

Eating in sync with biological clock could replace problematic diabetes treatment

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Type 2 diabetics inject themselves with insulin, a hormone that regulates the movement of sugar into liver, muscle and fat cells, up to four times a day. But insulin injections are linked to weight gain and the loss of

control of blood sugar levels. This triggers a vicious cycle of higher insulin doses, continuous weight gain, a higher incidence of cardiovascular disease and other complications.

A new Tel Aviv University study finds that a starch-rich breakfast consumed early in the morning coupled with a small dinner could replace insulin injections and other [diabetes medications](#) for many diabetics.

"The traditional diabetic diet specifies six small meals spread throughout the day. But our research proposes shifting the starch-rich calories to the early hours of the day. This produces a glucose balance and improved glycemic control among type 2 diabetics," explains Prof. Daniela Jakubowicz of TAU's Sackler Faculty of Medicine and Wolfson Medical Center's Diabetes Unit. "We believe that through this regimen it will be possible for diabetics to significantly reduce or even stop the injections of insulin, and most of antidiabetic medications, to achieve excellent control of glucose levels."

Prof. Jakubowicz is the lead author of the study, the result of a collaboration with Prof. Julio Wainstein and Dr. Zohar Landau of Wolfson Medical Center's Diabetes Unit and Prof. Oren Froy and Dr. Shani Tsameret of the Hebrew University of Jerusalem. The research was published in *Diabetes Care* in December.

According to the new research, our metabolism and [biological clock](#) are optimized for eating in the morning and for fasting during the evening and night, when we are supposed to be asleep. "But the usual diet recommended for type 2 diabetes consists of several small meals evenly distributed throughout the day—for example, three meals and three snacks daily, including a snack before going to sleep to prevent a drop in sugar levels during the night," Prof. Jakubowicz says.

"But the '6M-diet,' as this is called, has not been effective for sugar

control, so diabetics require additional medication and insulin. And [insulin injections](#) lead to weight gain, which further increases blood sugar levels," Prof. Jakubowicz adds.

The researchers studied 29 type 2 diabetes participants and compared a new "3M-diet," more in alignment with our biological clock, with a [control group](#) on the traditional 6M-diet. The experimental 3M-diet comprises a meal of bread, fruits and sweets in the early hours of the morning; a substantial lunch; and a small dinner specifically lacking starches, sweets and fruits.

The group on the traditional 6M-diet did not lose weight and did not experience any improvement of sugar levels, requiring an increase in medication and insulin doses. But the group on the 3M-diet not only lost weight but also experienced substantially improved sugar levels.

"Their need for diabetic medication, especially for insulin doses, dipped substantially. Some were even able to stop using insulin altogether," adds Prof. Jakubowicz. "In addition, the 3M-diet improved the expression of biological clock genes. This suggests that the 3M-diet is not only more effective in controlling [diabetes](#). It may also prevent many other complications such as cardiovascular disease, aging and cancer, which are all regulated by the biological clock genes."

The upregulation of the biological clock gene expression in the 3M-diet might be the mechanism behind its success, as it enhances [insulin](#) secretion and improves [sugar](#) delivery into the muscles, creating a balanced daytime and nocturnal glucose metabolism. The researchers are now investigating the role certain proteins play in breakfast foods consumed by diabetics.

More information: Daniela Jakubowicz et al, Reduction in Glycated Hemoglobin and Daily Insulin Dose Alongside Circadian Clock

Upregulation in Patients With Type 2 Diabetes Consuming a Three-Meal Diet: A Randomized Clinical Trial, *Diabetes Care* (2019). DOI: [10.2337/dc19-1142](https://doi.org/10.2337/dc19-1142)

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