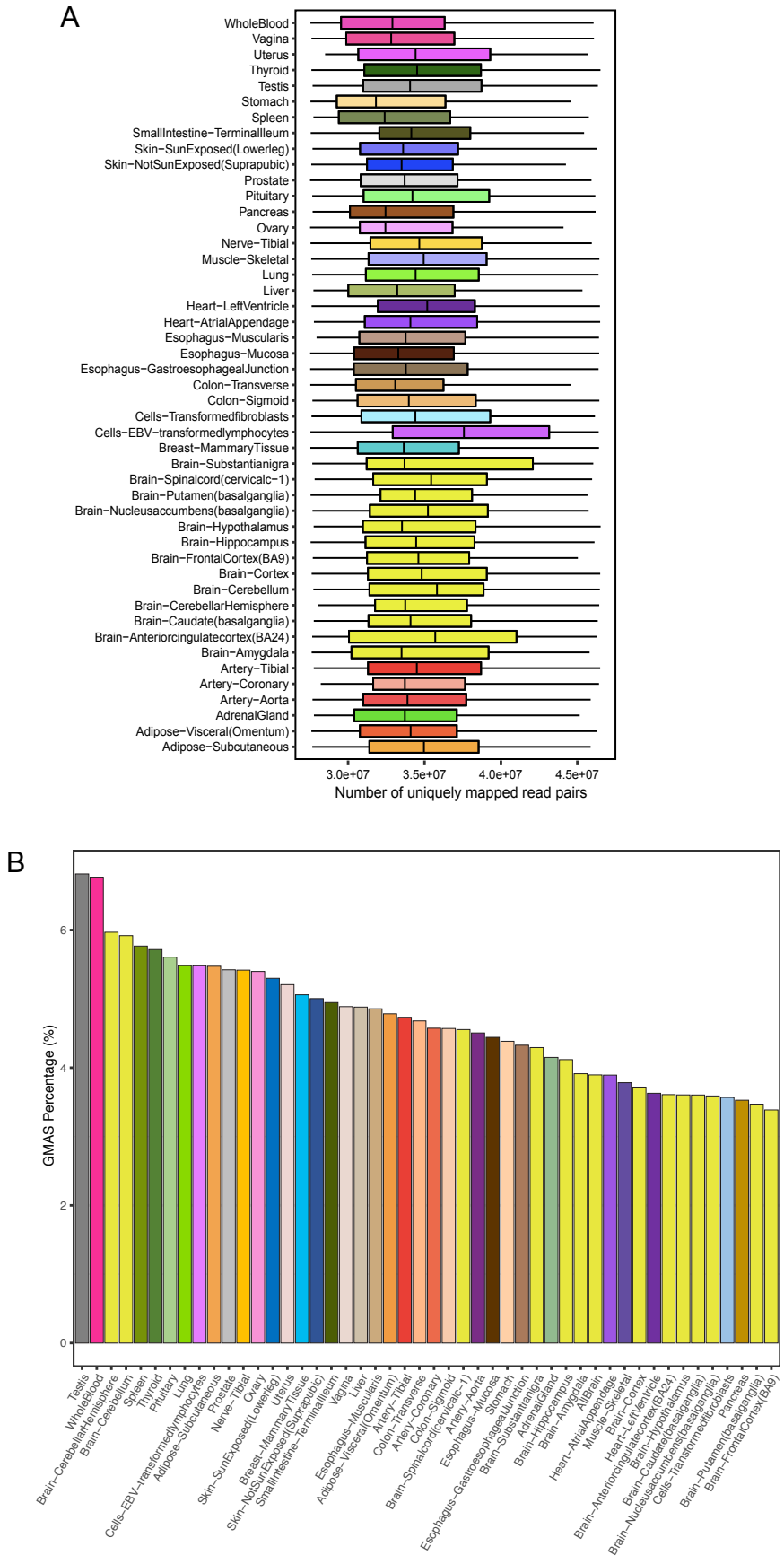


Figure S1. (A) Number of uniquely mapped read pairs per tissue. (B) Percentage of GMAS exons calculated as the total number of GMAS exons divided by the number of testable exons across selected sampled in a tissue. The analysis was done by selecting 58 samples from each tissue randomly, but matching the total number of reads per sample with those in the tissue (brain substantia nigra) that has the least number (n=58) of samples.

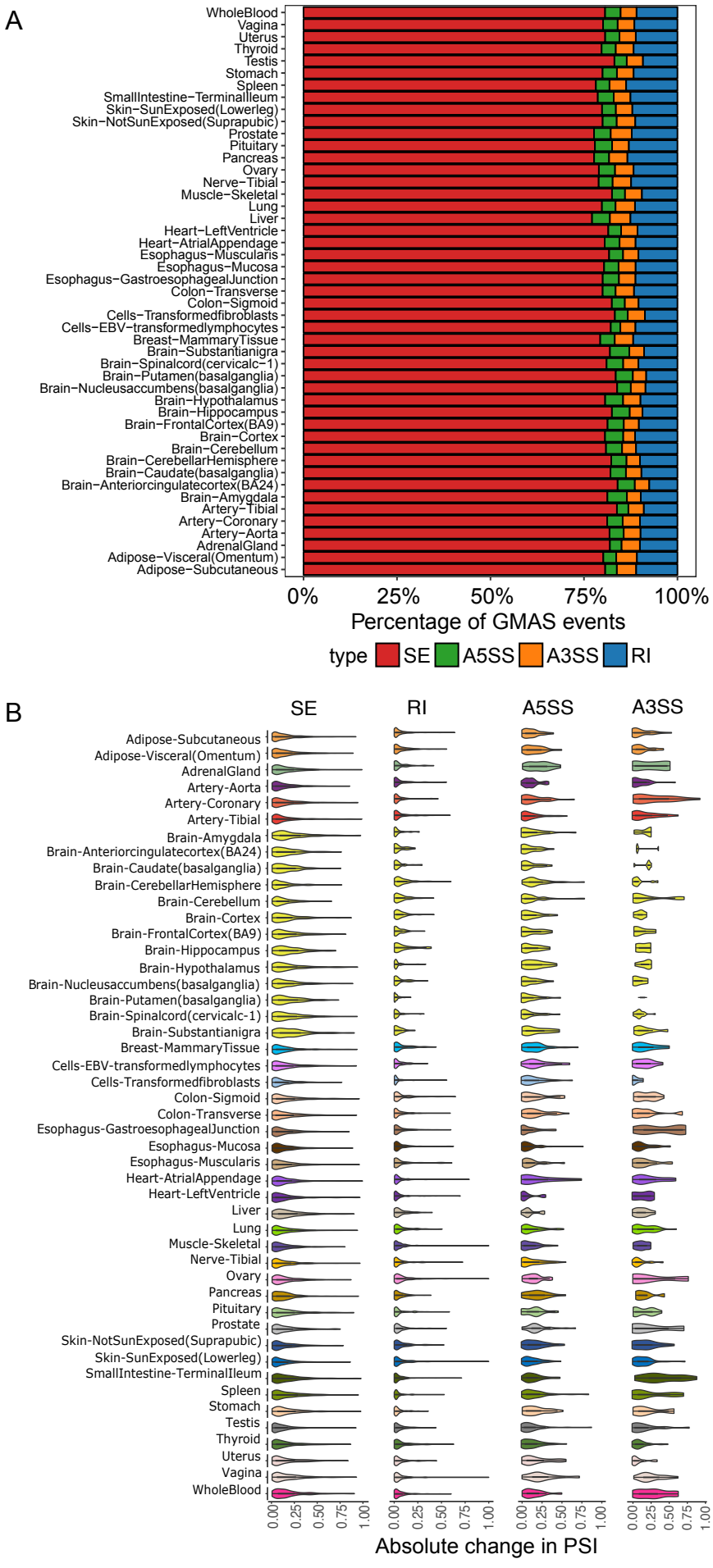


Figure S2. (A) Distribution of GMAS types per tissue. (B) The distribution of changes in PSI of GMAS exons per tissue. For each GMAS exon in each tissue, the mean absolute difference between PSI for individuals with homozygous reference allele and those with homozygous variants was taken. SE: skipped exons; RI: retained introns; A5SS: alternative 5'ss exon; A3SS: alternative 3'ss exon.

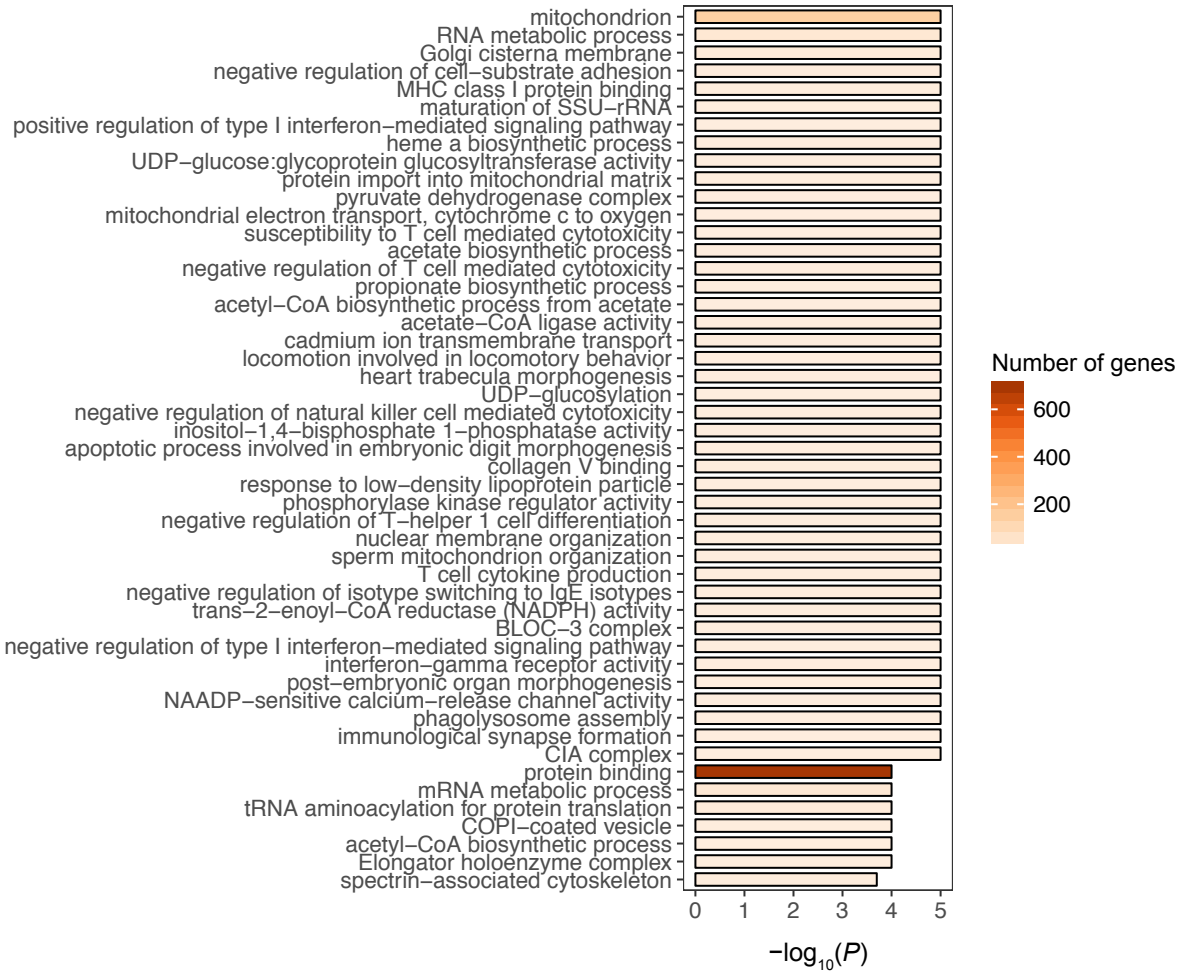


Figure S3. GO terms enriched among genes harboring GMAS exons with low variability across tissues and across individuals (N = 1636).

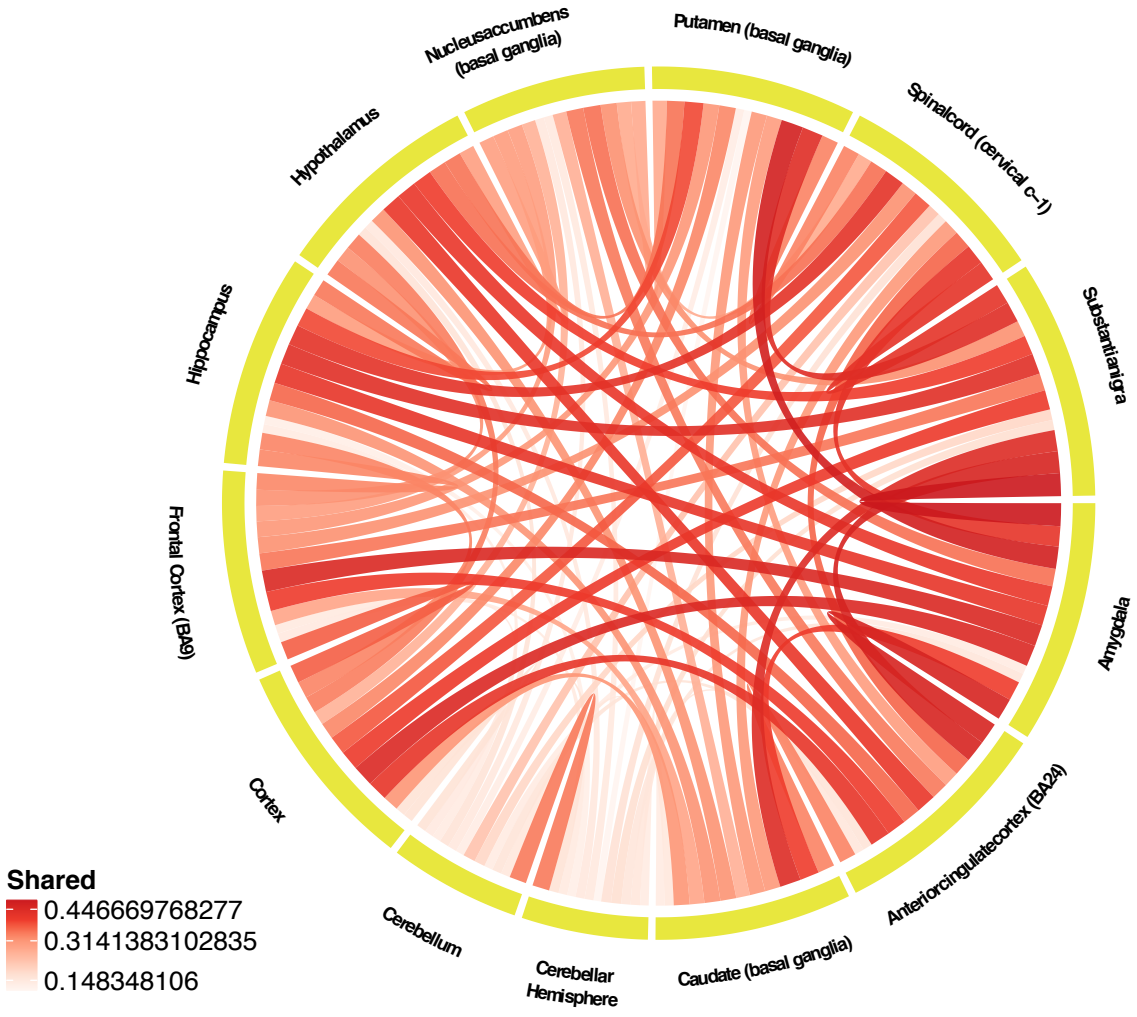


Figure S4. Jaccard index of GMAS patterns between pairs of brain regions (inner links). The color shade and thickness of the links are proportional to the number of shared GMAS exons between the two tissues.

