5.11 | 1.68117471731561 | 0.001037582862433 |
| PFDN4 | 1.33194673043164 | 0.001050448304468 |
| SELK | 1.14877854448654 | 0.001069518017963 |
| KIFAP3 | 0.994462235998564 | 0.001072058949498 |
| PRDX4 | 0.954634946485061 | 0.001092456839591 |
| SNAPC5 | 1.24210136725618 | 0.001092937527041 |
| HADH | 1.91724718957099 | 0.001097346680595 |
| ORF1a | 6.65388839231782 | 0.001123162445214 |
| NDUFA3 | 1.33638545655548 | 0.001125617615835 |
| ETFB | 1.56090420173085 | 0.001177421222647 |
| PRICKLE4 | 1.43700231330928 | 0.001180549697248 |
| TSHZ1 | 1.49409707907521 | 0.001236937210569 |
| COX7A1 | 2.74487619931195 | 0.001335900402338 |
| HAPLN3 | 1.68089900771121 | 0.001354583322905 |
| TSPAN18 | 1.9790536549361 | 0.001367791711912 |
| TARSL2 | 1.19248168924999 | 0.001373109763131 |

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|---|---|---|
| CPXM2 | 2.34231654457036 | 0.001418955904709 |
| HIST1H2AH | 2.58567567837383 | 0.001432101387404 |
| UQCC2 | 1.25408079723081 | 0.001446849793608 |
| SCARNA11 | 2.88038172126474 | 0.001457480037239 |
| BMP4 | 1.69040800610386 | 0.001537588223304 |
| ARL2 | 1.14404586825443 | 0.001555626656884 |
| CD34 | 2.01517707482428 | 0.001560103751638 |
| TSHZ2 | 1.34312339477702 | 0.001590058530167 |
| AIP | 1.36930803179186 | 0.001662988976258 |
| PDK2 | 1.5978118678933 | 0.00168975102901 |
| PDZRN3 | 2.08878218686121 | 0.001692315533535 |
| TMEM179B | 0.99317521318903 | 0.001702763342343 |
| ITM2C | 1.73326148790111 | 0.001728618267092 |
| FOXP2 | 1.76846133626143 | 0.00173774247128 |
| MEIS2 | 1.93552708345703 | 0.001881481851487 |
| MKKS | 0.864640716193715 | 0.001938749129058 |
| TWF2 | 1.65745103356822 | 0.001943601107247 |
| NDUFA12 | 1.03874319127284 | 0.001955928616331 |
| JAM2 | 1.94205589955327 | 0.002039511115121 |
| SEPW1 | 1.92512897584701 | 0.002214732139609 |
| NDUFB6 | 1.61289289618209 | 0.002360110227581 |
| MRPL15 | 0.860415136484149 | 0.002378879020029 |
| SAMM50 | 0.978632815658016 | 0.002380505638533 |
| TBCC | 1.3319430133407 | 0.00242273434927 |
| KCTD17 | 1.37773448430689 | 0.002520662515839 |
| RN7SL471P | 1.50584074123743 | 0.002573349726232 |
| USP11 | 1.03348211045325 | 0.002600890271915 |
| SFRP1 | 2.93470105065543 | 0.002613098259159 |
| SNORD116-8 | 1.48112134005549 | 0.002622375385753 |
| NDUFA8 | 1.27986660776173 | 0.00262833067074 |
| CILP | 2.28299508722494 | 0.002698371170262 |
| KIAA1161 | 1.6752808964474 | 0.002726814946685 |
| ATRAID | 1.25449449571652 | 0.002762273128163 |
| COQ5 | 1.25656276014607 | 0.002781947105678 |
| THUMPD3-AS1 | 0.977499234885537 | 0.002797552882389 |
| CEP112 | 1.56276371582206 | 0.002891839485942 |
| TMEM19 | 1.13387359010931 | 0.002892074786748 |
| AL355075.1 | 1.26324648838801 | 0.002896554901791 |
| SNORD116-1 | 1.76809351807499 | 0.002998736348838 |
| C19orf53 | 0.845888813796779 | 0.003013995867479 |
| IGLV4-69 | 3.22134846040441 | 0.003111179491557 |
| SCARA5 | 1.64724633146164 | 0.003295668859172 |
| DTNA | 1.49601604578755 | 0.003342120802914 |
| KANK1 | 1.97534925133354 | 0.003361474579263 |
| IGHV4-59 | 3.27394747315408 | 0.003376840566735 |
| ANK2 | 2.40517545709124 | 0.003386123065064 |
| ITGB1BP1 | 1.16427688676789 | 0.003425190466817 |
| ITIH5 | 1.46826259209016 | 0.00358051998119 |
| NDUFS8 | 1.19571620050824 | 0.003594032914839 |
| FANCL | 1.21455511699174 | 0.003667858721601 |
| VAMP5 | 1.93645817991739 | 0.003697566017494 |
| MT1L | 1.31707167908223 | 0.003731697304994 |

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|---|---|---|
| PCBD1 | 1.49224901769815 | 0.003796546704985 |
| POLR2I | 1.33311902667543 | 0.003839095702173 |
| TRIM69 | 1.22768708049444 | 0.004107339358219 |
| ARMCX2 | 1.42759849742789 | 0.004218758758094 |
| ITGA11 | 1.58900475000117 | 0.004254704064764 |
| RFX5 | 0.705889108122009 | 0.004254937874238 |
| CLPTM1 | 1.02025234138667 | 0.00431933035004 |
| AL139099.2 | 1.66307969854992 | 0.004424585911423 |
| C9orf3 | 0.978643742983191 | 0.004431862857341 |
| ABHD6 | 1.08866148667565 | 0.004436976109529 |
| TRIM68 | 1.14829181385085 | 0.004466405800018 |
| ZNF208 | 1.29330016214173 | 0.004521867363351 |
| CRYZ | 1.08317449538548 | 0.00454190806283 |
| FKBP7 | 1.15918381123043 | 0.004595880442432 |
| COX7B | 1.22548738493834 | 0.004613689214049 |
| PRDX5 | 0.921968608709316 | 0.00463208514818 |
| SLC35A4 | 1.01199232478796 | 0.004700915894914 |
| GIMAP7 | 1.12665873954639 | 0.00477795810269 |
| VPS45 | 1.03850099199308 | 0.004835688735717 |
| RFTN2 | 1.46734344979448 | 0.004854440752602 |
| KCNN3 | 1.55697367150365 | 0.004896102897672 |
| CARKD | 1.06360855105203 | 0.004973047068075 |
| AURKAIP1 | 1.06824363525065 | 0.004976270853562 |
| PDE1C | 1.96807990896943 | 0.004977523375906 |
| ABCB7 | 0.792735266122702 | 0.005015222179963 |
| IFI27L2 | 1.42420308513786 | 0.00510038220997 |
| MLLT3 | 0.762433766073176 | 0.005385678723916 |
| NDST1 | 0.923332053018346 | 0.005452034916779 |
| FAM13C | 1.27970471007186 | 0.00545211696387 |
| DCHS1 | 1.44332457168258 | 0.005485086362326 |
| UQCRQ | 1.01504054601419 | 0.005676977305352 |
| HIBCH | 1.17222054341046 | 0.005718855120098 |
| NGFRAP1 | 0.93086486530051 | 0.005746146941987 |
| IGF2 | 2.56172075808653 | 0.00577217751799 |
| SUCLG1 | 1.10103383991208 | 0.005792924722036 |
| PLCB4 | 1.5716293682478 | 0.005843398737194 |
| NAA38 | 1.21079764153984 | 0.005862914579702 |
| RP11-588K22.2 | 1.44621414147305 | 0.005911618226637 |
| TCEB2 | 1.11363138357256 | 0.005958517272337 |
| P4HA2 | 1.5378861104144 | 0.005974802075032 |
| ITGB4 | 1.62779940253018 | 0.006030426103553 |
| CTD-2562J17.6 | 1.10990208767601 | 0.006031501399559 |
| CALHM2 | 0.862159900667979 | 0.006051430420185 |
| BANP | 1.01954858666295 | 0.006190521674548 |
| CLEC14A | 1.29682155793639 | 0.006197699447931 |
| PPIC | 1.1693895434229 | 0.006209473973406 |
| MRPL46 | 0.976073660521982 | 0.006255075646803 |
| BCYRN1 | 1.45954283587346 | 0.006304751721552 |
| PPAP2A | 1.47503500500546 | 0.006379923043148 |
| H19 | 1.99071870100233 | 0.006504974546673 |
| HIST1H2BF | 2.06552708386627 | 0.006516506104319 |
| BPIFB1 | 3.13953498672133 | 0.006543748114458 |

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|---|---|---|
| ELP5 | 1.36411173909701 | 0.006582803573333 |
| RABAC1 | 0.864774193068762 | 0.006864448711316 |
| JADE2 | 1.11206528567496 | 0.006962234834028 |
| ZNF436 | 1.4320487303521 | 0.007014233535968 |
| IL3RA | 1.46007955415209 | 0.007162782496846 |
| ATP5G1 | 1.16710880000056 | 0.007423789519347 |
| CMAHP | 0.776892705599571 | 0.007489772083842 |
| RNA5-8SP2 | 2.64178356171982 | 0.007654680426189 |
| PCDHGB7 | 1.054448772843 | 0.007714295996678 |
| CLU | 1.40263327284787 | 0.007887503052662 |
| RNVU1-19 | 2.3452473553909 | 0.00821856962784 |
| UQCR10 | 0.941513644036914 | 0.008218782478351 |
| APOA1BP | 1.26903008486455 | 0.008278239445437 |
| IGLV3-10 | 3.49026016130491 | 0.008472065768636 |
| DSP | 2.06342160388415 | 0.008476774152923 |
| CDC26 | 1.42184216346165 | 0.008485241586787 |
| BET1 | 0.956326438549282 | 0.008606665451991 |
| CPE | 1.11560167422961 | 0.008672024926774 |
| TADA3 | 0.852781971804797 | 0.008719293093102 |
| CD99 | 0.916602406272735 | 0.008778728439475 |
| PAMR1 | 2.1001713924507 | 0.008894033618912 |
| COX14 | 1.37579869739759 | 0.008928284836991 |
| TMEM261 | 1.10802410329028 | 0.008983636526781 |
| NUBP1 | 1.26230424505335 | 0.008997955096338 |
| MRPS15 | 0.646598887662222 | 0.009062895044339 |
| RHOJ | 1.34384209132341 | 0.009107160358794 |
| ZBTB47 | 1.68385024744654 | 0.009219654645042 |
| GALNT15 | 1.65093932554479 | 0.009257445580312 |
| LOXL2 | 1.24824212350652 | 0.009293100568572 |
| LRP5 | 0.981544264133524 | 0.009334364221288 |
| S100A13 | 1.06751491718701 | 0.009371027071646 |
| DNM3OS | 1.37621216907438 | 0.009416915842556 |
| PDE10A | 1.56065185194762 | 0.009424480295023 |
| PPP2R4 | 1.04361225557242 | 0.009455706464399 |
| MAGED2 | 1.05759426572132 | 0.009516389761788 |
| TOMM5 | 1.20163112019249 | 0.009540895338641 |
| MYL6B | 1.54895286412426 | 0.009588950150521 |
| VDAC2 | 0.96407308702236 | 0.00959229772107 |
| ZNF354C | 1.03480779446455 | 0.009720045187585 |
| ETFDH | 1.27865441674741 | 0.009838341025605 |
| SLC12A7 | 1.11285614417797 | 0.009873789566246 |
| IGLV3-21 | 2.80552265449912 | 0.009879441886981 |
| SNORD116-6 | 1.47188645833984 | 0.009894673029359 |
| HIST4H4 | 1.07150050518342 | 0.009980180212543 |
| SNORD116-16 | 1.46295655857693 | 0.010030556068182 |
| TEF | 1.33830902429716 | 0.010064828121854 |
| NUP35 | 0.896285748820779 | 0.010186970654498 |
| MEGF8 | 1.19937683748276 | 0.01046961631733 |
| ROMO1 | 1.17519095988724 | 0.010493794377586 |
| IFITM1 | 1.46101549060511 | 0.010513049872289 |
| JAM3 | 1.1342676060293 | 0.010534164128442 |
| IGLV1-47 | 2.97058838865773 | 0.010607651238347 |

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|---|---|---|
| LGALS3BP | 1.52902860213005 | 0.010640346998597 |
| DBN1 | 1.02726531094779 | 0.01072396548688 |
| NDUFA9 | 0.96970425823163 | 0.010725040725103 |
| AMOT1 | .02750232563489 | 0.010759484379736 |
| DAB2IP | 1.16945488360586 | 0.011036269415955 |
| NDUFAB1 | 1.12186881187441 | 0.011125782599909 |
| FAM171A1 | 1.09752744769608 | 0.011308626479875 |
| CRYAB | 2.56429362401868 | 0.011572653067106 |
| HIST1H4B | 1.38376980652977 | 0.011686209926264 |
| HINFP | 0.781185382299289 | 0.011821550063453 |
| MAPK4 | 1.85322378578202 | 0.011825546009163 |
| SMG8 | 0.833082927588781 | 0.011901261650132 |
| IDH3A | 1.19249497952976 | 0.011993819112921 |
| C2orf88 | 1.18284491794909 | 0.012171239762591 |
| GABRE | 1.64157543242256 | 0.012241809056451 |
| TIE1 | 1.28607098272196 | 0.012478646659087 |
| IFT20 | 0.899275919899791 | 0.012531573039905 |
| COX6B1 | 1.00802731506692 | 0.012584256985932 |
| COX7A2 | 0.786823475691253 | 0.012790451413686 |
| PARP3 | 0.905411602893485 | 0.012819111541054 |
| PER2 | 1.03639281388603 | 0.012934624259386 |
| XPNPEP2 | 1.7139463455096 | 0.012965151088428 |
| R3HCC1 | 0.952464994357506 | 0.013380177352675 |
| PGM5 | 2.31866115645309 | 0.013382787373742 |
| BVES | 1.74747735418489 | 0.013400965126655 |
| HIST1H2AL | 1.61440332790196 | 0.013570695704358 |
| HIST1H2BI | 1.95530831880713 | 0.013587810525418 |
| RILPL1 | 1.42873359094857 | 0.013602324387464 |
| MMAB | 1.19293927205216 | 0.013742591362115 |
| RNA5-8S5 | 1.40376514223057 | 0.013755409249442 |
| NDUFB7 | 1.18583206343636 | 0.013782283321523 |
| SNORA35 | 2.08038665269563 | 0.013807561860401 |
| MOB2 | 1.07373619928912 | 0.01396336767934 |
| UQCR11 | 1.15811236923855 | 0.014001350379753 |
| HDAC9 | 1.36050004507615 | 0.014017429734096 |
| TRIM2 | 1.37151255056783 | 0.01412857049272 |
| HS1BP3 | 0.84305298573391 | 0.014145544437856 |
| CTSF | 1.5152964247877 | 0.014227742849107 |
| ASAP3 | 1.04403220331941 | 0.0143215001401 |
| CCDC77 | 1.02654025924734 | 0.014356492458066 |
| RAMP3 | 2.03089793647041 | 0.014359216955787 |
| FKBP2 | 0.850733401552685 | 0.014478648896166 |
| AR | 1.24662502660708 | 0.014578269969721 |
| SEPT1 | 1.52274686561412 | 0.014578502661998 |
| CKB | 2.11311922678248 | 0.014644632234613 |
| SNRNP25 | 1.281922252587 | 0.014789313935834 |
| C10orf32 | 0.980137749898905 | 0.014848133273168 |
| DLG3 | 1.03084018572225 | 0.014854426137412 |
| TEX264 | 0.960615336683849 | 0.014936498291583 |
| MDM1 | 0.856440619829444 | 0.014947595777332 |
| NPR1 | 1.23771395936151 | 0.015155017411904 |
| PUS3 | 0.892608099969548 | 0.015277639506246 |

