



VISUALIZING THE DEATH OF WOUND MICROORGANISMS WITHIN A SILVER ALGINATE DRESSING

S. J. Hooper¹, D.W. Williams², S.L. Percival³

¹Tissue Engineering & Reparative Dentistry, School of Dentistry, Cardiff University, Cardiff, UK;

²School of Medicine, West Virginia University, Morgantown, West Virginia;

³ Advanced Medical Solutions Ltd, Winsford, Cheshire, UK

INTRODUCTION

RESTORE Calcium Alginate Dressing with Silver is now widely used in the treatment of infected chronic wounds, combining the broad spectrum antimicrobial action of silver with the exudate management ability of alginate technology.

AIMS & OBJECTIVES

This study used confocal laser scanning microscopy (CLSM) and live/dead staining, to visualize the viability of wound microorganisms sequestered into a silver alginate wound dressing (RESTORE Calcium Alginate Dressing with Silver). The antimicrobial efficacy of RESTORE Calcium Alginate Dressing with Silver was compared with that of a non-antimicrobial Alginate dressing, by assessing the proportion of live/dead microorganisms over a 16 hour time course.

MATERIALS & METHODS

Reference strains of the frequently encountered wound pathogens *Pseudomonas aeruginosa* (ATCC 15692), *Staphylococcus aureus* (NCTC 8325) and *Candida albicans* (ATCC 90028) were cultured in Mueller Hinton broth until mid-log phase. Suspensions of these microorganisms (approx. 10⁸ cfu/mL) were stained with the Baclight live/dead viability kit (Invitrogen), and 100 µL of the preparations were used to hydrate the control alginate and the RESTORE Calcium Alginate Dressing with Silver and placed on glass slides. Fibers were then monitored by rapid CLSM with images taken at 20 minute intervals for up to 16 hours. The relative proportions at different time points of live and dead cells (appearing green and red, respectively) was assessed using image analysis software (Leica).

RESULTS

When the dressings were hydrated with stained microbial culture the alginate fibers swelled quickly, causing immobilization of the microorganisms in the gel-like spaces between the fibers. With the silver-free dressing, all microbial species quickly formed aggregates of viable cells. In comparison, when the same organisms were added to RESTORE Calcium Alginate Dressing with Silver they progressively appeared red (i.e. dead) within the first hour.

Figure 1 shows that both *Pseudomonas aeruginosa* and *Staphylococcus aureus* were rapidly killed within the RESTORE Calcium Alginate Dressing with Silver. In the case of *P. aeruginosa*, total kill was evident within 16 hours, while for *S. aureus* 4 hours was sufficient time for a total cidal effect to be observed. Over the same period the control alginate dressing did not exhibit an antimicrobial effect.

The broad spectrum antimicrobial effect of silver was evident when *C. albicans* was exposed to the dressing fibers. This fungal organism was also killed over a 16 hour exposure period (**Figure 2**) with no equivalent fungicidal effect observed in the control.

CONCLUSIONS

The ability of the RESTORE Calcium Alginate Dressing with Silver to quickly sequester and kill potentially pathogenic microorganisms, as demonstrated in this study, highlights the value of this dressing in reducing wound bioburden, thus potentially generating an environment supportive to the healing of infected wounds.

The authors wish to acknowledge the support received by a Knowledge Transfer Partnership (KTP) programme to facilitate this research

RESULTS (continued)

Figure 1. CLSM and Live/dead staining of wound bacterial pathogens in test dressings

