The American Institute of Stress **CONBAT STRESS** BRINGING YOU ALL THE WAY HOME

Volume 7 Number 2

000

P

May 2018

HBOT Brain Healing Hidden in Plain Sight

Volume 2 in a 2-Part HBOT Series

OXYGENOASIS

"Breathe your way to wellness" Dum Spiro Spero

Powered By REIMERS SYSTEMS, INC



The mission of AIS is to improve the health of the community and the world by setting the standard of excellence of stress management in education, research, clinical care and the workplace. Diverse and inclusive, The American Institute of Stress educates medical practitioners, scientists, health care professionals and the public; conducts research; and provides information, training and techniques to prevent human illness related to stress.

AIS provides a diverse and inclusive environment that fosters intellectual discovery, creates and transmits innovative knowledge, improves human health, and provides leadership to the world on stress related topics. Your source for science-based stress management information

COMBAT STRESS

We value opinions of our readers.

Please feel free to contact us with any comments, suggestions or inquiries.

Email: editor@stress.org

Editor In Chief Daniel L. Kirsch, PhD, DAAPM, FAIS AIS President

Guest Editor Robert L. Beckman, PhD

> Managing Editor Kathy Schoop

Creative Director

Krissa Brewer

Combat Stress is a quarterly magazine published in February, May, August and November with news and advertising designed with Service Members, Veterans and their families in mind. It appeals to all those interested in the myriad and complex interrelationships between combat stress because technical jargon is avoided and it is easy to understand. Combat Stress is archived online at <u>stress.org</u>. Information in this publication is carefully compiled to ensure accuracy.

Copyright © 2018 the American Institute of Stress (AIS). All rights reserved. All materials on AIS' website and in AIS' magazines are the property of AIS and may not be copied, reproduced, sold, or distributed without permission. For permission, contact <u>editor@stress.org</u>. Liberal use of AIS fact sheets and news releases is allowable with attribution. Please use the following: "Reproduced from the American Institute of Stress website [or magazine], © AIS [year]."

AIS Combat Stress Board

Chaired by Colonel Platoni, the role of this board is to develop initiatives and communications to serve the stress management needs of Service Members and Veterans.

Kathy Platoni, PsyD, DAAPM, FAIS	COL Richard P. Petri, Jr., MD, FAIS
Clinical Psychologist	Chief, Interdisciplinary Pain Management Center Director,
COL (RET), US Army	The Center for Integrative Medicine
COL/Ohio Military Reserve	William Beaumont Army Medical Center, El Paso, Texas
4th Civil Support and Sustainment Brigade	

Stephen Barchet, MD, FACOG, CPE, FACP, FAIS Rear Admiral/MC/US Navy Retired Melanie Berry, MS, BCB, OMC, FAIS

Raymond Scurfield, DSW, LCSW, FAIS

Christiane C. O'Hara, Ph.D., FAIS

Daniel L. Kirsch, PhD, DAAPM, FAIS

Cover and Contents Page Photo Credit: Victoria J. Bliss-Calkins, President & CEO, Oxygen Oasis Hyperbaric Wellness Center, LLC, <u>www.o2oasis.com</u>

Editor

Kathy Platoni, PsyD, DAAPM, FAIS COL (RET), US Army

JOINUS IN TRANSFORMING STRESS



Help us reduce the negative impact of stress in our world as we work together to extend our reach into the public to ENGAGE, EDUCATE and EMPOWER the global community with science based stress management information, tools and techniques, so we can live more peaceful, happier, healthier and longer lives.

Obtaining credentials from The American Institute of Stress is a designation that sets members apart and reflects their commitment to the advancement of innovative and scientifically based stress management protocols.

Join today and receive these two valuable gifts:

- Body Electric: Electroceuticals and the Future of Medicine, a documentary film aimed to revolutionize the way we think about health and the human body
- A Personal Appraisal of Hans Selye and the Origin of the American Institute of Stress, an eBook by Paul Rosch, MD, FACP

Memberships starting at \$45/year. Become a member today at stress.org.

CONTENTS

- 4 Overview of this Edition: Part 2: Expanding Options
- 6 MAJ (RET) Ben Richards and his HBOT Treatment Experience
- **12** To Treat a Concussion: Using Hyperbaric Oxygen to Mitigate the Duration of Symptoms of Acute Concussions
- **18** All the Right Moves: The Need for the Timely use of Hyperbaric Oxygen Therapy for Treating TBI/CTE/PTSD
- **29** A Discussion of the Use of Hyperbaric Oxygen Therapy as a Primary and Adjunctive Treatment Modality for TBI Patients
- **34** Patriot Clinics Press Release
- **38** TBI/PTSD and the Suicide Epidemic: Breaking the Cycle
- 42 IN THE NEWS- TBI Treatment: The Invisible Scars of War
- **44** Epilogue



Overview of this Edition: Part 2: Expanding Options

By Robert L. Beckman, PhD Executive Director, <u>TreatNOW.org</u>

"It is not entirely impossible, that, perhaps sometime in the next decade, professors of medicine will have difficulty in explaining why the treatment with (hyperbaric) oxygen was not widely adopted much earlier." Edward Teller, PhD (~1999) In Textbook of Hyperbaric Medicine, 2017.

Unless I am convinced by proof... or by plain and clear reasons and arguments, I can and will not retract, for it is neither safe nor wise to do anything against conscience. Here I stand. I can do no other. Martin Luther, 1521.

Once again, famous lines from history tell a true story without being quite true. Teller and Luther upset historical inevitability. So too will the authors in this edition and its companion in last quarter's Part 1 of the *Combat Stress* E-Magazine's HBOT issue attest to how evidence and science will change the history of medicine for brain wounds.

MAJ Ben Richards (USA, ret) and his family are testimony to how TBI wounds the warrior and the family. His story of resilience in the face of years of the 'best' military medicine could do – and

his conquest of years of neglect – reflect grandly on himself and the caregivers he discovered outside conventional, ineffective DOD/VA/Army medicine.

Rob Beckman, PhD, building on the work of many, particularly **Dr. Daphne Denham**, updates how much smarter we are in 2018 about the Mechanisms of Action underlying the wound healing actions of hyperbaric oxygen. Current worldwide debates about the "Concussion Protocol" fall miserably short of addressing a simple fact: you don't heal wounds to the brain without oxygen, and lots of it.

Dr. Ken Stoller's "All the right moves: the need for the timely use of hyperbaric oxygen therapy for treating TBI/ CTE/PTSD" crystallizes a fundamental dilemma for citizens, parent, ballplayers and warriors: Should people who are making money dispensing drugs make decisions about what therapies can be used to treat those brain wounds? In his words: HBOT has "met interference because other agendas are present be they the protection of the status quo, myopic budgetary constraints, or perceived liability issues - after all, when you treat TBI directly the way that HBOT does, the problems creating those TBI's in the first place are harder to ignore and the unconscious way those problems have been dealt with are harder to deny."

John Hughes, D.O., and James Lyons-Weiler, PhD are at the forefront of neuro-regenerative medicine. Their methods point to the role real science can play in cutting through the dilatory tactics of nay-saying researchers: pressurized oxygen is analogous to plugging the brain (the computer 'hardware') into a wall socket with enough voltage to begin its self-healing. Then the 'software' of multiple other therapies have a chance of running correctly.

First Coast News in Jacksonville, FL filmed a special on a Fort Hood mass shooting survivor who is seeing drastic changes after Hyperbaric Oxygenation. Eight years after the attack, Army Veteran **Patrick Zeigler** is another example of the power of oxygen under pressure to help awaken and heal the brain after injury. See: <u>http://www. firstcoastnews.com/article/news/local/</u> fort-hood-mass-shooting-survivorsees-drastic-changes-after-hyperbaric-chamber/77-506629334.

Partly in response to the slaughter at Fort Hood (with which the Editor is intimately connected), the **Patriot Clinics** movement in Oklahoma evolved to answer the call at the state level. Lacking federal energy, funding, focus, action or ethical incentive, Dr. William Duncan, PhD, organized the first downpayment on a state-centered model to provide the care to brain-wounded Veterans and public servants that is denied them by traditional medicine. The model has been replicated and enhanced in four more states: legislation encouraging hyperbaric oxygen treatment for the brain wounded, with some providing funding to offer the care to those essentially relegated to permanent welfare status.

In "**TBI/PTSD** and the Suicide **Epidemic: Breaking the Cycle**," the TreatNOW Coalition presents six stories that are illustrative of the work the Coalition has been performing for eight years: Veterans, Active Duty Military, National Guard, Reserves, First Responders, citizens and athletes returned to healthier lives after being told there was little to nothing conventional medicine could do to heal the wounds to their brains. The latest count from 70 plus Coalition clinics across the US have revealed more than 3,000 success stories.

In a final word, evidence continues to accumulate that corroborates previous independent studies finding that *Alpha-Stim* and other microcurrent devices provide a viable treatment option for pain, anxiety, insomnia and depression. When used in concert with hyperbaric oxygenation, these non-invasive, safe and effective alternatives are powerful antidotes to the conventional, ineffective, expensive and frequently fatal standard-of-care dispensed by military medicine.

70,000 plus suicides since 9/11; a continuing stream of 20 or more suicides a day; an opioid epidemic that gained momentum due to VA prescribing protocols;¹ 800,000 brain wounded Service Members since 9/11 and an equal number from previous wars: mental health costs destroying military medicine budgets; dramatically understaffed VA hospitals in mental health positions; non-stop mis- and malfeasance in VA corporate structure; lack of White House, Congressional and VA leadership taking action to help heal veterans' brain wounds - when is **ENOUGH** enough?

Reference

1. *Newsweek*, How VA Fueled the National Opioid Crisis and is Killing Thousands of Veterans, Art Levine, October 12, 2017.

MAJ (RET) Ben Richards and his HBOT Treatment Experience

By Ben Richards, B.S., M.A., Major (RET), US Army

During the spring and summer of 2007, I (MAJ Ben Richards) had the privilege of leading Bronco Troop, 1-14 CAV, a Stryker-equipped cavalry troop, during intense combat operations in and around Baqubah, Iraq. Bronco Troop was blessed with the deep bench of top-quality Noncommissioned Officers that distinguishes great units from good ones. Five of the six officers in the troop were West Pointers. At one point, all six of us were captains and the experience paid dividends in a challenging operating environment.

At the peak of operations, a new second lieutenant arrived straight from the basic course to take over a scout platoon. I greeted him shortly after he arrived at our dilapidated combat outpost and told him we would have a Combat Action Badge (CAB) for him the next day. His face showed that he clearly thought I was joking. By the following evening, he had survived an IED hit to his Stryker, been in two firefights and earned his CAB. The rest of us had earned our CABs on our first day in town two months earlier as well. A few weeks later he was wounded by a grenade fragment while leading his platoon in a dismounted close combat assault on an al Qaeda fighting

position. The courage, competence and character of these young officers was in every way a credit to our alma mater and a testimony to West Point's continuing role as the corner stone of our Nation's defense.

During those several months of combat operations, ninety percent of my men hit at least one IED - often more than one. In May 2007, a suicidebomber driving a sedan laden with explosives rammed into my Stryker and destroyed it. A few weeks later we hit a second 'plain vanilla' IED buried in the road that damaged our second Stryker sufficiently that it was later 'coded out' as not being worth fully repairing. After each hit, we got back up and returned to the fight because we knew that there was going to be a fight and we fought as a team, even when it hurt.

On returning home I, like so many others, began a personal battle against an enemy that I could not see, could not anticipate and was neither trained nor equipped to combat. Six months after arriving back at Fort Lewis, I was diagnosed with Post Traumatic Stress Disorder (PTSD). To be honest, I only sought help after being 'command directed' by my wife. At that time, I was



Ben Richards' Stryker armored vehicle after being hit by a suicide vehicle-borne IED in Baqubah, Iraq in May 2013. Richards and his crew survived the attack, but all with TBIs. Photo Credit: Ben Richards

not intimidated by PTSD. I had every confidence that it was something I could beat. I was surprised and not a little embarrassed that I had it all. I gave it a year, tops. By then I would be fully back in the saddle. The extent of damage to my brain caused by the pair of mild traumatic brain injuries was not recognized until more than three years after the injuries and was not fully diagnosed until yet another year had passed.

While I was serving in Iraq, I was extremely fortunate to be selected by the History Department at the US Military Academy West Point to return for a tour as an instructor. I arrived in the summer of 2010 in pretty rough shape. Less than a year into

the assignment, I collapsed under the weight of disabling chronic pain, memory problems, cognitive deficits, sleep deprivation, drugs (the legal kind), emotional problems, and all the 'noise' that often accompanies invisible injuries. At one point, heavily under the influence of prescription medications, I even seriously considered taking my own life.

