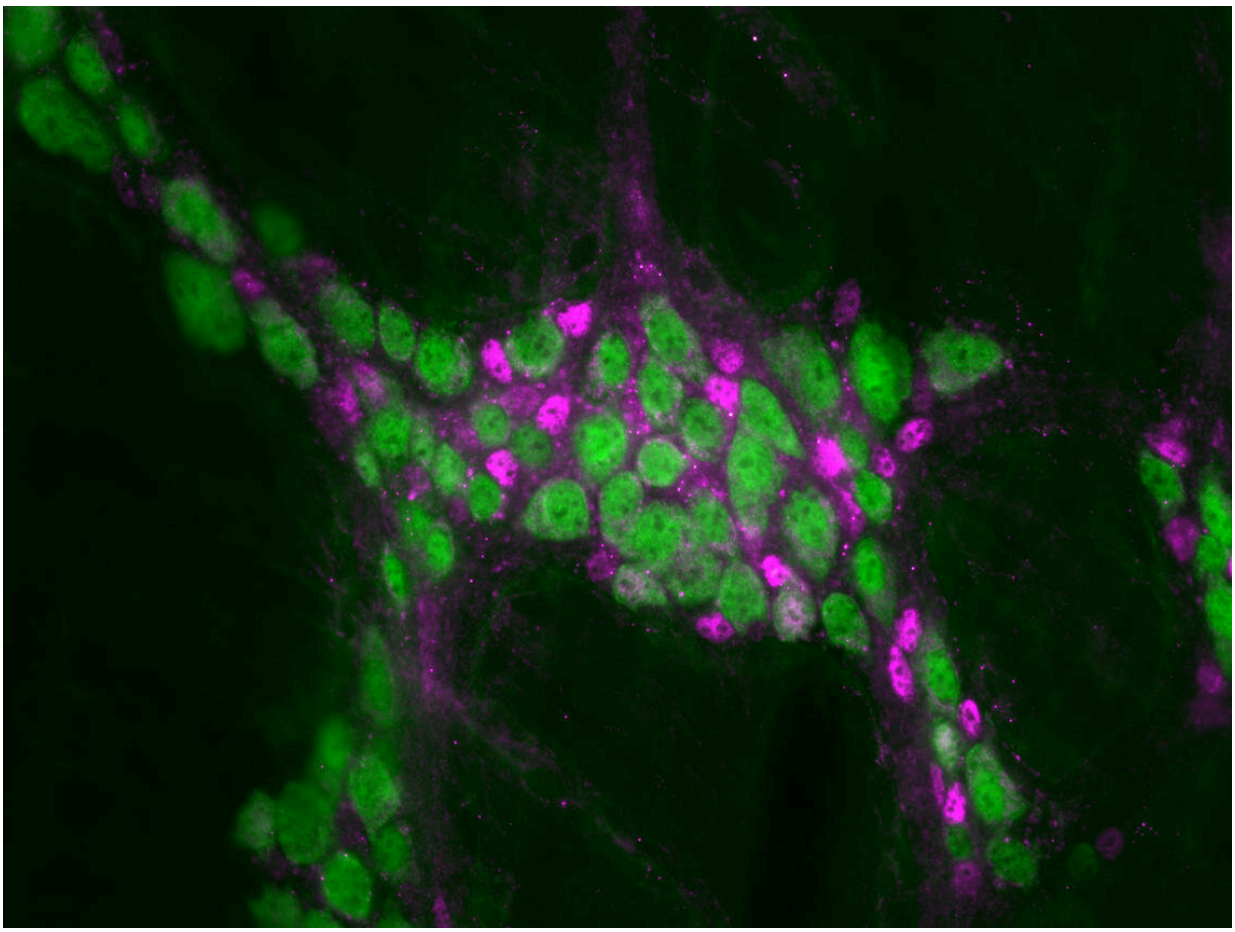
Medical Xpress

Microbiome discovery may open new doors to development of treatments for gastrointestinal diseases

November 12 2021, by Mike Fisher



Enteric neurons and glial cells in the myenteric plexus of the colon in an animal after natural microbial recolonization of the gut following antibiotic treatment. Credit: Laurie Wallace, Sharkey lab

University of Calgary researchers probing the gut—"the inner tube of life"—have for the first time discovered specific factors in its workings that in the future may help improve treatment for patients facing gut damage or gastrointestinal disease.

The findings from Snyder Institute for Chronic Diseases researchers immediately improve the understanding of factors that help regulate the enteric nervous system, the system of nerves that control the gastrointestinal tract. Researchers can now explore novel ways to treat gastrointestinal disorders using approaches based on these new findings, though the transition to treatment is likely years away.

The study's findings may impact future treatments for gastrointestinal diseases and disorders such as irritable bowel syndrome, inflammatory bowel disease and slow transit constipation, among others.

"We have uncovered microbial factors that help regulate the function and structural integrity of the enteric nervous system," says Dr. Keith Sharkey, Ph.D., a professor in the Cumming School of Medicine's Department of Physiology and Pharmacology. He is also a member of the Snyder Institute and the Hotchkiss Brain Institute. Sharkey is a senior author of the study and made the discovery with a research team from UCalgary and the University of Colorado.

"These and other gastrointestinal diseases with manifested changes in enteric neural control are all hard to treat. Our findings could impact approaches to their treatment," says Sharkey.

"Be aware, though, that there is a big jump from mice to men. In other words, translating our findings will be important, and our results are in only at the starting point of this journey."

The study examined the effects of microbiome depletion and restoration

in animal models using approaches that cause structural and functional changes in the gut. The researchers discovered that while microbiome depletion caused a loss of neurons, natural microbiome recovery restored gut function and promoted the growth of new neurons.

"The findings from our work provide clues as to the mechanisms that control 'plasticity' or the ability of the gut nervous system to be repaired if it undergoes damage," says Sharkey.

The study, entitled "Intestinal Microbiota Shapes Gut Physiology and Regulates Enteric Neurons and Glia," has recently been published in the science journal *Microbiome*.

Dr. Fernando Vicentini, Ph.D., first author of the study, says, "The most challenging aspect of researching the unknown physiological roles of the intestinal microbiota lies in identifying specific microbial-derived molecules that may affect the host, as there is a myriad of molecules with the potential to do so."

He adds that after many discussions and brainstorming sessions with the research team, they were able to hypothesize and demonstrate a link for two different bacterial molecules involved in the regulation of neuronal integrity.

For Dr. Simon Hirota, Ph.D., the study's co-senior author, in addition to the thrill of discovery, this research was exciting in that it allowed him to collaborate with a great team of people who contributed the complementary expertise needed to test these novel hypotheses.

The research was funded in part by the Canadian Institutes of Health Research, Canada's federal funding agency for health research.

Next steps for Sharkey and the research team include exploring other

potential microbial factors and their role in the neural control of the gut.

There is a rising awareness among the public through discussions in social media, on the internet and even through promotion of products such as yogurts that contain probiotics, that the gut microbiome plays a vital role in health as well as disease," says Sharkey. "These conversations are making their way into physicians' offices.

"As our understanding increases regarding the role the gut microbiome plays in gut health, I think we will ultimately have new ways to diagnose and treat gastrointestinal diseases on an individual level."

More information: Fernando A. Vicentini et al, Intestinal microbiota shapes gut physiology and regulates enteric neurons and glia, *Microbiome* (2021). DOI: 10.1186/s40168-021-01165-z

Provided by University of Calgary