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Effects of tail suspension on the expression of FNDC5/Irisin protein in rat skeletal muscle

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Objective Irisin is a myokine secreted by skeletal muscle,and it is a type I membrane protein factor encoded by the protein 5(FNDC5) gene after cleavage and modification of the type III fibronectin component.Dependence of peroxisome proliferator-activated receptor gamma coactivator (PGC-1α).In this study, the potential association between skeletal muscle atrophy and irisin was explored by detecting changes in rat soleus and gastrocnemius irisin-related proteins during unloading.
Methods Twenty male 8-week rats were randomly divided into control group C (n=10) and suspension group T (n=10). The tail suspension system (TSS) was used to perform a 2-week tail suspension experiment on the T group. Two weeks after the tail suspension test, the weights of the rats and the wet weights of soleus and gastrocnemius muscles were measured. HE staining was performed under light microscope to observe the changes of muscle fiber area of skeletal muscle in each group. Western-blot was used to detect the protein expression of MURF1, PGC-1α and FNDC5 in soleus muscle and gastrocnemius muscle of each group.
Results (1) The soleus muscle and gastrocnemius muscle mass in T group decreased by 28.6% (P<0.05) and 25.8% (P<0.01), respectively. (2) The cross-sectional area of soleus muscle and gastrocnemius muscle fiber in T group decreased by 20.5% (P<0.01) and 25.2% (P<0.05), respectively. (3) The MURF1 protein expression in the gastrocnemius muscle and soleus muscle in the T group was significantly higher than that in the C group (P<0.01). (4) The expression of PGC-1α protein in gastrocnemius muscle and soleus muscle of T group was significantly lower than that in group C (P<0.05). (5) The expression of FNDC5 protein in gastrocnemius muscle and soleus muscle in T group was significantly lower than that in group C (P<0.05).
Conclusions After sole tail suspension for two weeks, the soleus and gastrocnemius muscles of the rats were obviously atrophied, and soleus muscle atrophy was more obvious. Skeletal muscle atrophy may be related to increased expression of MURF1. The decrease of FNDC5/Irisin content may be related to the occurrence of skeletal muscle atrophy, and PGC-1α also may be involved in this process.