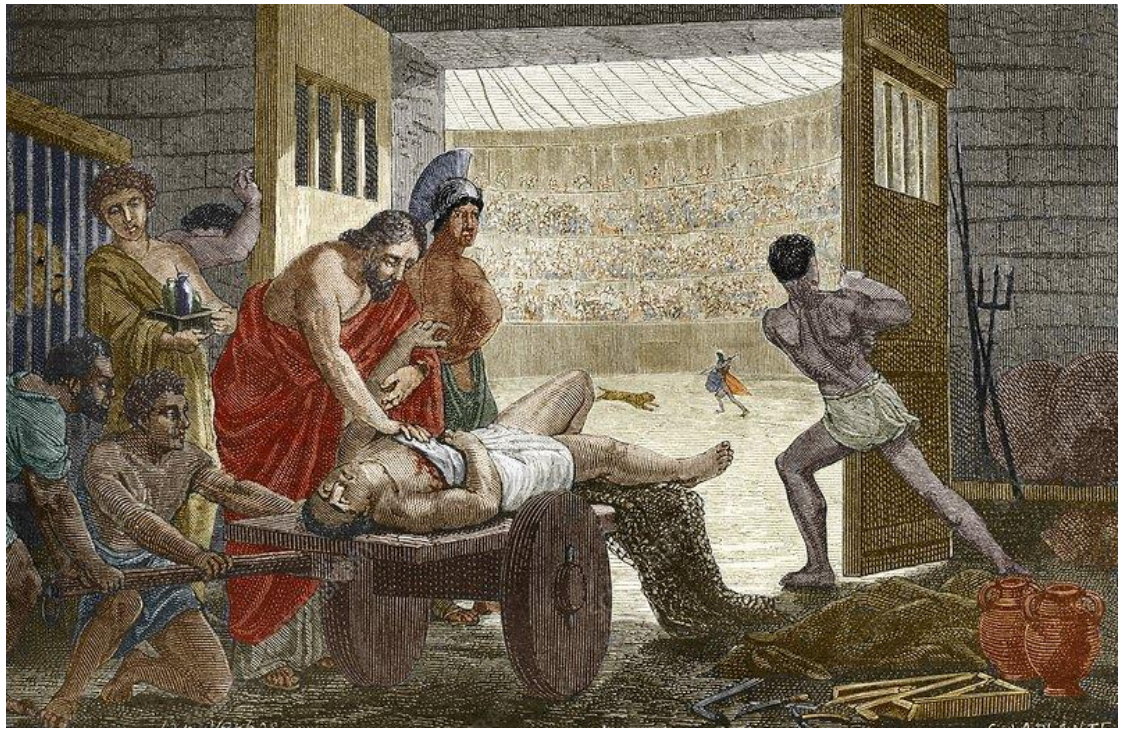
TÜRKİYE TRİATLON FEDERASYONU ANTRENÖR GELİŞİM SEMİNERİ

TRİATLON SPORUNDA BİSİKLET VE ATLETİZM PERFORMANS TESTLERİ

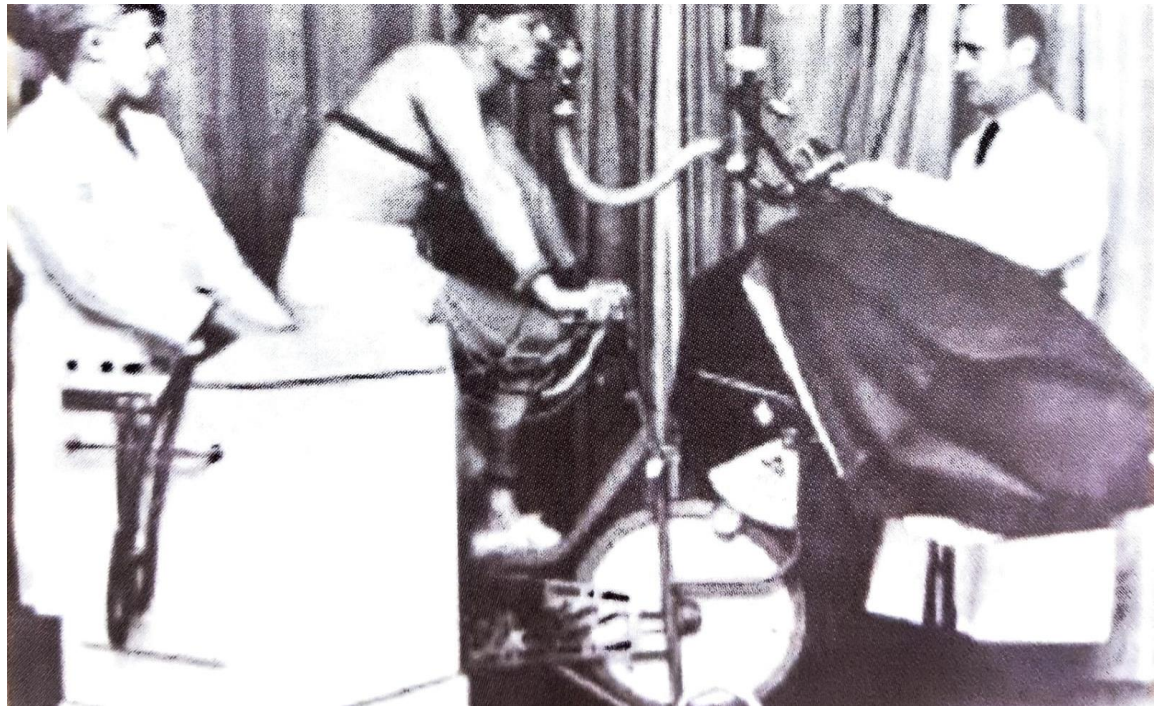
Arş. Gör. Ömer Cumhur BOYRAZ
Antrenörlük Eğitimi Anabilim Dalı
Spor Bilimleri Fakültesi
Çukurova Üniversitesi


SAĞLIKLI YAŞAM MERKEZİ


CLAUDE GALIEN



- **David Bruce Dill 1891- 1986**
- Harvard Yorgunluk Laboratuvarı
- Egzersiz reçetesi, eşik kavramları, diyet ve metabolizmada substrat, laktat, egzersiz ve hipoksi
- **Per-Olof Åstrand 1922 -2015**
- Metabolik yanıtlar → maksimal egzersiz




