Medical Xpress

New hope for victims of traumatic brain injury

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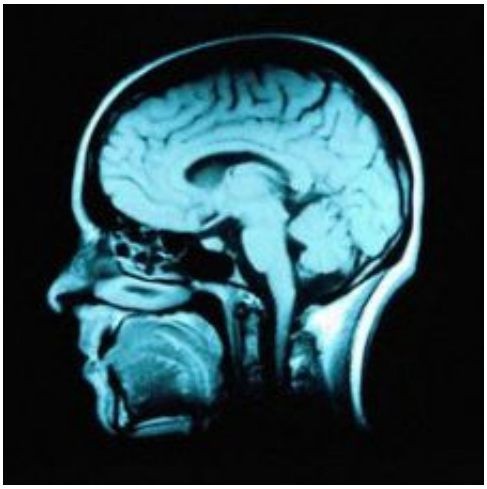

Every year, nearly two million people in the United States suffer traumatic brain injury (TBI), the leading cause of brain damage and permanent disabilities that include motor dysfunction, psychological disorders, and memory loss. Current rehabilitation programs help patients but often achieve limited success.

Now Dr. Shai Efrati and Prof. Eshel Ben-Jacob of Tel Aviv University's Sagol School of Neuroscience have proven that it is possible to repair brains and improve the quality of life for TBI victims, even years after the occurrence of the injury.

In an article published in *PLoS ONE*, Dr. Efrati, Prof. Ben Jacob, and their collaborators present evidence that hyperbaric oxygen therapy (HBOT) should repair chronically impaired brain functions and significantly improve the quality of life of mild TBI patients. The new findings challenge the often-dismissive stand of the US Food and Drug Administration, Centers for Disease Control and Prevention, and the medical community at large, and offer new hope where there was none.

The research trial

The trial included 56 participants who had suffered mild traumatic brain injury one to five years earlier and were still bothered by headaches, difficulty concentrating, irritability, and other cognitive impairments. The patients' symptoms were no longer improving prior to the trial.

The participants were randomly divided into two groups. One received two months of HBOT treatment while the other, the control group, was not treated at all. The latter group then received two months of treatment following the first control period. The treatments, administered at the Institute of Hyperbaric Medicine at Assaf Harofeh Medical Center, headed by Dr. Efrati, consisted of 40 one-hour sessions, administered five times a week over two months, in a high pressure chamber, breathing 100% oxygen and experiencing a pressure of 1.5 atmospheres, the pressure experienced when diving under water to a depth of 5 meters. The patients' brain functions and quality of life were then assessed by computerized evaluations and compared with single photon emission computed tomography (SPECT) scans.

Persuasive confirmation

In both groups, the hyperbaric oxygen therapy sessions led to significant improvements in tests of cognitive function and quality of life. No

significant improvements occurred by the end of the period of non-treatment in the control group. Analysis of brain imaging showed significantly increased neuronal activity after a two-month period of HBOT treatment compared to the control periods of non-treatment.

"What makes the results even more persuasive is the remarkable agreement between the cognitive function restoration and the changes in brain functionality as detected by the SPECT scans," explained Prof. Ben-Jacob. "The results demonstrate that neuroplasticity can be activated for months and years after acute brain injury."

"But most important, patients experienced improvements such as memory restoration and renewed use of language," Dr. Efrati said. "These changes can make a world of difference in daily life, helping patients regain their independence, go to work, and integrate back into society."

The regeneration process following brain injury involves complex processes, such as building new blood vessels and rebuilding connections between neurons, and requires much energy.

"This is where HBOT treatment can help," said Dr. Efrati. "The elevated oxygen levels during treatment supply the necessary energy for facilitating the healing process."

The findings offer new hope for millions of traumatic brain injury patients, including thousands of veterans wounded in action in Iraq and Afghanistan. The researchers call for additional larger scale, multi-center clinical studies to further confirm the findings and determine the most effective and personalized treatment protocols. But since the hyperbaric oxygen therapy is the only treatment proven to heal TBI patients, the researchers say that the medical community and the US Armed Forces should permit the victims of TBI benefit from the new hope right now,

rather than waiting until additional studies are completed.

Provided by Tel Aviv University

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