THE FDA APPROVED HBOT INDICATIONS IN VETERINARY MEDICINE AND BEYOND…

presented by

Andrew Turkell, DVM, CVA, CCRT, CHT-V
I have affiliations with Calusa Veterinary Emergency & Hyperbaric Center and Hyperbaric Veterinary Medicine (hvm)

I have no affiliations or financial interests with any book publications featured in this presentation. All references are shown as part of the educational learning.
## Conditions Treated With Hyperbaric Therapy:

### FDA Approved Conditions

- Actinomycosis
- Air or Gas Embolism
- Carbon Monoxide Poisoning and Smoke Inhalation
- Gas Gangrene
- Cyanide poisoning
- Crush Injury and other Acute Traumatic Ischemias
- Decompression Sickness
- Diabetic Wounds
- Necrotizing Soft Tissue Infections
- Osteomyelitis (Refractory)
- Radiation Tissue Damage
- Severe Anemia
- Skin Grafts and Flaps (Compromised)
- Thermal Burns

### Off Label Conditions

- ADD/ADHD
- ALS
- Alzheimer’s
- Anoxic Brain Injury
- Autism
- Bell’s Palsy
- Cancer
- Cerebral Palsy
- Chronic Fatigue
- Chronic Inflammatory Disease
- Crohn’s disease
- Decreased Immune Function
- Diabetes
- Fibromyalgia
- General Wellness/ Prevention
- Heart Disease
- Infections
- Immune Dysfunction
- Lyme Disease
- Macula Degeneration
- Meniere’s Disease
- Migraines
- Mitochondrial Disorders
- Multiple Sclerosis
- Near Drowning
- Peripheral Neuropathy
- Post Electrocution
- Raynaud’s Phenomenon
- Reflex Sympathetic Dystrophy
- Retinitis Pigmentosa
- Rheumatoid Arthritis
- Severed Limbs
- Sickle Cell Crisis
- Spinal Cord Injury
- Sports Injuries
- Stroke
- Surgery Pre and Post
- Traumatic Brain Injury
- Trigeminal Neuralgia
- Vascular Disease
- Venomous Bites

And other conditions

[www.completemedicalequipments.in](http://www.completemedicalequipments.in)
Double blinded placebo controlled studies along with evidenced based scientific reviews have been published on the efficacy of HBOT and case studies are abundant.
Clinical applications are described in major veterinary texts.

Vet Book Chapters on HBOT

Ettinger’s Textbook on Veterinary Internal Medicine

Bonagura’s Current Veterinary Therapy XV
HBOT and its role in the therapy of human infectious diseases is described at length in the Emergency Medical Clinics of North America.
Kaide concluded with the statement “in his opinion withholding HBOT because of a lack of randomized trials in the face of a huge body of clinical experience and invitro studies, especially in these devastating disease processes would be bordering on unethical and malpractice.”
SO MAYBE IT’S TIME TO ADD HYPERBARICS TO YOUR PRACTICE?
HBOT, therefore enhances:

REPAIR
REGENERATION
HEALING
FUNCTION
Here’s WHAT the 14 FDA approved HBOT TREATMENTS look like in veterinary medicine...
HBOT FOR AIR EMBOLISM

YES, THIS IS AN AIR EMBOLISM...THERE IS AIR IN THE CRANIAL VENA CAVA, THE RIGHT SIDE OF THE HEART AND IN THE LIVER.
HBOT FOR CARBON MONOXIDE POISONING

CO Poisoning, cyanide poisoning, methylene chloride poisoning.
Carbon Monoxide

- Most common cause of deaths from acute poisoning
- Generated by incomplete combustion of carbon-containing (organic) products
- Most fatalities result from fires
- Stoves, portable heaters, and automobile exhaust cause approximately one third of deaths
HBOT FOR GAS GANGRENE

Clostridial Myositis and myo-necrosis
Lateral view of the left hind limb after removal of hair on initial examination. Note the soft tissue swelling and discoloration of the skin into dark-red color at the caudal aspect of the thigh (The site of the intramuscular injection).
HBOT FOR CRUSH INJURY

Acute ischemia, usually caused by HBC’s and bite wounds…

We see these everyday!!!!!!
BUT THESE ARE CRUSH INJURIES ALSO!!!
HBOT FOR DECOMPRESSION DISEASE
HBOT FOR ARTERIAL INSUFFICIENCIES

Problem wounds
HBOT FOR SEVERE ANEMIA AND ACUTE BLOOD LOSS
HBOT AND INTRACRANIAL ABSCESS AND TRAUMATIC BRAIN INJURY (TBI)

An accumulation of infected material, these abscesses of the brain are common in patients with trauma.
THIS 5 YEAR OLD CHIHUAHUA WAS BITTEN IN THE HEAD BY ANOTHER DOG
HBOT FOR NECROTIZING SOFT TISSUE INFECTIONS

