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A bacterial-biofilm-induced oral osteolytic infection can be successfully treated by immuno-targeting an extracellular nucleoid-associated protein.

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Abstract

Periodontal disease exemplifies a chronic and recurrent infection with a necessary biofilm component. Mucosal inflammation is a hallmark response of the host seen in chronic diseases, such as colitis, gingivitis, and periodontitis (and the related disorder peri-implantitis). We have taken advantage of our recently developed rat model of human peri-implantitis that recapitulates osteolysis, the requirement of biofilm formation, and the perpetuation of the bona fide disease state, to test a new therapeutic modality with two novel components. First we used hyperimmune antiserum directed against the DNABII family of proteins, now known to be a critical component of the extracellular matrix of bacterial biofilms. Second we delivered the antiserum as cargo in biodegradable microspheres to the site of the biofilm infection. We demonstrated that delivery of a single dose of anti-DNABII in poly(lactic-co-glycolic acid) (PLGA) microspheres induced significant resolution of experimental peri-implantitis, including marked reduction of inflammation. These data support the continued development of a DNABII protein-targeted therapeutic for peri-implantitis and other chronic inflammatory pathologies of the oral cavity in animals and humans.

KEYWORDS: Aggregatibacter actinomycetemcomitans ; DNABII protein; biofilm; inflammation; integration host factor