

Here's what to eat to protect your mouth's good bacteria

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(Credit: Getty Images)

Your oral microbiome is the key to a healthy mouth and body. Here's how to make sure it's well-nourished.

Everyone knows that sugary foods can lead to dental cavities, by feeding harmful bacteria in our mouths. But it turns out that keeping them away is as much about what you do eat as what you don't eat – and from fruit to cheese, the most beneficial foods might surprise you.

Research is starting to uncover the importance of the oral microbiome. This community is made up of 700 different bacterial species, as well as viruses, fungi, and other microorganisms. It can have a profound effect on our health. Currently, though, it's often neglected.

It doesn't have to be this way. It's easy to take care of your mouth microbes – and as with the gut, your diet is a major factor. Here's what you need to know to eat your way to healthy teeth.

A thriving community

In the bustling neighbourhood of your mouth, microbes carve out ecological niches, with each species preferring a distinct habitat. While some bacteria choose to inhabit the surface of teeth, others might prefer the tongue or lurk in the tiny crevices between your teeth and gums.

Some of these microbes are bad news. Take *Streptococcus mutans*, which sits on the surface of teeth and loves to eat sugar. *This bacterium* turns sugars into acids that eat away at the protective enamel on teeth. Eventually this can lead to holes or cavities, which more than 80% of Americans have by the time they enter their mid-30s.

Other mouth microbes are actively helpful. For instance, if beneficial bacteria such as *Veillonella*, *Actinomyces*, some species of *Streptococcus*, or *Neisseria* make your mouth their home, they can prevent harmful pathogenic strains from colonising.

Having a good oral microbiome isn't just important for dental health. If you don't brush your teeth regularly or fastidiously enough then small pockets can form in the space between teeth and gums. In this oxygen-poor environment, bugs such as *Porphyromonas gingivalis* can thrive.

Once there, *P. gingivalis* causes gum disease, but also raises the risk of health problems such as cardiovascular disease, depression, Alzheimer's disease, diabetes, inflammatory bowel disease, rheumatoid arthritis, and even preterm birth. In recent years, scientists have increasingly linked a poor oral microbiome to colon and pancreatic cancer.

In one recent study, a team of scientists from across the US tested the saliva of participants and then followed up to identify their subsequent risk of cancer. Those whose oral microbiome contained certain bacterial species linked to tooth decay or *Candida* yeast were found to have a higher risk of pancreatic cancer.

There's also emerging evidence that, as with the gut, it's important to have a varied mix. For instance, one recent study found that a lower diversity of microbes in the mouth is associated with depression.

But crucially, brushing your teeth alone is not enough to maintain this microbial community. Everything you eat, they eat – and this has a direct effect on which ones can thrive.

What to eat – and what to avoid

Snacks or beverages to avoid are those primarily made up of lots of sugar, as these are gobbled up by cavity-causing bacteria. It's also a good idea to limit your intake of processed carbohydrates, as these are easily broken down into sugars in the mouth. Starchy snacks to avoid include white bread, crackers, biscuits, cakes, and pretzels.

Attracting "good" bacteria is helpful for two reasons. They compete for food and space with those that are linked to cavities and disease, reducing their populations. But some also directly attack the ones you don't want moving into your mouth.

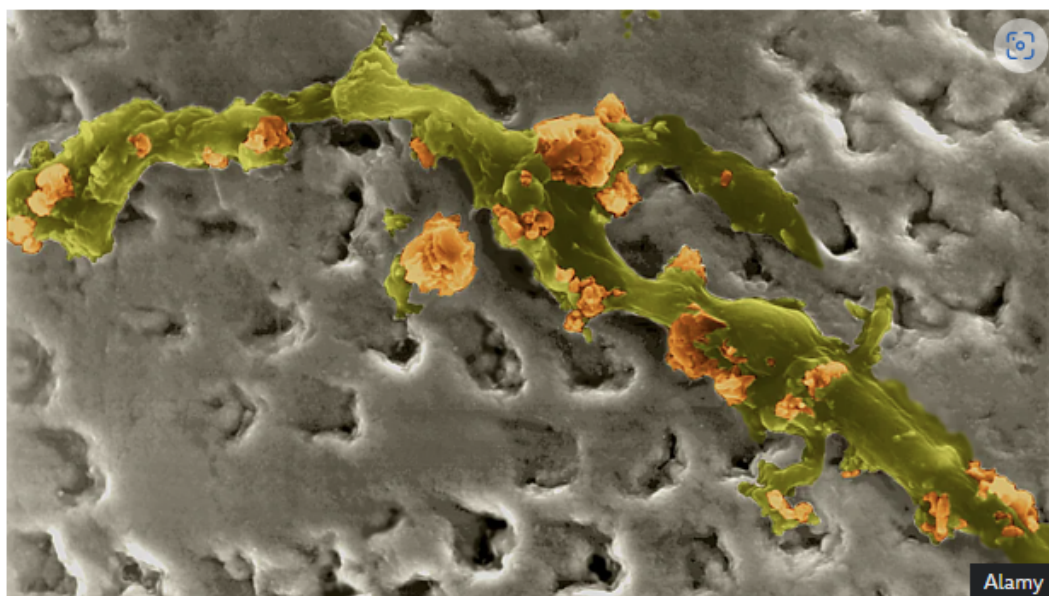
"Within the broader family of these sugar loving microbes, *Streptococcus*, there are some [bacteria] that don't produce much acid at all, and they'll actually attack some of the microbes that do produce acid," says Laura Weyrich, associate professor of anthropology and bioethics at Pennsylvania State University in the US, who studies the oral microbiome and how it has changed throughout history.

