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HYPERBARIC OXYGEN THERAPY

By *Editor*

Posted May 5, 2015

In *Anti-Aging*, *Geriatrics*

A NOVEL TREATMENT FOR THE AGING PATIENT

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As a large percentage of the American population continues to reach older age, many of these individuals will experience a decline in quality of life and a concomitant progression of chronic illness. The incidence of many chronic and sometimes preventable diseases increases with age. These include cardiovascular disease, stroke, diabetes, cancer, arthritis, endocrine disorders, and dementia. Aging is a natural and inevitable part of life, but the progression of disease does not have to be. As naturopathic physicians, it is our duty to continue to seek out treatments that may be of benefit to prevent, slow the onset of, or reverse the aging process.

While nutrition and lifestyle management and other naturopathic modalities will continue to be the cornerstones of how we treat our patients in the future, one treatment that has only recently garnered attention for its ability to assist in reducing disease and to slow aging is hyperbaric oxygen therapy (HBOT).

HYPERBARIC OXYGEN THERAPY

HBOT is a treatment in which a person breathes in either 100% oxygen or ambient air, while exposed to increased atmospheric pressure. This takes place in a hyperbaric chamber – an enclosed unit that can either accommodate a single person (a mono-place chamber) or between 2 and 14 patients (a multi-place chamber). Pressures applied while in the chamber usually range from 1.3 to 3 atmospheres absolute (ATA). Any pressure above sea level, or 1 ATA, is considered to be hyperbaric. For ambient air chambers, the pressure forcing oxygen into the body is truly what performs the "magic" during this therapy. Chambers that are able to achieve higher pressures and deliver pure oxygen provide an advantage by increasing oxygen saturation and absorption throughout the body. Even chambers that are considered "mild" hyperbaric chambers, ie, those that apply a pressure between 1.3 and 1.5 ATA, are still widely recognized as a viable treatment option when chambers with a higher pressure are unavailable. Most mild hyperbaric oxygen chambers are found in standalone medical offices, such as in a naturopathic doctor's office, while chambers that apply a pressure anywhere from 1.7 to 3 ATA are found mostly in hospital settings throughout the world.

The origins and development of hyperbaric medicine are closely tied to the history of diving medicine, and the first documented use of HBOT actually precedes the discovery of oxygen itself. In the 1600s, the British physician and priest, Nathaniel Henshaw, developed an air-tight room called a "domicilium," in which variable climatic and pressure conditions could be produced, with pressure provided by a large pair of bellows. He stated that "In times of good health this domicilium is proposed as a good expedient to help digestion, to promote insensible respiration, to facilitate breathing and expectoration, and consequently, of excellent use for the prevention of most afflictions of the lungs."[1]

Since Henshaw's time, hyperbaric chambers certainly have come a long way. Advancements in hyperbaric medicine and clinical research in the field continue to demonstrate countless benefits of HBOT for patients. HBOT has traditionally been used primarily to treat cases of decompression sickness and has also shown phenomenal results in assisting in wound repair due to burns, diabetes, or crush injuries. More recently, HBOT has also shown promise as a

standalone treatment for many other diseases and conditions. These include stroke and other cardiovascular diseases, Parkinson's disease, multiple sclerosis, autism, chronic fatigue syndrome, fibromyalgia, Lyme disease, Crohn's disease, ulcerative colitis, and cancer.

While HBOT's role in preventing and treating the aforementioned diseases has been extensively studied, there is a dearth of literature explaining its capacity to treat the aging patient without any evident pathology – more for an "anti-aging" purpose. It can easily be argued that most aging patients who are seen by naturopathic physicians would like to have more energy or vitality, improve their memory and brain function, reduce inflammation and/or pain, and improve their circulation. HBOT certainly has the potential to benefit patients in each of these areas. The following sections will discuss HBOT's role in energy production, cerebral perfusion, and inflammation reduction.

