

Table S2. Lists of ingenuity networks generated by proteins identified in each region of rat brain

Thalamus

ID	Molecules in Network	Score	Focus Molecules	Top Functions
1	<i>Actin, ACTR1A, ADCY, AMPH, CRHR1, CYFIP2 (includes EG:26999), DCTN1, DUOX2, E2f, EZR, F Actin, FSH, G protein alpha, GAD, GAD1, GAD2, GNAI3, GNAZ, GRIK1, GSN, KIF5B, Lh, MAG, MARCKS (includes EG:4082), MBP, MYO5B, MYO5C, NEFH, NFkB (complex), Pkc(s), PP2A, Rac, Rho gdi, SLC6A1, SPTBN1</i>	49	22	Amino Acid Metabolism, Molecular Transport, Small Molecule Biochemistry
2	<i>ACTR3, ARPC5, ATP6V1H, BAT2, BCAT1, C15ORF29, CD46, CHCHD2, CHCHD3, CHD4, DBF4, DHX8, EPCAM, ETFA, HIST2H3C, Histone h3, HNF4A, IMMT, KIF22, LRPPRC, LRRC40, MIR290 (includes EG:100049710), MRPL44, MYC, NDUFS2, NDUFS3, PHB (includes EG:5245), PNKP, PSAT1, SAMM50, SNX25, TOMM70A, TXNDC9, USO1, VEGFA</i>	35	17	Cardiovascular System Development and Function, Organismal Development, Tumor Morphology
3	<i>ACADM, ANKS1B, BDNF, beta-estradiol, CALB2, Calbindin, CNTNAP1, DLG2, DOCK7 (includes EG:85440), ERBB2, ETFB, FCGRT, FYN, GAD2, glycosylphosphatidylinositol, GPD1, HDAC6, HECTD1, HPRT1, LHX2, LRP8, MAP2K3, MAP2K6, MAP4K5, MIR103-1 (includes EG:406895), MLXIP, NFASC, OGDHL, SIK1, SLC27A1, SOX4, SOX21, SYNGR3, TNF, YWHAG</i>	27	14	Cell Death, Cell-To-Cell Signaling and Interaction, Dermatological Diseases and Conditions
4	<i>ACTN1, Akt, ALCAM, B2m-Mhc1a, CABC1, CABLES2, CADPS, CALR, CANX, CANX-CALR-CD1, Cd1, CD1D-CANX-CALR, CD1D-CANX-CALR-ERp57, DCT, ERK1/2, FCGRT, H2-LD, HLA-B27, ICAM4 (includes EG:3386), IgG, ITGAV, ITGB3, MAG, MAP2K6, MSR1, NCAM2, phosphatidylinositol 4,5-diphosphate, POLD3, PRNP, RAPH1, TACSTD2, TAPBP, TP53, TSHR, TYR</i>	21	12	Cellular Function and Maintenance, Cell Death, Cell-To-Cell Signaling and Interaction
5	<i>Ca2+, CACNA1A, CCT2, CCT3, CCT4, CCT5, CCT7, CCT8, CCT6A, CDK19, CTTNBP2, DICER1, DOCK5, EIF2B2, EIF2C4, FZD2, GCN1L1, MAP1A, MED29, PAFAH1B2, PIWIL2, PPP2R4, PPP2R2C, PPP2R2D, PPP4C, SLC2A4, SSSCA1, STK24, STRN, STRN3, SYT2, SYT7, TCP1, TSG101, ZFYVE27</i>	9	6	Cell Death, Post-Translational Modification, Protein Folding

