

Probiotics improve behavioral symptoms of chronic inflammatory diseases in mice

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Probiotics may improve the behavioral symptoms of chronic inflammatory diseases by altering communication between the immune system and the brain, according to an animal study published July 29 in the *Journal of Neuroscience*. Chronic inflammatory diseases such as rheumatoid arthritis and inflammatory bowel disease are associated with behavioral symptoms that include fatigue, depression, and social withdrawal. Researchers at the University of Calgary fed probiotics to mice with liver inflammation and found that the treatment reduced these behaviors.

The gastrointestinal tract is inhabited by a mass of microorganisms called the microbiota, which supports digestion and immune system health. Probiotics are live bacteria and yeasts that are commonly ingested to support the microbiota, and previous research has demonstrated that probiotics can have beneficial effects on mood and cognition. The mechanism of probiotics' effects on the brain is unclear, but it has been linked to changes in the immune system.

In this study, mice with [liver inflammation](#) were fed either a probiotic mixture or a placebo. The researchers gauged [behavioral symptoms](#) by measuring the amount of time the mice spent in social behaviors compared to time spent in isolation. Although it is unclear how inflammatory diseases lead to changes in brain function and behavior, previous research implicates the increased production of the inflammatory signaling molecule tumor necrosis factor alpha (TNF- α). Thus, the researchers also measured the amount of TNF- α circulating in

the blood and the amount of activated immune cells in the brain.

They found that:

- Mice that received the probiotics spent more time engaging in social behaviors compared to mice that received a placebo.
- Mice that received the probiotics had lower blood levels of TNF- α and fewer activated [immune cells](#) in the brain compared to mice that received a placebo.
- Probiotics did not alter the severity of liver inflammation.

The findings suggest that probiotics improved behavioral symptoms by altering communication between the immune system and the brain, the researchers said. The results suggest that, "in the setting of inflammatory disease, eating [probiotics](#) may be a novel way to improve the disease-associated symptoms that negatively impact the lives of patients," study author Mark Swain said.

The results have broader implications for the field as well, said Keith Kelley, an immunophysiologist at the University of Illinois at Urbana-Champaign who was not involved in the study. "The global implication of these data is that the gut microbiome can perhaps be manipulated to not only regulate immunity but also to regulate the neural circuitry that affects behavior."

Provided by Society for Neuroscience

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