

VOX PORCINE WOUND HEALING STUDY

2-LOG REDUCTION IN BIOBURDEN

Effects of Combined Negative Pressure Wound Therapy and Topical Oxygen on Bioburden and Tissue Healing in a Porcine Model. L. Lavery DPM, A. Killeen DPM, M. Wright-Carter DVM, University of Texas Rio Grande Valley. Poster presented at SAWC Spring 2024; manuscript submitted for publication.

STUDY OBSERVATIONS

Rapid Bioburden Reduction: 2-log reduction in *S. aureus* by Day 7 with combined therapy (vs. minimal change with NPWT alone), that was sustained through day 28.

Enhanced Tissue Quality: Sustained angiogenesis (Factor VIII) and progressive collagen maturation (Masson's trichrome scores 3-4).

Consistent Contraction: All combined therapy wounds achieved $\geq 50\%$ area reduction by Day 11, demonstrating reliable early healing response.



Decrease in Bacterial
Burden by Day 7



Increased Microvascular
Density & Collagen



Max Wound Area Reduction
by Day 28

CONCLUSION & RECOMMENDATION

Combined NPWT + Topical Oxygen is a promising strategy for contaminated or hypoxic wounds. In this porcine model, it effectively **reduced bioburden** and supported **angiogenesis & collagen organization**.

Preclinical porcine data from a combined NPWT + topical oxygen prototype; presented as a poster at SAWC, Spring 2024; manuscript submitted for publication. Animal results may not predict human outcomes. 510(k) pending.

MECHANISMS & BENEFITS

HOW COMBINED THERAPY WORKS

THE SYNERGISTIC EFFECT

NPWT optimizes mechanics & fluid dynamics while TOT fuels metabolic repair. Together they enhance bacterial clearance and matrix organization beyond either modality alone.

NEGATIVE PRESSURE (NPWT)

Promotes macro/micro-deformation.
Removes exudate/edema, improves perfusion gradients (-125 mmHg).



TOPICAL OXYGEN (TOT)

Corrects local hypoxia. Supports ATP production, collagen synthesis, angiogenesis, and ROS-mediated bacterial killing.

STUDY OVERVIEW (28-DAY PILOT)



Model Design

4 Yorkshire-cross pigs, 8 standardized 5-cm full-thickness dorsal wounds.



Therapies Tested

NPWT Alone vs. Combined NPWT + Topical Oxygen (various cycles).



Infection Arm

Inoculated with 1×10^6 CFU/mL *S. aureus* under occlusion pre-therapy.



Key Endpoint

16S rRNA Bioburden.

KEY OBSERVATIONS SUMMARY

DECREASED BIOBURDEN

Combined therapy showed rapid bioburden reduction vs. minimal change with standard NPWT in contaminated wounds.

IMPROVED TISSUE QUALITY

Histology revealed enhanced angiogenesis and more mature collagen architecture in combined therapy groups.

