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# Hydrogen water alleviates lung injury induced by one-lung ventilation

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## Abstract

**Background:** With the development of thoracic surgeries, one-lung ventilation (OLV) has been routinely used to facilitate surgical exposure. However, OLV can cause lung injury during the surgical process and becomes an important factor affecting the outcomes. To date, effective treatments for the prevention of lung injury caused by OLV are lacking. Hydrogen has been demonstrated to have effective protection against tissue injuries caused by oxidative stress, inflammation, and apoptosis. This study investigated the efficacy of hydrogen water consumption on the prevention of lung injury induced by OLV in rats.

**Materials and methods:** Male Sprague-Dawley rats (n = 32, 240-260 g) were divided randomly into the following four groups: sham group, sham + H<sub>2</sub> group, OLV group, OLV + H<sub>2</sub> group. The rats drank hydrogen water or degassed hydrogen water for 4 wk before the operation and received OLV for 60 min and two-lung ventilation for 60 min. Lung tissues were assayed for wet-to-dry ratio, oxidative stress variables, proinflammatory cytokines, and hematoxylin-eosin staining.

**Results:** Hydrogen water consumption reduced wet-to-dry weight ratio, malondialdehyde and myeloperoxidase activity and decreased the concentration of TNF- $\alpha$ , IL-1 $\beta$ , and IL-6 in the lung tissues compared with sham group and sham + H<sub>2</sub> group. Hydrogen water consumption further attenuated NF- $\kappa$ B activation and caused histopathologic alterations.

**Conclusions:** Our data demonstrated that hydrogen water consumption ameliorated OLV-induced lung injury, and it may exert its protective role by its anti-inflammation, antioxidation and reducing NF- $\kappa$ B activity in the lung tissues.

**Keywords:** Hydrogen; Inflammation; Lung injury; Nuclear factor kappa B; Oxidative stress.

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