How non-medicated dressings are tested using *in vitro* and *ex vivo* test methods

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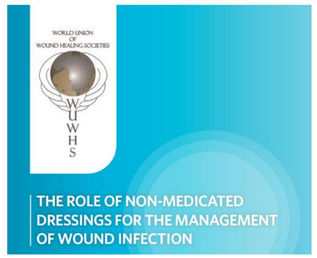
Introduction

Antimicrobial resistance is a global issue that is also present in wound care, in part, because systemic antibiotics and antimicrobial dressings can be often prescribed unnecessarily. In addition, the treatment of wound infection is a major challenge for clinicians, with many key opportunistic pathogens becoming resistant and difficult to eradicate (i.e., biofilm), leading to an increase in patient suffering and higher mortality levels. These issues have also been the center of the discussion in the Position Document issued by the World Union of Wound Healing Societies in 2020.

New and alternative methods of managing wound infections have been developed. NMWD are defined as wound dressings that do not contain any active ingredients (e.g. silver) but are able to eliminate wound bioburden in alternative ways rather than killing (i.e. in a physical manner). Examples of NMWD are hydrogels, hydrocolloids, superabsorbent and carboxymethylcellulose (CMC) dressing.



NMWD mode of action and test methods overview

The following graphic reviews the possible *in vitro* and *ex vivo* test methods that assess the efficacy of a NMWD dressings MOA.

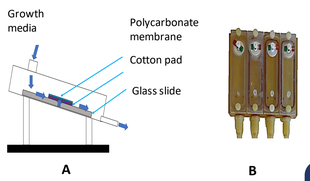


Figure 1. Schematics of the Colony Drip Flow Reactor from an illustration (A), and a photograph (B).

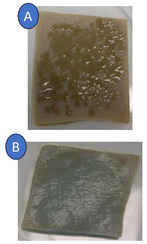


Figure 2. (A) Ex vivo porcine skin explant following incubation with Pseudomonas aeruginosa at 37°C for 7 days

(B) Ex vivo porcine skin explant following 2 minutes debridement treatment

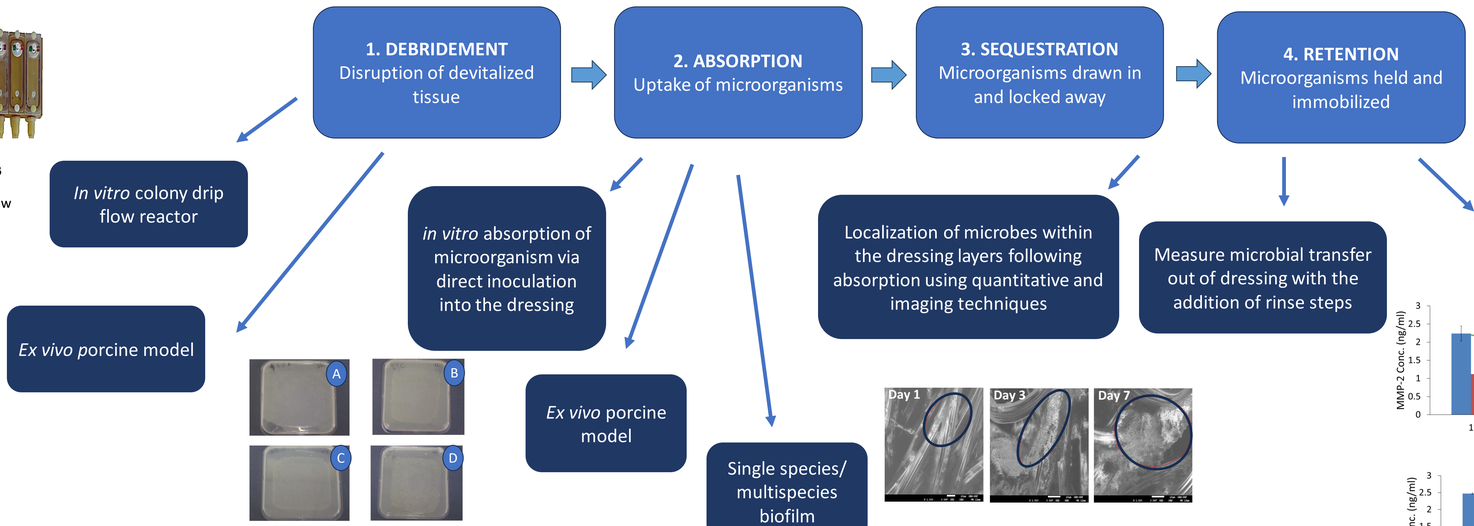


Figure 3. MRSA recovered from incubation trays after 3 hours (A), 6 hours (B), 24 hours (C) and 48 hours (D) following treatment with SAP dressings.

Figure 4. SEM imagery showing bacteria in SAP dressings over a 7 day challenge period.

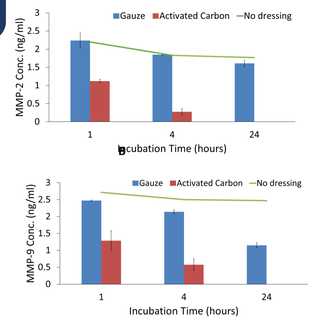


Figure 5. Concentration of MMP-2 (Graph A), and MMP-9 (Graph B), remaining in the supernatants after incubation with the ACCD was significantly lower than that for gauze at all of the time points and was undetectable after 24 hours

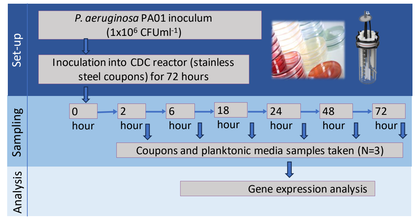


Figure 6. Methodology for the set-up, sampling and analysis of gene regulation during an up to 72 hour Pseudomonas aeruginosa growth in a CDC Biofilm Reactor® .

Conclusion

Preclinical models are extremely important in predicting clinical performance of medical device. The referenced models can help establishing whether NMWD can remove the bioburden at the wound surface without the use of antimicrobial agents.

References

Wounds International 2020 | Vol 11 Issue 4, Ousey et al., 2020, WUWHS Position Document 2020

This project was carried out by NAMSA, NAMSA, Sci-Tech Daresbury, Keckwick Lane, Cheshire, UK, WA4 4AD Tel +44 1925 864838, www.namsa.com