Università degli Studi di Napoli Federico II

PhD in Biotechnology - 40th cycle

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Self-Fibrillating Antimicrobial Peptides: A New Frontier in Surface Functionalization to Prevent Infections

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The rise of antimicrobial resistance (AMR) poses a critical public health threat, largely driven by the overuse of conventional antibiotics (Tang, Millar, e Moore 2023). Antimicrobial peptides (AMPs) have emerged as promising alternatives due to their broad- spectrum antimicrobial activity and their ability to target bacterial membranes, offering potential solutions for multidrug-resistant pathogens and biofilm-related infections, particularly those associated with medical implants (Wang et al. 2024). This research project aims to develop a novel approach by functionalizing surfaces with self-assembling antimicrobial chimeric proteins. The selected protein construct combines the fibrillogenic domain of apolipoprotein A-I (ApoA-I) with selected AMPs to form stable, biologically active amyloid fibrils. These antimicrobial fibrils will be tested for their ability to prevent bacterial colonization and biofilm formation on surfaces. This approach offers benefits such as enhanced mechanical strength, resistance to extreme conditions, and low immunogenicity, with promising applications in the functionalization of medical implants, in food packaging, and in cosmeceutical field, addressing the AMR crisis and improving infection treatment.

References

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