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Limb skeletal muscle adaptation in athletes after training at altitude

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Morphological and biochemical characteristics of biopsies obtained from gastrocnemius (GAS) and triceps brachii muscle (TRI), as well as maximal O₂ uptake (VO₂ max) and O₂ deficit, were determined in 10 well-trained cross-country skiers before and after a 2-wk stay (2,100 m above sea level) and training (2,700 m above sea level) at altitude. On return to sea level, VO₂ max was the same as the prealtitude value, whereas an increase in O₂ deficit (29%) and in short-term running performance (17%) was observed (P less than 0.05). GAS showed maintained capillary supply but a 10% decrease in mitochondrial enzyme activities (P less than 0.05), whereas an increase in capillary supply (P less than 0.05) but unchanged mitochondrial enzyme activities were observed in TRI. Buffer capacity was increased by 6% in both GAS and TRI (P less than 0.05). A positive correlation was found between the relative increase in buffer capacity of GAS and short-term running time (P less than 0.05). Thus the present study indicates no effect of 2 wk of altitude training on VO₂ max but provides evidence to suggest an improvement in short-term exercise performance, which may be the result of an increase in muscle buffer capacity.

Skeptical