West Point was up to the challenge. The History Department leadership kept me in the department so that they could personally oversee my care. My fellow instructors, both civilian and military, took on the burden of my workload without complaint, as they would have carried me, my rifle and my ruck to the CASEVAC point. I am sure theirs was a long, hard walk out. It was real leadership, at real personal cost and sacrifice.

The Department's Colonels breached every administrative and bureaucratic obstacle to ensure I literally received the best care available in the Department of Defense for my injury profile. When it turned out that the best care was not enough and after they had done everything within their power to assure my future well-being, they 'fare-welled' me with honors and fanfare well beyond those merited by a junior major.

The day I took off my uniform for the last time was one of the saddest in my life. I saw only an empty husk of the new cadet who had marched in the rain on R-Day eighteen years earlier and so full of the potential that enables a first-year cadet to sit with generals and presidents, while a second lieutenant hides from majors in the motor pool. I was permanently broken. The natural processes of neural plasticity had run their course and come up wanting at the end. Medications could only partially mitigate the pain while causing new problems of their own. The results of evidence-based psychotherapies became part of the new canon of evidence that those therapies, so promising for victims of rape and traffic accidents, are disappointingly much less effective against combat-related PTSD. Acceptance and accommodation were all that was left to aspire to.

It was at that moment of hopelessness that the Long Gray Line extended its hand to drag me back from the edge. John Batiste, class of '74, a retired general officer and president of the Veteran-serving non-profit, Stand for the Troops, founded by the legendary COL David Hackworth (SFTT.org), hunted me down to deliver a lifechanging message.

"We will help you," he told me, and "by that, I mean really help you and not in the sense of providing a palliative weekend retreat or the cathartic commiseration of other wounded warriors."

Had John not been a graduate and a Soldier of such well-known reputation, I would have hung up the phone. I did not have the hope left to waste on vain promises with unlikely outcomes, but because John was who he was, I gave him the time. He gave me my life back.

The problem of invisible wounds and injuries was one that merited a Manhattan Project. Instead, it had the Army Medical Corps bureaucracy that ran Walter Reed into scandal, regularly abused invisibly wounded warriors exiled to Warrior Transition Units, and never seemed to get past the word excuse, so clearly bookmarked in their dictionary, to the word execution. It was a corps of capable and dedicated medical operators who did not deserve their uninspired and ineffective leaders. Their obvious failures were difficult for me to understand after having spent a career in the company of men and women I would follow anywhere. And then there was the VA...

Unwilling to accept defeat at the hands of inefficacious bureaucracies, John and SFTT recruited a team of medical experts and began scouring the country for new and more effective approaches to treating traumatic brain injury (TBI) and PTSD. Their rescue mission had led them to Doctor Paul Harch, a practitioner of Hyperbaric Medicine at the Louisiana State University Medical School in New Orleans. Harch, John said, would treat me.

Dr. Harch had become the point man for the league of medical practitioners and researchers using Hyperbaric Oxygen Therapy to treat brain damage caused by TBIs. By the time I arrived in New Orleans, these practitioners had already treated over a hundred invisibly wounded warriors, as well as several well-known NFL football players to include the legendary quarterback, Joe Namath. Dr. Harch had personally completed a research study with 20 Soldiers and Marines, whose brains had been damaged by combat-related TBIs. The results were unprecedented.

When I was being evaluated by the military's top neurologists in 2011, the prevailing medical wisdom was that modern medicine could do very little, if anything, to help a brain heal after being damaged by a mild TBI. There was a period of natural healing of up to several years, but at four years post-injury, they had no expectation that my brain would improve and many reasons to suspect that it would instead begin to degrade. I arrived in New Orleans with repressed expectations.

I found Dr. Paul Harch to be a dedicated and innovative professional. He exhibited a reserved persona that I soon found to be a façade masking a burning passion for healing and especially for healing those that hope had passed by. Harch is a man of great moral courage, conviction and compassion; a classical gentleman endowed with the noblesse oblige of an heir of a great inheritance of character and natural capacity.

Dr. Harch and his colleagues had pioneered a protocol for using hyperbaric oxygen therapy (HBOT) to treat brain injuries. The medicinal effects of oxygen at higher the atmospheric pressure have been recognized empirically for over a century. It is perhaps best known as a treatment for diving injuries. It is also widely used for healing hard-to-treat wounds and is approved by the FDA for over a dozen different medical conditions. Using HBOT to treat brain injuries, like most of the prescription medications I had been prescribed by the DOD and VA, is considered off-label, but its safety has been recognized by the Institute of Medicine.

Treatment consisted of 40 one-hour 'dives' in a Plexiglas tank that I would describe as similar to a torpedo tube. These were conducted at a rate of one dive, sometimes two, a day. The tube is filled with 100 percent oxygen, which is then pressurized to 1.5 atmospheres. Protocols for wound healing and dive injuries use higher pressures. The pressure loads oxygen into the blood stream like carbonation in an unopened can of soda.



Ben Richards with his family in 2017. The ability to build and maintain meaningful social relationships has been one of the most important treatment outcomes. Photo Credit: Ben Richards

The introduction of the extra oxygen into the brain initiates a cascade of chemical interactions that are good for you. The end result is the creation of new blood vessels (angiogenesis) and the repair or regrowth of brain cells.

Before I began treatment, we did a SPECT neuro-imaging scan of my brain. A SPECT scan uses an injective radioactive agent to image blood flow in the brain. It is one of the more sensitive imaging tools for detecting brain damage caused by mild traumatic brain injuries (mTBIs) and in many cases, is superior to CT or MRI scans, especially if more than a few months have elapsed since the time of injury. The images showed the poor blood perfusion typical of a brain damaged by TBIs – not unexpected, as previous scans of other types had verified multiple points of structural damage. The image meant that my brain was not using the amount of oxygen that a normal brain would have been. That difference was apparent, not only in the scans, but in the neuropsychological testing and other measures of cognitive and emotional impairment with which I had been evaluated.

By the time I had completed 20 'dives,' the changes I was experiencing were becoming undeniable. Nearly every facet of my injury profile began to improve. Pain levels dropped. Sleep improved. Memory improved. Attention span lengthened. Irritability decreased. I started feeling things I had not felt in years. Good things. Happy things. I was able to sustain a light workout program for the first time since 2008. We scanned my brain again. The amount and extent of blood perfusion had increased significantly, matching the subjective results that even my guarded skepticism was compelled to recognize. The SPECT image is one of the most reliable predictors of the long-term prognosis of brain injury and mine had just changed radically.

The Harch's covered the cost of my treatment from their own pockets, as they have for dozens of other Veterans before me at no small sacrifice. John and SFTT rallied donors, mostly West Pointers, to help cover living expenses for four months of care. Gulf Coast Alumni quickly assumed an overwatch position and contributed several thousand dollars. I could not have covered the costs alone. Even a 100 percent VA disability rating only matches the pay of a private first class; not enough to maintain dual household with four kids at home.

HBOT has not completely healed my wounds, but it has given me more back than I thought possible. More than five years after leaving Iraq, a husband and a father finally came home to his family. The treatment that Dr. Harch provided unquestionably saved my marriage. It has enabled me to participate in and experience life in ways that I, and my DOD and VA doctors, had assumed were gone for good. I have even been able to contribute a little bit back. I am no longer a husk. Looking back on those dark days, I do not believe it would be unfair to say that Dr. Paul Harch and SFTT probably saved my life.

About the Author

Ben Richards is a combat Veteran who suffered disabling brain damage from a Traumatic Brain Injury (TBI) caused by a suicide bomber in Iraq and suffered from Post-Traumatic Stress Disorder (PTSD). He experienced significant healing from HBOT. He served in the Army for 16 years in the Armor and Cavalry Branch and is a graduate of the United States Military Academy at West Point and Georgetown University. He currently serves on the boards of the National Hyperbaric Association (NHA) and the International Hyperbaric Medical Associations (IHMA) where he advocates for improved access for invisibly wounded combat Veterans to hyperbaric oxygen therapy. He also serves as an executive director for the Veteran-serving nonprofit organization Stand for the Troops.

Army Veteran, Patrick Zeigler was shot in the head at the Fort Hood massacre on November 5, 2009. Thanks to Hyperbaric Oxygen treatment years after he was not expected to live, much less return to a sense of normalcy, Zeigler is testimony to the power of the community and the wound healing powers of oxygen under pressure. Watch the video here: <u>https://fcnews.tv/2rg2vC2</u>

TO TREAT A CONCUSSION: Using Hyperbaric Oxygen to Mitigate the Duration of Symptoms of Acute Concussions

By Robert L. Beckman, PhD

A concussion is a form of traumatic brain injury (TBI). It is a wound to the brain. The current medical standard of care for concussions relies on a protocol that essentially recommends rest. It is thought that this resting period will allow the brain to recover. Indeed, it is 'common knowledge' that 80 to 90 percent of concussions 'get better' on their own.¹ While it is true that some or all symptoms will diminish over time, it is equally true that merely waiting for those symptoms to go away is not our best medicine, nor is this good for the wounded brain.

In the State of Illinois, each school district must use educational materials provided by the Illinois High School Association to educate coaches, student-athletes, and parents/guardians of student-athletes about the nature and risk of concussions and head injuries. This includes advice about continuing play after a concussion or head injury. Concussion Management in Illinois public and private schools is governed by the Youth Sports Concussion Act (Public Act 099-0245). Illinois directs school boards to the Centers for Disease Control and Prevention's (CDC) Injury Center (www.cdc.gov/ Concussion), developing a formal public health response to concussion. Through their HEADS UP campaign, concussion educational materials are available at no cost for youth sports coaches, school coaches, parents, and school and health care professionals.

What the CDC does not discuss, let alone the Mayo Clinic, your hospital emergency room, the NCAA, nor your average concussion or TBI clinic, is that a concussion is a wound to the brain that should be treated according to wound healing principles to allow the brain to heal. There is no disputing the fact that in most of the millions of concussion cases experienced every year, the average person will 'recover' within a few weeks and symptoms will abate. In a large fraction of cases, however, those symptoms do not go away and in no case, will the brain become 'healed' unless necessary steps are taken to address the wound.

We are all becoming familiar with the symptoms of concussions: headaches, confusion, memory loss, nausea, vomiting, dizziness, fatigue, sleepiness, and emotional instability. These symptoms are linked to complex pathophysiological processes affecting the brain, induced by biomechanical forces. These forces can lead to brain inflammation and swelling, damage to blood vessels and brain cells, ringing in the ears (tinnitus), visual and balance problems, and a myriad of other overt and/or subtle physical and emotional and functional difficulties.

Some in the worldwide sports community recognize a concussion as an 'injury' to the brain, yet nowhere in the gold standard Consensus Statement of the 2017 Concussion in Sport Group (Berlin, 2017) is there mention of a 'wound' to the brain. In the eleven major sections of the Statement, only one is devoted to 'rehabilitation.' It is worth quoting in full: "Sports-related concussions (SRCs) can result in diverse symptoms and problems, and can be associated with concurrent injury

to the cervical spine and peripheral vestibular system. The literature has not evaluated early interventions, as most individuals recover in 10 to 14 days. A variety of treatments may be required for ongoing or persistent symptoms and impairments following injury. The data support interventions including psychological, cervical and vestibular rehabilitation. In addition, closely monitored active rehabilitation programs involving controlled subsymptom-threshold, submaximal exercise has been shown to be safe and may be of benefit in facilitating recovery. A collaborative approach to treatment, including controlled cognitive stress, pharmacological treatment, and school accommodations, may be beneficial. Further research evaluating rest and active treatments should be performed using high-quality designs that account for potential confounding factors, and have matched controls and effect modifiers to best inform clinical practice and facilitate recovery after SRC."2

They note that SRC "is considered to be among the most complex injuries in sports medicine to diagnose, assess and manage."³ Let us look at how we are now changing that paradigm and the long-standing nonchalance about aggressively intervening in the 'concussion cascade' to reverse the damage and wounding made to a major organ of the body: the brain.

Critical to understanding the work of integrative medicine doctors trained in wound healing are these facts: medicine knows a lot about how to heal wounds. A physical wound to the brain is like a physical wound to any other organ in the body. Hyperbaric Oxygen Therapy has already been approved by the FDA for certain types of wound healing (air embolism, arterial insufficiencies, compromised skin grafts and flaps, acute thermal burns, crush injuries and other acute traumatic injuries that lead to oxygen and blood constriction).

