

论著

细胞内钙信号对锌指转录因子及胚心标志基因的调控

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摘要 目的: 探讨心肌细胞内游离钙离子浓度 ($[Ca^{2+}]_i$) 变化对锌指转录因子及胚心标志基因的影响。方法: 以原代培养的乳鼠心肌细胞为模型, 血管紧张素 II (Ang II) 及雷尼丁(RY)刺激心肌细胞跨膜钙内流及细胞内钙释放; Fura-2/AM比率荧光成像系统分析细胞内钙信号; 免疫印迹(Western blotting)检测心肌细胞钙调神经磷酸酶(CaN)、活化T细胞核因子(NFAT3)、锌指转录因子(GATA4)、 α -actin蛋白表达, RT-PCR检测心肌球蛋白重链(β -MHC) mRNA表达。结果: Ang II及RY均可使心肌细胞内 $[Ca^{2+}]_i$ 增加, 与对照组相比差异显著($P < 0.01$)。Ang II、RY刺激1、3 d, 心肌细胞CaN、NFAT3、GATA4、 α -actin蛋白表达及 β -MHC mRNA表达明显高于对照组($P < 0.05$ 或 $P < 0.01$)。结论: 细胞内钙信号的变化可能通过影响CaN及ERK信号通路, 增加心肌细胞胚心标志基因的表达, 在心肌细胞肥大的病理过程中起重要作用。

关键词 [钙](#) [心肌](#) [钙调神经磷酸酶](#) [有丝分裂素激活蛋白激酶类](#)

分类号 [R363](#)

Effect of calcium signal on zinc finger transcription factor and fetal heart gene of cardiomyocytes

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Abstract

AIM: To investigate the effect of intracellular calcium free calcium ($[Ca^{2+}]_i$) on zinc finger transcription factor (GATA4) and fetal heart gene in cardiomyocytes. METHODS: Cardiomyocytes from fetal rat were cultured primarily. Angiotensin II (Ang II) and ryanodine (RY) were used to stimulate transmembrane calcium inflow and intracellular calcium release. Fura-2/AM ratio imagine analysis was applied to detect intracellular Ca^{2+} signal. Western blotting were used to measure calcineurin (CaN), nuclear activated T cell factor (NFAT3), GATA4 and α -actin. RT-PCR was applied for observing β -myosin heavy chain (β -MHC). RESULTS: Ang II and RY promoted intracellular free calcium concentration ($[Ca^{2+}]_i$) in cardiomyocytes ($P < 0.05$ versus control group). CaN, NFAT3, GATA4, α -actin expression and β -MHC mRNA expression significantly increased 1 and 3 days after the stimulation of cardiomyocytes with Ang II and RY (10^{-7} mol·L $^{-1}$) as compared with that in control ($P < 0.05$). CONCLUSIONS: The changes of intracellular calcium signal affect calcineurin and extracellular signal regulation kinase signal pathways, and up-regulate fetal heart gene expression in cardiomyocytes, which may play important roles in the pathogenic process of myocyte hypertrophy.

Key words [Calcium](#) [Myocardium](#) [Calcineurin](#) [Mitogen-activated protein kinases](#)

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