Modulating gut microbiome may help reverse ageing-related memory loss: Study

The study in mice,showed that composition of the naturally occurring bacterial population living in the gut, known as the gut microbiome, changes with age — favouring some species of bacteria over others

The changes in the gut microbiome are registered by immune cells in the gastrointestinal tract, which spark an inflammatory response hampering the ability of the vagus nerve to signal to the hippocampus. | Image used for representational purpose only. File | Photo Credit: Getty Images

Remotely changing the composition of the gut microbiome by stimulating the vagus nerve, which sends signals from the gut to the brain, may help reverse ageing-related memory loss, according to a new study.

Studies are looking at the gut for solutions to health issues arising due to ageing.

"We wanted to understand why some very old people remain cognitively sharp while other people see significant declines beginning in their 50s or 60s," senior author Christoph Thaiss, assistant professor of pathology at Stanford University, said.

"We learned that the timeline of memory decline is not hardwired; it's actively modulated in the body, and the gastrointestinal tract is a critical regulator of this process," Thaiss said.

The study in mice, published in the journal *Nature*, showed that composition of the naturally occurring bacterial population living in the gut, known as the gut microbiome, changes with age -- favouring some species of bacteria over others.

The changes in the gut microbiome are registered by immune cells in the gastrointestinal tract, which spark an inflammatory response hampering the ability of the vagus nerve to signal to the hippocampus -- a brain region that helps form memory and navigation, the researchers said.

Stimulating activity of the vagus nerve in older animals was seen to turn old, forgetful mice into "whisker-sharp whizzes" who were able to remember new objects and escape from mazes as nimbly as their younger counterparts.

"Our study emphasises that processes in the brain can be modulated through peripheral intervention. Since the gastrointestinal tract is easily accessible orally, modulating the abundance of gut microbiome metabolites is a very appealing strategy to control brain function," senior author Maayan Levy, an assistant professor of pathology at Stanford University, said.

The researchers housed young (two-month-old) mice together with old (18-month-old) mice. Living in close proximity exposed the young mice to the gut microbiomes of the old ones and vice versa. After one month, compositions of the microbiomes of the animals were examined.

Specific changes in the gut microbiome composition of ageing mice included an increase in abundance of a bacteria called Parabacteroides goldsteinii and directly associated with cognitive decline in the animals.

Listen to your gut – it may be telling you something about your heart | Explained

The researchers showed that colonising the guts of young mice with the bacteria inhibited performance on object recognition and maze escape tasks, with the cognitive deficit correlated with a reduced activity in the hippocampus.

However, treating old mice with a molecule that activates the vagus nerve revealed that the cognitive performance of the animals was indistinguishable from that of young animals.

Further experiments showed that an increasing prevalence of the Parabacteroides goldsteinii bacteria correlated with an increasing amount of metabolites called medium-chain fatty acids, and that the metabolites cause a group of immune cells in the gut called myeloid cells to initiate an inflammatory response.

The researchers said the inflammation inhibits activity of the vagus nerve, that of the hippocampus and the ability to form lasting memories.

News Source:

https://www.thehindu.com/sci-tech/health/modulating-gut-microbiome-may-help-reverse-ageing-related-memory-loss-study/article70736569.ece