

# Supplementary Materials: Estrogenic Endocrine Disrupting Chemicals Influencing NRF1 Regulated Gene Networks in the Development of Complex Human Brain Diseases

Mark Preciados, Changwon Yoo and Deodutta Roy

**Table S1.** 17- $\beta$  Estradiol interacting genes which are also NRF1 target genes.

**Table S2.** NRF-1 target genes associated with estrogen and estrogenic endocrine disruptors—BPA, PCB, phthalate, As, Cd, and Mn.

Estrogenic Endocrine Disruptor	Number of Genes	NRF1-Target Genes
17- $\beta$ Estradiol	724	<p>ABCA3 ABCD3 ABI1 ABLM2 ACADM ACYP2 ADCY9 ADI1 ADIPOR2 ADM5 AGPAT5 AIFM1 AKAP8L AKIP1 AKIRIN2 AKR7A2 AKT2 AKTIP ALAS1 ALDOA AMACR ANAPC1 ANAPC11 ANAPC16 ANKRD37 ANLN AP1S1 APBB2 APBB3 APITD1 ARAF ARF4 ARHGDI ARHGEF39 ARL3 ARPC2 ARPC5 ASH1L ASTN2 ATF5 ATF7IP ATM ATP11A ATP5O AUH AURKA AURKB B3GNTL1 BAG4 BASP1 BCAT1 BCAT2 BCL6B BCL7A BOP1 BRD2 BRK1 BSG BTBD3 BTBD7 BUB1 BYSL C16ORF45 C2ORF76 C4ORF46 C4ORF48 CACYBP CANT1 CASK CASP2 CBFB CBR1 CBX1 CBX2 CCDC86 CCNB1 CCNE1 CCNG2 CCNI CCNT2 CCT3 CCT6A CCT8 CD27 CD99L2 CDC34 CDC42 CDC7 CDCA2 CDK1 CDK10 CDK2AP2 CDKN2B CDKN2D CDT1 CDV3 CENPN CEP170 CEP85 CHAC2 CHMP2A CHMP2B CHMP5 CHORDC1 CIRBP CISD1 CKLF CKS1B CKS2 CLASP2 CLEC11A CLIC4 CMC1 CNBP CNKSR3 CNOT1 CNST COMMD8 COPB2 COX5B COX6A2 COX6C CPNE1 CREB1 CREM CRK CRKL CRMP1 CSK CSNK1A1 CTBP1 CTDSPL2 CTNNA2 CTPS1 CTSD CYB5A CYB5R4 CYCS DAAM1 DAD1 DAP DCAF8 DDAH1 DDIT3 DDX10 DDX27 DDX3X DEDD2 DENND5A DES1 DGKH DHX9 DKC1 DLGAP4 DLL3 DLX4 DNAAF1 DNAH14 DNAJB12 DNAJB2 DNAJB6 DNAJB9 DNAJC3 DNAJC5 DNMT1 DOHH DONSON DPY30 DPYSL2 DSN1 DST DTYMK DYNLL1 E2F1 E2F6 EBAG9 EEF1A1 EEF1D EEF1G EHD1 EHMT1 EIF1 EIF2S1 EIF2S2 EIF3K EIF3L EIF4E EIF4G1 EIF5A ELOVL4 ENO1 EPHX1 EPS15L1 EPS8 ERCC2 ERCC6 ERCC6L ERICH1 ERRFI1 ESRP2 ESRRA ETFB ETFDH ETV5 EXOSC2 EXT2 EZH1 EZH2 FADD FAM102A FAM118B FAM151B FAM161A FAM189A1 FAM219A FAM46C FAM47E FAM49B FARSB FASN FAU FBL FBXO31 FBXO46 FBXO5 FBXW5 FCHO2 FDPS FIGN FIGNL1 FIGNL2 FKBPL FSTL3 FUT8 FXDY3 FYTTD1 FZD4 FZR1 G3BP2 GAA GABRB1 GATAD2A GCLC GEMIN4 GFOD2 GFPT1 GLB1 GLE1 GNG5 GOLGA2 GPBP1L1 GPD1L GPR37 GPSM2 GRPEL2 GSR GSS GSTK1 GSTM3 GTF2E2 GTF2I HARS HAUS3 HBP1 HDAC2 HDAC3 HDAC4 HDLBP HEATR3 HIRIP3 HMMR HNRNPA1 HNRNPH1 HNRNPU HOOK3 HOXC6 HRAS HSD17B4 HSDL2 HSF1 HSF2 HSF4 HSP90AA1 HSPA14 HSPA4L HSPA8 HSPA9 HSPD1 HSPE1 HUNK HYLS1 IAH1 IFIT5 IGFBP3 IKZF2 IL17RD ILVBL IMMP2L INPP5A INPP5K INTS7 IP6K2 IPO9 IRS1 ITGA1 ITGAE JAK2 JMY KANSL1L KIAA0100 KIF18A KIF4A KIFC1 KLF13 KLHL11 KLHL22 KRCC1 KRR1 KRTCAP2 L3MBTL1 L3MBTL3 LAP3 LDHA LETM1 LFNG LIN37 LIPA LPCAT3 LRIF1 LRRC27 LRRC58 LSM2 LSR LSS LYAR MACF1 MAD2L1 MAGED2 MAGED4 MAGI1 MANEA MAP2K7 MAP4K3 MAPK7 MAPT MARS2 MBD1 MBD4 MCM2 MCM4 MCM6 MECP2 MECR MED11 MED18 MED20 MED4 MEF2A MEX3B MGEA5 MGST3 MKNK1 MKNK2 MKSI MLH3 MLLT3 MMADHC MMP17 MOK MPC2 MPP6 MRPL12 MRPL49 MRPS18B MSH2 MST1 MTHFD1 MYBBP1A MYCBP2 MYH10 MYH14 MYO1D NAA38 NAMPT NAP1L4 NARF NBEA NBPf3 NDFIP2 NDRG3 NDUFA3 NDUFb4 NEFH NEGR1 NEIL2 NEIL3 NEK2 NEK4 NF1 NGLY1 NMRK1 NOP2 NPM1 NR1D1 NRTN NUBP1 NUP107 NUP50 NUSAP1 NXT1 OAZ2 ODC1 OIP5 ORC6 OS9 OSBPL6 P4HB PAICS PAPSS1 PAQR8 PARP3 PAXIP1 PCBP2 PCDH9 PCNA PDCD4 PDCD6 PDHB PDIA4 PDGR1 PEG10 PELI1 PELP1 PER1 PFDN1 PFKFB4 PFN1 PGAM5 PGAP1 </p>

		<p>           PGRMC2 PHC3 PHF12 PIGA PIP5K1B PITX2 PKD1 PLA2G12A PLCG1 PLD1 PLK4 PLS1 PMS2 PNISR PNMAL1 POLA1 POLE4             POLG2 POLR1A POLR2A POLRMT POM121 POMT1 PPA1 PPAN PPAT PPDPF PPIA PPIF PPM1D PPM1F PPM1K PPP1R12A             PPP4R4 PPP6R1 PPTC7 PRAME PRC1 PRDM4 PRDX5 PRKAR2A PRKDC PRMT1 PRRC2C PRRT2 PSAP PSENE1 PSPC1 PSTK             PTBP1 PTCH1 PTK2 PTMA PTPRS PUS7L PVR PXD1 PYGL RAB1B RAB32 RAB4A RABL6 RAC1 RAD50 RAE1 RAF1 RAN             RANBP3 RASSF1 RBBP4 RBBP7 RBBP8 RBKS RBL2 RBM14 RBM7 RBMXL1 RBX1 RELA RENBP RFXANK RGS19 RGS20 RHD             RHOA RIPK2 RNF139 RNF14 RNF145 RNF149 RNF19B RNF32 RNPS1 ROCK1 RPL10 RPL13A RPL14 RPL36 RPS13 RPS16 RPS21             RPS29 RPS6KA5 RPS6KA6 RPS6KB1 RPS9 RPUSD1 RRP9 RSF1 RSL24D1 RSU1 RTN3 RUNX2 S100A13 SACS SAMHD1 SAP18             SARS SBF1 SCAF11 SCAMP4 SCAND1 SCARB2 SCN3B SCOC SDCBP SDCCAG8 SDF4 SDHA SDHAF4 SEC14L1 SEC22C SEC61G             SECTM1 SELT SERTAD1 SESN1 SET SFMBT2 SFR1 SFXN2 SGCB SGMS1 SH3BGR SH3BP5 SHBG SHC1 SHC4 SHMT2 SHAH2             SIN3B SIRT5 SLC16A1 SLC22A5 SLC25A10 