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ORIGINAL ARTICLE

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Hypobaric live high-train low does not improve aerobic performance more than live low-train low in cross-country skiers

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Live high-train low (LHTL) using hypobaric hypoxia was previously found to improve sea-level endurance performance in well-trained individuals; however, confirmatory controlled data in athletes are lacking. Here, we test the hypothesis that natural-altitude LHTL improves aerobic performance in cross-country skiers, in conjunction with expansion of total hemoglobin mass (Hb_{mass}, carbon monoxide rebreathing technique) promoted by accelerated erythropoiesis. Following duplicate baseline measurements at sea level over the course of 2 weeks, nineteen Norwegian cross-country skiers (three women, sixteen men, age 20 ± 2 year, maximal oxygen uptake (VO_2max) 69 ± 5 mL/min/kg) were assigned to 26 consecutive nights spent at either low (1035 m, control, n = 8) or moderate altitude (2207 m, daily exposure 16.7 ± 0.5 hours, LHTL, n = 11). All athletes trained together daily at a common location ranging from 550 to 1500 m (21.2% of training time at 550 m, 44.2% at 550-800 m, 16.6% at 800-1100 m, 18.0% at 1100-1500 m). Three test sessions at sea level were performed over the first 3 weeks after intervention. Despite the demonstration of nocturnal hypoxemia at moderate altitude (pulse oximetry), LHTL had no specific effect on serum erythropoietin, reticulocytes, Hb_{mass}, VO_2max, or 3000-m running performance. Also, LHTL had no specific effect on (a) running economy (VO_2 assessed during steady-state submaximal exercise), (b) respiratory capacities or efficiency of the skeletal muscle (biopsy), and (c) diffusing capacity of the lung. This study, showing similar physiological responses and performance improvements in