Starting in the fall of 2015, Dr. Daphne Denham, MD in her clinic began treating concussions.⁴ We know that we can do better than 'recognition, rest, and recovery.' Simply placing a patient in the Concussion Protocol⁵ is insufficient to promote recovery. Team trainers, doctors, coaches, teachers and families are then responsible for 'managing' symptoms and after a while and with the passage of time, these patients are somehow expected to be 'better.' We now know that we can be far more effective in treating wounds to the brain than waiting for these wounds to heal on their own. Consider the following:

There were tens of thousands of concussions sustained by athletes at all educational levels in 2017. There were 540 concussion evaluations and 281 concussions from the NFL pre-season that occurred until the week before Super Bowl LII. To improve their treatment protocols, the NCAA brought the chief medical officer of a college into the mix, demanding that an additional sign-off was required before returningto-play. The NFL went as far as placing more NFL-independent certified athletic trainers (ATC spotters) at every game. As recently as December of 2017, the NFL placed a central unaffiliated neurotrauma consultant (UNC) in

the league's command center for all games. On ESPN, it was reported that an estimated 400 people were involved in the concussion process, including every team physician, every athletic trainer, every UNC and every booth spotter.⁶ Imagine these 400-people worried about whether or not an athlete had suffered a concussion, but not one of them considering how to undertake healing these wounds to the brain.

A concussion leads to inflammation and cerebral ischemia (deficient supply of blood to the brain that is due to obstruction of the inflow of arterial blood). A host of negative chemical processes begin, along with mitochondrial/cell damage, oxidative damage and apoptosis (cell death). There can be a breakdown of the blood-brainbarrier and brain swelling. Numerous animal studies on concussion and blast injuries confirm that blows to the head are just not good for your brain. All the discoveries by Dr. Ann McKee and her Chronic Traumatic Encephalopathy (CTE) team in Boston confirm a strong correlation between numerous hits to the head and onset of CTE. At last count (admittedly a contentious statistic, given the selection criteria), she had found CTE in 99 percent of the brains studied or 110 out of 111 of former NFL players.⁷ Common sense is slowly causing parents, coaches, trainers and even some medical personnel to pay attention to these correlations. This is one of the primary reasons that word-of-mouth referrals to HBOT-for-Concussions are increasing nationwide.

A Mom's Tale

Told by M.J., client of Dr. Daphne Denham

On Monday, April 23rd 12-year-old W.J. was on the monkey bars at his school. Six feet off the ground, he was skipping bars, swinging his body a fair amount, skipped a few bars, grabbed the next bar and lost his grip. He fell to the ground on his back, shoulder and head. He was helped to the nurse's office by a friend. The school nurse determined he had no recollection of the fall or what he ate for lunch immediately preceding his fall. W.J. was also having balance issues, had a big headache and was lethargic. Additionally, he was sensitive to light and noise. I picked him up from school and brought him home at 1 pm. We stopped to see our pediatrician who diagnosed W.J. with a concussion. It was shortly after we arrived home that I reached out to Dr. Denham.

W.J. went into the hyperbaric chamber at 3:30 pm on the day of his accident. He still had a headache when he came out of the chamber but it was not as strong. He was also dizzy, sleepy and generally lethargic for the remainder of the day. He continued to be sensitive to light and noise.

On Tuesday, April 24th as we drove to see Dr. Denham, W.J. commented that the oncoming cars headlights were bothering him. He went into the hyperbaric chamber at 7 am and 11:30 am. Both times the headache lessened, but was not resolved. At home he only wanted to lay on the sofa and listen to audible books. He was sleeping more than normal and was still experiencing dizziness when he would get off the sofa.

On Wednesday, April 25th, two days after his fall, W.J. went back into the hyperbaric chamber. His headache improved much more after this visit. It was still hovering in the 3-4 range, but it would improve after each treatment. His dizziness was gone and he no longer was sensitive to light and sounds. W.J. stopped asking for Tylenol to treat his headache. He was also starting to act more like himself at this point. He was still hurting though, he was not interested in playing video games and watching TV. W.J. was relatively content to listen to audible books on the sofa and rest his brain. We did manage to walk the dog together and he felt good following that activity.

On Thursday, April 26th, W.J. went into the hyperbaric chamber around 11:30 am. He went in with a headache at a 2 and came out with no headache. W.J. was feeling much better, he was more energetic and had no lingering dizziness, no headache and no light or noise sensitivity.

W.J. has been headache free since 1 pm on Thursday, April 26th. His energy levels are good. He has watched TV, read on his phone and a book, played video games and has been a normal kid and has no headache or other concussion symptoms. His pediatrician saw him on Friday, April 27th and released him to go back to school on Monday April 30th.

We treat wounds to the brain. Hyperbaric oxygen has been proved to enhance several natural processes related to wound healing: it reduces inflammation, inhibits apoptosis (cell death), reduces Intracranial pressure, and promotes neurogenesis and angiogenesis.8 This is significant: HBOT promotes neurogenesis (growth of new neuronic tissue) and angiogenesis (growth of new blood vessels). The combination of oxygen (typically 100 percent O₂) and pressure (varying, depending on the diagnosis) leads to the production of more stem cells available for wound healing as well. All this has been proven by rigorous, scientific studies that have explored the role of oxygen and pressure in the brain healing process.⁹ What is not controversial is that HBOT aids tremendously in wound healing, typically 20 to 40 percent faster healing than is considered the 'norm.' In the case of acute concussions and within ten days of the injury, Denham demonstrated (http://bit.ly/2jwdUwl) that patients (51 out of 52) diagnosed with acute concussions completely resolved her/his symptoms in five or less treatments (average of 2.4 treatments per concussion). Her most recent numbers of success as of February 2018 are 108 successes out of 110 patients diagnosed with acute concussions.¹⁰

Readers can learn more about this by viewing a short film entitled "Concussion Help in a Hyperbaric Chamber?": <u>https://tinyurl.com/ybldktqn</u>. If brain injury patients (primarily high school athletes playing contact sports like football, hockey, lacrosse and field hockey) can be evaluated and treated over the weekend, we normally find that their symptoms can be resolved because of the wound healing,¹¹ they can return to school symptom-free on Monday. Much more importantly, however, are the comments from the concussed patients. Time and again, we hear within one or two one-hour treatments that the patient 'had no idea how messed up they were.' It is as if the fog has cleared as the symptoms resolve. The patient is wounded and brain function, including judgment, are typically impaired. Naturally, athletes want to get back into the game and are not always the best judges of their level of recovery and ability to return to playing football. Objective tests, coupled with subjective measures such as IMPACT,¹² may offer much more insight into the actual functional recovery. (Practitioners are familiar with athletes and warriors who 'game' the computer and paper tests, purposely obtaining low scores on baseline tests so that post-concussion testing fails to demonstrate a significant departure from 'normal.')¹³

To summarize: We are much smarter in 2018 than we were in the 20th century about the Mechanisms of Action, both stemming from the negative consequences of concussions and about the remarkable wound healing actions of hyperbaric oxygen. The Concussion Protocol must be upgraded to reflect what Dr. Denham and hundreds of other HBOT clinics are demonstrating daily: that wounds to the brain can be successfully treated and helped to heal using HBOT.¹⁴

References:

- The Center for Disease Control and Prevention keeps track of Traumatic Brain Injury and Concussion at: <u>https://www. cdc.gov/traumaticbraininjury/get the facts.html</u>. See also: <u>https://www.brainline.org/article/facts-about-concussionand-brain-injury</u>. For a more thorough look at those who do not recover so well, see Carmen Hiploylee, et al. Longitudinal Study of Postconcussion Syndrome: Not Everyone Recovers. *Journal of Neurotrauma* 34:1511–1523 (April 15, 2017). <u>http://bit.ly/2Cv7VwA</u>
- 2. McCrory P, et al. *Br J Sports Med* April 28, 2017; 0:1–10. doi: 10.1136/ bjsports-2017-097699. <u>http://bjsm.bmj.com/content/51/11/838</u>
- 3. Ibid., p.2.
- 4. Daphne Denham, MD, is a general surgeon who began practicing wound care exclusively in 2009. She is now a Diplomate of the American College of Wound Medicine and Surgery, demonstrating her extensive knowledge and passion for the art of wound care. She declares her interest in a private clinic in Northbrook, Illinois, *Comprehensive Wound Care, LLC*. This article is an outgrowth of her presentation at HBOT 2017 in New Orleans, LA. Her clinic has now treated 108 acute concussions successfully. <u>http://comprehensivewoundcare.com/</u>
- 5. There is no single Concussion Protocol. The Protocols differ in various ways, but they all generally speak to some variation on "graduated return to play" and a series of steps. For example, the NFL Concussion Protocol calls for these steps in their "Return to Practice Protocol": 1. Rest and Recovery; 2. Light Aerobic Exercise; 3. Continued aerobic exercise and strength training; 4. Football-specific activities; and 5. Full football activity. The Protocol was upgraded in December 2017 by NFL Head, Neck and Spine Committee's Protocols Regarding Diagnosis and Management of Concussion, available at: https://www.nytimes.com/2017/12/24/sports/football/nfl-concussion-protocol.html.
- 6. <u>http://www.espn.com/nfl/story/ /id/21864620/nfl-making-signifi-</u> <u>cant-changes-concussion-protocol</u>.
- 7. <u>https://www.nytimes.com/interactive/2017/07/25/sports/football/</u> nfl-cte.html.
- Amir Hadanny & Shai Efrati (2016): Treatment of persistent postconcussion syndrome due to mild traumatic brain injury: current status and future directions, Expert Review of Neurotherapeutics, DOI: 10.1080/14737175.2016.1205487 To link to this article: http://dx.doi.org/10.1080/14737175.2016.1205487.
- See Philip B. James, MD. Oxygen and the Brain: The Journey of Our Lifetime. Best Publishing: North Palm Beach, FL, 2014. See also Harch PG, Andrews SR, Fogarty EF, Lucarini J, Van Meter KW. Case control study: hyperbaric oxygen treatment of mild traumatic brain injury persistent post-concussion syndrome and post-traumatic stress disorder. Med Gas Res. 2017;7(3):156-174. <u>http://bit. ly/2zyFrAr</u>; and HBOT2017, 11th International Symposium. TBI: No Need to Die! A review of HBOT in Acute Severe Traumatic Brain Injury with an Extension to Acute Concussion, and an Update on Chronic Mild TBI. Paul G. Harch, M.D. <u>http://bit.ly/2x4tWUf</u>
- 10. Personal correspondence. A Case Report is being prepared.
- 11. Each concussion is unique. Variables such as number of previous head injuries and severity are taken into consideration. The protocol for each patient's treatment is similarly designed for each patient based on the presentation.
- 12. ImPACT® (Immediate Post-Concussion Assessment and Cognitive Test), the most widely-used and most cientifically-validated computerized concussion management tool available and the newly-launched ImPACT Pediatric, both the first of their kind to earn FDA clearance. See <u>https://www.impacttest.com/</u>
- 13. Jacob Resch, PhD, ATC, et al., ImPact Test-Retest Reliability: Reliably Unreliable? J Athl Train. 2013 Jul-Aug; 48(4): 506–511. doi: 10.4085/1062-6050-48.3.09. In cases of active duty Service Member testing, it is common to hear that the stigma of brain injury in a warrior pre-conditions study, participants to "game" the system. A warrior fears loss of security clearance in certain cases, to say nothing of being considered weak or a malingerer.
- Reichert WM, ed. Indwelling Neural Implants: Strategies for Contending with the In Vivo Environment. John D. Stroncek and W. Monty Reichert. Chapter 1. Overview of Wound Healing in Different Tissue Types. Boca Raton (FL): CRC Press/Taylor & Francis; 2008.

About the Author:

Robert L. Beckman, PhD, is the Executive Director for TreatNow.org and Chief Knowledge Officer, Foundation for the Study of Inflammatory Disease. He is part of a nationwide Coalition focused on ending the Service Member suicide epidemic through clinical research and healing TBI and PTSD in brain-injured Wounded Warriors. He is responsible for sustaining a national network of hyperbaric clinics as well as architecting the technology platform for data collection and analysis. Dr. Beckman has been building knowledge management systems most of his professional career, primarily in the Intelligence Community and DOD. He has participated in and led revolutionary efforts in strategic planning, organizational and management reengineering, knowledge-based targeting and decision support, competitive intelligence, war room development, targeting and thwarting foreign targeting of US assets, fraud detection, counter-drug, counter-terror, money laundering and organized crime investigations. He was a senior member of an elite data integration effort for the counter-intelligence (CI) and counterterrorism (CT) communities, and has built an 'insider threat' prototype for law enforcement entities engaged in CI, CT and homeland security. He had an extensive academic and publishing career. In a former life he taught at the US Naval Academy and was a co-owner of consulting and software companies. His PhD is in International Relations and he is an expert on nuclear non-proliferation and knowledge management. He is a former USAF KC-135 pilot and a Vietnam Veteran. He lives in Arlington, VA, is married and has three sons.



