



Exercise Biochemistry Review

Proceedings of IBEC 2018, Beijing, China, October 23-25
PO-212

Effects of hypoxic endurance training on weight loss and Irisin expression in nutritional obese rats

Zhigang Li¹, Wentao Lin²

1. Baise University

2. Guangzhou Sport University

Objective Exercise can induce the release of various myokine such as Irisin, which promote browning of white fat, improve body metabolism, and loss weight. Appropriate hypoxic training plays a better role in weight loss than single exercise, but the effect of hypoxic training on muscle factors that promote browning of fat is rarely reported. Therefore, this study aims to observe different concentrations of hypoxia training on the PGC1 α -Irisin-UCP1 signaling pathway in nutritional obese rats, and the role of weight loss.

Methods Male Sprague-Dawley rats (n=140) of 6 weeks old were divided into normal diet feeding group (group N, n=20) and high-fat diet feeding group (group HFD, n=120). The HFD rats became obese after 8 weeks' feeding, and they were further divided randomly into 8 groups. Including sedentary group (group A), training group (group AE), 16.3% hypoxia exposure group (group B), 16.3% hypoxia training group (group BE), and 13.3% hypoxia exposure group (group C), 13.3% hypoxia training group (group CE), 11.3% hypoxia exposure group (group D), 11.3% hypoxia training group (group DE), group B, group C and group D Rats were exposed to oxygen in concentrations of 16.3%, 13.3%, and 11.3% for 12 h/d, respectively. Rats in group BE, CE, and DE were subjected to animal treadmill training during hypoxic exposure with a slope of 0°, 20 m/min, 40min/d, 5d/w. After 8 weeks of intervention, blood, adipose tissue and skeletal muscle were collected and tested.

Results (1) In group AE, the body weight of obese rats decreased in a short time, but bounced back later. The body weight of rats in group CE and group DE decreased continuously. Hypoxia exposure and hypoxia training can inhibit the food intake of obese rats in varying degrees, and group CE has the most obvious effect. Hypoxia, endurance training and hypoxia training all reduced the percentage of visceral fat to body weight, group C is significantly lower than group B and D group ($p < 0.05$), the effect of hypoxia training is more obvious than single hypoxia or exercise, and the lower oxygen concentration the more significant effect. Group C、group CE、group D and group DE significantly decreased the concentration of LDL-C, increased the content of HDL-C in serum than other groups ($p < 0.05$). (2) The concentration of serum Irisin in group AE, group BE, group CE and group DE rats was significantly higher than that in group A ($p < 0.05$), and the highest level was found in group CE and DE. The insulin resistance of obese rats in group CE and group DE was significantly better than that in group AE ($p < 0.05$). (3) Three different concentrations of hypoxia exposure and hypoxia training can significantly increase the skeletal muscle PGC-1 α and FNDC5 gene expression, showing that the lower the concentration of oxygen, the higher the expression, 13.3% and 16.3% hypoxia training can significantly promote the gene transcription of UCP1. The contents of PGC-1 α and FNDC5 protein in skeletal muscle of obese rats in group C, AE and DE were significantly higher than those in group A ($p < 0.05$). The expression of UCP1 protein in skeletal muscle of rats in group C, CE and DE was significantly higher than that in group A ($p < 0.05$).

Conclusions 13.3% and 11.3% oxygen concentration combined with endurance training can effectively reduce the body weight and visceral fat of nutritional obese rats, enhance serum HDL-C and decrease LDL-C levels and insulin resistance. 13.3% and 11.3% oxygen concentration training

can significantly improve the level of serum Irisin, 11.3% oxygen concentration training can significantly promote the expression of PGC1 α -Irisin-UCP1 gene and protein in skeletal muscle.