TÜRKİYE
ORBEA
ASUS

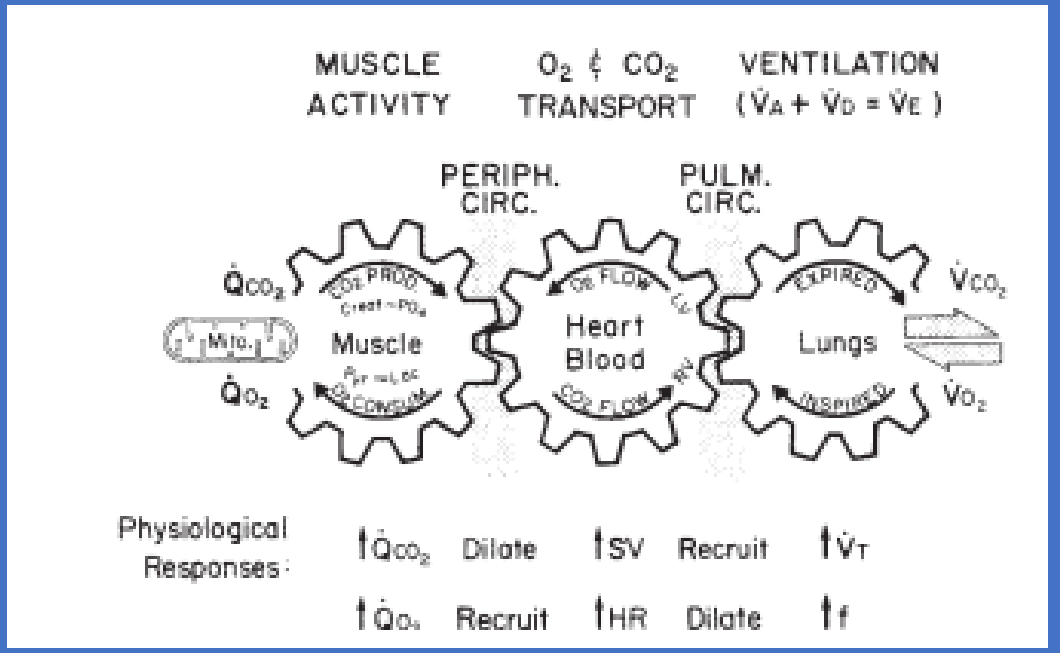
Training is Testing  **Testing is Training**

Ölçmediğini bilemezsin.

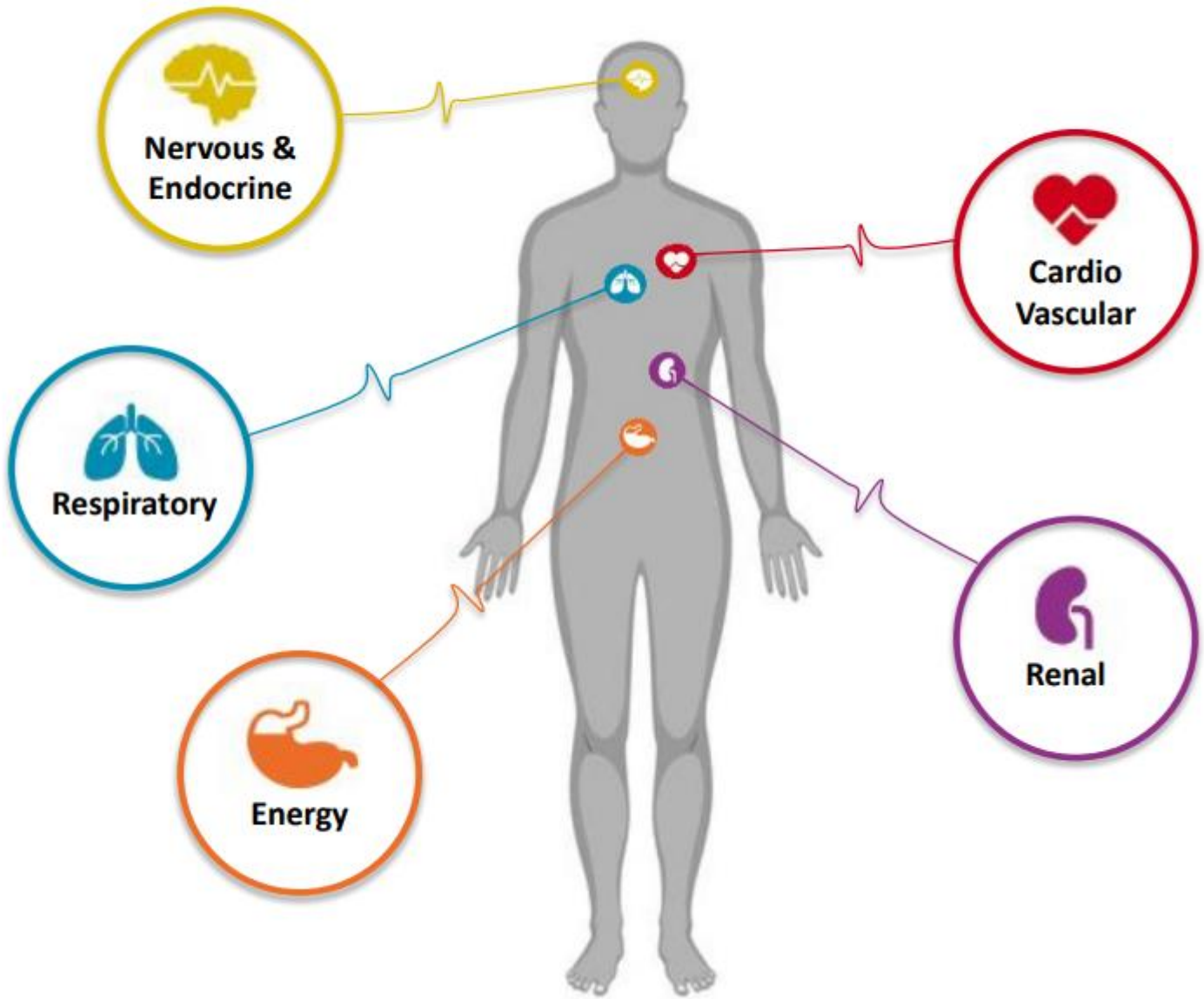
Bilmediğini antrene edemezsin.