SLC37A4 SLC39A14 SLC39A6 SLC3A2 SLC44A2 SMAP1 SMARCA4 SMC4 SMIM14             SMYD3 SNRK SNW1 SNX7 SOC1 SOS1 SPC24 SPDL1 SPOCD1 SPRY4 SPTAN1 SRC SRFBP1 SRRM1 SRRM2 SRSF1 SSH2             ST5 STARD13 STARD7 STK38 STPG2 STRN3 STUB1 STX1A STX3 SUCLA2 SUFU SUV39H2 SYMPK TADA2B TAF12 TAF5             TANGO2 TARS TBC1D24 TBC1D8 TCAIM TCEB2 TCF19 TCF25 TCTEX1D2 TGDS TGIF1 THBS2 THRA TIA1 TIMELESS TIPARP             TMED3 TMEM106C TMEM116 TMEM120B TMEM139 TMEM14A TMEM14C TMEM170B TMEM38B TMEM43 TMX1 TNKS2             TNPO2 TOP1 TP53BP2 TPM1 TPMT TPR TPX2 TRADD TRAM1 TRIO TRUB1 TSPAN12 TSPAN3 TSPYL2 TTC25 TTLL12 TUBB             TUBB4B TUBD1 TWF2 U2AF1 UBA52 UBE2D4 UBE2T UNG UNKL UPF1 UPF2 USP12 VAPB VARS2 VASH1 VMA21 VPS8             WDHD1 WDR4 WDR43 WDR5 WNT5A XPA XPO5 XRCC2 XRCC5 XRCC6 YWHAZ ZBED8 ZBTB43 ZBTB80S ZFAND2A ZNF281             ZNF428 ZNF610 ZNF652 ZNF658 ZNF711 ZNF750 ZNF84 ZP3 ZWINT ZXDC         </p>
Ethinyl estradiol	800	<p>           A1BG AATF ABCB10 ABCF1 ABCF3 ABHD14A ABI1 ACAD9 ACADM ACAT2 ACOT13 ACP1 ACTB ACTN4 ACTR1A ACTR8             ACYP2 ADCK5 ADCY9 ADIPOR2 AGPAT5 AIFM1 AKAP8 AKT2 AKTIP ALAS1 ALDOA AMZ2 ANAPC1 ANAPC11 ANAPC7             ANGEL2 ANLN ANXA5 AP1M1 AP1S1 AP2M1 AP3B1 APBA3 APBB2 APBB3 APEX2 APRT ARAF ARF1 ARF4 ARHGEF18             ARL2BP ARL3 ARMCX2 ARPC1A ARPC2 ARPC5 ASB8 ATAD1 ATAD3A ATAD3B ATF5 ATG7 ATP5O ATP6V0D1 ATP6V0E2             ATP6V1D ATRN AURKB AVEN B3GALNT2 B3GNTL1 B9D1 BBS2 BCAT1 BCCIP BCKDHA BCL6B BCL7B BCLAF1 BNIP3 BOP1             BSG BUB1 BYSL C20ORF24 CACYBP CANT1 CASC5 CASP2 CBFB CBR1 CBX1 CBX7 CBY1 CCDC43 CCNB1 CCNE1 CCNF             CCNG2 CCS CCT3 CCT5 CCT6A CCT8 CD320 CD47 CD59 CD99L2 CDC42 CDC42SE2 CDC7 CDK1 CDK2AP2 CDT1 CDV3 CDYL             CENPI CFDP1 CHMP2A CHMP3 CHORDC1 CHST12 CHTF18 CIAO1 CIB1 CIRBP CIZ1 CKLF CKS1B CKS2 CLEC11A CLK3             CLOCK CLP1 CMAS CNOT4 COG6 COPB2 COPG1 COQ10B COQ3 COX5B COX6C CPT1C CREB1 CRK CRY1 CSE1L CSK             CSNK1A1 CSTF1 CTNNA2 CTNNBIP1 CTPS1 CTSD CUTC CYB5A CYCS CYTH2 DAP DAP3 DAZAP1 DBI DCAF8 DDAH1 DDIT3             DDX27 DDX39B DDX41 DDX42 DDX56 DESI1 DHDDS DHODH DHX15 DIRC2 DLD DLGAP4 DNAJA3 DNAJB6 DNAJC3             DNMT1 DNMT11 DOLPP1 DPF2 DST DSTN DTNBP1 DUSP14 DUSP22 DYNC1H1 DYNC1L1 DYNLL1 DYNLRB2 E2F1 E2F6 EED             EEF1A1 EEF1G EGLN2 EHD1 EI24 EIF1 EIF2S1 EIF2S2 EIF3E EIF3K EIF3L EIF4B EIF4E EIF4E2 EIF5A ELMOD3 ELOF1 ELP5             EMC6 ENO1 EPHX1 EPN3 ERCC2 ERGIC3 ERI3 ERLIN1 ERP29 ERRF1 ETFDH ETV5 EVC EXOGE EXOSC1 EXOSC10 EXOSC5             EXT2 EZH1 EZH2 FADD FAM102A FAM120B FAM122B FANCA FARSB FASN FAU FBXL8 FBXO9 FBXW5 FDPS FGFR1OP2             FKBPL FKRP FLYWCH2 FNBP4 FOPNL FSD1 FUND1 FXR2 FXR3 FZD1 GABPB1 GCLC GDPGP1 GEMIN2 GIGYF2 GIT2 GLB1             GLRX3 GMEB2 GNAO1 GNPAT GNPDA2 GOLGA1 GOLGA2 GOLGA4 GPAA1 GPSM2 GRHPR GRPEL2 GSR GSS GSTM3 GSTZ1             GTF2A1 GTF2E2 GTF2F1 GTF2I GTSE1 HARS HBP1 HBS1L HCRT HDAC2 HDAC3 HDHD2 HDHD3 HDLBP HERC4 HGS HINT1             HIRIP3 HMGN1 HMHA1 HNRNPA1 HNRNPH1 HNRNPM HNRNPU HOXC6 HRAS HSD17B4 HSF1 HSP90AA1 HSPA14 HSPA4L             HSPA8 HSPA9 HSPD1 HSPE1 HUNK ICMT IDE IFT172 IFT27 IGFBP3 IKBKAP IL4I1 ILKAP INPP5A INSIG2 INTS6 IPO11 IRF3             ISOC1 ITGA1 KARS KBTBD2 KCTD9 KDELRL2 KIF5B KLF13 KLHL11 KRTCAP2 L3MBTL3 LARP7 LDHA LENG1 LETM1 LIG3             LIN37 LIPA LONP1 LRRC27 LSM4 LSS LYAR LYPLA1 LYPLAL1 MACF1 MAD2L1 MAFG MAGED1 MAGED2 MAP1LC3B MAP2          </p>

		<p> MAP2K7 MAPK7 MAPT MAST2 MBD1 MBD3 MBTD1 MCM2 MCM4 MCM6 MEA1 MECR MED11 MED25 MED28 MED4 MESP2   MGAT1 MGEA5 MGST3 MIDN MIP MKNK2 MLX MMRN2 MOK MORF4L1 MORF4L2 MPDU1 MPG MPHOSPH6 MPPE MRPL12   MRPL17 MRPL24 MRPL32 MRPL36 MRPL45 MRPL49 MRPL54 MRPS12 MRPS18B MRPS25 MRPS6 MSH2 MSRA MTCH2 MTG1   MTHFD1 MTHFSD MVD MXI1 MYCBP MYCBP2 MYH10 N6AMT1 NAA10 NAA16 NAA38 NADSYN1 NAE1 NAGK NAMPT   NAP1L4 NAPA NAPB NAPG NARFL NDST2 NDUFA8 NDUFS8 NEFH NEIL3 NEK4 NEK8 NEUROD1 NF2 NFX1 NOL7 NOMO1   NONO NPM1 NPRL3 NR1D1 NR1D2 NR2C1 NRBP1 NRTN NSUN2 NT5C3 NUDT7 NUP35 NUP50 NUSAP1 NXT1 OCIAD1   ODC1 OPA1 ORAOV1 ORC6 OS9 OSTF1 OTUD5 P4HB PAIP2 PAPSS1 PARD6A PATL1 PAXIP1 PCBP2 PCGF6 PCIF1 PCNA   PCNT PDCD4 PDCD5 PDCD6 PDCD6IP PDE8A PDHB PDIA4 PDXDC1 PEG10 PER1 PFDN1 PFN1 PGAM5 PGRMC2 PGS1   PHF23 PI4K2B PIGA PIN4 PINK1 PKD1 PKIB PLEKHA3 PLEKHB2 PLK4 PLOD3 PLS1 