Chemical produced in pancreas prevented and reversed diabetes in mice

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A chemical produced by the same cells that make insulin in the pancreas prevented and even reversed Type 1 diabetes in mice, researchers at St. Michael's Hospital have found.

Type 1 diabetes, formerly known as juvenile diabetes, is characterized by the immune system's destruction of the beta cells in the pancreas that make and secrete insulin. As a result, the body makes little or no insulin.

The only conventional treatment for Type 1 diabetes is insulin injection, but insulin is not a cure as it does not prevent or reverse the loss of beta cells.

A team led by Dr. Qinghua Wang, in the division of endocrinology and metabolism, and Dr. Gerald Prud'homme, in the division of pathology, has studied the role of GABA, or gamma-aminobutyric acid, an amino acid produced by beta cells in the pancreas. The research was funded by the Canadian Institutes of Health Research, the Juvenile Diabetes Research Foundation and the Canadian Diabetes Association.

The researchers found that GABA injections not only prevented diabetes in mice, but even reversed the disease. Their findings were published in the journal Proceedings of the National Academy of Sciences.

The significance of GABA is that it corrects both known causes of Type 1 diabetes in mice: It works in the pancreas to regenerate insulin-producing beta cells and it acts on the immune system to stop the

destruction of those cells. Those two actions are necessary to reverse the disease and prevent its recurrence. Until now, there has been no effective treatment that achieves both goals at the same time.

GABA has been known for decades to be a key neurotransmitter in the brain, a chemical that nerve cells use to communicate with each other, but its role in the pancreas was unknown. The St. Michael's study is the first to identify and describe GABA's importance in regulating the survival and function of pancreatic beta cells in mice.

GABA and related therapies will have to be tested in human clinical trials before they can be considered as a new treatment for Type 1 diabetes, said Dr. Wang.

"GABA is the first agent to act both by protecting the insulin-producing cells from damage and by decreasing the body's immune reaction against these cells," said Dr. Gary F. Lewis, incoming director of the Banting and Best Diabetes Centre and Director of the Division of Endocrinology and Metabolism at the University of Toronto, where insulin was discovered 90 years ago.

"The body's immune reaction against its own insulin-producing cells is responsible for most of the damage that leads to the development of type 1 diabetes. This exciting observation may open up new avenues for the prevention and treatment of Type 1 diabetes in humans."

Drs. Wang and Prud'homme are both clinician scientists in the Keenan Research Centre of the Li Ka Shing Knowledge Institute of St. Michael's Hospital. In addition, Dr. Wang is an associate professor in the Department of Physiology at the University of Toronto and Dr. Prud'homme is a professor in the university's Department of Laboratory Medicine and Pathobiology.

"Diabetes research such as this brings us closer to a cure," said Michael Cloutier, president and CEO at the Canadian Diabetes Association. "We are excited to be a part of this significant discovery and look forward to the outcomes of clinical studies."

Provided by St. Michael's Hospital