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# Blood Sugar Control Linked to Memory Decline, Study Says

By RONICARYN RABIN

Spikes in blood sugar can take a toll on memory by affecting the dentate gyrus, an area of the brain within the hippocampus that helps form memories, a new study reports.

Researchers said the effects can be seen even when levels of blood sugar, or glucose, are only moderately elevated, a finding that may help explain normal age-related cognitive decline, since glucose regulation worsens with age.

The study, by researchers at Columbia University Medical Center and funded in part by the National Institute on Aging, was published in the December issue of *Annals of Neurology*.

"If we conclude this is underlying normal age-related cognitive decline, then it affects all of us," said lead investigator Dr. Scott Small, associate professor of neurology at Columbia University Medical Center. The ability to regulate glucose starts deteriorating by the third or fourth decade of life, he added.

Since glucose regulation is improved with physical activity, Dr. Small said, "We have a behavioral recommendation — physical exercise."

In the study, researchers used high-resolution functional magnetic resonance imaging to map brain regions in 240 elderly subjects. They found a correlation between elevated blood glucose levels and reduced cerebral blood volume, or blood flow, in the dentate gyrus, an indication of reduced metabolic activity and function in that region of the brain.

By manipulating blood sugar levels in mice and monkeys, researchers said, they tried to confirm a cause-and-effect relationship between the glucose spikes and the reduced blood volume, Dr. Small said.

Bruce S. McEwen, who heads the neuroendocrinology lab at Rockefeller University in New York and was not involved in the research, said the study's findings were "compelling," with important implications not just for the elderly but for the growing number of overweight children and teens at risk of Type 2 diabetes.

“When we think about diabetes, we think about heart disease and all the consequences for the rest of the body, but we usually don’t think about the brain,” he said. “This is something we’ve got to be really worried about. We need to think about their ultimate risks not only for cardiovascular disease and metabolic disorders, but also about their cognitive skills, and whether they will be able to keep up with the demands of education and a fast-paced complex society. That’s the part that scares the heck out of me.”

Previous observational studies have shown that physical activity reduces the risk of cognitive decline, and studies have also found that diabetes increases the risk of dementia. Earlier studies had also found a link between Type 2 diabetes and dysfunction in the dentate gyrus.

Sheri Colberg-Ochs, an associate professor of exercise science at Old Dominion University in Norfolk, Va., said her research has found that regular exercise, even light physical activity, can offset the potentially negative effects of Type 2 diabetes on cognitive function. It is not clear what the mechanism is, she said, but may have something to do with the effect of insulin.

“This new study is interesting in that it allows for a greater understanding of which region of the hippocampus is likely most affected by poorly controlled diabetes,” she said.

But the elevations in blood glucose seen in the new study are more subtle and would not be considered a disease state, Dr. Small said.

“It’s part of the normal process of aging, much like wrinkling of skin,” he said. “It happens to all of us inexorably, and it worsens progressively across the life span.”

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