Could be from “flesh eating bacteria” that usually progress rapidly…
HBOT FOR OSTEOMYELITIS

Chronic bone infections that resist standard treatment.
OSTEOGENESIS IS ENHANCED POSTOPERATIVELY AFTER BONE LOSS DUE TO TOOTH ROOT ABSCESSSES
HBOT FOR POST RADIONECROSIS
Radio-Therapy can induce normal tissue complications in the radiation treatment field. These will benefit from HBOT!
HBOT FOR COMPROMISED SKIN GRAFTS AND FLAPS
HBOT FOR THERMAL BURN INJURY
HBOT FOR IDIOPATHIC SUDDEN SENSORINEURAL HEARING LOSS
The following indications have been introduced due to a growing body of evidence in support of using HBOT . . .
STROKE

In a review of 122 patients the American Stroke Association suggests that a significant number of our patients with completed stroke may benefit from HBOT.”
STROKE

There have been more than 30 human studies showing that HBOT can minimize injury and improve outcome if used shortly after a stroke. Other research shows that it can improve function even years after a stroke—particularly in patients who had strokes that don’t involve paralysis.

So why not use HBOT

Heat Stroke
Spinal Cord Stroke (FCE)
Vestibular Disease
Cerebrovascular accidents (CVA)
Transient Ischemic Attacks
HYPERBARIC OXYGEN TREATMENT IN POSTOPERATIVE NEUROSURGICAL INFECTIONS AND POST GENERAL NEUROSURGERY
Objective: To evaluate the clinical usefulness of hyperbaric oxygen therapy for neurosurgical infections after craniotomy or laminectomy

Conclusion: HBOT is a safe, powerful treatment for postoperative cranial and spinal wound infections and should be included in the neurosurgical armamentarium.
Hyperbaric Oxygen Treatment for Inflammatory bowel disease: a systemic review analysis

Rossignol Review 2012

Thirteen studies of HBOT in Crohn’s disease and 6 studies in ulcerative colitis were identified. In all studies participants had severe disease refractory to standard medical treatments, including corticosteroids, immunomodulators and anti-inflammatory medications. In Crohn’s disease 31/40 (78%) had clinical improvements with HBOT, while all 39 patients with ulcerative colitis improved.

Daniel Rossignol

Conclusions: HBOT lowered markers of inflammation and oxidative stress and ameliorated IBD in both human and animal studies. Most treated patients were refractory to standard medical treatments.
Hyperbaric Oxygen Therapy as a treatment for age-1 avascular necrosis of the femoral head

In Veterinary Medicine this is Legg Calve Perthes Disease.

The Journal of Bone and Joint Surgery, N.D.Reis, et.al. Rambam Medical Center, Haifa, Israel.

Avascular necrosis (AVN) is a potentially crippling disease affecting mainly young adults. This study selected 12 patients suffering from Steinberg stage-1 AVN of the femoral head whose lesions were 4 mm thick or more. 81% of the patients who received HBOT showed a return to normal on MRI compared to 17% in the untreated group.
Potential Effects of Hyperbaric Oxygen Therapy in Acute Pancreatitis

Christine Cuthbertson, et.al. 
University of Melbourne, Australia

Object: To extract from published reports the effects of HBOT on inflammatory disease, in particular acute pancreatitis.

Conclusions: Acute pancreatitis impairs the pancreatic and systemic microcirculation and causes acute inflammation (20-30% develop pancreatic necrosis). These processes are potentially improved by HBO therapy.
Hyperbaric Oxygen: Its application in cardiology: a historical perspective and personal journey

After encouraging animal work, HBO therapy was used in conjunction with thrombolytics to reduce the magnitude of injury in patients with acute myocardial infarction. The benefit is probably due to the decrease in reperfusion injury, which has been shown to be a major cause of myocardial cell death when the culprit artery is opened with a catheter.
AND DECREASED ISCHEMIA IN YOUR POST OF GDV PATIENTS
Reflections on the neurotherapeutic effects of hyperbaric oxygen

Shai Efrati and Eshel Ben-Jacob, Sackler School of Medicine and Tel-Aviv University 2014

Traumatic brain injury (TBI) and stroke are the major causes of brain damage and chronic neurological impairments. There is no agreed-upon effective metabolic intervention for TBI and stroke patients with chronic neurological dysfunction. Clinical studies published this year present convincing evidence that hyperbaric oxygen therapy (HBOT) might be the coveted neurotherapeutic method for brain repair.
To supplement the previous reviews, we have summarized the work performed on HBO and cancer in the period 2004–2012. Based on the present as well as previous reviews, there is no evidence indicating that HBO neither acts as a stimulator of tumor growth nor as an enhancer of recurrence. On the other hand, there is evidence that implies that HBO might have tumor-inhibitory effects in certain cancer subtypes, and we thus strongly believe that we need to expand our knowledge on the effect and the mechanisms behind tumor oxygenation.
LYME DISEASE

The purpose of this study was to determine if hyperbaric oxygen therapy affected Lyme disease caused by the spirochete, Borrelia burgdorferi. Ninety-one subjects completed a total of 1,995 hyperbaric oxygen treatments. Although additional statistical evaluation still is being carried out, it appears that approximately 84.8% of those treated showed significant improvement by a decrease or elimination of symptoms.