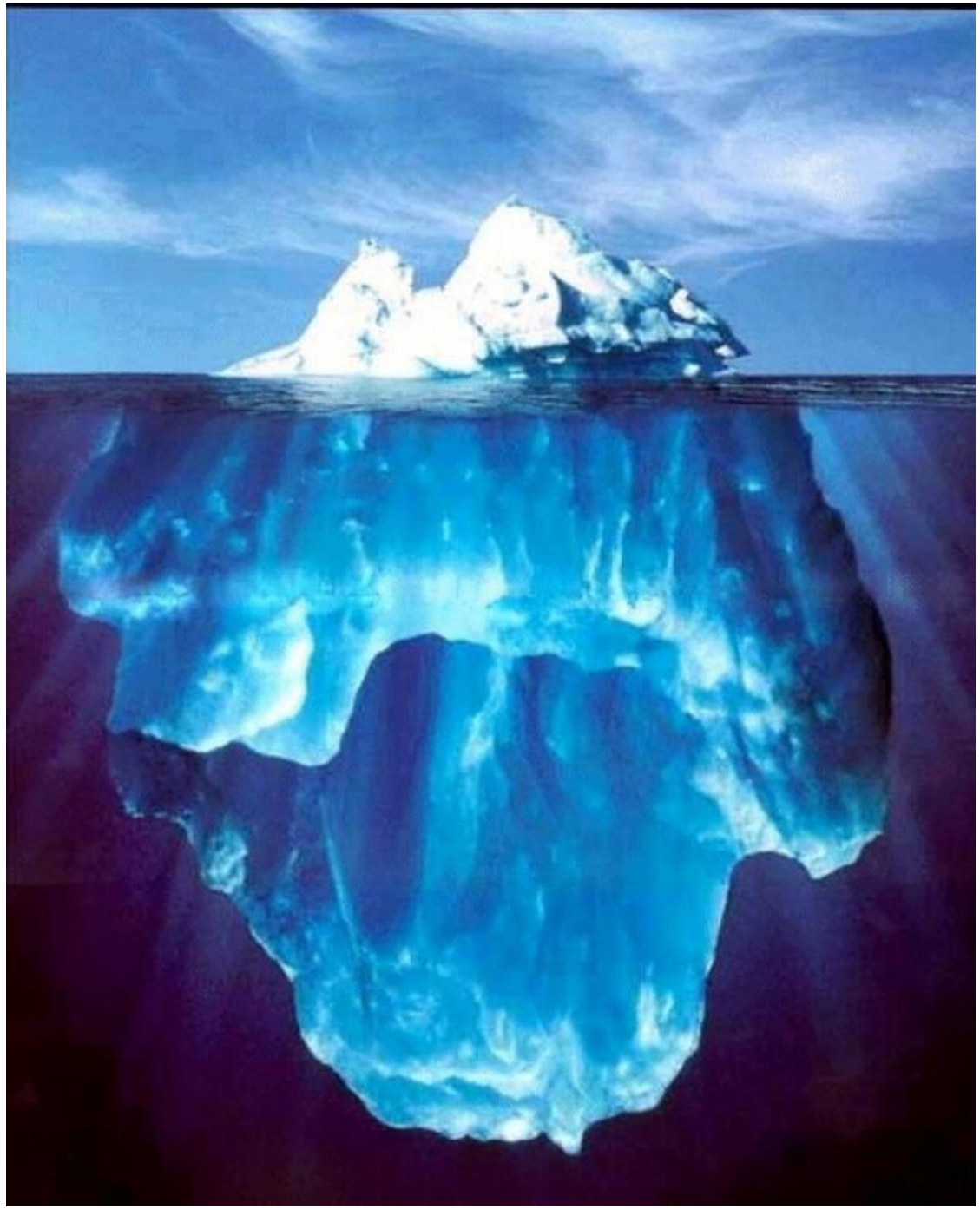
Egzersiz

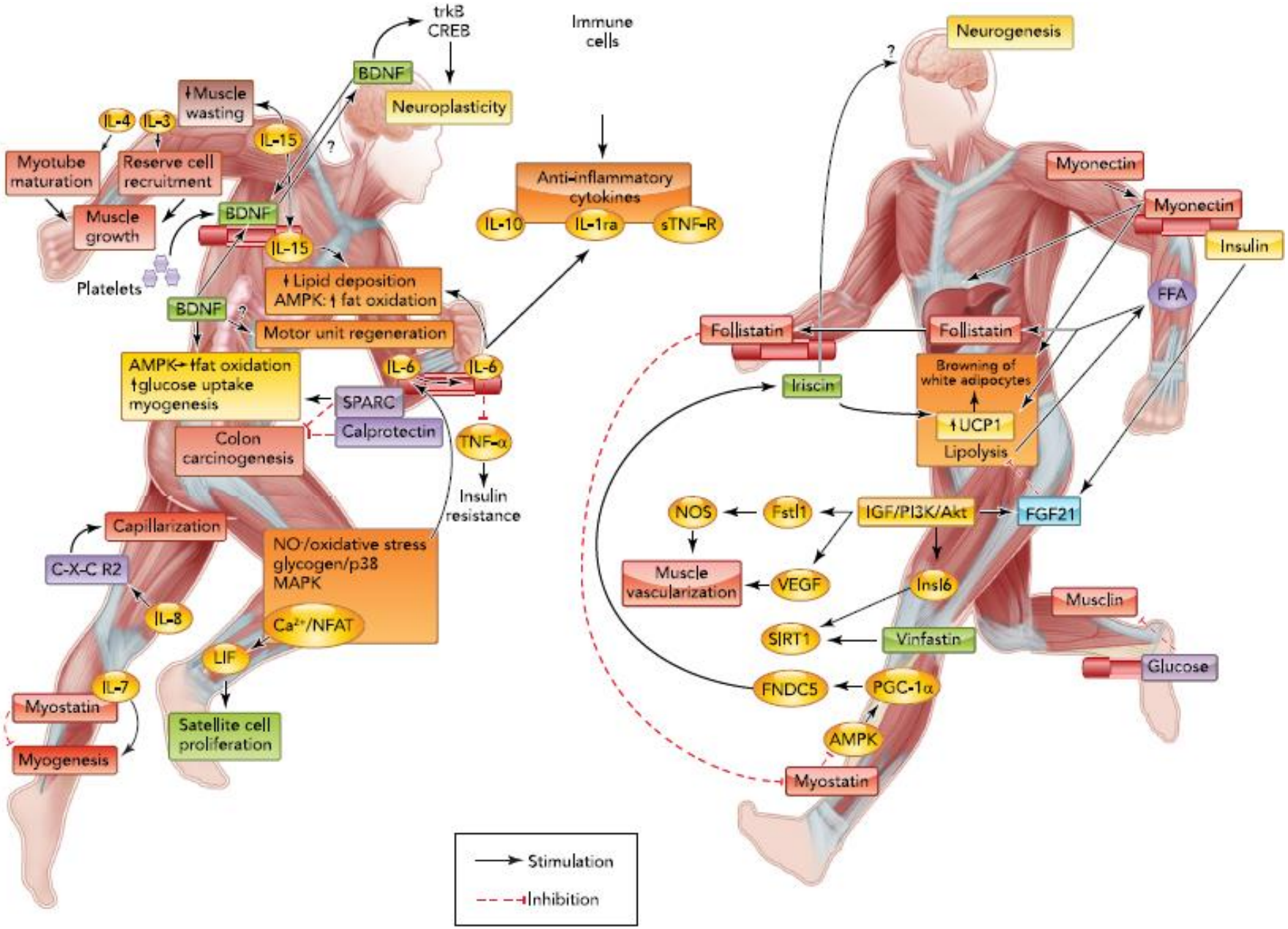
İstirahat halindeki homeostatik koşulların harekete bağlı olarak artan enerji gereksinimini karşılamak amacıyla yeniden oluşturulması.



