

External capsule protects gum disease-causing bacteria from immune response

17 November 2011

(Medical Xpress) -- The capsule of *Porphyromonas gingivalis*, the bacterium that causes gum disease, provides stealth, boosting the bacterium's virulence, according to a paper published in the November *Infection and Immunity*. Call it a sugar coating, if you will, for in fact, the capsule is made from sugar molecules, which do not ordinarily elicit immunity. Thus it hides the bacterium's proteins within, preventing immune response.

In the study, the researchers, led by Janina P. Lewis of Virginia Commonwealth University, Richmond, compared the ability of normal, and mutant bacteria that were missing the capsule, to activate the immune system, to enter eukaryotic cells (the kind that are present in multicellular organisms), to cause disease, and to survive in mice. "The mutant bacteria activated the host to a greater extent, and thus, were more easily killed by eukaryotic cells," says Lewis. "Thus, the capsule protects the bacteria and allows them to survive unnoticed in our bodies."

Capsules also protect both bacteria and fungi, including *P. gingivalis*, as per this report, from being engulfed by the immune system's phagocytes (phago=eat; cyto=cell) and from being identified by dendritic cells as dangerous, thus marking them for destruction by antibodies. Conversely, in the study, mutant, non-encapsulated *P. gingivalis* were rapidly engulfed by immune [cells](#), and killed.

"Thus, anything that would interfere with generation of capsule, such as drugs interfering with the action of enzymes involved in synthesis of the sugar coat, could be used in treatment of periodontal disease, and importantly, could have broader implications for prevention of more serious diseases," by other encapsulated [bacteria](#), such as pneumonia, anthrax, meningitis, endocarditis, and gastroenteritis, says Lewis.

More information: A. Singh, T. Wyant, C. Anaya-

Bergman, J. Aduse-Opoku, J. Brunner, M.L. Laine, M.A. Curtis, and J.P. Lewis, 2011. The capsule of *Porphyromonas gingivalis* leads to a reduction in the host inflammatory response, evasion of phagocytosis, and increase in virulence. *Infect. Immun.* 79:4533-4542.

Provided by American Society For Microbiology

APA citation: External capsule protects gum disease-causing bacteria from immune response (2011, November 17) retrieved 18 May 2021 from <https://medicalxpress.com/news/2011-11-external-capsule-gum-disease-causing-bacteria.html>

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