

## Hyperbaric Oxygen (HBO) Therapy Process & Applications

### The Process

Hyperbaric Oxygen Therapy is relaxing and painless. The patient lies on a bed enclosed in a clear plastic chamber. The patient and therapist can see one another and communicate through an intercom. The pressure is set to the prescribed level and the chamber is filled with oxygen. The patient will experience a slight sensation of pressure, like that felt in the descent of an airplane. Each session lasts for up to 90 minutes. For comfort, the patient can watch television or listen to the radio during treatment.

The individual requirements of the patient dictate the number of hyperbaric oxygen treatments necessary. For example, treatment for acute carbon monoxide poisoning or bloodless surgery may require only one treatment, while wound healing may require 30-40 treatments. The patient's response to hyperbaric treatment ultimately effects the exact number of treatments.

The Hyperbaric Treatment Center's medical team will work closely with the referring physician to design an individually tailored plan to meet each patient's specific needs. Physicians receive complete documentation and notification of progress. Most insurance companies, including Medicare, cover at least a portion of the costs of hyperbaric therapy.

For a referral to a physician who can discuss hyperbaric oxygen therapy as part of the treatment for your condition or for more information on a specific indication, please call Englewood Hospital and Medical Center's Department of Hyperbaric Medicine: 201-894-3898.

### Applications

**Air Embolism (The Bends):** Hyperbaric Oxygen Therapy has been used to treat divers suffering from air embolism or "bubbles" within the blood stream since the late 1960s. Embolisms can also occur during surgery. HBO compresses the bubbles to between 1/3 and 1/6 the original size, reestablishing uninterrupted circulation. In many cases, the success of HBO depends on rapid diagnosis and treatment.

**Bloodless Surgery:** HBO may also be used prior to and following bloodless surgery to maximize the oxygen carrying capabilities of the blood. Patients who opt for bloodless medicine and surgery do not wish to receive blood transfusions to replace blood lost during surgery. Oxygen is normally carried throughout the body in the red blood cells, which can only be replaced via a transfusion. The high pressure of the HBO chamber forces oxygen into the plasma, or fluid component of the blood. This enables oxygen levels in the body to be maintained even when red blood cells are in short supply.

**Carbon Monoxide (CO) Poisoning:** When a patient inhales a lethal amount of carbon monoxide, the CO migrates directly into the tissues where it attached to and alters proteins. These alterations do not become toxic until the tissues have an inadequate supply of oxygen. Administering oxygen at normal atmospheric pressure does not terminate this process. However, HBO therapy at pressures greater than 2 atmospheres stops cell deterioration.

**Diabetic Ulcers and Hard to Heal Wounds:** HBO therapy's role in stimulating capillary growth and increasing the white blood cells capacity to kill bacteria make it an effective aid in the treatment of

diabetic ulcers and other hard-to-heal wounds. Diabetics are especially susceptible to these ulcers due to poor circulation, low oxygen levels in the blood stream and rigidity of the blood cells.

In addition to increasing the amount of oxygen carried to tissues, HBO therapy also increases glucose and reduces lactose levels, making blood cells more flexible. This allows blood vessels in the body's extremities

**Gas Gangrene:** This familiar disease, caused by loss of blood supply, produces dead tissue accompanied by gas bubbles infected by bacteria that thrive in the absence of oxygen. These bacteria produce deadly toxins that rapidly multiply within the tissues of the body. Before Hyperbaric Oxygen Therapy, the only way to save a patient with gas gangrene from rapid death was to surgically remove the infected area by amputation or disfiguration. HBO inhibits the production of these poisonous toxins, stabilizes the patient, controls the infection and reduces the need for immediate surgery.

**Osteomyelitis:** Chronic bone infections that resist treatment carry high medical costs over the years. In combination with a comprehensive regiment of cleansing, isolation of infection, bone and muscle grafting and antibiotics, HBO can speed the healing process and may also reduce the likelihood of re-infection.

**Radio Necrosis:** HBO therapy represents a new approach to the treatment of wounds caused by radiation therapy. Radiation burns differ considerably from normal wounds. When the body is wounded, the blood flowing from all directions is cut off abruptly, therefore creating a sudden drop in oxygen pressure and sending a message to the brain to send all the infection fighters and healing agents.

In the case of radiation therapy, the pinpoint center of the area being treated receives the greatest amount of damage, while the perimeter receives the least. Since the radiation damage is gradual, the oxygen pressure does not drop abruptly and the brain does not receive the message to send infection fighting and healing agents. When the oxygen pressure is increased by over 10 times during HBO therapy, the brain can then recognize a sudden decline in pressure at the wound site, triggering the healing process. This provides new hope for patients suffering from radiation wounds that are incapable of healing.

**Soft-Tissue Infections:** HBO has also been proven to fight infection from bacteria that need oxygen to survive. Although it may seem that raising oxygen levels would promote the growth of these bacteria, the reverse is true. Simply stated, white blood cells kill bacteria with an "explosion" of oxygen. When oxygen levels are lower than normal due to poor circulation, white blood cells are not strong enough to produce this explosion. HBO not only restores oxygen to the normal level, but "super charges" these cells by delivering oxygen under greater than normal pressure.

**Tissue Flaps and Grafts:** Most tissue flaps and grafts heal readily without HBO. However, when a flap has lost oxygen and is in danger of becoming unsalvageable, HBO can often sustain the flap until the blood flow can be restored. HBO therapy can also significantly increase new capillary growth following surgery.

**Traumatic Crush Injury:** A number of factors contribute to tissue death due to traumatic crush injury. Although a surgeon can repair large blood vessels, crushed micro-vessels (capillaries) cannot be mended. In addition, the affected area may swell, limiting circulation even further. As the oxygen level drops in the tissue, the cells lose their consistency and their ability to regenerate. HBO sends oxygen to greater volumes of tissue, promoting new cell growth. It is vital that crush injury patients receive HBO therapy early, perhaps even before surgery is scheduled.