ADAPTING TO DIFFERENT TIME ZONES AND ACCLIMATIZATION TO ALTITUDE FOR PARTICIPATION IN COMPETITIONS

Narcis NEAGU [1]

Abstract

Some of the most important international competitions take place at altitude, especially those held in South America and Central Asia. The issue of acclimatization to altitude and time zone is extremely important for a good performance in sport. Climatologists distinguished climate of growth between 600 and 1000 m. and exciting climate, which is installed after 1200 to 1400 m. altitude. Bear in mind that marine climate and located between 0-100 m. altitude is also an exciting environment for physical effort. Geographers divided altitude as follows: between 1000-1200 m. the low altitude, between 1200-1800 m lower altitude, between 1800-2800 m. average altitude and over 2,800 m. high altitude. Changes in the circadian rhythms can be unbeneficial for energy efficiency, physiological and psychological processes, which can translate into an athletic performance decreasing.

Keywords: *adaptation, acclimatization, altitude, time zone, competitive.*

JEL classification: *I19; I20; I25*

1. Introduction

There is a memory of acclimatization, which is expressed by mitigating the increasingly obvious these adaptive changes in repeated training at altitude. Upon returning from altitude, after a period of 21-28 days, it is possible that in the first 24-48 h to not report a worsening of functional status or behavior.

Third day of re-cultivating phase follows, which is manifested by worsening functional status and decreased yield in any case more discreet events and shorter than the acclimatization phase, usually 7-10 days, after which from the tenth day, follows a positive phase. In this stage the yield increases by up to 15% on aerobic baseline plan and the biochemical parameters arrive at the best values.

2. Issues addressed

Many of these adaptive reactions may be related to adrenal response. In terms of return sporting the best competition in the lowlands after returning from medium altitude (21 to 28 days), it is between 14 to 21 days with a maximum optimally

[1] Polytechnic University of Bucharest, narcisneagu@yahoo.com

between 14 to 18 days. The living beings activities are conducted in cycles and there are known the day night cycles, sleep-wake or activity-rest alternation, etc.

Although circadian periodicity (24 h) is known for a long time, but in recent decades the attention it deserves in sport due to air traffic development and programming competitions in various continents, which makes many athletes to leave a locality with a certain rhythm of day and night and arrive after a few hours of flight in the area of competition that has a different time zone. (Aunola 2000)

As a result, in between the two cycles there is a lag. The lack of synchronization results with unwanted repercussions in human body function. It is known that physiological functions rhythm is synchronized with the day-night cycle of the time we live currently.

3. Practical applications

In sport, we are interested in altitude between 600-1200 m for redress and that between 1800-2400 m for stimulation, increase exercise capacity. In our country atmospheric pressure conditions in the lowlands averages 760 mmHg and at 2000 m reaches 580-600 mmHg; the partial pressure of oxygen of about 160 mmHg is flat and 2000 m is 111 mmHg. Typically the air pressure drops vertically ascending 10-12 mmHg more than 100 m altitude to decrease and making the partial pressure of oxygen and thus oxygen reach the 2000 m to represent only 15.8% of the volume of air (in the plain 20.95%). The air temperature drops every 100 m vertically 0.50 C and 0.70 C in summer and winter humidity also decreases relative air at altitude.

Adaptive functional changes that occur at altitude, these reactions adaptive cortical storage, compliance with methodic individualized recommendations of medical-biological, can guarantee biological performance improvement and a factor of progress for athletic performance. Whatever type of sport or event dominance aerobic or anaerobic, competing or training, using training at medium altitude remains a purchase scientific training contemporary to increase exercise capacity and efficiency sport that Romanian athletes have confirmed a practical land.

Attempts altitude simulation environments as pressure chamber proved dangerous and are likely to be included in the list of doping methods (Baldwin, Kenneth David Sutherland, George H. Fahey D. 2005).

In terms of signal the motor qualities: speed and strength increase after 7 days of training at medium altitude; aerobic resistance indices fall and remained low throughout the stay at medium altitude. Skill at medium altitude drops and returns to the plains. From a behavioral standpoint longer describe sleep and appetite

disturbances, exhaustion after exercise, digestive disorders, epistaxis, dry mucous membranes of the nose and throat, euphoria, etc. It points also after 21 days of stay / drive at medium altitude increased red blood cell counts (red blood cell crisis), particularly if the products were administered Fe, which goes to the lowlands but after Re-cultivating. We have noticed changes ischemic ECG or autonomic routes rest-effort; changes in EEG and EMG (hyper-excitability). In one word adaptive polymorphism, on multiple levels, might be most evident on some athletes and on others more discreet, but usually between 7-14 days it appears the crisis of acclimatization.

4. Conclusions

Regarding some incidents that can occur during training at medium altitude I point out the following: loss of water from great effort, haemo concentration, exaggerated tendency to apathy, pain in scars, acute exacerbation of symptoms of rheumatic type, muscle recovery challenge which can predispose to the occurrence of muscle contractures, injuries fibrillation, dry mucous membranes, an increased incidence of angina, rhino-pharyngitis, conjunctivitis, heatstroke, etc. Therefore, as a preventive measure, it would consider adequate hydration (2-3 l alkaline mineral water daily), skin and eye protection (creams, sunglasses, protective solutions and ocular instillation), mucosal protection. It will put a particular emphasis on post-training recovery and psychotherapy (avoid isolation that predispose to depression). Normo-caloric diet will be hyperglucidic, normo or slightly hypoproteic, hypolipidaemic rich in raw vegetables, milk, juices, fruits and vegetables for vitamins and minerals. As supplements medicinal recommended: vitamins and minerals, iron, folcisteine and vitamin B15 (acid pangamic) that would favor acclimated salts, aspartic acid and arginine for detoxifying the liver (Vitaspol, Sargenor) glycine for neuromuscular function, antioxidant (vitamin E, selenium, Q 10, etc.).

