



CURE | BIOMEDICAL RESEARCH

Project: Measuring insulin secretion from beta cells at the single cell level

Through donor support, Dr. Hongshen Ma, Associate Professor in the Department of Mechanical Engineering and School of Biomedical Engineering at the University of British Columbia, is working to reverse the effects of type 1 diabetes.

In healthy individuals, blood sugars are controlled by a hormone called insulin, which lowers blood sugar levels. Insulin is produced by cells in the pancreas called beta cells. For people with type 1 diabetes, their beta cells have been destroyed by their own immune system. As a result, they can no longer produce insulin to control their blood sugars, which can lead to health complications such as nerve damage, sight loss, heart disease, kidney failure, anxiety, amputations, and even death.

The Edmonton Protocol can reverse the effects of diabetes by transplanting donor beta cells into patients. However, the supply of donor beta cells is severely limited and can only serve a fraction of the patients in need.

Scientists are developing new methods to grow beta cells from stem cells to provide a limitless supply of beta cells for transplantation. However, the amount of insulin produced by these cells is highly variable, and as a whole, insufficient to reverse the effects of diabetes. If some beta cells produce more insulin than others, we want to manufacture more of these cells.

To help address this, Dr. Ma and his team are developing technologies to measure insulin production at the single beta cell level. Their work will help build an essential tool to develop improved stem cell derived beta cells, and to manufacture these cells at the scale needed to reverse type 1 diabetes.