BIOPOLYMER-BASED PARTICLES WORKING AS DELIVERY SYSTEMS FOR ANTIMICROBIAL PEPTIDES

OBŘUČA Stanislav, MATOUŠKOVÁ Petra, JANHUBA Filip, WURSTOVÁ Agata, DOSKOČIL Leoš, PEKAŘ Miloslav, MAROVÁ Ivana

Brno University of Technology, Brno, Czech Republic, EU

Abstract
Antimicrobial peptides attract attention as therapeutic agents targeted towards various pathogenic microorganisms. These are potent, broad spectrum antibiotics which demonstrate potential as novel therapeutic agents and; moreover, it appears they may also have the ability to enhance immunity by functioning as immunomodulators. Therefore, this work focused on fabrication of biopolymer-based particles carrying nisin as a model antimicrobial peptide. The biopolymer used in this study was bacterial polyester – poly(3-hydroxybutyrate) (PHB). This material is fully biodegradable and biocompatible and; hence, very promising material for targeted delivery purposes. The particles were produced by Reverse Phase Evaporation method and characterized by Dynamic Light Scattering (zeta-potential and diameter), Scanning Electron Microscopy and Optical Microscopy (diameter and morphology) and centrifugal dispersion analysis (diameter and stability). The particle diameter ranged from 100 – 400 nm depending on concentration of biopolymer in organic phase, zeta-potential of particles was approximately -35 mV. We were able to entrap about 20% of loaded nisin into the structure of particles and the particles slowly released the peptide (entire load of nisin was released during 24 hours in 100 mM phosphate buffer pH 7.4). The antimicrobial activity of peptide was assayed by using Bacillus subtilis as a sensitive strain. Its viability and growth in presence of nisin-loaded particles were determined by following optical density of bacterial culture, pour-plate technique and Flow Cytometry analysis of cell viability. Nisin loaded into particles retained its antimicrobial activity and; thus, PHB-based microparticles may be considered as potential delivery systems for antimicrobial peptides.

Keywords: PHB, nisin, microparticles

Author did not supply full text of the paper/poster