Microbiome Treatment Can Reverse Age-Related Brain Deterioration

Description

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Abstract:

The gut microbiota is increasingly recognized as an important regulator of host immunity and brain health. The aging process yields dramatic alterations in the microbiota, which is linked to poorer health and frailty in elderly populations. However, there is limited evidence for a mechanistic role of the gut microbiota in brain health and neuroimmunity during aging processes. Therefore, we conducted fecal microbiota transplantation from either young (3–4 months) or old (19–20 months) donor mice into aged recipient mice (19–20 months). Transplant of a microbiota from young donors reversed aging-associated differences in peripheral and brain immunity, as well as the hippocampal metabolome and transcriptome of aging recipient mice. Finally, the young donor-derived microbiota attenuated selective age-associated impairments in cognitive behavior when transplanted into an aged host. Our results reveal that the microbiome may be a suitable therapeutic target to promote healthy aging.

A staggering 100 trillion microorganisms live in the human gut – both good and bad. The immune system is impacted by the balance. The research team from Ireland showed that lab rodents experienced increased memory and cognitive function by introducing specific species.

Aging-associated changes in the immune system were reversed with fecal transplants from younger mice, including quicker deciphering of maze patterns and better memory afterward.

They were also less prone to anxiety, another common symptom of dementia. Scans later showed their brains had been rejuvenated, containing metabolites and patterns of gene regulation resembling those of adolescents.

“It should be said we are not advocating fecal transplants for people who want to rejuvenate their brain. Instead, these studies point towards a future where there will be a focus on microbiota-targeted dietary or bacterial-based interventions. They will promote optimum gut health and immunity in order to keep the brain young and healthy,” explains Cryan.

The study suggests such therapies could combat cognitive decline. It adds to evidence that probiotics sold in supermarkets as diet supplements boost concentration, decision-making, and understanding.

“Microorganisms that live on and in the human body have an impact on health and vary with age. Friendly bacteria have beneficial effects on the metabolic and immune systems. They can be gradually replaced with bacteria that drive chronic inflammation, metabolic dysfunction, and disease,” notes Cryan.

“Much work is needed to translate the findings for clinical use in humans. We know that microorganisms in the gut shape local immunity, but can also affect brain aging and increase the risk of neurodegenerative diseases. Now, there is a growing appreciation of the importance of the microbes in

the gut on all aspects of physiology and medicine."

Previous research has found that a daily dose of probiotics over 12 weeks can produce significant improvement in elderly patients.

"This research further demonstrates the importance of the gut microbiome in many aspects of health – and particularly across the brain/gut axis where brain functioning can be positively influenced. The study opens up possibilities in the future to modulate gut microbiota as a therapeutic target to influence brain health," concludes Professor Paul Ross, director of APC Microbiome Ireland at the university.

Centenarians have unique gut bacteria that enables them to live to a ripe old age, according to new research. Scientists in Japan say this unique gut makeup fuels bile acids that protect against disease.

The discovery could lead to yogurts and other probiotic foods that increase longevity and unlock the secret key to living past 100 years.

Meanwhile, a groundbreaking study by Israeli scientists have found that yogurt can mitigate cytokine storms in COVID-19 patients by disrupting communication between cells.