Exercise Physiological System



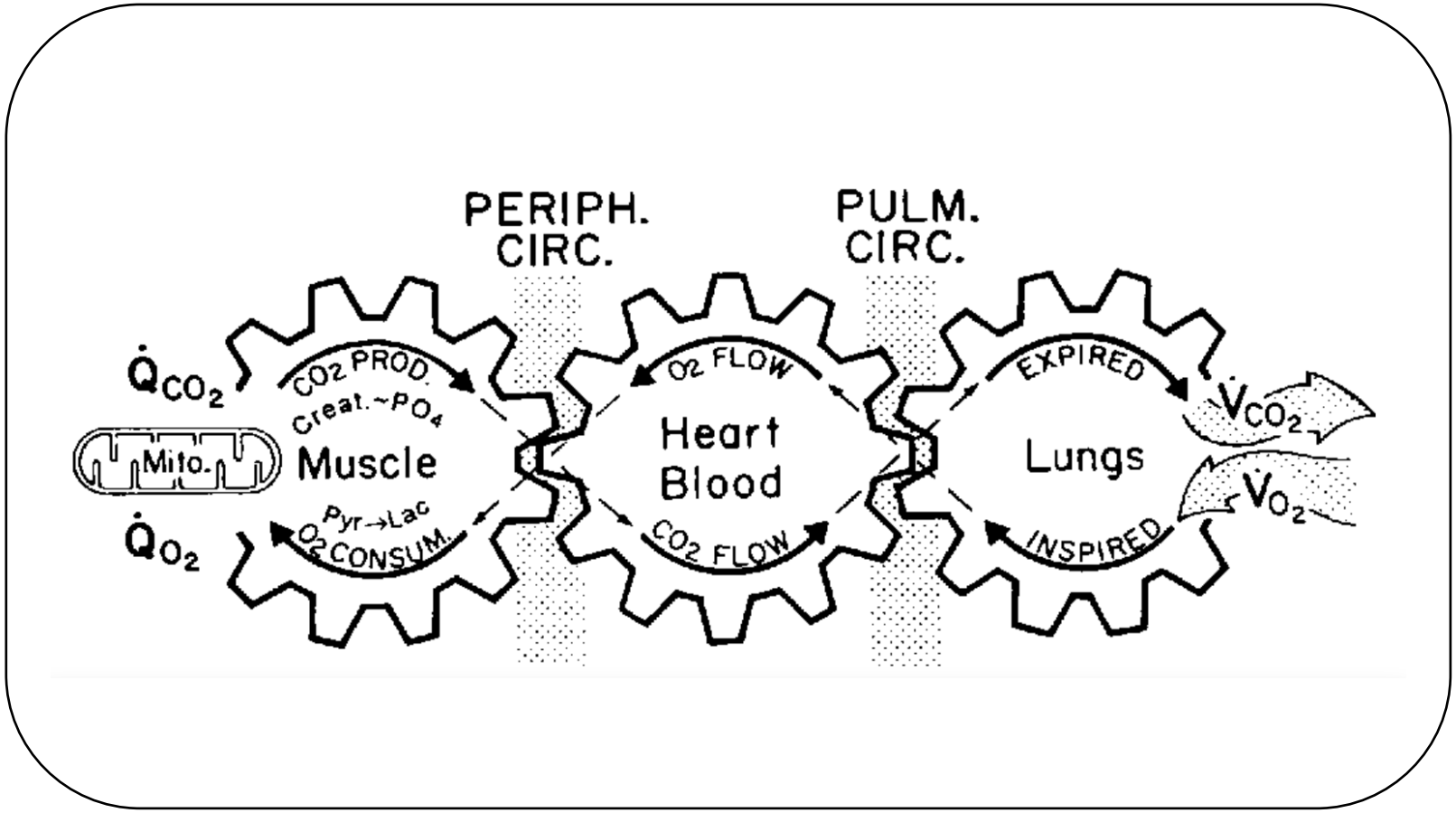


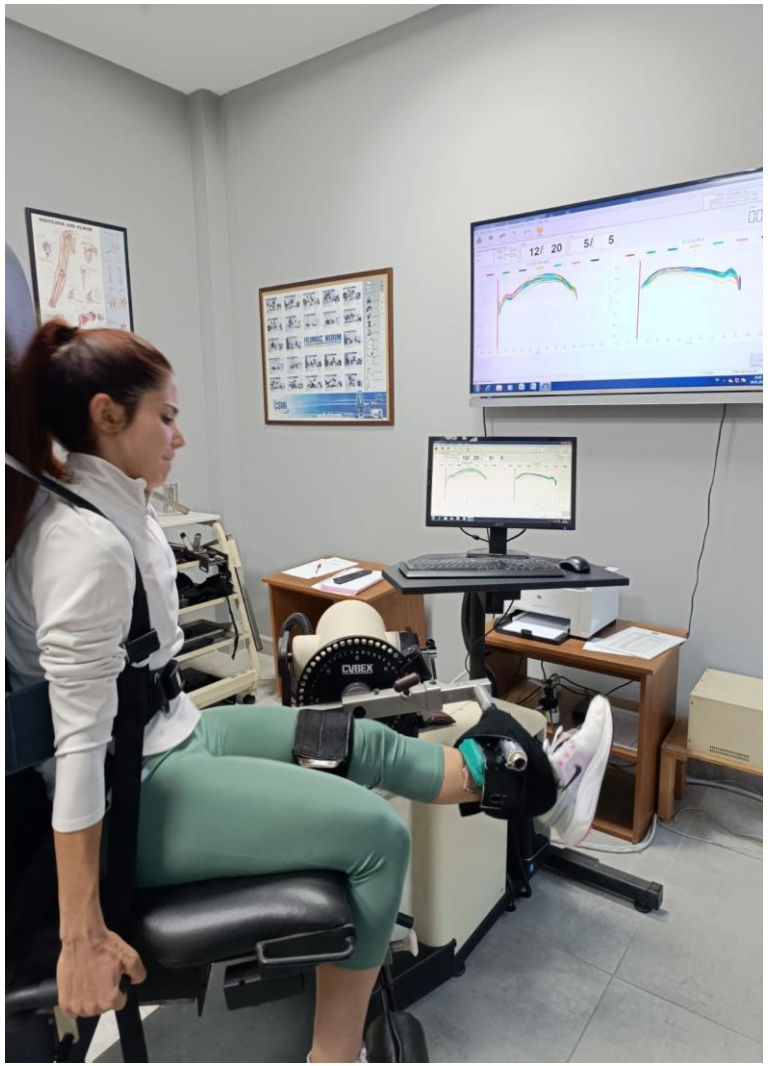

trkB
CREB
BDNF
Neuroplasticity
Immune cells
Muscle wasting
IL-4
IL-3
IL-15
Myotube maturation
Reserve cell recruitment
Muscle growth
BDNF
IL-15
Platelets
Lipid deposition
AMPK: fat oxidation
BDNF
Motor unit regeneration
Anti-inflammatory cytokines
IL-10
IL-1ra
sTNF-R
AMPK fat oxidation
glucose uptake
myogenesis
IL-6
IL-6
SPARC
Calprotectin
Colon carcinogenesis
TNF-α
Insulin resistance
Capillarization
C-X-C R2
IL-8
NO·/oxidative stress
glycogen/p38 MAPK
Ca2+/NFAT
LIF
IL-7
Myostatin
Myogenesis
Satellite cell proliferation
Neurogenesis
Myonectin
Myonectin
Insulin
FFA
Follistatin
Follistatin
Irisin
Browning of white adipocytes
UCP1
Lipolysis
NOS
Fstl1
IGF/PI3K/Akt
FGF21
Muscle vascularization
VEGF
Insl6
Musclin
SIRT1
Vinfastin
Glucose
FNDC5
PGC-1α
AMPK
Myostatin
Stimulation
Inhibition

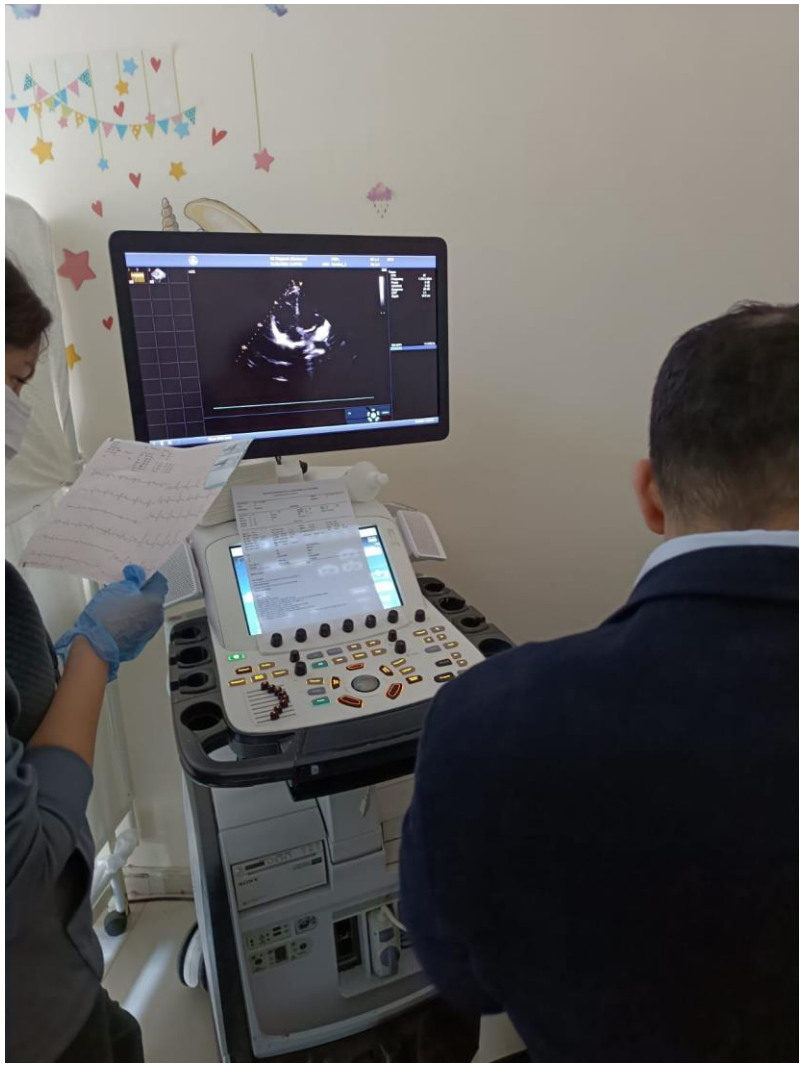
İnsanlar neden egzersiz yapar ?

- Zevk
- Sağlıklı gelişmek, yaşamak, yaşlanmak.
