

DIABETES AND DEMENTIA

THE CONNECTION BETWEEN DIABETES AND COGNITIVE DECLINE

BY ANDREW CURRY



maglyvi/Thinkstock (brain illustration); Highwaystarz-Photography/Thinkstock (MRI image)



Sandy Asherman's first doctor, the pioneering endocrinologist Elliott Joslin, instilled in her the importance of tight blood glucose management. By the time she met her husband, Ira, managing her type 1 diabetes was almost second nature: She could look at a plate of food and mentally calculate the amount of insulin she'd need.

Ten years ago, at age 68, she started having memory lapses, such as forgetting the location of her gym, a place she visited at least once a week. A specialist gave her a diagnosis of mild cognitive impairment and suggested she come in for regular evaluations but otherwise continue life as usual. "It didn't get in the way at all," Ira Asherman says. "We continued to travel, work, go to the theater, and generally have a good time."

But then, about four years ago, Sandy's cognitive impairment slowly began to worsen. She's now living with Alzheimer's disease. What used to come easily—checking her blood glucose, counting carbs, and injecting insulin, for example—is now complicated by her memory loss. She's able to insert her own insulin pump infusion set, and that's about it. "Cognitive decline means losing the ability to do things that were second nature," says Ira. "Add to that the diabetes, and life becomes a lot more complicated."

RISING RATES

The Ashermans are living through an increasingly common phenomenon: aging with a combination of diabetes and dementia. Studies show that diabetes is a major risk factor for dementia, the blanket term for conditions such as Alzheimer's disease and vascular dementia that afflict mostly older people. Alzheimer's disease is caused by the deterioration of brain tissue and the buildup of plaque (formed by protein deposits) on and around neurons, the cells that make the brain work. Vascular dementia, on the other hand, results from blocked or damaged blood vessels in the brain, such as after a stroke.

Researchers estimate that people with diabetes have double the risk for Alzheimer's as those without diabetes, and their chances of developing other types of dementia are also higher. "Cognitive dysfunction should be listed as one of the many complications of diabetes, along with retinopathy, neuropathy, nephropathy, and cardiovascular disease," says Elizabeth Seaquist, MD, an endocrinology researcher at the University of Minnesota and former American Diabetes Association President of Medicine and Science. "This is particularly true for older individuals with type 2 diabetes."

After people enter their 60s, vascular dementia and Alzheimer's rates rise steadily. A 2013 study found that

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—ELIZABETH SEAQUIST, MD

dementia affects between 5 and 7 percent of adults age 60 and over. And an earlier review of studies on Alzheimer's disease found that once people hit age 65, their risk for the disease doubles every five years.

While most people associate vascular dementia and Alzheimer's with memory loss, cognitive decline can also mean struggling with what researchers call "executive function"—the brain's ability to control behavior and make and carry out decisions. That, of course, makes managing a complex, chronic condition such as diabetes even more of a challenge. "Dementia is a huge problem for people with diabetes because they have to do so much, not just take a pill," says Medha Munshi, MD, director of the Geriatric Diabetes Program at the Joslin Diabetes Center in Boston.

In a way, the rising rates of dementia in people with diabetes are a sign of progress: They mean that more people with diabetes are living long enough to develop illnesses that are associated with old age. It's a trend experts expect to see grow in the decades to come, as Baby Boomers enter their 70s, 80s, and 90s. "This is an increasing concern," says Brian Frier, MD, a diabetes researcher at the University of Edinburgh in Scotland. "There's going to be a lot more dementia in the general population, and in people with diabetes."

The result is worsening health, or an increasing burden on caregivers. Ira Asherman, for example, is charged with most of his wife's diabetes management. "Our biggest challenge is that she can no longer manage her diabetes on her own," he says. "With type 1, there's so much involved. If I don't remember, it won't happen."

WAYS TO REDUCE YOUR RISK

Although people with diabetes are at a higher risk for dementia than those without, they too can work to reduce their chances of cognitive decline. Here's how:

1 KEEP YOUR BLOOD GLUCOSE LEVELS WITHIN YOUR GOAL

RANGE when you're younger to stay mentally fit over a longer period of time.

2 MAINTAIN HEALTHY BLOOD PRESSURE AND CHOLESTEROL LEVELS

to reduce the risk of vascular dementia, which can occur after a stroke.

3 EACH WEEK, GET 150 MINUTES OF MODERATE-INTENSITY AEROBIC EXERCISE

—brisk walking, for example—to reduce your risk for Alzheimer's.

4 STAY ENGAGED AND ACTIVE.

Isolation and depression are risk factors for cognitive decline, and the three together can significantly reduce your quality of life.

