

Efficacy of AMD™ Dressings Against MRSA and VRE

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SUMMARY

Studies were performed to evaluate the efficacy of PHMB treated AMD dressings against *Methicillin Resistant Staphylococcus aureus* (MRSA), and also against *Vancomycin Resistant Enterococcus faecalis* (VRE), in preventing microbial growth on the dressings. *KERLIX*® AMD, *CURITY*® AMD and *EXCILON*® AMD dressings containing 0.2% polyhexamethylene biguanide (PHMB) were directly inoculated with clinical isolates of MRSA or VRE and placed on growth mediums. The presence or absence of microbial growth was observed visually and under a Scanning Electron Microscope (SEM) for three days. All AMD dressings significantly inhibited growth of MRSA and VRE on and within dressings, as compared to untreated control dressings.

INTRODUCTION

Kendall AMD dressings contain 0.2% PHMB as a broad-spectrum antimicrobial agent [1]. *KERLIX* AMD and *CURITY* AMD dressings are cotton-based gauze dressings. *EXCILON* AMD dressings are rayon/polyester based drain sponge dressings. The PHMB in AMD dressings functions as an agent that reduces bacterial colonization within the dressing and bacterial penetration through the dressing.

The effectiveness of *KERLIX* AMD dressings as a barrier to bacterial penetration has been demonstrated in animal models as well as in a human clinical case series [2, 3]. It has also been demonstrated that packing wounds with *KERLIX* AMD gauze dressings may be beneficial in reducing the bacterial bioburden in terms of both the total amount of microorganisms and the number of species [4]. In one prospective, randomized controlled

open-label clinical case series, it was determined that *EXCILON* AMD drain sponge dressings could be an important adjunct in the control of antibiotic-resistant bacterial infection as well as other infections frequently found in patients with tracheostomies. The study results suggested that *EXCILON* AMD dressings can help control organisms such as MRSA and *P. aeruginosa* in an institutional setting [5].

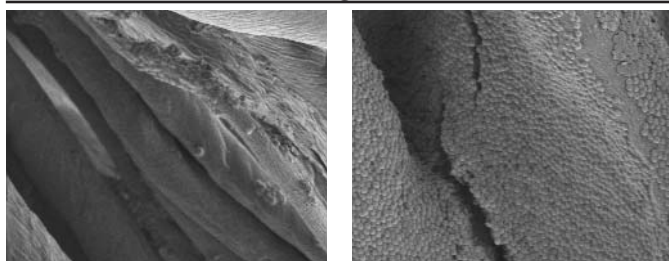
Broad-spectrum activity of AMD dressings against gram positive and gram negative bacteria as well as fungi has been demonstrated in several *in vitro* studies [6-10]. In one study, *KERLIX* AMD dressings visually exhibited a very high degree of antimicrobial efficacy and reduced growth of MRSA and VRE at 24 and 48 hours following direct inoculation on the dressing at 10⁵ cfu/mL challenge level [8, 9]. In another study, *KERLIX* AMD dressings exhibited high antimicrobial activity by 3-6 log reduction of MRSA challenge and 4-5 log reduction of VRE challenge at 30 minutes and 2 hours post inoculation of the dressing [10].

The purpose of this paper is to illustrate efficacy of three types of AMD dressings against clinical isolates of MRSA and VRE in preventing microbial growth on and within the dressings. The test dressings were directly inoculated with a suspension of MRSA or VRE and observed visually and under SEM for the growth/no growth on the dressings.

MATERIALS

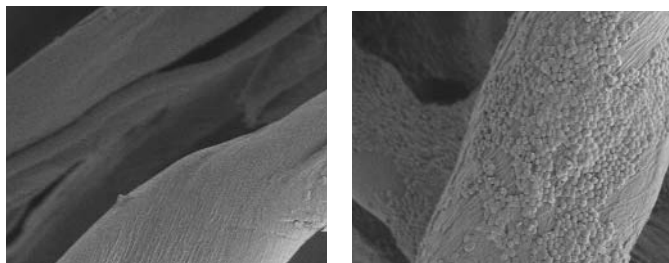
<i>Test Articles</i>		<i>Controls</i>	
<i>KERLIX AMD</i>	Lot# 51172700	<i>KERLIX</i>	Lot# 51532606
<i>CURITY AMD</i>	Lot# 51056501	<i>CURITY</i>	Lot# 51337800
<i>EXCILON AMD</i>	Lot# 51448601	<i>EXCILON</i>	Lot# 50977500

