



The Islet of Promise

In the world of diabetes research, the phrase “islet transplant” is commonplace.

According to the Juvenile Diabetes Research Foundation, islet transplantation has emerged as the most promising option for achieving restoration of normal blood sugar in people with type 1 diabetes. In type 1 diabetes, the lack of insulin is due to an autoimmune process in which the body’s immune system destroys the beta cells in the islets of Langerhans.

Lisa Stehno-Bittel, PhD, PT, associate professor and chair of the Department of Physical Therapy and Rehabilitation Science, is working on pancreatic islet transplantation—the transplantation of cells from a donor pancreas to a person with type 1 diabetes. Once implanted, the new islets begin to make and release insulin. The goal of islet transplantation is to prevent people with type 1 diabetes from having to administer daily injections of insulin.

Stehno-Bittel first became interested in diabetes research when she was earning her PhD at the University of Missouri. Her mentor’s 2-year-old son was diagnosed with type 1 diabetes mellitus. Determined to learn more about this disease that invaded his family, her mentor suddenly changed the focus of his lab from cardiovascular research to diabetes research. Stehno-Bittel made the switch with him and has devoted her career to the study of diabetes. Since then,

OPTIMISM BUBBLES UNDER THE SURFACE of a rat islet (left). In this cluster of cells, green represents cells dying via apoptosis, orange indicates death by necrosis and living cells do not pick up the dye. Current research in the school is uncovering mysteries buried deep in the cells of diabetes patients.

Stehno-Bittel has earned an international reputation for her research on improving treatment options for people with diabetes and on the effects of exercise on diabetes.

“Unfortunately, the small number of available donor organs limits the number of islet transplants that can be performed. Worse, the current protocols require islets from one to three donor pancreata per recipient. Research aimed at increasing islet yield, viability or functional activity would make a valuable contribution toward the clinical treatment of type 1 diabetes,” Stehno-Bittel explained.

In one project, funded by the Emilie Rosebud Diabetes Research Foundation, Stehno-Bittel discovered that the islets typically used in transplants were not healthy—possibly underlying the need for multiple transplants. Her work with rats showed that small islets consumed more

oxygen than large islets, indicative of good mitochondrial function. They secreted more insulin in vitro than large islets. And, most important, the transplants resulted in improved outcomes as compared with transplantation of the same volume of large islets. Without a human islet transplant site in Kansas City, Stehno-Bittel explained, they had to hope that other transplant sites around the world would read about the work at KU and adopt their transplant

and showed improved outcomes.

“It’s rare that a basic scientist working with rats can make an

impact in clinical practice in a short period of time. We have done that in less than a year, and we are thrilled,” Stehno-Bittel said.

Now the group is looking for innovative ways to capitalize on these observations to continue



Lisa Stehno-Bittel, PhD

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procedures, based on the KU findings. Within a year of Stehno-Bittel’s publication, a transplant site in Switzerland reported using Stehno-Bittel’s approach to islet transplants in humans

improving transplant success rates. With funding from the Juvenile Diabetes Research Foundation, Stehno-Bittel and her colleagues are currently testing gel patches of the

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AMERICANS ARE NEWLY DIAGNOSED
WITH DIABETES EVERY DAY

insulin-producing beta cells to be used for transplantation and examining ways to genetically modify the beta cells from large islets so that they will produce more insulin like the small ones.

Stehno-Bittel is also engaged in ongoing studies that examine the effects of exercise on diabetes.

“We have looked at the changes in the risk of cardiovascular disease if you exercise or do not exercise,” she said. “In rats we’ve seen that a certain protein goes up with diabetes that puts the heart at risk. We can bring the protein levels back down with exercise, and the risk of diabetes goes down.”

Now her team is translating what they have learned from their animal research into an intervention study using humans. They have set up an exercise program in their clinic as a community service and are beginning to collect data for research.

Stehno-Bittel’s research in rat exercise tests has gained international attention and scientists from around the world seek her advice and assistance. Right now, the team is helping researchers from the University of Houston with a three-year research project that evaluates the effects of exercise on rats with Parkinson’s disease. ■

Dr. Stehno-Bittel’s research has recently led to exciting international developments.

After listening to her presentation at an American Diabetes Association conference, a research group in Switzerland was able to implement Stehno-Bittel’s ideas about the superiority of smaller islet cells in transplantations from her rat studies to transform their work in human studies.

Patrick Kugelmeier, PhD, a researcher at Universitäts Spital in Zurich, Switzerland, spoke highly of Stehno-Bittel’s work:

“... your data was a big motivation for us to summarize our collected data and analyse our remaining data, so finally we could submit our work.”

Findings by Kugelmeier’s team were published in the March 2007 issue of *Diabetes*, the scientific journal of the American Diabetes Association that focuses on original research.

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