

Development of a thermo-responsive hydrogel as a carrier for biofilm targeting enzymes and antimicrobials for the treatment of orthopaedic device-related infections

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Tri-Enzymatic cocktail

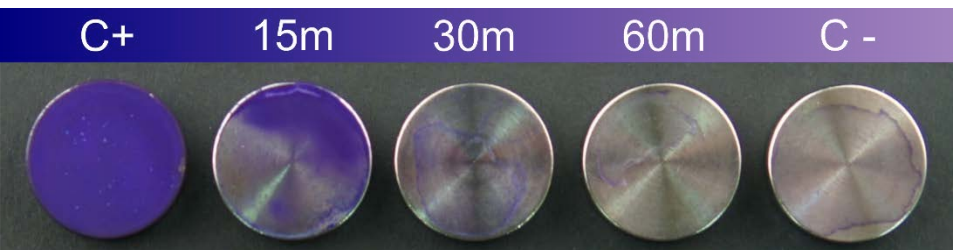
Components:

- Cellulase
- Endonuclease
- Acetylhexosaminidase

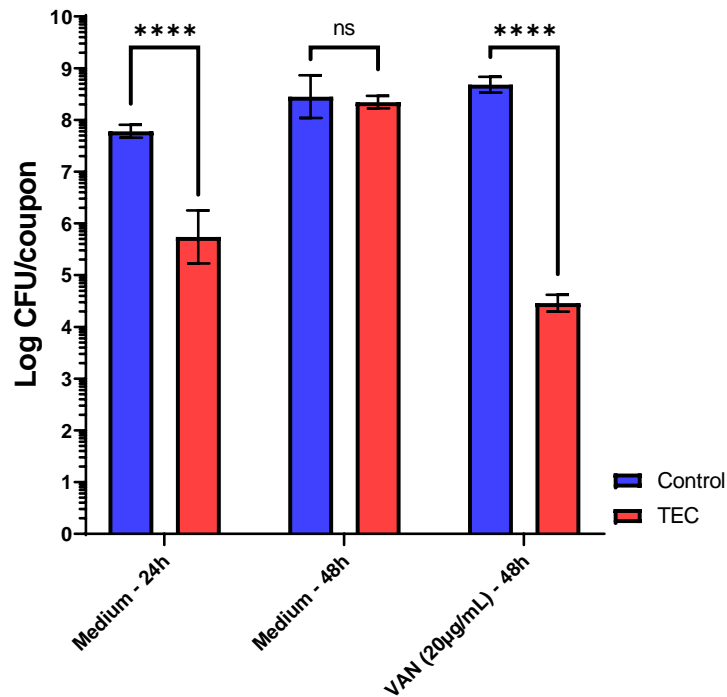
➤ *In-vitro*

Synergistic effect with varied antibiotics
(Poilvache et al. AAC 2021 Mar 18;65(4):e01699-20)

➤ How could we improve the drug form for intra-articular injections?



Effect of TEC and VAN on ATCC 33591 biofilms



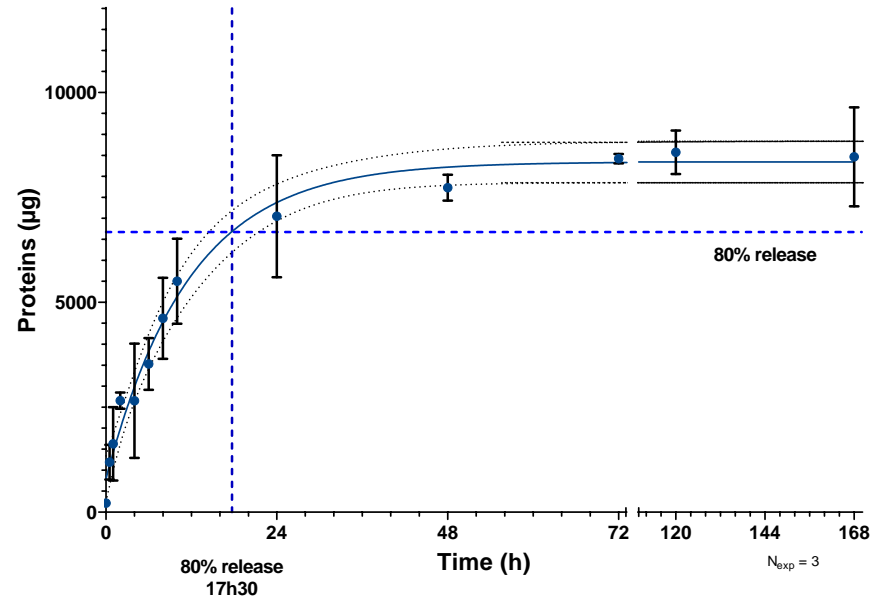
N_{experiments} = 3

Two-way ANOVA, Tukey post-hoc test

Thermo-responsive PF-127 hydrogel enzymes release

- 20% (m/v) PF-127 hydrogels
 - Liquid at 4°C
 - Gelify at 37°C¹
 - Non toxic²
- Fast protein release
 - 80% release after 17h30
 - Plateau reached between 48h and 72h

Protein release over time from 20% PF-127 hydrogels containing TEC and 10mg/mL of vancomycin



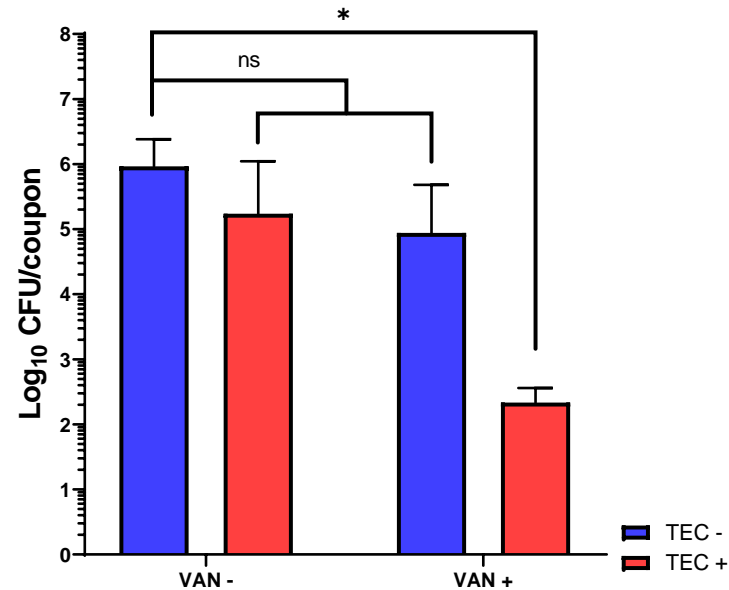
1. Almeida, H., Amaral, M. H., & Lobão, P. (2012). *J. Appl. Pharm. Sci*, 2(6), 1-10.

2. Rahdar, A., et al. (2019). *Journal of Molecular Liquids* 277: 624-630.

Combination of TEC and VAN in PF-127 hydrogels

- Significant reduction of ATCC 33591 MRSA biofilms CFU counts
- Comparable in magnitude to previous experiments
- Perspectives:
 - Experiments focusing on other antibiotics and bacterial species and strains
 - *In-vivo* experiments

Effect of co-incubation of a mature ATCC 33591 biofilm with F127 hydrogel containing TEC and/or vancomycin



$N_{\text{experiments}} = 3$

Two-way ANOVA, Tukey post-hoc test

Thank you for your attention!

