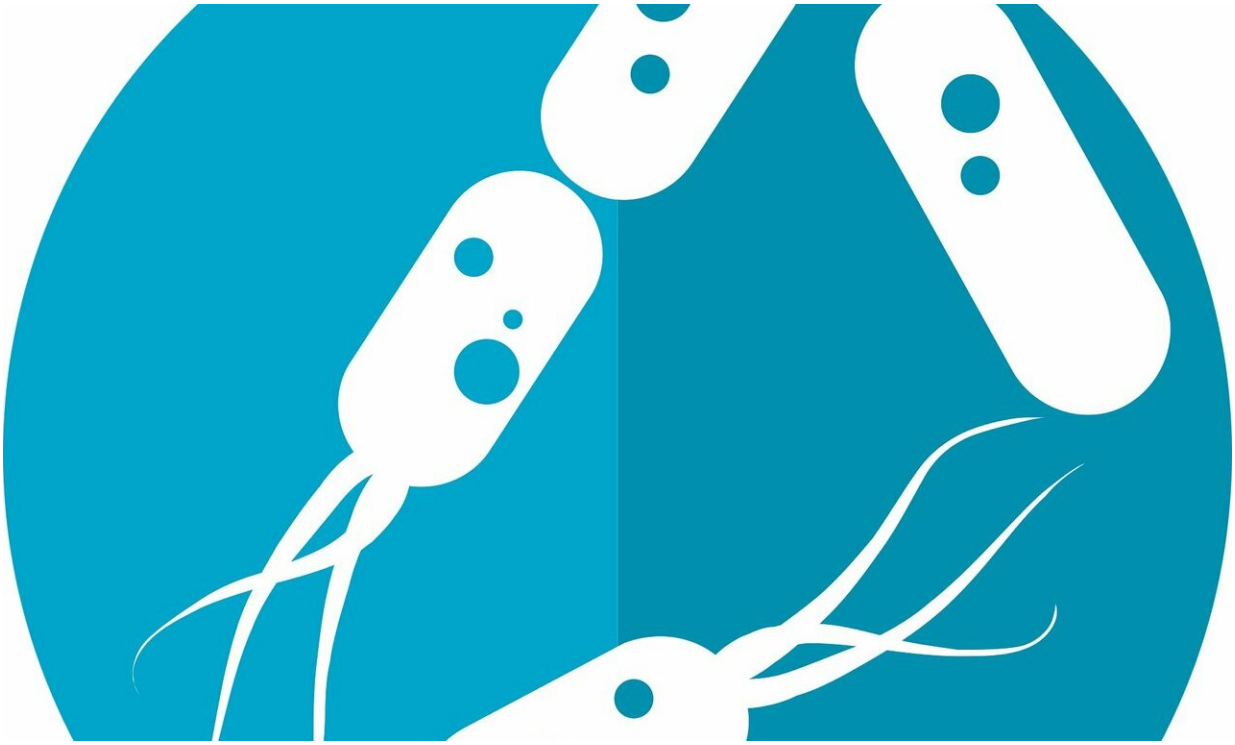
# Could a poo transplant one day be the secret of eternal youth?

October 2 2020



Credit: CC0 Public Domain

Fecal transplants could one day be used as a therapy to restore cognitive function in the elderly—according to new research from the University of East Anglia, the University of Florence and the Quadram Institute.

A new study published today shows how fecal transplants from older to

younger mice altered their gut microbiome, which in turn impacted their spatial learning and memory.

The research team hope that reversing the procedure could one day see fecal transplantation used to combat cognitive decline among the elderly.

Dr. David Vauzour, from UEA's Norwich Medical School, said: "Aging is an inevitable process that starts immediately after birth and ultimately leads to physical health problems as well as a decline in psychological well-being and cognitive function.

"Research has shown that the aging process may be linked with age-related changes in our gut microbiota. Recently, the existence of two-way communication between the gut and the brain—known as the 'gut-brain axis' – has emerged as an important player in shaping aspects of behavior and cognitive function. We wanted to see whether transferring gut microbes from older to younger mice could affect parts of the central nervous system associated with aging."

The research team performed fecal transplants from older adult mice to younger adult mice and then assessed the young adults for markers such as anxiety, exploratory behavior and memory.

After the transplantation, the team found significant differences in the young mice's microbial profiles.

While the young adults showed no significant changes in markers of anxiety, explorative behavior or locomotor activity, they did show impaired spatial learning and memory as measured in a maze test.

These changes were paralleled by alterations in the expression of proteins associated with synaptic plasticity and neuro transmission, and changes to cells in the hippocampus part of their brains—responsible for

learning and memory.

Dr. Vauzour said: "Our research shows that a fecal transplantation from an old donor to a young recipient causes an age-associated shift in the composition of gut microbiota. The procedure had an impact on the expression of proteins involved in key functions of the hippocampus—an important part of the brain that has a vital role in a variety of functions including memory, learning but also in spatial navigation and emotional behavior and mood. In short, the young mice began to behave like older mice, in terms of their cognitive function."

Prof Claudio Nicoletti, from the University of Florence, Italy, said: "While it remains to be seen whether transplantation from very young donors can restore cognitive function in aged recipients, the findings demonstrate that age-related shifts in the gut microbiome can alter components of the central nervous system." This work highlights the importance of the gut-brain axis in aging and provides a strong rationale to devise therapies aiming to restore a young-like microbiota to improve cognitive functions and quality of life in the elderly, he added.

"Manipulating the microbiome is increasingly being seen as a way of improving or maintaining human health, and these results are an exciting indication of its potential for helping us age healthily," said Prof Arjan Narbad from the Quadram Institute.

"We have established an FMT service on the Norwich Research Park to treat serious gut infections and now want to explore in humans its effectiveness in combating a number of age-related conditions, including cognitive decline."

The research was led by a team at UEA and the University of Florence, in collaboration with colleagues at the University of Milan, the Earlham Institute, University of Siena, the Quadram Institute, and Nottingham

Trent University.

It was funded by the Fondazione Cassa di Risparmio, the University of Florence and the Medical Research Council.

"Fecal microbiota transplant from aged donor mice affects spatial learning and memory via modulating hippocampal synaptic plasticity- and neurotransmission-related proteins in young recipients" is published in the journal *Microbiome*.

**More information:** Alfonsina D'Amato et al. Fecal microbiota transplant from aged donor mice affects spatial learning and memory via modulating hippocampal synaptic plasticity- and neurotransmission-related proteins in young recipients, *Microbiome* (2020). DOI: 10.1186/s40168-020-00914-w

Provided by University of East Anglia