

# A new pathway to the regeneration of insulin could mean a major breakthrough in diabetes treatment

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A world-first study by Monash University, in Melbourne, Australia has

discovered a pathway to the regeneration of insulin in pancreatic stem cells, a major breakthrough toward new therapies to treat Type 1 and Type 2 diabetes.

Using the pancreas stem [cells](#) of a type 1 diabetic donor, researchers were able to effectively reactivate them to become [insulin](#)-expressing and functionally resemble beta-like cells through the use of a drug approved by the US Food and Drug Administration but not currently licenced for [diabetes](#) treatment.

Though it requires further work, in principle the new approach would allow insulin-producing cells (beta-cells) that are destroyed in type 1 diabetics to be replaced with newborn insulin generating cells.

The study, led by diabetes experts Professor Sam El-Osta, Dr. Keith Al-Hasani and Dr. Ishant Khurana, from the Monash Department of Diabetes, may lead to a potential treatment option for insulin-dependent diabetes which is diagnosed in seven Australian children every day resulting in a lifetime testing of blood glucose and daily insulin injections, to replace the insulin no longer produced by a damaged pancreas.

As the number of cases of diabetes worldwide approaches 500 million, researchers are scrambling for a limited pool of treatments with unclear effectiveness.

"We consider the research novel and an important step forward towards developing new therapies," Professor El-Osta said. To restore insulin expression in a damaged pancreas, the researchers had to overcome a series of challenges since the diabetic pancreas was often thought to be too damaged to heal.

The findings are now published in the Nature journal, *Signal*

## *Transduction and Targeted Therapy*

According to Professor El-Osta, by the time an individual is diagnosed with Type 1 diabetes much of their [pancreatic beta cells](#), which produce insulin, have been totally destroyed. These studies show the "diabetic pancreas is not incapable of expressing insulin" and the proof-of-concept experiments "address unmet medical needs in type 1 diabetes".

The advances in the genetics of diabetes have brought a "greater understanding and along with it a resurgence of interest in the development of potential therapies," said Professor El-Osta.

"Patients rely on daily insulin injections to replace what would have been produced by the [pancreas](#). Currently, the only other effective therapy requires pancreatic islet transplantation and while this has improved [health outcomes](#) for individuals with diabetes, transplantation relies on organ donors, so it has limited widespread use," said Professor El-Osta.

Co-author of the study, Dr. Al-Hasani says that as we face a globally ageing population and the challenges of escalating numbers of Type 2 diabetes which is strongly correlated with increases in obesity, the need for a cure for diabetes is becoming more urgent," said Dr. Al-Hasani. "Before you get to patients, there are many issues to be resolved," Dr. Al-Hasani said. " More work is required to define the properties of these cells and establish protocols to isolate and expand them", he added. "I would think [therapy](#) is pretty far away, however, this represents an important step along the way to devising a lasting treatment that might be applicable for all types of diabetes."

Prof El-Osta, Drs Al-Hasani and Khurana have developed a revolutionary method to regenerate insulin cells without the [ethical concerns](#) that are commonly associated with embryonic stem cells.

**More information:** Keith Al-Hasani et al, Inhibition of pancreatic EZH2 restores progenitor insulin in T1D donor, *Signal Transduction and Targeted Therapy* (2022). [DOI: 10.1038/s41392-022-01034-7](https://doi.org/10.1038/s41392-022-01034-7)

Provided by Monash University

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