- Rehabilitasyon
- Performans
  - **Amatör**
  - **Profesyonel**

RACE	SWIM	BIKE	RUN
Sprint	750 meters	20K	5K
Olympic (International Distance)	1,500 meters	40K	10K
Half-Iron (70.3 Triathlon)	1.2 miles	56 miles	13.1 miles
Ironman (Long-Course Triathlon)	2.4 miles	112 miles	26.2 miles


PERIPH.
CIRC.
PULM.
CIRC.
$\dot{Q}_{CO_2}$
CO_2 PROD.
Creat.~PO_4
Mito.
Muscle
Pyr→Lac
O_2 CONSUM.
$\dot{Q}_{O_2}$
O_2 FLOW
Heart
Blood
CO_2 FLOW
EXPIRED
Lungs
INSPIRED
$\dot{V}_{CO_2}$
$\dot{V}_{O_2}$


CYBEX




h/p/cosmos

25-HİDROKSİ VİTAMİN D

1 Değer Referans Dışı

Referans Aralığı	Değer
10 - 60	**7,3 ng/mL**

Vitamin B12

1 Değer Referans Dışı

Referans Aralığı	Değer
214-914	**134 pg/mL**

Ferritin

Değer Normal

Referans Aralığı	Değer
22-322	**25.0 ng/mL**

Fark Analizi (kg)

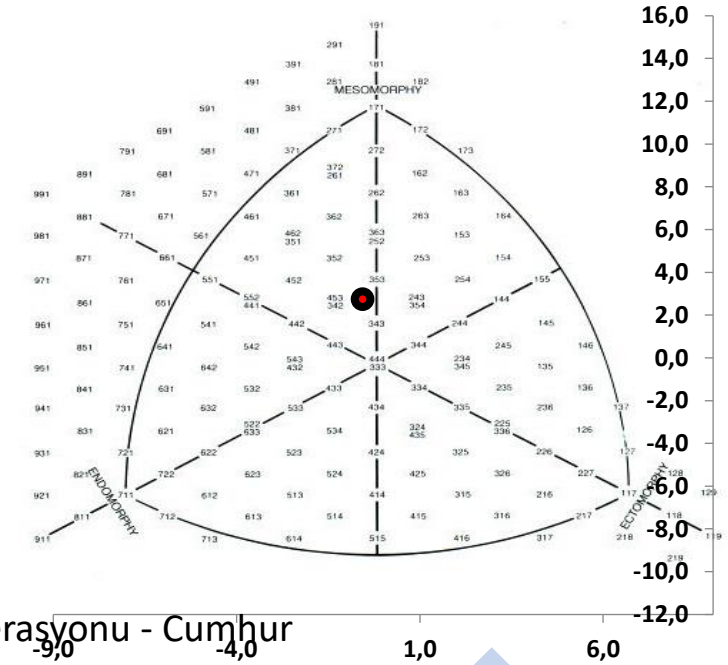
Ölçüm Tarihi	Kilo	Fark	Yağ kg	Fark	Kas kg	Fark	Sıvı kg	Fark	Yağ Dışı kg	Fark	Yağ Oranı	Fark
02.02.2024 09:47	60.100	-0.2	5.400	-0.3	52.300	0	40.000	0	54.7	0.1	9.000	-0.4
02.02.2024 09:46	60.300		5.700		52.300		40.000		54.6		9.400	