Hippocampus

ID	Molecules in Network	Score	Focus Molecules	Top Functions
1	26s Proteasome, Actin, ALDH2, BRF2, Caveolin, CCT8, CTTN, DNM3, DOCK5, Dynamin, ERCC6, ERK1/2, FPR1, GMNN, GNAI2, HSPD1, KEAP1, MCM7, MFN2, MUC2, NFkB (complex), P38 MAPK, PACRG, PACSIN1, PASK, PPP2R4, PPP2R1B, RAGE, RAPGEF3, RELT, RGS3, RGS16, S1PR2, S1PR3, SEPT4	40	19	Nervous System Development and Function, Cell Morphology, Cellular Development
2	CCNT2, CD59, CDKN2AIP, CHL1, DLD, DLG4, EPB41L2, FBXO11, FDXR, GRB2, GSN, HSPD1, HTT, NDUFA9 (includes EG:4704), NDUFS1, NDUFS2, NDUFS3, NDUFS5, NDUFV2, NUSAP1, PHB (includes EG:5245), PHLDA3, PTPRA, PURB, RGS16, RPS3A, SAAL1, SFN, TMEM25, TP53, TP63, TUBA4A, VDAC3, XPO5, YWHAG	28	15	Organismal Development, Cell Cycle, Gene Expression
3	ADAM2, ADAM3, ADAM1A, ALB, AMT (includes EG:275), ANKZF1, BCKDHA, C1ORF50, CAV1, CCT8, CTDSPL2, HDAC3, HNF1A, HNF4A, ITGA9, LMO3, MDFI (includes EG:4188), MIR34A (includes EG:407040), MRPL2, MYST2, NVL, ONECUT1, PCDHA12, PCIF1, PROX1, RORA, RXRA, SEC23A, SEC23IP, SLC25A13, SLC25A20, STAT3, ZNF193, ZNF225, ZNF324	27	14	Cell-To-Cell Signaling and Interaction, Cellular Assembly and Organization, Reproductive System Development and Function
4	APP, ASCL1, CD59, CNR1, Cytochrome c oxidase, DPYSL2, DPYSL3, DPYSL5, FCAR, FES, GARS, INS, KRT72, LPXN, MAP2K1/2, MAPK9, melatonin, NCF2, NCF1C, NSMAF, RAGE, RAPGEF3, REST, retinoic acid, RHOQ, Rsk, SLC26A4, SST, Tnf receptor, TRAF2, UBA1, UNC13B, WDR62, ZNF426, ZNF646	23	13	Cell-To-Cell Signaling and Interaction, Hematological System Development and Function, Immune Cell Trafficking
5	AGT, aldosterone, ATP6V0A4, BACH1, Calmodulin, CASP3, CD40LG, CD79B, CLEC4C, CNR1, CXCR4, cyclic AMP, FES, HMCN1 (includes EG:83872), IFNA2, IL4, IL15, IL12A, MAP6, MC1R, melatonin, NCF2, NCF1C, NDUFS1, NFATC2, OPRM1, PARG, PARP12, REN2, RGS2, RGS16, SPIN1, SST, TBX21, VDAC3	19	11	Inflammatory Response, Cell-To-Cell Signaling and Interaction, Hematological System Development and Function
6	ACTB, Actin, AKT1, amino acids, AURKC, BIRC5, CDK1, CDK4, DOK6, EGF, ERBB2, FER (includes EG:2241), GH1, IGF1, IGF1R, IRS1, JAK2, MAP3K1, MAPK13, MDM2, Plexin B, PLXNB2, POP1, PPHLN1, PPL, PPP2CA, PPP2R1A, PRKCA, PRKCE, PTK2B, RET, RPP14, SP1, SRC, VIM	7	5	Amino Acid Metabolism, Post-Translational Modification, Small Molecule Biochemistry

