

Artificial pancreas works in 11 patients: study

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A test run of an "artificial pancreas" that monitors blood sugar and delivers both insulin and regulatory hormone called glucagon helped patients achieve near-normal blood sugar levels for more than 24 hours, U.S. researchers said on Wednesday.

The system -- made up of a glucose monitor, two pumps and a laptop -- is designed to better mimic the body's natural mechanism of controlling both high and low blood sugar.

In previous tests of artificial pancreas systems that deliver only insulin, some patients have developed dangerously low blood sugar, known as hypoglycemia.

Adding small doses of glucagon, a hormone released by the pancreas to raise blood sugar levels, helped overcome this, according to the study published in the journal *Science Translational Medicine*.

After some adjustments to a sophisticated computer program that acts as the brain of the system, all 11 adults in the study had good blood sugar control without experiencing hypoglycemia, even after eating three high-carbohydrate meals.

"This is the first artificial pancreas device that has used both insulin and glucagon," said Dr. Steven Russell of Massachusetts General Hospital in Boston, who helped lead the study.

The finding is the latest in what has become a race to develop a fully functioning artificial pancreas that can give patients with

type 1 diabetes an automated way to control their blood sugar.

Type 1 diabetes is an autoimmune disease in which the body destroys its own ability to make insulin, rendering sufferers unable to properly break down sugar. People with the condition must frequently monitor and take insulin to regulate blood sugar and prevent diabetic complications such as eye damage, kidney failure and heart disease.

Devices like continuous glucose monitors, such as those made by Medtronic or Abbott Laboratories, that constantly track blood sugar and pumps that inject insulin help, but patients still risk hypoglycemia.

That is where glucagon comes in, Russell said. In people with type 1 diabetes, glucagon does not work properly. Building this into the system helps balance out both the highs and the lows of blood sugar control.

SURPRISE FINDINGS

The system was developed in the lab of Edward Damiano, a biomedical engineer at Boston University whose son David developed type 1 diabetes when he was a year old.

Damiano's team developed the brains of the device, the computer program that constantly analyzes blood sugar and calculates when diabetics need a dose of insulin or glucagon.

Initial tests of the system revealed a surprise. While the computer program was based on recommended doses of the fast-acting insulin Humalog, made by Eli Lilly and Co, they discovered that many diabetics in their study process insulin much more slowly than expected.

Tweaks to the computer program fixed the problem but the issue demonstrates the complexities of treating diabetes.

In February, British researchers tested a similar system on 17 children and found it kept their blood sugar levels within the normal range for 60 percent of the time.

The Juvenile Diabetes Research Foundation has teamed up with Johnson & Johnson's unit Animas, which makes insulin pumps, and DexCom Inc, which makes continuous glucose monitoring devices, to develop and test an artificial pancreas system.