Lifestyle has a strong impact on intestinal bacteria

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Credit: Peter Häger/Public Domain

Everything you eat or drink affects your intestinal bacteria, and is likely to have an impact on your health. That is the finding of a large-scale study led by RUG/UMCG geneticist Cisca Wijmenga into the effect of food and medicine on the bacterial diversity in the human gut, which is published this Friday in the prestigious research journal *Science*.

In this study researchers collected stool samples from more than 1100 people taking part in the LifeLines programme, which is monitoring the health of 165,000 residents of the Northern Netherlands. The samples were used to analyse the DNA of the bacteria and other organisms that live in the gut. In addition to stools, the study collected information on the participants' diet, medicine-use and health.

This study is unique in that it focussed on a group of normal people whereas previous research was frequently focussed on patients with a specific illness. Further, the study covered an exceptionally large group of people and studied their gut DNA in detail. "Normally researchers only investigate one particular region of DNA in which different groups of bacteria can be distinguished," Wijmenga explains. "We have mapped all the bacterial DNA to gain much more detailed information about bacteria types."

Coffee and wine

This DNA analysis made it possible to examine which factors impact the diversity of the microbiome (the intestinal bacterial community unique to each of us). And that appears to be many. Wijmenga says, "You see, for example, the effect of diet in the gut." People who regularly consume yogurt or buttermilk have a greater diversity of gut bacteria. Coffee and wine can increase the diversity as well, while whole milk or a high-calorie diet can decrease it.

"In total we found 60 dietary factors that influence the diversity. What these mean exactly is still hard to say," explains UMCG researcher Alexandra Zhernakova, the first author of the Science article. "But there is a good correlation between diversity and health: greater diversity is better."

Beyond diet, at least 19 different kinds of medicine - some of which are

widely used -have an impact on microbiome diversity. An earlier study by Groningen researchers has shown that antacids decrease this diversity, while antibiotics and the diabetes drug metformin also have an effect. These are important findings Wijmenga stresses, "Disease often occurs as the result of many factors. Most of these factors, like your genes or your age, are not things you can change. But you can change the diversity of your microbiome through adapting your diet or medication. When we understand how this works, it will open up new possibilities."

Stool samples

Recent research has demonstrated the importance of this. It is now possible to combat obesity through a 'faecal transplantation' in which the intestinal bacteria from a slender person are introduced into the gut of an obese patient. An appropriate diet or a specific medicine may produce the same effect on the microbiome.

Currently a lot of research is looking into the microbiome, but it often seems hard to reproduce. It is therefore striking that the results of a Belgian group published in the same issue of Science show about 80 percent agreement with those of the Groningen group. "The key is the way the research was done," Wijmenga says. What was important was that the stool samples were frozen immediately by the participants themselves, and picked up by the researchers while still frozen. "When samples are sent in by post, as is often the case, you expose them to oxygen and high temperatures. These are conditions that some bacteria can't survive in. These two Science articles have therefore set a new standard for future research in this field."

More information: "Population-based metagenomics analysis reveals markers for gut microbiome composition and diversity," *Science*, DOI: 10.1126/science.aad3369

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