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|---|---|---|
| ITPK1 | 1.04737986133895 | 0.015371371518979 |
| SCCPDH | 0.83111063705847 | 0.015506261872705 |
| MRPS23 | 1.05002971068722 | 0.015514582992838 |
| EPHA4 | 1.38222535045725 | 0.015528422543162 |
| HIST1H3C | 2.37136539931699 | 0.015594128248106 |
| MITF | 1.28871874731528 | 0.015698229237585 |
| CXorf36 | 1.71798405713199 | 0.015717551472184 |
| C14orf159 | 0.784318113250072 | 0.015789063873927 |
| UBL7 | 0.900672058528196 | 0.015916774747175 |
| CFD | 1.10913092591052 | 0.015951732222451 |
| GATB | 1.23299590128198 | 0.015973779863678 |
| PLEKHO1 | 0.891983854975566 | 0.015984560542618 |
| TRAFD1 | 0.729770649306126 | 0.016007469527297 |
| UBE2I | 0.765742914278555 | 0.016016600064672 |
| APIP | 1.02581155363388 | 0.016018380952167 |
| MAGOH | 0.953299345004074 | 0.016365954370886 |
| HTRA1 | 1.43021169844403 | 0.016377693400595 |
| RNU6ATAC | 1.85128031862397 | 0.016410216657824 |
| ZNF252P | 0.859788831535721 | 0.016588145345289 |
| ZFYVE19 | 1.03739234849808 | 0.016722617763188 |
| MS4A15 | 2.21329816400136 | 0.016741002191156 |
| MUL1 | 1.10482753202012 | 0.016886857003934 |
| NBR2 | 1.71259599449516 | 0.017008014124345 |
| HIST1H4I | 1.42750760056711 | 0.017245302144641 |
| ATP5I | 0.982901758925352 | 0.01741798182372 |
| PIK3C2B | 1.07286543540502 | 0.017514532610702 |
| EPHX1 | 1.10859872420665 | 0.017564439016381 |
| GFRA1 | 2.00866953572888 | 0.017614249833201 |
| GPRASP1 | 1.53174477414915 | 0.017650480856206 |
| NDUFS5 | 0.963577341912586 | 0.017859851949603 |
| MAP2K7 | 0.811175772729339 | 0.017939504987028 |
| IGHV1-46 | 3.01235338588808 | 0.01804116327402 |
| FAM96B | 1.12879667277776 | 0.018122807892528 |
| COMMD1 | 0.926608329613263 | 0.018172257792174 |
| RBM42 | 0.907817937980018 | 0.018240645754782 |
| MRPL2 | 0.943960938434813 | 0.018252927651129 |
| ITPA | 1.29498182903385 | 0.018278848270897 |
| YIPF3 | 0.66910657926379 | 0.018365403328866 |
| EXOC7 | 0.656232445722209 | 0.018563093890263 |
| NDUFA4 | 1.26422471048386 | 0.018765292652479 |
| LGALS1 | 0.730287304699782 | 0.01879386623333 |
| UBBP4 | 1.39268140122841 | 0.018799133744172 |
| LYRM5 | 1.12939286640848 | 0.018805444726294 |
| CAP2 | 1.92304281186892 | 0.018809576277857 |
| PDZD2 | 1.52929282549596 | 0.018830895457595 |
| NUTF2 | 0.740093729698485 | 0.018998210546953 |
| RAI2 | 1.30080820325546 | 0.019120182116569 |
| PIP4K2B | 0.746442151918672 | 0.019129383887859 |
| SNX7 | 0.866710451224869 | 0.01935614870535 |
| NOMO2 | 0.811787971410819 | 0.019417578880218 |
| COMMD6 | 0.786949851906349 | 0.019474494911207 |
| ZNF181 | 1.09682583329222 | 0.019492142119208 |

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|---|---|---|
| OSBPL10 | 0.758787781524342 | 0.019680600103027 |
| FBXO31 | 1.05140318842164 | 0.019987133188483 |
| SUCLA2 | 0.83837555540639 | 0.019992675379859 |
| SOD1 | 0.952902053831664 | 0.020028648566911 |
| TOM1L2 | 1.25242240134979 | 0.020199610171789 |
| SLC9A9 | 1.01892466218946 | 0.020354607886877 |
| NFKB2 | 0.801136402273911 | 0.020374443906685 |
| NDUFB2 | 1.1075699397737 | 0.020389092689244 |
| MAPK10 | 1.39172477159328 | 0.020406848025676 |
| TNFAIP8L1 | 1.20107006434118 | 0.020441274104872 |
| SNORA5A | 1.85341845294847 | 0.020554465716211 |
| SEMA6A | 0.963748947742921 | 0.020678232370337 |
| OST4 | 0.711595193313423 | 0.020816120652198 |
| AMZ2 | 0.837292366016403 | 0.02081937419618 |
| CD99L2 | 0.92357575564455 | 0.020870228585653 |
| RNF216P1 | 0.924046990881785 | 0.0209582563493 |
| TMTC1 | 1.33892093228453 | 0.021010290640011 |
| PLOD1 | 1.16111942325776 | 0.021069371278467 |
| FAM107A | 1.70820635267935 | 0.021153006764041 |
| ASCC1 | 0.623061273175698 | 0.021210311083476 |
| ANGPTL2 | 1.16379174082224 | 0.021230406844845 |
| GPR75-ASB3 | 0.733184178822322 | 0.021265865558565 |
| ANKMY2 | 0.776287694436383 | 0.021335378647738 |
| ASNA1 | 0.733728504101649 | 0.02160313583129 |
| MTFR1L | 1.43959865076926 | 0.02166782278164 |
| WFS1 | 1.01895646440592 | 0.021835815690222 |
| TMOD2 | 0.97922452457308 | 0.021930742713002 |
| IGLV3-25 | 2.72247475146572 | 0.021967959677634 |
| MIR4458HG | 1.55329176902062 | 0.022004934920885 |
| PLCXD3 | 1.67993121997095 | 0.022086352350893 |
| VWA1 | 1.34964045582735 | 0.022129577054015 |
| NUPR1 | 1.19426300841227 | 0.022268141670703 |
| PPP1R16B | 1.05631099129327 | 0.022336409568609 |
| CGNL1 | 1.1233467947148 | 0.022486258379552 |
| PHB | 1.04551910382375 | 0.02258896536949 |
| MRPL40 | 0.768626937378214 | 0.023183230916093 |
| RP11-37B2.1 | 1.05681882619976 | 0.023192396049672 |
| NCALD | 1.20337979486626 | 0.023301424738731 |
| HSPB8 | 1.52897352529292 | 0.023320506529598 |
| IFI35 | 1.1163583566181 | 0.023423275049086 |
| HIST1H2BB | 1.95869891819499 | 0.02352587383851 |
| HSPB1 | 1.60931566842079 | 0.023527419065954 |
| LMAN2L | 1.14836399970673 | 0.023767850606007 |
| MINA | 1.00608271039919 | 0.02379199706508 |
| FAM120C | 0.844245028208033 | 0.023813376565957 |
| MAF1 | 1.05079945578761 | 0.023826089024475 |
| LSM4 | 0.758173561169813 | 0.023951934678647 |
| GAS8 | 0.923762931488029 | 0.024206094498857 |
| GPRC5B | 1.55615771897964 | 0.024271075472072 |
| NDUFB10 | 1.0167376852959 | 0.02432218272339 |
| ACACB | 1.45456942639247 | 0.024362683006986 |
| UCHL1 | 1.72469014393439 | 0.024404079986976 |

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| MT-TP | 1.96304151661361 | 0.02441910996126 |
| BCAM | 1.49653947192748 | 0.02445254789432 |
| SPOCK1 | 1.8649083528954 | 0.024463229302961 |
| PREX2 | 1.04234305825158 | 0.024469649139124 |
| CDKN2AIPNL | 1.02969016386251 | 0.024507378495558 |
| MRPS7 | 0.997040820474886 | 0.02452269912806 |
| ARRB1 | 0.718362421202532 | 0.024647808176353 |
| NOSTRIN | 1.04050146638147 | 0.024795422843285 |
| RNU1-89P | 1.87245318947062 | 0.024955728481749 |
| PSMB3 | 0.700432889933193 | 0.025178670264294 |
| SNORA79 | 1.14421054060561 | 0.025260056099313 |
| TRIM16 | 1.19799251820386 | 0.025266214362765 |
| CD27-AS1 | 0.756276610363133 | 0.025311308116571 |
| IGHV3-21 | 2.22342804835049 | 0.025326735141259 |
| HSPG2 | 1.46618695085253 | 0.025397227417789 |
| MIEN1 | 0.721770049839192 | 0.025815030865723 |
| PCDH12 | 1.16281089440744 | 0.025883531351535 |
| MTRNR2L8 | 1.72509560545185 | 0.025902195769579 |
| DHX8 | 0.671286071055611 | 0.026095662495792 |
| ANAPC13 | 0.816989658129867 | 0.026134074801671 |
| ABCA10 | 1.1324031514469 | 0.02623567922278 |
| COX5B | 1.02259640619696 | 0.026572276392594 |
| AASS | 0.725836579756302 | 0.026583833905798 |
| EHMT2 | 0.74897046643809 | 0.026630487278564 |
| TSPYL4 | 1.06371146854738 | 0.026643353046586 |
| FDX1 | 0.800815712572355 | 0.026692734518481 |
| IDH3G | 0.736189953683353 | 0.026702405735303 |
| VEGFC | 1.03733992267464 | 0.02672888564877 |
| PCYOX1 | 1.10051280752985 | 0.026746919104156 |
| PIN1 | 0.787881530901308 | 0.026848785751117 |
| NNT-AS1 | 0.668717030735257 | 0.026854449014475 |
| RPF1 | 0.782619333628775 | 0.026856029650967 |
| CCDC101 | 0.826336147879745 | 0.02691450154108 |
| PER3 | 1.10943214990591 | 0.026940154335616 |
| RRAS | 0.73028859605243 | 0.027059869880765 |
| NMT1 | 0.582803429529806 | 0.027107011020212 |
| IGHV5-51 | 2.42414892761853 | 0.027270517278954 |
| NDUFB4 | 0.829750436710335 | 0.027379676146822 |
| KEAP1 | 0.946539820171315 | 0.02740780702668 |
| ANAPC10 | 0.983374433733159 | 0.027467752574014 |
| TMEM147 | 0.998242064107922 | 0.02748228771773 |
| C15orf52 | 1.51028610174206 | 0.027508611644718 |
| RBM10 | 1.0318419961159 | 0.027738984732131 |
| CST3 | 1.11141185034377 | 0.027751908079369 |
| HMOX2 | 0.871969330822181 | 0.028094109367606 |
| ING4 | 0.809822442648277 | 0.028100375432898 |
| EVC | 0.892046303121828 | 0.028110648378188 |
| SGCA | 1.60773260504675 | 0.028151981533702 |
| URGCP | 0.804266272266285 | 0.028201666532117 |
| MMP15 | 1.39326355141246 | 0.028349506099777 |
| NUDCD3 | 0.789860812303465 | 0.028508778228098 |
| GIMAP4 | 0.989413193537984 | 0.028511557035811 |

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| USF1 | 0.560893329904616 | 0.028546932605245 |
| SDF4 | 0.764360183993274 | 0.028841952837366 |
| LRIG1 | 1.20962485436922 | 0.029036192018785 |
| C15orf41 | 1.17619128621471 | 0.029068491279385 |
| BBS9 | 0.65972598534071 | 0.029435821427052 |
| BBS10 | 0.952197132997132 | 0.02952978722385 |
| CLPP | 0.767487219751378 | 0.029605623282769 |
| INPP5K | 0.810478777185621 | 0.02986526624173 |
| GIMAP6 | 0.875484865811672 | 0.030122278400179 |
| MZB1 | 2.52466932387754 | 0.030132342392744 |
| CD151 | 0.983827184144266 | 0.030215587104727 |
| PHLDB1 | 0.913656727494651 | 0.030261146368224 |
| AP4B1 | 0.9229267306893 | 0.030385446309281 |
| PTGFRN | 1.40412959812039 | 0.03080380366732 |
| ASAP2 | 0.736668698550595 | 0.030864464153444 |
| JUP | 1.31414424359029 | 0.030935889110884 |
| TTC23 | 0.842849572193834 | 0.030966329770501 |
| ZDBF2 | 0.670271518678619 | 0.031109635489453 |
| ERAL1 | 0.687577486582947 | 0.031193523922496 |
| GTF3C3 | 0.666249953725567 | 0.03125775242671 |
| NDUFC1 | 0.734613339002705 | 0.031460835349403 |
| ACOT7 | 1.07529368047422 | 0.031500313527287 |
| ID3 | 0.875563857441573 | 0.031594906384328 |
| DPYSL3 | 1.72218328779331 | 0.031678582359627 |
| PALMD | 1.09857247897039 | 0.031700481220507 |
| PHYH | 0.854989396171082 | 0.031768142177948 |
| NUDC | 0.794972898295261 | 0.031796399698013 |
| FRMD3 | 1.09908748422895 | 0.03179652351211 |
| NDUFA6 | 0.773647140601469 | 0.031817906116464 |
| NDUFB1 | 0.721438262568207 | 0.031826928386227 |
| HDAC5 | 1.0697264509176 | 0.031891324149311 |
| ABCA6 | 1.04914370570798 | 0.03204160129339 |
| SLIRP | 0.686887423066733 | 0.032043365730349 |
| CETN3 | 0.82877956273799 | 0.032283878745739 |
| RNU1-134P | 1.40135042245014 | 0.032377818994628 |
| DLGAP4 | 0.660915886718372 | 0.032406135502875 |
| PCGF2 | 0.93422228115831 | 0.032427375036908 |
| DCTN2 | 0.672102101767707 | 0.032752774433681 |
| C19orf12 | 0.870299552830215 | 0.032936026716658 |
| ZC3H4 | 0.690953659608617 | 0.032989120981832 |
| SLC1A4 | 0.906999333394563 | 0.033075760035491 |
| METTL13 | 0.824062488792258 | 0.033107106804319 |
| CNPY4 | 0.704842734145961 | 0.033409803643771 |
| EXOC6B | 0.796961440707035 | 0.033436871695349 |
| MMADHC | 0.591417866771234 | 0.033513001893524 |
| TPD52L1 | 1.44848896447876 | 0.033521515595773 |
| SYNC | 1.2454874296099 | 0.033591488621965 |
| IGHG4 | 2.1592052767222 | 0.033747362872373 |
| PRKCA | 0.861253737714921 | 0.033824113472895 |
| IGFBP4 | 0.894125034748654 | 0.034101679645895 |
| SYT11 | 0.793163150932669 | 0.034119129490161 |
| IGLL5 | 2.38844467020515 | 0.034141311025093 |

