Different response of mitochondrial respiration in skeletal muscle and adipose tissue to endurance exercise

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In obese individuals, endurance exercise improves fitness and increases the number of mitochondria and cellular respiration in skeletal muscles. However, the intervention has no effect on cellular respiration in adipose tissue. This is the result of a study by DZD researchers that has now been published in The *Journal of Clinical Endocrinology & Metabolism*.

Studies in rodents suggest that exercise not only increases the number of mitochondria and the respiratory capacity of skeletal muscles, but also in adipose tissue. In a study, researchers at the DZD in Tübingen investigated the effects of endurance training on cellular respiration in the human skeletal muscles and abdominal adipose tissue and whether there is a direct connection between increased cellular respiration and improved insulin sensitivity. For this purpose, the researchers carried out an 8-week aerobic endurance training intervention with 25 untrained test subjects (16 women, 9 men aged 29.8 ± 8.4 years) who were overweight or obese. The researchers then analyzed mitochondrial respiration in skeletal muscle fibers and in the subcutaneous adipose tissue of the abdomen.

Based on the change in insulin sensitivity after the intervention, the subjects were grouped into responders (subjects whose insulin sensitivity increased) and low responders (subjects whose insulin sensitivity did not increase significantly). In both groups, fitness, cellular respiration and the amount of mitochondrial enzymes in the skeletal muscles improved equally. The endurance training had no effect on the mitochondria in the abdominal subcutaneous adipose tissue. Another interesting finding of the study is that women exhibited higher cellular respiration in adipose tissue than men.

"Our data show that the increase in the mitochondrial respiratory capacity of the skeletal muscles after endurance training has no predictive power for the improvement of the peripheral insulin sensitivity. Furthermore, the endurance training does not increase cellular respiration in the subcutaneous adipose tissue, with a simultaneous decrease in this fat compartment," said Cora Weigert of the DZD partner Institute for Diabetes Research and Metabolic Diseases of Helmholtz Zentrum München at the University of Tübingen, summarizing the findings.

More information: Christoph Hoffmann et al, Response of mitochondrial respiration in adipose tissue and muscle to 8 weeks of endurance exercise in obese subjects, *The Journal of Clinical Endocrinology & Metabolism* (2020). DOI: 10.1210/clinem/dgaa571

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