Epigenetic and epitranscriptomic processes in cognitive diseases

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Epigenetic processes play a key role in the pathogenesis of neurodevelopmental and adult onset cognitive diseases. Of particular interest is the methylation of Histone 3 at lysine 4 (H3K4me) that is mediated by six different lysine methyltransferases. Mutations in all of these enzymes are found in neurodevelopmental intellectual disability disorders and de-regulated H3K4me is also observed in Alzheimer's disease. I will discuss recent work in which we compare the role of H3K4 methyltransferases in neuronal gene-expression and cognition. Specifically, we will show novel data on SET domain containing 1b (SETD1B) that has been linked to syndromic intellectual disability but its role in the postnatal brain has not been studied yet. In addition to the role of histone-methylation I will discuss the methylation of RNA, an epitranscriptomic process that is emerging as an important player in cognitive disease. I will present novel data in which we compare the RNA methylation in the healthy and diseased human brain as well as in corresponding animal models and summarize our findings on the functional consequences related to synaptic plasticity.