Insulin-producing cells offer hope for people with type 1 diabetes

Published: Thursday 1 October 2015 at 7am PST

 estimated 1.25 million Americans suffer from type 1 diabetes. Now, scientists are working on a new technique to produce cells with insulin-secreting capabilities, which could eventually be used in a transplantation process to help patients with type 1 diabetes.

  
Could artificial insulin-producing cells replace insulin injections for people with type 1 diabetes?

The research, presented this week at the 54th Annual European Society for Pediatric Endocrinology Meeting in Barcelona, Spain, was led by Dr. Philippe Lysy of the Université Catholique de Louvain in Louvain-la-Neuve, Belgium.

[**Type 1 diabetes**](http://www.medicalnewstoday.com/info/diabetes/type1diabetes.php) is an unavoidable condition that develops when the cells in the pancreas that produce [**insulin**](http://www.medicalnewstoday.com/info/diabetes/whatisinsulin.php), known as beta cells, are mistakenly destroyed by the immune system. As a result, the body is unable to create and release insulin - a hormone that regulates the levels of glucose in the blood.

Type 1 diabetes used to be known as "juvenile [**diabetes**](http://www.medicalnewstoday.com/info/diabetes/)," as it tends to develop in young people, especially in the middle teen years. However, it can occur at any age. Type 1 diabetes accounts for approximately 5% of all diagnosed cases of diabetes in the US.

There is no known way to prevent type 1 diabetes, and it can lead to death if not treated. The treatment is normally insulin artificially delivered by injection, or sometimes by pump or oral medication.

Recently, however, scientists have been looking for ways to replace beta cells in order to improve the quality of life for people with type 1 diabetes.

## Cells reprogrammed to secrete insulin

Dr. Lysy's team has already shown human pancreatic duct-derived cells (HDDCs) to be a potentially useful source of cells.

HDDCs are found in the adult pancreas and are progenitor cells, which means they have a tendency to differentiate into specific types of cells.

In this study, the group reprogrammed HDDCs to behave like beta cells and secrete insulin within the pancreas in response to glucose.

**The researchers used the messenger RNA (mRNA) of a transcription factor called MAFA - a protein that controls which genes are turned off or on in the genome. The mRNA is transformed into protein before binding to cellular DNA. This enables changes to occur in cellular functions.**

Using this technique, the researchers avoid any potential genetic modification of the target cells, which would entail risks such as [**cancer**](http://www.medicalnewstoday.com/info/cancer-oncology/).

In a mouse model, they have been able to transplant the manufactured cells into the diabetic mice and are following up on their disease. They are "analyzing the potential of the cells to function and secrete insulin into a body according to blood glucose levels." Dr. Lysy told Medical News Today that it is too early yet to know the results.

Dr. Lysy explains that what makes this work unique is the use of adult tissue, which means that risks related to[**stem cells**](http://www.medicalnewstoday.com/info/stem_cell/), such as cancer, are avoided. It is also novel in that it uses a protocol that modifies the cells with a direct action on DNA without modifying it structurally.

## A technique with future potential

The researchers hope that batches of cells might be produced that could eventually be transplanted into human patients with diabetes. For now, they are continuing to evaluate the conditions that allow the reprogrammed cells to be banked according to good laboratory practice and clinically compatible procedures.

They also hope that this system for cellular reprogramming with transcription factors using mRNA will be applicable to other scientific fields, potentially leading to the production of cells with a new function in the context of other diseases where loss of function has taken place.

With regard to future applications, Dr. Lysy told MNT:

"Our work may help build differentiation strategies in other fields of medicine in which a cell replacement therapy is needed ([**heart disease**](http://www.medicalnewstoday.com/articles/237191.php), skin problems, liver diseases, and so on), but also it may be used to knock down pathological expression of undesired metabolites in metabolic diseases."

Recently, MNT reported on the possibility of an artificial [**pancreas implant for people with type 1 diabetes**](http://www.medicalnewstoday.com/articles/296240.php).

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