

# Treeningu monitooring. Tagasiside

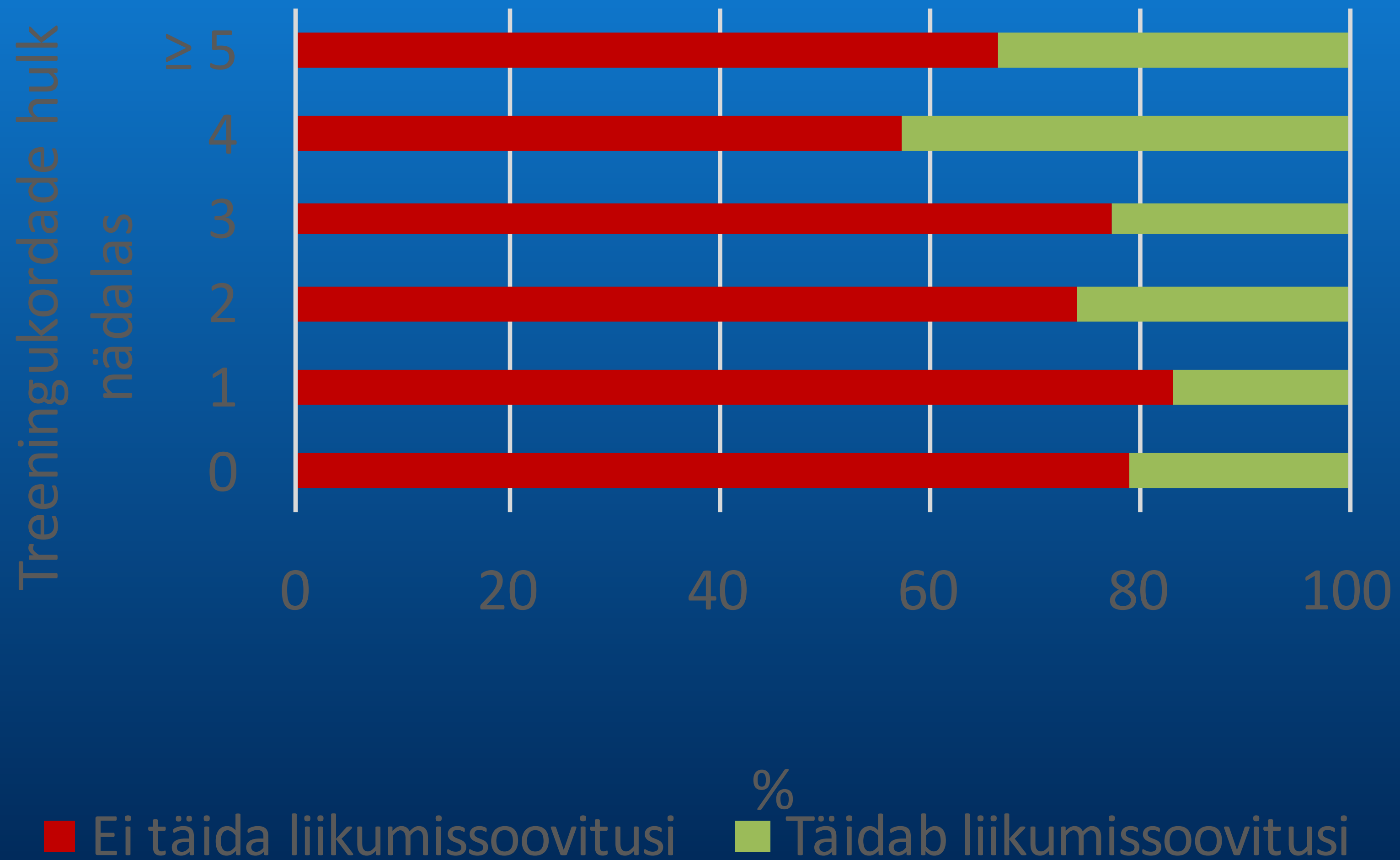
Jarek Mäestu

Suusatreenerite seminar

13 mai, 2017

Otepää

# Kas treenida või mitte treenida?



# Teeningmahud erinevatel ettevalmistuse etappidel

Tunde aastas

# Regulaarne testimine

							stessesetõus	Katekõverdused	Lõuatõmbed		
12	T	163	51	300	70	3	V.hea	V.hea	V.hea	19.20	Normkaal
13	T	156		215	70	0	V.hea	V.hea	Halb		
11	T	157	37	170	35	0	V.hea	V.hea	Halb	15.01	Normkaal
11	T	154	57	35	58	0	V.hea	V.hea	Halb	24.03	Kerge ülekaal
14	T	167	74	61	35	0	V.hea	V.hea	Halb	26.53	Kerge ülekaal
14	T	168	59	56	40	0	V.hea	V.hea	Halb	20.90	Normkaal
14	T	159	57	500+	134	2	V.hea	V.hea	Väga hea	22.55	Normkaal
13	T	168	58	69	105	0	V.hea	V.hea	Halb	20.55	normkaal
13	P	163	63	128	22	0	V.hea	Keskmine	Halb	23.71	Kerge ülekaal
14	P	171	59	210	41	3	V.hea	V.hea	Halb	20.18	Normkaal
12	P	167	53	220	43	2	V.hea	V.hea	Keskmine	19.00	Normkaal
13	P	167	65	150	52	0	V.hea	V.hea	Halb	23.31	Kerge ülekaal
13	P	175	58	108	75	6	V.hea	V.hea	Keskmine	18.94	Normkaal
14	P	177	55	250		3	V.hea		Halb	17.56	Normkaal

# Mida ja kuidas jälgitakse?

Taylor, 2012

Mida?		Kuidas?	
Vigastustest hoidumine	29%	Enesehinnangud	84%
Treeningprogrammi efektiivsus	27%	Töövõime test	61%
Töövõime säilitamine	22%	Võistlustulemus	43%
Ületreening	22%	Biokeemilised parameetrid	8%

# Pidev jälgimine.....

- Treeningute tajutud raskus
- Üldine enesetunne
- Väsimus
- Unequaliteet
- Hommikune SLS



# Millal alustada?

- Lihtsam tagasiside treeningule 8-10 a
- Esmane info seisundi kohta. Väsimus, uni - 10-12 a
- Treeningute info 12 +
- Võistlused 13-14+



Kuidas sulle meeldis  
täna treening?

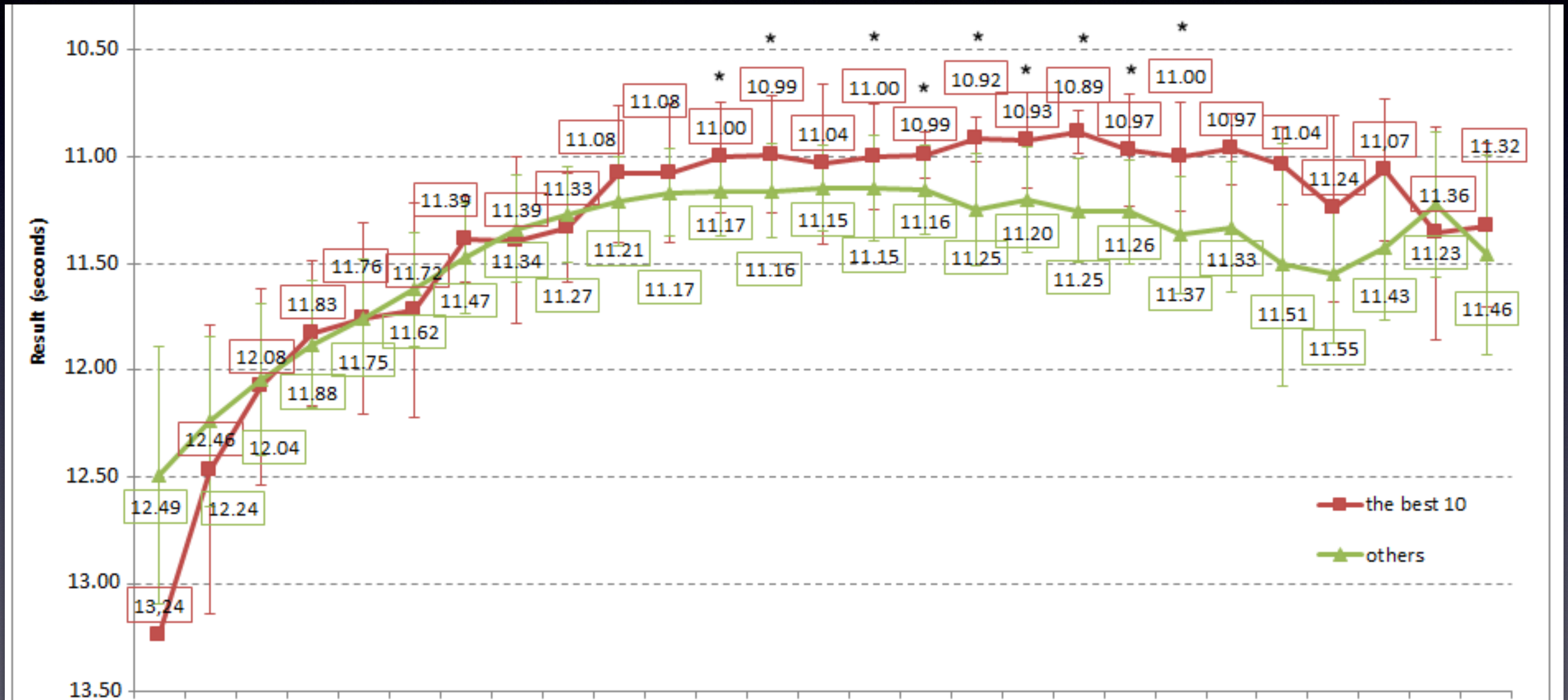
# Töövõime test

- Mida kõrgem seos erialase töövõimega seda parem.
- Majad ehitatakse väikestest kividest/blokkidest
- Regulaarselt testides annab väga olulisi tulemusi ja võrdlusandmeid tulevikuks



