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Hydrogen saline suppresses neuronal cell apoptosis and inhibits the p38 mitogen-activated protein kinase-caspase-3 signaling pathway following cerebral ischemia-reperfusion injury

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Abstract

Cerebral ischemia-reperfusion injury (CIRI) is a serious pathological disease that is associated with a high rate death and disability. Saturated hydrogen (H₂) saline exhibits brain protective functions through anti-inflammatory, antioxidant and antiapoptotic effects. The present study investigated the potential treatment effects of H₂ on CIRI. In addition, the potential protective mechanisms of H₂ in the prevention of CIRI were investigated. Adult, male Sprague-Dawley rats (n=60) were randomly divided into the following three groups: Sham-operated group; IR group; and IR + H₂ group (0.6 mmol/l, 0.5 ml/kg/day). Hematoxylin and eosin, and TUNEL staining were performed for histopathological analysis and investigation of apoptosis, respectively. In addition, the protein expression of caspase-3, p38 mitogen-activated protein kinase (MAPK) and phosphorylated-p38 MAPK in the cortex were measured by western blotting analysis. These results demonstrated that H₂ significantly reduced the number of apoptotic cells, and the protein expression of p38 MAPK and caspase-3, compared with the IR group. These effects may be associated with the p38MAPK signaling pathway.

Figures

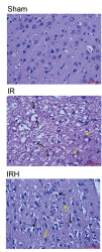


Figure 1.
Histopathological
examination by

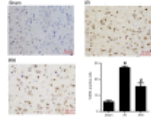


Figure 2. Effects of
saturated hydrogen
saline...

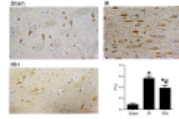


Figure 3.
Immunohistochemical
staining of p38 MAPK...

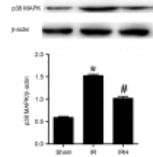


Figure 4. Expression of
p38 MAPK protein...

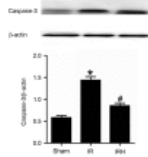


Figure 5. Expression of
caspase-3 protein in...

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