

Development of periodontitis induced in animal model orally inoculated with *Fusobacterium nucleatum*

Miyuki Toda¹, Ryoki Kobayashi², Tetsuro Kono³, Arata Watanabe³, Ryo Tamamura³, Hidenobu Senpuku², Hiroyuki Okada³

¹Histology, Cytology and Developmental Anatomy, Nihon University Graduate School of Dentistry at Matsudo

²Department of Microbiology and Immunology, Nihon University School of Dentistry at Matsudo

³Department of Histology, Nihon University School of Dentistry at Matsudo



Purpose and Background

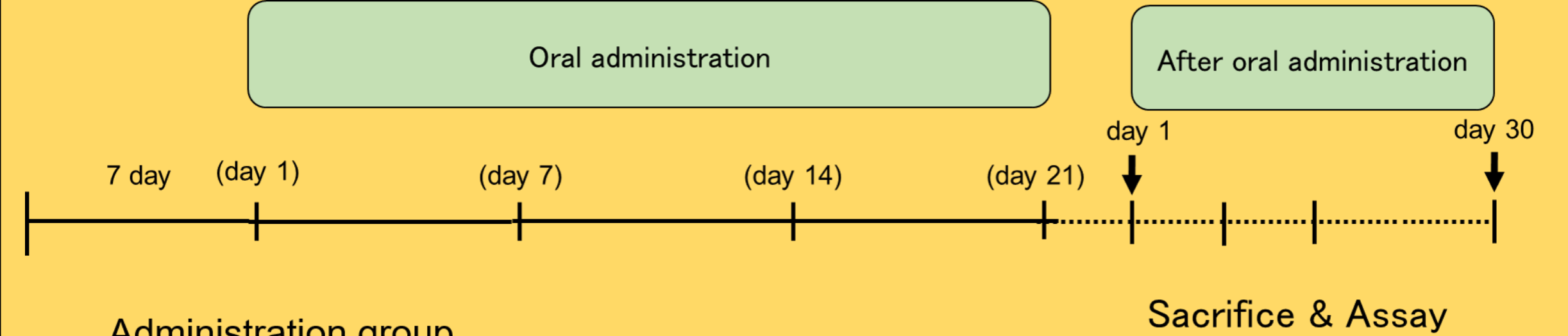
There are 700 types of bacteria in the human oral cavity, forming a resident oral flora. When the biodefense capacity of the oral flora is reduced, periodontal pathogenic bacteria invade from the periodontal pocket, and the pathogenic factors of these bacteria cause inflammation of the gingiva and destroy the alveolar bone, thereby occurs periodontitis. That is, the virulence factors of periodontopathic bacteria cause periodontitis by disturbing the balance of the host's immune response. It has been reported that periodontitis exacerbates systemic diseases such as diabetes, Alzheimer's dementia, rheumatoid arthritis and atherosclerosis due to chronicity. One of the periodontopathic bacteria is *Fusobacterium nucleatum* (*Fn*). However, the mechanism by which *Fn* causes periodontitis is unknown in animal models.

In this study, the effect of *Fn* on the development of periodontitis was investigated using mice by histological and molecular biological methods.

Material and methods

BALB/c mice were continuously inoculated with 10^9 cfu of *Fn*, which suspended in 0.1 ml of 5% carboxymethylcellulose (CMC) for 15 days.