All the Right Moves: The Need for the Timely Use of Hyperbaric Oxygen Therapy for Treating TBI/CTE/PTSD

By Kenneth P. Stoller

Abstract

Background: The modern age of hyperbaric medicine began in 1937; however, today few know about hyperbaric oxygen's effects on the body and medical conditions outside of diving medicine and wound care centers - a serious ethical issue as there are 20 US military veterans committing suicide every day directly related to Traumatic Brain Injury/Post Traumatic Stress Disorder. The problem is not whether hyperbaric oxygen is effective for treating brain injuries, but why the interference in offering this therapy to those who need it.

Discussion: Up against black-boxed anti-depressants that are not efficacious, it should be a "no-brainer" to use a safe, off-label drug, but in the case of military veterans, every suicide might be seen as a tremendous cost saving to certain technocrats. The unspoken rationale is that if the military were to embrace hyperbaric oxygen as the efficacious therapy that it is then current active troops that have suffered injuries will come forward and seek treatment and benefits for their Traumatic Brain Injuries now that they know there is a viable therapy and in so doing troop strength will be decimated.

So, to attempt to delay the acceptance of hyperbaric oxygen the Department of Defense has funded faux-studies claiming low pressure room air to be a placebo or sham, and then proclaiming there is no statistical difference between treatment arms and sham or placebo treatment arms. With few who understand hyperbaric medicine there is almost no one to call them on this subterfuge and prevarication. Many peer-reviewed articles have been published in the last decade that demonstrate hyperbaric oxygen is effective in repairing an injured brain even long after that injury took place. One of the most notable showed that blast-induced brain injured war veterans experienced a 15 point IQ increase (p < 0.001).

Summary: Hyperbaric oxygen is an efficacious, benign and humanitarian way to affect brain repair but it has not been adopted because it lacks patent protection and has no large corporate sponsors. It has also met interference because other agendas are present be they the protection of the status quo, myopic budgetary constraints, or perceived liability issues.

Keywords: Football, TBI, Brain Injury, HBOT, Hyperbaric Oxygen, CTE, Encephalopathy

Background

Hyperbaric oxygen therapy (HBOT) saturates the body's tissues with oxygen using a pressure vessel. HBOT is most often recognized as the treatment for decompression sickness (DCS) or "the bends." DCS causes significant neurological injury and post-initial injury similar pathophysiology is virtually identical to that caused by trauma. Thus oxygen under pressure has been used to treat neurological injuries since 1937, for 75 years. No one has found a replacement for or substitute treatment for the bends that works as well as oxygen. HBOT results in a 95% acute treatment cure rate for DCS in all of the navies of the world. Three currently accepted HBOT indications are for neurological conditions, and three are for various kinds of non-healing wounds. Thus there is more evidence for using HBOT for neurological acute and chronic wound treatment, with better clinical outcomes than any other single or combined treatment. The good news that combining HBOT with other therapies that help brain injured patients enhances the effect of those treatments and makes these other therapies less costly, with creating additional recovery in a given patient. Because a patient's future income is directly tied to recovery after injury, it is important for policy makers to set maximizing patient recovery as a goal to maximize productivity and tax revenue from each given individual.

An increase of one-half to a $1\frac{1}{2}$ atmosphere increase will raise the oxygen levels in plasma 7 × -12× normal (700% to 1200%) Under this increased pressure oxygen acts like a drug and DNA signaling agent. This treatment's

mechanisms of action simply follow the general gas laws for saturating liquids with a gas, similar to the way Coca-Cola[®] makes their product. No one yet has found a substitute for oxygen in human physiological processes, and any injury caused by a lack of oxygen can be expected to benefit, with the right oxygen dosage. Saturating with oxygen is a safe procedure, when all of the correct protocols are followed, and significant side effects are extremely rare.

The history of hyperbaric medicine reaches back to the year 1620 when Drebbel developed a one-atmosphere diving bell, and 40 years later Boyle joined forces with Gay-Lussac to develop the General Gas Law. Moving the sands of time to the near present day, the modern age of hyperbaric medicine began in 1937 when Behnke and Shaw used a hyperbaric chamber to treat DCS. However, it was not until 1955 that there was major interest in using hyperbaric oxygenation (HBO) outside of treating DCS. That year, Churchill-Davidson began to use oxygen therapy in a hyperbaric chamber to treat the damage induced by radiotherapy in cancer patients. In 1956, Boerema (Holland) performed the first reported heart surgery on "blue babies" in a hyperbaric chamber. He became the "Father of Hyperbaric Medicine" when he treated a woman who had been badly beaten, was unconscious, and was about to lose her leg. This became the first recorded prevention of an amputation with HBOT, and the woman did well. The next year his famous "Life without Blood"study was published. He referred to the treatment as "oxygen drenching."¹

In 1962, Sharp & Smith (Scotland) were first to treat carbon monoxide poisoning by HBOT; 1963, Hitchcock testifies before the House Labor Health. Education, and Welfare committee on the need for hyperbaric chambers in surgery and congress appropriates money for building a score of them;² 1965, Perrins (United Kingdom) showed the effectiveness of HBOT in osteomyelitis; 1965, Japanese researchers treat the first burn patients; 1966, Saltzman et al. (USA) showed the effectiveness of HBOT in stroke patients; 1970, Boschetty and Cernoch (Czechoslovakia) used HBOT for multiple sclerosis (MS); 1971 Lamm (France) used HBOT for treatment of sudden deafness; 1973, Thurston showed that HBOT reduces mortality in myocardial infarction: 1976. Hollbach & Wasserman determine 1.5 ATA (atmospheres absolute) maximizes oxygen content and glucose metabolism in the brain; 1983, first double-blind RCT using HBOT to treat MS; 1987 Jain (Swiss) treats paralysis of stroke with HBOT; 1989, the U.S. Navy discovers that bubbles are gone within 5 min, so while DCS is caused by bubbles the secondary injury cascade is the same as in all brain insults; 1992, Harch treats the first delayed decompression sickness, which lead to the treating "dementia pugilistica" in boxers, cerebral palsy children, and autistic children and nearly 50 neurological conditions in 700 patients. In 1992, Rockswold (USA) conducts first double-blind RCT showing HBOT reduces mortality in acute traumatic brain injury (TBI) by 59%, the largest single reduction in mortality since the invention of the ambulance. In 2002, US Army study confirms Harch's HBOT

repairs white matter damage in children with cerebral palsy (CP) and a Canadian group shows hyperbaric air (the original treatment for DCS and Mountain Sickness) and HBOT 1.75 effective in treating CP in double-blind RT; 2005, Stoller (USA) first child with fetal alcohol syndrome treated³ and Thom (USA) finds HBO causes stem cell mobilization; 2007, Harch et al. (USA) chronic TBI treated in animal model and in 2009 in military veteran;⁴ 2010, Godman discovers HBOT activates 8,101 genes, reducing inflammation and increasing growth and repair hormones. In 2011, Stoller treats first retired National Football League (NFL) player treated for CTE;5 2012, Harch et al. demonstrates blast-induced post-concussion syndrome and posttraumatic stress disorder treatable with HBOT in phase 1 clinical trial.⁶

The above is not meant to be a comprehensive timeline nor is this a meta-analysis of HBOT for various conditions, rather an opportunity to understand why a benign yet beneficial therapy has been ignored and even treated with great disdain. Bureaucratic concerns have repeatedly trumped medical and scientific evidence. For someone with training in decision theory and bureaucratic behavior, the problems are very clear. Each time in history when a decision was made about the deployment of hyperbaric oxygen therapy (starting with Behnke's discovery of oxygen improving the outcomes for DCS), bureaucratic concerns over budget constraints trumped science; to the determent of the persons those bureaucracies were intended to serve. Sometimes it was

concerns about costs. Other times it was incorrect assumptions about the impact of the new science on the system.

There is no evidence of pharmaceutical company interference; although, such interference could be inferred after a 1983 study was published in the New England Journal of Medicine showing HBOT to benefit patients with multiple sclerosis. B.H. Fischer, M.D., a tenured professor at New York University, became the principal investigator of a study funded by the National Multiple Sclerosis (MS) Society (which is directly funded by pharmaceutical interests). Apparently, this society had great difficulty accepting the results of the work Dr. Fischer had completed, and multiple revisions were made to weaken the conclusions sufficiently to satisfy the editors of the New England Journal of Medicine. In this doubleblind controlled study of patients with advanced chronic disabilities, Fischer found significant improvement in objective measurements, and the treatment effect persisted for at least 1 year.7

For reasons hard to explain (to a logical mind), this study was never followed up, despite the positive results, and the treatment languished for lack of financial support and sponsorship. Indeed, Fischer lost his position, and his chamber was destroyed.

It is almost always a bureaucratic decision that makes no sense to those who have to enforce it, because if you don't know the decision logic, one often comes to the conclusion, "it must be fraud." The reports about HBOT's impact on patients have never changed. What has changed is we now understand the mechanisms of action and how vital oxygen is to healthy functioning human metabolism.

For example, a 2002 Canadian study⁸ found that even room air under relatively low pressure (1.3 atmospheres) improved the clinical outcomes of the children in this thirteen-year-old double-blind randomized study. Ten times more progress was made in Gross Motor Function (GMF) during the 2 months of hyperbaric therapy (while all other therapies were ceased) than during the 3 months of follow-up with OT/PT restarted. The editorial in the Lancet, where the article was published, pointed out that "both groups of children improved substantially with respect to GMF, speech, attention, memory and functional skills." The Canadian government, which financed the study after being pressured by parents of children with cerebral palsy, falsely claimed the pressurized room air was a placebo and therefore there was no difference between the placebo group and the group of children receiving 100% oxygen. While this is sadly amusing, it kept HBOT from becoming standard of care for children with CP in Canada and in the United States. This is a gross tragedy and disservice, and not using hyperbaric oxygen therapy to treat these children when their brains are plastic and recovery can be dramatic, leaves them as adults with continued high care costs and lost productivity.



Faster Than Drugs and Without Their Side Effects

Prescription drugs are sometimes necessary. However, when a patient refuses to take them, has adverse side effects or a history of addiction, or you're out of medication options, Alpha-Stim provides another tool for your armamentarium. It is fast, safe and proven effective, even in the most difficult patients, as evidenced by the recent study of advanced cancer patients at The University of Texas MD Anderson Cancer Center.

The brain functions electrochemically and can be readily modified by electrical intervention. Alpha-Stim utilizes Cranial Electrotherapy Stimulation (CES) and Microcurrent Electrical Therapy (MET) to deliver the only patented waveform for a device of its class, with more than 100 clinical studies over 37 years, no serious adverse effects, and no risk of addiction.

LATEST RESEARCH: The University of Texas MD Anderson Cancer Center, "Cranial Electrotherapy Stimulation for the Management of Depression, Anxiety, Sleep Disturbance, and Pain in Patients with Advanced Cancer"



REFERENCE

Yennurajalingam S, Kang D-H, Hwu W-J, Padhye NS, Masino C, Dibaj SS, Liu DD, Williams JL, Lu Z, Bruera E. Cranial electrotherapy stimulation for the management of depression, anxiety, sleep disturbance, and pain in patients with advanced cancer: a preliminary study. *Journal of Pain and Symptom Management.* 2018 Feb; 55(2): 198-204.

To get started and to see more clinical data, visit www.Alpha-Stim.com/AIS or call 1-800-F0R-PAIN (in USA) or +940-328-0788 (Outside USA).

Alpha-Stim and the Alpha-Stim logo are registered trademarks, and LET NOTHING STOP THEM is a trademark of Electromedical Products International, Inc. © 2018 Electromedical Products International, Inc. All rights reserved. Read a full disclosure of the minor and self-limiting risks here: alpha-stim.com/risk.

HBOT has truly been the Cinderella of conventional medicine, which means it has been an attractive therapy that has been shown to be efficacious in treating many conditions and yet is treated with derision or ignored at best. Because no patent is possible on oxygen (or any other element), there is no profit to spark a large pharmaceutical interest to prove or promote it. Few know about HBOT's effects on the body and medical conditions outside of diving medicine and wound care centers. But this has become much more than an issue of lack of marketing and poor public relations. This is now a serious ethical issue as there are now 20 US military veterans committing suicide every day directly related to TBI/PTSD. Suicide losses now exceed combat casualties. Even National Football League (NFL) veterans are starting to commit suicide. The clinical trial called the National Brain Injury Rescue and Rehabilitation project¹⁵ showed HBOT can virtually eliminate suicidality in this population once they are treated with HBOT, while reducing depression by 51%. That is a larger and broader effect on depression than anything advertised on television. Yet even on the basis of compassionate use it is not possible to get HBOT paid for to treat TBI even though HBOT has more "on-label" indications for brain injury than any other drug or therapy in medicine. The issue at hand is not whether HBOT is effective for treating TBI/PTSD - HBOT is an effective treatment, the real issue is why the interference, for the time is upon us to expose the obfuscation of this humanitarian therapy - literally people are dying because they are not getting into hyperbaric chambers to breathe oxygen.

