

A heartbeat away: Advances in diabetes tech promise better self-care

By [Austen Hufford](#) / Friday, August 8th, 2014

In May 1922, Dr. William Sansum injected a diabetes patient with insulin for the first time in the U.S., instantly increasing life expectancy from mere weeks to many years. His patient lived to 90.

Since then, those living with diabetes have had to make hundreds of decisions daily to keep themselves healthy. The Santa Barbara-based Sansum Diabetes Research Institute hopes to one day automate this process and transform diabetes treatment from a mental exercise into an example of machine learning and cloud computing.



Dr. David Kerr of the William Sansum Diabetes Center in Santa Barbara demonstrates a smartphone app that can record a heart beat on Marketing Manager Pamme Mickelson. (Nik Blaskovich / Business Times photo)

The institute was founded in 1944 by Dr. Sansum and is devoted to treating and finding a cure to diabetes through clinical research, community outreach and education. The nonprofit uses local patients for clinical trials to test the best new methods and devices. It also runs several classes and Spanish-language seminars to help those living with diabetes better manage the disease.

Diabetes is a chronic condition that afflicts more than 25 million Americans whose bodies cannot properly manage blood sugar, also known as glucose. Insulin helps the

body absorb glucose in the process of turning food into energy. Type I diabetes, also called juvenile diabetes, is much less common but also more difficult to manage. People with the condition are born with it and cannot manage their glucose levels through diet and exercise alone.

The more common Type II diabetes is often associated with obesity and other weight-related conditions, although genetic factors also play a prominent role and certain races are much more

susceptible. In a patient with Type II diabetes, the body produces insulin but doesn't properly regulate it.

According to researchers, 79 million American adults are pre-diabetic, meaning their glucose levels indicate they are at a pronounced risk of developing the disease.

There is no known cure for either form of diabetes. Currently, those with the disease must constantly monitor and control bloodglucose levels through managed eating and insulin injections.

The institute is known for pioneering methods in helping diabetic pregnant mother deliver healthy babies and also for its artificial pancreas which aims to automate the process and calculations of insulin delivery.

This month, the institute will be renamed the William Sansum Diabetes Center to differentiate itself in the local community from the unaffiliated Sansum Clinic, one of the region's largest health care providers. Executive Director Rem Laan said in a wide-ranging interview with the Business Times that diabetes is unique from other chronic conditions because the burden of treatment lies largely on the patients themselves. Diabetics must monitor their glucose levels, manage what they eat and give themselves insulin injections.

Laan hopes recent advances in technology can reduce that burden. Computers can do much of the work and let people better focus on their daily lives, he said, predicting that a smartphone will one day be able to tell a diabetic if a certain food is safe to eat or not, given that person's current blood-sugar levels.

"We're not going to create new devices but we're going to figure out how to make devices that were created for other purposes work well and seamlessly for people with diabetes," Laan said.

Smartphones combined with medical devices can provide huge amounts of data, regarding physical activity, sleep patterns and location. And blood-sugar monitoring adapters for phones already exist.

Dr. David Kerr, Sansum's newly hired director of research and innovation, envisions a "smart diabetes society" where a plethora of data combined with computing power will allow people with diabetes to live healthier, less regulated lives. "Rather than just ask people to wear devices that measure physiological things, Kerr said, "the key is what are you going to do with the results."

Implantable devices that monitor blood glucose levels and can inject insulin at the touch of a button already exist. The next step is to connect those devices to a smartphone and the Internet so that algorithms can decide when an injection should occur, the Sansum doctors said. Kerr wants to apply machine-learning techniques, such as those that power Netflix's movie recommendations, to learn the behaviors and responses of individual patients.

Algorithms can be used to nudge people into healthy behavior, he said. A doctor can't be with someone 24/7, but an app can. A phone could encourage a person to park further from their destination or take the stairs, he said. Kerr said the entire diabetes industry should reshift its focus to improving quality of life for patients. Even if a cure can't be found, people with diabetes can see profound benefits from advances in diabetes research combined with consumer technologies, he said.

For example, blood-sugar levels don't necessarily mean anything to patients by themselves and perhaps it's excessive information. In reality, all people care about is whether they are healthy and not an opaque number. "The one thing we are not short of here are ideas," Kerr said. "We are also not short of experience and we are not short of empathy. When you got those three parameters, that's a pretty powerful place to be in."