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Gut reaction: Scientists get first good look at intestinal bacteria

By Tina Hesman Saey
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Relying on your gut may be more important than you ever thought.

As many as 100 trillion teeny organisms are working busily inside your gut right now. And those microbes in your colon may decide who's thick and who's thin, who's sick and who's healthy.

Now scientists are getting their first good look at the microscopic organisms that live in the intestines of healthy people to determine just how they keep people healthy. The research could be the first step in learning how the guts of healthy people differ from those with bowel diseases and which bacteria might make them well.

"The GI tract has the most abundant, diverse population of bacteria in the human body," said Steven Gill, lead author of a study published today in the journal *Science*. Gill works at the State University of New York in Buffalo.

"We're entirely dependent on this microbial population for our well-being. A shift within this population, often leading to the absence or presence of beneficial microbes, can trigger defects in metabolism and development of diseases such as inflammatory bowel disease."

The researchers, which included a team of scientists from Washington University, analyzed microbes from the guts of two anonymous healthy volunteers. One was a 28-year-old woman, the other a 37-year-old man. One was a vegetarian. Neither person had taken antibiotics or other medicines in the year prior to the study.

There were communities of thousands of different strains of single-celled organisms in each of their colons.

The research team, which also included scientists from the Institute for Genomic Research in Rockville, Md., Stanford University and George Washington University, identified several hundred types of bacteria. They also identified archaea, single-celled creatures that resemble bacteria but are chemically and genetically distinct.

"This is an early, high-altitude look at a complicated landscape," said Dr. Jeffrey I. Gordon, director of the Center for Genome Sciences at Washington University School of Medicine.

But it's still a far more complete portrait of the human gut than previously seen.

The Washington University group analyzed what all those microorganisms do. They sorted more than 60,000 microbial genes - more than twice the number in the human genome - into more than 2,500 functional groups, including genes that are involved in cholesterol production, helping the immune system mature, regulating energy and repairing cell damage.

The microbial communities divided the work among their members, said Jo Handelsman, a Howard Hughes Medical Investigator at the University of Wisconsin at Madison.

"It's like a human community," she said. "Somebody has to pick up the garbage, and somebody has to deliver the mail. Those may be different people with different names, but they still do the same job."

Bacteria have gotten a bad reputation for causing diseases, but few microbes are true bad guys, Handelsman said.

"Bacteria are our very, very best friends," she said. "Life on Earth would be impossible without them."

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