

# Rapid Recovery Hyperbarics

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## HEAD INJURIES/TBI'S

HBOT has been recognized world-wide for its benefits on head injuries and TBI's. Here at the Advanced Hyperbaric & Recovery Center, we have not only treated patients in this category, but our successes have brought some right out of comas. Head injuries and TBI's are most commonly thought of in motor vehicle injuries; however, this affects many more individuals, like skiing accidents and major falls. Of recent interest have been military personnel and veterans with acquired brain injuries, from blast injuries and implosive devices. This segment of the population is receiving a large interest, not only due to their line of duty but also due to the encouraging results when placed in a hyperbaric oxygen chamber. HBOT clearly demonstrates its value in TBI's by helping many helping many patients recover far beyond expectation. Over 10 years ago, it was thought that the primary mechanism of action was HBOT's influence on recoverable brain tissue (or the 'penumbra area' of the brain); in essence, WAKING UP THE BRAIN. It was also known that HBOT increases the formation of blood vessels to damaged tissue, so it was thought that a series of HBOT could repair the damage caused by a head injuries by both helping 'wake up' damaged brain cells and 'creating new permanent circulation' to these damaged areas. Now recent research is showing us another reason for the positive results seen with HBOT—Stem Cells. HBOT causes the body to produce stem cells in the brain, aka new brain cells. This is a key to long term recovery for any brain injured patient. Not only does HBOT stimulate the formation of new brain tissue, it also helps in re-organizing the brain (neuroplasticity). You see, after any brain injury, the brain is compromised and can have permanently damaged tissue. However, the brain has the ability to re-organize itself, allowing other parts of the brain to take over the functioning of the damaged tissue. HBOT has shown to enhance this effect. This means that not only does HBOT affect recoverable brain tissue, but it also affects non-recoverable tissue—the perfect solution for any patient aiming to have a full recovery.

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## Hyperbaric oxygen therapy assists with traumatic injury

**May 7<sup>th</sup> 2008**

By: Ivanhoe Broadcast News Service Hyperbaric oxygen therapy (HBOT) was originally created to treat medical conditions caused by scuba diving. One condition, decompression sickness, or 'the bends,' can be painful and sometimes deadly. During a dive, nitrogen gas enters the body. If a diver surfaces too quickly and returns to normal pressure, the gas expands rapidly inside the body without being released fast enough. In divers, HBOT is also used to treat gas embolism, which occurs when gas bubbles enter arteries, veins and/or capillaries, resulting in poor blood flow. Traditionally, HBOT uses a pressurized chamber to deliver 100 percent oxygen to the body. In our normal environment, the air we breathe is about 20 percent oxygen and 80 percent nitrogen. According to the United States National Library of Medicine and the National Institutes of Health, the air pressure inside a hyperbaric oxygen therapy chamber is two and one half times greater than normal atmospheric pressure. For certain conditions approved by the Undersea and Hyperbaric Medical Society (UHMS), Medicare and some health insurers will cover HBOT. In private clinics, HBOT sessions can cost from \$100 to \$200 while hospitals may charge over \$1,000. HBOT has also been found to be effective for traumatic brain injury, strokes, cerebral palsy, autism, near drowning, near hanging, birth injury, genetic disorders like mitochondrial disease, multiple sclerosis, chronic fatigue, among other conditions.

Paul G. Harch, M.D., a hyperbaric and emergency medicine physician, talks about hyperbaric oxygen therapy.



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- **What happens inside a hyperbaric chamber?**

**Dr. Harch** The pressure of the atmosphere in the chamber increases as 100 percent oxygen is added to the chamber. That oxygen is dissolved into the lungs and into the liquid portion of the blood. It reaches areas in the body it normally wouldn't reach because of the very high concentration.

- **How does hyperbaric oxygen therapy help patients with traumatic brain injuries or brain injuries in general?**

**Dr. Harch** There is a characteristic of severe traumatic brain injury where normally the blood flow and metabolism, like gasoline and RPMs in an engine, are tightly coupled. In a severe injury, blood flow and metabolism are uncoupled, so blood is rushing through the blood vessels and the cells are damaged and essentially not working. There has never been, in the history of science, any drug or therapy that has been able to recouple this severe derangement until hyperbaric oxygen. It was demonstrated that a single treatment in acute severe traumatic brain injury, in the first few days after injury, could recouple the severe derangement in the brain. Hyperbaric oxygen therapy is a remarkable discovery.

- **What are you finding when you treat people with hyperbaric oxygen? What does the oxygen do to their brains?**

**Dr. Harch** A variety of things from the acute injury. Some of the machinery of the cells can be so damaged that they can only live in a kind of low RPM state. The cells are just humming, idling along, and there is something about hyperbaric oxygen that overrides that freeze on the machinery and the next thing you know the cells start to function again. As this is done repetitively, however, what seems to happen is new blood vessels are growing in the damaged areas and that makes the brain cells function better.

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- **What does the oxygen do to the blood vessels?**

**Dr. Harch** Oxygen stimulates growth of new tissue. Everywhere this has been done in the body with hyperbaric oxygen therapy to chronic wounds, the net effect has been the growth of new blood vessels and new tissue. Indirectly, we proved that in an animal model and there is no other way, I think, to explain what is going on in humans.

- **How do you treat the patients who come to you with brain injuries and what changes have you seen in them?**

**Dr. Harch** It depends on their injury, but I do a lengthy physical exam. I usually do a video part on the exam to try to capture things that are not easily captured on and recorded on a written physical exam, and then I often image them. I image them with a brain blood flow type of imaging that shows the functional abnormalities, which leaves us some choices. We can put them in the chamber once, take them out, and repeat that scan and see if we have affected their brain with just one treatment or I treat them in a prolonged fashion and then at some other point, begin to re-image them. Some people we don't image, I just go ahead and start treating them and they go through a series of treatments. I try to get them to about 40 treatments and it seems like it's a magic number for the human body to respond to hyperbaric oxygen. By that point we usually have permanent improvements in function.

One young adult patient, five and a half years after severe traumatic brain injury, had been to every rehab facility and finally, was treated with hyperbaric oxygen. The right temporal lobe and the cerebral lobes, plus other areas in the brain, became very noticeably affected by the hyperbaric oxygen. According to the brain blood flow scan, there had been significant reductions in blood flow due to her injury. After a single hyperbaric treatment we saw noticeable improvements in this patient's very damaged areas that were similarly improved after four months of hyperbaric treatment. Clinically, she was functioning better, she was improved in her ability to write, had improvements in her endurance, ability to walk, and in her emotional state.

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- **What do you see in these people after the 40 treatments, before and after?**

**Dr. Harch** It depends on the diagnosis. For instance, in the case of near drowning — the most difficult of all to treat — you will see some improvements in their tone, awareness. You can see their seizures decrease in frequency and severity. We don't usually see the dramatic types of changes in chronic near-drowning because there is so much brain damage. In patients with traumatic brain injury and, for instance mild traumatic brain injury, there is only microscopic loss of tissue. Most of their deficits are cognitive and emotional; short temperedness, irritability, fatigue, memory problems, attention, concentration. After HBOT there is a general improvement in a majority of those functions; a return to their pre-injury status.

- **How does the treatment work to reduce symptoms like memory loss?**

**Dr. Harch** On a biological level, all I can tell you is we appear to be repairing some of the damaged tissue. The hardest evidence I have is what we did in an animal model where we saw an increase in blood vessel density to the damaged area and simultaneously the rats were able to recover some of their lost cognitive abilities (their short-term memory). You have to have new tissue growth and making new connections to recover that function. I think that is probably what is going on in the humans as well.

- **Are there other human studies that prove hyperbaric oxygen therapy is really working?**

**Dr. Harch** Yes, in different models and, for instance in an acute severe traumatic brain injury, we have more clues and evidence of the effectiveness of HBOT then we do for almost any one of the other 14 indications that are approved by the FDA and reimbursed by both insurance companies and Medicare.

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- **As you treat these patients, what does this mean for them?**

**Dr. Harch** It turns their life around, which is what is so rewarding about this and why I keep doing this. Our brain controls all of our being, our intellectual function, our personality, our jobs, our relationships, our emotions — everything — and when people who have such dysfunction recover; it changes their lives in immeasurable ways.

- **What do you see the hyperbaric chamber as being capable of?**

**Dr. Harch** Oh, I see it as revolutionizing medicine because there are so many applications and I talked about them in the book. It has been confirmed in a study that animals can be resuscitated 25 minutes after warm cardiac arrest or 25 minutes after they are dead. It is unparalleled and it started with a case about a human in a hyperbaric chamber who is alive today and fully functional; however, in human terms, the longest amount of time is usually about 15 minutes of warm cardiac arrest and no one survives. Cardiac arrest, surgical complications, dementia, traumatic brain injuries, residual effects of stroke, cerebral palsy, autism — the list of possible things treatable with hyperbaric technology goes on and on. This is a little bit of an atypical route that we are going here, but its necessary because the impact of this and the potential, especially now for the hundreds of thousands of brain-injured soldiers just in our country alone; but for traumatic brain injury worldwide, this could change healthcare so dramatically that what we are doing here today is very important.

- **What does oxygen do inside the brain?**

**Dr. Harch** As I mentioned to you earlier, it appears to be causing new tissue growth. Between the input of hyperbaric oxygen and the output of new tissue, no one understood the intermediate steps until the last 15 years. Now, with biochemical techniques that are more sophisticated, we are finding the oxygen acts like a drug and the sight of action is in the DNA in the cells. The oxygen is unlocking and stimulating certain gene sequences that code for growth and repair hormones. The oxygen is stimulating the DNA in our cells to begin to transcribe these hormones that then cause growth and repair.