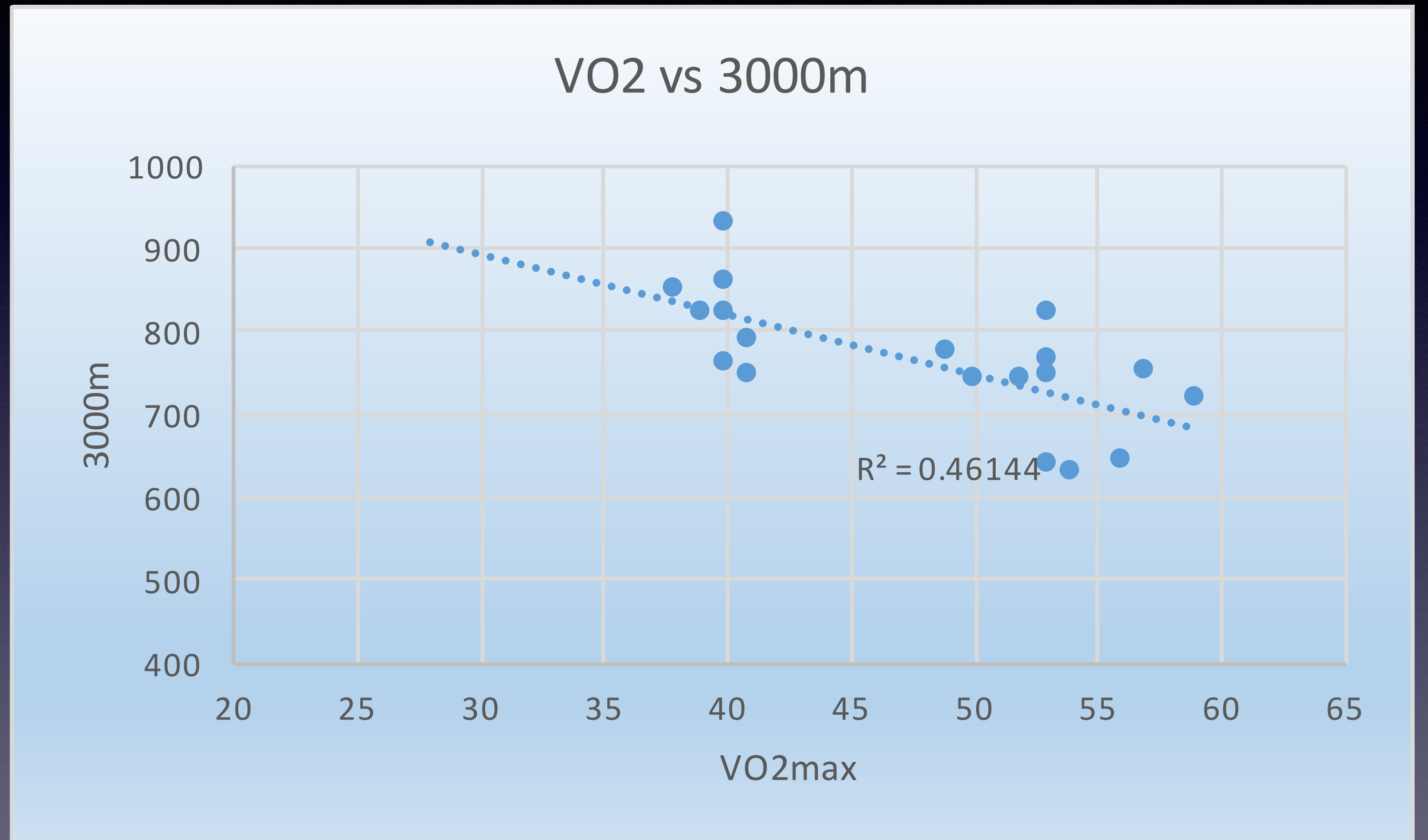


# Kellel on andekust?

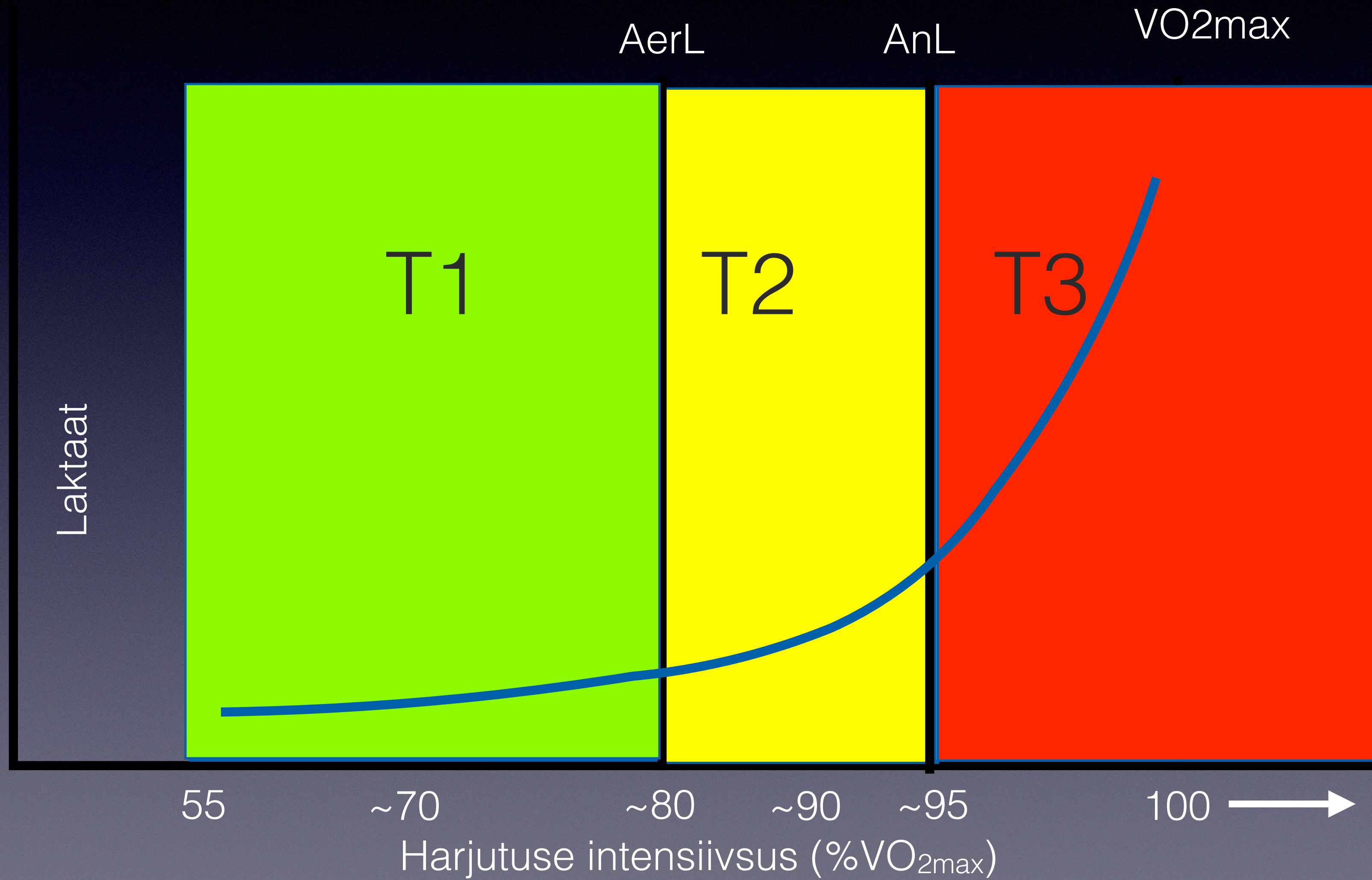


# Millised testid?

- Jõutestid  $r = -0,59$  -  $-0.627$
- Lõuatõmme  $r = -0.74$
- Max töövõime/kg  $r = -0,742$



# Intensiivsustsoonid



**POLAR**®

*LISTEN TO YOUR BODY*



**EVERY BODY TELLS A STORY**

**POLAR**®

**LISTENS TO YOUR BODY**



# Ületreening, ülekoormus

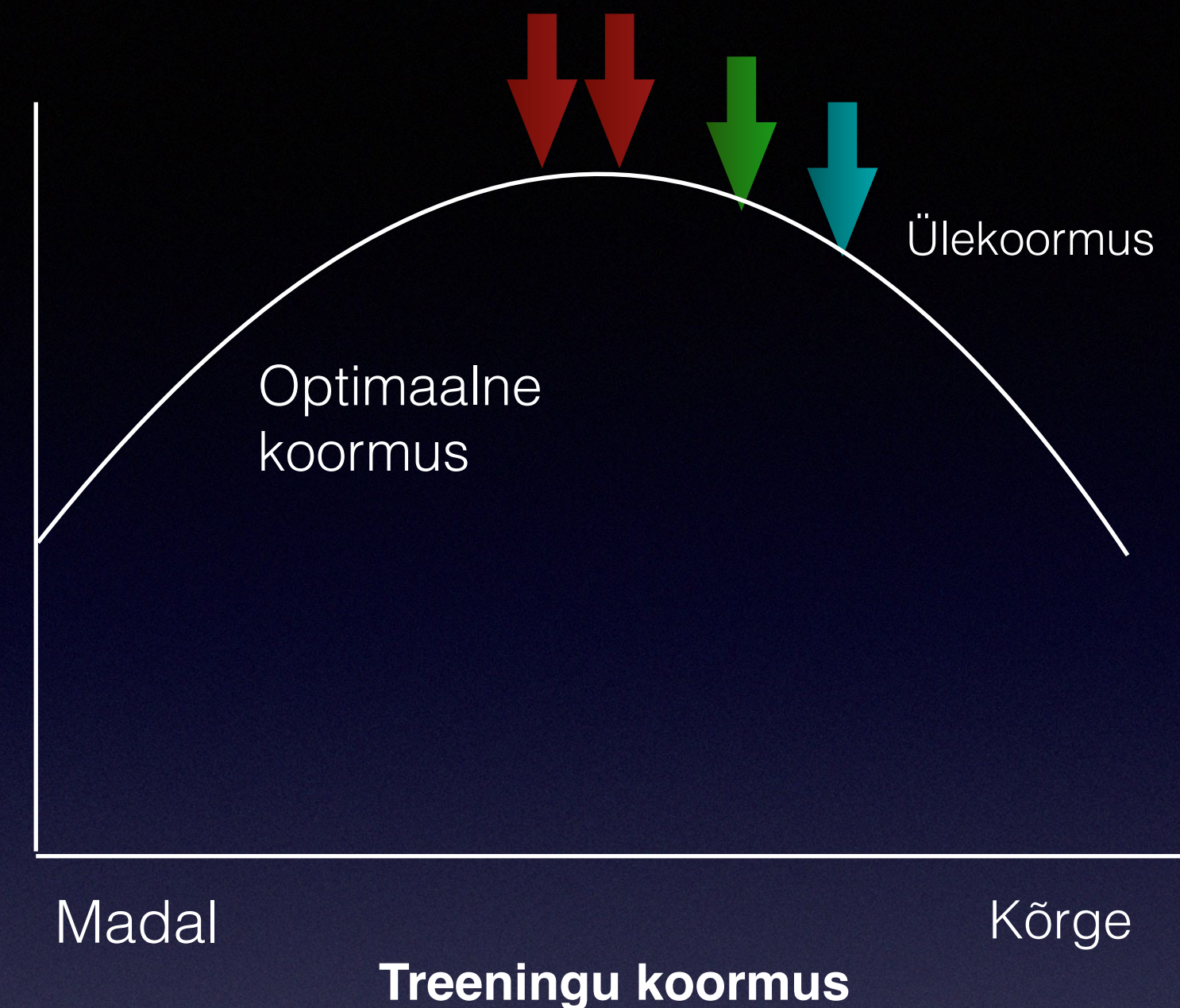
## Sümptomid

- Alanenud töövõime
- Alanenud koormustaluvus
- Pidev väsimustunne
- Sagedased haigestumised
- Uneprobleemid
- “Rasked jalad”

## Põhjused

- Liiga suur koormus, liiga vähe taastumist
- Treeningute monotoonsus
- Järsud muutused treeningu mahus ja intensiivsuses
- Sagedased haigused
- Uneprobleemid
- Vale, ebaregulaarne toitumine
- Psühholoogilised stressorid