İsim	
Soyisim	
Cinsiyet	E
Yaş	32
Boy	1,75
Vücut Ağırlığı	66,5

	Ölçüm 1
Subskapular skinfold	8,7
Triseps skinfold	4,4
Biseps skinfold	2,7
Önkol skinfold	4,3
Abdominal skinfold	6,5
Pektoral skinfold	4,4
Suprailiak skinfold	3,3
Uyluk skinfold	9,4
Baldır skinfold	4,1

BMI	21,7
% Yağ	7,7
Kas Kütlesi (Matiegka)	31,0
Kas Kütlesi (Martin)	28,3
% Kas	44,6
Kemik Kütlesi (Matiegka)	12,0
% Kemik	18,1
Ektomorf	3,0
Endomorf	1,4
Mezomorf	3,6

	Ölçüm 1
Biceps çevre	25,2
Biceps Fleks. Çevre	29,3
Ön kol çevresi	25,1
Üstbacak çevre	54,9
Uyluk Çevre	53,1
Baldır çevre	33,9
Omuz çapı	40,4
Pelvis çapı	28,3
Dirsek çapı	7,1
El bileği çapı	5,9
Diz çapı	9,8
Ayak bileği çapı	7,5
el uzunluğu	
el genişliği	
ayak uzunluğu	
kol uzunluğu	
stream-line uzunluğu	
iki kol açık uzunluk	
oturma yüksekliği	



RBCDH Brazilian Journal of KINANTHROPOMETRY and Human Performance

DOI: http://dx.doi.org/10.5007/1980-0037.2013v15n6p646

original article

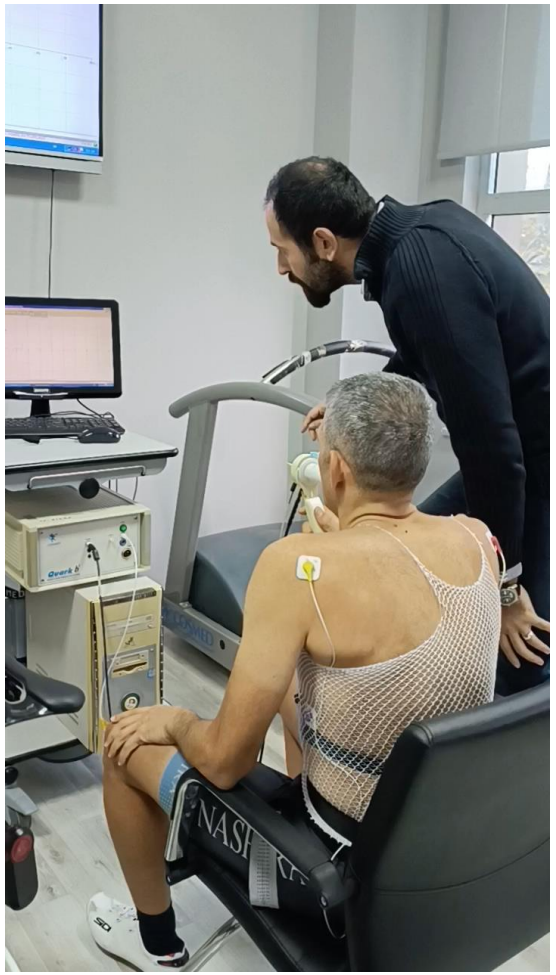
Comparison of body composition and aerobic and anaerobic performance between competitive cyclists and triathletes

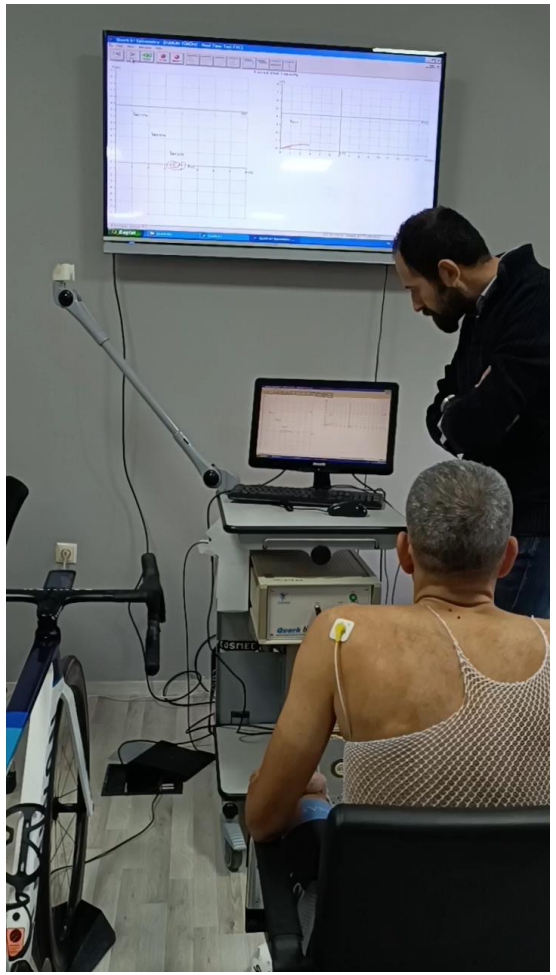
Comparação da composição corporal, desempenho aeróbio e anaeróbio entre ciclistas e triatletas competitivos