Discussion

In 2009, and again in 2010, Paul Harch, MD, Director of the LSU Hyperbaric Medicine Department, delivered testimony to both the House and Senate Armed Services Committee reminding them that the epidemic of suicides amongst military veterans was most likely due to cocktail of "off-label" antidepressants they were being prescribed - Black-Boxed antidepressants. None of which are approved for treating TBI. Others have delivered this warning as well. The exact FDA warning states: "Antidepressants increased the risk compared to placebo of suicidal thinking and behavior (suicidality) in children, adolescents, and young adults in short-term studies of major depressive disorder (MDD) and other psychiatric disorders. Anyone considering the use of (insert name of antidepressant) or any other antidepressant in a child, adolescent, or young adult must balance this risk with the clinical need."

While antidepressants are modestly effective in reducing the symptoms of severe depression, they increase the brain's susceptibility to future episodes after they have been discontinued. This fact contradicts pharmaceutical company sponsored research as antidepressants cause neuronal damage and mature neurons to revert to an immature state, both of which may explain why antidepressants also cause neurons to undergo apoptosis (programmed death).⁹ If antidepressants cause death on a micro level then it is much easier to understand why certain patients commit suicide given the human body (macro level) is made up of these cells. So, not only are black-boxed off-label Selective Serotonin Reuptake Inhibitors (SSRI's) prescribed to a vulnerable population but they are done so without any regard to an ability tometabolize this class of drugs¹⁰ which further exacerbates suicidal behaviors. And then it seems SSRIs actually deplete both catecholamine and serotonin,¹¹ which is exactly what isn't in a depressed individual's interest.

Up against black-boxed anti-depressants that are not efficacious, it should be a "no-brainer" to use a safe, off-label drug, i.e., oxygen at hyperbaric doses, to treat those who have received a TBI now with two decades of use treating various neurological conditions (the double-blind RCT by Rockswold,¹² showing HBOT effective in treating acute severe TBI, was published in 1992 - decreasing mortality in the acute treatment on severe TBI by 59%, the largest reduction in mortality since the invention of the ambulance, the use of helicopters in Vietnam for battle casualties, and penicillin for infection). So, what is the problem? What does it take to become "standard-of-care?"

As already pointed out, HBOT is non-patentable. Research on non-patentable or off-patent drugs or with insufficient marketing prospects (orphan drugs) is funded by nonprofit or charitable organizations only. Drugs for which a patent cannot be granted are not being developed, and/or marketed even when they respond to a public health need. Patients, pharmacists, physicians and other caregivers consequently cannot take advantage of potentially effective treatments – they can't even find out about them.

But while HBOT won't make any entity large profits, doesn't it have other monetary incentives? For each active duty brain injured solider returned to duty the lifetime savings to the government is \$2.6 million dollars and \$2 million for each injured service member returned to work or school. Between 60 and 80 percent of the veterans participating in the National Brain Injury Rescue and Rehabilitation (NBIRR) project are returning to work, duty or school after receiving HBOT. One would think that would move the powers-that-be to action, but it has not, and the reason for that may be because all they can see is what an injured veteran will cost should they stay alive. That is a serious accusation, so to better understand this controversial area on how the Department of Defense (DoD) handles TBI, the NFL provides an example of what takes place on a smaller scale.

For many decades, evidence has linked repetitive traumatic brain injury to long-term neurological problems in many sports. The NFL as the organizer, marketer, and face of the most popular sport in the United States, in which head trauma is a regular occurrence, was aware of the evidence and the risks associated with repetitive traumatic brain injuries and concussions for decades, but apparently ignored and worse actively concealed the information from those who participated in organized football at all levels. That is now the basis of hundreds of lawsuits.

So, what seems to have taken place is the NFL inserted itself into the scientific research and discussion concerning the relationship between concussions and short-term and long-term impairment of the brain. After doing so, the NFL then intentionally and fraudulently mislead present and former players, and all people who reasonably rely upon the NFL's expertise about its own sport, regarding the short-term and long-term risks posed by concussions and head trauma.

Rather than warn players that they risked permanent brain injury if they returned to play too soon after sustaining a concussion, the NFL actively deceived players, by misrepresenting to them that concussions did not present serious, life-altering risks.

The NFL created the Mild Traumatic Brain Injury Committee (the "MTBI Committee") in 1994 to research and ameliorates the impact of concussions on NFL players. Notwithstanding the purported purpose of the MTBI Committee, and despite clear medical evidence that on-field concussions led directly to brain injuries with tragic results for players at every level of the sport, the NFL failed to inform its current and former players of the true risks associated with such head trauma and purposefully misrepresented and/ or concealed medical evidence on that issue. The NFL also stonewalled on an intervention and therapy that could be helping injured players regardless of whether those injuries were acute or chronic. The author has firsthand experience dealing with the NFL's 88 Plan in an attempt to get veteran NFL players with dementia HBOT.

The 88 Plan is designed to assist players who are vested under the Bert Bell/Pete Rozelle NFL Player Retirement Plan and who are determined to have dementia. But if a plan member tries to get HBOT using the plan because they have been diagnosed with CTE, they will be told CTE does not cause dementia and therefore HBOT, which treats CTE, will not be a covered benefit. Obviously, that is irrational, but there is often madness behind the reason for not allowing an effective treatment to be utilized by those that need it. In the case of military veterans, for 20 suicides every day might be seen as a tremendous cost saving to certain decision makers. Yet it goes beyond money for if the military embraced HBOT as a viable therapy of TBI/PTSD then many, many troops who are on active duty with TBI/PTSD will come forward once they know there is an efficacious intervention that is recognized by the military. In so coming forward, troop strength could be decimated. This is the fear, and this is what has driven faux research funded by the Department of Defense.

All civilian studies published have been reported as positive even a randomized Israeli study, while all the Department of Defense studies have been consistently negative. One study had to go so far as to say that it was "biologically implausible" for compressed room air to have a healing effect on the brain. That would be called conformational bias if only this were about bias, but this was a deliberate and orchestrated attempt to scuttle HBOT as a recognized therapy for the above reason. Yes, it is illegal to waste tax payer dollars knowing you are creating pseudo-science, but that is beyond the scope to this editorial.

Now, this is truly misanthropic, but no more so than what tobacco corporations do and we still tolerate their malfeasance. In the case of the NFL, the reason for prevaricating about TBI and potential treatments is just a business decision. The exposure of the "hit squad" of the New Orleans's Saints, where there was a bounty put on players from opposing teams, is a clear example of what kind of business this is about.

A great deal of time has been lost by those who believe hyperbaric oxygen is either a placebo, sham or should be subjected to placebo-controlled studies - or want others to believe this. But oxygen can never be a placebo. HBOT is an FDA-approved drug that affects non-specific biological repair; in fact it is the only non-hormonal FDA approved treatment known to repair and regenerate human tissue. It does so at a DNA level by activating growth factors and reviving mitochondrial function.¹³ The beneficial effects of HBOT apply no matter where a wound or injury is located in the body.

Many peer-reviewed articles have been published in the last decade that demonstrates HBOT is effective at repairing an injured brain even long after that injury took place. One of the most notable was the article published by Harch et al.⁶ using only one half of the NBIRR protocol (Forty 60 min treatments at 1.5 atmospheres). The blast-induced TBI war veterans experienced a 15 point IQ increase (p < 0.001), 39% reduction in post concussion symptoms, 30% reduction in PTSD symptoms and a 51% decrease in depression. This is all consistent with past-published reports of HBOT in chronic brain injury. including research by the US Army on brain-injured children.¹⁴

The first battle casualty to be treated with HBOT (1.5), and one of the few to be treated was General Patt Maney (retired) for his blast-induced brain injury in Afghanistan. His treatment was ordered after 9 months of therapy at Walter Reed had shown minimal improvement. As a result of his injuries, he was non-functional and unable to return to his job, let alone redeploy back to Afghanistan. After HBOT treatment he was discharged from Walter Reed and returned to his civilian job as a Florida state judge.

He received treatment from George Washington University Medical Center at the Tricare Reimbursement rate of \$250 per treatment. Counting lost time and hospital costs, his months at Walter Reed making no progress; the DoD spent \$400,950, with a permanent disability loss to the service of \$1.3 million. Had he received HBOT (at 1.5 atmospheres) earlier, he would have been able to remain on active duty, a savings of \$1.3 million, but more importantly, the 5 months of recovery once he began receiving HBOT 1.5 cost \$133,650, a savings to the government of \$287,300. No other patients were treated at the Walter Reed's brain injury center, despite the General's remarkable recovery that everyone on the staff witnessed. The \$20,000 for his hyperbaric medical treatment was \$12,000 less than what a RAND report states the annual ongoing costs per year of the current treatments for mild-TBI is,¹⁶ and that is a lot of SSRI's.

Since every working person represents \$1 million in tax revenue over their working life to the government, that government should be interested in, and foster payment for, biological repair of brain injury. Thus every brain injured veteran, all 700,000+ of them, at a cost of \$60,000 per year to the economy every year in increased costs and lost productivity, is a \$42 billion drain on the economy. Treated, they immediately set about doing what young people do, they begin to form families and create the next American generation. Injured, they are unable to do so, and it is highly likely that these untreated brain injuries are a major cause of our nation's economic challenges. But bureaucracies do not think logically their ability to think laterally is limited. When Medicare approved HBOT to treat diabetic foot ulcers at the end of 2002, they only made it available for Wagner III and IV lesions (osteomyelitis and gangrene) so afraid they were of budgetary constraints.

HBOT prevents 75% of major limb amputations in Wagner III and IV ulcers, but if they had included Wagner II lesions HBOT would be preventing 88% of amputations. So, the result is there are a lot of unnecessary amputations not because of bad science, but because technocrats were afraid of having a short term budget problem.

Summary

HBOT is an efficacious, benign and humanitarian way to affect brain repair but it has not been adopted because it lacks patent protection and has no large corporate sponsors. It has also met interference because

other agendas are present be they the protection of the status quo, myopic budgetary constraints, or perceived liability issues - after all, when you treat TBI directly the way that HBOT does, the problems creating those TBI's in the first place are harder to ignore and the unconscious way those problems have been dealt with are harder to deny. It brings the true cost and repercussions of war to the fore, and football itself, after all, is just a form of organized war. This perspective, should it be adopted by the general public, will be a catalyst for change. So, whether that means changing the way football is played to not allowing our "leaders" to guide us into unending military forays for the sack of warprofiting run amuck - all of these sub-terrain issues come into play when a very straight forward and effective therapy tries to assert itself, hence the resistance both on a conscious and subconscious level.

Veterans are considered a threat by the security apparatus in the USA. Is someone thinking that it is better to let 20 potential threats kill themselves every day? This is a dark rabbit hole to go down but the human cost of war is very much a deep rabbit hole and one that many want to keep hidden. Someone is making money when someone else bleeds to death from a cluster bomb. It is that black & white - someone is making money giving dangerous SSRIs for treating TBI. Technocrats rotating between corporation and state are the last people you want making medical decisions, but that is exactly who has been making medical decisions. These are all things to be looked at when asking the question why a therapy like HBOT is being suppressed. If the man

on the street understood why certain medical therapies are not available while other dangerous and nonefficacious therapies are favored then change would be demanded. Right now the man on the street is being kept in the dark about money driving medical decisions to the extent it is today including the suppression of medical knowledge if it will interfere with the flow of that money, or some other irrational fear such as troop strength decimation if soldiers were officially offered HBOT by the military to treat their TBI/PTSD.

Appeared in Medical Gas Research, 2015; 5:7.

Abbreviations

TBI: Traumatic brain injury; ATA: Atmospheres absolute; CTE: Chronic traumatic encephalopathy; PTSD: Post traumatic stress disorder; HBOT: Hyperbaric oxygen therapy; DCS: Decompression sickness; HBO: Hyperbaric oxygen; CP: Cerebral palsy; NFL: National Football League; GMF: Gross motor function; MTBIC: Mild Traumatic Brain Injury Committee; NBIRR: National Brain Injury Rescue and Rehabilitation; DoD: Department of Defense; RCT: Randomized Controlled Trial; FDA: Federal Drug Administration; SSRI: Selective Serotonin Reuptake Inhibitor; MS: Multiple sclerosis.

Competing interests

Financial competing interests: Dr. Stoller practices hyperbaric medicine in New Mexico and California.

Non-financial competing interests: Dr. Stoller was president of the International Hyperbaric Medical Association for over a decade.

