

## 论文

### A $\beta$ 对大鼠海马细胞钙浓度和线粒体膜电位影响

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#### 摘要:

目的 探讨 $\beta$ -淀粉样蛋白(A $\beta_{25\sim35}$ )对原代培养大鼠脑海马细胞内游离钙离子浓度和线粒体膜电位影响。方法 原代培养8 d的SD大鼠脑海马神经细胞,利用老化的A $\beta_{25\sim35}$  1、10和20  $\mu\text{mol/L}$ 对其染毒,分别观察染毒后24、48和72 h时海马细胞形态改变、细胞内游离钙离子浓度和线粒体膜电位。结果 随着染毒剂量增加,海马神经细胞开始变形、萎缩、神经元胞体模糊,突起变细、变短、分支减少,边缘模糊,神经网络破裂中断;电镜结果显示,随着染毒剂量增加和染毒时间延长,海马细胞凋亡比例增加;20  $\mu\text{mol/L}$  A $\beta_{25\sim35}$ 染毒24、48和72 h后,细胞内Ca<sup>2+</sup>浓度分别为(30.79 $\pm$ 1.28)、(38.19 $\pm$ 2.13)和(41.65 $\pm$ 3.60),细胞内线粒体膜电位分别为(46.94 $\pm$ 9.55)、(39.98 $\pm$ 6.51)和(34.52 $\pm$ 5.67),与对照组比较,Ca<sup>2+</sup>浓度均升高,膜电位均降低( $P<0.01$ )。结论 A $\beta_{25\sim35}$ 可以通过破坏细胞内钙稳态和线粒体膜电位而发挥神经毒性作用。

关键词:  $\beta$ -淀粉样蛋白(A $\beta_{25\sim35}$ ) 线粒体 游离钙离子 膜电位

### Effect of $\beta$ -amyloid on intracellular calcium concentration and mitochondrial membrane potential of primary cultured hippocampal neurons

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#### Abstract:

Objective To assess the effect of the  $\beta$ -amyloid fragment A $\beta_{25-35}$  on mitochondria membrane potential and the concentration of intracellular calcium ion in primary hippocampal neurons. Methods Primary hippocampal neurons on the 8th day *in vitro* were treated with A $\beta_{25-35}$  at the concentration of 1  $\mu\text{mol/L}$ , 10  $\mu\text{mol/L}$ , and 20  $\mu\text{mol/L}$  for 24 hr, 48 hr, and 72 hr with double distilled water as control. Purity of primary hippocampal neurons was determined on the eighth day after plating. The morphology of primary hippocampal neurons was determined by light microscope and electron microscopical. [Ca<sup>2+</sup>]<sub>i</sub> and mitochondrial membrane potential were also determined. Results The results showed that A $\beta_{25-35}$  damaged the morphology and mitochondria function of primary hippocampal neurons. For 20  $\mu\text{mol/L}$  A $\beta_{25-35}$  treatment group, the concentration of Ca<sup>2+</sup> at 24, 48, and 72 hr was 30.79 $\pm$ 1.28, 38.19 $\pm$ 2.13, and 41.65 $\pm$ 3.60, significantly higher than that of the control group and the mitochondrial membrane potential was 46.94 $\pm$ 9.55, 39.98 $\pm$ 6.51, and 34.52 $\pm$ 5.67, respectively, significantly lower than that of the control group. The results indicated that A $\beta_{25-35}$  decreased mitochondrial membrane potential and increased [Ca<sup>2+</sup>]<sub>i</sub> in a dose-time dependent manner. Conclusion A $\beta_{25-35}$  exhibits a neurotoxicity effect by interfering the calcium homeostasis and disturbing the function of mitochondrial.

Keywords: A $\beta_{25-35}$  mitochondria free calcium ion mitochondrial membrane potential

收稿日期 2012-11-29 修回日期 网络版发布日期

DOI: 10.11847/zgggws2013-29-04-18

基金项目:

国家自然科学基金(30972503)

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