

# Hyperbaric Oxygen Therapy for Treating Chronic Wounds

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## ABSTRACT

**Background:** chronic wounds are wounds that take a long time to heal, do not heal, or recur; these wounds are often ulcers associated with diabetes or arterial or venous disease (poor blood circulation) and pressure ulcers. One characteristic of chronic wounds is that the wound tissues are hypoxic (have low oxygen levels). Chronic wounds are commonly occurring and reduce the quality of life of those affected and are significant socioeconomic problem.

**Material and Methods:** A literature review of clinical and basic science studies regarding oxygen and wound healing was conducted to assess benefits of adjunctive hyperbaric oxygen therapy (HBOT) for healing chronic wounds. The aim is to improve the understanding of the role of oxygen in wound healing and to advance our management of wound patients.

**Results:** Many experimental and clinical observations have shown wound healing to be impaired under hypoxia. Hypoxia appears to inhibit the wound healing process by blocking fibroblast proliferation, collagen production, and capillary angiogenesis and to increase the risk of infection. Hyperbaric oxygen therapy (HBOT) is a treatment designed to increase the supply of oxygen to wounds that are not responding to other treatments. HBOT involves people breathing pure oxygen in a specially designed compression chamber (such as those used for deep-sea divers suffering pressure problems after resurfacing). HBO improves microvascular supply by increasing the amount of oxygen so that gaseous diffusion can occur in relatively avascular or ischaemic areas. Normal fibroblast proliferation and collagen production requires a local oxygen tension level of 20 - 40 mm of Hg. Raising this threshold level to 40 - 50 mm of Hg stimulates greater degree of neovascularisation which may favour definitive local healing. Oxygen is bactericidal to certain anaerobic or microaerophilic organisms because they lack the appropriate enzymes (superoxide

dismutase and catalase) necessary to protect them in highly oxygenated environments. Advocates have suggested that the experimentally demonstrated effects of HBOT on improving wound tissue hypoxia, enhancing perfusion, reducing edema, downregulating inflammatory cytokines, promoting fibroblast proliferation, collagen synthesis, and angiogenesis make it a useful adjunct in clinical practice for “problem wounds,” such as diabetic foot ulcers and pressure ulcers. Randomized trials compared the effects of HBOT with standard wound care. They found that HBOT was associated with statistically significantly higher rates of wound healing, lower rates of operative interventions (debridement, amputation, or skin flap or graft); and fewer lower extremity amputations. HBOT is also touted for eradicating difficult to treat soft tissue and bone infections by mechanisms that include killing microorganisms, improving leukocyte and macrophage function, and enhancing the effect of antimicrobials .

**Conclusions:** Adjunctive treatment with HBOT facilitates healing of chronic wounds. It is cost effective treatment, and significantly can reduced the risk of major amputation and increases the likelihood of wound healing.

**Keywords:** Hyperbaric Oxygen Therapy, Chronic Wound, Healing