

# **New study investigates how exposure to certain triggers can increase the risk of type 1 diabetes**

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Lead researcher Professor Jenny Gunton. Credit: The Westmead Institute for Medical Research

A new study has investigated how exposure to certain triggers can increase the risk of type 1 diabetes.

Researchers from The Westmead Institute for Medical Research are looking at an array of potential triggers that could increase the risk of type 1 [diabetes](#). Results of a recent study have shown how exposure to coxsackievirus can increase this risk. Coxsackievirus is a common virus that causes diseases including myocarditis, Hand, Foot and Mouth Disease and gastroenteritis.

The study discovered a key transcription factor (proteins that help turn specific genes on or off) called hypoxia inducible factor 1-alpha (HIF-1A) is behind this increase in risk. Researchers found that mice missing HIF-1A in [beta cells](#) ( $\beta$ -cells) had a much higher risk of type 1 diabetes after infection with viruses, including coxsackievirus. Lack of  $\beta$ -cell HIF-1A increased  $\beta$ -cell death and, in turn, increased the incidence of type 1 diabetes.

Lead researcher Professor Jenny Gunton said the findings highlight the key role  $\beta$ -cells play in the risk of diabetes.

"If they are healthy, then  $\beta$ -cells recover normally after stresses like viral infections, and diabetes does not develop. But, if  $\beta$ -cells don't cope well with these stresses, it can trigger the immune process that leads to type 1 diabetes.

"Our study also showed that the increase in diabetes risk can result from exposure to other stresses, including toxins. So  $\beta$ -cells play a crucial part in preventing their own death when faced with environmental triggers for type 1 diabetes.

"We have now identified that HIF-1A is an important factor in this decision about whether the cells recover, or die. This is the first  $\beta$ -cell specific model to show increased risk of type 1 diabetes with a range of triggers," said Professor Gunton.

The findings highlight HIF-1A as a potential pathway for the development of new preventative measures and suggest the possibility that a vaccine for coxsackievirus could help prevent type 1 diabetes in at-risk people.

This comes at a crucial time, as rates of type 1 diabetes are increasing worldwide.

Type 1 diabetes is an autoimmune condition where the immune system attacks and kills  $\beta$ -cells in the pancreas. These are the only cells in the body that make insulin, which we need to control our [blood glucose](#) (sugar) levels.

Professor Gunton said, "While there is a strong genetic component to type 1 diabetes, genes alone cannot explain the rising global rates of type 1 diabetes. Currently, the only cures for type 1 diabetes are whole pancreas or islet transplantation, and people have to take insulin for the rest of their lives. So potential preventative strategies are exciting."

**More information:** Amit Lalwani et al,  $\beta$  Cell Hypoxia-Inducible Factor-1 $\alpha$  Is Required for the Prevention of Type 1 Diabetes, *Cell Reports* (2019). [DOI: 10.1016/j.celrep.2019.04.086](https://doi.org/10.1016/j.celrep.2019.04.086)

Provided by Westmead Institute for Medical Research

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