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Comparative Study [Heart Lung Circ.](#) 2015 Jun;24(6):602-10. doi: 10.1016/j.hlc.2014.11.018.

Epub 2014 Dec 4.

Cardioprotective Effect of Hydrogen-rich Saline on Isoproterenol-induced Myocardial Infarction in Rats

Lei Jing ¹, Yun Wang ², Xiao-Min Zhao ³, Bing Zhao ⁴, Ji-Ju Han ², Shu-Cun Qin ², Xue-Jun Sun ⁵

Affiliations

PMID: 25533677 DOI: [10.1016/j.hlc.2014.11.018](#)

Abstract

Background: Infusion with hydrogen gas-saturated saline has recently been reported to exert antioxidant and anti-inflammatory activity that may protect against organ damage induced by oxidative stress. Therefore because oxidative stress plays a significant role in the pathophysiology of myocardial infarction (MI), the aim of our study was to investigate whether hydrogen-rich saline has cardioprotective effects against isoproterenol-induced MI in rats.

Methods: An acute MI model was induced in male Wistar rats by subcutaneous injection of isoproterenol. Different doses of hydrogen-rich saline (5, 7.5, and 10 mL/kg body weight i.p.) or Vitamin C (250 mg/kg body weight i.g.) were administered to the rats. Oxidative stress indices including levels of myocardial marker enzymes, inflammatory cytokines, membrane-bound myocardial enzymes and histopathological changes were measured.

Results: Compared with those in isoproterenol-MI group, hydrogen-rich saline decreased malondialdehyde and 8-hydroxy-desoxyguanosine concentrations, enhanced superoxide dismutase and Na(+)-K(+)-ATPase activity, lowered Ca(2+)-ATPase activity and decreased interleukin-6 and tumour necrosis factor- α levels in the serum and/or cardiac tissue of rats. Hydrogen-rich saline pretreatment also diminished infarct size, improved left heart function, and ameliorated pathological changes of the left heart.

Conclusion: From these results, hydrogen-rich saline exerts cardiovascular protective effects against isoproterenol-induced MI at least in part via interactions which evoke antioxidant and anti-inflammatory activities.

Keywords: Hydrogen; Inflammation; Isoproterenol; Myocardial infarction; Oxidative stress.

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