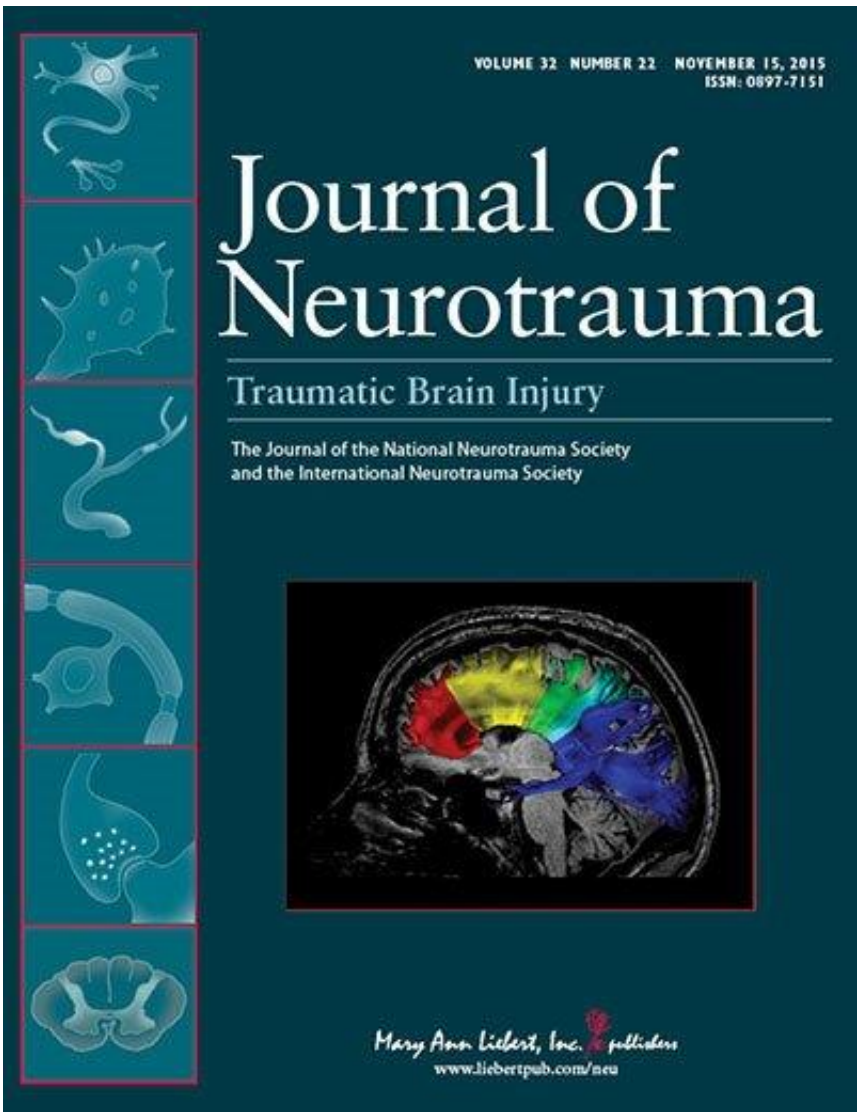
Air evacuation following traumatic brain injury worsens effects on learning, memory/brain cell loss

December 2 2015



Credit: ©Mary Ann Liebert, Inc., publishers

A study that simulated the effects of reduced barometic pressure (hypobaria) experienced by patients with traumatic brain injury (TBI) evacuated by air showed that prolonged hypobaria significantly worsened long-term cognitive and neurological outcomes. Maintaining normal oxygen levels did not affect the poorer outcomes after hypobaric exposure, and multiple exposures or use of 100% oxygen further worsened the effects in the rats studied, as described in an article published in *Journal of Neurotrauma*.

In "Simulated Aeromedical Evacuation Exacerbates Experimental Brain Injury", Alan Faden, MD led a team of researchers from the Center for Shock, Trauma and Anesthesiology Research (STAR), University of Maryland School of Medicine, Baltimore, in designing a study that simulated the prolonged hypobaria that a soldier with TBI would experience if evacuated by air from the battlefield. The researchers examined the effects on learning, memory, movement, and depressive-like behaviors in rats with induced TBI exposed to 6 hours of hypobaria 24 hours after injury. Some rats were exposed to a second 10-hour hypobaric period 72 hours after injury.

Based on the results of this study, the authors suggest several approaches to limit the negative effects of hypobaric exposure following TBI, including delaying air transport, increasing cabin pressurization to reduce barometric effects, having specialized enclosures to individualize pressurization, or changing supplemental oxygenation protocols.

In the Editorial "Hidden Perils of the 'Wild Blue Yonder' after Traumatic Brain Injury", Patrick M. Kochanek, MD, MCCM and Hülya Bayir, MD, University of Pittsburgh, PA, describe the study as "a valuable and timely exploratory report that takes an early step in addressing a largely unrecognized gap in the pre-clinical and clinical

literatures—a gap that is highly relevant to combat casualty care, but also to some cases of civilian trauma." The study authors "appear to have identified a new secondary injury pathway after TBI to add to the list of hypoxemia, hypotension, hyponatremia, hyperthermia, hypertension, hypervolemia, namely, hypobaria that needs to be characterized and prevented to maximize outcomes after TBI—even if patients need to travel into the wild blue yonder."

John T. Povlishock, PhD, Editor-in-Chief of *Journal of Neurotrauma* and Professor, Medical College of Virginia Campus of Virginia Commonwealth University, Richmond, notes that, "the Journal is exceptionally pleased to report this well done and provocative study that probes important questions relevant to the current standard of combat casualty care during aeromedical evacuation. The reported studies conducted in traumatically brain injured rodents illustrate the damaging consequences of sustained hypobaric exposure, while demonstrating the concomitant adverse consequences associated with the use of 100% oxygen. While additional studies are needed to further refine the overall interpretation of this study, the published work raises the important implication that hypobaria should be considered a potential secondary insult in traumatically brain injured patients."

More information: The article is available free to download on the *Journal of Neurotrauma* website until January 2, 2016.

Provided by Mary Ann Liebert, Inc