

# Using Objective Measurements to Evaluate Reduction in Inflammation and Bioburden Response to Application of a Fibrous Silver Oxysalt Dressing

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## Purpose/Objective:

Bioburden wound management is often accomplished using an antimicrobial agent. One of the most popular agents, silver, is available in several chemical and physical forms – each of which affects biocidal and biofilm disruption activity. Fibrous silver oxysalt dressings (FSOD) have demonstrated decreased bioburden via lower bioburden assessment tool scores<sup>1</sup> and wound surface area reductions in unblinded case series<sup>1,2</sup> reports. It is unknown how, if at all, FSODs impact inflammation.

## Methods:

Ten certified wound nurses (CWNs), blinded to the topical agent used, evaluated standard and wound thermography serial photographs of wounds with different etiologies receiving a FSOD\* over a two-week period. Bioburden is determined using the visual Bioburden Assessment Tool<sup>3</sup> (BAT) (Figure 1 and 2). Wound thermography evaluations, a direct measure of wound bed and peri-wound inflammation<sup>4</sup>, are done concurrently.

## Results:

CWNs are able to objectively determine responses to a fibrous silver oxysalt dressing application in a variety of wounds using wound thermography and standard wound photos using a bioburden assessment tool.

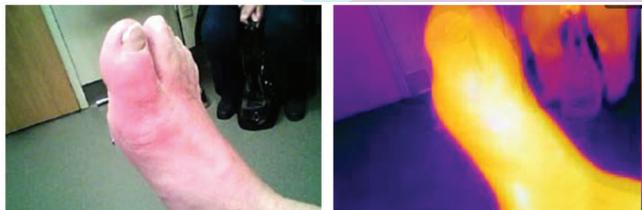
Wound assessment tools that require reliance on the clinician's visual interpretation of wound health may be inaccurate, or at the very least may be need to be redefined, as technology adds to wound management knowledge base.

## Understanding Infrared Thermography

Since 1972, there has been interest in using infrared thermography in wound management. As technology improved, there is strong supporting literature that supports the following:

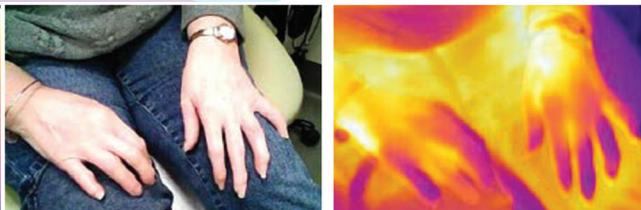
- Use of infrared thermography in wound care is a viable option to measure inflammation
- Infrared thermography has reliability and validity
- Infected and colonized wounds have increased temperature

Test Patient #1



65 year old male with gout. Knowing that inflammation creates heat, where is this patient most likely to have a gout flare?

Test Patient #2



72 year old female with Raynaud's disease. Knowing that the lighter the color on the image, the hotter the surface temperature, where is this patient having symptoms of Raynaud's?

Figure 1 – Bioburden Assessment Tool (BAT)

Group	Signs & Symptoms	Severity	Determination
A	<ul style="list-style-type: none"> <li>• Stalled healing</li> <li>• Friable or bright red granulation tissue</li> <li>• Increasing or changing exudate characteristics</li> <li>• Increasing odor</li> <li>• Local edema</li> <li>• Increasing pain</li> </ul>	Colonized	No signs or symptoms checked from Group A, B or C
B	<ul style="list-style-type: none"> <li>• Increasing periwound induration with erythema</li> <li>• Increasing wound size or new satellite areas</li> <li>• Lymphangitis</li> <li>• General malaise</li> </ul>	Local Infection	2 or more signs/symptoms checked from Group A
C	<ul style="list-style-type: none"> <li>• Fever</li> <li>• Rigors</li> <li>• Chills</li> <li>• Hypotension</li> <li>• Organ failure</li> </ul>	Spreading Infection	2 or more signs/symptoms checked from Group A PLUS 1 or more sign/symptoms checked from Group B
		Systemic Infection	Any sign/symptom checked from Group A and B PLUS 1 or more sign/symptoms checked from Group C

