

New way to prevent heart disease in type 1 diabetes

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Scientists reveal the mechanism which allows a commonly prescribed drug for type 2 diabetes to prevent heart disease in patients with type 1 diabetes—and could lead to new treatments.

Metformin is an inexpensive treatment that is often used for type 2 [diabetes](#) to lower [blood sugar levels](#) by reducing glucose production in the liver. The drug is not regularly given to patients with type 1 diabetes.

A clinical trial has revealed [metformin](#) can promote a patient's ability to repair their own damaged blood vessels by decreasing the presence of microRNAs (miRs) which increases the growth of blood vessels—in addition to improving [glucose levels](#).

These microRNAs are messenger molecules which with regulate different genes in different cells.

Dr. Jolanta Weaver, Senior Lecturer in Diabetes Medicine at Newcastle University and Honorary Consultant Diabetologist at Queen Elizabeth Hospital, Gateshead, led the clinical trial at the Gateshead hospital and is lead author of the work being published today in the *International Journal of Molecular Sciences*. She said: "This is an exciting development as understanding this underlying mechanism opens up the possibility of new forms of treatment which will lower the chances of patients with type 1 diabetes developing [heart disease](#).

"As the outcomes of [heart](#) disease are worse in [diabetic patients](#) compared to people who don't have diabetes, there is a need to identify additional treatment options.

"Our previous study showed that the vascular stem cells were improved by metformin so this was the first example how metformin improved heart disease as well as lowering glucose levels.

"Now we know that the drug metformin was able to do this by lowering the presence of microRNAs."

A previous study revealed the potential of metformin to slow the

development or delay heart disease however, this is the first time that the potential of miRs in preventing heart disease have been identified.

Clinical trial

The study – known as MERIT—was the first to test metformin for the cardioprotective effects in type 1 diabetes patients. In an open label, case-controlled study, the treatment group consisted of 23 people, aged between 19 and 65, with type 1 diabetes who were free of cardiovascular disease. They were treated with metformin for 8 weeks.

Patients in the treatment group were matched with a standard group of nine type 1 diabetic patients taking standard insulin. Additionally, there were 23 participants in the "healthy" control group without diabetes.

At the start of the study, the anti-angiogenic microRNAs, miR-222, miR-195, and miR-21a were detected to be higher in type 1 diabetic patients compared to the control group. However, metformin [treatment](#) successfully reduced the levels of miR-222, miR-195, and miR-21a.

Moreover, as the levels of miR-222 lowered, there was a corresponding decrease in the amount of circulating endothelial cells, which indicates an improvement in vascular repair.

Dr. Weaver adds: "These results confirm that as well as improving a patient's blood sugar control, metformin is working to protect the heart."

The team will now be working to further the work with the goal of developing new therapies based on regulating the levels of microRNAs.

More information: Anti-Angiogenic miR-222, miR-195, and miR-21a Plasma Levels in T1DM Are Improved by Metformin Therapy, Thus Elucidating Its Cardioprotective Effect: The MERIT Study *Int. J.*

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