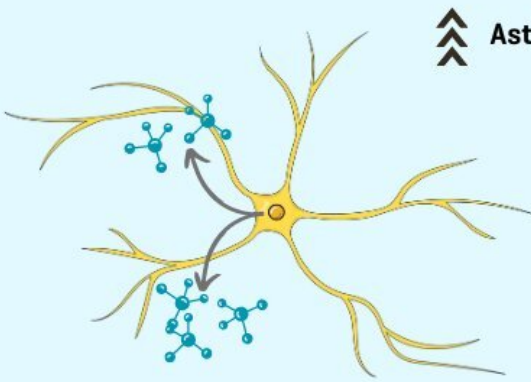


Alzheimer's disease processes without symptoms. How is that possible?

May 15 2024

Alzheimer versus resilient group



Astrocytes

Astrocytes keep the chemical environment of nerve cells constant. One way they do this is by producing metallothionein. This is an antioxidant.

In the resilient group, astrocytes produce more antioxidants. This is protective.

Microglia

Microglia are the immune cells of the

Infographic: "Alzheimer's Disease Without Symptoms. How is That Possible?"
Credit: Netherlands Institute for Neuroscience

Everyone experiences aging in their own way, and factors such as genetics, lifestyle and environment play a role in this process. Some

individuals reach the age of 90 or even 100 in good health, without medications or brain disease. But how do these individuals maintain their health as they age?

Luuk de Vries from Joost Verhaagen's group, and his colleagues Dick Swaab and Inge Huitinga, looked at brains from the Netherlands Brain Bank. The Netherlands Brain Bank stores brain tissue from more than 5,000 deceased brain donors with a wide range of different brain diseases.

What makes the Netherlands Brain Bank so unique is that, in addition to the stored tissue with very precise neuropathological diagnoses, they also keep the documented medical history and detailed disease course with the symptoms of each donor.

Resilient group

The team found a subgroup of people who had Alzheimer's disease processes in their brains, but did not show any clinical symptoms while alive. A so-called "resilient" group. But how is it possible that they did not experience any symptoms while others did?

Luuk de Vries explains, "What is happening in these people at a molecular and cellular level was not clear yet. We therefore searched for donors with brain tissue abnormalities who did not show [cognitive decline](#) in the Brain Bank. Of all the donors we found 12, so it is quite rare. We think that genetics and lifestyle play an important role in resilience, but the exact mechanism is still unknown."

"Exercise or being cognitively active and having a lot of social contacts can help in delaying the onset of Alzheimer's disease. It has recently also been found that those who receive a lot of cognitive stimuli, like through a complex job, can build up more Alzheimer's pathology before

developing symptoms.

"If we can find the [molecular basis](#) for resilience, then we have new starting points for the development of medication, which could activate processes related to resilience in Alzheimer's patients," adds de Vries.

Alzheimer's versus resilient group

"When we looked at [gene expression](#), we saw that a number of processes were altered in the resilient group. First of all, the [astrocytes](#) appeared to produce more of the antioxidant metallothionein. Astrocytes are like garbage collectors and provide a protective role for the brain. Astrocytes often also ask for help from microglia, but because they can be quite aggressive, they sometimes worsen inflammation," continues de Vries.

"In the resilient group a microglia pathway that's often linked to Alzheimer's disease appeared to be less active. In addition, we saw that the so-called 'unfolded protein response,' a reaction in brain cells that automatically removes a misfolded toxic protein, was affected in Alzheimer's patients, but was relatively normal in resilient individuals. Finally, we found indicators that there may also be more mitochondria in the brain cells resilient individuals, which ensures better energy production."

But what do these differences in processes mean? And is there cause or effect?

"It remains difficult to determine from human data which process initiates the disease process. You can only demonstrate this by changing something in cells or animal models and seeing what happens next. That is the first thing we have to do now," says de Vries.

The findings are [published](#) in the journal *Acta Neuropathologica*

Communications.

More information: Luuk E. de Vries et al, Gene-expression profiling of individuals resilient to Alzheimer's disease reveals higher expression of genes related to metallothionein and mitochondrial processes and no changes in the unfolded protein response, *Acta Neuropathologica Communications* (2024). [DOI: 10.1186/s40478-024-01760-9](https://doi.org/10.1186/s40478-024-01760-9)

Provided by Netherlands Institute for Neuroscience - KNAW

Citation: Alzheimer's disease processes without symptoms. How is that possible? (2024, May 15) retrieved 20 June 2024 from <https://medicalxpress.com/news/2024-05-alzheimer-disease-symptoms.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.