**Table S1. KEGG analysis of five hub modules**

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| **Module** | **Description** | ***p*-value** | **Genes** |
| Midnightblue | Glycosphingolipid biosynthesis | 9.37E-04 | *ST3GAL4, B3GNT3, FUT2, A4GALT* |
| Tight junction | 0.006368 | *MARVELD2, CLDN7, MYH14, TJAP1, TJP3, LLGL2* |
| Glycerophospholipid metabolism | 0.014771 | *PLA2G12A, LPCAT4, GPD1L, AGPAT3* |
| Glutathione metabolism | 0.017097 | *GSR, IDH2, GPX7* |
| Histidine metabolism | 0.020717 | *MAOA, ALDH9A1* |
| Darkgrey | Thermogenesis | 1.33E-04 | *RPS6KA3, ATP8, ATP6, COX1, CYTB, ND3, CPT1B, SMARCA2, ND2, ND5, ND4* |
| Oxidative phosphorylation | 2.31E-04 | *ATP8, ATP6, COX1, CYTB, ND3, ND2, ND5, ND4* |
| Parkinson disease | 3.61E-04 | *ATP8, ATP6, COX1, CYTB, ND3, ND2, ND5, ND4* |
| Nucleotide excision repair | 0.002555 | *LIG1, CCNH, ERCC5, POLE* |
| Fanconi anemia pathway | 0.004239 | *TOP3B, WDR48, TOP3A, FANCG* |
| Blue | Cell cycle | 5.12E-12 | *PCNA, MCM7, PRKDC, TTK, PKMYT1, CCNB2, ORC4, ORC6, PTTG2, E2F1, EP300, BUB1, SMAD2, CREBBP, GADD45B, CDKN2A, PLK1, CDC7, CDC6, SMC1A, CCNA2, DBF4, CCNE1, CDK4, CDK2, MDM2, CDK1, MCM3, MCM4, MCM5, MCM6, ANAPC1, MCM2, MAD2L1* |
| DNA replication | 7.39E-11 | *RFC5, FEN1, RNASEH2A, PCNA, RFC4, MCM7, RFC2, RPA1, RNASEH1, POLD1, POLE3, RPA4, MCM3, MCM4, MCM5, MCM6, MCM2* |
| RNA transport | 1.37E-09 | *NUP205, POM121, NUP107, NXT1, NUP188, DDX20, CASC3, AAAS, NUP160, PNN, XPO1, SUMO1, SUMO3, NUP62, XPO5, NUP88, NUP43, RAE1, NUP214, NDC1, EIF1AY, NUP210, NUP155, NCBP1, NUP133, ALYREF, PABPC4, THOC5, DDX39B, XPOT, GEMIN4, TACC3, RNPS1, EIF3F, RPP25, EIF4G1* |
| Nucleotide excision repair | 1.76E-05 | *RFC5, PCNA, RFC4, RFC2, XPA, RPA1, XPC, GTF2H4, ERCC3, POLD1, ERCC1, POLE3, RPA4* |
| Base excision repair | 6.99E-05 | *FEN1, PARP3, PCNA, PARP1, PARP2, POLD1, POLE3, XRCC1, LIG3, UNG* |
| Salmon | ECM-receptor interaction | 1.12E-09 | *LAMB3, ITGB4, ITGA3, LAMA3, TNC, LAMC2, ITGAV, ITGB6, ITGA5, AGRN, CD44* |
| Focal adhesion | 3.79E-09 | *LAMB3, SHC1, ITGB4, ITGA3, PXN, LAMA3, TNC, LAMC2, PGF, VEGFA, FLNB, ITGAV, ITGB6, ITGA5, BCAR1* |
