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Scientists closer to understanding how to control high blood sugar

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Scientists are closer to understanding which proteins help control blood sugar, or glucose, during and after exercise. This understanding could lead to new drug therapies or more effective exercise to prevent Type 2 diabetes and other health problems associated with having high blood sugar.

Insulin resistance happens when insulin produced by the body doesn't properly stimulate the transport of glucose into the cells for energy. Too much glucose in the bloodstream can cause a host of medical problems, including Type 2 diabetes, said Gregory Cartee, professor at the University of Michigan School of Kinesiology.

Insulin and muscle contractions are the two most important stimuli to increase glucose transport into muscle cells. Cells then use the glucose for energy. However, scientists aren't entirely sure how this works.

Cartee and colleague Katsuhiko Funai, a graduate student researcher in kinesiology, looked at how two different proteins believed to be important in stimulating glucose transport react to two different enzymes also related to glucose transport. The goal of the study was to understand the contribution of the two proteins, AS160 and TBC1D1, in skeletal muscle stimulated by insulin.

"We're trying to rule out or rule in which proteins are important with exercise," Cartee said.

The results suggest that the protein TBC1D1 was more important for exercise-stimulated glucose transport and suggested that the second protein, AS160, might be less important for this effect of exercise. By focusing on the protein that works best---in this case, TBC1D---scientists can develop ways to make that protein work better for insulin-resistant people.

Insulin resistance is a huge public health problem that affects millions of people, Cartee said.

"Almost all people with Type 2 diabetes have muscle insulin resistance," he said. "This doesn't cause diabetes by itself, but it's an essential component that contributes to Type 2 diabetes. This impacts millions of people. Even for people who aren't diabetic, insulin resistance is associated with lots of health problems."

In the longer term, people who are insulin resistant, or whose muscle don't respond normally to insulin, are more likely to get Type 2 diabetes, Cartee said.

"The muscles seems to have the machinery to respond to exercise, even though they aren't responding to insulin normally," he said. "If we understood how exercise worked we could develop more effective exercise protocols. In others who can't exercise, we could figure out a drug therapy or something else for insulin control."

The next step is to study what exactly TBC1D1 does to promote glucose transport during and after exercise.

More information: The study will appear in an upcoming print edition of the journal *Diabetes*. For an advance online copy: diabetes.diabetesjournals.org/ … abstract/db08-1477v1

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