PNISR POLD1 POLE4 POLG2 POLR1A   POLR1C POLR3K POLRMT POMT1 POP1 POP4 POP7 POT1 POUF2F1 PPAN PPAT PPCS PPIF PPP1R12A PPP2CA PPP2R1A   PPP2R5C PPP5C PPP6C PPP6R1 PQLC2 PRC1 PRDM4 PRDX3 PREB PRMT1 PRPF3 PRPF4B PRPSAP1 PSAP PSENEN PSMA2   PSMA4 PSMC4 PSPC1 PTCH1 PTK2 PTMA PTPN2 PTPN23 PTPRS PTS PVR PXDN PYGL QPCTL RAB14 RAB18 RAB1A RAB4A   RAB6A RAB8A RABEP1 RABGGTB RABIF RAE1 RALBP1 RALGDS RAN RANBP1 RAP1GDS1 RASSF1 RBBP4 RBBP7 RBBP8 RBKS   RBM12 RBM14 RBM17 RBX1 RCBTB2 RDM1 REEP3 REEP6 RER1 RFXANK RGS19 RHEBL1 RHOA RNFI30 RNFI19A RNFI8 RNH1   RNPS1 RPA1 RPA2 RPL19 RPL36 RPL5 RPL8 RPP14 RPP30 RPS12 RPS16 RPS6KA6 RPS9 RRP9 RSF1 SG1 SL1D1 RSPH3   RSU1 RTCA RTCB S100A13 SAMHD1 SAP18 SARS SBD5 SBF1 SCAMP1 SCAND1 SCARB2 SCOC SDCBP SDHB SDHD SEC61G   SEPT2 SERTAD1 SESNI SET SETD4 SGMS1 SH3BP5 SHBG SHMT1 SHAH2 SIN3B SIRT5 SIVA1 SLC16A1 SLC22A5 SLC25A10   SLC25A3 SLC27A3 SLC30A5 SLC35A4 SLC35E3 SLC37A4 SLC39A6 SLC3A2 SLK SMAD4 SMARCA4 SMARCB1 SMARCC1 SMG6   SMYD4 SNAP29 SNRK SNRNP25 SNX1 SNX4 SOC5 SPAG6 SPC24 SPDL1 SPECC1L SPG7 SRD5A1 SRP54 SRP68 SRPRB SRSF1   SRSF11 SRSF4 SRSF9 SS18L2 SSB ST5 STAG1 STARD10 STARD7 STK25 STK38 STRN3 STUB1 STX17 STX2 STX3 SUCCO SUPT3H   SUV39H2 SZRD1 TAF12 TAF5 TAF6 TARS TAX1BP3 TBCB TBK1 TCEB2 TCF19 TCP1 TCTA TDG TERF2IP TFDP1 THOP1 THRA   TIMELESS TIMM21 TIMM8B TIPARP TM9SF2 TMED9 TMEM109 TMEM115 TMEM116 TMEM127 TMEM131 TMEM135 TMEM14C   TMEM206 TMEM39A TMEM41B TMEM43 TMEM53 TMEM9 TOMM20 TOMM34 TOP1 TOPORS TPCN2 TPM1 TRAPPC5 TRIM28   TRIM32 TRIM39 TRIO TRMT2A TSN34 TSPAN14 TSPAN3 TSPYL2 TSSC4 TTC13 TTC25 TUBA1B TUBB4B TUBG2 TXLNA   TYMP UBA2 UBE2D3 UBE2K UBE2M UBE2T UBE4B UBTD1 UIMC1 UPF1 UQCR11 UQCRB1 UQCRC1 UQCRFS1 USP10 USP21   USP39 VAMP2 VARS2 VASH1 VDAC3 VGF VHL VPRBP VPS28 VPS8 WAC WDHD1 WDR1 WDR19 WDR4 WDR45 WDR5   WDR5B WDR60 WDR62 WNT5A WRB XPO7 XRCC1 XRCC5 YIF1A YIPF5 YWHAH YWHAZ ZC3H14 ZC3H3 ZDHHC12   ZDHHC16 ZFAND2A ZMAT3 ZP3 </p>
Bisphenol-A	2113	<p> A1BG AARSD1 AATF ABCA3 ABCB10 ABCD3 ABCF1 ABHD14A ABHD18 ABHD5 ABI1 ABLIM2 ACAD9 ACADM ACAP3 ACAT2   ACD ACIN1 ACOT13 ACP1 ACTB ACTN4 ACTR1A ACTR8 ACY2 ADAM10 ADAT3 ADCK3 ADCK5 ADCY9 ADI1 ADIPOR2   AEBP2 AFG3L2 AFTHP AGPAT1 AGPAT5 AIFM1 AIMP2 AIP AK3 AKAP17A AKAP8 AKAP8L AKIP1 AKIRIN2 AKR7A2 AKT2   AKTIP ALAS1 ALDH16A1 ALDOA ALG12 ALG8 ALKBH5 ALYREF AMACR AMZ2 ANAPC1 ANAPC11 ANAPC13 ANAPC15   ANAPC16 ANAPC2 ANAPC7 ANGEL2 ANGPTL6 ANKRD13D ANKRD26 ANKRD31 ANKRD37 ANLN ANXA5 AP1M1 AP1S1   AP2M1 AP3B1 AP4S1 APBA3 APBB2 APC APC2 APEX2 APLF APOA1BP APOLD1 APRT AQP11 ARAF ARF1 ARF4 ARF6   ARFGAP3 ARHGAP44 ARHGDI1 ARHGEF10 ARHGEF18 ARHGEF39 ARL10 ARL13B ARL16 ARL2BP ARL3 ARL5A ARMC2   ARMC6 ARMC7 ARMCX2 ARPC1A ARPC2 ARPC5 ARRB2 ARSB ARV1 ASB3 ASB8 ASCC1 ASH1L ASNSD1 ASTN2 ASUN   ATAD1 ATAD3A ATAT1 ATF5 ATF7IP ATG10 ATG2A ATG5 ATG7 ATM ATOH7 ATP11A ATP5G2 ATP5I ATP5O ATP6V0D1   ATP6V0E2 ATP6V1C1 ATP6V1D ATP6V1F ATP6V1G1 ATPAF2 ATRN ATXN2L ATXN7L3B AURKA AURKB AVEN B3GALNT2   B3GALT6 B3GNT4 B3GNTL1 B4GALT5 B9D1 B9D2 BAG1 BAG4 BASP1 BBS9 BCAN BCAR1 BCAT1 BCAT2 BCCIP BCKDHA BCL10   BCL2L12 BCL6B BCL7A BCL7B BCLAF1 BLOC1S2 BLOC1S4 BNIP3 BORCS7 BPNT1 BRD2 BRK1 BROX BRSK1 BSG BTBD7 BTRC  </p>

BUB1|BUB3|BVES|BYSL|C10ORF137|C10ORF88|C11ORF71|C12ORF45|C12ORF65|C14ORF119|C14ORF2|C14ORF28|C14ORF80|  
 C15ORF40|C16ORF45|C16ORF70|C16ORF87|C17ORF97|C18ORF54|C19ORF47|C19ORF52|C19ORF67|C19ORF81|C1GALT1C1|  
 C1ORF109|C1ORF131|C1ORF228|C1ORF27|C1ORF35|C1ORF50|C1ORF53|C1QBP|C20ORF194|C20ORF24|C21ORF2|C21ORF58|  
 C22ORF23|C22ORF29|C2CD3|C2ORF73|C2ORF74|C3ORF67|C4ORF46|C4ORF48|C5ORF24|C6ORF136|C8ORF37|C8ORF48|C9ORF40|  
 C9ORF69|CAB39|CACUL1|CACYBP|CANT1|CAPZA2|CARNMT1|CASK|CASKIN2|CASP2|CASZ1|CATSPERD|CBFB|CBLL1|CBR1|  
 CBR4|CBX1|CBX2|CBX5|CBX7|CBY1|CBY3|CC2D1A|CC2D1B|CCDC11|CCDC114|CCDC12|CCDC120|CCDC127|CCDC150|CCDC167|  
 CCDC171|CCDC28B|CCDC43|CCDC47|CCDC86|CCDC87|CCDC89|CCDC92|CCDC93|CCDC96|CCDC97|CCHCR1|CCNB1|CCNE1|  
 CCNF|CCNG2|CCNI|CCNJL|CCNT2|CCS|CCT3|CCT5|CCT6A|CCT8|CD27|CD274|CD320|CD47|CD59|CD99L2|CDAN1|CDC34|  
 CDC42|CDC42BPB|CDC42EP4|CDC42SE2|CDC7|CDCA2|CDK1|CDK10|CDK16|CDK19|CDK2AP2|CDKAL1|CDKL3|CDKN2B|  
 CDKN2D|CDNF|CDPF1|CDS2|CDT1|CDV3|CDYL|CENPI|CENPN|CEP104|CEP170|CEP19|CEP192|CEP250|CEP57L1|CEP63|CEP85|  
 CES4A|CFAP206|CFDP1|CHAC2|CHCHD4|CHD2|CHD3|CHKB|CHMP1A|CHMP2A|CHMP2B|CHMP3|CHMP5|CHMP7|CHORDC1|  
