BY TERRI D'ARRIGO [research profile]

EXERCISE
Can It Help You Think?

Laura Dehaven Baker, MA, PhD, believes that regular exercise can help seniors with pre-diabetes stay mentally sharp.

PHOTOGRAPHS BY PAUL SAUDERS

LAURA DEHAVEN BAKER, MA, PHD

Occupation
Assistant Professor of Psychiatry and Behavioral Sciences, University of Washington School of Medicine

Professional Focus
Behavioral Science, Endocrinology, Alzheimer's disease

Outside Interests
Skiing, cycling, running, basketball, gardening, reading, and riding the ferry

Research Funding
ADA Clinical Research Award

Physical activity goes a long way toward preventing type 2 diabetes, especially if you're a senior. In 2002, a study called the Diabetes Prevention Program revealed that regular exercise coupled with other lifestyle changes can cut the risk of developing type 2 by as much as 71 percent in people older than

60 who have pre-diabetes. (In pre-diabetes, blood glucose is higher than normal but not high enough for a diagnosis of diabetes.)

Laura Dehaven Baker, MA, PhD, believes exercise can do even more than that. She thinks it can help older adults with pre-diabetes stay mentally sharp, too. Baker, an assistant professor of psychiatry and behavioral sciences at the University of Washington School of Medicine in Seattle, is using funds from an American Diabetes Association clinical research award to test her theory.

Baker's study will involve 40 adults aged 55 to 85 who have pre-diabetes. First the participants will come to the study center for special blood tests to measure their insulin resistance. Insulin resistance is a major cause of pre-diabetes and occurs when cells don't use insulin efficiently.

Next, participants will take tests that measure different aspects of their cognitive ability, such as their short-term memory and their ability to process and organize new information. For example, they will read stories, learn lists of items, and view pictures. Then they'll answer questions about what they've seen or heard.

From Movement, Memory?

After the tests, the researchers will divide the participants into two groups. One group will be assigned to a 6-month aerobic exercise program. Each participant in this group will visit the local YMCA four times a week to work out on a treadmill and receive guidance and coaching from an exercise physiologist and an exercise trainer. Participants will start slowly, at 15 to 20 minutes of slow walking, and gradually work up to 45 to 60 minutes per session.

"It's a very structured program," says Baker. "There's a lot of encouragement needed. At first people often have no confidence in themselves.

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They're afraid of gyms or afraid of hurting themselves. Regular attention [from exercise professionals] has an amazing effect on adherence, particularly when a person first begins to exercise."

The second group will be assigned to a 6-month stretching program. Like the treadmill group, they'll start slowly and build up to a more demanding routine. They'll receive the same amount of supervision and coaching as the treadmill group, as well.

All participants will return to the study center for blood tests and cognitive ability tests 3 months into the study and again at the end of 6 months. Then the researchers will evaluate the results.

Baker expects to see a greater improvement in insulin sensitivity in the treadmill group: It's accepted among the scientific community that vigorous exercise makes cells more sensitive to insulin. But Baker also anticipates that the treadmill group will become mentally sharper as well.

"First, improved insulin sensitivity from exercise means that glucose is transported more efficiently to the brain, which is dependent on glucose for fuel. That could potentially improve thinking," she says.

Next, she notes that people with pre-diabetes often also have high blood pressure and poor lipid profiles (high LDL or "bad" cholesterol, low HDL or "good" cholesterol, and high triglycerides). "High blood pressure and a detrimental lipid profile affect cognition by constricting blood vessels," she says. This means the brain gets less oxygen-rich blood. Exercise, however, lowers blood pressure and improves cholesterol, which in turn lets blood flow more freely to the brain, she says.

The third possibility is something scientists have

only recently begun to consider: Memory and thinking abilities may be affected not only by glucose in the brain, but also by *insulin* in the brain. That is, insulin may have important functions for memory and thinking that are separate from glucose.

"We have demonstrated in other studies that when insulin levels are increased but glucose levels are suppressed, memory improves for older adults with [pre-diabetes] and for some patients with Alzheimer's disease. This finding suggests that insulin, independent of glucose, has beneficial effects on memory and thinking abilities," Baker says.

Therefore, she adds, it's "possible that exercise will not only improve how efficiently the body uses glucose for body and brain fuel, but it may also have a positive influence on insulin in the brain, particularly in regions that support memory and thinking abilities."

A Prescription For Exercise

If aerobic exercise can help older people who have pre-diabetes stay sharp while they are warding off type 2, that's just one more argument for structured exercise programs, Baker says.

"If we can demonstrate a significant improvement in cognitive ability, hopefully that will encourage large health care organizations to mandate structured exercise programs for people with pre-diabetes," she says.

"It's possible that this kind of program would encourage our health care system to approve routine screening procedures that would more effectively identify people with pre-diabetes," she adds. "For example, if people older than age 60 were to receive screening every couple of years as part of their routine health care, then those with pre-diabetes could be identified before the condition progresses. Then their doctors could write prescriptions to enroll them in the exercise programs.

"We'd like to say people will exercise on their own, but the reality of the American lifestyle is that this kind of intervention takes work and much encouragement on the part of health care providers as well as patients to succeed," she says.