

论文

一种新的钠-钙交换电流记录方法及阿米洛利的作用

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摘要:

目的: 研究胞外不同Ca²⁺浓度对豚鼠心室肌细胞钠-钙交换电流(Na⁺-Ca²⁺ exchange current, I_{Na-Ca})的影响和阿米洛利(amiloride)对该电流的作用。方法: 建立缺血再灌时胞内Na⁺超载的细胞模型, 用膜片钳全细胞技术, 记录I_{Na-Ca}的电流-电压关系曲线。结果: 阿米洛利10⁻⁵, 3×10⁻⁵和10⁻⁴ mol.L⁻¹, 在+50 mV时, 对I_{Na-Ca}的抑制率分别是15.4%, 22.6%和40.9%; 在-80 mV时抑制率分别是5.6%, 14.6%和23.2%。结论: 胞内Na⁺超载确可引起Na⁺-Ca²⁺交换系统激活; 阿米洛利对豚鼠心室肌细胞I_{Na-Ca}有抑制作用, 且对I_{Na-Ca}外向成分的抑制作用大于对内向成分的抑制作用。

关键词: Na⁺-Ca²⁺交换电流 阿米洛利 心室肌细胞 膜片钳

A NOVEL METHOD OF RECORDING Na⁺-Ca²⁺ EXCHANGE CURRENT AND EFFECT OF AMILORIDE ON THE CURRENT IN GUINEA PIG VENTRICULAR MYOCYTES

Liang Yon; Zhang Yalan and Wang Xiaoliang

Abstract:

AIM: To study the effects of various extracellular Ca²⁺ concentration and amiloride on Na⁺-Ca²⁺ exchange current(I_{Na-Ca}) in guinea pig ventricular myocytes. METHODS: Through setting up the model of intracellular Na⁺-overload during myocardial ischemia and reperfusion, the current-voltage relationship of I_{Na-Ca} was recorded using whole-cell patch clamp technique with a declining ramp pulse protocol. RESULTS: Amiloride can block the I_{Na-Ca} significantly. At potential of +50 mV, amiloride 10⁻⁵, 3×10⁻⁵ and 10⁻⁴ mol.L⁻¹ inhibited the I_{Na-Ca} by 15.4%, 22.6% and 40.9%, respectively; at potential of -80 mV amiloride inhibited I_{Na-Ca} by 5.6%, 14.6% and 23.2%, respectively. CONCLUSION:

Intracellular Na⁺-overload can activate Na⁺-Ca²⁺ exchange system which can be affected by extracellular Ca²⁺. Amiloride can block I_{Na-Ca} in guinea pig ventricular myocytes. Its inhibition effects on outward currents were greater than those on inward currents.

Keywords: amiloride ventricular myocytes whole-cell patch clamp technique Na⁺-Ca²⁺ exchange current

收稿日期 1998-07-16 修回日期 网络版发布日期

DOI:

基金项目:

通讯作者: 王晓良

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