S4 Table. Single-tissue gene-trait association test results from tissue enrichment analysis using UTMOST.

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| --- | --- | --- | --- | --- |
| Phenotype | Tissue | GENE | zscore | pvalue |
| Mean Activity Levels During Sleep | Esophagus\_Muscularis | BRSK1 | 4.63 | 3.70E-06 |
| Mean Activity Levels During Sleep | Prostate | BRSK1 | 4.80 | 1.57E-06 |
| Mean Activity Levels During Sleep | Skin\_Not\_Sun\_Exposed\_Suprapubic | BRSK1 | 4.71 | 2.52E-06 |
| Mean Activity Levels During Sleep | Brain\_Frontal\_Cortex\_BA9 | CEP70 | -4.59 | 4.46E-06 |
| Mean Activity Levels During Sleep | Esophagus\_Gastroesophageal\_Junction | CEP70 | -4.68 | 2.84E-06 |
| Mean Activity Levels During Sleep | Brain\_Hypothalamus | CEP70 | -4.61 | 4.09E-06 |
| Mean Activity Levels During Sleep | Lung | CEP70 | -4.63 | 3.73E-06 |
| Mean Activity Levels During Sleep | Heart\_Left\_Ventricle | KATNAL2 | 4.64 | 3.41E-06 |
| Mean Activity Levels During Sleep | Brain\_Nucleus\_accumbens\_basal\_ganglia | KCNH7 | -5.01 | 5.35E-07 |
| Mean Activity Levels During Sleep | Adipose\_Subcutaneous | L3MBTL2 | -4.75 | 2.07E-06 |
| Mean Activity Levels During Sleep | Whole\_Blood | L3MBTL2 | -4.72 | 2.38E-06 |
| Mean Activity Levels During Sleep | Brain\_Hippocampus | PLA2G4B | -4.84 | 1.31E-06 |
| Mean Activity Levels During Wake | Brain\_Putamen\_basal\_ganglia | ARID3B | 4.81 | 1.54E-06 |
| Mean Activity Levels During Wake | Heart\_Left\_Ventricle | BEAN1 | 4.70 | 2.57E-06 |
| Mean Activity Levels During Wake | Adipose\_Subcutaneous | GIPC2 | -4.72 | 2.32E-06 |
| Mean Activity Levels During Wake | Heart\_Left\_Ventricle | GIPC2 | 4.83 | 1.35E-06 |
| Mean Activity Levels During Wake | Breast\_Mammary\_Tissue | GIPC2 | -4.74 | 2.12E-06 |
| Mean Activity Levels During Wake | Adipose\_Subcutaneous | L3MBTL2 | -5.39 | 7.05E-08 |
| Mean Activity Levels During Wake | Muscle\_Skeletal | L3MBTL2 | -5.62 | 1.92E-08 |
| Mean Activity Levels During Wake | Liver | MBD2 | 4.78 | 1.71E-06 |
| Mean Activity Levels During Wake | Brain\_Anterior\_cingulate\_cortex\_BA24 | PRUNE | -4.67 | 3.02E-06 |
| Mean Activity Levels During Wake | Whole\_Blood | SEC11C | -4.70 | 2.63E-06 |
| Mean Activity Levels During Wake | Brain\_Anterior\_cingulate\_cortex\_BA24 | SOD3 | -4.75 | 2.06E-06 |
| Mean Activity Levels During Wake | Muscle\_Skeletal | SPARC | -5.03 | 4.86E-07 |
| Mean Activity Levels During Wake | Adrenal\_Gland | TRAF3 | 4.87 | 1.14E-06 |
| Mean Activity Levels During Wake | Artery\_Aorta | TRAF3 | 4.87 | 1.12E-06 |
| Mean Activity Levels During Wake | Brain\_Cerebellar\_Hemisphere | TRAF3 | 4.67 | 3.01E-06 |
| Mean Activity Levels During Wake | Brain\_Frontal\_Cortex\_BA9 | TRAF3 | 5.11 | 3.25E-07 |
| Mean Activity Levels During Wake | Esophagus\_Gastroesophageal\_Junction | TRAF3 | 4.77 | 1.85E-06 |
| Mean Activity Levels During Wake | Esophagus\_Muscularis | TRAF3 | 4.86 | 1.18E-06 |
| Mean Activity Levels During Wake | Liver | TRAF3 | 4.88 | 1.07E-06 |
| Sleep Duration | Vagina | ADAMTS7 | 4.80 | 1.63E-06 |
