



Examples of equipment adaptations and scientific support methods in high-performance paracanoers

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- ~ Head Coach/Team Leader of Polish Paracanoe Team 2013-2018
 - ~ Paralympic Games Rio
 - ~ WCh, Ech, WC
 - ~ National Paracanoe Clasifier
- ~ PhD in Exercise Physiology
- ~ Institute of Sport (since 2012 r.)
- ~ Coach Developer
- ~ Academic Teacher

Foto: Michał Starczewski



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Outcomes

- “ You will have a basic knowledge about the equipment, its adaptations, and differences between sports classes
- “ You will be introduced to the applications of exercise physiology in training and assessment of paracanoers

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Introduction

KL1	KL2	KL3
Total Score = 3 <i>Athletes with no or very limited trunk function and no leg function and typically need a special seat with high backrest in the kayak</i>	Total Score = 4 – 7 <i>Athletes with partial trunk and leg function, able to sit upright in the kayak but might need a special backrest, limited leg movement during paddling</i>	Total Score = 8 – 9 <i>Athletes with trunk function and partial leg function, able to sit with trunk in forward flexed position in the kayak and able to use at least one leg/prosthetic</i>

icf_paracanoe-kayak_classification_manual_19-08-2018.pdf



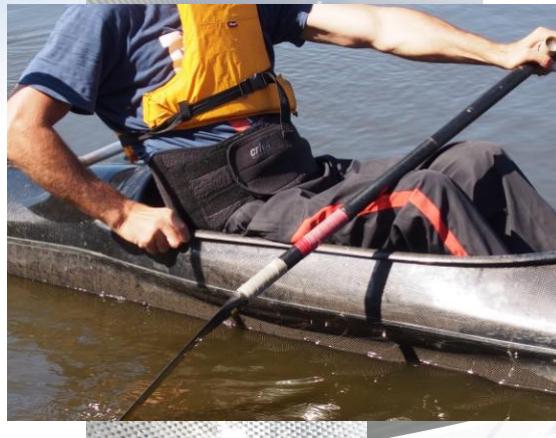
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KL1 and VL1



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KL1 and VL1



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KL1 and VL1



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KL2 and VL2



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KL2 and VL2



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KL2 and VL2





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Scientific Support

Water test:
Time 200m
Lactate



Incremental test:
AT4 power
Lactate



Wingate test:
Mechanical indices
Lactate



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Paracanoers



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The aerobic performance test Procedure

