

ORC/Collagen Matrix Containing Silver Controls Bacterial Bioburden while Retaining Dermal Cell Viability

Dr. Breda Cullen, Claire Boyle, Tracy Rennison, Yvonne Webb, Sarah Gregory
J&J Wound Management, Gargrave, U.K.

Abstract

It is generally accepted that all chronic wounds are colonized with bacteria, however not all of these are infected and treatment with antimicrobials alone does not facilitate healing. Historically, silver containing therapies have been used as topical antimicrobials to help manage bioburden. Silver is a broad spectrum antimicrobial with minimal resistance issues, however it may not yield optimal wound repair due to its cytotoxic effect on host cells. While it is essential to treat with an antimicrobial when clinical infection is obvious, it is difficult to determine appropriate treatment when the clinical signs are questionable. In these cases, a therapy, which addresses bioburden and retains cell viability, could help reduce the incidence of wound infection without impacting healing rate.

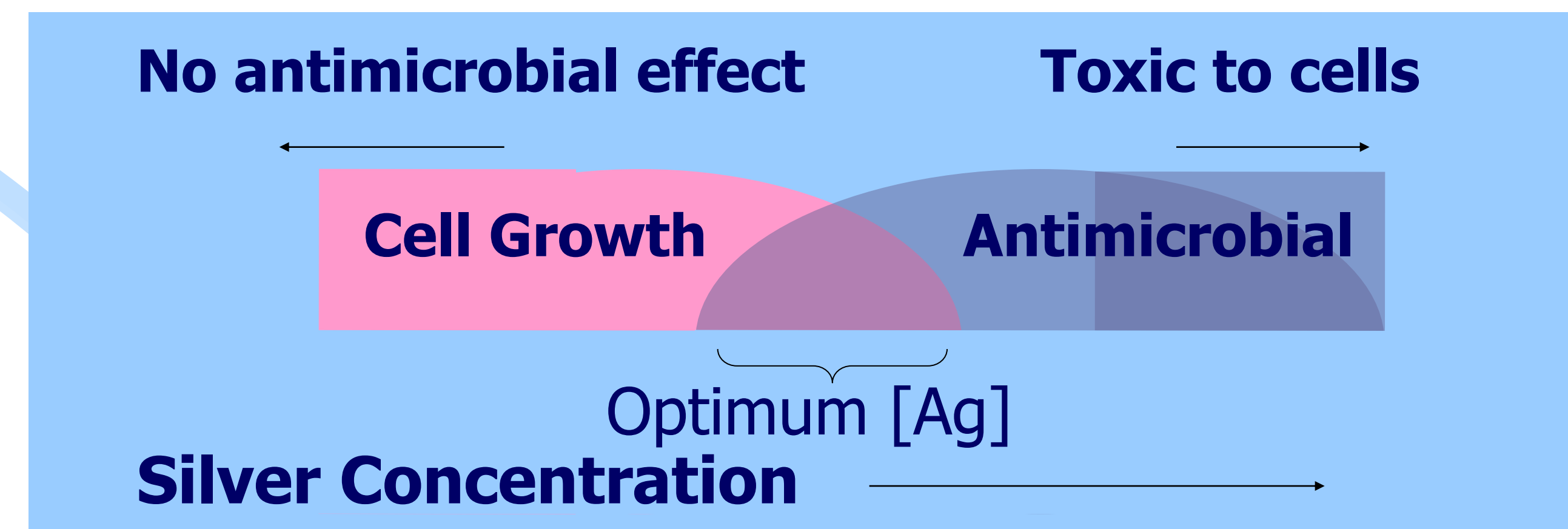
In this study, we investigated the effect of silver on human dermal fibroblasts *in vitro*. Extracts of silver dressings, including ORC/collagen matrix containing silver, were assessed for their effects on cell viability. In addition, antimicrobial efficacy was assessed *in vitro*, using a Log₁₀ reduction assay and confirmed by zone of inhibition testing.

ORC/collagen matrix containing silver was effective against both common wound pathogens, and resistant strains. Furthermore, this dressing also promoted host cell growth, which was in contrast to other silver-releasing dressings tested.

This *in vitro* work suggests that ORC/collagen matrix containing silver is an ideal therapy for difficult to heal wounds when clinical signs of infection are not obvious and level of bacterial bioburden is unknown.