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| MDK | 1.55998554096556 | 0.034255122809667 |
| FGD6 | 1.03726351559182 | 0.034270203454585 |
| NFS1 | 1.02423833132684 | 0.034288577816178 |
| SCAPER | 0.753102258430983 | 0.034316218294315 |
| POLR2J | 0.825275944845643 | 0.034356385606571 |
| BST2 | 1.06156089732132 | 0.034468898494372 |
| IGHV4-34 | 3.13374499798114 | 0.034490302061631 |
| LENG1 | 0.703139023344769 | 0.034584299558121 |
| HINT1 | 0.510049625786398 | 0.034604061554172 |
| ZFYVE9 | 0.838998496920232 | 0.034703988434766 |
| FAM195B | 0.857776733144436 | 0.035113436493306 |
| Metazoa_SRP | 0.913766503782085 | 0.035238584551625 |
| RRAGB | 0.824280039373138 | 0.035242764323174 |
| RNASEH2C | 0.626380522634371 | 0.035539695582195 |
| APOL4 | 1.61536589277272 | 0.035615178247403 |
| ZNF271P | 0.798324850801376 | 0.035634351890262 |
| CLTB | 0.847717534316 31 | 0.035635060882855 |
| ABCA8 | 1.31740253843311 | 0.035687510036613 |
| TMEM101 | 0.722624927577717 | 0.03616546658088 |
| C1orf115 | 1.30981392598166 | 0.036276289935474 |
| ENG | 0.964860189124001 | 0.036426542652353 |
| SLC25A20 | 0.770071189345224 | 0.036502068665546 |
| DIXDC1 | 1.26610863763203 | 0.036556931569627 |
| LARP6 | 1.50362606081646 | 0.036577929810127 |
| SELP | 1.21407522531557 | 0.036605826348792 |
| FHOD3 | 2.1614390392496 | 0.036635073531792 |
| MDH1 | 0.914029076542233 | 0.036715683064182 |
| CYC1 | 1.10158652578896 | 0.037285256286725 |
| HIST1H2AJ | 1.92598476035305 | 0.037323007899845 |
| CRIP2 | 1.21860439050226 | 0.037378120861829 |
| PHF14 | 0.733642316768309 | 0.037521117736876 |
| CHPF | 1.02308957668198 | 0.037635758271758 |
| ACADM | 0.731727263967819 | 0.037735715425625 |
| NOD1 | 0.759813404064337 | 0.037778987861187 |
| GRK5 | 0.965469694758284 | 0.037794576440501 |
| FBXO32 | 1.86857747949063 | 0.037800642499957 |
| MYOM1 | 2.28938553916214 | 0.037809748512595 |
| TEAD2 | 1.13003835883198 | 0.037996029094852 |
| CUEDC2 | 0.860221643548019 | 0.038144288651241 |
| MTHFR | 0.787583681693372 | 0.038238752508251 |
| IDO1 | 2.89609676883334 | 0.038288455364949 |
| FAM213A | 1.13537098657925 | 0.038324279854703 |
| C9orf64 | 1.19253273228015 | 0.038338487701929 |
| ITGA9 | 0.95311196470026 | 0.038393334947758 |
| TSPAN12 | 1.10252191171555 | 0.038469028517835 |
| LPIN1 | 0.786922770547257 | 0.038516204840084 |
| PRMT2 | 0.600696273925543 | 0.038630922473872 |
| IGBP1 | 0.577596948657479 | 0.038648376843946 |
| CEP104 | 0.57491156126583 | 0.038711541257078 |
| COA5 | 0.836296045566416 | 0.038797426624148 |
| ING3 | 0.78537023753511 | 0.038800231930718 |
| GPR155 | 1.14363649028394 | 0.038935476967689 |

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| RALGPS2 | 0.943327119105676 | 0.039063990161983 |
| PMVK | 1.0094378320087 | 0.039131157555198 |
| ANGPTL1 | 1.34199717615295 | 0.03914440759472 |
| NUDT9 | 0.923933314846786 | 0.039352466167125 |
| TACC2 | 1.50772494575913 | 0.039393709120659 |
| CXCL9 | 3.22461990487493 | 0.039495683843959 |
| SGCB | 0.867679172376512 | 0.039632626714224 |
| KLF12 | 0.744457326204384 | 0.039776207978137 |
| ZNF92 | 0.944767303604986 | 0.039883256227011 |
| PVRL3 | 0.81503762365405 | 0.040146604700111 |
| EMC7 | 0.61990001751917 | 0.040209090323732 |
| OLFML1 | 1.05230767609552 | 0.04022153004427 |
| MPDZ | 1.17343337622565 | 0.040250440343856 |
| TP53BP1 | 0.630802493893477 | 0.040330606188243 |
| CCDC149 | 0.879669415922514 | 0.040572679997623 |
| CPVL | 1.13183965413179 | 0.040574545186215 |
| QDPR | 0.622901564025608 | 0.040638548774822 |
| PSPH | 0.90366165829783 | 0.040825301325993 |
| SEPHS1 | 0.818112213720582 | 0.040977248713945 |
| EBF1 | 0.848953465029235 | 0.041062033752511 |
| PRIMPOL | 0.613186541546622 | 0.041326914714373 |
| SNORA63 | 1.61240955460318 | 0.041343268728481 |
| HERC2P3 | 0.813752760749133 | 0.041426745539101 |
| TMEM9 | 0.675496353386362 | 0.041528212053152 |
| NDUFS4 | 0.651467544393023 | 0.041575500661833 |
| LARGE | 1.51282979706416 | 0.041679889278587 |
| PIK3CG | 1.21003286972584 | 0.041838571772022 |
| KIT | 1.37051835885466 | 0.041857331314944 |
| CHID1 | 0.703093147235601 | 0.041875584106904 |
| RUNX1T1 | 1.30711950883203 | 0.04194308429849 |
| PSMD4 | 0.585206795231093 | 0.04196583651523 |
| ACOT9 | 0.643467746213931 | 0.042484960329608 |
| MRPL9 | 0.714184584633229 | 0.042608466392813 |
| HSP90AA2P | 1.57297326061608 | 0.042713538639958 |
| PLEKHG5 | 1.10937892998224 | 0.043020230133264 |
| GPR137 | 0.63397655752699 | 0.043035313096217 |
| ZNF204P | 0.833087204347238 | 0.043046059322158 |
| PHLDB3 | 0.872590423671449 | 0.043073116811395 |
| ABTB2 | 1.15458958209876 | 0.043117270812902 |
| VANGL1 | 0.777666501927017 | 0.043214589201901 |
| DRG1 | 0.5207452353976 | 0.043217946289943 |
| ABCF3 | 0.731610753520707 | 0.043255149702559 |
| IGHV1-18 | 2.38409498849451 | 0.043255286114142 |
| TTC5 | 0.759016005523924 | 0.0436281650835 |
| ISLR | 1.01794444820858 | 0.043858529261884 |
| ABHD10 | 0.684807878970731 | 0.043921881694758 |
| RNU1-21P | 1.58759601548946 | 0.04393397923189 |
| PCLO | 1.02939540087255 | 0.043992409094751 |
| SF3B5 | 0.685795616247459 | 0.044068952971011 |
| AKIRIN1 | 1.13117427994402 | 0.044116372163144 |
| TBC1D4 | 1.02614836072851 | 0.044242714451335 |
| SNORD116-24 | 1.16386088833945 | 0.044267338014101 |

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| ARHGEF15 | 1.3565353748778 | 0.044465483207321 |
| FILIP1 | 1.24145207623349 | 0.044541392167797 |
| PMPCA | 0.784716001774263 | 0.044606285548348 |
| MRPL24 | 0.836953527981412 | 0.044621622866585 |
| LIMS2 | 1.48690786815884 | 0.044663101720157 |
| APLF | 1.00564136387878 | 0.044675328482248 |
| CCDC127 | 0.786138919534127 | 0.044847904532649 |
| RBCK1 | 0.719472666256777 | 0.044940867732078 |
| IGKV3-15 | 1.82243618561422 | 0.044949304147919 |
| MRPL10 | 0.755510344076665 | 0.044988886690655 |
| PRICKLE2 | 1.10383488975057 | 0.045162297921898 |
| ASS1 | 1.21105480538363 | 0.045339411579409 |
| BCAP31 | 0.56061329136518 | 0.045419745770767 |
| FAM26E | 0.855276968132779 | 0.045498220436771 |
| CDR1 | 0.891694802443481 | 0.0456040688493 |
| PLCE1 | 1.15088474397752 | 0.045646528497219 |
| HAX1 | 0.737230205757504 | 0.045652063931675 |
| GPT2 | 0.888736909323232 | 0.045723258855959 |
| CRIP1 | 0.855741936333981 | 0.045750382050884 |
| PLCD3 | 1.32481043250513 | 0.045900998794319 |
| PLEKHA7 | 0.832469495132487 | 0.045949416100486 |
| ECSCR | 0.939060930968941 | 0.046037567250949 |
| CAMTA1 | 0.624039077445631 | 0.046044666587566 |
| C4B | 1.06983034382245 | 0.046046726090977 |
| ITSN1 | 0.52067324953425 | 0.046061076815642 |
| TMEM109 | 0.671467686885261 | 0.04634670159389 |
| TCEB1 | 0.714649203628731 | 0.046498394418275 |
| DUT | 0.571364419537328 | 0.046750030379438 |
| IGLV2-23 | 2.4404588668285 | 0.046933373284105 |
| ECHS1 | 0.836620889512602 | 0.046950348103224 |
| LRRC20 | 1.58960696627459 | 0.047111692047054 |
| RASSF4 | 0.719980331034465 | 0.047129744149661 |
| PCOLCE2 | 1.32942520314411 | 0.047140182716157 |
| NFU1 | 0.715870537435629 | 0.047316372777318 |
| TBC1D13 | 1.08092535745673 | 0.047418658367132 |
| POLR2L | 0.847780349597831 | 0.047455319633638 |
| AVEN | 0.863746367273905 | 0.047461814180803 |
| PBXIP1 | 0.730765720930402 | 0.047559180891227 |
| SNRPD2 | 0.828377862714079 | 0.047681529105621 |
| ZNF521 | 0.782846730899827 | 0.047753007688003 |
| DNAJC15 | 0.548794336702051 | 0.047818756751265 |
| PLIN4 | 2.14686718829385 | 0.047837460243607 |
| SGCE | 1.02417220448296 | 0.048056035588248 |
| NDUFB11 | 1.04822621149025 | 0.048100099053454 |
| FAM63A | 1.10639270453329 | 0.048317953250482 |
| IGHV3-33 | 2.45049559916729 | 0.048335460696975 |
| WBP1L | 0.559744110106664 | 0.048397926048091 |
| RNH1 | 0.68307315804623 | 0.048551106051449 |
| CACNA1C | 1.48487025283062 | 0.048791571174701 |
| RNF216 | 0.500272825221294 | 0.048891593392035 |
| RNVU1-10 | 1.48874241978667 | 0.049043899834635 |
| NIPAL3 | 0.685242220101028 | 0.049102157743172 |

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| CAPNS1 | 0.536216752524404 | 0.049117643719576 |
| EIF3G | 0.521746012564379 | 0.049145570970587 |
| EHD3 | 1.1489888983896 | 0.049261073611596 |
| RNF150 | 1.82964254614818 | 0.04935524007362 |
| PRCC | 0.683831442216535 | 0.049439677341351 |
| EIF3K | 0.770999858549397 | 0.049494922312546 |
| PCDHGA6 | 0.996743904500637 | 0.049594702703646 |

**Downregulated**

| **gene_symbol** | **logFC** | **P.Value** |
|---|---|---|
| MTHFD1L | -0.995588795500916 | 0.049891276509548 |
| SLC35E3 | -0.723427002471635 | 0.049722853242674 |
| RBM12 | -0.675468840268023 | 0.049141474019758 |
| PLEK | -1.24191955641856 | 0.048851252322266 |
| METTL9 | -0.559323718166655 | 0.048826061361431 |
| BTAF1 | -0.684829231087528 | 0.048753543984871 |
| SORL1 | -1.08680555457527 | 0.048382434354937 |
| MYBBP1A | -0.652179613350711 | 0.048382120638298 |
| ATG3 | -0.621501378428561 | 0.048156044955424 |
| RQCD1 | -0.584685558935794 | 0.04811589204463 |
| WHSC1L1 | -0.630395003739651 | 0.048075965457121 |
| SLC23A2 | -0.703598438855762 | 0.047849422557967 |
| CCDC59 | -0.675139200732064 | 0.047497359640483 |
| PPIP5K2 | -0.637644572065183 | 0.047258843597425 |
| SPI1 | -1.39474323027782 | 0.047216776333995 |
| RAB1A | -0.759639839339181 | 0.047215995419927 |
| USP15 | -0.786788616974627 | 0.047190447455434 |
| SEC22B | -0.549665183304579 | 0.047088543366785 |
| GDAP2 | -0.689501815689805 | 0.046692296531126 |
| RAB31 | -1.16247895563701 | 0.046686112157943 |
| SLC39A8 | -1.48713850478261 | 0.046608828267 |
| ZFP36L2 | -0.818168033997091 | 0.046494857850749 |
| ROCK1 | -0.556928927195311 | 0.046450723563927 |
| KLHL9 | -0.537694055361669 | 0.046409005801263 |
| RORA | -0.661465366123389 | 0.046364254534318 |
| HBB | -2.56665261225656 | 0.046318341427933 |
| MARK3 | -0.71835361167676 | 0.04613857368436 |
| CDC42BPG | -1.68032572820665 | 0.045824227975487 |
| GAS6-AS1 | -0.740674169997477 | 0.045783465806761 |
| DLEU1 | -0.829212336449597 | 0.045654281170015 |
| CCDC88A | -0.681182229846256 | 0.04551155218388 |
| ATP6V0B | -0.630721490870796 | 0.045485402662351 |
| RP11-405O10.2 | -0.896632507915135 | 0.045376246798244 |
| CEBPB | -1.01383457370974 | 0.045139706314858 |
| CCDC186 | -0.574041889531699 | 0.045105736734765 |
| IMPDH2 | -0.769317300677721 | 0.04498572936316 |
| FBXW2 | -0.559368168132571 | 0.044860624708143 |
| TNFRSF11B | -1.43174575032816 | 0.044838274475289 |
| CXCR4 | -1.6936179722046 | 0.044790960747474 |
| TRIM58 | -1.18067524804123 | 0.044685790055526 |
| LRRC58 | -0.737238817093906 | 0.044235864456409 |
| RP11-342K2.1 | -0.963926749167964 | 0.044163377652761 |