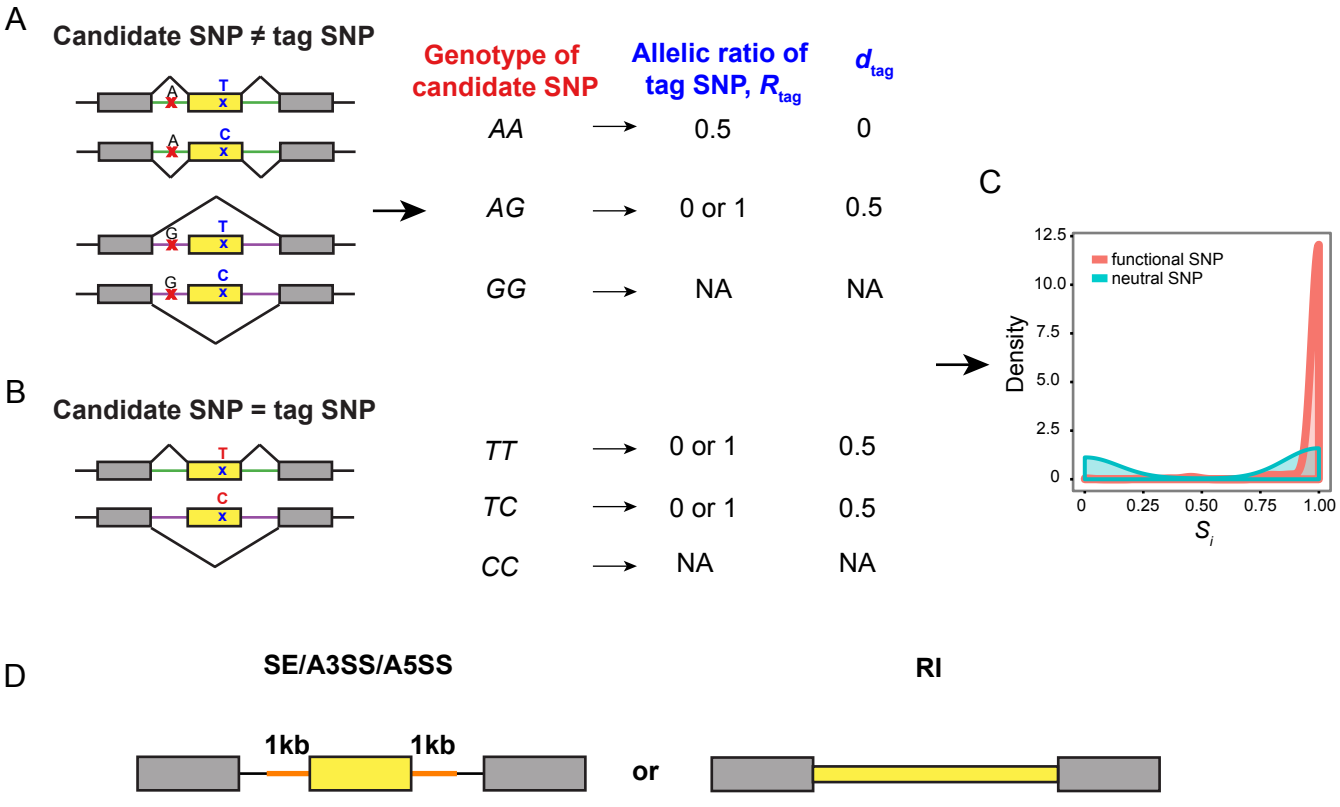


Figure S5. Calculation of concordance scores to predict functional SNPs. (A) A simple example showing a functional candidate SNP that causes complete exon inclusion or exclusion. The allelic ratio of the tag SNP is shown depending on the genotype of the functional SNP. d_{tag} is calculated as $|R_{tag}-0.5|$. (B) A simple example showing that the tag SNP is the functional SNP and its alleles induce complete exon inclusion or exclusion. (C) Hypothetic distribution of concordance score S_i for the functional SNPs in (A) and (B). The distribution for neutral SNPs is also shown. (D) The regions within which to search for candidate functional SNPs (yellow boxes). For SE, A3SS, and A5SS events, we also included intronic SNPs within 1kb (orange line) of the target exon.

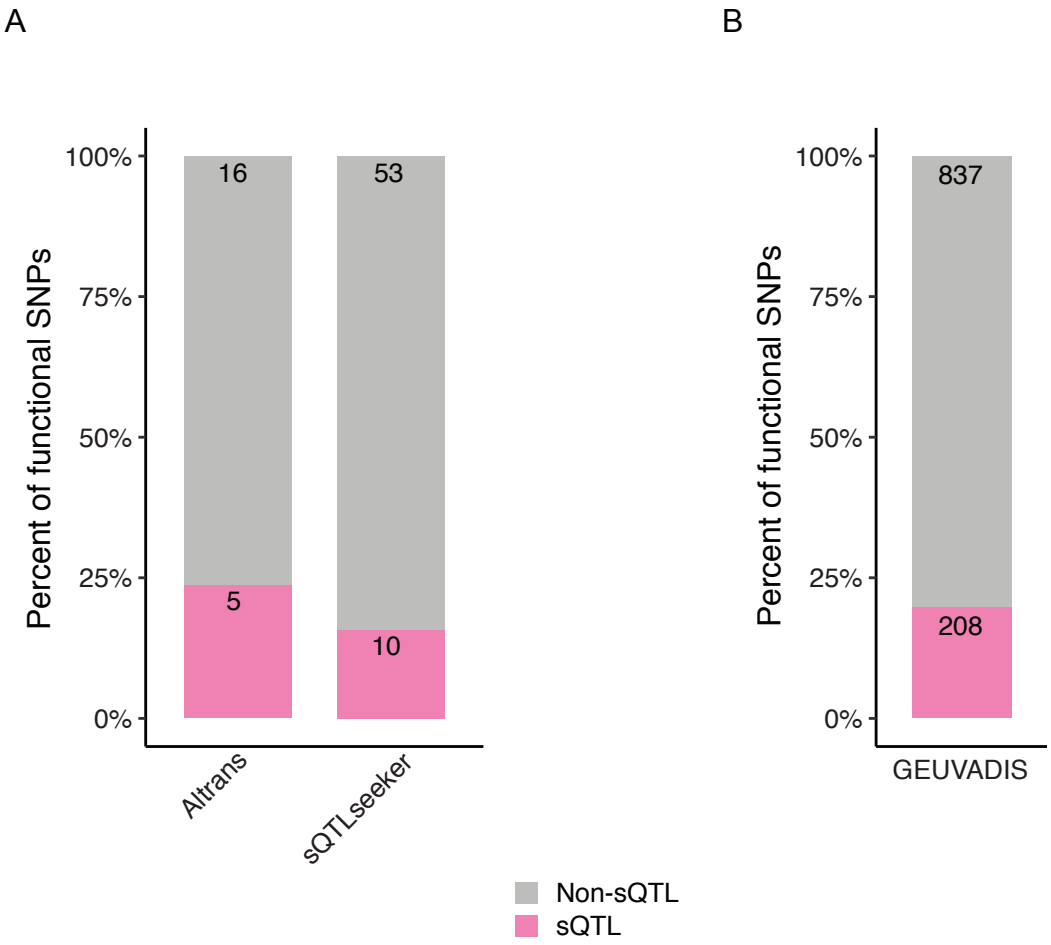


Figure S6. Functional SNPs overlapping known sQTLs. (A) sQTLs identified from GTEx pilot study. (B) sQTLs identified from 1000 Genomes Project.

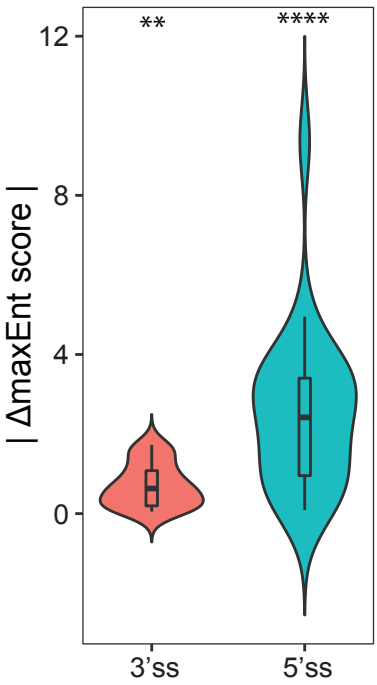


Figure S7. The absolute difference in maxEnt scores between the alternative alleles of predicted functional SNPs located in the 3'ss (Kolmogorov-Smirnov P = 0.003007) or 5'ss (Kolmogorov-Smirnov P = 0.0001128).

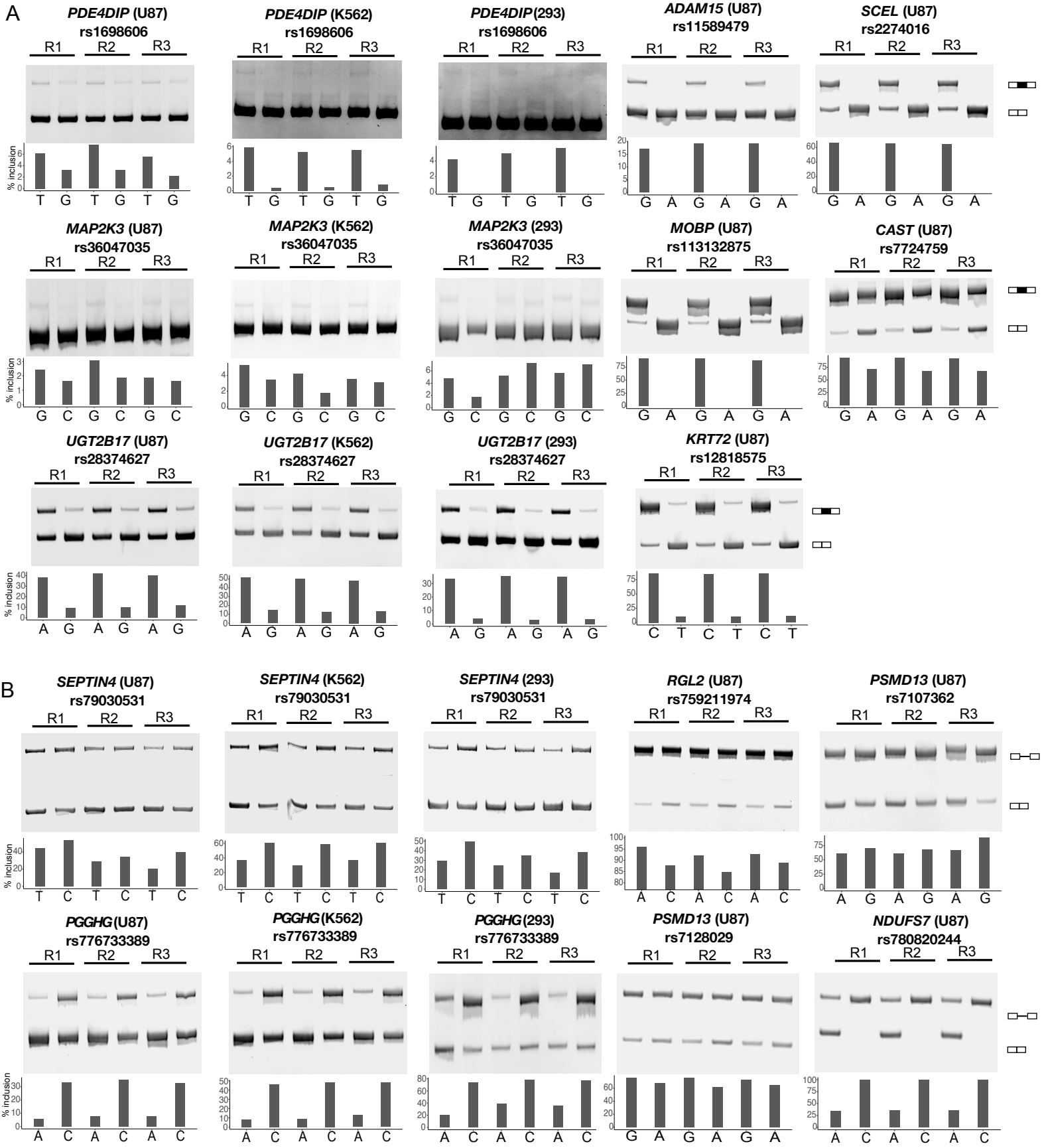


Fig. S8: Experimental support of predicted functional SNPs. Minigene experiments validating predicted functional SNPs for GMAS in triplicates (R1-3). The inclusion levels (% inclusion) of the skipped exons or retained introns were estimated from the band intensities of the PAGE gel. (A) Functional SNPs in *PDE4DIP*, *MAP2K3*, *UGT2B17*, *ADAM15*, *SCEL*, *MOBP*, *CAST* and *KRT72* tested in U87, K562 and HEK293 cells for exon skipping. (B) Functional SNPs in *SEPTIN4*, *PGGHG*, *PSMD13*, *RGL2* and *NDUFS7* tested in U87, K562 and HEK293 cells for intron retention

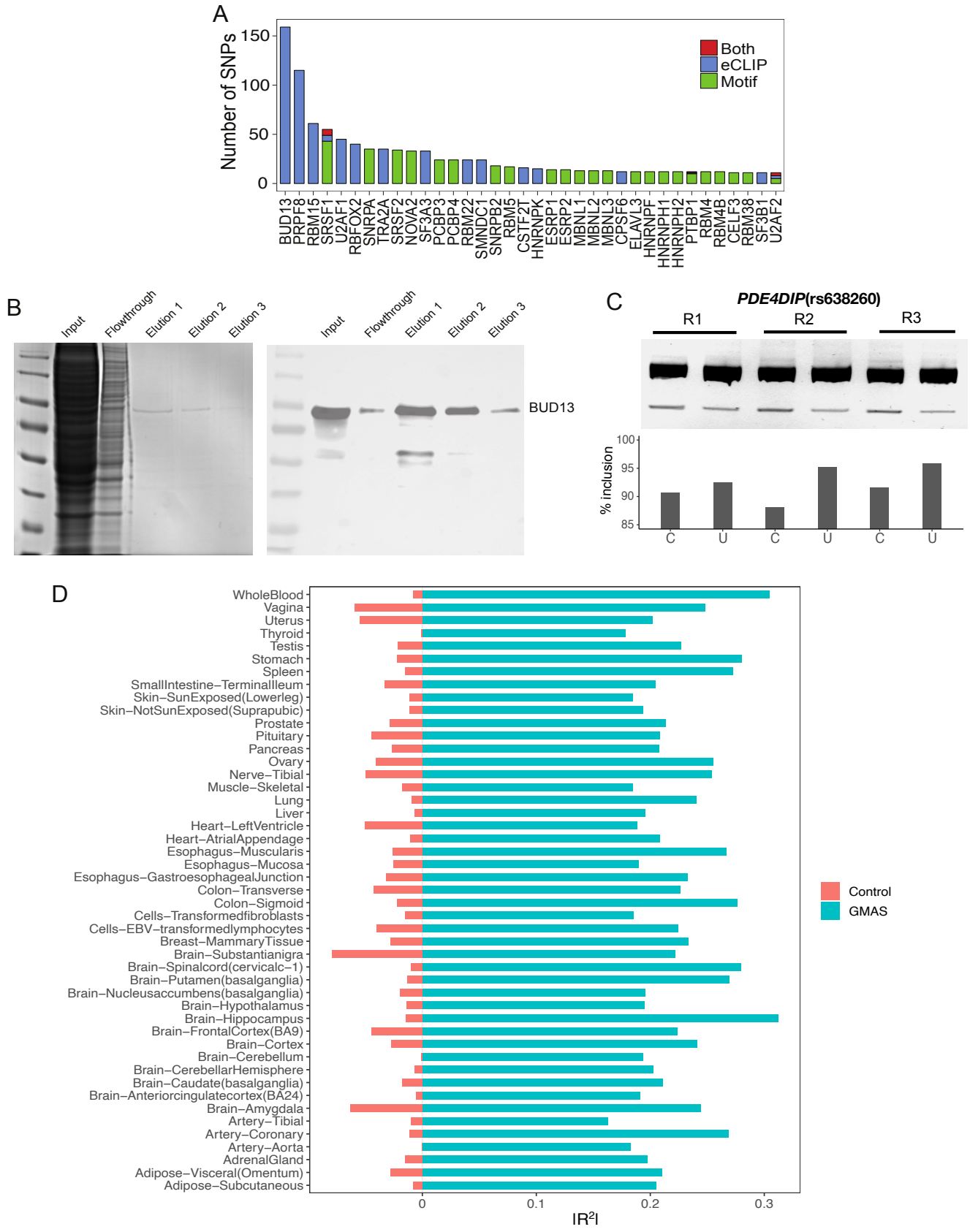


Fig. S9: (A) Number of functional SNPs predicted to alter RNA binding motifs of splicing factors by de novo motif and/or eCLIP overlap analyses. Both: functional SNPs predicted by both methods (B) Purification of recombinant BUD13. Mammalian overexpression of human BUD13 was carried out. pLJM1 3XFlag-Bud13-6HIS lentiviral plasmid was transfected into 293T cells. Stably overexpressed BUD13 was purified using HisTrap purification column and additional Flag affinity purification was performed. Detailed purification conditions are described in Methods. Purified BUD13 proteins were confirmed by SimplyBlue Safe staining (left) and western blot using BUD13 antibody (right). (C) Splicing of a minigene reporter carrying the exon in *PDE4DIP* regulated by rs638260, previously reported in Yang et al. 2019 (PMID: 30902979). (D) *BUD13* expression correlated with GMAS tag SNP allelic ratio. We required GMAS SNPs to overlap with BUD13 eCLIP peaks and randomly sampled an equal number of testable non-GMAS SNPs as control. For all 47 tissues, GMAS events are better correlated with *BUD13* expression levels than controls.

