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Hydrogen rich saline reduces immune-mediated brain injury in rats with acute carbon monoxide poisoning

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Abstract

Objectives: This experiment was designed to determine whether hydrogen (H(2)) rich saline can ameliorate brain abnormalities in a rat model with acute carbon monoxide (CO) poisoning.

Methods: Sprague-Dawley male rats were used for CO poisoning and H(2) rich saline treatment. Changes in neurons, microglias, and myelin sheath were observed by electron microscope. Neuron loss was assessed by Nissl staining. Antioxidant capacities were evaluated by studying superoxide dismutase activities and malondialdehyde concentration in the brain and serum. Infiltration of macrophages, expression of immune-associated cytokines (MIP-1-alpha and ICAM-1), and changes in myelin basic protein (MBP) were monitored by immunohistochemical staining and western blotting.

Results: CO-exposed rats showed the increase in neuron loss and the decrease in antioxidant capacities. And H(2) rich saline given after CO poisoning can prevent the alterations mentioned above. CO-mediated oxidative stress caused alterations in MBP, which initiated an adaptive immunological response that led to brain injury. MBP from H(2) rich saline-treated, CO-exposed rats was recognized normally by immunohistochemical staining and western blotting. Electron microscope observation from CO-exposed rats showed an apparent aggregation of microglias. Macrophages from CO-exposed rats were significantly more than those from H(2) rich saline-treated and control rats, and the immunofluorescence observation showed that macrophages were similar to microglias in type. Expression levels of MIP-1-alpha and ICAM-1 increased in the brains of CO-poisoned rats and H(2) rich saline treatment decreased the levels.

Discussion: The results indicate that H(2) rich saline prevents immune-mediated brain injury after CO poisoning.

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