CRISPR editing in pancreatic cells reduced cell death and increased insulin secretion

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With the help of the CRISPR/Cas9 gene scissors, researchers at Lund University Diabetes Centre in Sweden have managed to "turn off" an enzyme that proved to play a key role in the regulation of the diabetes-associated TXNIP gene. The results are decreased cell death and increased insulin production in the genetically modified pancreatic beta cells.

In a recent study, researchers have conducted an investigation on a group of enzymes, histone acetyltransferases (HATs), which play a crucial role in the regulation of the TXNIP gene that, in cases of high blood sugar levels, leads to beta cell death and reduced insulin production.

The researchers compared donated insulin -producing pancreatic islets from type 2 diabetes patients with those from healthy people and discovered that the gene activity of HAT enzymes is twice higher in diabetic cells than in the healthy ones. Following this discovery, the goal was to remove the genetic function of the enzyme to study its effect on diabetes. And this proved to be successful.

Using CRISPR/Cas9, the researchers were able to remove a sequence in the genetic code that controls the function of the HAT enzyme in insulin-producing cells from rats. This resulted in reduced TXNIP gene activity, and thereby reduced cell death and increased insulin production.

"Our research shows that HAT enzymes play a key role in the regulation of TXNIP gene and that by targeting at this mechanism, we improved

insulin secretion and prevent cell death", says researcher Yang De Marinis who led the study. She adds:

"CRISPR/Cas9 is one of the most important discoveries in molecular genetics made in recent years, and we are very happy to have managed to establish this cutting-edge technology in our research team. It opens up new possibilities to study the function of an endless number of genes related to diabetes. We are now working hard to further develop this technology to make it as efficient and accurate as possible."

More information: Pradeep Bompada et al. Histone acetylation of glucose-induced thioredoxin-interacting protein gene expression in pancreatic islets, *The International Journal of Biochemistry & Cell Biology* (2016). DOI: 10.1016/j.biocel.2016.10.022

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