

河蟹眼柄神经分泌细胞离子通道的膜片钳研究

孙金生^{1,3}、刘安西²、陈家童²、贺秉军²、马维林³、相建海¹

1 中国科学院海洋研究所海洋生物开放实验室

2 南开大学生物学系

3 天津市水产研究所

神经分泌细胞离子通道进行了研究。结果表明,河蟹眼柄MTXO中分布的A、B、C三种类型神经分泌细胞均可记录到由内向电流和外向电流组成的正常全细胞电流。内向电流由高电压激活钙离子通道电流(I_{Ca})和对TTX敏感钠离子通道电流(I_{Na})组成。 I_{Ca} 的激活电压为-30mV,在0~+20mV电压下达到峰值,在-40mV和-70mV保持电压下记录的 I_{Ca} 激活阈值、初始峰值及I-V曲线无明显差别。外向电流明显,幅值较大,包括对4-AP敏感的快速激活、快速失活钾离子通道电流(I_A)和对TEA敏感的缓慢激活、缓慢失活钾离子通道电流(I_K)。正常蟹种、二龄成蟹和早熟蟹种MTXO神经分泌细胞均表达电压门控钠、钾、钙离子通道,通道电流和电压特征无明显区别。

PATCH CLAMP STUDY ON THE ION CHANNELS IN THE CULTURED MTXO NEURONS IN ERIOCHEIR SINENSIS

The whole-cell patch clamp technique was used to study the properties of the voltage-gated ion channels expressed by the cultured types A, B, C neurosecretory cells dissociated from MTXO of Chinese mitten crab *Eriocheir sinensis* 12~24 hours after plating. Most neurons showed immediately outgrowth and readily formed seals with patch pipettes, allowing stable, whole-cell patch-clamp recordings. Under voltage clamp, net current consisted of outward and inward current. When solution that suppressed the outward current was used, a tetrodotoxin-sensitive Na^+ current (I_{Na}) and a slow, Cd^{2+} -sensitive Ca^{2+} current (I_{Ca}) were resolved in three cell types. In TTX, I_{Ca} was activated at potential -30mV, was maximal at 0~+20mV, and the form of the Ca current I(V) was unchanged by changes of holding potential between -40mV and -70mV. In the presence of $1\mu mol/L$ TTX and $0.5mmol/L$ Cd^{2+} , three cell types expressed a 4-AP-sensitive transient current, analogous to I_A , and a slower-rising, TEA-sensitive current, analogous to I_K . Obvious distinguish was not observed on the ion channel properties in the neurosecretory cells of MTXO from juvenile, precocious and matured crabs.

关键词

甲壳动物(Crustacean); 中华绒螯蟹(*Eriocheir sinensis*); MTXO; 神经分泌细胞(Neurosecretory cell); 离子通道(Ion channel)