

Indications: Hyperbaric Oxygen Therapy



From DVM Newsmagazine • April, 2012
Indications for Hyperbaric Oxygen Therapy

Central Nervous System

- * Cranial/spinal chord trauma
- * Cerebral/global ischemia
- * Compressive cord diseases
- * Fibro-cartilagenous emboli
- * Cortical blindness
- * Tetraparesis
- * Peripheral nerve injury
- * Equine protozoal myelitis

Musculoskeletal

- * Athletic injuries
- * Tendonitis
- * Desmitis
- * Periostitis
- * Fracture
- * Laminitis
- * Myositis
- * Crush injuries

Infectious Diseases

- * Osteomyelitis
- * Septic arthritis
- * Septicemia
- * Endotoxemia
- * Blastomycosis
- * Lyme disease
- * Anaerobic infections
- * Intracranial and abdominal abscess

Cardiovascular

- * Hypotension
- * Shock, all causes
- * Cardiac infarction
- * Acute anemia
- * Reperfusion disease
- * Carbon monoxide/cyanide toxicity
- * Smoke inhalation
- * Lymphangitis

Respiratory

- * Exercise induced pulmonary hemorrhage
- * Pleuritis
- * Sinusitis
- * Pulmonary edema
- * Rhodococcus
- * Cutaneous
- * Wounds
- * Thermal burns

Compromised grafts/flaps

- * Envenomation-spider, snake

Gastrointestinal

- * Ileus
- * Pancreatitis
- * Peritonitis
- * Ulcers
- * Reperfusion

Genito-urinary

- * Infertility
- * Pre & post radiation therapy



Mechanisms of Action of HBOT

1. Hyperoxygenation

Breathing 100% oxygen while under 2 – 3 atmospheres of pressure delivers 20 times more oxygen to the tissues than if breathing room air (21%) under normal living conditions. This provides immediate help to ischemic and compromised tissue even with marginal blood flow.

2. Direct Pressure

Oxygen under pressure shrinks the size of gas bubbles leading to reabsorption. This is the mechanism by which HBOT treats arterial gas embolisms and nitrogen in the tissues, caused by diving accidents.

3. Bactericidal and Bacteriostatic

Hyperoxygenation of the tissues enhances the killing of bacteria and is critical in curing deep seated, resistant infections.

4. Vasoconstriction

HBOT vasoconstricts the small vessels in the body, especially in injured tissues. This decreases edema and is important in the treatment of burns, crush injuries and injured tissues in general.

5. Angiogenesis

HBOT creates collateral blood flow, critical to injured tissues. Collateral blood vessels are produced by increased fibroblasts leading to increased collagen. Therefore, in creating new vascularization in ischemic, injured tissues, these new collateral blood vessels are functional as opposed to the collateral blood vessels from hypoxic tissue or ischemic tissue, which are non-functional.

6. Stimulates Superoxide Dismutase (SOD)

Superoxide dismutase is one of the body's main antioxidants and free radical scavengers. HBOT gives critically needed help to compromised, injured tissue

by stimulating the antioxidant, which in turn rids the affected area of the products of inflammation and free radicals.

7. Antibiotic Synergy

HBOT creates synergy with the following antibiotics: fluoroquinolones, aminoglycosides, and amphotericin B. These antibiotics use oxygen to transport across cell membranes.

8. Decreased Lactic Acid

HBOT decreases lactate accumulation on ischemic tissue, which greatly aids healing.

9. Increased Destruction of Anaerobes

HBOT is very effective against anaerobic bacteria that thrives in tissue with not enough oxygen. HBOT facilitates the oxygen-dependent peroxidase system by which leukocytes kill bacteria (Gill and Bell '97)

10. Leukocyte Oxidative Killing

In anaerobic environments (with limited oxygen), the killing capacity of certain white blood cells (leukocytes), is markedly reduced. By providing supplemental oxygen, HBOT supercharges the destructive capacity of these white blood cells, thus allowing more bacteria to be killed (Leach et. al., BMJ)

11. Decrease in Inflammation

HBOT decreases inflammation by several mechanisms. Cytokines and other inflammatory chemicals, including lactic acid, are cleared with HBOT. Oxidative stress markers and C-reactive protein were reduced with HBOT. (Biomedcentral) HBOT stimulates the body's internal antioxidants to help clear inflammation.

12. Increases Stem Cells

In response to HBOT, stem cells move out of the bone marrow to sites with inflammation at more than eight times normal levels.