Objectives

- To develop a silver-containing dressing which would have antimicrobial efficacy but also retain the beneficial effects of ORC/Collagen in promoting wound repair
- To compare the effects of silver containing dressings on cell viability & antimicrobial efficacy



Results

- ORC/Collagen matrix containing 1% Silver-ORC (PRISMA*) has been shown to reduce bacterial bioburden
- *In vitro* studies have demonstrated its effectiveness against both common wound pathogens (Graph 1) & resistant bacterial strains such as clinical isolates of VRE & MRSA (Graph 2)
- In contrast to other silver containing dressings ORC/Collagen matrix containing 1% Silver-ORC also enhanced dermal cell growth (Graph 3), stimulating both human dermal fibroblasts & human endothelial cells *in vitro* (Graph 4)

Methods

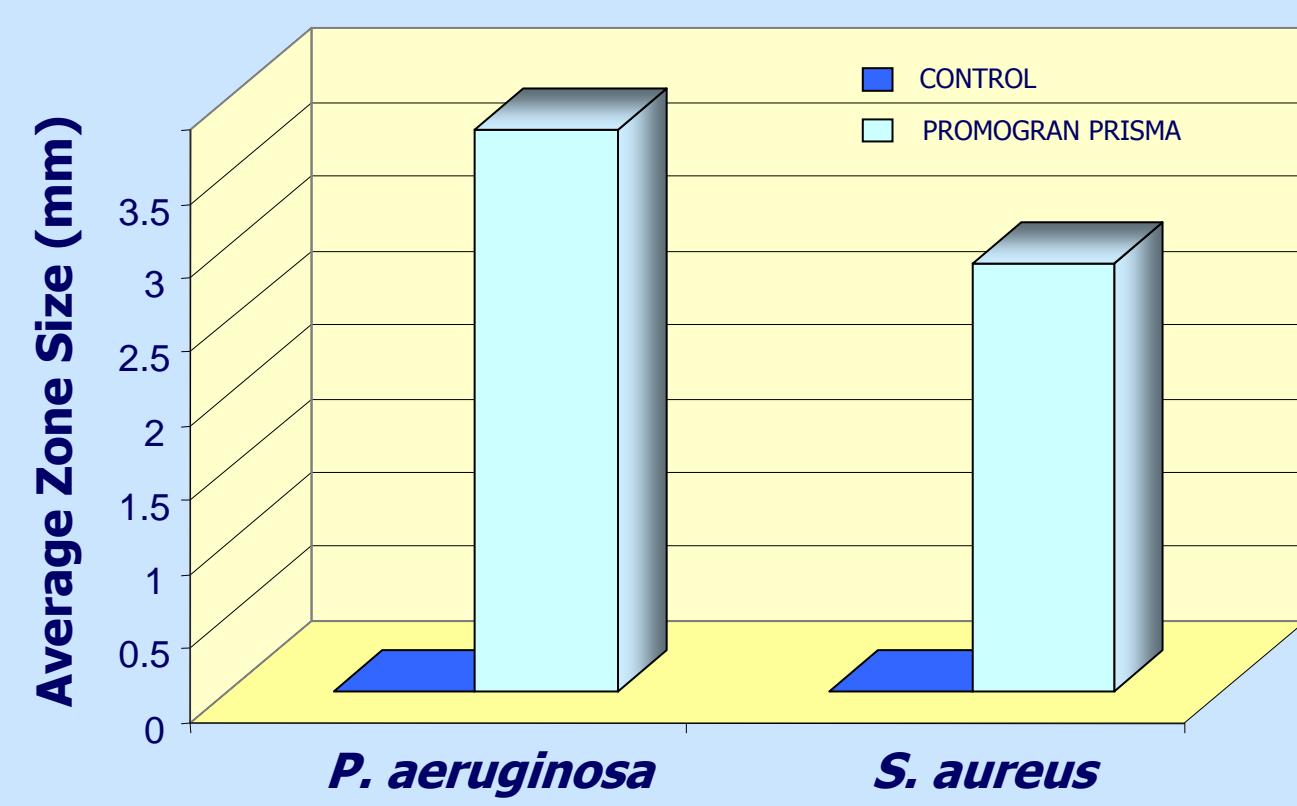
Cell viability was assessed *in vitro* by cell proliferation

