

Training-induced increases in sea-level performance are enhanced by acute intermittent hypobaric hypoxia

Ted Meeuwsen, Ingrid J.M. Hendriksen, and Michael Holewijn. *Eur J Appl Physiol* (2001) 84: 283-290

Protocol:

- 2 hours per day, 10 days, 60-70% of heart rate reserve at 8,200 feet
- "After" tests were performed 9 days after the final altitude session

Results:

Change in O₂ max

- Altitude group...Increased by 7%
- Sea-Level control group...No significant change

Change in power output at O₂ max

- Altitude group...Increased by 7.4%
- Sea-Level control group...No significant change

Time-to-Peak Power (Wingate test):

- Altitude group...Time decreased by 37%
- Sea-Level control group...No significant change

Stated conclusion: "The results of this study indicate that intermittent hypobaric training can improve both the aerobic and the anaerobic energy-supply systems."

Abstract:

The goal of this study was to investigate to what extent intermittent exposure to altitude in a hypobaric chamber can improve performance at sea-level. Over a 10-day period, elite male triathletes trained for 2 h each day on a cycle ergometer placed in a hypobaric chamber. Training intensity was 60-70% of the heart rate reserve. Eight subjects trained at a simulated altitude of 2,500 m (hypoxia group), the other eight remained at sea-level (sea-level group). Baseline measurements were done on a cycle ergometer at sea-level, which included an incremental test until exhaustion and a Wingate Anaerobic Test. Nine days after training in hypoxia, significant increases were seen in all important parameters of the maximal aerobic as well as the anaerobic test. A significant increase of 7.0% was seen in the mean maximal oxygen uptake per kilogram body weight ($\dot{V}_{O_{2\max}}$), and the mean maximal power output per kilogram body weight (W_{\max}) increased significantly by 7.4%. The mean values of both mean power per kilogram body weight and peak power per kilogram body weight increased significantly by 5.0%, and the time-to-peak decreased significantly by 37.7%. In the sea-level group, no significant changes were seen in the above-mentioned parameters of both the maximal aerobic and the maximal anaerobic test at the second post-test. The results of this study indicate that intermittent hypobaric training can improve both the aerobic and the anaerobic energy-supply systems.