**PUHKUS!**



## Üleväsimus

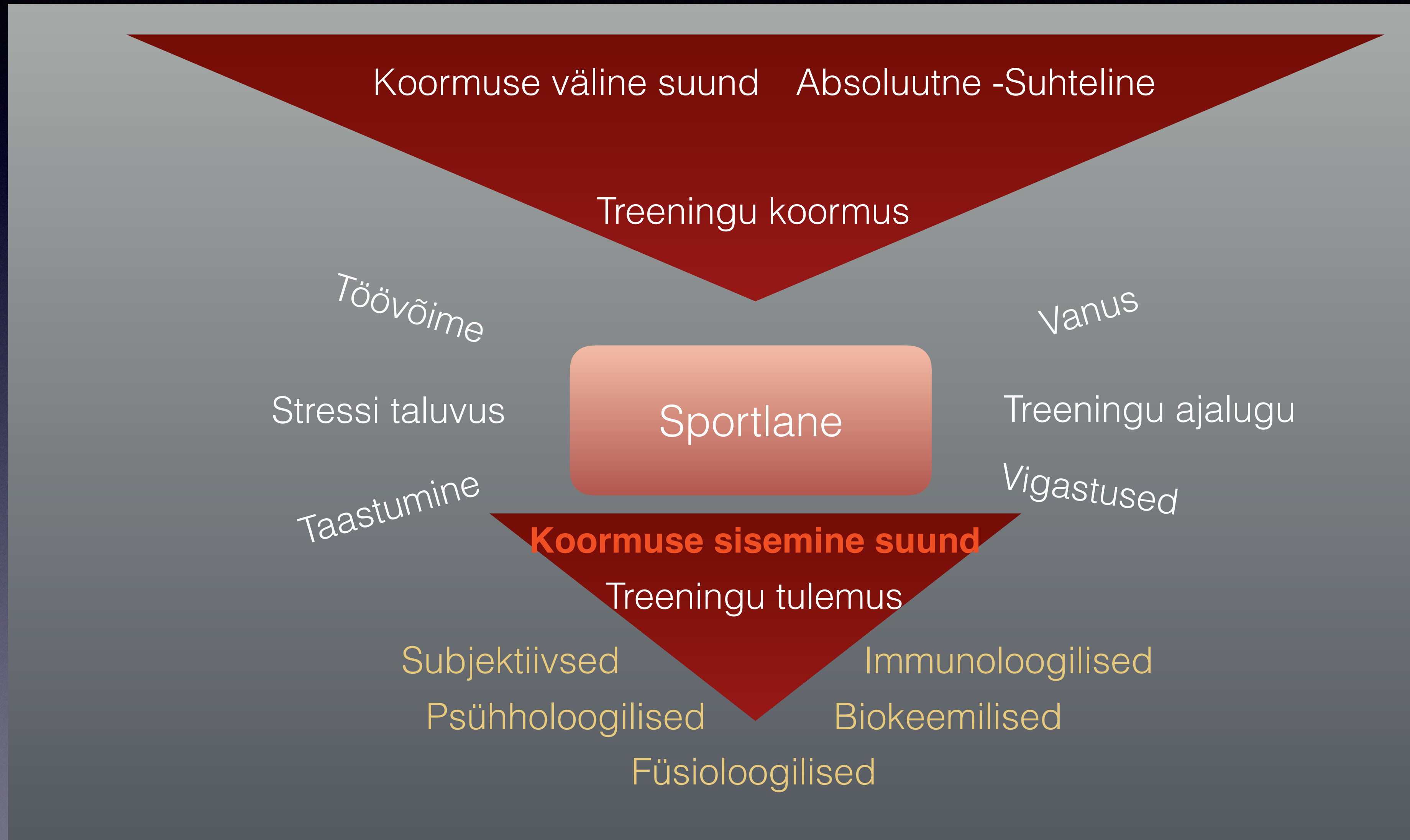
- Puhka paar päeva
- Treeninintensiivsus alla 30-40%
- Treeningmaht alla 30-40%



## Ületreeningusündroom

- Puhkus 1-2 nädalat. Enesetunne
- Taasalusta väga kergete treeningutega
- Siit samm-sammult edasi

# Treeningu koormuse mõju



# Treeningu koormus

Treeningu maht

x

intensiivsus

**Selleks, et saada heaks vastupidavuses  
tuleb treenida palju.....**

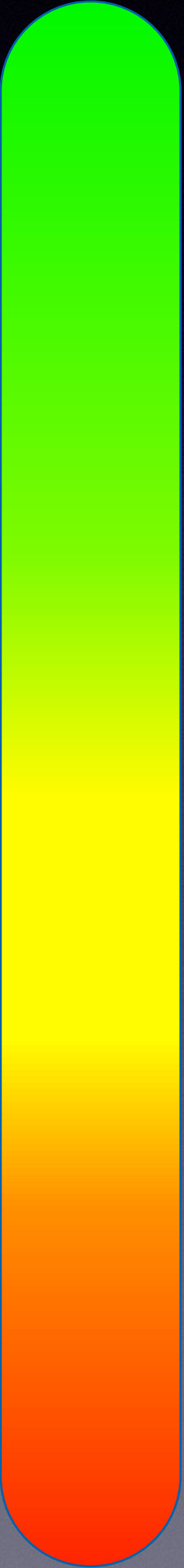
**..... ja tuleb treenida targalt.**

**Üks ilma teiseta ei ole kuidagi piisav.**

**Treeningute monotoonsus = Keskmise nädala koormus/Standardhälve**

**Hoia alla 2,0, eelistatult 1,5**

# Kui raske oli sinu treening?

- 
- 0- Puhkus
  - 1- Väga kerge
  - 2- Kerge
  - 3-
  - 4- Keskmine
  - 5- Raske
  - 6-
  - 7- Väga raske
  - 8- Väga, väga raske
  - 9- Peaaegu maksimaalne
  - 10- Maksimaalne

- “Kui raske oli sinu treening?”
- **RPE x treeningu pikkus**
- Jalgpallis:
  - 300-500 AU kerge treening
  - 700-1000 AU raske treening
- Vastupidavusaladel :
  - 200-400 AU kerge treening
  - 600-900 AU raske treening



# Quantifying training intensity dist is there evidence for an “optimal”

K. Stephen Seiler, Glenn Øvrevik Kjerland

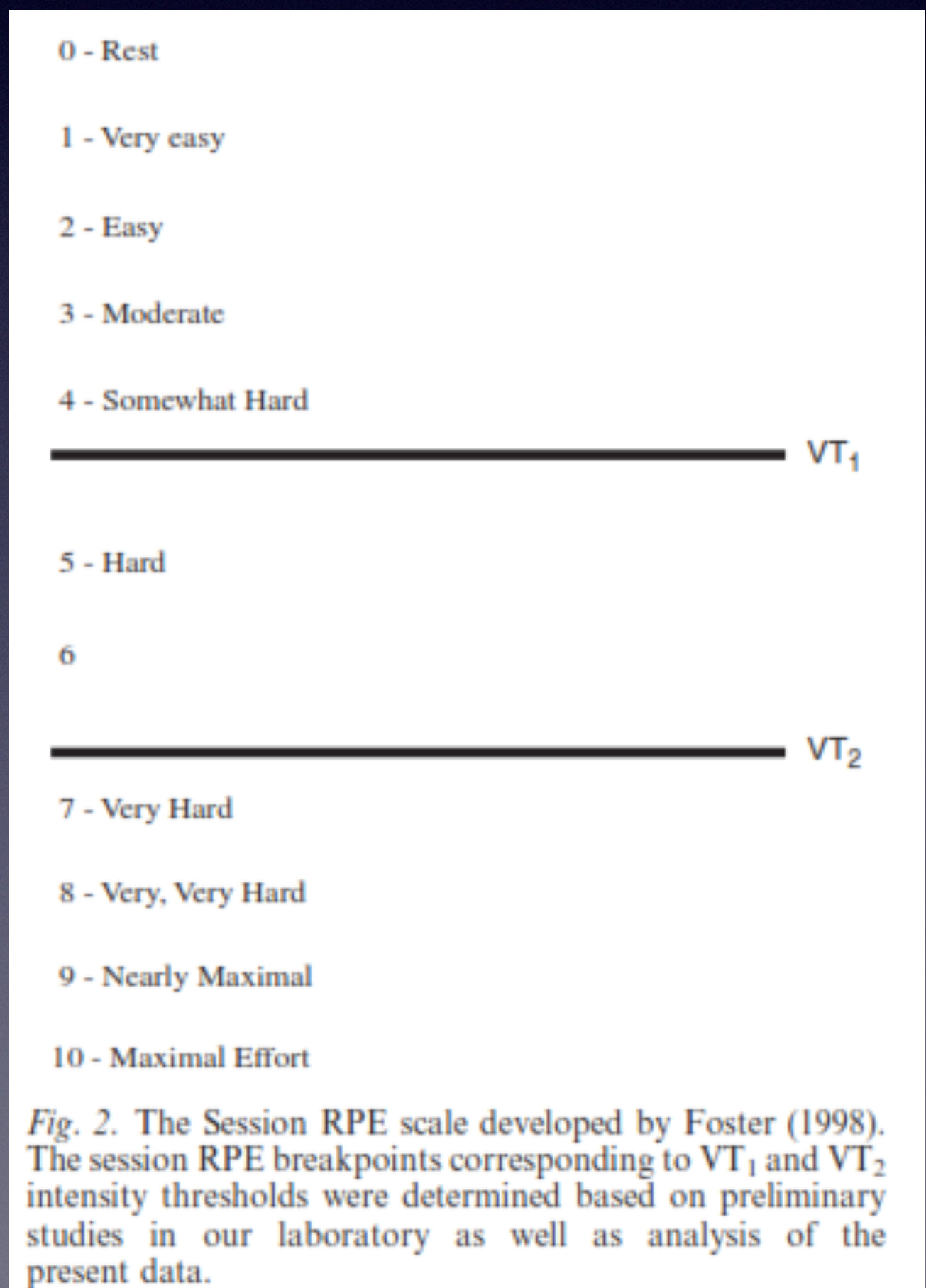
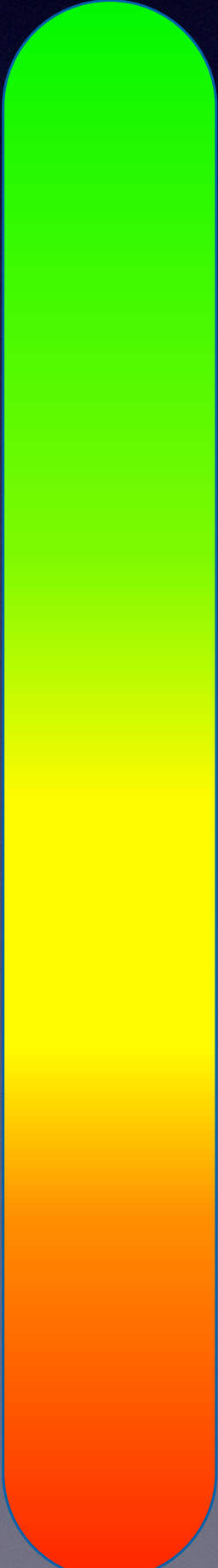
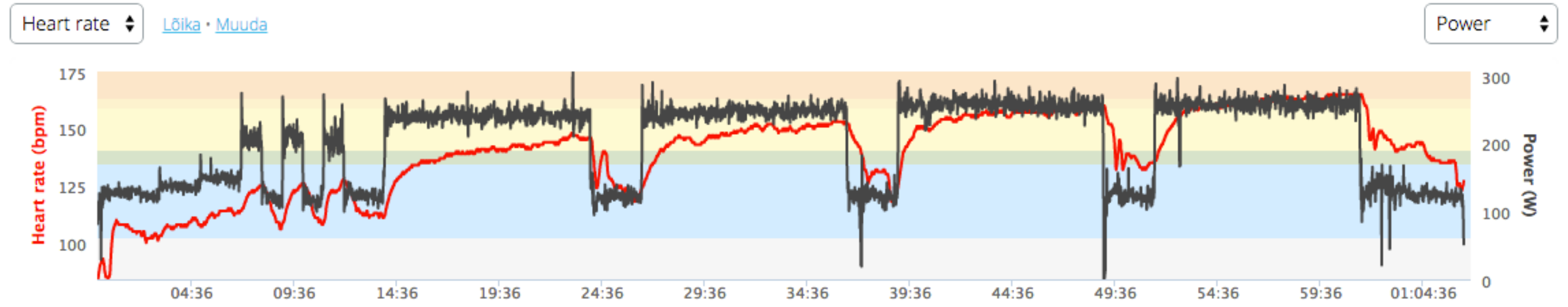
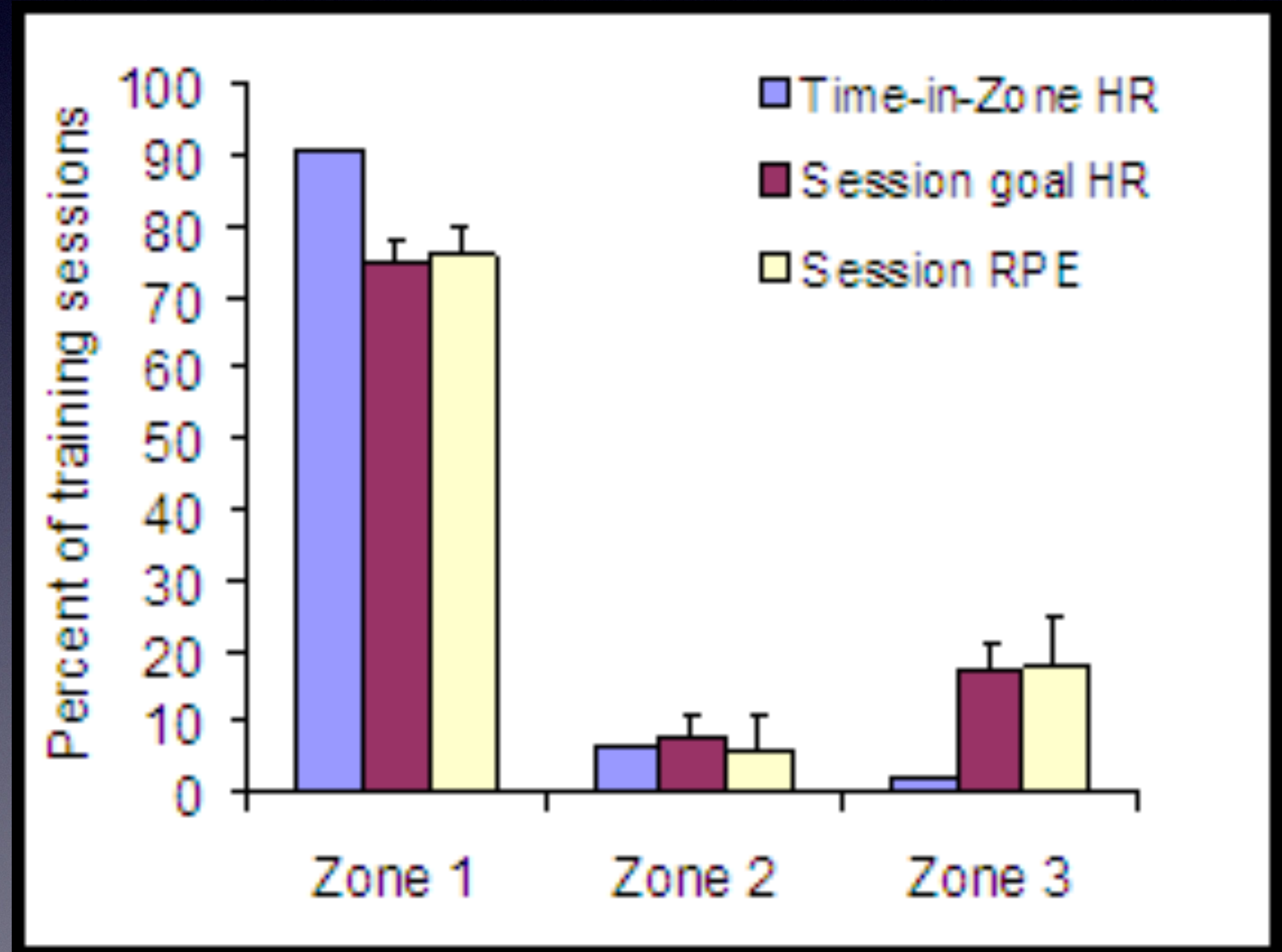
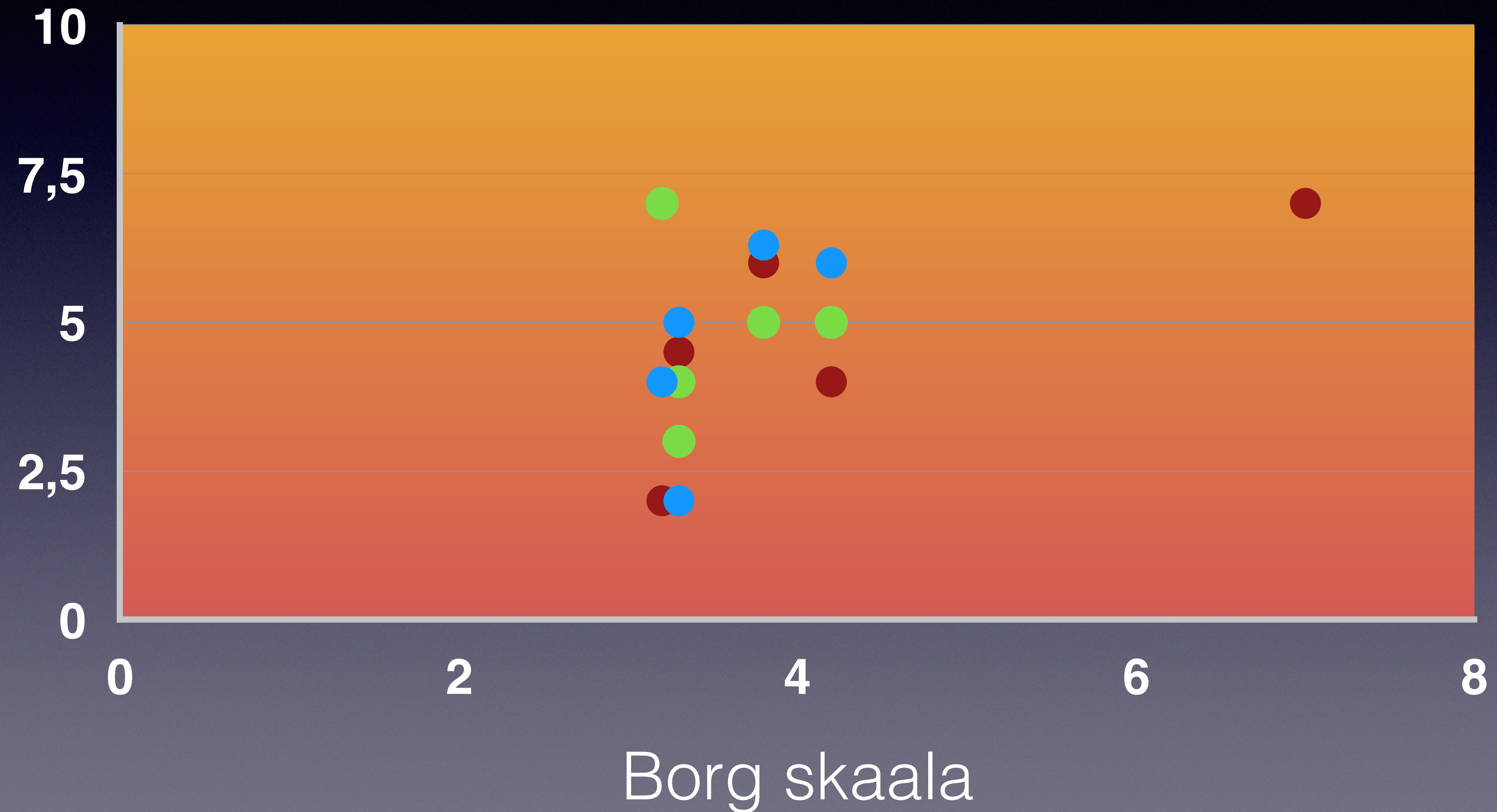