 CHST12|CHTF18|CHTF8|CHTOP|CIAO1|CIB1|CIC|CIRBP|CIRH1A|CISD1|CISD2|CIZ1|CKLF|CKS1B|CKS2|CLASP1|CLASP2|CLCN5|  
 CLEC11A|CLIC4|CLK3|CLN5|CLN8|CLOCK|CLP1|CLPTM1L|CLPX1|CMAS|CMC1|CMC2|CNBP|CNKSR3|CNNM3|CNOT1|CNOT11|  
 CNOT4|CNP|CNPY4|CNST|CNTLN|CNTNAP1|CNTROB|COG1|COG2|COG6|COMMMD8|COPB2|COPG1|COQ10B|COQ3|COX14|  
 COX15|COX18|COX5B|COX6C|CPSF1|CPSF3L|CPT1C|CREB1|CREM|CRIPT|CRK|CRKL|CRMP1|CRTC1|CRY1|CRYZL1|CSAD|  
 CSDE1|CSE1L|CSK|CSNK1A1|CSNK1G2|CSTF1|CTBP1|CTDNEP1|CTDSP1|CTDSPL2|CTNNA2|CTNNBIP1|CTPS1|CTSD|CTU1|  
 CUTC|CXORF38|CXXC1|CYB5A|CYB5R4|CYCS|CYHR1|CYTH1|CYTH2|D2HGDH|DAAM1|DAD1|DALRD3|DAP|DAP3|DAZAP1|  
 DBI|DCAF6|DCAF8|DCPS|DCUN1D1|DCUN1D2|DDAH1|DDIT3|DDRKG1|DDX27|DDX39A|DDX39B|DDX3X|DDX41|DDX42|  
 DDX56|DECR2|DENND3|DENND5A|DESI1|DFFB|DGKH|DHDDS|DHODH|DHX15|DHX34|DHX9|DIDO1|DIP2A|DIRC2|DISP2|  
 DKC1|DL|DLGAP4|DLL3|DLX4|DMXL2|DNA2|DNAAF1|DNAH2|DNAI1|DNAJA3|DNAJB12|DNAJB2|DNAJB6|DNAJB9|DNAJC25|  
 DNAJC28|DNAJC3|DNAJC5|DNAL1|DNM1L|DNMT1|DOCK3|DOCK9|DOHH|DOLPP1|DONSON|DPF2|DPY19L2|DPY30|DPYSL2|  
 DSCR3|DSN1|DST|DSTN|DTNBP1|DTYMK|DUS3L|DUSP11|DUSP14|DUSP18|DYNC1H1|DYNLL1|DYNLRB2|DYNLT1|DYRK1B|  
 E2F1|E2F6|EBAG9|ECSIT|EDEM2|EED|EEF1A1|EEF1D|EEF1G|EGLN2|EHD1|EHMT1|EI24|EID1|EID2|EID2B|EIF1|EIF1AX|  
 EIF2AK1|EIF2D|EIF2S1|EIF2S2|EIF3E|EIF3K|EIF3L|EIF4B|EIF4E|EIF4E2|EIF4G1|EIF4H|EIF5A|EIF5B|ELL|ELMOD3|ELOF1|ELOVL4|  
 ELP2|ELP5|ELP6|EMC10|EMC6|EMD|EML4|ENDOV|ENKUR|ENO1|ENTPD5|ENTPD6|EPHX1|EPN3|EPS8|ERCC2|ERCC6|ERCC6L|  
 ERGIC3|ERI1|ERI3|ERICH1|ERLIN1|ERMAP|ERP29|ERRFI1|ESCO1|ESRP2|ESRRA|ETFB|ETFDH|ETV5|EVC|EXOC8|EXOG|  
 EXOSC1|EXOSC10|EXOSC2|EXOSC5|EXT2|EZH1|EZH2|FADD|FAM102A|FAM104A|FAM109A|FAM118A|FAM118B|FAM120A|  
 FAM120B|FAM122A|FAM122B|FAM133B|FAM134A|FAM134C|FAM151B|FAM161A|FAM175A|FAM189A1|FAM195B|FAM206A|  
 FAM210B|FAM213A|FAM219A|FAM219B|FAM220A|FAM222B|FAM227A|FAM32A|FAM46C|FAM49B|FAM58A|FAM60A|FAM71E1|  
 FAM98A|FANCA|FANCL|FARSB|FASN|FAU|FBL|FBXL5|FBXL8|FBXO15|FBXO21|FBXO31|FBXO42|FBXO48|FBXO5|FBXO7|  
 FBXO9|FBXW5|FCHO2|FDPS|FDX1L|FGFR1OP2|FGGY|FIGN|FIGNL1|FIP1L1|FITM2|FKBP1A|FKBP2|FKRP|FLYWCH1|FMNL1|  
 FMR1|FNBP4|FOCAD|FOPNL|FOXO4|FPGT|FRMD8|FSD1|FSD1L|FSTL3|FUNDC2|FUT11|FUT8|FXN|FXR2|FXYD3|FZD4|FZR1|  
 G3BP2|GAA|GABPB1|GABRB1|GABRB2|GAK|GALNT11|GAPVD1|GATAD2A|GCLC|GDPD1|GEMIN2|GEMIN4|GEN1|GFOD2|  
 GFPT1|GID8|GINM1|GIT1|GIT2|GLB1|GLIPR1L2|GLRX3|GLTPD1|GMCL1|GMEB2|GNAO1|GNB1L|GNG5|GNPAT|GNPDA2|  
 GNPTAB|GNPTG|GNS|GOLGA1|GOLGA2|GOLGA4|GON4L|GOPC|GPA1|GPANK1|GPATCH1|GPATCH8|GPBP1L1|GPD1L|  
 GPR101|GPR180|GPR19|GPR37|GPRIN1|GPSM2|GPSM3|GRHPR|GRIPAP1|GRPEL2|GRSF1|GSG2|GSR|GSS|GSTK1|GSTM3|GSTZ1|  
 GTF2A1|GTF2E2|GTF2F1|GTF2H4|GTF2I|GTF3C1|GTPBP10|GTPBP8|GTSE1|GUCD1|GXYLT1|GZF1|HARS|HARS2|HAUS3|HAUS6|  
 HAUS8|HBP1|HBS1L|HCRT|HDAC2|HDAC3|HDAC4|HDHD2|HDHD3|HDLBP|HEATR3|HEATR5B|HERC4|HEXIM1|HEXIM2|HGS|  
 HINFP|HIRIP3|HLC5|HMGN1|HMMR|HNRNPA1|HNRNPH1|HNRNPM|HNRNPU|HNRNPUL2|HOOK3|HOXC6|HP1BP3|HRAS|  
 HRSP12|HSD17B4|HSDL1|HSDL2|HSF1|HSF2|HSF4|HSP90AA1|HSPA14|HSPA8|HSPA9|HSPD1|HSPE1|HUNK|HYLS1|IAH1|IBA57|

ICMT|IDE|IFNAR1|IFT122|IFT172|IFT27|IGFBP3|IGFBPL1|IGFLR1|IKBKAP|IKZF2|IL17RD|ILKAP|ILVBL|IMMP2L|IMMT|ING2|INO80C|INPP4A|INPP5A|INPP5K|INSIG2|INTS10|INTS2|INTS3|INTS5|INTS6|INTS7|IP6K1|IP6K2|IPMK|IPO11|IPO9|IPP|IQCE|IRAK4|IRF2BPL|IRF3|IRS1|ISOC1|ITFG2|ITGA1|ITGAE|IWS1|JAK2|JMJD4|JMY|JPH4|KANK3|KARS|KATNA1|KCNC3|KCNN1|KCTD13|KCTD7|KCTD9|KDELR2|KDM3A|KDM4A|KDM5C|KEAP1|KIAA0100|KIAA0513|KIAA0556|KIAA0586|KIAA0895|KIAA2026|KIF16B|KIF18A|KIF26A|KIF27|KIF2A|KIF3A|KIF4A|KIF5B|KIF6|KIFAP3|KIFC1|KLF13|KLHDC3|KLHL11|KLHL22|KLHL26|KLHL35|KPNA1|KRCC1|KRI1|KRR1|KRTCAP2|KXD1|L3MBTL1|LAGE3|LAMTOR4|LAPTM4A|LARP7|LDHA|LEMD2|LENG1|LENG8|LEPRE1|LETM1|LFNG|LGJ4|LIG3|LIN37|LIPA|LIPT2|LLGL1|LMF1|LONP1|LPCAT1|LPCAT3|LRBA|LRCH3|LRIF1|LRPAP1|LRRC10B|LRRC14|LRRC20|LRRC24|LRRC27|LRRC42|LRRC46|LRRC58|LRRC63|LRRIQ3|LSM1|LSM11|LSM12|LSM14B|LSM2|LSM4|LSM7|LSR|LSS|LUC7L|LYAR|LYPLA1|LYPLAL1|LYRM2|LYSMD3|MACF1|MAD2L1|MAFG|MAGED1|MAGED2|MAGI1|MAGIX|MAN1B1|MANEA|MAP1LC3B|MAP2|MAP2K7|MAP3K14|MAP4K3|MAP7D2|MAPK12|MAPK7|MAPKAP1|MAPRE3|MAPT|MARS2|MAST2|MATN1|MBD1|MBD3|MBD6|MCM2|MCM4|MCM6|MCMBP|MCRS1|MEA1|MEAF6|MECP2|MECR|MED11|MED18|MED20|MED25|MED28|MED4|MED9|MEGF8|MEMO1|MEPCE|MESDC2|MESP1|MESP2|METTL15|METTL22|METTL8|MEX3B|MFSD8|MFSD9|MGA|MGAT1|MGEA5|MGST3|MIB1|MIDN|MINK1|MIP|MIS18