References

- 1. Trimble Vance. In hyperbaric oxygen, the uncertain miracle: the little-known maverick medical treatment which has saved the lives of thousands of people. First edition [Unknown Binding]. 1974: 83–84.
- U.S. House of Representatives. Labor-HEW Public Witness Testimony. 1963. p. 274–9.
- Stoller KP. Quantification of neurocognitive changes before, during, and after hyperbaric oxygen therapy in a case of fetal alcohol syndrome. Pediatrics. 2005;116:e586–91.
 Harch PG, Fogarty EF, Staab PF, van Meter K. Low pressure
- 4. Harch PG, Fogarty EF, Staab PF, van Meter K. Low pressure hyperbaric oxygen therapy and SPECT brain imaging in the treatment of blast-induced chronic traumatic brain injury (post-concussion syndrome) and post traumatic stress disorder: a case report. Cases J. 2009;2:6538.
- 5. Stoller KP. Hyperbaric oxygen therapy (1.5 ATA) in treating sports related TBI/CTE: two case reports. Med Gas Res. 2011;1:17.

- Harch PG, Andrews SR, Fogarty EF, Amen D, Pezzullo JC, Lucarini J, et al. A phase I study of low-pressure hyperbaric oxygen therapy for blast-induced post-concussion syndrome and post-traumatic stress disorder. *J Neurotrauma*. 2012;29(1):168–85.
- 7. Fischer BH, Marks M, Reich T. Hyperbaric-oxygen treatment of multiple sclerosis: a randomized placebo-controlled, double-blind study. *New Eng J Med.* 1983;308:181–6.
- 8. Carole S, Larivee S, Richard E, Marois P. Hyperbaric oxygenation therapy in the treatment of cerebral palsy: a review and comparison to currently accepted therapies. *J Am Phys Surg*. 2007;12:4.
- 9. Andrews PW, Thomson Jr JA, Amstadter A, Neale MC. Primum non nocere: an evolutionary analysis of whether antidepressants do more harm than good. *Front Psychol.* 2012;3:117. Epub 2012 Apr 24.
- 10. Lucire Y, Crotty C. Antidepressant-induced akathisia-related homicides associated with diminishing mutations in metabolizing genes of the CYP450 family. *Pharmacogenomics Personalized Med.* 2011;2011(4):65–81.
- 11. Delgado PL, Moreno FA, Onate L. Sequential catecholamine and serotonin depletion in mirtazapine-treated depressed patients. *Int J Neuropsychopharmacol*. 2002;5:63–6.
- 12. Rockswold GL, Ford SE, Anderson DC, Bergman A, Sherman RE. The results of a prospective, randomized trial for treatment of severely brain-injured patients with hyperbaric oxygen. *J Neurosurg.* 1992;76:929–34.
- 13. Gutsaeva DR, Suliman HB, Carraway MS. Oxygeninduced mitochondrial biogenesis in the rat hippocampus. Neuroscience. 2006;137(2):493–504.
- 14. Waalkes P, Fitzpatrick DR, Stankus S, Topolski R. Adjunctive HBO treatment of children with cerebral anoxic injury. *Army Med Dept J.* 2002;April-June:13–21.
- 15. http://clinicaltrials.gov/ct2/show/NCT01105962
- 16. RAND Report: "Invisible Wounds of War: Psychological and Cognitive Injuries, Consequences, and Services to Assist Recovery." Tanielian, Terri; Jaycox, Lisa, April 2008, page xxii-xxiii: Two year costs within the first two years the service member returns home; PTSD \$5,904 to \$10,298 depending on whether we count the lives lost to suicide; Two year costs for major depression, \$15,461 - \$25,757; co-morbid PTSD and major depression; \$12,427 to \$16,884; One year costs for traumatic brain injury diagnosis: \$25,572 to \$30,730 in 2005 for mild cases (\$27,259 to \$32,759 in 2007 dollars), and \$252,251 to \$383,221 for moderate or severe cases (\$268,902 to \$408,519 in 2007 dollars.) These costs, largely treating symptoms, continue to have out year costs and out year consequences in terms of disability payments, inability to work, etc. Given that the HBOT ONE TIME cost for service members who need all 80 treatments averages \$16,000 at Medicare Reimbursement rates for a 1-h treatment. HBOT alone, and even HBOT in conjunction with other treatments, is very cost effective. If provided acutely within hours of injury, the treatment is even more effective and massively more cost effective.

About the Author

Ken Stoller is an Adjunct Assistant Professor of the AT Still University School of Medicine, a Fellow of the American College of Hyperbaric Medicine and a principal investigator of the NBIRR clinical trial.

A Discussion of the Use of Hyperbaric Oxygen Therapy as a Primary and Adjunctive Treatment Modality for TBI Patients

By John Hughes, D.O. and James Lyons-Weiler, PhD

Traditional Approach

Most treatments for chronically debilitated traumatic brain injury (TBI) patients have involved pharmaceutical drugs, occupational and physical rehabilitation, speech therapy and cognitive maintenance. Many patients resign to merely manage their condition and gain very little improvement or begin a slow decline of cognitive or motor function. It is true that some mild traumatic brain injury (mTBI) patients recover to a degree using mainline therapies, but this recovery time can take 7 or more years, with significant loss of cognition, learning, and psychological affect during that time of recovery.

TBI Therapy's Approach

Using TBI Therapy's standard of care protocols, patients at Dr. John Hughes' TBI treatment facilities optimally receive HBOT therapies before and after intranasal and IV infusions, as well as with other healing modalities such as cranial osteopathic treatment, IV nutrition and hydration, and other adjunctive therapies to aid in neuro-regeneration. The procedures and protocols used by Dr. Hughes' Colorado-based TBI treatment clinic are patent pending, uniquely sophisticated, presently scarce, and at the forefront of neuroregenerative medicine. "The brain is in

a metabolic crisis in a concussion..." Robert Cantu, MD (2013). It is this understanding of what happens in a traumatic brain injury (even a mild TBI) that forms the basis of TBI Therapy's unique treatment protocols.

Most mainstream therapies just work to treat the symptoms of a TBI using pharmaceutical drugs, speech therapies, vision therapy and physical therapy. While these therapies have importance, most TBI patients hit a plateau in terms of treatment benefits. These TBI patients continue to suffer from post-concussive symptoms: sound and light hypersensitivity, sleep disturbances, memory loss, loss of concentration, headache pain, loss of libido, loss of decision-making, mood changes, loss of motivation and inability to handle daily stressors. Many TBI patients suffer so significantly from these conditions, that they may not recover. They eventually lose hope ... sometimes even at the expense of families and their own lives.

Most all of the above post-concussive symptoms of TBI are related to one major disturbance to the brain; in Dr. Robert Cantu's (2013) words: "*a metabolic crisis*". Standard of care for concussion includes rest to avoid perpetuation of a crisis of gliosis (Gunther & Queen, 2013). A TBI is like a bomb that goes off in the biochemistry lab of the brain.... all the experiments are in disarray and it will require tremendous energy to get the lab back in working order once again.

This energy must come from somewhere. The challenge is, however, that the brain, even at a resting state, is always using energy. It can never fully rest because it is always working or healing itself. The brain cannot be placed on the couch for a week with an icepack on it to heal like a sprained ankle. We do not need our ankle to work every day, but we do need the brain to work at all times in order to sustain life.

So how can a 'working' human TBI brain, consuming at least 20 percent of the oxygen inhaled by the lungs, recover? If we cannot rest the brain. the most important way to heal the TBI brain, in a metabolic crisis, is to give it more energy. The primary way to get energy to the brain is with more oxygen. Will breathing a few extra liters of O₂ per minute be enough to help these TBI patients? Not really. The brain requires a significantly higher dose of oxygen to heal from injury. It is hypothesized that the brain needs a continuous 3 to 4 times its regular inhaled dose of oxygen to begin healing from TBI (depending on its severity). The only way to significantly increase oxygen in the brain is with a medical grade hyperbaric chamber (providing 8 to12 times as much oxygen) or home hyperbaric chamber (5 to 6 times as much oxygen as normally inhaled when the patient is at rest). With enough oxygen, the brain can begin repairing its hardware.

Pressurized oxygen is analogous to plugging a computer (the hardware of the brain) into a wall socket with enough voltage to begin its self-healing.

Hyperbaric Oxygen Therapy and TBI

Traumatic brain injuries (TBIs) are frequent among Soldiers, football players and victims of assault. Studies of the impact of HBOT on TBIs have been inconsistent. One small study has had a dampening impact on the medical community's enthusiasm for clinical adoption of HBOT for the treatment of TBI; with only 50 participants per group, the study was likely underpowered for small, but important positive (or negative) effects of HBOT (Wolf, Cifu, Baugh, Carne & Profenna, 2012). A full review of studies and their limitations have been provided by Eve, Steele, Sanberg, & Borlongan (2016), including extensive consideration of the difficulty in obtaining a control group that is free of confounding influences of the procedure itself. The difficulty with this explanation, however, is that other uses of HBOT show clear benefits in spite of this limitation, which applies to all randomized clinical trials with obvious intervention. A randomized clinical trial of patients with long-standing TBIs by Boussi-Gross et al. (2013) found improved cognition and guality of life measures during the HBOT treatment period. Clinical improvements can be seen at exposures of 1.1 atmospheres (ATA) or less; therefore, teasing the placebo effect out is challenging. Outcomes should be studied for correlation along the axes of the number of treatment sessions completed,

the duration of each session, and the dosage (in terms of atmospheres and oxygen concentrations). Studies of this type should also be restricted to clearly homogeneous clinical populations, which is extremely difficult in the heterogeneous population of patients with TBI, which can involve any number of regions of the brain, differing in severity, and degree of injury. A priori power calculations should be conducted to ensure that negative results are not due to small sample sizes.

Studies of hyperbaric oxygen therapy (HBOT) for treatment of traumatic brain injuries (TBIs) vary in results in part due to the heterogeneity in the type of scope of TBI cases and challenges in isolating the effect of pressure because subjects are prone to potential placebo effect. Well-designed dose escalation studies of both pressure and oxygen concentrations compared to low pressure control would provide knowledge on dose efficacy. Other variables include treatment intensity (frequency and length of 'dives') and duration (length of treatment period in months). These sources of variation are usually well-controlled within, but not between, HBOT studies. Meaningful clinical outcome variables in mild traumatic brain injuries (mTBIs) include localization and extent of injury.

In a landmark study, Harch et al. (2012) applied hyperbaric oxygen therapy to individuals who had developed PTSD after blast-induced post-concussions. All subjects in the study were given half of the clinical protocol for the study (forty 60-minute treatments at 1.5 ATA). Those receiving the full dose of HBOT showed a 14.8-point increase in intelligence quotient (p<0.001), a 39 percent reduction in the post-concussion syndrome (PCS) symptoms, an 87 percent reduction in headache severity, a 30 percent increase in quality on the PTSD scale, and 51 percent reduction in indicators of depression. They also impressively experienced a 64 percent reduction in the need for psychoactive or narcotic prescription medications. Overall, 92 percent of subjects



reported sustained improvement six months after treatment, with functional improvements in cognition (39 percent), physical well-being (45 percent), emotional areas (96 percent) and significant reductions in anger issues. There is concern that improvements in both treatment and placebo groups demonstrated the Hawthorne effect; the study shows that significance of difference between groups' outcomes (which were not likely due to chance) can be obtained in a manner that obliviates the concern of the placebo effect when the effects are unidirectional. A small clinical study of concussion patients reported cognitive improvements in both groups treated at 1.2 ATA air or 2.4 ATA 100 percent oxygen. There were, in fact, no differences in cognitive improvements between the two groups (Wolf et al., 2015).

There is solid evidence that hyperbaric oxygen therapy provides cognitive and neuropsychological improvements for TBI patients. However, the appropriate dosing of hyperbaric oxygen required to gain significant benefits for these TBI patients has not yet been determined. It is hypothesized that patients may gain more benefits from using HBOT at milder pressures from 1.1 to 1.3 ATA than at higher pressures of 1.5-2.4 ATA. These milder HBOT treatments at pressures from 1.1 to 1.3 ATA can be performed daily in FDA-approved home hyperbaric chambers over extended time periods (3 to 12 months) - at significantly lower cost per treatment than in an outpatient medical facility.

In a study highly relevant for those using off-label neurological applications, Lin et al. (2012) found that HBOT either 1 or 8 hours after TBI in rats led to reduced cerebral infarction, microglial activation, TNF-alpha expression, and neuronal apoptosis – all factors that can influence inflammatory and neurotrophic processes in the human brain. More recently, Tal, Hadanny, Sasson, Suzin, & Efrati (2017) found that HBOT stimulated both angiogenesis and nerve fiber regeneration in TBI patients, including improvements in memory, executive functions, information processing speed and global cognitive scores (post-treatment compared to pre-treatment).

