BOOK OF ABSTRACTS

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Programming training loads MTB cyclists during first 7-days of the stay in conditions of high-altitude hypoxia

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Introduction

Hematological effects of training in accordance with the LH-TH (live high – train high) model is well–defined (Stray-Gundersen, Levine 2008). Special attention has been paid to conditioning of the effect of a 2-3 week stay at altitude combined with various combinations of training loads (Friedmann-Bette 2008). However, the issue of selection of intensity of training loads (external loads) in one week stay in the conditions of hypoxia and respond to changes in the physiological parameters (internal load) in relation to the conditions observed in lowland has not been described in literature. The first aim of this investigation was to determine a direction and range of training loads during the first week of MTB cyclists stay at the altitude of 2250 m above sea level. The second aim of this investigation was amounts of intensity basic training loads applied during first 7-days of the stay in conditions of high-altitude hypoxia

Methods

The participants of the study were The MTB XCO Nationals Teams Russia and Poland athletes (women n=9, 25,4/2.1year, 50,3/2.2kg, 160,3/5.5cm), 72 hours before they came to the altitude of 2250 m. and on the second day of stay. The participants of the study done the gradet incremental exercise test (GXTs) at the altitude of 170 m (Lonato del Garda, Italy) and 2250 m (Livignio-Trepale Italy). The GXTs test was executed on ergometer Cyclus 2 (RBM, Germany). The I-st step was 1Wxkg-1 b.m. and increased every 3 minutes by 0,5 Wxkg-1 b.m.. In last 30 the seconds of every exercise grade was taken 20 µl of arterialized blood to the sign LA (Biosen S-line, EKF, Germany). In the course of effort VO2, VE, VCO2 was measured by means of K4b2 analyser. The heart rate monitor, Polar V650 (Polar Finland) measured HR during GXTs. At the level of aerobic threshold (LT) (Farell et al. 1979), anaerobic threshold (AT) (Powers et al. 1983) i VO2max. the powers value was set. The purpose of the training was to execute the seven day program at the altitude of 2300-2100 m above sea level.

Results

After physiological tests, it was determined the direction of oxygen consumption (VO2), ventylatory (VE), HR, oxygen puls (O2HR) and mocy (P) na poziomie VO2max., LT (lactat treshold) and AT (anaerobic trehsold) changes. The character of changes of physiological indicators shows that in all cases changes are closely related to each other. The scope of changes is individual.. On LT: P↓ (6-8%), VO2↑ (4-6%), VE↔, HR↔, O2HR↑ (4-6%). On AT: P↔; VO2↑ (8-10%); VE↑ (6-7%); HR↑ (5-7%); O2HR ↑ (6-7%). On Pmax: P↓(6-10%); VO2↑ (8-10%); VE↑(8-12%); HR↑ (6-8%); O2HR↑ (8-10%). For power (P) they marked value of the coefficient of determination dla HR (LT: R^2 = 0, 1851; AT: R^2 = 0,1663 i VO2max: R^2 = 0,5431). Above data served the correction of parameters trening load (tab. 1)

Conclusions

HR is not a good indicator of regulation of physical effort intensity in the first week of stay at altitude (low value of the coefficient of determination for HR). Therefore correction of intensity of training loads based on changes of the power. The scope of changes results from the individual response of competitors to the high-altitude hypoxia. Changes were included in a period from 5 up to the 10%, depending on the time both intensity and exercises

Tabel 1.
Changes of the value of parameters of training loads in the result of the reaction to the high-altitude hypoxia

Character of the work	Direction of the training load	Conditions and contents of the training	
		Hypoxia	Normoxia
Constans power	Compensation on bicycle	2,5 – 2,7 W/kg b.m.	2,8 – 3,0 W/kg b.m.
Changeable intensity	Strengh in gym	70-75% max load	80-90% max load
		5 exercise x 4 repetition x 3 series for uper and 2 series for lower body	5 exercise x 6 repetition x 3 series for uper and 3 series for lower body
Changeable intensity	Endurance on bicycle	15’/2,9-3,1W/kg b.m. Compensating break 15’/<LT x 4	15’/2,9-3,1W/kg b.m. Compensating break 15’/<LT x 4
Changeable intensity	Power on bicycle	Hight cadence 110-120 4x(4’/3,2-3,5 Compensating break 4’/<LT	Hight cadence 110-120 6x(4’/3,8-4 W/kg b.m. Compensating break 4’/<LT)
Changeable intensity	Strengh on bicycle	6x(1’/3,8-4,0 W/kg b.m.+1’/3,4-3,6W+1’/3,8-4,0 W/kg b.m. Compensating break 3’/<LT	8x((1’/4,0-4,2 W/kg b.m.+1’/3,6-3,8W+1’/4,0-4,2 W/kg b.m. Compensating break 3’/<LT

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