

不同时程弱前掩蔽声对小鼠下丘神经元声反应的选择性抑制

梅慧娴、郭玉萍、吴飞健*、陈其才
华中师范大学生命科学学院

自由声场条件下,以强度为神经元最小阈值阈上5 dB,时程分别为40、60、80和100 ms的纯音作为前掩蔽声,观察和记录了不同时程弱前掩蔽声对小鼠(*Mus musculus* Km)下丘神经元发放和声强处理的影响。实验共获得154个神经元,对其中的104个神经元做了不同时程掩蔽声影响的测试。结果发现:掩蔽声对神经元放电率的抑制作用在时间上表现为前抑制(41%, 41/100)、后抑制(9%, 9/100)、和全抑制(50%, 50/100)三种类型。改变掩蔽声时程时,大部分神经元(72%, 72/100)的抑制类型不发生改变,但少部分神经元(28%, 28/100)随掩蔽声时程的增加,大量的后抑制类型转变为前抑制或全抑制类型。此外,超过一半的神经元(58.06%, 54/93)其强度-放电率函数曲线随掩蔽声时程的改变而发生转变,主要表现为单调型向饱和型转变、及饱和型向非单调型转变,这种转变并不随掩蔽声时程增加表现出规律性的变化。结果表明,前掩蔽作用于下丘神经元声反应的时间域和强度域时具有不均衡性,推测不同时程弱前掩蔽声激活的抑制性输入能分化性调制下丘神经元声反应特性。

Selective inhibition of weak forward masker with different durations on the acoustical responses of the inferior collicular neurons in the mouse

To study the effects of forward masker sound with different duration on neuronal firing and rate-intensity function (RIF) of inferior colliculus (IC) neurons, a tone relative to 5 dB above minimum threshold (re MT+5 dB) at the characteristic frequency (CF) of recorded neurons was used as forward masker sound under free field stimulation. The masker durations were 40, 60, 80, 100 ms. 154 neurons were recorded and 104 neurons were examined under different masker durations. We found that there were three types of inhibition period of neuronal firing, i. e., early-inhibition (41%, 41/100), late-inhibition (9%, 9/100) and whole-inhibition (50%, 50/100). The inhibition period of 72% (72%) neurons remained constant whereas that of a minority of the neurons (28, 28%) altered when masker duration was changed. Among the 28 neurons, most of them tended to transform the late-inhibition to the early-inhibition or the whole-inhibition. Moreover, the RIFs of 54 (58.06%) neurons changed as the masker duration increasing. Most monotonic RIFs were converted to saturated, and saturated to nonmonotonic RIFs. However, this transformation was not as regular as masker duration increasing. Our results suggest that the inhibitory influences of forward masking upon temporal and intensity domains of the acoustical responses of the IC neurons to probe tone are not proportionate. The inhibitory input induced by forward masker with diverse durations might differentially modulate the responses,

关键词

掩蔽声时程(masker duration); 前掩蔽(forward masking); 选择性抑制(selective inhibition); 下丘神经元(IC neurons)