MRSA-inoculated dressings at 24 hours 2,000 x magnification*



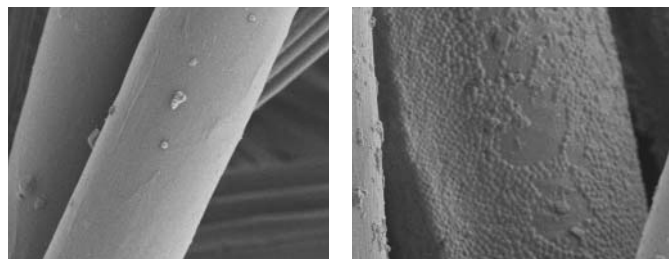
KERLIX AMD

KERLIX



CURITY AMD

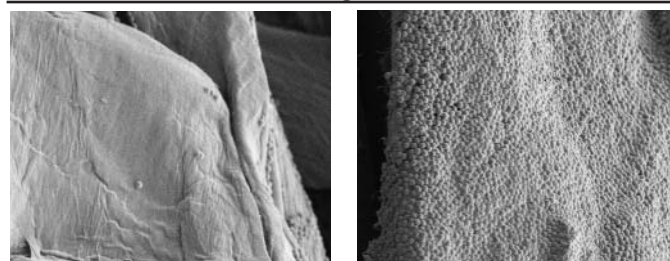
CURITY



EXCILON AMD

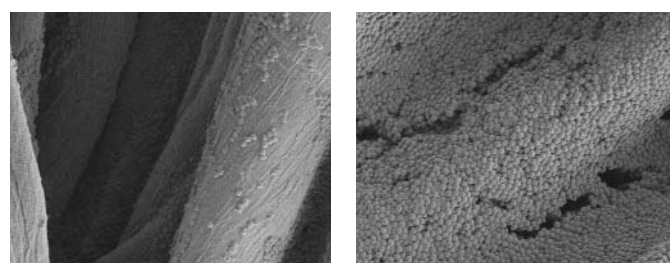
EXCILON

MRSA-inoculated dressings at 72 hours 2,000 x magnification*



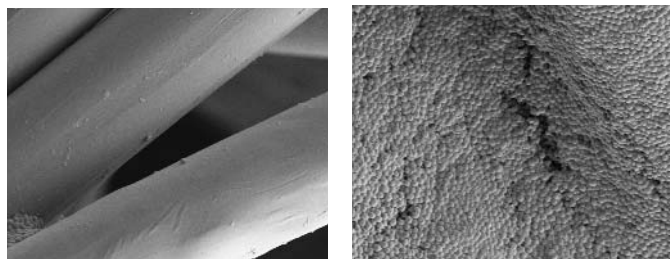
KERLIX AMD

KERLIX



CURITY AMD

CURITY



EXCILON AMD

EXCILON

*Enlarged for clarity

Challenge Organisms

The methicillin-resistant *Staphylococcus aureus* (MRSA) strain used in this study was obtained from Dr. Mark Shirtliff, Dept. of Microbiology and Immunology, School of Medicine, University of Maryland-Baltimore. It was originally isolated from a bone debridement sample from a patient undergoing treatment for osteomyelitis at the University of Texas Medical Branch.

The Vancomycin-resistant *Enterococcus* (VRE) *faecalis* strain used in this study was obtained from the American Type Culture Collection (ATCC 700802). This strain was originally isolated from a human blood sample.

METHODS

Inoculation and Bacterial Growth

MRSA and VRE cultures were each grown in Tryptic Soy Broth (TSB) at 37°C for 24 h. They were then diluted 1:10 with fresh TSB prior to inoculation of the dressing samples. The approximate cell density of the MRSA culture was 1×10^7 cfu/mL. The approximate cell density of the VRE culture was 6×10^6 cfu/mL.

The dressing samples were first cut into 20mm, 1-ply squares and then inoculated by holding them with sterile forceps and dipping into the diluted cultures. After inoculation, the dressings were immediately placed onto Trypticase Soy Agar (TSA) plates, and incubated at 37°C. They were transferred to fresh TSA every 24 hours.

Scanning Electron Microscopy

After 2 days incubation, the dressing samples were removed from the TSA plates and placed in a sterile Petri dish. Each dressing was treated with one mL of 50% ethanol for 10 minutes, after which the ethanol was decanted. This procedure was repeated with 70% and 100% ethanol to dehydrate the samples for SEM. Following dehydration, the samples were sputter coated

with 10 nm layer of gold-palladium and imaged on a JEOL model 6100 Scanning Electron Microscope, which uses a LaB6 electron source. The acceleration voltage was set to 10kV with a working distance of 8mm.

RESULTS

Efficacy of AMD dressings

Antimicrobial efficacy of *KERLIX* AMD, *CURITY* AMD, and *EXCILON* AMD dressings against MRSA and VRE is illustrated in the following SEM pictures at 2,000 times magnification levels [enlarged 200% in this literature]. These images were collected after 24 hours and again at 72 hours. It can be observed that *AMD* dressings significantly inhibited growth of MRSA and VRE on and within the dressings, compared to untreated *KERLIX*, *CURITY* and *EXCILON* dressings.