ENERGY PRODUCTION

Within the human body, energy, in the form of ATP, is generated from the food that we eat on a daily basis. This takes place mostly in the mitochondria, sometimes dubbed the "energy powerhouse" of the cell. Inside the mitochondria, the Kreb's citric acid cycle and the electron transport chain (ETC) help to produce some 30 molecules of ATP per glucose molecule ingested. This ATP alone constitutes the main cellular energy packets used for all life processes.[2]
More importantly, to generate ATP adequately, the ETC uses most of the oxygen that we inhale. As we age, however, our bodies become more hypoxic, lacking the vital oxygen that is necessary to perfuse mitochondria; this results in lower amounts of ATP generated.

It can stand to be reasoned that many cases of age-related fatigue and lowered vitality are a direct result of these hypoxic conditions and reduced mitochondrial energy-producing capability. Chronic fatigue syndrome (CFS), with a typical onset being later in life, is an illness characterized by medically unexplained fatigue lasting at least 6 months and accompanied by infectious, rheumatological, and/or neuropsychiatric symptoms. It has been demonstrated that individuals with CFS suffer from great mitochondrial dysfunction with the degree of dysfunction and severity of the illness being strongly correlated.[2] Moreover, hypoxia has been shown to impair mitochondrial function and diminish ATP production in other disease states. Since only 0.3% of all inhaled oxygen is ultimately delivered to the mitochondria,[3] increasing the oxygen delivery to the mitochondria by HBOT may actually

improve mitochondrial function and improve age-related fatigue. In animal studies, HBOT (in comparison to room air pressure and oxygen levels) has been shown to increase the amount of work done by mitochondria, improve mitochondrial function after brain injury, and prevent mitochondrial deterioration.[4]

Despite its importance, mitochondrial dysfunction is only 1 plausible explanation for age-related fatigue. Nutritional, lifestyle, endocrinological and cardiovascular factors should also be considered to explain an aging person's energy decline. With that being said, most patients can benefit from HBOT, and the therapy could be considered to help any degree of fatigue, from mild to even the most severe forms, seen in CFS.

CEREBRAL PERFUSION

Undoubtedly, the brain is one of the most important vital organs in the human body. With increasing age, the brain's weight and volume both decrease. Atrophy of the brain mostly involves the grey matter, which has been shown in research using computed tomography (CT) imaging. Subsequent to atrophy of the grey matter, cerebral blood flow has been reported to decline with advancing age.[1] Restoring brain function is one of the many important goals of HBOT in aging patients. With improved brain function, many age-related symptoms such as memory decline, confusion, disorientation, dizziness, headaches, or tinnitus may be corrected. HBOT has also been used extensively over the last 50 years as a primary or adjunctive therapy, and in both experimental and clinical studies to treat stroke and other types of insults to the brain, such as encephalopathy, carbon monoxide poisoning, cerebral air embolism, and acute spinal cord injury. Unfortunately, it does not appear that patients with Alzheimer's disease are responsive to HBOT.[5]

In the United States, there are more than 700 000 documented cases of stroke each year, with about 80% of these due to focal cerebral ischemia as a result of interruption of blood flow to brain tissue.[6] During focal ischemia, the ischemic core is thought to be surrounded by an area that is viable, yet non-functioning, called an "ischemic penumbra." Neuronal cells in this area might be salvaged with appropriately timed and adequate therapy.[7] HBOT may restore function in areas of the brain that are hypoxic and primarily vascular in origin, even in cases with onset up to a decade prior to treatment. Single photon emission computed tomography (SPECT) scans are helpful in determining rates of blood perfusion and metabolic changes in regions impacted by stroke, and can provide prognostic clues before, during, and after HBOT therapy.[5]

There are many case reports documenting HBOT's efficacy in improving brain function. One such case, reported by Dr Richard Neubauer, a pioneer in hyperbaric medicine, involved a 70-year-old woman who had a 1-year history of confusion, forgetfulness, agitation, and inability to live alone. A SPECT scan showed that the patient did not have Alzheimer's disease but had hypoperfusion in the frontal and temporal lobes. After just 3 treatments, her SPECT scan had improved dramatically, and after just 20 treatments the patient returned to a perfectly normal lifestyle and work as a minister.[5]

