S03.5/PS01.35

Polydopamine-mediated immobilization of PALM and DNAse to create an anti-adhesive and antimicrobial bi-functional coating

Diana Alves, P Jorge, MO Pereira
CEB – Centre of Biological Engineering, University of Minho, Braga, Portugal

The development of novel approaches to prevent biomaterial-associated infections are in great demand in modern healthcare. A mussel-inspired coating strategy was applied to introduce both anti-adhesive and antimicrobial functionalities on silicone material. Substrates were immersed in an alkaline solution of dopamine to form a thin layer of polydopamine and then transferred into a solution containing different proportions of the antimicrobial lipopetide PALM-KGK-NH2 and the enzyme DNAse I. Surface characterization confirmed the immobilization of both compounds onto silicone. The immobilization efficiency of peptide was about 65 % and peptide did not detach from the surface for up to 5 days. The mono-functional enzymatic coating prevented *Staphylococcus aureus* adhesion while the coating functionalized with the lipopetide killed most of the adhered cells. Combination of both compounds resulted in a bi-functional coating able to prevent bacterial adhesion and kill the adherent ones. Moreover, cells adhered to these modified surfaces exhibited the same antibiotic susceptibility pattern as cells adhered to unmodified surfaces, suggesting no resistance development. In conclusion, silicone functionalization with enzymes and antimicrobial peptides holds great potential in the development of biomaterials to prevent biomaterial-associated infections.

Acknowledgements: Project “BioHealth - Biotechnology and Bioengineering approaches to improve health quality', Ref. NORTE-07-0124-FEDER-000027, co-funded by the Programa Operacional Regional do Norte (ON.2 – O Novo Norte), QREN, FEDER, the project “RECI/BBB-EBI/0179/2012 - Consolidating Research Expertise and Resources on Cellular and Molecular Biotechnology at CEB/IBB”, Ref. FCOMP-01-0124-FEDER-027462, FEDER and Diana Alves PhD Grant SFRH/BD/78063/2011.