

22 Effects of training at altitude on physical performance

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Study of mechanisms of high altitude physiology and acclimation to hypoxic stress particularly under the added stress of exercise has been a popular topic of investigation for more than a century. The term hypoxia is derived from Greek and means simply "less than a normal amount of oxygen". Hypoxia resulting from altitude exposure is termed hypoxic hypoxia and results in a reduced arterial oxygen content from a decrease of the partial pressure of oxygen in inspired air (P_{iO_2}).

Strenuous exercise itself induces an arterial hypoxemia in athletes under normobaric conditions and thus athletic performance is particularly compromised at altitude.

Devising methods to minimize the effect of an oxygen deficiency in the surroundings is a challenging environmental ergonomic problem and has been attempted by a variety of methods including:

- i) Hypobaric exposure of subjects in decompression chambers prior to hypoxic exposure
- ii) Chemical suppression of negative metabolic reactions to hypoxia
- iii) Prior attainment of a high degree of fitness by potential altitude sojourners

- n) Design of optimal patterns of movement to high altitude in order to minimize its debilitating effects through gradual acclimatization
- v) Design of portable devices simulating altitude effects which may be worn while training in normobaria in order to effect prior acclimation

The effectiveness of these methods will be analysed in this review particularly in light of the varying cardiorespiratory characteristics required to operate at peak levels at medium or high altitudes revealed in the recent literature by such studies as Operation Everest I (American Everest Scientific Expedition) and Operation Everest II (the USA I.E.M. 40 day decompression chamber expedition).