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We are not entirely human, germ gene experts argue

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By Maggie Fox, Health and Science Correspondent

WASHINGTON (Reuters) - We may not be entirely human, gene experts said on Thursday after studying the DNA of hundreds of different kinds of bacteria in the human gut.

Bacteria are so important to key functions such as digestion and the immune system that we may be truly symbiotic organisms -- relying on one another for life itself, the scientists write in Friday's issue of the journal Science.

Their findings suggest that studying bacteria native to our bodies may provide important clues to disease, nutrition, obesity and how well drugs will work in individuals, said the team at The Institute for Genomic Research, commonly known as TIGR, in Maryland.

"We are somehow like an amalgam, a mix of bacteria and human cells. There are some estimates that say 90 percent of the cells on our body are actually bacteria," Steven Gill, a molecular biologist formerly at TIGR and now at the State University of New York in Buffalo, said in a telephone interview.

"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."

Scientists have long known that at least 50 percent of human feces, and often more, is made up of bacteria from the gut. Bacteria start to colonize the intestines and colon shortly after birth, and adults carry up to 100 trillion microbes, representing more than 1,000 different species.

They are not just freeloading. They help humans to digest much of what we eat, including some vitamins, sugars, and fiber. They also synthesize vitamins that people cannot.

"Humans have evolved for million of years with these bacteria. And they provide essential functions," Gill said.

GERM SURPRISE

Gill and his team sequenced the DNA in feces donated by three adults. They found a surprising amount of it came from bacteria.

They compared the gene sequences to those from known bacteria and to the human genome and found this so-called colon microbiome -- the entire sum of genetic material from microbes in the lower gut -- includes more than 60,000 genes.

That is twice as many as found in the human genome.

"Of all the DNA sequences in that material, only 1 to 5 percent of it was not bacterial," Gill said.

"We were surprised."

They also found a surprising number of Archaea, also known as archaebacteria, which are genetically distinct from bacteria but which are also one-celled organisms often found in extreme environments such as hot springs.

The donors were healthy adults. None had taken antibiotics for a year, as these drugs are known to disturb the bacteria in the body.

Gill said his team hopes now to make a comparison of the gut bacteria from different people.

"The ideal study would be to compare 20 people, 30 people from different ethnic backgrounds, different diets, drinkers, smokers, and so on, because I think there are going to be distinct differences," Gill said.

These bacteria almost certainly help break down drugs that people take and studying the effects of different populations of the microbes might provide clues to treating different people with various medications.

The next study will focus on the bacteria in the mouth, Gill said. There are at least 800 species in the mouth and maybe more, Gill said.

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