

"Surprising" new insights into link between gut microbiome and aging

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Healthy older mice were found to have higher volumes of butyrate-producing gut microbes, suggesting a diverse gut microbiome may protect against age-related disease [Artanika/Depositphotos](#)

A new study is suggesting a metabolite produced by gut microbes could increase neuron production in the brain, improve intestinal function, and ultimately slow the aging process. Across several compelling mouse experiments the research found the negative effects of aging could be counteracted by enhanced microbial production of a molecule called butyrate.

Investigating the effect of the gut microbiome on aging, the new research first performed gut microbiome transplants between old and young mice. Using fecal transplants, young germ-free mice were colonized with the gut microbiota of older mice. The results were somewhat unexpected as the younger mice colonized with the older microbiomes displayed increased neurogenesis, a process whereby new neurons are produced in the brain.

“We’ve found that microbes collected from an old mouse have the capacity to support neural growth in a younger mouse,” explains Sven Pettersson, lead on the research team from Nanyang Technological University in Singapore. “This is a surprising and very interesting observation...”

Compared to a control group of young germ-free mice colonized with the gut microbiomes of age-matched young mice, the older microbiomes seemed to confer greater beneficial effects on the young mice. Digging into what could be causing these unusual effects the researchers discovered the older microbiomes contained greater volumes of microbes that produce a short chain fatty acid known as butyrate.

Administering butyrate on its own to the younger mice resulted in similar beneficial effects to both intestinal health and neurogenesis. The researchers say this implies a healthy aging microbiome may increase its populations of butyrate-producing microbes as a way of balancing out the more systemic deficits of aging in an organism.

One interesting hypothesis generated by this study suggests aging could be more generally modulated by the gut microbiome, and more extreme imbalances of gut bacterial populations can result in earlier age-related diseases. Brian Kennedy, from the National University of Singapore, didn’t work on this particular study but points out these new insights enhance our understanding of the influence our gut microbiome has on healthy longevity.

“It is intriguing that the microbiome of an aged animal can promote youthful phenotypes in a young recipient,” says Kennedy. “This suggests that the microbiota with aging have been modified to compensate for the accumulating deficits of the host and leads to the question of whether the microbiome from a young animal would have greater or less effects on a young host.”

This is not the first study to pinpoint butyrate as a beneficial compound in maintaining general health. For example, [a 2017 study discovered](#) that exercise, in both human and mouse experiments, resulted in enhanced microbiome production of butyrate. A substantial body of research has also found butyrate has significant anti-inflammatory effects, and maintaining healthy populations of butyrate-producing microbes in the gut can protect against auto-immune disease.

The new study raises the prospect that healthy aging could be promoted either through dietary products that enhance butyrate-producing microbial populations, or through direct butyrate supplementation. Pettersson notes further research is necessary to explore how butyrate is related to neurogenesis and healthy aging in humans.

“We can conceive of future human studies where we would test the ability of food products with butyrate to support healthy aging and adult neurogenesis,” says Pettersson. “In Singapore, with its strong food culture, exploring the use of food to ‘heal’ ourselves, would be an intriguing next step, and the results could be important in Singapore’s quest to support healthy aging for their silver generation.”

The new research was published in the journal *Science Translational Medicine*.