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| DESI2 | -0.716831180996523 | 0.044160807141449 |
| ZBTB37 | -0.554422584546326 | 0.043978200428098 |
| TET2 | -0.681027752314909 | 0.043977378495101 |
| IL1RAP | -0.887769711126212 | 0.043915873322981 |
| TMEM55B | -0.823398990949944 | 0.043822691135163 |
| LPGAT1 | -0.691057852145774 | 0.043685049067198 |
| CYTH1 | -0.70231536034771 | 0.043649146496169 |
| RAP1B | -0.774381004648362 | 0.043468671714948 |
| TNFAIP8L3 | -0.928574086783507 | 0.043326866382442 |
| PPARG | -0.975875661596081 | 0.043090902106048 |
| TFCP2L1 | -1.99525081779186 | 0.042922965419633 |
| NPM1 | -0.757312705252591 | 0.04288691709959 |
| CRLF3 | -0.671484604193503 | 0.042794287325318 |
| KDM7A | -0.732285411980739 | 0.042561501007653 |
| DGKA | -1.0927926018397 | 0.04253647219114 |
| RCOR3 | -0.514995510429288 | 0.042474167650306 |
| RP4-671O14.6 | -0.776599421032934 | 0.042394077927653 |
| SP3 | -0.636747202247716 | 0.042158522862054 |
| ATP6V0A2 | -0.581116101686002 | 0.042143074175456 |
| TAF1D | -0.620718991639101 | 0.041536764607606 |
| TMX3 | -0.633008274009091 | 0.041437139943639 |
| ZNF451 | -0.670099220268372 | 0.04143120983984 |
| AGPAT5 | -0.784647850377296 | 0.041415400980973 |
| GK5 | -0.7261276726299 | 0.041256663162721 |
| AP000347.2 | -0.876526844606666 | 0.041229664383676 |
| CHPF2 | -0.77390050478333 | 0.041190220047008 |
| UBLCP1 | -0.981836075434002 | 0.041166890091833 |
| TMEM167B | -0.628877607838574 | 0.041137984506353 |
| EGLN2 | -0.647884680267275 | 0.040865575753962 |
| H1F0 | -0.850346293751398 | 0.040653822303737 |
| BCL6 | -0.993390458555578 | 0.040631365035719 |
| ZNF254 | -0.55537970171655 | 0.040405177845637 |
| HCK | -1.69633972255378 | 0.040300985711702 |
| OGG1 | -0.806934522425971 | 0.040275683432581 |
| MAP3K8 | -0.805557619124119 | 0.040268701164858 |
| CBX5 | -0.729909764815188 | 0.040141366890991 |
| DENND4A | -0.741444787083853 | 0.040108941540117 |
| IREB2 | -0.614971155897108 | 0.040100511821905 |
| ZFAS1 | -1.07274480284901 | 0.039277817007562 |
| CAPZA1 | -0.986119699060812 | 0.039039013357257 |
| NFKBIZ | -0.794925057072357 | 0.038914955576491 |
| GABBR1 | -0.592281529269273 | 0.038596792534693 |
| TXNRD2 | -1.24281672634514 | 0.038258116835764 |
| MTMR6 | -0.776105707293027 | 0.038186381500565 |
| PAXBP1 | -0.794842452321627 | 0.03805275316984 |
| E2F3 | -0.622964711092951 | 0.037705270168497 |
| NUP107 | -0.684721199408537 | 0.037685852663726 |
| ANKRD13D | -0.921362385036105 | 0.037679135264386 |
| EMD | -0.771870189243501 | 0.037654023813964 |
| STXBP4 | -0.702746283699406 | 0.037619107456587 |
| PLCD1 | -0.743629606918681 | 0.037569405251241 |
| SLA | -1.17755823586664 | 0.037523083907179 |

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| KCNE1 | -1.5168692679982 | 0.037335188652662 |
| SLC44A1 | -0.882419819089587 | 0.037222226315761 |
| LETMD1 | -0.613966922099524 | 0.036959959757277 |
| SPTY2D1 | -0.699893395376677 | 0.036826296518825 |
| MROH1 | -0.828586110916421 | 0.036804967286102 |
| TRA2B | -0.801534526516415 | 0.03680063422163 |
| UBXN2B | -0.944300337874338 | 0.036620743427449 |
| TMEM165 | -0.676463799039071 | 0.036609909427631 |
| TP53INP1 | -0.671613305578776 | 0.036563843195584 |
| FAM76A | -0.829768556968204 | 0.036315057561693 |
| CISH | -1.06835044192411 | 0.03629640079317 |
| NUS1 | -0.703541768547912 | 0.036142549644923 |
| CPNE3 | -0.58281163921131 | 0.03613218029728 |
| POLM | -0.865948331403883 | 0.036082882082078 |
| VPS37A | -0.634353382522241 | 0.036024563234407 |
| RGS16 | -1.24818965755211 | 0.036004804172631 |
| SLC35D1 | -0.611173675395426 | 0.035858373497209 |
| RP11-53O19.3 | -0.932942373061028 | 0.035798468337443 |
| CACNA1D | -1.53994590482347 | 0.035750264695533 |
| ZYX | -0.801911312917201 | 0.035713384739293 |
| CLCN5 | -0.846449241531056 | 0.035490944800751 |
| PTPN18 | -0.786690942124049 | 0.035433528616089 |
| RNF126 | -1.18701157020438 | 0.03499938916392 |
| LDLRAD3 | -1.12295519306705 | 0.034921850119271 |
| ARRDC3 | -0.919630989677445 | 0.034820062881914 |
| CCNG1 | -0.878712814644265 | 0.03479979368125 |
| ZNF518A | -0.559564858181877 | 0.034654347249198 |
| C22orf34 | -1.02405363376942 | 0.034573944711997 |
| HBA2 | -1.80345264131336 | 0.034553084710162 |
| HSPBAP1 | -0.680049350719582 | 0.034513003348654 |
| GBE1 | -0.788171107386107 | 0.034422307505904 |
| ERBB2IP | -0.786376398504966 | 0.034358779082886 |
| MICAL1 | -0.92804932144184 | 0.033854696385908 |
| ASXL2 | -0.681727892087539 | 0.033723868953502 |
| ATP7A | -0.709847875735635 | 0.033603095180071 |
| TVP23B | -0.713714377129514 | 0.033544149914541 |
| MYO1G | -1.50189819241214 | 0.033321943554598 |
| IER3 | -1.38266390312934 | 0.033321107829484 |
| CHD1L | -0.79018579446285 | 0.033233540371195 |
| SLK | -0.547327110621149 | 0.033172289390311 |
| TP53BP2 | -0.624324137633992 | 0.032935682309664 |
| ADAM9 | -0.89976736499615 | 0.032796939715022 |
| THOC1 | -0.575048288516101 | 0.032736058486775 |
| ZFAND6 | -0.762984510150424 | 0.032733545429897 |
| QSOX2 | -1.09843794142504 | 0.032613618764888 |
| PABPC1 | -0.927540901245207 | 0.032542946414865 |
| THAP9-AS1 | -1.24931629090483 | 0.032408782106208 |
| CSF2RA | -1.37146542622719 | 0.032294038102804 |
| BCAT1 | -1.33580451812495 | 0.032281092868309 |
| LARP1B | -0.60044328323378 | 0.032089369377965 |
| SLC35F5 | -0.787331632993426 | 0.031961790923932 |
| AMMECR1 | -1.34936594853686 | 0.03190351240644 |

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| MAN1B1 | -0.675355067330179 | 0.031805499989601 |
| ZNF207 | -0.644190959824671 | 0.031795236493689 |
| PRG4 | -1.83137893593722 | 0.031366632421221 |
| RGS1 | -1.84570131750027 | 0.031245677581832 |
| CREBZF | -0.693475985017088 | 0.031138954998924 |
| SGK1 | -1.16925629343453 | 0.031095591596574 |
| INHBA | -1.03449556620105 | 0.030882987253511 |
| GTPBP2 | -0.861692092861238 | 0.030740608920567 |
| RCN2 | -0.891292952724523 | 0.030593588342934 |
| NRCAM | -1.8274442764255 | 0.030302749255011 |
| RP11-53B2.2 | -1.03264420726057 | 0.030225407542266 |
| ZMYM2 | -0.697270166326698 | 0.030182293443808 |
| TP73-AS1 | -0.909797801811266 | 0.030020635702475 |
| RAB11FIP2 | -0.575233169007673 | 0.029892592170687 |
| TSNAX | -0.628132535627418 | 0.029861513906736 |
| FAM49B | -1.04069481457475 | 0.029787227736168 |
| ARHGAP30 | -1.47936156625627 | 0.029718933329032 |
| CHST11 | -1.10179184434298 | 0.029597770782293 |
| ERVK3-1 | -0.869465713369986 | 0.029352837435395 |
| FGG | -1.80727949445899 | 0.029257129619109 |
| DIP2B | -0.590823303529681 | 0.029241972913094 |
| CD300E | -2.20911034368223 | 0.029129315629642 |
| CCNC | -0.790611948681123 | 0.028951850330435 |
| SRGN | -1.45531697332474 | 0.028940782690941 |
| NKTR | -0.854218986211078 | 0.028935497364488 |
| WDR11 | -0.684763080480579 | 0.028848987802889 |
| CXCL16 | -1.59116244316154 | 0.028818190845296 |
| POU2F1 | -0.637384892855723 | 0.028760698058856 |
| PTGER2 | -1.16200694569434 | 0.028447329348603 |
| SLC19A1 | -0.813996714218555 | 0.028439730110462 |
| APOBR | -1.29099596749869 | 0.028382138500288 |
| SNX5 | -0.726652801139229 | 0.028222127124532 |
| CD302 | -0.942722600976873 | 0.028151816084577 |
| NUP153 | -0.602928865027501 | 0.027943706542511 |
| RP11-46H11.11 | -0.873186433537422 | 0.027937622579041 |
| EPT1 | -0.744098601223393 | 0.027873577262191 |
| GTF2A1 | -0.618305020499451 | 0.027794043875517 |
| STK17B | -1.33049329660362 | 0.027729687953912 |
| ZNF558 | -0.732304994518143 | 0.027692482147598 |
| AFF2 | -1.46250289824969 | 0.027634994323633 |
| SYNGAP1 | -0.772580928233043 | 0.02757870285739 |
| DOCK5 | -0.771453545882069 | 0.027484435413474 |
| ATG2B | -0.631422694804708 | 0.027478837933184 |
| ATP6V1A | -1.03717144934395 | 0.027406098869539 |
| AKAP10 | -0.666897313248847 | 0.027377572128385 |
| NECAP1 | -0.619852357962867 | 0.027277531773526 |
| LHFPL2 | -1.07497322789232 | 0.027175665880317 |
| TBX4 | -2.42645844744497 | 0.027168143599037 |
| GRINA | -0.822618033992241 | 0.027154187496137 |
| LAIR1 | -1.36674310544847 | 0.02710973300655 |
| FHDC1 | -1.5396227815828 | 0.02695759385135 |
| CD83 | -1.48293046187538 | 0.026955961701545 |

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| RNASET2 | -1.10437224478193 | 0.026918333233168 |
| MZF1 | -0.761009287602251 | 0.02661336330663 |
| VPS37B | -0.768081309526727 | 0.026610655074815 |
| CDK2 | -0.94094373288628 | 0.026597051043449 |
| PIP4K2A | -0.823577657445145 | 0.026587028804246 |
| GSPT1 | -0.823792218200086 | 0.026578676968081 |
| ARID3A | -0.817921141320496 | 0.026524150737087 |
| ARPC2 | -0.724997110304903 | 0.02650809781364 |
| TLK2 | -0.680577643322697 | 0.026317843175629 |
| SLC25A5 | -0.570723632232594 | 0.026316838502109 |
| CNOT2 | -0.742894167497577 | 0.026288705521966 |
| RAPGEF6 | -0.836370106852043 | 0.026219459244966 |
| MCTP2 | -1.34034151411749 | 0.02617877371124 |
| RFWD2 | -0.510546877918756 | 0.025965521541147 |
| RP11-423E7.2 | -1.34185464165583 | 0.025963240440431 |
| SLC19A2 | -1.4397760977607 | 0.025910903236542 |
| ZFP36 | -0.919932693527891 | 0.025700795857827 |
| ADAMTSL2 | -1.5290600265068 | 0.025672664635045 |
| LCOR | -0.7802599173354 | 0.025573573487264 |
| GPD2 | -0.735220877330648 | 0.025527648173493 |
| TC2N | -1.02594947795719 | 0.025478256557792 |
| ACTR3 | -0.939260296140008 | 0.025364657523974 |
| LAMP3 | -2.7312886498718 | 0.025194483557565 |
| NPL | -1.54797176013367 | 0.025158765461062 |
| PATL1 | -0.734200216940955 | 0.025025575068185 |
| MME | -1.42554133452298 | 0.024942760270555 |
| JARID2 | -1.00427589275722 | 0.024905310384359 |
| IRAK1 | -0.745862699376486 | 0.024830235958326 |
| WDR27 | -0.676143051439634 | 0.024798291950808 |
| LARP4B | -0.626390114301603 | 0.024688517807062 |
| NAP1L1 | -0.972838651899652 | 0.024586014077983 |
| GATAD2B | -0.644212418419114 | 0.024585237804088 |
| CELF2-AS1 | -0.991968617420598 | 0.024404312608177 |
| CBFB | -0.654489298555269 | 0.024368584608485 |
| SLC17A5 | -0.84804907567847 | 0.02434397334825 |
| LOH12CR1 | -0.939163257277481 | 0.024074146759015 |
| ARL4C | -1.27729211589638 | 0.023994331054211 |
| ADIPOR1 | -0.698995366329368 | 0.023867082350787 |
| HSPA13 | -0.663187850888687 | 0.023857710652083 |
| BIRC2 | -0.683069987587968 | 0.023796625499806 |
| FAM133B | -0.716863160485183 | 0.023557514959319 |
| RABGGTB | -0.799622791665217 | 0.02353753951716 |
| NCEH1 | -1.18878746305154 | 0.023499416107773 |
| LONRF3 | -0.876185706173772 | 0.023433814452768 |
| PTAR1 | -0.944433125557484 | 0.023169008241309 |
| P2RY1 | -1.02492989802272 | 0.023131618966028 |
| HMGA1 | -1.06877580017529 | 0.023129918258991 |
| TRIM38 | -0.849117417287266 | 0.022942041920124 |
| LRP2 | -2.21094847206404 | 0.022916537960171 |
| MPP1 | -1.20406374525078 | 0.022772677108379 |
| LRRK2 | -1.57107135158904 | 0.02266309045508 |
| RBM27 | -0.71661117970541 | 0.022411247958464 |

