

Breathe deep. Heal faster.

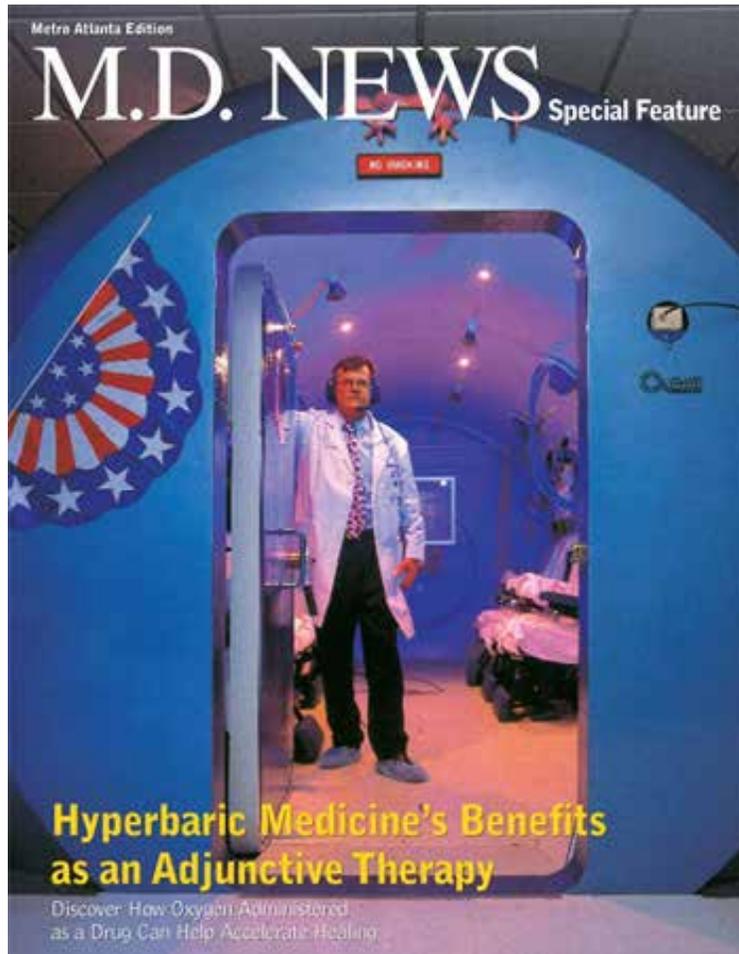
SPECIAL REPORT – Hyperbaric Medicine’s Benefits as an Adjunctive Therapy

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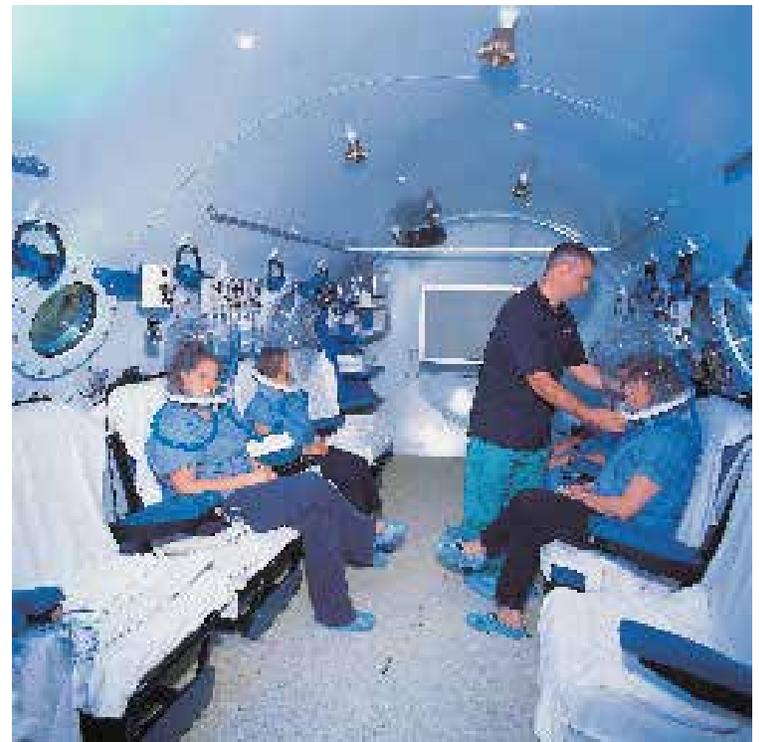
By Tim Kelley

Photos by Leland Holder

Discover How Oxygen Administered as a Drug Can Help Accelerate Healing



(HBO₂) therapy, beyond decompression sickness and carbon monoxide poisoning, is a revelation or an enigma to many physicians. Routinely overlooked in traditional medical training, HBO₂ is a medical embodiment of a diamond in the rough. Despite Medicare, the FDA, commercial insurers, specialty boards and accreditation bodies labeling the therapy “highly effective,” there is still reluctance in the medical field to take full advantage of its benefits.



TRUE or FALSE: When a patient breathes 100 percent oxygen in a pressurized chamber, the elevated air pressure leads to a 10- to 15-fold increase in tissue oxygen content.

