MedicalXpress

Researchers identify mechanisms that are necessary to live without insulin

September 3 2013

Several millions of people around the world suffer from insulin deficiencies. Insulin is a hormone, secreted by the beta cells in the pancreas, which plays a major role in the regulation of energy substrates such as glucose. This insufficiency, primarily caused by diabetes (types 1 and 2), has lethal consequences if it is not treated. As of now, only daily insulin injections allow patients to survive.

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While life without insulin was inconceivable, a group of researchers, led by Roberto Coppari, professor in the Department of Cell Physiology and Metabolism at UNIGE, has just demonstrated that insulin is not vital for survival. By eliminating this dogma, scientists are now considering alternatives to insulin treatment, which poses many risks to patients. An error in dosage may cause hypoglycemia, i.e., a decrease in the level of glucose in the blood, which can lead to a loss of consciousness. In

addition, about 90% of patients over 55 who have been undergoing treatment for several years develop cardiovascular disease due to elevated levels of cholesterol brought on by the lipogenic properties of insulin.

Leptin leads to an essential discovery

Researchers from UNIGE's Faculty of Medicine conducted experiments on rodents devoid of insulin, to which they administered leptin, a hormone that regulates the body's fat reserves and appetite. Thanks to the leptin, all the subjects survived their insulin deficiency. Using leptin offers two advantages: it does not provoke hypoglycemia and it has a lipolytic effect. 'Through this discovery, the path to offering an alternative to insulin treatment is emerging. Now we need to understand the mechanisms through which leptin affects glucose level, regardless of insulin level,' explains Professor Coppari.

The studies were able to verify whether the neurons involved in the mediation of leptin's anti-diabetic action in healthy mammals played a similar role in rodents suffering from an insulin deficiency. The results showed that this was not the case. In fact, to the scientists' surprise, GABAergic neurons located in the hypothalamus were identified as the main mediators of leptin's action on glucose level in the context of insulin deficiency. These neurons' influence on glucose had never been considered substantial before.

Additionally, the researchers detected the peripheral tissues that are affected by leptin during insulin deficiency. They consist mainly of the liver, the soleus muscle, and brown adipose tissue, which could be directly targeted by future treatments.

Through this discovery, scientists now know where to look for the answer to an insulin-free diabetes treatment. Understanding the

functioning and effect of leptin on the body will enable scientists to identify the areas of the body that are involved, and ultimately the molecules that will form the basis of a new treatment.

Provided by University of Geneva