Frontal cortex

ID	Molecules in Network	Score	Focus Molecules	Top Functions
1	ADIPOR1, APP, AR, BBS2, BHMT, D-glucose, DLST, EGF, FSH, GH1, HNF4A, hydrogen peroxide, IGF1, Insulin, L-triiodothyronine, Laminin1, LARP1B (includes EG:55132), LMOD1, MDH2, MGST1, MTUS1, NPY, OGDH, PET112L, PLSCR1, POLR3E, POLRMT, PPARGC1A, SYTL3, TBCK, TMEM87B, UQCC, VEGFA, ZNHIT3	29	15	Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry
2	Alpha catenin, ARHGAP5, C11ORF17, DYNLL1, EGF, GAST, GCC2, glucosamine, hydrogen peroxide, IGF1, Insulin, Jnk, KIAA0182, MAPK13, MDH2, MORC4, MYOG, PIK3R1, PLSCR1, Ponsin-Afadin-Nectin2, PPARGC1A, PPFIA3 (includes EG:8541), PRAM1, PTPN20B, PVRL2, SAE1, SKIL, SLC2A4, TGFB1, TTF2, USP25, USP28, VEGFA, YWHAZ	24	12	Carbohydrate Metabolism, Cellular Development, Embryonic Development
3	ADIPOR1, APP, BIRC2, Calmodulin, CARD8, Caspase, CDC23 (includes EG:8697), Ciap, D-glucose, EGF, FSH, glycochenodeoxycholate, GP5, GSN, GSN-PI3K-PIP2-Src, GSPT1, HTT, IGF1, IL16, IL15r, Insulin, MIR124, MYLK3, NFkB (complex), PCNT, PI3K, RHOB, SLC2A4, STK10, TARBP1 (includes EG:6894), TSC22D4, VEGFA, XAF1, XIAP/CIAP, ZMYND11	22	12	Amino Acid Metabolism, Molecular Transport, Small Molecule Biochemistry
4	ADCY, Alp, AP1G1, APP, ATP6V0A2, BDNF, beta-estradiol, BMP2, CAMKK1, COCH, cyclic AMP, DYNLL1, EGF, FBN1, GAS7, GFRA1, GH1, IGF1, IL10, Insulin, MIR17 (includes EG:406952), MYOG, NCKAP1L, NELL1, NOS2, PDE1B, retinoic acid, SFPQ, SLC12A5, SLC2A4, SOSTDC1, SYNRG, TG, VEGFA, ZNF804A	22	13	Tissue Development, Cellular Development, Hematopoiesis
5	ADCY, APP, CAPNS1, Cdc2, COL4A1, CRYM, cyclic AMP, D-glucose, DLG4, EDN1, EGF, FBLN5, FSH, GH1, hydrogen peroxide, IGF1, IL-2R, IL2RG, Insulin, ITGA10, JUN, L-triiodothyronine, Laminin1, LGALS3, MPRIP, MRPL12, MTHFR, MYC, MYCBP2, Pkg, PPP1R12A, sucrose, TG, VEGFA	8	6	Developmental Disorder, DNA Replication, Recombination, and Repair, Cellular Growth and Proliferation

