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Hydrogen-rich saline ameliorates lung injury associated with cecal ligation and puncture-induced sepsis in rats

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Abstract

Aims: Although hydrogen has been proved to be a novel therapeutic medical gas in several lung injury animal models, to our knowledge, it has not been tested yet in acute lung injury (ALI) induced by cecal ligation and puncture (CLP). This study was to investigate the hypothesis that hydrogen could ameliorate CLP-induced lung injury in rats.

Methods and results: Our experiments exhibited that gas exchange dysfunction and lung tissue inflammation were observed in animals exposed to CLP. Hydrogen-rich saline treatment significantly attenuated lung injury as indicated by significantly improved gas exchange and histological changes in the lung and significantly reduced lung water content (LWC) and neutrophil infiltration 8h after CLP. Lipid peroxidation and DNA oxidation in the lung tissue were significantly reduced along with a decreased nitrotyrosine content and maintained superoxide dismutase activity in the presence of hydrogen, demonstrating antioxidant role of hydrogen in CLP-induced ALI. Importantly, hydrogen-rich saline treatment significantly inhibited the activation of p-p38 and NF- κ B while suppressing the production of several proinflammatory mediators.

Conclusions: This observation indicated that hydrogen-rich saline peritoneal injection improves histological and functional assessment in rat model of CLP-induced ALI. The therapeutic effects of hydrogen-rich saline may be related to antioxidant and anti-inflammatory actions.

Keywords: Acute lung injury; Cecal ligation and puncture; Hydrogen; Inflammation; Oxidative stress.

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