



# Hippocampal cerebral blood flow increased following low-pressure hyperbaric oxygenation in firefighters with mild traumatic brain injury and emotional distress

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## Abstract

**Background:** Recent evidence suggests that hyperbaric oxygenation (HBO), which has been used as an effective treatment for certain types of tissue injury, may change neural activities in the human brain and subsequently improve symptoms of psychiatric disorders. To scrutinize the neural mechanism of HBO in the human brain, we investigated whether 20 sessions of HBO changed regional cerebral blood flow (rCBF) of the limbic system in firefighters with mild traumatic brain injury (mTBI) and subjective emotional distress.

**Methods:** Twenty firefighters with mTBI and mild emotional distress were treated with HBO at a relatively low pressure of 1.3 atmospheres absolute for 45 min a day for 20 consecutive days (the mild emotional distress group). The rCBF of the limbic system was measured using an arterial spin labeling perfusion magnetic resonance imaging before and after the HBO. Analyses were performed on the data from fourteen individuals who

completed the study and 14 age- and sex-matched healthy firefighters (the comparison group).

**Results:** Firefighters in the mild emotional distress group showed increase rCBF following HBO in a cluster encompassing the right hippocampal and parahippocampal regions (peak  $t = 4.31$ ; cluster size =  $248 \text{ mm}^3$ )(post-hoc analysis,  $z = 5.92$ ,  $p < 0.001$ ) that had lower rCBF relative to the comparison group at baseline (post-hoc analysis,  $t = -2.20$ ,  $p = 0.04$ ).

**Conclusion:** The current study demonstrated that low-pressure HBO might increase rCBF of the hippocampal and parahippocampal regions, suggesting a potential underpinning mechanism of HBO in the human brain.