Proteins may slow memory loss in people with Alzheimer's

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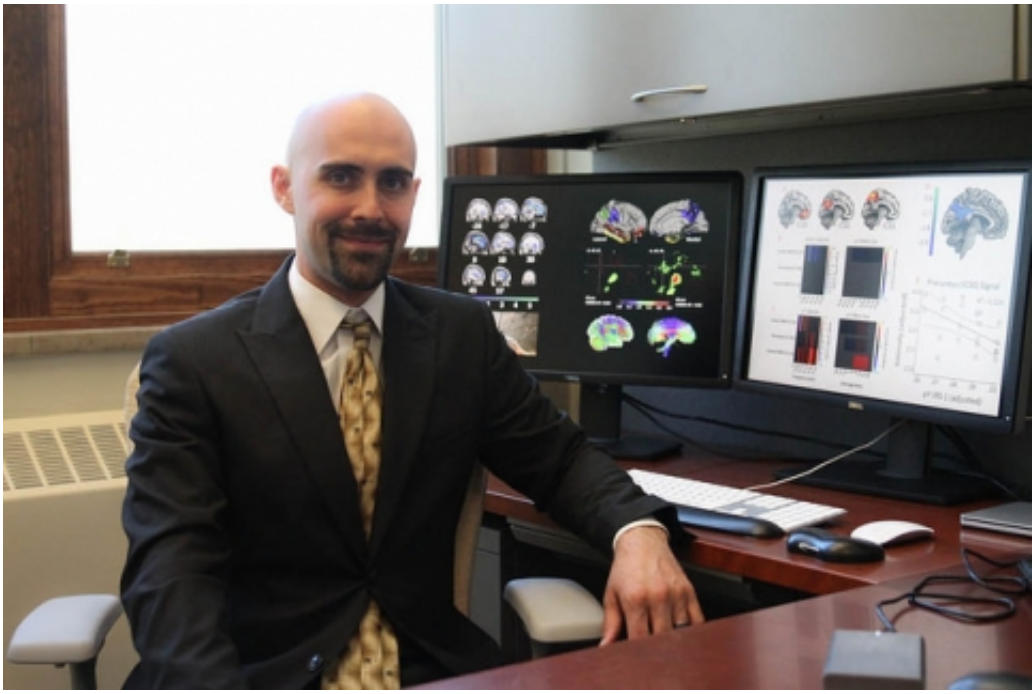

Auriel Willette, a researcher in food science and human nutrition at Iowa State University, found evidence that an elevated presence of a protein called neuronal pentraxin-2 may slow cognitive decline and reduce brain atrophy in people with Alzheimer's disease. Credit: Blake Lanser

Certain proteins may slow the devastating memory loss caused by Alzheimer's disease, according to a groundbreaking Iowa State University study.

Auriel Willette, a researcher in food science and human nutrition, found evidence that an elevated presence of a protein called neuronal pentraxin-2 may slow cognitive decline and reduce brain atrophy in people with Alzheimer's disease.

Willette will present his findings at the Psychoneuroimmunology Research Society's annual scientific meeting, June 3 to 6 in Seattle.

The Alzheimer's Association predicts that by 2050, nearly 14 million Americans over 65 will have Alzheimer's. Caring for them will cost an estimated $1 trillion every year.

"It's just a devastating illness," Willette said. "Unlike a lot of other neurological diseases, Alzheimer's disease basically robs you of yourself."

A groundbreaking study

Researchers have long suspected that inflammation in the brain leads to the cell death and brain atrophy found in people with Alzheimer's disease. Yet previous studies didn't place much emphasis on the varying roles of different immune proteins and how they might change the brain over time.

As part of his latest research, Willette analyzed data from the Alzheimer's Disease Neuroimaging Initiative, an effort to collect and archive brain images and spinal fluid samples for researchers.

He compared brain scans, as well as fluid from the brain and spine, from three groups: people without Alzheimer's disease, people with mild cognitive impairment or memory problems who may have Alzheimer's disease, and people with full-blown Alzheimer's disease.

Willette found that participants with higher levels of neuronal pentraxin-2, the protein that regulates immune function and connections between neurons, showed little or no memory loss after two years. He also found that participants with higher levels of inflammatory proteins in their cerebrospinal fluid showed modestly greater memory loss and brain atrophy over two years.

Neuronal pentraxin-2 is naturally produced in the body, primarily by neurons—nerve cells that carry electrical impulses and chemical signals. The protein seems to be involved in forming or reconfiguring connections between neurons, possibly by clearing away old debris or inefficient connections to make way for new connections.

Willette compared neuronal pentraxin-2 to a chemical bulldozer, clearing away old buildings to make way for new buildings.

"If you have high levels of this synapse-building, inflammation-regulating protein, you may not have as much, if any, change in your memory," he said.

Reducing risk factors

Reducing or eliminating risk factors for brain inflammation may help prevent Alzheimer's disease, Willette said.

People who are overweight or obese are particularly at risk of developing Alzheimer's disease because excess body weight leads to inflammation in the brain. Exercise can help induce more activity between neurons, which could in turn boost a person's level of neuronal pentraxin-2.

"If part of this is related to obesity, moderate exercise and reducing body weight can reduce chronic inflammation in the brain," he said. "Exercise definitely does increase your protective factors."

Complex jobs, hobbies, and social interactions might promote the production of protective proteins like neuronal pentraxin-2. Engaging in new or complicated cognitive tasks tends to form new or more complex connections between neurons, Willette said.

"Attaining higher levels of education, having a mentally demanding job, or regular and sustained mental effort builds something called cognitive reserve," Willette said. "Cognitive reserve is thought to be a protective factor against memory loss and Alzheimer's disease. Neuronal pentraxin-2 may play a role in building cognitive reserve, helping to help create and remodel connections between neurons to handle the increased complexity thrown at the brain."

Willette cautions against the use of nonsteroidal anti-inflammatory drugs, or pain relievers, to reduce inflammation. Researchers don't know if these medications can help prevent the kind of inflammation associated with memory loss, and taking too many pain relievers can cause organ damage and even death.

"The literature is mixed," he said. "Some studies find a protective effect, some do not. For people with memory loss, taking pills is also an issue. They may forget to take their pills or take too many."

Willette hopes that future studies will look at how Alzheimer's disease relates to body weight and epigenetics—variations in gene activity that are not caused by changes in DNA. Even if researchers are unable to find a cure for Alzheimer's disease, slowing its symptoms could be a major help to caregivers.

"If we can slow the symptoms or halt them temporarily for even three or four years, that could have a very meaningful impact on the ability to have people live their lives as opposed to having so much of it taken up with dealing day in and day out with this disease," Willette said.

Provided by Iowa State University