A Novel Activated-zinc Antiseptic Solution Effective Against *Staphylococcus aureus* and *Pseudomonas aeruginosa* in a Pig Model

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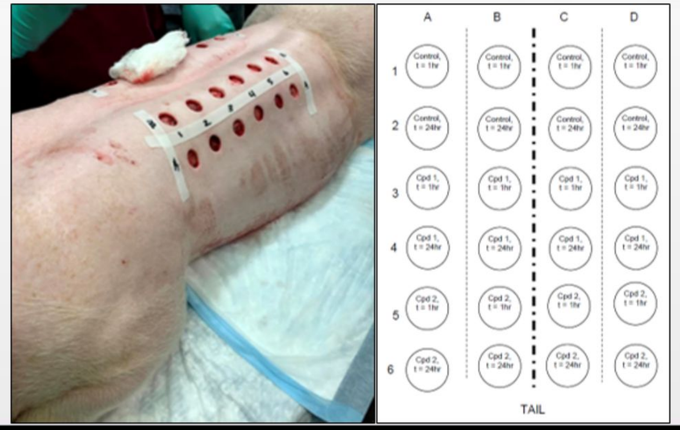
Background

- Over 300,000 US Surgical Site Infections (SSIs) annually
- 10,000 Periprosthetic Joint Infections annually in US
- 600,000-900,000 fracture infections
- Chronic wounds affect 6.5 million Americans
- Infection in vascular surgical grafts 0.5-6.0%
- Implant infection after breast reconstruction 1-16%

- Debridement and irrigation using multiple irrigating solutions has been the first-line of infected prosthetic/graft/implant management
- Identifying the optimal irrigation agent remains challenging as there is limited data on superiority

Methods

- Twenty-four 1.5cm wounds were created on the back of a Yorkshire-cross pig (Figure Right)
- Wounds were inoculated with Pseudomonas and S. aureus, simulating surgical wound contamination
- 8 control wounds (inoculum without treatment)
- 8 treated with activated-zinc #1 formulation 15 minutes post-inoculation
- 8 with activated-zinc #2 formulation 15 minutes post inoculation
- Punch biopsies were taken 1 hour after treatment and bacteria quantified
- Wound necrosis/neutrophil infiltrate was measured 24-hours post-exposure by blinded veterinary pathologist



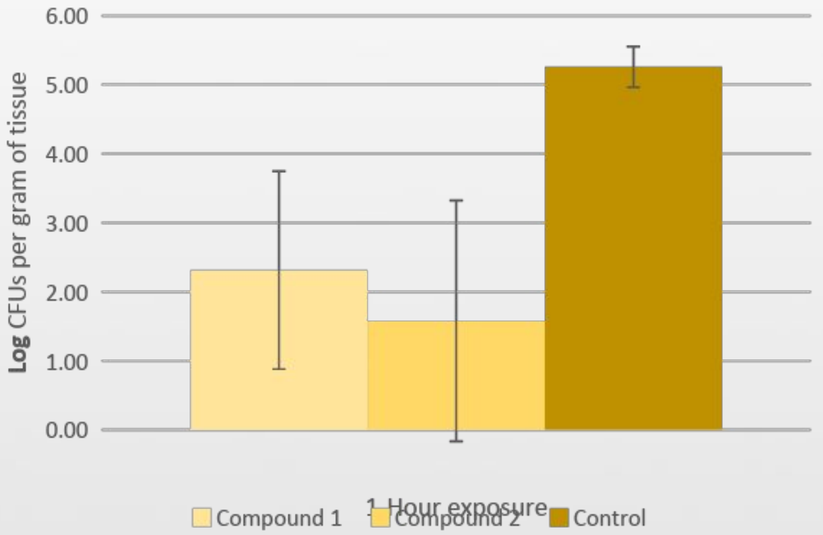
Results

- 3.0-3.7 log (99.9 - 99.98%)(p=0.009) reduction of S. aureus
- 5.1-5.45 log (99.999 - 100%)(p=0.000) reduction of Pseudomonas
- Statistically significant reductions against the most common pathogenic bacteria
- Treated wounds (formulations 1 & 2) were scored the same as non-treated controls for necrosis and inflammatory infiltrate.

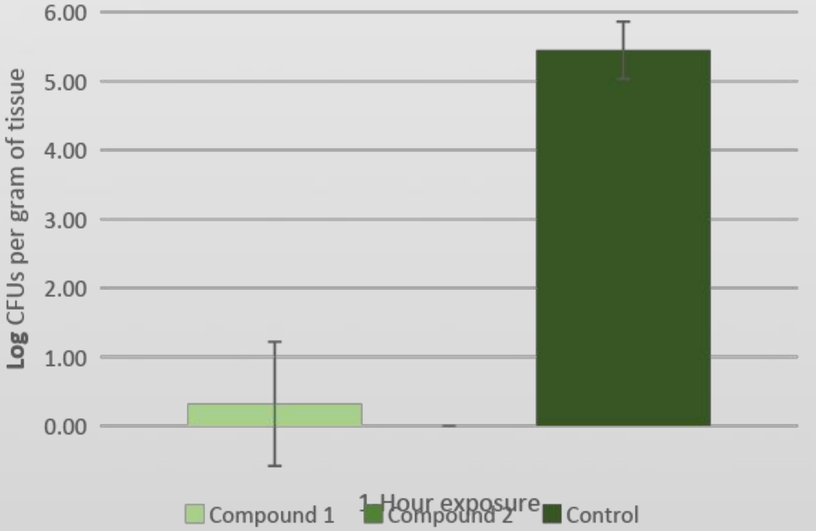
Discussion

- Our novel activated-zinc compound demonstrated:
- 99.9 - 99.98% reduction in S. aureus
- 100% eradication of Pseudomonas 1 hour after exposure
- $ZnCl_2$ has been well reported to promote innate wound healing while maintaining antibacterial properties
- A synergistic $ZnCl_2/NaClO_2$ solution obviates chlorhexidine and povidone-iodine cytotoxicity at the concentrations evaluated in this study.

Recoverable Log CFUs of *S. aureus*



Recoverable Log CFUs of *P. aeruginosa*



This study was performed at Bridge PTS, San Antonio, TX