GENERAL CRYOTHERAPY EFFECTIVE DOMAIN OF BIOLOGICAL RENOVATION IN QUALIFIED SPORT

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The crucial factor which determines the highest results in qualified sport is: the proper burden of trainings and starts, as it is for their range as for intensity.

Implementing the training's burdens without the corresponding biological renovation treatment, not only lowers the adaptative outcome of the specified burden but also the overall efficiency of the training process. This, in consequence leads to over-training syndrome.

The intensity of biological renovation and training interventions must be the major concern when managing the training cycle.

It is not merely about utilising biological renovation's methods to intensify training but also about taking advantage of the possibility to actively prevent strains and exhaustion, acute injuries and psychological traumas.

Introducing cryotherapy to medicine and physiology of sport (Polish school of Cryotherapy) has greatly enriched the general and targeted treatment of sport's injuries prescribed until now, it enabled to establish the

exceptionally effective form of biological renovation in qualified sport.

General cryotherapy (cryostimulation) it is a stimulating influence of submaximal thermal stimuli- temperaure is lower than 100 ºC- on the surface of the whole body for about 3-4 minutes in order to provoke physiological, systemic and organic reflexes and defence reactions, which in return are beneficial and effective in regaining or stabilising natural balance of the body- which is homeostasis

Reactions and reflexes evoked are controlled by hypothalamus which acts by nervous, vegetative and hormonal systems supporting self-organisational processes and regulating the balance of all functions.

FEW OUTCOMES OF GENERAL CRYOTHERAPY IN PHYSIOLOGY OF SPORT.

General cryotherapy elicits a vast range of important healing clinical effects, hormonal and biochemical results.

The main outcome of sub-maximal low temperatures' influence is a sudden drop in temperature of skin and hypodermic tissues. Subsequently, although much slower, reduces the temperature of muscles. It is caused by the contraction of peripheral vessels with the following centralisation of circulation.

The initial physiological defence mechanism involved in cryostimulation process is mobilising the thermoregulational reactions. It is made through

thermo-receptors and thermo-exteroreceptors which control temperature being located at the peripherals of the body and receiving thermal stimuli from the environment as well as through thermo-enteroreceptors adjusting the temperature inside the body

The main task of external receptors is transmitting neural impulses through centripetal tract up to the hypothalamus- the part of a brain which serves as the regulation centre for all vegetative and majority of hormonal functions of human body.

The effect of general cryotherapy on perfusion of skin, hypodermic tissues and muscles is highly visible and massive. In sport, especially loaded are structures which are naturally poorly supplied with blood such as: ligaments, articular capsules, tendons and muscles.

Effective microcirculation stimulated for the period of 2-3 hours after each session of cryotherapy ensures optimal interstitial pressure and lymphatic drainage of the interstitial spaces. This contributes to the reduction of oedmas, faster healing of wounds, injuries or strains, inhibition of inflammatory processes and faster removal of acid metabolites from muscles.

Cryostimulation influences collagen which builts ligaments, tendons and muscles- rendering them more flexible and strain resistant.

Moreover, cryostimulation of tissues lowers the efficiency of respiratory processes at the level of a cell, releases enzymes from broken cells, inhibits the dissolution of highly

– energetic compounds (ATP, CP, glycogen). It represses the secretion of: bradykinins, prostaglandins and histamine.

All of the above mentioned factors lowers permeability of vessels' endothelium and they diminish the tendency of swellings or bleedings due to the contraction of blood vessels.

CONCLUSIONS

At the basis of accessible scientific reports, experiences of other centres and the data gathered at cryotherapy department in Spala it can be concluded that:

General cryotherapy can be advised at any point of a training cycle, at least two times a year, in10-14 days' sessions, once a day after the main training. The cryostimulation should be ended 3 weeks before the starts' period.

General cryotherapy is not in opposition to other passive methods (hydrotherapy, classical massage) used in physiotherapy of sport, on the contrary, it adds potential to them.

General cryotherapy renders possible the intensification of active methods used in physiotherapy of sport such as: stomach muscles' reinforcing exercises, isometric exercises (static work) and isotonic exercises (dynamic work), isokinetic, auxotonic, eccentric exercises as well as exercises aimed to lessen the muscle tension.

It stabilises the circulation system by normalising the frequency of heart beats and blood pressur

After the progressive physical effort general cryotherapy reduces the concentration of the growth hormone, cortisol and testosterone in blood serum. However, this reduction is not lower than the optimal level at rest.

General cryotherapy decreases the levels of lactates in blood serum, by which it improves the metabolic tolerance for physical effort and delays the progression of tiredness when doing muscle work.

General cryotherapy does not influence the endurance substantially but it is causing the visible increase in the ability to do a long-term effort within the highest intensivities (increase in power of threshold values). The increase of this index can be compared with the effects of a few weeks endurance training.

General cryotherapy stimulates the activity of noradrenaline pathways giving a positive result for the psychological wellbeing. It lowers the anxiety level, helps with fears and hyperactivity. It improves perception, decisive processes, visual-kinetic co-ordination and emotional control. It strenghtens the endurance, effectiveness and resistance of a central nervous system to mental fatigue and it improves the control of operational thinking and ability to analyse spatial relations (pilot data).

General cryotherapy causes the essential decrease in the outcomes of stressful reactions as a response to the physical effort. It is achieved through the stimulation of serotonine's pathways in particular regions of a brain.

Such stimulation evokes the increase in serotonin's synthesis, further transferred into melatonine in the pineal gland. The latter hormone cataliyzes the process of falling asleep by shortening the latention of sleep, reduces the number of night awakenings, regulates the sleep-wakefulness cycle. Subjective sensations of sportsmen after having visited the cryo-chamber during sessions, measured with the Borge's Scale indicate: better tolerance and faster regeneration after the training as well as better motivation to undergo intensive training's loading (pilot research).

General cryotherapy sessions normalise the inbalances of menstrual period amongst the women who professionally participate in sport.

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