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Effects of exercise in hypoxia but rest in normoxia during sprint interval training on acute physiological responses and performance

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INTRODUCTION:

Exercise under hypoxia can induce arterial and tissue deoxygenation due to low oxygen availability. This arterial and tissue hypoxia can induce physiological adaptations through an oxygen-sensing signaling pathway. However, adding hypoxia to exercise can negatively impact training stimulus due to reducing absolute training intensity and/or volume. In this study, we tested our hypothesis that exercise in hypoxia but rest in normoxia during sprint interval training can induce larger arterial hypoxia during exercise with maintained absolute training intensity and volume compared to normoxic exercise. **METHODS:**

Seven male athletics sprinters volunteered to participate in this study. This study was conducted in a single-blinded, cross-over manner. All participants performed 4 × 30-sec all-out cycling sprints with 4.5-min rest in normobaric hypoxia (12.7%O2, H), or normoxia (N), or exercise in normobaric hypoxia (12.7%O2) but rest in normoxia (HN) in a randomized order. Total work, arterial oxygen saturation, and blood lactate concentration were measured as performance and physiological variables. **RESULTS:**

Compared to N, total work was significantly decreased in H (p<0.05) but maintained in HN. Main effect of time (p<0.001), condition (p<0.001) and interaction (p<0.001) were observed for arterial oxygen saturation. Arterial oxygen saturation of HN significantly decreased only during exercise to the same level as H (SpO2: 85.4±2.6 vs 85.3±4.9%) but not different during rest compared to N (SpO2: 97.1±1.0 vs 97.6±1.4%). Blood lactate concentration significantly increased across repetition (p<0.001) but was not different between conditions. CONCLUSION:

In this study, compared to normoxic condition, exercise in hypoxia but rest in normoxia during sprint interval training induced large arterial hypoxia only during exercise with similar absolute training intensity and volume. Therefore, the hypoxic training protocol in this study could be a new potential training method to induce a large physiological training stimulus with the same mechanical training stimulus.

Topic:

Physiology

Poster

Presentation

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