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# Activated Carbon Cloth in Contact with Venous Leg Ulcer Granulation Tissue is Synergistic with Fuzzy Wale Focused Elastic Compression Therapy

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## **Problem**

New biomaterials advance wound healing. Wound science describes the underpinning biomaterial physiology, for example: 1. the positive charge on powered chitin from shrimp activates thrombin and staunches battle field wound bleeding from IED injuries, 2. rayon gauze coated with DACC (dialkyl carbamoyl chloride), a hydrophobic lipid, “upsets” biofilm bacteria to speed healing, and 3. nanosphere Hydroxyethylmethacrylate (HEMA), a hydrophobic polymer used in soft contacts, “upsets” biofilm bacteria to enhance healing. <sup>1,2</sup>

As a biomaterial, activated charcoal is known for example by the meat packing industry, to be a powerful local inhibitor of microorganisms. Activated carbon cloth (ACC) has a huge fractal surface area, 1,000 – 2,000 meters<sup>2</sup> per gram, that exposes highly reactive carbon atoms to interact with biologic molecules via weak London Forces disrupting bacterial physiology.<sup>3</sup> Developed for chemical warfare in the ‘60s, ACC is widely used to control malodor in ostomy appliances and wound dressings.<sup>4</sup> Historically ACC dressing design has not had the active carbon molecules in direct physical contact with wound granulation tissue to fully exploit the London force.

This study asks two questions, is activated charcoal a superior contact layer when delivering elastic compression therapy to: 1. treat venous leg ulcers,

VLU and, 2. treat periwound stasis dermatitis? In stasis dermatitis, inflamed skin is at risk from maceration and bacterial colonization leading to cellulitis, the coup de grace skin disruption that presages VLU formation.

## **Methods**

Four refractory VLU patients were treated with ACC \*, \*\* and fuzzy wale elastic compression stockinet\*\*\*. 5 Topical ointments and crèmes were avoided.

## **Results**

Photos document all VLUs healed and stasis dermatitis improved.

## **Conclusions**

Activated Carbon Cloth with and without silver as an antimicrobial contact layer during elastic compression therapy appears effective to: 1. decrease stasis dermatitis and 2. speed VLU healing.

## **References**

1. Hampson, S. Evaluation of the efficacy of, dialkyl carbamoyl chloride, Sorbact®, in different types of non-healing wounds, Wounds UK, 2007, Vol. 3, No 4, p 1-7.
2. St. John, JV, Randomized Clinic Study Comparing a Novel Transforming Power Dressing to a Carboxymethylcellulose-Silver Dressing in Skin Graft Donor Sites, <http://www.altrazeal.com/global/randomized-clinical-trial.html>
3. F. London, Zeitschrift für Physik, vol. 44, p. 455 (1927). English translation in H. Hettema, Quantum Chemistry, Classic Scientific Papers, World Scientific, Singapore (2000).
4. Stadler et al. Survey of 12,444 patients with chronic wounds treated with active carbon cloth, Actisorb. Akt Dermatol 2002; 28: 351-354
5. Kozeny, D., Stott, K., "Longitudinal yarn compression textile: An innovative treatment for leg swelling." Journal of Vascular Nursing, Volume 25, Issue 3, Pages 62-62, September 2007

\*Zorflex® Active Carbon Cloth, Calgon Carbon, Tyne and Wear, UK

\*\*Actisorb ® Carbon Cloth with Silver (deconstructed at bedside),  
Systagenix, Gatwick, UK

\*\*\*EdemaWear®, Compression Dynamics, LLC, Omaha, NE