



Exercise Biochemistry Review

Proceedings of IBEC 2018, Beijing, China, October 23-25
PO-178

Heat Treatment and Exercise Prevents Skeletal Muscle Insulin Resistance in Wistar Rats Fed High-Fat Diet

Jiexiu Zhao¹, Fei Qin¹, Minxiao Xu^{1,2}, Yanan Dong^{1,3}, Zhongwei Wang^{1,2}, Zhining Han^{1,3}

1.China Institute of Sport Science

2.Shanghai Sport University

3.Qufu Normal University

Objective Insulin resistance (IR) is associated with many related health complications. Previous studies demonstrate that heat and exercise independently reduce IR. The purpose of this study was to test the hypothesis that combined exercise and heating is even more favorable in reducing IR.

Methods Male Wistar rats were randomly divided into five groups: exercise (NE; n=10), heated (HC; n=10), exercise and heated (HE; n=10), sedentary (NC; n=10), and normal diet plus sedentary (CC; n=10). All but the latter group was fed a high-fat diet (60% calories from fat) for 10 weeks while receiving heat and/or exercise exposure for latter 8 weeks. Following this regimen, protein expression from the soleus and extensor digitorum longus muscles, serum, and brown fat were analyzed using Western blotting.

Results Exercise combined with heating shifted the metabolic characteristics of rats on a high-fat diet toward that observed in the rats on a standard diet. Specifically, eight weeks of combined heat and endurance exercise increased PGC-1 α , CnA, CaMKIV and p38 MAPK protein expression in the soleus ($P < 0.05$), insulin protein expression in the serum ($P < 0.05$), and UCP1 protein expression in the brown fat ($P < 0.05$), when compared to the high fat fed sedentary group. There were some significant differences in responses (i.e., body weight and Leptin & Adiponectin concentrations) between the combined exercise and heat group relative to the exercise alone group.

Conclusions Exercise combined with heat exposure mitigates the development of IR, presumably from the Irisin pathway. The study provides potential non-pharmaceutical methods for therapeutic treatment of IR.