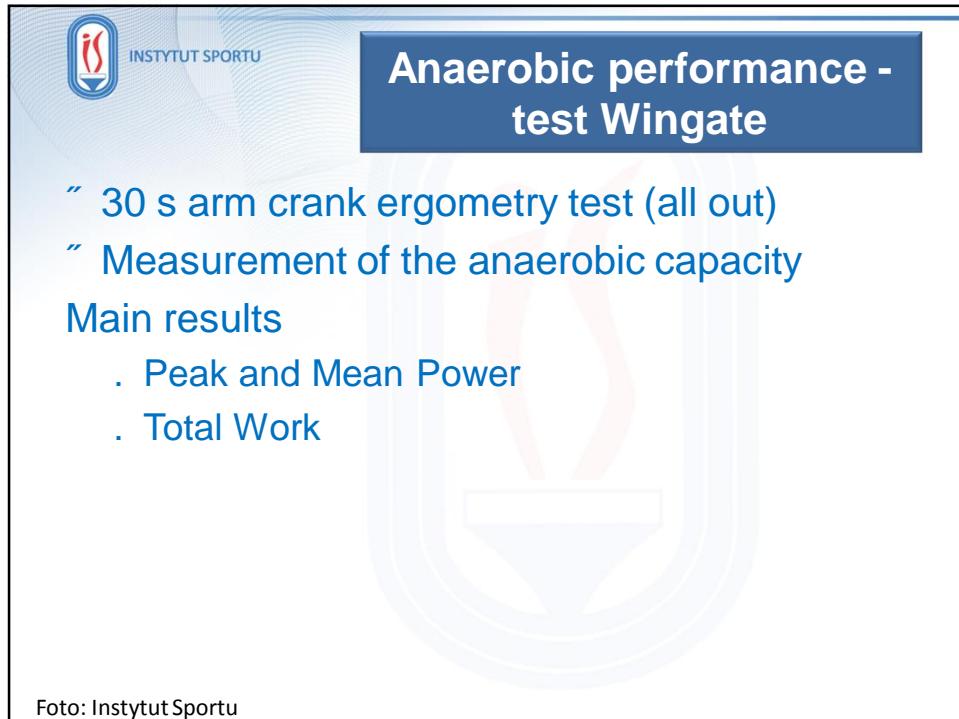
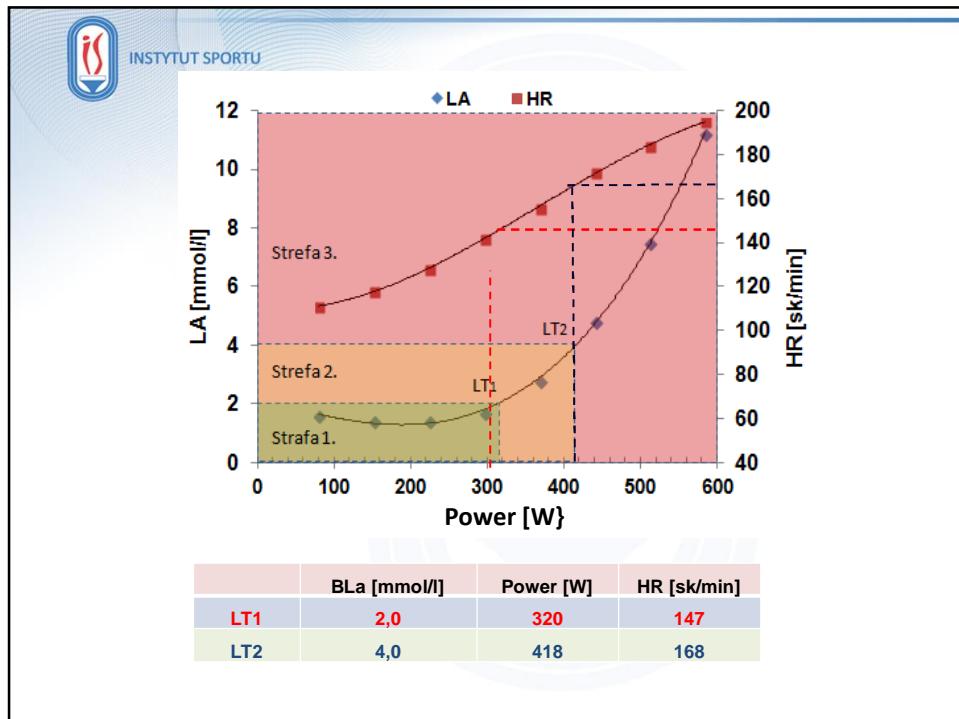
- “ Incremental test on kayak/canoe ergometer
- “ The power established for each athlete individually
- “ 5 Times 4 minutes
- “ During the test Blood lactate, Power, HR were measured
- “ Main results of the test
 - . Anaerobic threshold (AT)
 - . Lactate threshold (LT)



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The aerobic performance test Procedure





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Anaerobic performance - test Wingate

„ 30 s arm crank ergometry test (all out)
„ Measurement of the anaerobic capacity

