



Silent Wounds: the true signature wound of the War on Terror

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“Far too often the lessons learned from past wars have been forgotten at great cost to human life.”

*LTG Frank F. Ledford
Surgeon General
United States Army 1990*

Our country is in the middle of a health care crisis, the likes of which we have never experienced. At the center of this crisis is a silent wounding of our armed forces that often goes unrecognized. If you believe the Rand Corporation's estimates, silent wounding may be affecting as many as 325,000 veterans.

This silent wounding is much more than the anxiety disorder as identified by Pentagon officials, while they rendered a decision earlier this month on the eligibility of veterans with these injuries for receiving purple hearts. The purple heart is a recognition reserved to honor service-members injured in combat. The Pentagon's decision this month made the soldiers with this condition ineligible for purple hearts.

Silent wounding can be traced historically back as far as the American Civil War. Identified under different labels since that time, this condition has significantly contributed to the number of casualties experienced by armies on the field of battle in every conflict in the last 140 years. The treatment of this war derived patient population has been shameful. In the War to end all Wars, which ended ninety-one years ago, the British Army executed over 300 soldiers afflicted with this condition. Finally in 1996, this group of "wounded" was finally pardoned by the British Government.

Today, ninety one years later, researchers and investigators are still struggling to identify the mechanism of injury which is causing the impairment of our veterans. A very simplistic explanation of this wounding is to label it an anxiety or conversion disorder. The physiological possibilities must be explained before attributing these impairments to stress and psychological causes.

There is a significant body of evidence that would lead one to believe that these injuries are caused by bubbles formed as a result of exposure to blast overpressure. This creates an injury that can be likened to decompression illness or the bends, a condition which affects divers that are removed from pressure environments too quickly. The care of these "primary blast wounds" created by exposure to blast overpressure are often subordinated to other more impressive injuries created by the detonation of improvised explosive devices.





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 them, 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 the clots formed around these bubbles. Some bubbles may escape pulmonary 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 "peri-venous syndrome". This condition results in blood brain barrier dysfunction, inflammation, demyelination and diffuse axonal damage.

The resulting impairment is not easily recognized by the health care professional, but the deficit is clearly evident to family members. The individuals themselves may not even recognize that they are impaired. These injuries are cumulative and impairment increases with subsequent exposures to blast overpressure.

At the center silent wounding is the exposure of our troops to blast overpressure. This exposure has increased since 2004 as insurgents have used IEDs as their principle weapon to engage our forces. It is particularly interesting to note that the signs and symptoms that accompany the condition of neurological decompression illness are consistent with much of the constellation of signs and symptoms attributed to post traumatic stress disorder, PTSD or mild traumatic brain injury mTBI, terms that are used interchangeably to describe the impairment of US and Coalition Forces in the current conflict. These signs and symptoms are virtually identical to those used to describe the other labels for this same affliction throughout history. The legacy of this silent wounding is that a large portion of the younger generation are adversely affected. Those injured as a result of





exposure to blast overpressure often go unrecognized, until the impairment progresses to the point that it is easily recognizable to the untrained observer. This injury is often readily apparent to family and friends when the wounded return home. Historically, this affected group of young men and women have rarely been rehabilitated. This legacy can't be allowed to continue.

Currently the United States Air Force is conducting a study of the use of hyperbaric oxygen in the treatment of veterans returning from Iraq and Afghanistan with the diagnosis of mild traumatic brain injury. The principle investigator of this study is Dr. George Wolf.

Preliminary observations generating this study were that many of the signs and symptoms observed in the veterans with impairment were substantially improved with the use of hyperbaric oxygen. The hope is that the study will validate this observation. Perhaps it will never be known how many veterans are truly affected. What is for certain is the lifetime costs of taking care of these injured veterans may easily surpass the amount of committed by Congress to the economic bailout of Wall Street. Until that time the veterans with this silent wounding submit to a barrage of therapeutic interventions and in the end accept their plight as a sign of "recovery".