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- What is the cost of one hyperbaric oxygen treatment if you don't have insurance?

Dr. Harch About \$200

## 1st successful treatment for chronic traumatic brain injury

**Sunday, 14-Oct-2007**

C A research team led by Dr. Paul Harch, Assistant Professor of Clinical Medicine at Louisiana State University Health Sciences Center New Orleans and Director of the LSU Hyperbaric Medicine Fellowship Program, has **published findings** that **show hyperbaric oxygen therapy (HBOT) improved spatial learning and memory in a model of chronic traumatic brain injury**. HBOT is the use of greater than atmospheric pressure oxygen as a pharmacologic treatment of basic disease processes/states and their diseases. The paper is **reported in the October 12, 2007 issue of Brain Research**. (Paper available upon request.) The research team adapted a well-known acute animal model of focal traumatic brain injury to chronic brain injury to evaluate the ability of low-pressure hyperbaric oxygen therapy (HBOT) to improve behavioral and neurobiological outcomes. The 64 rat subjects were divided into three groups: an untreated control group (22), an HBOT group treated with a human protocol (19), and a group treated with sham hyperbaric pressurization (23). The subjects were tested pre and then 31-33 days post HBOT using the Morris Water Task (MWT), a behavioral test which measures learning and memory. The HBOT group received low pressure twice daily therapy, and the sham-treated normobaric air group the identical schedule of air treatments using a sham hyperbaric pressurization. All groups were subsequently retested in the MWT. Post experiment, blood pressure density was measured in the brain and was correlated with MWT performance. HBOT caused an increase in vascular density in the injured hippocampus ( $p < 0.001$ ) and an associated improvement in spatial learning ( $p < 0.001$ ) compared to the control groups. The increased vascular density and improved MWT in the HBOT group were highly correlated ( $p < 0.001$ ). **In conclusion, a 40-day series of 80 low-pressure HBOTs caused an increase in vascular density and an associated improvement in cognitive function**. These findings **reaffirm** the **clinical experience of HBOT-treated patients** with chronic traumatic brain injury and write the authors, represent the first demonstration of noninvasive improvement of chronic brain injury in an animal model. Traumatic brain injury (TBI) is a disorder of major public health significance. According to the National Institutes of Health, each year in the United States alone there are 100 new cases/100,000 population and 52,000 deaths. Most patients survive and add to an increasing prevalence of chronic TBI, estimated at 2.5-6.5 million individuals in 1998. Direct and indirect costs have been estimated at \$56 billion/year in 1995. Unfortunately,

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there is no cure for chronic TBI and only a few previous studies suggest effectiveness under limited conditions. These new findings could hold enormous significance not only for the million+ who sustain TBI from falls, motor vehicle accidents and assaults in this country each year, but also for returning US military veterans.

## Researchers Report First Successful Treatment of Chronic Traumatic Brain Injury

ARLINGTON, Va., **Oct. 11, 2007** — The American Association of Health Freedom and the International Hyperbaric Medical Association announced today that physician-researchers at the Baromedical Research Institute and **Louisiana State University School of Medicine, New Orleans have reported the successful treatment of chronic traumatic brain injury (TBI)**. The findings, **published in Brain Research (2007 Oct 12;1174:120-9)**, are purportedly ***the first-ever demonstration of improvement of chronic brain injury in animals***. The treatment involved a new application and drug dosage of hyperbaric oxygen therapy. Hyperbaric oxygen therapy has been applied to diving injuries, carbon monoxide poisoning, "flesh-eating bacteria," and chronic wounds. Application to chronic brain injury is controversial. **This demonstration is a landmark achievement that reverses 100 years of neurology and the institutionalized belief that chronic brain injury is untreatable.** It has significant implications for the treatment of chronic human traumatic brain injury (TBI) such as for current U.S. military veterans. Lead author, Paul G. Harch, M.D., Clinical Assistant Professor, Director of the LSU School of Medicine Hyperbaric Medicine Fellowship in New Orleans, and author of recently published *The Oxygen Revolution* (Hatherleigh Press, NY), said that he made this discovery when he first applied HBOT to divers with a disabling form of "the bends," brain decompression illness. Harch noticed that the traditional application of a single HBOT to freshly injured divers did not result in the immediate cure described by the U.S. Navy. Instead, divers from the Gulf of Mexico presented days to weeks after their injury and required much more HBOT at a lower pressure. Eventually, he realized that they were treating more chronic forms of brain injury since the bubbles had long passed through the divers' brains. Harch and colleagues applied this lower dose of HBOT to patients with other forms of ***chronic brain injury, including trauma, cerebral palsy, autism, toxic brain injury, dementia,*** and multiple other diagnoses. Harch stated that when he presented this human case experience at scientific meetings from 1992 to 1999 he was criticized for lack of an animal model. As a result, he adapted the Feeney model of acute traumatic brain injury to chronic brain injury and applied his human protocol of HBOT. Harch and colleagues were able to show in *Brain Research* that they could improve cognition (spatial learning and memory) while increasing blood vessel density in the damaged hippocampus of the rats. The potential application to chronic human TBI is important because there is currently no treatment. Chronic TBI affects over 5 million Americans. Costs of treating TBI exceed \$60 billion/year in the U.S. alone. The personal toll is far greater. *Traumatic brain injury has also been described as the signature injury of the wars in Iraq and Afghanistan.*



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As many as 400,000 U.S. servicemen have been exposed to blast injuries and could have varying degrees of TBI. ***Application of HBOT to these veterans could have a significant impact on their return to work, quality of life, and national security.*** For information on the Brain Injury Rescue and Rehabilitation Project, please visit <http://www.healthfreedom.net>

## Hyperbaric oxygen in traumatic brain injury

**Neurol Res. 2007 Mar;29(2):162-72**

*Rockswold SB, Rockswold GL, Defillo A.*

*Division of Neurosurgery, Department of Surgery, Hennepin County Medical Center, Department of Neurosurgery, University of Minnesota, 701 Park Avenue, Minneapolis, MN 55415, USA.*

**OBJECTIVES:** This critical literature review examines historical and current investigations on the efficacy and mechanisms of hyperbaric oxygen (HBO) treatment in traumatic brain injury (TBI). Potential safety risks and oxygen toxicity, as well as HBO's future potential, are also discussed. **METHODS:** Directed literature review. **RESULTS:** Historically, cerebral vasoconstriction and increased oxygen availability were seen as the primary mechanisms of HBO in TBI. HBO now appears to be improving cerebral aerobic metabolism at a cellular level, namely, by enhancing damaged mitochondrial recovery. HBO given at the ideal treatment paradigm, 1.5 ATA for 60 minutes, does not appear to produce oxygen toxicity and is relatively safe. **DISCUSSION:** The use of HBO in TBI remains controversial. Growing evidence, however, shows that HBO may be a potential treatment for patients with severe brain injury. Further investigations, including a multicenter prospective randomized clinical trial, will be required to definitively define the role of HBO in severe TBI.

## Pilot case study of the therapeutic potential of hyperbaric oxygen therapy on chronic brain injury

**J Neurol Sci. 2007 Feb 15;253(1-2):94-105. Epub 2007 Jan 16**

*Hardy P, Johnston KM, De Beaumont L, Montgomery DL, Lecomte JM, Soucy JP, Bourbonnais D, Lassonde M. Centre de Recherche en Neuropsychologie et Cognition, Université de Montréal, Québec, Canada.*

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**BACKGROUND:** Recently, the effect of hyperbaric oxygen (HBO(2)) therapy was explored in the treatment of chronic TBI. It has been speculated that idling neurons in the penumbra zone remain viable several years after injury and might be reactivated by enhanced oxygenation. We studied the therapeutic potential of HBO(2) therapy in a 54-year-old man who had sustained traumatic brain injuries one year before testing that resulted in permanent neurological symptoms. **METHODS:** Two treatment series separated by a one-year inter-session interval were administered. Treatment series consisted of 20 and 60 daily one-hour exposures to 100% oxygen at 2 ATA. Electrophysiological (event-related potentials), metabolic and behavioral (sensorimotor and neuropsychological) measurements were obtained to evaluate the effects of hyperbaric oxygen therapy on neurocognitive functioning. **RESULTS:** Following the initial treatment, the patient showed improvements in sensorimotor functions, as well as enhanced P300 amplitude in the damaged hemisphere. Although most of these gains were no longer observed one year after treatment, these were reinstated with an additional series of 60 exposures. Neuropsychological improvements were also observed after the completion of the second series of treatments. **CONCLUSION:** The present single-case study provides preliminary evidence of neuropsychological and electrophysiological improvements after series of 20 and 60 treatments, although the first dosage appeared to be insufficient to produce permanent benefits. Longitudinal studies using different treatment parameters should be conducted if we are to systematically investigate long-term improvements resulting from HBO(2) therapy.

