Improved running economy in elite runners after 20 days of moderate simulated altitude exposure

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Abstract" To investigate the effect of altitude exposure on running economy (RE), 22 elite distance runners (VO2max 72.8 +/- 4.4 ml.min(-1).kg(-1); training volume 125 +/- 27 km.wk(-1)) homogenous for VO2max and training volume were assigned to one of three groups; live-high (simulated altitude 2000-3100 m) train-low (natural altitude 600 m; LHTL, n=10), live-moderate train-moderate (natural altitude 1500-2000 m; LMTM, n=10) or live-low train-low (natural altitude 600 m; LLTL, n=13) for a period of 20 d. RE was assessed during three sub-maximal treadmill runs at 14, 16 and 18 km.h(-1) prior to and at the completion of each intervention. O2 consumption (VO2), ventilation (VE), respiratory exchange ratio (RER), heart rate (HR) and blood lactate concentration (La) were determined during the final 60 s of each run, while haemoglobin mass (Hbmass) was measured on a separate occasion. VO2 (L.min(-1)) averaged across the three sub-maximal running speeds was 3.3% lower (p=0.005), after LHTL compared with either LMTM or LLTL. VE, RER, HR and Hbmass were not significantly different after the three interventions. There was no evidence of an increase in (La) after the LHTL intervention suggesting that the lower aerobic cost of running was not attributable to an increased anaerobic energy contribution. Furthermore, the improved RE could not be explained by a decrease in VE, by preferential use of carbohydrate as a metabolic substrate, nor was it related to any change in Hbmass. We conclude that 20 d LHTL at simulated altitude improved the RE of elite distance runners.