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## INTRODUCTION

- Chronic wounds frequently stall in the healing process, in part due to elevated bacterial loads that are not reliably detected through standard clinical signs.
- Although fluorescence imaging has improved real-time visualization of bacterial presence, an unexpected imaging pattern emerged during the Fluorescence Imaging Assessment and Guidance (FLAAG) trial: a bright, circular concentration of bacterial fluorescence encircling the wound periphery.
- This pattern, termed the “ring of fire,” suggested that the wound edge may harbor a disproportionately high bacterial burden.

## METHODS

- Prospective, single-blind, multicenter, cross-sectional study (NCT03540004)
- Enrolled 350 adults with chronic wounds across 14 U.S. wound care centers from May 2018 to April 2019. All wounds underwent evaluation using clinical signs of infection and point-of-care fluorescence imaging.
- When fluorescence indicated bacterial presence, clinicians obtained quantitative biopsies from both the wound center and margin. Six cases that clearly demonstrated the “ring of fire” pattern were selected for detailed description.
- These cases included diabetic foot ulcers, venous leg ulcers, and a postsurgical infection.

**Table 1:** Key Inclusion and Exclusion Criteria

INCLUSION CRITERIA	EXCLUSION CRITERIA
<ul style="list-style-type: none"> <li>• At least 18 years of age</li> <li>• Chronic wounds of uncertain infection status were enrolled</li> </ul>	<ul style="list-style-type: none"> <li>• Received an investigational drug in the prior 30 days</li> <li>• Undergone a wound culture within the past month</li> <li>• Unable to provide consent</li> <li>• Wounds located in areas unsuitable for imaging</li> </ul>

## RESULTS



Figure 1. M, 44, DFU    Figure 2. F, 55, Surgical Site    Figure 3. M, 45, DFU    Figure 4. M, 58, DFU    Figure 5. M, 65, VLU    Figure 6. M, 68, VLU

**Table 2:** Case Summary

Case	Sex	Age	Wound Type	Wound Measurement	Bacterial Presence
1	Male	44	DFU	1cm x 0.6cm x 0.3cm	Streptococcus agalactiae, Enterococcus faecalis, Finegoldia magna
2	Female	55	Surgical Site	6.5cm x 1.5cm x 1.2cm	Corynebacterium species
3	Male	45	DFU	4.5cm x 2cm x 0.3cm	Enterococcus faecalis, Staphylococcus aureus, Klebsiella oxytoca, Serratia marcescens
4	Male	58	DFU	2.4cm x 1.5cm x 0.2cm	Staphylococcus aureus, Enterococcus faecalis
5	Male	65	VLU	3cm x 2.2cm x 0.3cm	Pseudomonas aeruginosa, Enterococcus faecalis, Corynebacterium striatum, Staphylococcus simulans
6	Male	68	VLU	2.7cm x 3cm x 0.2cm	Pseudomonas aeruginosa

## CONCLUSIONS

**This report provides the first clinical description of the “ring of fire,” a fluorescence-defined pattern indicating concentrated bacterial burden at the margins of chronic wounds. Recognition of this phenomenon emphasizes the diagnostic value of fluorescence imaging and the importance of evaluating, and when appropriate, debriding, the wound edge. Incorporating imaging-guided assessment into routine practice may enhance detection of pathogenic bacteria and support more effective management of nonhealing wounds.**

Across the six representative cases, fluorescence imaging consistently revealed a well-defined band of bacterial signal localized to the wound perimeter, even when clinical signs of infection were absent. Quantitative cultures confirmed substantially higher bacterial loads at the edges than at the wound centers. Organisms identified included *Streptococcus agalactiae*, *Enterococcus faecalis*, *Staphylococcus aureus*, *Finegoldia magna*, *Corynebacterium species*, and *Pseudomonas aeruginosa*. The pattern was most striking in diabetic foot ulcers, where dense peripheral fluorescence formed a complete or near-complete ring. These findings indicate that clinically relevant bacterial communities often cluster at the wound edge rather than the central wound bed.

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