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Hydrogen saline treatment attenuates hyperoxia-induced retinopathy by inhibition of oxidative stress and reduction of VEGF expression.

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Abstract

OBJECTIVE: Retinal neovascularization or retinopathy is a proliferative disorder of the retinal capillaries and is the primary cause of blindness. Some studies have shown that oxidative stress plays an important role in hyperoxia-induced retinal neovascularization. Previous reports have indicated that hydrogen has a therapeutic, antioxidant activity by selectively reducing hydroxyl radicals. This study examined the therapeutic effect of hydrogen saline on retinopathy in an established mouse model of hyperoxia-induced retinopathy.

METHODS: Mouse pups were exposed to 75% O₂ from postnatal day 7 (P7) to P12. Hydrogen saline was administered by intraperitoneal injection (5 ml/kg) daily for 5 days. On P17, the pups were decapitated, and retinal neovascularization was assessed using fluorescence imaging and histopathological examination. Vascular endothelial growth factor (VEGF) expression was evaluated using real-time polymerase chain reaction and fluorescence immunohistochemistry. Oxidative stress was quantified based on the malondialdehyde (MDA) level.

RESULTS: Hydrogen saline decreased retinal neovascularization, reduced the mRNA and protein expression of VEGF, and suppressed the MDA levels.

CONCLUSIONS: Hydrogen saline may be a potential treatment for hyperoxia-induced retinopathy that acts via the inhibition of oxidative stress and the reduction of VEGF expression.

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