PHYSIOLOGICAL FACTORS AND PERFORMANCE GAIN THROUGH HIGH ALTITUDE TRAINING

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ABSTRACT

Adaptation is the development of some unique characteristic features by the individuals to survive in a particular environmental condition. High altitude is any elevation above 1500 meters (5000ft) rom the sea level. High altitude training is the practice by some endurance athletes of training for several meters at high altitude. Physiological adaptations that acclimatise the body of athletes by high altitude training involves increased erythropoietin (EPO) level, increased red blood cells (RBC) and haemoglobin, or alteration of muscle metabolism and higher VO2 Max. A set of researchers claims that altitude training stimulates a more efficient use of oxygen by the muscles. This efficiency can arise from numerous other responses to altitude training including angiogenesis, glucose transport, glycolsis and PH regulation. Furthermore exercising at high altitude has been shown to cause to muscle adjustment of selected gene transcripts and improvement of mitochondrial properties in skeletal muscle. The effects of high altitude on human are highly conclusive. The percentage of oxygen saturation of haemoglobin determines the contents of oxygen in blood. After the athlete's body reaches 7000 ft above sea level, the oxy haemoglobin saturation begins to decrease constantly. Infect the human body has both short term and long term adaptation to altitude that allow it to partially compensate for the lack of oxygen. Athletes use their adaptations to help their performance.

Keywords: *Adaption, High Altitude and Haemoglobin.*

INTRODUCTION:

The study of altitude training and its impact on physiological adaptation by athletes was heavily delved into during and after the 1968 Olympics which took place in "Mexico City" Mexico elevation 2240 meters (7349ft). It was during these Olympics games that indurance events saw significant below record finishes while an anaerobic sprint events broke all types of record. This was attributed not only to less resistance during moment due to less dense air but also to the anaerobic nature of the sprint events. Ultimately, these games inspired investigation into altitude training from which unique training principles were developed with the aim of avoiding

underperformance. Athletes are individuals who wish to gain a competitive edge for endurance events can take advantage of exercising at high altitude. Some methods of altitude training principles are discussed below. Now a days, altitude training has become a standard training protocol in many aerobic sports to increase exercise capacity at sea level to acclimati ze prior to competitions at altitude or before ascending to altitude. Sudden exposure of human body to a hypoxic environment or staying at altitude indance numerous adaptations which can lead to improved athletes performance at sea level.

This training idea involves living at higher altitude in order to experience the physiological adaptation that occurs in the body of athletes. Good adaptation that occurs in the body of athletes. Good venues for live-high, train low at global level include Mammoth Lakes, California, Flagstall, Arizonia and the Sieera Nevada near Granada in Spain. Altitude training can produce increases in speed, strength, endurance and recovery by maintaining altitude exposure for a significant period of time.

A study using simulated altitude exposure for 18 days, yet training closer to the sea level-showed performance gains were still evident 15 days later.

Live Hiogh Train High Principle in the live high train high regime an athlete lives and trains at a desired altitude. The stimulus in the body is constant because, the athlete is continuously in a hypoxis environment. Athlete will no longer be able to metabolise as much oxygen as they would at sea level. How after long period of training at altitude, high trained athletes returning to sea level donot exhibit increased red blood cells count or improved performance on 4000 mtr cycling test.

In repeated sprints in hypoxis (RSH) athlete run short sprint under 30 secs as fast as they can. The experience incomplete recoveries in hypoxis conditions. When comparing (RSH) and repeated sprint time to fatigue and power output. (RSH) and RSN group were tested before and

after 4 week training period. Both groups initially completed 9-10 alloat sprint before to tall exhaustation. After the 4 week training period, the RSH group was able to complete 13 allout sprints before exhaustation and the (RSN) group only completed (9) Nine.

Biggest issue facing those climbing to fram or live at altitude is that environment may cause you to feel acute altitude sickness.That cause you to feel acute altitude sickness. That include Nausea, Vomiting, headache, dizziness and difficult sleeping which can start from six hours following exposure.

However, the symptoms usual resolve with 24-72 hours upon returns to sea level.

Visible Physiological advantage from RSH include compensatory vesodilation and regeneration phosphocreation (PCR). The body tissue have the ability to sense hypoxis and include vasodilation. The higher blood flow helps the skeletal muscles maximize oxygen delivery. A greater level of PCR resynthesis avgments the muscles power production during the initial stages of high intensity exercise.

ARTIFICIAL ALTITUDE:

In Finland, a scientist named HEIKKI RUSKO has designed a high-altitude house situated at sea level at normal pressure but modified to have low concentration of oxygen which is roughly equilant to the amount of oxygen available at high altitude often used for altitude training.

RUSKOS result show improvement of erythropoient and red blood cells. Artificial altitude can also be used for hypoxis exercises, where athlete train in an altitude simulator which judge the conditions of high altitude environment. Athletes are able to perform high intensity training at lower velocities and thus produce lesse stress on the muscular skeletal system.

At high altitudes, there is decrease in oxygen hemoglobin saturation. The hypoxis condition cause hypoxis-inducor factor (HIFZ) to become stable and to stimulate to production of erythropoietin EPO stimulates red blood cell production from bone marrow in order to increase hemoglobin saturation and o_2 deficiency. EPO has become frequently abused by Hypoxic condition is defined as an abnormally low content in any tissue or organ, or body as a whole Hypoxemia that refers to low oxygen in the blood, can cause hypoxia (hypoxemic hypoxia) but other mechanisms such as anaemia can also leads to hypoxia.competition athlete through blood doping and injections in order to gain advantages in indurance events. Abuse of EPO however increases RBC counts beyond normal level (Polycythemia) and increase in the viscosity of blood, possibly likelyhood of hypertension blood clot, heart attack stroke.

NON HAEMOTOLOGICAL CHANGES:

In addition to the changes in the blood cell volume, there are also a number of biological tissue alternations which help to turn one muscles into energy efficient machines.

There include:-

- Increased oxidative enzymes capacity.
- Increased mitochondrial volume and augmented muscle energy efficiency.
- Increased fatty acid substrate utilization.
- Greater lactic acid tolerance and muscle buffering.
- Improved muscle tissue PH regulation.
- Better glucose transport and glycolysis.

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CONCLUSION:

For athletes, high altitude produces two contradictory effects on performance. For explosive events (Sprint upon 400 meters, long jump, triple jump, the reduction in atmospheric pressure means there is less resistance from the atmosphere and the athletes performance will generally be better at high altitude.

For endurance events (races of 800 meters or more predominant effect is the reduction in oxygen which is generally reduced the athlete performance at high altitude.

Sports organization acknowledge the effects of altitude on performance. The international association of athlete federations for example, have ruled that performance achieved at an altitude greater than 1000 meters will be approved for record purposes.

Despite the potential benefits arising from altitude training, its effectiveness in improving hematological variables is still debatable. Further research and better understanding of factors influencing the response to altitude, as well as factors effecting

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