Main results

- . Peak anaerobic power
- . Total Work

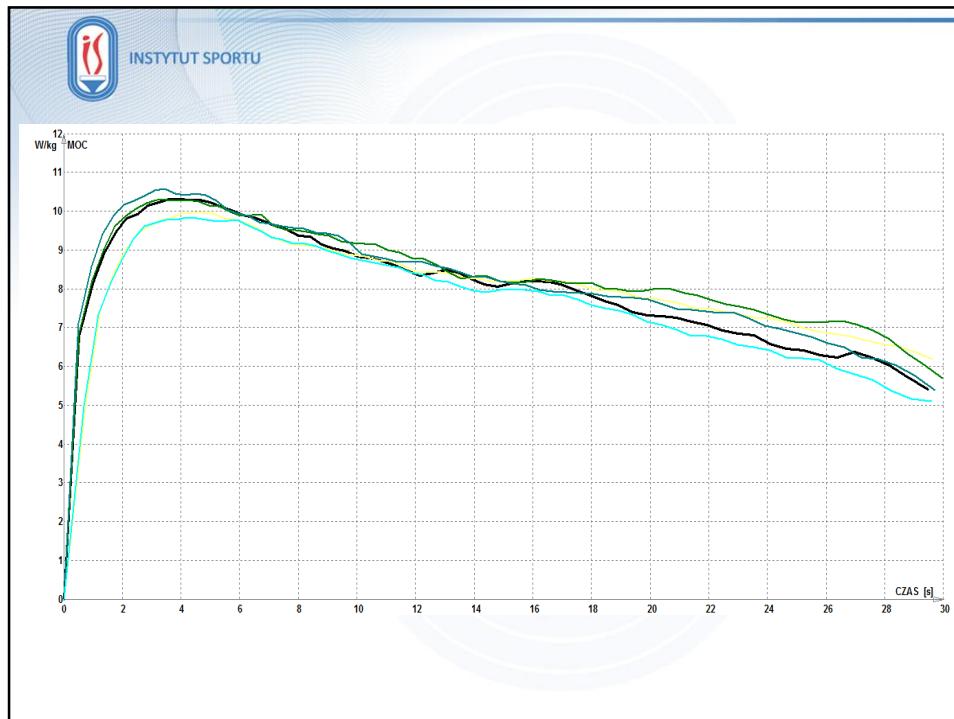
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Test Protocol

Arm Crank Ergometer Wingate Test (30'')		
	Women	Men
Sitting position	4 % of body mass	5 % of body mass
Standing position	5 % of body mass	6.2 % of body mass



Relative values

	Men			Women		
	Work [J/kg]	Power [W/kg]	AT4 Power	Work [J/kg]	Power [W/kg]	AT4 Power
KL1	165	7,06	1,20	125	4,96	0,97
KL2	179	6,82	1,30			
KL3	231	9,86	1,86			0,93
VL2	150	6,15	0,78			0,53
VL3	183	8,29	0,82			

Results

Wingate

Tab. 2. Results of Pearson's correlation between the 200m time (in-water test) and the mechanical indices obtained in the Wingate test and the power at anaerobic threshold in the group of paracanoeists tested (n=7)

Test/Variable	Unit	Time 200 m		
		R	R ²	p
Wingate test				
W	[J/kg]	-0.882	0.778	0.009*
P _{mean}	[W/kg]	-0.882	0.778	0.009*
P _{max}	[W/kg]	-0.796	0.634	0.032*
T _{tp}	[s]	0.593	0.352	0.160
T _{kp}	[s]	0.516	0.266	0.236
FF	[W/s]	-0.494	0.244	0.260
Anaerobic threshold test				
P _{AT4}	[W/kg]	-0.921	0.849	0.001*

W - total work, P_{mean} - mean power, P_{max} - peak power, T_{tp} - time to reach peak power, T_{kp} - time of maintaining peak power, FF - power drop index, P_{AT4} - power at anaerobic threshold, *statistically significant correlations

