

PhD in Biomedical Sciences

Research Area: Endodontics

TITLE

ANTIMICROBIAL PEPTIDES-BASED ENDODONTIC DISINFECTION MATERIALS: DEVELOPMENT AND ASSESSMENT OF CYTOTOXICITY AND EFFECTIVENESS

ABSTRACT

Pulp diseases are often associated with very evident pain. From inflammations with moderate symptoms to infections with considerable systemic repercussions, patients with this type of pathology experience distressing clinical episodes.

Endodontic treatment aims to treat pulp inflammations and infections, in order to prevent or promote healing of apical periodontitis. This treatment includes mechanical approach, irrigation and intracanal medication with subsequent obturation, in order to control microorganisms. In this way, topical medication and irrigants complete the antimicrobial action. However, the most commonly agents used for this purpose exhibit limited activity, supporting the need for alternatives.

Sodium hypochlorite is one of the most common and profitable solution for root canal irrigation. Calcium hydroxide is the most widely used and effective intracanal medication. As the endodontic microbiology features many microorganisms found in caries and periodontal disease, it is plausible that active peptides for these diseases may affect the endodontic microbiota. Antimicrobial agents that effectively eliminate resistant species in root canals have the potential to improve endodontic treatment.

Considerable evolution can be observed in the endodontics regarding instrumentation and mechanics of the treatment process. However, the rates of unsuccessful endodontic treatment remain high. In this context, new approaches for endodontic chemical disinfection are extremely necessary. There are many AMPs with excellent antimicrobial activity against the endodontic microbiota at relatively low inhibitory concentrations and that can modulate an exacerbated immune response.

The combined activities of these biomolecules may promote elimination of microorganisms as well as modulation of exacerbated immune response. All these reasons indicate that endodontic treatment based on antimicrobial peptides is a promising option. However, the efficacy and specificity of antimicrobial peptide activity should be evaluated under different parameters, such as in vivo physiological conditions, peptide concentration, synergistic and antagonistic actions, and bacterial replication characteristics.

KEYWORDS

Pulp diseases, disinfection, antimicrobial peptides, irrigants, intracanal medication

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