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Protective effects of hydrogen enriched saline on liver ischemia reperfusion injury by reducing oxidative stress and HMGB1 release

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Abstract

Background: The nuclear protein high-mobility group box 1 (HMGB1) is a key trigger for the inflammatory reaction during liver ischemia reperfusion injury (IRI). Hydrogen treatment was recently associated with down-regulation of the expression of HMGB1 and pro-inflammatory cytokines during sepsis and myocardial IRI, but it is not known whether hydrogen has an effect on HMGB1 in liver IRI.

Methods: A rat model of 60 minutes 70% partial liver ischemia reperfusion injury was used. Hydrogen enriched saline (2.5, 5 or 10 ml/kg) was injected intraperitoneally 10 minutes before hepatic reperfusion. Liver injury was assessed by serum alanine aminotransferase (ALT) enzyme levels and histological changes. We also measured malondialdehyde (MDA), hydroxynonenal (HNE) and 8-hydroxy-guanosine (8-OH-G) levels as markers of the peroxidation injury induced by reactive oxygen species (ROS). In addition, pro-inflammatory cytokines including TNF-α and IL-6, and high mobility group box B1 protein (HMGB1) were measured as markers of post ischemia-reperfusion inflammation.

Results: Hydrogen enriched saline treatment significantly attenuated the severity of liver injury induced by ischemia-reperfusion. The treatment group showed reduced serum ALT activity and markers of lipid peroxidation and post ischemia reperfusion histological changes were reduced. Hydrogen enriched saline treatment inhibited HMGB1 expression and release, reflecting a reduced local and systemic inflammatory response to hepatic ischemia reperfusion.

Conclusion: These results suggest that, in our model, hydrogen enriched saline treatment is protective against liver ischemia-reperfusion injury. This effect may be mediated by both the anti-oxidative and anti-inflammatory effects of the solution.

Figures

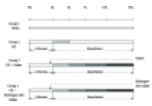

Figure 1 Schematic illustration of the experimental...

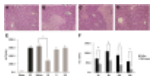

Figure 2 Hydrogen-enriched saline treatment protects

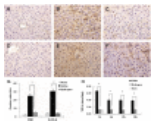

Figure 3 Hydrogen-enrich saline inhibited hepatic peroxidation...

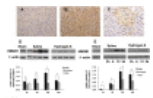

Figure 4 Hydrogen-enriched saline prevents liver

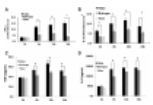

Figure 5 Hydrogen-enriched saline attenuates TNFα and...

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