

Much-needed new antibiotic shows great promise for treating gum disease

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A new antibiotic being developed at the University of Virginia School of Medicine appears ideal for battling periodontal disease, the leading cause of tooth loss in adults, according to dental researchers at Virginia Commonwealth University led by Richard T. Marconi.

The drug, amoxicillin, was found to be effective against the harmful "Red Group" of [anaerobic bacteria](#) associated with advanced gum [disease](#). Amoxicillin is already in development for treatment and prevention of antibiotic-associated colitis caused by *Clostridium difficile*, dangerous bacteria that can cause life-threatening infections.

The researchers say amoxicillin may have another important benefit, too. Because amoxicillin works differently than other antibiotics, it is thought that it would be extremely difficult for bacteria to find a

way to become resistant to it. That means it could be used widely without contributing to the growing problem of antibiotic resistance.

"In the fight against antibiotic resistance, it is rare to find an antibiotic that breaks the rules – opening up the possibility for treating patients for life, just like statins [drugs used to lower cholesterol]," said researcher Paul Hoffman of UVA's Division of Infectious Diseases and International Health. "Why is this important? Medical researchers know that inflammation caused by chronic anaerobic infections like [periodontal disease](#) contributes to the onset of autoimmune disease – rheumatoid arthritis, type 2 diabetes, atherosclerosis and even Alzheimer's disease. Think about it: Like taking a daily-dose aspirin for prevention of heart disease, taking a pill a day for prevention of inflammation might just lower risks for these other diseases."

Benefits for Gum Disease

While amoxicillin could have many applications, it appears to have several benefits specific to periodontal disease. The VCU researchers, working in the laboratory, found that amoxicillin was highly effective at inhibiting the growth of six different species of harmful *Treponema* spirochetes associated with gum disease. In addition, the drug was found to reduce expression of virulence traits that allow the bacteria to penetrate tissue and promote inflammation, key steps in establishing gum infections.

Research also suggests that amoxicillin will accumulate in inflamed gum areas where the pathogens are most concentrated, a feature which might spare beneficial bacteria in surrounding healthy gum tissue.

"We were very excited by the outcome of this study," Marconi said. "The oral *treponema* associated with periodontal disease are a diverse group of bacteria. The ability of amoxicillin to

effectively target these bacteria is a significant step forward that will provide a new and targeted treatment approach for periodontal disease. The need for antimicrobials that can specifically target specific groups of bacteria is of paramount importance."

Preventing Antibiotic Resistance

The researchers note that their tests looked at only a subset of the factors that contribute to [gum disease](#). More research, they say, will need to be done. But they are encouraged by their early results.

In a scientific paper outlining their findings, the researchers note that moving away from antibiotics that kill [bacteria](#) indiscriminately to antibiotics that work more selectively would be an "important step forward" in the battle against the growing problem of [antibiotic resistance](#). Despite increasing concerns about "superbugs" that no longer respond to existing antibiotics, there are few new antibiotics in the pipeline.

"Unbridled imagination and creativity have worked so well in advancing knowledge in so many medical disciplines – why not for antibiotics?" Hoffman asked. "The three big challenges to this end are, one, overcoming drug resistance; two, chemistries that limit drug metabolism and toxicity in humans and animals; and three, antibiotics that mitigate damage to the human microbiome. Maybe amoxicillin can teach us something useful about how to create the next generation of [antibiotics](#)."

The researchers have published their results in the *Journal of Periodontology*.

More information: Lucas A. Reed et al. Antimicrobial activity of amoxicillin against *Treponema denticola* and other oral spirochetes associated with periodontal disease, *Journal of Periodontology* (2018). [DOI: 10.1002/JPER.17-0185](#)

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