A|MKKS|MKL2|MKNK1|MKNK2|MKRN1|MK51|MLH3|MLL2|MLLT3|MLST3|MLX|MMAA1|MMADHC|MMP17|MMP25|MOB3A|MOC52|MOK|MORC3|MORF4L1|MORF4L2|MORN1|MORN5|MPC2|MPDU1|MPG|MPHOSPH6|MPL|MPP6|MRGBP1|MRM1|MRPL10|MRPL12|MRPL14|MRPL17|MRPL24|MRPL32|MRPL36|MRPL45|MRPL49|MRPL54|MRPS12|MRPS18B|MRPS25|MRPS6|MRS2|MSH2|MSH5|MSL2|MSRA|MST1|MTCH2|MTFMT|MTG1|MTHFD1|MTURN|MVD|MXI1|MYBBP1A|MYCBP1|MYCBP2|MYH10|MYH14|MYH7B|MYO1D|MYO1F|MYO9A|MYPOP|MZT2B|N4BP1|N6AMT1|N6AMT2|NAA10|NAA16|NAA25|NAA38|NAA40|NAA50|NACAD|NADK|NADSYN1|NAE1|NAGK|NAMPT|NANP|NAP1L4|NAPA|NAPB|NAPG|NAPS1|NARF|NARF1|NARS2|NAT9|NBEA|NCAN|NCAPD3|NCKIPSD|NCOA5|NDEL1|NDFIP2|NDNL2|NDRG3|NDST2|NDUFA11|NDUFA12|NDUFA3|NDUFA6|NDUFA8|NDUFAF4|NDUFB10|NDUFB4|NDUFS6|NDUFV3|NEFH|NEFM|NEGR1|NEIL2|NEIL3|NEK2|NEK4|NEK8|NEUROD1|NF1|NF2|NFU1|NFX1|NFYA|NGLY1|NIP2|NKTR|NMRK1|NOB1|NOL7|NOMO1|NONO|NOP2|NOTCH4|NPAT|NPLOC4|NPM1|NPRL3|NR1D1|NR1D2|NR2C1|NR2C2AP|NRBP1|NRN1|NRTN|NSUN2|NT5C3|NT5DC1|NUBP1|NUDCD2|NUDT15|NUDT16L1|NUDT7|NUP107|NUP35|NUP50|NUP62|NUSAP1|NXT1|OARD1|OAZ2|OCEL1|OCIAD1|OCLN|ODC1|OIP5|OPA1|ORAOV1|ORC4|ORC6|ORMDL1|OS9|OSBPL6|OSER1|OSTC1|OSTF1|OTUD3|OTUD5|OTUD6B|OXSM|P4HA1|P4HB|PAICS|PAIP2|PAM16|PAPD7|PAPSS1|PAQR4|PAQR8|PARD6A|PARD6B|PARK2|PARK7|PARN|PARP3|PARP6|PATL1|PATZ1|PAXIP1|PCBP2|PCDH9|PCGF1|PCGF3|PCGF6|PCLO|PCMT1|PCMTD1|PCMTD2|PCNA|PCSK4|PCYOX1|PDCD2L|PDCD4|PDCD5|PDCD6|PDCD6IP|PDCL3|PDDC1|PDE7A|PDE8A|PDHB|PDIA4|PDIA5|PDRG1|PDXDC1|PDZD11|PEG10|PEG3|PELI1|PELP1|PER1|PEX5L|PFDN1|PFKFB4|PFN1|PGAM1|PGAM5|PGAP1|PGLS|PGRMC2|PGS1|PHACTR4|PHC3|PHF12|PHF14|PHF20|PHF23|PHF6|PI4K2A|PI4K2B|PIAS4|PIGA|PIGF|PIGH|PIGP|PIGT|PIGX|PIKFYVE|PILRB|PINK1|PIP5K1B|PITHD1|PITPNB|PITX2|PJA1|PKD1|PKD2L2|PKIB|PKMYT1|PLA2G12A|PLCG1|PLD1|PLEKHA3|PLEKHA8|PLEKHB2|PLEKHJ1|PLK4|PLOC3|PLS1|PM20D2|PMS1|PMS2|PNISR|PNMAL1|PNMAL2|POC1A|POFUT2|POLA1|POLD1|POLG2|POLR1A|POLR1C|POLR2A|POLR2F|POLR2H|POLR2I|POLR3B|POLR3H|POLR3K|POM121|POMT1|POMT2|POP1|POP4|POP7|POT1|POU2F1|PPA1|PPAN|PPAT|PPCS|PPDPF|PPIA|PPIF|PPM1D|PPM1K|PPME1|PPP1CB|PPP1R10|PPP1R11|PPP1R12A|PPP1R27|PPP1R7|PPP2R1A|PPP2R3B|PPP2R5C|PPP4R2|PPP4R4|PPP5C|PPP6R1|PPTC7|PQLC2|PRAME|PRC1|PRDX3|PRDX5|PREB1|PRKAR2A|PRKDC|PRMT1|PRPF3|PRPF39|PRPF4B|PRPSAP1|PRR14|PRR29|PRRC1|PRRC2C|PSAP|PSENE1|PSMA2|PSMA3|PSMA4|PSMC4|PSPC1|PSTK|PSTPIP2|PTBP1|PTCD3|PTCH1|PTGES3|PTGR2|PTK2|PTMA|PTPN2|PTPN20|PTPN23|PTPRS|PTS|PTTG1IP|PUS7L|PUSL1|PVR|PWP1|PXD1|PYGL|QPCTL|RAB10|RAB14|RAB18|RAB1A|RAB1B|RAB23|RAB32|RAB33B|RAB35|RAB4A|RAB6A|RAB6B|RAB8A|RAB9B|RABEP1|RABGGTA|RABGGTB|RABIF|RABL6|RAC1|RAD21|RAD23B|RAD50|RAD54B|RAE1|RAF1|RALBP1|RALGAP2|RALGDS|RAN|RANBP1|RANBP3|RAP1GDS1|RAPGEF6|RASSF1|RAVER1|RB1CC1|RBAK1|RBBP4|RBBP7|RBBP8|RBFA|RBKS|RBL2|RBM12|RBM14|RBM17|RBM19|RBM4B|RBM7|RBMX2|RBX1|RCAN3|RDM1|REEP3|

REEP4|REEP6|RELA|RELL2|RENBPI|RER1|RETSAT|REXO2|RFWD2|RFX1|RFX2|RFXANK|RGS17|RGS19|RGS20|RHEBL1|RHOA|  
 RIOK2|RIPK2|RNFI23|RNFI39|RNFI14|RNFI145|RNFI149|RNFI170|RNFI19A|RNFI19B|RNFI24|RNFI32|RNFI38|RNFI5|RNFI8|RNFTT|RNH1|  
 RNPS1|ROCK1|ROPN1L|RPA1|RPA2|RPL13A|RPL14|RPL19|RPL36|RPL5|RPL7L1|RPL8|RPLP1|RPP14|RPP30|RPP38|RPS12|RPS13|  
 RPS16|RPS19BP1|RPS21|RPS23|RPS29|RPS5|RPS6KA5|RPS6KA6|RPS6KB1|RPS9|RPUSD1|RPUSD3|RRM2B|RRP1|RRP9|RSBN1|  
 RSF1|RSG1|RSL1D1|RSL24D1|RSPH3|RSRP1|RSU1|RTCA|RTCB|RTDR1|RTKN2|RTN3|RUNX2|RWDD2B|RXRB|SACS|SAFB|  
 SAFB2|SAMHD1|SAP18|SARM1|SARS|SARS2|SAYSD1|SBDS|SBF1|SBF2|SCAF11|SCAMP1|SCAMP3|SCAMP4|SCAND1|SCAP|  
 SCARB2|SCN3B|SCOC|SDCBP|SDCBP2|SDCCAG8|SDF4|SDHA|SDHAF4|SDHB|SDHD|SDR39U1|SEC14L1|SEC24C|SEC24D|  
 SEC61A2|SEC61G|SECTM1|SEH1L|SELT|SENP2|SENP3|SENP8|SEPT2|SERINC1|SERTAD1|SESNI1|SET|SETD4|SF3A2|SF3B1|SF3B2|  
 SFI1|SFMBT1|SFMBT2|SFR1|SFT2D1|SFXN2|SGCA|SGCB|SGMS1|SGTA|SH3BGR|SH3BP5|SHBG|SHC1|SHC4|SHMT1|SHMT2|  
 SHPRH|SIAH2|SIKE1|SIL1|SIN3B|SIRT5|SIRT6|SIRT7|SIT1|SIVA1|SKA1|SLC12A6|SLC16A1|SLC16A13|SLC22A5|SLC25A10|  
 SLC25A3|SLC25A6|SLC27A3|SLC30A4|SLC30A5|SLC35A4|SLC35A5|SLC35B3|SLC35D1|SLC35E3|SLC35G1|SLC36A4|SLC37A4|  
 SLC39A14|SLC39A6|SLC3A2|SLC44A2|SLC9A3|SLK|SLTM|SLU7|SLX4|SLX4IP|SMAD4|SMAP1|SMAP2|SMARCA4|SMARCB1|  
 SMARCC1|SMARCD3|SMC4|SMC5|SMG6|SMG9|SMIM14|SMIM4|SMIM7|SMPD4|SMYD3|SMYD4|SNAP23|SNAP29|SNAPC1|  
 SNRK|SNRNP25|SNRNP70|SNRPD2|SNURF|SNW1|SNX1|SNX14|SNX32|SNX4|SNX7|SNX8|SOCS1|SOCS4|SORCS3|SOS1|SOS2|  
 SOX12|SPACA5|SPAG6|SPAG8|SPAST|SPATA1|SPATA4|SPATA5L1|SPATS2|SPC24|SPDL1|SPECC1L|SPOCD1|SPOP|SPPL2B|  
