

Point-of-care fluorescence imaging reveals extent of bacterial load in diabetic foot ulcers

Armstrong D.G., Edmonds M.E. & Serena T.E. 2023 ✨

Key Points

- Clinical **signs of infection were poor predictors of bacteria in DFUs** at loads 10^4 up to 10^9 CFU/g
- **Fluorescence (FL) imaging** (MolecuLight) **improved the ability to detect and locate CIBL** across all bacterial loads, for **proactive bacterial infection management & treatment**

New Terminology

Chronic inhibitory bacterial load (CIBL) describes the chronic presence of bacteria in a wound or its surrounding tissue at loads which can damage tissues, be inhibitory to healing, and requires clinical intervention with or without presence of clinical symptoms

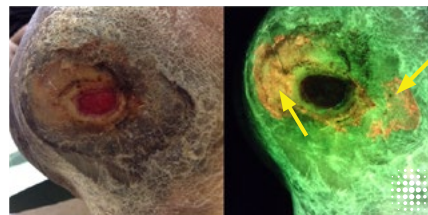
Why are bacterial loads of clinical concern?

- Diabetes often masks signs of bacteria & infection (e.g., neuropathy, blunted immune response)
- Unaddressed bacteria & biofilm at high loads ($>10^4$ CFU/g) increase infection risk & inhibit healing in chronic wounds
- It is difficult to detect, locate, and address covert/asymptomatic pathogenic bacterial loads

Below: Green = skin components; Red = most bacterial species at $>10^4$ CFU/g; Cyan = *Pseudomonas aeruginosa* at $>10^4$ CFU/g



TBL: 2.3×10^8 CFU/g | FL signal: Red
Signs of infection reported: None



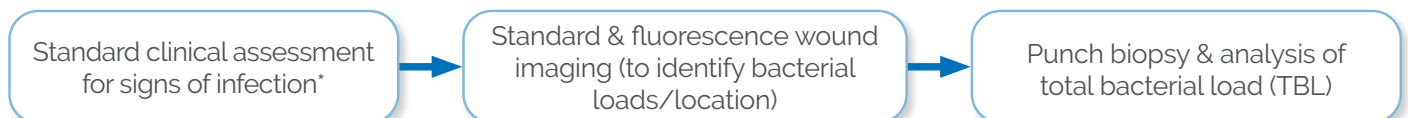
TBL: 1.1×10^8 CFU/g | FL signal: Red
Signs of infection reported: None



TBL: 1.5×10^7 CFU/g | FL signal: Cyan
Signs of infection reported: Erythema

Study Design/Objectives:

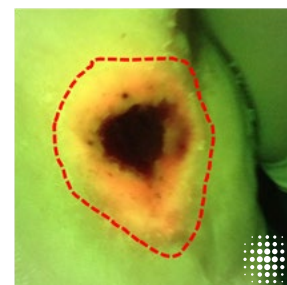
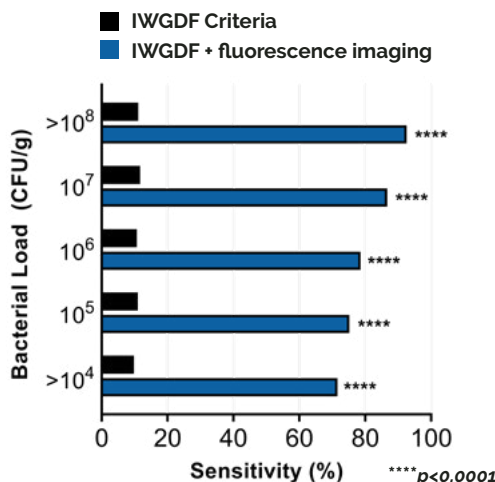
- Post-hoc analysis of 138 DFUs from the multicenter FLAAG clinical trial¹
1. Investigate how often DFUs contain high bacterial loads & how bacteria are distributed in/around DFUs
 2. Determine if standard clinical assessment can reliably detect high bacterial loads & if this can be improved with point-of-care FL-imaging



