Hyperbaric Oxygen Therapy:
Using Evidence-Based Medicine to Heal Injured Brain Tissue

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To the Editor—I am writing in response to the NCMJ issues published in April 2015 and September/October 2015, which addressed traumatic brain injury (TBI) in North Carolina [1] and evidence-based practice [2], respectively.

TBI and post-traumatic stress disorder (PTSD) are "neurocognitive disorders" according to government treatment protocols stipulated by the Defense and Veterans Brain Injury Center and the Veterans Administration. The medical community uses these protocols for treatment [3, 4], despite compelling evidence that symptoms result from a physical injury to the brain [4-6].

Difficulties in diagnosing brain injuries [3, 7]—as well as the challenge of categorizing TBI and PTSD in the Diagnostic and Statistical Manual of Mental Disorders [8]—have tended to validate the use of drug therapy for these conditions [6]. Unfortunately, the drugs prescribed for symptom mitigation frequently result in serious side effects, including an increased risk of suicide [6]. According to the results of a Congressional study, government protocols for treatment of PTSD, which include alternative counseling, are in question. A study by the National Academy of Medicine concluded that neither the Department of Defense nor the US Department of Veterans Affairs "knows whether its many programs and services are effective in reducing the prevalence of PTSD in service members or veterans" [9]. Of the 30 drugs and 25 alternative therapies addressed in this study, only 2 are authorized by the government; those are used in treating PTSD symptoms. All of the remaining therapies are provided off label based on standards of care established through evidence-based medicine [10, 11].

Oxygen has been used successfully to treat wounds for more than 30 years. It is a prerequisite for successful healing due to cells' increased demand for oxygen during reparative processes such as proliferation, angiogenesis, and collagen synthesis [12-14], all of which contribute to the wound-healing cascade. The brain represents less than 2% of body weight but uses 20% of oxygen consumed by the body. This helps to explain why "cerebral ischemia is the most important pathological condition encountered in TBI" and why restoration of an adequate oxygen supply is a critical factor for brain recovery [14].

Hyperbaric oxygen therapy (HBOT) takes advantage of the fact that oxygen is transported in the blood; increasing atmospheric pressure therefore maximizes tissue oxygenation [15], thus stimulating wound repair [12-14]. The US Food and Drug Administration has approved HBOT for 14 indications, providing 30 years of safe and successful clinical use. Four approved indications are supported by clinical trials; the remaining 10 indications are supported by evidence-based medicine [13].

TBI and PTSD are seriously debilitating injuries that affect millions of Americans [16]. HBOT is a safe and highly effective therapy for healing an oxygen-deprived organ such as an injured brain. Government protocols for treatment of TBI and PTSD are off-label, have no documented evidence of efficacy, and are prescribed in spite of significant deleterious side effects. Compelling evidence exists from clinical studies [17, 18] and from growing numbers of clinical reports of military veterans, National Football League veterans [19], and civilian patients that HBOT can restore patients' ability to once again function normally as spouses, parents, employers, employees, and contributing citizens of the community.

This situation warrants the earliest availability of HBOT for treatment of TBI and PTSD among injured civilians and military personnel through federal and state government health care systems based on evidence-based medicine criteria. NCMJ

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