

Don't blame your genes for your toothache, twin study shows

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For the first time, investigators have looked at the role that genes and the oral microbiome play in the formation of cavities and have found that your mother was right: The condition of your teeth depends on your dietary and oral hygiene habits. The study appears September 13 in *Cell Host & Microbe*.

"Limiting sugar consumption and acid buildup in the mouth have been part of the dogma of the dental community for some time," says senior author Karen Nelson, President of the J. Craig Venter Institute (JCVI). "This work introduces specific taxa of [bacteria](#) that can be acquired through the [environment](#) and that have the ability to induce cavities."

Since the early 20th century, dentists and other experts have known that Streptococcus bacteria in the mouth are linked to the formation of cavities. Now, with the ability to study studying the [microbiome](#), the investigators were able to take a closer look at specific taxa that are important.

To separate the role of heritability versus the environment, Nelson and her team turned to a popular method for studying such interactions: identical and fraternal twins. Specifically, they profiled the oral microbiomes of 485 [twin pairs](#) between the ages of 5 and 11. There were 280 fraternal twins and 205 identical twins—and one set of triplets. The samples were obtained with mouth swabs.

"We decided to focus on children because we hypothesized two things—that the oral microbiome rapidly changes with age, and also that child twin pairs are likely to have a shared environment," Nelson says. "This allowed us to better control the influence of shared and unique

environments."

Their results—driven with significant analysis input from co-authors Josh Espinoza (JCVI Engineer) and Chris Dupont (JCVI Associate Professor)—showed that identical twins had oral microbiomes that were more similar to each other than those of fraternal twins, indicating that there is genetic contribution to which kinds of bacteria are likely to be present in the mouth. However, the taxa that were linked most closely to heritability were not the ones that play a role in [cavity](#) formation. In addition, they found that the heritable strains of bacteria decrease in abundance as people get older, whereas the ones linked to the environment increase.

An important additional finding was the link between certain bacterial species and [sugar consumption](#). Bacteria that were associated with fewer cavities were in lower abundance in twins who had a lot of added sugar in their food and drinks. In contrast, bacteria that are more common in children who consume a lot of sugar were associated with having more cavities.

The team plans to continue studying the twins over repeat visits to examine changing patterns in the [oral microbiome](#). They are also looking at functional differences in the oral microbiomes of identical and fraternal twin pairs that have various states of oral health.

More information: *Cell Host & Microbe*, Gomez et al: "Host Genetic Control of the Oral Microbiome in Health and Disease."

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