

Microbiome: Certain gut microbes may warn of Alzheimer's disease long before the first symptoms begin

June 25 2023, by Catherine Purse



Credit: AI-generated image ([disclaimer](#))

What if the microbes in your gut could act as an early warning system, alerting you that you could be developing Alzheimer's disease? This might sound improbable, but [recent research](#) has found certain microbes are more common in those with very early signs of the disease, pointing

to a potential new method of diagnosis for a disease that [affects millions worldwide](#).

The [gut microbiome](#) is the collection of microbes, which include bacteria, viruses and fungi, in the gut. Having diverse populations of microbes is thought to be [important for our overall health](#). However, in certain circumstances, the gut [microbiome](#) can also contain microbes that [are harmful to our health](#).

In [Alzheimer's](#), two proteins, known as amyloid-beta and tau, accumulate abnormally in the brain. Their presence results in the characteristic memory loss and [cognitive decline](#) associated with the disease, with symptoms becoming progressively worse with time.

It's known that amyloid-beta and tau begin to accumulate [long before the onset](#) of Alzheimer's symptoms. It's at this stage (known as the "preclinical stage") that the researchers saw changes in the gut microbiome.

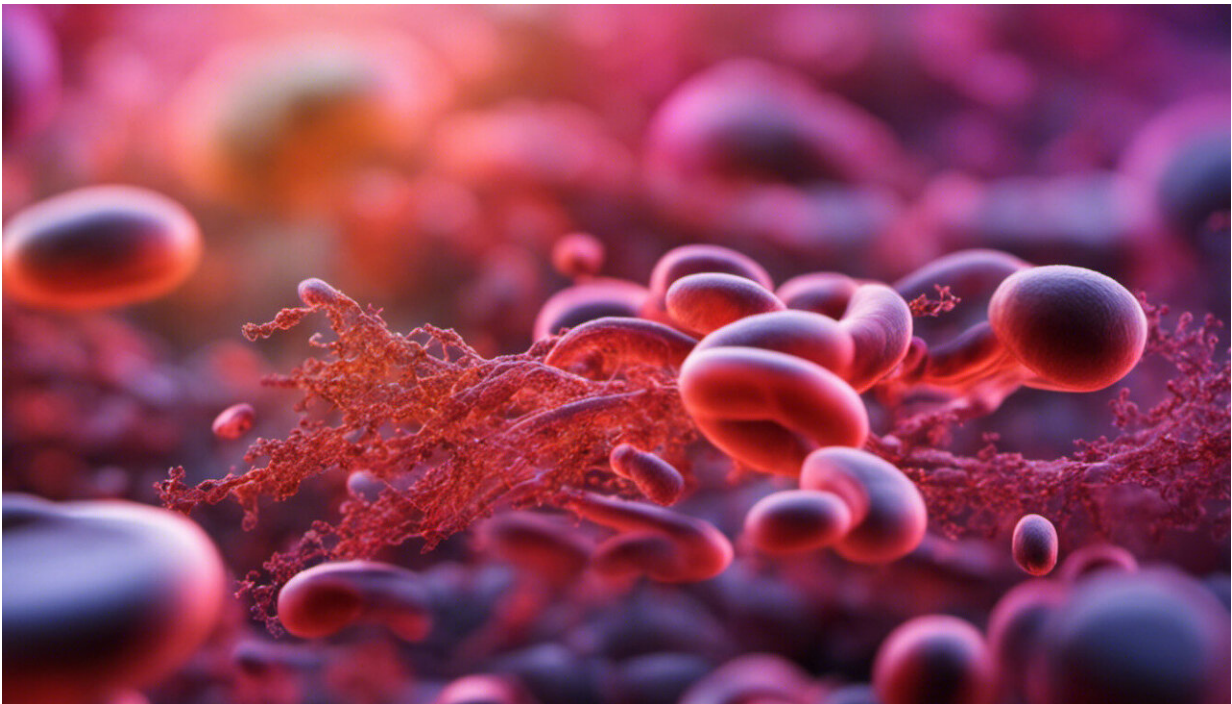
The researchers found distinct differences in the gut microbiome profiles of older people with and without signs of preclinical Alzheimer's. In those with signs of preclinical Alzheimer's, the differences in the gut microbiome appeared to be connected to the accumulation of amyloid-beta and tau proteins in the brain.

Doctors currently rely on the results of various diagnostic tests to assess whether someone may have preclinical Alzheimer's. The researchers combined these results with their participant's gut microbiome data and put it into a machine learning algorithm, a computer program that can make predictions based on the data that you give it

They found that including the gut microbiome data improved the algorithm's ability to diagnose preclinical Alzheimer's accurately. This

remained the case even when not all the diagnostic test data was included.

Some of the [diagnostic tests](#) for preclinical Alzheimer's may be unpleasant, such as a [lumbar puncture](#), or rely on expensive imaging technologies, such as [magnetic resonance](#) imaging (MRI) scanners, access to which is [known to be unequal globally](#).



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The idea of analyzing a person's gut microbiome, which only requires a stool (poo) sample, to assess their risk of developing the disease is appealing. It would offer a non-invasive, more accessible way of identifying those at risk of developing Alzheimer's at an earlier stage, allowing them more time to plan and prepare for the future.

It should be noted, however, that the improvement found by the study in predicting preclinical Alzheimer's by including the gut microbiome data was quite modest. So, while analyzing gut microbiome data might complement existing methods for diagnosing preclinical Alzheimer's, it can't replace them just yet.

Curious finding

Unexpectedly, some of the species found to be associated with signs of preclinical Alzheimer's have previously been thought to be beneficial for human health. One of those identified is a bacteria known as *Faecalibacterium prausnitzii* (*F. prausnitzii*), which, [in a previous study](#), was found to be more common in the gut microbiome of people *without* Alzheimer's compared to those with the disease.

It's unclear why what are considered to be potentially beneficial microbes were associated with those with symptoms of preclinical Alzheimer's, as opposed to those who were cognitively healthy.

One explanation might be the stage of the disease. It's important to recognize that [not everyone](#) who has signs of preclinical Alzheimer's will go on to develop Alzheimer's itself. There may be changes to the gut microbiome that happen in later stages of the disease, such as the loss of *F. prausnitzii*.

While it might be tempting to conclude that the gut microbes identified as being associated with signs of preclinical Alzheimer's are also contributing to developing the [disease](#), the study does not provide any evidence of a cause-and-effect relationship.

However, if a connection can be established, it opens up an exciting possibility that future treatments for Alzheimer's might target the [microbes](#) in our gut.

More information: Aura L. Ferreiro et al, Gut microbiome composition may be an indicator of preclinical Alzheimer's disease, *Science Translational Medicine* (2023). [DOI: 10.1126/scitranslmed.abo2984](https://doi.org/10.1126/scitranslmed.abo2984)

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