- Human dermal fibroblasts
- Human endothelial cells

Antimicrobial efficacy assessed *in vitro*

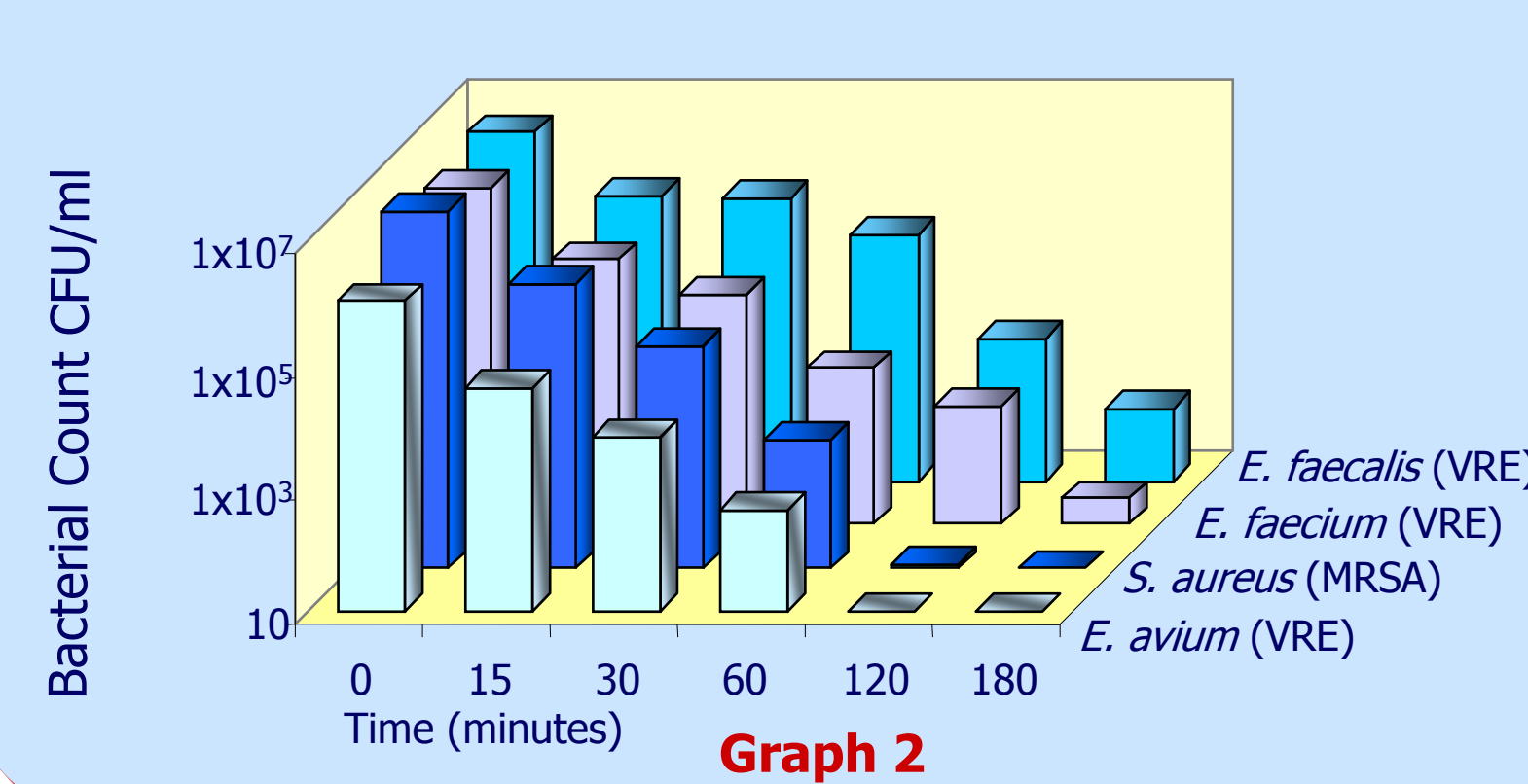
- Log₁₀ reduction assay
- Zone of inhibition

