

# Pesticide exposures can cause changes in oral microbiome

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Pesticide exposure in farmworkers from agricultural communities is associated with changes in the oral microbiome. This is the first study to demonstrate such a correlation in humans. The research is published November 11th in *Applied and Environmental Microbiology*, a journal of the American Society for Microbiology.

In the study, the investigators sampled oral swabs from 65 [farmworkers](#) and 52 non-farmworker adults from the Yakima Valley (Washington) community agricultural cohort during the spring and summer (2005), when farmworkers can undergo high pesticide exposures while working in recently sprayed orchards, thinning the fruit and pruning; and during winter (2006), when exposures are quite low. Concurrently, they measured blood levels of organophosphate pesticides in the study subjects.

The most important finding was that among those farmworkers in whom the organophosphate pesticide, Azinphos-methyl was detected in the blood, the researchers found "significantly reduced abundances of seven common taxa of oral bacteria, including *Streptococcus*, one of the most common normal microbiota in the mouth," said first author, Ian B. Stanaway, a PhD candidate in Environmental Toxicology in Elaine M. Faustman's lab at the University of Washington, Seattle. Changes in populations, species, and strains of *Streptococcus*, as well as from the genus, *Halomonas*, remained particularly low during the following winter.

The investigators also saw a pesticide-associated spring/summer general reduction in bacterial diversity in the study subjects, which persisted into the winter, suggesting that "long-lasting effects on the commensal microbiota have occurred," according to the report.

Predictably, farmworkers had greater blood concentrations of pesticide, and greater changes in their oral microbiota than local, non-farmworking adults.

"The challenge becomes, what does this mean," said principal investigator Faustman, PhD, Professor in the department of Environmental and Occupational Health Sciences. "We don't know," she said, adding that "we depend on the microbiome for many metabolic processes."

Nonetheless, "in other studies, changes in species and strains of *Streptococcus* have been associated with changes in oral health," noted Stanaway.

The study subjects' enthusiasm for the research has been important to its success, said coauthor Beti Thompson, PhD, Professor, School of Public Health, University of Washington. The investigators have followed the study participants for more than ten years, she said. "They are very interested in all the effects of pesticides. They have contributed thousands of urine samples, tens of cheek cell samples, blood samples, saliva samples, and house and vehicle dust."

Provided by American Society for Microbiology

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