

# Innovations Steadily Advance Artificial Pancreas

BY MIRIAM E. TUCKER

FROM THE ANNUAL MEETING  
OF THE AMERICAN DIABETES ASSOCIATION

ORLANDO — Progress toward an “artificial pancreas” for automatically controlling glucose levels in people with diabetes is happening in incremental steps that will begin with the minimization of hypoglycemic and hyperglycemic excursions.

“The artificial pancreas is not immediately going to be a system that you immediately plug on and walk away from your diabetes .... This is going to be an evolutionary, iterative process,” said Aaron J. Kowalski, assistant vice president for glucose control research at the Juvenile Diabetes Research Foundation.

The foundation is funding much of the research into the development of “closed-loop” insulin delivery systems via its Artificial Pancreas Project.

Current areas of research focus involve systems that would minimize hypoglycemia and hyperglycemia, including a pump shut-off system that predicts impending nocturnal hypoglycemia and suspends delivery for up to 2 hours.

The Medtronic Veo insulin pump that already contains such a mechanism is available in the United Kingdom but not the United States because of regulatory issues, Dr. Kowalski noted during a symposium.

Overnight closed-loop control is already possible with currently available technology, while improved sensors and insulin formulations will ultimately be needed in order to create a fully automated system that is envisioned as including a bihormonal system with glucagon as well as insulin, Dr. Kowalski said.

Dr. Roman Hovorka of the Institute

of Metabolic Science and the department of pediatrics at the University of Cambridge, England, presented new data on use of closed-loop overnight glucose control using currently available insulin pumps and sensors along with an algorithm created by his team that utilizes adaptive model-predictive control.

His study involved 17 children and 24 adults with type 1 diabetes.

Over the course of 57 nights with the closed loop, the patients spent an average of 77% of the time in the target glucose range of 71-145 mg/dL, compared with just 47% of 45 nights with insulin pump therapy that did not use a closed-loop system.

Similar benefit was seen in both the adults and the children, Dr. Hovorka said.

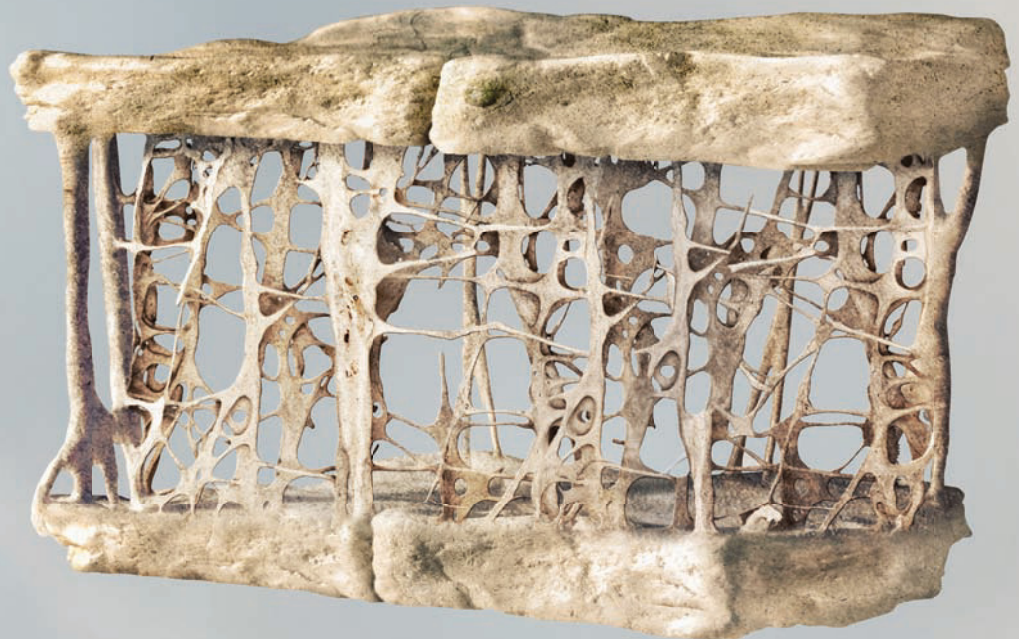
Marilyn Ritholz, Ph.D., a psychologist

at the Joslin Diabetes Center, Boston, presented new qualitative data on attitudes toward the use of continuous glucose monitors in a focus group of 20 adults with type 1 diabetes who had participated in a JDRF-sponsored trial of the efficacy of CGM.

In semistructured interviews, patients who had more success using CGM tended to use a problem-solving approach and used retrospective data to try to

For postmenopausal women with osteoporosis at high risk for fracture

## ON THE VERGE OF ANOTHER FRACTURE

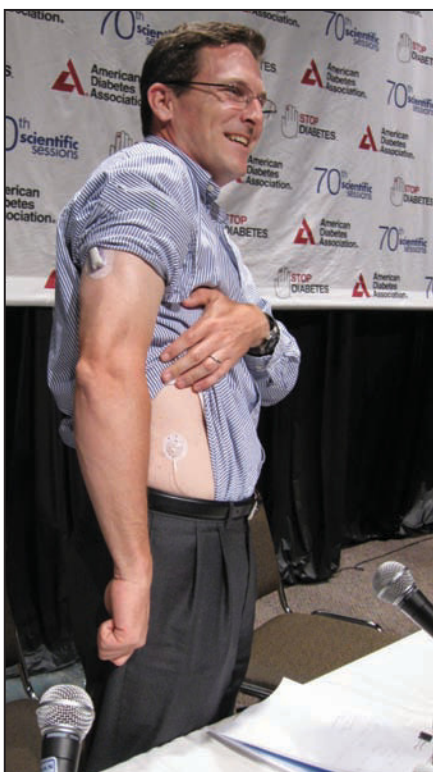


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Dr. Aaron J. Kowalski wears an insulin pump and glucose sensor, two of the three “artificial pancreas” components.

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identify patterns, rather than simply relying on the minute-by-minute updates. Support from spouses and other loved ones also was important in achieving good results.

On the other hand, patients who tended to react emotionally to the CGM readings and alarms were less likely to be successful, as were those whose spouses were disinterested or unsupportive.

And, while body image perception did not appear to predict success, certain themes emerged in that area that merit further exploration.

From the patient's perspective, "CGM needs to become a personal accessory and not a medical device," Dr. Ritholz commented. ■

**Disclosures:** Dr. Kowalski and Dr. Ritholz stated that they have no conflicts of interest. Dr. Hovorka is on the advisory panel for Animas, receives research support from MiniMed Medtronic, Abbott Diabetes Care, and Smiths Medical, and is on the speakers bureau for LifeScan, MiniMed Medtronic, Braun, and Novo Nordisk. He also receives license fees from Becton Dickinson.

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