Administration schedule



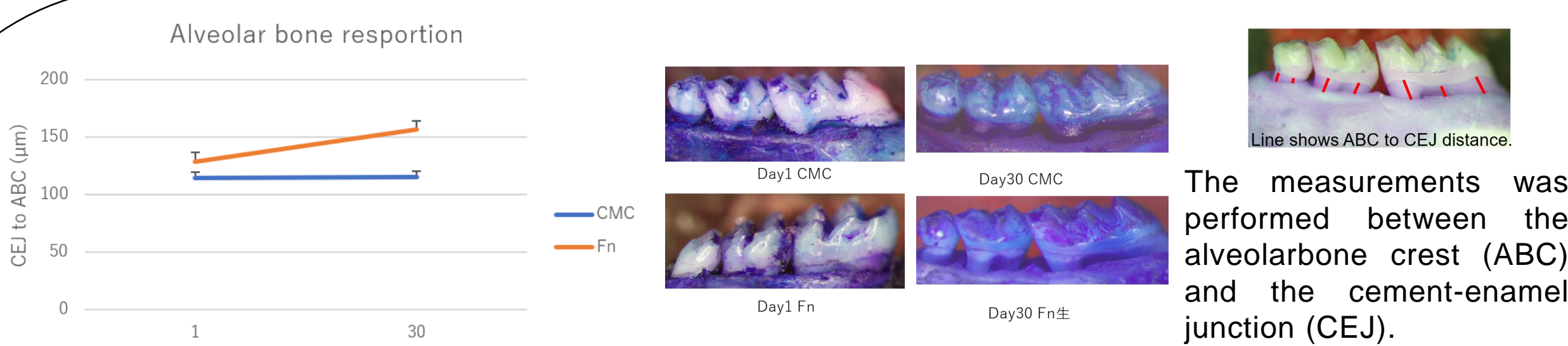
Administration group

- Experimental group
Fn of viable bacteria (ATCC 23726) ($\times 10^9$ CFU/mouse)
- Sham group
Only administrated 5% carboxymethylcellulose ($\times 10^9$ CFU/mouse)

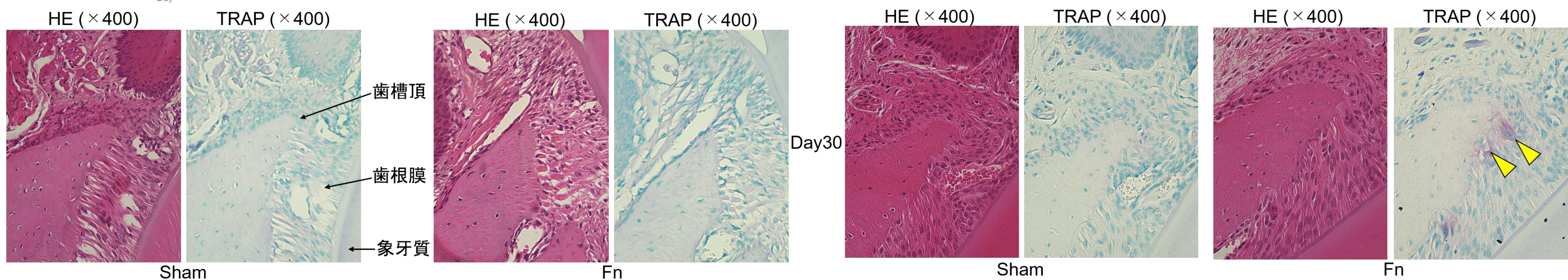
Assay

1. Analysis of mandibular and maxillary resorption using stereo microscope
2. Real-time PCR analysis of inflammatory gingival
3. Histopathological analysis of inflammatory periodontal tissue by HE and TRAP staining

