

Stiff arteries linked with memory problems, mouse study suggests

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As we age, our arteries gradually become less flexible, making it harder for the heart to pump blood throughout the body. This hardening of the arteries occurs faster in people with high blood pressure and increases the risk for heart problems. Using a new mouse model, researchers have found that stiffer arteries can also negatively affect memory and other critical brain processes.

The new research may eventually reveal how arterial stiffness leads to Alzheimer's and other diseases involving dementia. The work will be presented at the American Physiological Society's Inflammation, Immunity and Cardiovascular Disease conference.

"Although the relationship between arterial stiffness and dementia has been hinted in human studies, the mechanisms by which arterial stiffness affects brain functions remain poorly understood," said study co-author M. Florencia Iulita, PhD, Herbert H. Jasper Postdoctoral Fellow in Neurosciences at the University of Montreal, Canada. "This is partly due to the lack of good animal models that are specific for this condition."

To better study arterial stiffness, the researchers modeled the condition in mice by applying calcium chloride to one of the mouse's carotid arteries. This treatment makes the artery stiff without increasing the animal's blood pressure or decreasing the blood volume through the carotids, which can themselves damage the brain. With the new animal model, the researchers could study the direct effects of arterial stiffness on the brain's function and health.

When the mice with stiffened carotids were presented with a task requiring memory, they showed slower learning and remembered less than the healthy mice. The brain vessels of the mice with arterial stiffness were also less responsive to stimuli that normally increase [cerebral blood flow](#) when required, suggesting that the brains of these

mice might not be getting [adequate blood supply](#) to function properly.

The researchers also observed higher levels of amyloid-beta peptides in the brains of mice with arterial stiffness. Amyloid-beta peptides tend to clump together and are found in high amounts in the brains of people with Alzheimer's disease.

"Our study provides evidence that arterial stiffness negatively affects vital brain processes," said study coauthor H el ene Girouard, PhD, associate professor at University of Montreal. "A better understanding of the mechanisms by which arterial stiffness affects brain functions and leads to dementia could allow us to identify new targets for therapeutics that might prevent or delay Alzheimer's disease in the elderly and hypertensive individuals. Our new animal model will also allow us to test whether drugs that correct [arterial stiffness](#) can protect the [brain](#)."

Provided by American Physiological Society

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