Medical Xpress

Gut microbiota forms a molecule that can contribute to diabetes progression

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It is the bacterial changes in the gut that increase the levels of imidazole propionate, the molecule that makes the body's cells resistant to insulin in type 2 diabetes. This result emerges from a European study, that

confirms previous studies from the University of Gothenburg.

In previous research led by Fredrik Bäckhed, professor of molecular medicine at the University of Gothenburg, the study demonstrated that diabetes can be linked to a change in the composition of intestinal bacteria, which increases the production of molecules that may contribute to the disease.

His group has shown that the altered intestinal microbiota leads to altered metabolism of the amino acid histidine, which in turn leads to increased production of imidazole propionate, the molecule that prevents the blood sugar-lowering effects of insulin.

An article published in the journal *Nature Communications* now confirms the initial findings in a large European study with 1,990 subjects, which shows that patients with type 2 diabetes from Denmark, France and Germany also had increased levels of imidazole propionate in their blood.

"Our study clearly shows that imidazole propionate is elevated in type 2 diabetes in other populations as well," says Fredrik Bäckhed, and continues:

"The study also shows that the levels of imidazole propionate are elevated even before the diabetes diagnosis is established, in so-called prediabetes. This may indicate that imidazole propionate may contribute to disease progression."

The altered gut microbiota observed in people with type 2 diabetes has fewer species than normal glucose tolerant individuals, which is also linked to other diseases. The researchers speculate that this leads to altered metabolism of the amino acid histidine.

Importance of gut microbiota composition

The EU-funded research collaboration MetaCardis has been led by Karine Clément, Professor of Nutrition at Sorbonne University in Paris.

"Interestingly enough, our findings suggest that it is the altered intestinal microbiota rather than the histidine intake in the diet that affects the levels of imidazole propionate." She continues, "An unhealthy diet also associates with increased imidazole propionate in individuals with type 2 diabetes."

One problem with research on microbiota and various diseases has been limited reproducibility. By studying the products that the bacteria produce, the metabolites, one focuses on the function of the bacteria rather than on the exact species in the intestine.

"The collaboration gave us unique opportunities to confirm preliminary findings that imidazole propionate can be linked to type 2 diabetes," said Bäckhed. "Here we had the opportunity to analyze almost 2,000 samples and can thus determine that elevated levels of imidazole propionate can be linked to type 2 diabetes. As the levels are elevated even in prediabetes, imidazole propionate may also cause the disease in some cases," he says.

More information: Imidazole propionate is increased in diabetes and associated with dietary patterns and altered microbial ecology, *Nature Communications* (2020). DOI: 10.1038/s41467-020-19589-w

Provided by University of Gothenburg