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| ZNF331 | -0.950988430755085 | 0.022212480722392 |
| GMPPB | -0.938518652352047 | 0.022033862777857 |
| RNF24 | -0.805322466775261 | 0.022005468527119 |
| INSIG1 | -0.964518545684693 | 0.021866969499749 |
| TNFRSF10C | -1.56410540946004 | 0.021473105053615 |
| SDK2 | -0.987183254226381 | 0.021265362909421 |
| LRRC59 | -0.632125223315395 | 0.021255940570427 |
| GLUL | -1.70234731246567 | 0.020842819835951 |
| RUNX1 | -1.12336717409878 | 0.020681947180855 |
| ARRDC1 | -0.739637117625673 | 0.020514871562778 |
| TMA16 | -0.762891943950812 | 0.020508584181405 |
| CHST15 | -0.838960405130058 | 0.020388838390728 |
| C9orf72 | -1.20622547826014 | 0.020381528473307 |
| ACAP2 | -0.845455005068548 | 0.020105973679943 |
| RNF166 | -0.893973025747134 | 0.020088589951689 |
| NOTCH2NL | -1.04996494491285 | 0.020059721503864 |
| TMF1 | -0.655987880451357 | 0.020049006909153 |
| RABL3 | -0.988896193223483 | 0.020044880372819 |
| PKHD1L1 | -1.28726253299679 | 0.019994828048194 |
| PDZD8 | -0.755765307954404 | 0.019902071562669 |
| RRM2B | -1.08847407339558 | 0.0198357721681 |
| MFSD2A | -1.74325764138149 | 0.019830259934464 |
| DCP2 | -0.807810665372877 | 0.019615437453698 |
| SLC25A44 | -0.812788962789928 | 0.019395470150512 |
| UGCG | -0.834055559601372 | 0.019221298223359 |
| PLK3 | -1.21321505973266 | 0.019155180892869 |
| IFRD1 | -0.739439310062312 | 0.01906075891906 |
| THBS1 | -1.64203581578447 | 0.018970694029849 |
| ZNF746 | -0.711754061381064 | 0.018951117101577 |
| PTP4A1 | -1.09788674355396 | 0.018919291342842 |
| DDIT4 | -0.969418393428321 | 0.01878604652985 |
| ZFAND5 | -1.06577194761317 | 0.018685560369551 |
| CITED2 | -0.87964609049423 | 0.01867384198994 |
| LGALSL | -0.967938688768284 | 0.018670984809886 |
| HIF1A | -1.57323005540772 | 0.018649740645782 |
| ADRBK2 | -1.07342204789112 | 0.018621797774957 |
| CHML | -0.752729006207049 | 0.018601731377896 |
| SERTAD2 | -0.608998187279904 | 0.018559410796463 |
| AREG | -1.54616277821917 | 0.018435249321583 |
| NBPF19 | -1.45974402861371 | 0.01837178694617 |
| TNFAIP3 | -1.27794838934085 | 0.018274767569229 |
| SNX30 | -0.964785239560908 | 0.018249699397582 |
| FOSB | -1.98219799912535 | 0.018243344977977 |
| AP4E1 | -0.628185135185101 | 0.018227671062471 |
| SNX13 | -0.695677814947202 | 0.018120549155012 |
| FAM65B | -1.34178590158213 | 0.017951909246709 |
| TAF9B | -1.23371072586708 | 0.017939327557518 |
| CMPK1 | -0.765213445568218 | 0.017754227605826 |
| DUSP1 | -1.03866949133751 | 0.017721253052079 |
| CDC42SE1 | -0.65883067984278 | 0.017664834706574 |
| MDM4 | -0.660323833117675 | 0.017586264783781 |
| ARRB2 | -0.877196852039018 | 0.017561019708957 |

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| MASTL | -1.20356174227642 | 0.017453960469272 |
| IRS2 | -1.02774274110828 | 0.017411220080221 |
| MEGF9 | -1.18434549863376 | 0.017373590815198 |
| ARID3B | -0.880048588911643 | 0.017362217767173 |
| GOLGA8A | -1.37196073110093 | 0.017296258415805 |
| USP53 | -1.35649817180364 | 0.017270317141102 |
| NAA50 | -0.957459597161295 | 0.017203202378408 |
| CYB5R4 | -0.793695684815658 | 0.017179148694794 |
| NOLC1 | -0.684601967637942 | 0.017126938357097 |
| PTGS2 | -1.81046790102558 | 0.017073733081038 |
| HLTF | -0.873812416401071 | 0.01691229967923 |
| RIT1 | -0.694907125918179 | 0.016815876225 |
| ZCCHC8 | -0.748592586209269 | 0.016672885526639 |
| HNRNPA1 | -1.1083769458962 | 0.016606308839689 |
| OXSR1 | -0.678385113427829 | 0.016559986764772 |
| SNHG12 | -0.890439854795563 | 0.016536238495776 |
| TREM1 | -1.71997624772032 | 0.016464830116995 |
| CCNG2 | -0.841472690547472 | 0.016429090532213 |
| CCP110 | -0.77807115730246 | 0.016417654681785 |
| MAP3K7 | -0.661873627301017 | 0.016329728849311 |
| RIMKLB | -0.63081260996245 | 0.016192712438289 |
| ABCC4 | -1.05313589852371 | 0.016029439700195 |
| ANKRD13A | -0.846075318659332 | 0.01602825220699 |
| TMEM39A | -0.776909260818615 | 0.016002416241363 |
| PPME1 | -0.699042496972194 | 0.015918244248802 |
| SLC36A4 | -1.13596502757805 | 0.015910611034715 |
| NPHP3 | -0.746005283680909 | 0.01577654919807 |
| MMP25 | -1.40440758945249 | 0.015708518699631 |
| AEN | -1.18789850597847 | 0.015694512264637 |
| MAMLD1 | -1.57588143893 | 0.015585137380778 |
| ZBTB43 | -0.819542649031916 | 0.015374883835775 |
| CACUL1 | -0.739219893636856 | 0.015355468310216 |
| EXPH5 | -2.27837641191468 | 0.015277157726911 |
| FBXO34 | -0.750534192426621 | 0.015272397074827 |
| IGSF10 | -1.50458910037595 | 0.015199698776099 |
| CMTR2 | -1.00483792123421 | 0.015117623265925 |
| THEMIS2 | -1.39622345483537 | 0.014939481640305 |
| FOS | -1.32965395988091 | 0.014903161078282 |
| F2R | -0.785844383559047 | 0.014769284446387 |
| STXBP2 | -1.64645812871997 | 0.014716011056122 |
| SNHG17 | -1.15918198434012 | 0.014689735299804 |
| FOXO1 | -0.917766828439399 | 0.014614441356284 |
| PRRC1 | -0.717506112285489 | 0.014579855024899 |
| STK4 | -1.10625587987372 | 0.014492036193737 |
| STEAP3 | -1.49054854843768 | 0.014394896405395 |
| KIAA0907 | -0.764565157069395 | 0.014380757212466 |
| ZXDC | -0.692890789760151 | 0.014375990738631 |
| CTB-152G17.6 | -1.14166020593529 | 0.014309262346067 |
| TANC2 | -0.832321973698059 | 0.014298887926982 |
| TMEM41B | -0.784984477867376 | 0.014241296026092 |
| ZNF678 | -0.885579048152382 | 0.01420953363176 |
| VMP1 | -1.31653224988719 | 0.014173750647376 |

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| LIMS1 | -0.828658941215013 | 0.014107884042018 |
| ACER3 | -0.864634627989837 | 0.014100159752525 |
| ERMAP | -1.08515571564368 | 0.014067949689711 |
| BACH1 | -1.13391229081428 | 0.014067015801183 |
| MYO19 | -1.08709195575099 | 0.014005653838236 |
| CNOT8 | -0.793087022794803 | 0.013977456056011 |
| P2RX4 | -1.09136936597209 | 0.013912236714671 |
| SLC38A5 | -1.5805362823334 | 0.013889419519995 |
| ALPL | -1.74986527186036 | 0.013888230160626 |
| DDI2 | -0.989121307097017 | 0.013837353259242 |
| RP11-1023L17.2 | -1.19329176137705 | 0.013751412846681 |
| IRAK2 | -1.22264230379035 | 0.013676725906152 |
| HCLS1 | -1.10546495501136 | 0.013653870398441 |
| RP4-530I15.9 | -1.61156088689854 | 0.013641607817403 |
| TTC19 | -0.802192730527064 | 0.01361753997217 |
| PIK3IP1 | -0.782931848114087 | 0.01335906757362 |
| BCL2L1 | -1.24041712002673 | 0.013347026333428 |
| COX15 | -0.797832034521402 | 0.013231785006494 |
| BAG4 | -0.7567061798779 | 0.013220975639578 |
| EML4 | -0.925394687406438 | 0.013211069395584 |
| WSB1 | -1.11557600943723 | 0.013174657875607 |
| PI4K2B | -0.955236678664347 | 0.013170578522475 |
| RASGEF1B | -1.90007257732022 | 0.013166189249064 |
| EIF2S3 | -0.781832696919538 | 0.013140158993063 |
| LIN54 | -0.874138321251885 | 0.013131687535125 |
| KRAS | -0.962261136018053 | 0.013014768118266 |
| TVP23C | -0.974826367566677 | 0.012920223373705 |
| HMGN1 | -0.811564501611699 | 0.012802180459074 |
| FGR | -1.47331140075603 | 0.012734771353277 |
| MYSM1 | -0.70584033645586 | 0.012734712385551 |
| CNNM2 | -0.788354728428904 | 0.012683840842185 |
| ZNF217 | -0.828998859062435 | 0.012678331833696 |
| IFI30 | -1.93169464198825 | 0.012669349717119 |
| GPR176 | -1.55290984661543 | 0.012606441121221 |
| CDC40 | -0.795221590229708 | 0.012553413947548 |
| BHLHE40 | -1.10823945876165 | 0.012521024678809 |
| PFKFB2 | -1.41314257014912 | 0.012424814613585 |
| PAPD4 | -0.71772172428877 | 0.012314671921903 |
| EMR2 | -1.52413200755026 | 0.012296808103158 |
| ESM1 | -2.22613587058188 | 0.012201332419398 |
| LYN | -1.24838101153849 | 0.012046204235925 |
| FAM104A | -0.77786982084511 | 0.012014811806401 |
| PIK3R5 | -1.63532084567657 | 0.011857388095394 |
| HPS4 | -1.0288470694854 | 0.011829277192121 |
| UBA5 | -1.06428751471481 | 0.01181953329777 |
| ERO1L | -0.983569848379406 | 0.01180112426306 |
| SLC36A1 | -1.13730724958299 | 0.011800326912602 |
| SAT1 | -1.57996738863876 | 0.011679418235148 |
| PDE3B | -0.944971655322003 | 0.011556798242796 |
| ZNF439 | -0.826801040747824 | 0.011381072275732 |
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| NFKBIA | -0.970310319625739 | 0.010944947333885 |

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| TIPARP | -0.929295707192056 | 0.010921713718646 |
| DDX21 | -0.683812810896354 | 0.010881870994598 |
| PER1 | -0.975556516333086 | 0.010843784324183 |
| DOT1L | -0.996508197240933 | 0.010833725935377 |
| STX3 | -1.13942359266402 | 0.01065944031301 |
| B3GNT5 | -1.58409424460117 | 0.010617280789692 |
| POLR2J3 | -1.00663550182936 | 0.010398586078358 |
| JUNB | -0.98239249226662 | 0.01030381623694 |
| HAUS6 | -0.991628649587024 | 0.010144948189594 |
| GLO1 | -0.879307001862221 | 0.010105578242049 |
| IGF2BP2 | -1.38468769388107 | 0.009963963842035 |
| TBCEL | -0.821403368455564 | 0.009814710903086 |
| NCF2 | -1.32233370067594 | 0.0098139949687 |
| ZNF800 | -0.83888263172899 | 0.00976128009318 |
| NRAS | -0.906985015088943 | 0.009686490207148 |
| RNF149 | -1.34261268558986 | 0.009584967571734 |
| RCOR1 | -0.961694139153492 | 0.00946854726669 |
| EHBP1L1 | -0.993736044718068 | 0.009384715057316 |
| TRIM27 | -0.599510991453375 | 0.009323557488025 |
| SETDB2 | -0.793526277062068 | 0.009106691447976 |
| CXCL8 | -3.16670565708635 | 0.009059487153437 |
| ERRFI1 | -1.52879399380808 | 0.008967232310326 |
| LITAF | -1.06353092383367 | 0.008963628964149 |
| ERI1 | -0.890790668977961 | 0.00879711384475 |
| DUSP6 | -0.987376553358764 | 0.008681648542952 |
| PUS7L | -0.878883877113424 | 0.008591402454922 |
| SLC20A1 | -0.944403564965326 | 0.008543582043082 |
| ATP2B1 | -0.916914318512383 | 0.008531837082168 |
| MAP3K2 | -1.24384606168118 | 0.008506963478678 |
| LILRB3 | -1.78681404759267 | 0.008456427312042 |
| IL6 | -2.10338031253641 | 0.008326400341792 |
| TAB3 | -0.853871211394617 | 0.008291908713836 |
| SLC22A15 | -1.21833213602484 | 0.008282868185155 |
| BBC3 | -1.59873259168252 | 0.008129678450108 |
| RP11-295P9.3 | -0.929582293377299 | 0.008029236563201 |
| OLR1 | -2.09421073816563 | 0.007996259985143 |
| NUDT21 | -0.787872183579434 | 0.007820563711676 |
| RP1-309I22.2 | -1.98399353464243 | 0.00771038154842 |
| UPP1 | -1.40269769338222 | 0.007581494620796 |
| GADD45B | -1.07885694054726 | 0.007568964394318 |
| ADAMTS8 | -2.18471061762939 | 0.007315091787792 |
| BASP1 | -1.86831588751455 | 0.007307203601518 |
| IL18R1 | -1.84198864078584 | 0.007176290783388 |
| ADAMTS2 | -1.21943456749765 | 0.007172313704092 |
| RIOK3 | -0.853840425976544 | 0.007007804394676 |
| SS18L1 | -1.19718662927915 | 0.006809404352597 |
| FKBP5 | -1.27143990290826 | 0.006784596198405 |
| CDC27 | -0.890241517636242 | 0.006712216342364 |
| PYGL | -1.33791083658085 | 0.00667465042921 |
| CMTM3 | -0.880529900360722 | 0.006607731788755 |
| EAF1 | -1.18543687693512 | 0.006552431761438 |
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| PELI1 | -0.800881082227392 | 0.006459948639535 |
| UHMK1 | -1.04084220052535 | 0.006409939891456 |
| CD300A | -1.85478073939685 | 0.006182157116057 |
| RGL3 | -1.2542423250796 | 0.006141456170011 |
| BLOC1S6 | -0.657712727751588 | 0.00606930730683 |
| PIM1 | -1.00827201556046 | 0.006014100933203 |
| IL18RAP | -1.72393210771315 | 0.005988627019038 |
| PANK3 | -0.777229271641867 | 0.0057532018704 |
| ELK4 | -0.940973374155456 | 0.005715337768385 |
| TTLL3 | -0.991806287536157 | 0.005685487677145 |
| SERINC5 | -0.928607771683874 | 0.005521949223644 |
| ITGAX | -2.50764779295252 | 0.005354081793939 |
| LRCH4 | -1.17963827428282 | 0.005244692938898 |
| KIAA1715 | -1.02666846126927 | 0.005217613019063 |
| SLC11A1 | -2.19500407623416 | 0.005184420801139 |
| CTD-3252C9.4 | -1.28529730587385 | 0.005105041613726 |
| FAM35A | -0.843557462633754 | 0.005007976867309 |
| RASSF1 | -0.989770999714363 | 0.004916438954463 |
| TDG | -1.06456874461634 | 0.004901475285048 |
| KBTBD11 | -1.50839405913259 | 0.004877486596347 |
| SLC26A2 | -1.03108234060135 | 0.004787366530411 |
| WDFY2 | -0.768005607772611 | 0.004752619045295 |
| MBNL3 | -1.13491279177859 | 0.004674494556471 |
| DENND3 | -0.969143701943516 | 0.004654391944377 |
| ALOX5 | -1.47956156595565 | 0.004623641542023 |
| DDX39B | -1.0623307628959 | 0.004622469432273 |
| CHSY1 | -0.815883668694872 | 0.004476660022447 |
| TET3 | -1.18346495445149 | 0.004335074309407 |
| MDM2 | -1.23286307386157 | 0.004283790685417 |
| GK | -1.76722575789054 | 0.004238048258153 |
| CROCCP2 | -1.32566235074839 | 0.004111569122643 |
| CCDC14 | -1.04892994122793 | 0.004095342102813 |
| CTC-444N24.11 | -0.735469040288133 | 0.00397359610244 |
| EDEM1 | -1.29843999852276 | 0.003965063337117 |
| LRRC75A-AS1 | -1.13010332854666 | 0.003933866057612 |
| ELL2 | -1.4407067318132 | 0.003902772147221 |
| ERAP2 | -1.58819964747533 | 0.003830430048151 |
| AMPD3 | -1.9559846971759 | 0.003815445583511 |
| SLC25A37 | -1.58466470912524 | 0.003806751032854 |
| CCNK | -1.05897315277987 | 0.003729817829575 |
| RBM3 | -1.67805250148104 | 0.003715631738967 |
| NR4A2 | -2.02796920763398 | 0.003595596453654 |
| PTBP3 | -1.11491101569623 | 0.003577565955622 |
| GZF1 | -1.06348189469898 | 0.003576505320785 |
| DCAF12 | -0.932369627344722 | 0.003449470091685 |
| USP32 | -0.920287324939752 | 0.003412994052707 |
| PNPLA8 | -0.95744446914723 | 0.003404005481548 |
| CTD-2033D15.2 | -2.25502846005875 | 0.003264750161334 |
| AC092881.1 | -1.50408437304301 | 0.003236686479766 |
| C5AR1 | -1.6946846217429 | 0.003229077168407 |
| ATP13A3 | -1.27799593408033 | 0.003208933270301 |
| RLIM | -1.01619452537479 | 0.00303587861501 |