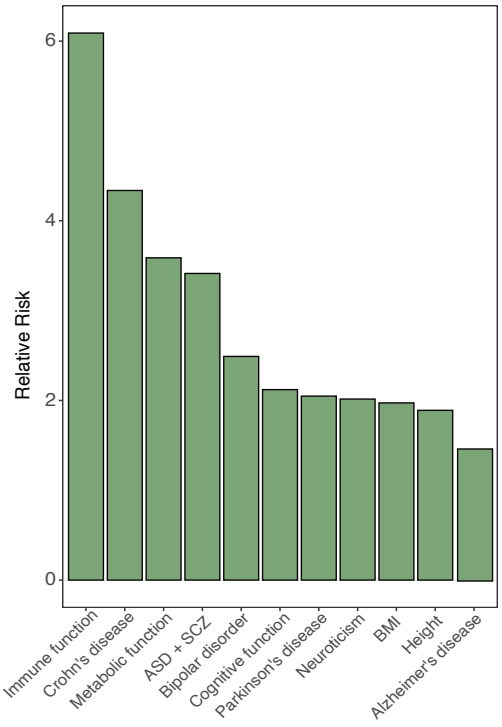
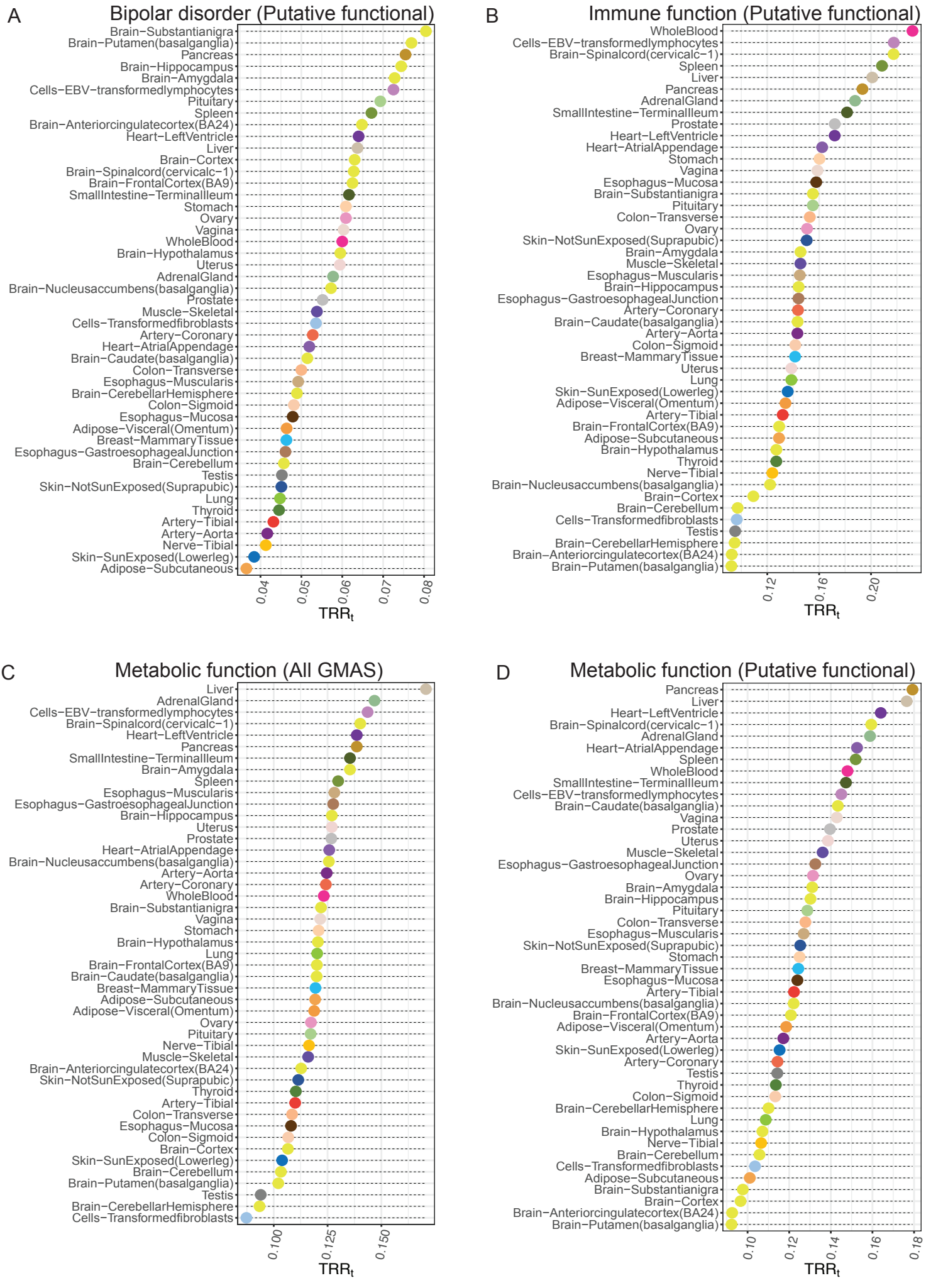
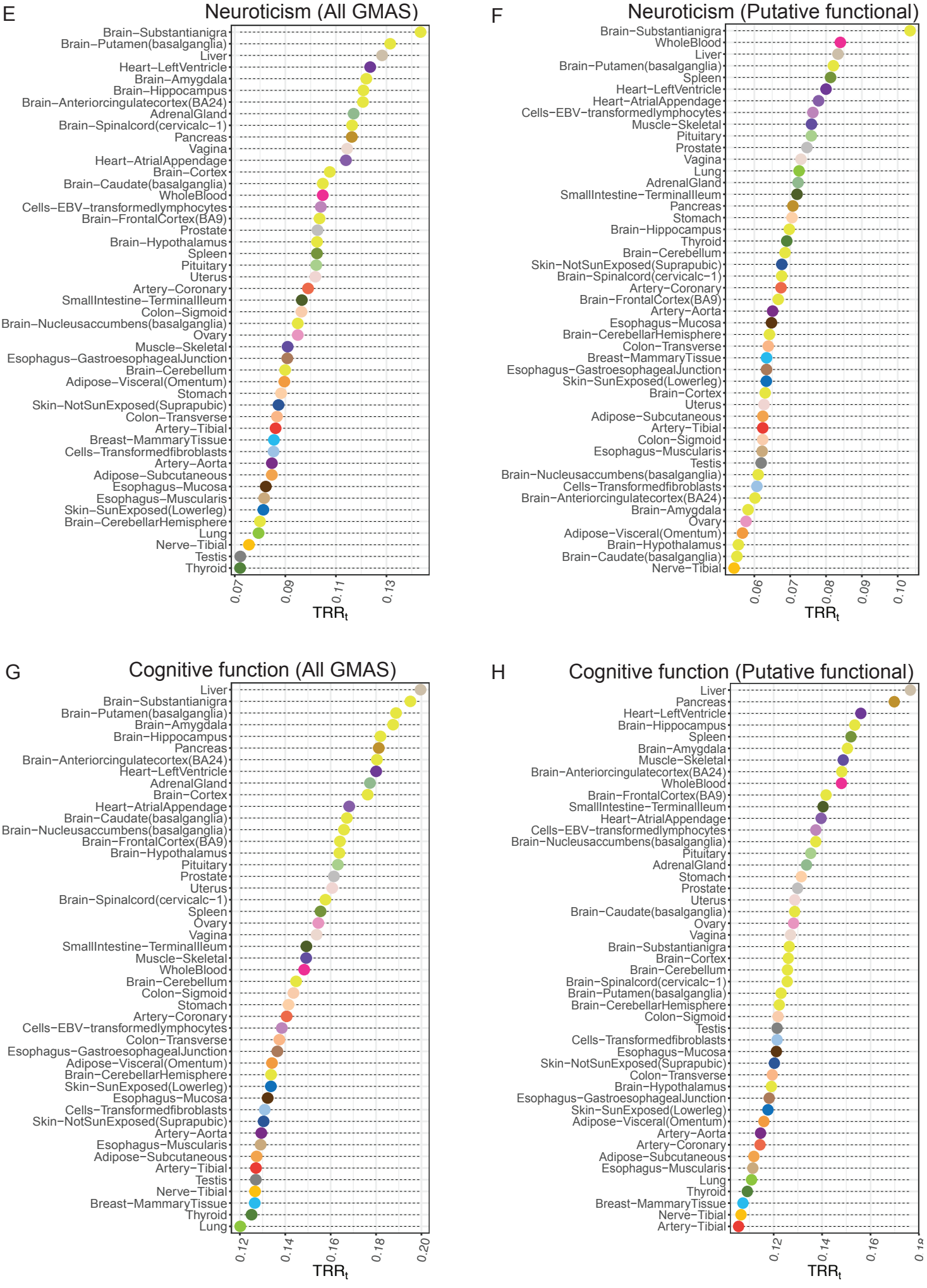
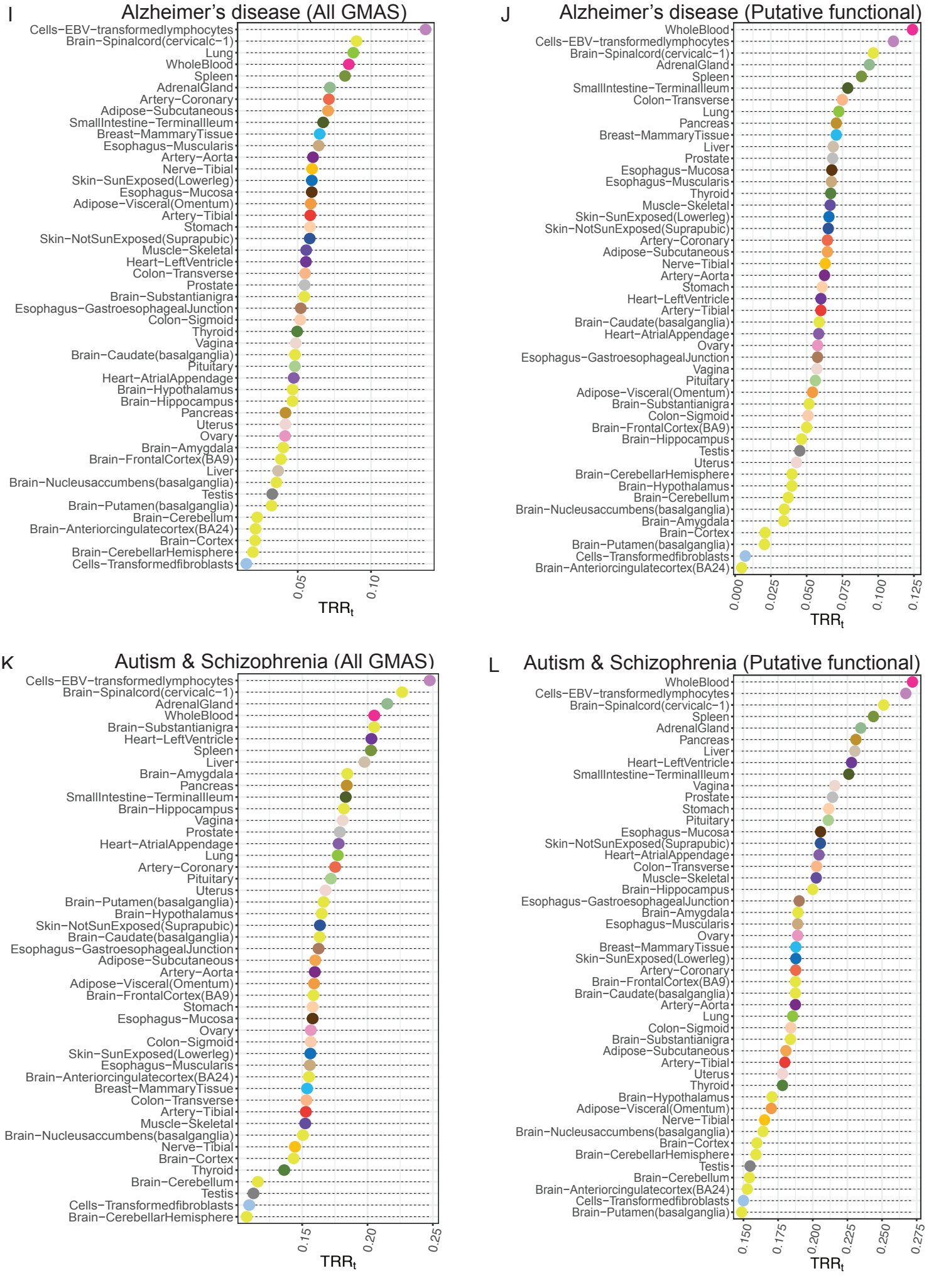
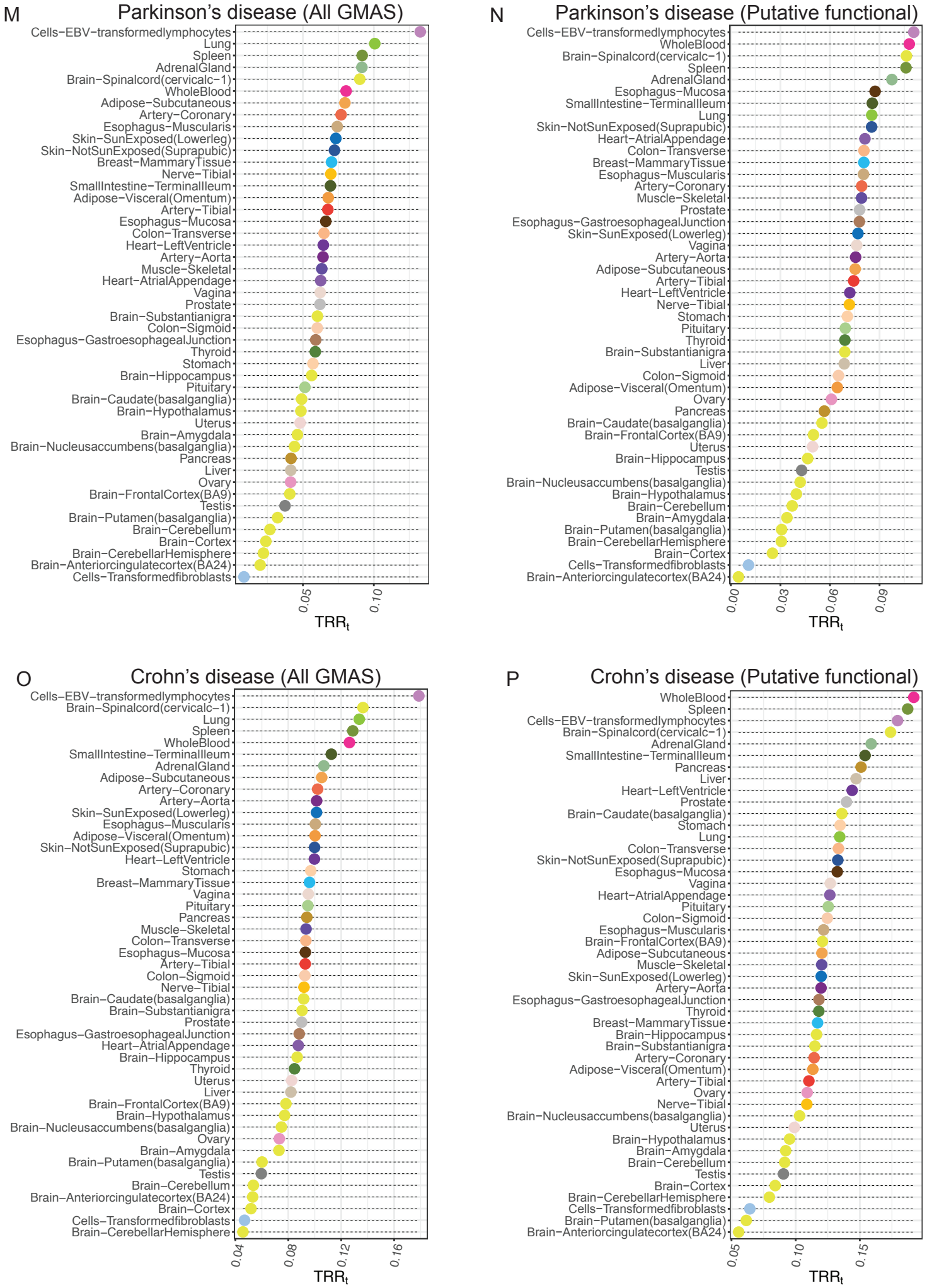


Fig. S10: Relative risk of putative functional SNPs in LD with selected trait/disease.


