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Evaluation of the Antibacterial Activity of New Dermaseptin Derivatives Against Acinetobacter Baumannii

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Abstract : Nosocomial infections represent one of the biggest health problems nowadays. Acinetobacter baumannii is known as an opportunistic pathogen in humans, affecting people with compromised immune systems, and is becoming increasingly important as a hospital-derived infection. It is known that in recent years, more and more bacteria have become multidrug-resistant (MDR), and for this reason, the development of new drugs is a priority. However, these products must not affect the human body, and therefore, cytotoxicity studies are mandatory. In this context, antimicrobial peptides with potential antibacterial proprieties could be an alternative. In this research, we describe the synthesis and the bioactivity of dermaseptins and their derivatives against Acinetobacter baumannii. The cytotoxicity of these dermaseptins was investigated on the HEp-2 cell line by the MTT cell viability assay. Thereafter, we studied morphological alterations caused by the action of one of the active peptides on the bacterial membrane using atomic force microscopy (AFM). The cytotoxicity of dermaseptins was concentration-dependent at microgram concentrations. It was observed that all tested analogs exhibit antibacterial activity with Minimum Inhibitory Concentrations (MICs) ranging from 3.125 to 12.5 µg/mL and Minimum Bactericidal Concentrations (MBCs) ranging from 6.25 to 25 µg/mL. Microscopic images obtained by AFM revealed morphological changes on the surface of treated bacteria caused by K4S4(1-16), as well as significant surface alterations. Overall, these findings demonstrate that dermaseptins might constitute new lead structures for the development of potent antibacterial agents against Acinetobacter baumannii infections.

Keywords : dermaseptin B2, dermaseptin S4, analogs, Acinetobacter baumannii, healthcare-associated infections, antibacterial activity
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