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What Is Type 3 Diabetes?

Rather than a third type of the disorder, this phrase refers to the proposed link between Alzheimer's and diabetes.

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You've heard of [type 1 diabetes](#), and you know what [type 2 diabetes](#) is. But if you've ever heard the phrase "type 3 diabetes," you've probably wondered what that refers to. Before we get into that, let's make clear what type 3 diabetes *isn't*: True diabetes. Instead, it's a catchy way to refer to the link between insulin resistance and Alzheimer's disease, says [Domenico Praticò, M.D.](#), the director of the Alzheimer's Center at Temple University in Philadelphia, PA.

So what does Alzheimer's have to do with [diabetes](#)? Here, experts break down the connection between blood sugar and the brain, warning signs of an issue, and tips for prevention.

The Diabetes-Alzheimer's Link

[Alzheimer's disease](#) is the most common type of dementia, accounting for about 60% to 80% of cases, according to the [Alzheimer's Association](#). The prevailing theory is that it's driven—at least in part—by the buildup of beta-amyloid plaques and tau tangles (tiny protein fragments) in the brain. But scientists are still learning about how this disease develops and why it occurs in some people but not others, says Dr. Praticò.

“Alzheimer's is multifactorial,” he says. “It's not a disease caused by one agent, like a virus.” Additionally, he says there are likely several subsets of the condition; in some (but not all) patients, a problem with insulin signaling in the brain could be a major culprit. The evidence that dysregulated brain insulin signaling may play a key role in the development of [Alzheimer's disease](#) is continuing to mount, as explained in a recent [research review](#).

This is what people are referring to when they say “type 3 diabetes.” Dr. Praticò believes that “diabetes of the brain” might be a somewhat more accurate description. Scientists are more apt to refer to it as a dysregulation of brain insulin signaling, which is, admittedly, a mouthful.

Real diabetes, says Dr. Praticò, occurs when the pancreas doesn't produce enough [insulin](#) (a hormone that controls blood sugar levels) or the body doesn't respond to it properly (known as [insulin resistance](#)), so blood sugar levels get dangerously high. In a healthy person, insulin helps move sugar out of the bloodstream and into cells; if you lack adequate insulin or are insulin resistant, the sugar lingers in the blood. When blood sugar levels get high enough, you have diabetes, according to the [Cleveland Clinic](#).

Someone who has “type 3 diabetes,” may or may not also have type 2 diabetes, but the issue here isn't what's going on in the bloodstream, says Dr. Praticò. The problem is that the *brain* is lacking adequate insulin or not responding to it properly.

“The brain uses glucose as the first and most important source of energy,” he says. Without the proper amount and functioning of insulin in the brain, glucose can't get into the neurons (nerve cells), essentially starving them of adequate fuel to function, says Dr. Praticò. This is one mechanism by which cognitive decline is hypothesized to occur.

Type 3 Diabetes vs. Type 3C Diabetes

While the names are similar, what's referred to as type 3 diabetes should not be confused with type 3C diabetes. Also called pancreatogenic diabetes, type 3C is an official form of diabetes that happens when cancer or another problem severely damages the pancreas or necessitates its removal, according to the [Cleveland Clinic](#).

Risk Factors

Type 3 Diabetes Risk Factors

You do not have to have type 1 or type 2 diabetes to have a problem with insulin signaling in the brain, says Dr. Praticò. However, people with diabetes are probably at higher risk for this type of dysfunction.

Scientists already know that having diabetes increases the risk of developing Alzheimer's, as well as other forms of dementia, including vascular dementia, according to the [National Institute of Diabetes and Digestive and Kidney Disorders](#) (NIDDK).

"Alzheimer's disease is not diabetes, nor is diabetes Alzheimer's disease," says [Heather M. Snyder, Ph.D.](#), the vice president of medical and scientific relations for the Alzheimer's Association in Chicago. "That said, [research studies](#) have identified diabetes as a risk factor for cognitive decline, including Alzheimer's."

How long you have diabetes might matter. One recent study, published in [JAMA](#), found that being diagnosed with type 2 diabetes at a young age increases the odds of later developing dementia.

It's worth noting that diabetes can impact the brain in numerous ways. People with high glucose levels are more apt to have beta-amyloid plaques in the brain, says Snyder. (Researchers have [many theories as to why](#), including that high glucose levels increase [inflammation](#) throughout the body and brain, allowing more of those plaques to form.) Additionally, if diabetes is not well-controlled, chronically high glucose levels can damage blood vessels throughout the body, including in the brain, according to the [NIDDK](#). This could lead to vascular dementia, which is a different type of dementia than Alzheimer's disease but causes similar symptoms, according to the [Mayo Clinic](#).

Diagnosis

Type 3 Diabetes Diagnosis

Despite its existence as a lay term, neither the Alzheimer's Association nor the American Diabetes Association considers "type 3 diabetes" to be an accepted medical term, so it's not a diagnosis you're likely to be given. However, it might be possible for someone with early signs of dementia to find out if they have a problem with insulin signaling in their brain thanks to an imaging test called FDG-PET, says Dr. Praticò.

