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Hydrogen-rich saline protects against small-scale liver ischemia-reperfusion injury by inhibiting endoplasmic reticulum stress ☆

Hui Li, Ge Bai, Yansong Ge, Qianzhen Zhang, Xiangdong Kong, Weijing Meng, Hongbin Wang

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Abstract

Aim

Our research investigated the role of Hydrogen-rich saline (HRS) on the Endoplasmic reticulum stress (ERS) pathway and the effect of HRS on tissue injury in small Bama pig model of hepatic ischemia-reperfusion combined with partial hepatectomy.

Main methods

Eighteen healthy Bama miniature pigs were randomly divided equally into three groups: Sham, IRI, and HRS. Laparoscopic technique was employed to establish the model of hepatic ischemia-reperfusion combined with partial hepatectomy. HRS (10 mL/kg) was injected into the portal vein 10 min before perfusion. Histological examinations of the liver tissues were performed after HE staining. Additionally, transmission electron microscopy was performed to detect liver cell microstructure. Real-time PCR, Western blotting, and immunohistochemical staining were performed to analyze various ERS molecules including GRP78, p-eIF2α, XBP-1s, Full-length ATF6α, p-JNK, ATF4, and CHOP.

Key findings

We observed that HRS visibly improved ischemia-reperfusion injury (IRI) by reducing various parameters of ERS stress as evidenced by down-regulation of the mRNA as well as protein levels of GRP78, p-eIF2α, XBP-1s, p-JNK, and CHOP, and reducing the cleavage of Full-length ATF6α.

Significance

Our study demonstrates that HRS protects the liver from IRI by inhibiting ERS.

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Keywords

Hydrogen-rich saline; Ischemia-reperfusion; Pig; Liver; Endoplasmic reticulum stress

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