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Saturated hydrogen saline protects the lung against oxygen toxicity

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Abstract

Exposure to high oxygen concentrations leads to acute lung injury, including lung tissue and alveolar edema formation, congestion, intra-alveolar hemorrhage, as well as endothelial and epithelial cell apoptosis or necrosis. Several studies have reported that molecular hydrogen is an efficient antioxidant by gaseous rapid diffusion into tissues and cells. Moreover, consumption of water with dissolved molecular hydrogen to a saturated level (hydrogen water) prevents stress-induced cognitive decline in mice and superoxide formation in mice. The purpose of the present study was to investigate the effect of saturated hydrogen saline on pulmonary injury-induced exposure to >98% oxygen at 2.5 ATA for five hours. Adult male Sprague-Dawley (SD) rats were randomly divided into three groups: control group, saline group and saturated hydrogen saline group. Hematoxylin and eosin (H&E) staining were used to examine histological changes. The lung wet to dry (W/D) weight ratio was calculated. The concentration of protein and total cell counts in bronchoalveolar lavage fluid (BALF) were measured. Lactate dehydrogenase (LDH) in serum and BALF were measured by spectrophotometer. The light microscope findings showed that saturated hydrogen saline reduced the impairment when compared with the saline group: Saturated hydrogen saline decreased lung edema, reduced LDH activity in BALF and serum, and decreased total cells and protein concentration in BALF. These results demonstrated that saturated hydrogen saline alleviated hyperoxia-induced pulmonary injury, which was partly responsible for the inhibition of oxidative damage.

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