Fife, William P; Freeman, DM. "Treatment of Lyme disease with hyperbaric oxygen therapy"
Stem Cell Mobilization by Hyperbaric Oxygen

Steven Thom, et.al. 2005
University of Pennsylvania Medical Center, Philadelphia, PA.

In over a course of 20 HBOT treatments, circulating CD-34 cells increased eightfold.

It was concluded that HBOT mobilizes stem/progenitor cells by stimulating nitric oxide synthesis.
Core policy’s now includes: bone marrow transplants, colloidal silver treatments, gold seed therapy, herbal therapy, hyperbaric oxygen therapy, kidney transplants, platelet rich plasma injections, polyethylene glycol medication, shockwave therapy, and stem cell therapy.
Trupanion Announces Major Pet Insurance Policy Enhancements

SEATTLE, WA/March 8, 2013 — Trupanion, a leading provider of pet insurance, today announced several policy enhancements that help maintain their distinction as the pet insurance provider with the most comprehensive accident and illness coverage in North America. These enhancements were made based on data and direct feedback from pet owners and the veterinary community.
Trupanion’s only additional health care rider – the “Additional Care Package” – has been enhanced to include the following 17 modalities: acupuncture, behavioral modification, bone marrow transplants, chiropractic, colloidal silver treatments, gold seed therapy, herbal therapy, homeopathy, hydrotherapy, hyperbaric oxygen therapy, kidney transplants, naturopathy, physical/rehabilitative therapy, platelet rich plasma injections, polyethylene glycol medication, shock-wave therapy, and stem cell therapy.
All veterinary-recommended treatments will be covered with no financial limits, making it simple for both pet owners and veterinarians to understand.
top 10 most extraordinary treatments covered

conditions:
skin infection secondary to g-tube placement for intestinal lymphoma

years insured: 5
claims: 105

treatment:
hyperbaric oxygen chamber

amount reimbursed:
$29,946.41

Spooky, Domestic Shorthair

Spooky was diagnosed with intestinal lymphoma after her pet parent noticed she was reluctant to eat. During chemotherapy treatments, Spooky became anorexic and a g-tube was placed. Spooky developed an infection at the tube site that was resistant to antibiotic therapy. The vet recommended hyperbaric oxygen chamber treatment, and 20 treatments were planned to treat the draining fistula/g-tube site infection.
Rattlesnake Bites: Pre HBOT

After 12 HBOT Tx
BEFORE & AFTER PHOTOS
Bite and Kidney: Post Debridement – Pre HBOT

After 17 HBOT Tx
Thermal Burn: Post Debridement – Pre HBOT

After 30 HBOT Tx
Envenomation:
After 1\textsuperscript{st} HBOT Tx

4 Days After 5th HBOT Tx
Chemical Burn: Pre HBOT

After 35 HBOT Tx
Deep Dog Bite Wounds: Pre HBOT

After 15 HBOT Tx
Necrotic Wound prior to HBOT

After 5 HBOT TX’s - 6 days later
Presenting HBC 6 days ago

After 5 HBOT TX’s over 7 days
Chronic non-healing wound

After 5 HBOT TX’s- 7 days
WHAT ELSE CAN WE TREAT?

300LB Loggerhead Turtle with Chronic Osteomyelitis of Flipper

Eagle with Aspergillosis Infection
Guinea pig on presentation after limb FX and resulting tissue necrosis.

After final HBOT TX – 5 TX’s over 8 days.
BEFORE & AFTER PHOTOS

Guinea Pig before

Guinea Pig after
Equine shoulder wound 2 days after insult - prior to HBOT

18 days later - 10 TX’s daily then 4 EOD = total 14 HBOT TX’s
Nail in foot- fungal osteomyelitis blastomycosis

Prior to nail removal and HBOT
During HBOT TX (after session #3)

After 8 HBOT sessions - returned to the show ring.
Thermal burns on presentation - 24 hrs. after insult

After 5 HBOT TX’s – over 5 days
NEW CREDENTIALS

The national Board of Diving and Hyperbaric Medical Technology,

The organization designed to meet the clinical, technical, and safety needs of the discipline of undersea and hyperbaric medicine now offers a certification called CHT-V

CERTIFIED HYPERBARIC TECHNOLOGIST

VETERINARY!
Food for thought,

A discussion to nourish your mind…
And bring new ideas to your practice.