

论著

冈田酸对培养的大鼠三叉神经元电压门控性钾和钙通道的调节

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摘要 目的 通过研究冈田酸对大鼠三叉神经元电压门控性钾、钙电流的影响, 探讨磷酸酯酶在细胞信号转导中的调节作用。方法 采用全细胞膜片钳方法。结果 冈田酸 $1 \mu\text{mol} \cdot \text{L}^{-1}$ 对瞬时外向钾电流(I_A)的抑制率为28.6%, 对延迟整流钾电流(I_K)和钙电流(I_{Ca})的增加率分别为22.7%和20.0%。冈田酸 $1 \mu\text{mol} \cdot \text{L}^{-1}$ 使IA和IK的激活曲线以及IA的失活曲线发生超级化位移, 对ICa激活和失活曲线的影响没有统计学意义。结论 ① 蛋白丝/苏氨酸磷酸酯酶1和2A可能参与了大鼠三叉神经节神经元电压门控性钾和钙通道的调节。② 电压门控性钾和钙通道对蛋白丝/苏氨酸磷酸酯酶1和2A的去磷酸化反应表现出不同的依赖性。

关键词 [冈田酸](#) [磷蛋白磷酸酶](#) [膜片钳技术](#) [三叉神经](#) [神经元](#) [离子通道](#)

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Effects of okadaic acid on voltage-gated potassium and calcium channels in cultured rat trigeminal neurons

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Abstract

AIM To investigate the effects of serine/threonine protein phosphatases in regulation of cell signal transduction on voltage-gated potassium and calcium channels in cultured rat trigeminal ganglion (TRG) neurons. **METHODS** Whole-cell patch clamp technique was used to record the potassium and calcium currents from adult rat TRG neurons before and after perfusion of okadaic acid, a potent inhibitor of the serine/threonine protein phosphatases 1 and 2A. **RESULTS** Okadaic acid $1 \mu\text{mol} \cdot \text{L}^{-1}$ inhibited transient outwards potassium currents (I_A) by 28.6%, increased delay rectified potassium currents (I_K) and calcium currents (I_{Ca}) by 22.7% and 20.0%, respectively. okadaic acid $1 \mu\text{mol} \cdot \text{L}^{-1}$ produced significant hyperpolarizing shifts in the conductance-voltage ($G-V$) curves and inactivation curves of I_A , also produced significant hyperpolarizing shifts in the $G-V$ curves of I_K , while it had no effect on the activation and inactivation kinetics of I_{Ca} . **CONCLUSION** Serine/threonine protein phosphatases 1 and 2A may be involved in the modulation of voltage-gated potassium and calcium channels on rat TRG neurons. In addition, voltage gated potassium and calcium channels show different dependence on the dephosphorylation reactions of PP1 and PP2A phosphatases.

Key words [okadaic acid](#) [phosphoprotein phosphatase](#) [patch-clamp technique](#) [trigeminal ganglion neurons](#) [ion chnnels](#)

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