

E-cigarettes found to cause change in mouth bacteria, which could lead to gum disease or oral cancer

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Credit: Jonathan Borba from Pexels

E-cigarettes are a popular alternative to smoking, but we still know very little about the effects of them on our health. While numerous studies

have explored the effect of e-cigarettes on our lungs, heart, and overall health, one important and often overlooked consideration is what effect they have on our microbiome. But a recent study has found e-cigarettes [change the bacteria](#) in our mouths. These bacterial changes can [lead to disease](#), if left unchecked.

Our microbiome is the living community of [bacteria](#), fungi, and viruses that keep us healthy. We often hear a lot about our gut microbiome, but our oral microbiome is probably just as important to our overall health. It's the [second and most diverse microbiota](#) next to the gut, home to over [1,000 species](#) of [microbes](#). It's the gateway to the rest of our digestive system and plays a key role in helping us break down foods.

Our oral microbiome also wards off [potentially harmful microbes](#) by [preventing them from reproducing](#). A healthy oral microbiome reduces the chances of developing [infections or disease](#).

A [recent study](#) investigating the effect of e-cigarettes on our [oral microbiome](#) found that e-cigarettes have a [negative impact](#) on the diversity of the bacteria present. They also cause an [immune response](#) from cells, which can lead to long-term damage to the surrounding cells.

Our oral microbes are not only the first to experience e-cigarette vapor, they're also exposed to higher concentrations of the chemicals. This arguably makes them most likely of any of the body's microbes to experience the negative effects of e-cigarettes. Changes in the balance of our mouth microbes can lead to some severe diseases, such as tooth decay and gum disease, or leave us [susceptible to infections](#) from localized gum disease that can [trigger heart disease or respiratory infections](#) or [systemic infections like sepsis](#), which can be fatal. Some of these infections and diseases have also been associated with [oral cancers](#).

For this particular study, 123 participants were recruited and split into

five groups: smokers, non-smokers, e-cigarette users, former smokers currently using e-cigarettes, and those that use both. The team collected dental plaque samples to find out more about the microbes present and the genes they have, as well as fluid from the gums to know how the human body has reacted to these microbes. They also grew bacteria in the lab after exposing them to cigarette smoke and e-cigarette vapor.

Bacteria changes

The study found that those who used e-cigarettes had very similar species of microbes, suggesting e-cigarettes played a role in how the microbial community forms and exists. However, there were some significant differences in the smokers group, non-smoker group and e-cigarette groups, all of which had unique oral microbiomes.

When they looked at groups of people that switched from smoking to e-cigarettes and former smokers, they found their microbiota to be very similar—but they were still very different compared to non-smokers. Although this study didn't specify which bacterial species were affected, even small changes from the healthy bacteria would likely result in negative effects overall. Gram negative bacteria, which are typically considered the "bad microbes", were common between smokers and e-cigarette users.

This was also the case when the team did lab studies to see what effects e-cigarette vapor and [cigarette smoke](#) had on how bacteria grow. They found that the e-cigarette vapor (with or without nicotine) was able to change the way the bacteria grow, by increasing volume and the area covered by the bacteria, which can lead to infections if untreated.

The researchers also found that the microbes in the e-cigarette group had genes that lead to biofilm growth (such as dental plaque). Biofilms make microbes more resilient to the effects of drugs, toxic compounds and the

immune system. This suggests that e-cigarettes vapors cause a [stress response](#) in the mouth's microbes.

When stressed, microbes switch on their fight-or-flight genes, making them better able to survive in harsh environments. They do this by producing special enzymes that cause damage to other cells in order for the microbes to use their nutrients and get more space to reproduce. This leads to a cycle of more inflammation, causing a stronger stress response from other cells. However, if we can't remove these stressed microbes, this sustained, long-term inflammation can lead to [severe diseases](#).

It was also found that when e-cigarette users were compared with non-smokers, [e-cigarette](#) users had significantly higher levels of immune cell response chemicals than non-smokers. E-cigarettes users also had lower levels of chemicals that stop this stress response happening. This shows that the body is trying to fight off microbes present, much more so than in non-smokers.

The presence of a diverse microbiota is essential for healthy mouths, healthy bodies, and healthy people. But based on this study's findings, the use of e-cigarettes has a negative impact on not only the number and types of oral microbes, but on how the microbes behave and how our body responds. [Other studies](#) have had [similar findings](#). Though more research into the health effects of e-cigarettes is needed, current evidence suggests ditching them may be best for our overall health.

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