

Molecular link between diabetes and cancer described

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Developing type 2 diabetes is a lengthy process. An early sign that it has begun is high levels of insulin in the blood. As long as the insulin-producing beta cells are able to compensate for the increased demand, for example when the individual is overweight, the blood sugar levels remain normal. It is not until the capacity for insulin secretion falls below the level needed that type 2 diabetes becomes a fact. The latter stage generally goes quickly, as the stressed beta cells work themselves to death.

"We have worked with the most well-known risk gene for [type 2 diabetes](#), a variant of the TCF gene, and have studied its function in the beta cells", says Yuedan Zhou, a [doctoral student](#) at the Lund University Diabetes Centre and principal author of the published study.

The risk variant of TCF is common, 25 per cent of the population carry it and 31 per cent of diabetics, according to figures from the Malmö Preventive Project population survey.

An equally well-established [risk](#) gene in cancer research is p53. The gene has been called the "protector of the genome" because it prevents the uncontrolled cell division that takes place in cancer. The p53 gene has been linked to protection against colon and liver cancer, among others.

"The function of the TCF gene in the beta cells is to protect the cells against high, stressful [blood sugar levels](#). If that function fails, the beta cells die, which leads to diabetes", says Ola Hansson, researcher and principal author of the survey.

The two genes work in concert, TCF protects against cell death, while p53 prevents excessive cell division.

"It is here that the connection between diabetes and cancer arises. When the blood sugar levels

are high, the TCF gene is activated and this impedes the activity of the p53 gene thereby protecting the [beta cells](#) from cell death" .

The research group began working with the TCF gene two years ago to understand its role in insulin production. The discovery of the link with p53 and cancer was mostly by chance.

"Or good intuition", they say.

The mapping of the TCF gene is continuing, this time in collaboration with the European Bioinformatics Institute in Cambridge.

Cancer researchers are working to try and influence p53 so that its tumour-preventing function is restored.

"In a similar way, strengthening the protective function of TCF against beta cell death in connection with high blood sugar would work as a drug for type 2 [diabetes](#), or as a treatment before the disease has even developed fully", says Ola Hansson.

More information: 'Survival of pancreatic beta cells is partly controlled by a TCF7L2-p53-p53INP1-dependent pathway'. The study was published in the scientific journal *Human Molecular Genetics*.

Provided by Lund University

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