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Effect of exercise intensity and diet on Glucose Metabolic factors in T2DM rat skeletal muscle

Lei Ji^{1,2}, He Long Quan^{1,2}, Chang Keun Kim^{2,3}, Chung Su Yoon⁴

1.Zhejiang Normal University

2.Exercise and Metabolism Research Center, Zhejiang Normal University, China

3.Korea National Sport University, Korea

4.Chonbuk National University, Korea

Objective This study was to examine the effect of different exercise intensity and diet on the expression of the metabolism related factors in T2DM rat skeletal muscles.

Methods Diet induced T2DM rat by a combination of low dose streptozotocin (STZ: 40mg/kg) and feeding of a high fat diet used as experimental animals. The rats trained on the treadmill for 8 weeks with low (40% max) and high (80% max) intensities of exercise on the treadmill for 8 weeks. The soleus (SOL) and extensor digitorum longus (EDL) muscles were excised. The western blotting was performed for the expression of AMPK, p-AMPK, PGC-1 α , and GLUT-4 proteins.

Results The expression of AMPK, p-AMPK, PGC-1 α , and GLUT-4 proteins in SOL and EDL muscles were higher in both training groups compared to the non-training groups. The AMPK was differently expressed to the recruitment pattern of muscle group during exercise; expressed higher in SOL during low intensity of exercise and also highly expressed in EDL during high intensity of exercise, whereas the PGC-1 α was expressed a contrast phenomenon to AMPK expression in both muscle groups. The expression of p-AMPK in both muscle groups was higher in low intensity of exercise and normal diet groups than in high intensity of exercise and high fat groups. The AMPK, p-AMPK, PGC-1 α , and GLUT-4 protein expression demonstrated significantly higher in normal diet with endurance training group than in high fat diet with endurance training group.

Conclusions In summary, the expression of AMPK, p-AMPK, PGC-1 α , and GLUT-4 proteins was differed with exercise intensities, diet and the type of muscles. These results indicated that the endurance training improved the insulin sensitivity according to the exercise intensity and diet in T2DM rats.