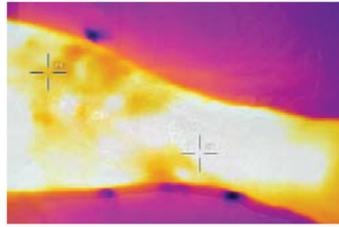
## References

1. Baker M, Vair A, Keast D. Evaluation of silver-impregnated dressings in a clinical setting: observations on efficacy and practicality. Presented at: Edmonton West Primary Care Network, Edmonton, May 2015.
2. Motta G, Merkle D, Milne C, Saucier D. A multi-center prospective clinical evaluation and cost comparison of a new silver oxysalts dressing. Presented at: Wound, Ostomy, Continence Nurses society 44<sup>th</sup> Annual Conference; June 9-13th, Charlotte, North Carolina.
3. Appropriate use of silver dressings in wounds. International Consensus. London: *Wounds International*, 2012.
4. Dini V, Salvo P, Janowska A, Di Francesco F, Barbini A, Romanelli M. Correlation between wound temperature obtained with an infrared camera and clinical wound bed score in venous leg ulcers. *Wounds*. 2015; 27(10): 274-278.

\*KerraCell™ Ag, is a registered Trademark of Crawford Healthcare, Ltd., Doylestown, PA. Costs associated with poster presentation were provided by Crawford Healthcare, LTD.

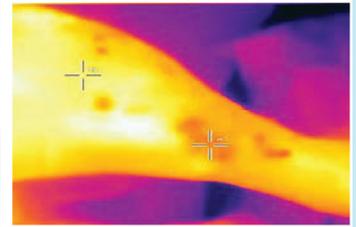
**FSOD – Case History #1:** Venous hypertension with ulceration. Patient had been receiving compression and standard foam dressing for two weeks.

**Case #1 – Initial Presentation**



FSOD applied covered by foam dressing. Area covered by ABD pad prior to reapplying compression. Wound dimensions –Total 15.8 x 12.2 cm<sup>2</sup>. BAT Interpretation = Local Infection. Note area of inflammation.

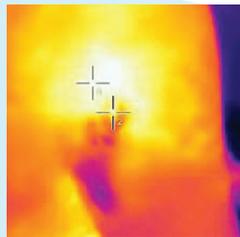
**Case #1 – Week 2**



Wound dimensions –Total 9.1 x 4.2cm<sup>2</sup>. BAT Interpretation = Colonized

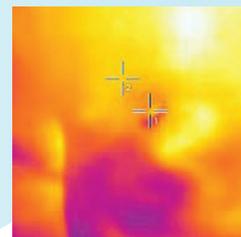
**FSOD – Case History #2:** Middle-aged male experienced infection of inclusion cyst rupture site / Are received I&D and systemic oral antibiotics for two weeks and local wound care with topical silver alginate packing with foam dressing three times a week for 4 weeks. Sent for evaluation of non-healing wound.

**Case #2 – Initial Presentation**



Wound packed with a FSOD and covered with a foam dressing. Wound dimensions 2.1 x 1.5 x 1.2cm with 4.7cm tunnel at 11 o'clock. BAT Interpretation = Local Infection

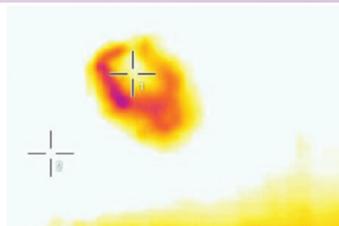
**Case #2 – Week 2**



Wound dimensions 1.2 x 0.7 x 0.8cm with 2.1cm tunnel at 11 o'clock. Bioburden Clinical Interpretation = Local Infection

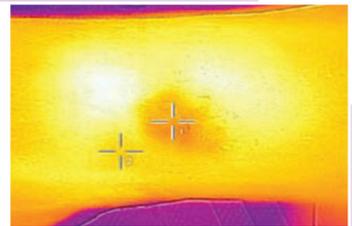
**FSOD – Case History #3:** Vasculitic wound related to CREST syndrome. Patient without changes in systemic medication (systemic steroid and mycophenolate mofetil). Was using silver hydrogel topically daily and covering with non-adherent gauze. Using light compression to treat underlying lymphedema.

**Case #3 – Initial Presentation**



Wound dimensions 1.8 x 2.4x 0.3 cm BAT Interpretation= Local infection. Thermography shows ischemia/early necrosis (purple edges) not detected with routine visualization. FSOD applied and covered with foam dressing

**Case #3 – Week 2**



Wound dimensions 2.2 x 2.4 x 0.2 cm. BAT Interpretation = Local infection. Patient now pain free. Wound dimensions increased reflecting the edge necrosis not visualized at initial presentation.

**Conclusion:**

Fibrous silver oxysalt dressings can impact bioburden, wound bed and peri-wound inflammation when applied over a two-week period. Use of objective measurements, such as wound thermography in conjunction with completion of a bioburden scale can be beneficial to guide topical wound treatment. Further study is warranted.