## Evaluation of hyperbaric oxygen treatment of neuropsychiatric disorders following traumatic brain injury

**Chin Med J (Engl). 2006 Dec 5;119(23):1978-82.**

*Shi XY, Tang ZQ, Sun D, He XJ.*

*Neuroscience Care Unit, Second Affiliated Hospital of Zhejiang University College of Medicine, Hangzhou, China. xys0571@hotmail.com*

**BACKGROUND:** Improvement of clinical symptoms following hyperbaric oxygen (HBO) treatment of neuropsychiatric disorders arising from traumatic brain injury was proved by our previous study. This study was aim to obtain the evidence of other changes. **METHODS:** Three hundred and ten patients with neuropsychiatric disorders arising from traumatic brain injury were treated twice with hyperbaric oxygen. Cerebral single photon emissions computed tomography (SPECT) images and computed tomography scans (CT) before and after hyperbaric oxygen treatment, were compared. **RESULTS:** Before

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treatment, the proportion of abnormal cerebral changes detected by SPECT was 81.3% but only 15.2% by CT. After HBO treatment, 70.3% of SPECT scans showed no abnormalities and these patients were clinically improved. Treatment improved regional cerebral blood flow. CONCLUSION: SPECT was much more sensitive than CT in the diagnosis of neuropsychiatric disorders following hyperbaric oxygen treatment of neuropsychiatric disorders arising from traumatic brain injury.

## Improving neuropsychological function after chronic brain injury with hyperbaric oxygen

**Disabil Rehabil. 2006 Nov 30;28(22):1379-86.**

*Golden Z, Golden CJ, Neubauer RA.*

*University of Florida, Fort Lauderdale, FL 33314, USA. [goldench@nova.edu](mailto:goldench@nova.edu)*

PURPOSE: One suggested treatment for chronic brain injury (CBI) is the use of hyperbaric oxygen therapy (HBOT). The present study was an evaluation of neuropsychological improvement after HBOT in CBI patients. METHOD: Study 1 compared test – retest results of 21 CBI children treated with HBOT against test – retest results of 42 untreated brain injured and normal children. Study 2 compared 21 CBI adults treated with HBOT against 42 untreated normal and brain injured adults. In each study, subjects received pre and post assessments to evaluate neuropsychological function. RESULTS: The HBOT-treated children showed significant improvement when compared with the two control groups on measures of daily living, socialization, communication, and motor skills. The treated adults made significant gains in all neuropsychological areas tested as compared to controls. CONCLUSION: The studies were strongly supportive of HBOT as a treatment for lessening the neurological impact of CBI. These studies indicate that HBOT can be an effective aid in ameliorating the neuropsychological and physiological effects of CBI. The absence of a clear sham HBOT treatment group is an issue as it could be that there was a placebo effect, but it should be noted that the controls were receiving more traditional interventions during the study.

## Oxygen therapy speeds soldier's recovery

**March 11, 2009** by: Kathryn Bursch

Tampa, Florida – As a medical team transfers him from stretcher to stretcher, no one can say if Bradley Thomas really knows what's about to happen at University Community Hospital. But his doctor and mother are convinced that a new kind of treatment here is

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helping. “We’ve seen a considerable change,” say Veronica Thomas.

The 23-year-old Army Specialist from Texas suffered a severe brain injury in Iraq. After more than a year, he’s still in a semi-coma. Thomas is a patient at the James A. Haley Veterans’ Hospital, but for five weeks he’s been receiving hyperbaric oxygen therapy at UCH. Thomas is placed in a pressurized chamber where he inhales 100% oxygen. It’s called-taking a dive. “The body is basically receiving 18 times more oxygen that it would normally be used to receiving,” explains Andy Dennis, the safety officer for the UCH Hyperbaric Center. **Hyperbaric chambers** have long been used to **speed up the healing of flesh wounds** and now it’s thought that the increased oxygen intake helps the brain to heal as well. “Oxygen is needed by all healing tissue and it allows the brain to heal at a faster rate than it normally would,” says Dr. Ajay Patel, a hyperbaric therapy specialist. The U.S. military is conducting research into hyperbaric therapy and the need is certainly there. In recent years, more than 8,000 military members have suffered brain injuries. While serious scientific research is being done on this therapy, success stories also abound on the internet. One You Tube video shows a young man who received a brain injury in a car crash. Before hyperbaric therapy he looks unresponsive and a few months later the improvement is remarkable. No one can say if Thomas will make the same type of recovery, but after just a few weeks of oxygen therapy, his mother says he’s getting better. She says he’ll respond to questions by blinking his eyes or squeezing her hand. “We’re seeing more spontaneous movement and just visually, he seems like he’s more with us,” says Veronica. Recovery will be a long road for Thomas and his family, but this treatment is offering them both a fresh breath of oxygen and hope.

## Texas Soldier Gets Hyperbaric Chamber Treatment in Bay Area

March 11, 2009 by KATIE CORONADO | News Channel 8

Bradley Thomas was an athletic man who loved the outdoors, but that all changed when the infantry soldier’s tank was struck by a roadside bomb in Iraq. Doctors say the explosion left

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the 23-year-old semi-comatose, so the Texas man was brought to Tampa's James A. Haley V.A. Hospital for treatment. Day after day, he is transported to University Community Hospital in Carrollwood where he undergoes hyperbaric chamber treatment. "He's going each day into a pressurized oxygen chamber," said Dr. Ajay Patel. "That **pressurized oxygen chamber** puts him down to about one-and-a-half atmospheres, and in doing so it increases the amount of oxygen he receives and increases the amount of oxygen that healing tissue needs, such as the **brain itself**." There are risks associated with the treatment, Patel noted. The eardrum could be injured, and patients can develop seizures because of the pressure, he said. But he added that Bradley has not had any complications. "The goal for him is try to get him as much function back as possible," said Patel. *Since the **start of his treatment**, Bradley has shown **dramatic improvement**, doctors say.* He went from being semi-conscious to responding by blinking his eyes. Bradley's mother, Veronica Thomas, said "it's just another day closer to recovery," adding that even small signs of progress give her hope. Thomas said her son is responding to verbal commands, "He's smiling, squeezing a hand," she said. "We're seeing more spontaneous [reactions]. He just seems like he's more with us."

## Baby Steps to Recovery

02/06/2009

*It can **take years** for the body and mind **to recover** from a **traumatic brain injury**, and **in most cases**, patients **never regain full control**. But physicians are finding that **breakthroughs in hyperbaric oxygen** therapy are **helping more TBI victims** bring their **lives back to normal**. This type of treatment is helping one Rapid City man take small steps toward rebuilding his life. A year ago, he was just a face in the crowd of students at the South Dakota School of Mines and Technology. A senior studying civil engineering ready to graduate in December. A father, a fiance. Shaun Herrod led a normal life. "I was just an ordinary guy," Herrod said. Until, in an instant, the snapshots in Herrod's family photo album changed. "Nothing's the same, since May. Everything changed. Our daily routine, our whole life," fiancée Agnes Steele said. Herrod and his son, then four-year-old Keenan, were driving last May when an SUV came barreling toward them. Police believe the driver was doing around fifty-miles per hour in a fifteen mile an hour zone. That SUV*

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was quickly in Herrod's lane, and soon, smashed into the driver's side. The driver had blacked out after huffing Dust-off. Herrod was knocked into a coma, leaving fiancée Steele to wait and wonder about their future together and whether the love of her life would ever walk or talk again. "They really had no idea. They really couldn't tell me anything about that. When he slipped into his coma, they told me all I could do was wait. They couldn't say when he'd wake up, if he'd wake up, or what kind of condition he'd be in if he did wake up," Steele said. Not only did he wake up, but he's beating the odds; teaching himself how to talk, eat and even take steps less than a year from the accident. "That's the funny thing: I have to learn to walk again. Like a baby," Herrod said. Each baby step is the result of hours of pain-staking work. In addition to multiple occupational therapy sessions each week, Herrod is using Hyperbaric Oxygen Therapy, a technique Therapist Brett Szymonski says is being used on more traumatic brain injury patients as they return home from the Global War on Terror. "The hyperbarics, it's just a process of putting a person in a chamber that's under pressure and that forces oxygen into the cells of the body, which promotes the healing process," Szymonski said. A process that's showing progress for Steele every week. "The hyperbarics have been tremendously helpful in him becoming more independent. I did practically everything for him, I still do most of it, but he does a lot more by himself than he used to," Steele said. And even if it doesn't always come easily, Herrod says he's thankful to have the chance to struggle through his recovery. "If I give up, there's no use to go on," Herrod said. "We're not gonna think negative, and that's what I always kept telling him, 'We're going to keep positive. You're going to get through this. We're going to go home and get our lives back to normal. You're going to go back to school.' That's all I can really do and keep his humor up," Steele said. By this fall, Herrod hopes to once again be just a face in the crowd of students at his old campus.

