

论文

体外液压冲击伤对大鼠神经细胞内游离钙和pH值的影响

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摘要:

目的研究体外液压冲击伤后大鼠神经细胞内游离钙和pH值的变化及其药物的保护作用。方法培养新生乳鼠的大脑皮层神经细胞, 给予2.5kPa, 20ms的液压冲击伤, 通过激光扫描共聚焦显微镜检测伤后单个神经细胞内游离[Ca²⁺]i和pH值的变化, 并分别给予尼莫地平和D-AP-5, 观察药物对上述变化的影响。结果伤后细胞内[Ca²⁺]i迅速升高, 持续12h达高峰, 随后逐渐下降, 48h接近正常; pH值下降较慢, 于12h达低谷, 48h未恢复正常。尼莫地平和D-AP-5均可明显抑制细胞内[Ca²⁺]i的升高和pH值的下降。结论可根据液压冲击伤后神经细胞内游离[Ca²⁺]i及pH值的变化规律指导用药。

关键词: 神经元培养 液压冲击性脑损伤 细胞内游离钙

EFFECTS OF FLUID PERCUSSION INJURY ON INTRACELLULAR [Ca²⁺]i AND pH IN CULTURED RAT NEURONS

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Abstract:

AIM To study the change of intracellular [Ca²⁺]i and pH in cultured neurons after fluid percussion injury, and the therapeutic effect of drugs. METHODS The neurons of Sprague Dawley rats were cultured for 8-14 days, then treated them with fluid percussion injury (2.5 kPa, 20 ms). Alterations of [Ca²⁺]i and pH in single neural cell following fluid percussion injury were measured by a laser scanning confocal microscope. After being injured for several hours the cultured neurons were treated with nimodipine or D-(-)-2-amino-5-phosphonovaleric acid (D-AP-5). Two hours later, the effects of drugs on intracellular [Ca²⁺]i and pH were studied. RESULTS The Intracellular [Ca²⁺]i increased quickly after brain injury and reached peak in 12 hours. It then decreased gradually and became normal at 48 hours. The pH decreased slowly, reached minimum in 12 hours, and then kept at a lower level. It did not recover normal at 48 hours. Nimodipine and D-AP-5 decreased significantly the ascension of [Ca²⁺]i and the descent of pH. But nimodipine and D-AP-5 must be given within 10 hours after injury for a good therapeutic effect. CONCLUSION According to the change of intracellular [Ca²⁺]i and pH, early use of nimodipine and D-AP-5, will get a better therapeutic effect.

Keywords: fluid percussion brain injury intracellular [Ca²⁺]i cultured neurons

收稿日期 2000-09-26 修回日期 网络版发布日期

DOI:

基金项目:

通讯作者: 杨宝峰

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