Hormone discovered that preserves insulin production and beta cell function in diabetes

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(Medical Xpress) -- Researchers at Duke University Medical Center have found protective, anti-diabetic functions for a hormone that, like insulin, is produced by the islet cells of the pancreas. The new hormone was found to stimulate insulin secretion from rat and human islet cells and protect islet cells in the presence of toxic, cell-killing factors used in the study.

The study, which was supported in part by JDRF, a global leader in type 1 diabetes research, appears in the July 3 issue of the journal Cell Metabolism.

The findings provide insight into the health and survival of beta cells, a type of islet cell that produces insulin to regulate sugar levels. The discovery could open pathways for further research toward prevention and treatments for type 1 diabetes and type 2 diabetes.

The researchers gave the hormone, TLQP-21 to Zucker Diabetic Fatty rats, which have a genetic propensity to develop type 2 diabetes. They saw a significant improvement in insulin and glucose (sugar) levels and less beta cell death in the treated animals.

"We think this finding is important because it is the first demonstration that TLQP-21 prevents deterioration of the beta cells and stimulates insulin secretion in the presence of glucose," said senior author Christopher B. Newgard, Ph.D., director of the Sarah W. Stedman Nutrition and Metabolism Center, and the W. David and Sarah W.

Stedman Distinguished Professor. "Because diabetes starts to take hold when the number of beta cells dwindles and insulin production drops, finding the best way to produce more of this protective hormone could be valuable."

Although the researchers have so far only tested TLQP-21 in models of type 2 diabetes, they plan to test the hormone in type 1 in future studies.

Both types of diabetes are characterized by a loss of functional beta cell mass. Type 1 is an autoimmune disease characterized by selective and progressive loss of functional insulin-producing beta cells and is more severe. Type 2 is a disease characterized by beta cell dysfunction as well as peripheral insulin resistance. Most people with type 2 eventually become insulin-dependent.

"These exciting findings provide novel insight into how beta cell health and survival may be regulated in the body," said Patricia Kilian, Ph.D., director of the beta cell regeneration program at JDRF. "We are looking forward to studies that will further test how this novel hormone affects beta cell function in T1D (type 1 diabetes) models."

TLQP-21 is similar in some of its functions to another naturally occurring hormone produced in the digestive tract, glucagon-like peptide-1 (GLP-1). Through different mechanisms, both hormones protect and promote insulin secretion. GLP-1 or drugs that stabilize it are widely used to treat type 2 diabetes, but with some side effects, including increased heart rate and reduced stomach emptying; the effect on intestinal function has caused some people to stop the therapy.

"What's exciting is that in the animal studies of TLQP-21, we didn't see these side effects," said lead author Samuel B. Stephens, Ph.D., a postdoctoral researcher in the Stedman Center. "The rats had typical appetites and ate normal amounts of food, and didn't show any changes

in heart rate or digestion patterns when they were given large doses of the hormone."

The next step is to find a small molecule that could stimulate the islet cells to produce more of the TLQP-21 hormone, or to develop more potent or stable versions of injected hormone. Research toward a longer-acting drug will help accelerate its eventual testing in type 1 diabetes, said Newgard, who is also a professor of Pharmacology and Cancer Biology.

Provided by Duke University Medical Center

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