

New research reveals how vitamin K helps protect against diabetes

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Canadian researchers have identified a new role for vitamin K and gamma-carboxylation in beta cells and their potentially protective role in diabetes, achieving a first in 15 years of basic research.

The discovery by scientists at Université de Montréal and its affiliated Montreal Clinical Research Institute (IRCM) is a welcome advance in the understanding of the mechanisms underlying diabetes, a disease that affects one in 11 people worldwide and has no cure.

Published May 11 in *Cell Reports*, the study explains, at least in part, how vitamin K helps prevent diabetes, and could lead to new therapeutic applications for type 2 diabetes.

Vitamin K is a micronutrient known for its role in blood clotting, in particular in gamma-carboxylation, an enzymatic reaction essential to the process. It has been suspected for several years that this vitamin, and thus gamma-carboxylation, may have other functions as well.

Several studies suggest a link between a reduced intake of vitamin K and an increased risk of diabetes. However, the biological mechanisms by which vitamin K protects against diabetes remained a mystery until now.

Enzymes in large quantities

In their study, UdeM associate research professor of medicine Mathieu Ferron and his team at the IRCM were first able to determine that the enzymes involved in gamma-carboxylation and therefore in the use of vitamin K were present in large quantities in pancreatic [beta cells](#), the very cells that produce the precious insulin that controls blood sugar levels.

"Diabetes is known to be caused by a reduction in the number of beta cells or by their inability to produce enough insulin, hence our keen interest in this novel finding," said Ferron, a leading researcher in molecular biology. "In order to elucidate the cellular mechanism by which vitamin K maintains beta cell function, it was essential to determine which protein was targeted by gamma-carboxylation in these

cells."

"We were able to identify a new gamma-carboxylated protein called ERGP," added Julie Lacombe, who conducted the work in Ferron's laboratory. "Our study shows that this protein plays an important role in maintaining physiological levels of calcium in beta cells in order to prevent a disturbance of [insulin secretion](#). Finally, we show that vitamin K through gamma-carboxylation is essential for ERGP to perform its role."

This is the first time in 15 years that a novel vitamin K-dependent protein has been identified, opening a new field of research in this area.

More information: Julie Lacombe et al, Vitamin K-dependent carboxylation regulates Ca²⁺ flux and adaptation to metabolic stress in β cells, *Cell Reports* (2023). [DOI: 10.1016/j.celrep.2023.112500](https://doi.org/10.1016/j.celrep.2023.112500)

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