Parietal cortex

ID	Molecules in Network	Score	Focus Molecules	Top Functions
1	ACTN1, ADD2, ANXA5, ARHGDIG, ATP2A3, C9, CAPZA2, Caspase, CFB, CLIP2, DDB2, ERK1/2, GSTM2, GSTP1, HMMR, Insulin, Interferon alpha, Jnk, Lh, LIMK2, NAIP, NARS, NFkB (complex), Pkc(s), PPP2R1A, PRDX1, PRKCI, PTGDR, PXN, RAB1A, RAP1GDS1, Ras homolog, SMC1B, TSHR, UBE2L6	57	26	Lipid Metabolism, Small Molecule Biochemistry, Cellular Assembly and Organization
2	ABCB9, ATP6V1D, C21ORF56, C9ORF5, CCDC59, CDK5, CETN2, CP110, CYP3A43, DLST, DPH5, EIF2AK2, GAPDH (includes EG:2597), HIST1H2BD, HNF4A, LGALS7B, LSG1, MAP2K3, MAP2K4, MAP3K3, MAPK14, MYL6, NDUFS1, NDUFS3, NDUFS4, OGDH, PAK7, PHB (includes EG:5245), PRKCE, S100A9, SLC25A5, TBC1D16, TRAF2, UMPS, VKORC1	28	15	Free Radical Scavenging, Cardiovascular Disease, Skeletal and Muscular Disorders
3	ACTN1, ALG1, amino acids, ATP6V0A2, BACE1, BBC3, CASP9, CAT, CSNK1E, CYC1, FSH, GLI1, GZMH, HCFC1, IL10, ILK, mannitol, OTUD4, PCNA, PDHB, PDHX, PDK2, PKN1, POLQ, PPP2R2A, PPP2R5C, PTPN4, PTPRC, SERPINF2, Sod, SP1, STK24, TGFB1, TNKS1BP1, TOB1	23	13	Amino Acid Metabolism, Post-Translational Modification, Small Molecule Biochemistry
4	ADORA2A, CTNNB1, CXCR2, DDX4, GSTM2, HBE1, HBG1, HBG2, HBZ, HOXA9, HSPD1, IL13, MAGI1, NCAN, NR2C2, OSM, PLEC, Ppp2c, PSMB8, PSMB9, psychosine, PTPRC, QPCT (includes EG:25797), RNF8, RXRA, SEPT11, SFMBT1, SNAP91, TADA3, TH, TNF, TNF, UGCG, VASH1, ZNF467	22	13	Cell-To-Cell Signaling and Interaction, Tissue Development, Gene Expression
5	ACTB, ACTN1, Ap1, BBC3, CSNK2B, EEA1, EGF, FBXO2, GH1, HCG 25371, IDH3A, IDH3G, LPHN2, MLH1, MYC, ND3, NKX3-2, NPHS1, NPHS2, PPP2R3A, PRDX1, PSMA3, PSMB3, PYGB, RAB5B, RAB7A, RIN1, RNF115, RTN1, Shc, SMARCB1, SNPH, TH, thyroid hormone, TXNIP	21	12	Cellular Development, Cell Cycle, Connective Tissue Development and Function
6	ACTB, ADAMTS5, ANXA2, AP2A2, ATP5B, BFSP2 (includes EG:8419), CAPN2, Caveolin, CD28, DCTN2, EIF4EBP1, F Actin, FGF1, FMR1, GCG, GPM6B, HRAS, HSPD1, HTT, KIF2B, LRMP, MIR302A (includes EG:407028), MIR34A (includes EG:407040), NAPG, NEGR1, NSF, PPP1R16B, RBPMS2, SLC25A22, Snare, SPTBN2, SRF, STAU1, TGM2, ZFYVE26	20	12	Cellular Assembly and Organization, Cellular Compromise, Infection Mechanism
7	19S proteasome, 26s Proteasome, ADRM1, AR, ATXN1, BRCA2, CDK4, COIL, CSNK2B, CYB5R2, PARK2, PLEKHG4, PSMA1, PSMA2, PSMA4, PSMA6, PSMA7, PSMB1, PSMB5, PSMB6, PSMB7, PSMB8, PSMB9, PSMB10, PSMC4, PSMD5, PSMD7, PSMD9, PSMD13, PSME1, SMAD2, SNCAIP, TRAF2, TRIP6, VCP	7	5	Cellular Assembly and Organization, Cell Cycle, Cell-mediated Immune Response