A
Bipolar disorder (Putative functional)
Brain−Substantianigra
Brain−Putamen(basalganglia)
Pancreas
Brain−Hippocampus
Brain−Amygdala
Cells−EBV−transformedlymphocytes
Pituitary
Spleen
Brain−Anteriorcingulatecortex(BA24)
Heart−LeftVentricle
Liver
Brain−Cortex
Brain−Spinalcord(cervicalc−1)
Brain−FrontalCortex(BA9)
SmallIntestine−TerminalIleum
Stomach
Ovary
Vagina
WholeBlood
Brain−Hypothalamus
Uterus
AdrenalGland
Brain−Nucleusaccumbens(basalganglia)
Prostate
Muscle−Skeletal
Cells−Transformedfibroblasts
Artery−Coronary
Heart−AtrialAppendage
Brain−Caudate(basalganglia)
Colon−Transverse
Esophagus−Muscularis
Brain−CerebellarHemisphere
Colon−Sigmoid
Esophagus−Mucosa
Adipose−Visceral(Omentum)
Breast−MammaryTissue
Esophagus−GastroesophagealJunction
Brain−Cerebellum
Testis
Skin−NotSunExposed(Suprapubic)
Lung
Thyroid
Artery−Tibial
Artery−Aorta
Nerve−Tibial
Skin−SunExposed(Lowerleg)
Adipose−Subcutaneous
0.04
0.05
0.06
0.07
0.08
TRRt
B
Immune function (Putative functional)
WholeBlood
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
Spleen
Liver
Pancreas
AdrenalGland
SmallIntestine−TerminalIleum
Prostate
Heart−LeftVentricle
Heart−AtrialAppendage
Stomach
Vagina
Esophagus−Mucosa
Brain−Substantianigra
Pituitary
Colon−Transverse
Ovary
Skin−NotSunExposed(Suprapubic)
Brain−Amygdala
Muscle−Skeletal
Esophagus−Muscularis
Brain−Hippocampus
Esophagus−GastroesophagealJunction
Artery−Coronary
Brain−Caudate(basalganglia)
Artery−Aorta
Colon−Sigmoid
Breast−MammaryTissue
Uterus
Lung
Skin−SunExposed(Lowerleg)
Adipose−Visceral(Omentum)
Artery−Tibial
Brain−FrontalCortex(BA9)
Adipose−Subcutaneous
Brain−Hypothalamus
Thyroid
Nerve−Tibial
Brain−Nucleusaccumbens(basalganglia)
Brain−Cortex
Brain−Cerebellum
Cells−Transformedfibroblasts
Testis
Brain−CerebellarHemisphere
Brain−Anteriorcingulatecortex(BA24)
Brain−Putamen(basalganglia)
0.12
0.16
0.20
TRRt
C
Metabolic function (All GMAS)
Liver
AdrenalGland
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
Heart−LeftVentricle
Pancreas
SmallIntestine−TerminalIleum
Brain−Amygdala
Spleen
Esophagus−Muscularis
Esophagus−GastroesophagealJunction
Brain−Hippocampus
Uterus
Prostate
Heart−AtrialAppendage
Brain−Nucleusaccumbens(basalganglia)
Artery−Aorta
Artery−Coronary
WholeBlood
Brain−Substantianigra
Vagina
Stomach
Brain−Hypothalamus
Lung
Brain−FrontalCortex(BA9)
Brain−Caudate(basalganglia)
Breast−MammaryTissue
Adipose−Subcutaneous
Adipose−Visceral(Omentum)
Ovary
Pituitary
Nerve−Tibial
Muscle−Skeletal
Brain−Anteriorcingulatecortex(BA24)
Skin−NotSunExposed(Suprapubic)
Thyroid
Artery−Tibial
Colon−Transverse
Esophagus−Mucosa
Colon−Sigmoid
Brain−Cortex
Skin−SunExposed(Lowerleg)
Brain−Cerebellum
Brain−Putamen(basalganglia)
Testis
Brain−CerebellarHemisphere
Cells−Transformedfibroblasts
0.100
0.125
0.150
TRRt
D
Metabolic function (Putative functional)
Pancreas
Liver
Heart−LeftVentricle
Brain−Spinalcord(cervicalc−1)
AdrenalGland
Heart−AtrialAppendage
Spleen
WholeBlood
SmallIntestine−TerminalIleum
Cells−EBV−transformedlymphocytes
Brain−Caudate(basalganglia)
Vagina
Prostate
Uterus
Muscle−Skeletal
Esophagus−GastroesophagealJunction
Ovary
Brain−Amygdala
Brain−Hippocampus
Pituitary
Colon−Transverse
Esophagus−Muscularis
Skin−NotSunExposed(Suprapubic)
Stomach
Breast−MammaryTissue
Esophagus−Mucosa
Artery−Tibial
Brain−Nucleusaccumbens(basalganglia)
Brain−FrontalCortex(BA9)
Adipose−Visceral(Omentum)
Artery−Aorta
Skin−SunExposed(Lowerleg)
Artery−Coronary
Testis
Thyroid
Colon−Sigmoid
Brain−CerebellarHemisphere
Lung
Brain−Hypothalamus
Nerve−Tibial
Brain−Cerebellum
Cells−Transformedfibroblasts
Adipose−Subcutaneous
Brain−Substantianigra
Brain−Cortex
Brain−Anteriorcingulatecortex(BA24)
Brain−Putamen(basalganglia)
0.10
0.12
0.14
0.16
0.18
TRRt


E
Neuroticism (All GMAS)
Brain−Substantianigra
Brain−Putamen(basalganglia)
Liver
Heart−LeftVentricle
Brain−Amygdala
Brain−Hippocampus
Brain−Anteriorcingulatecortex(BA24)
AdrenalGland
Brain−Spinalcord(cervicalc−1)
Pancreas
Vagina
Heart−AtrialAppendage
Brain−Cortex
Brain−Caudate(basalganglia)
WholeBlood
Cells−EBV−transformedlymphocytes
Brain−FrontalCortex(BA9)
Prostate
Brain−Hypothalamus
Spleen
Pituitary
Uterus
Artery−Coronary
SmallIntestine−TerminalIleum
Colon−Sigmoid
Brain−Nucleusaccumbens(basalganglia)
Ovary
Muscle−Skeletal
Esophagus−GastroesophagealJunction
Brain−Cerebellum
Adipose−Visceral(Omentum)
Stomach
Skin−NotSunExposed(Suprapubic)
Colon−Transverse
Artery−Tibial
Breast−MammaryTissue
Cells−Transformedfibroblasts
Artery−Aorta
Adipose−Subcutaneous
Esophagus−Mucosa
Esophagus−Muscularis
Skin−SunExposed(Lowerleg)
Brain−CerebellarHemisphere
Lung
Nerve−Tibial
Testis
Thyroid
0.07
0.09
0.11
0.13
TRRt
F
Neuroticism (Putative functional)
Brain−Substantianigra
WholeBlood
Liver
Brain−Putamen(basalganglia)
Spleen
Heart−LeftVentricle
Heart−AtrialAppendage
Cells−EBV−transformedlymphocytes
Muscle−Skeletal
Pituitary
Prostate
Vagina
Lung
AdrenalGland
SmallIntestine−TerminalIleum
Pancreas
Stomach
Brain−Hippocampus
Thyroid
Brain−Cerebellum
Skin−NotSunExposed(Suprapubic)
Brain−Spinalcord(cervicalc−1)
Artery−Coronary
Brain−FrontalCortex(BA9)
Artery−Aorta
Esophagus−Mucosa
Brain−CerebellarHemisphere
Colon−Transverse
Breast−MammaryTissue
Esophagus−GastroesophagealJunction
Skin−SunExposed(Lowerleg)
Brain−Cortex
Uterus
Adipose−Subcutaneous
Artery−Tibial
Colon−Sigmoid
Esophagus−Muscularis
Testis
Brain−Nucleusaccumbens(basalganglia)
Cells−Transformedfibroblasts
Brain−Anteriorcingulatecortex(BA24)
Brain−Amygdala
Ovary
Adipose−Visceral(Omentum)
Brain−Hypothalamus
Brain−Caudate(basalganglia)
Nerve−Tibial
0.06
0.07
0.08
0.09
0.10
TRRt
G
Cognitive function (All GMAS)
Liver
Brain−Substantianigra
Brain−Putamen(basalganglia)
Brain−Amygdala
Brain−Hippocampus
Pancreas
Brain−Anteriorcingulatecortex(BA24)
Heart−LeftVentricle
AdrenalGland
Brain−Cortex
Heart−AtrialAppendage
Brain−Caudate(basalganglia)
Brain−Nucleusaccumbens(basalganglia)
Brain−FrontalCortex(BA9)
Brain−Hypothalamus
Pituitary
Prostate
Uterus
Brain−Spinalcord(cervicalc−1)
Spleen
Ovary
Vagina
SmallIntestine−TerminalIleum
Muscle−Skeletal
WholeBlood
Brain−Cerebellum
Colon−Sigmoid
Stomach
Artery−Coronary
Cells−EBV−transformedlymphocytes
Colon−Transverse
Esophagus−GastroesophagealJunction
Adipose−Visceral(Omentum)
Brain−CerebellarHemisphere
Skin−SunExposed(Lowerleg)
Esophagus−Mucosa
Cells−Transformedfibroblasts
Skin−NotSunExposed(Suprapubic)
Artery−Aorta
Esophagus−Muscularis
Adipose−Subcutaneous
Artery−Tibial
Testis
Nerve−Tibial
Breast−MammaryTissue
Thyroid
Lung
0.12
0.14
0.16
0.18
0.20
TRRt
H
Cognitive function (Putative functional)
Liver
Pancreas
Heart−LeftVentricle
Brain−Hippocampus
Spleen
Brain−Amygdala
Muscle−Skeletal
Brain−Anteriorcingulatecortex(BA24)
WholeBlood
Brain−FrontalCortex(BA9)
SmallIntestine−TerminalIleum
Heart−AtrialAppendage
Cells−EBV−transformedlymphocytes
Brain−Nucleusaccumbens(basalganglia)
Pituitary
AdrenalGland
Stomach
Prostate
Uterus
Brain−Caudate(basalganglia)
Ovary
Vagina
Brain−Substantianigra
Brain−Cortex
Brain−Cerebellum
Brain−Spinalcord(cervicalc−1)
Brain−Putamen(basalganglia)
Brain−CerebellarHemisphere
Colon−Sigmoid
Testis
Cells−Transformedfibroblasts
Esophagus−Mucosa
Skin−NotSunExposed(Suprapubic)
Colon−Transverse
Brain−Hypothalamus
Esophagus−GastroesophagealJunction
Skin−SunExposed(Lowerleg)
Adipose−Visceral(Omentum)
Artery−Aorta
Artery−Coronary
Adipose−Subcutaneous
Esophagus−Muscularis
Lung
Thyroid
Breast−MammaryTissue
Nerve−Tibial
Artery−Tibial
0.12
0.14
0.16
TRRt


I
Alzheimer's disease (All GMAS)
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
Lung
WholeBlood
Spleen
AdrenalGland
Artery−Coronary
Adipose−Subcutaneous
SmallIntestine−TerminalIleum
Breast−MammaryTissue
Esophagus−Muscularis
Artery−Aorta
Nerve−Tibial
Skin−SunExposed(Lowerleg)
Esophagus−Mucosa
Adipose−Visceral(Omentum)
Artery−Tibial
Stomach
Skin−NotSunExposed(Suprapubic)
Muscle−Skeletal
Heart−LeftVentricle
Colon−Transverse
Prostate
Brain−Substantianigra
Esophagus−GastroesophagealJunction
Colon−Sigmoid
Thyroid
Vagina
Brain−Caudate(basalganglia)
Pituitary
Heart−AtrialAppendage
Brain−Hypothalamus
Brain−Hippocampus
Pancreas
Uterus
Ovary
Brain−Amygdala
Brain−FrontalCortex(BA9)
Liver
Brain−Nucleusaccumbens(basalganglia)
Testis
Brain−Putamen(basalganglia)
Brain−Cerebellum
Brain−Anteriorcingulatecortex(BA24)
Brain−Cortex
Brain−CerebellarHemisphere
Cells−Transformedfibroblasts
0.05
0.10
TRR$_t$
J
Alzheimer's disease (Putative functional)
WholeBlood
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
AdrenalGland
Spleen
SmallIntestine−TerminalIleum
Colon−Transverse
Lung
Pancreas
Breast−MammaryTissue
Liver
Prostate
Esophagus−Mucosa
Esophagus−Muscularis
Thyroid
Muscle−Skeletal
Skin−SunExposed(Lowerleg)
Skin−NotSunExposed(Suprapubic)
Artery−Coronary
Adipose−Subcutaneous
Nerve−Tibial
Artery−Aorta
Stomach
Heart−LeftVentricle
Artery−Tibial
Brain−Caudate(basalganglia)
Heart−AtrialAppendage
Ovary
Esophagus−GastroesophagealJunction
Vagina
Pituitary
Adipose−Visceral(Omentum)
Brain−Substantianigra
Colon−Sigmoid
Brain−FrontalCortex(BA9)
Brain−Hippocampus
Testis
Uterus
Brain−CerebellarHemisphere
Brain−Hypothalamus
Brain−Cerebellum
Brain−Nucleusaccumbens(basalganglia)
Brain−Amygdala
Brain−Cortex
Brain−Putamen(basalganglia)
Cells−Transformedfibroblasts
Brain−Anteriorcingulatecortex(BA24)
0.000
0.025
0.050
0.075
0.100
0.125
TRR$_t$
K
Autism & Schizophrenia (All GMAS)
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
AdrenalGland
WholeBlood
Brain−Substantianigra
Heart−LeftVentricle
Spleen
Liver
Brain−Amygdala
Pancreas
SmallIntestine−TerminalIleum
Brain−Hippocampus
Vagina
Prostate
Heart−AtrialAppendage
Lung
Artery−Coronary
Pituitary
Uterus
Brain−Putamen(basalganglia)
Brain−Hypothalamus
Skin−NotSunExposed(Suprapubic)
Brain−Caudate(basalganglia)
Esophagus−GastroesophagealJunction
Adipose−Subcutaneous
Artery−Aorta
Adipose−Visceral(Omentum)
Brain−FrontalCortex(BA9)
Stomach
Esophagus−Mucosa
Ovary
Colon−Sigmoid
Skin−SunExposed(Lowerleg)
Esophagus−Muscularis
Brain−Anteriorcingulatecortex(BA24)
Breast−MammaryTissue
Colon−Transverse
Artery−Tibial
Muscle−Skeletal
Brain−Nucleusaccumbens(basalganglia)
Nerve−Tibial
Brain−Cortex
Thyroid
Brain−Cerebellum
Testis
Cells−Transformedfibroblasts
Brain−CerebellarHemisphere
0.15
0.20
0.25
TRR$_t$
L
Autism & Schizophrenia (Putative functional)
WholeBlood
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
Spleen
AdrenalGland
Pancreas
Liver
Heart−LeftVentricle
SmallIntestine−TerminalIleum
Vagina
Prostate
Stomach
Pituitary
Esophagus−Mucosa
Skin−NotSunExposed(Suprapubic)
Heart−AtrialAppendage
Colon−Transverse
Muscle−Skeletal
Brain−Hippocampus
Esophagus−GastroesophagealJunction
Brain−Amygdala
Esophagus−Muscularis
Ovary
Breast−MammaryTissue
Skin−SunExposed(Lowerleg)
Artery−Coronary
Brain−FrontalCortex(BA9)
Brain−Caudate(basalganglia)
Artery−Aorta
Lung
Colon−Sigmoid
Brain−Substantianigra
Adipose−Subcutaneous
Artery−Tibial
Uterus
Thyroid
Brain−Hypothalamus
Adipose−Visceral(Omentum)
Nerve−Tibial
Brain−Nucleusaccumbens(basalganglia)
Brain−Cortex
Brain−CerebellarHemisphere
Testis
Brain−Cerebellum
Brain−Anteriorcingulatecortex(BA24)
Cells−Transformedfibroblasts
Brain−Putamen(basalganglia)
0.150
0.175
0.200
0.225
0.250
0.275
TRR$_t$


