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INTRINSIC FIRING PROPERTIES OF THE MOUSE HIPPOCAMPAL PYRAMIDAL CA1 NEURONS DURING THE POSTNATAL DEVELOPMENT

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Postnatal development is a crucial period for hippocampus neuronal maturation and neural pathways organization, when neurons change morphologically and exhibit an increase in the number of ion channels in the membranes[1]. The maturation of neuronal pathways has primarily been investigated through anatomical and immunohistochemical studies, but, some features like an intrinsic firing properties and functional synaptic activity necessitates direct electrophysiological recordings. The majority of electrophysiological research on hippocampal development has primarily involved rats[2]. Combination of novel molecular and genetic tools developed for mice animal model[3] with electrophysiological profiles would provide an additional insight about mechanisms of hippocampus postnatal development. Moreover, sex also can potentially influence the developmental processes of the hippocampus[4]. The aim of this study was to evaluate the intrinsic firing properties during the postnatal development in hippocampal pyramidal CA1 neurons in different sex mice.

In this study we used wild-type mice of different ages (5 to 21 postnatal days), both males and females. We employed whole cell patch-clamp technique. The firing properties were evaluated as f-I (frequency-current) relation, indicating how neurons integrate inputs and encodes outputs in the frequency of action potentials. Spike frequency adaptation was also evaluated.

We have found that the f-I relation significantly decreases during the development both in males and females before and after the spike frequency adaptation. The spike frequency adaptation ratio did not significantly change during the development both in males and females. There are also no significant differences between sex groups.

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