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2. **Title**

   Impact of Cigarette Smoke on Expression of Bacterial Genes Induce Periodontal Diseases

3. **Period**

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4. **Summary**

Infection with oral bacteria has been known a risk factor of systemic diseases such as respiratory diseases, heart diseases, systemic vascular system diseases beside periodontal diseases. It is known that smoking enhances inflammation of oral epithelium and this would progress infectious diseases. In this study, we examine another hypothesis that smoke components alter gene expression and physiology of bacteria, then these changes influence bacterial virulence and infectious diseases by oral bacteria. To do so we first examined level of stress-induced sigma factor RpoS, that regulates stress-releasing genes. We found organic solvent extracts of tobacco smoke enhanced expression of RpoS to induce radical scavenger proteins of bacteria and escaped from phagocytic killing of host macrophages. We then carried out comprehensive analysis of bacterial membrane receptors and transcription factors that regulate gene expression in the presence of tobacco extracts. We found about several receptor-transcription pathways that showed higher strength by smoke extracts. Among them, two pathways acted for regulated bacterial virulence to host. Finally, we asked whether smoke extract affects periodontal bacteria in terms of the strength of sigma factors and of membrane receptor pathways. We found alter expression levels of several genes coding proteins regulate stress-related genes in Porphyromonas gingivalis and Treponema denticola, typical periodontal bacteria. Taken together, tobacco smoke extracts alter oral bacterial gene expression especially transcription regulators, and these changes would affected on bacterial virulence and level of periodontal diseases.