Brain Disorders/Neurological

Hyperbaric oxygen induces rapid protection against focal cerebral ischemia.


Department of Neurology, Ruprecht-Karls-University Heidelberg, Im Neuenheimer Feld 400, 69120 Heidelberg, Germany. roland_veltkamp@med.uni-heidelberg.de

BACKGROUND AND PURPOSE: The timing and mechanisms of protection by hyperbaric oxygen (HBO) in cerebral ischemia have only been partially elucidated. We monitored the early in vivo effects of HBO after 2 h transient focal ischemia using repetitive MRI. METHODS: Wistar rats underwent filament occlusion of the middle cerebral artery (MCAO). 40 min after MCAO, rats were placed in a HBO chamber and breathed either 100% O(2) at 3.0 atmospheres absolute (ata; n = 24) or at 1.0 ata (control; n = 24) for 1 h. Diffusion, perfusion and T2-weighted MR-images were obtained after 15 min and 3, 6 and 24 h of reperfusion. In 6 axial MR slices, volume of abnormal diffusion and T2w signals were measured in the ischemic hemisphere. Furthermore, hemispheric mean apparent diffusion coefficient- (ADC) and T2 values were calculated for statistical analysis. RESULTS: HBO significantly reduced volume of abnormal DWI signal beginning immediately after reperfusion (control: 92 +/- 28 mm(3); HBO: 64 +/- 17) and lesion size on T2w (control: 375 +/- 91 mm(3); HBO: 225 +/- 39) after 24 h. Correspondingly, mean ADC levels were lower and T2 values higher in the ischemic hemisphere in the control group. HBO reduced histological infarct size at 24 h. CONCLUSION: High-dose intraischemic HBO therapy has an immediate protective on the brain which is superior to normobaric oxygen.

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