

Hydration Response Technology Dressing uses a passive mechanism to manage bacteria

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Introduction

Microbial sequestration is the ability of a wound dressings to 'bind' and immobilise microorganisms. The risk of clinical infection is reduced if bacterial sequestration is of a magnitude that maintains a wound bioburden 'balance' in favour of the host. Wound dressings need to be changed less regularly when they demonstrate a strong and prolonged ability to sequester microorganisms.

Aims

- Demonstrate the ability of sachet 5 to sequester *S. aureus* and *P. aeruginosa*.
- Compare the ability of sachet 5 and 3 competitor dressings to sequester and retain microorganisms.
- Visualise *P. aeruginosa* within a sachet 5 dressing.

Methods

Bacteria were cultured into Solution A to a concentration of 2.0×10^6 cfu/ml. A total volume of 105ml was used. Wound dressings (N=3) were placed in a tray containing 15ml of inoculated Solution A. Trays were incubated at 37°C. After 24 hours, 3 dressings were transferred to sterile agar plates and incubated for a further 24 hours. After incubation dressings were removed and the agar plates were incubated for a further 24 hours. Trays were re-infected daily with inoculated Solution A. Samples were collected on days 1, 3, 5, and 7. When no growth was visualised on the agar, agar was re-inoculated in order to demonstrate that no active agent was released from the dressing.

- Competitor 1 – Super absorbent dressing with a non-woven contact layer.
- Competitor 2 - Super absorbent polymer particle dressing with a polyethylene contact layer.

A working culture of bacteria was prepared in Tryptic Soy Broth (TSB) to a concentration of 1.0×10^8 cfu/ml. Nine sachet 5 dressings were placed in trays. Six trays were filled with 75ml of inoculated TSB, covered, and then incubated at 37°C for 10 minutes (N=3) or 48 hours (N=3). Three additional dressings were treated with sterile TSB only acting as a negative control. Following incubation 1cm² sections of the lower polypropylene (pp) layer and the inner gel layer were removed from the dressing and visualised using a TM3000 table top Scanning electron micrograph (SEM) (Hitachi).



Results

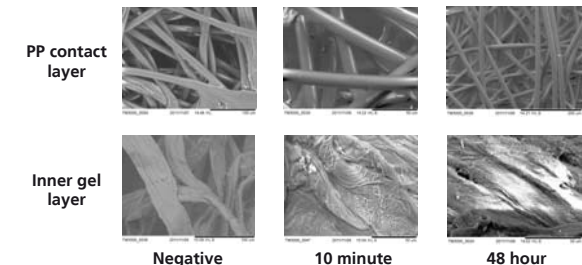
At day 1 gauze and the Competitor 2 dressings produced confluent growth under the dressings. Competitor 1 demonstrated some growth and sachet 5 demonstrated minimal growth. A similar picture was observed at day 3.



From day five less growth was visible under the sachet 5 dressings than all the competitor dressings. Competitor dressing and gauze all demonstrated confluent growth at day 7.

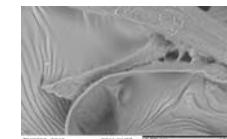


Bacteria were not visible on the contact pp layer of the control dressing, the 10 minute sample or the 48 hour sample.



The inner gel layer of the control sample was smooth and regular. The test samples appeared to be covered by a thick irregular substance suspected to be of bacterial origin. The substance visualised on the 48 hour sample appeared thicker and more developed than the covering on the 10 minute sample.

Interaction between cellulose fibres and the gelling agent, demonstrating that bacteria can proliferate on the cellulose but not on the gelling agent. This illustrates the benefit of a dressing that contains multiple fibre types.



Conclusions

- The area under the sachet 5 dressing remained clear for 7 days.
- sorbion sachet 5 has a potential wear time of up to 7 days.
- Bacteria are sequestered within the inner gel layer of sachet 5.
- The growth surrounding sachet 5 was expected since the polypropylene was not in contact with the absorbent core. This is of no relevance for application as the dressing size is larger than the wound area. This bacterial growth also demonstrates no release of any antimicrobial agents.