REASONS BEHIND THE RISK

Some of the best evidence for the links between diabetes and cognitive decline comes from large studies that follow thousands of people as they age, monitoring participants on a regular basis for changes in their health and cognitive ability.

The English Longitudinal Study of Aging followed more than 5,000 people over the age of 50 for a decade or more, measuring A1C and testing participants' mental ability at two-year intervals. In a paper published earlier this year in the journal *Diabetologia*, researcher Wuxiang Xie, PhD, a professor at the Imperial College of Medicine in London, showed that people with higher blood glucose levels—whether they had prediabetes, type 1, or type 2—also had higher rates of cognitive decline.

BEYOND BLOOD GLUCOSE

The nature of the links, however, is tough to tease out. "There are a lot of things that affect cognitive function," notes Frier. "As people get older, they get lipid problems, high blood pressure, a whole milieu of things causing problems. When you try to sort it out, it's very difficult to research because there are always many confounding factors."

Diabetes, in particular, has a lot of overlap with conditions known to contribute to dementia. "Individuals with diabetes are at an increased risk for comorbidities such as depression, obesity, and [heart disease], all of which could affect cognitive performance," says Xie.

One possibility is that chronic high blood glucose damages small blood vessels that supply the brain with glucose and oxygen, in much the same way it can damage blood vessels in the eyes, feet, and kidneys. Over time, this form of vascular dementia results in what Munshi calls a "stepwise decline" in cognitive ability. In other words, people will often experience sudden drops in cognitive ability, caused by tiny ruptures in the blood vessels that supply the brain, followed by periods of stability. Munshi says many patients have a mix of both vascular dementia and Alzheimer's and typically become totally dependent on caregivers at some point.

Alzheimer's disease, on the other hand, "is a slow, steady decline," Munshi says. People with Alzheimer's disease—the most common form of dementia, representing two-thirds of all cases—steadily move from forgetfulness to total dependence on caregivers.

Studies suggest that Alzheimer's is connected to insulin resistance (when cells have trouble responding to insulin's signals to absorb glucose from the blood). The brain cells of Alzheimer's patients may be more insulin resistant, making it harder for them to get the fuel they need. That can lead to trouble with thinking and to permanent damage.

WATCH THE LOWS

Some studies show that very tight blood glucose management also presents a risk because it ups the chances of low blood glucose (hypoglycemia).

"There's accumulating evidence that recurrent exposure to hypoglycemia promotes cognitive decline," says Frier. "The brain functions entirely on glucose. If it's deprived of glucose, the brain rapidly malfunctions. Severe hypoglycemia puts great stress on the brain." On a brain scan, the aftermath of a particularly severe hypoglycemic episode—with blood glucose low enough to put someone in a coma—is actually visible, with reduced gray matter in parts of the brain.

Very young children and the elderly are most at risk for permanent cognitive impairment: The adult brain is typically resilient enough to bounce back and repair damage from an isolated hypoglycemic episode. But "over time, hypoglycemic episodes may cause cumulative brain damage," Frier says.

IN THIS TOGETHER

In her practice at the Joslin clinic, Munshi sees a lot of older people with diabetes who are reluctant to talk about memory problems or difficulties coping with their self-care. "Their biggest fear is, 'If I tell someone I have memory problems, they'll put me in a nursing home,'" Munshi says.

As a patient or a caregiver, remember you're not alone—or at fault. "You cannot reverse cognitive decline," Munshi says, "but you can manage it."



CAREGIVERS: WHAT TO KNOW

If you're a caregiver for someone with cognitive decline, it's important to communicate with that person's health care provider. Medha Munshi, MD, director of the Geriatric Diabetes Program at the Joslin Diabetes Center in Boston, recommends simplifying diabetes regimens for people with cognitive decline. For people in their 70s or 80s, for instance, tight blood glucose management probably isn't necessary—and it may even be dangerous. A simple routine that results in slightly higher blood glucose levels is better than a complicated routine that's hard for an overwhelmed caregiver to administer.

Munshi sometimes sees patients who could benefit from a change to their self-management routine but can't seem to implement it. Often, their families interpret these failures to switch familiar routines—going from an insulin pump to insulin pens, for example—as stubbornness. But Munshi says the problem may be more fundamental. "It's very difficult to learn new behaviors when you have this condition," she says. "They can't put things together. Their working memory is intact, but they're not able to integrate that into their behavior."

Munshi advises caregivers to be patient and get creative. "They're not doing it on purpose. Doctors and families need to know they're not going to get patients to change," she says. "They need to change the strategy."