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Hydrogen-rich saline is cerebroprotective in a rat model of deep hypothermic circulatory arrest

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Abstract

Deep hypothermic circulatory arrest (DHCA) has been widely used in the operations involving the aortic arch and brain aneurysm since 1950s; but prolonged DHCA contributes significantly to neurological deficit which remains a major cause of postoperative morbidity and mortality. It has been reported that hydrogen exerts a therapeutic antioxidant activity by selectively reducing hydroxyl radical. In this study, DHCA treated rats developed a significant oxidative stress, inflammatory reaction and apoptosis. The administration of HRS resulted in a significant decrease in the brain injury, together with lower production of IL-1β, TNF-α, 8-OHdG and MDA as well as decreased activity of NOS while increased activity of SOD. The apoptotic index as well as the expressions of caspase-3 in brain tissue was significantly decreased after treatment. HRS administration significantly attenuated the severity of DHCA induced brain injury by mechanisms involving amelioration of oxidative stress, down-regulation of inflammatory factors and reduction of apoptosis.

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