

## **Hydrogen Water Alleviates Obliterative Airway Disease**

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### **Objective:**

Bronchiolitis obliterans syndrome arising from chronic airway inflammation is a leading cause of death following lung transplantation. Several studies have suggested that inhaled hydrogen can protect lung grafts from ischemia-reperfusion injury via anti-inflammatory and -oxidative mechanisms. We investigated whether molecular hydrogen-saturated water can preserve lung allograft function in a heterotopic tracheal allograft model of obliterative airway disease and were subsequently administered hydrogen water (10 ppm) or tap water (control group) (n=6 each) daily without any immuno suppressive treatment. Histological and immuno histochemical analyses were performed on days 7, 14, and 21.

### **Results**

Hydrogen water decreased airway occlusion on day 14. No significant histological differences were observed on days 7 or 21. The cluster of differentiation 4/cluster of differentiation 3 ratio in tracheal allografts on day 14 was higher in the hydrogen water group than in control. Enzyme-linked immuno sorbent assay performed on day 7 revealed that hydrogen water reduced the level of the pro-inflammatory cytokine interleukin-6 and increased that of fork head box P3 transcription factor, suggesting an enhancement of regulatory T cell activity.

### **Conclusions**

Hydrogen water suppressed the development of mid-term obliterative airway disease in a tracheal allograft model via anti-oxidant and -inflammatory mechanisms and through the activation of Tregs. Thus, hydrogen water is a potential treatment strategy for BOS that can improve the outcome of lung transplant patients.

These results indicate that molecular hydrogen may be a novel preventive and therapeutic approach for COPD. In a pilot study, hydrogen gas inhalation ameliorates airway inflammation in bronchial asthma.

### **Is hydrogen water good for lungs?**

Indeed, hydrogen water has been reported to improve various diseases and tissue injuries through anti-oxidative and anti-inflammatory activities including Pulmonary Inflammation and Asthma, Cerebral Infarction (stroke), Alzheimer's Disease, Parkinson's Disease, Rheumatoid Arthritis (RA), Diabetes and COPD patients.

## What does hydrogen do in the respiratory system?

An increasing number of studies have revealed that hydrogen may protect the lungs from diverse diseases, including acute lung injury, chronic obstructive pulmonary disease, asthma, lung cancer, pulmonary arterial hypertension, and pulmonary fibrosis. Molecular hydrogen is a promising therapeutic agent for pulmonary disease

### Abstract:

Molecular hydrogen exerts biological effects on nearly all organs. It has anti-oxidative, anti-inflammatory, and anti-aging effects and contributes to the regulation of autophagy and cell death. As the primary organ for gas exchange, the lungs are constantly exposed to various harmful environmental irritants. Short- or long-term exposure to these harmful substances often results in lung injury, causing respiratory and lung diseases. Acute and chronic respiratory diseases have high rates of morbidity and mortality and have become a major public health concern worldwide.

For example, Coronavirus Disease 2019 (COVID-19) caused by severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) has become a global pandemic. An increasing number of studies have revealed that hydrogen may protect the lungs from diverse diseases, including acute lung injury, chronic obstructive pulmonary disease, asthma, lung cancer, pulmonary arterial hypertension, and pulmonary fibrosis. In this review, we highlight the multiple functions of hydrogen and the mechanisms underlying its protective effects in various lung diseases, with a focus on its roles in disease pathogenesis and clinical significance.