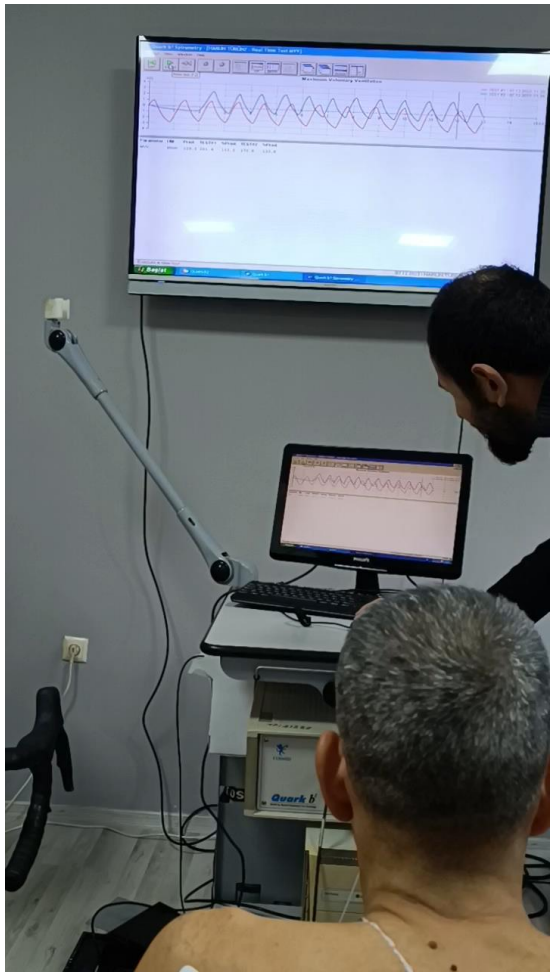
Table 1. Age, anthropometric characteristics and body composition of cyclists and triathletes.

Variable	Cyclists (n=12)	Triathletes (n=11)
Age (years)	30.6 ± 5.7	32.3 ± 6.6
Body mass (kg)	78.6 ± 5.8	74.7 ± 7.6
Height (cm)	177.7 ± 4.2	176.1 ± 6.7
Skinfold thickness		
Triceps (mm)	11.3 ± 6.1	8 ± 1.9
Biceps (mm)	5.3 ± 3.8	3.9 ± 1.2
Subscapular (mm)	11.6 ± 4.9	10.7 ± 2.8
Iliac crest (mm)	14.6 ± 6.2	12.7 ± 4.6
Supraspinal (mm)	11.1 ± 5.6	7.9 ± 2.3
Abdominal (mm)	19.2 ± 9.2	16 ± 5.6
Mid-thigh (mm)	15.2 ± 6.3	10.5 ± 4.8*
Medial calf (mm)	7.5 ± 3.2	7.5 ± 4.2
Sum 4SF (mm)	41.5 ± 15.4	34.3 ± 8.3
Body composition		
Body fat (%)	9.5 ± 4.1	7.6 ± 2.3
Fat mass (kg)	7.7 ± 3.8	5.7 ± 2.1
Lean body mass (kg)	70.9 ± 3.3	68.1 ± 6.9

Results are reported as the mean ± standard deviation. Sum 4SF: Sum of subscapular, triceps, suprasp
(Student t-test for independent samples).



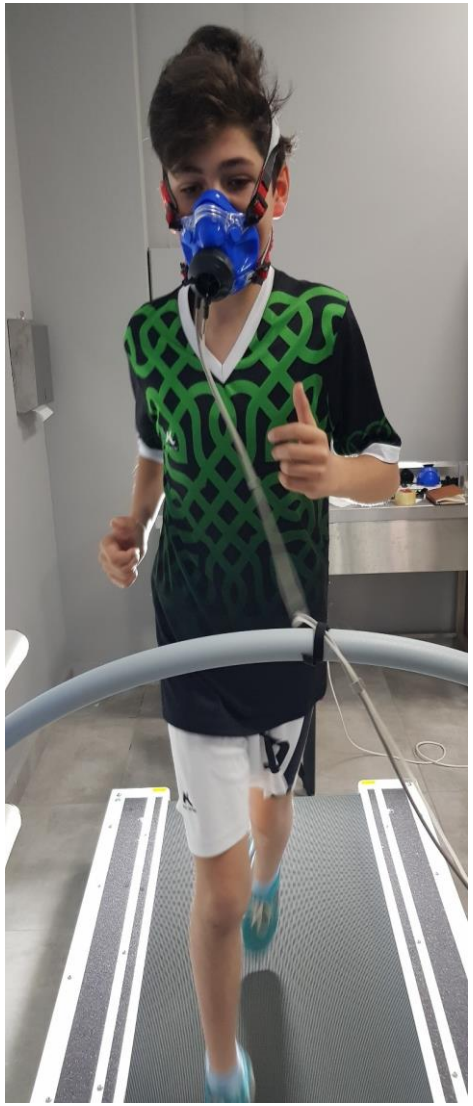




CPET- (KPET) Kardiyopulmoner Egzersiz Testi maxVO$_2$

maxVO$_2$ değeri

- Yaş
- Cinsiyet
- Egzersiz tipi
- Vücut ağırlığına göre değişir.