**Karla Ramaekers:** "Do you want to walk across the stage to get your diploma on graduation day?"

**Herrod:** "Yes, yes, very much."

**Karla Ramaekers asks,** "Think you can do it?"

**Herrod:** "Yes. It's taking time. I understand that it will take time."

Time well spent to rebuild a life put on hold. Maconnell Baker, the person who was responsible for Herrod's accident, was sentenced in December for vehicular battery. He



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was given a 10-year suspended prison sentence, six months in jail,  
300 hours of community service and ordered to pay restitution

## New treatments helping to cure brain injuries for soldiers

February 10, 2009 Meg Farris / Eyewitness News

NEW ORLEANS – It's been called ***the signature wound of the wars in Iraq and Afghanistan.*** Traumatic brain injury may have affected 320,000 service men and women, costing as much as \$32,000 a year to treat. Now a local doctor and injured soldier are part of a groundbreaking study that hopes to find a new treatment. At 17 years old, Jake Mathers enlisted in the Marine Corps, the youngest in his division of 20,000. He served in Iraq twice. "Until like the last two months that we were there, we literally got shot at and blown up and mortared every single day," Mathers said. His role models: A father who flew U-2 Spy Planes in the cold war and a grandfather, George "Bud" Day, who was highly decorated in the Marine Corps Air Force. He served in Korea and Vietnam. Day was a POW with Senator John McCain, earned several Purple Hearts and the Congressional Medal of Honor. Like his grandfather, Jake now too has the Purple Heart, and the same terrible post war nightmares. "You think you're going to die?" I ask. "Oh yeah, those dream – I always have those dreams, you know. They probably will never go away. My grandfather still has them, and he's in his 80s," Mathers said. That's why Jake has come to New Orleans from his home in Monroe. He is part of a pilot study with LSU Health Sciences Center's Dr. Paul Harch. As an emergency medicine expert, Harch has been studying in animals and humans for years if Hyperbaric Oxygen treatments, the kind used to heal wounds of diabetics and divers, can also heal brain damage. "If you lose consciousness, you will lose brain cells. You lose brain tissue," Harch said. And that's exactly what happened to Jake in Iraq. Nearly two dozen times he was knocked unconscious. So, along with the post traumatic stress disorder known as PTSD, he has brain damage. "You forget where you put your cell phone, like, 10 times a day. You can't find your car keys. You can't really do

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anything productive without screwing it up a couple of times,” Mathers said. A video with music recorded on it, put on YouTube, shows a suicide bomber in a truck loaded with artillery shells and barrels of gasoline that hit Mathers’ observational post. Fellow soldiers lost eyes, limbs, fingers and toes. “The gasoline went everywhere and started burning all around my body, and so I could still feel that pain in my unconscious state and it felt like I was burning. So I thought I was going to hell and it was really bad,” said Mathers, who said he thought he had died. Jake is one of the first soldiers in the study to complete the testing, brain imaging and 40 so called “dives” in the **hyperbaric oxygen chamber**. And *he believes it’s made a difference*. “My **sleep is better**, I’m sleeping longer, I’m not dreaming about mean and angry things constantly,” Mathers said. “My **memory**, I don’t even have a memory problem anymore. I don’t have **headaches** at all anymore.” Harch said the results have been encouraging. “Two of the three have had an over 40 percent reduction in PTSD symptoms in a 35 day period using the military’s PTSD check list, which is a huge reduction in symptoms,” Harch said. “And we are also **seeing improvements in memory, attention and some of the other factors.**” Harch has many critics who don’t believe hyperbaric medicine can help the brain. He hopes this study will lead to bigger military studies and published scientific evidence to convince them. At only 21, Jake hopes to convince his critics as well. “A lot of people see all the bad things that U.S. Marines do. But nobody ever sees all the schools that we build and all the medical supplies that we give,” Mathers said. “I must have given out 10,000 soccer balls alone myself, and hundreds of pounds of candy to little kids. But nobody ever shows that.” The study is open for people who have traumatic brain injury from a blast, with or without post traumatic stress. The injury has to have been within the last five years. People in the military are encouraged to call

**Silent War Wounds: What really happens when an Improvised Explosive Device or Explosives explode?**

**February 12, 2009**

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What happens when an Improvised Explosive Device detonates?

When I initially wrote this question, I thought the answer would be quite simple. As I began to answer this I realized the answer was quite complex. The injuries created by the detonation are complex and usually compound in nature. When explosives or explosive devices are detonated, the explosives are transformed into energy. This energy moves from the epicenter of the explosion at the speed of sound in a three dimensional wave of blast overpressure. As the blast wave moves it compresses the air directly in front of it creating blast overpressure. The injuries created by the detonation of improvised explosive devices may be created in several ways. The most common mechanisms of injury from these blasts involve the exposure to blast overpressure, propelling projectiles or fragments, inertia, burns or chemical exposure. Those injuries which are created exclusively by blast overpressure are called primary injuries. In World War II, injuries of this type were considered the number one cause of immediate death as a result of bombing of the civilian populations. These primary blast injuries are often quite subtle but the damage created is no less real. The mechanism of injury in this situation involves the creation of bubbles in the body due to the change in pressure. In the human body sub-clinical bubbling can begin to be seen at pressure differential pressures as low as 5.826 psi, a pressure that is seen quite far from the epicenter of the detonation of improvised explosive devices and explosions. Once formed the bubbles can persist from 11 to 70 days, with the variance depending on the size and the shape of bubbles. What is the appropriate treatment of these bubbles? For over 130 years, the appropriate treatment for bubbles formed on leaving pressure environments has been hyperbarics. First developed using air, the addition of oxygen to this treatment made it much more effective in returning bubbles to solution where they no longer pose a problem. In a 1990 publication entitled *A Textbook of Military Medicine – Conventional Warfare Ballistics, Blast and Burn Injuries*, compiled by the Walter Reed Institute of Research and approved by the Office of the Surgeon General of the Army, treatment with hyperbaric oxygen was considered definitive in the treatment of Neurological Abnormalities in the Blast Casualty. What happens to these bubbles when they are not treated? Untreated, the bubbles are perceived as foreign bodies and the immune system moves to isolate these creating clots. In studies of decompression illness, Dr. Phillip James, Professor Emeritus, Wolfson Hyperbaric Unit, University of Dundee, Dundee Scotland, says the filtration provided by the lungs traps most of these bubbles or clots formed around these bubbles. Some bubbles may escape pulmonary

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filtration. Usually these are not large enough to cause cell death.

According to Dr James' March 2007 article in Neurological Research, these bubbles or solid emboli pass through cerebral circulation, but disturb the blood brain barrier creating "perivenous syndrome". This condition results blood brain barrier dysfunction, inflammation, demyelination and diffuse axonal damage.(1) The resulting impairment is not easily recognized by the health care professional, but deficit is clearly evident to family members. The individual may not even recognize that they are impaired, themselves. These injuries are cumulative and impairment increases with subsequent exposures to blast overpressure.

## PTSD? Mild Traumatic Brain Injury?

**February 20, 2009**

At first glimpse, Ryan Groves appears to be like any other university student. In speaking with him, it isn't long before you realize that his drive, determination and spirit combine to make him quite extraordinary. It is hard to put your finger on it, but the military bearing is impressive. You see Ryan is a Marine, once a Marine always a Marine. In 2004 he was hit by a rocket-propelled grenade while on patrol in Fallujah, Iraq. Fortunately for Ryan, a forward surgical center was nearby, the injuries he sustained from the explosion required his left leg to be amputated above the knee. His right leg was also severely damaged by the force of the rocket blast and shrapnel, but was not amputated. After coming out of a medically-induced coma 8 days later at National Naval Medical Center (NNMC), the doctors, in speaking with Ryan made the decision to attempt to salvage what was left of the limb despite the damage. Ryan like so many injured veterans, knew the road ahead would be long and arduous. As Ryan describes the decision to keep his remaining leg "For psychological reasons, I also knew the importance of keeping what was mine." After months of debridement surgeries, severe bone infections, and a failed knee reconstruction, the doctors were left no choice but to remove the knee joint completely and they eventually fused the tibia and femur straight. Knowing the road would not be a smooth one though not ideal, Ryan wanted to keep his leg. Following 4 months multiple courses of antibiotics and 36 surgeries, the DOD transferred Ryan to Walter Reed Army Medical Center to begin his physical therapy. After two months at Walter Reed, however, Ryan began experiencing a

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very deep pain in his right thigh, and “puss was oozing from the pin sites of my external fixator”. Ryan realized there was something wrong, but the doctors assured him that, if there was infection, it was merely superficial. Ultimately, he convinced the doctors at NNMC to re-admit him as an inpatient in order to ensure that the osteomyelitis had not returned. To make a long story short, the doctors agreed after several MRIs and blood tests that his right femur and fibula still suffered from deep bone infections. Ryan found it difficult to fairly describe the feelings his family and he experienced upon hearing that news. “I knew that I was running out of options and that the antibiotics had not been effective”. He was at a turning point where he simply could not continue with his rehabilitation until his knee fusion was complete, or his second leg was amputated. “I did not want the doctors to amputate my leg. This was important” Meanwhile, the doctors at NNMC again placed Ryan on a very aggressive antibiotic regiment; however his family and he were not very optimistic. It was at this time that he remembered a visit a few months earlier by Bill and Susan Casner, from Flower Mound, Texas. “During their visit, they had shared with my family and me the advantages of combining Hyperbaric Oxygen Treatment with my current antibiotic regiment; however, at that time we were receiving good news and did not consider it necessary. But, it was obvious this time that HBOT was worth a shot, so I contacted Mr. Casner. “In response to my call, Bill began to forward any and all research on HBOT that was relevant to my case, and I began to forward the same information to my doctors. Every doctor on my case told me the same thing, that HBOT was purely experimental and would not help with my circumstance.” “They were quite opinionated, most likely because they not taken the time to properly evaluate it, and did not feel it necessary to indulge in nonsense. Fortunately for me, I was compelled to seek out this therapeutic option whose rationale to me was so very obvious,” said Ryan. “Frankly, it should not have been my duty – I had fulfilled my duty in Fallujah – to conduct research from my hospital bed on whether or not HBOT could have contributed to the salvage of my right leg, but in the end it was,” said Ryan. He added, **“You are your best advocate and should be involved in directing your care, your rehabilitation and recovery.”** “It is therapeutic,” he said. Ryan eventually convinced the doctors and the hospital administration to refer him to the University of Maryland Shock Trauma Center in Baltimore for 25 HBOT treatments. For 5 straight weeks, he took a ride in an ambulance to Shock Trauma with hopes of keeping his leg. By this time, Ryan had had 40 surgeries and was “losing faith” that he would keep his leg. “After only 10 treatments, my appetite and energy had

