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Three hydrogen-rich solutions protect against intestinal injury in uncontrolled hemorrhagic shock

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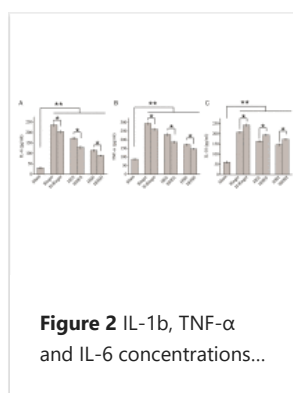
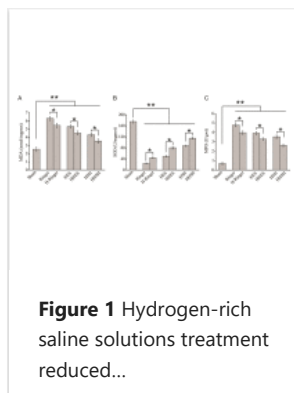
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Abstract

Intestinal tissue got largely decreased blood supply in uncontrolled hemorrhagic shock, because of limited blood mainly supporting brain, heart, kidney etc. This makes intestine as the primary injury target after uncontrolled hemorrhagic shock. However, limited studies focus on how to protect intestine against hemorrhagic shock. Ringer's solution, pentoxifylline and hypertonic saline are widely used to resuscitate in haemorrhagic shock and sepsis tissue injury. Evidence showed that hydrogen inhibited inflammation and reduced oxidative damage. Here we tested the hypothesis whether hydrogen rich Ringer's, pentoxifylline and hypertonic saline solutions increase the benefit in protecting small intestine from injury in uncontrolled hemorrhagic shock rat model. We tested the anti-inflammation effect of H-Ringer's, HHES and HSSH administration. We found hydrogen-rich solutions treatment groups showed the decreased MDA, MPO, IL-6 and TNF- α levels, and increased SOD, IL-10 comparing with those of non-hydrogen solutions administration groups. Our histological results showed that these three solutions with saturation hydrogen alleviated the intestinal injury including the intact intestinal villi and less neutrophil infiltration. Our results indicate that these three hydrogen-rich solutions can protect intestinal injure after uncontrolled hemorrhagic shock. The protective effect might be through inhibiting proinflammatory factors, promoting anti-inflammatory cytokines and reducing inflammatory cells infiltration. Our study has potential clinical importance of uncontrolled hemorrhagic shock patient's resuscitation.

Keywords: Hydrogen; hemorrhagic shock; intestinal injure; neutrophil infiltration; pro-inflammatory factors.

Figures



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