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Okayama University research: Role of commensal flora in periodontal immune response investigated

(Okayama, 26 November) **Researchers at Okayama University report in the *Journal of Periodontology* that the presence of commensal flora in the mouth may play a key role in the functioning of the immune system against periodontal infections.**

The development of an animal's immune system relies on commensal flora — microorganisms such as bacteria present in certain parts of the body. In the case of immunity against periodontal diseases — infections of the areas surrounding teeth — it is unclear, however, what exactly the role of commensal flora is. Now, Professor Manabu Morita from Okayama University and colleagues have investigated the relation between commensal flora in the mouth and the immune response to a bacterium called *Porphyromonas gingivalis* (*P. gingivalis*), which contains lipopolysaccharide (LPS), a known periodontal pathogen.

The researchers tested the immune response of mice after the application of *P. gingivalis*/LPS. Two types of mouse were used in the experiments: germ-free and specific-pathogen-free mice. The former are free of any microorganisms, including commensal flora; the latter are mice guaranteed to be free of certain pathogens — in this case, periodontal pathogens — but not of commensal flora.

The response to the bacterium was assessed by the amounts of particular types of cells that are characteristic of immune system activation. Four groups of mice were monitored: a 'baseline' group not exposed to *P. gingivalis* and three groups to which the bacterium was applied; each of the three groups was then examined at different points in time after the application of LPS.

The scientists observed that exposure to *P. gingivalis* led to an increase in the number of a certain type of cell associated with immune system activity in the specific-pathogen-free mice, after 3 hours, indicating that application of the bacterium indeed triggered the immune system. At the same time, the germ-free mice did not show similar increased levels of these cells, suggesting that commensal flora contribute to the development and functioning of the periodontal immune system.

Professor Morita and colleagues are aware of the limitations of their study. They did not, for example, investigate the effect of repeatedly applying LPS. They also acknowledge that only a limited set of cell types characteristic of immune system activity was monitored. Therefore, the scientists concluded that “[the] results, though suggestive, should be interpreted with caution.”

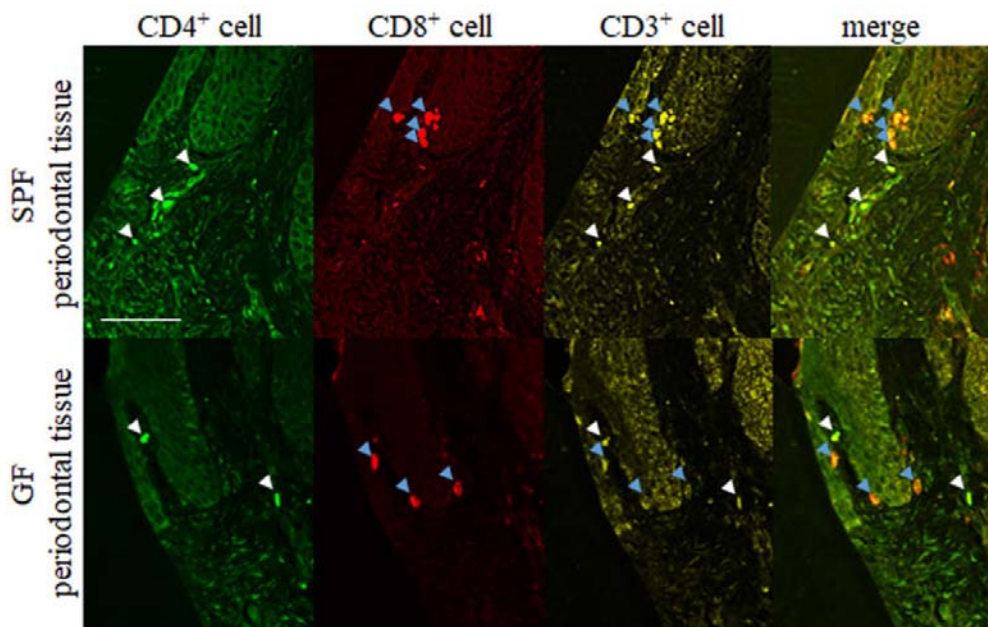
Background

R Commensal flora

Flora is the term for a community of bacteria and other microorganisms in a part of an animal’s body. The term commensal flora is used when the presence of the flora is not harmful for the animal host. Professor Manabu Morita from Okayama University and colleagues have now studied the role of commensal flora in the gingival sulcus — the area between a tooth and surrounding tissues — on the development of proper periodontal immune responses.

Lipopolysaccharide

A lipopolysaccharide (LPS) is a large organic molecule consisting of a lipid and a polysaccharide; LPS molecules occur in certain types of bacteria. LPS is known to be toxic, and typically triggers immune response activation. Professor Morita and colleagues have now investigated whether immune response to LPS, when applied via the bacterium *Porphyromonas gingivalis* (*P. gingivalis*), is influenced by the presence of commensal flora in the gingival sulcus.



Caption

Fluorescence analysis of cells indicative of immune system activity in periodontal tissue in germ-free (GF) and specific-pathogen-free (SPF) mice.

Reference

Daiki Fukuhara, Koichiro Irie, Yoko Uchida, Kota Kataoka, Kentaro Akiyama, Daisuke Ekuni, Takaaki Tomofuji, Manabu Morita. Impact of commensal flora on periodontal immune response to lipopolysaccharide. *Journal of Periodontology*, 2018;89:1213–1220.

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Okayama University is one of the largest comprehensive universities in Japan with roots going back to the Medical Training Place sponsored by the Lord of Okayama and established in 1870. Now with 1,300 faculty and 13,000 students, the University offers courses in specialties ranging from medicine and pharmacy to humanities and physical sciences.

Okayama University is located in the heart of Japan approximately 3 hours west of Tokyo by Shinkansen.

Website: http://www.okayama-u.ac.jp/index_e.html



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