Use of pancreatic islets show promise in diabetes research, treatments

April 14 2009

The use of pancreatic islets (hormone-producing cells) is increasing in diabetes research and may play an important role in future treatments, according to an article in the April 15 issue of *JAMA*, a theme issue on diabetes.

John S. Kaddis, B.S., of the City of Hope National Medical Center, Duarte, Calif., presented the findings of the article at a *JAMA* media briefing at the National Press Club in Washington, D.C.

"The primary objective of islet-based research is to cure diabetes. Perhaps the most prominent clinical application of this research is currently in the form of cell replacement therapy. With the exception of 1 report in a type 2 diabetic cohort, islet transplantation has been used exclusively for a subset of individuals with type 1 diabetes mellitus and was shown, at least temporarily, to improve glucose control and, in a few cases, to lead to insulin independence," writes Mr. Kaddis and colleagues.

With this procedure, pancreatic islets are transplanted from a donated pancreas to a person with diabetes as a means of restoring beta-cell function. The destruction of beta cells in the pancreas is the cause of type 1 diabetes.

"Although islet transplantation has been shown to offer both protection against long-term complications of the disease and significant improvement in quality of life, several obstacles remain, such as limited

engraftment [acceptance of the islets within the recipient], chronic immunosuppression, and inconsistent supply of human islets. These issues must be addressed if the procedure is to be used as a standard of care for qualified individuals," they write.

According to the authors, investigators seeking to understand the biology of human islets have approached the problem in a variety of ways. "Some have used surrogate beta cells and cell lines while others have focused on pancreas-derived isolated islets from human or nonhuman sources. Islets and islet-like cells have been used experimentally and clinically to increase beta-cell mass."

The demand for pancreatic islets for research and treatment has been increasing, with the production of human islets contingent on the availability of pancreata (plural for pancreas).

One of the barriers to islet production is the cost of acquiring organs, with data from the Islet Cell Resource (ICR) consortium showing that for 665 pancreata acquired from 2001 to 2008, standard acquisition charges ranged from a low of $600 to a high of $39,800.

To help address the supply and demand issues faced by islet laboratories and clinical and laboratory scientists, islet sharing networks have been established. "These distribution networks have had a global influence on diabetes research but face economic obstacles in preserving the availability of human islets in a growing research community."

Data indicate that 297.6 million islets were produced by 14 ICR laboratories between September 2001 and August 2008, with 67 percent used for basic science research and 31 percent for clinical purposes.

"The importance of human pancreatic islets, clinically or for basic science research, is substantiated by the number and quality of studies

being performed that rely on these preparations. Data available through the ICR as of August 2008 indicate that a total of 151 national and international scientists received human islets for use in both intramural research performed by the consortium as well as 182 clinical and basic science projects submitted to the consortium for support," they write.

"Human pancreatic islets will be critical for restoration of beta-cell function in patients with diabetes. Even given adequate funding levels, the ongoing challenges to supplying human islets must be addressed for the successful exploration of therapeutic options for this chronic and debilitating disease," the authors conclude.

More information: JAMA. 2009;301[15]:1580-1587.

Source: JAMA and Archives Journals (news : web)