

研究论文

外源性锌离子对大鼠海马切片癫痫样放电的起源、传播与频率特性的调节作用

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摘要:

本研究采用多电极记录技术,在离体条件下研究外源性锌离子(Zn^{2+})对无镁人工脑脊液诱导的Sprague-Dawley大鼠海马切片癫痫样放电的起源、传播与频率特性的调节作用。结果表明: $1 \mu\text{mol/L}$ 和 $100 \mu\text{mol/L}$ 的 Zn^{2+} 作用于海马切片,不改变海马切片上癫痫样放电的起始位置,但能够降低癫痫样放电顺行和逆行两个方向的传播速度,并改变癫痫样放电不同频率范围成分所占的比例。以上结果提示, $1 \mu\text{mol/L}$ 和 $100 \mu\text{mol/L}$ 的 Zn^{2+} 可以对海马切片上的癫痫样放电起到调节作用,减慢癫痫样放电在网络中的传播速度,同时,可能对神经元放电活动起到去同步化的作用。

关键词: 癫痫样放电 锌离子 微电极阵列 海马切片

The Modulatory Effects of Exogenous Zn^{2+} on Propagation and Frequency of Epileptiform Discharges on Rat Hippocampal Slices

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Abstract:

The modulatory effects of exogenous Zn^{2+} on initiation, propagation and frequency characteristics of epileptiform discharges induced by Mg^{2+} -free artificial cerebrospinal fluid (ACSF) in hippocampal slices of Sprague-Dawley rats were examined by multi-electrode array (MEA) system. The main results of the present study are: the modulatory effects of $1 \mu\text{mol/L}$ and $100 \mu\text{mol/L}$ Zn^{2+} did not change the initiation site of the epileptiform discharges, but the antegrade and retrograde speed of epileptiform discharges were slowed down by perfusion of Zn^{2+} , and the ratio of different frequency components were changed by Zn^{2+} application. These results imply that $1 \mu\text{mol/L}$ and $100 \mu\text{mol/L}$ Zn^{2+} play the neuromodulatory effects on epileptiform discharges in hippocampal slices, which can slow down the propagation speeds of epileptiform discharges in the network. Zn^{2+} may also play the desynchronization effects on the neural firing activity.

Keywords: Epileptiform discharges Zn^{2+} Micro-electrode array Hippocampal slice

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