Fig. 2. The Session RPE scale developed by Foster (1998). The session RPE breakpoints corresponding to VT<sub>1</sub> and VT<sub>2</sub> intensity thresholds were determined based on preliminary studies in our laboratory as well as analysis of the present data.



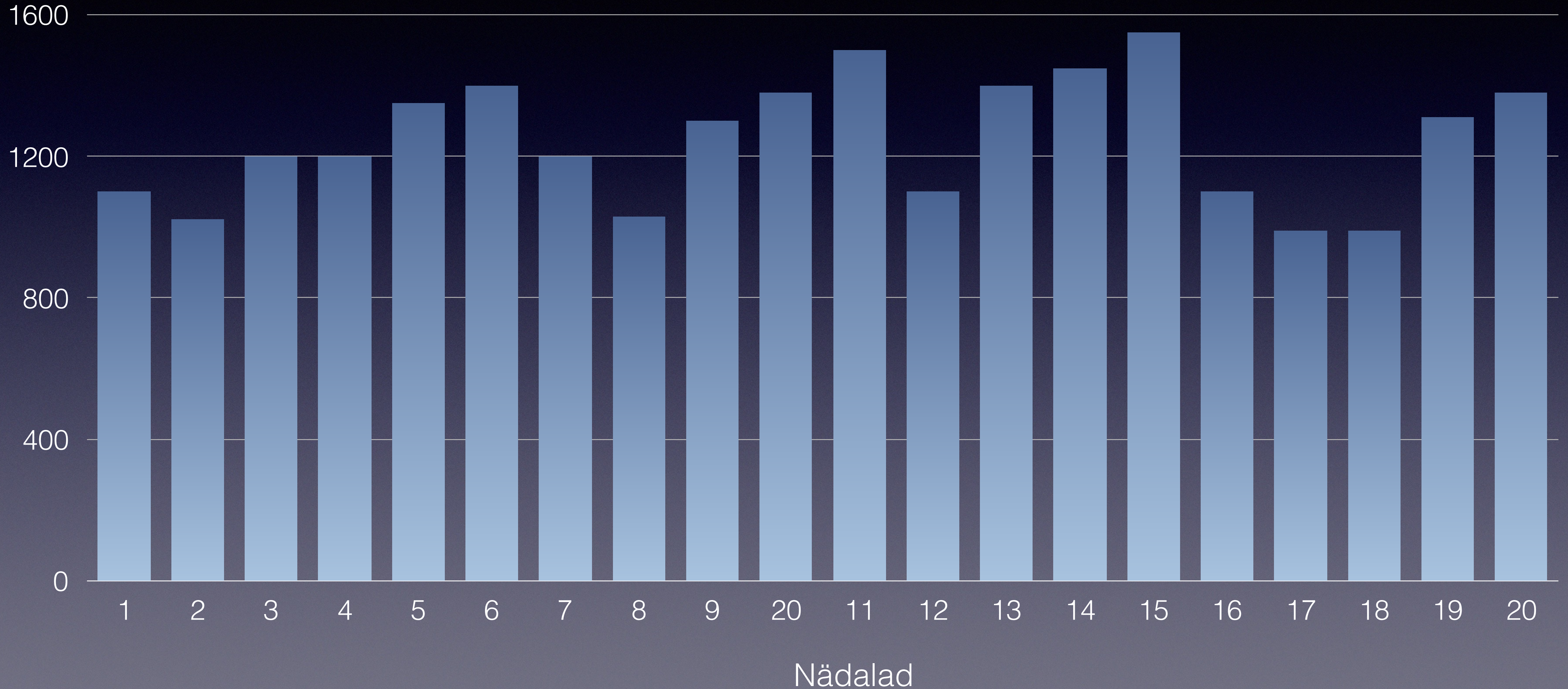
# Borg skaala ja ületreening



# Borg skaala ja treeningute raskus

Treeningu liik	n	Treener	Sportlane	r
Põhivastupidavuse treeningud	121	3,61±0,6	3,50±1,0	0,25; p=0,006
Kiirus- ja intervall treeningud	61	6,64±2,0	5,57±1,8	0,71; p=0,001
Taastavad treeningud	100	1,87±0,8	2,17±0,8	0,35; p=0,002
Kokku	282	3,65±2,0	3,48±1,7	0,80; p=0,001

# Treeningu koormuse planeerimine AUS sõudekoondisel



# Planeerisime ilusti, välja kukkus nagu ikka



**TABLE 5.** Comparison of 1 week of prescribed training loads for 2 squads: lightweight sculling women and heavyweight sculling men.