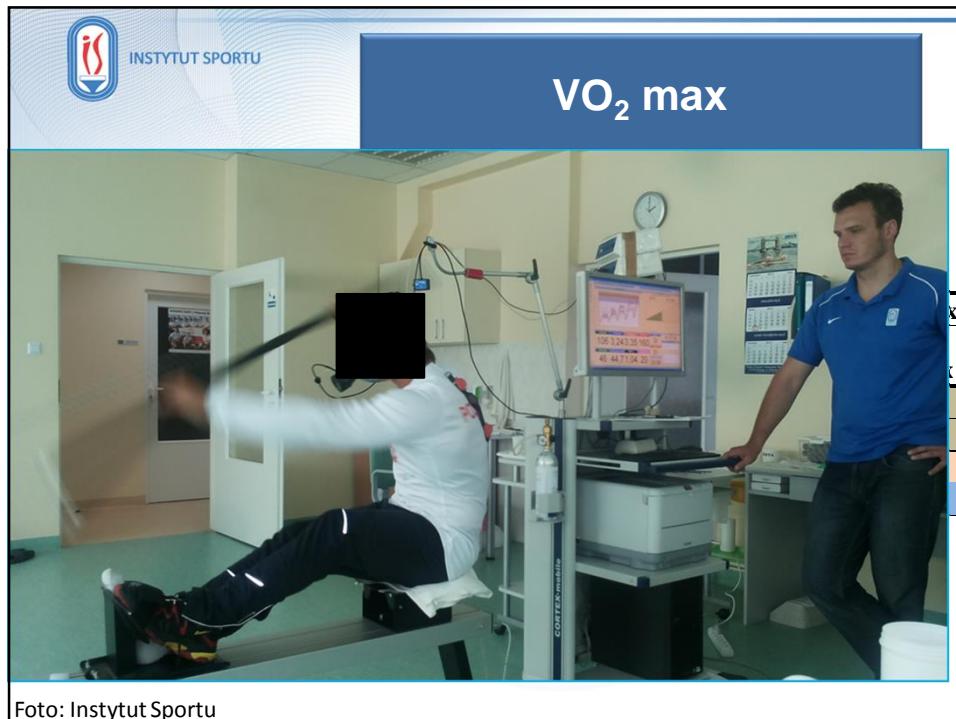
Time [sec]

Foto: Instytut Sportu, Michał Starczewski

VO₂ max

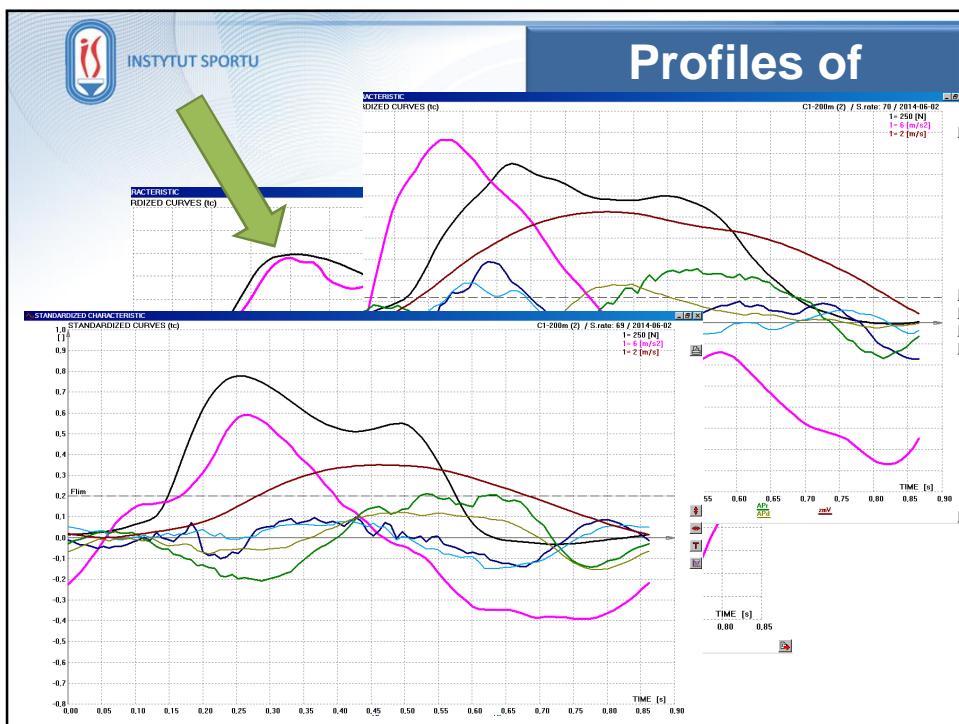
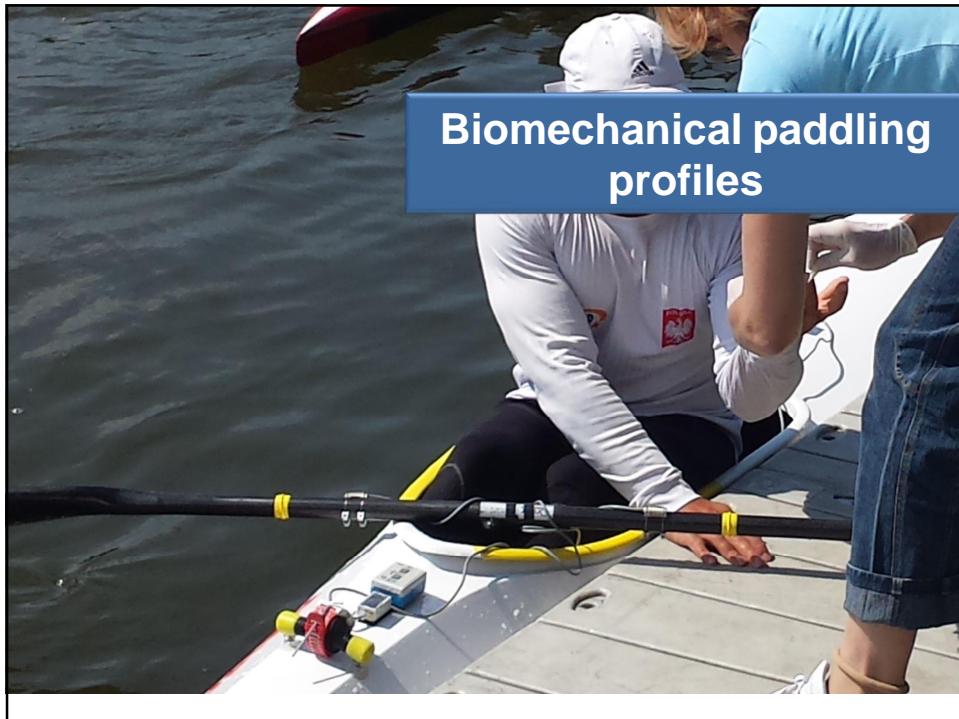
Nazwisko	Data badania	max					AT4/max	
		HR	VO2 [l/min]	VO2 [ml/kg/min]	Moc [W]	Moc [W/kg]	HR %max	VO2 %max
KL3	29.07.2013	199	3,69	44,4	188	2,26	89	86
KL3	29.07.2013	183	3,49	48,2	206	2,85	90	93
KL1	29.07.2013	184	2,84	36,9	141	1,88	87	90
VL3	29.07.2013	197	2,97	39,5	96	1,25	76	71

