

RESULTS OF INTENSITY VARIABLE EFFORT ON CONDITION OF POLISH AND RUSSIA NATIONAL TEAM CROSS COUNTRY MTB CYCLISTS

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ФЕДЕРАЦИЯ
ВЕЛОСИПЕДНОГО СПОРТА
РОССИИ



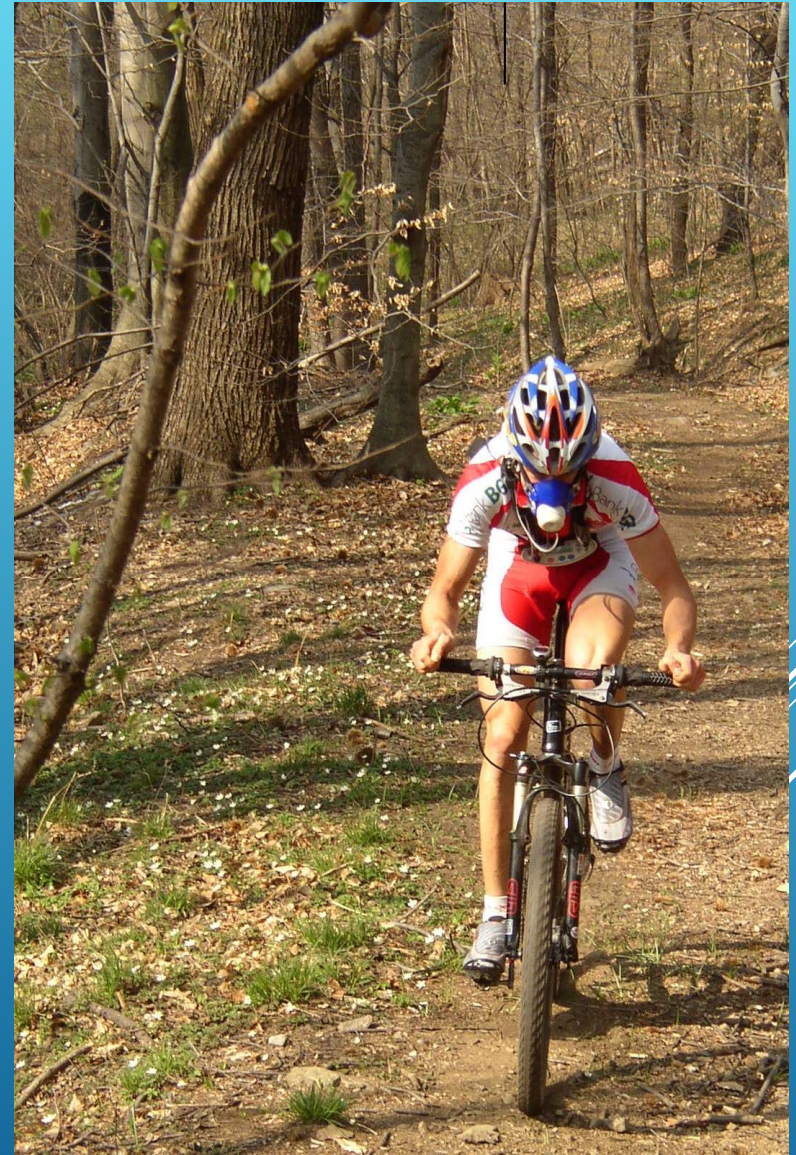
- ▶ Selection of endurance test for cyclist, which reflects most precisely training or starting is very complicated.
- ▶ Accurate evaluation of endurance warrants precise indication of training load (Lucia et al 2004).
- ▶ Alteration of training load is precisely correlated with periodization of training load (Rønnestad, Hansen 2014) and is result of various training goals set for respective training periods (Rønnestad et al 2014).



INTRODUCTION

- ▶ Purpose of this study was establishing training load during general and special preparatory periods in cross country cyclists.
- ▶ Double testing procedure for endurance testing was used to verify different intensity zone parameters.

AIM OF INVESTIGATION



- ▶ Tested group included medalists of Olympic Games, World and Europe Championship in MTB Cross Country.
- ▶ Women (n=3), age: $28,5 \pm 2,3$ years old, body mass: $54,1 \pm 2,2$ kg, body height: $171,8 \pm 2,4$ cm
- ▶ Men cyclists (n=5), age: $29,3 \pm 4,8$ years old, body weight: $64,1 \pm 4,7$ kg, body height: $178,6 \pm 3,4$ cm.

