

Reduction of Planktonic and Biofilm Bacteria in Pig Skin Explant Model by Topical LAE Formulation

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Introduction

Bacterial biofilms have been found in over 80% of chronic wounds and recent consensus guidelines recommend assuming biofilms are present in all chronic wounds.¹ Bacterial biofilm are typically found beneath the surface of chronic wounds and on the surface of wound beds.² We evaluated the effects of 1% and 5% formulations containing lauryl arginate ethyl ester (LAE) on killing planktonic bacteria and mature biofilms of bacteria grown on an ex vivo model of chronic skin wounds.

Methods

Sterile porcine skin explants with deep partial thickness wounds were inoculated with 50ul of *Pseudomonas aeruginosa* (PA01) or *Staphylococcus aureus* (SA113) suspension culture containing 4×10^6 CFU then incubated at 37°C for 30 min followed by exposure to one of four treatments (*PBS, Vehicle gel, 5% LAE gel and 1% LAE gel*). Total bacterial CFU was measured after 24 and 48 hours of incubation at 37°C. Inoculated explants were cultured for 3 days at 37°C to develop mature biofilms then wiped with sterile gauze and exposed to the same four treatments. Total biofilm bacterial CFU were measured after 1, 2, and 3 days of exposure.

Hypothesis

1% and 5% LAE could prevent biofilm formation and planktonic bacteria.

Results

- 5% LAE formulation completely killed PA01 and SA planktonic bacteria on pig skin explants.
- Compared to the PBS treatment, the 1% LAE of both PA01 and SA bacteria only reduced the levels ~2-logs after 1, 2 and 3 days.
- 5% and 1% LAE completely killed the biofilm of PA01 bacteria since the 1st day of treatment.
- 5% LAE formulation reduced the biofilms of SA113 ~2-logs after the 1st day and completely killed the biofilms on the 2nd and 3rd days.
- After the 1st day 1% LAE formulation reduced the biofilms of SA113 ~1-log and completely killed them on the 2nd and 3rd days.

Conclusion

The 5% LAE formulation completely kills both planktonic and biofilm of PA01 and SA113 bacteria, while the 1% LAE formulation is less effective.

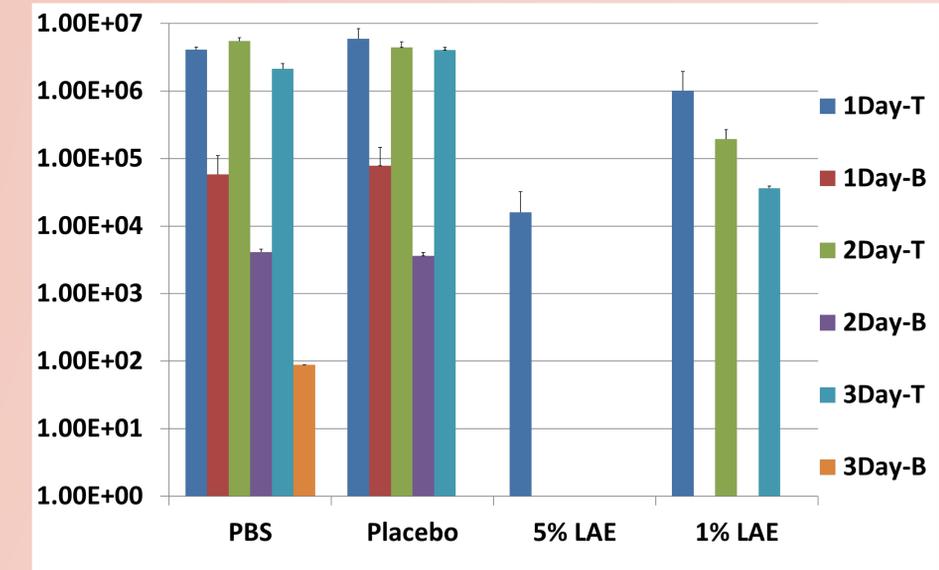


Figure 1. Four treatments for PA01

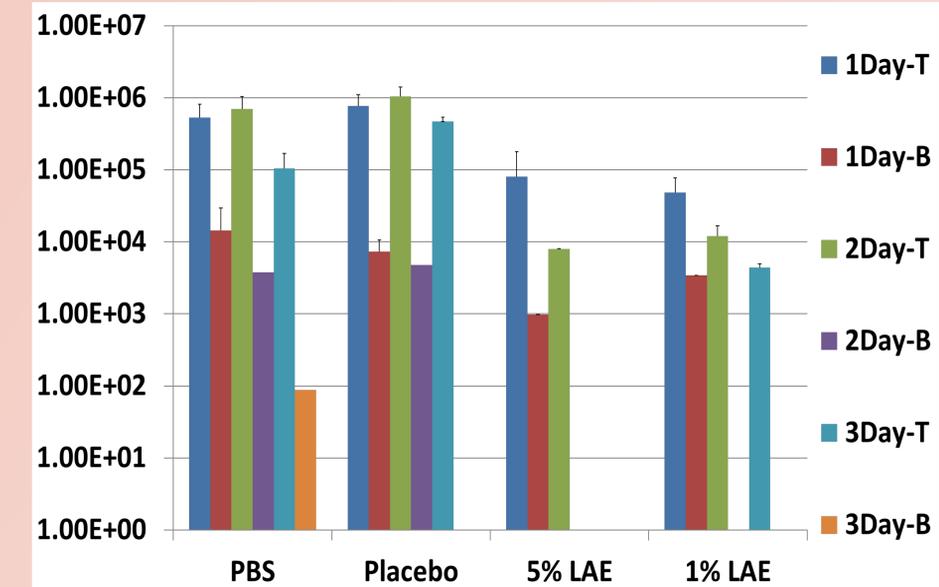


Figure 2. Four treatments for SA113

References

1. G. Schultz et al.. Consensus guidelines for the identification and treatment of biofilms in chronic non-healing wounds, Wound Rep Regen, in press.
2. M. Fazli et al. J Clin Microbiol. Non-random distribution of *Pseudomonas aeruginosa* and *Staphylococcus aureus* in chronic wounds 47:4084-9, 2009