

# 损伤神经自发放电节律分岔与频率变化的非线性特征

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为了研究神经放电节律加周分岔与放电频率变化之间的关系,采用大鼠坐骨神经慢性结扎模型,记录损伤区的自发放电,观察放电节律转化的动力学规律,分析相应的放电频率的变化,并用理论模型进行数值模拟。结果表明,与放电节律加周分岔相对应,放电频率的变化呈现非线性的特征,数值模拟支持实验的发现。研究提示:神经放电的频率变化与刺激强度的改变并非呈简单的线性相关,可能具有更复杂的关系。

## THE BIFURCATION OF INTERSPIKE INTERVALS AND NONLINEAR CHARACTERISTICS OF RATE CHANGE IN SPONTANEOUS DISCHARGE OF INJURED NERVES

In order to investigate the relationship of the bifurcation and the rate change in the spontaneous discharge of injured nerves, transitional modes of firing rhythms were observed in the experiments and the characteristics of rate change were analysed and numerical simulation. The results indicate that firing rate changed nonlinearly with the bifurcation in interspike intervals. Similar results was found in the theoretic simulation. The investigation suggested that there is a more complicated than linear relationship between the firing rate and the stimulation intensity and which need to be studied.

### 关键词

自发放电 (Spontaneous discharge); 节律 (Rhythm); 动作电位间期 (Interspike interval); 分岔 (Bifurcation); 频率编码 (Rate coding)