The faint memory of Biochemistry class and a bold assessment of oxygen’s ability to give life should have you answering “T.” Even though you answered “true,” do you believe the effects of an adjunctive therapy using oxygen as a drug truly can accelerate healing of chronic wounds, decrease the risk of complications prior to and following certain surgeries, and speed the recovery of soft tissues and bones affected by radiation therapy?

Although the use of air under pressure for medicinal purposes is centuries old, today’s expanded applications for hyperbaric oxygen

Hyperbaric oxygen therapy has been clinically proven to enhance tissue regeneration, heal chronic wounds and increase the efficacy of prescribed surgical and antibiotic treatments. MEDICARE recently expanded its list of covered conditions to include diabetic leg wounds. HyOx’s \$1.4 million, 32-foot by nine-foot chamber helps relieve claustrophobia and tends to put patients at ease.

Currently, medical applications for HBO₂ are progressing as new developments occur in both clinical and academic settings. The New England Journal of Medicine reports HBO₂ as having “a number of beneficial biochemical, cellular and physiologic effects.” Since HBO₂ has been clinically proven to enhance tissue regeneration, heal chronic wounds and increase the efficacy of prescribed surgical and antibiotic

treatments, many specialties have taken note, including orthopedic surgery, oncology, plastic surgery, otolaryngology, oral-maxillofacial surgery, wound care, infectious disease and podiatry.

Using HBO₂ as an adjunct to traditional treatment methods, **patients with diabetic foot wounds, arterial insufficiency, delayed radiation injury, traumatic ischemia, crush injuries and osteomyelitis have been shown to recover faster with little or no side effects.** The evidence-based results are stacking up in HBO₂'s favor and HyOx Medical Treatment Center stands ready as an effective ancillary rehabilitation arm of a referring physician's practice.

Founded in 1999, HyOx Medical Treatment Center is a specialized outpatient facility focused on wound care. HyOx delivers HBO₂ therapy in the region's only multi-patient hyperbaric chamber, the largest in Georgia. HyOx's integrated approach includes physical therapy, respiratory therapy, wound care, social services and HBO₂ in Atlanta's only walk-in hyperbaric chamber. The center is among the nation's first clinical hyperbaric facilities to achieve accreditation from the Undersea and Hyperbaric Medical Society (UHMS), the field's protocol and standard-setting organization.

HyOx's \$1.4 million chamber accommodates up to 12 patients at one time to reap the benefits of 100 percent oxygen delivered to their ischemic, infected and hypoxic tissues, at two to three times the pressure of air at sea level. **During each HBO₂ treatment, the patient's plasma becomes supersaturated with oxygen—increasing blood and tissue oxygen content at the wound site, which in turn, stimulates fibroblast proliferation, accelerates healing, fights infection and controls further damage.**

"We prescribe oxygen as a drug and deliver it in doses according to accepted clinical protocols and the severity of the patient's condition, just like any other medication," said HyOx's Medical Director, Dr. Richard W. King, Jr. The Emory University Medical School graduate was introduced to HBO₂ while serving as an Air Force flight surgeon. In addition to being board-certified in physical medicine and rehabilitation, Dr. King holds a subspecialty certification in undersea and hyperbaric medicine and is a fellow of the American Academy of Disability Evaluating Physicians.



Senior Hyperbaric Technician Shane McKinnon monitors patients from his "mission control" panel, both verbally and visually.

Dr. King acknowledges that the recognized and accepted benefits of HBO₂ treatment are an adjunct to other medical and surgical treatments. "It's not a panacea for everything." Instead Dr. King stresses that the way HyOx delivers HBO₂ therapy in its 12-seat chamber, with a relaxed atmosphere and "on-board" clinicians, makes this type of rehabilitation medicine extremely rewarding and very beneficial to patients for healing chronic wounds and other conditions. (See text box for a list of approved conditions.)

According to Dr. King, the challenge "is to help physicians understand how this therapy can help them achieve improved clinical outcomes for their patients. Although some physicians may have heard how HBO₂ therapy can help accelerate recovery after cosmetic surgery, or hasten the pro athlete's return to the playing field, not everyone recognizes that it can also be beneficial for various acute injuries or chronic conditions."

Medicare recently expanded its list of covered conditions to include diabetic leg wounds that have not responded after an adequate 30-day course of standard wound therapy.

"Medicare's decision to expand coverage reflects the scientific basis of hyperbaric medicine, and the growing acceptance of HBO₂ for selected conditions," added Dr. King.