In conclusion that average altitude training can be beneficial on two levels: competitive (in endurance sports long, predominantly aerobic returning to the lowlands) such as running (athletics) longer than 800 m, road cycling, rowing, kayaking, swimming, sports, judo, wrestling, boxing, skiing, etc., as well as training, normal, especially in sports (events) with anaerobic prevalence (increasing resistance to hypoxia, improve natural recovery, increase muscle labor) such as sprinting, jumping, throwing, weight lifting, downhill skiing, gymnastics, fencing (Aunola 2000).

For athletes acclimated to the difference in time zones eastward is more difficult and longer. At return to the place of residence occurs resynchronization re-cultivating is shorter and milder as manifestations. The current practice of the great performers competitive observed that athletes, who move to towns with higher

hourly difference of 6 hours, can achieve good results in the first 24-72 hours of sports while others do not, this distinction probably depending on the structured individual memory acclimation to differences in time zones. For major competitions, which take place in different time zones then the residence, the athlete can take a number of measures to facilitate acclimatization, as follows:

- prior to travel, the athlete must be healthy, motivated, balanced neuro-vegetative, with outbreaks of infection drained with a high degree of training;
- the travel is with so many days prior to each time zone difference (1 day per time zone) plus 2-5 days to accommodate to the ambient environment;
- travel is organized so that the athletes reach the evening the new settlement;
- arrived at his/her new residence will ensure sleep at night from day, even medicinal;
- first day after the arrival will be a day of orientation to new conditions and adaptation physical training;
- the first 5-7 days will not allow hours of sleep day and night sleep drug will be helped;
- of the second day after resuming training program at home, at the point when leaving the displacement (volume-intensity), with particular emphasis on intra and post recovery effort;
- diet and daily medication will be that of home without modification;
- daily special recovery, in particular metabolic and neuropsychiatric;
- in leisure time provide a program more enjoyable, varied, relaxing, especially in the first 5-7 days when avoids afternoon nap;
- introduction of afternoon sleep (1-2 hours) just like home after 5-7 days and given that night sleep is regulated. (Dragan 2002)

In terms of international sporting calendar today, when major competitions fast moving from one continent to another, we witness such great performers get, short-term high performance in terms of variation of 8.10 or more time zones, without having to go through the classic stages of acclimatization. The explanation may consist in: motivation, high level of training, health, neuro-vegetative balance and not least the acclimation memory.

5. Methodical implications

What methodic steps can we take? First athletes going at medium altitude might meet the following prerequisites: a good state of health, motivation, high degree of training (weary, stressed, and untrained will not go at medium altitude for risk of deeper disturbances), with outbreaks musculoskeletal drained off infection and

sequelae. The performers, who are constantly at medium altitude training uses two variants:

1. Optimal prescribes three stages/annum, of 21 days each for the gradual resumption of effort in reaching specific about 7-8 days to maximum effort (French school sports physiology);

2. Second variant, on which sports Romanian school has great contributions worldwide, states that after 24-48 hours (period of orientation in time and space) can continue as planned training workouts from lowland, volume, intensity, with special focus on recovery and psychotherapy (training and varied daily schedule, pleasant, attractive).

Changes in the circadian rhythms can be unbeneficial for energy efficiency, physiological and psychological processes, which can translate into an athletic performance decreasing.

This is a matter of practical interest for high performance sport, where athletes have to travel greater distances than 6 time zones in a few hours to participate in high level competitions. Quick fights by plane to destination make day-night cycle differ physically than at home with the appropriate number of hours (Baldwin, Kenneth David Sutherland, George H. Fahey D. 2005).

Physiological functions of the body are able to adapt clinical initially incomplete. Athlete physiological clock do not coincide with astronomical local time, it cannot follow rapid changes in environmental conditions during the journey (Dragan 2002).

This psycho-physiological cycle of day and night can last from 3-4 days up to 10-14 days in the case of large differences for 6 hours (the reactions being strictly individual), after which the two end rings to be synchronized. All these adaptive mechanisms must be taken into account when the training plan is designed, because of the body effort on adapting to the new conditions of macro and micro-climate (temperature and air humidity, wind, solar radiation and ionizing ionization negative light, pollution, rainfall, etc.). The intensity and duration of physiological adaptive reactions and clinical symptoms on adaptation stage are closely related to the number of time zones crossed, the nature of physiological functions affected, stress travel reactivity, individual characteristics of the activity after leaving the flight, the biological status taken before departure, incentive travel, etc.

There are Not exactly known the activation rules and interdependence of these factors in the acclimatization process. However, flights lasting 10-12 hours, about 70% of passengers on arrival accuse obvious discomfort (difficulty sleeping and appetite, hyperexcitability, insomnia, weight loss, abnormal behavior, inattention attention, some fine movement coordination disorders, etc.). These events appear to

accompany the athletes and sport reduction in yield. Some authors, to whom we associate ourselves, argue the existence of adaptive reactions slower when movement occurs in the direction of East versus West, without having so far [have no] a rational scientific explanation.

REFERENCES

1. Aunola, S. 2000, Reproducibility of aerobic and anaerobic thresholds in 20-25 years old men, fur *J Appl. Physiology* 53.260.
2. Baldwin, Kenneth David Sutherland, George H. Fahey D. 2005, *Exercise Physiology: Human Bioenergetics and its applications*, New York: McGraw-Hill
3. Drăgan I. 2002, *Medicina sportivă*, Ed. Medicală, București
4. McArdle W., Katch F., 2010, *Exercise physiology: Energy, nutrition and human performance*. New York Med. Sport