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长期中等强度运动对小鼠骨骼肌HIF-1 $\alpha$  mRNA的表达及葡萄糖转运的影响 [点此下载全文](#)

[谢康玲](#) [刘遂心](#) [蔡颖](#) [张文亮](#)

中南大学湘雅医院康复医学科, 长沙, 410008

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摘要:

**摘要目的:** 观察长期中等强度运动对小鼠骨骼肌血管内皮生长因子-A (VEGF-A)、葡萄糖转运体1(GLUT-1)、葡萄糖转运体4 (GLUT-4) mRNA表达的影响, 在此基础上进一步观察运动对缺氧诱导因子1 $\alpha$  (HIF-1 $\alpha$ ) mRNA表达的影响, 初步探讨运动对小鼠骨骼肌葡萄糖转运的影响及其可能机制。方法: 健康雄性昆明小鼠24只随机分为运动组和对照组, 运动组小鼠给予12周中等强度跑步训练。末次运动后处死所有小鼠, 取双侧腓肠肌, 光镜及电镜观察显微及超微结构; 实时 PCR法测定小鼠骨骼肌VEGF-A、GLUT-1、GLUT-4及HIF-1 $\alpha$  mRNA的表达。结果: ①运动组小鼠较对照组体重明显增加 ( $P < 0.05$ ); ②骨骼肌肌细胞数目增加、肌纤维增粗, 肌原纤维的直径增加, 线粒体数目增加; ③运动组小鼠骨骼肌VEGF-A、GLUT-1、GLUT-4及HIF-1 $\alpha$  mRNA表达明显高于对照组 (分别增加1.68、1.14、2.31、1.92倍,  $P$ 分别 $< 0.05$ 、 $0.01$ 、 $0.01$ 、 $0.01$ )。结论: 长期中等强度运动可导致小鼠体重增加、肌纤维增粗、线粒体数目增加, VEGF-A mRNA表达增加; 可增加骨骼肌GLUT-1、GLUT-4 mRNA的表达, 其机制可能与上调骨骼肌HIF-1 $\alpha$  mRNA表达有关。

**关键词:** [运动](#) [缺氧诱导因子1 \$\alpha\$](#)  [骨骼肌](#) [葡萄糖转运体](#) [小鼠](#)

Effects of long-term exercise with moderate intensity on the expressions of hypoxia inducible factor-1 $\alpha$  mRNA and glucose transporters in skeletal muscles of mice [Download Fulltext](#)

Xianga Hospital of Central South University, Changsha, 410008

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Abstract:

**Abstract Objective:** To investigate the effect of long-term exercise with moderate intensity on the expressions of glucose transporter-1 (GLUT-1) and glucose transporter-4 (GLUT-4) mRNA, as well as of hypoxia inducible factor-1 $\alpha$ (HIF-1 $\alpha$ ) and vascular endothelial growth factor-A (VEGF-A) mRNA in skeletal muscles of mice and explore its possible mechanisms. Method: Kunming male mice (n=24) were randomly divided into exercise group and control group. The mice in exercise group were forced to run with moderate intensity on a treadmill. After 12 weeks of exercise, all mice were sacrificed immediately and both sides of gastrocnemius were harvested. The middle part of tissue samples were prepared for H & E staining, and analysed under light microscope and transmission electron microscope. In addition, part of tissues were used to check gene expression by real-time PCR. Result: ①Compared to control group, the body weights of exercise group increased significantly ( $P < 0.05$ ). ②The number of muscle cells increased, the size of muscle fibers thickened, the diameter of myofibril and the amount of mitochondria increased significantly. ③The expressions of VEGF-A mRNA, GLUT-1 mRNA, GLUT-4 mRNA, and HIF-1 $\alpha$  mRNA in exercise group were significantly higher (increased by 1.68, 1.14, 2.31 and 1.92-fold separately,  $P < 0.05$ ,  $0.01$ ,  $0.01$ ,  $0.01$  separately) than those of control group. Conclusion: ①Long-term exercise with moderate intensity can cause weight gain, thickening of skeletal muscle fibers, increasing of mitochondria amount and expression of VEGF-A mRNA; ②Long-term exercise with moderate intensity can increase the expressions of GLUT-1 mRNA, GLUT-4 mRNA in skeletal muscles. Induction of HIF-1 $\alpha$  mRNA expression in skeletal muscles by exercise might be one of the possible mechanisms.

**Keywords:** [exercise](#) [hypoxia inducible factor-1 \$\alpha\$](#)  [skeletal muscle](#) [glucose transporter](#) [mouse](#)

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