

Chemical found in drinking water linked to tooth decay in children

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They investigated whether higher concentrations of PFAS were associated with greater tooth decay in [children](#). One of them—perfluorodecanoic acid—was linked to dental cavities. Their findings appear in the *Journal of Public Health Dentistry*.

"Due to the strong chemical bonds of PFAS, it is difficult for them to breakdown, which makes them more likely to be persistent within the environment, especially in drinking [water systems](#)," said Waters, who directs the School of Dentistry's research labs. "A majority of people may not be aware that they are using water and other products that contain PFAS."

Being exposed to PFAS—a class of chemicals found in drinking water—has been linked to higher rates of cancer, heart disease, thyroid dysfunction and other conditions. WVU School of Dentistry researchers R. Constance Wiener and Christopher Waters studied whether PFAS exposure is also associated with tooth decay. They found that higher concentrations of a particular PFAS correlated to greater rates of tooth decay in children. Credit: Aira Burkhart/West Virginia University

The 629 children who participated in the study were 3 to 11 years old and were part of the National Health and Nutrition Examination Survey. Samples of the children's blood were analyzed for PFAS in 2013 and 2014. Their tooth decay and other factors—such as their race, their BMI and how often they brushed their teeth—were assessed.

Of the seven PFAS that Wiener and Waters analyzed, perfluorodecanoic acid was the one that correlated with higher levels of tooth decay.

Children with higher concentrations of a certain chemical in their blood are more likely to get cavities, according to a new study by West Virginia University School of Dentistry researchers.

"Perfluorodecanoic acid, in particular, has a long molecular structure and strong chemical bonds; therefore, it remains in the environment longer. As a result, it is more likely to have negative health consequences such as [dental caries](#)," said Dr. Wiener, an associate professor in the Department of Dental Practice and Rural Health.

Manufactured chemical groups called perfluoroalkyl and polyfluoroalkyl substances are universal as a result of extensive manufacturing and use. Although manufacturers no longer use PFAS to make nonstick cookware, carpet, cardboard and other products, they persist in the environment. Scientists have linked them to a range of health problems—from heart disease to high cholesterol—but now R. Constance Wiener and Christopher Waters are exploring how they affect [dental health](#).



Christopher Waters, research labs director, and R. Constance Wiener, assistant professor, both of the WVU School of Dentistry, Department of Dental Research. Credit: Aira Burkhart/West Virginia University

But how does that influence happen? Wiener and Waters have a hypothesis. According to other research, perfluorodecanoic acid may disrupt the healthy development of enamel, which is what makes teeth hard. That disruption can leave teeth susceptible to decay.

However, when it comes to cavities, scientists haven't parsed perfluorodecanoic acid's mechanism of action yet. The topic warrants further investigation.

"While the findings of this study are important, there are some study limitations, and more work is needed to fully understand how this molecule impacts normal tooth formation," said Fotinos Panagakos, the School of Dentistry's vice dean for administration and research.

"The good news is that, in our study, about half of the children did not have any measurable amount of PFAS. Perhaps this is due to certain PFAS no longer being made in the US," Wiener said.

Another piece of good news is that the study reaffirmed the importance of dental hygiene and checkups. Children who brushed once a day or less frequently had significantly higher tooth decay than those who brushed at least twice daily.

Likewise, children who had not been to the dentist within the previous year were twice as likely to have higher rates of [tooth decay](#) than kids who hadn't.

So, even though parents cannot control what is in their children's drinking [water](#), they can still protect their children's teeth by fostering thorough, regular brushing and scheduling dental exams.

The School of Dentistry will hold Give Kids a Smile Day on Friday, Feb. 7, at the Pediatric Dentistry Clinic. Dental students will treat more than 100 children for free that day. Each visit includes an exam, a cleaning, a fluoride treatment and—if appropriate—X-rays.

More information: R. Constance Wiener et al, Perfluoroalkyls/polyfluoroalkyl substances and dental caries experience in children, ages 3–11 years, National Health and Nutrition Examination Survey, 2013–2014, *Journal of Public Health Dentistry* (2019). [DOI: 10.1111/jphd.12329](https://doi.org/10.1111/jphd.12329)

Provided by West Virginia University

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