The Use of Superficial Coating of Antimicrobial Peptide-Polymer Conjugate to Combat Biofilm Formation: Application of Bio-surfaces in Medical Devices

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Many pathogens, such as *Pseudomonas aeruginosa* and *Escherichia coli* bacteria can easily form biofilms. The formation of such biofilms is known to affect different areas of industrial interest and the area of biomedical devices. Searching for a new solution to this problem, this work explores the covalent attachment of antimicrobial peptides (AMPs) to polyethylene glycol (PEG) polymers to potentially be applied to a bioinspired surfaces. Previous research has explored the antimicrobial activity of the anionic and hydrophobic peptide Maximin H5 (MH5), which is an integral part of the defense system of the frog *Bombina maxima*. First, microbiological tests, such as Minimal Inhibitory Concentration (MIC) were performed to evaluate the antimicrobial activity of the AMPs against *P. aeruginosa* and *E. coli*. From these results, the MIC of MH5 was determined to be a range of 40 μM to 90 μM, where in both bacteria, this concentration produced a broad antibacterial effect. Scanning Electron Microscopy (SEM) was also employed to evaluate the formation of biofilms and its interaction with these peptides, showing no biofilm formation. To assess their secondary structure and determine the thermodynamics of the peptide unfolding, the circular dichroism (CD) technique was carried out. After physical and anti-microbial activity characterization, MH5 was bio-conjugated to PEG, followed by size exclusion purification (SEC). Afterwards, SDS-PAGE and MALDI ToF MS were utilized to confirm the reaction. Moreover, the CAUTI's, are the most common hospital-acquired microorganism infection worldwide and cause very serious problems related to human health. Thus, with the antimicrobial qualities of these AMPs it is important to consider the fabrication of antimicrobial coatings for catheters as a way to avoid the biofilms formation in these medical devices.