

Bacteria in gut might mitigate heart attack, researchers say

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Diet, exercise and gut bacteria? Surprisingly enough, it turns out that all three - yes, even the bacteria in your gut - might influence how healthy your heart is.

According to researchers at the Medical College of Wisconsin, using antibiotics or so-called probiotic-containing drinks to manipulate the balance of the bacteria in rats' guts had a marked effect on their susceptibility to [heart](#) attacks.

Scientists know that there are a lot of tiny microbes living in our bodies, outnumbering our [human cells](#) by at least 10 to 1. In our [intestines](#) alone, there are more than a thousand different types of bacteria.

We don't know exactly who they are or what they do - though scientists do have some ideas. A massive national project called the Human Microbiome Project is underway to catalog everyone who's living in the neighborhood, and the microbes living in our bodies have so far been linked to everything from obesity to [tooth decay](#).

John Baker, a professor of surgery at the Medical College of Wisconsin, suspected that these microbes might also play a role in determining the severity of heart attacks.

To study this link, Baker and his research team gave rats low levels of an antibiotic to alter the distribution of their gut bacteria, and then cut off [blood flow](#) to part of their hearts in a process designed to mimic a heart

attack.

They found that rats who had been on the [antibiotic treatment](#) had less damage to their heart muscles than rats who didn't get the treatment.

The antibiotic, it turned out, reduced the number of certain types of bacteria in the rats' intestines. In turn, this reduced the amount of the [hormone leptin](#) in the blood, and the lower leptin levels made the rats' hearts less susceptible to injury. Leptin is a hormone usually involved in controlling appetite, but research has implicated it in [heart disease](#) as well.

Baker hypothesizes that normal levels of leptin "mask," or block, functions in [heart cells](#) that help them survive. Reducing the amount of leptin in the blood then helps turn these survival pathways back on.

So if you can protect the heart by using antibiotics to kill off leptin-producing bacteria, can you also do the opposite? Can you instead introduce bacteria to the gut that have similar effects on leptin levels and heart health?

It wasn't hard to find a source of bacteria to play this role. Baker and his team used the probiotic drink Goodbelly, which can be bought at health food stores and contains the leptin-reducing bacterium *Lactobacillus plantarum*.

While antibiotics are medicines that kill off bacteria and other microorganisms, probiotics are supplements of "good" bacteria that benefit their host.

And it turns out that the rats even liked the stuff. "The rats didn't seem to mind what the flavor was," says Baker, "but they were certainly very happy drinking it!"

Like the rats treated with antibiotics, the rats that drank Goodbelly didn't suffer as much damage to their hearts as those that went without.

Various tests helped Baker and his team show that leptin and the gut bacteria really were the key players. If the researchers gave the rats both antibiotic and leptin before testing their hearts, the damage was as large as if they received no antibiotic at all. Similarly, if they irradiated the Goodbelly drink to kill off the probiotic bacteria before feeding it to the rats, the drink had no effect.

These results are exciting, says Hemal Patel, a professor at the University of California, San Diego whose lab studies heart disease, because until now, "no one even considered bacteria as a confounding factor in whether you do poorly or well after a heart attack."

But now that the link has been established, it opens the door for all sorts of new experiments.

For example, Baker and his colleagues have so far only shown that antibiotics and probiotics reduce heart attack severity in rats. The next challenge is to see whether they might help humans as well.

This step is not always easy, says UCSD's Patel.

"A mouse and a rat are not human. Are the things that you see in these tiny species translatable to humans?"

While researchers can't, of course, induce heart attacks in human volunteers, they can give them the same antibiotics and probiotics used in the rat studies and see whether their gut bacteria, [leptin levels](#) and other biological markers of heart disease (such as blood flow or cholesterol) change. Baker recently received funding to start these types of human trials.

The results might not only help researchers figure out how to treat or prevent heart attacks, but also new ways to diagnose their severity.

If someone comes into the emergency room after a [heart attack](#), for example, a quick check of the person's [gut bacteria](#) might help doctors determine how likely they are to have suffered severe damage to their heart. This information might then help the doctors make better decisions about how to treat these patients.

Neither low-level antibiotics nor probiotics are likely to be good therapies for heart disease on their own. But, says Morris Karmazyn, a professor of cardiology at the University of Western Ontario, they have "substantial potential when administered in combination with existing medications."

Karmazyn, who wasn't part of Baker's study, calls the results "a very exciting finding" that shows the potential of probiotics to improve cardiovascular health.

And Baker, for one, feels like he's contributed something new and important to our understanding of how bacteria might influence our health.

"Personally," he says, "I think that this is the most important science that I've done."

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