Public release date: 23-Nov-2006

Contact: Sue McGreevey
smcgreevey@partners.org
617-724-2764
Massachusetts General Hospital

New data from NIH lab confirms protocol to reverse type 1 diabetes in mice

Data also support role for adult spleen cells in regeneration of beta cells

New data published in the Nov. 24 issue of Science provide further support for a protocol to reverse type 1 diabetes in mice and new evidence that adult precursor cells from the spleen can contribute to the regeneration of beta cells. In 2001 and 2003, researchers at Massachusetts General Hospital (MGH) demonstrated the efficacy of a protocol to reverse of type 1 diabetes in diabetic mice. Three studies from other institutions published in the March 24, 2006 issue of Science confirmed that the MGH-developed protocol can reverse the underlying disease but were inconclusive on the role of spleen cells in the recovery of insulin-producing pancreatic islets. The new data from a study performed at the National Institutes of Health (NIH), published as a technical comment, provides additional confirmation of the ability to reverse type 1 diabetes and on the role of the spleen cells in islet regeneration.

"This data from the NIH and the earlier studies have added significantly to the understanding of how diabetes may be reversed," says Denise Faustman, MD, PhD, director of the Immunobiology Laboratory at Massachusetts General Hospital, primary author of the 2001 and 2003 studies and co-corresponding author of the current report. "It is still early, but it appears that there are multiple potential sources for regenerating islets. As a research community we should pursue all avenues. We're excited to see what will happen in humans."

In the 2001 and 2003 studies, Faustman and colleagues treated end-stage nonobese diabetic (NOD) mice with Freund's complete adjuvant, a substance that suppresses the activity of the immune cells that destroy islets in type 1 diabetes. They also introduced donor spleen cells to retrain the immune system not to attack islets and found that the protocol not only halted the immune destruction caused by diabetes but also allowed the insulin-producing pancreatic islet cells to regenerate. Evidence indicated that the spleen cells were the source of at least some of the regenerated islet cell and hastened the restoration of blood sugar levels.

The direct contribution of spleen cells to islet recovery, first described in the 2003 study, is confirmed in the current work. NIH researchers used cell lineage tracking in the form of Y-chromosomal fluorescence in situ hybridization (FISH), in combination with insulin staining, to follow the fate of male spleen cells transplanted into female recipients. The female mice that received male donor cells consistently showed Y-chromosome-positive insulin-producing islet cells, indicating that the introduced spleen cells contribute to islet recovery. The current study also showed that the degree of spleen cell contribution is influenced by mouse age at the start of treatment. Spleen cells appear to contribute to islet recovery more in mice who are older and with more advanced diabetes compared with younger mice with less advanced diabetes, in which regeneration of remaining islets may be the dominant mechanism.

###

The research to support the new data was conducted at the NIH laboratory of Eva Mezey, MD, PhD, co-corresponding author of the report. It was funded by the Sjogren's Syndrome Foundation, National Institutes of Health/NIDCR intramural program, Canadian Institutes of Health Research and Canada Research Chair. The three studies published in March 2006 were supported by the Juvenile Diabetes Research Foundation. Faustman's research at Massachusetts General Hospital has been supported by The Iacocca Foundation, which is also supporting a clinical trial program based on her research.

Massachusetts General Hospital, established in 1811, is the original and largest teaching hospital of Harvard Medical School. The MGH conducts the largest hospital-based research program in the United States, with an annual research budget of nearly $500 million and major research centers in AIDS, cardiovascular research, cancer, computational and integrative biology, cutaneous biology, human genetics, medical imaging, neurodegenerative disorders, regenerative medicine, transplantation biology and photomedicine. MGH and Brigham and Women's Hospital are founding members of Partners HealthCare System, a Boston-based integrated health care delivery system.