 SPPL3|SPRTN|SPRY4|SPRYD7|SPTAN1|SPTLC1|SPTY2D1|SRC|SRCRB4D|SRD5A1|SRFBP1|SRP54|SRP68|SRPK1|SRPRB|SRR|  
 SRRM1|SRSF1|SRSF10|SRSF11|SRSF4|SRSF9|SSB|SSH1|SSH2|SSNA1|SSSCA1|ST5|STAG1|STAP2|STARD10|STARD13|STIM2|  
 STK25|STK38|STPG2|STRADA|STRN3|STRN4|STUB1|STX12|STX17|STX1A|STX2|STX3|STX4|STX7|SUCLA2|SUCCO|SUFU|SUMF2|  
 SUPT3H|SUV39H2|SWI5|SYCE2|SYF2|SYMPK|SYNGR4|SYP|SYPL1|SYS1|SZRD1|TADA2B|TAF12|TAF1B|TAF4|TAF5|TAF6|TAF7|  
 TANGO2|TAOK2|TAOK3|TARS|TAX1BP3|TBC1D10B|TBC1D20|TBC1D24|TBC1D25|TBC1D5|TBC1D7|TBC1D8|TBCA|TBCB|TBCD|  
 TBK1|TCAIM|TCEANC|TCEB2|TCF19|TCF25|TCP1|TCTA|TCTEX1D2|TDG|TDP2|TDRD7|TDRP|TECR|TERF2IP|TEX264|TEX30|  
 TFAP2B|TFB2M|TFDP1|TFG|TGDS|TGIF1|THAP7|THBS2|THNSL1|THOC3|THOP1|THRA|TIA1|TIGAR|TIMELESS|TIMM13|  
 TIMM21|TIMM8B|TIMM9|TIPARP|TM2D3|TM9SF2|TMBIM6|TMC06|TMED3|TMED4|TMED5|TMED9|TMEM106B|TMEM106C|  
 TMEM109|TMEM115|TMEM116|TMEM120B|TMEM127|TMEM131|TMEM135|TMEM139|TMEM141|TMEM143|TMEM145|TMEM14A|  
 TMEM14C|TMEM161B|TMEM170A|TMEM170B|TMEM175|TMEM184B|TMEM19|TMEM206|TMEM219|TMEM237|TMEM254|  
 TMEM263|TMEM38B|TMEM39A|TMEM41B|TMEM43|TMEM53|TMEM55B|TMEM63A|TMEM65|TMEM70|TMEM9|TMEM91|TMF1|  
 TMTTC2|TMX1|TMX3|TMX4|TNFSF13|TNKS2|TNPO2|TOLLIP|TOMM20|TOMM20L|TOMM34|TOMM7|TOP1|TOP1MT|TOX2|  
 TP53BP2|TPBGL|TPCN2|TPGS1|TPM1|TPMT|TPR|TPRA1|TPX2|TRADD|TRAF3IP1|TRAM1|TRAM1L1|TRAPPC1|TRAPPC12|  
 TRAPPC13|TRAPPC3|TRAPPC5|TRAPPC9|TRIM23|TRIM28|TRIM32|TRIM37|TRIM39|TRIM46|TRIM59|TRIM62|TRIT1|TRMO|  
 TRMT11|TRMT112|TRMT2A|TRNAU1AP|TRO|TRPC1|TRPM7|TRUB1|TSEN2|TSEN34|TSEN54|TSPAN12|TSPAN3|TSPYL2|TSPYL5|  
 TSR3|TSSC4|TTBK2|TTC13|TTC25|TTC34|TTC37|TTC7B|TTLL12|TTLL9|TUBA1B|TUBB|TUBB4B|TUBD1|TUBG1|TUBG2|TUBGCP4|  
 TUSC1|TXLNA|TXNDC11|TXNDC9|TXNL1|TYMP|U2AF1|U2AF1L4|U2AF2|UBA2|UBA52|UBAC2|UBE2D3|UBE2D4|UBE2K|  
 UBE2M|UBE2N|UBE2T|UBE2V1|UBE4B|UBN2|UBR4|UBTD1|UBXN7|UCK1|UGGT2|UIMC1|UNC13A|UNC45A|UNG|UPF1|UPF2|  
 UQCC|UQCR10|UQCR11|UQCRB|UQCRC1|UQCRF51|URGCP|URI1|UROS|USF1|USO1|USP10|USP12|USP21|USP22|USP28|  
 USP37|USP39|UTP18|UTP20|UTP23|UVSSA|UXS1|VAMP2|VAPA|VAPB|VASH1|VDAC2|VDAC3|VGF|VHL|VKORC1L1|VMA21|  
 VMAC|VPS13A|VPS13C|VPS26B|VPS28|VPS35|VPS4B|VPS8|VRK3|WAC|WARS2|WDFY2|WDHD1|WDR1|WDR13|WDR19|WDR20|  
 WDR4|WDR43|WDR44|WDR45|WDR5|WDR5B|WDR60|WDR62|WDR78|WDSUB1|WDTTC1|WIPI2|WNK3|WNT5A|WRB|WRNIP1|  
 WWP1|XPA|XPO5|XPO7|XRCC1|XRCC5|XRCC6|YARS2|YEATS4|YIF1A|YIPF2|YIPF3|YIPF5|YTHDC1|YTHDF1|YWHAH|YWHAZ|  
 ZBED4|ZBTB17|ZBTB2|ZBTB24|ZBTB4|ZBTB43|ZBTB49|ZBTB80S|ZC2HC1C|ZC3H14|ZC3H15|ZC3H18|ZC3H3|ZC4H2|ZCCHC7|  
 ZCWPW1|ZDHHC16|ZFAND2A|ZFAND3|ZFP1|ZFP14|ZFP161|ZFP28|ZFR|ZFYVE16|ZFYVE27|ZGRF1|ZMAT2|ZMAT3|ZMAT5|

		ZMYM1 ZMYM4 ZMYM6 ZMYND12 ZMYND19 ZNF14 ZNF174 ZNF175 ZNF180 ZNF248 ZNF251 ZNF280B ZNF281 ZNF287 ZNF329 ZNF438 ZNF445 ZNF483 ZNF518B ZNF524 ZNF565 ZNF583 ZNF652 ZNF667 ZNF692 ZNF706 ZNF711 ZNF740 ZNF761 ZNF770 ZNF784 ZNF800 ZNF845 ZNFX1 ZP3 ZRSR2 ZSCAN18 ZSCAN30 ZWINT ZXDC ZYG11B
Dibutyl phthalate	756	AATF ABCB10 ABCF1 ABHD14A ACAD9 ACADM ACAP3 ACAT2 ACD ACOT13 ACP1 ACTB ACTN4 ADCK5 ADCY9 ADI1 ADIPOR2 AIP AKAP17A AKIP1 AKR7A2 ALAS1 ALDH16A1 ALDOA ALG8 ALKBH4 AMACR AMZ2 ANAPC1 ANAPC11 ANAPC16 ANKRD37 ANXA5 APC2 APITD1 APLF APOA1BP ARF4 ARF6 ARHGDI ARHGEF10 ARHGEF18 ARL2BP ARL5A ARMC2 ARMC6 ARMCX2 ARPC1A ARPC2 ARPC5 ARRB2 ARSB ASCC1 ATAT1 ATF5 ATG10 ATM ATP5I ATP5O ATP6V0E2 ATP6V1F ATPAF2 ATRN AURKB BAG1 BAG4 BASP1 BCAT1 BCAT2 BCKDHB BCL10 BCLAF1 BLOC1S5 BNIP3 BOP1 BROX BSG BTF3 BTRC BUB3 C1GALT1C1 C1QBP CAB39 CASC5 CBFB CBR1 CBR4 CBX5 CBY1 CCDC12 CCDC28B CCNB1 CCNE1 CCNF CCNT2 CCT3 CD320 CD47 CD59 CD99L2 CDC7 CDCA2 CDK1 CDK2AP2 CDKN2D CDPF1 CDT1 CDV3 CENPN CEP250 CEP57L1 CEP85 CHAC2 CHTF18 CISD1 CISD2 CKS1B CKS2 CLASP2 CLEC11A CLIC4 CLN8 CLPX CMAS CNBP CNKSR3 CNP CNPY4 CNST CNTLN CNTROB COPG1 COQ10B COQ3 COX15 COX18 COX6A2 CPSF3L CREB1 CREM CRIPT CRTC1 CSNK1A1 CSNK1G2 CTBP1 CTDNBP1 CTNNA2 CTSD CUTC CYB5A CYCS CYHR1 CYTH2 DAAM1 DBI DCAF12 DCPS DDAH1 DDIT3 DDX27 DDX39B DDX3X DDX56 DDFB DHODH DHRS7B DHX15 DIP2A DLGAP4 DNA2 DNAAF1 DNAJB9 DNAJC3 DNM3 DNMT1 DOLPP1 DONSON DPY30 DPYSL2 DST DSTN DTNBP1 DTYMK DUSP11 DUSP14 EBAG9 EEF1A1 EEF1D EIF1 EIF2S1 EIF2S2 EIF4E EIF4E2 EIF4G1 ELL ELP5 EMD ENO1 ENTPD5 EPHX1 EPS8 ERI1 ERRFI1 ESRRA ETFB ETFDH ETV5 EXOC8 EXOG EXOSC10 EXOSC2 EXOSC5 EXOSC6 EXT2 EZH1 EZH2 FAAP20 FADD FAM134A FAM151B FAM210B FAM46C FAM49B FAM60A FANCA