M
Parkinson's disease (All GMAS)
Cells−EBV−transformedlymphocytes
Lung
Spleen
AdrenalGland
Brain−Spinalcord(cervicalc−1)
WholeBlood
Adipose−Subcutaneous
Artery−Coronary
Esophagus−Muscularis
Skin−SunExposed(Lowerleg)
Skin−NotSunExposed(Suprapubic)
Breast−MammaryTissue
Nerve−Tibial
SmallIntestine−TerminalIleum
Adipose−Visceral(Omentum)
Artery−Tibial
Esophagus−Mucosa
Colon−Transverse
Heart−LeftVentricle
Artery−Aorta
Muscle−Skeletal
Heart−AtrialAppendage
Vagina
Prostate
Brain−Substantianigra
Colon−Sigmoid
Esophagus−GastroesophagealJunction
Thyroid
Stomach
Brain−Hippocampus
Pituitary
Brain−Caudate(basalganglia)
Brain−Hypothalamus
Uterus
Brain−Amygdala
Brain−Nucleusaccumbens(basalganglia)
Pancreas
Liver
Ovary
Brain−FrontalCortex(BA9)
Testis
Brain−Putamen(basalganglia)
Brain−Cerebellum
Brain−Cortex
Brain−CerebellarHemisphere
Brain−Anteriorcingulatecortex(BA24)
Cells−Transformedfibroblasts
0.05
0.10
TRRt
N
Parkinson's disease (Putative functional)
Cells−EBV−transformedlymphocytes
WholeBlood
Brain−Spinalcord(cervicalc−1)
Spleen
AdrenalGland
Esophagus−Mucosa
SmallIntestine−TerminalIleum
Lung
Skin−NotSunExposed(Suprapubic)
Heart−AtrialAppendage
Colon−Transverse
Breast−MammaryTissue
Esophagus−Muscularis
Artery−Coronary
Muscle−Skeletal
Prostate
Esophagus−GastroesophagealJunction
Skin−SunExposed(Lowerleg)
Vagina
Artery−Aorta
Adipose−Subcutaneous
Artery−Tibial
Heart−LeftVentricle
Nerve−Tibial
Stomach
Pituitary
Thyroid
Brain−Substantianigra
Liver
Colon−Sigmoid
Adipose−Visceral(Omentum)
Ovary
Pancreas
Brain−Caudate(basalganglia)
Brain−FrontalCortex(BA9)
Uterus
Brain−Hippocampus
Testis
Brain−Nucleusaccumbens(basalganglia)
Brain−Hypothalamus
Brain−Cerebellum
Brain−Amygdala
Brain−Putamen(basalganglia)
Brain−CerebellarHemisphere
Brain−Cortex
Cells−Transformedfibroblasts
Brain−Anteriorcingulatecortex(BA24)
0.00
0.03
0.06
0.09
TRRt
O
Crohn's disease (All GMAS)
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
Lung
Spleen
WholeBlood
SmallIntestine−TerminalIleum
AdrenalGland
Adipose−Subcutaneous
Artery−Coronary
Artery−Aorta
Skin−SunExposed(Lowerleg)
Esophagus−Muscularis
Adipose−Visceral(Omentum)
Skin−NotSunExposed(Suprapubic)
Heart−LeftVentricle
Stomach
Breast−MammaryTissue
Vagina
Pituitary
Pancreas
Muscle−Skeletal
Colon−Transverse
Esophagus−Mucosa
Artery−Tibial
Colon−Sigmoid
Nerve−Tibial
Brain−Caudate(basalganglia)
Brain−Substantianigra
Prostate
Esophagus−GastroesophagealJunction
Heart−AtrialAppendage
Brain−Hippocampus
Thyroid
Uterus
Liver
Brain−FrontalCortex(BA9)
Brain−Hypothalamus
Brain−Nucleusaccumbens(basalganglia)
Ovary
Brain−Amygdala
Brain−Putamen(basalganglia)
Testis
Brain−Cerebellum
Brain−Anteriorcingulatecortex(BA24)
Brain−Cortex
Cells−Transformedfibroblasts
Brain−CerebellarHemisphere
0.04
0.08
0.12
0.16
TRRt
P
Crohn's disease (Putative functional)
WholeBlood
Spleen
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
AdrenalGland
SmallIntestine−TerminalIleum
Pancreas
Liver
Heart−LeftVentricle
Prostate
Brain−Caudate(basalganglia)
Stomach
Lung
Colon−Transverse
Skin−NotSunExposed(Suprapubic)
Esophagus−Mucosa
Vagina
Heart−AtrialAppendage
Pituitary
Colon−Sigmoid
Esophagus−Muscularis
Brain−FrontalCortex(BA9)
Adipose−Subcutaneous
Muscle−Skeletal
Skin−SunExposed(Lowerleg)
Artery−Aorta
Esophagus−GastroesophagealJunction
Thyroid
Breast−MammaryTissue
Brain−Hippocampus
Brain−Substantianigra
Artery−Coronary
Adipose−Visceral(Omentum)
Artery−Tibial
Ovary
Nerve−Tibial
Brain−Nucleusaccumbens(basalganglia)
Uterus
Brain−Hypothalamus
Brain−Amygdala
Brain−Cerebellum
Testis
Brain−Cortex
Brain−CerebellarHemisphere
Cells−Transformedfibroblasts
Brain−Putamen(basalganglia)
Brain−Anteriorcingulatecortex(BA24)
0.05
0.10
0.15
TRRt

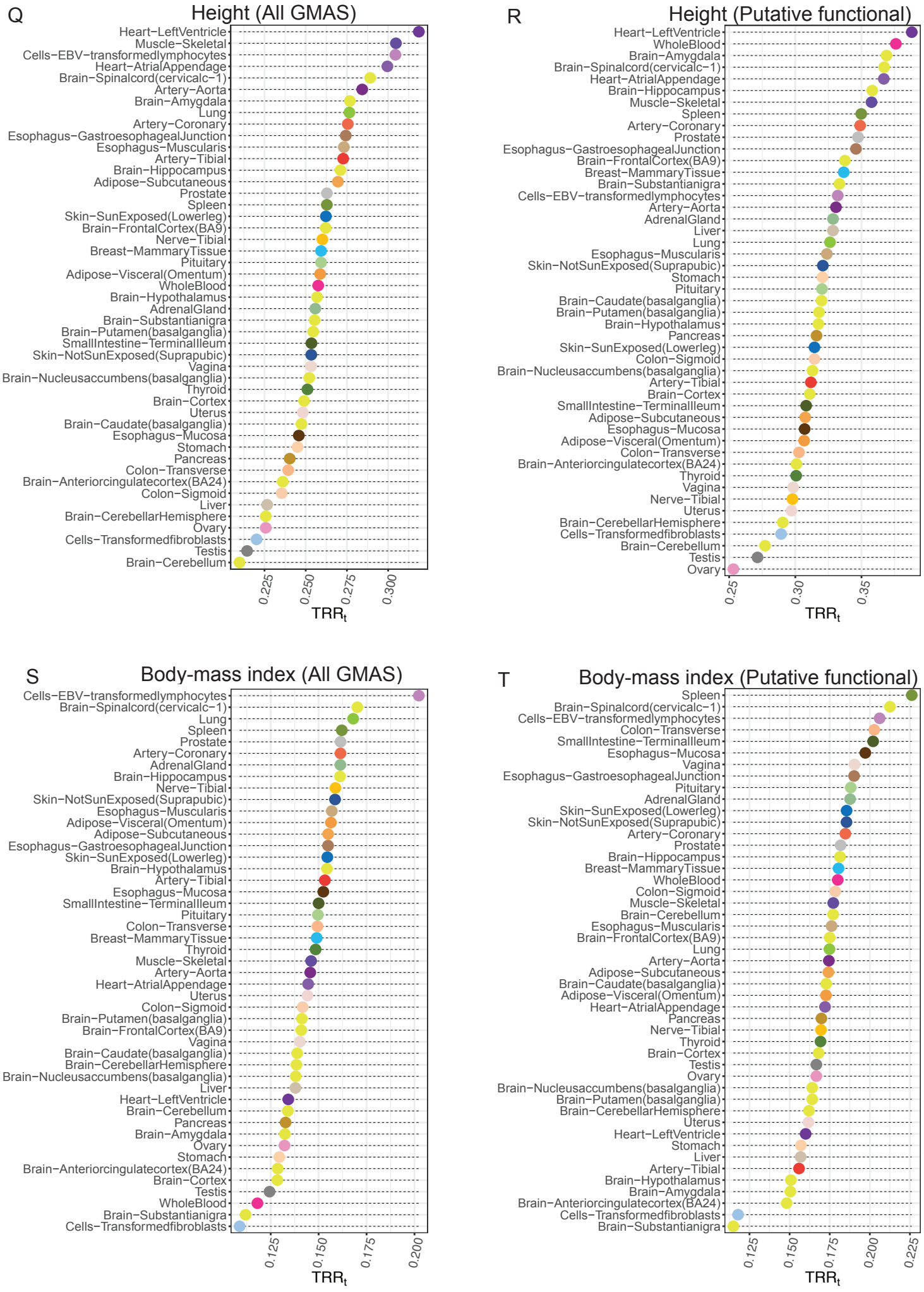
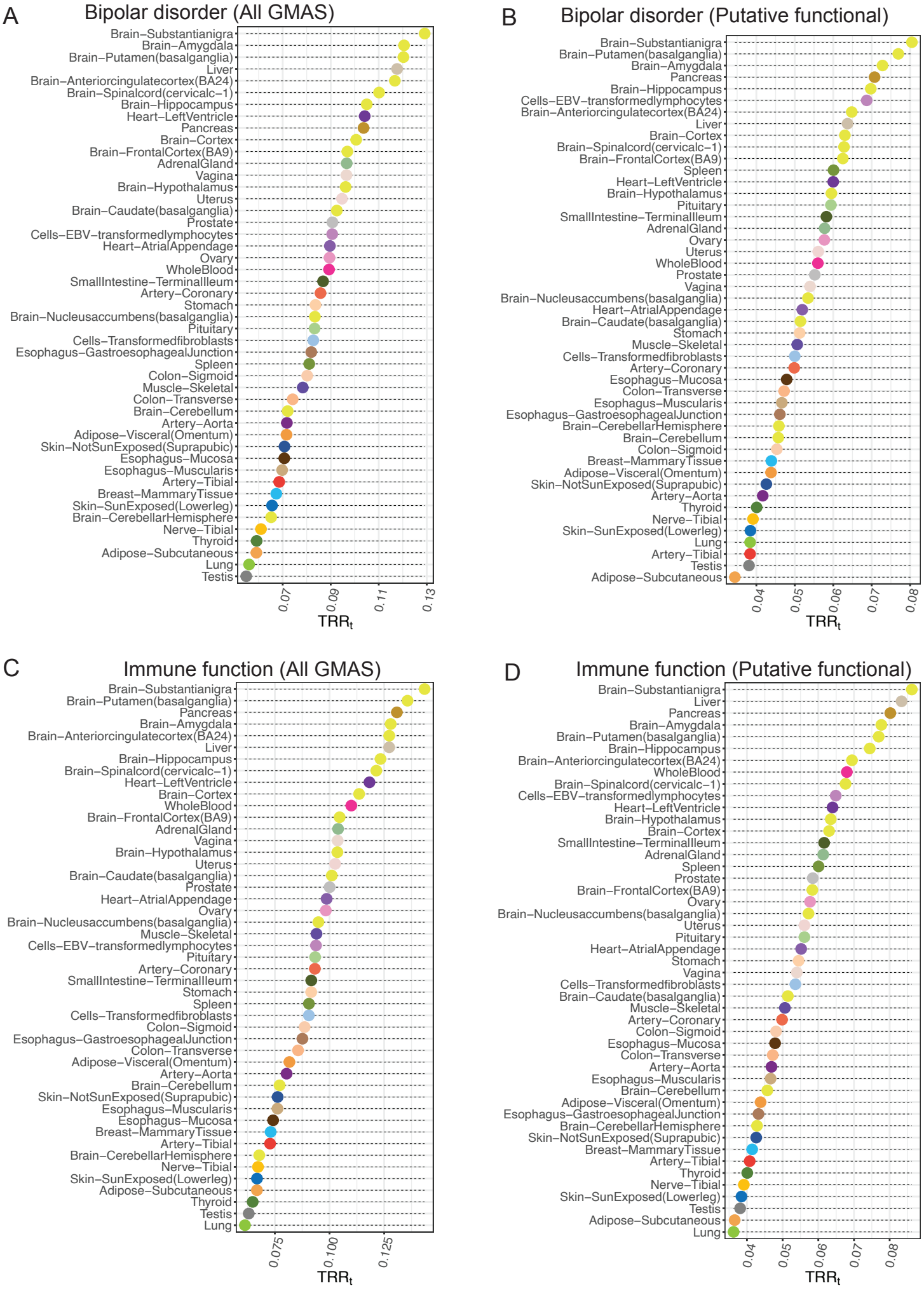
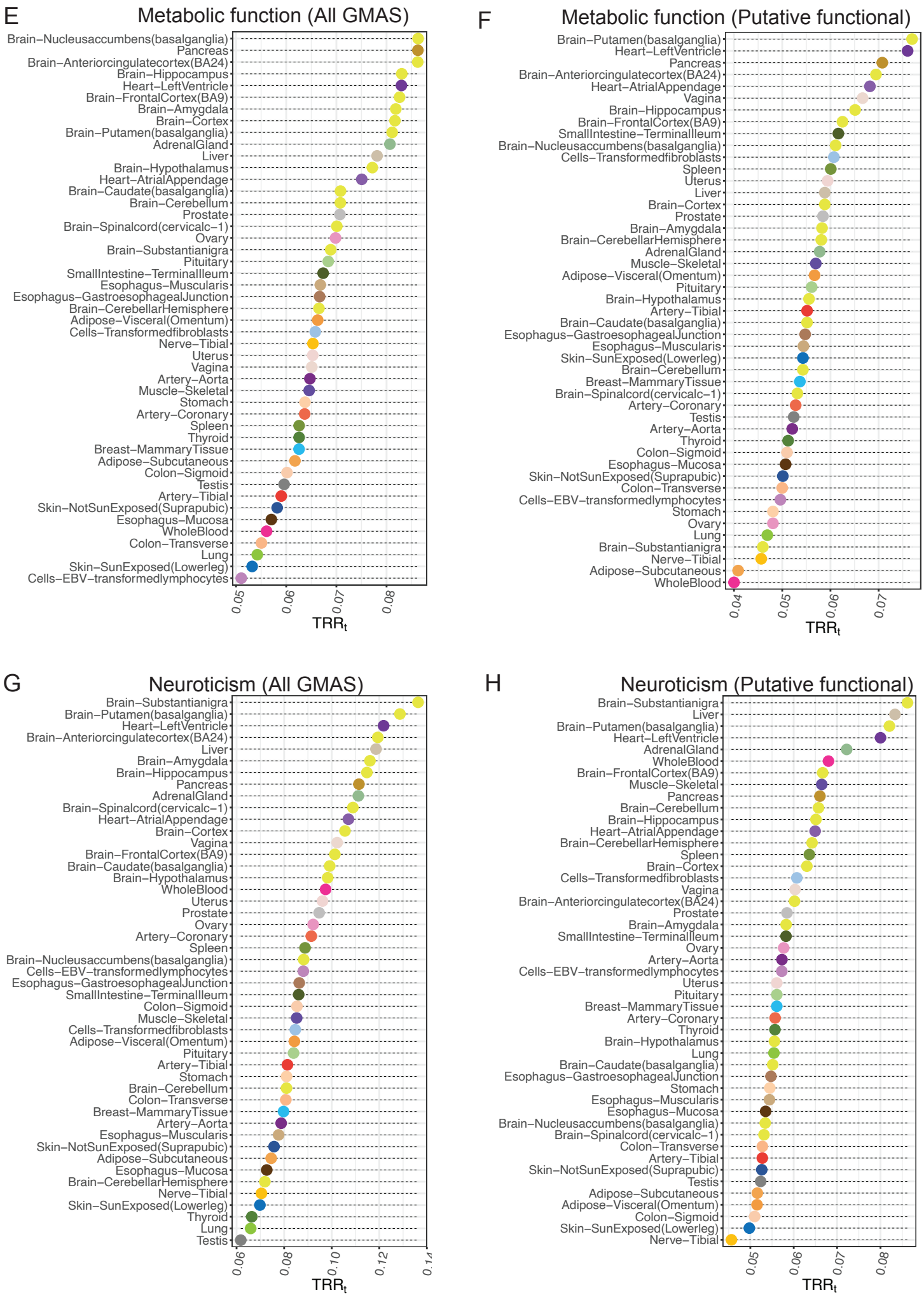
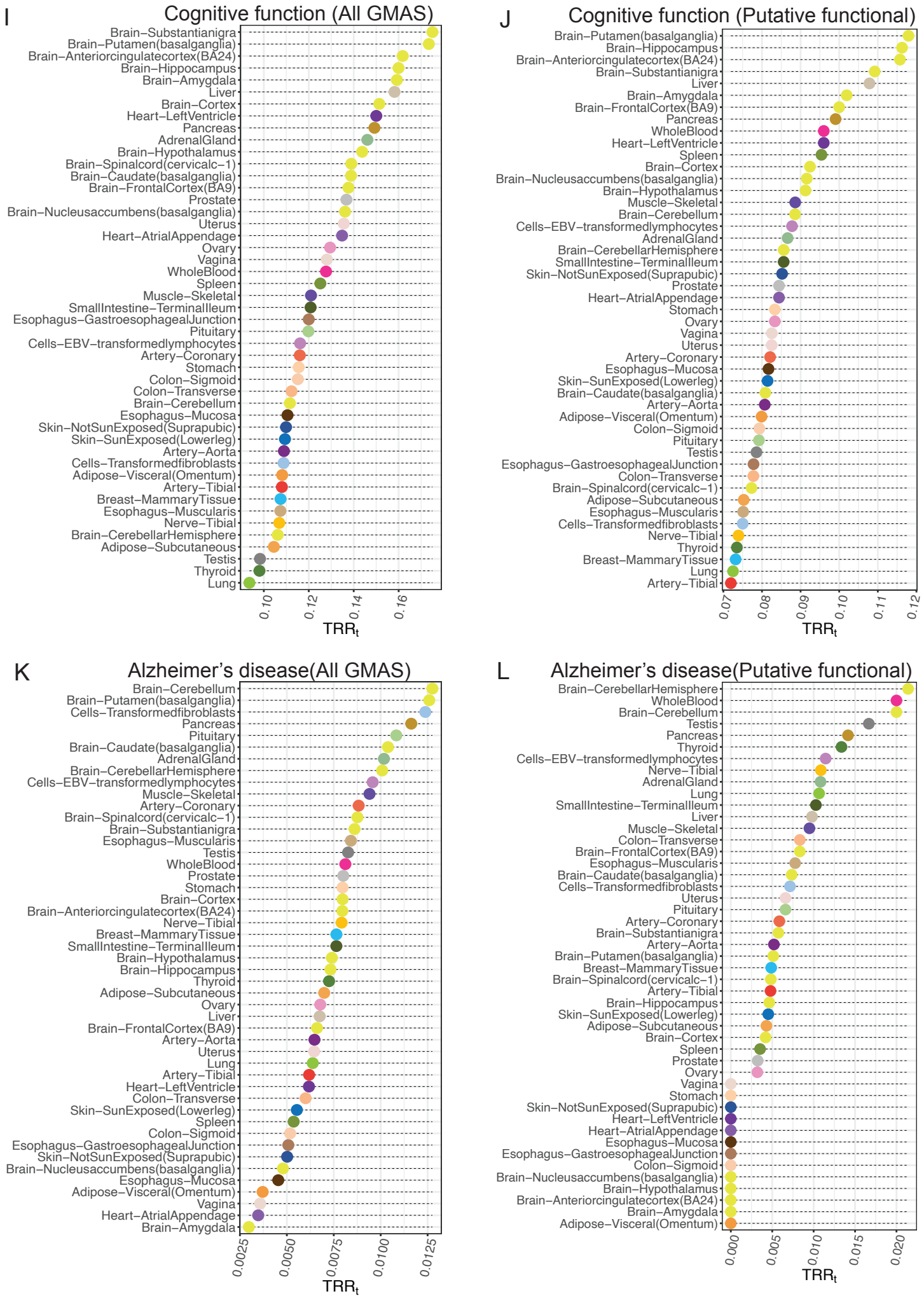
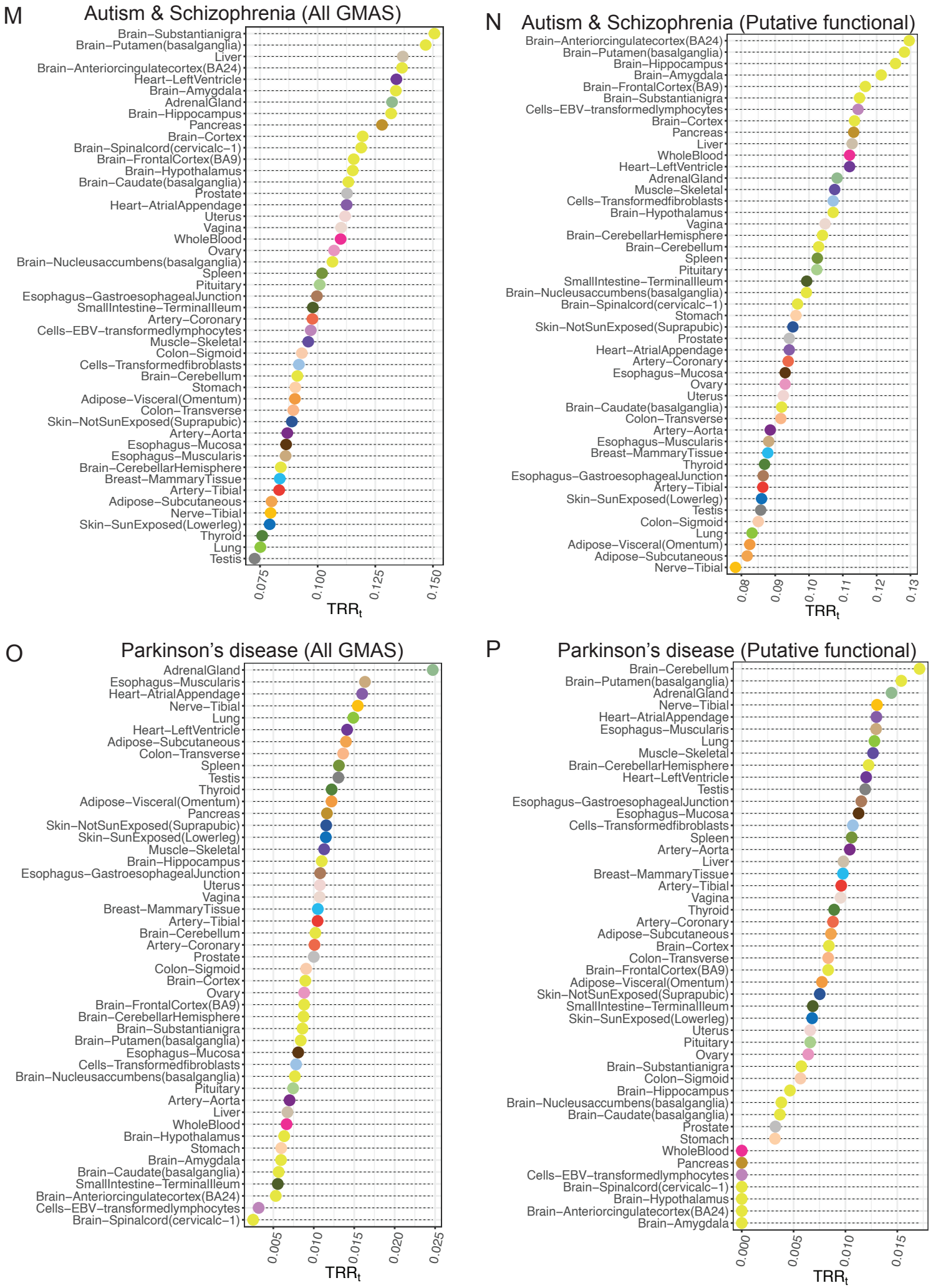

