

Division of Microbiology Department of Oral Biology

Outline

We engage in educations on microbiology and immunology regarding with a general medicine and dentistry, and in researches on microbiology.

Faculty members

Professor

Keiji NAGANO, Ph D. (Left)

Senior Assistant Professor

Hiroshi MIYAKAWA, Ph D. (Center)

Assistant professor

Mari FUJITA, D.D.S., Ph D. (Right)

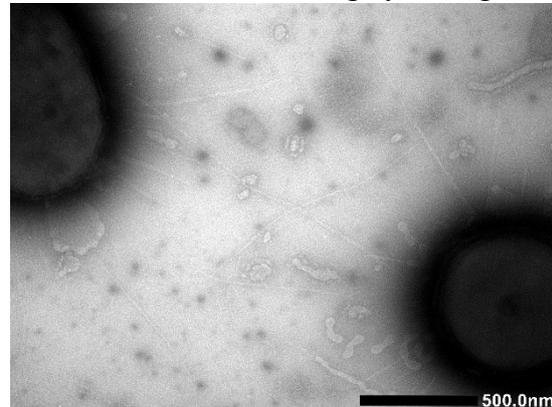


Research Interests

We are interested in the biochemical and molecular genetic analyses of bacterial virulent factors. Topics currently pursued include mechanisms of biofilm formation of oral bacteria, especially periodontopathic bacteria such as *Porphyromonas gingivalis*, *Tannerella forsythia*, *Treponema denticola* and *Prevotella* spp. We are also interested in the exploitation of antimicrobial regents.

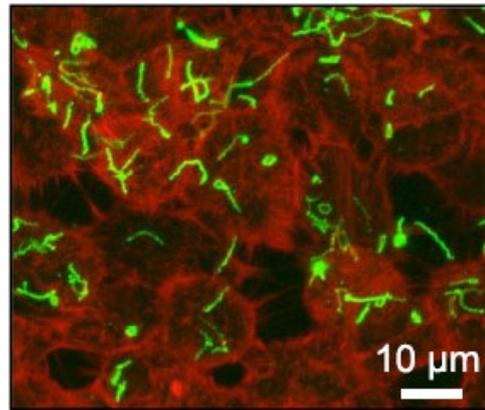
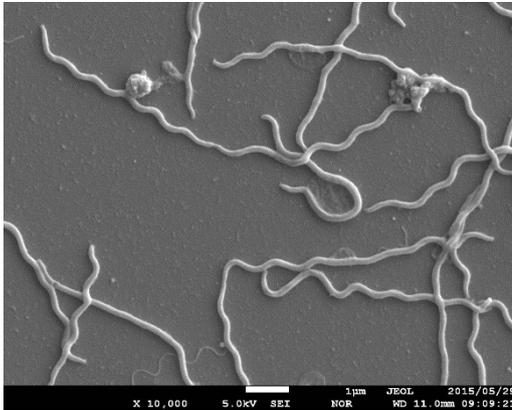
Current Projects

- Functional and structural analyses of fimbriae in *Porphyromonas gingivalis***
P. gingivalis expresses thin filamentous structures, fimbriae, on the surface (see below). They adhere to the gingival tissues and form a biofilm largely through the fimbriae.



(2) **Analysis of biofilm formation in *Treponema denticola***

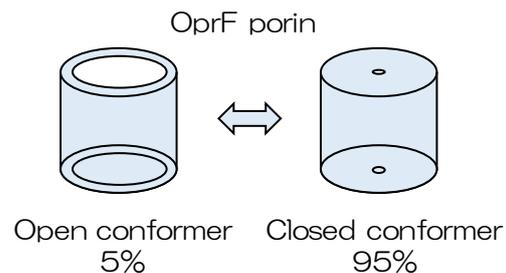
Oral spirochete *T. denticola* colonizes on gingival tissues with multi-species biofilm. However, the mechanisms of adherence to the gingiva and biofilm formation are not elucidated.



T. denticola is an oral spirochete (left, and green in right), and adheres to the gingival epithelial cells (red in right).

(3) **Analysis of conformational change of OprF porin in *Pseudomonas aeruginosa***

P. aeruginosa shows a highly intrinsic resistance to antibiotics largely due to the low outer membrane permeability. The low permeability is caused by the folding of the major porin OprF; a majority (~95%) forms a closed-channel conformer.



Selected Publications

- Sakae K, Nagano K, Furuhashi M, Hasegawa Y. Diversity analysis of genes encoding Mfa1 fimbrial components in *Porphyromonas gingivalis* strains. *PLoS One* **16**:e0255111 (2021)
- Sato K, Naya M, Hatano Y, Kondo Y, Sato M, Narita Y, Nagano K, Naito M, Nakayama K, Sato C. Colony spreading of the gliding bacterium *Flavobacterium johnsoniae* in the absence of the motility adhesin SprB. *Sci Rep* **11**:967 (2021)
- Nagano K, Hasegawa Y. Construction of a gene-deletion mutant in *Tannerella forsythia*. *Methods Mol Biol* **2210**:25-31 (2021)
- Nagano K, Hasegawa Y, Yoshida Y, Yoshimura F. Novel fimbriin PGN_1808 in *Porphyromonas gingivalis*. *PLoS One* **12**:e0173541 (2017)
- Nagano K, Hasegawa Y, Yoshida Y, Yoshimura F. A major fimbriin variant of Mfa1 fimbriae in *Porphyromonas gingivalis*. *J Dent Res* **94**:1143-1148 (2015)
- Nagano K, Hasegawa Y, Murakami Y, Nishiyama S, Yoshimura F. FimB regulates FimA fimbriation in *Porphyromonas gingivalis*. *J Dent Res* **89**:903-908 (2010)
- Nagano K, Nikaido H. Kinetic behavior of the major multidrug efflux pump AcrB of *Escherichia coli*. *Proc Natl Acad Sci U S A* **106**:5854-5858 (2009)
- Nagano K, Read EK, Murakami Y, Masuda T, Noguchi T, Yoshimura F. Trimeric structure of major outer membrane proteins homologous to OmpA in *Porphyromonas gingivalis*. *J Bacteriol* **187**:902-911 (2005)