

# Evaluation of hypoxic training protocols

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### Introduction.

Acute exposure to high altitude impairs performance, both aerobic and psychomotor. Consequently preparation of personnel to be deployed to high altitude regions should incorporate a programme of altitude acclimatisation. The aim of the present study was to evaluate the effect of several training programmes on sea level and altitude performance: Live low-Train High (LL-TH), Intermittent Hypoxic Training (IHT), Respiratory Muscle Training (RMT), and Sleep High-Train Low (SH-TL).

### Methods.

A total of 50 healthy male subjects were assigned to either a control group, or to one of the four training groups. Each group comprised 10 subjects. Subjects conducted daily 1 hr training sessions on a cycle ergometer at a work rate equivalent to 50% of their previously determined peak power output (PPO).

During the one month training programme, they maintained their exercise heart rate at a level corresponding to 50% PPO. Before, during and after the training programme, subjects conducted a VO<sub>2</sub>max and Endurance test under hypoxic and normoxic conditions. Endurance was defined as time to exhaustion when exercising on a cycle ergometer at 80% PPO. Complete haemograms were obtained before, during and after the training programmes

### Results.

Compared to the Control group, the LL-TH, IHT and SH-TL groups exhibited an improvement ( $p < 0.05$ ) in hypoxic VO<sub>2</sub>max.

**The SH-TL group also demonstrated improvement ( $p < 0.05$ ) in the endurance test. The LL-TH, RMT and the IHT groups showed no improvement.**

**Normoxic performance (VO<sub>2</sub>max, Endurance) improved ( $p < 0.05$ ) only in the SH-TL group, not in the LL-TH, the RMT or in the IHT groups**

**Improvements in pulmonary function (maximum voluntary ventilation, MVV) were observed in the SH-TL and RMT groups, but not in the LL-TH or IHT groups.**

### Conclusion.

**The optimal method for improving sea level and altitude aerobic performance is SH-TL. It initiated the largest improvements in VO<sub>2</sub>max and endurance.**

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