HBOT & Inflammation

1. The Benefits of HBOT for Inflammation

**Inflammation: The Root of All Disease?**
Hay fever, heart disease, depression, and diabetes...four very different conditions with one common denominator: Inflammation is at the root of all four. And that's just the beginning! "Researchers are linking inflammation to an ever-wider array of chronic illnesses," reports Newsweek's Anne Underwood. "Suddenly medical puzzles seem to be fitting together, such as why hypertension puts patients at increased risk of Alzheimer's, or why rheumatoid-arthritis sufferers have higher rates of sudden cardiac death. They're all connected on some fundamental level." Even our crow's feet and laugh lines are due to an inflammatory process in the skin! Celebrity anti-aging doctor Dr. Nicholas Perricone (The Perricone Weight Loss Diet, The Wrinkle Cure) considers inflammation "the single most powerful cause of the signs of aging.

*What can be done to prevent and reverse the damage caused by systemic inflammation?*

Healthy lifestyle habits such as exercising regularly, not smoking, maintaining a healthy weight, and minimizing stress all help to reduce inflammation. But the most important factors in fighting inflammation are the food you eat every day and the amount of oxygen you get.

That's why all the experts, from diet doctor Barry Sears (The Zone) to alternative medicine guru Andrew Weil Healthy Aging) and Hyperbaric Oxygen Therapy (HBOT) specialist Dr. Paul Harch (The Oxygen Revolution) recommend an anti-inflammatory diet and HBOT for everything from weight loss to heart disease prevention. Says Dr. Harch, “The benefits of reducing inflammation via HBOT are immediate, as well as long term. You'll notice that your skin looks younger, your joints feel better, and your symptoms improve. At the same time, when you reduce inflammation, you also reduce your risk of heart disease, Alzheimer's disease, cancer, osteoporosis, diabetes, and other complications of aging.”

Experts now agree that HBOT is quickly becoming one of the treatments of choice reported to invoke a strong anti-inflammatory response and has been shown to improve immune function. There is evidence that oxidative stress can be reduced with HBOT through the up-regulation of antioxidant enzymes. HBOT can also increase the function and production of mitochondria and improve neurotransmitter abnormalities. In addition, HBOT up-regulates enzymes that can help with detoxification problems. Finally, HBOT has been shown to mobilize stem cells from the bone marrow to the systemic circulation. Recent studies in humans have shown that stem cells can enter the brain and form new neurons, astrocytes, and microglia. It is expected that amelioration of these underlying patho-physiological problems through the use of HBOT will lead to improvements in the health of both children and adults.

2. HBOT for Traumatic Brain Injury

HBOT has been shown to decrease swelling, repair the metabolic injury to the cell and cable, and stop the inflammation in acute brain injuries with just a few treatments in the first 72 hours after injury. It is the only drug known to break the vicious cycle. Once the vicious cycle is broken neurological function is
restored and patients survive. This is what has been shown in multiple scientific studies beginning in the 1970s in Germany.

If HBOT is not used early on in traumatic injury, the injury "matures" as inflammation runs its course. Since inflammation is "stereotypic" or identical regardless of where in the body it occurs, the inflammatory reaction is like playing a videotape or DVD. It is the same process, the same story every time, everywhere. The net result is nearly identical chronic wounds by the time the wound is 6 months to 1 year old. At this point, the wound resembles any other wound in the body that HBOT has been shown to treat. It's just that it is in the brain.

This is what Dr. Harch showed in the 1990s and beyond, and what Dr. Neubauer also showed at the same time, treating a vast range of brain injuries. Eventually, this experience in humans with chronic brain injuries was duplicated in an animal model that was published by Dr. Harch in October 2007 (Brain Research, 2007; 1174:120-9). It is the first demonstration in the history of science of improvement of chronic brain injury in animals. And, it was done using the original protocol of HBOT Dr. Harch developed in 1990. Today, variations on this protocol are being applied to chronic brain injury worldwide with reproducible results.

3. The effects of hyperbaric oxygen therapy on oxidative stress, inflammation, and symptoms in children with autism: an open-label pilot study

Background
Recently, hyperbaric oxygen therapy (HBOT) has increased in popularity as a treatment for autism. Numerous studies document oxidative stress and inflammation in individuals with autism; both of these conditions have demonstrated improvement with HBOT, along with enhancement of neurological function and cognitive performance. In this study, children with autism were treated with HBOT at atmospheric pressures and oxygen concentrations in current use for this condition. Changes in markers of oxidative stress and inflammation were measured. The children were evaluated to determine clinical effects and safety.

Methods
Eighteen children with autism, ages 3-16 years, underwent 40 hyperbaric sessions of 45 minutes duration each at either 1.5 atmospheres (atm) and 100% oxygen, or at 1.3 atm and 24% oxygen. Measurements of C-reactive protein (CRP) and markers of oxidative stress, including plasma oxidized glutathione (GSSG), were assessed by fasting blood draws collected before and after the 40 treatments. Changes in clinical symptoms, as rated by parents, were also assessed. The children were closely monitored for potential adverse effects.

Results
At the endpoint of 40 hyperbaric sessions, neither group demonstrated statistically significant changes in mean plasma GSSG levels, indicating intracellular oxidative stress appears unaffected by either regimen. A trend towards improvement in mean CRP was present in both groups; the largest improvements were observed in children with initially higher elevations in CRP. When all 18 children were pooled, a significant improvement in CRP was found (p = 0.021). Pre- and post-parental observations indicated statistically significant improvements in both groups, including motivation, speech, and cognitive awareness (p < 0.05). No major adverse events were observed.
**Conclusion**

In this prospective pilot study of children with autism, HBOT at a maximum pressure of 1.5 atm with up to 100% oxygen was safe and well tolerated. HBOT did not appreciably worsen oxidative stress and significantly decreased inflammation as measured by CRP levels. Parental observations support anecdotal accounts of improvement in several domains of autism. However, since this was an open-label study, definitive statements regarding the efficacy of HBOT for the treatment of individuals with autism must await results from double-blind, controlled trials.