Lightweight women			Heavyweight men		
Day	Session description	Session load (T2min)	Day	Session description	Session load (T2min)
Monday	Rowing ergometer: 100- and 500-m test	62	Monday	Rowing ergometer: 100- and 500-m test	62
	On-water rowing: 70 min, technical row	69		On-water rowing: 70 min, technical row	68
	Rowing ergometer: 6,000-m test	133		Rowing ergometer: 6,000-m test	133
	Walk: 30-min brisk walk, active recovery	15		Stationary cycling: 60 min	56
Tuesday	On-water rowing: 88 min, race pieces	126	Tuesday	Rowing ergometer: 30 min	45
	On-water rowing: 98 min, race pieces	141		On-water rowing: 98 min, race pieces	141
	Conditioning: Pilates	20		On-water rowing: 70 min, technical row	68
Wednesday	Road cycling: commute to training	47	Wednesday	Road cycling: 90 min, flat ride	76
	On-water rowing: 60 min, short pieces	160		On-water rowing: 94 min, short pieces	179
	Walk: 30-min brisk walk, active recovery	14			
Thursday	Rowing ergometer: 81 min, long pieces	142	Thursday	Rowing ergometer: 60 min, short pieces	166
Friday	Conditioning: Pilates	20	Friday	Road cycling: commute to training	43
	Road cycling: commute to training	47		On-water rowing: 93 min, long pieces	105
Saturday	On-water rowing: 70 min, long pieces	121	Saturday	On-water rowing: 73 min, long pieces	137
	Road cycling: commute to training	47		On-water rowing: 70 min, technical row	68
	On-water rowing: 73 min, long pieces	137		Road cycling: 120 min, flat ride	98
Sunday	Stationary cycling: 70 min	69	Sunday	Day off	
	Walk: 30-min brisk walk, active recovery	15			
	Running: 45-min easy run, active recovery	67			
	Walk: 30-min brisk walk, active recovery	15			
	Total weekly training load (T2min)	1,467		Total weekly training load (T2min)	1,445

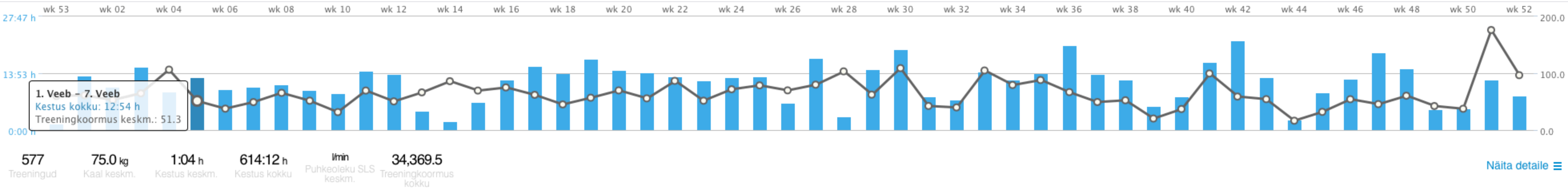
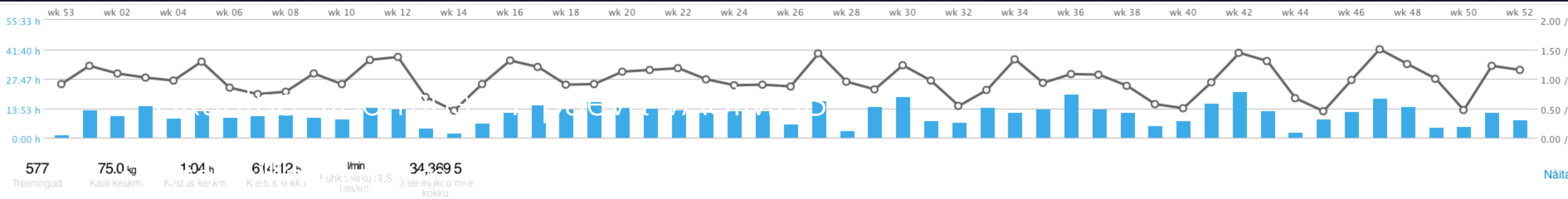
**Monotoonusus**

Naistel = 2,9

Meestel = 1,7

# Akuutne ja krooniline koormus

## Akuutne vs Krooniline koormus



Keskmine koormus

# Treeningute maht

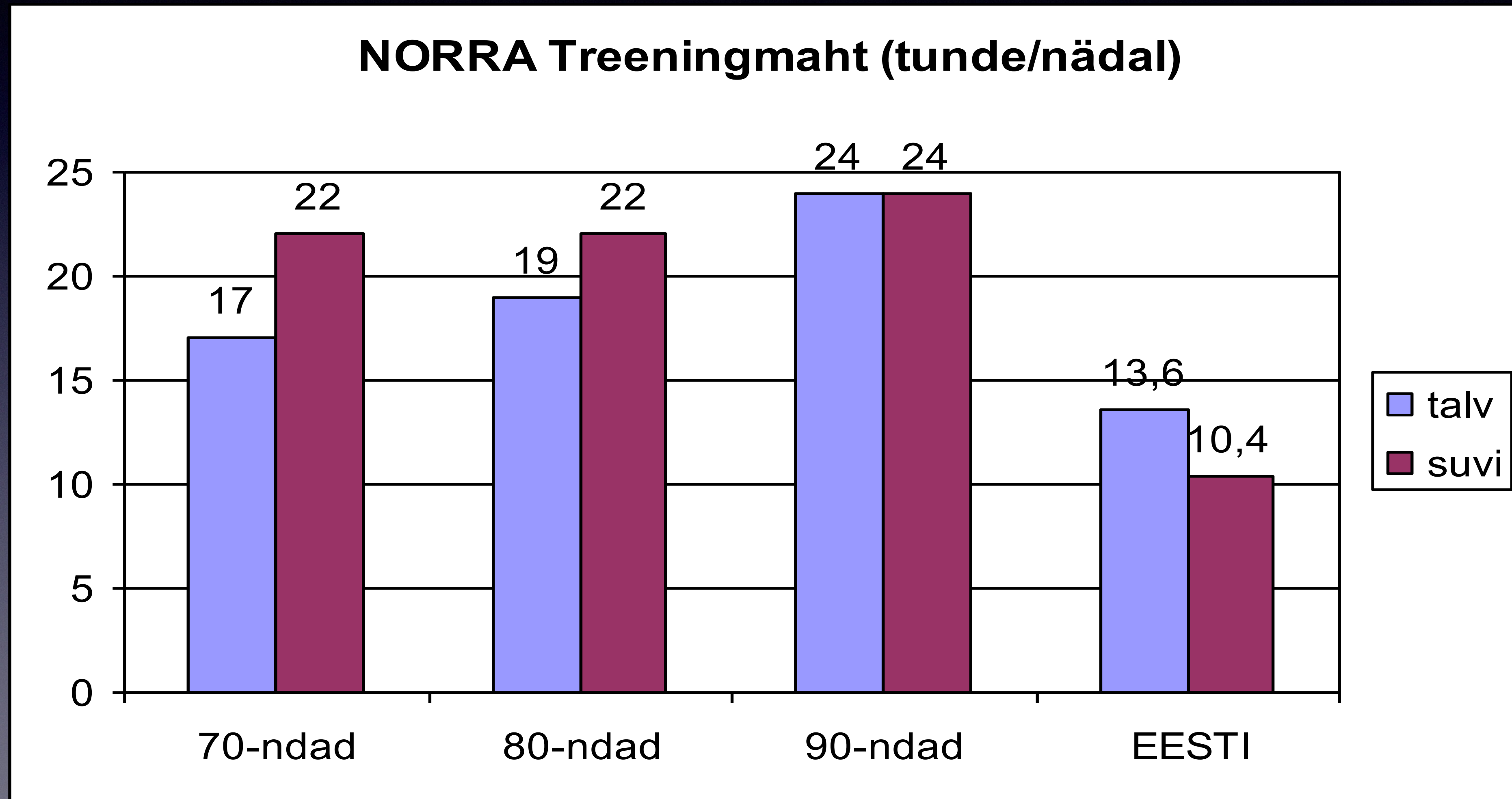
**Table 2.** Total training performed in the six months previous to the laboratory measurements in world class and national level sprint cross-country skiers (mean and SD).

	World-class ( <i>n</i> = 8)		National level ( <i>n</i> = 8)	
	Training hours	% of total training	Training hours	% of total training
<b>LIT</b>	340 ± 23**	76.4 ± 4.6	254 ± 94	73.1 ± 12.0
<b>MIT</b>	29 ± 12**	6.5 ± 2.2*	14 ± 6	4.4 ± 2.4
<b>HIT</b>	19 ± 3	4.4 ± 0.8	19 ± 8	5.6 ± 2.1
<b>Speed</b>	16 ± 7**	3.7 ± 1.5*	7 ± 3	2.3 ± 1.2
<b>Strength</b>	39 ± 14	8.8 ± 2.9	31 ± 14	9.4 ± 3.7
<b>Total</b>	445 ± 27**	100	341 ± 90	100

LIT, low intensity endurance training; MIT, moderate intensity endurance training; HIT, high intensity endurance training. Significant group differences, \*  $P < 0.05$  and \*\*  $P < 0.01$ .



