



Hyperbaric Therapy for Auto Immune Diseases

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ABSTRACT: An autoimmune disease arises when the immune system mistakenly targets the body's own tissues, causing damage rather than providing protection. Hyperbaric oxygen therapy (HBOT) involves the administration of 100% pure oxygen within a specialized environment known as a hyperbaric chamber. While atmospheric air contains only 21% oxygen, HBOT leverages increased air pressure within the chamber to enhance the lungs' ability to absorb oxygen. This elevated oxygen intake delivers vital oxygen to tissues, promoting healing and aiding in the fight against certain infections.

HBOT operates through multiple mechanisms: it reduces inflammation, combats infections, and facilitates the repair of damaged tissues. The therapy's pure oxygen content supports the immune system in combating bacteria while stimulating the production of stem cells. These stem cells play a pivotal role in generating various cell types essential for bodily functions, including blood cells, brain cells, and muscle cells. In essence, HBOT fosters tissue repair and enhances overall immune functionality.

KEYWORDS: Auto-immune disease, Damage repair, HBOT (Hyperbaric Oxygen therapy), Inflammation, stem cells.

1. INTRODUCTION

Hyperbaric oxygen therapy (HBOT) involves inhaling 100% pure oxygen within a specialized environment known as a hyperbaric chamber. While atmospheric air contains only 21% oxygen, the increased air pressure within the chamber enables the lungs to absorb a significantly higher amount of oxygen. This elevated oxygen intake facilitates the delivery of oxygen to tissues, aiding in healing and combating certain infections. The air pressure inside the hyperbaric chamber is raised above normal atmospheric levels, enhancing its therapeutic effects. However, excessive oxygen exposure can potentially cause harm to the body. To ensure safety and efficacy, the U.S. Food and Drug Administration regulates both the oxygen used in HBOT and the hyperbaric chambers themselves, which may be designed as single-person tubes or larger rooms accommodating multiple individuals. With repeated treatments, HBOT promotes the normalization of tissue oxygen levels, which often persist even after the therapy concludes. [1].

The U.S. Food and Drug Administration has approved hyperbaric oxygen therapy for specific medical conditions. These include:

- Sudden, painless vision loss.
- Skin or bone infections leading to tissue death.
- Severe burns.
- Sudden hearing loss.
- Open wounds that fail to heal, such as diabetic foot ulcers.
- Crush injuries.
- Gas bubbles in the blood vessels (arterial gas embolism).
- Brain abscesses.
- Damage to the skin flap or graft with a risk of tissue death.
- Radiation-related injuries.
- Decompression sickness (often seen in divers).
- Carbon monoxide poisoning.
- Traumatic brain injury.
- Severe anemia.
- Gangrene (tissue death due to poor blood flow) [2].



There are several unapproved uses of hyperbaric oxygen therapy often promoted by medical spas or alternative medicine centers. These claims suggest that HBOT can help treat a variety of conditions, including:

- Depression
- Stroke
- Alopecia
- HIV and AIDS
- Sports injuries
- Autism spectrum disorder
- Migraine headaches
- COVID-19
- Cerebral palsy
- Age-related symptoms or conditions [1]

Hyperbaric oxygen therapy is not suitable for everyone and may pose risks for individuals with certain conditions. It can be dangerous to undergo HBOT if you have:

- Recent ear injury or surgery.
- Lung disease like COPD, emphysema, or cystic fibrosis.
- Pneumothorax.
- Fever or common cold [3].

There are 3 types of hyperbaric oxygen therapy chambers:

Monoplace chamber – During hyperbaric oxygen therapy, a single patient lies inside a transparent, pressurized chamber, breathing 100% medical-grade oxygen at a carefully controlled atmospheric pressure. The duration of each session is predetermined based on the medical condition being treated. A specially trained hyperbaric technician remains outside the chamber, closely monitoring the patient and the equipment to ensure safety and efficacy throughout the treatment session.

Multiplace chamber – In a multi-person hyperbaric chamber, multiple patients can sit in chairs or recline while receiving oxygen through face masks or hoods. A trained hyperbaric technician remains inside the chamber to directly monitor the patients and ensure their safety during the session. This type of chamber is commonly used in hospitals, allowing simultaneous treatment for several individuals while maintaining close supervision and immediate assistance if needed.