"They're like freedom fighters – they have their own antibiotics that they use as weapons. So if you have these bacteria then you're going to be in good shape," says Weyrich. For example, the friendly bacteria *S. salivarius* produces **proteins that can kill** a wide variety of unwanted microbes. This includes pathogens with resistance to conventional antibiotics.

If you want to cultivate a healthy oral microbiome, one of the best things you can do is eat plenty of leafy green vegetables. Foods such as kale, spinach, beetroot and radishes contain high amounts of nitrate, which is **gobbled up** by *Neisseria* bacteria in our mouths. The microbes convert this nitrate into nitrite, which is then further changed by bacteria in the gut into nitric acid. Nitric acid circulates in the blood and acts to reduce blood pressure, benefiting cardiovascular health. For instance, in one **trial**, older adults who drank nitrate rich beetroot juice twice a day for two weeks saw their blood pressure fall.

Weirdly, chewing garlic – although it may not do wonders for your breath – can also benefit oral health, as it **contains a chemical** called allicin that attacks the bacteria that cause cavities and gum disease.

Eating a largely plant-based diet can benefit your oral microbiome in other ways too. The reason is down to a class of compounds found in plants called polyphenols. When it gets too hot, cold, or sunny, animals can simply get up and move to a more hospitable environment. Plants don't have this luxury, so instead they produce **polyphenols** – special antioxidants that protect their cells and tissues from damage.



At a microscopic level, even the seemingly smooth surface of a tooth has plenty of crevices for microbes to live in (Credit: Alamy)

However, polyphenols can protect against harmful bacteria too. For instance, Wu's research and that of others has shown that the polyphenols found in tea can suppress the "bad" oral bacteria that cause cavities and gum disease and stop them from clumping together and attaching to the surface of teeth.

"The polyphenols inhibit one of the enzymes that is responsible for the stickiness of the plaque," says Christine Wu, professor of paediatric dentistry at the University of Illinois Chicago College of Dentistry in the US, whose research focuses on foods that could help combat oral pathogens.

In Wu's study, drinking tea also appeared to inhibit the bacteria responsible for bad breath, which live at the back of the tongue.

Other foods rich in polyphenols include many fruits, particularly dark-coloured berries. This is why, contrary to what you may expect, these sugar and acid-rich foods can benefit oral health. Wu's research has shown that drinking cranberry juice can prevent the growth of dental plaque, and inhibit the bacteria associated with cavities and periodontal disease. Honey is also packed with polyphenols and has likewise been shown to prevent plaque formation and fight against the bacteria that causes cavities.

Chewing on cheese is also thought to have some benefits for our oral communities.

In one small study by researchers in Italy, nine participants were asked to eat Grana Padano cheese each day for five days. At the end of the study, the scientists found that the genetic signatures of the bacterial communities in their mouths had shifted slightly, with fewer of the sugar-loving *S. mutans* and more *S. sanguinis*, a bacteria more likely to be found in healthy mouths.

Cheese can also counteract some of the harm caused by *S. mutans*.

"Cheese is awesome because it has all the good properties of milk, but it is solid, so when you chew it the saliva increases," says Wu. "The saliva will get rid of some of the extra sugar on the tooth or in the mouth, and because saliva is neutral it buffers the acid that's produced in the mouth."

Fermented foods can also benefit your oral microbiome as they contain beneficial bacteria that compete with the "baddies." For instance a recent review found that drinking kefir – a fermented milk product – could inhibit certain oral pathogens and stop them from producing their sticky biofilm.

However, according to Gaetano Isola, associate professor of periodontology at the University of Catania, Italy, there is no single "superfood" for oral health, and what matters much more is the overall dietary pattern.

"If we repeatedly consume refined sugars and easily fermentable carbohydrates, we favour microorganisms that are particularly efficient at producing and tolerating acids," he says. He explains that, over time, this can shift the microbial community towards an imbalance.

"By contrast, an overall diet richer in whole plant foods, fibre and complex carbohydrates and lower in frequent refined-sugar exposure is more compatible with maintaining a stable oral ecosystem."

A simple practical tip from Isola is to favour whole plant foods – vegetables, whole fruits, legumes and whole grains – rather than refined carbohydrates.

A recent study in which Isola was involved found that people who adhered more closely to a Mediterranean-style diet, known for its emphasis on fruits, vegetables, whole grains, and healthy fats, tended to have less severe gum disease. Patients who did not follow the Mediterranean diet as closely tended to have more severe gum disease, especially if they consumed red meat frequently.

It's not clear what might be causing the association between red meat and gum disease. One idea is that the protein may create an oral environment that favours harmful microbes, such as *P. gingivalis*.

Of course, brushing and flossing is still essential. Flossing has been associated with lower concentrations of the dental pathogen *S. mutans*, while brushing the teeth and tongue significantly decreases microbes associated with dental diseases.

Scientists don't yet know how regular over-the-counter mouthwashes affect your oral microbiome. The hope is that one day they could be used to balance microbial communities rather than just reducing the total amount of bacteria present. Some mouthwashes that contain chlorhexidine, on the other hand, are known to disrupt the balance of oral microbes. These can still help to treat gum disease and certain other oral conditions in the short term.

But for a healthier mouth microbiome, eating the right foods is a powerful tool in your arsenal.

"It's the same thing that everybody always says – which is kind of boring – which is sticking to a diet that's well balanced and has lots of vegetables, lots of leafy greens, lean proteins and limiting your sugar intake, especially sugary drinks," says Weyrich.

So why not make yourself a sumptuous salad, or a selection of fine cheeses washed down with a hot cup of tea. Not only will doing so benefit your body – you'll be making the good microbes in your mouth happy too.

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