# Treeningmahud Eesti vs Norra sõudekoondisel



2 tundi

### Soojendus, 0:30

keskm. 143 l/min

jooksime

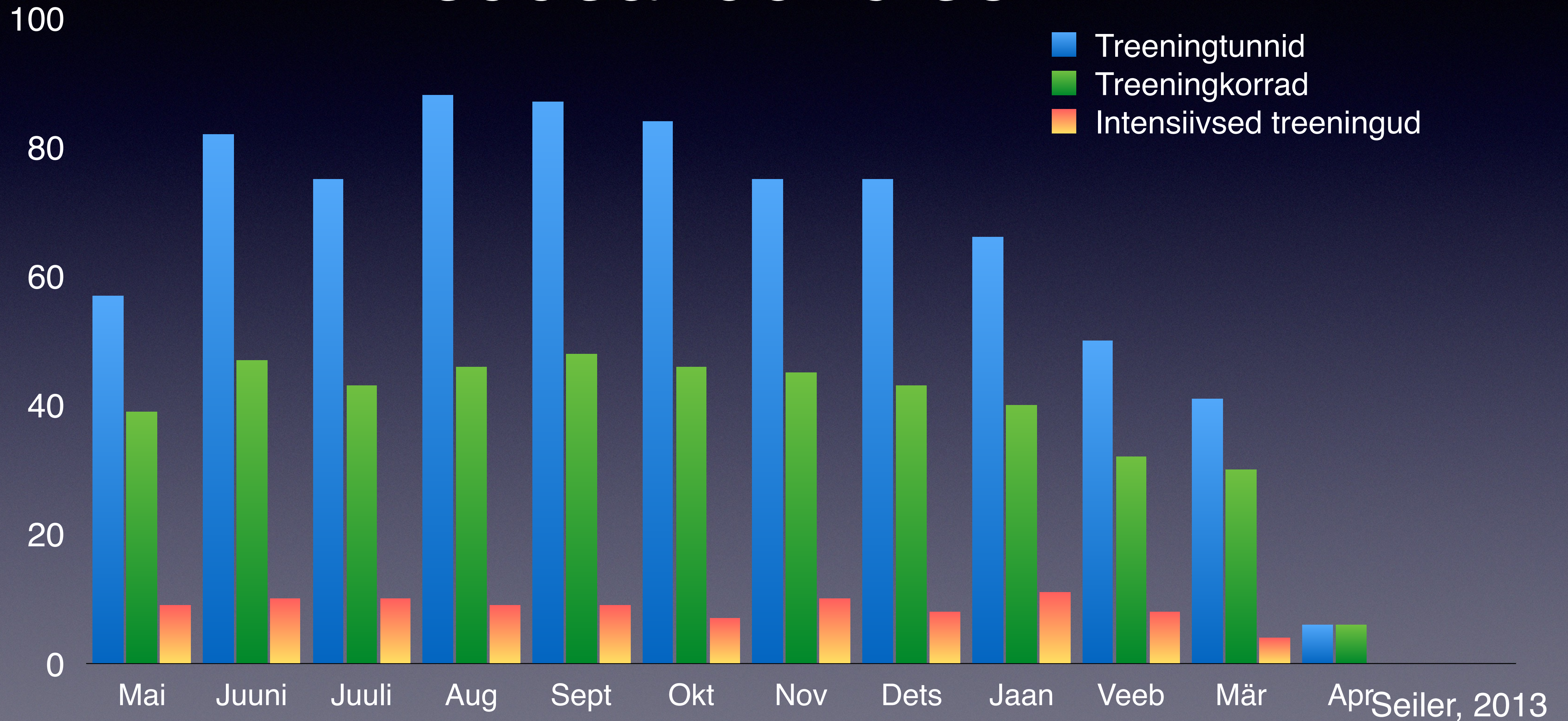
Kustuta

Vaata

Muuda

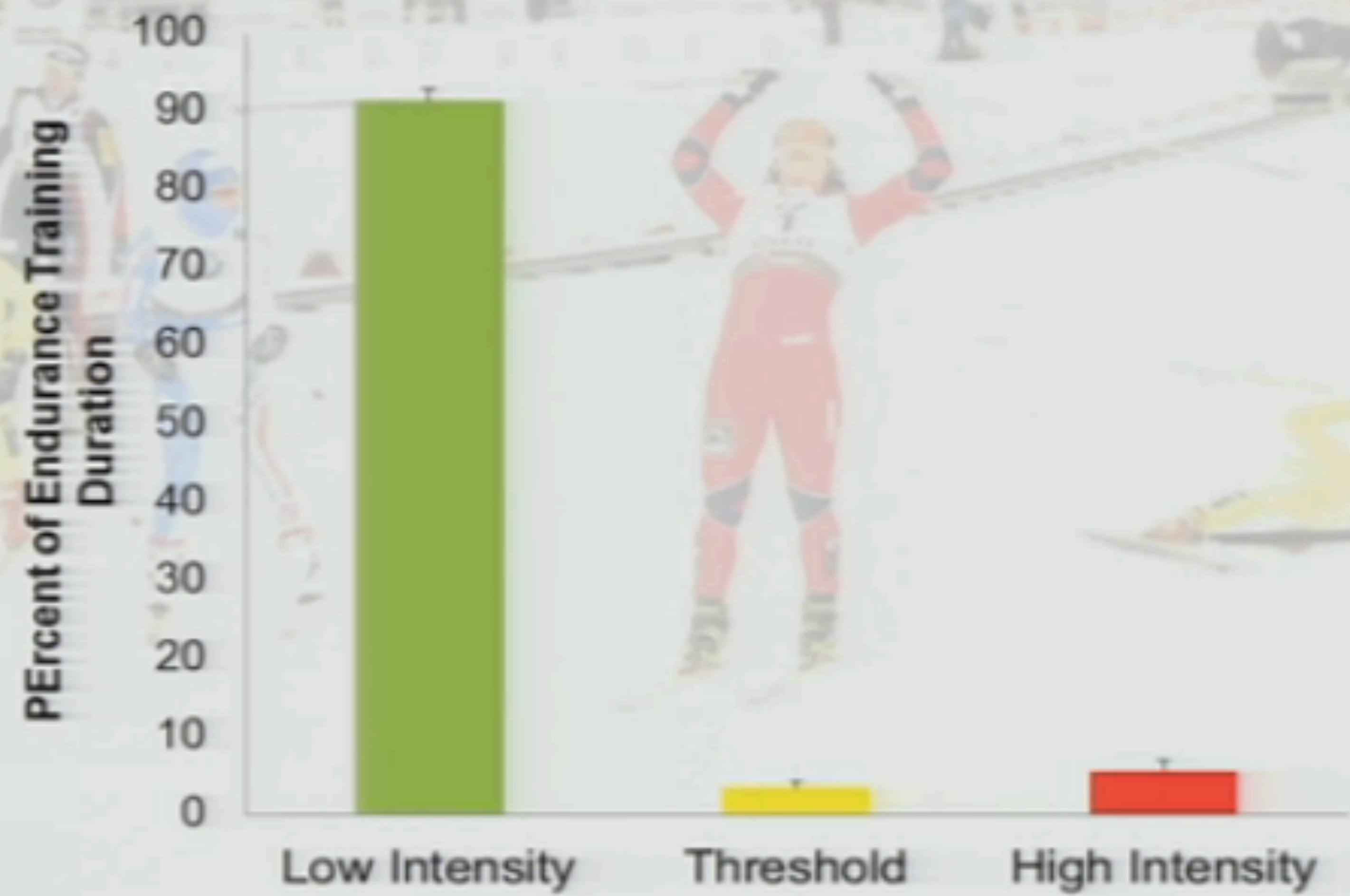


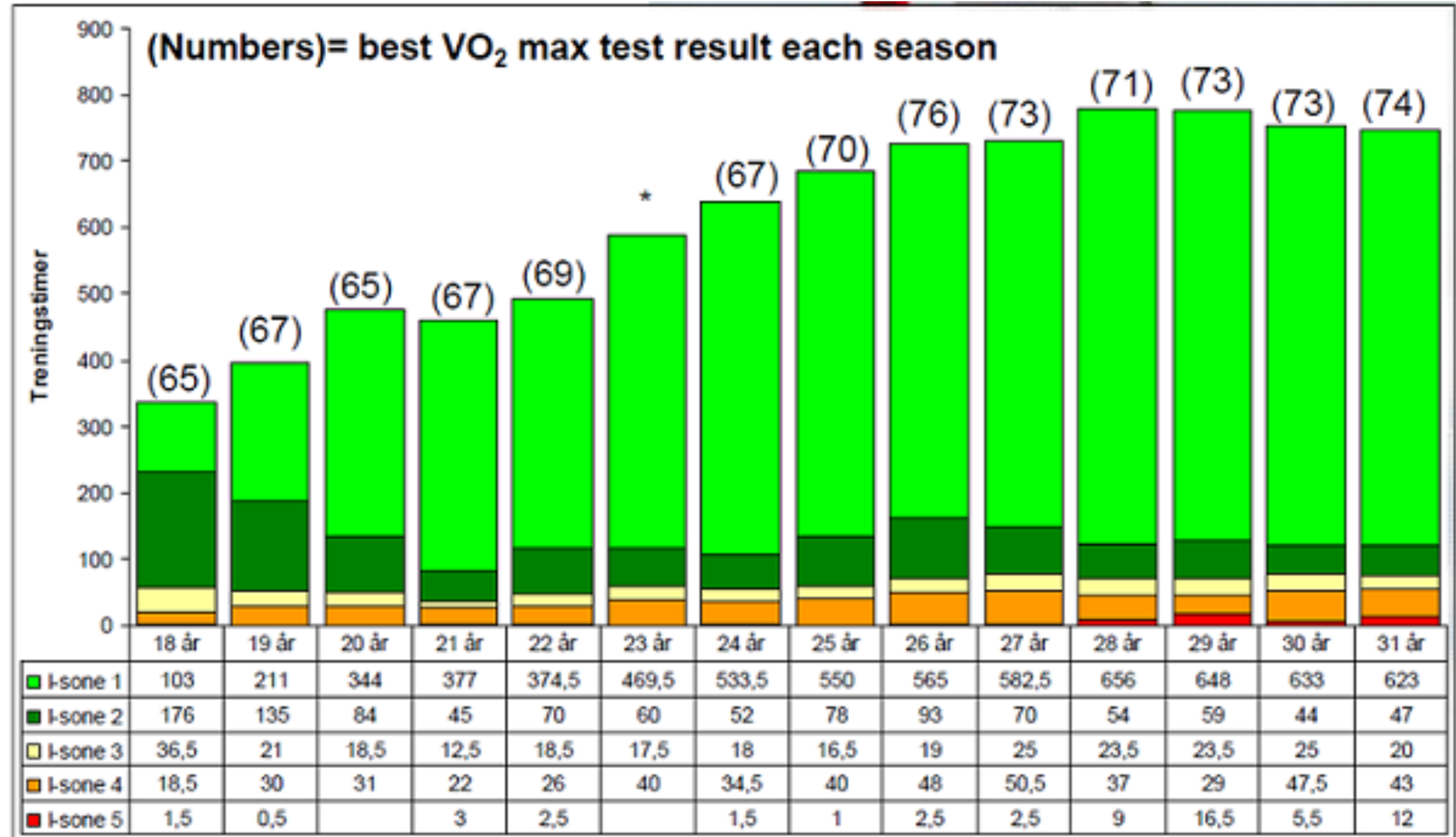
# Periodiseerimine Norra suusakoondisel



Seiler, 2013

# Annual intensity distribution of 12 Olympic/ World champions- XC skiing





# Treeningpäevik

- Pidev mõõtmine
- Kui meil puudub treeningpäevik, siis ei tea me kunagi, mis oli edu või ebaedu põhjuseks

## Olympic Preparation of a World-Class Female Triathlete

by Iñigo Mujika, IJSP 2014

Designed by ©YLM SportScience

**Ainhoa Murua**  
**7<sup>th</sup>** place  
2012 London Olympic Games

This study reports on the training program of a world-class female triathlete preparing to compete in the London 2012 Olympic Games

