ENABLING AGGRESSIVE SURGICAL DEBRIDEMENT AND HEALING IN A 10-YEAR-OLD DECUBITUS ULCER WITH A NOVEL SELF-ASSEMBLING PEPTIDE-BASED ADVANCED WOUND DRESSING

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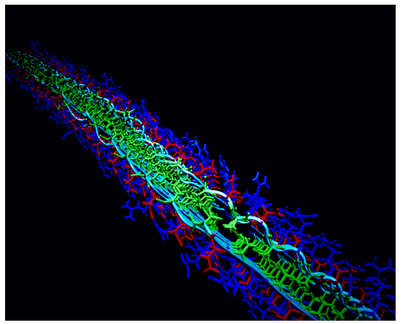
Background

Chronic wounds that are exacerbated by surface-associated bacteria (biofilm) benefit tremendously from frequent debridement and wound bed surface management - the optimal strategy to achieve better healing outcomes.[1] However, uncontrolled bleeding as a result of aggressive debridement and the procedural issues associated with bleeding (i.e. loss of visual connection to the wound, need for bleeding control measures, added procedure time) pose significant barriers to the implementation of this treatment strategy, particularly for chronic, recalcitrant wounds or those treated in a low acuity clinic setting.

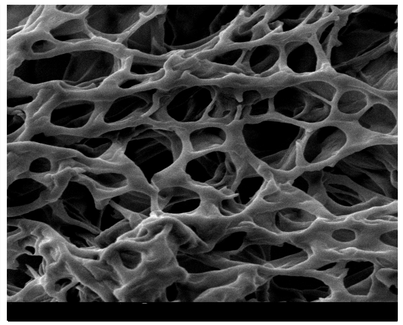
Technology: AC5 Advanced Wound System[2]

AC5 Advanced Wound System is a novel dressing. The mechanism of action derives from the physiochemical properties of its synthetic peptide. Upon exposure to ions in wounds, peptide units self-assemble into higher ordered nanofibrils and nanofibers before culminating in an entangled network. An extracellular matrix-like structure that contours to the macro and micro architecture of the wound milieu is formed. The network resembles that of collagen and provides a scaffold, enabling cell migration and proliferation as well as repair of damaged tissue.

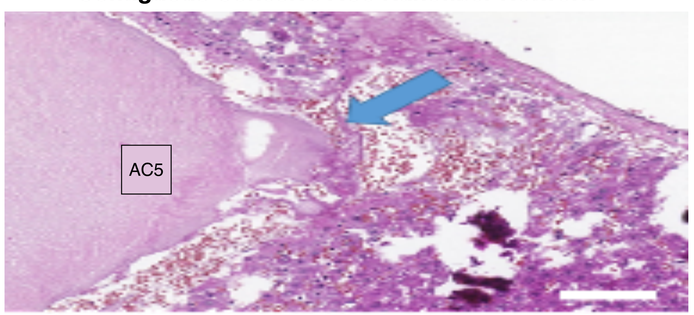
AC5 Nanofibril[3]



Electron Micrograph of AC5[3]



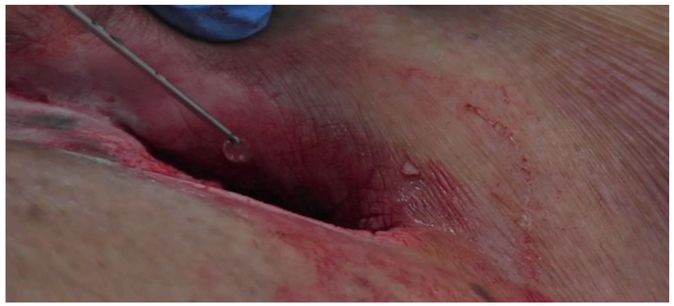
Contiguous Cohesive AC5 Nanofiber Network[3]



Case Study

A 47-year-old patient presented with a history of paraplegia and an ischial decubitus ulcer that would not heal during the prior decade of standard care. The wound was subjected to repetitive trauma due to operation of heavy equipment by the patient, thus exacerbating the need for wound management. Offloading was pursued and the wound microbiota were addressed. Approximately five years ago, topical agents and dressings targeting Staphylococcus were used. As the wound aged further, the microbiota changed to Pseudomonas and Candida.

