

Intranasal insulin improves cognitive function in patients with type 2 diabetes

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In recent years, the link between type 2 diabetes and dementia has become widely recognized. Older individuals with diabetes develop Alzheimer's disease at an earlier age, and are more likely to develop vascular dementia than people who do not have diabetes.

Now, a small proof-of-concept study led by investigators at Beth Israel Deaconess Medical Center (BIDMC) offers promise of a new treatment for this widespread problem. Currently published on-line in the journal *Diabetes Care*, the study results show that a single dose of intranasal insulin can help improve cognitive function in patients with diabetes.

"We know that diabetes accelerates brain aging," explains first author Vera Novak, MD, PhD, an investigator in the Department of Neurology at BIDMC, who conducted this research as a faculty member in BIDMC's Department of Medicine. "If we consider that there are more than 45 million people with diabetes in the U.S. alone and that older adults are the fastest growing segment of the diabetes population, we realize what an extremely serious problem we're facing."

In the brain, insulin helps to regulate signaling and connections among neurons and also regulates vascular functions. Central insulin receptors are abundant and yet are mostly dependent upon insulin transport through the blood-brain barrier. Therefore, inadequate insulin delivery may affect perfusion and cortical activity in brain regions associated with high-energy demands, such as cognitive networks.

"Previous studies had suggested that augmenting cerebral insulin may enhance cognitive function," says Novak, an Associate Professor of Neurology at Harvard Medical School. Intranasal administration delivers insulin directly to the brain, bypassing the blood-brain barrier and reaching receptors in multiple brain regions within minutes after administration.

In this pilot study, the authors tested whether similar effects would be observed in patients with diabetes. Fifteen patients with diabetes and 14 healthy older adults, average age 62, were administered a single 40-unit dose of insulin or saline in a randomized order on two subsequent days. Measurements of brain function were then made using regional perfusion and vasodilatation with 3 Tesla MRI and neuropsychological evaluation of learning and memory.

"We observed in both the healthy subjects and the patients with diabetes that there was an improvement in both verbal learning and visual-spatial learning and memory after they received the insulin," explains Novak. Through imaging tests, the investigators also learned that these improvements were dependent on the brain's vascular function.

"Our findings provide preliminary evidence that intranasal insulin administration appears safe in older adults, and does not lead to low sugar levels," says Novak. "Intranasal insulin may potentially improve learning and memory in [older adults](#) with and without diabetes, through vascular mechanisms. However, larger and longer duration studies are needed to determine whether intranasal [insulin](#) may provide long-term benefits for memory in older patients with [diabetes](#)."

Provided by Beth Israel Deaconess Medical Center

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