

Inflammation vs. Infection:

Challenges of and approaches to differentiating persistent inflammation from infection in chronic wounds

PRESENTERS:

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Attendees of this session learned about the following:

- Pathophysiology of inflammation and infection in chronic wounds.

- Challenges in assessing and differentiating persistent inflammation or infection (i.e. planktonic vs. biofilm bacteria).
- Diagnostic testing and clinical treatment options to assist in early detection and management of inflammation and infection.

Factors leading to infection and inflammation

Karen Laforet began by noting that the factors that lead to increased risk of infection include

- pathology;
- comorbidities (e.g. diabetes, autoimmune diseases);
- obesity;
- cachexia/malnutrition;
- decreased perfusion;
- host resistance;
- polypharmacy;
- age; and

- the presence of foreign bodies (e.g. necrotic debris, retained packing material, small fragments of gauze dressings).

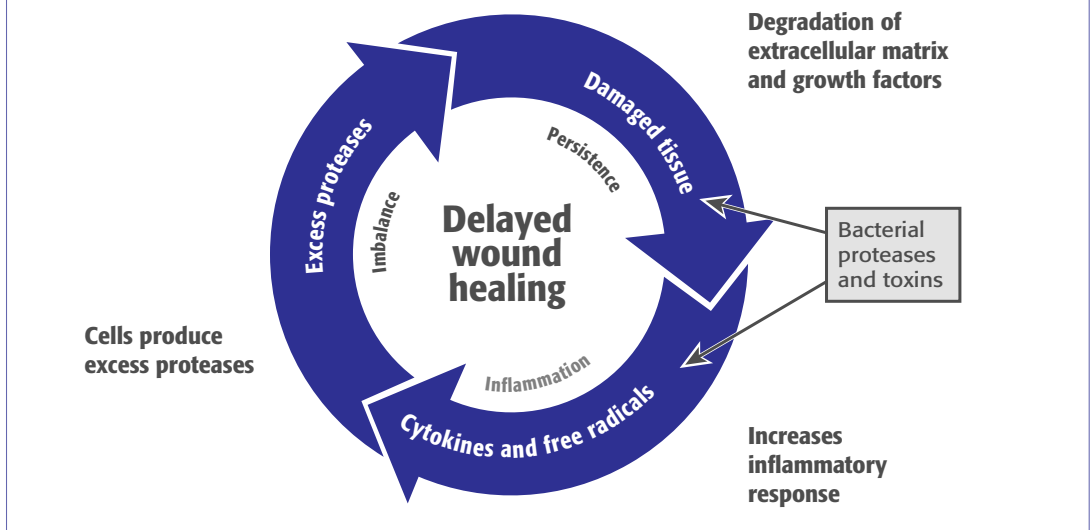
Host issues and factors that lead to protracted inflammation and delayed healing in chronic wounds include (Figure 1):¹⁻⁴

- recurrent physical trauma;
- older age;
- diabetes;
- contamination with foreign material;
- ischemia–reperfusion injury; and
- subclinical bacterial contamination of wound tissues.

“Critical colonization” is an important concept in wound healing, and a number of definitions have been suggested. In 2008, the World Union of Wound Healing Societies proposed that critical colonization is: “A potentially important concept that is widely applied to chronic wounds but lacks clarity. It arose to differentiate problems caused by bacteria that are not always accompanied by the classical signs of infection, e.g. delayed (or stalled) healing, from more obvious infection. However, the concept and a clear under-

FIGURE 1

The vicious circle of inflammation, high protease activity levels and delayed wound healing⁷



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A critically colonized wound state is one that has the presence of polymicrobial biofilm not detected by standard clinical microbiology assays.

standing of its meaning and implications are not universally accepted.⁷

Simply put, however, a critically colonized wound state is one that has the presence of polymicrobial biofilm not detected by standard clinical microbiology assays.⁵ Indeed, it has been demonstrated that 60% of chronic wounds contain biofilm vs. 5% of acute healing wounds.⁶

Assessment tools for determining infection vs. inflammation

Signs of infection include the following:⁷

- failure of the wound to heal;
- stalling after making progress, i.e. atrophy or deterioration of what was healthy granulation tissue;

discoloration of granulation tissue (i.e. pale, gray, reddish-purple); or

- unhealthy granulation tissue (i.e. friable, excessive watery exudate that is purulent).

Laforet offered the following practice pearls for the assessment and treatment of protracted inflammation in chronic wounds:

- Use consistent assessment tools for determining infection vs. inflammation.
- Early intervention is critical: if a wound has not decreased by approximately 30% in size by week 4, then reassess the care plan and consult with a wound specialist.
- Be persistent!
- As biofilms recover from debridement and reform mature biofilm, sometimes as soon as 24 hours after the procedure, serial wound debridement is therefore recommended, as well as antimicrobial use post-debridement.

Distinguishing between infection and inflammation

Gregory Schultz offered the following tips for distinguishing between infection and inflammation in wounds:

- Obtain complete information regarding the bacterial and fungal species present in chronic wounds: use polymerase chain reaction (PCR)-based detection of microbes.
- Detect and measure biofilm bacteria, using modifications of standard clinical microbiology laboratory techniques for planktonic bacteria. ☺

References

1. Hart J. Inflammation. 2: Its role in the healing of chronic wounds. *J Wound Care*. 2002;11:245-249.
2. Ashcroft GS, Greenwell-Wild T, Horan MA, et al. Topical estrogen accelerates cutaneous wound healing in aged humans associated with an altered inflammatory response. *Am J Pathol*. 1999;155:1137-1146.
3. Bjarnsholt T, Kirketerp-Møller K, Jensen PØ, et al. Why chronic wounds will not heal: a novel hypothesis. *Wound Repair Regen*. 2008;16:2-10
4. Sibbald RG, Syder R, Botros M, et al. *The Role of a Point of Care Protease Activity Diagnostic Test in Canadian Clinical Practice. A Canadian Expert Consensus*. Markham, ON: Systagenix; 2011.
5. Phillips PL, Wolcott RD, Fletcher J, Schultz GS. Biofilms made easy. *Wound International*. 2010;1:1-6.
6. James GA, Swogger E, Wolcott R, et al. Biofilms in chronic wounds. *Wound Repair Regen*. 2008;16:37-44.
7. Sibbald RG, Orsted H, Schultz GS, et al. Preparing the wound bed: focus on infection and inflammation. *Ostomy Wound Manage*. 2003;49:23-51.

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