Q
Height (All GMAS)
Heart−LeftVentricle
Muscle−Skeletal
Cells−EBV−transformedlymphocytes
Heart−AtrialAppendage
Brain−Spinalcord(cervicalc−1)
Artery−Aorta
Brain−Amygdala
Lung
Artery−Coronary
Esophagus−GastroesophagealJunction
Esophagus−Muscularis
Artery−Tibial
Brain−Hippocampus
Adipose−Subcutaneous
Prostate
Spleen
Skin−SunExposed(Lowerleg)
Brain−FrontalCortex(BA9)
Nerve−Tibial
Breast−MammaryTissue
Pituitary
Adipose−Visceral(Omentum)
WholeBlood
Brain−Hypothalamus
AdrenalGland
Brain−Substantianigra
Brain−Putamen(basalganglia)
SmallIntestine−TerminalIleum
Skin−NotSunExposed(Suprapubic)
Vagina
Brain−Nucleusaccumbens(basalganglia)
Thyroid
Brain−Cortex
Uterus
Brain−Caudate(basalganglia)
Esophagus−Mucosa
Stomach
Pancreas
Colon−Transverse
Brain−Anteriorcingulatecortex(BA24)
Colon−Sigmoid
Liver
Brain−CerebellarHemisphere
Ovary
Cells−Transformedfibroblasts
Testis
Brain−Cerebellum
0.225
0.250
0.275
0.300
TRRt
R
Height (Putative functional)
Heart−LeftVentricle
WholeBlood
Brain−Amygdala
Brain−Spinalcord(cervicalc−1)
Heart−AtrialAppendage
Brain−Hippocampus
Muscle−Skeletal
Spleen
Artery−Coronary
Prostate
Esophagus−GastroesophagealJunction
Brain−FrontalCortex(BA9)
Breast−MammaryTissue
Brain−Substantianigra
Cells−EBV−transformedlymphocytes
Artery−Aorta
AdrenalGland
Liver
Lung
Esophagus−Muscularis
Skin−NotSunExposed(Suprapubic)
Stomach
Pituitary
Brain−Caudate(basalganglia)
Brain−Putamen(basalganglia)
Brain−Hypothalamus
Pancreas
Skin−SunExposed(Lowerleg)
Colon−Sigmoid
Brain−Nucleusaccumbens(basalganglia)
Artery−Tibial
Brain−Cortex
SmallIntestine−TerminalIleum
Adipose−Subcutaneous
Esophagus−Mucosa
Adipose−Visceral(Omentum)
Colon−Transverse
Brain−Anteriorcingulatecortex(BA24)
Thyroid
Vagina
Nerve−Tibial
Uterus
Brain−CerebellarHemisphere
Cells−Transformedfibroblasts
Brain−Cerebellum
Testis
Ovary
0.25
0.30
0.35
TRRt
S
Body−mass index (All GMAS)
Cells−EBV−transformedlymphocytes
Brain−Spinalcord(cervicalc−1)
Lung
Spleen
Prostate
Artery−Coronary
AdrenalGland
Brain−Hippocampus
Nerve−Tibial
Skin−NotSunExposed(Suprapubic)
Esophagus−Muscularis
Adipose−Visceral(Omentum)
Adipose−Subcutaneous
Esophagus−GastroesophagealJunction
Skin−SunExposed(Lowerleg)
Brain−Hypothalamus
Artery−Tibial
Esophagus−Mucosa
SmallIntestine−TerminalIleum
Pituitary
Colon−Transverse
Breast−MammaryTissue
Thyroid
Muscle−Skeletal
Artery−Aorta
Heart−AtrialAppendage
Uterus
Colon−Sigmoid
Brain−Putamen(basalganglia)
Brain−FrontalCortex(BA9)
Vagina
Brain−Caudate(basalganglia)
Brain−CerebellarHemisphere
Brain−Nucleusaccumbens(basalganglia)
Liver
Heart−LeftVentricle
Brain−Cerebellum
Pancreas
Brain−Amygdala
Ovary
Stomach
Brain−Anteriorcingulatecortex(BA24)
Brain−Cortex
Testis
WholeBlood
Brain−Substantianigra
Cells−Transformedfibroblasts
0.125
0.150
0.175
0.200
TRRt
T
Body−mass index (Putative functional)
Spleen
Brain−Spinalcord(cervicalc−1)
Cells−EBV−transformedlymphocytes
Colon−Transverse
SmallIntestine−TerminalIleum
Esophagus−Mucosa
Vagina
Esophagus−GastroesophagealJunction
Pituitary
AdrenalGland
Skin−SunExposed(Lowerleg)
Skin−NotSunExposed(Suprapubic)
Artery−Coronary
Prostate
Brain−Hippocampus
Breast−MammaryTissue
WholeBlood
Colon−Sigmoid
Muscle−Skeletal
Brain−Cerebellum
Esophagus−Muscularis
Brain−FrontalCortex(BA9)
Lung
Artery−Aorta
Adipose−Subcutaneous
Brain−Caudate(basalganglia)
Adipose−Visceral(Omentum)
Heart−AtrialAppendage
Pancreas
Nerve−Tibial
Thyroid
Brain−Cortex
Testis
Ovary
Brain−Nucleusaccumbens(basalganglia)
Brain−Putamen(basalganglia)
Brain−CerebellarHemisphere
Uterus
Heart−LeftVentricle
Stomach
Liver
Artery−Tibial
Brain−Hypothalamus
Brain−Amygdala
Brain−Anteriorcingulatecortex(BA24)
Cells−Transformedfibroblasts
Brain−Substantianigra
0.125
0.150
0.175
0.200
0.225
TRRt

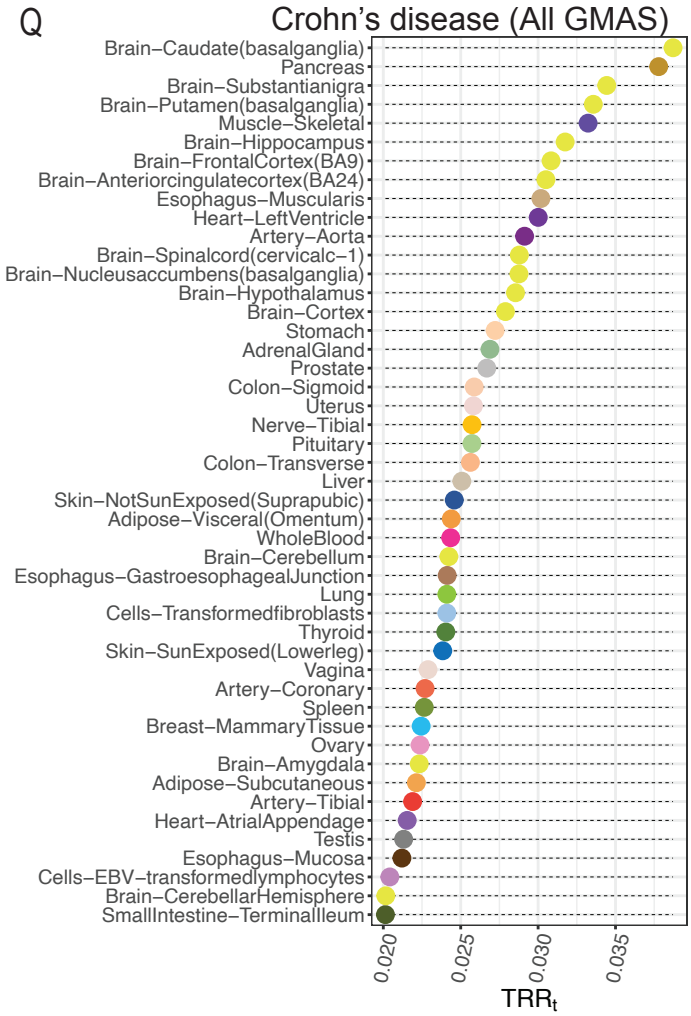
Fig. S11: Functional relevance of GMAS SNPs (A)-(T) Trait relevance ratios of all GMAS SNPs and putative functional SNPs (labeled accordingly) in LD with GWAS SNPs for different traits/diseases.

