

Regulation on Macrophage and Insulin Resistance after Aerobic Exercise in High-Fat Diet Mice

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Abstract : Aims: Obesity is often accompanied by insulin resistance (IR) and whole-body inflammation. Aerobic exercise is an effective treatment to improve insulin resistance and inflammation. However, the anti-inflammatory mechanisms of exercise on epididymal and subcutaneous adipose remain to be elucidated. Here, we compared the macrophage polarization between epididymal and subcutaneous adipose after aerobic exercise. Methods: Male C57BL/6 mice were fed a normal diet group or a high-fat diet group for 12 weeks and performed aerobic training on a treadmill at 55%~65% VO₂ max for eight weeks. Food intake, body weight, and fasting blood glucose levels were monitored weekly. The intraperitoneal glucose tolerance test was to evaluate the insulin resistance model. Fat mass, blood lipid profile, serum IL-1 β , TNF- α levels, and CD31/CD206 rates were analysed after the intervention. Results: FBG (P<0.01), AUCIPGTT (P<0.01), and HOMA-IR (P<0.01) increased significantly for a high-fat diet and decreased significantly after the exercise. Eight weeks of aerobic exercise attenuated HFD-induced weight gain and glucose intolerance and improved insulin sensitivity. Serum IL-1 β , TNF- α , CD11C/CD206 expression in subcutaneous adipose tissue were not changed before and after exercise, but not in epididymal adipose tissue (P<0.01). Conclusion: Insulin resistance is not accompanied by chronic inflammation and M1 polarization of subcutaneous adipose tissue macrophages in high-fat diet mice. Aerobic exercise effectively improved lipid metabolism and insulin sensitivity, which may be closely associated with reduced M1 polarization of epididymal adipose macrophages.

Keywords : aerobic exercise, insulin resistance, chronic inflammation, adipose, macrophage polarization

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