

Endodontic Microbiome Dysbiosis: An Empirical Analysis of Pathogenic Profiles in Apical Periodontitis Cases

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Abstract. This study investigates the microbial profiles present in apical periodontitis, a common endodontic condition. Utilizing advanced sequencing techniques, we analyzed root canal samples from 100 patients undergoing endodontic treatment. The results reveal a distinct dysbiosis in microbial communities associated with clinical symptoms and periapical radiolucency. We identified several key pathogenic species contributing to the inflammatory response, including *Enterococcus faecalis* and *Prevotella intermedia*. These findings underscore the importance of microbiological assessment in guiding endodontic therapies and highlight potential targets for future therapeutic interventions.

Keywords: apical periodontitis, microbial dysbiosis, endodontic treatment, pathogenic profiles, root canal microbiome, *Enterococcus faecalis*, *Prevotella intermedia*

Introduction

Apical periodontitis (AP) represents a significant global public health challenge, affecting millions worldwide and leading to tooth loss and related systemic health issues. Recent studies have demonstrated a strong association between the complexity of microbial communities in the root canal system and the severity of clinical manifestations in patients with AP. This condition is characterized by the inflammatory response of periapical tissues to microbial infection, with dysbiotic microbial profiles often complicating treatment outcomes. Despite advances in endodontic therapies, the persistent nature of AP indicates the need for a more profound understanding of its microbial etiology. In recent years, researchers have increasingly adopted high-throughput sequencing technologies to elucidate the microbial diversity within endodontic infections, revealing substantial shifts in

microbial populations that may dictate disease progression and treatment response. The relevance of this research is underscored by the growing recognition of the oral microbiome's role in systemic health, positioning AP not merely as a dental concern but as a broader health issue warranting comprehensive investigation. This paper aims to explore the microbial dysbiosis observed in apical periodontitis cases, employing empirical methodologies to profile dominant pathogenic species. We will detail the techniques used to obtain and analyze microbiological samples, discuss the implications of our findings for clinical practice, and propose future avenues for research aimed at enhancing endodontic outcomes. The structure of this paper includes a thorough review of current literature on AP, a detailed methodology section, presentation of our empirical findings, and a discussion of the clinical implications of microbial dysbiosis in endodontics.

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References

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