Occipital cortex

ID	Molecules in Network	Score	Focus Molecules	Top Functions
1	20s proteasome, 26s Proteasome, ACPP, C4BPB, CHAT, Ck2, Creb, DDX42, DSPP, DZIP3, ERBB2, G6PD, Histone h3, Histone h4, HOXB7, Hsp70, HTT, Laminin, MAGI2, MIR1, NFkB (complex), NID1, NKIRAS1, NUB1, PARK7, PI3K, POLR2A, PSMA8, PSMB6, RAB11FIP2, RIPK3, RNA polymerase II, RPS6KA1, SH2D4A, WDR36 (includes EG:134430)	47	23	Genetic Disorder, Nervous System Development and Function, Skeletal and Muscular Disorders
2	amino acids, ANXA3, ASS1, beta-estradiol, CDK2AP1, DSCAM, EEA1, ERH, FMO2, FOLH1, GNL2, HDAC1, HLTf, HMGCLL1, HUNK, IKZF1, IL4, IL5, IL15, ISG15, ITGAD, MBP, MIR98 (includes EG:407054), NR2E3, PDE4B, POLG, PTPN5, SET, SRM, TRIM28, UGT1A10 (includes EG:54575), ULK1, VIPR2, WDR44, ZFP53	27	15	Lymphoid Tissue Structure and Development, Tissue Morphology, Cellular Development
3	ABCD2, ARHGEF2, ATP5J2, CEP250, COPG, CSF3, DKC1, FAHD1, FGFBP2, LONP1, MAGED1, MBP, MME, MYC, NDUFA8, NDUFA9 (includes EG:4704), NDUFS2, NDUFS3, NFYB, PAK2, PIWIL1, PRKCD, PSMA1, PSMA2, PSMA3, PSMB7, PSMD6, RFX2, SLC27A6, TRIM41, TTLL9, UBR2, VDAC2, VIM, ZNF473	27	15	Cellular Assembly and Organization, Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance
4	ASCC2, ATL2, BMPR2, CCDC67, CCDC89, CHCHD3, CHCHD6, CYFIP1, DNAJC11, GIGYF2, HNRNPD, HTT, IFIT3, IMMT, ISG15, LANCL1, LDHAL6A, LDHAL6B, LDHC, LYST, MID1, MTX2, NDUFS3, OC90, retinoic acid, SERPINA3K, SP6, SPI1, SRGAP1, SRGAP2, SRRT, TXNDC11, VGLL3, YWHAZ, ZNF133	25	14	Tissue Development, Cellular Development, Cellular Compromise
5	ADAM15, AFF1, butyric acid, CDC42EP5, CLCN6, CNTN3, CYP1A1, DHRS1, DLG4, DPP6, DYNC2H1, FBN2 (includes EG:2201), FYN, GLI3, KCND2, KRAS, LRP8, MAN2A1, MAPK9, MBP, MDFI (includes EG:4188), MIR122 (includes EG:406906), MIR31 (includes EG:407035), MYOG, NRG1, OTOA, PAK2, RAB20, SEPT2, SEPT5, SEPT7, SEPT11, SYNGAP1, VLDLR, ZBTB25	22	13	Nervous System Development and Function, Neurological Disease, Cell-To-Cell Signaling and Interaction
6	ABCC3, AGGF1, ALPL, ASCC3, BECN1, CAR ligand-CAR-Retinoic acid-RXR α , CENPI, COMMD8, COMMD1 (includes EG:150684), CX3CL1, ELL2, FAF1, FSH, GAD1, LEP, lithocholic acid, MED15, NR1I2, OPLAH, PPP2R1A, PXR ligand-PXR-Retinoic acid-RXR α , RELA, RGS16, SCP2, SKIL, SLCO1A2, SMAD1, STAT6, TNFSF12, ursodeoxycholic acid, USP25, ZEB2, ZSCAN4, ZZEF1	16	10	Lipid Metabolism, Molecular Transport, Small Molecule Biochemistry
7	Akt, BLM, CHCHD2, CNP, CNTF, creatine, ERK1/2, GDNF, Glycogen synthase, GUCY2C, hCG, Insulin, Jnk, MAP3K3, Mapk, MBP, MCAM, mevalonic acid, OPRK1, P38 MAPK, PAK2, PCSK9, PEA15, Pi3-kinase, PIK3R3, PYGM, Ras, RGS20, S100A1, SET, SOS1, SP100, STXBP4, TRIM63, TYRO3	12	8	Skeletal and Muscular Disorders, Organismal Injury and Abnormalities, Cell Death

