

# Topical oxygen therapy—hocus pocus or science?

**T**he concept of Topical Oxygen Therapy is not a new concept. Like most providers the concept of 'the foot in a bag of oxygen' to improve healing seemed like 'hocus pocus' and was not taken seriously. It was not until very convincing scientific studies supported the concept of topical oxygen therapy that I was willing to reconsider my position. Based on the scientific studies I initially used the therapy on very large chronic, painful wounds. The results were very impressive for, not only, healing wounds, but decreasing the pain associated with these large wounds.

It is accepted that oxygen is of paramount importance to collagen formation, granulation, angiogenesis and epithelialization, and also plays an important role in controlling bacteria. Hypoxia at the level of the wound can interfere with the healing process. Studies also support that chronic wounds may have focal ischemia.<sup>1</sup> The question was whether or not topical oxygen could increase oxygen tension in the wound supporting the important functions of oxygen in wound healing.

The scientific basis of topical oxygen therapy was supported by the Fries et al study demonstrating in an experimental animal model that with topical oxygen administration, central wound PO<sub>2</sub> increased from a baseline of 5–7mm to levels of >40mmHg as early as four minutes into treatment. The O<sub>2</sub> levels were detected 2mm below the surface of the wound. This study provided key proof of the principle that topical oxygen can oxygenate superficial wound tissue.<sup>2</sup>

With the basic science support that oxygen tension could be increased with topical oxygen therapy, multiple delivery systems were developed. I selected the continuous diffusion of oxygen system (CDO) because of the unique delivery system supported by a well-designed, blinded study. The system combines a small oxygen generator the size of a cell phone with the OxySpur Oxygen Diffusion dressing providing a continuous flow of humidified oxygen to the surface of the wound. The system has the additional advantage of being an easy to apply dressing that is connected by tubing to the small generator. The dressing can be changed by the patient or family member making usage by patients in more remote areas away from the hospital very practical. This also decreases the clinical support required by the wound care clinic.

## References

- 1 Gordillo GM, Sen CK. Evidence-based recommendations for the use of topical oxygen therapy in the treatment of lower extremity wounds. *Int J Low Extrem Wounds* 2009; 8(2):105–111. doi:10.1177/1534734609335149.
- 1 Fries RB, Wallace WA, Roy, S. Dermal excisional wound healing in pigs following treatment with topically applied pure oxygen. *Mutat Res* 2005; 579:172–181

The therapy is supported by a well designed fully blinded study comparing CDO therapy to most wound therapy in diabetic foot wounds. The control group utilized the same generator, tubing and dressing however, none of the oxygen was delivered to the wound (the output was diverted/blocked). The CDO therapy closed more the twice the number of wounds than the placebo. The results were most pronounced in very large and chronic wounds.<sup>3</sup> A follow-up study also demonstrated significant pain reduction in 100% of patients.<sup>4</sup>

My personal experience has reinforced the value of the CDO system with healing of very chronic wounds that had failed all other therapeutic modalities. This includes healing of wounds in radiated tissue. These wound are known to have regional ischemia from the irradiation and often times fail any type of wound therapy. This also includes healing of wounds with exposed hardware.

The pain relief has also been very dramatic. I had a patient with a very painful lower-extremity wound that we treated with the CDO system. The wound rapidly improved and the pain was relieved. When the wound had decreased in size the patient indicated he would like to transition to just ointment and a cover dressing. He had other appointments in the hospital for X-rays and Lab work. Within a very short period of time he returned to the clinic stating his severe pain had returned and requested his oxygen dressing be replaced. By that evening his pain had again resolved. He then continued therapy until the wound was fully healed. Once the wound was healed the pain did not return.

Our clinical experience and the scientific studies support that this is a very effective treatment, especially for large chronic wounds that have failed standard therapy. In my opinion, this therapy should no longer be considered hocus pocus, but an important adjunct not only for large, painful or chronic wounds but also other wounds such as irradiated wounds, those with exposed hardware and any other wound that could benefit from direct oxygen infusion. **JWC**



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1 Niederauer MQ, Michalek JE, Liu Q et al. Continuous diffusion of oxygen improves diabetic foot ulcer healing when compared with a placebo control: a randomised, double-blind, multicentre study. *J Wound Care* 2018; 27(9):s30-s45

1 Bowen J, Ingersoll MS, Carlson R. Effect of CDO on pain in treatment of chronic wounds. *Wound Central* 2018; 2(4):186–195