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Hydrogen inhalation ameliorated mast cell–mediated brain injury after intracerebral hemorrhage in mice

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Abstract

Objective: Hydrogen inhalation was neuroprotective in several brain injury models. Its mechanisms are believed to be related to antioxidative stress. We investigated the potential neurovascular protective effect of hydrogen inhalation especially effect on mast cell activation in a mouse model of intracerebral hemorrhage.

Design: Controlled in vivo laboratory study.

Setting: Animal research laboratory.

Subjects: One hundred seventy-one 8-week-old male CD-1 mice were used.

Interventions: Collagenase-induced intracerebral hemorrhage model in 8-week-old male CD-1 mice was used. Hydrogen was administrated via spontaneous inhalation. The blood-brain barrier permeability and neurologic deficits were investigated at 24 and 72 hours after intracerebral hemorrhage. Mast cell activation was evaluated by Western blot and immuno-staining. The effects of hydrogen inhalation on mast cell activation were confirmed in an autologous blood injection model intracerebral hemorrhage.

Measurement and main results: At 24 and 72 hours post intracerebral hemorrhage, animals showed blood-brain barrier disruption, brain edema, and neurologic deficits, accompanied with phosphorylation of Lyn kinase and release of tryptase, indicating mast cell activation. Hydrogen treatment diminished phosphorylation of Lyn kinase and release of tryptase, decreased accumulation and degranulation of mast cells, attenuated blood-brain barrier disruption, and improved neurobehavioral function.

Conclusion: Activation of mast cells following intracerebral hemorrhage contributed to increase of blood-brain barrier permeability and brain edema. Hydrogen inhalation preserved blood-brain barrier disruption by prevention of mast cell activation after intracerebral hemorrhage.

Figures

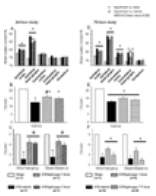

FIGURE 1 (**A**) Intracerebral hemorrhage...

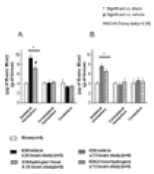

FIGURE 2 (A) Intracerebral hemorrhage caused significant...

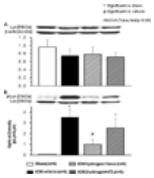

FIGURE 3 (A) Neither intracerebral hemorrhage nor...

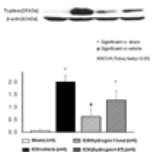

FIGURE 4 Intracerebral hemorrhage increased the release...

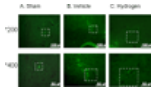

FIGURE 5 6 hours after intracerebral hemorrhage...

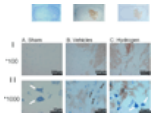

FIGURE 6 Effect of intracerebral hemorrhage and...

All figures (9)

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