Soft hyperbaric chambers – Mild hyperbaric chambers, often referred to as "soft chambers," are constructed from materials like polyurethane or canvas. These chambers are more affordable and user-friendly, making them a popular option for home use. Unlike the hard-sided chambers used in clinical settings, soft chambers do not provide 100% oxygen. Instead, they use compressed ambient air with lower oxygen concentrations, which may limit their therapeutic effectiveness compared to medical-grade HBOT systems [4].

2. BENEFITS OF HYPERBARIC OXYGEN THERAPY IN AUTOIMMUNE DISEASES

A. *Reduces Inflammation*

Inflammation, while a crucial component of the body's defense mechanism against injury and infection, assumes a detrimental role in autoimmune conditions, manifesting as a persistent and chronic state. This chronic inflammatory response is intricately linked to a confluence of factors, encompassing intestinal permeability, the consumption of inflammatory diets, the enduring impact of chronic stress, and the ubiquitous exposure to environmental toxins and infectious agents. Effectively managing and reversing autoimmune disease necessitates a multifaceted approach aimed at modulating the immune system and attenuating the ongoing inflammatory cascade. Hyperbaric oxygen therapy emerges as a promising therapeutic modality with a potent anti-inflammatory effect, surpassing the efficacy of corticosteroids in this regard. This therapeutic intervention facilitates the delivery of elevated oxygen levels into the bloodstream via the plasma, consequently mitigating both inflammation and associated pain. Empirical evidence from scientific studies corroborates this observation, demonstrating a significant reduction in C-reactive protein and cytokine levels, both recognized as cardinal markers of chronic inflammation, following the administration of hyperbaric oxygen therapy.



B. Kills Infections

Hyperbaric oxygen therapy, a well-established and widely accepted treatment for severe infections, constitutes a pivotal component of the Autoimmune Solution protocol, given the critical role of effective infection resolution in managing autoimmune conditions. The presence of harmful microorganisms, encompassing bacteria, viruses, parasites, and fungi, can significantly contribute to the aberrant immune responses characteristic of autoimmune diseases. Hyperbaric oxygen therapy exhibits particular efficacy in combating anaerobic microbes, which are incapable of thriving in environments characterized by high oxygen concentrations. Furthermore, this therapeutic modality exerts a profound influence on leukocyte function. The augmented oxygen supply enhances their capacity to eliminate bacterial pathogens and cellular debris, thereby facilitating the clearance of infectious agents. Notably, white blood cells, key protagonists in the orchestration of the immune response, exhibit a concomitant increase in production in response to elevated oxygen levels

C. Repairs Damaged Tissue

Hyperbaric oxygen therapy exerts a significant stimulatory effect on angiogenesis, the physiological process of neovascularization. Recognizing the pivotal role of blood vessels in facilitating tissue repair, it is crucial to acknowledge their function as conduits for the transport of essential cellular components and nutrients. Furthermore, blood vessels actively participate in the clearance of cellular debris, damaged cellular material, and foreign microorganisms. Evidence from scientific research unequivocally demonstrates a substantial increase in both the quantity and caliber of blood vessels within compromised tissues and wounds following the administration of HBOT [5].

3. RISK OF HYPERBARIC OXYGEN THERAPY

When used for FDA-approved indications, hyperbaric oxygen therapy is typically safe, with serious complications being uncommon. However, due to the elevated pressure and heightened oxygen concentration during treatment, potential risks include:

- Claustrophobia
- Dry cough
- Middle ear injuries, such as tympanic membrane rupture
- Seizures
- Chest pain or burning sensation
- Oxygen poisoning
- Temporary vision changes
- Ear and sinus pain
- Anxiety or panic attacks
- Lung collapse (Rare)

The use of high oxygen concentrations carries a fire hazard, which is why the FDA advises receiving treatment at accredited facilities. Incidents of fires and explosions have been reported in HBOT chambers that lack FDA review and are housed in unaccredited locations [6].

4. USES OF HYPERBARIC THERAPY

A. Used to Treat Decompression Sickness

Decompression sickness, a condition that afflicts individuals engaged in deep-sea diving, high-altitude mountaineering, or occupations involving exposure to extreme altitudes or depths, arises from the formation of nitrogen and other gas bubbles within the bloodstream. This pathophysiological phenomenon manifests as a constellation of symptoms, including severe articular pain, vertigo, and dyspnea. Hyperbaric oxygen therapy constitutes the mainstay of treatment, aimed at attenuating the formation of gas emboli and facilitating the replenishment of oxygen within the affected tissues. Scientific research strongly supports the utilization of HBOT for the majority of decompression sickness cases until the patient achieves a state of hemodynamic stability.