During this scan, [given to people who may have both Alzheimer's and dementia](#), a patient is given an injection of glucose that's laced with a tracer chemical so doctors can measure the rate at which sugar moves into the neurons, says Dr. Praticò. If sugar is metabolized too slowly, it's a sign that there's a lack of insulin in the brain or a problem with how the neurons in that region are responding to insulin.

Symptoms

Type 3 Diabetes Symptoms

Type 3 diabetes—dysregulated insulin signaling in the brain—can certainly cause symptoms, says Dr. Praticò. These symptoms are the same ones associated with Alzheimer's disease and other forms of dementia, and they might develop for a reason unrelated to insulin. According to the [National Institute on Aging](#), signs of mild Alzheimer's disease may include:

- **Asking the same question over and over.** This suggests that someone is struggling with short-term memory and recall.
- **Losing or misplacing items, especially if they end up somewhere strange.** This is more than, "Where did I put my keys?" says Dr. Praticò. Someone with signs of Alzheimer's or another form of dementia might put their keys somewhere a cognitively healthy person never would, like inside the refrigerator.
- **Memory loss that impacts daily life.** Imagine forgetting how to do basic tasks, like brushing your teeth or putting on your socks.
- **Mood changes.** Increasing anxiety and aggression are sometimes associated with Alzheimer's.
- **Wandering or getting lost.** Anyone can get lost, but healthy people do not typically get lost in their own neighborhood or other familiar settings.

Someone who exhibits these symptoms doesn't necessarily have Alzheimer's disease, says Dr. Praticò, but they should be evaluated. They might have a different type of dementia, including

potentially reversible forms like those caused by a vitamin B12 deficiency or [hypothyroidism](#), he says.

Treatment

Type 3 Diabetes Treatment

Since “type 3 diabetes” isn’t a disease in and of itself, you shouldn’t be surprised to learn that there’s no direct treatment for it. Scientists still need to learn more about how insulin works in the brain.

“Research indicates that insulin is used by the brain in different ways than other organs. That is in part because the brain is protected by the blood-brain barrier, and therefore is somewhat separate from what may or may not influence the surrounding environment,” says Synder.

Determining whether medication designed to treat [prediabetes](#) or type 2 diabetes might have brain benefits is an active area of scientific investigation. Researchers have tried to use diabetes drugs to treat people with Alzheimer’s, but so far they haven’t seen a benefit, says Snyder. However, more research is ongoing, and scientists remain hopeful that some diabetes drugs might pave the way for new therapies that treat Alzheimer’s or even prevent it, she adds.

Prevention

Preventing Type 3 Diabetes

The Alzheimer’s Association is currently supporting research on using diabetes drugs preventively for cognitive diseases like Alzheimer’s. One study, called [Met-FINGER](#), aims to determine whether the combination of [metformin](#) (a common oral diabetes drug) and lifestyle changes can improve memory in people who are at risk for Alzheimer’s. [Another study](#) is investigating the impact that inhaled insulin and empagliflozin (an oral [diabetes medication](#)) might have on changes in the fluid surrounding the brain and spinal cord, as well as blood flow patterns in the brain.

For now, the best way to reduce your risk of having insulin-related cognitive problems—or perhaps even reverse early symptoms of dementia—is to focus on making healthy lifestyle changes, says Dr. Praticò. He advises:

- **Follow a Mediterranean-style diet.** It’s been associated with a host of health benefits, including a lower risk of Alzheimer’s disease. One recent study, published in [Neurology](#),

found that people who loaded up on healthy foods including leafy greens, whole grains, nuts, and berries had almost a 40% lower odds of developing plaques and tangles in their brain (which are associated with Alzheimer's).

- **Eat fewer refined carbs.** On that note, a diet that's high in refined carbohydrates (think: white pasta, crackers, sweets) is associated with an increased risk of dementia and Alzheimer's disease in some people (those who carry the [e4 allele of the apoe gene](#), a risk factor for developing Alzheimer's disease), reports a study in the journal [Alzheimer's & Dementia](#).
- **If you have prediabetes or diabetes, get it under control ASAP.** People with these conditions face a higher risk of Alzheimer's and other forms of dementia—but the real problem is that many let their diabetes go unchecked, says Dr. Praticò. Keeping your blood glucose well-controlled goes a long way toward reducing your risk of developing a variety of diabetes complications, including cognitive problems.
- **Walk every day for at least 20 minutes.** Physical activity improves insulin sensitivity, including in the brain, he says.

Takeaways

Type 3 diabetes isn't an established condition, but emerging science suggests that the link between defective insulin signaling in the brain and Alzheimer's is worth taking seriously.

"In the future, we'll hopefully have many new treatments, perhaps including one that corrects insulin signaling problems in patients who have this issue," says Dr. Praticò. "I'm optimistic."

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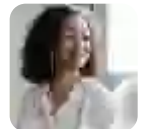
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