Exercise boosts blood flow to the brain, study finds

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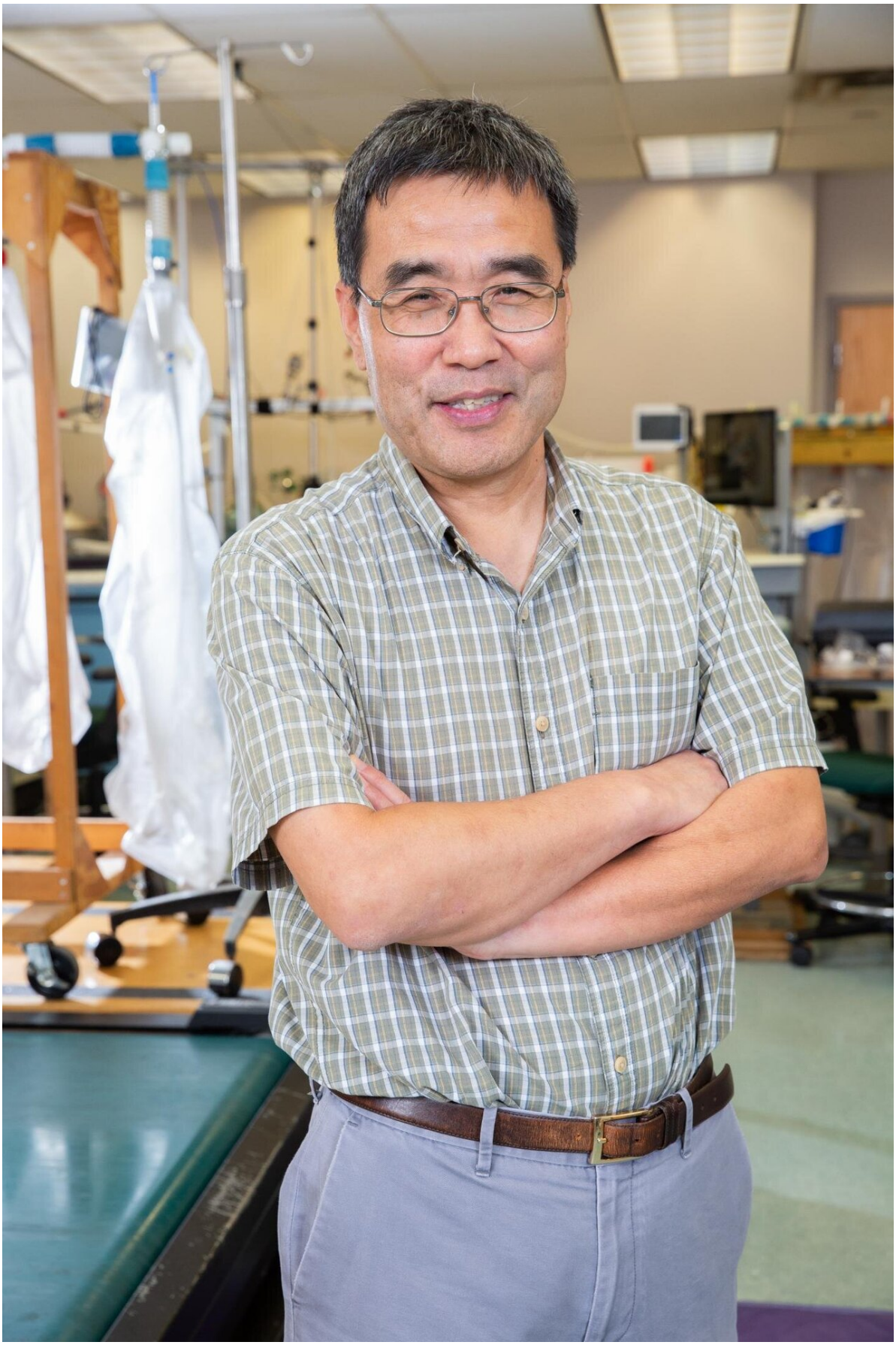

Rong Zhang, Ph.D. Credit: UT Southwestern Medical Center

It's not just your legs and heart that get a workout when you walk briskly; exercise affects your brain as well. A new study by researchers at UT Southwestern shows that when older adults with mild memory loss followed an exercise program for a year, the blood flow to their brains increased. The results were published online today in the *Journal of Alzheimer's Disease*.

"This is part of a growing body of evidence linking exercise with brain health," says study leader Rong Zhang, Ph.D., professor of neurology at UTSW. "We've shown for the first time in a randomized trial in these older adults that exercise gets more blood flowing to your brain."

As many as one-fifth of people age 65 and older have some level of mild cognitive impairment (MCI) - slight changes to the brain that affect memory, decision-making, or reasoning skills. In many cases, MCI progresses to dementia, including Alzheimer's disease.

Scientists have previously shown that lower-than-usual levels of blood flow to the brain, and stiffer blood vessels leading to the brain, are associated with MCI and dementia. Studies have also suggested that regular aerobic exercise may help improve cognition and memory in healthy older adults. However, scientists have not established whether there is a direct link between exercise, stiffer blood vessels, and brain blood flow.

"There is still a lot we don't know about the effects of exercise on cognitive decline later in life," says C. Munro Cullum, Ph.D., professor

of psychiatry at UTSW and co-senior author of the study. "MCI and dementia are likely to be influenced by a complex interplay of many factors, and we think that, at least for some people, exercise is one of those factors."

In the study, Zhang, Cullum, and their colleagues followed 70 men and women aged 55 to 80 who had been diagnosed with MCI. Participants underwent cognitive exams, fitness tests, and brain magnetic resonance imaging (MRI) scans. Then they were randomly assigned to either follow a moderate aerobic exercise program or a stretching program for one year. The exercise program involved three to five exercise sessions a week, each with 30-40 minutes of moderate exercise such as a brisk walk.

C. Munro Cullum, Ph.D. Credit: UT Southwestern Medical Center

In both programs, exercise physiologists supervised participants for the first four to six weeks, then had the patients record their exercises and wear a heart rate monitor during exercise.

Forty-eight study participants—29 in the stretching group and 19 in the aerobic exercise group—completed the full year of training and returned for follow-up tests. Among them, those who performed aerobic exercise showed decreased stiffness of blood vessels in their neck and increased overall blood flow to the brain. The more their oxygen consumption (one marker of aerobic fitness) increased, the greater the changes to the blood vessel stiffness and brain blood flow. Changes in these measurements were not found among people who followed the stretching program.

While the study didn't find any significant changes in memory or other cognitive function, the researchers say that may be because of the small size or short length of the trial. Changes to blood flow could precede changes to cognition, they say. They're already carrying out a larger two-year study, Risk Reduction for Alzheimer's Disease (rrAD), that further investigates the link between exercise and cognitive decline.

"There are likely some people who benefit more from exercise than others," says Cullum. "But with the sample size in this study, it was hard to analyze subgroups of people to make those conclusions."

Still, the data are important to help explain the effects of exercise on the brain and why it can be beneficial, say Zhang and Cullum, who are members of the Peter O'Donnell Jr. Brain Institute.

"Having physiological findings like this can also be useful for physicians

when they talk to their patients about the benefits of exercise," says Zhang. "We now know, based on a randomized, controlled trial, that exercise can increase blood flow to the brain, which is a good thing."

More information: Tsubasa Tomoto et al. One-Year Aerobic Exercise Reduced Carotid Arterial Stiffness and Increased Cerebral Blood Flow in Amnestic Mild Cognitive Impairment. *Journal of Alzheimer's Disease* (2021)

Provided by UT Southwestern Medical Center