

Targeting gut microbiome could be key to improving HIV health outcomes

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The study seeks to understand the protective functions of intestinal immune cells and their relationship with specific gut microbial species that become depleted during chronic HIV infection, even with antiretroviral therapy. Illustration by Shutterstock.

Tulane University researchers have been awarded a five-year, \$3.6 million grant from the National Institutes of Health to study how changing the gut microbiome may ease chronic inflammation and associated gastrointestinal issues for people taking antiretroviral therapy (ART) for HIV.

Long-term ART is crucial for people living with HIV to maintain low viral levels and enjoy extended, healthy lives. However, it has been associated with chronic gut dysfunction and inflammation, contributing to the development of cardiovascular, metabolic, kidney, and liver diseases. The precise mechanism by which ART contributes to gut dysfunction and related diseases is not yet fully understood.

To address this, [Namita Rout](#), PhD, an assistant professor of microbiology and immunology at the Tulane National Primate Research Center, will investigate the interactions between the gut microbiome and specific protective immune cells. These immune cells play a role in enhancing intestinal barrier function and reducing inflammation in a nonhuman primate model of HIV infection.

The intestinal barrier walls, consisting of epithelial cells, should ideally have tight "junctions" between them to prevent the leakage of microbes into the bloodstream, which can lead to inflammation and disease. Rout's study seeks to understand the protective functions of intestinal immune cells that strengthen these tight junctions and their relationship with specific gut microbial species that become depleted during chronic infection, even with antiretroviral therapy.

Previously, Rout's lab demonstrated that a decline in specific intestinal immune cells, gamma delta T cells, contributes to gut barrier disruption and the loss of specific gut microbial species in the nonhuman primate model of chronic HIV infection treated with ART. To counteract those effects, Rout's team will replenish the depleted gut microbiome with fecal microbial transplants enriched with specific microbes, employing a new approach with combined immunotherapy.

"This study will improve our understanding of the interaction between gut immune cells and the microbiome and their role in the persistent disruption of gut barrier functions," said Rout. "The gut primarily houses the immune system, and our optimization of it could benefit not only health outcomes for those living with HIV and on long-term ART, but for many suffering from inflammatory conditions."

[Jay Rappaport](#), PhD, director and chief academic officer of the Tulane National Primate Research Center, said that this study may explain why individuals with full viral suppression under ART may still experience ongoing activation of their immune systems and a propensity to develop other comorbidities.

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Namita Rout, PhD, assistant professor of microbiology and immunology