Acute metabolic, physiological and neuromuscular responses to two high-intensity intermittent training protocols in endurance runners

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BACKGROUND: Since a growing body of evidence points to mean training intensity over a season as a key factor to performance improvements, and there is wide evidence of the benefits of high-intensity intermittent training (HIIT) for endurance athletes, coaches need further information about the acute impact of typical HIIT workouts on endurance runners. OBJECTIVE: To compare the physiological strain and muscular performance parameters of endurance runners during two HIIT workouts by determining whether a typical HIIT for endurance runners (10 × 400 m) leads to a similar impact as a HIIT protocol (40 × 100 m) that increases the average training pace despite maintaining the same training volume. METHODS: Eighteen endurance runners performed 2 HIITs. Metabolic (blood lactate [BLa], blood ammonia [BAmm]), neuromuscular (countermovement jump [CMJ], handgrip strength test [HS]), and physiological responses were monitored during both protocols. RESULTS: No significant differences between HIITs were found for BLa-1 min post-test, BAmm, HS and HRpeak. Significant differences were found in fatigue-induced changes in CMJ performance (-0.36 cm in 40 × 100 m; +1.48 cm in 10 × 400 m), and in average pace ($P < 0.001$) which was faster during the 40 × 100 m. CONCLUSIONS: Despite similar physiological, metabolic, and HS responses, the 40 × 100 m protocol allowed runners to train at a higher intensity, which might have important effects on the training prescription for endurance runners.

Blood metabolites

endurance athletes

mechanical power

physiological strain

ammonia

lactic acid

adult

ammonia blood level

Article

controlled study

endurance training

fatigue

female

grip strength test

high intensity intermittent training

human

human experiment

lactate blood level

male

marathon runner

metabolism

monitoring

muscle function

neuromuscular function

normal human

physiological process

running