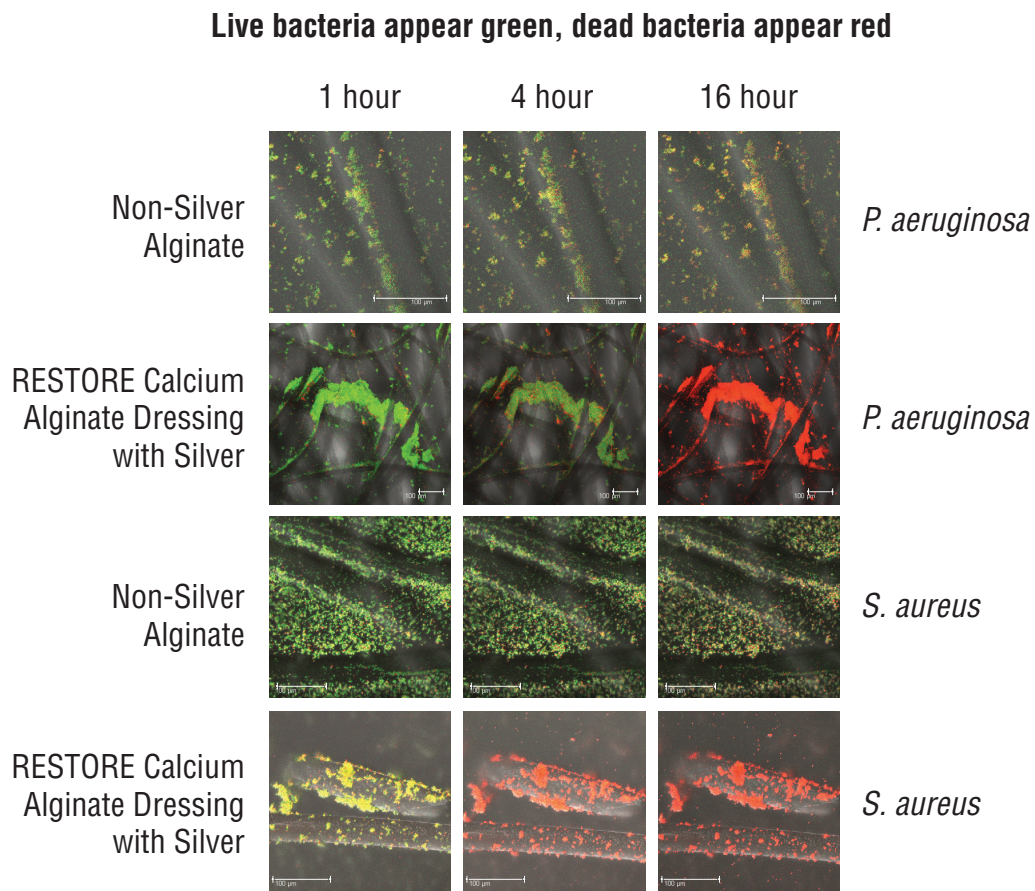
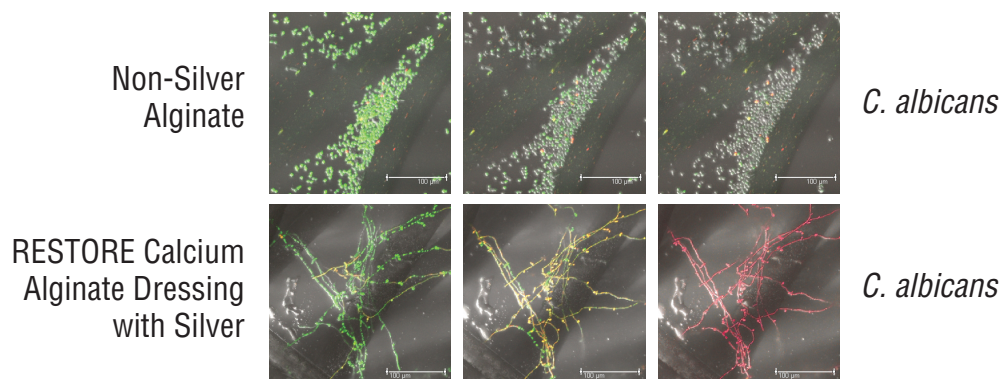


Figure 2. CLSM and Live/dead staining of *Candida albicans* in test dressings





SAWC/WHS Spring Conference

April 21-24, 2011
Dallas, TX



Complex Problems. Innovative Solutions.

Manufactured for
Hollister Wound Care LLC
1580 South Milwaukee Avenue
Suite 405
Libertyville, IL 60048
1.888.740.8999

Distributed in Canada by
Hollister Limited
95 Mary Street
Aurora, Ontario L4G 1G3
1.800.263.7400

www.hollisterwoundcare.com

Hollisterwoundcare and the wave logo are trademarks of Hollister Incorporated. Restore is a trademark of Hollister Wound Care LLC.
Made and printed in USA. ©2011 Hollister Wound Care LLC.

921762-0711