

Investigators chart microbial ecology of gingivitis, periodontitis

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Gingivitis, a common and mild form of gum disease can progress to periodontitis, a more serious infection that damages the soft tissue of the gums and sometimes even destroys the bone supporting the teeth. An international team of researchers and clinicians has charted the microbial ecology of the mouth at all stages of this progression, in nearly 1,000 women in Malawi. This work is laying a foundation of knowledge that could lead to better oral health. The research is published August 12 in *Applied and Environmental Microbiology*, a journal of the American Society for Microbiology.

The investigators used high-throughput sequencing of the 16S ribosomal RNA (rRNA) gene to take the census of the oral microbiomes. Among much else, they found that a small number of species were associated with periodontitis, but not gingivitis, including members of the genera, *Prevotella*, *Treponema*, and *Seimonas*. "Our findings confirm that periodontitis cannot be considered simply an advanced stage of gingivitis, even when only considering supragingival plaque," said first author Liam Shaw, a PhD student at University College London, United Kingdom.

Periodontitis is diagnosed by measuring the depth of the pockets in the gums next to the teeth. "But diagnosing periodontitis visually is impossible and it doesn't usually give any symptoms until it has developed so far that teeth become mobile, which is very late for any treatment," said coauthor Ulla Harjunmaa, a dentist with a master's degree in international Health, who is a PhD student at the Center for

Child Health Research, University of Tampere and Tampere University Hospital, Finland.

Diagnosis requires specially trained dental professionals and expensive equipment, which are seldom available in developing countries, said Harjunmaa. But among other things, in the future, this research may lead to an inexpensive and rapid point-of-care test, based on distinguishing the two conditions' microbiomes. "The research made it possible to tell which differences in bacteria were linked specifically to the deepening of dental pockets—which causes loss of teeth—rather than just to bleeding gums," explained Shaw,.

"We're not the first to do this sort of research into periodontal disease, but our study is the largest to be done in such a setting," said Shaw.

"There is a great need to find new solutions to prevent these problems everywhere, but especially in this kind of setting." He added that oral infections are very common in Malawi, since there is little awareness about oral health and prevention, and little treatment available.

Some of the techniques used in the research may have wide applications, said Shaw. "Where diseases can have multiple severities and clinical features that are also found in non-disease (like bleeding gums in [periodontitis](#)), this kind of modeling will be increasingly important in microbiome research."

Periodontal disease is a major public health problem associated with oral bacteria. In developed nations, approximately half of adults are thought to have moderate periodontal disease, with another 7-15 percent having advanced disease, according to the Centers for Disease Control and Prevention. Additionally, [periodontal disease](#) is thought to be a risk factor for cardiovascular disease, diabetes, and other [chronic health conditions](#). Treating [gum disease](#) could reduce healthcare costs, as well as hospitalizations, according to a study published in the August, 2014

American Journal of Preventive Medicine.

"The best way to prevent periodontal diseases is by proper tooth brushing twice a day combined with flossing once a day," said Harjunmaa. For smokers, quitting is also critically important to prevention, she said.

Provided by American Society for Microbiology

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