Porphyromonas gingivalis accelerates inflammatory atherosclerosis in a mouse model

January 4 2011

Atherosclerosis is the leading cause of death in the developed world. While a number of risk factors for atherosclerosis have been defined, scientists continue to study other possible risk factors for this disease. Recent epidemiological and experimental studies link infectious agents with the development of inflammatory atherosclerosis.

A hallmark of chronic infection with the oral pathogen *Porphyromonas gingivalis* is the induction of a chronic inflammatory response. *P. gingivalis* induces a local inflammatory response that results in oral bone destruction, which is manifested as periodontal disease, an inflammatory disease that affects approximately 100 million people in the US. In addition to chronic inflammation at the initial site of infection, mounting evidence has accumulated supporting a role for *P. gingivalis*-mediated periodontal disease as a risk factor for systemic diseases including, diabetes, pre-term birth, stroke, and atherosclerotic cardiovascular disease.

In new studies Dr. Caroline Genco together with Dr. James Hamilton at Boston University School of Medicine have begun to define the precise mechanisms contributing to the link between infection with *P. gingivalis* and atherosclerotic disease.

In elegant studies recently published (*Atherosclerosis*-12-22-10 online publication date) these investigators report on in-vivo high-resolution

magnetic resonance imaging (MRI) to document *P. gingivalis* mediated inflammation and atherosclerosis in a mouse model.

MRI is a novel modality that allows for detailed studies of atherosclerosis progression in the same animal that can depict the narrowing of the arterial lumen and small vessel wall areas. Genco and collogues demonstrate that *P. gingivalis* infection accelerates inflammation and atherosclerosis in the innominate artery, an artery that has a high degree of lesion progression.

Lesions in the innominate artery express features characteristic of clinical disease in humans including vessel narrowing characterized by atrophic media and perivascular inflammation and plaque disruption. Plaque rupture is the basis for the coronary thrombosis in acute ischemia.

In humans, plaques with extensive macrophage accumulation and inflammation have a greater likelihood of disruption at their luminal surface, and formation of a life-threatening thrombus. Genco's studies are the first to demonstrate progression of plaque in the innominate arteries by in-vivo MRI, and lipid and immunohistochemical analysis following exposure to an infectious agent, and to document protection from plaque progression via immunization.

An important question is whether *P. gingivalis* accelerates atherosclerotic plaque formation in the innominate artery leading to increased numbers of vulnerable plaques, and possibly enhanced plaque rupture. Future studies will explore this possibility as well as the testing of new therapeutic strategies to prevent infection induced atherosclerotic disease.

Provided by Boston University Medical Center