

黑质致密部神经元的反应性与放电型式的关系

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通过研究黑质致密部(substantia nigra compacta, SNc)神经元的放电型式与其对谷氨酸、多巴胺及缺氧敏感性的关系,探讨“非周期敏感”现象在神经系统的普遍性。在幼鼠的脑片胞外记录SNc神经元的自发放电,比较周期与非周期放电神经元对该三种刺激反应的敏感性,并对非周期放电神经元的动作电位峰峰间期序列(interspike interval, ISI)进行非线性动力学分析。结果表明,非周期放电神经元比周期放电神经元对上述三种刺激更敏感;非周期放电神经元的放电ISI序列含有非稳定周期轨道族,提示非周期放电存在确定的动力学机制。

RELATIONSHIP BETWEEN FIRING PATTERN AND RESPONSIVENESS OF SUBSTANTIA NIGRA COMPACTA NEURONS

Studying of relationship between the firing pattern and sensitivity of substantia nigra compacta (SNc) neurons to glutamate, dopamine and anoxia, to certify universality of “non-period sensitivity” in nervous system. Spontaneous activities of SNc neurons in brain slice of young rats were recorded extracellularly, which were divided into periodic and non-periodic firing patterns. The sensitivity of neurons with two firing patterns to glutamate, dopamine and anoxia were compared. Further, the non-linear dynamic of interspike interval (ISI) time series of non-period firing was analyzed. The results indicate that the non-periodic firing neurons are more sensitive to glutamate, dopamine and anoxia than periodic firing neurons in SNc, and that a family of unstable period orbits was identified from time series of ISI of non-periodic firing, suggesting deterministic dynamical mechanism contained within in ISI time series of non-periodic firing.

关键词

黑质致密部(Substantia nigra compacta); 自发放电(Spontaneous activity); 谷氨酸(Glutamate); 多巴胺(Dopamine); 缺氧(Anoxia); 非稳定周期轨道(Unstable period orbits)