174: Modulating an antimicrobial release approach by dopamine chemistry to fight infections associated to orthopedic implants - *Alves D*

Alves D[1], Borges P[1], Rodrigues C.F[1], Grainha T[1] and Pereira M.O[1]

[1]Centre of Biological Engineering, Laboratory of Research in Biofilms Rosário Oliveira, University of Minho, Campus de Gualtar, Braga, Portugal

Introduction: Alongside with orthopedic implants contribution for modern healthcare improvements, there's the risk associated to their microbial colonization and biofilm formation, compromising the performance of the implant itself and representing niches for infection.

Hypothesis and aims: This study aimed to engineer an antimicrobial release coating for stainless steel surfaces (SS) to empower them with the ability to prevent *Staphylococci* colonization.

Methodology: Surface modification was based on dopamine chemistry, which self-polymerization results in the deposition of a thin, adhered film called polydopamine (pDA). Chlorohexidine (CHX) was chosen to confer the antimicrobial features. Its immobilization was performed through a 2-step approach, including pDA formation and immersion in CHX solution, and 1-step strategy, in which dopamine and CHX were dissolved together and SS coupons were immersed in this solution. An additional layer of pDA was also performed for both strategies.

Results: SEM and AFM confirmed pDA coating by the presence of self-polymerized pDA particles without altering the roughness of SS surfaces. Immobilization of CHX using a 1-step approach yielded surfaces with a more homogenous coating than the 2-step approach. Different pDA-based strategies yielded different CHX release profiles: the amount of CHX released was higher for the 2-step approach and the addition of another pDA layer reduced the amount of CHX released. The antimicrobial performance of the modified surfaces was evaluated against *S. aureus* and *S. epidermidis* and the results showed that all the strategies caused a significant reduction (more than 3 LOG) in the number of cells adhered to the surfaces and in suspension, after 24 h. The 2-step approach was able to impart SS surfaces with antimicrobial activity even after 10 days of exposure.

Conclusion: In conclusion, dopamine chemistry can modulate CHX release from the surfaces to obtain an antimicrobial coating strategy with great potential to fight infections associated with orthopedic implants.