CARED Report Summary

Project ID: QLG5-CT-2002-00893
Funded under: FP5-LIFE QUALITY
Country: United Kingdom


RATIONALE: Breathing supplemental oxygen reduces breathlessness during exercise in patients with chronic obstructive pulmonary disease (COPD). Replacing nitrogen with helium reduces expiratory flow resistance and may improve lung emptying. Combining these treatments should be independently effective.

OBJECTIVES: Study the effect of changing oxygen or helium concentration in inspired gas during exercise in patients with stable COPD.

METHODS: In 82 patients (mean age, 69.7 yr; mean FEV(1), 42.6% predicted), we measured endurance shuttle walking distance, resting and exercise oxygen saturation, and end-exercise dyspnea (Borg scale) while patients breathed Heliox28 (72% He/28% O(2)), Heliox21 (79% He/21% O(2)), Oxygen28 (72% N(2)/28% O(2)), or medical air (79% N(2)/21% O(2)). Gases were administered using a randomized, blinded, crossover design via a face mask and an inspiratory demand valve.

RESULTS: Breathing Heliox28 increased walking distance (mean+/−SD, 147+/−150 m) and reduced Borg score (-1.28+/−1.30) more than any other gas mixture. Heliox21 significantly increased walking distance (99+/−101 m) and reduced dyspnea (Borg score, -0.76+/−0.77) compared with medical air. These changes were similar to those breathing Oxygen28. The effects of helium and oxygen in Heliox28 were independent. The increase in walking distance while breathing Heliox28 was inversely related to baseline FEV(1) breathing air. Conclusion: Reducing inspired gas density can improve exercise performance in COPD as much as increasing inspired oxygen. These effects can be combined as Heliox28 and are most evident in patients with more severe airflow obstruction.

Related information

Result In Brief
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