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Antimicrobial activity of Ib-M peptides against *Escherichia coli* O157: H7

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Abstract

The development of new antimicrobial peptides has become an attractive alternative to conventional antibiotics due to the increasing rates of microbial drug resistance. Ib-M corresponds to a family of cationic synthetic peptides, 20 amino acids in length, that have shown inhibitory effect against the non-pathogenic strain *Escherichia coli* K-12. This work evaluated the antimicrobial potential of Ib-M peptides against the pathogenic *E. coli* O157: H7 using a reference strain and a clinical isolate. The Ib-M peptides showed antibacterial activity against both strains of *E. coli* O157: H7; the minimum inhibitory concentration of Ib-M peptides ranged from 1.6 to 12.5 μM and the minimum bactericidal concentration ranged from 3.7 to 22.9 μM, being Ib-M1 and Ib-M2 the peptides that presented the highest inhibitory effect. Time-kill kinetics assay showed a reduction of the bacterial population by more than 95% after 4 hours of exposure to 1xMIC of Ib-M1. Low cytotoxicity was observed in VERO cells with 50% cytotoxic concentration in the range from 197.5 to more than 400 μM. All peptides showed a random structure in hydrophilic environments, except Ib-M1, and all of them transitioned to an α-helical structure when the hydrophobicity of the medium was increased. In conclusion, these findings support the *in vitro* antimicrobial effect of Ib-M peptides against the pathogenic bacteria *E. coli* O157: H7 and prove to be promising molecules for the development of new therapeutic alternatives.

Introduction

Pathogenic bacteria with antimicrobial resistance has become a global public health threat leading to the research and development of new antibiotics [1]. Antimicrobial peptides (AMPs) are naturally occurring small molecules, 15–20 amino acids in length, with activity towards a broad spectrum of bacteria and fungi, including multi-drug resistant bacteria and