



## Exercise Biochemistry Review

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### Effects of HIIT on FTO protein expression and its relationship with glucose and fat metabolism

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**Objective** FTO (Fat mass and obesity-associated) is associated with increased risk of obesity and type 2 diabetes incidence. Studies have shown that the expression of FTO protein in skeletal muscle and adipose tissue is related to the oxidation rate of whole body substrate. With the increase of age, the body's carbohydrate oxidation rate decreases, the fat oxidation rate increases, and at the meanwhile the expression of FTO protein in skeletal muscle decreases and that in adipose increases. HIIT is very helpful for inhibiting obesity, insulin resistance and type 2 diabetes. So the purpose of this study is to investigate the effect of HIIT exercise on the expression of FTO protein in rats and its relationship to glucose and fat metabolism.

**Methods** 20 Male, 3-week-old SD rats were randomly divided into two groups, each group has 10 rats. C group: sedentary; HIIT group: high-intensity intermittent training group (85% ~ 90%  $VO_2$ max exercise for 6min, 50%  $VO_2$ max exercise interval 4min, repeated 6 times, 5 times/week, 4 weeks). All subjects were maintained in a free facility with constant temperature of 25°C, light-dark cycle of 12/12 h and free access to water. 48 hours after the last exercise, all samples were taken with an overnight fast. The expression of FTO protein in skeletal muscle and adipose tissue was measured by Western Blot. Serum insulin was tested by ELISA; Estimation of blood glucose was tested by Glucose oxidase method.

**Results** 1. The expression of FTO protein in skeletal muscle was significantly higher than that of group C ( $P < 0.01$ ); The expression of FTO protein in adipose tissue of HIIT group was significantly lower than that of group C ( $P < 0.05$ ); 2. Serum insulin levels of group HIIT was significantly lower than that of group C ( $p < 0.01$ ); And the blood glucose of group HIIT was significantly lower than that of group C ( $p < 0.01$ ). 3. Serum LDL-C of group HIIT was significantly lower than that of group C ( $p < 0.01$ ), and serum HDL-C of group HIIT was significantly higher than that of group C ( $p < 0.01$ ); 4. Correlation analysis showed that serum insulin level was negatively correlated with skeletal muscle FTO protein expression ( $R = -0.454$ ,  $p < 0.05$ ). Correlation analysis showed that serum LDL-C levels was positively correlated with adipose tissue FTO protein expression ( $R = 0.559$ ,  $p < 0.05$ ) and serum HDL-C levels was negatively correlated with adipose tissue FTO protein expression ( $R = -0.474$ ,  $p < 0.05$ ).

**Conclusions** 1. HIIT can increase the protein expression of FTO in rat skeletal muscle and decrease the expression of FTO protein in adipose tissue; 2. HIIT can regulate glucose metabolism and lipid metabolism in rats; 3. The regulation of glucose metabolism by HIIT may be related to the increase of FTO protein expression in skeletal muscle. The regulation of lipid metabolism may be related to the reduction of FTO protein expression in adipose tissue.