Over 50 weeks

**16 ± 4**

sessions per week



303 swim

194 bike

254 run

45 strength training



**21**

days of full rest over the year



427 h

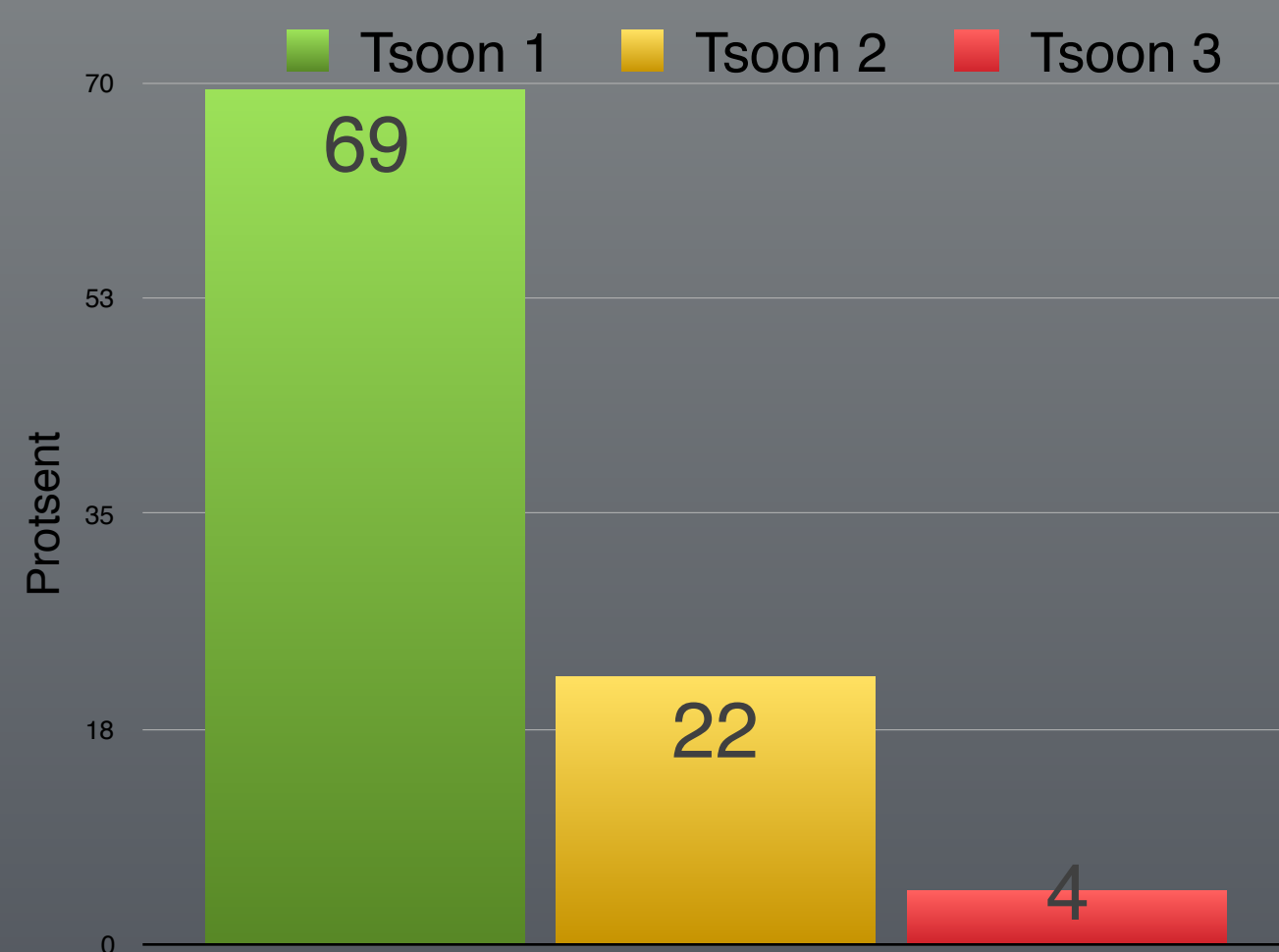
Training intensity distribution



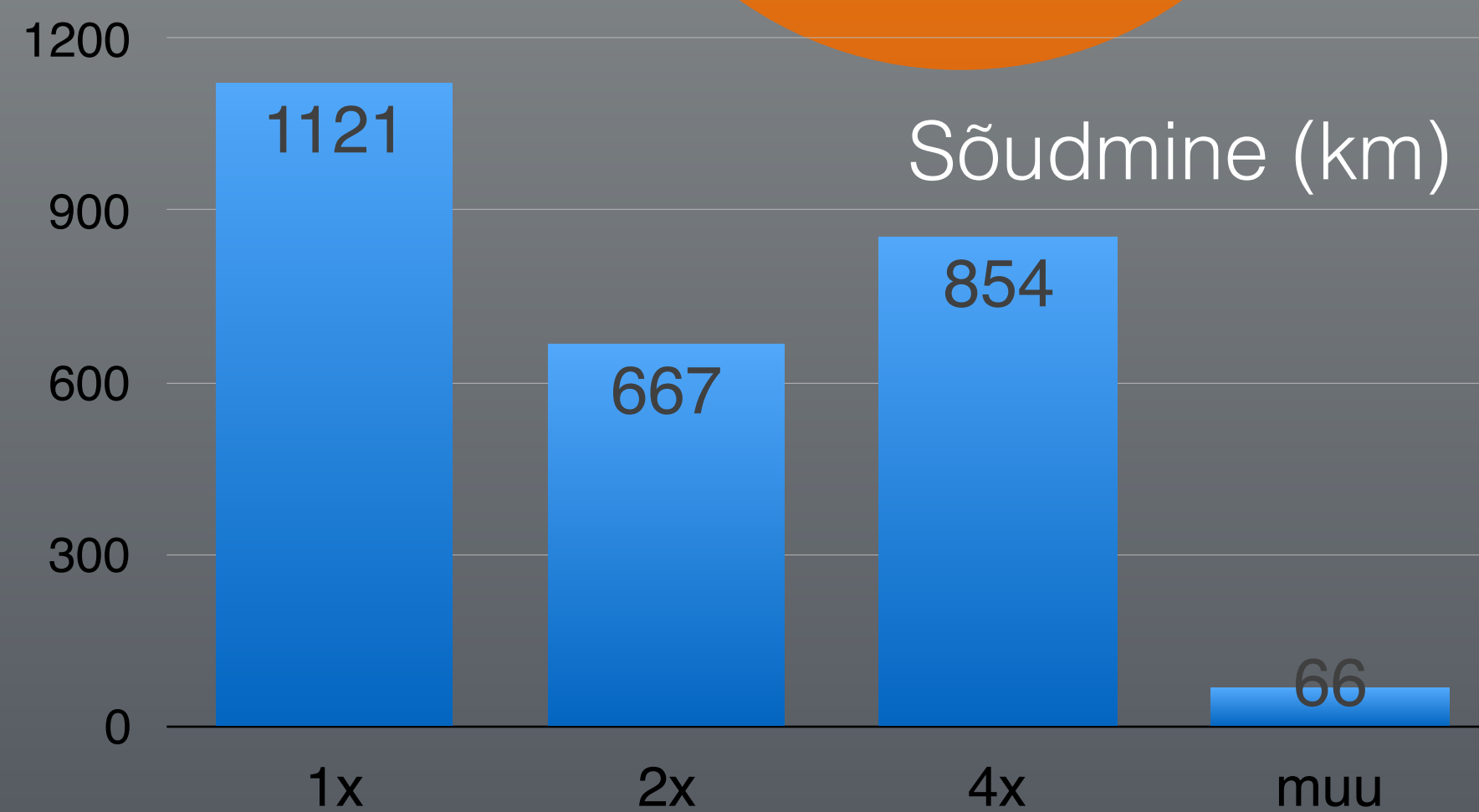
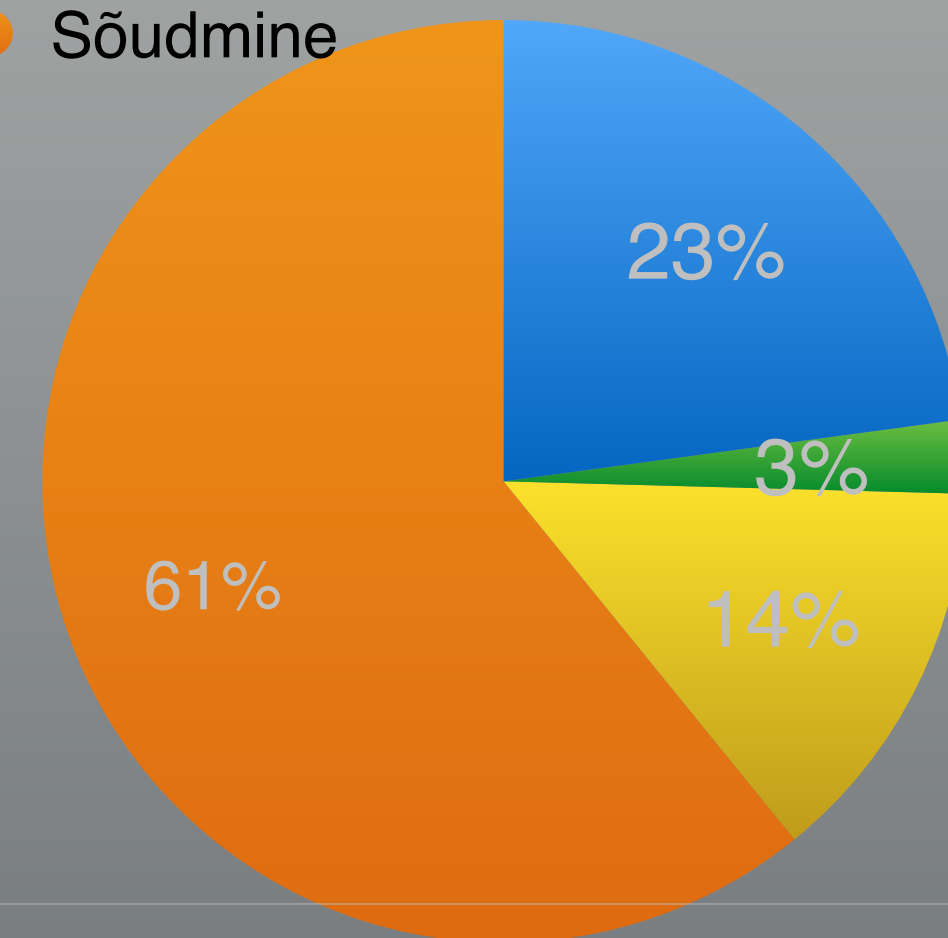
# 8 kuud olümpiapronksi viimase ettevalmistuse alguseni

*36 treeningnädalat*

Nädalas:  
10,7 treeningut  
14,0 tundi



● Jõutreening ● Jooks ● Jalgratas  
● Sõudmine



# Metoodika

## Kasvavate koormustega test

- Algkoormus 40W.
- Iga minut koormuse juurdekasv 20W
- Väjahingatava õhu parameetrid
  - »  $VO_{2MAX}$ , Vent, RER
- Aeroobne lävi
- Anaeroobne lävi
- Borg 10pt
- Laktaat 3, 5 ja 15 taastumine





# Metoodika

## Keha koostis

- DXA
  - » Rasva mass
  - » Rasvavaba mass

## Maksimaalne töövõime

- » 5000m suusarollerid
- » Aeg
- » Borg 10pt
- » Laktaat 3, 5 ja 15 min



# Tulemused

Vaatlusaluste keha koostise näitajad uuringuperioodi alguses ja lõpus.

	EG (n=7)		KG (n=9)	
	Test 1	Test 2	Test 1	Test 2
Rasvavaba mass (kg)	64,1±7,4	63,84±8,3	60,8±2,7	60,79±2,41
Keha rasva %	13,73±1,36	13,50±0,82	14,01±2,35	14,3±2,1
Keha rasvamass (kg)	10,72±1,69	10,48±1,61	10,39±1,74	10,68±1,61
Käte lihasmass (kg)	3,8±0,7	3,8±0,7	3,70±0,8	3,55±0,3
Jalgade lihasmass (kg)	10,8±1,4	10,6±1,2	10,5±0,5	10,4±0,4
Käte rasvamass (kg)	0,5±0,09	0,5±0,08	0,5±0,08	0,5±0,08
Jalgade rasvamass (kg)	1,9±0,4	1,8±0,4	1,9±0,7	2,0±0,7

# Tulemused

*Vaatlusaluste töövõime näitajad kasvavate koormustega paaristõuke-ergomeetri testil ning maksimaalse 5000 meetri testil.*

	EG (n=7)			KG (n=9)		
	Test 1	Test 2	muutuse%	Test 1	Test 2	muutuse%
Töövõime (W)	332,2±68,3	336,5±62,1	2%	282,2±22,6	303,5±18,1*	8%
VO <sub>2</sub> max (ml/min/kg)	48,7±4,1	59,0±4,0*	17,5%	50,2±5,8	58,0±4,9*	13%
Anaeroobne lävi (W)	240,3±39,8	259,0±47,6*	7,3%	223,9±19,6	230,7±16,9*	7%
VO <sub>2</sub> AnL (ml/min/kg)	40,4±4,1	48,7±6,7*	17,1%	46,4±6,2#	45,4±3,2	-2%
Aeroobne lävi (W)	156,7±40,5	164,1±34,5*	4,5%	140,7±8,7	145,7±13,4	4%
VO <sub>2</sub> AeL (ml/min/kg)	29,1±3,4	32,4±3,8	10%	28,3±5,1	31,5±5,4	11%
LA5 min (mmol/l)	13,3±3,7	11,4±2,3	-16%	14,7±3,2	11,6±2,6	-26%
LA15 min (mmol/l)	10,0±3,2	8,0±3,2	-25%	12,6±3,8	8,6±2,5	-46%
5000 m (s)	769,7±34,9	736,9±28,7*	-4,4%	808,2±32,9	756,5±35,1*	-6%
Borg (10pt)	9,0±1,7	9,2±0,7	3%	8,7±0,9	9,1±0,8	5%
LA5 min (mmol/l)	8,3±2,3	9,8±2,7	16%	10,6±2,4	9,8±3,0	-8%
LA15 min (mmol/l)	5,6±1,8	5,7±2,5	13%	6,9±2,1	6,7±2,6	-2%