MATERIAL OF INVESTIGATION



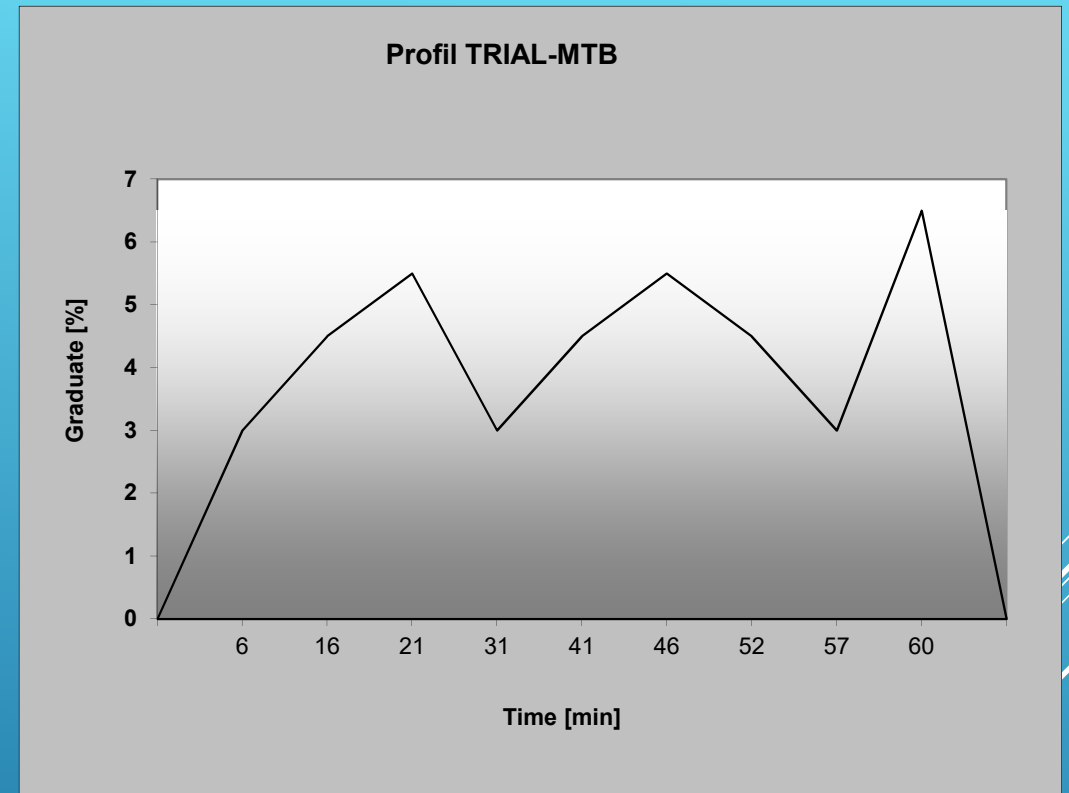
- ▶ The participants of the study performed graded incremental exercise test (GXTs). The GXTs test was executed on ergometer Cyclus 2 (RBM, Germany). The 1-st step was $1 \text{ W} \times \text{kg}^{-1} \text{ b.m.}$ and increased every 3 minutes by $0,5 \text{ W} \times \text{kg}^{-1} \text{ b.m.}$
- ▶ In last 30 the seconds of every exercise grade was taken $20 \mu\text{l}$ of arterialized blood to the sign LA (Biosen S-line, EKF, Germany).
- ▶ In the course of effort VO_2 , VE , VCO_2 was measured by means of K4b2 analyser.
- ▶ The heart rate monitor, Polar V650 (Polar Finland) measured HR during GXTs.



I-ST PART OF INVESTIGATION

- ▶ The creation of the individual program of specific strength trial (TRIAL-MTB) was based on the following:
- ▶ - work time consists of 50% of the starting effort
- ▶ - During the strength exercise, work intensity must dominate on the level of AT and submaximal.
- ▶ - In the trial there must be periods of maximum intensity and below the level of AT (stimulating steep inclination and gentle decline)
- ▶ - Trial must be done on the bicycle of the subject
- ▶ - Conditions of the trial must be constant and can not change in the preparation period.