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| MMP19 | -2.28854779640845 | 0.003031212474158 |
| AC068580.6 | -2.17576896439619 | 0.002985842695343 |
| SLC30A7 | -0.917595505391155 | 0.002906034749065 |
| EBLN3 | -0.972842839567279 | 0.002855691739124 |
| OSBPL8 | -1.31980234451625 | 0.00280384977912 |
| LRRTM2 | -0.977129000129245 | 0.002720174415181 |
| ATG16L2 | -1.45642726863942 | 0.002664804852114 |
| GDF15 | -2.53416058812566 | 0.002655023783421 |
| NABP1 | -1.87138278974918 | 0.00251846085469 |
| SNTB1 | -1.2559821690037 | 0.002500185834633 |
| NME9 | -1.48625724413971 | 0.002474668269984 |
| WDR26 | -0.890047971280282 | 0.002433494564656 |
| ATP6V1B2 | -1.33854507508441 | 0.002336320464651 |
| PTEN | -0.968273243945867 | 0.002331424396947 |
| BNIP3L | -1.05057931804877 | 0.002325383706918 |
| TMED8 | -0.973424397964796 | 0.002282008964548 |
| REL | -1.15271020563162 | 0.002262427250128 |
| RP11-752L20.3 | -1.57395550264162 | 0.002258680759729 |
| SMAP2 | -1.71047726043119 | 0.002244331533419 |
| RP11-680G24.5 | -1.9428045997536 | 0.002179648739462 |
| H3F3A | -1.21646446569178 | 0.002064708233908 |
| GLRX | -1.24500951099687 | 0.001953626902917 |
| RP11-104N10.2 | -1.45347850200623 | 0.001933601287154 |
| BEST1 | -1.40687071841764 | 0.001917042628622 |
| HS2ST1 | -1.10301848566805 | 0.001901496923059 |
| H2AFY | -1.32081375232994 | 0.001854499406062 |
| DDHD1 | -0.830012078773119 | 0.001793715530223 |
| ENPP4 | -1.03910442345292 | 0.001756810666072 |
| RP11-415J8.3 | -1.5893564580824 | 0.001726738291706 |
| YOD1 | -1.46009096718521 | 0.001720274876487 |
| FAM213B | -1.22280841097589 | 0.001713127388297 |
| FOXO3 | -1.05034875403992 | 0.001692865483556 |
| NAMPTP1 | -1.95874607714139 | 0.001677676413924 |
| KLHL2 | -0.889891032641533 | 0.001659714393411 |
| IL1R2 | -2.94092775225322 | 0.00162993397553 |
| NCR3LG1 | -1.94541027878898 | 0.001601428548125 |
| AVL9 | -0.846610948172124 | 0.001574727462657 |
| NDEL1 | -0.796434365221325 | 0.001558217592997 |
| ADPGK | -1.21561986619086 | 0.001556101005842 |
| AGFG1 | -1.06219430190764 | 0.001547437949988 |
| GLDN | -2.17006358890939 | 0.00152790533564 |
| ARHGAP19 | -1.53065414078826 | 0.001342730843607 |
| TXNL4A | -1.10671095144536 | 0.001319739892112 |
| S1PR2 | -1.04586528504588 | 0.00131949174342 |
| MXD1 | -1.72707788843913 | 0.001267272573294 |
| FNIP1 | -0.877627833704669 | 0.001245974844731 |
| C1GALT1 | -1.18817354888797 | 0.00123171431873 |
| RP11-107E5.3 | -1.52121032928464 | 0.001179680816275 |
| SLC2A3 | -2.18866006811161 | 0.001135312333323 |
| SLC31A1 | -1.11721262878305 | 0.001126180023068 |
| CSF3R | -2.12367247910878 | 0.001088432497545 |
| TLR2 | -2.23112815547463 | 0.00107183291654 |

GPCPD1 -1.75831950457294 0.001028679627422
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NUTM2B-AS1 -1.08383359478265 0.000758785990901
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NAMPT -1.75778383256835 0.000708167172181
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ADM -1.66753173592187 0.000532670378748
BRI3 -1.05402873070652 0.000532293185167
RELT -1.46240022899999 0.000417657898672
EIF4A1 -1.16842345685302 0.00039608747651
HK2 -2.18978772470103 0.000394742888391
MAPK6 -1.33796073874914 0.000366559166107
SLC16A3 -1.77578728774831 0.000359551129723
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TFRC -2.38319903302317 0.000261879669427
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ENTPD7 -1.34209298049025 0.0002237731487
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PTX3 -2.97360495216617 0.000180932364061
RP11-463O12.5 -1.50731344345757 0.000161279918298
ZNF638-IT1 -1.6475029579887 9.53483217792537E-05
PAG1 -1.78597492727201 8.32357295358576E-05
CSGALNACT2 -1.70814476302253 7.83765712035459E-05
LIF -2.91508641818152 6.82392594174629E-05
NUPL1 -1.47834233626953 6.19977332483482E-05
IRAK3-1.67909542810095 4.89201552790743E-05
RP3-394A18.1 -1.41524981699574 3.04727887003569E-05
AC007278.3 -3.31147030076245 1.69036930690998E-05
PFKFB3 -1.67375775766138 1.35606527173223E-05

**GSE155241**
**Upregulated**
**gene_symbol logFC P.Value**
SMYD3 1.30251565029173 0.00762481724439
CDC42EP5 1.03179404384056 0.009031666932179
RPS27L 0.807237492990884 0.010243172058959
CCAR1 0.607864463391292 0.012284872529204
WDR19 0.656418056365439 0.013675794246461
LOXL1 1.25135468254145 0.016046346446367
STX8 0.88009922825633 0.017267799022984
PHLDA3 0.86517192351909 0.019069691814266

| | | |
|---|---|---|
| ALG9 | 0.657441138370908 | 0.019733323620441 |
| AMZ2 | 0.602123215166927 | 0.02038153190483 |
| FN1 | 1.03896146344408 | 0.020683876799123 |
| GIPC1 | 0.784934418243742 | 0.022262692005175 |
| AKR1A1 | 0.800986147406864 | 0.022322301782835 |
| CTD-2545G14.7 | 2.77239540281221 | 0.023331807742048 |
| FAM229B | 0.902760632480542 | 0.024263195542639 |
| C14orf2 | 0.767632904731066 | 0.024538987745867 |
| COL16A1 | 1.29672248404783 | 0.024723660817773 |
| TTC39C | 0.725271805272444 | 0.024785992973682 |
| MAP2K2 | 0.624762284901637 | 0.026450499912604 |
| CPSF3 | 0.650164480116808 | 0.027252069899166 |
| CYFIP2 | 0.584034748109364 | 0.028602293813221 |
| NDUFB3 | 0.590897707997834 | 0.029355531464605 |
| RAD51C | 0.504174328527922 | 0.029512980831546 |
| TMEM261 | 0.763711265527278 | 0.029727817361842 |
| PTGFRN | 0.901652969114132 | 0.030396676545536 |
| RGS14 | 0.859035901477344 | 0.032867110104354 |
| CYP2R1 | 0.61435208859618 | 0.033735566590112 |
| MTIF3 | 0.62224459023553 | 0.033819839496644 |
| MIB2 | 0.791343033851315 | 0.034858778723714 |
| FAM219B | 0.726727395861504 | 0.036913328323012 |
| COPE | 0.844447737835218 | 0.036954896532897 |
| HIST1H2BD | 1.46504452150091 | 0.037780343395209 |
| DTNB | 0.786173374275153 | 0.038610284005958 |
| SAP30L | 0.861804467381777 | 0.039226303269815 |
| LUC7L3 | 0.970827067192292 | 0.040770163203657 |
| REXO1 | 0.730662051793015 | 0.040826511481483 |
| ACOT13 | 0.993876646872254 | 0.041068734671694 |
| FAM96A | 0.577056085419265 | 0.041102155340989 |
| NEDD8 | 0.563137601872459 | 0.041252022508283 |
| MTCP1 | 1.15671654191891 | 0.042511395589728 |
| ABHD17A | 0.890712517796783 | 0.042975996754554 |
| TRAPPC2L | 0.687926220780914 | 0.043436664742237 |
| SGCE | 0.727572263452315 | 0.043551330802394 |
| LLGL2 | 0.734852233887342 | 0.044576445108025 |
| SIRT6 | 0.645054559426015 | 0.045182780401196 |
| MDH1 | 0.603235462996016 | 0.04537242419392 |
| VPS33B | 0.814046470968059 | 0.046348555508575 |
| EFEMP2 | 0.756873309602192 | 0.046912765473613 |
| ANO9 | 1.28523141225799 | 0.048363564370078 |
| SAMD1 | 0.769049102641808 | 0.048617776338688 |
| NUDT2 | 0.546744491511691 | 0.048918907776399 |
| RP11-298I3.5 | 0.932013494439674 | 0.048921980515892 |
| MCTS1 | 0.64238395988761 | 0.049029531712096 |
| PTOV1 | 0.569725201161264 | 0.049245448466564 |
| SMYD2 | 0.780368529504051 | 0.049386331245998 |
| PHF14 | 0.690907115140375 | 0.049576876283333 |
| SWI5 | 0.670564257067442 | 0.04967180320118 |

**Downregulated**

| | | |
|---|---|---|
| CMIP | -0.702168069215766 | 0.049966412328321 |
| ATP1A1 | -0.591267854501984 | 0.049411158060246 |
| CDC42BPB | -0.79065794635338 | 0.04910946755984 |
| SIK1 | -0.901426574078388 | 0.04891922994295 |
| ERRFI1 | -1.17065599852261 | 0.048764092273361 |
| RAI14 | -0.770780795486171 | 0.048649978991756 |
| CD200 | -0.99438215255487 | 0.048170470730784 |
| WASF2 | -0.554693240636328 | 0.047800726119494 |
| GOLT1B | -0.803359066529631 | 0.046021302358574 |
| JAM3 | -0.802254446901803 | 0.045976669112543 |
| BNIP2 | -0.503960562635377 | 0.044859186661121 |
| ZNF263 | -0.571188663056805 | 0.044160908976147 |
| ARRB1 | -0.69039190116891 | 0.044130911553696 |
| LDLR | -0.933043074776835 | 0.043744036971444 |
| FBXL3 | -0.618798594237152 | 0.043374217630971 |
| NOLC1 | -0.886771781352663 | 0.04234431129262 |
| TCN2 | -0.589729996829425 | 0.041947772186095 |
| MPZL2 | -0.60788683118893 | 0.04086133292758 |
| ELF1 | -0.651036974574354 | 0.039994865828138 |
| NUPL1 | -0.708350622573227 | 0.03882164871505 |
| CMTM8 | -0.549838614528696 | 0.038731550722882 |
| STC1 | -2.45522953470475 | 0.038653291795802 |
| ACKR3 | -1.22445061666505 | 0.038517002723542 |
| DR1 | -0.653348272299716 | 0.036956178155672 |
| CYFIP1 | -0.522127158942009 | 0.036874229944739 |
| PHLDA1 | -1.20820468175288 | 0.035277932248682 |
| MOB4 | -0.507329519989721 | 0.035269158994608 |
| MCMBP | -0.649998648374649 | 0.035180734607416 |
| SLC25A4 | -0.515952560021832 | 0.033788844755148 |
| CSNK1D | -0.549195931150809 | 0.033361340800498 |
| ATP2A2 | -0.711660323217993 | 0.03332624038058 |
| SLC12A7 | -0.529506423540625 | 0.03315799609939 |
| SLC19A2 | -0.642785338911297 | 0.033016959141448 |
| MAT2A | -1.03323801758992 | 0.032978354480919 |
| YWHAG | -0.572348266120044 | 0.032850519071499 |
| NUP98 | -0.709263465644194 | 0.032802054828113 |
| MIDN | -0.693975850018416 | 0.032775135359809 |
| UGCG | -0.981934524068011 | 0.032509149172945 |
| ECE1 | -0.86933087386031 | 0.03195344677785 |
| AQP3 | -0.813302678466522 | 0.031877338694982 |
| SNN | -0.656226774278413 | 0.027913562140005 |
| CCAR2 | -0.529968081816735 | 0.026822132883594 |
| JUN | -1.06200474193041 | 0.024696793307385 |
| ETS2 | -1.29523475974473 | 0.024305303556916 |
| CD9 | -0.605771340406605 | 0.023875149385434 |
| SPSB1 | -0.96755991153186 | 0.023823341040988 |
| SYS1 | -0.562209693716119 | 0.023682306090983 |
| THBD | -1.34521436908379 | 0.021410538236251 |
| PFKFB3 | -0.903724507986315 | 0.020677436288685 |
| TMEM2 | -1.05276186040938 | 0.020496377702317 |

| | | |
|---|---|---|
| TSPAN14 | -0.855324247266825 | 0.020236857785224 |
| NDRG1 | -1.11806327887312 | 0.020088576184363 |
| AAR2 | -0.596507347090173 | 0.018238925152089 |
| B4GALT5 | -1.02372050583373 | 0.018186549620934 |
| SYPL1 | -0.646692160609632 | 0.018014858085905 |
| SEMA3F | -0.87924973158786 | 0.017829712791013 |
| TIPARP | -1.44240466554153 | 0.016854192786103 |
| SPRY2 | -1.04291913583563 | 0.016301555054811 |
| PEX5 | -0.973834658071353 | 0.013258206768151 |
| LRRC8A | -0.783825724995473 | 0.013026106944295 |
| KLF10 | -1.20381790510923 | 0.012630880444863 |
| ABL1 | -0.811923982242501 | 0.012438408791228 |
| DUSP6 | -1.33578336257542 | 0.00892068422602 |
| SEMA4C | -1.07484123496354 | 0.008648233928523 |
| HES1 | -1.00046416903974 | 0.005398166458272 |