FANCL FASN FBL FBXL8 FBXO21 FBXO31 FBXO5 FBXO9 FBXW5 FDP5 FGFR1OP2 FIGN FIP1L1 FKBP1A FLYWCH1 FMR1 FOPNL FOXO4 FRMD8 FXN FZR1 G3BP2 GABRB1 GABRB2 GALNT11 GAPVD1 GCLC GEMIN2 GEMIN4 GFPT1 GINM1 GLB1 GMEB1 GNB1L GNG5 GNPAT GPBP1L1 GPR19 GRHPR GRSF1 GSG2 GSR GSS GSTZ1 GTF2A1 GTF2F1 GTF3A GTF3C1 HAUS8 HBP1 HCRT HDAC3 HDHD3 HEATR5B HEXIM1 HIRIP3 HMG1 HMHA1 HMMR HNRNPA1 HNRNP1 HNRNPUL2 HOOK3 HP1BP3 HSD17B4 HSDL1 HSF1 HSP90AA1 HSPA14 HSPA8 HSPA9 HSPD1 HSPH1 ICMT IDE IGFLR1 ILVBL IMMT ING2 INPP5A INSIG2 INTS5 INTS6 IP6K2 IRAK4 IRF3 ISOC1 ITGA1 JAK2 JMY KANK3 KAT2A KDM4A KEAP1 KIF26A KIF2A KIF6 KIFC1 KLHDC3 KLHL22 KPNA1 KRR1 KRTCAP2 LAGE3 LAMTOR4 LARP7 LDHA LFNG LIPA LIPT2 LLGL1 LPCAT3 LRRC20 LRWD1 LSM2 LSM4 LSM7 LSR LSS LYPLAL1 LYRM2 LYSMD3 MACF1 MAFG MAP1LC3B MAP2 MAST2 MBD3 MBD4 MCM2 MCM4 MCM6 MEAF6 MED20 MED28 MED9 MEF2A MEGF8 METTL22 MEX3B MGAT1 MGST3 MKRN1 MKS1 MLST8 MLX MMP17 MOB3A MOCS2 MORF4L2 MPG MRPL12 MRPL36 MRPL49 MRPS18B MRPS25 MRPS6 MSH2 MTCH2 MTFMT MTHFD1 MVD MXI1 MYCBP MYCBP2 MYH10 NAA10 NAA38 NAA50 NADK NAGK NAMPT NANP NAP1L4 NCKIPSD NDEL1 NDNL2 NDST2 NDUFA12 NDUFA3 NDUFA6 NDUFAF4 NDUFB10 NDUFB4 NDUFS6 NDUFS8 NEGR1 NEK4 NF1 NF2 NFX1 NIPA2 NOL7 NONO NOTCH4 NPM1 NPRL3 NR1D2 NR2C2AP NRTN NT5C NUBP1 NUDT16L1 NUDT7 NUP50 NUP62 NXT1 OAZ2 OCLN ODC1 OIP5 OPA1 ORC4 ORC6 OSTC OSTF1 P4HA1 PAIP2 PAPSS1 PAR6B PARK2 PARK7 PATZ1 PCGF3 PCNA PCNT PDCD4 PDCD6 PDCD6IP PDCL3 PER1 PFDN1 PGAM1 PGAM5 PGLS PGP PGRMC2 PHACTR4 PI4K2B PIGH PIGP PIN4 PJA1 PLA2G12A PLD1 PLEKHA3 PLEKHA8 PLEKHJ1 PMS1 PMS2 PNISR PNMAL2 POFUT2 POLD1 POLE4 POLI POLR1A POLR2A POLR2F POLR2I POLR3K POM121 PPAN PPCS PPDPF PPIF PPP1CB PPP1R10 PPP1R12A PPP1R7 PPP2CA PPP2R5C PRDM4 PRDX3 PRDX5 PRKAR2A PRKDC PRMT1 PRPSAP1 PSMA3 PSPC1 PSTK PTBP1 PTCH1 PTGES3 PTPN2 PTPRS PTS PUS3 PUS7L PUSL1 PVR PYGL RAB10 RAB14 RAB32 RAB4A RABEP1 RABGGT RABGGTB RAE1 RAF1 RALBP1 RAN RANBP1 RASSF1 RAVER1 RBBP4 RBM19 REEP6 RELL2 RENBP RETSAT REXO2 RGS19 RHOA RHPN1 RIOK2 RNF145 RNF19B RNF5 RNF8 RNGTT RNH1 RNPS1 RPA1 RPA2 RPL13A RPL14 RPL19 RPL36 RPP14 RPP30 RPS12 RPS13 RPS21 RPS29 RRP9 RXRB S100A13 SAFB2 SARM1 SAYS1D1 SBF2 SCAMP3 SCARB2 SCN3B SDCBP SDF4 SDHA SDHB SDR39U1 SERINC1 SERTAD1 SET SETD4 SF3A2 SF3B1 SF3B2 SFI1 SFMBT1 SFT2D1 SGMS1 SGTA SH3BGR SHBG SHMT1 SHPRH SIKE1 SIRT5 SLC12A6 SLC25A10 SLC25A3 SLC27A3

		SLC35G1 SLC39A6 SLC3A2 SLK SLTM SMAP2 SMARCA4 SMARCC1 SMARCD3 SMIM14 SMPD4 SMYD3 SNRK SNRNP25 SNRPD2 SNW1 SOC51 SORCS3 SOX12 SPC24 SPDL1 SPG11 SPOP SPRY4 SRC SRD5A1 SRR SRSF11 SRSF10 SRSF11 SSB SSH2 SSNA1 SSSCA1 STAP2 STARD7 STIM2 STK38 STRADA STRN3 STUB1 STX17 STX3 SYCE2 SYP SZRD1 TAF1B TAF6 TARS TAX1BP3 TBC1D8 TBCB TBCD TCEB2 TCF19 TCF25 TCP1 TCTA TCTEX1D2 TDP1 TDRD7 TFE3 TGIF1 THAP7 THBS2 THOC3 THOP1 THRA TIA1 TIMELESS TIPARP TMED9 TMEM116 TMEM141 TMEM14C TMEM175 TMEM180 TMEM263 TMEM39A TMEM43 TMEM65 TMEM9 TMTTC2 TMX1 TNKS2 TOMM20 TOMM34 TPM1 TPRA1 TPX2 TRAF3IP1 TRAPPC9 TRIM28 TRIM62 TRIO TRMT2A TSEN2 TSEN34 TSPAN3 TSSC4 TTC7B TTLL12 TTLL9 TUBA1B TUBG1 TWF2 TXNL1 U2AF1 U2AF2 UBA2 UBA52 UBE2T UBE4B UCK1 UGGT2 UIMC1 UNG UQCR11 UQCRB UQCRCF51 USF1 USO1 USP21 UXS1 VAMP2 VAPA VDAC2 VKORC1L1 VMAC VPS28 WDHD1 WDR1 WDR43 WDR45 WDR62 WNT5A WRB XPO5 XRCC2 XRCC5 YARS2 YIF1A YTHDF1 YWHAH ZBTB17 ZBTB8OS ZC3H14 ZDHHC12 ZFAND2A ZFAND3 ZFYVE27 ZMYND19 ZNF652 ZNFEX1 ZNHIT1 ZSCAN18 ZWINT
Diethylhexyl phthalate	149	ACADM ACAP3 ACAT2 ACOT13 ACTB AKAP17A AKT2 ALAS1 ALDOA AMZ2 ANAPC11 ARMCX2 ARRB2 ATG7 BCAT2 BROX BSG CASZ1 CBX2 CCNB1 CCNE1 CCT3 CCT6A CDC34 CDV3 CEP85 CNKSR3 CSAD CYCS DBI DECR2 DLGAP4 DNAJB9 DNMT1 DPY30 DPYSL2 DYNLL1 EIF4G1 ENTPD5 EPHX1 ERCC6 ERP29 ESRRA ETV5 FAM102A FASN FBXL8 FBXO21 FBXO9 FDPS FITM2 FKBP2 FMR1 G3BP2 GABRB1 GNPTG GPR19 GRPEL2 GSR GSTK1 GSTM3 HDAC4 HDAC4 HSD17B4 HSDL2 HSP90AA1 HSPA4L HSPA8 HSPA9 HSPD1 HSPE1 INPP4A INSIG2 IRS1 ITGA1 KIF18A KLHDC3 LDHA LRRC42 LSS1 MAP3K14 MAPT MECP2 MIDN MMADHC MMP17 MRPL54 MRPS18B MSH2 MVD NAE1 NDUFA3 NF1 NKTR NOTCH4 NPM1 NR1D1 ODC1 ORC4 PAPSS1 PARK2 PDCD5 PDCD6 PDIA5 PER1 PGLS PI4K2B PIGP PLD1 POLE4 POU2F1 PPP1R10 PPP2R5C PSMA2 PSMA4 PSMC4 PTPRS PUSL1 PYGL RBX1 RETSAT RNF14 RNF19A RPL36 RPS13 RPS23 RPS6KB1 RUNX2 RXRB SCN3B SEC61G SIAH2 SLC37A4 SMAP1 SNX7 SPRY4 SRD5A1 SRR SYP TIMM13 TIMM9 TMEM141 TPM1 TUBA1B TUBB4B TXNL1 UCK1 VDAC3 ZWINT
