

## **Cause of diabetes may be linked to iron transport**

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Scientists have been trying to explain the causes of diabetes for many years. Researchers at the University of Copenhagen and Novo Nordisk A/S have now shown that the increased activity of one particular iron-transport protein destroys insulin-producing beta cells. In addition, the new research shows that mice without this iron transporter are protected against developing diabetes. These results have just been published in the prestigious journal *Cell Metabolism*.

Almost 300,000 Danes have diabetes – 80 per cent have type-2 diabetes, a so-called lifestyle disease. The number of people with diabetes doubles every decade and the disease costs Danish society about DKK 86 million per day. People develop diabetes when the beta cells in their pancreas do not produce enough insulin to meet their body's needs. New research from the University of Copenhagen and <u>Novo Nordisk</u> A/S links this defect to one particular cellular <u>iron</u> transporter:



"Iron is a vital mineral for the healthy functioning of the body and is found in many enzymes and proteins, for example, the red blood pigment that transports oxygen. But iron can also promote the creation of toxic <u>oxygen radicals</u>. An increase in the iron content of the cells may cause tissue damage and disease. We find that increased activity of a certain iron transporter causes damage to the beta cell. And if we completely remove this iron transporter in the beta cells in genetically engineered mice, they are indeed protected against diabetes," explains Professor Thomas Mandrup-Poulsen, Department of Biomedical Sciences, The Faculty of Health and Medical Sciences.

## Surplus iron increases diabetes risk

Together with Christina Ellervik, Associate Professor and Professors Børge Nordestgaard and Henrik Birgens from the University of Copenhagen, Thomas Mandrup-Poulsen has previously documented a connection between surplus iron and <u>diabetes risk</u>, based on large population studies. But this is the first time that scientists have found a link between inflammation and <u>iron transport</u>, which appears to be the underlying cause of the observed higher risk:

"We need to conduct controlled clinical trials showing that changes in the <u>iron content</u> of the body can reduce the risk of diabetes. Only then will we be able to advise people at risk of diabetes not to take iron supplements, or recommend drug treatment to reduce the amount of iron in the body," says Thomas Mandrup-Poulsen.

## The evolutionary explanation

The team behind the scientific article in <u>Cell Metabolism</u> can see that the inflammatory signal substances created around the beta cells in both type-1 and type-2 diabetes accelerate the activity of the iron transporter.



"The evolutionary explanation of why the highly specialised beta cells are influenced by the inflammatory signal substances and contain the potentially dangerous iron transport proteins is presumably that the shortterm increase in the amount of oxygen radicals is critical to the finetuning of insulin production during bouts of fever and stress. However, nature had not foreseen the long-term local production of signal substances around the <u>beta cells</u>, which we see in type-1 and type-2 diabetes," continues Thomas Mandrup-Poulsen.

The new results have implications for many scientists, not only those conducting research in diabetes. The beta cell can be used as a model for other cells that are particularly sensitive to iron, such as liver cells and cardiac-muscle cells.

Provided by University of Copenhagen

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