- ▶ After this subjects performer 60-minute effort characterized by:
- ▶ 10 minutes at 50% PVO2max,
- ▶ 5 minutes at 75% PVO2max,
- ▶ 5 minutes at 90% PVO2max,
- ▶ 10 minutes at 50% PVO2max,
- ▶ 10 minutes at 75% PVO2max,
- ▶ 5 minutes at 90% PVO2max, 6 minutes at 75% PVO2max,
- ▶ 5 minutes 50% PVO2max
- ▶ 4 minutes at 100% PVO2max.



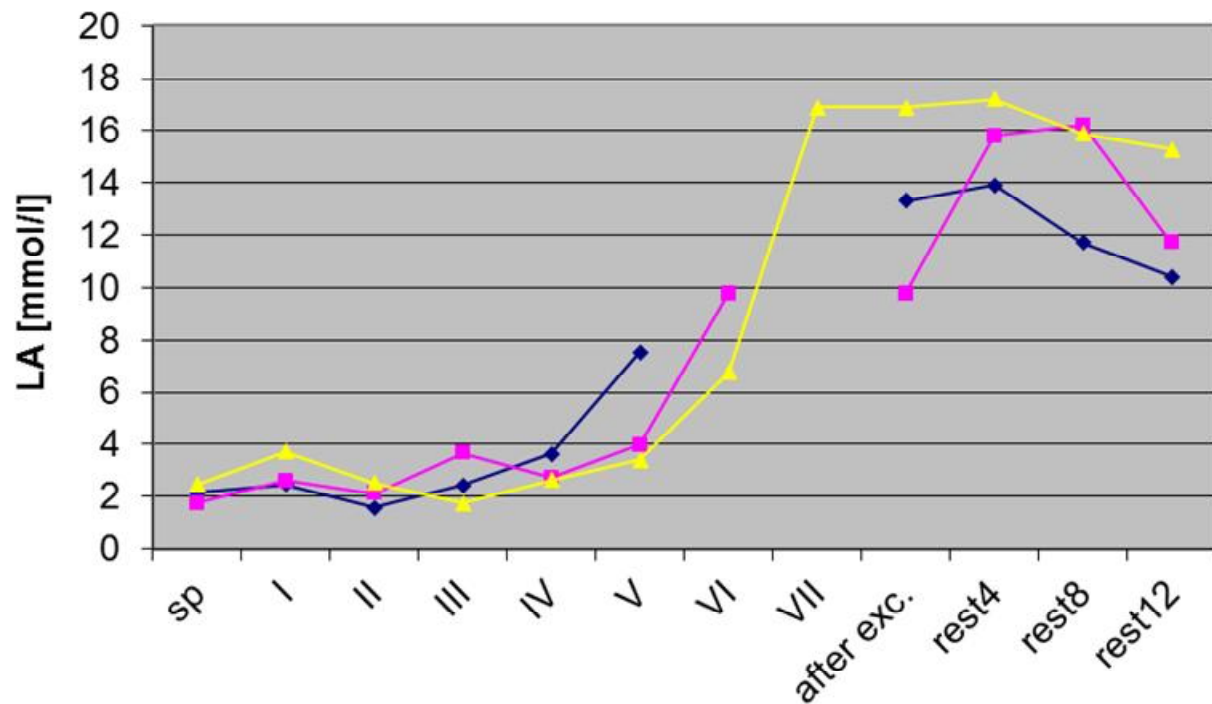
II –ND PART OF INVESTIGATION

RESULTS



Parameters	Women						Men					
	1		2		3		1		2		3	
	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD
VO ₂ max (mlxmin ⁻¹ xkg ⁻¹)	61,7	2,8	68,7	0,6	68,5	4,82	73,2	3,3	78,2	4,0	79,3	3,56
VE _{max} (lxmin ⁻¹)	106,3	21,5	104,3	17,2	112,7	18,34	162,3	16,0	183,0	37,8	171,2	29,28
HR _{max} (udxmin ⁻¹)	188,0	11,8	189,7	11,7	191,7	9,61	189,0	12,2	191,0	9,3	190	10,42
HR _{LT} (udxmin ⁻¹)	148,3	5,8	156,7	5,8	139,7	7,51	143,6	8,9	152,0	5,7	154,8	4,87
HR _{AT} (udxmin ⁻¹)	173,7	5,1	178,3	5,8	175,7	6,66	168,6	11,0	171,6	7,9	176,2	5,67
LA _{max} (mmolxl ⁻¹)	12,1	1,6	14,3	1,8	13,87	2,89	15,3	6,1	15,7	2,8	12,81	3,84