Polychlorinated biphenylsCadmium	263	ARAF ARHGEF10 ARL3 AURKA AURKB BASP1 BCL10 C18ORF54 CASP2 CCNF CDC42 CDK1 CDK2AP2 CDKAL1 CDT1 CENPN CHTF18 CIRBP CKS1B CNTLN CTPS1 DAD1 DIDO1 DNAJB9 DNMT1 DTYMK EEF1D EIF2S2 EPHX1 FAM98A FANCA FBXO5 FCHO2 GABRB2 GNPTAB HNRNPU HSPD1 KEAP1 KIF3A KIF4A LENG8 MACF1 MCM2 MCM6 P4HB PCNA PEX5L PILRB PLK4 PPIA PPM1F PPM1K PPME1 PPP4R2 PRC1 PRRT2 RAD23B RAF1 RBKS RPA1 RTKN2 SAFB SCML1 SDCBP SFXN2 SGMS1 SMC4 SMG6 SPAG8 SPOCD1 TCF25 THRA TMEM38B TNKS2 TRPM7 TSEN54 TSPAN12 TXLNA UBE2T UNG VDAC2 ZNF428 ZNF692 ZSCAN18 ZWINT



Arsenic	520	<p>TCEB2 TCF19 TCP1 TDP2 TFAP2B THRA TMX4 TNFSF13 TPM1 TPX2 TRADD TRPM7 TSSC4 UBE2D3 UBE2D4 UBE2N UCK1 USF1 USP39 VGF VHL WDSUB1 WWP1 XPA XPO5 YWHAZ ZBTB17 ZBTB4 ZFAND2A ZMYND19 ZNF286A ZNF554 ZNF747</p> <p>ABCA3 ABHD14A ABLM2 ACAD9 ACTB ADAM10 ADCK5 ADCY9 ADIPOR2 AGPAT1 AKAP8 ALDOA ANAPC16 ANAPC7 APBB3 APC2 APLF APOLD1 ARF1 ARHGEF10 ARHGEF18 ARPC2 ARSB ASB7 ASB8 ATAD3B ATF7IP ATG10 ATG2A ATG7 ATM ATP11A ATP6V0D1 AURKA B3GNTL1 B9D2 BBS9 BCAR1 BCL10 BCL2L12 BCL7B BLOC1S2 BORCS7 BPNT1 BTBD3 BTBD7 BYSL C16ORF87 C17ORF82 C19ORF57 C1GALT1C1 C1ORF35 C2CD3 C6ORF136 CASP2 CASZ1 CBFB CBL1 CBR4 CCDC114 CCDC150 CCDC47 CCDC89 CCHCR1 CCNB1 CCNE1 CD27 CD59 CDC42 CDC42BPB CDK1 CDK19 CDKN2B CDKN2D CDYL CEP104 CEP250 CEP63 CEP72 CES4A CHCHD4 CHD2 CHORDC1 CHST12 CIPC CLASP1 CLN8 CLP1 CLPTM1L CNOT1 CNST COG1 COQ2 COX6A2 CPSF3L CREB1 CREM CRT1 CSAD CSE1L CSNK1G2 CTBP1 CTSD CXXC1 CYCS CYHR1 D2HGDH DAZAP1 DCPS DDIT3 DDX10 DDX11 DDX27 DDX39B DECR2 DENND3 DFFB DHDDS DHODH DIRC2 DLGAP4 DLL3 DNA2 DNAJC5 DNM3 DNMT1 DOLPP1 DUSP14 DYNC1H1 DYNLRB2 DYRK1B E2F1 E2F6 EED EEF1G EHD1 EHMT1 EIF5A ELL ENO1 ENTPD6 ERCC2 ERCC6 ERGIC3 ERMAP ERP29 ERRF1 ETFB ETFDH EVI5 EXOC8 EXOSC5 EZH2 FAAP20 FAM133B FAM134C FAM189A1 FAM213A FAM3A FAM49B FANCA FASN FBXL5 FBXO3 FCHO2 FGFR1OP2 FGGY FIGN FIP1L1 FKBP1 FUT8 FZR1 GAK GCLC GDPD1 GFOD2 GJA9 GLE1 GMEB2 GNAO1 GNPDA2 GOLGA4 GPANK1 GPR180 GPRIN1 GSR GSS1 GSTM3 GTF2A1 GTSE1 HAUS3 HCRT HDAC4 HDHD3 HEXIM2 HLC5 HNRNPA1 HNRNPM HP1BP3 HRAS HSD17B4 HSDL1 HSP90AA1 HSPA8 HSPA9 HSPD1 IBA57 IFT122 IFT80 IGFBP3 INPP4A INPP5A INSIG2 INTS6 IP6K2 IQCE IRAK4 ISOC1 ITFG2 ITGAE IWS1 JAK2 KANK3 KANSL1 KANSL1L KDM5C KEAP1 KIF4A KIF6 KIFAP3 KIFC1 KLF13 KPNA1 KRR1 LAP3 LDHA LENG8 LIG3 LMF1 LPCAT1 LRCH3 LRRC20 LRRC58 LSM2 LSM4 LYPLA1 LYRM2 MACF1 MAD2L1 MAG1 MAGIX MAP2 MAPK7 MAPT MBD1 MED18 MED26 MED9 MEGF8 METTL22 MFSD9 MGA MMADHC MMP17 MMRN2 MMS19 MPG MSH2 MSH5 MSRA MST1 MYH10 MYH14 MYH7B MYO1D N6AMT1 NADK NAP1L4 NARFL NARS2 NCAN NDEL1 NEFH NEFM NEGR1 NEIL2 NEK4 NEUROD1 NF1 NFYA NKTR NOMO2 NOTCH4 NPM1 NPRL3 NR1D2 NRN1 NRTN NSUN2 NUBP1 OCLN ORC4 P4HA1 P4HB PAICS PAIP2 PARK2 PATL1 PCBP2 PCDH9 PCGF3 PCIF1 PCLO PCNA PCNT PDCD2L PDCD4 PDE7A PDE8A PELI1 PER1 PGP1 PGS1 PHF20 PHF23 PI4K2B PI4KA PIN4 PITHD1 PKD1 PKIB PLCG1 PLD1 PLEKHA8 PLEKHJ1 PLOC3 PLS1 POFUT2 POLD1 POLR2H POLR3B POM121 PPAN PPAT PPFIA3 PPM1D PPP1R10 PPP2R1A PPP2R5C PPP5C PPTC7 PQLC2 PRDX5 PRKAR2A PRKDC PSMA3 PTBP1 PTCH1 PTK2 PTPRS PVR RABL6 RAF1 RALGAP2 RAPGEF6 RASSF1 RBM12B RBM19 RBM4B REEP3 RGS17 RHEBL1 RNFI130 RNFI14 RNFI149 RNFI170 RNFI19A RNFI8 RNPS1 ROCK1 RPA1 RPL36 RPUSD3 RRM2B RSRP1 RUNX2 RXR8 S100A13 SBF1 SBF2 SCAP SCN3B SDHA SDHB SET SGMS1 SHMT1 SIAH2 SIL1 SIVA1 SKA1 SLC30A5 SLC3A2 SLC44A2 SLC9A3 SMAD4 SMARCA4 SMARCC1 SMPD4 SMYD3 SNX32 SNX8 SOS1 SOS2 SPATA5L1 SPDL1 SPG7 SPICE1 SPPL2B SRC SRP68 SRRM2 SRSF11 SSH1 ST5 STARD7 STIM2 STRN4 STX12 STX1A STX3 SUCLA2 SUFU SYCE2 SYPL1 TAF4 TAF6 TAF7 TARBP1 TBC1D24 TBCD TECR TEX264 TFDP1 TIGD1 TIMM8B TMEM106C TMEM115 TMEM116 TMEM135 TMEM263 TMT2C TOLLIP TOX2 TPCN2 TPGS1 TPMT TRAPPC9 TRIM39 TRIT1 TSEN54 TSPAN12 TSPAN14 TSPYL5 TTC37 TTLL12 TUBB TUBB4B U2AF2 UBA52 UBE2D4 UBE2K UBE2N UBE2V1 UGGT2 UNKL UPF1 UQCRC1 USO1 UVSSA VAPA VAR2 VASH1 VHL VPS13C VPS26B VPS8 WARS2 WDFY2 WDR19 WDR20 WDR5 WRB XPA XRCC1 XRCC5 YIPF3 ZBTB4 ZBTB49 ZC3H3 ZFAND3 ZFR ZNF10 ZNF146 ZNF2 ZNF248 ZNF324B ZNF331 ZNF445 ZNF524 ZNF527 ZNF551 ZNF610 ZNF611 ZNF692 ZNF771 ZNF782 ZNF787 ZNF845 ZP3</p>
		<p>ACAT2 ARHGDI1 ATM BNIP3 BUB1 CKS2 COMMD8 CREB1 CYCS CYHR1 DDAH1 DDIT3 DLD DNAH14 ENO1 EPHX1 ERCC2 ERCC6L ERICH1 GSR HSPA8 IPO11 MAGED2 MAP3K14 MCM4 NAMPT NOTCH4 P4HB PARK2 PARK7 PPM1D PSMA3 PSMA4 PVR RAB23 REEP4 RELA RNFI145 SCN3B SDCBP2 SEH1L SLC39A14 SMIM14 SPTAN1 SRC TFAP2B TRPM7 UBE2N VPS13A ZMYM6</p>
Manganese	50	