

UCSB and Sansum Research Institute team up for diabetes study



MICHAEL MORIATIS / NEWS-PRESS

Diabetes patient Jeanie Seashore examines monitor that shows her blood glucose levels. She is the initial participant in joint UCSB/Sansum Diabetes Institute clinical trials that could fully automate measurement and injection protocols associated with the monitoring of diabetes patients.

Project would create automated diabetes management

By **GARRY WORMSER**
NEWS-PRESS CORRESPONDENT

Santa Barbara resident Jeanie Seashore spent a full day last week sitting in a well-padded chair with a hair-thin wire sensor running from under the skin of her abdomen to a nearby computer. While her normal routine of biking and jogging was interrupted, she nevertheless felt good about what she was doing.

"I'm a type-1 diabetic who is

fortunate enough to be the subject of clinical tests which promise to free other diabetics from the serious consequences of uncontrolled blood glucose levels," the 54-year-old woman explained.

Mrs. Seashore is the first patient to participate in startup trials of the Artificial Pancreas Program, a combined research effort between UCSB's Department of Chemical Engineering

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System 'would improve the life of people with type-1 diabetes'

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and Santa Barbara's Sansum Diabetes Research Institute. The trials have been approved by the Federal Drug Administration. Their ultimate goal is to field an automated diabetes management system that would remotely monitor glucose levels and inject precisely measured insulin dosages without the active participation of users.

"Such a system, once widely available, would improve the life of people with type-1 diabetes 24/7," said Howard Zisser, M.D., director of clinical research at Sansum Diabetes. "The pancreas in patients with type-1 diabetes can no longer produce insulin that the body requires to regulate blood glucose. When precise dosages of insulin are not supplied on a continuing basis to meet varying bodily requirements, the patient can get into serious trouble very quickly."

The artificial pancreas may also benefit patients with type-2 diabetes, according to Dr. Zisser. While these patients retain the ability to manufacture insulin, their bodies cannot produce it in appropriate amounts, he explained.

When fully configured, the automated system would consist of a subdermal glucose sensor, an insulin pump and an Internet-capable controller similar to a cell-phone browser, which would allow the system to be remotely monitored. "Getting the glucose sensor and the pump to talk accurately to each other in real time is key to the system's development," explained Frank Doyle, a UCSB professor of Chemical Engineering and Associate Dean for Research.

"In operation, electronic signals proportional to the amount of glucose in the body would be measured by the sensor, converted into a glucose value



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Initial Santa Barbara clinical tests of new remote management system for diabetes patients get underway at the Sansum Diabetes Institute on Bath Street. Sansum's clinical research director Howard Zisser is shown at left. Patient Jeanie Seashore can be seen seated at the opposite end of the table.

and sent to the controller," Dr. Doyle said. "The controller, using engineering algorithms, would then determine the appropriate dose of insulin to be delivered by the pump. We're ultimately aiming for a five-minute monitoring cycle throughout the day," he explained.

Near continuous glucose monitoring is considered vital because blood sugar levels in a person with type-1 diabetes can fluctuate between 40 to 400 milligrams per deciliter per day based on such bodily functions as exercise, eating and sleeping, according to Dr. Zisser.

In the case of Jeanie Seashore, the study could not have gone smoother,

the M.D. told the News-Press. "The system did exactly what it was supposed to do, automatically adjusting the woman's blood sugar to a target value after recognizing that she ate a meal."

"Food dramatically effects blood sugar levels, which means that meal detecting algorithms have safety and quality of life implications," explained UCSB chemical engineer Eyal Dassau. "This is particularly true in children and adolescents with diabetes," Dr. Dassau pointed out.

Because their work impacts diabetic youngsters of all ages, The UCSB/Sansum research team of Drs. Dassau, Doyle and Zisser has received

program funding from the Juvenile Diabetes Research Foundation as well as from The National Institutes of Health.

The team's synergistic study efforts are local yet nationally recognized. UCSB's Department of Chemical Engineering ranked second in the country in a recent review by the National Research Council. The nonprofit Sansum Institute traces its roots back to 1922 when its Santa Barbara founder, Dr. William Sansum, became the first U.S. researcher to purify and administer insulin.

e-mail: news@newspress.com