

Weakened Gut-Brain Connection May Contribute to Memory Loss

Changes to gut bacteria in aging mice hindered communication between the gut and the brain and led to worse performance on memory tasks.

April 29, 2026 By National Institutes of Health

At a Glance:

- Researchers found that changes to gut bacteria in aging mice hindered communication from the gut to the brain and led to worse performance on memory tasks.
- If these results hold true in humans, they could inspire treatments to prevent, reduce, or even reverse age-related cognitive decline.

When we think of our senses, we think about what we can see, hear, taste, smell, and feel. Our brains interpret that sensory information to help us make sense of the world. However, the brain also receives sensory information about what is happening inside our bodies. Researchers are now starting to appreciate that signals from the gut to the brain affect a person's ability to clearly think, learn, and remember. Some of this communication relates to the microbiome—or the variety and amounts of microbes located in the gut.

An NIH-funded research team, led by Dr. Christoph A. Thaiss at Stanford University and the Arc Institute, explored how aging affects the gut-brain connection in mice. The researchers focused on age-related changes in the microbiome, with the hope of identifying new ways to fend off memory loss in humans. Study results were [reported in Nature](#) on March 11, 2026.

The researchers looked at how the microbiomes of young and old mice differed and how those differences related to memory. They found that old mice performed worse on memory tasks than young mice. But changing the microbial makeup of young mice altered their performance.

The microbiomes of young mice were made to resemble those of older mice. The team achieved this in two ways. One was to house young and older mice together for a month. The other was to transplant gut bacteria from old mice into their younger counterparts. These young mice with “old” microbiomes performed worse on memory tasks than young mice with young microbiomes. When old and young mice with “old” microbiomes were treated with antibiotics to deplete gut

bacteria, their performance improved.

The researchers also examined the microbiomes of young and old mice to see which microbes increased in numbers during aging. A type of bacteria called *Parabacteroides goldsteinii* exhibited the largest such increases. They found that mice exposed specifically to these bacteria performed worse on cognitive tests.

The team also found that the bacteria produced large amounts of a certain type of fatty acid that led to cognitive decline when fed to mice. These fatty acids drove inflammation in myeloid cells, a type of white blood cell. This in turn impaired signaling from the gut to the brain via the vagus nerve. The vagus nerve connects various organs, including the digestive tract, to the brain.

This weakened signal to the brain led to reduced activity in the hippocampus, a brain region responsible for short-term memory. Activity was also disrupted in other brain regions involved in the processing of sensory information.

The researchers tried three approaches to restore vagus nerve signaling. These included treating the mice with bacteria-killing viruses, blocking inflammation, and chemically activating the vagus nerve. All these approaches improved cognitive performance in aged mice.

“We tend to think of memory decline as a brain-intrinsic process. But this study indicates that we can enhance memory formation and brain activity by changing the composition of the gastrointestinal tract—a kind of remote control for the brain,” says Thaiss.

Manipulating gut-brain communication during aging may be an attractive strategy to treat cognitive decline. But more research still needs to be done to learn exactly how age-related changes in the gut develop, and how they influence brain health.

This [research summary](#) was published by the National Institutes of Health on April 28, 2026.