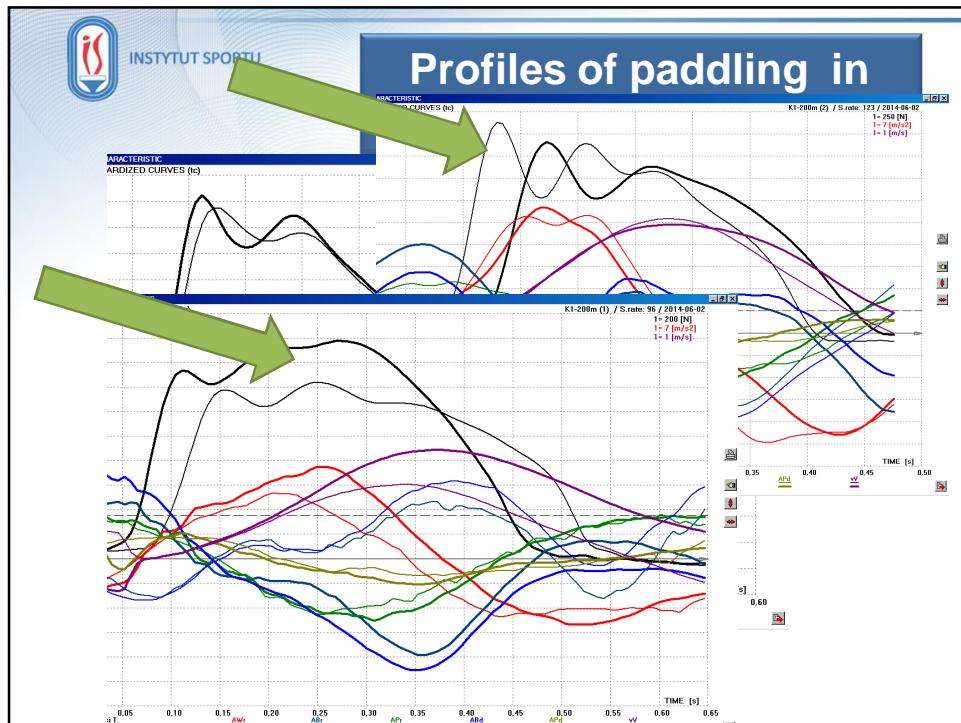
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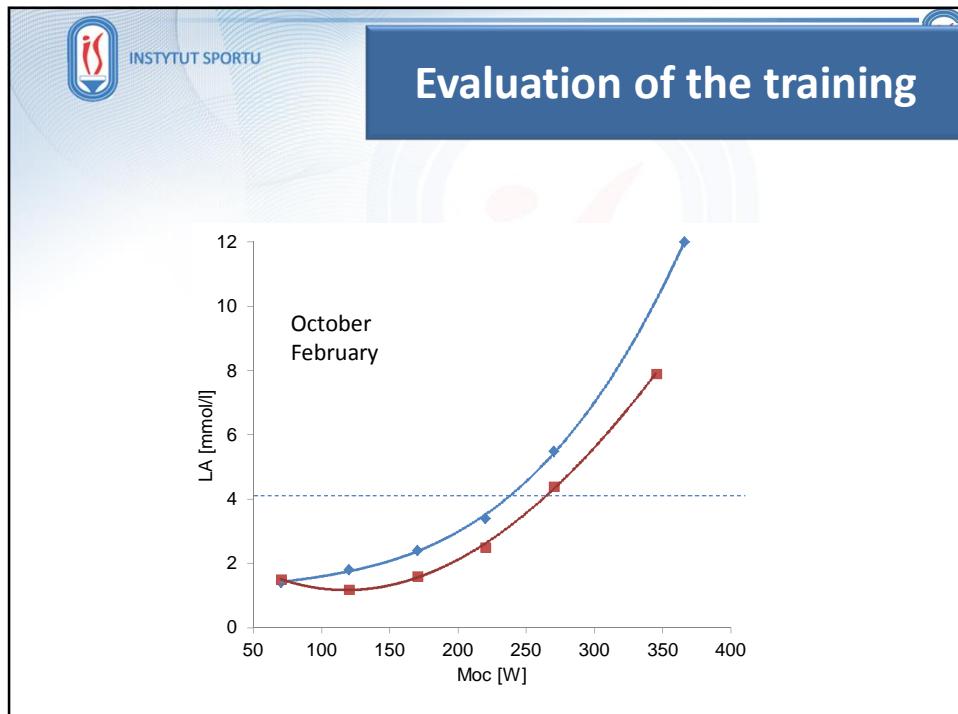
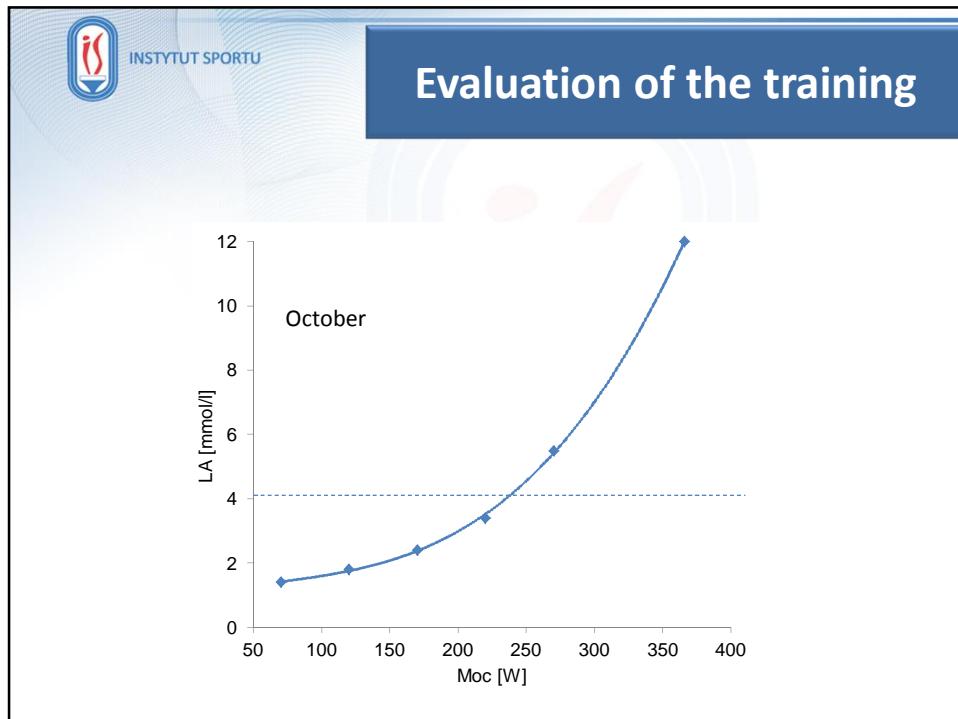


