Evaluation of CHG Compatibility of Skin Care Products in an *Ex Vivo* Porcine Dermal Model

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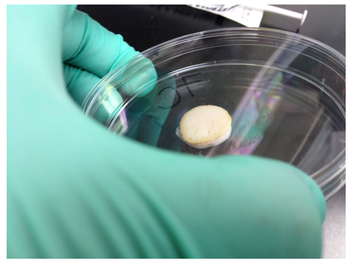
Background

The use of preventative measures to reduce healthcare-associated infections, including the use of the antimicrobial chlorhexidene gluconate (CHG)[1], is becoming more widespread. It is known that under certain circumstances, commonly used components of skin care products can reduce the antimicrobial effectiveness of CHG[2-5]. Although review of ingredients has been recommended, this does not provide definitive guidance for the clinician. Therefore, an *ex vivo* porcine skin model was used at an independent microbiology laboratory to test the CHG compatibility of three skin care products using methods that simulated clinical usage while allowing assessment of CHG antimicrobial activity.

Methods

Skin model. Porcine skin was selected as a model for human skin, based on anatomical similarities[6]. Pig dorsal skin was harvested post mortem then disinfected with betadine and 70% isopropyl alcohol. Full thickness, 2cm diameter skin samples were cut and frozen at -20ºC prior to the experiment, for which they were aseptically thawed and pre-warmed to 37ºC.



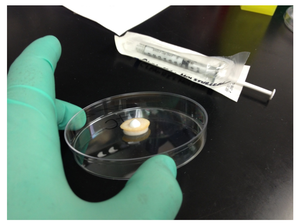
Inoculum. Prior to the experiment, gram positive *Staphylococcus epidermidis* (CNS) and gram negative *Pseudomonas aeruginosa* (Pig isolate) were cultured separately and then combined to yield a Tryptic Soy Broth (TSB) suspension. On the morning of experiment, the organisms were diluted to a final density of approximately 10^7 colony forming units (CFU)/mL in Phosphate-buffered saline (PBS). An aliquot of the suspension was reserved to determine the initial number of bacteria for inoculation.

Methods (cont.)

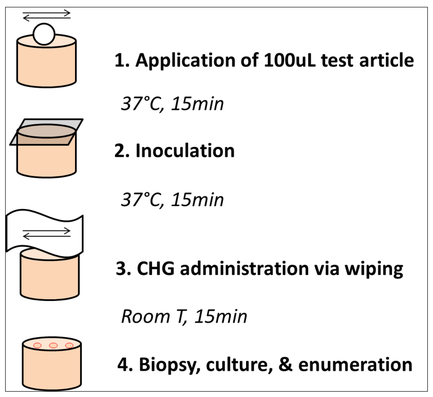
Test & Control Articles.
Restore DimethiCreme (Hollister Incorporated)
Restore Skin Conditioning Crème (Hollister Incorporated)
Restore Cleanser & Moisturizer (Hollister Incorporated)
Sterile PBS served as a negative control.

Study Design. For each experimental test article or control, 3 skin samples were used per treatment group.

1. Test articles Restore Dimethicreme, Skin Conditioning Crème, and control saline were rubbed into the using a circular motion with sterile gloved fingers for 30s. 10 mL of Restore Cleanser & Moisturizer was delivered to the skin & wiped across the skin using sterile gauze in a circular motion, then removed with a 2nd sterile gauze within 30s. These methods simulated clinical usage.



2. Samples were incubated 15min at 37ºC, inoculated with 100µL of the polymicrobial TSB suspension, then incubated another 15 minutes at 37ºC.
3. The surface was wiped with 2% CHG (Sage 2% CHG Cloth, 7-1/2" x 7-1/2") in a circular motion for 30s.
4. Following 15min at room temp, 3 4-mm biopsies were harvested from the contaminated skin sample & placed into neutralization buffer.



5. Samples were homogenized in neutralization buffer, homogenized and drop-plated (unpooled) on tryptic soy agar, mannitol salts agar (MSA), and Pseudomonas isolation agar (PIA) to evaluate the total number of bacteria on the skin surface in the control and treated samples at 24h.

Results & Conclusions

Initial inoculation levels. *P. aeruginosa*: 1.7 x 10^8CFU/mL
S. epidermidis: 2.8 x 10^8CFU/mL

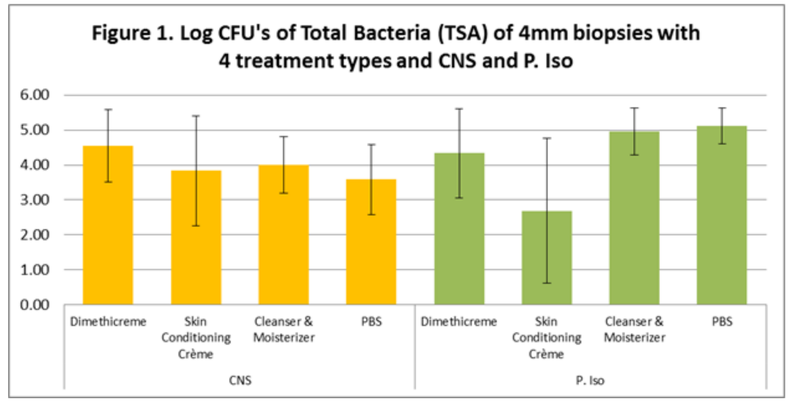


Figure 1. Total bacterial counts showed a lack of interference with the antimicrobial activity of 2% CHG.

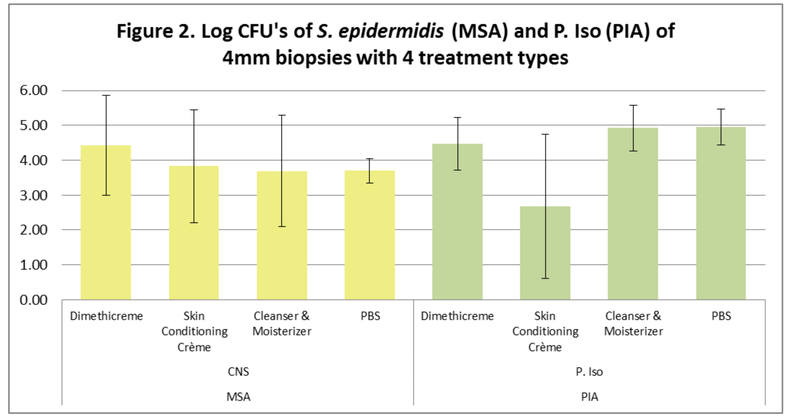


Figure 2. *S. epidermidis* & *P. aeruginosa* counts showed a lack of interference with the antimicrobial activity of 2% CHG.

The dimethicone cream, skin conditioning cream, & skin cleanser/moisturizer products in this *in vitro* study did not reduce the antimicrobial effectiveness of 2% CHG cloths.

References

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