Università degli Studi di Napoli Federico II

PhD in Biotechnology - 34th cycle

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Antimicrobial functionalization of surfaces through antimicrobial chimeric protein self-assembling

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The main aim of the present PhD project is the functionalization of medical implant surfaces with novel antimicrobial agents. Surfaces of medical implants can be colonized by bacteria during the implantation process, or at a later time point, putting the performance and the longevity of the implant at risk [1]. Indeed, it has been estimated that from two to six percentage of inserted implants are affected by infections associated to bacterial biofilm formation. Conventional approaches, including prophylactic and systemic administration of antibiotics, fail to adequately treat biofilm-associated infections. In this scenario, Host Defence Peptides (HDPs) represent an alternative and promising weapon, since they are generally endowed with antimicrobial, anti-biofilm and anti-inflammatory activities [2]. Hence, HDPs might be successfully used to coat medical device surfaces, in order to prevent bacterial colonization. Since self-assembling peptides have emerged as ideal candidates for the development of safe nanostructured scaffolds in the field of tissue engineering [3], we propose the construction of a chimeric construct composed by a human fibrillogenic polypeptide fused to a human HDP already known to be endowed with antimicrobial, anti-biofilm, immunomodulatory and wound-healing properties [4]. The structural and functional characterization of the construct will be performed with the ultimate goal to obtain a biologically active self-assembling chimeric protein construct, useful to actively coat the surfaces of selected medical implants.

References

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[3] Stuart K. et al. Biomaterials **2010**, 31, 9395-9405**.**

[4] Gaglione R. et al. Biochem Pharmacol. **2017**, 130, 34-50.