Clearly, HBOT can help to treat and reverse damage caused by a variety of insults to the brain. It also has the potential to be a great adjunctive or standalone treatment in improving brain function in aging patients. Most research has documented the use of higher pressures in treating patients with recent stroke. The use of mild hyperbaric chambers (1.3-1.5 ATA) has also been reported to positively affect hypoxic or damaged brain tissue.

INFLAMMATION

Inflammation is now widely regarded as the precursor to a wide array of diseases. Anti-inflammatory diets, restoring the gastrointestinal mucosal barrier in leaky gut, and improving the intestinal microbiome are all naturopathic cornerstones to help reduce inflammation. HBOT also has the potential to reverse inflammation and prevent disease. Inflammatory bowel disease is a chronic inflammatory disease of the GI tract characterized by chronic and recurrent ulcerations, and includes both Crohn's disease and ulcerative colitis.[8] Activated macrophages appear to play a key role in the disease process and produce inflammatory cytokines, including TNFα and interleukin (IL)-6 and IL-8. A recent meta-analysis of 19 studies demonstrated clinical improvement in both Crohn's disease (78% of patients) and ulcerative colitis (100% of patients) after HBOT.[8] Significant decreases in proinflammatory cytokines (IL-1, IL-6, TNFα) were also demonstrated in the patients with Crohn's, and a decrease in IL-6 in ulcerative colitis patients undergoing HBOT.

Arthritis, another inflammatory disease, affects nearly 1 out of 5 adults in the United States. Individuals with arthritis suffer from great pain, disability, and decreased quality of life. Animal studies have demonstrated HBOT's ability to significantly reduce joint inflammation and sensitivity to pain. HBOT was equally as effective as aspirin in reducing both parameters.[9] The anti-inflammatory benefit seen in animal studies certainly proves hopeful for arthritis sufferers.

While IBD and arthritis are only 2 diseases with inflammation at their roots, HBOT should be considered to treat any inflammatory disease, commonly found in aging.

POTENTIAL SIDE EFFECTS OF HBOT

The benefits of HBOT are clearly numerous, and fortunately HBOT is considered a safe treatment for most people. One of the biggest concerns with HBOT is otic barotrauma. With heightened pressure in a hyperbaric chamber, this could lead to increased pressure and pain in the inner ear. The pain usually resolves once the chamber has completed its pressurization phase. In a mild hyperbaric chamber, this usually takes roughly 4-5 minutes. There have been instances where the pressure in the inner ear does not resolve, and to risk any further damage, the treatment is discontinued. Another potential risk is increased seizure activity in those who suffer from epilepsy. Although HBOT has been used to treat seizures, it may also activate a seizure. Absolute contraindications to receiving HBOT are individuals with compressive brain lesions, first trimester pregnancy, or patients with an active head cold. Other things to look out for with HBOT include reduced blood sugar in diabetics, pulmonary hyperexpansion, and a detox (or “die-off”) reaction.

CONCLUSION

Hyperbaric medicine is at the forefront of a growing trend by Americans seeking out alternative therapies to prevent and treat illness. As the US population continues to get a little older, HBOT certainly has the potential to provide a great boost to naturopathic doctors who wish to maximize clinical outcomes and help their patients have more energy, improve brain function, reduce inflammation, and feel and look better as they age.

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replacement therapy, clinical nutrition, IV nutritional therapy, acupuncture, and hyperbaric oxygen to help his patients. Dr Cavaiola also enjoys supervising medical students at SCNM and is an adjunct professor at Rio Salado College where he teaches Introduction to Human Nutrition.