Further research backing the use of hyperbaric medicine for the treatment of TBI patients is available online (see <u>https://tbitherapy.com/</u> <u>tbi-protocol-references/</u>).

References

- Boussi-Gross, R., Golan, H., Fishlev, G., Bechor, Y., Volkov, O., Bergan, J. & Efrati, S. (2013). Hyperbaric oxygen therapy can improve post concussion syndrome years after mild traumatic brain injury-randomized prospective trial. PloS one, 8(11), e79995.
- Eve, D. J., Steele, M. R., Sanberg, P. R., & Borlongan, C. V. (2016). Hyperbaric oxygen therapy as a potential treatment for post-traumatic stress disorder associated with traumatic brain injury.Neuropsychiatric disease and treatment, 12, 2689.
- Gunther, N. & Queen, E. (2013). What Physical and Cognitive Rest Really Mean After a Concussion. Brainline. Retrieved from <u>http://www.brainline.org/content/multimedia.</u> <u>php?id=9022</u>
- Harch, P. G., Andrews, S. R., Fogarty, E. F., Amen, D., Pezzullo, J. C., Lucarini, J., & Van Meter, K. W. (2012). A phase I study of low-pressure hyperbaric oxygen therapy for blast-induced post-concussion syndrome and post-traumatic stress disorder. *Journal of Neurotrauma*, 29(1), 168-185.
- 5. Lin, K. C., Niu, K. C., Tsai, K. J., Kuo, J. R., Wang, L. C., Chio, C. C., & Chang, C. P. (2012).
- 6. Attenuating inflammation but stimulating both angiogenesis and neurogenesis using hyperbaric oxygen in rats with traumatic brain injury. *Journal of Trauma and Acute Care Surgery*, 72(3), 650-659. Tal, S., Hadanny, A., Sasson, E., Suzin, G., & Efrati, S. (2017). Hyperbaric oxygen therapy can induce angiogenesis and regeneration of nerve fibers in traumatic brain injury patients. *Frontiers in Human Neuroscience*, 11.
- Wolf, G., Cifu, D., Baugh, L., Carne, W., & Profenna, L. (2012). The effect of hyperbaric oxygen on symptoms after mild traumatic brain injury. *Journal of Neurotrauma*, 29(17), 2606-2612.

About the Authors

Dr. James Lyons-Weiler, PhD, is the CEO and President of The Institute for Pure and Applied Knowledge. With over 50 publications in major research journals, Dr. Lyons-Weiler has designed and analyzed the data from over 100 basic, translational and clinical studies. His current research interests include finding commonalities in the mechanisms of physical and chemical brain injury, especially focused on neurotoxic metals, and finding treatment options from traumatic brain injury that might translate over to pediatric neurodevelopmental disorders. An expert in genetics, genomics, proteomics, systems biology, research design and bioinformatics, he has authored three books. He is alumnus of SUNY Oswego (BA, Biology), Ohio State University (MSc, Zoology), and The University of Nevada Reno (PhD, Ecology, Evolution and Conservation Biology). He was awarded an NIH National Service Award (Post-doctoral Fellowship) and a US DOE/AP Sloan Foundation Fellowship. He has served on the faculty of the Departments of Biology (UMASS Lowell), Department of Pathology, Department of Biomedical Informatics (University of Pittsburgh) and served as Full Faculty at the University of Pittsburgh Cancer Institute prior to creating and assuming the role of Senior Research Scientist and Scientific Director of the Genomics and Proteomics Core Laboratory Bioinformatics Analysis Core at the University of Pittsburgh. Visit http://ipaknowledge.org for more information and for updates on current research publications.

Dr. John Hughes, D.O. practices osteopathic, integrative, and regenerative medicine. His clinic, Aspen Integrative Medicine, Inc., provides the latest innovations in modern and natural medical care in Basalt and Aspen, Colorado. Dr. Hughes graduated from the Arizona College of Osteopathic Medicine in 2007 and trained in family practice at the University of Arizona. He has specialized in integrative and regenerative medicine, prolotherapy, platelet rich plasma (PRP) therapy, and osteopathic manual medicine since 2009.

In 2013, Dr. Hughes gained an interest in the treatment of traumatic brain injuries after, incidentally, treating a patient with a severe TBI using a regenerative medicine protocol of hyperbaric oxygen, an intranasal PRP/insulin/nutrient cocktail, IV nutrition, cranial therapy, and autologous stem cells. In 2014, Dr. Hughes founded TBI Therapy, LLC, a TBI clinic in Colorado focused on the development of specific protocols for mild to severe brain injury patients.

In 2016, Dr. Hughes applied for a patent status for his TBI Therapy Protocol and intranasal cocktail formulation. His TBI rehabilitation work has been recognized by the patients from the US military, the regenerative medical community, and brain injury specialists. Dr. Hughes sees TBI patients from around the US and the world on a regular basis in Basalt, Colorado and Lafayette, Colorado. Read more about the innovative work of Dr. Hughes at <u>tbitherapy.com</u>.



February 22, 2018

CONTACT:

Dr. William A. Duncan, President, Patriot Clinics, Inc. (405) 999-0965 williamaduncan@msn.com

FOR IMMEDIATE RELEASE -

Today we are losing more Veterans to suicide than we lost in combat, in theater, and under fire in World War I. (120,000 suicides to 116,000 deaths in WWI). Sadly this is because one the biggest myths in medicine is "there is no treatment for brain injury." There are over one million current war Soldiers whose lives have been significantly affected by these injuries.

The truth is we have two major treatments for brain injury in the United States. Hyperbaric Oxygen Therapy (HBOT) has been in use since 1937 and Cognitive Rehabilitation has been utilized since 1980. In fact, Department of Defense HBOT medicine could easily repair a braininjured Veteran while still in service with an 80-treatment protocol while still in the service at a cost of \$480. The VA can do the job for about \$4,800 while civilian treatment facilities increase the cost to \$25,000.

Instead, VA and DoD medicine are spending about \$32,000 per year on ineffective medications that have significant negative side effects. Each untreated war veteran with Traumatic Brain Injury (TBI) or Post-Traumatic Stress Disorder (PTSD) is costing the economy, federal, state, and local governments about \$60,000 per year if they are not homeless. That almost doubles if they are homeless.

"When hyperbaric medicine becomes the standard of care, society will save billions as lives are restored. The cost of oxygen treatment is exponentially less than the millions it costs our state each year to leave our wounded Veterans untreated, or treated ineffectively," Dr. William A. Duncan, President of Patriot Clinics, Inc., explained. "Experience shows that if you take 100 Veterans in transitional living and give them hyperbaric medicine, half will be back to work within 40 treatments, and 80 percent will be back to work after completing HBOT treatment."

Patriot Clinics in Oklahoma City was born from the fact that veterans were not being effectively treated. The non-profit corporation was set up in 2014 and is modeled after 90 charity hyperbaric centers serving patients in Great Britain. The treatment regimen follows the National Brain Injury Rescue and Rehabilitation Project's HBOT (1.5 ATA 99% O₂) protocol.

Patriot Clinics focus on effective medical care and interventional hyperbaric medicine. Recently a Church Pastor called that one of his parishioners was in trouble. Joe is a young Afghanistan War Veteran, and in serious danger of suicide. He came to Patriot Clinics, and within 3 hours, had a BrainMaster QEEG brain scan. took the Automated Neuropsych Assessment Metric (ANAM), had a Dive Physical, and a hyperbaric treatment. He received a second treatment that night, an additional treatment in the morning, and acupuncture for his PTSD, and massage therapy for his injuries aggravated by blasts overseas. The improvements in mood and outlook were immediate and welcomed. For over 500 Veterans, like Joe, over the past four years doctors, practitioners, techs, and volunteers at Patriot Clinic delivered over \$4 million worth of treatments in 14,000 hyperbaric 'dives.' The clinic also delivered

other therapies to help those with PTSD, such as 3,000 chiropractic adjustments and 1,000 acupuncture treatments for PTSD and pain.

This care replicates research results from Louisiana State University, Oklahoma State University, and the country of Israel where people gained 15 IQ points (the difference between a high school dropout and a college graduate), a 39% reduction in postconcussion syndrome (sleep disorder, light sensitivity, executive function difficulty), 30% reduction in PTSD (the largest percentage of any published treatment), a 51% reduction in depression, and a 96% improvement in emotional control. Clinically significant improvement can be expected in every patient who follows the protocol. Suicidality is reduced, as Dr. Harch recently published in his study.

"At Patriot Clinics, we simply got tired of an attitude of 'throw away people' and 'managed care' that treats only symptoms. Instead we have implemented 'effective care' using therapies that actually work to improve a patient's medical condition," Duncan added.

Patriot Clinics works to make hyperbaric treatment accessible to everyone. Combat veterans are often treated using donated funds. Civilians pay based upon income and family resources. Third parties, like workers compensation and automobile carriers, will be billed when appropriate. Duncan explained the clinic is able to deliver these treatments for veterans and others who cannot pay because of charity donations. "We have to raise as much as \$10,000 each month to accomplish our goals. We ask all patients that experience success in treatment to donate at least \$10 for the future treatment for vets." Patriot Medical Foundation at <u>www.</u> <u>PatriotMedicalFdn.org</u> raises money for clinics across the nation to fund this kind of care.

Patriot's facebook page flows with gratitude from those who have experienced the outcomes first hand. "Too many Veterans are committing suicide. HBOT therapy is healing the hidden wounds that drugs cannot cure and the typical medical community does not understand. Patriot Clinics has seen substantial, measurable successes, despite operating on a shoestring budget of donations. You will not find a harder-working group of volunteers than at Patriot Clinicsmost of whom have been successfully treated with HBOT - returning to them a sense of pride in being able to give back."

Two thirds of patients were Vets referred by Vet service organizations and their family members. One-third were civilians whose donations contributed toward the treatment for Vets. At over 30 treatments per day, the clinic is one of the busiest hyperbaric centers in the nation. "To put this into perspective, since 2008 only 2,000 Vets have been treated nationwide. We treated over 500 at our clinic," Duncan noted.

"Many injured Veterans have lost hope of ever recovering. After years of living with shattered life symptoms, they are more than pleased when the headaches disappear, normal sleep returns, the anger issues subside and the ability to think, reason and have healthier family relationships returns," volunteer Office Manager, Stanley Maness explained. Volunteers work every week to keep the clinic operating.

The clinic also treats people with cancer, diabetic wound care and Lyme disease. It offers pre- and post-surgery treatments resulting in improved healing, reduced complications and pain, and greater patient satisfaction compared to surgery without the benefit of pre- and post-hyperbaric treatment. The clinic has also begun treating car accident and workers compensation patients. The addition of the BrainMaster QEEG system give the clinic the ability to do brain scans for patients in real-time, which greatly improves the ability to help acutely injured patients.

With hyperbaric medicine and the other integrated therapies, Patriot Clinics uses tools to do better for those who served their country. Learn more or donate to help heal our warriors at <u>www.patriotclinics.com</u> or <u>www.patriotmedicalfdn.org</u>.

BODY ELECTRIC Electroceuticals and the Future of Medicine

A documentary film to revolutionze the way we think about health and the human body

The American Institute of Stress is an executive producer of Body Electric: Electroceuticals and the Future of Medicine, a documentary film aimed to revolutionize the way we think about health and the human body. This 68 minute movie, by British producer/director/writer Justin Smith, is available online and on DVD for purchase through AIS.

Members stream for free at stress.org Click here to buy the DVD for \$29.95

WATCH NOW







TBI/PTSD and the Suicide Epidemic: Breaking the Cycle

The Stories that follow are illustrative of the work the TreatNOW Coalition has been performing for eight years:

Veterans, Active duty, National Guard, Reserves, First Responders, citizens and athletes — over 2,300 — returned to healthier lives after being told there was little to nothing conventional medicine could do to heal the wounds to their brains.

Some success Stories can be viewed at:

MSGT Scott Roessler <u>http://tinyurl.com/z7psx45</u> CPT Smotherman/Rep John Bennett <u>http://tinyurl.com/lvcf22r</u> MAJ Ben Richards <u>http://tinyurl.com/jts2jy3</u> Joe Namath, football <u>http://tinyurl.com/kflu9up</u> The Honorable Patt Maney (BG, USA) <u>http://tinyurl.com/m97x4jp</u> GnySgt Rotenberry & wife <u>http://tinyurl.com/gpzpxgy</u> Brian Fleury - Hockey Player <u>http://tinyurl.com/hefs478</u> Ben Richards <u>http://tinyurl.com/hd9ahcd</u>

Post injury, Pre-Hyperbaric Oxygen Therapy (HBOT)

Post HBOT



Senior Force Recon Marine

Survived Fallujah and over 7 concussions. Constant ER visits with migraines and 6 different pills for 13 years until wife, worried about suicide talk, found HBOT. Refused HBOT by his unit, Cmdr approved 30-day leave. 40 dives in one month from pro bono civilian clinic. Now instructor, reports no longer "the anger gunny."



