External Evidence – Summary

Name of Article: Implications of endotoxins in wound healing: a narrative review

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Summary:

- Endotoxin effects on wound healing When the skin is broken as a result of injury, skin integrity must be quickly restored so that the skin's function can be maintained.
- The interplay of a number of distinct but interdependent phases is required for wound healing to occur and involves the coordinated interaction between numerous cell types, inflammatory mediators and cytokines, and tissue matrix components.
- Endotoxins, and their effects on cells and tissues, result in various consequences for each of the phases of wound healing
- Bacterial toxins are thought to play a role in delayed wound healing in critically colonised and infected wounds.
- Endotoxins are released from Gram-negative bacteria when they are lysed(the cell usually Lyases and releases mature virus particles) by host phagocytic (engulf) cells during an immune response
- Or by antimicrobial agents, potentially leading to a detrimental effect on the host tissues.
- Endotoxins can affect all aspects of the wound healing process, leading to delayed healing and contributing to wound chronicity.
- Release of endotoxins by bacteria can also have serious systemic effects (for example, septic shock) that can lead to high levels of patient mortality.
- This review summarises the role and implications on wound healing of bacterial endotoxins, describing the impact of endotoxins on the various phases of the wound healing response.
- There is a paucity (small amounts) of in vivo/clinical evidence linking endotoxins attributed to a wound (via antibiotic treatment) or their release from infecting bacteria with parameters of delayed wound healing.
- Future work should investigate if this link is apparent and determine the mechanism(s) by which such detrimental effects occur, offering an opportunity to identify possible treatment pathways.
- This paper describes the phenomenon of antimicrobial induced endotoxin release and summarises the use of wound dressings to reduce wound bioburden without inducing microbial death and subsequent release of endotoxins, thus limiting their detrimental effects.
- Disruption of bacterial cells causes endotoxin release

External Evidence – Summary

- Treatment of such infections using antimicrobials (for example, antibiotics) that are bactericidal/bacteriostatic can exacerbate this and significantly raise the levels of endotoxins (as can neutrophils/ white blood cells)
- Endotoxins are detrimental to a patient in that they can have serious systemic effects, such as septic shock, that can lead to a high level of patient mortality.
- Endotoxins can also affect all aspects of the wound healing process, ultimately leading to delayed healing and wound chronicity
- Management of endotoxin release should be considered when choosing treatment options for infected wounds.
- **A beneficial approach is to use wound dressings that do not contain 'active' agents that will kill or damage bacteria (and hence release endotoxins) but choose those that reduce levels of bacteria by physical means, for example, adsorption, sequestration, binding and removal**.
  Limitations
- This review is narrative and limited by the lack of a systematic approach to the literature search.
- The relative impact of endotoxin versus exotoxin release on wound healing is unknown, and there are limitations to the clinical application of currently available data on the risks posed by endotoxin release to patients with wounds relative to the risks posed by exotoxin release.

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External Evidence – Summary

External Evidence – Summary