

Relationships between gene expression and brain wiring in the adult rodent brain

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Abstract

The wiring diagram of the brain is complex. Its self-assembly is guided by gradients, activity and guidance signals. To examine the global relationships between gene expression and neuroanatomical connectivity we examine large scale gene expression signatures in the adult rodent brain. The analysis approaches whole brain scale by using a wiring diagram containing over 900 brain regions and gene expression signatures of 17,530 genes within 142 regions. We find that adult gene expression signatures have a statistical relationship to connectivity. We extracted a reduced set of genes most correlated with neuroanatomical connectivity, and find that this set of genes is enriched for genes involved in neuronal development and axon guidance. Our results have the potential to shed light on the role of gene expression patterns in influencing neuronal activity and connectivity, with potential applications to our understanding of brain disorders.