B. Fights Serious Infections

Hyperbaric Oxygen Therapy Composes a critical treatment approach of severe infectious conditions, encompassing a spectrum of pathologies such as diabetic foot ulcers, fungal infections, neurosurgical infections, gangrene, and necrotizing fasciitis, often



colloquially referred to as "flesh-eating disease." HBOT exerts a potent antimicrobial effect through the augmentation of free radical oxygen species generation. Moreover, by significantly elevating tissue oxygen tension, HBOT facilitates the restoration of leukocyte bactericidal capacity within the infected wound bed. Notably, scientific investigations have explicitly demonstrated a synergistic interaction between HBOT and a diverse array of antibiotic regimens.

C. Heals Chronic Wounds

Hyperbaric oxygen therapy constitutes a valuable therapeutic modality in the management of chronic wounds, exerting a multifaceted influence that encompasses enhanced oxygenation and the stimulation of angiogenesis. HBOT possesses significant anti-inflammatory properties, thereby mitigating the risk of adverse sequelae, such as amputation, as corroborated by research published in *Advances in Skin and Wound Care*. The clinical application of HBOT is particularly prevalent in the treatment of diabetic foot ulcers, radiation-induced injuries, and a spectrum of complex wound etiologies, including leg ulcers, ischemic wounds arising from compromised vascular perfusion, radiation-induced injuries, and surgical wounds.

D. May Improve Neurodegenerative Diseases

Hyperbaric Oxygen Therapy has demonstrated significant potential in enhancing neurological function and improving quality of life in individuals recovering from stroke and traumatic brain injuries. Furthermore, it has shown promise in ameliorating the symptoms of certain neurodegenerative disorders, including Alzheimer's disease. Recent research published in *Neural Regeneration Research* provides compelling evidence for the therapeutic efficacy of HBOT in Alzheimer's disease. The study revealed that HBOT effectively mitigated hypoxia and neuroinflammation, while concurrently improving behavioral outcomes in murine models

E. Used for Carbon Monoxide Poisoning

HBOT constitutes a viable therapeutic intervention in cases of carbon monoxide poisoning, a condition characterized by the displacement of oxygen within the circulatory system by carbon monoxide. Empirical evidence from scientific investigations suggests that, under specific circumstances, HBOT may effectively mitigate the risk of neurological sequelae, including cerebral and peripheral nerve damage, following carbon monoxide intoxication [7].

5. CONCLUSION

An autoimmune disease is the result of the immune system accidentally attacking our own body instead of protecting it. HBOT involves 100% pure oxygen in a special space called a hyperbaric chamber. Our body's tissues need oxygen to function. The air we breathe is only 21% oxygen. The increased air pressure in the chamber helps the lungs to collect more oxygen. The air pressure inside the hyperbaric chamber is raised to a level that is higher than normal air pressure. Getting more oxygen to the tissues that need it can help the body heal and fight certain infections. HBOT works by reducing inflammation, kills infections, repairs the damaged tissues. Hyperbaric oxygen is healthy. It's pure oxygen, which helps your immune system fight bacteria and generate stem cells. Stem cells are special cells in your body that help create other types of important cells, including blood cells, brain cells and muscle cells.

REFERENCES

1. <https://www.mayoclinic.org/tests-procedures/hyperbaric-oxygen-therapy/about/pac-20394380>
2. <https://www.fda.gov/consumers/consumer-updates/hyperbaric-oxygen-therapy-get-facts>
3. Hyperbaric Oxygen Therapy: What It Is & Benefits, Side Effects (clevelandclinic.org)
4. <https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/hyperbaric-oxygen-therapy>
5. <https://www.amymyersmd.com/article/hyperbaric-therapy-autoimmune-disease>
6. What Conditions Are Treated With Hyperbaric Oxygen Therapy (HBOT)? (medicinenet.com)
7. Hyperbaric Oxygen Therapy Benefits, Risks and Side Effects - Dr. Axe (draxe.com)

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