GXTS PARAMETERS RECORDED DURING BASES TEST IN WOMEN AND MEN POLISH NATIONAL TEAM IN MTB CROSS COUNTRY BEFOR GENERAL (1), BEFOR SPECIAL (2) AFTER SPECJAL (3) PREPARATORY PERIOD

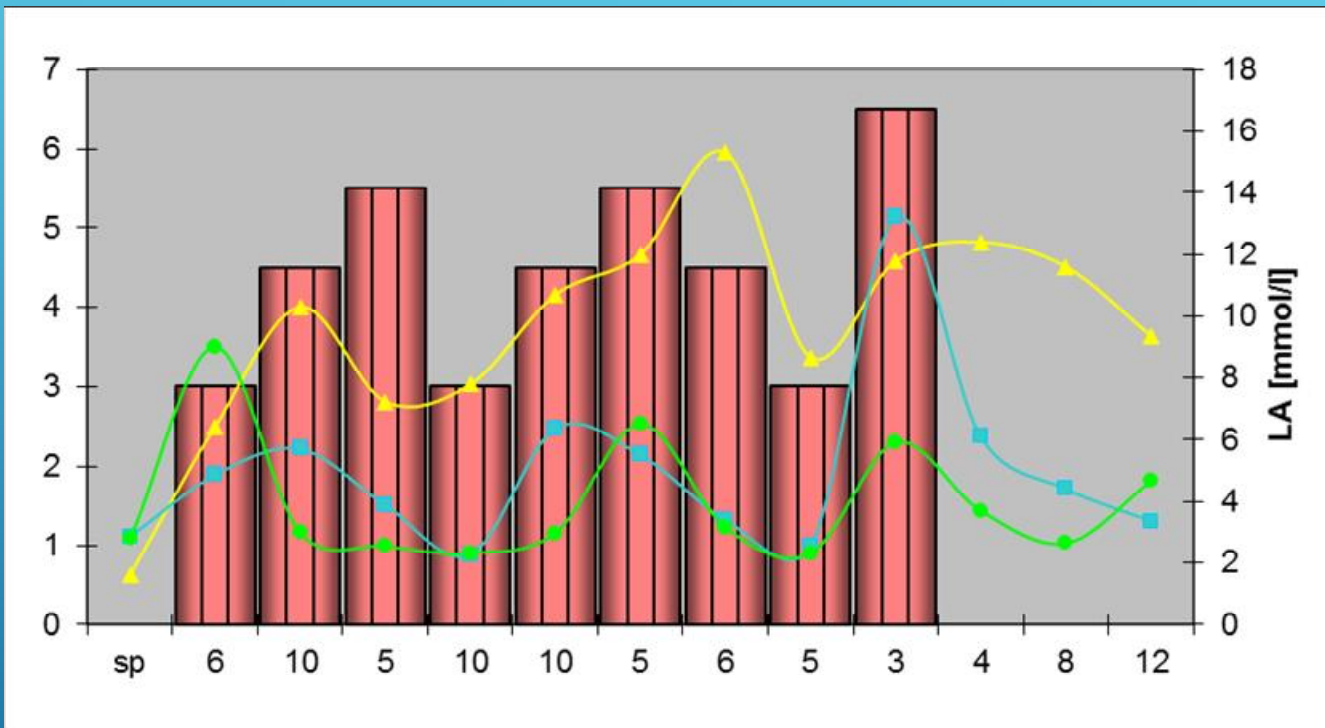


Parametrs	Part of special preparatory period		
	Befor I	After I	After II
VO2max [ml/kg/min]	59	69	70,5
VEmax [l/min]	101	110	119
HRmax [bp/min]	185	181	183
HR _{LT} [bp/min]	145	150	132
HR _{AT} [bp/min]	175	175	170
LA pre exerc. [mmol/l]			
LA I level [mmol/l]	2,14	1,73	2,46
LA II level [mmol/l]	2,47	2,61	3,73
LA III level [mmol/l]	1,57	2,11	2,53
LA IV level [mmol/l]	2,44	3,67	1,74
LA V level [mmol/l]	3,63	2,73	2,63
LA VI level [mmol/l]	7,53	3,97	3,42
LA VII level [mmol/l]	-	9,77	6,77
LA after exerc. [mmol/l]			
LA rest..4 min [mmol/l]	13,3	9,77	16,9
LA rest.8 min [mmol/l]	13,9	15,8	17,2
LA rest.12 min [mmol/l]	11,7	16,2	15,9
LA rest.12 min [mmol/l]	10,4	11,7	15,3
Time work [min:s]	16:30	18:20	21:00