# How Do Endurance Runners Actually Train? Relationship with Competition Performance

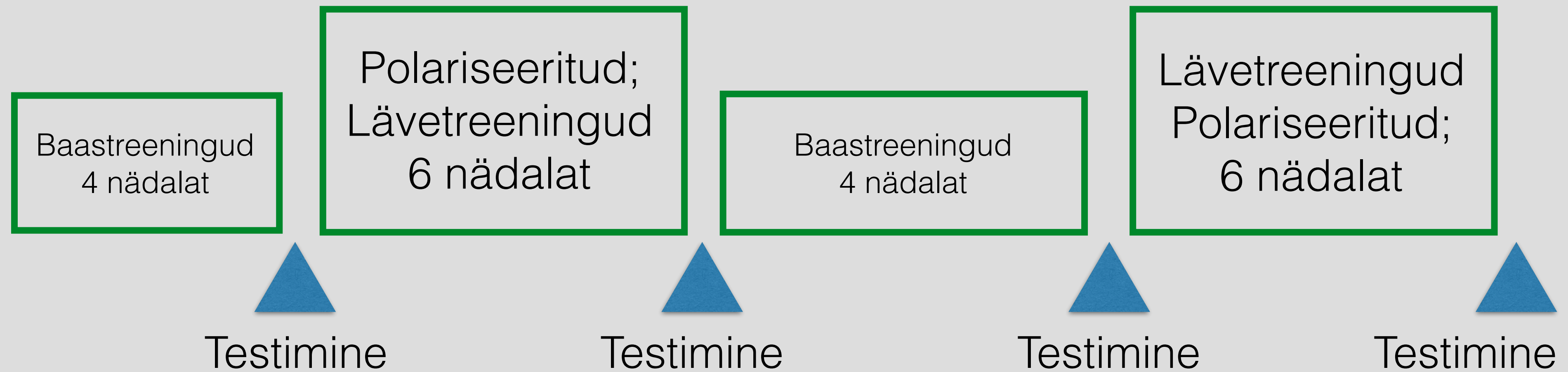
JONATHAN ESTEVE-LANAO<sup>1</sup>, ALEJANDRO F. SAN JUAN<sup>1</sup>, CONRAD P. EARNEST<sup>2</sup>, CARL FOSTER<sup>3</sup>, and ALEJANDRO LUCIA<sup>1</sup>

<sup>1</sup>Exercise Physiology Laboratory, European University of Madrid, SPAIN; <sup>2</sup>Cooper Institute Center for Human Performance and Nutrition Research, Dallas, TX; and <sup>3</sup>University of Wisconsin-La Crosse, La Crosse, WI

- 2 gruppi kõrge klassiga jooksjaid (10k ~ 32 min)
- 5 kuuline treeningprogramm (80-100 km nädalas)
- Grupp 1. 80/10/10 (T1, T2, T3)
- Grupp 2 65/25/10
- Treening koormus (TRIMP) võrdne gruppide vahel.
- Jõutreeningud indentsed.
  - Kasvavate koormustega test (Intensiivsustsoonid)
  - 10,4 km krossijooks eksperimendi algul ja lõpul

# Six weeks of a polarized training-intensity distribution leads to greater physiological and performance adaptations than a threshold model in trained cyclists

Craig M. Neal,<sup>1</sup> Angus M. Hunter,<sup>1</sup> Lorraine Brennan,<sup>2</sup> Aifric O’Sullivan,<sup>2</sup> D. Lee Hamilton,<sup>1</sup> Giuseppe DeVito,<sup>3</sup> and Stuart D. R. Galloway<sup>1</sup>



	Units	POL	THR
<b>Total training time</b>	min/wk	381 ( $\pm$ 85)	458 ( $\pm$ 120)*
<b>Training load</b>	intensity zone $\times$ duration	517 ( $\pm$ 90)	633 ( $\pm$ 119)*
<b>Zone 1</b>	% of training time	80 ( $\pm$ 4)	57 ( $\pm$ 10)*
<b>Zone 2</b>	% of training time	0 ( $\pm$ 0)	43 ( $\pm$ 10)*
<b>Zone 3</b>	% of training time	20 ( $\pm$ 4)	0 ( $\pm$ 0)*

# Six weeks of a polarized training-intensity distribution leads to greater physiological and performance adaptations than a threshold model in trained cyclists

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Training Model	Measure	$\Delta$ , %	Effect Size	Descriptor*
<b>POL</b>	40-km TT MPO, W	8 ( $\pm$ 8)	0.57	Moderate
	LT, W	9 ( $\pm$ 9) <sup>†</sup>	0.59	Moderate
	LTP, W	6 ( $\pm$ 10)	0.40	Small
	PPO, W	8 ( $\pm$ 5) <sup>†</sup>	0.77	Moderate
	95% exercise capacity, s	85 ( $\pm$ 43) <sup>†</sup>	2.44	Large
<b>THR</b>	40-km TT MPO, W	4 ( $\pm$ 6)	0.35	Small
	LT, W	2 ( $\pm$ 14)	0.11	Trivial
	LTP, W	4 ( $\pm$ 7)	0.34	Small
	PPO, W	3 ( $\pm$ 4)	0.26	Small
	95% exercise capacity, s	37 ( $\pm$ 45)	0.99	Large

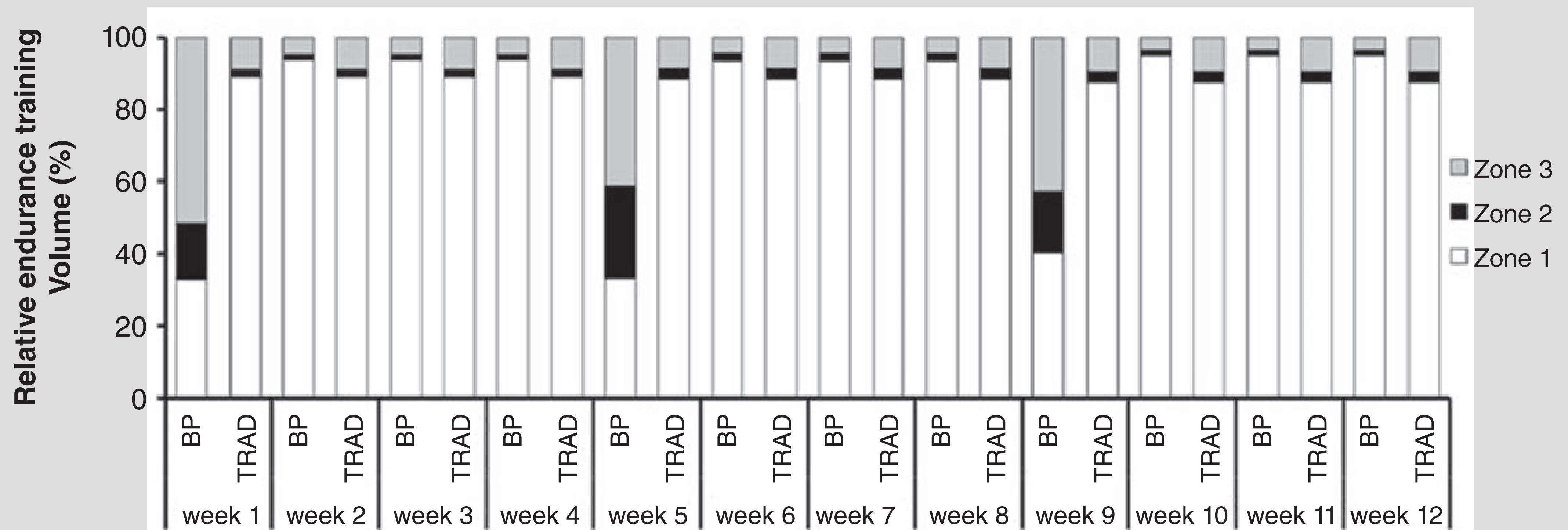
# Effects of 12 weeks of block periodisation on performance and performance indices in well-trained cyclists

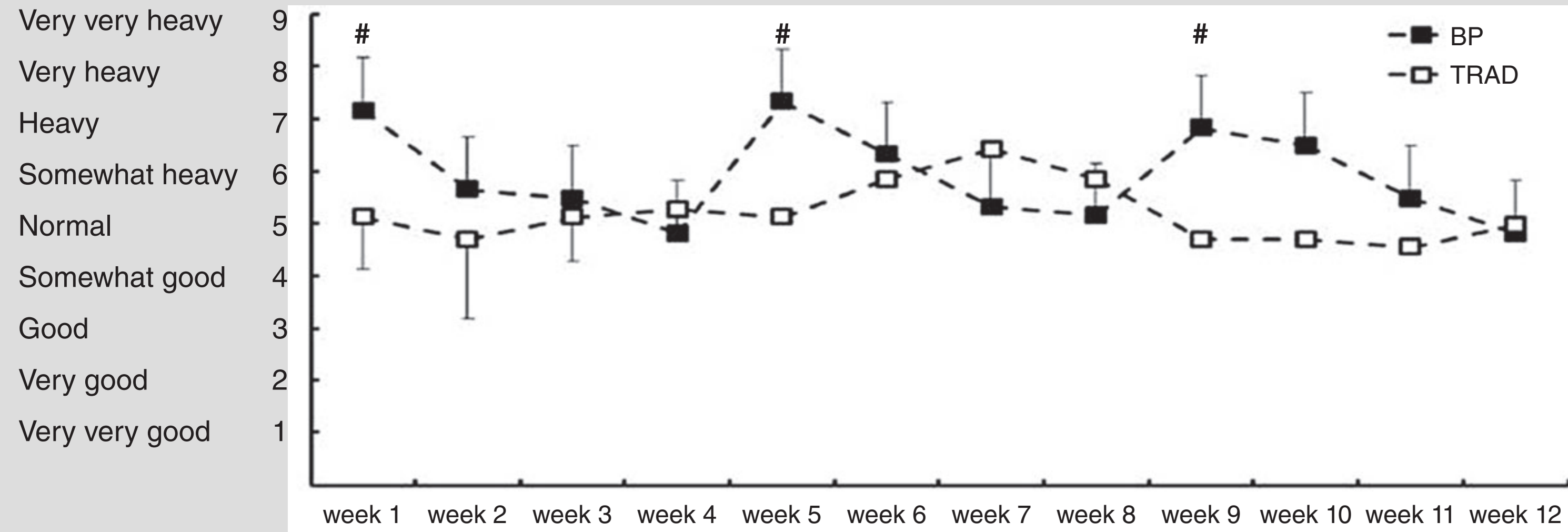
(Rønnestad et al., 2014)



	BP ( <i>n</i> = 8)	TRAD ( <i>n</i> = 7)
Body mass (kg)	76 ± 7	78 ± 7
Body height (cm)	181 ± 5	182 ± 6
Age (years)	32 ± 7	34 ± 6
Experience (years)	6 ± 4	6 ± 4
VO <sub>2max</sub> (L/min)	4.7 ± 0.5	4.9 ± 0.5

- Astmeline koormustest
- 40 km time-trial





	BP (n = 8)		TRAD (n = 7)		Magnitude of BP vs TRAD
	Pre	Post	Pre	Post	
VO <sub>2max</sub> (L/min)	4.7 ± 0.5	5.1 ± 0.6*†	4.9 ± 0.5	5.1 ± 0.6*	0.99
(mL/kg/min)	62 ± 2	68 ± 5*†	63 ± 3	66 ± 4*	1.08
HR <sub>peak</sub> (beats/min)	187 ± 15	186 ± 15	182 ± 12	179 ± 12	
[la <sup>-</sup> ] (mmol/L)	13 ± 2	12 ± 3	11 ± 1	12 ± 2	
RPE	19 ± 1	19 ± 1	19 ± 1	19 ± 1	
W <sub>max</sub> (W/kg)	5.40 ± 0.33	5.80 ± 0.43*	5.45 ± 0.32	5.67 ± 0.40	0.62
Hemoglobin mass (g)	999 ± 136	1053 ± 130*	1088 ± 123	1098 ± 120	0.83
Power <sub>2mmol/L</sub> (W/kg)	2.89 ± 0.50	3.49 ± 0.46*†	3.23 ± 0.43	3.56 ± 0.41*	1.12
%VO <sub>2max</sub>	64 ± 9	67 ± 8	68 ± 7	70 ± 7	
Gross efficiency (%)	20.3 ± 0.8	20.9 ± 0.7	19.6 ± 0.4	19.5 ± 0.4	1.10
Power <sub>40 min</sub> (W/kg)	3.71 ± 0.38	4.00 ± 0.31*	3.98 ± 0.31	4.14 ± 0.30*	0.89



# Kokkuvõte

- Objektivne testimine, ära unusta ehitusblokke
- Kui täpselt me teame milline on koormus ja kuidas koormus sportlasele mõjub?
- Ärge alahinnake sportlase enda poolt raporteeritavaid andmeid
- Olge järjekindlad!

Küsimused ??