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The effect of hydrogen gas on a mouse bilateral common carotid artery occlusion

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Abstract

In recent studies, molecular hydrogen selectively reduced the levels of hydroxyl radicals in vitro and exerted a therapeutic anti-oxidant activity in a rat middle cerebral artery occlusion model. The aim of this study was to investigate the effect of hydrogen gas on a mouse bilateral common carotid artery occlusion (BCCAO) model. Male C57BL/6J mice were subjected to transient BCCAO with a nontraumatic aneurysm clip. The mice were divided into three groups: sham, BCCAO, and BCCAO treated with 1.3 % hydrogen gas. Cerebral blood flow (CBF) in the cortex was measured sequentially for both hemispheres with a non--invasive and noncontact laser Doppler blood perfusion imager during the procedure. Vital signs were also recorded. Oxidative stress evaluated by measuring the level of 8-hydroxy-2'-deoxyguanosine (8-OHdG), neuronal injury in the hippocampal CA1 sector, and brain water content were assessed 24 h after ischemia. The hydrogen gas treatment had no significant effect on vital signs or CBF values. However, the reduction of the expression of 8-OHdG, the decrease in the neuronal injury in the hippocampal CA1 sector, and the attenuation in brain water content were observed in hydrogen-treated mice. In conclusion, hydrogen gas might be effective in a mouse BCCAO model.

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