METABOLIC ADAPTATIONS TO EXERCISE IN THE FASTED STATE
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Exercise in the fasted state (F) stimulates fat oxidation and glycogen breakdown when compared with exercise after the intake of a breakfast and with additional carbohydrate intake (CHO). It is unclear if exercise in F can affect training adaptations. Therefore, the present study investigated the effect of a short-term endurance training period (6 weeks, 3days/week, 1-2h, 75% VO2peak) with F or CHO. Moreover, substrate use during a 2h exercise bout with high carbohydrate availability before (150g) and during (1g903.kg-1 bw903.hr-1) exercise was determined before (Pretest) and after (Posttest) the training period. Twenty moderately active young males trained in F (n=10) or CHO (n=10) while receiving an isocaloric carbohydrate-rich standardised diet (65%En from carbohydrates, 20%En fat, 15%En protein). Needle biopsies from m. vastus lateralis were obtained before, immediately after, and 4h after the standardised exercise bout. Compared with Pretest, during Posttest initial glycogen content was higher in CHO (545 ± 19 mmol.kg-1 dw; p = .02), but not in F (434 ± 32 mmol.kg-1 dw; p = .23). Training tended to blunt exercise-induced glycogen breakdown in F (p=0.09), but not in CHO (p=0.49). VO2peak (+7%), succinate dehydrogenase activity, and GLUT4 (p=.049) content were increased, irrespective of the training regimen. 946;HAD activity and IMCL content remained unchanged. Neither IMCL breakdown (p=.23) nor fat oxidation rates were altered by training in F and CHO. Basal mRNA content of several fat metabolic genes was lower in F compared to CHO during Posttest whereas GLUT4 mRNA was higher. mRNA content during the recovery period did not change following training. It is concluded that training in the fasted state suppresses glycogen breakdown during exercise with high carbohydrate availability.

Keywords: Substrate Metabolism, Carbohydrate Intake, Endurance Training