

Stool samples from the 1980s hold clues to fighting HIV today

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What do all the microbes living rent-free in your gut have to do with

disease risk? Perhaps a lot.

A study of decades-old stool and blood samples from the early AIDS epidemic suggests that men who had high levels of inflammation-causing bacteria in their intestinal tract may have had a greater risk for contracting HIV.

At issue is the specific makeup of the bacteria, fungi, algae and other [single-celled organisms](#) that colonize everyone's digestive tract. Collectively, they're known as the gut [microbiome](#).

"A healthy gut microbiome is essential for many bodily functions, such as turning food into energy, fighting bad pathogens and maintaining the lining of our intestines," said study lead author Yue Chen, an associate professor of infectious diseases and microbiology at the University of Pittsburgh. "Scientists are increasingly learning that it has other wide-ranging impacts, including fighting cancer, influencing our behavior and activating our immune response."

This new study found that men infected in the early stages of the HIV/AIDS pandemic had more pro-inflammatory gut microbes before they became HIV-positive than did men who remained HIV-negative.

And certain types of gut microbes seemed to be associated with a quicker progression from HIV infection to full-blown AIDS, the study found.

Study co-author Charles Rinaldo said he'd been looking into a potential link between the microbiome and HIV/AIDS for the better part of four decades.

That effort kicked into high gear once he and his colleagues at Pitt uncovered "a treasure trove of specimens" available for

analysis—namely, 35-year-old stool and blood samples collected from a group of gay men starting in 1984.

All had been part of a U.S. National Institutes of Health (NIH) study, and all the samples were frozen.

That allowed researchers fresh access to samples from 265 men.

None had HIV when they joined the NIH's study. Within a year of providing blood and stool samples, however, 109 had contracted the virus that causes AIDS.

To the 21st century researchers, their samples were telling.

"Participants who went on to contract HIV had a greater relative abundance of 'Prevotella stercorea'—a bacterium that promotes inflammation—and lower levels of four 'Bacteroides' species that are known to be involved in immune response," Chen noted.

Analyses of [blood samples](#) also indicated that participants who eventually contracted HIV had higher levels of inflammation before they were infected, Chen said.

"My colleagues and I believe that the unfavorable gut microbiome was aggravating the immune response and promoting inflammation, making the men more susceptible to contracting HIV, and less able to prevent the disease from progressing to AIDS in a time before antiretroviral therapy existed," Chen said.

And though a scientific blast from the past, the new findings could offer insight into tackling a host of current and emerging viral challenges, the researchers said.

"It is important for us to understand that humans are complex organisms that host other complex organisms," said Rinaldo, a professor of infectious diseases and microbiology.

"What we eat, our activities and environmental exposures, and a variety of other factors can all influence how we respond to a pathogen and whether we become seriously ill or have a benign infection," he explained. "If the gut microbiome influences a person's susceptibility to HIV in this way, it could be doing the same for other pathogens, such as COVID-19."

Two experts, who were not involved in the study but reviewed the findings, agreed.

"The microbiome is one component of how your body responds immunologically," said Dr. Christina Price, chief of clinical allergy and clinical immunology at Yale University in New Haven, Conn. She described the findings as "interesting" and "remarkable," but in no way surprising.

Along with our skin, tears, mucus and saliva, the gut is one of the primary natural immunity defense systems, added Lona Sandon of the University of Texas Southwestern Medical Center at Dallas.

Sandon referred to her own research into an apparent link between microbiome status and rheumatoid arthritis risk. That work, she said, showed that while "a healthy [gut microbiome](#) keeps the gut wall healthy," microbial disruptions can undermine the gut's protection from disease.

"If the microbiome creates an environment in which these tissues cannot respond effectively, then immunity will be negatively impacted," she said.

The new findings were published online Dec. 9 in the journal [Microbiome](#).

More information: Harvard University's T.H. Chan School of Public Health has more about [the microbiome](#).

Yue Chen et al, Signature changes in gut microbiome are associated with increased susceptibility to HIV-1 infection in MSM, *Microbiome* (2021). [DOI: 10.1186/s40168-021-01168-w](https://doi.org/10.1186/s40168-021-01168-w)

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