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https://bodyecology.com/articles/the-world's-best-healing-agent-oxygen-the-secret-to-anti-aging

The World's Best Healing Agent: Oxygen, the Secret to Anti-Aging

From professional athletes to actresses, autistic children to Alzheimer's patients, one treatment is having fantastic results. What is Hyperbaric Oxygen Therapy? Almost 20 years ago, we saw its potential emerge.

When cells do not receive enough oxygen, they slowly begin to malfunction and die.

In 1998, a Scottish physician from the University of Dundee reported that the same high-pressure hyperbaric chambers used to prevent decompression sickness in deep sea divers could serve another purpose — preventing permanent damage to the spinal cord and even paralysis in cases of spinal cord injury. Raising oxygen levels in the damaged nerve tissue to normal levels could aid in recovery, Dr. Philip James said.[i] In 2013, specialists at Israel's Assaf Harofeh Medical Center

using hyperbaric oxygen treatments noted remarkable improvements in brain function, up to 20 years after a patient suffered a stroke.[2]

In the past two decades, as the popularity of Hyperbaric Oxygen Therapy has increased, celebrities like Keanu Reeves, John Travolta, and Kirstie Alley have made headlines for using the treatment. Michael Jackson was even reported to have kept a $125,000 hyperbaric oxygen chamber in his home as his own "Fountain of Youth."[3]

IF WE COULD TURN BACK TIME

We are so dependent on oxygen that each blood cell is equipped with 280 million molecules of hemoglobin. In red blood cells, hemoglobin is what binds to oxygen, carrying it through the body and delivering it to cells. As the source of life, oxygen may be more important than we first realized — new geological studies that emerged from Western Greenland in 2016 revealed that oxygen may have been present in our atmosphere up to 0.8 billion years *earlier* than scientists previously estimated.[4] It took 100 million years for the oxygen supply in the oceans and atmosphere to rise to a level that could sustain all animal life on earth, occurring only 600 million years ago.[5]

Oxygen's role as a life-giver in our universe is fascinating, and we can see the same effect, on a smaller scale, inside the human body. When tissue in the body becomes damaged, it is unable to receive full support from surrounding blood vessels. This could happen in the brain, in the muscle tissue, in the joints, or in the organs.

When we age, when our skin begins to sag, and when we develop wrinkles, there is less blood flow to the skin and less cellular support.

When our hair begins to thin, and when our hands and feet are always cold, this is an indication that the body's vascular system is not able to fully nourish each and every cell. When our memory begins to fail, especially if there has ever been a head trauma in the past, this is because there are places in the brain that are not receiving the support they need.

Oxygen is the anti-aging secret.

Many anti-aging protocols focus on mitochondrial health. The mitochondria are found in our cells, and they are responsible for creating usable cellular energy. This process requires oxygen! The body literally uses oxygen to fuel itself.

As researchers from the Universities of Bristol and St. Andrews discovered in 2009, a healthy flow of oxygen that supports healthy circulation in the body can have a direct effect on the health of the skin. Researchers observed that the color of a person's skin determines how healthy — and

how attractive — they look, with many changes in skin tone related to diet. Skin that was flushed and full of oxygen was linked to a stronger heart and lungs, solidifying that rosier skin may indeed appear healthier.

"We knew from our previous work that people who have more blood and more oxygen color in their skins looked healthy, and so we decided to see what other colors affect health perceptions," Dr. Ian Stephen, a researcher from the University of Bristol, said.[6] "In the West, we often think that sun tanning is the best way to improve the color of your skin, but our research suggests that living a healthy lifestyle with a good diet might actually be better."

It turns out that as we age, our cells become progressively starved of nutrients. This could be because of diet, lifestyle, or other stress factors. As this happens, the number of mitochondria in each cell decreases. Our cells fail to thrive. When we supply oxygen to our cells and to the mitochondria, this can, in a very literal sense, stoke the cellular fire. We become healthier, we have more energy, and our cells are more productive and efficient. This may manifest as changes in health or changes in the color or texture of the skin.

