

Effects of winter military training on energy balance, whole-body protein balance, muscle damage, soreness, and physical performance

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Abstract

Physiological consequences of winter military operations are not well described. This study examined Norwegian soldiers (n = 21 males) participating in a physically demanding winter training program to evaluate whether short-term military training alters energy and whole-body protein balance, muscle damage, soreness, and performance. Energy expenditure ((D2O)-O-18) and intake were measured daily, and postabsorptive whole-body protein turnover ([N-15]-glycine), muscle damage, soreness, and performance (vertical jump) were assessed at baseline, following a 4-day, military task training phase (MTT) and after a 3-day, 54-km ski march (SKI). Energy intake (kcal.day⁻¹) increased (P < 0.01) from (mean +/- SD (95% confidence interval)) 3098 +/- 236 (2985, 3212) during MTT to 3461 +/- 586 (3178, 3743) during SKI, while protein (g.kg⁻¹).day⁻¹) intake remained constant (MTT, 1.59 +/- 0.33 (1.51, 1.66); and SKI, 1.71 +/- 0.55 (1.58, 1.85)). Energy expenditure increased (P < 0.05) during SKI (6851 +/- 562 (6580, 7122)) compared with MTT (5480 +/- 389 (5293, 5668)) and exceeded energy intake. Protein flux, synthesis, and breakdown were all increased (P < 0.05) 24%, 18%, and 27%, respectively, during SKI compared with baseline and MTT. Whole-body protein balance was lower (P < 0.05) during SKI (-1.41 +/- 1.11 (-1.98, -0.84) g.kg⁻¹).10 h) than MTT and baseline. Muscle damage and soreness increased and performance decreased progressively (P < 0.05). The physiological consequences observed during short-term winter military training provide the basis for future studies to evaluate nutritional strategies that attenuate protein loss and sustain performance during severe energy deficits.

Keywords

Author Keywords:nitrogen; dietary protein; recommended dietary allowance; stress

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