| Sleep Duration | Adipose\_Subcutaneous | GLTP | 4.66 | 3.13E-06 |
| Sleep Duration | Adipose\_Visceral\_Omentum | GLTP | -4.76 | 1.90E-06 |
| Sleep Duration | Adrenal\_Gland | GLTP | -4.71 | 2.42E-06 |
| Sleep Duration | Artery\_Aorta | GLTP | 4.76 | 1.97E-06 |
| Sleep Duration | Artery\_Coronary | GLTP | 4.74 | 2.11E-06 |
| Sleep Duration | Artery\_Tibial | GLTP | -4.74 | 2.12E-06 |
| Sleep Duration | Brain\_Anterior\_cingulate\_cortex\_BA24 | GLTP | -4.75 | 2.07E-06 |
| Sleep Duration | Brain\_Caudate\_basal\_ganglia | GLTP | -4.73 | 2.25E-06 |
| Sleep Duration | Brain\_Cerebellar\_Hemisphere | GLTP | -4.76 | 1.95E-06 |
| Sleep Duration | Brain\_Cortex | GLTP | -4.75 | 2.01E-06 |
| Sleep Duration | Brain\_Hippocampus | GLTP | -4.75 | 1.99E-06 |
| Sleep Duration | Brain\_Hypothalamus | GLTP | -4.76 | 1.92E-06 |
| Sleep Duration | Brain\_Nucleus\_accumbens\_basal\_ganglia | GLTP | -4.70 | 2.55E-06 |
| Sleep Duration | Brain\_Putamen\_basal\_ganglia | GLTP | -4.69 | 2.77E-06 |
| Sleep Duration | Cells\_EBV-transformed\_lymphocytes | GLTP | 4.61 | 3.97E-06 |
| Sleep Duration | Cells\_Transformed\_fibroblasts | GLTP | 4.75 | 1.99E-06 |
| Sleep Duration | Colon\_Sigmoid | GLTP | 4.73 | 2.26E-06 |
| Sleep Duration | Colon\_Transverse | GLTP | -4.76 | 1.94E-06 |
| Sleep Duration | Esophagus\_Gastroesophageal\_Junction | GLTP | -4.75 | 2.00E-06 |
| Sleep Duration | Esophagus\_Mucosa | GLTP | 4.73 | 2.29E-06 |
| Sleep Duration | Esophagus\_Muscularis | GLTP | 4.65 | 3.28E-06 |
| Sleep Duration | Heart\_Atrial\_Appendage | GLTP | 4.63 | 3.68E-06 |
| Sleep Duration | Heart\_Left\_Ventricle | GLTP | -4.74 | 2.15E-06 |
| Sleep Duration | Liver | GLTP | 4.73 | 2.24E-06 |
| Sleep Duration | Lung | GLTP | -4.75 | 2.01E-06 |
| Sleep Duration | Vagina | GLTP | -4.75 | 1.98E-06 |
| Sleep Duration | Muscle\_Skeletal | GLTP | -4.73 | 2.27E-06 |
| Sleep Duration | Nerve\_Tibial | GLTP | -4.76 | 1.89E-06 |
| Sleep Duration | Ovary | GLTP | -4.75 | 2.02E-06 |
| Sleep Duration | Pancreas | GLTP | -4.76 | 1.98E-06 |
| Sleep Duration | Prostate | GLTP | 4.73 | 2.26E-06 |
| Sleep Duration | Skin\_Not\_Sun\_Exposed\_Suprapubic | GLTP | -4.75 | 2.03E-06 |
| Sleep Duration | Small\_Intestine\_Terminal\_Ileum | GLTP | 4.77 | 1.88E-06 |
| Sleep Duration | Spleen | GLTP | 4.76 | 1.94E-06 |
| Sleep Duration | Stomach | GLTP | -4.77 | 1.89E-06 |
| Sleep Duration | Testis | GLTP | 4.75 | 2.06E-06 |
| Sleep Duration | Uterus | GLTP | 4.73 | 2.28E-06 |
| Sleep Duration | Whole\_Blood | GLTP | 4.67 | 2.94E-06 |
| Sleep Duration | Lung | KIFC3 | 4.65 | 3.28E-06 |
| Sleep Start | Artery\_Coronary | ABCD2 | 4.71 | 2.53E-06 |
| Sleep Start | Brain\_Anterior\_cingulate\_cortex\_BA24 | ABCD2 | -4.61 | 3.94E-06 |
| Sleep Start | Adipose\_Visceral\_Omentum | ABCD2 | 4.76 | 1.94E-06 |
| Sleep Start | Brain\_Cortex | ABCD2 | 4.62 | 3.90E-06 |
| Sleep Start | Brain\_Cerebellum | ABCD2 | -4.78 | 1.79E-06 |
| Sleep Start | Colon\_Sigmoid | ABCD2 | 4.61 | 4.11E-06 |
| Sleep Start | Adipose\_Subcutaneous | ABCD2 | 4.75 | 2.03E-06 |