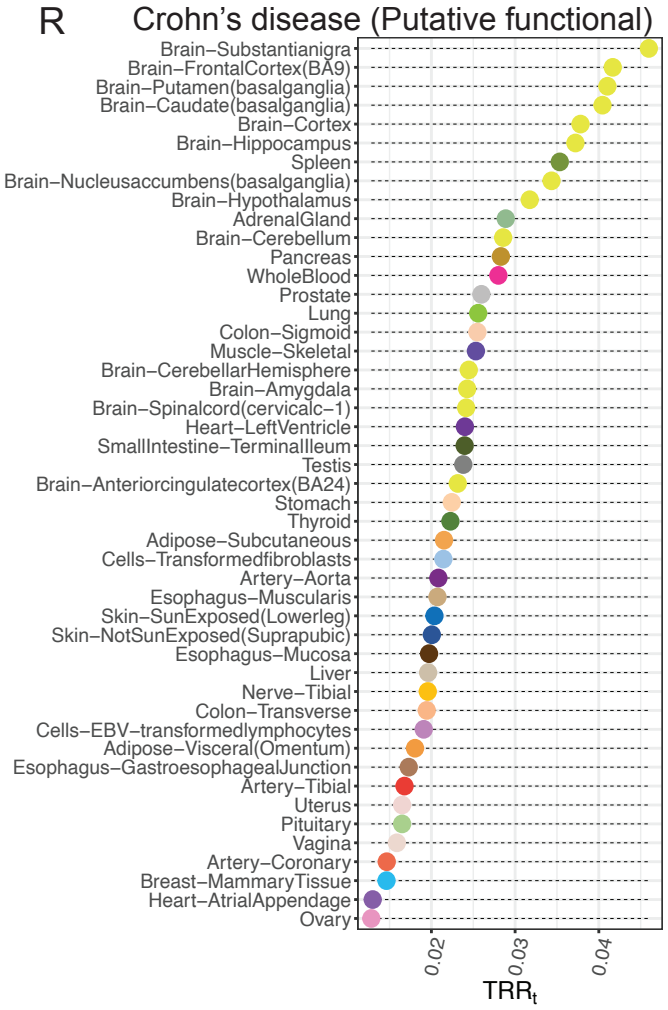

A
Bipolar disorder (All GMAS)
Brain–Substantianigra
Brain–Amygdala
Brain–Putamen(basalganglia)
Liver
Brain–Anteriorcingulatecortex(BA24)
Brain–Spinalcord(cervicalc–1)
Brain–Hippocampus
Heart–LeftVentricle
Pancreas
Brain–Cortex
Brain–FrontalCortex(BA9)
AdrenalGland
Vagina
Brain–Hypothalamus
Uterus
Brain–Caudate(basalganglia)
Prostate
Cells–EBV–transformedlymphocytes
Heart–AtrialAppendage
Ovary
WholeBlood
SmallIntestine–TerminalIleum
Artery–Coronary
Stomach
Brain–Nucleusaccumbens(basalganglia)
Pituitary
Cells–Transformedfibroblasts
Esophagus–GastroesophagealJunction
Spleen
Colon–Sigmoid
Muscle–Skeletal
Colon–Transverse
Brain–Cerebellum
Artery–Aorta
Adipose–Visceral(Omentum)
Skin–NotSunExposed(Suprapubic)
Esophagus–Mucosa
Esophagus–Muscularis
Artery–Tibial
Breast–MammaryTissue
Skin–SunExposed(Lowerleg)
Brain–CerebellarHemisphere
Nerve–Tibial
Thyroid
Adipose–Subcutaneous
Lung
Testis
0.07
0.09
0.11
0.13
TRRt
B
Bipolar disorder (Putative functional)
Brain–Substantianigra
Brain–Putamen(basalganglia)
Brain–Amygdala
Pancreas
Brain–Hippocampus
Cells–EBV–transformedlymphocytes
Brain–Anteriorcingulatecortex(BA24)
Liver
Brain–Cortex
Brain–Spinalcord(cervicalc–1)
Brain–FrontalCortex(BA9)
Spleen
Heart–LeftVentricle
Brain–Hypothalamus
Pituitary
SmallIntestine–TerminalIleum
AdrenalGland
Ovary
Uterus
WholeBlood
Prostate
Vagina
Brain–Nucleusaccumbens(basalganglia)
Heart–AtrialAppendage
Brain–Caudate(basalganglia)
Stomach
Muscle–Skeletal
Cells–Transformedfibroblasts
Artery–Coronary
Esophagus–Mucosa
Colon–Transverse
Esophagus–Muscularis
Esophagus–GastroesophagealJunction
Brain–CerebellarHemisphere
Brain–Cerebellum
Colon–Sigmoid
Breast–MammaryTissue
Adipose–Visceral(Omentum)
Skin–NotSunExposed(Suprapubic)
Artery–Aorta
Thyroid
Nerve–Tibial
Skin–SunExposed(Lowerleg)
Lung
Artery–Tibial
Testis
Adipose–Subcutaneous
0.04
0.05
0.06
0.07
0.08
TRRt
C
Immune function (All GMAS)
Brain–Substantianigra
Brain–Putamen(basalganglia)
Pancreas
Brain–Amygdala
Brain–Anteriorcingulatecortex(BA24)
Liver
Brain–Hippocampus
Brain–Spinalcord(cervicalc–1)
Heart–LeftVentricle
Brain–Cortex
WholeBlood
Brain–FrontalCortex(BA9)
AdrenalGland
Vagina
Brain–Hypothalamus
Uterus
Brain–Caudate(basalganglia)
Prostate
Heart–AtrialAppendage
Ovary
Brain–Nucleusaccumbens(basalganglia)
Muscle–Skeletal
Cells–EBV–transformedlymphocytes
Pituitary
Artery–Coronary
SmallIntestine–TerminalIleum
Stomach
Spleen
Cells–Transformedfibroblasts
Colon–Sigmoid
Esophagus–GastroesophagealJunction
Colon–Transverse
Adipose–Visceral(Omentum)
Artery–Aorta
Brain–Cerebellum
Skin–NotSunExposed(Suprapubic)
Esophagus–Muscularis
Esophagus–Mucosa
Breast–MammaryTissue
Artery–Tibial
Brain–CerebellarHemisphere
Nerve–Tibial
Skin–SunExposed(Lowerleg)
Adipose–Subcutaneous
Thyroid
Testis
Lung
0.075
0.100
0.125
TRRt
D
Immune function (Putative functional)
Brain–Substantianigra
Liver
Pancreas
Brain–Amygdala
Brain–Putamen(basalganglia)
Brain–Hippocampus
Brain–Anteriorcingulatecortex(BA24)
WholeBlood
Brain–Spinalcord(cervicalc–1)
Cells–EBV–transformedlymphocytes
Heart–LeftVentricle
Brain–Hypothalamus
Brain–Cortex
SmallIntestine–TerminalIleum
AdrenalGland
Spleen
Prostate
Brain–FrontalCortex(BA9)
Ovary
Brain–Nucleusaccumbens(basalganglia)
Uterus
Pituitary
Heart–AtrialAppendage
Stomach
Vagina
Cells–Transformedfibroblasts
Brain–Caudate(basalganglia)
Muscle–Skeletal
Artery–Coronary
Colon–Sigmoid
Esophagus–Mucosa
Colon–Transverse
Artery–Aorta
Esophagus–Muscularis
Brain–Cerebellum
Adipose–Visceral(Omentum)
Esophagus–GastroesophagealJunction
Brain–CerebellarHemisphere
Skin–NotSunExposed(Suprapubic)
Breast–MammaryTissue
Artery–Tibial
Thyroid
Nerve–Tibial
Skin–SunExposed(Lowerleg)
Testis
Adipose–Subcutaneous
Lung
0.04
0.05
0.06
0.07
0.08
TRRt

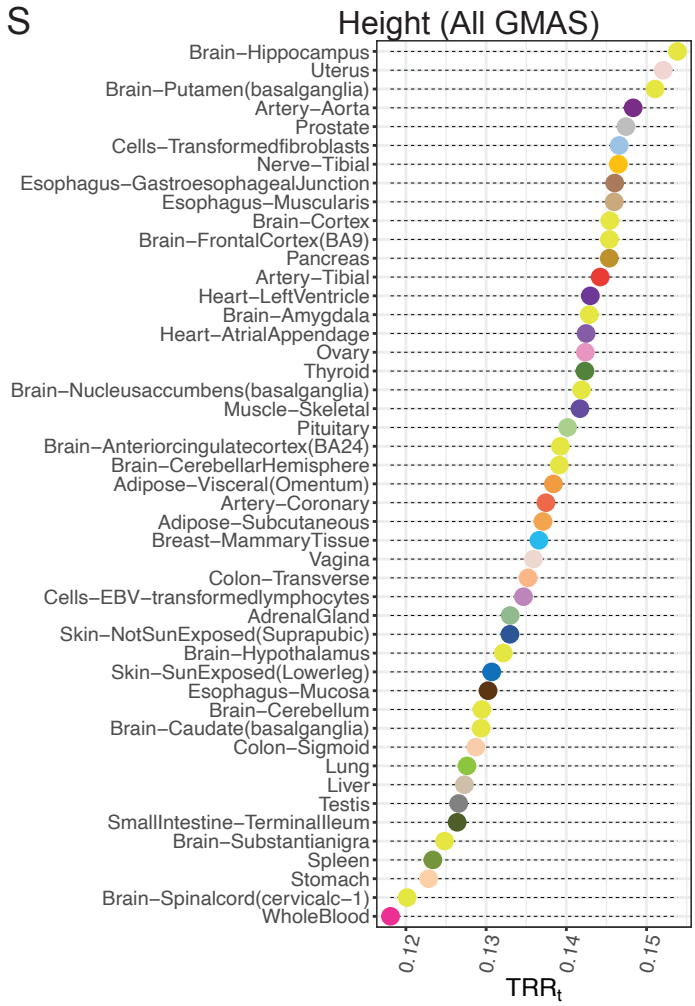

E
Metabolic function (All GMAS)
Brain−Nucleusaccumbens(basalganglia)
Pancreas
Brain−Anteriorcingulatecortex(BA24)
Brain−Hippocampus
Heart−LeftVentricle
Brain−FrontalCortex(BA9)
Brain−Amygdala
Brain−Cortex
Brain−Putamen(basalganglia)
AdrenalGland
Liver
Brain−Hypothalamus
Heart−AtrialAppendage
Brain−Caudate(basalganglia)
Brain−Cerebellum
Prostate
Brain−Spinalcord(cervicalc−1)
Ovary
Brain−Substantianigra
Pituitary
SmallIntestine−TerminalIleum
Esophagus−Muscularis
Esophagus−GastroesophagealJunction
Brain−CerebellarHemisphere
Adipose−Visceral(Omentum)
Cells−Transformedfibroblasts
Nerve−Tibial
Uterus
Vagina
Artery−Aorta
Muscle−Skeletal
Stomach
Artery−Coronary
Spleen
Thyroid
Breast−MammaryTissue
Adipose−Subcutaneous
Colon−Sigmoid
Testis
Artery−Tibial
Skin−NotSunExposed(Suprapubic)
Esophagus−Mucosa
WholeBlood
Colon−Transverse
Lung
Skin−SunExposed(Lowerleg)
Cells−EBV−transformedlymphocytes
0.05
0.06
0.07
0.08
TRRt
F
Metabolic function (Putative functional)
Brain−Putamen(basalganglia)
Heart−LeftVentricle
Pancreas
Brain−Anteriorcingulatecortex(BA24)
Heart−AtrialAppendage
Vagina
Brain−Hippocampus
Brain−FrontalCortex(BA9)
SmallIntestine−TerminalIleum
Brain−Nucleusaccumbens(basalganglia)
Cells−Transformedfibroblasts
Spleen
Uterus
Liver
Brain−Cortex
Prostate
Brain−Amygdala
Brain−CerebellarHemisphere
AdrenalGland
Muscle−Skeletal
Adipose−Visceral(Omentum)
Pituitary
Brain−Hypothalamus
Artery−Tibial
Brain−Caudate(basalganglia)
Esophagus−GastroesophagealJunction
Esophagus−Muscularis
Skin−SunExposed(Lowerleg)
Brain−Cerebellum
Breast−MammaryTissue
Brain−Spinalcord(cervicalc−1)
Artery−Coronary
Testis
Artery−Aorta
Thyroid
Colon−Sigmoid
Esophagus−Mucosa
Skin−NotSunExposed(Suprapubic)
Colon−Transverse
Cells−EBV−transformedlymphocytes
Stomach
Ovary
Lung
Brain−Substantianigra
Nerve−Tibial
Adipose−Subcutaneous
WholeBlood
0.04
0.05
0.06
0.07
TRRt
G
Neuroticism (All GMAS)
Brain−Substantianigra
Brain−Putamen(basalganglia)
Heart−LeftVentricle
Brain−Anteriorcingulatecortex(BA24)
Liver
Brain−Amygdala
Brain−Hippocampus
Pancreas
AdrenalGland
Brain−Spinalcord(cervicalc−1)
Heart−AtrialAppendage
Brain−Cortex
Vagina
Brain−FrontalCortex(BA9)
Brain−Caudate(basalganglia)
Brain−Hypothalamus
WholeBlood
Uterus
Prostate
Ovary
Artery−Coronary
Spleen
Brain−Nucleusaccumbens(basalganglia)
Cells−EBV−transformedlymphocytes
Esophagus−GastroesophagealJunction
SmallIntestine−TerminalIleum
Colon−Sigmoid
Muscle−Skeletal
Cells−Transformedfibroblasts
Adipose−Visceral(Omentum)
Pituitary
Artery−Tibial
Stomach
Brain−Cerebellum
Colon−Transverse
Breast−MammaryTissue
Artery−Aorta
Esophagus−Muscularis
Skin−NotSunExposed(Suprapubic)
Adipose−Subcutaneous
Esophagus−Mucosa
Brain−CerebellarHemisphere
Nerve−Tibial
Skin−SunExposed(Lowerleg)
Thyroid
Lung
Testis
0.06
0.08
0.10
0.12
0.14
TRRt
H
Neuroticism (Putative functional)
Brain−Substantianigra
Liver
Brain−Putamen(basalganglia)
Heart−LeftVentricle
AdrenalGland
WholeBlood
Brain−FrontalCortex(BA9)
Muscle−Skeletal
Pancreas
Brain−Cerebellum
Brain−Hippocampus
Heart−AtrialAppendage
Brain−CerebellarHemisphere
Spleen
Brain−Cortex
Cells−Transformedfibroblasts
Vagina
Brain−Anteriorcingulatecortex(BA24)
Prostate
Brain−Amygdala
SmallIntestine−TerminalIleum
Ovary
Artery−Aorta
Cells−EBV−transformedlymphocytes
Uterus
Pituitary
Breast−MammaryTissue
Artery−Coronary
Thyroid
Brain−Hypothalamus
Lung
Brain−Caudate(basalganglia)
Esophagus−GastroesophagealJunction
Stomach
Esophagus−Muscularis
Esophagus−Mucosa
Brain−Nucleusaccumbens(basalganglia)
Brain−Spinalcord(cervicalc−1)
Colon−Transverse
Artery−Tibial
Skin−NotSunExposed(Suprapubic)
Testis
Adipose−Subcutaneous
Adipose−Visceral(Omentum)
Colon−Sigmoid
Skin−SunExposed(Lowerleg)
Nerve−Tibial
0.05
0.06
0.07
0.08
TRRt

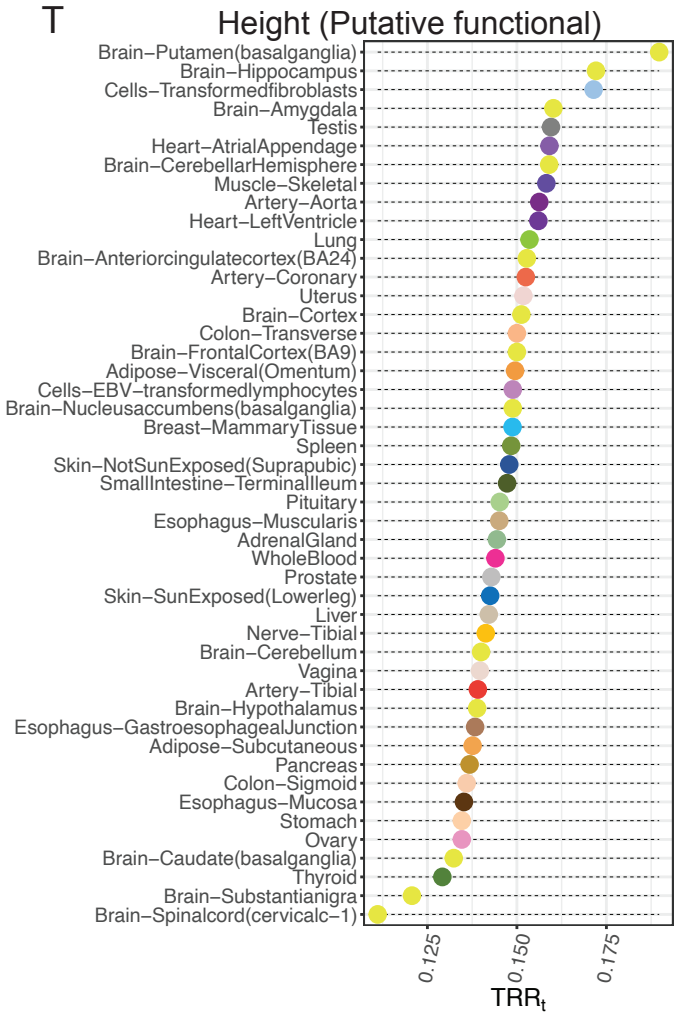

I
Cognitive function (All GMAS)
Brain–Substantianigra
Brain–Putamen(basalganglia)
Brain–Anteriorcingulatecortex(BA24)
Brain–Hippocampus
Brain–Amygdala
Liver
Brain–Cortex
Heart–LeftVentricle
Pancreas
AdrenalGland
Brain–Hypothalamus
Brain–Spinalcord(cervicalc–1)
Brain–Caudate(basalganglia)
Brain–FrontalCortex(BA9)
Prostate
Brain–Nucleusaccumbens(basalganglia)
Uterus
Heart–AtrialAppendage
Ovary
Vagina
WholeBlood
Spleen
Muscle–Skeletal
SmallIntestine–TerminalIleum
Esophagus–GastroesophagealJunction
Pituitary
Cells–EBV–transformedlymphocytes
Artery–Coronary
Stomach
Colon–Sigmoid
Colon–Transverse
Brain–Cerebellum
Esophagus–Mucosa
Skin–NotSunExposed(Suprapubic)
Skin–SunExposed(Lowerleg)
Artery–Aorta
Cells–Transformedfibroblasts
Adipose–Visceral(Omentum)
Artery–Tibial
Breast–MammaryTissue
Esophagus–Muscularis
Nerve–Tibial
Brain–CerebellarHemisphere
Adipose–Subcutaneous
Testis
Thyroid
Lung
0.10
0.12
0.14
0.16
TRRt
J
Cognitive function (Putative functional)
Brain–Putamen(basalganglia)
Brain–Hippocampus
Brain–Anteriorcingulatecortex(BA24)
Brain–Substantianigra
Liver
Brain–Amygdala
Brain–FrontalCortex(BA9)
Pancreas
WholeBlood
Heart–LeftVentricle
Spleen
Brain–Cortex
Brain–Nucleusaccumbens(basalganglia)
Brain–Hypothalamus
Muscle–Skeletal
Brain–Cerebellum
Cells–EBV–transformedlymphocytes
AdrenalGland
Brain–CerebellarHemisphere
SmallIntestine–TerminalIleum
Skin–NotSunExposed(Suprapubic)
Prostate
Heart–AtrialAppendage
Stomach
Ovary
Vagina
Uterus
Artery–Coronary
Esophagus–Mucosa
Skin–SunExposed(Lowerleg)
Brain–Caudate(basalganglia)
Artery–Aorta
Adipose–Visceral(Omentum)
Colon–Sigmoid
Pituitary
Testis
Esophagus–GastroesophagealJunction
Colon–Transverse
Brain–Spinalcord(cervicalc–1)
Adipose–Subcutaneous
Esophagus–Muscularis
Cells–Transformedfibroblasts
Nerve–Tibial
Thyroid
Breast–MammaryTissue
Lung
Artery–Tibial
0.07
0.08
0.09
0.10
0.11
0.12
TRRt
K
Alzheimer's disease(All GMAS)
Brain–Cerebellum
Brain–Putamen(basalganglia)
Cells–Transformedfibroblasts
Pancreas
Pituitary
Brain–Caudate(basalganglia)
AdrenalGland
Brain–CerebellarHemisphere
Cells–EBV–transformedlymphocytes
Muscle–Skeletal
Artery–Coronary
Brain–Spinalcord(cervicalc–1)
Brain–Substantianigra
Esophagus–Muscularis
Testis
WholeBlood
Prostate
Stomach
Brain–Cortex
Brain–Anteriorcingulatecortex(BA24)
Nerve–Tibial
Breast–MammaryTissue
SmallIntestine–TerminalIleum
Brain–Hypothalamus
Brain–Hippocampus
Thyroid
Adipose–Subcutaneous
Ovary
Liver
Brain–FrontalCortex(BA9)
Artery–Aorta
Uterus
Lung
Artery–Tibial
Heart–LeftVentricle
Colon–Transverse
Skin–SunExposed(Lowerleg)
Spleen
Colon–Sigmoid
Esophagus–GastroesophagealJunction
Skin–NotSunExposed(Suprapubic)
Brain–Nucleusaccumbens(basalganglia)
Esophagus–Mucosa
Adipose–Visceral(Omentum)
Vagina
Heart–AtrialAppendage
Brain–Amygdala
0.0025
0.0050
0.0075
0.0100
0.0125
TRRt
L
Alzheimer's disease(Putative functional)
Brain–CerebellarHemisphere
WholeBlood
Brain–Cerebellum
Testis
Pancreas
Thyroid
Cells–EBV–transformedlymphocytes
Nerve–Tibial
AdrenalGland
Lung
SmallIntestine–TerminalIleum
Liver
Muscle–Skeletal
Colon–Transverse
Brain–FrontalCortex(BA9)
Esophagus–Muscularis
Brain–Caudate(basalganglia)
Cells–Transformedfibroblasts
Uterus
Pituitary
Artery–Coronary
Brain–Substantianigra
Artery–Aorta
Brain–Putamen(basalganglia)
Breast–MammaryTissue
Brain–Spinalcord(cervicalc–1)
Artery–Tibial
Brain–Hippocampus
Skin–SunExposed(Lowerleg)
Adipose–Subcutaneous
Brain–Cortex
Spleen
Prostate
Ovary
Vagina
Stomach
Skin–NotSunExposed(Suprapubic)
Heart–LeftVentricle
Heart–AtrialAppendage
Esophagus–Mucosa
Esophagus–GastroesophagealJunction
Colon–Sigmoid
Brain–Nucleusaccumbens(basalganglia)
Brain–Hypothalamus
Brain–Anteriorcingulatecortex(BA24)
Brain–Amygdala
Adipose–Visceral(Omentum)
0.000
0.005
0.010
0.015
0.020
TRRt


