Medical Xpress

Resistance exercise improves insulin resistance, glucose levels

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A new study suggests that resistance exercise may improve indicators of type 2 diabetes by increasing expression of a protein that regulates blood sugar (glucose) absorption in the body. The paper, published ahead of print in the *American Journal of Physiology—Endocrinology and Metabolism*, was chosen as an APSselect article for April.

People with type 2 diabetes develop a resistance to insulin—a hormone that helps the body absorb glucose from the bloodstream and use it for energy—in various areas of the body, including the muscles. Insulin resistance can cause blood sugar to rise to potentially dangerously high levels. A protein called APPL1 regulates glucose absorption in the fat cells and has been found to increase insulin sensitivity in the muscles. Previous research has shown that aerobic exercise improves expression of APPL1 in the liver to improve insulin resistance, but the process that causes exercise to increase APPL1 expression remains unclear.

A research team studied the effects of resistance training on APPL1 expression in rats. Resistance training is a type of exercise that causes muscles to get bigger. The researchers studied a model of type 2 diabetes in rats and compared them to a non-diabetic control group. One leg of the rats underwent three weekly resistance training sessions for six weeks and the other leg was not exercised. The rats with diabetes had lower APPL1 expression and higher insulin resistance than the control rats. However, after resistance training, both of these factors had improved in the exercised leg of diabetic animals.

In addition, the research team identified four separate signaling pathways that became activated as a result of resistance exercise, which in turn increased expression of APPL1. "These results are suggestive of a mechanism for chronic resistance training-induced improvements in insulin sensitivity in skeletal muscles of rats with [type 2 diabetes]," the researchers wrote.

"Resistance training recovers attenuated APPL1 expression and improves insulin-induced Akt signal activation in skeletal muscle of type 2 diabetic rats" is published ahead of print in the *American Journal of Physiology—Endocrinology and Metabolism*.

More information: Kohei Kido et al. Resistance training recovers attenuated APPL1 expression and improves insulin-induced Akt signal activation in skeletal muscle of type 2 diabetic rats, *American Journal of Physiology-Endocrinology and Metabolism* (2018). DOI: 10.1152/ajpendo.00362.2017

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