Early Bactericidal Activity of Sputtered Nanocrystalline Silver versus Electroless Autocatalytically Plated Silver

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The broad spectrum antimicrobial properties of silver provide treatment and protection for many types of wounds and are found in many frequently used dressings. The two most common techniques of applying silver to dressings are electroless autocatalytic plating and reactive magnetron sputtering, a form of physical vapor deposition. These dressings exhibit different conformability and stretch capabilities, moisture management properties and silver release characteristics. There remains debate as to the amount of silver release required for early bacterial kill and for the prevention of inadequate silver exposure that might lead to bacterial resistance. We utilized an in-vitro skin based protocol to evaluate the early bactericidal activity of dressings constructed with these two techniques.

Procedure: Sterile meshed porcine skin was cut into 0.75 inch squares and saturated with three different concentrations of Methicillin Resistant Staphylococcus Aureus. The skin was then transferred to blood agar plates and covered with a moistened one inch square of Acticoat® or TheraBond™ 3D . These were then incubated at 37 degrees for 15, 30, 60 or 240 minutes. Following incubation, the skin was removed and placed into tryptic soy broth and immediately treated for twenty seconds with a smooth tissue grinder. Ten microliters of this suspension was then plated onto blood agar and incubated for 24 hours at 37 degrees. Quantitative counts were then performed and recorded. This entire procedure was repeated with Pseudomonas Aeruginosa.

Results: Quantitative analysis revealed greater than 99.99% effectiveness (log 4 reduction) against both Methicillin Resistant Staphylococcus Aureus and Pseudomonas Aeruginosa for both TheraBond™ 3D and Acticoat® at 15 minutes, 30 minutes, 60 minutes and 240 minutes in all concentrations of bacterial exposure. No significant difference was present between the two silver dressings.

Conclusion: Silver dressings created using silver sputtering and electroless autocatalytic techniques possess similar early bactericidal activity. This allows the clinician to choose the appropriate dressing based on other characteristics such as moisture management, staining, and stretch and conformability suitable for each specific need without concern for initial antimicrobial capabilities.

[1] [abstract]. In: Proceedings of the John A. Boswick Burn and Wound Care Symposium; 2009 Feb 16-20; Maui, HI. p. 61-62.