M
Autism & Schizophrenia (All GMAS)
Brain–Substantianigra
Brain–Putamen(basalganglia)
Liver
Brain–Anteriorcingulatecortex(BA24)
Heart–LeftVentricle
Brain–Amygdala
AdrenalGland
Brain–Hippocampus
Pancreas
Brain–Cortex
Brain–Spinalcord(cervicalc–1)
Brain–FrontalCortex(BA9)
Brain–Hypothalamus
Brain–Caudate(basalganglia)
Prostate
Heart–AtrialAppendage
Uterus
Vagina
WholeBlood
Ovary
Brain–Nucleusaccumbens(basalganglia)
Spleen
Pituitary
Esophagus–GastroesophagealJunction
SmallIntestine–TerminalIleum
Artery–Coronary
Cells–EBV–transformedlymphocytes
Muscle–Skeletal
Colon–Sigmoid
Cells–Transformedfibroblasts
Brain–Cerebellum
Stomach
Adipose–Visceral(Omentum)
Colon–Transverse
Skin–NotSunExposed(Suprapubic)
Artery–Aorta
Esophagus–Mucosa
Esophagus–Muscularis
Brain–CerebellarHemisphere
Breast–MammaryTissue
Artery–Tibial
Adipose–Subcutaneous
Nerve–Tibial
Skin–SunExposed(Lowerleg)
Thyroid
Lung
Testis
0.075
0.100
0.125
0.150
TRR$_t$
N
Autism & Schizophrenia (Putative functional)
Brain–Anteriorcingulatecortex(BA24)
Brain–Putamen(basalganglia)
Brain–Hippocampus
Brain–Amygdala
Brain–FrontalCortex(BA9)
Brain–Substantianigra
Cells–EBV–transformedlymphocytes
Brain–Cortex
Pancreas
Liver
WholeBlood
Heart–LeftVentricle
AdrenalGland
Muscle–Skeletal
Cells–Transformedfibroblasts
Brain–Hypothalamus
Vagina
Brain–CerebellarHemisphere
Brain–Cerebellum
Spleen
Pituitary
SmallIntestine–TerminalIleum
Brain–Nucleusaccumbens(basalganglia)
Brain–Spinalcord(cervicalc–1)
Stomach
Skin–NotSunExposed(Suprapubic)
Prostate
Heart–AtrialAppendage
Artery–Coronary
Esophagus–Mucosa
Ovary
Uterus
Brain–Caudate(basalganglia)
Colon–Transverse
Artery–Aorta
Esophagus–Muscularis
Breast–MammaryTissue
Thyroid
Esophagus–GastroesophagealJunction
Artery–Tibial
Skin–SunExposed(Lowerleg)
Testis
Colon–Sigmoid
Lung
Adipose–Visceral(Omentum)
Adipose–Subcutaneous
Nerve–Tibial
0.08
0.09
0.10
0.11
0.12
0.13
TRR$_t$
O
Parkinson's disease (All GMAS)
AdrenalGland
Esophagus–Muscularis
Heart–AtrialAppendage
Nerve–Tibial
Lung
Heart–LeftVentricle
Adipose–Subcutaneous
Colon–Transverse
Spleen
Testis
Thyroid
Adipose–Visceral(Omentum)
Pancreas
Skin–NotSunExposed(Suprapubic)
Skin–SunExposed(Lowerleg)
Muscle–Skeletal
Brain–Hippocampus
Esophagus–GastroesophagealJunction
Uterus
Vagina
Breast–MammaryTissue
Artery–Tibial
Brain–Cerebellum
Artery–Coronary
Prostate
Colon–Sigmoid
Brain–Cortex
Ovary
Brain–FrontalCortex(BA9)
Brain–CerebellarHemisphere
Brain–Substantianigra
Brain–Putamen(basalganglia)
Esophagus–Mucosa
Cells–Transformedfibroblasts
Brain–Nucleusaccumbens(basalganglia)
Pituitary
Artery–Aorta
Liver
WholeBlood
Brain–Hypothalamus
Stomach
Brain–Amygdala
Brain–Caudate(basalganglia)
SmallIntestine–TerminalIleum
Brain–Anteriorcingulatecortex(BA24)
Cells–EBV–transformedlymphocytes
Brain–Spinalcord(cervicalc–1)
0.005
0.010
0.015
0.020
0.025
TRR$_t$
P
Parkinson's disease (Putative functional)
Brain–Cerebellum
Brain–Putamen(basalganglia)
AdrenalGland
Nerve–Tibial
Heart–AtrialAppendage
Esophagus–Muscularis
Lung
Muscle–Skeletal
Brain–CerebellarHemisphere
Heart–LeftVentricle
Testis
Esophagus–GastroesophagealJunction
Esophagus–Mucosa
Cells–Transformedfibroblasts
Spleen
Artery–Aorta
Liver
Breast–MammaryTissue
Artery–Tibial
Vagina
Thyroid
Artery–Coronary
Adipose–Subcutaneous
Brain–Cortex
Colon–Transverse
Brain–FrontalCortex(BA9)
Adipose–Visceral(Omentum)
Skin–NotSunExposed(Suprapubic)
SmallIntestine–TerminalIleum
Skin–SunExposed(Lowerleg)
Uterus
Pituitary
Ovary
Brain–Substantianigra
Colon–Sigmoid
Brain–Hippocampus
Brain–Nucleusaccumbens(basalganglia)
Brain–Caudate(basalganglia)
Prostate
Stomach
WholeBlood
Pancreas
Cells–EBV–transformedlymphocytes
Brain–Spinalcord(cervicalc–1)
Brain–Hypothalamus
Brain–Anteriorcingulatecortex(BA24)
Brain–Amygdala
0.000
0.005
0.010
0.015
TRR$_t$


Q
Crohn's disease (All GMAS)
Brain–Caudate(basalganglia)
Pancreas
Brain–Substantianigra
Brain–Putamen(basalganglia)
Muscle–Skeletal
Brain–Hippocampus
Brain–FrontalCortex(BA9)
Brain–Anteriorcingulatecortex(BA24)
Esophagus–Muscularis
Heart–LeftVentricle
Artery–Aorta
Brain–Spinalcord(cervicalc–1)
Brain–Nucleusaccumbens(basalganglia)
Brain–Hypothalamus
Brain–Cortex
Stomach
AdrenalGland
Prostate
Colon–Sigmoid
Uterus
Nerve–Tibial
Pituitary
Colon–Transverse
Liver
Skin–NotSunExposed(Suprapubic)
Adipose–Visceral(Omentum)
WholeBlood
Brain–Cerebellum
Esophagus–GastroesophagealJunction
Lung
Cells–Transformedfibroblasts
Thyroid
Skin–SunExposed(Lowerleg)
Vagina
Artery–Coronary
Spleen
Breast–MammaryTissue
Ovary
Brain–Amygdala
Adipose–Subcutaneous
Artery–Tibial
Heart–AtrialAppendage
Testis
Esophagus–Mucosa
Cells–EBV–transformedlymphocytes
Brain–CerebellarHemisphere
SmallIntestine–TerminalIleum
0.020
0.025
0.030
0.035
TRRt


R
Crohn's disease (Putative functional)
Brain–Substantianigra
Brain–FrontalCortex(BA9)
Brain–Putamen(basalganglia)
Brain–Caudate(basalganglia)
Brain–Cortex
Brain–Hippocampus
Spleen
Brain–Nucleusaccumbens(basalganglia)
Brain–Hypothalamus
AdrenalGland
Brain–Cerebellum
Pancreas
WholeBlood
Prostate
Lung
Colon–Sigmoid
Muscle–Skeletal
Brain–CerebellarHemisphere
Brain–Amygdala
Brain–Spinalcord(cervicalc–1)
Heart–LeftVentricle
SmallIntestine–TerminalIleum
Testis
Brain–Anteriorcingulatecortex(BA24)
Stomach
Thyroid
Adipose–Subcutaneous
Cells–Transformedfibroblasts
Artery–Aorta
Esophagus–Muscularis
Skin–SunExposed(Lowerleg)
Skin–NotSunExposed(Suprapubic)
Esophagus–Mucosa
Liver
Nerve–Tibial
Colon–Transverse
Cells–EBV–transformedlymphocytes
Adipose–Visceral(Omentum)
Esophagus–GastroesophagealJunction
Artery–Tibial
Uterus
Pituitary
Vagina
Artery–Coronary
Breast–MammaryTissue
Heart–AtrialAppendage
Ovary
0.02
0.03
0.04
TRRt


S
Height (All GMAS)
Brain–Hippocampus
Uterus
Brain–Putamen(basalganglia)
Artery–Aorta
Prostate
Cells–Transformedfibroblasts
Nerve–Tibial
Esophagus–GastroesophagealJunction
Esophagus–Muscularis
Brain–Cortex
Brain–FrontalCortex(BA9)
Pancreas
Artery–Tibial
Heart–LeftVentricle
Brain–Amygdala
Heart–AtrialAppendage
Ovary
Thyroid
Brain–Nucleusaccumbens(basalganglia)
Muscle–Skeletal
Pituitary
Brain–Anteriorcingulatecortex(BA24)
Brain–CerebellarHemisphere
Adipose–Visceral(Omentum)
Artery–Coronary
Adipose–Subcutaneous
Breast–MammaryTissue
Vagina
Colon–Transverse
Cells–EBV–transformedlymphocytes
AdrenalGland
Skin–NotSunExposed(Suprapubic)
Brain–Hypothalamus
Skin–SunExposed(Lowerleg)
Esophagus–Mucosa
Brain–Cerebellum
Brain–Caudate(basalganglia)
Colon–Sigmoid
Lung
Liver
Testis
SmallIntestine–TerminalIleum
Brain–Substantianigra
Spleen
Stomach
Brain–Spinalcord(cervicalc–1)
WholeBlood
0.12
0.13
0.14
0.15
TRRt


T
Height (Putative functional)
Brain–Putamen(basalganglia)
Brain–Hippocampus
Cells–Transformedfibroblasts
Brain–Amygdala
Testis
Heart–AtrialAppendage
Brain–CerebellarHemisphere
Muscle–Skeletal
Artery–Aorta
Heart–LeftVentricle
Lung
Brain–Anteriorcingulatecortex(BA24)
Artery–Coronary
Uterus
Brain–Cortex
Colon–Transverse
Brain–FrontalCortex(BA9)
Adipose–Visceral(Omentum)
Cells–EBV–transformedlymphocytes
Brain–Nucleusaccumbens(basalganglia)
Breast–MammaryTissue
Spleen
Skin–NotSunExposed(Suprapubic)
SmallIntestine–TerminalIleum
Pituitary
Esophagus–Muscularis
AdrenalGland
WholeBlood
Prostate
Skin–SunExposed(Lowerleg)
Liver
Nerve–Tibial
Brain–Cerebellum
Vagina
Artery–Tibial
Brain–Hypothalamus
Esophagus–GastroesophagealJunction
Adipose–Subcutaneous
Pancreas
Colon–Sigmoid
Esophagus–Mucosa
Stomach
Ovary
Brain–Caudate(basalganglia)
Thyroid
Brain–Substantianigra
Brain–Spinalcord(cervicalc–1)
0.125
0.150
0.175
TRRt

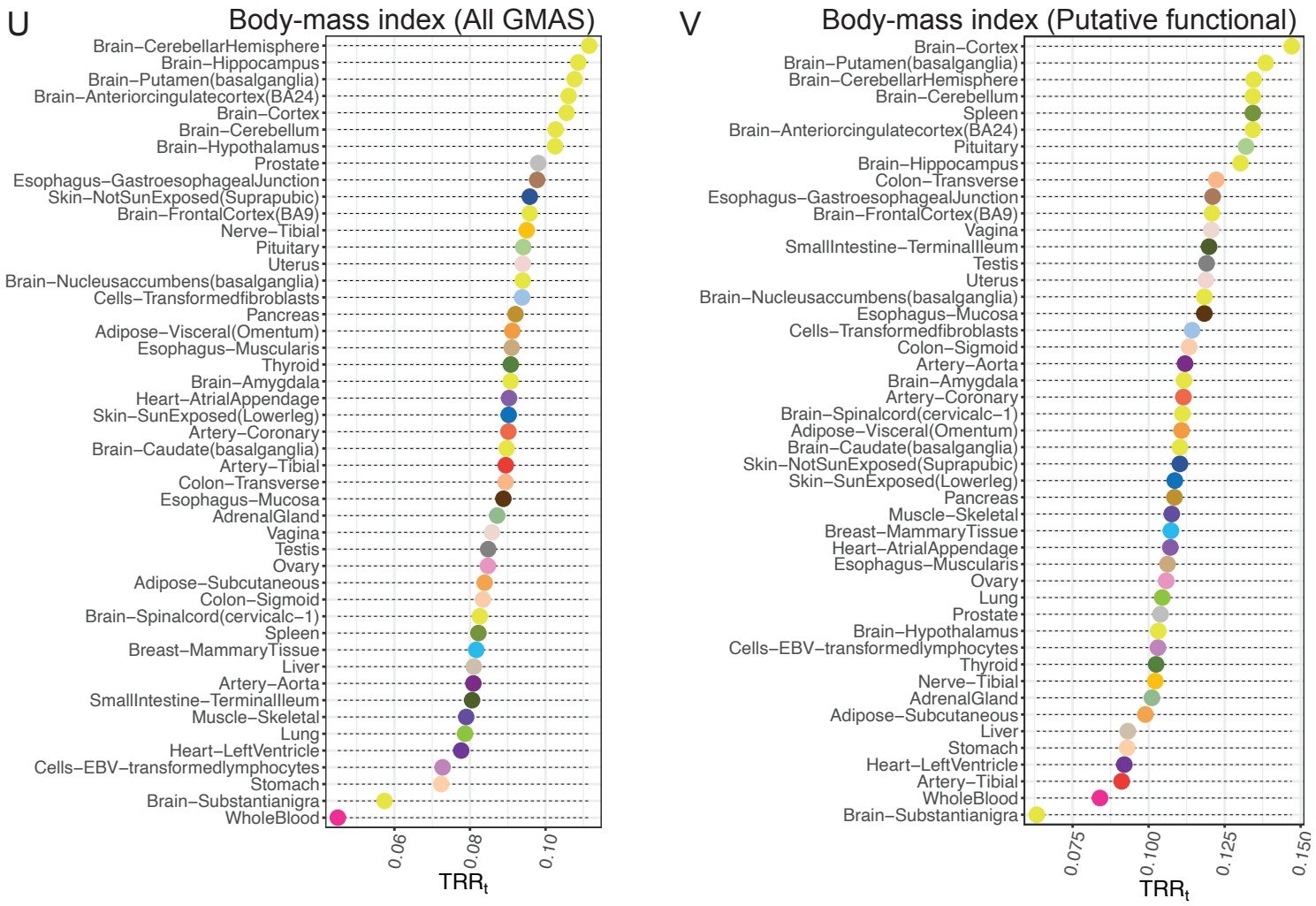


Fig. S12: Functional relevance of relevance SNPs after controlling for tissue-specific gene expression. (A)-(V) Trait relevance ratios of all GMAS SNPs and putative functional SNPs (labeled accordingly) in LD with GWAS SNPs for different traits/diseases.