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'Bionic pancreas' could make life easier for people with type 1 diabetes

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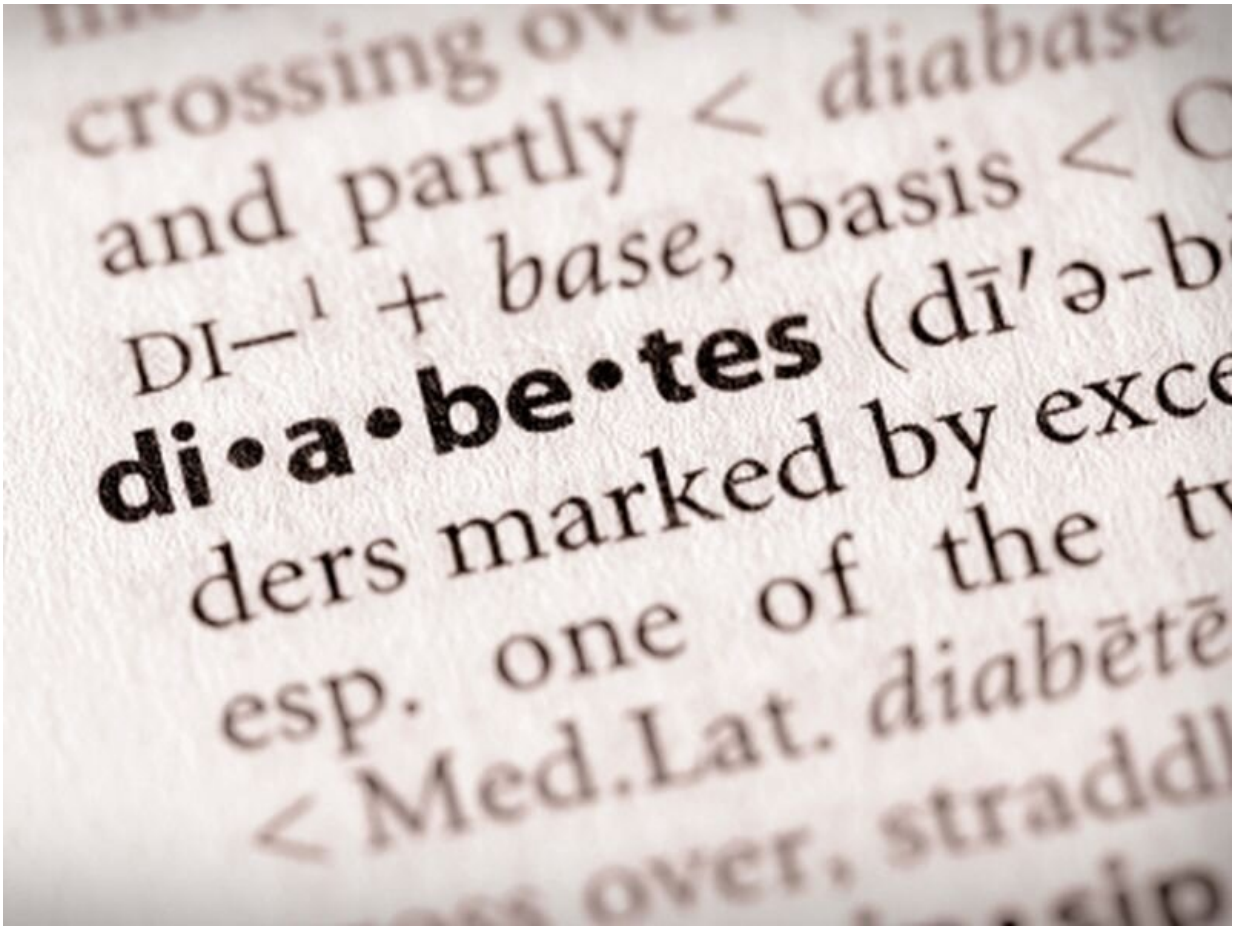

A new technology dubbed the "bionic pancreas" may beat standard

treatment in helping people with type 1 diabetes control their blood sugar levels, a clinical trial has found.

Among adults and children with type 1 diabetes, those who used the bionic pancreas for three months saw their average blood sugar levels decline—without an increase in potentially dangerous blood sugar lows, the researchers reported.