Amygdala

ID	Molecules in Network	Score	Focus Molecules	Top Functions
1	ACACA, Actin, ADAM19, alcohol group acceptor phosphotransferase, BLM, CCR1, CDK18, Collagen type I, Collagen type IV, ERK1/2, FMNL1, Focal adhesion kinase, G protein alpha, Gpcr, GRK4, hCG, Interferon alpha, LPAR2, MAPK1, MAPKAPK2, Metalloprotease, MTTP, NOS3, PDGF BB, PFN2, Pkc(s), PLC, PP2A, PPP2R4, PRKD3, PRKG2, Rock, SREBF2, T3-TR-RXR, TPM3	34	18	Cell Cycle, Cardiovascular System Development and Function, Organ Development
2	Ap1, CALB1, CD7, CSDE1, CXCL12, EGFR, Estrogen Receptor, Fibrinogen, FKBP1A, G protein alphas, GH1, Growth hormone, HBB (includes EG:3043), HDL, HIVEP1, Insulin, LDL, LPL, Mapk, MBL2, Mek, NFkB (complex), NRG, Pi3-kinase, PTPN1, Rac, Rap1, Ras, Sapk, SCGB1A1, SH3BP1, TNFRSF10A (includes EG:8797), UTRN, VAV, Vegf	28	16	Cellular Movement, Tumor Morphology, Cell Morphology
3	amino acids, ARHGEF1, BMP7, CCDC85B, CDH1, DNAH2, DUSP13, ERBB2, GBAS, HCK, HOXA13, Laminin1, LNX1, LYN, MAOA, MUC16, MYO18A, NIPSNAP1, NPHS1, NUDT3, PRKAR1A, PRKCI, progesterone, RANBP6, RBM12, SFRP1, SHROOM3, SMAD2, SPAG1, TGFBI, TPM1, TPM2, TPM3, YLPM1, ZNF337	24	14	Cell-To-Cell Signaling and Interaction, Cellular Function and Maintenance, Cancer
4	ALB, ALDH16A1, beta-estradiol, BMP4, CALB1, CCNG1, CEP152, EPB41L3, HELLS, HNF1A, HNF1B, HRAS, IKBKB, KAT2B, KCNMA1, KLF1, lipid, MYH4, MYH10, MYH14, OBSL1, PKHD1, PRDX6, RPL37, SFXN5, SLC22A12, SOD2, SYP, TAF6L, TMOD2, Tropomyosin, TRPM6, TSC22D1, TWSG1, ZNF526	22	13	Cancer, Cell Death, Cellular Development
5	ABCF2, ABL1, ALDH1A1, ANKZF1, BDNF, Calmodulin, CEBPB, CLPP, CYP1A1, DKK1, DYNC2LI1, GNPAT, HNF4A, HP, INS1, ISL1, KLF12, LDB1, LMX1A, NDUFA4, NRSN2, OTC, PRKCI, PRKCZ, RBL2, RNA polymerase II, RRP8, SFRP1, SNAP23, STK11, SUV39H1, TAOX3, TTYH1, ZFP106, ZKSCAN5	22	13	Cellular Development, Hepatic System Development and Function, Lipid Metabolism
6	AMMECR1, ATP11A, CCT4, COX2, COX3, COX4I1, COX5B, CUL1, CYTB, Cytochrome c oxidase, DMRTB1, E2F1, GABPB1 (includes EG:2553), HNRNPA1, IFNB1, IKBKB, IKBKE, IL16, INO80C, KCTD13, LPPR4, MIR122 (includes EG:406906), MIR183 (includes EG:406959), NQO2, PELI1, PGRMC1, SAT1, SFXN1, TNF, TNFSF12, TPM3, UBR2, UBXN7, UQCRCF1, VPS54	20	12	Inflammatory Disease, Inflammatory Response, Cell Death
7	Akt, ATP6V0D1, Calmodulin, Ck2, Creb, CREBZF, DNAJC5, E2f, ERK, ETV5, FSH, G protein beta gamma, Histone h3, Hsp70, Hsp90, IgG, IL1, Jnk, KLF5, Lh, MYBL2, NPHS1, P38 MAPK, PI3K, Pka, Ras homolog, RNA polymerase II, SMARCB1, SMC4, SNCA, STUB1, TPX2, TXLNA (includes EG:200081), UNC13B, VAMP2	18	11	Molecular Transport, Small Molecule Biochemistry, Cancer
8	20s proteasome, ABL1, ATP5B, BAI3, CAV1, COX2, COX3, COX17, COX5B, COX6B1, CTSB, Cytochrome c oxidase, FAM173A, GAPVD1, HSPA8, HTT, IGSF9B, IL3, iron, KAT2B, MEIS2, MIR141 (includes EG:406933), MIR181B2, PHLPP2, PPP2CA, PRKCG, SFXN3, SIAH1, SLC25A3, SNCA, SUMO1, TGM2, TP53, UCHL1, YWHAG	10	7	Neurological Disease, Cell Death, Nervous System Development and Function