

New biomarker predicts Alzheimer's disease and link to diabetes

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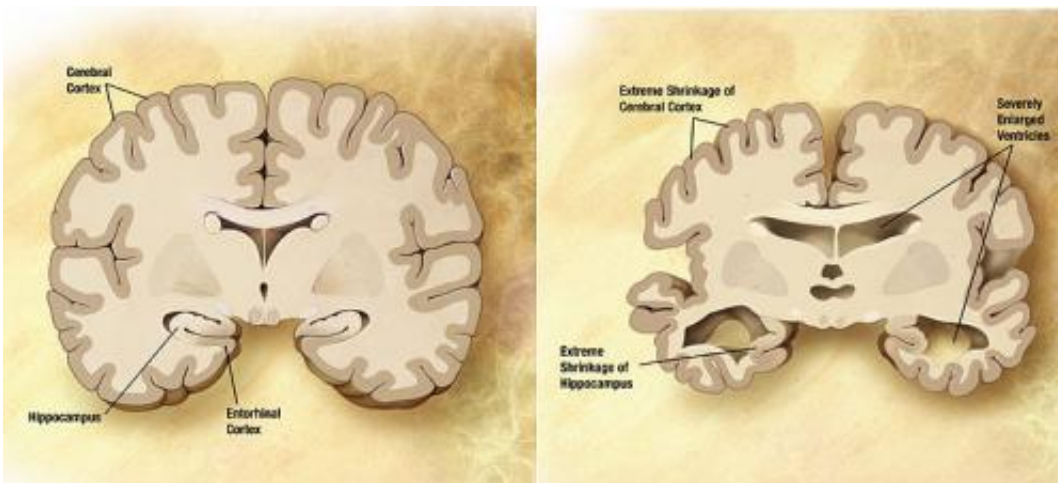


Diagram of the brain of a person with Alzheimer's Disease. Credit: Wikipedia/public domain.

An enzyme found in the fluid around the brain and spine is giving researchers a snapshot of what happens inside the minds of Alzheimer's patients and how that relates to cognitive decline.

Iowa State University researchers say [higher levels](#) of the enzyme, autotaxin, significantly predict [memory](#) impairment and Type 2 diabetes. Just a one-point difference in autotaxin levels - for example, going from a level of two to a three - is equal to a 3.5 to 5 times increase in the odds of being diagnosed with some form of memory loss, said Auriel Willette, an assistant professor of food science and human nutrition at

Iowa State.

Autotaxin, often studied in cancer research, is an even stronger indicator of Type 2 diabetes. A single point increase reflects a 300 percent greater likelihood of having the disease or pre-diabetes. The results are [published](#) in the *Journal of Alzheimer's Disease*. Willette and Kelsey McLimans, a graduate research assistant, say the discovery is important because of autotaxin's proximity to the [brain](#).

"We've been looking for metabolic biomarkers which are closer to the brain. We're also looking for markers that reliably scale up with the disease and have consistently higher levels across the Alzheimer's spectrum," Willette said. "This is as directly inside of the brain as we can get without taking a tissue biopsy."

Willette's [previous research](#) found a strong association between [insulin resistance](#) and memory decline and detrimental brain outcomes, increasing the risk for Alzheimer's disease. Insulin resistance is a good indicator, but Willette says it has limitations because what happens in the body does not consistently translate to what happens in the brain. That is why the correlation with this new enzyme found in the cerebrospinal fluid is so important.

"It has a higher predictive rate for having Alzheimer's disease," McLimans said. "We also found correlations with worse memory function, brain volume loss and the brain using less [blood sugar](#), which have also been shown with insulin resistance, but autotaxin has a higher predictive value."

Physical health linked to memory

The fact that autotaxin is a strong predictor of Type 2 diabetes and memory decline emphasizes the importance of good physical health.

Researchers say people with higher levels of autotaxin are more likely to be obese, which often causes an increase in insulin resistance.

Willette says autotaxin levels can determine the amount of energy the brain is using in areas affected by Alzheimer's disease. People with higher autotaxin levels had fewer and smaller brain cells in the frontal and temporal lobes, areas of the brain associated with memory and executive function. As a result, they had lower scores for memory and tests related to reasoning and multitasking.

"Autotaxin is related to less real estate in the brain, and smaller brain regions in Alzheimer's disease mean they are less able to carry out their functions," Willette said. "It's the same thing with blood sugar. If the brain is using less blood sugar, neurons have less fuel and start making mistakes and in general do not process information as quickly."

Researchers analyzed data from 287 adults collected through the Alzheimer's Disease Neuroimaging Initiative, a public-private partnership working to determine whether MRI and PET scans as well as biological markers can measure the progression of cognitive impairment and Alzheimer's disease. The data came from adults ranging in age from 56 to 89 years old. Study participants completed various tests to measure cognitive function. This included repeating a list of words over various time increments.

Provided by Iowa State University

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