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Breakthrough at IIT Kanpur opens new direction in diabetes research

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IIT Kanpur scientists discover how immune cells silence insulin, a new clue in fight against diabetes



In a breakthrough that changes our understanding of how diabetes develops, researchers at the Indian Institute of Technology Kanpur (IIT Kanpur) have found that immune cells inside the pancreas can switch off insulin release within minutes and have identified the molecular switch that allows them to do it.

The study published in the Journal of Clinical Investigation, one of the leading biomedical journals in the world, was jointly led by Simran Singh and Ashish Kumar, who are the co-first authors of the research, under the supervision of Dr Sai Prasad Pydi at the Department of Biological Sciences and Bioengineering, IIT Kanpur.

The team has also confirmed that the same pathway is present and active in human pancreatic tissue, which makes it a target for drugs meant to protect insulin production in people with obesity and type 2 diabetes.

"We discovered that immune cells that are present next to beta cells can switch off insulin release within minutes," said Dr Sai Prasad Pydi, Assistant Professor in the Department of Biological Sciences and Bioengineering at IIT Kanpur who led the study. "And they do it without giving any of the classical inflammation signals we have been studying for decades. The findings change our fundamental understanding of how immune cells influence insulin production. The effect is not slow damage from inflammation but instruction that is delivered in minutes. The fact that this works the same way in human tissue is what makes it exciting, It is not just a finding in tissues of laboratory mice, but a real biological circuit that could be targeted with a drug "

The team used a precision genetic technique that allowed them to switch a single signalling pathway on or off inside immune cells. Activating this pathway in macrophages caused a sharp reduction in insulin release in mouse models. Conversely, switching the same pathway off had the opposite effect, with insulin secretion improving.

While the study does not offer a treatment for diabetes, the validation establishes a foundation for further research into how disrupting the pathway can help preserve insulin secretion in people with obesity and type 2 diabetes.