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Neuroprotective Effect of Hydrogen-Rich Saline in Global Cerebral Ischemia/Reperfusion Rats: Up-Regulated Tregs and Down-Regulated miR-21, miR-210 and NF- κ B Expression

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Abstract

Recently, it has been suggested that molecular hydrogen (H₂) can selectively reduce the levels of hydroxyl radicals (.OH), and ameliorate oxidative and inflammatory injuries to organs in global cerebral ischemia reperfusion models. Global cerebral ischemia/reperfusion (I/R) can induce a sudden activation of inflammatory cytokines and later influence the systemic immunoreactivity which may contribute to a worse outcome. Regulatory T cells (Tregs) are involved in several pathological aspects of cerebral I/R. In addition, miRNA took part in the processes of cellular response to hypoxia. Since the expression of a specific set of miRNA called "hypoxamirs" is upregulated by hypoxia. Therefore, the aim of this study was to analyze the effect of HRS on I/R inducing cerebral damage, Tregs, and specific miRNA. Our results showed that rats undergone global cerebral I/R and treated with HRS have milder injury than I/R animals without HRS treatment. miR-210 expression in the hippocampus of the I/R group at 6, 24 and 96 h after reperfusion was significantly increased at each time point, while its expression in the group treated with HRS was significantly decreased. In addition, Tregs number in group I/R was decreased at each time points, while its number in the group treated with HRS was increased at 24 and 96 h after reperfusion. We focus on the relationship among Tregs, TGF- β 1, TNF- α and NF- κ B at 24 h, and we found that there is a high correlation among them. Therefore, our results indicated that the brain resuscitation mechanism in the HRS-treated rats may be related with the effect of upregulating the number of Treg cells.

Keywords: Global cerebral ischemia/reperfusion; Hydrogen; Immuno-inflammatory response; MiRNA; Neuroprotection; Regulatory T cells.

Figures

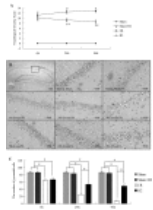


Fig. 1 Hydrogen-rich saline (HRS) reduces brain...

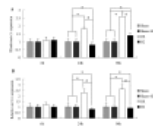


Fig. 2 MicroRNA-21 and MicroRNA-210 expression are...

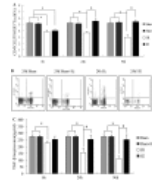


Fig. 3 Regulatory T cells in the...

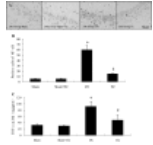


Fig. 4 NF-κB immunohistochemical staining and positive...

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