

Abstract

# Potential Protective Activity and Stability of Cornstarch/Chitosan Films Loaded with the Ctx(Ile<sup>21</sup>)-Ha Antimicrobial Peptide †

Cesar Augusto Roque-Borda <sup>1,\*</sup>, Bruna Fernandes Antunes <sup>2</sup>, Silvio Rainho Teixeira <sup>3</sup> and Eduardo Festozo Vicente <sup>4</sup>

<sup>1</sup> Tuberculosis Research Laboratory, School of Pharmaceutical Sciences, São Paulo State University (UNESP)

<sup>2</sup> School of Biotechnology in Regenerative Medicine and Medicinal Chemistry, University of Araraquara (UNIARA). 14801-340 Sao Paulo

<sup>3</sup> São Paulo State University (UNESP), School of Technology and Sciences, Presidente Prudente, São Paulo – Brazil. 19060-900. Sao Paulo, Brazil

<sup>4</sup> School of Sciences and Engineering, São Paulo State University (UNESP), Tupã, 17602-496 São Paulo, Brazil

\* Correspondence: roqueb.cesar@gmail.com

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**Abstract:** The high mortality rate of different multi-resistant bacteria (MDR) has led to an immediate and urgent solution. Patients hospitalized for chronic diseases have a weakened immune system and are at high risk of contracting an opportunistic infection. Likewise, WHO prioritized studies against a selected group of MDR bacteria for their control [1]. In this scope, the Ctx(Ile<sup>21</sup>)-Ha antimicrobial peptide (AMP) presented great potential and efficient biological activity against *Acinetobacter baumannii* and *Pseudomonas aureginosa* MDR bacteria [2]. Thus, the aim of this research was to design ultrasound-assisted microstructured films loaded with the Ctx(Ile<sup>21</sup>)-Ha AMP, based on starch and chitosan, for its effective protective action. Gelling was done, for grain breaking and exposing the hydroxyls [3]. For this, it was used 10 g cornstarch and 300 mL distilled water under agitation at 90°C for 1 h. Then, added 5 mL of the gelled starch and mixed with 50 mg of peptide and stored in petri dishes, at 50°C for 5 h. Chitosan film was synthesizing by free radical polymerization in the presence of crosslinker [4]. Chitosan dispersion (CD) was prepared by dissolving 2% w/v chitosan in 2% v/v acetic acid solution. Ctx(Ile<sup>21</sup>)-Ha was placed on the CD with 0.3% w/v of glycerol and magnetic agitation at 150 rpm. For this, its properties were evaluated by DSC/TGA, FTIR, XRD and SEM. The physicochemical stability studies of the AMP showed its structure unchanged for up to 3 months exposed to water and for up to one year in the form of a dry film. These results were confirmed by the LC/MS profile, in which XDR indicate a consistent semi-morpho phase. Finally, with these results, we show that new products based on AMPs could be potential anti-MDR bacterial agents, avoiding the exposure of critically ill patients in intensive care or post-surgery beds and preventing their dissemination.

**Keywords:** AMP; MDR bacteria; chitosan; cornstarch; film