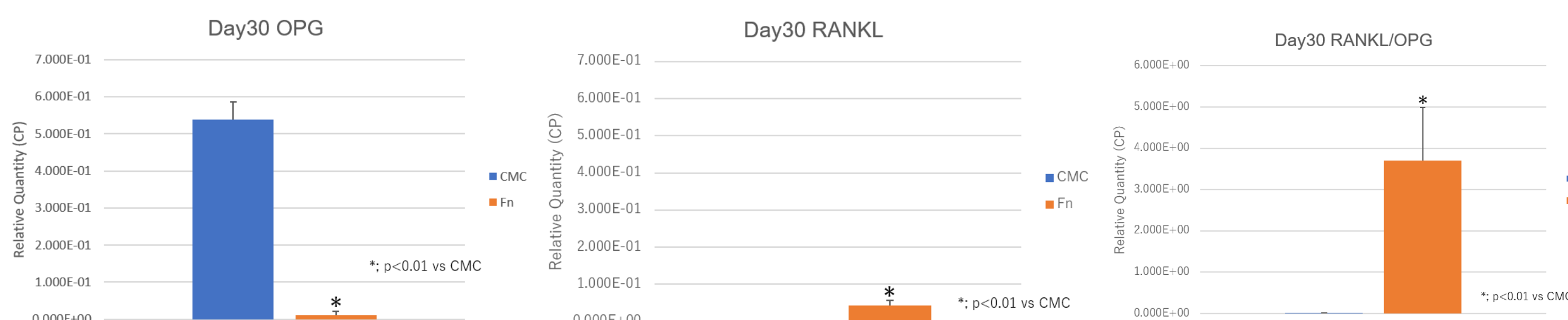
Result



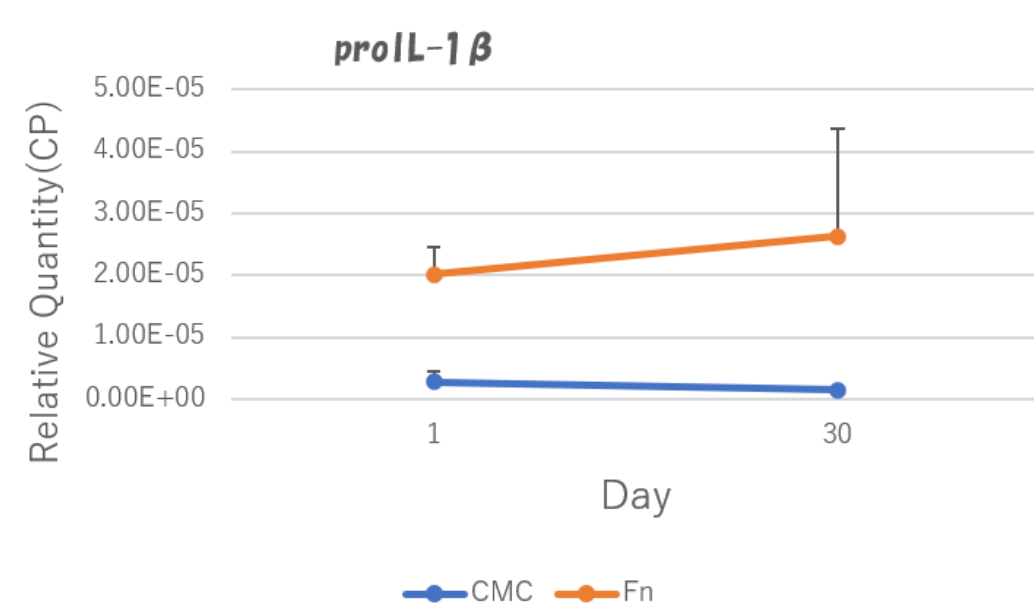
The amount of bone resorption in the *Fn* group 1 day after inoculation was not much different from that in the Sham group. In addition, 30 days after inoculation, the difference between the *Fn* group and the Sham group was large, and alveolar bone resorption was remarkable.



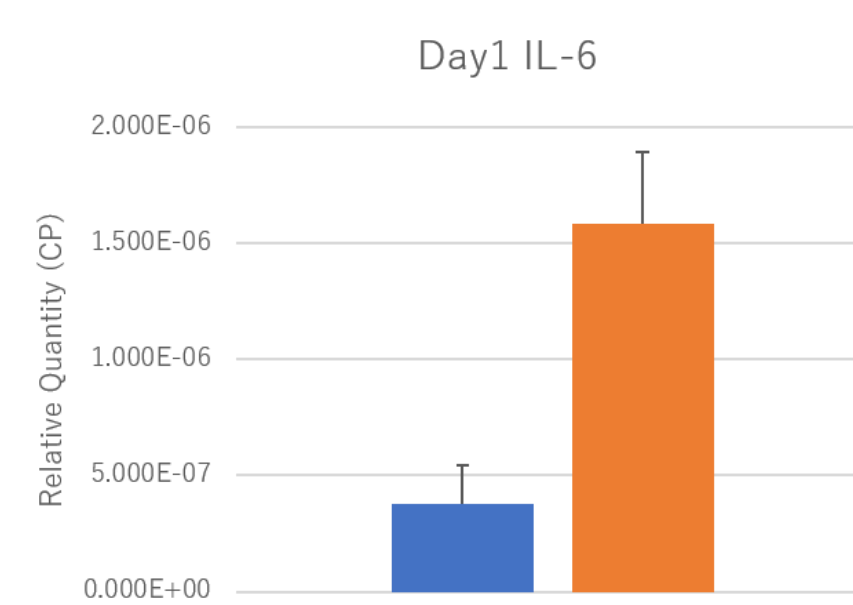
In the *Fn* group, osteoclasts were not observed near the alveolar crest 1 day after inoculation, but osteoclasts were observed near the alveolar crest 30 days after inoculation. In addition, horizontal bone resorption of the alveolar crest was also observed in the *Fn* group 30 days after inoculation.



