

Discovery points to a way to reverse suffering of diabetic nerve pain

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For people with diabetes who suffer from peripheral neuropathy, a gentle touch can be agony. A warm shower can be torture. New research at the University of Virginia School of Medicine, however, has shed light on the causes of this common diabetes complication – and may ultimately offer a way to reverse it.

"Normally pain is useful information because it alerts us that there is a damaging effect – something happening to tissues. But this pain is typically without any obvious reason," U.Va. researcher and anesthesiologist Dr. Slobodan M. Todorovic said. "It's because nerves are being affected by high levels of glucose in the blood. So nerves start working on their own and start sending [pain signals](#) to the brain. It can be a debilitating condition that severely affects quality of life."

Todorovic and Dr. Vesna Jevtovic-Todorovic, Harold Carron Professor of Anesthesiology and Neuroscience at U.Va., have been able to reverse the condition of peripheral diabetic neuropathy in mice using a substance that is naturally present in humans and animals.

"Our hope," he said, "is that we can do clinical studies in humans in the near future to show that this is a new treatment that is promising for patients."

Scientists have known that diabetic neuropathy is caused by excess glucose in the blood, but the new findings shed light on how this happens. The U.Va. researchers and their collaborators found that high

levels of blood sugar change the structure of channels that allow calcium into [nerve cells](#), essentially throttling them open. Excess calcium floods into the cells, the cells become hyperactive, and the effect can range from tingling in the arms and legs to unbearable pain.

That understanding could be extremely important not just for treating diabetic neuropathy, a condition that affects 60 percent to 70 percent of people with diabetes, but for other conditions that cause [chronic pain](#), such as [nerve injuries](#) from accidents or wounds veterans received in combat. "We found the function of these channels is similarly affected in these conditions," Todorovic said.

It's extremely important to find new treatments for diabetic neuropathy because of the growing prevalence of diabetes and the limitations of existing options, the Todorovics said. For example, a commonly used drug, helpful for some but not all patients, often causes significant fatigue.

"A lot of patients decide to cope with the pain rather than to be sleepy all day," Todorovic said. The substance the U.Va. researchers are testing, on the other hand, does not cause drowsiness, because it works on the nerves rather than in the brain.

"A lot of drugs will completely shut down function of the channel, and that, in humans, we know will cause side effects. ... If you completely block it, then you can have a complete lack of sensation, which is not good either," Todorovic said. "So we're trying to find something that would work in between."

"In some ways, you can think about it as going back to the baseline," Jevtovic-Todorovic said. "It's not a complete blockade; it's a normalization."

The new findings have been published online by the journal *Diabetes* and will appear in a forthcoming print edition. The U.Va. researchers hope that reversing the early stages of [diabetic neuropathy](#) could prevent the complete loss of feeling associated with the advanced stages of the disease.

Provided by University of Virginia

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