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Strategy for colonization by periodontal pathogen *Treponema denticola*

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Periodontitis is an infectious disease manifesting inflammation of periodontal tissue and alveolar bone loss. Dysbiosis in subgingival plaque microbiome is suggested to be a major etiologic agent of this disease. A number of studies indicated that detection rate of *Porphyromonas gingivalis, Treponema denticola and Tannerella forsythia* increased significantly at the lesion site of chronic periodontitis. *T. denticola* is spiral shaped motile anaerobes and was detected frequently not only chronic periodontitis and apical periodontitis in human and it possessed several virulence factors such as dentilisin and major outer sheath protein. These observations suggest that this microorganism play an important role in the development of chronic periodontitis. For the colonization by *T. denticola,* adherence to the bacteria already colonized on the tooth surface and adaptation to the environmental condition is essential. *T. denticola* has been reported to have ability to coaggregate to the periodontopathic bacteria such as *P. gingivalis.* For adaptation to the environmental condition, this microorganism overcome against oxygen stress and limitation of the nutrient, however, mechanisms of adaptation by this microorganism has not clarified. The regulation of gene expression is essential for it. Bacteria have numerous regulatory systems including two component system and DNA binding protein. We have been investigated the regulation of gene expression by DNA binding proteins. Several DNA binding proteins increased under aerobic condition and they involved in the resistance to the oxygen stress and the expression of the adhesion protein was also synchronized to expression the DNA binding protein. Other DNA biding protein involved in the motility of this microorganism. Here we show the strategy for colonization to subgingival crevice by this microorganism focusing on the regulation of the gene by DNA binding protein.

Curriculum Vitae

1985	DDS Tokyo Dental College
1989	PhD Doctoral Course, Department of Microbiology, Tokyo Dental College.
1989－1994	Research Assistant, Department of Microbiology, Tokyo Dental College
1992－1993	Postdoctoral Fellow, University of Texas Health Science Center at San Antonio, San Antonio, TX and States University of New York at Buffalo, NY
1994－2002	Assistant Professor, Department of Microbiology, Tokyo Dental College
2002－2008	Associate Professor, Department of Microbiology, Tokyo Dental College
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Honors

1997	Japanese Association for Oral Biology Rising Members Award
2000	Kuroya Award from Japanese association for Microbiology
2009	Japanese Society of Periodontology Scientific Award

Research Fields of Interest

Pathogenesis of periodontopathic bacteria

Selected Publications

1. Ishihara K, Miura T, Kuramitsu HK, Okuda K：Characterization of the Treponema denticola prtP gene encoding a prolyl-phenylalanine-specific protease（dentilisin）. ***Infect Immun.*** 64：5178－86, 1996.
2. Saito T, Ishihara K, Kato T, Okuda K：Cloning, expression, and sequencing of a protease gene from Bacteroides forsythus ATCC 43037 in Escherichia coli. ***Infect Immun.*** 65：4888－4891, 1997.
3. Ishihara K, Kuramitsu HK, Miura T, Okuda K：Dentilisin activity affects the organization of the outer sheath of Treponema denticola. ***J Bacteriol.*** 180：3837－3844, 1998.
4. Ishihara K, Nabuchi A, Ito R, Miyachi K, Kuramitsu HK, Okuda K：Correlation between detection rates of periodontopathic bacterial DNA in coronary stenotic artery plaque［corrected］and in dental plaque samples. ***J Clin Microbiol.*** 39：1313－1315, 2004.
5. Yamazaki T, Miyamoto M, Yamada S, Okuda K, Ishihara K：Surface protease of Treponema denticola hydrolyzes C３ and influences function of polymorphonuclear leukocytes. ***Microbes Infect.*** ８：1758－63, 2006.
6. Ota K, Kikuchi Y, Imamura K, Kita D, Yoshikawa K, Saito A, Ishihara K：SigCH, an extracytoplasmic function sigma factor of Porphyromonas gingivalis regulates the expression of cdhR and hmuYR. ***Anaerobe.*** 43：82－90, 2017.
7. Miyachi K, Ishihara K, Kimizuka R, Okuda K：Arg-gingipain A DNA vaccine prevents alveolar bone loss in mice. ***J Dent Res.*** 86：446－450, 2007.
8. Ohki T, Itabashi Y, Kohno T, Yoshizawa A, Nishikubo S, Watanabe S, Yamane G, Ishihara K：Detection of periodontal bacteria in thrombi of patients with acute myocardial infarction by polymerase chain reaction. ***Am Heart J.*** 163：164－167, 2012.
9. Adachi M, Ishihara K, Abe S, Okuda K, Ishikawa T：Effect of professional oral health care on the elderly living in nursing homes. ***Oral Surg Oral Med Oral Pathol Oral Radiol Endod.*** 94：191－195, 2002.