21-year Marine SpecOps

Multiple missions. Blown up by 2 IEDs, serious parachute accident, over 1,200 breaching exposures. Constant ringing in ears, eye pain and migraines. Ditto for his unit. HBOT made available to this warrior and his Cmdr. 40 dives each. Both report lives drastically changed for the better. Results are consistent across other fellow Marines misdiagnosed with "only" PTSD.



Recently retired SEAL

Over 2 dozen tours and dozens of concussive events: IEDs, friendly fire, breaching. Reports dozens of his unit in equally bad shape, "hollowed out" and needing help. Treated quietly off-base, over 40 dives, after being told HBOT could ruin his career. Feels he has been given new lease on life. Advocating for forward-deployed HBOT chambers, and HBOT treatment as standard-of-care for combat.

Returned to active duty. Further

tours and decorations. Ordered

not to talk about his treatment

with HBOT.



AFSOC Silver Star Winner

In police custody for road rage. Rescued from jail by HBOT physician who provided 80 dives on pro bono basis.

17 year Special Operator/ Breacher

Multiple tours, innumerable exposures. Multiple failed marriages. Suicidal. Subjected to 3 months intensive care in PREP program. Regressed to original state and psychotropic meds within 2 months. Green Beret Foundation provided support for HBOT treatment with Dr. Zant. After 40 dives, reports off all medicines, migraines gone, wife and children ecstatic. Still on active duty and fully functional.

Post injury, Pre-Hyperbaric Post HBOT **Oxygen Therapy (HBOT)** Margaux Mange, Irag Veteran 90 dives. Hiked to South Pole with Prince Harry, hiked across US and Major head injury, brain surgery, up Denali. Essentially drug and failed marriage, depression, symptom free. 4-time Wounded suicidal. Told to get used to Warrior Olympics champion after her 'new normal.' Nothing more being relegated to life on welfare. could be done. MAJ Ben Richards (USA, ret.) Poster child for HBOT. Genius Iraq Veteran and 3 TBI survivor. IQ returned after being told his Misdiagnosed TBI for 5 years. 'new normal' was all he could Genius IQ reduced to full ever expect. In PhD program and spokesman nationwide for HBOT. disability. DVBIC and Army had him on multiple drugs. Judge Patt Maney (BG, USA, ret) Returned to elected Judgeship. IED survivor Afghanistan. Instituted Veteran Courts in FL and 15 months without progress at lectures nationwide on need for Walter Reed Army Medical Center. HBOT and special treatment of First HBOT patient in 2006. Veterans with brain injury. Over 120 dives. **CPT Matt Smotherman**, Finished law school after 80 dives. **OK Natl Guard** Promoted to CPT after being told Law student before being blown he would have to retire on full up 3 times in Iraq. Could not fill disability. Commended personally out paperwork, read, sleep, by POTUS for efforts in OK focus. Drugged out of pain and tornado relief. into stupor. GnySgt Rotenberry (USMC, ret) Wife found Dr Harch in LA. Donations paid for 40 dives. IED in 2011. Pain, fatigue, Employed at DHS as dog-handler. depression, headaches, Life returning to 'old normal.' withdrawn. Hyperactivity. Getting 40 more dives for lingering Late TBI diagnosis, 15 daily pills. pain and some headaches.

REGAINING LIFE AFTER AN I

Medically separated.

Post injury, Pre-Hyperbaric Oxygen Therapy (HBOT)		Post HBOT
	NFL legend Joe Namath 5 big concussions. Memory loss, balance, brain fog. Awash in pain and suicides and CTE of friends.	Poster child for HBOT. Lectures on his recovery and deterioration of his friends. Strong advocate for HBOT and against delay and denial of concussions in NFL.
	Steve Bowman, Alabama/NY Giants Concussion drove him to early retirement. Life and wife rapidly going downhill. Progres- sive dementia-like symptoms.	Went from inability to walk, think, remember, sleep to mobile husband. Wife cries gratefully: "I got my man back."
	Joe Delamielleure, Buffalo Bills, HOF 2003. Memory, brain fog, pain. 80 dives after plea to help him in Charlotte, NC.	Spokesman for HBOT. Lectures to NFL Players and veterans about his recovery and need for HBOT in every locker room.
	NFL Pro Bill Romanowsky 20 concussions over 16 years. 80 dives to fight memory loss, headaches, physical pain.	He feels HBOT should be standard- of-care for concussions. Continues a dive a month and proselytizes for HBOT at Super Bowl 50.
	Marv Fleming, Packers, Dolphins, Patriots Memory loss, balance, headaches, physical pain.	Spokesman at SB50 for HBOT. Works to encourage other brain- damaged players to get HBOT and demand treatment.

6

IN THE NEWS

TBI Treatment: The Invisible Scars of War

By Lance Cpl. Nicholas Lubchenko, MCB, Camp Lejeune

The Department of Defense has had more than 350,000 traumatic brain injuries since the year 2000 according to Defense and Veterans Brain Injury Center. In response, the Intrepid Spirit Concussion Recovery Center offers a holistic, integrated, interdisciplinary, patient and family-centered TBI recovery program.

The DVBIC and ISCRC hosted an open house during Brain Injury Awareness Month to inform Active-duty Service Members, medical providers and commanders of the services offered at the Naval Medical Center Camp Lejeune ISCRC on Marine Corps Base Camp Lejeune, March 23.

"Brain injuries are the invisible wounds of war," said Navy Captain Tom Johnson, director of the ISCRC. "Once they can be seen, identified and treated the vast majority of Service Members who come here return to full duty."

The ISCRC maintains a wide range of service providers within their program, including a neurologist, speech and language pathologist, behavior health and art therapists, among others.

"We have staff with a vast array of talents," said Johnson. "All of them collocated in the building here. This allows them to communicate with each other and with the patient on a regular basis to coordinate care and make it as effective as possible."

The ISCRC on MCB Camp Lejeune is the only Navy Facility on the East coast to offer this type of TBI recovery program.

"The services we offer here are unique to Camp Lejeune," said Navy Captain Tom Johnson, director of the ISCRC on Camp Lejeune. "There is only one other Intrepid Spirit in the Navy and that's at MCB Camp Pendleton."

"We have seen Service Members who were extremely debilitated by problems with mood, headaches, memory and sleep who really thought their career was ended. However, after completing treatment here, had full recovery," said Johnson. "When dealing with TBIs, about 95% of our Service Members return to full duty."

"There was a senior-enlisted, specialforces individual who had been on many deployments that came to our clinic who was extremely frustrated because over the years he had suffered several TBIs," said Johnson.

"The only options he was given was medical retirement or narcotics. In participating in our program, he was able to take advantage in not just the traditional rehabilitative and pharmacological modalities, but also Alpha-Stim, yoga and acupuncture. The combination of these therapies, along with others, allowed him to get pain control without narcotics. He was able to remain on full-duty and continue his career. He was able to become reacquainted with his wife and kids because he wasn't dealing with chronic pain or sedated by medications."

Along with a hope to increase staff and treatment options, Intrepid Spirit hopes to expand their research into the causes and treatment for brain injuries. "With our research, we would like to be able to identify the mechanism of injury after a blast exposure and improve prevention, diagnosis and treatment," said Johnson.

Johnson said he was grateful to have the opportunity to help his fellow Service Members and encourages everyone to be aware of the risks TBIs impose.

"If you have or think you have sustained a brain injury, seek medical attention," said Johnson.

Appeared in Camp Lejeune Globe on Thursday, March 29, 2018.



Now more than ever, we must learn to address stress! Generous contributions help fund educational programs, institutional resources, research and less stressful lives.

Click here or visit www.stress.org/give/make-a-gift to donate today!

EPILOGUE

Once again, Dr. Robert Beckman has gathered some of this nation's premier experts and authors, whose expertise leads the way for one of the very most powerful and effective interventions for the treatment of traumatic brain iniuries. Dr Beckman has been doggedly dedicated to collaborative initiatives for the promotion of HBOT as a well-tested and proven alternative wound-healing therapy. What we have on-hand has not done the job for our war-wounded and Veterans in terms of returning their lives to them. Tens of thousands of suffering souls have everything to lose by relying on those traditional interventions that too often lead to a life of progressive debilitation and an early demise. In the meantime, Big Pharma and idle prescribers rake in plenty of profits by dispensing Hefty bags filled with medications. Together with other unproven and even dangerous interventions found in prescription bottles, troglodytes (cave dwellers) operate with no design or direction to promote healing and recovery of wounds to the brain. We cannot continue to derail progress at the cost of lives, families and purposeless lives, when oxygen to the brain has very clearly emerged as a way to reclaim them.

As a survivor of the Fort Hood Massacre, I have devoted the last 8 and one-half long years, with more than veiled threats on my life, to demanding that the massacre be reconsidered as an act of domestic terrorism and that every single one of the wounded receive every benefit due them. Sadly, and despite continued lies perpetrated by DOD, DA and the US Government, this is not the case. No doubt that I may die trying or come up missing, but it is my solemn vow to right this sinking ship.

I have had the privilege of meeting SSG Patrick Ziegler at two of the memorials and the Purple Heart Ceremony in the years following the Fort Hood Massacre. Though we were not assigned to the same unit, I made it my business to meet him and to pay homage to his sacrifices in service of this great country. I am acutely aware of the massive brain injuries he sustained at the hands of a madman and the tremendous losses in functioning he suffered. This does not even begin to take into account the vast quality of life issues and the enormously destructive impact this has had on his family. To view the extraordinary progress made in his recovery was unimaginable previous to his receipt of HBOT. This offers unequivocal proof of the immeasurable benefits of treating the brain with large doses of oxygen and demands that we put an end to our ignorance and avoidance of this compelling form of treatment. TreatNOW please!

Your Editor, Kathy Platoni, PsyD, DAIPM, FAIS COL (RET), US Army COL, Ohio Military Reserve, State Defense Forces

A

A Discussion of the Use of Hyperbaric Oxygen Therapy as a Primary and Adjunctive Treatment Modality for TBI Patients, *May 2018, 29-33*

All the right moves: the need for the timely use of hyperbaric oxygen therapy for treating TBI/ CTE/PTSD, *May 2018, 18-28*

An Epic Issue, March 2018, 88

C Coming Home, *March 2018, 83-87*

Ε

Epilogue, May 2018, 44

Η

Hyperbaric Oxygen Therapy and Alternative Therapies: Healing Brain Wounds Safely, Effectively and Inexpensively, *March 2018, 5-29*

Hyperbaric Oxygen Therapy: Effective Treatment of the Silent (Signature) Injuries of Combat, *March 2018, 36-43*

Μ

MAJ (RET) Ben Richards and his HBOT Treatment ExperienceOverview of this Edition: Part 2: Expanding Options, *May 2018, 6-11*

Martin Hoffman Legacy, March 2018, 1

0

Old World Wisdom, New World Healing and Health, *March 2018, 52-54*

Overview Part 1: Perspective for the Curious, *March 2018, 2-4*

Overview Part 2: Expanding Options, *May 2018, 4-5*

Ρ

Patriot Clinics Press Release, May 2018, 34-36

S

Sacred Duty: Broken Promise A Call to Action in Treating our Wounded, *March 2018, 74-81*

Т

TBI/PTSD and the Suicide Epidemic: Breaking the Cycle, *May 2018, 38-41*

TBI Treatment: The Invisible Scars of War, *May 2018, 42-43*

The Next Generation in Brain Recovery and Neuroregeneration The Use of Cranial Electrotherapy Stimulation in Traumatic Brain Injuries, *March 2018, 44-51*

The Use of Cranial Electrotherapy Stimulation in Traumatic Brain Injuries, *March 2018, 55-67*

To Treat a Concussion: Using Hyperbaric Oxygen to Mitigate the Duration of Symptoms of Acute Concussions, *May 2018, 12-17*

To Veterans with Invisible Wounds- Video Link, *March 2018, 73*

Trauma Presskit, March 2018, 69-70

Trauma, Documentary Review, *March 2018,* 71-72

W

What is Hyperbaric Oxygen Therapy?, *March 2018, 30-35*

Not a subscriber?



Have "Combat Stress" delivered to your inbox each quarter!



The American Institute of Stress 220 Adams Drive, Ste 280 - #224 Weatherford, TX 76068

> info@stress.org Main: (682) 239-6823

The American Institute of Stress is a qualified 501(c)(3) tax-exempt organization.