

# 小鼠下丘神经元声刺激跟随力与声时程及强度的关系

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**摘要:** 自由声场条件下, 通过给予小鼠具有不同时程(10、40 以及100 ms)、强度(最小阈值以上5、15、25、35及45 dB SPL)、呈现率(0.5、1、2、3.3、5、6.7、10和20 Hz)的纯音短声刺激, 分析探讨了昆明小鼠下丘神经元声刺激跟随力与声时程及强度的关系。结果发现: 多数神经元的脉冲发放数随声强增高而增加, 随短声时程的延长而减少; 随声强的增高, 多数神经元的临界呈现率(CPR)和最大呈现率(MPR)变大, 而随短声时程的延长, 神经元的CPR、MPR变小为主要趋势; 下丘神经元的声反应跟随力总体上随时程延长而下降, 随声强加大而提高。推测当声时程延长、强度下降时, 前次刺激对后继刺激声反应的抑制性影响增强, 提示声时程适当缩短、声强增大可能有助于下丘神经元汇聚更多的声信息进行高级神经处理, 从而提高听中枢表征高密度声信息的能力。

**关键词:** 下丘神经元; 声呈现率; 声强和时程; 小鼠

## The relationship between the mouse inferior colliculus neurons' ability to follow the sound presentations and the duration and intensity of the sound

**Abstract:** To study the relationship between the mouse inferior colliculus (IC) neurons' ability to follow sound presentations and the duration and intensity of sound, the tones with different durations (10, 40 and 100 ms)、intensities (MT +5, 15, 25, 35 and 45 dB SPL) at characteristic frequency of recorded neurons were presented to Nembutal anesthetic mice (*Mus musculus*, Km) at different presentation rates (ranged from 0.5 ~ 20 Hz) under free field stimulation conditions. The results show that firing rate of the majority of neurons increased with the intensity increasing and decreased with the duration prolonging. The critical presentation rates (CPRs) and maximal presentation rates (MPRs) of the majority neurons increased with the intensity increasing, and decreasing with the duration prolonging. Overall, the ability to follow the sound presentations of the IC neurons increased with the intensity increasing and decreased with the duration prolonging, demonstrating that inhibitory effects of the preceding stimulation on the response to the succeeding stimulation were enhanced as the duration was prolonged and the intensity was decreased. It is suggested that shortening the duration and increasing the intensity of the sound within a proper scope might favor the IC neurons to pool more information for neural processing. This maybe benefits the central auditory system to represent the dense acoustical information.

**Key words:** inferior colliculus neurons; sound presentation rate; intensity and duration; mouse

### 关键词

下丘神经元(inferior colliculus neurons); 声呈现率(sound presentation rate); 强度和时程(intensity and duration); 小鼠(mouse)