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increased noticeably, but most importantly –

my **positive attitude** had also returned,” Ryan said. *Ryan attributes his turning point to hyperbaric oxygen saying, “Many doctors would still have us believe that it was solely their unmatched wisdom that had eliminated my leg of the incredibly dangerous osteomyelitis and staph infections; however it is clear to my family and me that, *without the HBOT, the antibiotics simply could not do their job until my body was strong enough to utilize them effectively.*”* In response to the question from Examiner Alternative Medicine reporter Thomas Fox, Are there any final comments you would like to what we have discussed today? Ryan answers “I have witnessed firsthand the benefits of HBOT in *augmenting* the treatment of combat related injuries. I understand that every wounded warrior’s case is not exactly like my case; however we have also learned from countless medical journals that HBOT can help manage numerous combat-related symptoms. It is because of this that I am incredibly disappointed that HBOT is not incorporated into the treatment of any and all of the returning wounded who would benefit. We can only speculate as to how many limbs would have been salvaged given immediate HBO treatments, but when we weigh the pros and cons, it seems almost a dereliction of duty to actively disregard success stories like mine. It simply does not seem that the incorporation of HBOT into the treatment of battlefield injuries can do anymore harm than removing someone’s limbs. It may make perfect sense to lean on the traditional textbook wisdom of medical school, but for those who are lying in those hospital beds, hooked up to numerous machines and countless tubes, **HBOT is worth the very minimal risk.** *For whom are we working so hard anyway? Who are we to decide that HBOT will not help? Have you tried it?”*

## Advanced Wound Care Systems selected for Veterans

## Hyperbaric Therapy Program.

February 26, 2009



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I had the opportunity to visit with Teri Rich, the founder of Advanced Wound Care Systems, Inc. located in Taylorsville, Utah located inside the Salt Lake City metropolitan area. Teri Rich and Dr. Sherman Johnson informed me that Advanced Wound Care Systems has been selected as one of approximately 90 installations around the U.S. for providing a Hyperbaric Oxygen therapy program for veterans. Here is the beginning of the overview for this program. It will be completed in subsequent entries:

## **Department of Defense Brain Injury Rescue and Rehabilitation Project (DoD-BIRR) Rescue for Blunt Trauma, Crush & Acute Traumatic Brain Injury Summary of Scientific Backgrounds & Overview**

*Oxygen delivered under pressure, Hyperbaric Oxygen Therapy (HBOT) is one of the most powerful drugs known to man. Simultaneously, HBOT delivers the substrate of life, oxygen, for which there is no substitute. HBOT has profound beneficial effects on injury pathophysiologic processes that are common in military casualties. Moreover, it has been shown to positively impact traumatic brain injury, compartment syndrome, burns, hemorrhage, and reperfusion injury. These injuries and injury processes comprise the bulk of battlefield casualties. With timely intervention of HBOT the morbidity and mortality of injured soldiers should substantially improve as they have in their civilian counterparts. Past foreign military experience strongly suggests this benefit in extremity wounds and it is our conviction that United States soldiers deserve nothing less. This is the goal of the **Brain Injury Rescue and Rehabilitation Project (DoD-BIRR)**. HBOT has both acute and chronic drug effects. HBOT exerts these effects by obeying the Universal Gas Laws, the most important of which is Henry's Law (2). Henry's Law states that the concentration of a gas in solution is proportional to the pressure of that gas interfacing with the solution. At the point of three atmospheres absolute of pure oxygen (3 ATA), just slightly more than the amount the U.S. Navy has used for 50 years in the treatment of divers with decompression sickness, we can dissolve enough oxygen in the plasma to render red blood cells useless. Under these conditions as blood passes through the tiniest blood vessels tissue cells will extract all of the dissolved oxygen in the blood without touching the oxygen bound to hemoglobin. This amount of dissolved oxygen alone can exceed the amount necessary for the tissue to sustain life. In other words, you don't need red blood cells for life at 3 ATA of 100% oxygen. This ability to maintain life without*

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blood has obvious potential to battlefield casualties awaiting transfusion. As a result of Henry's Law HBOT is able to exert a variety of drug effects on acute pathophysiological processes. These have been well documented over the past 50 years and include reduction of hypoxia (lack of oxygen), inhibition of reperfusion injury (immune response to injury), reduction of edema (swelling), blunting of systemic inflammatory responses, and a multitude of others. In addition, repetitive HBOT in wound models acts as a DNA stimulating drug to effect tissue growth. HBOT has been shown to interact with the DNA of cells in damaged areas to begin the production of repair hormones, proteins, and cell surface receptors that are stimulated by the repair hormones. The resultant repair processes include replication of the cells responsible for tissue strength (fibroblasts), new blood vessel growth, bone healing and strengthening, and new skin growth. In the past 12 years scientific research has unequivocally shown that the only drug to completely or nearly completely reverse the reperfusion injury process is hyperbaric oxygen. This physiological reaction of the body to trauma is a major source of injury that battlefield casualties experience. In multiple experiments with different models, different organ systems, different types of blood flow reduction or absence (e.g., heart attack, stroke, cardiac arrest, carbon monoxide, tourniqueting of an extremity, etc.) timely HBOT within hours of reperfusion injury has been shown to completely or nearly completely reverse reperfusion injury. Simultaneously, due to HBOT's ability to dissolve large amounts of oxygen in the liquid portion of the blood, oxygen-enriched plasma is able to reach damaged areas of tissue not accessible by normal blood flow and restore oxidative function to those areas. The net result is a dramatic reduction in the secondary injury process, improved viability of tissue that would otherwise die. In addition, twenty percent of the wounded in Iraqi experience traumatic brain injury (TBI) a diffuse cerebral insult characterized by primary mechanical disruption of tissue and secondary injury from ischemia, hypoxia, edema, vasospasm, neurochemicals and reperfusion injury. A review of the medical literature shows that there is substantial data proving a beneficial effect of HBOT on the secondary injury processes of acute TBI. HBOT has been shown indirectly to improve ischemia and hypoxia in acute TBI by its effect on aerobic metabolism and EEG. The neurosurgeon authors of the Rockswold study conclude that "HBOT should be initiated as soon as possible after acute severe traumatic brain injury."

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## Good News for Veterans: Hyperbaric Oxygen Treatment for TBI, PTSD, and Depression.

March 1, 2009 \* From the E-Newsletter, [American Association for Health Freedom]

*Hyperbaric oxygen therapy (HBOT) appears to be a safe and effective treatment for Traumatic Brain Injury (TBI), Post-Traumatic Stress Disorder (PTSD) and Depression.* Thanks to the work of the American Association for Health Freedom, and their petition to Congress, it looks as though our veterans will soon be receiving this much-needed treatment. For each of you who took time to write your representatives regarding this issue – Thank you. The legislation which was passed and signed into law is a start, but this program needs to be funded and sustained. Please see the link at the bottom of this piece to ask Congress for its continued support of HBOT for veterans. **AAHF Scores a Victory with HBOT for Wounded Veterans.** Hope for Traumatic Brain Injury, Diabetic Failure-to-Heal Wounds and More? On September 30, President Bush signed into law the FY2009 Continuing Resolution that contains the Defense Appropriations bill. In doing so, crucial funding became available to complete a scientific study important to all Americans. *Seventeen years ago, Paul G. Harch, M.D., discovered that hyperbaric oxygen therapy at 1.5 atmospheres of pressure (HBOT 1.5) could repair a chronic traumatic brain injury (TBI).* Dr. Harch, director of the Hyperbaric Medicine Fellowship at Louisiana State University's School of Medicine and an AAHF member, has used the therapy on over 700 patients and has taught the technique to hundreds of doctors. In 2008, Dr. Harch applied HBOT 1.5 to five combat veterans of the current war who have traumatic brain injury and post traumatic stress disorder (PTSD) from concussive blasts. *So far, all of the veterans treated have significant recovery. Eighty percent no longer have PTSD and all are improved.* During this same year, Dr. Harch testified in front of the Surgeon General of the Navy and the Deputy Commandant of the Marine Corps. He told the stories of the five combat veterans he treated with HBOT 1.5; three of those veterans were in the same room. One of them, a judge who served as a general in the Army Reserves, endured a year of treatment failures at Walter Reed. *He is now back on the bench, fully recovered in 120*

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days, **after 80 HBOT 1.5 treatments**. The Health Freedom Foundation, sponsored a Marine machine gunner who experienced seven concussive events from roadside bombs during two tours in Iraq. Now, after HBOT treatments, his migraine headaches have disappeared, his sleep is restored, his PTSD is gone. He is now actively employed. He has his life back, as do other veterans who have undergone HBOT treatment. At Louisiana State University in New Orleans, under an approved study protocol, Dr. Harch is now treating another thirty veterans of the war who have TBI and PTSD. AAHF sought funding from Congress for this important study for the past two years. This year, after nearly 200 visits to members of Congress, funding was finally provided. In April 2008, the RAND Corporation, a non-profit "think tank" highly respected by the government and NGOs, found that of the 1.6 million veterans of the war, 300,000 have PTSD, 320,000 suffer TBI, and 80,000 have depression. Current treatment costs for each of these conditions, when treated separately, is more than the cost associated with HBOT 1.5. HBOT 1.5 one-time cost is US \$16,000 (80 treatments at \$200 per session) and appears to treat all three symptoms simultaneously; the earlier a person is treated, the more effective the recovery, and the fewer the treatments needed. Hyperbaric oxygen therapy at 2.4 atmospheres of pressure is already used 10,000 times a day at over 900 locations for everything from non-healing diabetic wounds and radiation injuries from cancer treatment, to fourteen other Medicare-reimbursable and FDA-approved indications. HBOT 1.5 is a dose of HBOT that clinical experience shows is safe and effective for TBI. According to Dr. Ted Fogarty, Chairman of Radiology at the University of North Dakota School of Medicine, "Functional neuroimaging shows HBOT revitalizes brain tissues and restores normal brain metabolism in vastly different areas of the brain in ways that other existing treatments cannot. To leave these injured neurons in our brave veterans to wither on the vine seems criminal when HBOT 1.5 is available and works." Today a multi-state coordinated effort is under way to treat vets at 78 locations. We expect this AAHF-coordinated effort will result in the necessary scientific proof to establish HBOT 1.5 as the standard of care for acute and chronic neurological injuries, and we hope it will secure reimbursement by the VA, Tri-Care, Medicare and civilian insurance. The body of scientific evidence indicates that modern medicine has overlooked hyperbaric oxygen as a key tool in the treatment of strokes, diabetic failure-to-heal wounds, and conditions like reflex sympathetic dystrophy. Timely HBOT therapy could reduce the incidence of stroke (the leading cause of disability in the U.S., with over 500,000 reported cases each year) and

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amputations due to diabetic failure-to-heal wounds. HBOT has sound science, many years of clinical practice and a convincing reason for all of us to seek access when it can be of help.

