

SB researchers to test artificial pancreas

BY STEPHEN NELLIS
Staff Writer

Santa Barbara will soon host trials of a first-ever artificial pancreas being developed by researchers at UC Santa Barbara and Sansum Diabetes Research Institute to help treat type 1 diabetes.

Under development for the past several years in Santa Barbara, the artificial

pancreas is now in clinical trials around the globe. Much of the funding has come from the Juvenile Diabetes Research Foundation.

The system that will be tested in Santa Barbara this fall — made up of off-the-shelf equipment linked by a crucial control algorithm developed by chemical engineers at UCSB — is likely to resemble what may eventually reach consumers,

though researchers say a commercially available artificial pancreas could still be years away.

Type 1 diabetes, sometimes known as juvenile diabetes, can't be controlled with diet and exercise alone. It's an autoimmune disorder in which the patient's body attacks cells that produce insulin, the hormone that helps the body turn food into energy.

There's no cure, and the only treatment is relentless blood sugar monitoring coupled with careful diet control and insulin injections.

Over the long term, high blood sugar puts type 1 diabetics at risk of kidney disease, heart disease and blindness. But pumping in too much insulin can

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Maldonado to keynote Spirit of Small Biz

I'm really pleased to report that I'll be welcoming a fellow small business owner to the podium to keynote the 8th Annual Spirit of Small Business Awards luncheon this year on Thursday, Aug. 12.



HENRY DUBROFF
Editor

Lt. Gov. Abel Maldonado,



DENNIS EAMON/ YOUNG PHOTO

New firm drilling in old wells

BY STEPHEN NELLIS
Staff Writer

A newly public Carpinteria oil firm backed by industry veterans has garnered \$20 million to go after black gold in California and Wyoming.

NiMin Energy Corp. raised \$11.5 million in a public offering in May and now trades under the symbol NNN on the Toronto Stock Exchange, where many natural resource companies make their home. The company

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bring blood sugar down to dangerously low levels in the short term.

"It can cause seizures, and it can kill people," said Aaron Kowalski, research director of the artificial pancreas project for the New York-based Juvenile Diabetes Research Foundation. "It's a balancing act."

Today, there are devices that constantly monitor blood sugar, also known as glucose. There are also devices that pump insulin into the blood. But the connection between the two — how much insulin it takes to get blood sugar in a safe range — has mostly been a matter of keeping paper logs and simple calculation.

Even with careful monitoring, many patients spend a lot of time outside the normal blood sugar range.

"Even though we see bad outcomes because of bad glucose control throughout the population, it's not that people aren't trying," Kowalski said. "We believe that with computers and the amazing technology that's evolved over the years, we can do much better."

That's where UCSB's engineers came in.

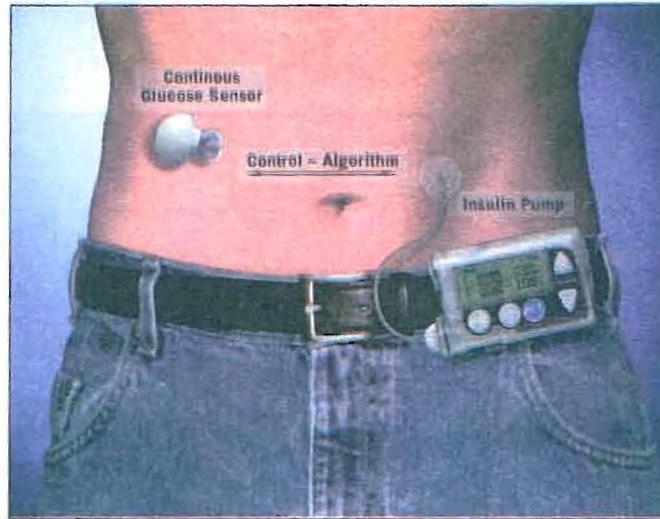
"We started to think about closing the loop," said Eyal Dassau, lead scientist for UCSB's artificial pancreas system team. "The missing link is the brain — the control algorithm that will take measurements, calculate the optimal dose for that specific time and send a command to the pump."

The engineers have been working closely with Sansum, and the institutions consider themselves a singular unit when it comes to the artificial pancreas project.

"We teach them about medicine, and they teach us about engineering," said Howard Zisser, director of clinical research and diabetes technology at Sansum. "It's hard for one person with one hat to figure out the intricacies of the system."

And those intricacies are many. First, the algorithm has to deal with only being able to move blood sugar in one direction — insulin generally lowers blood glucose levels. That makes controlling blood sugar with insulin "like driving a car with just your accelerator pedal," Zisser said.

Another problem is the limitations of the equipment. The



COURTESY SANSUM DIABETES RESEARCH INSTITUTE

This diagram illustrates where an artificial pancreas would be implanted and connected to an insulin pump.

blood sugar sensor has both a lag and a margin of error. On top of that, the insulin used doesn't hit peak effectiveness until 45 minutes after it's pumped under the skin. It's like driving without seeing a curve until you've passed it, and the tires not responding until well after you've turned the wheel.

"The algorithm has to do a really good job at predicting the future," Kowalski said.

On top of that, researchers are working on ways to detect meals and adjust for meals and exercise, both of which have an effect on blood sugar. "We believe our best approach right now is to have a personalized model for each patient," Dassau said. "We take data from the patient and develop a model that is fit to the patient."

As studies unfold in France, Israel and the United States, Kowalski — who has type 1 diabetes himself — said the research wouldn't have been possible without the contributions from Santa Barbara.

"It's not an understatement to say they're some of the best people in the world and are key to driving this science forward," Kowalski said. "I've been holding out to participate in this trial so I could come to Santa Barbara to do it."

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...museum hosted a reception honoring John C. Orr, the chairman of the museum board and a partner at the law firm Ferguson Case Orr Paterson.

Orr was instrumental in raising the money for the expansion, which recently finished its first phase with a total of \$3.5 million in improvements.

The reception was in the museum's new event plaza, a rock-walled outdoor space just across Main Street from Mission San Buenaventura. The setting wasn't the only thing unique about the reception. Joanna Orr — an associate at Ferguson Case, but no relation to John Orr — was in charge of procuring the beverages, and she arranged for five different beers from Carpinteria's Island Brewing Co. Thirsty museum patron appreciated the gesture.

FIGHTING CANCER

On this week's front page, we bring you the story of cutting-edge diabetes research happening in Santa Barbara. That's not the only area where the region leads the way — four physicians from the Cancer Center of Santa Barbara have been published recently in leading medical journals.

Dr. Daniel Greenwald had an article in *Science*; Dr. W. Warren Suh was published in both the journal *Cancer* and the *International Journal of Radiation Oncology, Biology and Physics*; Dr. Allen Bryce contributed to a study in the *American Journal of Clinical Oncology*; and Dr. Fred Kass contributed to a study in *Cancer*.

TOP OF THE HEAP

JFK's honeymoon spot, the San Ysidro Ranch in Montecito, was named the best resort in the U.S. and Canada by *Travel & Leisure* magazine. It was No. 4 on the list last year.