The device, called the iLet Bionic Pancreas, is under review by the U.S. Food and Drug Administration. If approved, it would be the most automated system available for managing type 1 diabetes—tracking blood sugar levels and delivering insulin with minimal input from patients.

"This technology takes more of the burden away from patients," said Dr. Jennifer Sherr, a pediatric endocrinologist at Yale School of Medicine, in New Haven, Conn.

While she specializes in treating kids with type 1 diabetes, Sherr said people of any age could get relief from not having to constantly think about managing a chronic disease.

Sherr wrote an editorial published with the study in the Sept. 29 issue of the *New England Journal of Medicine.*

Type 1 diabetes differs from the far more common type 2 diabetes, which mainly affects adults and is often associated with obesity.

The type 1 form often strikes during childhood, and is caused by a misguided immune system attack on the body's insulin-producing cells. Insulin is a hormone that shuttles sugar from food into body cells to be used for fuel.

People with type 1 diabetes need to take synthetic insulin in order to survive. They are also tasked with trying to keep their blood sugar levels within a certain range—to lower the risks of long-term complications like nerve damage, kidney failure and heart disease.

Traditionally, that meant doing multiple "finger sticks" a day to measure their blood sugar, then injecting the right amount of insulin.

Over the years, some wearable devices have been developed to make the job easier: People can opt for a "pump" that delivers insulin throughout the day via a small tube just under the skin. And an alternative to finger sticks is the continuous glucose monitor—a device that tracks blood sugar levels via a sensor placed under the skin.

The past several years have seen even bigger strides, with the approval of several so-called hybrid closed-loop systems.

Those devices—sometimes called "artificial pancreas" systems—integrate the insulin pump and continuous glucose monitor into one system. The middle-man is a computer algorithm that analyzes the monitor's glucose readings and automatically adjusts the pump's insulin doses.

The systems, which include brands like MiniMed and Control-IQ, are not only simpler. Studies show they control blood sugar levels better than conventional treatment.

"Technology really has moved forward in recent years," said Dr. Steven Russell, the lead researcher on the new trial.

Still, the currently available systems require a good amount of patient input, explained Russell, of Harvard Medical School and Massachusetts General Hospital Diabetes Research Center, in Boston.

To get the right insulin dose before mealtime, for example, users have to count the grams of carbohydrates they'll be eating, and make adjustments to the insulin dose.

The bionic pancreas, Russell said, eliminates the math.

Like available systems, the device integrates an insulin pump and glucose monitor. But the algorithms mean there's no carb-counting; users simply enter which meal they're eating (breakfast, for example), and then whether they are eating their "usual" amount, more or less.

"The system determines every drop of insulin that's given," Russell said.

To test the device against standard treatments, the researchers recruited more than 300 patients aged 6 to 79, then randomly assigned 219 to use the bionic pancreas for 13 weeks. Another 107 patients stuck with their standard care—either a hybrid closed-loop system, conventional insulin pump or injections.

Overall, patients using the bionic pancreas saw a decline in their A1c, a measure of average blood sugar levels over the past three months. It dipped from an average of 7.9% to 7.3%, while the comparison group showed no change. (In general, the A1c goal for people with diabetes is below 7%.)

Patients using the bionic pancreas also spent more time with their blood sugar levels in target range—an extra 2.5 hours per day, on average.

If approved, the device might make such automated insulin therapy more widely available, Russell and Sherr said.

They noted that many Americans with type 1 diabetes see a primary care doctor, rather than an endocrinologist who specializes in the disease.

Primary care doctors might be more comfortable prescribing a simpler technology that demands no special numbers skills, or complicated set-up: To get started, users only have to enter their weight.

Neither doctor, however, foresees everyone with type 1 diabetes rushing to get the bionic pancreas. Some people, Sherr noted, prefer more control over insulin dosing, or are simply comfortable with their current routine.

"In the end," she said, "the technology that's best is the one you'll use."

Russell agreed. "I think it's good to have options," he said.

In the real world, there's also the issue of cost. It can be hard to get some insurance plans to cover the currently available hybrid systems.

"We do a lot of fighting," Sherr said.

The trial was funded by the U.S. National Institutes of Health and iLet's developer, Beta Bionics, Inc.

More information: The nonprofit JDRF has more on managing type 1 diabetes.

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