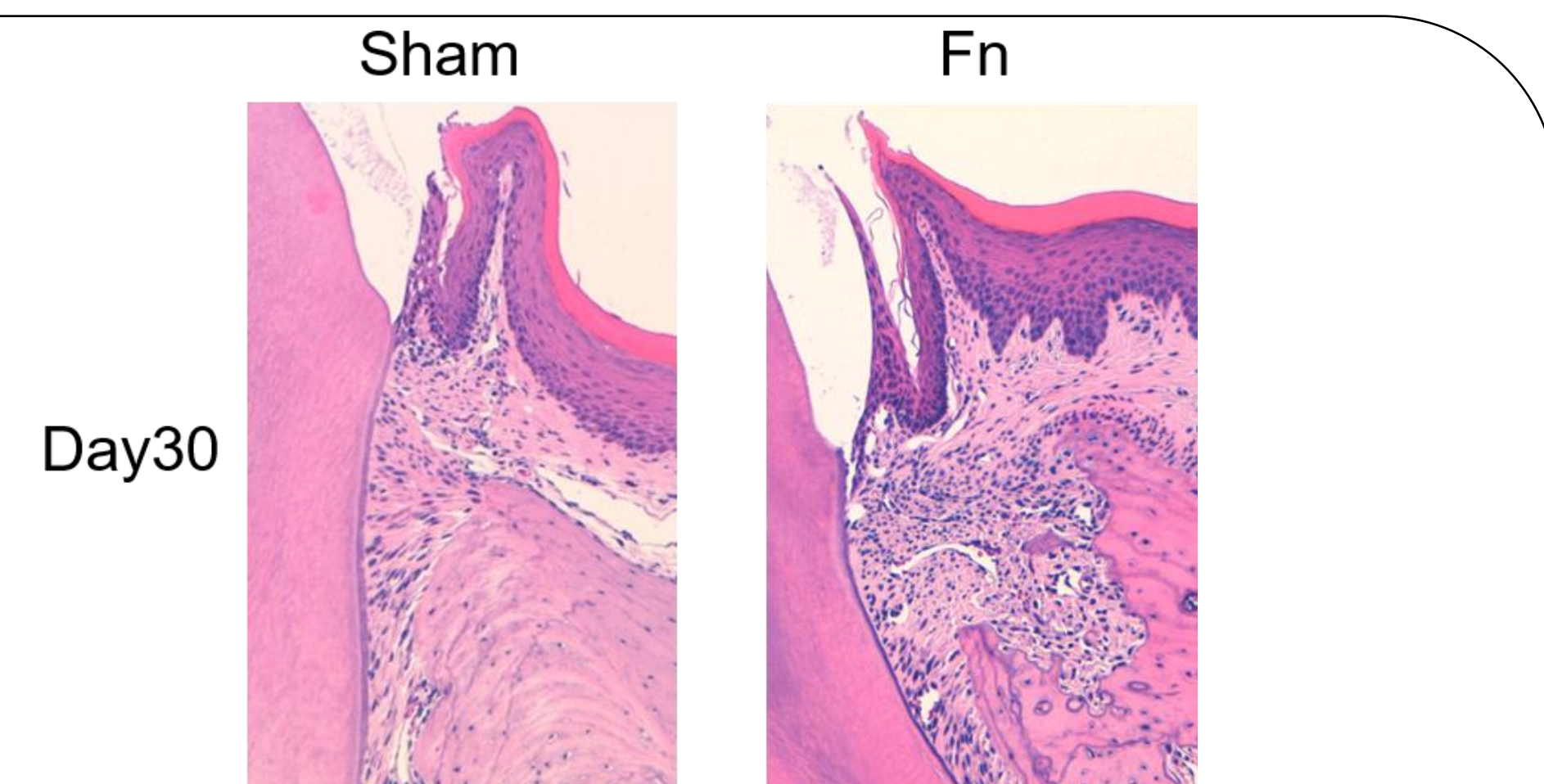
The OPG of the *Fn* group 30 days after inoculation was lower than that of the Sham group. On the other hand, RANKL in the *Fn* group showed a higher value than that in the Sham group. The RANKL/OPG ratio in the *Fn* group was significantly higher than in the Sham group.



The expression of pro-IL-1 β in the *Fn* group was significantly increased as compared with the Sham group at 1 day and 30 days after inoculation. Comparing the expression of pro-IL-1 β in the *Fn* group 1 day and 30 days after inoculation, it was higher after 30 days than after 1 day.



The expression of IL-6 in the *Fn* group was significantly increased 1 day after inoculation compared with the Sham group.



In the *Fn* group 30 days after inoculation, infiltration of lymphocytes was observed in the gingival lamina propria near the gingival sulcus than in the Sham group.

Consideration

These results clarified that continuous oral inoculation of *Fn* induced periodontitis in mice.

Acknowledgement

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