SYNTHESIS AND CHARACTERIZATION OF NANOBIOSTRUCTURES BASED ON ANTIMICROBIAL PEPTIDE BP100

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Antimicrobial peptides are components of innate immune system defenses of diverse organisms and represent a new class of antimicrobial agents. Nevertheless, several applications of these molecules has been development such as incorporation in food, cosmetics or pharmaceuticals packaging, in order to reduce product contamination and increase its durability. However, antimicrobial peptides are poorly bioavailable from its natural sources and are isolated at small quantities. The chemical synthesis of these biomolecules is the greater strategy to get around this problem.

This study has proposed the synthesis of antimicrobial peptide BP100 (EAAA-KKLFKKILKYL) for incorporation into alumina nanoparticles.

The BP100 peptide was obtained by solid phase peptide synthesis using Fmoc (9-fluorenilmetoxycarbonyl) strategy. Alumina nanoparticles (NP) have been achieved by reaction of aluminum nitrate and sodium carbonate in aqueous medium. Then, the nanoparticles were functionalized (NPOH) at hydrogen peroxide solution following by treatment with (3-aminopropyl)triethoxysilane to provide amino groups (PNP). Covalent binding between BP100 and PNP (NPBP100) was carried out by activation of Glu-1 side chain using 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide and 1-hydroxybenzotriazole).

All nanoparticles were characterized by FTIR and the results confirmed the success of each synthesis step. It was observed O-H stretches for NPOH in range of 3690-3000 cm\(^{-1}\), primary amines stretches near to 3130-3100 cm\(^{-1}\) for NPNP; and features vibrations of BP100 peptide at 1652 cm\(^{-1}\) (carbonyl), 1200-1120 cm\(^{-1}\) (aliphatic amine) and near to 1600-1400 cm\(^{-1}\) (aromatic residue Phe-8), confirming the NPBP100 formation. Superficial charge analysis of nanoparticles showed a zeta potential for NP about 0.3 mV, which increased after each derivatization step, reaching a maximum value (27.9 mV) for nanobiostructures containing BP100, as expected due to the presence of five Lys residues in the primary structure of the peptide.

These results have revealed that the proposed method is efficient for obtaining nanobiostructures of antimicrobial peptides.

Key words: alumina, BP100, nanobiostructures

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