

Assessment of synergistic treatments using wound solutions and antimicrobial gels to evaluate the degree of inactivation of microbial colonies.



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BACKGROUND

Microbial colonies in wounds create substantial therapeutic challenges by forming protective extracellular matrices that dramatically complicates wound healing. Some wound cleansing solutions with antimicrobial preservatives can provide microbial colony disruption on an immediate basis, while antimicrobial gels offer the potential of prolonged germ removal efficacy.

This study addresses how synergistic combination therapy with sequential applications of antimicrobial preserved wound solutions and antimicrobial gels can overcome potentially work alone or together, and enhance clinical outcomes.

METHOD

A 48-hour age *P. aeruginosa* AATCC 15442 colony was established on a wounded porcine explant model, then submerged in *Hypochlorous acid solution or Saline for 10 minutes before being placed into a *Poloxamer gel, a *Hypochlorous acid gel or Saline for a further 4 hours. Also, samples were placed in a Hypochlorous acid gel for 10 minutes, then in Saline for 4 hours. Samples were then neutralized for 5 minutes, sonicated for 30 minutes, and enumerated to determine CFU/cm². A log₁₀ reduction value was calculated from an untreated 48-hour control.

*:Vashe® wound solution: Hypochlorous acid solution; Vashe®gel: Hypochlorous acid gel; revyve™ gel: Poloxamer gel.

METHOD

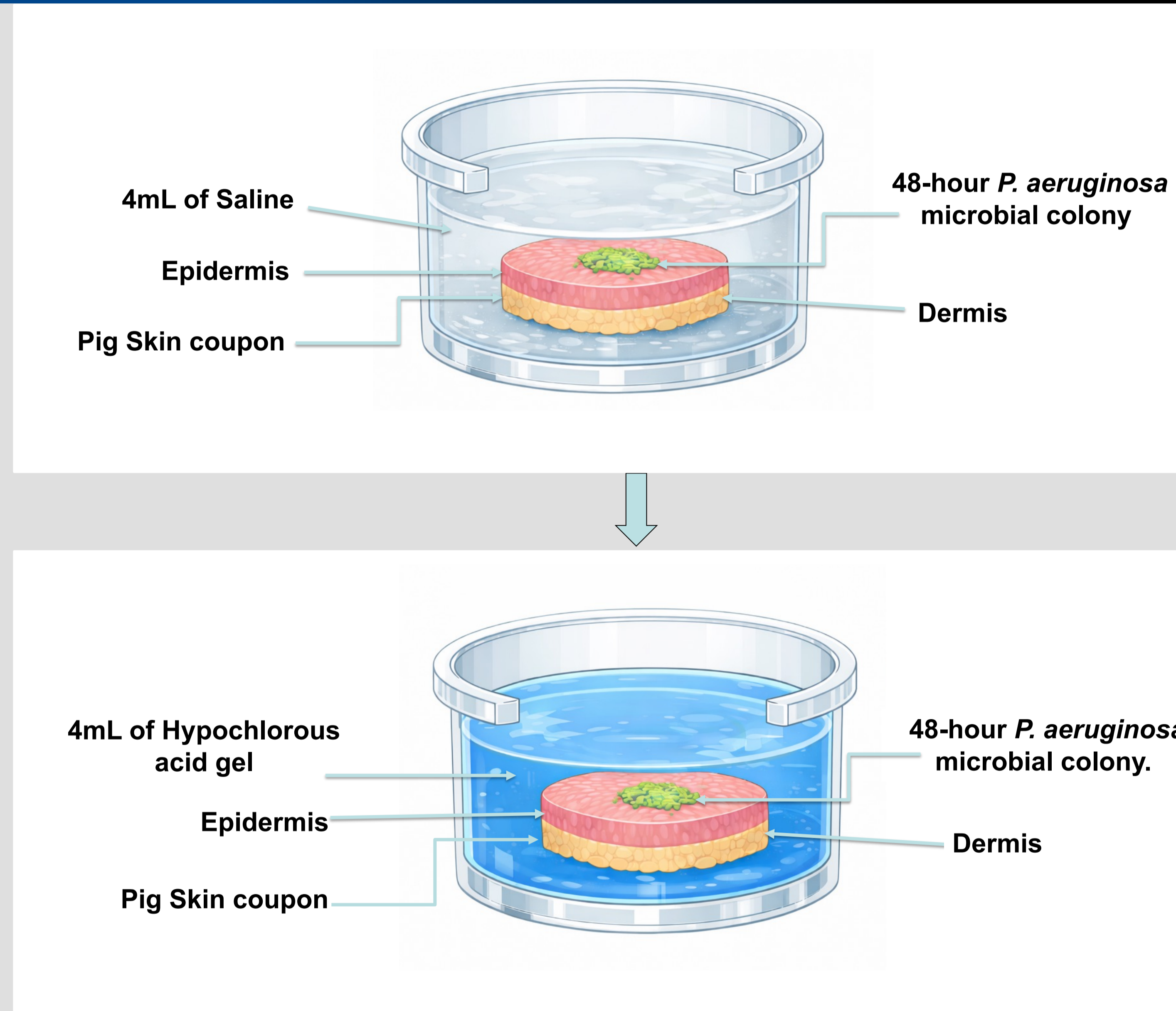


Figure 1. Schematic demonstrating the methodology set up of pig skin sample, with a 48-hour *P. aeruginosa* colony in place first placed into Saline for 10 minutes and then placed into hypochlorous acid gel for 4 hours.

