

Intrahippocampal recordings of rhythmic neuronal activity in freely moving conditionally L1 deficient mice

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This study focuses on *in-vivo* hippocampal activity in conditionally L1 deficient mice, in which the gene encoding the L1 cell adhesion molecule is ablated during the third postnatal week by an enzyme (cre-recombinase) under control of the Ca²⁺/calmodulin dependent kinase II promoter (Law et al., 2003). The behavioural phenotype of this L1 mutant is characterized by decreased anxiety, increased locomotion, and increased exploratory drive. Furthermore, there is a deficit in perisomatic GABAergic inhibition in juvenile constitutive L1 deficient mice (Saghatelyan et al., 2004). Here we have recorded oscillatory neuronal activity from the hippocampus of these mice in unrestrained exploratory behaviour on two consecutive days. Moreover, we have used repetitive auditory stimuli to investigate sensory gating, i.e. the decrease of a second auditory evoked response in a paired-stimulus paradigm, as a measure of GABAergic inhibition. We recorded ongoing local field potentials and auditory evoked potentials from the stratum lacunosum-moleculare of the CA1 region. During recordings, the animals were video-taped and behaviours were classified into known types (restless, motionless, approaching or investigating an object), in order to test the levels of anxiety, habituation and eventually object recognition. Our results suggest that L1 deficient mice compared to control animals show a tendency for altered behaviour and abnormal hippocampal oscillations in both low- and high-frequency ranges. Furthermore, L1 deficient mice show an impairment of auditory sensory gating. Taken together, these data suggest that conditional ablation of the L1 cell adhesion molecule leads to functional alterations in circuits involved in habituation and novelty processing.