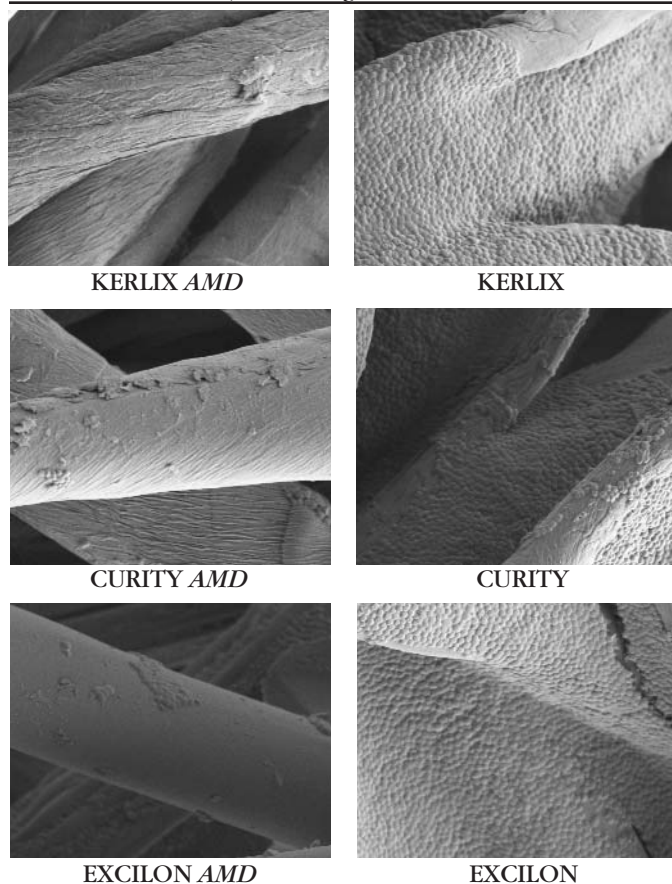
DISCUSSION

The studies reported in this paper involved direct inoculation of the test materials in which results are reported on a visual scale. The presence or absence of activity is a good indication of the efficacy of a test sample. All *AMD* dressings exhibited excellent ability to inhibit growth on and within the dressing compared to control dressings. The significance of these observations is that the contaminated traditional wound dressings could provide support for microbes to grow unchallenged and might lead to increase in bioburden in the wound. However, the use of antimicrobial dressings could prevent or reduce growth of the microbes that contact the dressings via exogenous contamination or absorption of wound exudates.

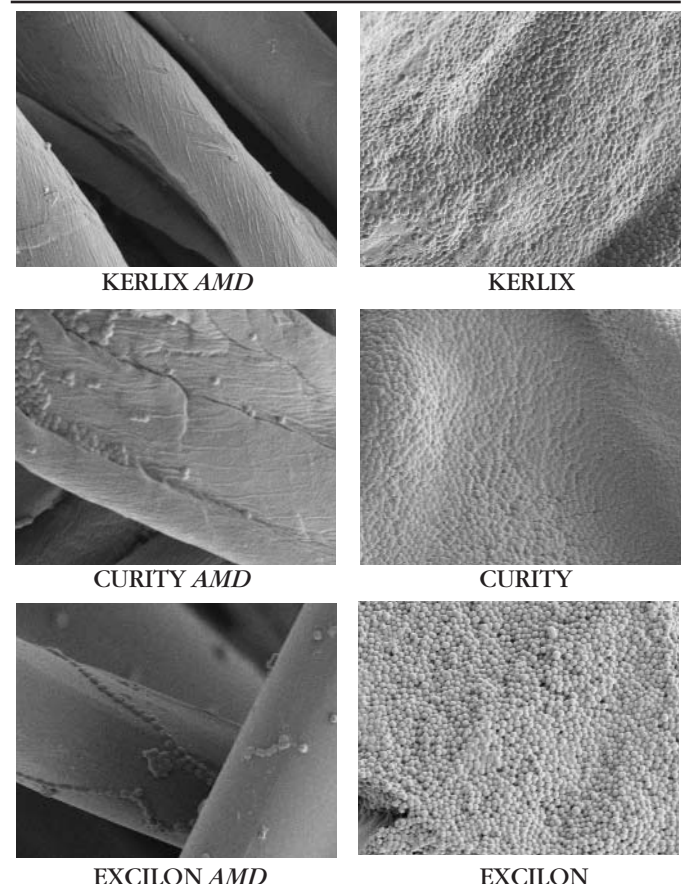
CONCLUSION

PHMB treated *AMD* dressings (i.e. *KERLIX* AMD, *CURITY* AMD and *EXCILON* AMD) exhibit antimicrobial activity against MRSA and VRE in terms of resisting bacterial colonization within the dressing and inhibit bacterial penetration through the dressing for up to 72 hours.

VRE-inoculated dressings at 24 hours
2,000 x magnification*



VRE-inoculated dressings at 72 hours
2,000 x magnification*



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