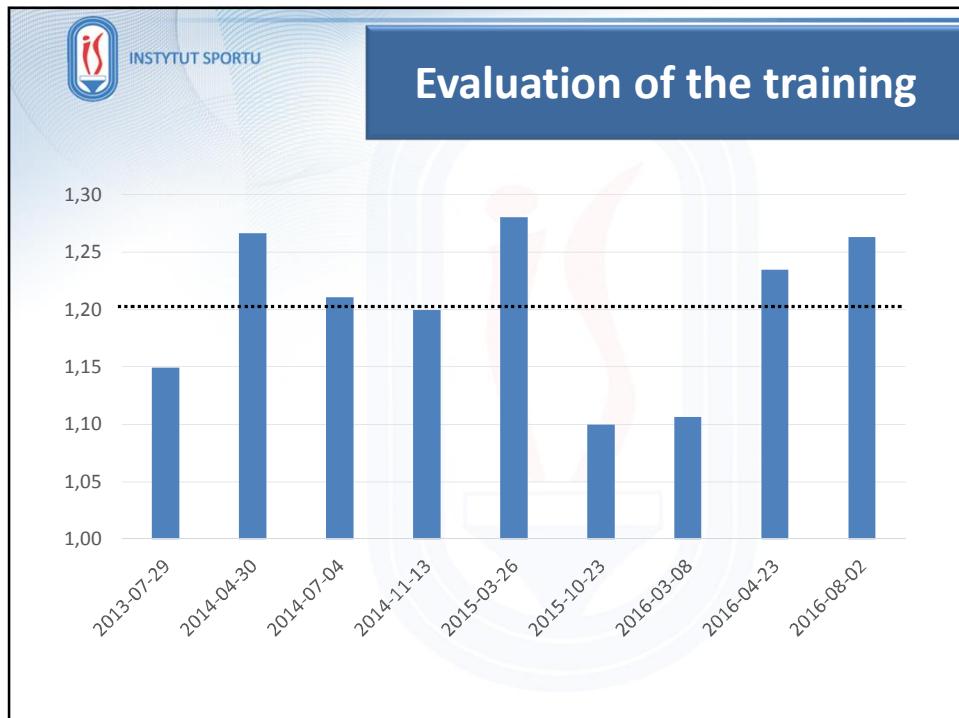
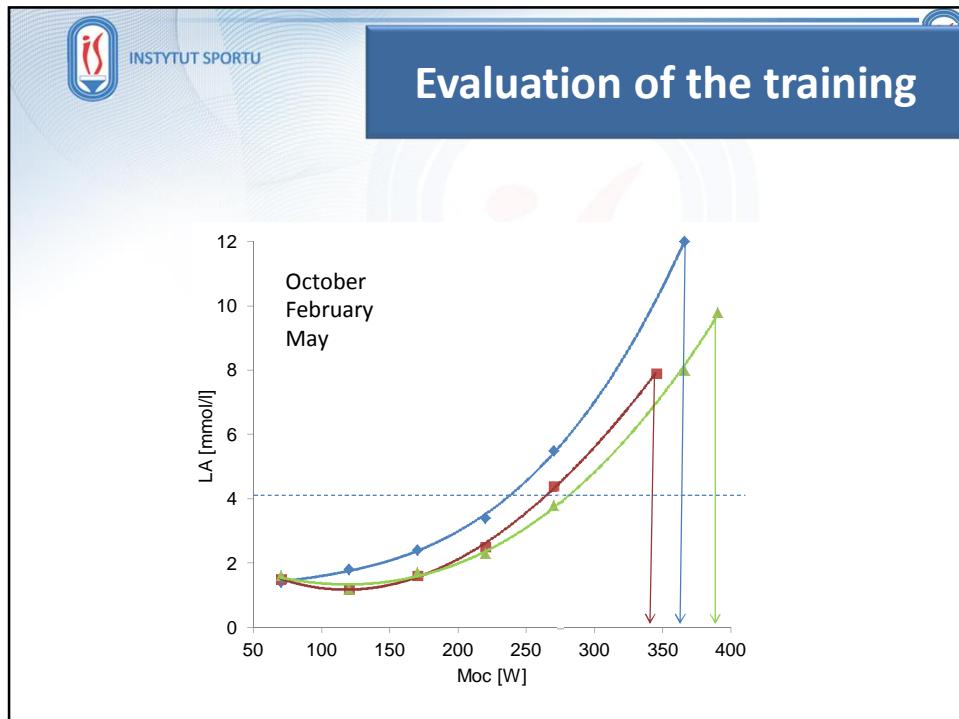
Additional tests