*As per International Working Group of the Diabetic Foot (IWGDF) criteria (2019)

Study Results:

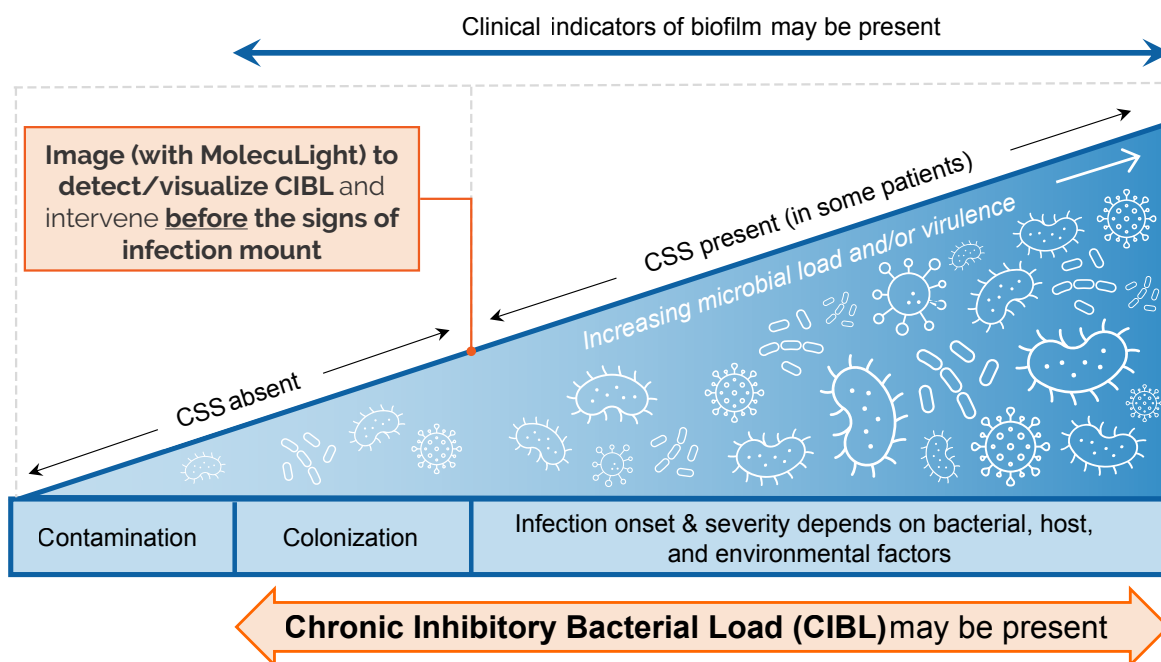
- 95% of DFUs had bacterial loads $>10^4$ CFU/g & 52% of those DFUs experienced delayed healing beyond expectation
- IWGDF signs of infection did not correlate with bacterial loads at any threshold ($10^4 - 10^9$ CFU/g)**
 - Only 11.5% of DFUs with loads $>10^8$ CFU/g were considered infected, using the IWGDF criteria



84% of DFUs contained bacterial loads in the periwound region (dashed line)

Relevance of CIBL in your clinical practice

- DFU infections are the initiating event in more than 85% of diabetes-related lower limb amputations² – a result of reactive infection management strategies & the accumulation of CIBL
- By identifying and removing CIBL earlier in the bacterial infection continuum (below[†]), you may help prevent the sequelae of infection and support improved DFU outcomes
- Fluorescence imaging is currently the only method to detect CIBL in real time at the point-of-care**



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¹ Le L, Baer M, Briggs P, et al. *Adv Wound Care (New Rochelle)* (2021). doi:10.1089/wound.2020.1272

² Brownrigg, J. R. et al. *Diabetologia* (2012). doi:10.1007/s00125-012-2673-3

[†] Adapted from the International Wound Infection Institute (IWII) Wound Infection Paradigm in "Wound Infection in Clinical Practice" (2021)