

论著

## 异丙肾上腺素致大鼠心肌肥厚时心肌细胞核Ca<sup>2+</sup>转运

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**摘要** 目的 观察异丙肾上腺素(Iso)致大鼠心肌肥厚模型心肌细胞核<sup>45</sup>Ca<sup>2+</sup>摄取、钙释放通道肌醇1, 4, 5-三磷酸(IP<sub>3</sub>)受体(IP<sub>3</sub>R)和ryanodine受体(RyR)的动力学变化, 以探讨细胞核Ca<sup>2+</sup>的转运是否参与心肌肥厚发生。方法 Iso(sc 20、10和5 mg·kg<sup>-1</sup>剂量递减3 d, 3 mg·kg<sup>-1</sup> 维持7 d)制备大鼠心肌肥厚模型, 用差速离心和蔗糖密度梯度离心提纯心肌细胞核, 用<sup>45</sup>Ca<sup>2+</sup> 同位素法测定细胞核钙摄取, 用 [<sup>3</sup>H] 标记配体分析心肌细胞核IP<sub>3</sub>R和RyR的动力学特点。结果 与对照组相比, Iso可导致大鼠心肌显著肥大, 伴有显著心肌纤维化; 心肌细胞核膜IP<sub>3</sub>R与其配体的最大结合容量(B<sub>max</sub>)减少23.4%(*P*<0.05), 解离常数(K<sub>d</sub>)无明显变化(*P*>0.05); 细胞核RyR的B<sub>max</sub>增加59.9%(*P*<0.01), K<sub>d</sub>无明显变化(*P*>0.05); <sup>45</sup>Ca<sup>2+</sup>摄取显著低于对照组(*P*<0.01), 最大摄取与对照组相比降低62%(*P*<0.01), 达半数最大摄取时 [Ca<sup>2+</sup>] 无显著变化。结论 Iso导致大鼠心肌肥厚纤维化发生过程中, 心肌细胞核<sup>45</sup>Ca<sup>2+</sup>摄取能力降低, 核上RyR数目上调, 而IP<sub>3</sub>R数目下调, 受体亲和力无变化, 提示心肌细胞核钙调节系统参与心肌肥厚的发生过程。

**关键词** [肌肥厚](#) [细胞核](#) [受体](#), [肌醇1,4,5 三磷酸](#) [受体](#), [ryanodine](#) [钙](#) [异丙肾上腺素](#)

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## Nuclear Ca<sup>2+</sup> transport of isoprenaline-induced heart hypertrophy in rats

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### Abstract

**AIM** To investigate whether rat's myocardial nuclear Ca<sup>2+</sup> transport system is involved in the isoprenaline (Iso)-induced cardiac hypertrophy. **METHODS** The model of rat myocardial fibrosis and hypertrophy was established by subcutaneous injections of Iso (20, 10 and 5 mg·kg<sup>-1</sup>·d<sup>-1</sup> for 3 d, subsequently 3 mg·kg<sup>-1</sup>·d<sup>-1</sup> for 7 d). Velocity and sucrose isopycnic gradient centrifugation were employed to fractionate rat cardiac nuclei. Myocardial nuclear calcium uptake was assayed with <sup>45</sup>Ca<sup>2+</sup> isotope. The maximal binding (B<sub>max</sub>) and affinity (K<sub>d</sub>) of IP<sub>3</sub> and ryanodine to their nuclear receptors were measured by [<sup>3</sup>H] ligand binding assay. **RESULTS** Iso increased the blood pressure and the cardiac hypertrophy. B<sub>max</sub> of IP<sub>3</sub> binding to its receptors in cardiac nuclear envelopes decreased by 23.4% (*P*<0.05), and B<sub>max</sub> of ryanodine binding to its receptors increased by 59.9% (*P*<0.01), Both K<sub>d</sub> of IP<sub>3</sub> and ryanodine binding to their receptors were not changed (*P*>0.05) in hypertrophic myocardium as compared with control. Significant decrease in nuclear <sup>45</sup>Ca<sup>2+</sup> uptake was observed and the maximal uptake was lowered by 62% as compared with that of control (*P*<0.01), but the half maximal [Ca<sup>2+</sup>] uptake remained unchanged. **CONCLUSION** These results indicate that the changes of nuclear Ca<sup>2+</sup> transport system in myocardial nuclei may be involved in the Iso-induced myocardial hypertrophy.

**Key words** [heart hypertrophy](#) [cell nucleus](#) [receptors](#) [inositol 1 4 5-triphosphate](#) [receptors](#) [ryanodine](#) [calcium](#) [isoprenaline](#)

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