WHAT IS HYPERBARIC OXYGEN THERAPY?

Hyperbaric Oxygen Therapy (HBOT) delivers oxygen to your body where you need it most.

Just because you breathe in enough oxygen to survive, it does not mean that your joints or your organs are receiving enough oxygen to function properly. Remember, when cells do not receive enough oxygen, they slowly begin to malfunction and die.

Hyperbaric Oxygen Therapy takes place in a high-pressure, oxygen-rich chamber. This therapy, which is FDA-approved and in some cases even covered by insurance companies, can transform a person's health. This is because HBOT bathes the cells in the body with oxygen. The chamber is pressurized, and oxygen easily enters into the body.

Body Ecology was able to discuss the benefits of HBOT with Maya Volk of Global Hyperbaric, whose center documents tremendous results on a wide array of health challenges.

Maya references Dr. Gunnar Heuser's research on the efficacy of HBOT, which can help:

- Speed up the healing process after an injury or surgery.
- Aid in recovery after stroke or a traumatic brain injury.
- Ease arthritic pain.
- Lessen the inflammatory response in patients with autoimmunity like multiple sclerosis or rheumatoid arthritis.
- Generate glowing skin and improve skin elasticity.

- Improve brain function, memory, and mood.
- Mitigate the effects that diabetes has on vasculature.

HBOT may also help to improve the lives of those who are struggling with digestive issues, insomnia, infertility, cerebral palsy, ADD/ADHD, and autism spectrum disorder. In 2015, Israeli researchers discovered that women with fibromyalgia who underwent Hyperbaric Oxygen Therapy were able to drastically reduce their use of pain medications — and in some cases, even eliminate them altogether.[7] This complemented the previous Washington State University research that suggested that hyperbaric oxygen could be used for chronic pain relief.[8] And in 2013, University of South Florida researchers found that a combination of dietary changes and Hyperbaric Oxygen Therapy was enough to effectively prolong survival time in mice with aggressive metastatic cancer.[9]

People that have benefited from HBOT are:

- Professional athletes with injuries.
- Iraq and Afghanistan war veterans.
- Celebrities who want to look great and increase their energy.
- Diabetics with circulatory problems.
- Patients with chronic and systemic infections.

If you don't have the time to schedule regular hyperbaric treatments or can't find a skilled technician in your area, the NanoVi Eco may provide similar results for home use. With each treatment lasting only an hour, the device is designed to stimulate repair at the cellular level — producing a protective signal that is bioidentical to the body's own natural signal that governs its repair process. Comparable to Hyperbaric Oxygen Therapy, the NanoVi Eco emits a humidified air stream; breathing in the concentrated air can signal the body to start its healing process.

Aging can be dangerous because it begins before you notice it.

With aging and with many degenerative diseases like dementia or diabetes, the body slowly breaks down in increments that are barely detectable. For example, Alzheimer's and other forms of dementia do not happen suddenly. Rather the process is slow and happens over a long period of time. The trick to avoiding the devastating effects of degenerative disease is to catch the process before it is detectable.

Anti-aging is not just about looking young. Oxygen therapies can change the appearance of the skin, and they may also address chronic health problems and improve quality of life. As University of Illinois at Chicago researchers solidified in 2005, the body's own healing process slows down under stress, a "phenomenon" that none of us are strangers to. Yet something as simple as supplying oxygen to the skin can almost completely reverse a slowed recovery process — at the most fundamental level, oxygen lets tissues breathe and heal.[10]

What To Remember Most About This Article:

Our bodies depend on oxygen for survival. A lack of oxygen can decrease blood flow, damage tissue, cause premature aging, cause the hair to thin, and even affect the memory. When we age, our cells are starved of nutrients, but supplying oxygen to our cells can provide health, energy, and vitality.

