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Role of Bacteria in Periodontitis-Induced Murine Model

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Structured Abstract

Background: Periodontitis is a chronic inflammatory disease affecting more than one billion individuals worldwide. It is characterised by degeneration of periodontal tissues that support the tooth leading to gingival inflammation and bleeding, deepening of periodontal pocket and eventually tooth loss. As direct sampling from patients is not feasible, this review was aimed to identify the best possible murine model for periodontal research with emphasis on the importance of bacteria or bacterial product applications in periodontitis induction.

Literature Review:
Periodontitis is a multifactorial oral infectious disease, mainly influenced by periodontal pathogens, particularly *Porphyromonas gingivalis* (*P. gingivalis*) and *Aggregatibacter actinomycetemcomitans* that harboured the supragingival biofilm. Although there are many periodontitis animal model, murine (i.e., mice and rats) is at the top of the list. This partly attributed by their molar structure and immunological response are similar to that of humans. Furthermore, murine are cost effective and easy to handle. In general, oral eubiosis provide protection against pathogen, which increase abundance of periodontal pathogen trigger imbalance of oral microbiota leading to oral dysbiosis, a driving factor for periodontitis.

Results: Oral dysbiosis-induced by biofilm accumulation or periodontal pathogen, disturbs the immune system and stimulate inflammatory responses of the host. In murine models, ligature-induced is the most commonly used strategies as biofilm accumulating device, placed at the molars to induce development of subgingival biofilm. The ligature-induced alone and/ or application *P. gingivalis* or its lipopolysaccharide or direct inoculation into supragingival biofilm have successfully produced periodontitis, in one to five weeks (acute) or six to sixteen weeks (chronic). Wistar or Sprague-Dawley rats and C57BL/6, C57BL/6J, Balb/c mice were widely used for periodontitis induction. The inflammatory reactions were evident with reported increase in IL-1β, TNF-α, and IL-6. Mice is preferred for the availability of genetically modified strains, whilst rat is preferred for its large-scale tissue sampling.

Conclusion: Periodontitis-induced murine models is a successful model, confirmed with increment of pro-inflammatory cytokines and/ or physical changes of the periodontal area. The C57BL/6 mice, induced with inoculation of *P. gingivalis* and ligature technique for at least 14 days can simulate human periodontitis.

Keywords: Periodontitis, Periodontal Pathogen, Murine Model, Supragingival Biofilm

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