Solvent-cast films of an Elastin-like polymer fused to an antimicrobial peptide, ABP-CM4, exhibits high antibacterial activity against *Pseudomonas aeruginosa*

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The nosocomial infections grew significantly in the last years and became a worldwide problem. Antimicrobial peptides (AMPs) arise as a good treatment to these infections, since traditional antibiotics have become useless against resistant hospital strains. AMPs exhibit a broad range of antimicrobial activity but antitumoral and antiviral activities have also been found. AMPs are usually small, cationic molecules that occur as part of the innate defense mechanism in many organisms, even in microbes and virus. The combination of AMPs with recombinantly produced polymers, such as the Elastin-like Polymers (ELPs), inspired in the mammalian elastin, could improve medical equipment, such as catheters, to overcome infections and biofilms formation.

In this work we describe the cloning and recombinant production in *Escherichia coli* BL21(DE3) of ABP-CM4, a cationic AMP from *Bombyx mori*, fused to an ELP, consisting of 200 repeats of the pentamer VPAVG (A200). This ELP exhibits thermoresponsive properties, exploitable as a purification method. The morphological characteristics as well as its antibacterial activity of this hybrid polymer were studied as essential for the applicability in medical devices.

The ABP-CM4 gene was chemically synthesized, with the inclusion of a formic acid cleavage site, and fused in frame with the N-terminus of the gene coding A200. Production of the recombinant polymer in *E. coli* BL21(DE3) was achieved and purification was based on the use of the inverse transition cycling method.

Formic acid treatment allowed tag removal and obtention of the soluble protein. The hybrid polymer, CM4::A200, and the cleaved ABP-CM4 were tested for its antimicrobial activity in liquid form. Solvent-cast films of CM4::A200, using formic acid as solvent, were tested for the antibacterial activity against *Pseudomonas aeruginosa* comparing with A200 polymers containing different contents of positively charged aminoacids.

The hybrid polymer presented similar morphological and physicochemical features to A200. The cleaved recombinant ABP-CM4 and CM4::A200 showed low levels of inhibition against *P. aeruginosa* in the liquid form but, in the solvent-cast film form, the inhibition of growth of was almost 100%. This result reveals very good perspectives for the use of these polymers in the medical equipment.

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