

How Does Alcohol Affect the Gut Microbiome?

Scientists are just beginning to explore the relationship between drinking and the good and bad bacteria in your gut.



By Alice Callahan

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A frothy beer or a glass of wine can enhance a meal and settle the mind. But what does alcohol do to the trillions of microbes living in your gut?

As with much of microbiome science, “there is a lot that we don’t know,” said Dr. Lorenzo Leggio, a physician-scientist who studies alcohol use and addiction at the National Institutes of Health.

That said, it’s clear that happy microbes are essential for proper digestion, immune function and intestinal health. And as scientists begin to explore how drinking may influence your gut, they’re learning that overdoing it could have some unhappy consequences.

How does heavy drinking affect your microbiome?

Most of the available research on alcohol and the microbiome has focused on people who drink regularly and heavily, said Dr. Cynthia Hsu, a gastroenterologist at the University of California, San Diego.

A handful of studies, for instance, have found that people with alcohol use disorder (the inability to control or stop problematic drinking) often have an imbalance of “good” and “bad” bacteria in their guts. This is called dysbiosis, and it is generally associated with greater inflammation and disease compared with having a healthier microbiome, Dr. Hsu said.

Heavy drinkers with dysbiosis can also have “leakier,” or more permeable, intestinal linings, Dr. Leggio said. A healthy gut lining acts as a barrier between the interior of the intestine — full of microbes, food and potentially harmful toxins — and the rest of the body, he said.

When the gut lining breaks down, bacteria and toxins can escape into the bloodstream and flow to the liver, Dr. Hsu added, where they can cause liver inflammation and damage.

Preliminary research suggests that an unhealthy gut might even contribute to alcohol cravings, said Dr. Jasmohan Bajaj, a hepatologist at Virginia Commonwealth University and the Richmond V.A. Medical Center.

In a 2023 study, for example, researchers looked at the microbiomes of 71 people ages 18 to 25 who did not have alcohol use disorder. Those who reported more frequent binge drinking (defined as four or more drinks within about two hours for women, or five or more drinks for men) had microbiome changes that correlated with greater alcohol cravings. That study also added to previous research that found that binge drinking was associated with greater blood markers of inflammation.

Of these studies, none of them have proven that alcohol causes dysbiosis in humans, however. The link is clearer in animal studies, but in human studies, it’s harder for researchers to control for factors like diet and other health conditions.

What about those who drink less?

Federal guidelines define moderate drinking as no more than two drinks per day for men or one drink per day for women. There's very little research on how this amount of alcohol consumption affects your gut microbiome, said Jennifer Barb, a clinical bioinformatics scientist at the National Institutes of Health.

Scientists have found that compared with those who don't drink at all, people who drink at low-to-moderate levels have more diverse gut microbiomes — a characteristic generally associated with a healthy gut. This could be attributed to other diet or lifestyle factors, or it could be that something in alcoholic drinks might benefit the microbiome — though it's likely not the ethanol, Dr. Barb said.

In a 2020 study of 916 women in Britain who consumed two or fewer drinks per day, for example, researchers found that those who drank red wine — or to a lesser extent, white wine — had greater gut microbial diversity than those who did not. No such link was found with beer or liquor. The researchers hypothesized that polyphenols, compounds found in grape skins that are in high concentrations in red wines, might explain their results.

But you don't need alcohol to find polyphenols, said John Cryan, a neuroscientist who studies the microbiome at University College Cork in Ireland — they're also in grapes and most other fruits and vegetables, as well as many herbs, coffee and tea.

In general, consuming a variety of plant-based foods and fermented foods like yogurt, kombucha and kimchi can improve microbiome diversity, too.

Can cutting back on alcohol improve your gut health?

Researchers have looked at the microbiomes of people who have been treated for alcohol use disorder and found that within two to three weeks after the people stopped drinking, their gut microbes started to show signs of recovering, Dr. Barb said, and their gut linings became less "leaky." But, she added, people who get treated for alcohol use disorder also usually start to eat more healthfully and sleep better, which can improve gut health, too.

It's not clear how — or even if — quitting or cutting back on alcohol might influence the microbiomes of moderate drinkers, Dr. Leggio said. But we do know that alcohol can cause acid reflux, stomach lining inflammation and gastrointestinal bleeding, he added, and can increase your risk of several types cancer, including those of the esophagus, colon and rectum.

So "there is no question whatsoever," Dr. Leggio said, that drinking less is a worthwhile endeavor for your health.

Alice Callahan is a Times reporter covering nutrition and health. She has a Ph.D. in nutrition from the University of California, Davis. More about Alice Callahan

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