| PI3K-Akt signaling pathway | 2.69E-07 | *HSP90AA1, LAMB3, IRS1, ITGB4, ITGA3, LAMA3, TNC, LAMC2, OSMR, PGF, VEGFA, GNB1, GNB4, ITGAV, ITGB6, ITGA5, YWHAH* |
| Antigen processing and presentation | 1.63E-06 | *HSP90AA1, HSPA5, HSPA6, HSPA2, CALR, HSPA1B, CTSB, HSPA1A* |
| Proteoglycans in cancer | 1.74E-06 | *TGFB1, PLAU, PXN, PLAUR, MSN, FLNB, ITGAV, ITGA5, CBL, MMP9, CD44, VEGFA* |
| Greenyellow | Spliceosome | 8.42E-26 | *TCERG1, RBM25, DDX46, DDX42, PQBP1, SNRPD2, SNRPD1, SNRNP70, MAGOH, DHX15, SNRPD3, BCAS2, AQR, THOC1, PRPF40A, PLRG1, CRNKL1, CDC40, RBMXL1, SYF2, SNRPG, SRSF3, SNRNP27, SRSF4, PPIH, SNRPA1, SNRPF, SRSF6, SNRPC, SRSF7, SNRPB, SRSF9, SF3B2, DHX8, SF3B6, SNU13, U2AF1, U2AF1L4, SNRPB2, HNRNPA1, SF3B1, SMNDC1, SF3A3, HSPA8, PRPF38B, PPIL1, HNRNPA3, PRPF38A, CWC15, LSM5, MAGOHB, LSM4, LSM2, HNRNPM, XAB2, LSM7, SNRNP40, HNRNPK, LSM6, SNW1, PHF5A, ACIN1, HNRNPC* |
| Proteasome | 2.15E-16 | *PSMD12, PSMD11, PSMD14, PSMD13, POMP, PSMA7, PSMD8, PSMB6, PSMB7, PSMB4, PSMD7, PSMB5, PSMD4, PSMB2, PSMB1, PSMD1, PSMA5, SEM1, PSMA6, PSMC5, PSMA3, PSMC6, PSMA4, PSMC3, PSMA2, PSME3, PSMC1, PSMC2* |
| Alzheimer disease | 4.08E-12 | *APP, NDUFA12, ATP2A2, IDE, CASP3, UQCRFS1, ADAM10, NDUFC2, SDHC, SDHA, SDHB, COX7A2L, ADAM17, NDUFS6, IL1B, NDUFS5, NDUFS2, ATF6, GAPDH, NDUFB9, NDUFB10, UQCRB, NDUFB6, NDUFB4, NDUFB3, ATP5MC3, PSEN1, UQCR10, COX5A, UQCRH, RTN4, PPP3R1, ATP5F1B, COX2, MAPK1, FADD, NDUFV2, BID, NDUFA9, NDUFA8, ATP5PF, NDUFA6, NDUFA5, NDUFA4, COX6C, ATP5F1C, ATP5F1E, CDK5, NDUFAB1, CYCS, CALM3, CALM2* |
| Oxidative phosphorylation | 1.24E-10 | *ATP6V1A, NDUFB9, NDUFB10, UQCRB, NDUFB6, NDUFA12, NDUFB4, COX17, NDUFB3, ATP5MC3, TCIRG1, UQCR10, COX5A, UQCRH, ATP5F1B, COX2, COX11, UQCRFS1, ATP6V1E1, NDUFV2, ATP6V1C1, NDUFA9, NDUFA8, ATP5PF, ATP6V1G1, NDUFA6, NDUFA5, NDUFA4, NDUFC2, SDHC, ND4L, SDHA, COX6C, ATP5F1C, SDHB, ATP5F1E, COX7A2L, PPA1, NDUFS6, NDUFS5, NDUFAB1, NDUFS2* |
| Parkinson disease | 1.19E-09 | *NDUFB9, NDUFB10, UQCRB, NDUFB6, NDUFA12, NDUFB4, NDUFB3, HTRA2, ATP5MC3, PARK7, UQCR10, COX5A, UQCRH, UBE2L3, ATP5F1B, CASP3, COX2, UQCRFS1, NDUFV2, NDUFA9, NDUFA8, ATP5PF, NDUFA6, NDUFA5, NDUFA4, NDUFC2, SDHC, ND4L, SDHA, COX6C, ATP5F1C, SDHB, ATP5F1E, COX7A2L, NDUFS6, NDUFS5, NDUFAB1, VDAC3, CYCS, NDUFS2, SLC25A5, SLC25A6* |