

MEDICINE

Advances in Type 1 Diabetes Research

by *Larry Schwigel*

Cases of diabetes are increasing at epidemic proportions. The Centers for Disease Control (CDC) estimate that more than 30 million people in the United States live with this condition — and millions more with diabetes have not yet been diagnosed.

Chances are you know someone living with this devastating disease. The most common is Type 2 or non-insulin dependent diabetes, and although a chronic condition (affecting the way the body processes glucose), it is treatable through medication, healthy eating habits, exercise, and weight loss.

Type 1 or insulin-dependent diabetes is an autoimmune disease that occurs most often in children and adolescents, though it can strike at any age. In Type 1 Diabetes (T1D), the body's immune system mistakenly targets and destroys the insulin-producing cells of the pancreas. Insulin is a vital hormone that converts sugar (glucose) to energy for all of the body's cells, and people facing this medical problem must have daily insulin therapy.

Diabetes affects many parts of the body and causes serious complications, such as heart disease, stroke, blindness, kidney failure, and lower limb amputations, among other conditions. However, one of the most feared complications is hypoglycemia unawareness. This is a severe condition whereby patients cannot sense that their blood sugar is dropping to dangerously low levels. It

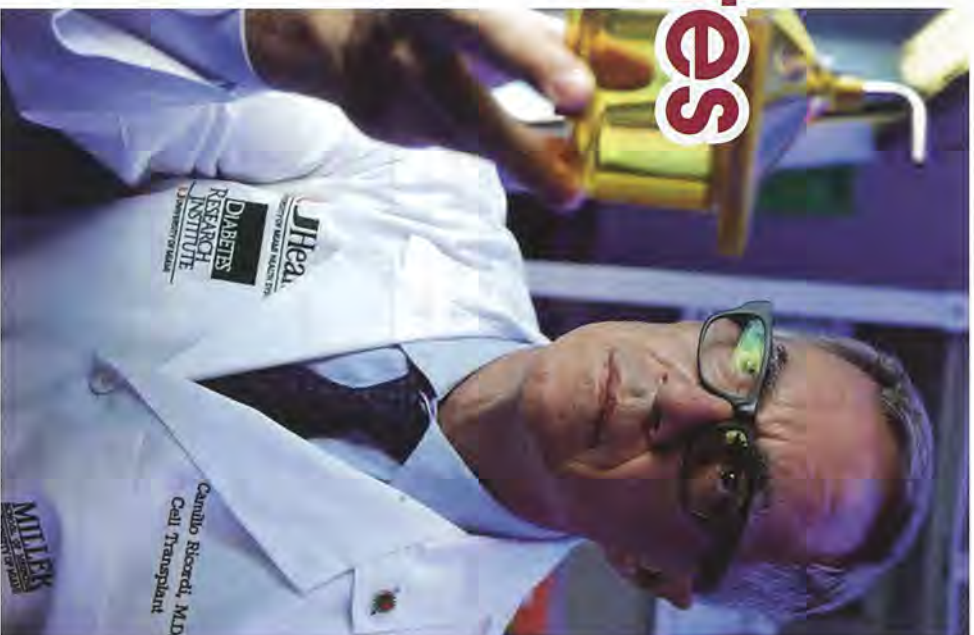
can lead to seizures, loss of consciousness, and even death.

Currently, T1D cannot be prevented, nor is there a cure, but scientists at the Diabetes Research Institute (DRI) at the University of Miami are urgently working to change that. The singular goal is to discover a biological cure that restores a patient's ability to make his or her own insulin.

Islet Transplantation Therapy

DRI Director Dr. Camillo Ricordi works in concert with more than 150 researchers at the Miami Institute, and a network of scientists around the globe. Their collective expertise is focused on overcoming the challenges presented by diabetes. To date, DRI scientists and their collaborators have shown that natural insulin function actually can be restored through a procedure called islet (eye-let) transplantation.

In this procedure, insulin-producing islet cells from a donor's pancreas are isolated and infused into patients with T1D. Several islet transplant recipients have enjoyed 10 years or more of freedom from insulin injections — a



Diabetes Research Institute Director Dr. Camillo Ricordi holds the Ricordi Chamber, a device he invented.

clear indicator that this cell replacement therapy dramatically changes lives.

"Patients that received islet transplants not only experienced normal glucose levels, but they were also free of hypoglycemic episodes and enjoy a better quality of life," said Dr. Ricordi, who is recognized as one of the foremost leaders in diabetes research. He invented the Ricordi Chamber, a device used for separating islet cells from a donor pancreas making islet transplantation possible. Scientists around the world use it.

"For all of the advances that have been made in diabetes technology, islet transplantation is the only procedure (outside of a full pancreas transplant) that gives patients back what they lost at the onset of the disease," Dr. Ricordi said.

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At this time, islet transplantation is still an experimental procedure and requires the use of immunosuppression or anti-rejection drugs to prevent the body from rejecting the new cells. These drugs can cause dangerous side effects and cannot be given to children.

“The widespread application of islet transplantation for T1D is a limited approach we can offer until there are less toxic immunosuppressive regimens, more robust ways of inducing immune tolerance to the transplanted islets, and ultimately, the development of strategies to block autoimmunity,” Ricordi said. “If we can ensure that new islets will not be destroyed by autoimmune disease, then we can think about regenerating insulin-producing cells from the patient’s own tissues.”

Clinical Research Trials

DRI scientists are now intensely focused on overcoming the remaining challenges posed by diabetes, and are intent on delivering a cure for everyone with the disease. They are particularly focused on addressing the immune system, which is the true culprit in T1D. DRI recently received approval from the FDA to proceed with several new clinical trials that can begin to answer those final questions.




Insulin injection Kim Astacio-Murphy administers an insulin injection to her 4-year-old son Lucas, who has type-1 diabetes.

“This is an exciting time in diabetes research because we have five clinical trials progressing in parallel at the DRI, and this is unprecedented in our history,” Dr. Ricordi said. “Our new clinical research efforts are directed towards the challenges of immune tolerance, reversal of autoimmunity and islet regeneration.”

One of the trials is the Diabetes Islet Preservation Immune Treatment (DIPIT) study that combines five different clinically approved agents that have demonstrated benefits when used alone, or in combination with two or three of the drugs. This first-ever multi-combination therapy tests the effects of the agents for halting an attack on the immune system, preserve remaining islet function, and possibly give the body a chance to recover and regenerate its own insulin-producing cells.

Insulin has saved the lives of millions of people with diabetes but it is not a cure, and insulin therapy does not prevent chronic complications associated with the disease. A biological cure is needed. Thanks to Dr. Ricordi and his colleagues, significant progress is being made. According to the research scientist, “We have built a strong and talented network of like-minded scientists committed to eradicating T1D and that is our singular goal.”

For more information about diabetes research, visit DiabetesResearch.org, or call 1-800-321-3437. 



Scientists in Lab Scientists Alice Tomtei (left) and Diana Velluto work inside a lab at the Diabetes Research Institute in Miami.

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