

28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

Speed and power improvements derived from hypoxic repeated-sprint training in world-class short-track speed skaters are influenced by the anaerobic speed reserve

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INTRODUCTION:

Short-track speed skaters with different physiological traits can be successful on the international stage. We aimed to investigate the ergogenic potential and transferability of cycling repeated-sprint training in hypoxia (RSH) on key performance indicators in world-class speed skaters with different physiological and race profiles.

METHODS:

Fourteen national team short-track speed skaters (women, n=6; men, n=8), including World and Olympic champions and world cup performers, added RSH (FIO₂ 13.5%) to their training regime 3 times per week for 3 consecutive weeks. RSH was implemented immediately after specific ice training sessions to prolong metabolic stimulation. Testing included on- and off-ice evaluations, pre and 2- and 4-weeks post RSH. Skaters were classified based on their race profile (endurance, hybrid, sprinter) estimated from fuzzy cluster analysis of the anaerobic speed reserve (top speed – maximal aerobic speed). Due to the team heterogeneity in sexes and race profiles, control participants could not be used, and all athletes undertook RSH.

RESULTS:

On-ice top speed measured during a 3-lap test improved in both males (0.8%, Cohen's effect size ES 0.63, p=0.03) and females (1.3%, ES 1.04, p=0.06) 2-weeks post. Concomitantly, males improved their peak power during a 7-s cycling sprint (5.1%, ES 0.39, p=0.04). These changes were not meaningful 4-weeks post. In males only, Wingate average power also improved 4-weeks post RSH (3.3%, ES 0.23, p=0.08). Training did not enhance indices of endurance capacity (maximal aerobic power and 27-lap time-trial time). Sub-analysis of race profiles suggested that endurance-type athletes benefited the most from RSH to improve on-ice top speed (ES 0.45 vs hybrid ES 0.32 vs sprinter ES 0.17).

CONCLUSION:

Results demonstrate that cycling RSH can transfer into meaningful improvements on the ice that are associated with neuromuscular function and anaerobic capacity in world-class skaters. This RSH modality tended to benefit athletes with the smallest anaerobic speed reserve, which could be used to target athletes with the greatest chances of improvements.

Topic: Training and Testing

Presentation Oral

European Database of Sport Science (EDSS)

Supported by SporTools GmbH



16050