**5. Supplementary information on pathways**

**Kegg upregulated pathways**

| Term | P-value |
|---|---|
| Huntington disease | 4.94411853507123E-17 |
| Parkinson disease | 5.9391049284398E-16 |
| Oxidative phosphorylation | 6.16438714917146E-15 |
| Non-alcoholic fatty liver disease (NAFLD) | 1.77326787631063E-14 |
| Alzheimer disease | 1.12816326428253E-13 |
| Thermogenesis | 2.63449898977764E-12 |
| Retrograde endocannabinoid signaling | 3.02117301974943E-11 |
| Cardiac muscle contraction | 0.000291875262904 |
| Systemic lupus erythematosus | 0.000588418529793 |
| Propanoate metabolism | 0.000628315862242 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.002937975416975 |
| Citrate cycle (TCA cycle) | 0.003090716437485 |
| Alcoholism | 0.003332192230608 |
| Inositol phosphate metabolism | 0.003488333254667 |
| ABC transporters | 0.017512010379131 |
| Phosphatidylinositol signaling system | 0.019105990036933 |
| Tight junction | 0.030186196687815 |
| Vascular smooth muscle contraction | 0.035574786678319 |
| Lysine degradation | 0.049033555850626 |
| AGE-RAGE signaling pathway in diabetic complications | 0.0531525629649 |
| Fatty acid elongation | 0.061879766280688 |
| Hypertrophic cardiomyopathy (HCM) | 0.068249859373761 |
| Acute myeloid leukemia | 0.072516492761664 |
| Valine | 4/48 |
| RNA polymerase | 0.086249586012207 |
| beta-Alanine metabolism | 0.086249586012207 |
| Dilated cardiomyopathy (DCM) | 0.08824163702912 |
| Morphine addiction | 0.08824163702912 |
| GnRH signaling pathway | 0.095545292182452 |
| Thyroid hormone signaling pathway | 0.098959029187999 |
| SNARE interactions in vesicular transport | 0.106771054510122 |
| Cell adhesion molecules (CAMs) | 0.119548334344458 |
| African trypanosomiasis | 0.128979016740106 |
| ECM-receptor interaction | 0.144872592900616 |
| Viral carcinogenesis | 0.145468660415613 |
| Ribosome | 0.148400510389738 |
| Relaxin signaling pathway | 0.152314764305142 |
| Arginine biosynthesis | 0.157722297107585 |
| Insulin secretion | 0.166536129025027 |
| Wnt signaling pathway | 0.167999967742504 |
| Tryptophan metabolism | 0.169130659228056 |
| Terpenoid backbone biosynthesis | 0.169809651957453 |
| Transcriptional misregulation in cancer | 0.180524886973932 |
| Fatty acid degradation | 0.186094914368533 |
| Long-term potentiation | 0.191325096882334 |
| Proteasome | 0.194737808722587 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.198271696441733 |

Fc epsilon RI signaling pathway 0.198271696441733
Renin secretion 0.205293532541604
Folate biosynthesis 0.219405591557276
Endocrine and other factor-regulated calcium reabsorption 0.221214137386926
Circadian entrainment 0.231782029382331
Sulfur relay system 0.240836335710997
Butanoate metabolism 0.244652147723646
Melanogenesis 0.257128769636936
Oxytocin signaling pathway 0.261765437419264
Purine metabolism 0.27223941209988
Circadian rhythm 0.282672838608074
Mucin type O-glycan biosynthesis 0.282672838608074
Parathyroid hormone synthesis 5/106
MAPK signaling pathway 0.298689433914548
Hippo signaling pathway 0.298827591143172
Peroxisome 0.309321190290969
Necroptosis 0.30962255028941
Ubiquinone and other terpenoid-quinone biosynthesis 0.315381541633573
Ubiquitin mediated proteolysis 0.31936203387294
VEGF signaling pathway 0.322496001601811
ErbB signaling pathway 0.324713869090346
Fluid shear stress and atherosclerosis 0.331343492138544
Long-term depression 0.331830814694123
Alanine 2/35
Prion diseases 0.333033641256557
Apoptosis 0.355457071799713
Fatty acid biosynthesis 0.360971451147907
Proteoglycans in cancer 0.371386600799747
Central carbon metabolism in cancer 0.37833425232219
Mitophagy 0.37833425232219
Pyruvate metabolism 0.382330227389842
Phospholipase D signaling pathway 0.385753498103742
Ras signaling pathway 0.386448403646733
Rap1 signaling pathway 0.397143214950854
Thiamine metabolism 0.403529630124736
Staphylococcus aureus infection 0.405926519437459
Amoebiasis 0.409560623921214
mTOR signaling pathway 0.409998039827415
Porphyrin and chlorophyll metabolism 0.418261166317339
Aldosterone synthesis and secretion 0.424830628515541
Pathways in cancer 0.431952722256346
Progesterone-mediated oocyte maturation 0.432429051169879
Autophagy 0.437177400579791
Regulation of actin cytoskeleton 0.43835996604562
Selenocompound metabolism 0.443257409995538
Endocytosis 0.444417656944739
Calcium signaling pathway 0.453163186269287
Bacterial invasion of epithelial cells 0.459893749004455
Type II diabetes mellitus 0.464446784906005
Toll-like receptor signaling pathway 0.469963811402076
Cysteine and methionine metabolism 0.475653071925996
Hedgehog signaling pathway 0.475653071925996

Spliceosome 0.476761350948412
Pertussis 0.477421484819903
Steroid biosynthesis 0.480342770751487
cGMP-PKG signaling pathway 0.49360065853817
Apelin signaling pathway 0.496211647863625
Insulin signaling pathway 0.496211647863625
Arginine and proline metabolism 0.497631337499604
Malaria 0.497631337499604
One carbon pool by folate 0.497949855664012
Complement and coagulation cascades 0.503201901252851
Hepatocellular carcinoma 0.50525609245029
Focal adhesion 0.512785873928097
TNF signaling pathway 0.513731507464579
Cholinergic synapse 0.527950366464178
Leukocyte transendothelial migration 0.527950366464178
PI3K-Akt signaling pathway 0.539375195213392
Glycosaminoglycan biosynthesis 0.539775967715721
Proximal tubule bicarbonate reclamation 0.547276643779424
Fanconi anemia pathway 0.549923025597275
NOD-like receptor signaling pathway 0.561924567654996
Sphingolipid signaling pathway 0.576033330458353
Gap junction 0.576326688966537
alpha-Linolenic acid metabolism 0.577442027644375
Pyrimidine metabolism 0.579410283804854
cAMP signaling pathway 0.580040264905021
GABAergic synapse 0.584025851080174
Salivary secretion 0.591635392493427
TGF-beta signaling pathway 0.591635392493427
Viral myocarditis 0.59826731307893
Fc gamma R-mediated phagocytosis 0.599154422534489
Biosynthesis of unsaturated fatty acids 0.605600226852112
Collecting duct acid secretion 0.605600226852112
Oocyte meiosis 0.614951452273107
Glycerolipid metabolism 0.616481668640067
Osteoclast differentiation 0.627419811900003
Linoleic acid metabolism 0.631884613386319
Hematopoietic cell lineage 0.642330030526645
Glyoxylate and dicarboxylate metabolism 0.644363369524459
Pancreatic secretion 0.649198426952248
Hepatitis B 0.650222039487665
Cortisol synthesis and secretion 0.650992532331047
Shigellosis 0.650992532331047
Dopaminergic synapse 0.651572302719282
Choline metabolism in cancer 0.655972464203525
Aminoacyl-tRNA biosynthesis 0.659224589387987
Non-small cell lung cancer 0.659224589387987
Protein processing in endoplasmic reticulum 0.660759630413576
RNA transport0.660759630413576
Inflammatory mediator regulation of TRP channels 0.662652021119936
Amphetamine addiction 0.675220661547129
Longevity regulating pathway 0.675727554091146
Base excision repair 0.679321774076369

Adipocytokine signaling pathway 0.682987055775343
Renal cell carcinoma 0.682987055775343
C-type lectin receptor signaling pathway 0.688425394306832
Pentose and glucuronate interconversions 0.690194626182804
Prolactin signaling pathway 0.690600770144688
RIG-I-like receptor signaling pathway 0.690600770144688
Signaling pathways regulating pluripotency of stem cells 0.696664280158099
B cell receptor signaling pathway 0.698063225404346
Melanoma 0.705375920966391
DNA replication 0.710848390358711
Drug metabolism 0.712694247309046
Insulin resistance 0.712694247309046
Metabolism of xenobiotics by cytochrome P450 0.719558383342882
PPAR signaling pathway 0.719558383342882
Thyroid hormone synthesis 0.719558383342882
Aldosterone-regulated sodium reabsorption 0.720653774381632
Primary immunodeficiency 0.720653774381632
Thyroid cancer 0.720653774381632
Gastric acid secretion 0.726431482508089
Glioma 0.726431482508089
Adrenergic signaling in cardiomyocytes 0.727637952099419
Breast cancer 0.737422412123885
Serotonergic synapse 0.74094751294623
Glutamatergic synapse 0.746325441828238
Ferroptosis 0.748122236933058
Glycine 1/40
Nicotine addiction 0.748122236933058
Human T-cell leukemia virus 1 infection 0.755084992635349
Bladder cancer 0.756665335597767
Fat digestion and absorption 0.756665335597767
Homologous recombination 0.756665335597767
Chemical carcinogenesis 0.770639483268867
Neurotrophin signaling pathway 0.771886545023706
Type I diabetes mellitus 0.772893267700163
Cushing syndrome 0.773906578670015
Chemokine signaling pathway 0.774684422782512
Taste transduction 0.776420076419069
Vasopressin-regulated water reabsorption 0.78059734294081
Human papillomavirus infection 0.789639422587837
Lysosome 0.790786089954575
Colorectal cancer 0.793003105070087
Cell cycle 0.795302571909459
Ether lipid metabolism 0.802178746559184
mRNA surveillance pathway 0.818233997613391
Cholesterol metabolism 0.821640114704082
N-Glycan biosynthesis 0.821640114704082
Vibrio cholerae infection 0.821640114704082

**Kegg downregulated pathways**

| | |
|---|---|
| p53 signaling pathway | 5.6858228961209E-07 |
| TNF signaling pathway | 3.23949689166567E-06 |
| FoxO signaling pathway | 7.3051700710994E-06 |
| Transcriptional misregulation in cancer | 1.31557796856218E-05 |
| Cellular senescence | 2.22896389529206E-05 |
| Pathways in cancer | 3.68097953879826E-05 |
| IL-17 signaling pathway | 5.3871997411462E-05 |
| Chronic myeloid leukemia | 0.000189406655944 |
| Mitophagy | 0.000266563742598 |
| NF-kappa B signaling pathway | 0.000289909037129 |
| Non-small cell lung cancer | 0.000299773856397 |
| Bladder cancer | 0.000346031247629 |
| Human T-cell leukemia virus 1 infection | 0.000359370878506 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.000376494348038 |
| Autophagy | 0.001081506019363 |
| Kaposi sarcoma-associated herpesvirus infection | 0.001309621624823 |
| Chemokine signaling pathway | 0.001618283960021 |
| MAPK signaling pathway | 0.001946805480208 |
| Leishmaniasis | 0.002961161528043 |
| Rheumatoid arthritis | 0.003070887297743 |
| Circadian rhythm | 0.003193030779933 |
| Osteoclast differentiation | 0.003213926406841 |
| Small cell lung cancer | 0.003557014721769 |
| Prostate cancer | 0.004709140156244 |
| Malaria | 0.005245043179526 |
| Choline metabolism in cancer | 0.00538447386314 |
| Shigellosis | 0.005432344282429 |
| AGE-RAGE signaling pathway in diabetic complications | 0.005749056224386 |
| Neurotrophin signaling pathway | 0.006000419144408 |
| Measles | 0.006022033522328 |
| Epstein-Barr virus infection | 0.006942830453553 |
| Thyroid cancer | 0.006967414299793 |
| Endocytosis | 0.007191530103448 |
| Toll-like receptor signaling pathway | 0.007401174479218 |
| Colorectal cancer | 0.00740400969976 |
| Glycosaminoglycan biosynthesis | 0.007711436458517 |
| Hepatitis B | 0.007867055414474 |
| B cell receptor signaling pathway | 0.008769333472387 |
| Legionellosis | 0.009216214249793 |
| Melanoma | 0.00944555811896 |
| Ferroptosis | 0.009703325252174 |
| cAMP signaling pathway | 0.010827856361182 |
| Collecting duct acid secretion | 0.011218779501294 |
| Glioma | 0.011702753490709 |
| Endometrial cancer | 0.011849940482119 |
| Toxoplasmosis | 0.012423830424981 |
| Thyroid hormone signaling pathway | 0.014560599262735 |
| Cytokine-cytokine receptor interaction | 0.018249546705731 |
| Central carbon metabolism in cancer | 0.019967962493274 |
| Inflammatory bowel disease (IBD) | 0.019967962493274 |