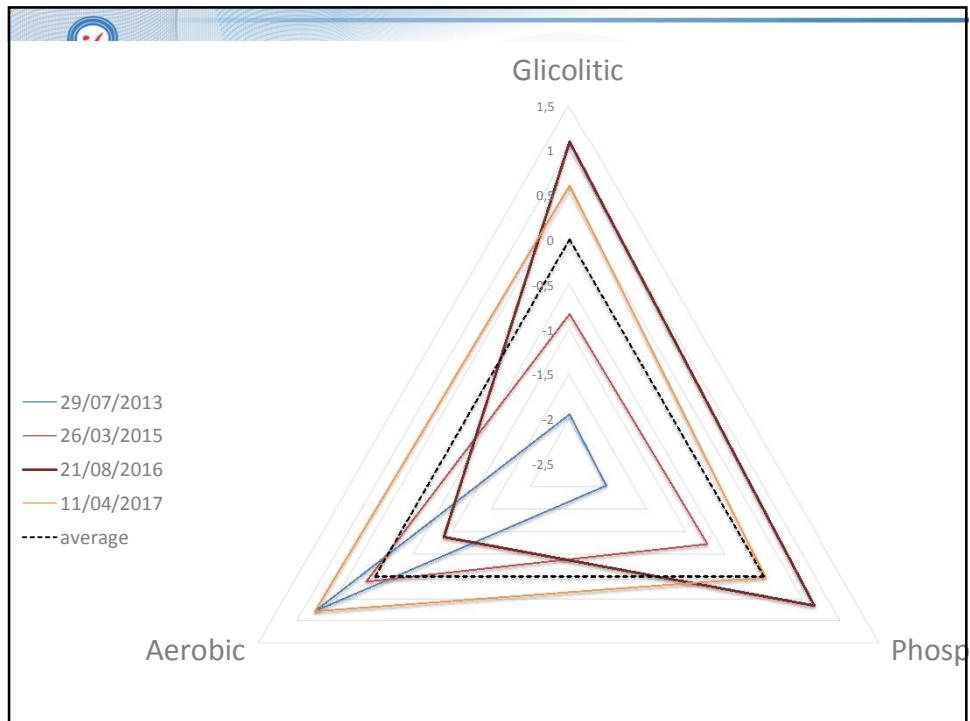
Biomechanical paddling profiles
Training evaluation











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Conclusions

- “ Equipment adaptations are correlated with sports class, boat and impairment
- “ Individual adaptations are necessary to increase performance
- “ Scientific support in high-performance athletes is necessary to increase efficiency of the training
- “ Presented tests protocols can be used to determine current performance

