Examining TLR4 influences of B cell response

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Chronic inflammation, which is at the root of multiple diseases, links periodontal disease to increased incidence of cardiovascular disease.

The activation of Toll-Like Receptors, which are essential components of the immune response to certain pathogens, promotes chronic inflammation in periodontal disease. Of these receptors TLR4 is one of a family of receptors that provides critical links between immune stimulants produced by microorganisms and the host response. It stands out because it plays a key role in systemic inflammation by stimulating a type of white blood cells produced in bone marrow. Known as B cells they are the cornerstone of the body's antibody production system. The ability of pathogens that chronically infect the mouth to induce TLR4 responses indicates that TLR4 plays a role in the relationship between periodontal disease and cardiovascular disease.

The link between TLR4 activity and periodontal disease, and the importance of B cells in oral immunity prompted a team of Boston University School of Medicine (BUSM) researchers, led by Barbara Nikolajczyk, an associate professor of microbiology and medicine, and her co-investigator, Lisa Gnaley-Leal, an assistant professor of medicine and microbiology, to question whether B cells respond to chronic periodontal disease infection through TLR4.

Tests compared B cells from human blood collected from both healthy volunteers and patients with aggressive periodontitis but no other known disease. The study, published in the Journal of Leukocyte Biology,

showed that people with periodontal disease had a higher percentage of peripheral blood and tissue B cells that expressed TLR4. These TLR4-expressing B cells harbored significant changes in the pathways located downstream of TLR4, including unexpected decreases in inflammatory gene expression. Decreased inflammatory gene expression in TLR4-expressing B cells is highly likely to alter the immune responses of periodontal disease patients during inflammation as compared to healthy individuals.

The study highlights two fundamentally different responses by TLR4-expressing cells from periodontal disease patients: activation of monocytes, a type of white blood cell that ingests bacteria and tissue debris, versus inactivation of B cells.

"Overall, these findings demonstrated that the proposed strategy of regulating systemic inflammation disease by regulating TLR4 expression/activation must account for this newly identified source of TLR4 activity, B cells," the study states.

Source: Boston University Medical Center