Brain-damaged crash survivor mending

**Friday, January 02, 2009** by Andria Simmons

***Oxygen chamber treatment*** in California is making 'a huge difference.' Sometimes a fresh start begins with a few deep breaths. *Demetrius Randle* —- a 45-year-old Lawrenceville man who suffered **brain damage** last spring in a wreck that killed his daughter, son and grandson —- has taken a lot of deep breaths lately. He and his wife, Falleen, moved to Malibu, Calif., renting a house there in October so he could undergo a series of treatments in a hyperbaric oxygen chamber at Malibu Hyperbaric Medical Center. Such treatments were **once reserved** for deep-sea divers recovering from the bends, or decompression sickness, **but now** they are also used to stimulate healing of brain injuries and other ailments by saturating the body with oxygen. The Randles decided to move to California because they couldn't find a medical facility in Georgia that offers the treatments, Falleen Randle said, noting that the **resultshave been "amazing."** "I just see a huge difference in him. He will carry on a conversation, and his speech is clearer and his ability to want to take part in the conversation is so much higher than it was," she said. Demetrius Randle is still using a wheelchair, but he can crawl and walk with assistance. His goal is to walk again on his own. Leaving Lawrenceville and a home filled with memories has been bittersweet for the Randles, who have one surviving son attending college in Alabama. Chris Randle was not riding in the limousine with the rest of the family on March 31, 2008, when the limo was struck by a speeding driver, touching off a five-car collision on I-85. The Randles' 14-year-old son, Alex, and 21-year-old daughter, Whitney, died, along with Whitney's infant son, Kayden. Also killed in the wreck was the limo driver, Mark Gay, 44. "We thought it would be best for our whole family to change the scenery," Falleen said. "It was hard coming home to that same house, to drive on that highway and to be around where our daughter lived and where all of them had gone to school. All of that was a constant reminder, and it was really difficult." Falleen said the family will still try to



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attend future court hearings for Carmon Cody Rhoden, 20, the driver charged with vehicular homicide for allegedly causing the accident. A trial date for him has not been scheduled.

## Local soldier recovering slowly

January 11, 2009 by John Lowman

*U.S. Army Spc. Brad Thomas' recovery from injuries suffered in Iraq a year ago has been a roller-coaster ride, but in the last few weeks, it has had more ups than downs.* Thomas, 23, suffered **severe head trauma** from the explosion of a roadside improvised explosive device in January 2008 while serving in Iraq. A Jones Creek resident, Thomas initially was taken to Landstuhl Regional Medical Center in Germany before being sent to James A. Haley Hospital in Tampa, Fla., soon after the incident. He remains in a trauma unit there. The recovery has been slow, but at least it's recovery, said his father, Rocky Thomas. "He's semi-conscious and improving a little bit," Rocky Thomas said. "He's hanging tough." The family recently was able to get Brad Thomas some time in a hyperbaric chamber, which pressurizes oxygen so the skin and lungs can absorb more concentrated oxygen in a short period of time. He's also undergone a spinal tap to relieve pressure from fluid on his brain. The changes seem to be helping, Rocky Thomas said. "He's responding to small things we're asking him to do," he said. "He's made a heck of a comeback since we saw him in Germany. We're taking it a day at a time and are keeping things upbeat." Thomas was deployed to Iraq in December 2007. This year, family members spent a week in Florida for the holidays. "It was probably one of the best Christmases we've ever had," Rocky Thomas said of his family and, in particular, his wife, Veronica. "She deserves a medal of honor. You couldn't ask for a better mom." The family togetherness was a gift in itself, Military Moms and Wives of Brazoria County founder Mary Moreno said. The group keeps tabs on all Brazoria County military men and women, and offers emotional and material support in the form of essential items sent to active duty personnel. "Brad may not be home physically, but here's here in spirit," Moreno said. "He's going to get better, and it's going to take a lot of faith. His family has a lot of faith, and he has the love of the community. That alone is healing." Prayers and positive thoughts are welcome, Rocky Thomas said. Through the Web site [caringbridge.org](http://caringbridge.org), anyone can send Brad Thomas a get-well wish. On New Year's



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Day, Capri Sealy of Jones Creek wrote, “You made tons of progress in 2008 but I know that God has great plans for you in 2009.” On Dec. 30, Randi Northup of Rosharon said Brad is continuously in prayers here. Vanessa Silva of Freeport wished the Army specialist a happy new year. “Keep on fighting and we’ll see you home soon,” Silva wrote. The posts mean a lot to the family, and visitors are encouraged any time, Rocky Thomas said. “People have sent notes from around the world,” he said. “And as far as I’m concerned, Brazoria County has gone above and beyond the call in supporting the troops.” He paused, drawing a quiet breath. “This is the hardest thing we’ve ever had to go through,” he said. “It’s been a roller-coaster ride. This is a long road, but they told us it would be. Please just keep praying.”

## Oxygen Provides New Hope for Brain Injured Soldiers

01/14/2009 by J. David Patterson

In early December 2008, the Department of Defense with the Navy as lead agency sponsored a conference on the healing effects of 100 percent oxygen under pressure on brain-injured patients. The procedure is called **Hyperbaric Oxygen Therapy**, or HBOT. Though this conference generally went unnoticed in the national media, the importance of the developments discussed cannot be overstated. What underscores the significance of this conference is that Traumatic Brain Injury, or TBI, is the “signature” injury for those serving in Operation Iraqi Freedom and Operation Enduring Freedom (OIF/OEF), the conflicts in Iraq and Afghanistan. The extensive use of improvised explosive devices (IED) by the enemy has resulted in a significant number of brain-injured combat veterans of OIF/OEF. A study by the RAND Corporation released in April 2008 titled *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery* puts the number of returning soldiers who could be suffering from mild to severe TBI as high as 320,000. ***Recent application of HBOT has produced very promising results, giving real hope to those suffering from TBI.*** The Department of Defense’s “Wounded, Ill and Injured” program has stressed ensuring the best medical treatment possible for service members returning from OIF/OEF. It has put a priority on assessing the

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efficacy of HBOT. HBOT is an important initiative to provide the most effective treatment for soldiers suffering from brain injuries back to living normal lives, but there is another important consideration. Getting soldiers back on their feet and fit for duty with a treatment regimen that is a relatively inexpensive is good government. The money that would have gone for more traditional and expensive treatments of the brain-injured now can be used to fund other medically urgent injuries and illnesses. So, what exactly is HBOT? HBOT treatments are similar to the treatments given to treat victims of “the bends”, the condition divers sometimes suffer. Patients are placed in a chamber filled with 100 percent oxygen at a positive pressure of one-and-a-half-times normal sea level atmospheric pressure, or what you would experience if you were SCUBA diving at a depth of around 16.5 feet. The treatment involves up to 80 one-hour sessions administered in two blocks or phases over 120 days. The therapy is not new. The HBOT regimen has been used for years in the treatment of deep-sea divers suffering from the bends, victims of carbon monoxide poisoning, and patients suffering from abscesses on the brain. In fact, the federal government’s Food and Drug Administration (FDA) and Medicare have approved this therapy for the types of injuries mentioned above. Other medical conditions for which HBOT has been used successfully include the treatment of tissue damage on diabetic patients’ feet. The therapy has been shown to prevent 75 percent of amputations for such patients. The obvious questions are, “Just how effective is HBOT in the treatment of TBI and is the science behind the treatment solid?” Although the medical research on HBOT as a treatment for brain injuries resulting from explosions and traumatic blows to the head has not been subjected to the rigor of scientific methodologies, there is ample anecdotal evidence of the healing qualities of HBOT for TBI patients. Dr. Paul Harch, MD, from Louisiana State University in New Orleans and one of the medical community’s leading experts and most experienced researchers in the use of HBOT for those diagnosed with TBI, has presented evidence of significant improvement. In an interview with Harch for this article, he explained that, “It is rare to find an unsuccessful outcome. Of the patients treated with hyperbaric oxygen therapy, 90 percent have shown improvement a year out.” Dr. Harch went on to point out that of patients identified for a pilot program of HBOT, the first three patients treated have shown a substantial recovery. But, as Harch also made it clear that he has confidence that additional studies with larger sample groups will provide the necessary data to allay what lingering doubts there may be about HBOT as the treatment of choice for brain-injured patients. Finishing our interview, Harch emphasized, “... we are

