



## CASE STUDY

# Case Study: Controlling the Wound Environment

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## Introduction

Effective wound management is crucial to ensure optimal healing, minimize complications, and improve patient outcomes. This case study focuses on the importance of controlling the wound environment, particularly in the context of managing bioburden, pH levels, moisture balance, and scar formation. Influencing the wound environment plays a pivotal role on wound responses, dressings and advanced therapies, time to heal, and ultimately, the healed outcome. Highlighted within this article are the special capabilities of a product using XBIO™ technology, and the significance of biofilm focused wound care.

## Importance of Controlling the Wound Environment

### Bioburden Control

Uncontrolled bioburden, which includes bacteria, fungi, and other microorganisms, can lead to infections, delayed healing, and increased risk of scarring. Proper wound management includes debridement, effective antimicrobial treatments, biofilm management, and maintaining a clean wound environment to prevent infection, encourage organized collagen deposition, and promote healing.

### pH Levels

The pH of the wound environment significantly affects the healing process. An optimal pH, usually slightly acidic, can promote enzymatic activity necessary for tissue repair

and reduce bacterial growth. Disruption in pH balance can lead to increased inflammation, slower healing, and exuberant scar formation. Awareness of the wound microenvironment especially with regard to modulating wound pH is an important aspect of appropriate use of different dressings and the use of advanced modalities such as skin substitutes.

### Moisture Balance

Maintaining appropriate moisture balance is essential for wound healing. A moist wound environment can accelerate the healing process by promoting cell migration and reducing the risk of dehydration and scab formation. However, unbalanced, or prolonged excessive moisture can lead to maceration and delayed healing.

### Biofilm Formation

Biofilms, complex communities of microorganisms, are present in over 90% of non-healing wounds. Biofilm can create a barrier to healing, contributing to chronic inflammation which is a leading cause of stalled healing, and can lead to infection. Managing biofilm is critical to reduce bioburden, prevent wound exacerbation, and support effective healing methodologies and eventual healing. Signs and symptoms of inflammation caused by

tissue invasion of micro-organisms define the presence of wound infection.

## Special Capabilities of X BIO Technology and BLASTX®

### BLASTX

BLASTX Antimicrobial Wound Gel uses X BIO technology that addresses several aspects of wound management:

**Antimicrobial Action:** X BIO technology helps reduce bioburden by targeting and eliminating bacteria within the wound.

**Biofilm Disruption:** X BIO technology deconstructs the biofilm super structure by removing the metallic bonds. Disrupting the ability of the structure to protect hidden pathogens and through proprietary processes, X BIO destroys the pathogens preventing bacterial attachment and reformation of the biofilm eliminating microbes within the gel, promoting a cleaner wound bed.

**Moisture Regulation:** The gel formulation helps maintain optimal moisture levels, allowing nutrient and oxygen transfer, preventing maceration, and supporting a healing environment.

**Scar Management:** The gel formulation helps in managing and reducing the appearance of scars, by reducing inflammation and the bioburden that stimulates disorganized and slow healing.

Effective wound management extends beyond healing to address scar formation and minimize long-term aesthetic and functional impairments. Key considerations include:

### Microbiome and Scar Formation

Research indicates that microbiome dysbiosis, particularly *S. aureus* colonization, plays a significant role in hypertrophic scar formation (Yu et al., 2023). Maintaining a balanced microbiome can thus be crucial in managing scars.

### Necrotizing Soft Tissue Infections

Infections, such as those seen in necrotizing soft tissue infections, can exacerbate scar formation. Proper wound care and infection control are vital to minimize scarring (Mount Sinai, 2024).

### General Scar Management Strategies

Comprehensive scar management involves multiple strategies, including appropriate wound care, infection control, and the use of products designed to minimize scar tissue formation (OrthoBethesda, 2024).

## Conclusion

Controlling the wound environment is critical for effective healing and minimizing complications. Technologies like X BIO and products like BLASTX offer advanced solutions for managing bioburden, pH, moisture, and biofilms, ultimately supporting better healing outcomes and scar management. By understanding and implementing these strategies, healthcare providers can significantly improve patient care and recovery in wound management.

## Acknowledgments

None

## Ethical Consideration

None

## Conflicts of Interest

None

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## Illustrations/Supplementary Data

Visual representations of wound progression, combined with the application of BLASTX in each patient's case, highlight BLASTX's effectiveness in enhancing healing outcomes and improving scar management.

## CASE REPORTS-(1/4)

65 yo diabetic with flap necrosis s/p removal of exostosis from base of 5<sup>th</sup> MT



Post-debridement, NPWT started



BlastX started (just available on market)



Healed 16 days later

1

**61-year-old female who sustained a dog bite to her left foot 7/25/20. Initially the patient attempted self-care at home but developed an infection at the site. On day four, she was admitted to the Emergency Department (ED) for urgent care of her wound 7/29/20.**

Past medical history (PMH):

- HIV
- drug abuse
- hypertension (HTN)
- myocardial infarction (MI)
- superficial vein thrombosis

Past surgical history (PSH):

- L foot bunionectomy (2011) [location of current injury]

Multiple medications including methadone, gabapentin, lisinopril, prazosin, trazodone, and others



8/10/20 (10 days post surg debridement)



8/26/20 SurgX applied



9/17/20



Healed: 10/22/20

2

## BLASTX Wound Care Results



Before



After

- 10 weeks between pictures
- 63-year-old male
- History of diabetes mellitus and peripheral artery disease
- Necrotizing cellulitis and deep abscess

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11 days post Blastx treatment



PIC-COLLAGEN



Dressing was tenting above the wound; bolstered and hyper granulation was resolved.

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