Medical Xpress

Leptin therapy in animal models shows promise for type 1 diabetes

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Using leptin alone in place of standard insulin therapy shows promise in abating symptoms of type 1 diabetes, UT Southwestern Medical Center researchers report.

UT Southwestern researchers, using mouse models, found that leptin administered instead of insulin showed better management of blood-sugar variability and lipogenesis, the conversion of simple sugars into fatty acids. Leptin is a hormone produced by fat cells and involved in the regulation of body weight.

Dr. Roger Unger, professor of internal medicine at UT Southwestern, led the study whose findings are available online and in a future issue of the Proceedings of the National Academy of Sciences.

Insulin treatment has been the gold standard for type 1 diabetes (insulin-dependent diabetes) in humans since its discovery in 1922. Dr. Unger's laboratory found that insulin's benefit resulted from its suppression of glucagon, a hormone produced by the pancreas that raises blood sugar levels in healthy individuals.

"Insulin cells are destroyed in people with type 1 diabetes, however, and matching the high insulin levels needed to reach glucagon cells with insulin injections is possible only with amounts that are excessive for other tissues," said Dr. Unger, senior author of the latest study. "Peripherally injected insulin cannot accurately duplicate the normal process by which the body produces and distributes insulin."

People on insulin therapy tend to experience large swings in blood-sugar levels, said Dr. Unger. Other studies have shown that frequent blood-sugar variation complicates the symptoms of type 1 diabetes, which affects about 1 million people in the U.S.

Benefits of letpin's glucose-lowering action appear to involve the suppression of glucagon. Normally, glucagon is released when the glucose level in the blood is low, thanks to supervision by insulin release from neighboring cells. In insulin deficiency situations, however, glucagon levels are inappropriately high and cause the liver to release excessive amounts of glucose into the bloodstream. This action is opposed by insulin, which tells the body's cells to remove sugar from the bloodstream.

"Leptin treatment in the non-obese type 1 diabetic mouse profoundly reduced food intake, which in turn reduced body fat," Dr. Unger said. "And like insulin, leptin suppresses glucagon in the body and helps increase lean body mass."

As a countermeasure to the destruction of their pancreatic islet cells, type 1 diabetics currently must take insulin multiple times a day to metabolize blood sugar, regulate blood-sugar levels and prevent diabetic coma. They also must adhere to strict dietary restrictions.

"We hope the positive results we've had in animals can translate to people living with this disease," Dr. Unger said. "Insulin therapy has transformed a uniformly fatal disease into a livable one; however, the regimen for people with type 1 diabetes is onerous and symptoms aren't always well controlled. We hope that low-dose insulin combined with leptin will closely mimic the body's normal physiological process."

Provided by UT Southwestern Medical Center