| Sleep Start | Colon\_Transverse | ABCD2 | 4.67 | 3.02E-06 |
| Sleep Start | Whole\_Blood | ABCD2 | -4.58 | 4.55E-06 |
| Sleep Start | Small\_Intestine\_Terminal\_Ileum | ALG10B | 4.94 | 7.99E-07 |
| Sleep Start | Whole\_Blood | ALG10B | -4.75 | 1.99E-06 |
| Sleep Start | Adipose\_Subcutaneous | CCDC181 | -4.81 | 1.49E-06 |
| Sleep Start | Lung | CCDC87 | -4.63 | 3.66E-06 |
| Sleep Start | Brain\_Anterior\_cingulate\_cortex\_BA24 | CEP128 | -4.62 | 3.85E-06 |
| Sleep Start | Prostate | FSIP2 | -4.65 | 3.28E-06 |
| Sleep Start | Nerve\_Tibial | KIAA0391 | -4.65 | 3.31E-06 |
| Sleep Start | Brain\_Cerebellum | LIMS1 | 4.90 | 9.76E-07 |
| Sleep Start | Brain\_Nucleus\_accumbens\_basal\_ganglia | LIMS1 | 5.02 | 5.18E-07 |
| Sleep Start | Testis | LIMS1 | -4.81 | 1.50E-06 |
| Sleep Start | Brain\_Frontal\_Cortex\_BA9 | LIMS1 | 4.95 | 7.61E-07 |
| Sleep Start | Esophagus\_Mucosa | LRFN4 | 4.80 | 1.62E-06 |
| Sleep Start | Brain\_Anterior\_cingulate\_cortex\_BA24 | LRFN4 | 4.63 | 3.59E-06 |
| Sleep Start | Adrenal\_Gland | LRFN4 | 4.65 | 3.26E-06 |
| Sleep Start | Artery\_Coronary | LRFN4 | 4.62 | 3.76E-06 |
| Sleep Start | Colon\_Sigmoid | LRFN4 | 4.64 | 3.55E-06 |
| Sleep Start | Ovary | LRFN4 | 4.79 | 1.65E-06 |
| Sleep Start | Uterus | MYO18A | -5.05 | 4.39E-07 |
| Sleep Start | Brain\_Cortex | STX17 | -4.65 | 3.37E-06 |
| Sleep Start | Colon\_Transverse | TREH | 7.23 | 4.68E-13 |
| Sleep Start | Stomach | TREH | 5.76 | 8.54E-09 |
| Sleep Start | Esophagus\_Mucosa | TREH | 5.53 | 3.15E-08 |
| Sleep End | Whole\_Blood | HILPDA | -4.66 | 3.19E-06 |
| Sleep End | Brain\_Cerebellum | JARID2 | -5.13 | 2.95E-07 |
| Sleep End | Artery\_Coronary | SEPN1 | -4.69 | 2.73E-06 |
| Sleep End | Brain\_Cortex | SEPN1 | -4.61 | 3.94E-06 |
| 1-day Periodicity | Brain\_Cerebellar\_Hemisphere | C1orf162 | 4.91 | 9.06E-07 |
| 1-day Periodicity | Liver | C1orf162 | -4.94 | 7.97E-07 |
| 1-day Periodicity | Adipose\_Subcutaneous | L3MBTL2 | -5.03 | 4.81E-07 |
| 1-day Periodicity | Breast\_Mammary\_Tissue | L3MBTL2 | -4.77 | 1.82E-06 |
| 1-day Periodicity | Muscle\_Skeletal | L3MBTL2 | -4.83 | 1.38E-06 |
| 1-day Periodicity | Muscle\_Skeletal | SPARC | -5.28 | 1.30E-07 |
| 1-day Periodicity | Artery\_Tibial | ZFAND2B | 4.73 | 2.26E-06 |
| 1-day Periodicity | Cells\_EBV-transformed\_lymphocytes | ZNF79 | -4.63 | 3.72E-06 |
| 1/2-day Periodicity | Esophagus\_Mucosa | CPZ | -4.78 | 1.79E-06 |
| 1/2-day Periodicity | Pancreas | DCTPP1 | 4.72 | 2.38E-06 |
| 1/2-day Periodicity | Esophagus\_Mucosa | PCDH9 | 4.61 | 3.98E-06 |
| 1/2-day Periodicity | Muscle\_Skeletal | PCDH9 | 4.61 | 3.98E-06 |
| 1/2-day Periodicity | Prostate | PCDH9 | -4.61 | 3.98E-06 |
| 1/2-day Periodicity | Vagina | PCDH9 | 4.61 | 3.98E-06 |
| 1/2-day Periodicity | Brain\_Hypothalamus | PRSS36 | 4.65 | 3.39E-06 |
| 1/2-day Periodicity | Brain\_Putamen\_basal\_ganglia | STARD3 | -4.89 | 1.02E-06 |
| 1/3-day Periodicity | Brain\_Anterior\_cingulate\_cortex\_BA24 | PDE7B | 4.63 | 3.59E-06 |
| 1/3-day Periodicity | Muscle\_Skeletal | STATH | 4.97 | 6.74E-07 |