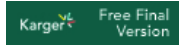


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*Cell Physiol Biochem.* 2017;43(4):1503-1514. doi: 10.1159/000481974. Epub 2017 Oct 16.

# Hydrogen Gas Attenuates Myocardial Ischemia Reperfusion Injury Independent of Postconditioning in Rats by Attenuating Endoplasmic Reticulum Stress-Induced Autophagy

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PMID: 29035876 DOI: [10.1159/000481974](https://doi.org/10.1159/000481974)

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## Abstract

**Background/aims:** To study the effect of inhaling hydrogen gas on myocardial ischemic/reperfusion(I/R) injury in rats.

**Methods:** Seventy male Wistar albino rats were divided into five groups at random as the sham group (Sham). The I/R group (I/R), The ischemic postconditioning group (IPo), The I/R plus hydrogen group (IH2) and the ischemic postconditioning plus hydrogen group (IPoH2). The Sham group was without coronary occlusion. In I/R group, Ischemic/reperfusion injury was induced by coronary occlusion for 1 hour. Followed by 2 hours of reperfusion. In the IPo and IPoH2 group, four cycles of 1 min reperfusion/1 min ischemia was given at the end of 1 hour coronary occlusion. While 2% hydrogen was administered by inhalation 5 min before reperfusion till 2 hours after reperfusion in both the IPoH2 and IH2 group. The heart and blood samples were harvested at the end of the surgical protocol. Then the myocardium cell endoplasmic reticulum(ER) stress and autophagy was observed by electron microscope. In addition, the cardiac ER stress and autophagy related proteins expression were detected by Western blotting analysis.

**Results:** Both inhaling 2% hydrogen and ischemic postconditioning treatment reduced the ischemic size and serum troponin I level in rats with I/R injury, and inhaling hydrogen showed a more curative effect compared with ischemic postconditioning treatment. Meanwhile inhaling hydrogen showed a better protective effect in attenuating tissue reactive oxygen species. Malondialdehyde levels and immunoreactivities against 8-hydroxy-2'-deoxyguanosine and inhibiting cardiac endoplasmic reticulum stress and down-regulating autophagy as compared with ischemic postconditioning treatment.

**Conclusion:** These results revealed a better protective effect of hydrogen on myocardial ischemic/reperfusion injury in rats by attenuating endoplasmic reticulum stress and down-regulating autophagy compared with ischemic postconditioning treatment.

**Keywords:** Autophagy; Endoplasmic reticulum stress; Hydrogen; Ischemic postconditioning; Ischemic/reperfusion injury.

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