PRISMA* Effective Against Common Wound Pathogens



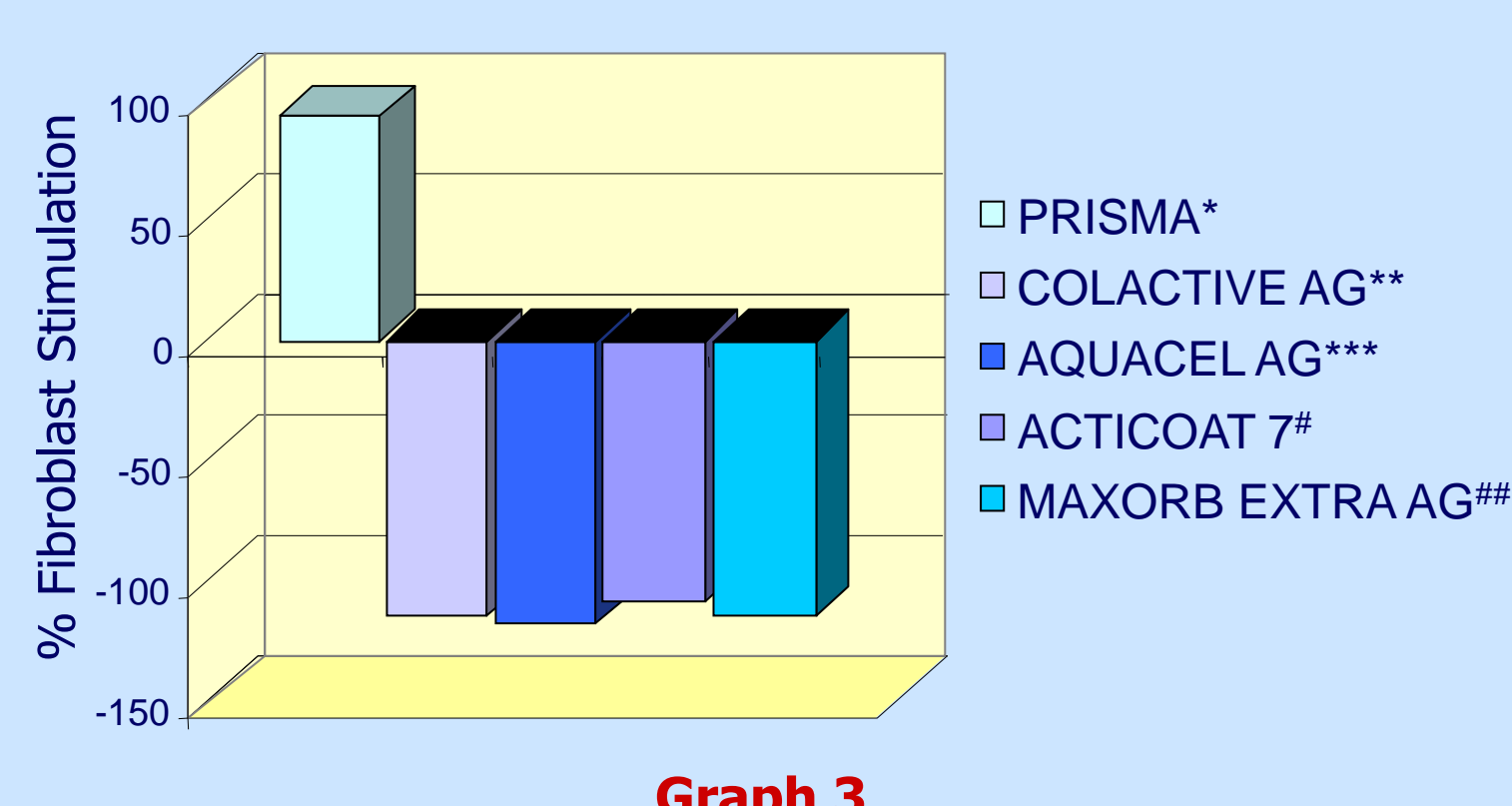
Graph 1

PRISMA* Effective Against Resistant Bacterial Strains



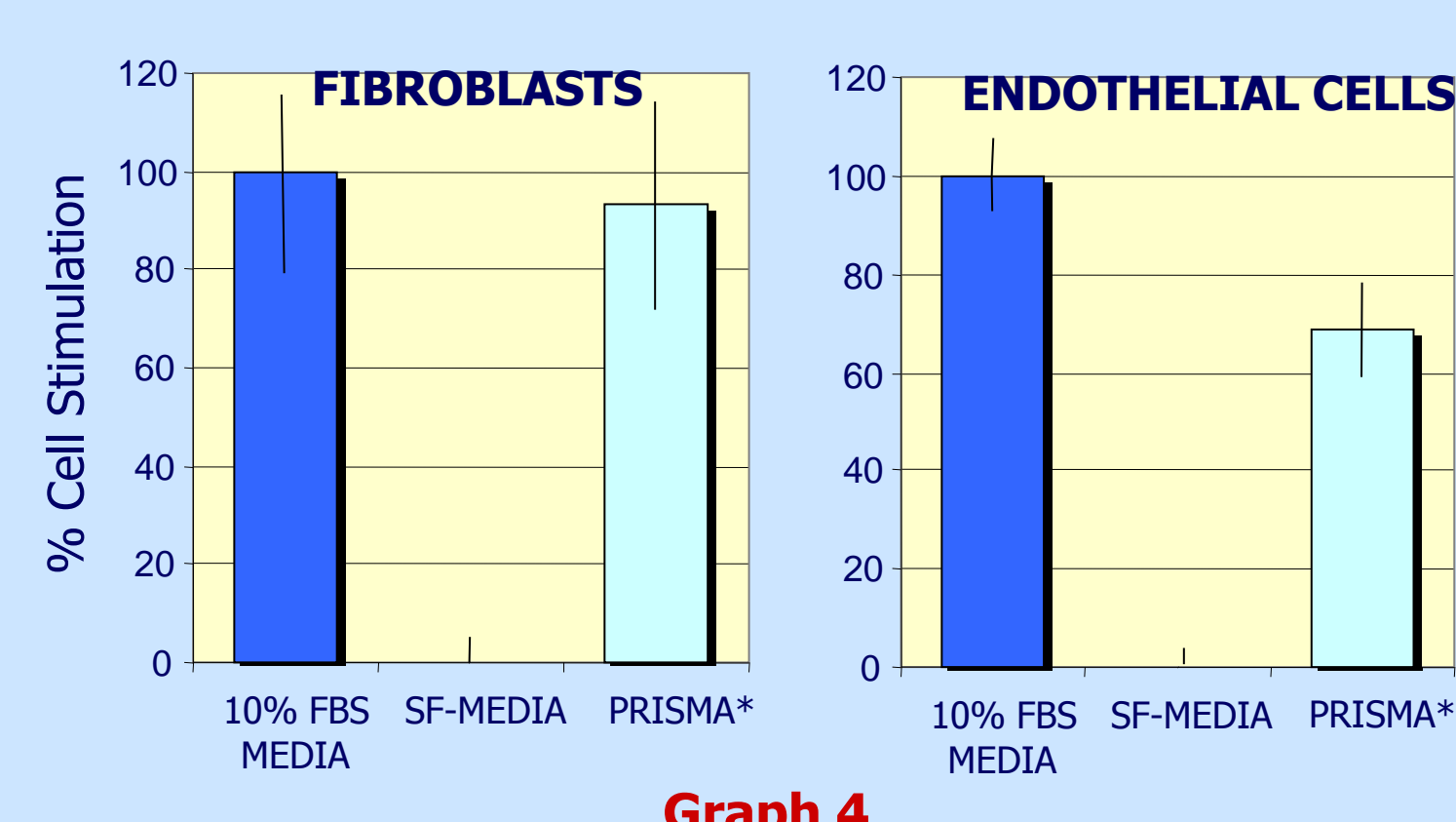
Graph 2

Effect of Silver Dressings on Fibroblast Proliferation

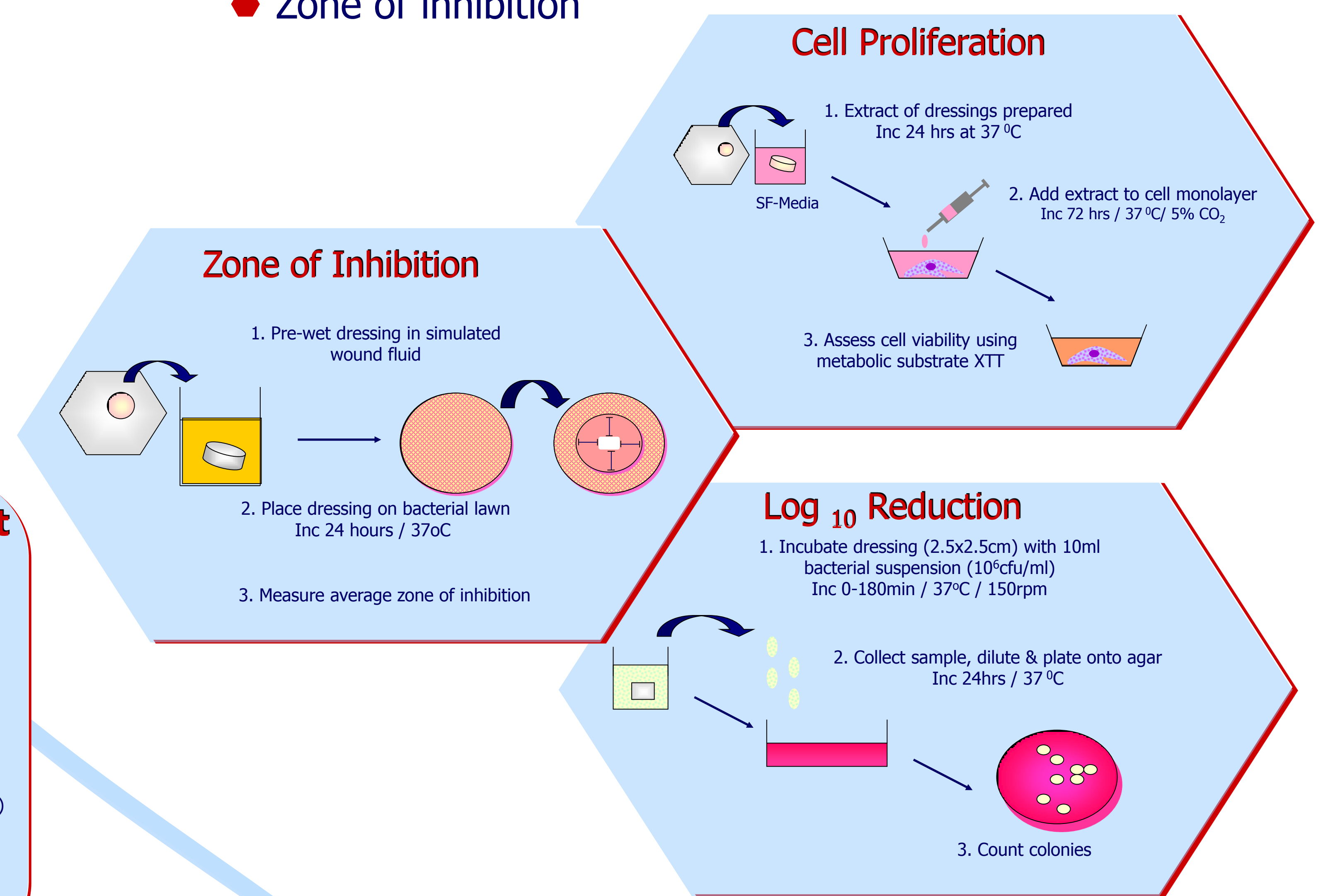


Graph 3

Effect of PRISMA on Cell Growth



Graph 4



Conclusions

- Topical antimicrobials are used to reduce the risk of infection however they can be detrimental to healing – ORC/Collagen + 1% Silver-ORC overcomes this anomaly
- These *in vitro* results suggest that ORC/Collagen + 1% Silver-ORC controls bacterial bioburden while retaining cell viability
- This suggests that ORC/Collagen + 1% Silver-ORC is ideal for 'suspect wounds' since it incorporates an ability to reduce risk of infection while also promoting healing

PRISMA*-Trademark of Johnson & Johnson Wound Management, a division of ETHICON, INC, NJ, USA.
Acticoat7# - Trademark of Smith & Nephew
Aquacel Ag***- Trademarks of E R Squibb & Sons inc and related companies
ColActive Ag** -Trademark of Hartmann Conco Inc.
Maxorb Extra Ag## - Trademark of Medline Industries Inc.