July 1st Deep stage IV Decubitus Ulcer of the Right Ischium[4]



Methods

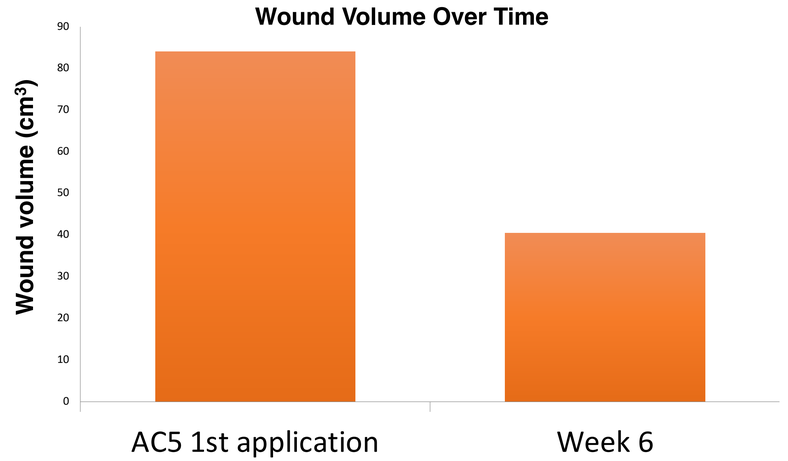
The patient was treated every two weeks over 42 days with aggressive surgical debridement (until a bleeding wound bed was visible). AC5 Advanced Wound System was then applied as a liquid dressing to conform to the wound's irregular geometry and further covered by a nonadherent dressing. The wound was also packed with iodinated foam. The wound was covered with a standard non-occlusive dressing which was sufficient because of decreased drainage. Between AC5 treatments in the clinic, the dressings were changed three times per week, at home. A PCR evaluation for Pseudomonas showed a cycle threshold number of 23 (moderate level) and no Candida.

References

[1] European Society of Clinical Microbiology and Infectious Diseases guideline for the diagnosis and treatment of biofilm infections 2014, Clin Microbiol Infect 2015; 1: S1–S25
[2] AC5® Advanced Wound System, Arch Therapeutics, Inc., Framingham, MA
[3] © 2019 Arch Therapeutics, All Rights Reserved; Data on File
[4] © 2020 Arch Therapeutics, All Rights Reserved; Data on File
[5] Wounds were measured with comparably applied tension at each time point

Results

Over just six weeks of every other week debridement and AC5 Advanced Wound System dressing applications, the patient's wound approached 50% reduction in volume,[5] despite having previously been refractory and stalled over the course of a decade (see figure below). The patient self reported that each dressing change required less packing and that a significant reduction in drainage and bleeding resulted in easier at-home wound care with fewer in-between clinic visits. Importantly, the wound decreased in size and improved in all other assessments even though the patient continued to sit. This milestone encouraged the patient to adhere to scheduled clinic visits, thus allowing for continued care and healing.



Conclusions

Concomitant use of debridement and the novel self-assembling peptide-based AC5 Advanced Wound System, which formed a clear conforming dressing over the wound surface, allowed for a more aggressive procedure with bleeding control in a low acuity clinic setting and without the need for thrombin or sutures. In addition, the nanofiber network appeared to cohesively seal the wound bed surface after debridement made the wound devoid of biofilm and senescent host cells. The resulting scaffold allowed for the adhesion, migration, and proliferation of healthy host cells and favorable wound healing outcomes.

Disclosures

This case study may discuss indications for use which are not currently approved by the FDA. AC5 is a registered trademark of Arch Therapeutics, Inc, which owns commercial rights to AC5.

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