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Hydrogen-rich water improves neurological functional recovery in experimental autoimmune encephalomyelitis mice

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Abstract

Multiple sclerosis (MS) is a chronic autoimmune demyelinating disease of the central nervous system (CNS). The high costs, inconvenient administration, and side effects of current Food and Drug Administration (FDA)-approved drugs often lead to poor adherence to the long-term treatment of MS. Molecular hydrogen (H₂) has been reported to exhibit anti-oxidant, anti-apoptotic, anti-inflammatory, anti-allergy, and anti-cancer effects. In the present study, we explored the prophylactic and therapeutic effects of hydrogen-rich water (HRW) on the progress of experimental autoimmune encephalomyelitis (EAE), the animal model for MS. We found that prophylactic administration of both 0.36mM and 0.89mM HRW was able to delay EAE onset and reduce maximum clinical scores. Moreover, 0.89mM HRW also reduced disease severity, CNS infiltration, and demyelination when administered after the onset of disease. Furthermore, HRW treatment prevented infiltration of CD4(+) T lymphocytes into the CNS and inhibited Th17 cell development without affecting Th1 cell populations. Because HRW is non-toxic, inexpensive, easily administered, and can readily cross the blood-brain barrier, our experiments suggest that HRW may have great potential in the treatment of MS.

Keywords: CD4(+) T lymphocytes; Experimental autoimmune encephalomyelitis; Hydrogen-rich water; Multiple sclerosis; TH17.

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