

UHMJ, 2011

Hyperbaric oxygen and muscle performance in maximal sustained muscle contraction

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Purpose: The purpose of this study was to examine the effects of hyperbaric oxygenation (HBO₂) on sustained maximal muscle contraction. **Methods:** Fifty-two healthy volunteers participated in the study. Thirty-four experimental subjects breathing 100% oxygen at 253kPa (2.5ATA) in a multiplace hyperbaric chamber performed a maximal grip contraction for one minute (initial grip) followed by a 30-second rest period and another one-minute maximal contraction (recovery grip). The protocol was repeated one week later inside the chamber while subjects were breathing normobaric air. A control group of 18 subjects completed the same two-week protocol but breathing normobaric air during both sessions to assess any changes due to learning effect. **Results:** Exposure to HBO₂ significantly increased force production for initial maximal grip, recovery maximal grip and total one-minute effort. Time to decrease to 50% of initial contraction was shorter with HBO₂ for both initial grip and recovery grip, but force production remained higher throughout the effort with HBO₂. **Conclusions:** These data suggest that when performing sustained maximal contractions during acute exposure to HBO₂, overall contractile force may be significantly increased compared with breathing normobaric air. Initial rate of fatigue is higher with HBO₂, perhaps due to increased extravascular compression with the initial greater force production.