

SCHOOL OF DENTISTRY

UofL Researchers Uncover New Clues to Periodontal Disease

Researchers at University of Louisville School of Dentistry have learned that a common bacteria of the mouth, *P. gingivalis*, may be circumventing the body's immune system by "tricking" white blood cells and then hijacking the cells to ensure its own survival.

The finding is important because *P. gingivalis* is a leading cause of periodontal diseases, a proven contributor to the destruction of gum, bone and teeth. The bacteria is also believed to play a role in heart disease, stroke and other serious health problems.

UofL associate professor George Hajishengallis found that *P. gingivalis* uses a receptor, CR3, on the bacteria-eating white blood cells of our immune system to circumvent the body's defenses and flourish in dental plaque.

Hajishengallis and his team have discovered that the sticky fringes—fimbriae—that cover *P. gingivalis* interact with CR3 and tell it to reduce production of a substance that keeps infection at bay. This interferes with the body's immune defense and may also allow other microbes that live with *P. gingivalis* in dental plaque to survive.

Moreover, *P. gingivalis* may actually be targeting the CR3 receptor to pass into white blood cells, because, unlike other immune receptors, it does not vigorously promote killing of bacteria. This makes *P. gingivalis* better able to survive and could also allow the harmful bacteria to use white blood cells as "trojan horses" that carry them into vulnerable cells in other parts of the body, Hajishengallis said.

Hajishengallis and his team are conducting tests to see if blocking CR3 with an inhibitor will control periodontitis and associated diseases. Similar inhibitors may also be useful in other inflammatory or autoimmune diseases such as psoriasis and forms of cardiovascular disease.

"Our research suggests that *P. gingivalis* has evolved, learning to use the human immune system for its own survival," Hajishengallis said. "Depriving *P. gingivalis* of the ability to do its trick by blocking CR3 might be one way to prevent periodontitis. In the future, we'll need to study whether periodontal disease is inhibited when CR3 is blocked in humans, just as we have seen in mice."

Controlling periodontal diseases offers hope for related conditions. Periodontitis seems to influence coronary artery disease and increase the risk of heart attack and stroke.

These findings were released in two articles recently published in *The Journal of Immunology*.