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JDRF-funded researchers discover proteins regulating human beta cell replication

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NEW YORK, January 16, 2009 - Researchers at the University of Pittsburgh School of medicine, funded by jdrf, have discovered that adult beta cells have the ability to replicate with the help of a protein known as cdk6. This research was led by Andrew F. Stewart, M.D., a Professor of medicine and Chief of the Division of Endocrinology and Metabolism at the University of Pittsburgh School of medicine. The complete findings of this discovery can be found in the early online version of Diabetes.

"Most scientists thought that these important pancreatic cells could not be induced to regenerate, or could only replicate very slowly," explained Dr. Stewart. "This work provides proof-of-principle that the production of human beta cells can be stimulated, and that those newly-generated cells function effectively both in the lab and in a living animal."

The ability of cells including human beta cells to divide or replicate is controlled by a series of events known as the cell cycle or cell division cycle. Pittsburgh researchers have taken steps to map comprehensively the proteins regulating the cell cycle in human beta cells. They examined 34 different proteins and found that cyclin dependent kinase- 6 (cdk6) alone or with cyclin D, when injected into human islets by viral delivery methods, triggered the beta cells to replicate. These transduced islets were then transplanted into diabetic mice for six weeks. The transplanted islet cells with cdk6 and cyclin D performed better than control (non-modified) human islets as measured by blood glucose levels and glucose tolerance tests in the transplanted animals. Researchers removed the transplanted cells after the six week study and confirmed that the human beta cells replicated in the transplant model.

"The question as to whether and how human beta cells can be induced to proliferate is a fundamentally important one for jdrf's Regeneration Program. Dr. Stewart and his colleagues address this question by demonstrating that modulation of specific cell cycle control proteins stimulates human beta cell replication. By identifying the control points for human beta cell cycle progression, Dr. Stewart and his colleague provide new insights and open up potentially new avenues in the search for therapies to promote beta cell regeneration in individuals with type 1 diabetes,", said Patricia Kilian, Ph.D., Therapeutic Program Director for Regeneration research at jdrf.

The ability to replicate adult human beta cells in an animal model and in vitro allows researchers the opportunity to fully understand and break down the components of cell replication. This research combines two therapeutic goals of the organization, regeneration and replacement therapy.

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