

下丘神经元声信号处理过程中的频谱整合

吴飞健*、陈其才、JEN PHS
华中师范大学

自由声场条件下, 采用特定双声刺激、双电极同步记录方法研究了下丘神经元的频谱整合作用。实验在6只大棕蝠 (*Eptesicus fuscus*) 上进行, 共获得22对频谱整合相关的配对神经元。结果显示: (1) 81.8% (36/44) 的配对神经元产生相互抑制性频谱整合, 18.2% (8/44) 为相互易化性频谱整合; (2) 频谱整合的范围主要在20~30 kHz之间, 其中约一半 (45.5%, 20/44) 的配对神经元其最佳频率差小于2 kHz, 但也可见最佳频率差大于10 kHz的配对神经元 (13.6%, 6/44) 产生频谱整合; (3) 下丘神经元的频率及强度选择性受频谱整合作用的调制。推测等频层内及等频层之间的下丘神经元在声信号处理过程中存在相互作用机制, 以利于对复杂声信号的加工。

With a particular two-tone stimulation paradigm under free field conditions, the frequency spectral integration of inferior collicular (IC) neurons was studied by using a pair of 3 mol/L KCL glass electrodes to simultaneously record. The experiments were conducted on 6 big brown bats (*Eptesicus fuscus*) tranquilized and anesthetized with Innoval-Vet (Fentanyl 0.08 mg/kg b.w., Droperidol 4 mg/kg b.w.) and Nembutal (50 mg/kg b.w.) and 22 paired IC neurons were obtained. The results are as follows: (1) 81.8% (36/44) paired neurons yielded mutually inhibitory spectral integration while others (18.2%, 8/44) mutually facilitated; (2) The most best frequencies (BFs) of correlated neurons (86.4%, 38/44) with integration were within the range of 20~30 kHz. Although there were nearly half of paired neurons (45.5%, 20/44) whose BFs differences were less than 2 kHz, the spectral integration between those neurons (13.6% 6/44) whose BFs differences were more than 10 kHz also can be observed; (3) The acoustic responses selectivity of IC neurons to frequency and intensity were modulated by frequency spectral integration. Our results add evidence to the notion that for better processing of complex sound signals there are mutual interactions of IC neurons within iso-frequency lamina or between iso-frequency laminae.

关键词

下丘神经元(Inferior collicular (IC) neurons); 频谱整合(Spectral integration); 蝙蝠(Bats)