

Special Report:

Hyperbaric Oxygen Study Shows Potential Benefit for Patients With Traumatic Brain Injury

A 5-year study of patients with severe traumatic brain injury conducted at Hennepin County Medical Center in Minneapolis shows significant benefit of hyperbaric oxygen therapy to improve brain metabolism and its ability to recover from injury. The results were recently published in the *Journal of Neurosurgery*.

Every year, more than 1.4 million Americans sustain a traumatic brain injury (TBI) - the leading cause of death and disability in children and young adults. Those who survive often face months or even years of therapy, and sometimes the damage to the brain is irreversible. Decreased utilization of oxygenated blood to brain tissue immediately after the injury is often to blame.

Cells need oxygen to fuel metabolism for cellular growth and repair. Healthy brains produce their own energy to maintain brain tissue and keep the rest of the body doing what it's supposed to do. That includes automatic processes like breathing and circulation, as well as voluntary actions like walking and talking. After a traumatic brain injury, the brain itself needs care. Barriers to blood flow can be compromised from the impact of the injury itself, and then when the brain swells inside the skull, a secondary injury can occur that causes even more brain damage.

"There's a direct correlation between clinical outcome and the degree to which the brain's metabolism is restored," explains one of the study's authors, neurosurgeon Gaylan Rockswold, MD. "In previous research we learned that the brain's energy production is improved and maintained with hyperbaric oxygen treatment, but this study confirms that hyperbaric oxygen treatment has a major impact in terms of increased energy production."

Within 24 hours after injury, eligible patients for the study were randomized into three groups: One group received "normobaric" treatment: oxygen delivered at the patient's bedside; another group received hyperbaric treatment in Hennepin County Medical Center's hyperbaric oxygen chamber; and a third (control) group did not receive additional oxygen therapy. All groups received the intensive standard of care for brain injury consistent with good clinical practice. The patients who received higher levels of oxygen (hyperoxia) via the hyperbaric oxygen chamber were found to have a marked increase in positive brain metabolism when compared to the normobaric and control group.

"Our goal was to evaluate the brain's metabolism and intracranial pressure, and whether or not too much oxygen posed a concern with hyperbaric oxygen treatment in these patients," said Dr. Rockswold. "The results indicate that hyperbaric oxygen treatment was found to significantly enhance the brain's energy production and reduce intracranial pressure without any toxic effects on the brain or lungs from too much oxygen."

This research provides important preliminary data for a National Institutes of Health (NIH) supported multicenter trial. NIH trials directly assess the ability to improve clinical outcomes, which is the final step needed to change standard clinical processes. Currently standard clinical practice does not include

hyperbaric oxygen for traumatic brain injury.

"TBI is not only devastating for the patient, it's also heart wrenching for his or her family. We couldn't be more pleased about the impact this study will have for patients with traumatic brain injury."

The Traumatic Brain Injury Center at Hennepin County Medical Center offers comprehensive, multidisciplinary patient care education and research to serve people who have sustained a traumatic brain injury. Providing a full range of state-of-the-art medical and rehabilitative services, HCMC's expertise spans the entire continuum of care for adult and pediatric TBI patients, from prevention to emergency care, neurosurgery, critical care, rehabilitation and the Mild to Moderate Traumatic Brain Injury Clinic.