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Hydrogen-rich saline protects against oxidative damage and cognitive deficits after mild traumatic brain injury

Zonggang Hou ¹, Wei Luo, Xuejun Sun, Shuyu Hao, Ying Zhang, Feifan Xu, Zhongcheng Wang, Baiyun Liu

Affiliations

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Abstract

Oxidative stress is the principal factor in traumatic brain injury (TBI) that initiates events that result in protracted neuronal dysfunction and remodeling. Importantly, antioxidants can protect the brain against oxidative damage and modulate the capacity of the brain to cope with synaptic dysfunction and cognitive impairment. However, no studies have investigated the effects of hydrogen-rich saline on cognitive deficits after TBI. In the present study, rats with fluid percussion injury (FPI) were used to investigate the protective effects of hydrogen-rich saline. The results showed that hydrogen-rich saline reduced the level of malondialdehyde (MDA) and elevated the level of silent information regulator 2 (Sir2). In addition, treatment with hydrogen-rich saline, which elevated the levels of molecules associated with brain-derived neurotrophic factor (BDNF)-mediated synaptic plasticity, improved cognitive performance in the Morris water maze after mild TBI. These results suggest that hydrogen-rich saline can protect the brain against the deleterious effects of mild TBI on synaptic plasticity and cognition and that hydrogen-rich saline could be an effective therapeutic strategy for patients with cognitive deficits after TBI.

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