Indicated Conditions for HBO₂ Therapy

Acute Ischemias

- Acute peripheral arterial insufficiency
- Acute traumatic peripheral ischemia—crush injury, compartment syndrome, reperfusion injury and suturing of severed limbs
- Brown Recluse Spider bites
- Air or gas embolism
- Exceptional blood loss—anemia

Chronic Ischemias

- Diabetic wounds of the lower extremity
- Chronic non-healing wounds
- Compromised skin grafts and flaps

Delayed Radiation Tissue Injuries

- Osteoradionecrosis
- Soft-tissue radionecrosis
- Radiation-induced cystitis, prostatitis and proctitis
- Prophylactic pre- and post-treatment for patients undergoing dental surgery of a radiated jaw (following radiation treatment for head and neck cancer)

Infections

- Chronic refractory osteomyelitis
- Gas gangrene (Clostridial myositis and myonecrosis)
- Progressive necrotizing infections (necrotizing fasciitis), including mixed aerobes and anaerobes
- Refractory actinomycosis and other mycoses

Additional Uses

- Carbon monoxide poisoning
- Cyanide poisoning
- Decompression illness ("the bends")
- Thermal burns

How HBO₂ Works

The air we breathe is made up of 21 percent oxygen. When we breathe air, the body's hemoglobin is almost 100 percent saturated with oxygen. However, an injury such as a crushed limb, traumatic ischemia or the latent effects of radiation therapy can disrupt the flow of oxygen to the cells, depriving them and the surrounding tissue of some or all of the nutrients required to regenerate and heal.

"In the hyperbaric chamber, 100 percent oxygen is delivered under pressure to saturate the patient's tissues," says Dr. King. "The oxygen gets dissolved in the plasma, and is available to the cells in molecular form—what we refer to as a bio-available gas." During each two-hour HBO₂ treatment, buffers latch onto the molecular oxygen, and diffuse by osmosis to cells throughout the patient's body, including tissues that are hypoxic. The oxygen then is slowly released back to the surrounding cells over the next 24 hours. On average, a patient's treatment calls for approximately 30 sessions, but according to Dr. King, "the required course ultimately depends upon the severity of the wound, the responsiveness of the patient and their commitment to consistent treatment sessions."

In addition to supersaturating the plasma, hyperoxygenation promotes new capillary growth and elevates oxygen tensions to meet metabolic needs and heal ischemic tissues. It also promotes white blood cell bactericidal activity by working synergistically with antibiotics, and inhibiting growth of a number of anaerobic and aerobic organisms at the wound site.

HBO₂ also reduces edema by vasoconstriction. The oxygen causes constriction of the blood vessels, thereby decreasing pressure and edema in injured tissues, while still increasing the total amount of oxygen to this area.

Comprehensive Services Round Out HBO₂ Treatment

- In addition to HBO₂, HyOx's services include: respiratory therapy, physical therapy, social services, scuba diving physicals, telephone consultation with physicians and nurses and regular progress reports to referring physicians with accompanying digital photographs showing patient progress.
- HyOx's team includes board-certified physicians, registered nurses, certified hyperbaric technologists, certified wound specialists and physical and respiratory therapists. In addition, off-duty firefighters and paramedics supplement HyOx's full-time clinical and technical personnel.
- HyOx features in-house customer service for insurance verification and precertification.

"Diving" In

The HyOx team calls HBO₂ treatment "taking a dive," since patients are literally taken to the equivalent of 45 feet below sea level to receive the pressurized oxygen. Inside the chamber, respiratory therapists or certified hyperbaric technologists tend to patients on the "dive," as other staff members monitor the procedure from a control panel located just outside. In case of a medical emergency, hands-on treatment can be provided instantaneously without any decompression wait time.

HyOx's chamber is 32 feet long and nine feet wide, accommodating multiple patients, medical personnel and even patients on stretchers. This roomy interior allows patients to stretch their legs, socialize with their comrades, read, watch videos, listen to CDs, snack, and take medications. The spaciousness helps relieve claustrophobia and tends to put patients more at ease. The temperature controlled chamber is also equipped with a restroom and footrests for additional comfort.

HyOx's chamber was engineered and manufactured by Gulf Coast Hyperbarics, a Florida firm whose clients include NASA's Johnson Space Center in Houston. The chamber is made with the same materials used in the construction of high-pressure oil pipelines.

"Initially, some patients are concerned about what happens in the chamber," said HyOx's Executive Director, Thomas Sims, MBA, CHT. "To offset their anxiety, we do a lot of explaining, preparing and training before their first treatment. Once a patient overcomes any fear, the greatest challenge is making sure they clear their ears, just as anyone would do who dives into a backyard swimming pool or flies on a plane, to avoid barotrauma to the ears and sinuses."



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Before a new patient enters the chamber, Dr. King reviews their medical history and conducts a complete evaluation, which may include transcutaneous oxygen measurements to assess the wound's hypoxic state and evaluate the patient's microcirculation. According to Dr. King, "The diagnosis, the symptoms and the patient's overall condition determine our treatment protocol."

Given the viability and effectiveness of HBO₂, the HyOx challenge to physicians is to consider oxygen as a well-prescribed drug and adjunct treatment method. "The truth of the matter," concludes Dr. King, "is when a patient breathes 100 percent oxygen in a pressurized chamber, the treatment they receive helps them on their road to recovery—the same road we as physicians want all our patients to travel."

HyOx Medical Treatment Center is located at 2550 Windy Hill Road, Suite 110, Marietta, GA 30067.

For further information, contact HyOx at (678) 303-3200; connect to www.hyo.com or e-mail info@hyox.com.