DISCUSSION

Improved activity was observed for Hypochlorous acid solution and Saline, which produced a 3.59 log₁₀ reduction. A combination of Saline followed by Hypochlorous acid gel achieved a >4 log₁₀ reduction. The most successful synergistic treatment was the use of Hypochlorous acid solution followed by Hypochlorous acid antimicrobial gel which demonstrated a >6 log₁₀ reduction. The poloxamer gel demonstrated lower germ colony inactivation, achieving <2 log₁₀ reduction.

RESULTS

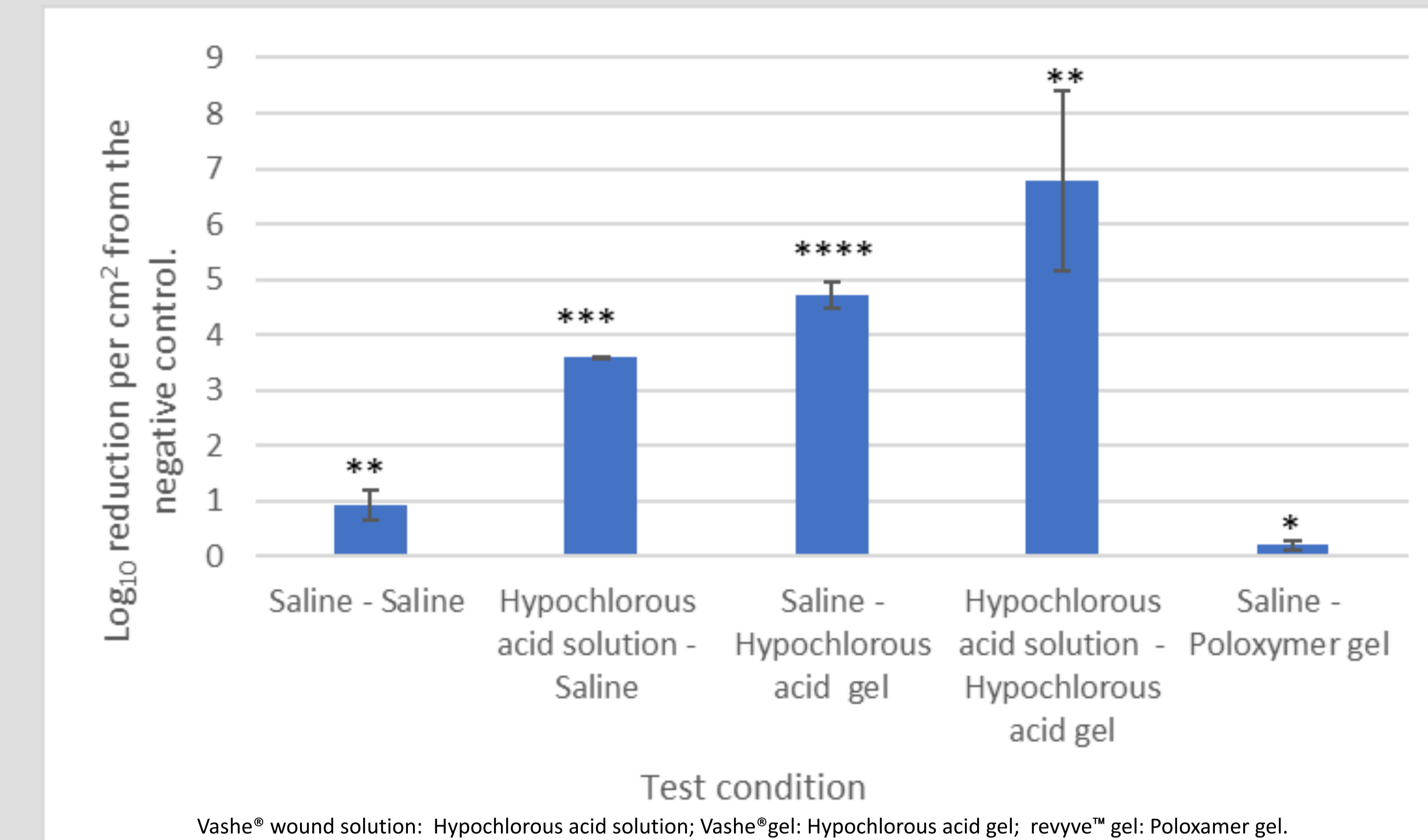


Figure 2. Log₁₀ reduction (Log₁₀ CFU/cm²) of 48-hour *P. aeruginosa* colonized porcine explant soaked in Saline or Hypochlorous acid for 10 minutes before being placed into Saline (control), Hypochlorous acid gel or poloxamer gel for 4 hours. Significance levels: **p*<0.05, ***p*<0.01, ****p*<0.001, *****p*<0.0001. Student's t-test comparing to the untreated control.

CONCLUSIONS

The results suggest there is a synergistic or additive effect between the Hypochlorous acid antimicrobial solution and Hypochlorous acid antimicrobial gel in the inactivation of mature colonies of germs within a wounded pig skin model.

ACKNOWLEDGEMENTS

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