



**Development of Novel Tools for Prevention and Diagnosis of  
*Porphyromonas gingivalis* Infection and Periodontitis**

av

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**Akademisk avhandling**

Avhandling för medicine doktorsexamen i Medicinisk  
Vetenskap, inriktning Biomedicin,  
som kommer att försvaras offentligt  
Fredag den 28 Oktober 2016 kl. 09.00,  
HSC 1, Campus USÖ, Örebro universitet

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## Abstract

Sravya Sowdamini Nakka (2016): Development of Novel Tools for Prevention and Diagnosis of *Porphyromonas gingivalis* Infection and Periodontitis. Örebro studies in Medicine 151.

Periodontitis is a chronic inflammatory disease caused by exaggerated host immune responses to dysregulated microbiota in dental biofilms leading to degradation of tissues and alveolar bone loss. *Porphyromonas gingivalis* is a major periodontal pathogen and expresses several potent virulence factors. Among these factors, arginine and lysine gingipains are of special importance, both for the bacterial survival/proliferation and the pathological outcome. The major aim of this thesis was to develop and test novel methods for diagnosis and prevention of *P. gingivalis* infection and periodontitis. In study I, anti-*P. gingivalis* antibodies were developed *in vitro* for immunodetection of bacteria in clinical samples using a surface plasmon resonance (SPR)-based biosensor. Specific binding of the antibodies to *P. gingivalis* was demonstrated in samples of patients with periodontitis and the results were validated using real-time PCR and DNA-DNA checkerboard analysis. In study II, we elucidated the properties and antimicrobial effects of different lactobacillus species and the two-peptide bacteriocin PLNC8  $\alpha\beta$  on *P. gingivalis*. *L. plantarum* NC8 and 44048 effectively inhibited *P. gingivalis* growth and pure PLNC8  $\alpha\beta$  induced bacterial lysis by damaging *P. gingivalis* membrane. In study III, we demonstrated that PLNC8  $\alpha\beta$  dose-dependently induces proliferation and release of growth factors in gingival epithelial cells (GECs). Furthermore, PLNC8  $\alpha\beta$  decreased *P. gingivalis*-induced cytotoxic effects in GECs but did not alter the effect of gingipains on cytokine expression. In study IV, we elucidated the effects of anti-*P. gingivalis* antibodies and PLNC8  $\alpha\beta$  in regulating cellular responses during *P. gingivalis* infection. Both antibodies and PLNC8  $\alpha\beta$  modulated *P. gingivalis*-induced expression of growth factors in GECs, however, their effects were diminished when used in combination. The results of this thesis demonstrate a possible role of anti-*P. gingivalis* antibodies and PLNC8  $\alpha\beta$  in prevention and treatment of *P. gingivalis* infection and periodontitis with no cytotoxic effects on human cells.

**Keywords:** Periodontitis, *Porphyromonas gingivalis*, anti-*P. gingivalis* antibodies, surface plasmon resonance, PLNC8  $\alpha\beta$ , proliferation, growth factors.

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