Hyperbaric Oxygen Therapy (HBOT) delivers oxygen to the areas of your body where you need it most, beyond just survival. Hyperbaric Oxygen Therapy will bathe the body in oxygen to stimulate healing and recovery, ease arthritic pain, reduce inflammation, improve brain function, and even improve the quality of the skin. While this therapy has a growing body of research to back it, it has been most popularly used by celebrities as an anti-aging treatment, professional athletes to speed up injury recovery, and Iraq and Afghanistan war veterans to relieve chronic symptoms and potentially treat traumatic brain injury. Stimulating repair in the body at the cellular level with an at-home device like the NanoVi Eco can provide similar health benefits.

Fighting the effects of aging and degenerative disease both inside and out may improve your health and your quality of life. Oxygen, a life-giving source that has existed in our atmosphere for billions of years, is required by the body to begin its essential healing process. University of Illinois at Chicago researchers discovered that while the body's wound healing process can slow down under stress, a steady supply of oxygen can reverse slowed healing almost completely.

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GENERAL DESCRIPTION: The term "oxygen therapy" refers to a range of treatments that can be categorized into two basic groups: oxygenation, which refers to adding oxygen to the blood, and oxidation, which refers to a chemical process in which an electrically charged particle (electron) is split off from a molecule (which may nor may not be an oxygen molecule).

GENERAL DESCRIPTION:

The term "oxygen therapy" refers to a range of treatments that can be categorized into two basic groups: oxygenation, which refers to adding oxygen to the blood, and oxidation, which refers to a chemical process in which an electrically charged particle (electron) is split off from a molecule (which may nor may not be an oxygen molecule). Oxygenation: Oxygen can be administered in a number of ways-orally, rectally, vaginally, by vein, by artery, through inhalation or via skin absorption. Hyperbaric oxygen therapy (100% oxygen delivered under high pressure) is familiar to most people as a treatment for deep-sea divers who, having surfaced too quickly, suffer from decompression sickness (the bends). Hyperbaric oxygen therapy, whether in a hyperbaric chamber or via a special oxygen (pressure) mask, also can be used to treat a number of conditions that benefit from an oxygen-rich environment:

Oxidation: More often than not, we try to counteract the damage oxidation can cause by using antioxidants. However, oxidation is not always a bad thing. In fact, the body functions best in a state of oxidative balance. When infection or environmental stress challenges this balance, the body may need an oxidation "wake-up" call. Because of the potential for damage however, oxidative therapies are controversial and must be administered by a qualified professional. Oxidative therapies include hydrogen peroxide, ultraviolet blood irradiation, and ozone. Ozone therapy is widely used in Europe but is not yet sanctioned by the Food and Drug Administration for use in the United States.

ROLE FOR ANTI-AGING:

Oxygen therapy can help to jump start the body’s antioxidant defenses and ability to fight free radicals, boost metabolism, and counteract the hypoxia (low oxygen level) that leads to sluggish cell activity and oxidative stress. Research has shown that oxygen therapy can help to improve the efficiency of hemoglobin in transporting oxygen around the body, improve blood flow by helping to keep cell membranes flexible, and detoxify and fight infection by destroying bacteria, viruses, parasites and fungi that thrive in low-oxygen environments and don’t have the antioxidant resources to fight back. Hyperbaric oxygen can treat carbon monoxide poisoning-by displacing the lethal gas with oxygen, it may also be beneficial to people who have sustained burns, crush injuries and radiation damage as it stimulates the regrowth of damaged tissues. There is some evidence to suggest that hyperbaric oxygen may

also help to kill cancer cells and reduce toxic symptoms associated with chemotherapy, relieve fatigue and numbness associated with AIDS, increase resistance to opportunistic infections in people with AIDS, reduce post-ischemic stroke damage, and relieve the symptoms of multiple sclerosis. However, none of these benefits of hyperbaric oxygen therapy has been clinically proven.

SIDE EFFECTS/CONTRAINDICATIONS:

Because of the pressure inherent in treatment, people with a history of middle ear infection, emphysema or spontaneous pneumonia should avoid hyperbaric oxygen therapy.