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trying to get the military to appreciate that the time-honored principle in medicine of ‘the sooner the treatment the better’ is applicable to HBOT in acute traumatic brain injury. The evidence is there that at the dose we are using in chronic TBI a few treatments within the first 72 hours after acute severe traumatic brain injury can have up to a 60 percent reduction in mortality.”Proposals for completing a comprehensive study of the positive effects on TBI using HBOT would involve 100 patient subjects at a cost per individual of \$25,000 or \$2.5 million total. The clinical trial would include brain imaging at selected universities or medical facilities, psychometric testing, data analysis, patient follow-up, and monitoring. When compared with the \$1.6 billion that the Congressional Budget Office has estimated that the current Traumatic Brain Injury Act of 2008 will cost taxpayers over the 2009 – 2013 time period, the cost of the HBOT trial is very small. But, the results of this trial will have inestimable value for patients suffering from TBI and their families. There is another clear benefit of achieving more rapid recovery to normal brain functioning in our wounded warfighters. Seasoned troops are ready for duty in greater numbers, and military readiness is increased as a result. The American Association for Health Freedom, a health and wellness advocacy group located in Arlington, Virginia, estimates that at the current civilian Medicare reimbursement rate the average one-time cost of treatment is \$8,000 for 40 HBOT sessions and \$16,000 for the entire regimen. Considering that an infantry soldier costs roughly \$20,000 to recruit; about \$18,000 to put through basic training; and another \$2,000 for essential equipment, like boots and body armor (a total of around \$40,000), \$16,000 to get a soldier fit and back on active duty doesn’t seem much to pay. Hyperbaric Oxygen Therapy may not be the silver bullet that achieves 100 percent recovery in every brain-injured soldier, but existing evidence of success and low risk of side effects speaks loudly that this treatment now needs to be offered as an option to our injured warfighters. It is to the great credit of the outgoing Bush Administration and the Department of Defense that they are pursuing this important medical initiative. Again, in the words of Navy Secretary Don Winter, “The goal is to move forward quickly in obtaining valid scientific support to safely establish clinical guidelines for the use (of) HBOT in the total treatment regimen for our wounded warriors suffering from TBI.

## Innovative Brain Therapies Offer Hope to Injured

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## Troops

**03.23.2009** Story by Gerry Gilmore

### *Office of the Secretary of Defense Public Affairs*

WASHINGTON – Innovative therapies that have assisted previously comatose patients regain consciousness may be incorporated on a greater scale to treat troops diagnosed with traumatic brain injuries, a brain injury expert said here today. Dr. Philip A. DeFina, chief executive and scientific officer at the not-for-profit International Brain Research Foundation Inc., in Edison, N.J., said that, over the past four years, electronic brain stimulation, oxygen-induction, drugs and other therapies were used to bring 43 people, including five injured soldiers, out of minimally-conscious or vegetative states. DeFina, an Army veteran, is also the chief consultant for the brain injury program at the Kessler Institute for Rehabilitation, a for-profit hospital in West Orange, N.J. He was one of several civilian and military guest speakers who attended today's Reserve Officers Association-sponsored seminar here on mental health care. Brain injuries can occur because of blunt-force trauma to the head, explosions, and penetrative wounds, DeFina explained. Such injuries, he said, cause oxygen starvation in the brain, from which damage ensues. "There are a number of different types of (brain) injuries that we've been dealing with — all of which have been responding to the protocols," he said. "What we're doing proactively, with our consortium of doctors and scientists," he said, is "to electrically and chemically stimulate the brain." Other treatments employed, he said, include drugs and oxygen-inducing regimes, such as hyperbaric oxygen therapy, where the brain is inundated with oxygen. The goal, he said, is to balance the electrical and chemical activity in the brain. "Once we can stabilize electrical-chemical activity, we can optimize what the brain's capability is at that point," he said. Doctors can employ functional imagery techniques to examine the state of a person's neural markers, which are the chemical and electrical patterns within the brain, he said. "We can then use that to guide us for treatment and to predict recovery," he said. The prognosis for recovery for the five injured soldiers was "close to zero," he said, before they underwent the treatments at the Kessler institute. "The brain heals," DeFina said, noting there are "different levels of improvement" among patients who'd formerly been minimally conscious and/or unresponsive. After treatment, some people "wake up and some people can communicate,"

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DeFina said. Other people, he said, may be able to perform simple tasks or return to work. “So, we have different levels of the ability to recover,” he said. And, applying such innovative therapies to patients with mild to moderate forms of traumatic brain injury, he said, produces “dramatic results.” Congress has set aside about \$6.4 million in Fiscal Year 2009 appropriations funding, DeFina said, so that the foundation can conduct continued research and development of the new therapies in cooperation with military health care organizations. “We’re in the process of accessing those funds,” he said. The foundation has developed close relationships with several Defense Department healthcare components, DeFina said, including the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury, headed by Army Brig. Gen. (Dr.) Loree K. Sutton. “Within the last year, we’ve had probably about 30 military doctors from the Army and Marines come visit Kessler to look at the program, including General Sutton,” DeFina said. “We’ve briefed them, we’ve given them formal presentations on all the science, and then showed them the patients that are there. “We’ve gotten a really good response from that,” he said. Many innovative therapies, DeFina said, have been used in a “stand-alone” manner to successfully treat patients with brain injuries. Yet, using those therapies in combination “is even more powerful,” he said.

## Hyperbarics under study as traumatic brain injury treatment

**May 3rd, 2009** by Wendy Rigby

Brain injuries are fast becoming one of the signature injuries of the wars in Iraq and Afghanistan. Now, some San Antonio researchers are trying a cutting edge way to treat these wounded warriors. It involves oxygen. A sudden blast. A bone-rattling jolt. Soldiers who have fallen victim to bombs set off in the war on terror say it’s an experience that rocked their world. “I remember hitting my head on the roof and then coming down and eating the steering wheel and then after that, I really don’t remember anything besides laying on the ground and having the doc ask me if I was okay,” described John, a Marine

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who suffers from a traumatic brain injury. Microscopic damage has been causing a disturbing array of symptoms he can't ignore. "Reflexes, response time, that's kind of delayed. I have a terrible memory, slight hearing loss. Slight loss of vision in one of my eyes," John said. John has volunteered for a study at Brooks City Base. He's heading into a hyperbarics chamber, the kind originally used to help divers with the bends. Now, it's a state-of-the-art treatment for wound healing. The idea is that a high concentration of oxygen in the blood will stimulate healing of injured brain tissue. But no one knows for sure. "We don't know if it will help or will not help," said Dr. George Wolf, a hyperbarics medicine researcher. "The oxygen in a higher level gets to the metabolic side of the cell and jumpstarts it back into a more functional mode. 50 Marines, soldiers, airmen and seamen with traumatic brain injuries will go through this program over the next year. They'll sit in the hyperbarics chamber 30 times, about two hours at a time. After they're finished, scientists will try to gauge if it's had any kind of positive impact on their cognitive ability. 24-year-old Brian is another injured Marine trying to help his fellow soldiers by testing hyperbaric therapy. He's a blast victim who wasn't diagnosed with a brain injury until months later. "Bad reflexes. Memory loss," described Brian. "Can't remember anything unless I write it down." A series of cognitive tests help determine if the oxygen treatment is going any good. These young men and women don't even know if they're getting the real treatment or not. But they're willing to gamble on a solution to their frustrating problems. "I hope the study does well," Brian said. "I hope they gather all the information they need to. Hoping it helps other people out." Even if it helps, hyperbarics won't be a solo therapy for these wounded warriors. But if it works in conjunction with drugs and therapy, this could become an important treatment for thousands of civilians, too." "God willing, we'll have a positive study," Wolf said

## Ryan Gray: Part 2 of A Young Man's Second Lease on Life

May 18, 2009 By Kurt Langmann – Aldergrove Star



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UPDATE: Star readers and community members have responded with an outpouring of offers of assistance to Ryan Gray and his family, since The Star began a series of stories on the family's effort to get him home and in their care. Tradespeople have volunteered their services and begin work this weekend on transforming Ryan's home into a wheelchair friendly house, and many others have offered prizes and purchased tickets for the upcoming fundraiser — but more is welcomed by the family. See information at the bottom of the following story. Video footage of Ryan's ongoing recovery will also be posted on this website by Monday, May 25: Ryan Gray's ongoing recovery from a near-fatal road accident on October 13, 2007 has been a miracle. The 27-year-old Aldergrove man was not expected to survive serious head injuries he received after his employer's truck hit a moose near Blue River. As it is, Ryan still has a long way to go before he can live the normal life he and his family are striving so hard for. Ryan is still, technically speaking, in a coma. On the Glasgow scale of zero to 15 — with zero being completely unconscious and 15 being that of ordinary people — Ryan is still in the middle area of about 8. It is thanks to the dedication of his parents, Terry and Rob, and siblings, Tanya, Rob and Rodney — and his beloved niece, Tanya's daughter, Taylor — that Ryan has emerged at all from the darkness of his coma. Terry and Rob have regularly and routinely worked his muscles so that they didn't atrophy during his prolonged bed stay. They have fed him with a feeding tube. They have ensured that he receives the best care possible, including speech, occupational, hydro and physiotherapy, as well as "hyperbaric" oxygen treatments and acupuncture. He also has the support of a large group of friends and supporters — there are more than 700 members on the Facebook page "Get well Ryan Gray" — who have contributed in their own way to his recovery. Some of these therapies, along with his care and treatment in the "Connect" care home in Langley, are provided by WCB. However, some such as the "unproven" hyperbaric oxygen treatments are not covered. Terry says it was a meeting with a Poco man, Michael Coss, that convinced the family to undertake the hyperbaric treatments at their own expense. "Michael Coss is 40 and his accident left him in a foetal position but he's now home, walking and talking — he's my inspiration," says Terry. "He swears by the hyperbaric treatments for his recovery. He told Ryan that when he can talk and eat again they're going out to the Keg together for steaks." The trips to the hyperbaric treatment chamber required ambulance paramedics and fire fighter assists, and the total costs were over \$400 for each trip. The family quickly racked up \$13,000 in bills for these treatments, but Terry says there was significant improvement. She's working off the

