

A Long Noncoding RNA Critical for Synapse Function

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Perhaps one of the biggest challenges in the modern genomics era is to understand the role of the noncoding transcriptome in determining cellular functions and behavior. Long noncoding RNAs (lncRNAs) are transcripts that are more than 200 nucleotides long and are important regulators of gene expression. An increasing number of functional studies have established that lncRNAs regulate almost every stage of gene expression, from epigenetic modifications in the nucleus to mRNA stability and translation in the cytoplasm. Although the presence of several lncRNAs in the brain and their differential expression in specific neurons have been described, whether and how they mediate synapse function remains largely unknown. Here we report identification of an lncRNA, termed SYNRENC that is necessary for synaptic communication, synapse density and dendritic branching in hippocampal neurons. Importantly, SYNRENC modulates expression of specific lncRNAs and their cognate mRNA targets as well as several mRNAs involved in neuronal development and differentiation. Our results establish a key role of SYNRENC in mediating synapse function.

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