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Oral Presentation

Modulation of Pacemaker Channels and Rhythmic Thalamic Activity by Demyelination and Inflammatory Cytokines

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Abstract

The thalamus is a central element for the generation of rhythmic oscillatory activity under physiological and pathophysiological conditions. Especially slow oscillations in the delta and theta frequency band which normally occur during slow-wave sleep are associated with a number of neuropsychiatric conditions if they occur during wakefulness and may be the basis for the generation of characteristic symptoms. This type of slow rhythmic activity requires sus tained membrane hyperpolarization and the cyclic interaction between the pacemaker current, Ih, and the T-type Ca2+ current, IT, on the cellular level. Only recently a critical role of the thalamus in neuroinflammatory diseases like Multiple sclerosis (MS) has been appreciated. However it is unclear how Ih and oscillatory network activity in the thalamocortical system are influenced by MS-related pathologies like demyelination and increases in cytokines. Here we found that general demyelination and pro-inflammatory cytokines differentially modulated the voltage-dependency of Ih in thalamocortical relay neurons and that the availability of this current was an essential parameter for determining the parameters (frequency, number of bursts) of rhythmic thalamocortical activity which may explain some aspects of MS pathology.

Keywords: Pacemaker Channels, Thalamic Activity, Inflammatory Cytokines

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