

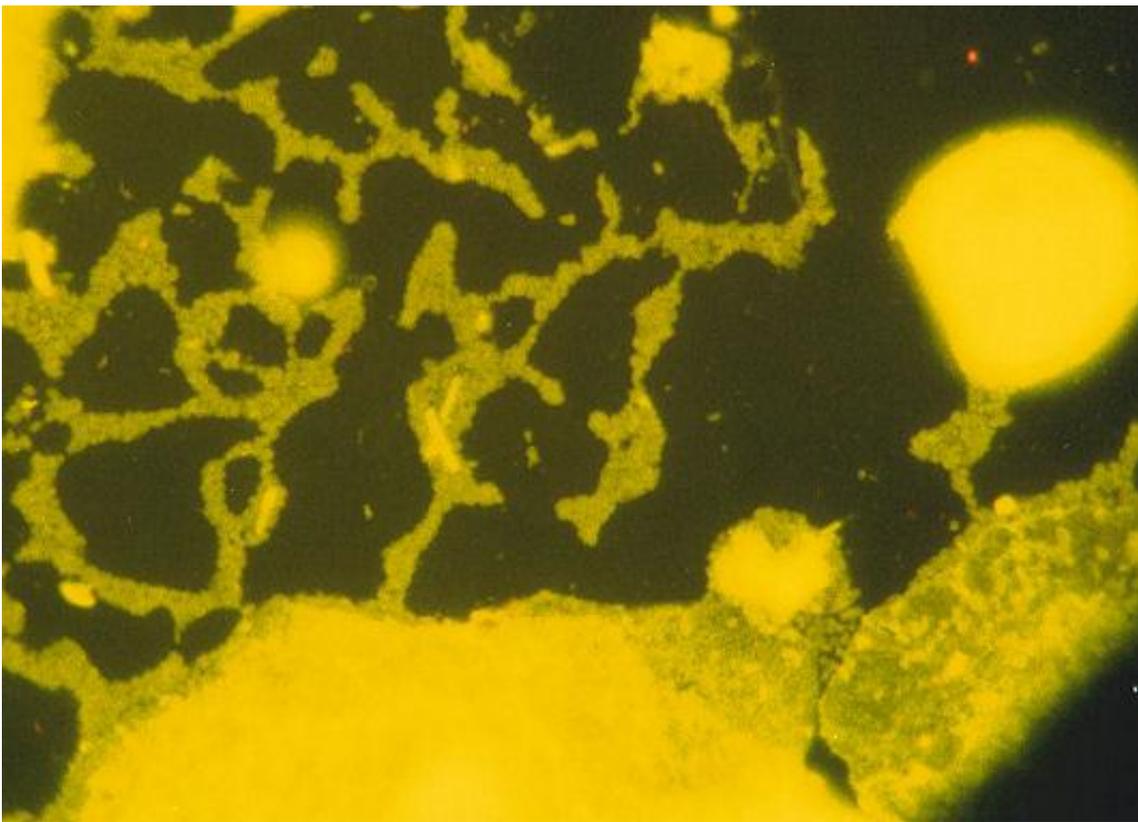


**HEALTHY LIVING**

# Surprising Gut Bacteria Health Benefit: Regulating Blood Pressure

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By  
Ashik Siddique



Healthy gut bacteria have many benefits for your body – new research says they may help control blood pressure. *Creative Commons*

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Gut bacteria have long been known to help humans digest food and protect against harmful pathogens, but new research suggests that they play an important health role in preventing hypertension as well.

Gut bacteria are all the microorganisms that live in the human digestive system, from the stomach through the intestines to the colon. Around 500 different species of bacteria live in the gut, and the relationship between humans and their gut bacteria is mutually beneficial.

Recent research has shown that, among other functions, the gut bacteria help digest fiber and carbohydrates, maintain healthy fat levels, and promote immunity. They also help keep away "bad" pathogenic bacteria that makes us sick.

Researchers from Johns Hopkins and Yale University, supported by a grant from the National Institute of Diabetes and Digestive and Kidney Diseases, published their findings in the *Proceedings of the National Academy of Sciences* journal on February 11.

The team already knew that gut bacteria have strong health influences on the bodies of their mammal hosts by releasing molecules called short chain fatty acids (SFCAs), and wanted to examine receptors throughout the body respond to the SFCAs.

According to MedicalNewsToday, SFCAs are the gut bacteria's byproducts from breaking down dietary fiber, and enter the human bloodstream when absorbed by the colon. The SFCAs then land on receptors (protein molecules on the surface of cells) throughout the body, sending signals that regulate health-related processes like the growth of fat and immune cells.

They decided to look at which receptors throughout the body react to the healthy gut bacteria's fiber-derived SFCAs, and were surprised to find that receptors involved in blood pressure regulation were among them.

"There is still much to learn about this mechanism, but we now know some of the players and how they interact," said first author Jennifer Pluznick, assistant professor of physiology at the Johns Hopkins University School of Medicine, in a statement.

The initial discovery was that olfactory receptor 78 (Olfr78), a specific type of odor-sensing receptor that was thought to only be present in the nose, actually

exists in the kidneys, along the smooth muscle walls of blood vessels, and in the heart, skeletal muscle, and skin.

After finding Olfr78 in such unexpected places, the scientists looked for which molecules would bind to Olfr78. They altered cells to have the Olfr78 receptors on their surfaces, and to express a light-emitting chemical whenever a molecule bound to the receptors. After testing a variety of substances, they discovered that acetic acid, or vinegar, and propionate were the only molecules that bound to Olfr78.

Since acetic acid and propionate are short chain fatty acids (SFCAs), the scientists immediately realized that Olfr78 might be sensitive to large amounts of SFCAs released by gut bacteria.

The next step was to get rid of all the SFCAs in mice and see what happened. Since the receptor existed throughout the walls of blood vessels, the researchers thought that it might help control high blood pressure. They gave the mice antibiotics for three weeks to destroy all the healthy gut bacteria that normally produce SFCAs, and recorded their blood pressure.

The normal mice didn't show much change in blood pressure, but mice that were genetically altered to lack the Olfr78 receptor had lower blood pressure after their gut bacteria was killed. This complicated the picture and suggested that other factors might be involved in regulating healthy blood pressure, other than just Olfr78 and SFCAs.

After examining other SFCA-sensitive receptors, they realized that another receptor called Gpr41 was also involved in healthy blood pressure regulation. They conducted similar tests on mice with the Gpr41 gene "knocked out," and found that when SFCAs bind to Gpr41, blood pressure goes down.

The data showed that there were two opposite SFCA receptor mechanisms. When SFCAs bind to the Olfr78 receptor, there is high blood pressure, but when they bind to the Gpr41 receptor, blood pressure decreases. Gpr41 has a stronger effect, so a higher level of SFCAs means there is a net decrease in blood

pressure.

If these findings can be generalized from mice to humans, they suggest that gut bacteria's ability to help us avoid hypertension depends on both healthy diets and our genes.

If cells' receptors are in sync with healthy SFCA levels from gut bacteria, it is possible that the body can naturally regulate high blood pressure if we eat a diet high in fiber.

Dr. Pluznick says that the team has found only some of the many players involved in preventing high blood pressure.

"We don't know why it would be beneficial for blood pressure to decrease after eating or why gut microbes would play a part in signaling that change. But our work opens the door for exploring the effects of antibiotic treatments, probiotics and other dietary changes on blood pressure levels in mice, and perhaps eventually people," she said.

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