

# 神经自发整数倍峰放电节律的随机性和确定性模式的比较

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为进一步区分神经自发整数倍峰放电节律的随机性和确定性模式的动力学性质,详细研究了实验神经起步点、随机理论模型(Chay模型)和确定性理论模型(Wang模型)产生的3种整数倍峰放电节律及其变化规律。结果发现,实验和随机模型经随机自共振产生的整数倍峰放电节律具有相同的统计性质(峰峰间期越大,出现的频度越低,约呈指数递减)和变化规律,与确定性Wang模型产生的整数倍节律明显不同。这提示,呈指数衰减分布的整数倍峰放电节律是经随机自共振产生的,是确定性因素和随机因素共同作用的结果。

In order to further reveal and distinguish the dynamics and changing regularity of the stochastic integer multiple spiking and the deterministic integer multiple spiking, the integer multiple spiking from the experiment, the stochastic Chay model, and the deterministic Wang model and their changing regularity with respect to extra-cellular concentrations of  $Ca^{2+}$  ( $[Ca^{2+}]_o$ ) or the reversal potential of  $Ca^{2+}$  in model were studied. The results showed that the statistical characteristics and changing regularity of the integer multiple spiking from the experiment were similar to those from the stochastic Chay model, but different obviously to those from the deterministic Wang model. It indicated that the integer multiple spiking from the experiment and that from the stochastic model were caused by the effect of stochastic resonance, and were determined by both of the deterministic and the stochastic mechanism, and could not emerge only from the deterministic model.

## 关键词

整数倍节律(Integer multiple rhythm); 随机自共振(Autonomous stochastic resonance); 动作电位间期(Interspike interval); 非线性确定性(Nonlinear deterministic); 神经元(Neural pacemaker); 自发放电(Spontaneous discharge)