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bills and intends to continue the treatments once the account is settled, and possibly even buy an oxygen tent for treatments in their home. Getting Ryan back into his own home in Aldergrove is now the family's first priority. The family is prepared to continue to provide Ryan with in-home care, but are looking for a commitment from WCB to continue to support the ongoing recovery and treatments for Ryan. They did manage to bring Ryan home this past Christmas for a few days, but for day to day living there will have to be some major renovations to accommodate his wheelchair and provide safe bathing facilities. This is where his friends have stepped up to the plate. A wheelchair lift van was donated by a friend at Ryan's former workplace, Costco. Another supporter donated a lift for the house. Last year his friends held a fundraiser that collected about \$16,000 for his medical expenses, and they're aiming to repeat that success next month with another fundraiser to help pay for conversion of his house to a wheelchair-friendly home. This "pub night" will be held at the Fox and Fiddle, 19530 Langley Bypass on June 18, starting at 6:30 p.m. Friends are also seeking donations of goods, money and labour to help with this home conversion. If anyone wishes to volunteer anything that could help they should call Bonnie Stewart at 604-856-1812. There is also a trust account at the Aldergrove branch 276 of TD Canada Trust, number 6275144, for the public to donate cash to Ryan's rehabilitation. Ryan is able to type and mouth words and his left side is getting stronger. "He can raise his arms to pat and hug us," says Terry. "And the other day he stood up for two minutes on his own, once he was raised to his feet. "We want him home; he needs his family." With so much support behind him Ryan has a good chance of making a full recovery, as he continues to show that he is making real progress. "The love and support keeps everyone going," says Terry. "You don't realize it until it happens to you.

## The Hill Report- From Congressman Pete Sessions

**July 13, 2009** Posted By [admin](#) @ 12:29 pm In [On The Record](#)

This afternoon, the House of Representatives unanimously passed legislation I authored to recognize and report the results and planned expansion of Hyperbaric Oxygen Therapy in Veterans Affairs medical facilities. Hyperbaric Oxygen Therapy (HBOT) uses a chamber to

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administer oxygen in prescribed dosages for a variety of external and internal injuries. The oxygen acts as a catalyst in healing wounds that often fail to respond to other medical and surgical practices and that lack the blood circulation and blood-oxygen levels necessary to heal. The Federal Drug Administration has already approved the use of HBOT for thirteen medical conditions, including non-healing diabetic foot wounds, crush injuries, exceptional blood loss, and tissue transfer for complex wound reconstruction. Under military and VA medical care, HBOT has saved injured service members or veterans from expensive, painful, life-altering, and potentially life-threatening amputation of an arm, leg, hand or foot. Thousands of our brave servicemen and women are returning from combat with severe limb injuries, Traumatic Brain Injuries and Post-Traumatic Stress Disorders, resulting in an inability to hold a job, properly care for their families, or, in some cases, overcome suicidal tendencies. As a nation, we have the responsibility for their care and recovery, and I am particularly encouraged with the potential of expanding hyperbaric therapy to treat brain-injured soldiers suffering from TBI and PTSD. Since 2006, I have been actively engaged in researching a new cross-application of hyperbaric therapy to an increasingly-common and life-threatening non-healing wound: Traumatic Brain Injury (TBI). Currently, veterans suffering from TBI are receiving hyperbaric therapy from only private physicians, and evidence from numerous cases show substantial progress in brain function after treatment. I have met with physicians, scientists, the Department of Defense, the Department of Veterans Affairs, and service members regarding the potential of expanding hyperbaric therapy for TBI and PTSD in military and VA medical facilities. As an amendment to the Fiscal Year 2010 Military Construction and Veterans Affairs Appropriations Act, my legislation requires the VA to submit a report to Congress detailing the current and planned use of the Hyperbaric Oxygen Therapy in VA medical facilities, including the number of veterans and types of conditions being treated with HBOT, their respective success rates, and the current inventory of hyperbaric chambers. My report amendment is the first step toward expanding the use of hyperbaric therapy in military and VA medical facilities. By knowing how it is used today, we will have a greater understanding of how best to assist our injured service members and veterans tomorrow. I remain committed to working with military and health professionals to ensure that our injured soldiers receive the best care possible to improve quality of life and return to active duty, employment, family life, or school.

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## New hope for victims of traumatic brain injury

Saturday, June 28, 2008 By JEAN ENERSEN / KING 5 News

Five-million people in the United States have traumatic brain injuries, injuries that are likely to have a significant impact on their quality of life and their future. There is no cure, but researchers have found a treatment that could make a real difference. In August 2005, Brigadier General Patt Maney was driving through Afghanistan when a roadside bomb exploded “Everything went bright red, then black and I had a sensation of flying up into the air,” he said. He suffered a traumatic brain injury. “I was having trouble articulating, finding words and articulating thoughts and symptoms even,” he said. “I knew I couldn’t do things that used to be simple.” When nothing helped, he agreed to try an experimental option — hyperbaric oxygen therapy. Patients breathe pressurized oxygen in a sealed chamber. After 80 treatments over four months – a dramatic improvement. “It has improved my cognition, my word finding, my balance,” Maney said. “I had tremendous balance problems, I’d just fall over.” Doctor Paul Harch has studied the effects of hyperbaric oxygen therapy on more than 500 patients. He says high doses of oxygen stimulate the brain to repair itself. “And what we see is a general improvement in the majority of those functions, a return to pre-injury status. It turns their lives around,” he said. Today, General Maney is retired, working as a judge in Florida, grateful for a life a bomb almost took away. General Maney hopes hyperbaric oxygen therapy can be used to treat some of the soldiers coming back from Iraq and Afghanistan with brain injuries. So far, the procedure is still considered experimental. However, hyperbaric oxygen therapy is approved for treating diving injuries and carbon monoxide poisoning

## Hyperbaric oxygen therapy the key to treating shell-shocked soldiers?

December 20th, 2008 by MICHAEL STAPLES

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Hyperbaric oxygen therapy may be the answer to treating shell-shocked soldiers returning from Afghanistan. Tom Fox, a staff physiologist with Centre Hyperbare de L'Île in Pincourt, Que., and a former member of the U.S. military, said the same treatment used on divers to relieve what's known as the bends can be applied to assist combat soldiers. The bends occurs when divers are exposed to increased pressure without taking special precautions to prevent gas bubbles from forming in their bodies. Hyperbaric oxygen is used to prevent the adverse side effects of the bubbles. Fox said the procedure can be applied to "signature wounds" in soldiers, such as mild traumatic brain injuries (TBI) or post-traumatic stress disorder (PTSD). "The constellation of signs and symptoms attributable to mild TBI and PTSD is the same as those seen in a condition in which bubbles are formed from the exposure to excessive pressures," Fox said. "These pressures are routinely seen with the detonation of IEDs (improvised explosive devices)." Traumatic brain injury treatment traditionally relies on rehabilitative and retraining strategies, and on the use of drugs. Fox said of the 2,500 troops Canada sends to Afghanistan for six-month missions, as many as one-third will be impacted by what's described as silent shell-shock injuries. "The effects of the IEDs and the casualties seen from combat operations in Afghanistan will continue to grow because of the use of a type of explosives designed to maximize the casualties produced by blast overpressure," Fox said. Hyperbaric oxygen therapy, if delivered immediately, could make a difference, he said. "Right now, the silent wounding that is occurring in our troops coming back from Afghanistan is something that needs to be addressed," Fox said. He said he wants to present his findings to the Canadian Forces but he hasn't been able to get his foot in the door. Fox said the cost of providing care to each affected service member is between \$800,000 and \$2 million over a lifetime, depending on the level of impairment. Lt.-Col. Rakesh Jetly, the mental health adviser at National Defence headquarters in Ottawa, said the procedure isn't being used in Canada but the military is monitoring the work that's taking place. "The evidence for hyperbaric oxygen, the arguments are that very controlled hyperbaric oxygen helps in the healing process and is sometimes used in spinal injuries and other kinds," Jetly said. "To extrapolate that to traumatic brain injury is an interesting concept. For post-traumatic stress disorder, I think it is a bit of a stretch." Jetly said literature shows there may be some overlap between diagnoses for traumatic brain injury and post-traumatic stress disorder. "Some studies are showing that, when the PTSD gets treated, symptoms go down and so do the brain injury symptoms." Ryan Jestin, a retired colonel and

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former commander of Canadian Forces Base Gagetown, said some of the biggest challenges facing soldiers today in Afghanistan are improvised explosive devices. They have the potential to disrupt everything from logistics to patrols to hearts and minds, he said. As the numbers of troops increase in Afghanistan, he said, so do the opportunities to be ambushed and exposed to IEDs