Apoptosis 0.020133208915641
Acute myeloid leukemia 0.02137391305387
C-type lectin receptor signaling pathway 0.02160030330368
Fructose and mannose metabolism 0.022412478799322
Salmonella infection 0.023326168573223
Th17 cell differentiation 0.025122812279965
Mineral absorption 0.025830764524115
Renal cell carcinoma 0.025988811438493
Phagosome 0.029195440374568
MicroRNAs in cancer0.039844827925675
Hematopoietic cell lineage 0.041156812125749
Vitamin digestion and absorption 0.043110108049431
AMPK signaling pathway 0.045013094180446
Phosphatidylinositol signaling system 0.045143692332205
RNA transport0.046896134756598
cGMP-PKG signaling pathway 0.048502900540651
T cell receptor signaling pathway 0.049370408877802
Lysosome 0.050749464999394
Longevity regulating pathway 0.051574658675485
Cell cycle 0.052761692168055
Chagas disease (American trypanosomiasis)0.053839933225161
Breast cancer 0.05457211519725
mTOR signaling pathway 0.064623682477903
Hedgehog signaling pathway 0.068450393671214
NOD-like receptor signaling pathway 0.070694695900676
Amino sugar and nucleotide sugar metabolism 0.072819418713741
PI3K-Akt signaling pathway 0.078741074061082
Prolactin signaling pathway 0.080811312046295
Vibrio cholerae infection 0.081970350446652
Inositol phosphate metabolism 0.096966741818384
Pancreatic cancer 0.101243060929857
Pertussis 0.105612030028085
Pathogenic Escherichia coli infection 0.107154015332245
HIF-1 signaling pathway 0.11255071169076
Starch and sucrose metabolism 0.114390907742195
Synaptic vesicle cycle 0.114622617044961
Platelet activation 0.115644536625579
Phospholipase D signaling pathway 0.116466113230005
Complement and coagulation cascades 0.119261401790637
RNA degradation 0.119261401790637
African trypanosomiasis 0.121602918211171
Aldosterone-regulated sodium reabsorption 0.121602918211171
Human cytomegalovirus infection 0.125607142928609
Pantothenate and CoA biosynthesis 0.128321475629469
Viral carcinogenesis 0.128726873606388
Oxytocin signaling pathway 0.133407040135543
Tuberculosis 0.13792565961591
Relaxin signaling pathway 0.138144186443714
Insulin resistance 0.146382634264284
ErbB signaling pathway 0.148863382306011

**Reactome- upregulated pathways**

**Term P-value**

Respiratory electron transport Homo sapiens R-HSA-611105 2.91264341923691E-21
The citric acid (TCA) cycle and respiratory electron transport Homo sapiens R-HSA-1428517 1.52795548735682E-20
Complex I biogenesis Homo sapiens R-HSA-6799198 1.17988499157356E-14
Metabolism Homo sapiens R-HSA-1430728 1.07372731447021E-05
Mitochondrial translation initiation Homo sapiens R-HSA-5368286 2.49415645028422E-05
Mitochondrial translation Homo sapiens R-HSA-5368287 5.02640293911422E-05
Mitochondrial translation termination Homo sapiens R-HSA-5419276 0.000121210711134
Mitochondrial translation elongation Homo sapiens R-HSA-5389840 0.000121210711134
Beta oxidation of octanoyl-CoA to hexanoyl-CoA Homo sapiens R-HSA-77348 0.000366927995294
Beta oxidation of decanoyl-CoA to octanoyl-CoA-CoA Homo sapiens R-HSA-77346 0.000366927995294
Extracellular matrix organization Homo sapiens R-HSA-1474244 0.000682386125065
Response to elevated platelet cytosolic Ca2+ Homo sapiens R-HSA-76005 0.001261498021981
Integrin cell surface interactions Homo sapiens R-HSA-216083 0.001854920451169
mitochondrial fatty acid beta-oxidation of saturated fatty acids Homo sapiens R-HSA-77286 0.001903650002243
Platelet degranulation Homo sapiens R-HSA-114608 0.002967424688856
Citric acid cycle (TCA cycle) Homo sapiens R-HSA-71403 0.003361387679346
Pausing and recovery of Tat-mediated HIV elongation Homo sapiens R-HSA-167238 0.003584050878443
Tat-mediated HIV elongation arrest and recovery Homo sapiens R-HSA-167243 0.003584050878443
HIV elongation arrest and recovery Homo sapiens R-HSA-167287 0.004131410957178
Pausing and recovery of HIV elongation Homo sapiens R-HSA-167290 0.004131410957178
Elongation arrest and recovery Homo sapiens R-HSA-112387 0.004131410957178
TP53 Regulates Metabolic Genes Homo sapiens R-HSA-5628897 0.007527652134665
Organelle biogenesis and maintenance Homo sapiens R-HSA-1852241 0.007946872541318
mRNA Splicing - Minor Pathway Homo sapiens R-HSA-72165 0.007980483325977
Collagen formation Homo sapiens R-HSA-1474290 0.008070508609606
Cytosolic iron-sulfur cluster assembly Homo sapiens R-HSA-2564830 0.008567396408567
Synthesis of IP3 and IP4 in the cytosol Homo sapiens R-HSA-1855204 0.009345047876653
Mitochondrial protein import Homo sapiens R-HSA-1268020 0.009567465153071
HATs acetylate histones Homo sapiens R-HSA-3214847 0.010452632110631
Activation of anterior HOX genes in hindbrain development during early embryogenesis Homo sapiens R-HSA-5617472 0.010539423674324
Activation of HOX genes during differentiation Homo sapiens R-HSA-5619507 0.010539423674324
SUMOylation of transcription factors Homo sapiens R-HSA-3232118 0.01063311224871
Beta oxidation of hexanoyl-CoA to butanoyl-CoA Homo sapiens R-HSA-77350 0.010688704481466
Beta oxidation of lauroyl-CoA to decanoyl-CoA-CoA Homo sapiens R-HSA-77310 0.010688704481466

Transcriptional regulation by small RNAs Homo sapiens R-HSA-5578749 0.010850049674063
Initial triggering of complement Homo sapiens R-HSA-166663 0.013393762250178
HIV Transcription Elongation Homo sapiens R-HSA-167169 0.014575502547905
Tat-mediated elongation of the HIV-1 transcript Homo sapiens R-HSA-167246 0.014575502547905
Formation of HIV-1 elongation complex containing HIV-1 Tat Homo sapiens R-HSA-167200 0.014575502547905
JNK (c-Jun kinases) phosphorylation and activation mediated by activated human TAK1 Homo sapiens R-HSA-450321 0.015558218889148
Formation of HIV elongation complex in the absence of HIV Tat Homo sapiens R-HSA-167152 0.015998947272924
RNA Polymerase II Transcription Elongation Homo sapiens R-HSA-75955 0.015998947272924
Formation of RNA Pol II elongation complex Homo sapiens R-HSA-112382 0.015998947272924
ABC-family proteins mediated transport Homo sapiens R-HSA-382556 0.017512010379131
ABC transporters in lipid homeostasis Homo sapiens R-HSA-1369062 0.018425430933674
Mitochondrial Fatty Acid Beta-Oxidation Homo sapiens R-HSA-77289 0.018425430933674
Complement cascade Homo sapiens R-HSA-166658 0.018604195811492
FCERI mediated MAPK activation Homo sapiens R-HSA-2871796 0.019837700116543
Nectin/Necl trans heterodimerization Homo sapiens R-HSA-420597 0.021457393485099
Activation of SMO Homo sapiens R-HSA-5635838 0.021565337764556
Pyruvate metabolism and Citric Acid (TCA) cycle Homo sapiens R-HSA-71406 0.022609030346532
mRNA Splicing Homo sapiens R-HSA-72172 0.024752852947595
Signaling by FGFR2 IIIa TM Homo sapiens R-HSA-8851708 0.024978585345306
Regulation of TP53 Activity through Methylation Homo sapiens R-HSA-6804760 0.024978585345306
Platelet activation 15/253
Activated PKN1 stimulates transcription of AR (androgen receptor) regulated genes KLK2 and KLK3 Homo sapiens R-HSA-5625886 0.026998616883266
Synthesis of PIPs at the plasma membrane Homo sapiens R-HSA-1660499 0.026998616883266
Insulin-like Growth Factor-2 mRNA Binding Proteins (IGF2BPs/IMPs/VICKZs) bind RNA Homo sapiens R-HSA-428359 0.027975324367416
Nicotinamide salvaging Homo sapiens R-HSA-197264 0.027975324367416
Regulation of Insulin-like Growth Factor (IGF) transport and uptake by Insulin-like Growth Factor Binding Proteins (IGFBPs) Homo sapiens R-HSA-381426 0.03262224544888
Vif-mediated degradation of APOBEC3G Homo sapiens R-HSA-180585 0.033065256651811
Type I hemidesmosome assembly Homo sapiens R-HSA-446107 0.035172885633461
Crosslinking of collagen fibrils Homo sapiens R-HSA-2243919 0.035172885633461
Mitochondrial iron-sulfur cluster biogenesis Homo sapiens R-HSA-1362409 0.035172885633461
mRNA Splicing - Major Pathway Homo sapiens R-HSA-72163 0.038594022407732
MAP2K and MAPK activation Homo sapiens R-HSA-5674135 0.038692546735692
MicroRNA (miRNA) biogenesis Homo sapiens R-HSA-203927 0.041341161053944
Abortive elongation of HIV-1 transcript in the absence of Tat Homo sapiens R-HSA-167242 0.041341161053944
BBSome-mediated cargo-targeting to cilium Homo sapiens R-HSA-5620922 0.041341161053944

Activation of Ca-permeable Kainate Receptor Homo sapiens R-HSA-451308 0.042996739994234
Ionotropic activity of Kainate Receptors Homo sapiens R-HSA-451306 0.042996739994234
Calcitonin-like ligand receptors Homo sapiens R-HSA-419812 0.042996739994234
Chromatin organization Homo sapiens R-HSA-4839726 0.044487155525489
Chromatin modifying enzymes Homo sapiens R-HSA-3247509 0.044487155525489
Senescence-Associated Secretory Phenotype (SASP) Homo sapiens R-HSA-2559582 0.046140900333307
Metabolism of water-soluble vitamins and cofactors Homo sapiens R-HSA-196849 0.048599986736784
Elastic fibre formation Homo sapiens R-HSA-1566948 0.049086225136413
Histidine phenylalanine
Transcriptional Regulation by TP53 Homo sapiens R-HSA-3700989 0.050253154519771
Uptake and function of anthrax toxins Homo sapiens R-HSA-5210891 0.051396373124505
Import of palmitoyl-CoA into the mitochondrial matrix Homo sapiens R-HSA-200425 0.051396373124505
Phenylalanine and tyrosine catabolism Homo sapiens R-HSA-71182 0.051396373124505
HDACs deacetylate histones Homo sapiens R-HSA-3214815 0.052067518613155
Viral Messenger RNA Synthesis Homo sapiens R-HSA-168325 0.052859570327313
Signaling by VEGF Homo sapiens R-HSA-194138 0.055052427945226
TP53 Regulates Transcription of DNA Repair Genes Homo sapiens R-HSA-6796648 0.055208642067976
Gene Silencing by RNA Homo sapiens R-HSA-211000 0.055525694768391
FGFR2 alternative splicing Homo sapiens R-HSA-6803529 0.056370167768653
ERCC6 (CSB) and EHMT2 (G9a) positively regulate rRNA expression Homo sapiens R-HSA-427389 0.056786145419767
Classical antibody-mediated complement activation Homo sapiens R-HSA-173623 0.056786145419767
Autodegradation of Cdh1 by Cdh1:APC/C Homo sapiens R-HSA-174084 0.058456901894455
MAPK family signaling cascades Homo sapiens R-HSA-5683057 0.060197436029361
Inositol phosphate metabolism Homo sapiens R-HSA-1483249 0.060864869214393
RNA Pol II CTD phosphorylation and interaction with CE Homo sapiens R-HSA-167160 0.061879766280688
RNA Pol II CTD phosphorylation and interaction with CE Homo sapiens R-HSA-77075 0.061879766280688
Processing of Capped Intron-Containing Pre-mRNA Homo sapiens R-HSA-72203 0.0643817578328
Metabolism of vitamins and cofactors Homo sapiens R-HSA-196854 0.064642797861647

**Downregulated pathways**

**Term P-value**
Transcriptional Regulation by TP53 Homo sapiens R-HSA-3700989 1.73383545468243E-06
TP53 Regulates Transcription of Cell Death Genes Homo sapiens R-HSA-5633008 8.9601120379801E-06
Interleukin-1 signaling Homo sapiens R-HSA-446652 1.09377243484373E-05
Immune System Homo sapiens R-HSA-168256 1.20860400970762E-05
Hemostasis Homo sapiens R-HSA-109582 1.67186807456203E-05
Transmembrane transport of small molecules Homo sapiens R-HSA-382551 1.67359045754493E-05

SLC-mediated transmembrane transport Homo sapiens R-HSA-425407 2.96276381404827E-05
Signaling by Interleukins Homo sapiens R-HSA-449147 4.66658933948091E-05
MyD88:Mal cascade initiated on plasma membrane Homo sapiens R-HSA-166058 4.83456214883364E-05
Toll Like Receptor TLR1:TLR2 Cascade Homo sapiens R-HSA-168179 4.83456214883364E-05
Toll Like Receptor TLR6:TLR2 Cascade Homo sapiens R-HSA-168188 4.83456214883364E-05
Toll Like Receptor 2 (TLR2) Cascade Homo sapiens R-HSA-181438 4.83456214883364E-05
Activated TLR4 signalling Homo sapiens R-HSA-166054 8.16252888327764E-05
Cytokine Signaling in Immune system Homo sapiens R-HSA-1280215 9.3609953740681E-05
Interactions of Vpr with host cellular proteins Homo sapiens R-HSA-176033 0.000122829431746
TP53 Regulates Transcription of Cell Cycle Genes Homo sapiens R-HSA-6791312 0.000156662849662
Toll Like Receptor 4 (TLR4) Cascade Homo sapiens R-HSA-166016 0.000195486168638
MAP2K and MAPK activation Homo sapiens R-HSA-5674135 0.000211592800006
Cellular responses to stress Homo sapiens R-HSA-2262752 0.000226074800241
TP53 Regulates Transcription of Genes Involved in Cytochrome C Release Homo sapiens R-HSA-6803204 0.000302840622228
Transferrin endocytosis and recycling Homo sapiens R-HSA-917977 0.000310787112601
Toll Like Receptor 10 (TLR10) Cascade Homo sapiens R-HSA-168142 0.000355770470769
Toll Like Receptor 5 (TLR5) Cascade Homo sapiens R-HSA-168176 0.000355770470769
MyD88 cascade initiated on plasma membrane Homo sapiens R-HSA-975871 0.000355770470769
TRAF6 mediated induction of NFkB and MAP kinases upon TLR7/8 or 9 activation Homo sapiens R-HSA-975138 0.000392784967455
Chondroitin sulfate biosynthesis Homo sapiens R-HSA-2022870 0.00039290380564
NOD1/2 Signaling Pathway Homo sapiens R-HSA-168638 0.000455494942948
Iron uptake and transport Homo sapiens R-HSA-917937 0.000468519185772
MyD88 dependent cascade initiated on endosome Homo sapiens R-HSA-975155 0.00047646569162
Toll Like Receptor 7/8 (TLR7/8) Cascade Homo sapiens R-HSA-168181 0.00047646569162
Transport of glucose and other sugars metal ions and amine compounds Homo sapiens R-HSA-425366
TP53 regulates transcription of additional cell cycle genes whose exact role in the p53 pathway remain uncertain Homo sapiens R-HSA-6804115 0.000501797941109
TRAF6 Mediated Induction of proinflammatory cytokines Homo sapiens R-HSA-168180 0.000578710049939
Toll Like Receptor 9 (TLR9) Cascade Homo sapiens R-HSA-168138 0.000629319181835
Toll-Like Receptors Cascades Homo sapiens R-HSA-168898 0.000745511391464
MAP kinase activation in TLR cascade Homo sapiens R-HSA-450294 0.000751264646938
ROS 6/34
Innate Immune System Homo sapiens R-HSA-168249 0.000779429683187
Deadenylation of mRNA Homo sapiens R-HSA-429947 0.000785732600894