CHARACTERISTICS OF CHOSEN PHYSIOLOGICAL AND BIOCHEMICAL PARAMETERS RECORDED DURING PROGRESSIVE TEST IN WORLD CHAMPION OF XCO

Parameters	Women						Men					
	1		2		3		1		2		3	
	x	SD	x	SD	x	SD	x	SD	x	SD	x	SD
VO ₂ max (mlxmin ⁻¹ xkg ⁻¹)	66,13	4,76	69,33	3,06	56,2	3,06	75,2	6,83	75,6	5,77	70,6	4,04
VE _{max} (lxmin ⁻¹)	105,3	25,5	88,3	5,77	68,7	5,7	146,8	141	134,2	23,2	121,8	10,4
HR _{max} (udxmin ⁻¹)	191	8,72	185	7,94	175	7,94	188,4	9,04	182,2	10,23	177	9,62
LA _{max} (mmolxl ⁻¹)	10,72	2,41	8,4	4,19	4,87	4,19	9,54	2,11	6,71	2,13	5,64	1,73

MAXIMAL VALUES DURING 60-MINUTE VARIABLE INTENSITY TEST IN WOMEN AND MEN POLISH NATIONAL TEAM IN MTB CROSS COUNTRY BEFOR GENERAL (1), BEFOR SPECIAL (2) AFTER SPECJAL (3) PREPARATORY PERIOD



CHARACTERISTICS OF CHOSEN PHYSIOLOGICAL AND BIOCHEMICAL PARAMETERS RECORDED DURING TRIAL MTB TEST IN WORLD CHAMPION OF XCO

Parametrs	Part of special preparatory period		
	Befor I	After I	After II
VO2max [ml/kg/min]	70,4	70	54,6
VEmax [l/min]	122	95	70
HRmax [bp/min]	187	179	162
LA pre exerc. [mmol/l]	1,6	2,85	2,8
Time of work [min:s]	Lactate concentration [mmol/l]		
15:30	6,43	4,87	4,01
21:30	10,3	5,71	2,99
24:30:00	7,24	3,89	2,54
30:30:00	7,8	2,26	2,3
40:30:00	10,7	6,37	2,97
46:30:00	12	5,51	6,52
52:30:00	15,3	3,41	3,15
56:30:00	8,68	2,54	2,31
LA after exerc. [mmol/l]	11,8	13,2	5,92
LA rest..4 min [mmol/l]	12,4	6,1	3,7
LA rest.8 min [mmol/l]	11,6	4,42	2,63
LA rest.12 min [mmol/l]	9,37	3,36	2,37

- ▶ The trial of the strength exercise that is trying to stimulate natural conditions (training, competition) must be characterized by following parameters:
- ▶ - work load with changing intensity that will be completed in the appropriate time period were the full activation of metabolic changes will be accomplished for the specific type of the exercise
- ▶ - the intensity structure on different metabolic levels and their occurrence should allow to evaluate adaptation of the sport person in the conditions of increasing tiredness and rest periods during exercises of low intensity, ability of subject to perform multiple work loads in the high intensity, and the ability to perform work with maximum intensity in the tiredness conditions.
- ▶ - During the exercises there must be capability of recording the basic physiological parameters: VO_2 , VE, CO_2 , RQ, HR, and biochemical: lactate in the blood
- ▶ - Intensity and the time of exercise must be constant for every training period, and their completion possible for the subject. The only difference that can occur is the efficiency of work load of the subject during the trial.

CONCLUSIONS

- ▶ The structure of the 60 min specific laboratory trial period TRIAL-MTB is made up of following exercises and intensity: 21 min 50% VO₂max intensity, 26 min 75% VO₂max intensity, 10 min 90% VO₂max intensity, 3 min. 100%VO₂max intensity.
- ▶ Above structure allows determining specific characteristic traits that are adapted by a mountain biker during the preparation period. The first analysis shows this structure should be modified in the starting period.
- ▶ Mountain biker should be characterized by high tolerance on the work loads above the 75% VO₂max intensity. Starting period needs to take the structure that will allow determining the changing characteristics of adaptation, which are the result of many starts.
- ▶ Earlier diagnostics and recording of body signals during increasing tiredness level allows avoiding in many cases over exhaustion of the sports person. This is the area that should be further study.

CONCLUSIONS