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Context

Bacterial biofilms on medical devices contributes to nosocomial infections ⇒ Increased morbidity, mortality and costs

Bacterial biofilms = bacterial cells communities embedded in a self-produced exopolymeric substance (EPS)

Protection against antimicrobial agents: 1000 times less sensitive to antibiotics than in planktonic state¹

Biofilm composition
Water + Bacteria + EPS
• Polysaccharides
• Proteins
• eDNA

¹ Sharma, D et al. *Antimicrobial Resistance & Infection Control*, 2019, 6, 76

Cleaning by static surfactant foams ⇒ mechanical forces generated at the air-liquid interface²

Foam cleaning of a historical piece²

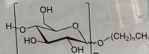
² Schadt, T et al. *Tenside Surfactants Detergents*, 2022, 59, 451.

PhD project: Antibiotic-free biofilm elimination using static glucoside surfactant foams

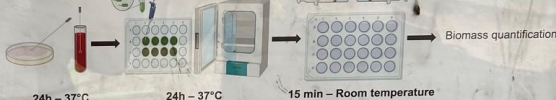


Materials and methods

Non ionic glucoside surfactant



Surfactants	Disponil APG425®	Glucopon 225DK®
Chain length (n)	16-18	8-10
Concentration in RPMI w L-glutamine	1 wt%	8.1 wt%
Liquid fraction of the foam	20 %	



Bacteria strains: *Pseudomonas aeruginosa* ATCC27853 and *Staphylococcus aureus* ATCC25923 (OD₆₀₀=0.01)

Results

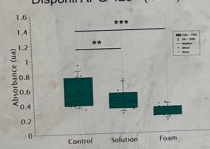
Safranin test

Disponil APG 425®

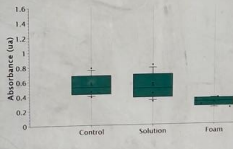


P. aeruginosa biofilm

Disponil APG 425® (n = 3)

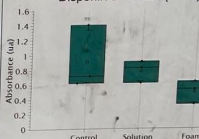


Glucopon 225DK® (n = 2)



S. aureus biofilm

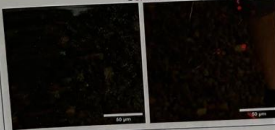
Disponil APG 425® (n = 1)



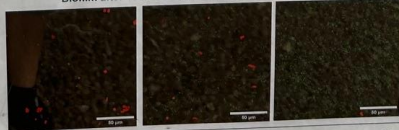
*, **, ***: statistical significance with p-value < 0.05, 0.01 or 0.001, respectively

Glucoside-based foams removed 50% of *P. aeruginosa* and *S. aureus* biofilm biomass in static conditions

Confocal images of *P. aeruginosa* biofilm



Biofilm after 15 min contact with Disponil APG 425® foam



Bacteria green (SYTO9)
Polysaccharides red
(Concavalin A)
BIO chambers μ-1
CLSM ZEISS LSM710

Reduction of the polysaccharide content and bacteria after 15 min contact with Disponil-based foam
Variability of the results all over the sample

Conclusion and perspectives

50% decrease of *P. aeruginosa* and *S. aureus* biofilms with glucoside static foams
Removal of polysaccharides and bacteria.
The first results has to be confirmed.

Perspectives: study of the influence of the liquid fraction and contact time of the foam and the efficiency depending on the maturity of the biofilm.

Acknowledgments

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