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大鼠初级听皮层神经元迟发型听觉反应的电生理特征

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Title: Electrophysiological characteristics of late responses of rat primary auditory cortex to acoustic stimulation

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关键词: 初级听皮层; 细胞内记录; 膜电位; 在体; 潜伏期

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摘要: 目的 探讨声刺激诱发大鼠初级听皮层反应的电生理特征及机制。方法 运用场电位记录、细胞贴附式膜片钳记录和细胞内记录技术, 在麻醉大鼠初级听皮层分别从整体水平和单细胞水平分析声诱发的迟发型反应特征, 并从膜电位特征分析其产生的可能机制。结果 在给予白噪声刺激的条件下, 我们在大鼠初级听皮层记录到起始相onset反应之后的长潜伏期场电位活动, 其反应的潜伏期 (152 ± 18) ms显著长于起始相反应 (9.2 ± 0.4) ms, 属于迟发型听觉反应。单细胞胞外记录显示迟发型听觉反应的动作电位发放潜伏期 (144 ± 11) ms与场电位水平的迟发型活动相似。在体细胞内记录共记录到29个神经元, 其中10个神经元在声刺激后表现出长潜伏期 (137 ± 11) ms和长时程的迟发型活动。结论 大鼠初级听皮层神经元迟发型反应的潜伏期远长于起始相onset反应, 且反应特征(潜伏期、时程)与on-off双相

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反应神经元的offset反应明显不同，其产生机制可能与突触前输入以及神经元本身的兴奋性改变有关。

Abstract: **Objective** To investigate the electrophysiological characteristics and underlying mechanisms of neuronal responses to acoustic stimulation in rat primary auditory cortex (A1). **Methods** The late responses of anesthetic rat primary auditory cortex to noise stimulation were obtained by *in vivo* recording of local field potentials (LFP), single unit activities (SUA) and intracellular membrane potentials. **Results** We observed sound-evoked LFP with long latencies after the onset responses in A1, which were classified into late responses. The latency of late phase responses (152 ± 18 ms) was significantly longer than the onset latency (9.2 ± 0.4 ms). Single unit recording results further confirmed that the spiking latency (144 ± 11 ms) of late responses was similar to that of LFP. Ten of 29 neurons also showed late responses with intracellular recording. The late depolarization had a long latency (137 ± 11 ms) and duration. **Conclusion** The latency of late responses is longer than that of onset responses in