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## Lung inflation with hydrogen during the cold ischemia phase decreases lung graft injury in rats

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Affiliations

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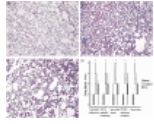
### Abstract

Hydrogen has antioxidant and anti-inflammatory effects on lung ischemia-reperfusion injury when it is inhaled by donor or/and recipient. This study examined the effects of lung inflation with 3% hydrogen during the cold ischemia phase on lung graft function in rats. The donor lung was inflated with 3% hydrogen, 40% oxygen, and 57% nitrogen at 5 mL/kg, and the gas was replaced every 20 min during the cold ischemia phase for 2 h. In the control group, the donor lung was inflated with 40% oxygen and 60% nitrogen at 5 mL/kg. The recipient was euthanized 2 h after orthotopic lung transplantation. The hydrogen concentration in the donor lung during the cold ischemia phase was 1.99-3%. The oxygenation indices in the arterial blood and pulmonary vein blood were improved in the hydrogen group. The inflammation response indices, including lung W/D ratio, the myeloperoxidase activity in the grafts, and the levels of IL-8 and TNF- $\alpha$  in serum, were significantly lower in the hydrogen group ( $5.2 \pm 0.8$ ,  $0.76 \pm 0.32$  U/g,  $340 \pm 84$  pg/mL, and  $405 \pm 115$  pg/mL, respectively) than those in the control group ( $6.5 \pm 0.7$ ,  $1.1 \pm 0.5$  U/g,  $443 \pm 94$  pg/mL, and  $657 \pm 96$  pg/mL, respectively ( $P < 0.05$ ), and the oxidative stress indices, including the superoxide dismutase activity and the level of malonaldehyde in lung grafts were improved after hydrogen application. Furthermore, the lung injury score determined by histopathology, the cell apoptotic index, and the caspase-3 protein expression in lung grafts were decreased after hydrogen treatment, and the static pressure-volume curve of lung graft was improved by hydrogen inflation. In conclusion, lung inflation with 3% hydrogen during the cold ischemia phase alleviated lung graft injury and improved graft function.

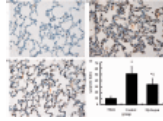
**Keywords:** Hydrogen; donor; ischemia reperfusion injury; lung transplantation.

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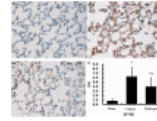
### Figures



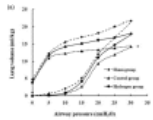
**Figure 1** Histological analysis of lung grafts...



**Figure 2** Alveolar epithelial cell apoptosis in...



**Figure 3** Caspase-3 protein expression of alveolar...



**Figure 4** The static P-V curve of...

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