Ramp - Incremental

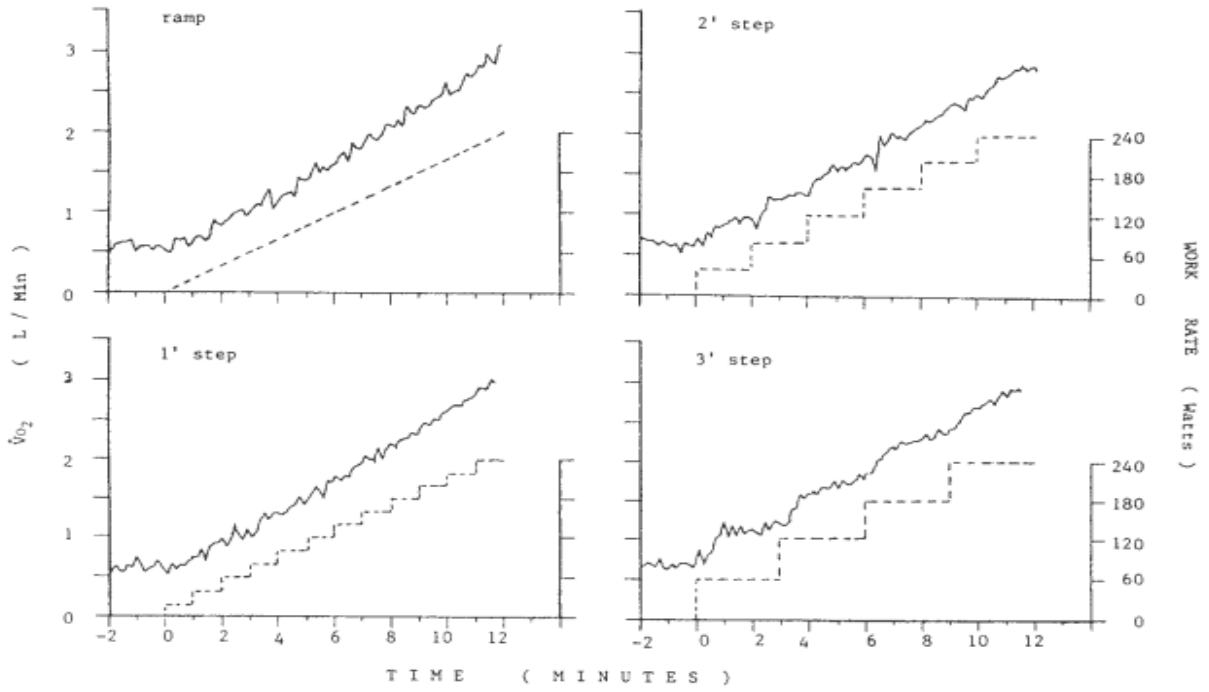
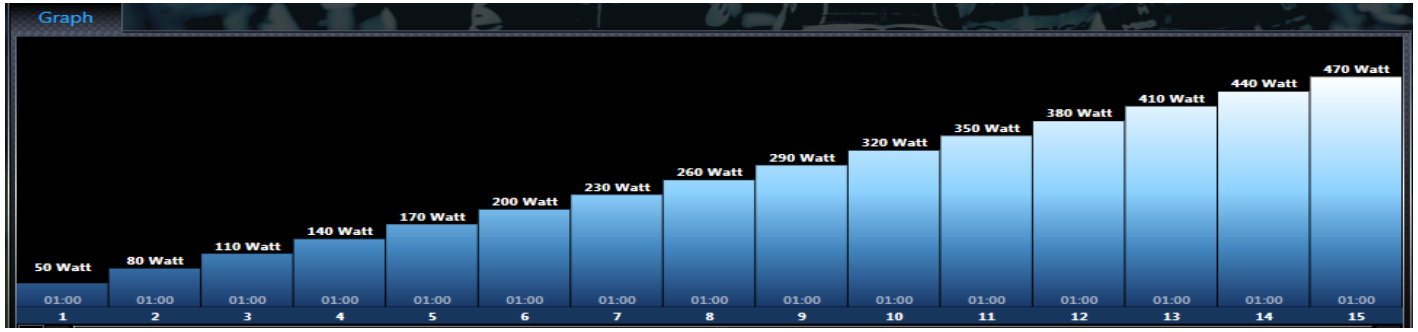


FIGURE 4.3. $\dot{V}O_2$ response in a single subject to four different protocols: ramp and 1-, 2-, and 3-minute steps. The dashed lines show the administered work rate and pattern of work rate increase with time. The $\dot{V}O_2$ data are the average of 9-second periods. (From Zhang YY, Johnson MC, Chow N, et al. Effect of exercise testing protocol on parameters of aerobic function. *Med Sci Sports Exerc.* 1991;23:625–630, with permission.)



In comparing the ramp test with 1-, 2-, and 3-minute step increments at the same overall average work rate increase, Zhang et al.[97] have shown that no significant differences were found in the $\dot{V}O_2$max, *AT*, peak $\dot{V}E$, peak HR, $\Delta \dot{V}O_2/\Delta WR$, or exercise duration among the four protocols in healthy subjects. Step patterns in some measures ever (see Fig. 4.3). Thus, although any of these protocols might be used, either the ramp or the 1-minute incremental test seems practical and preferable for patients because they do not feel sudden increases in work rate.

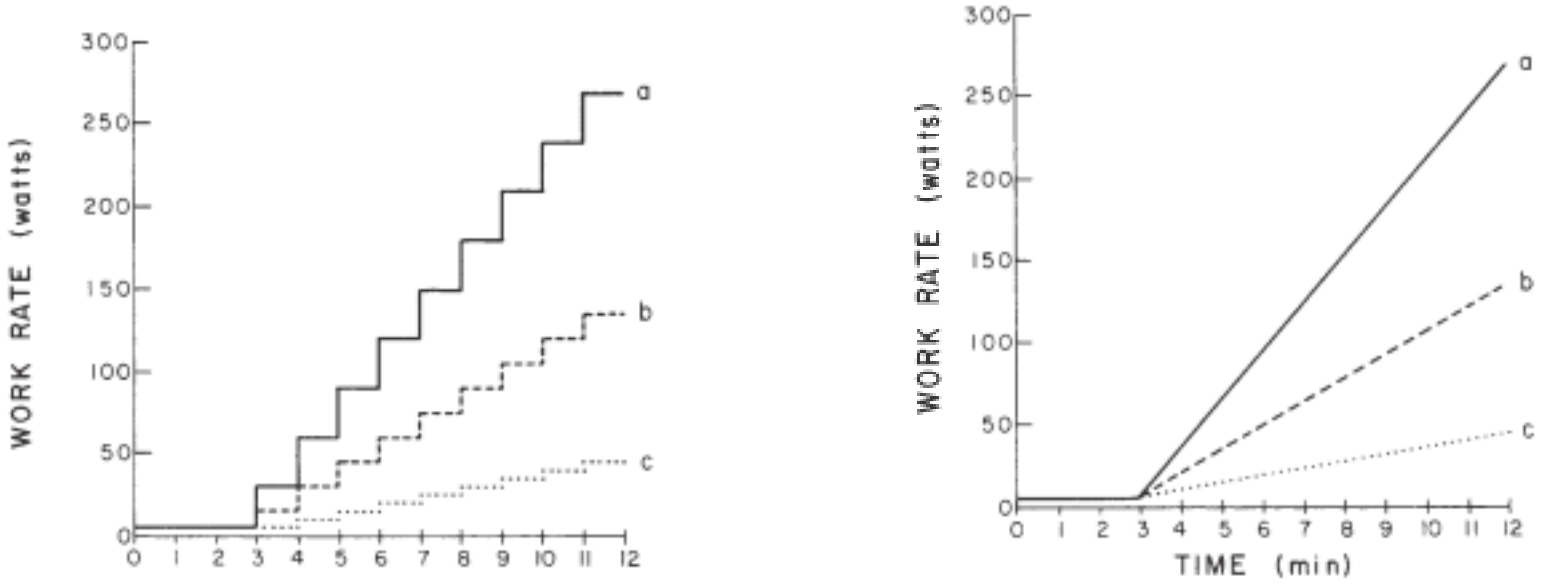


FIGURE 6.4. One-minute incremental (upper) and ramp incremental (lower) protocols for cycle ergometry. In both cases, the subject initially cycles for 3 minutes of unloaded pedaling. In the example shown, the work rate is incremented 30 W (*a*), 15 W (*b*), or 5 W (*c*) per minute depending on the height, age, gender, and health of the subject. The increment is added at the start of each minute for the 1-minute test, whereas the increment is completed at the end of each minute for the ramp test. Larger or intermediate increments can also be used. The cycle is returned to the unloaded setting when the cycling frequency cannot be maintained over 40 rpm or when the physician or subject decides to terminate the incremental exercise.

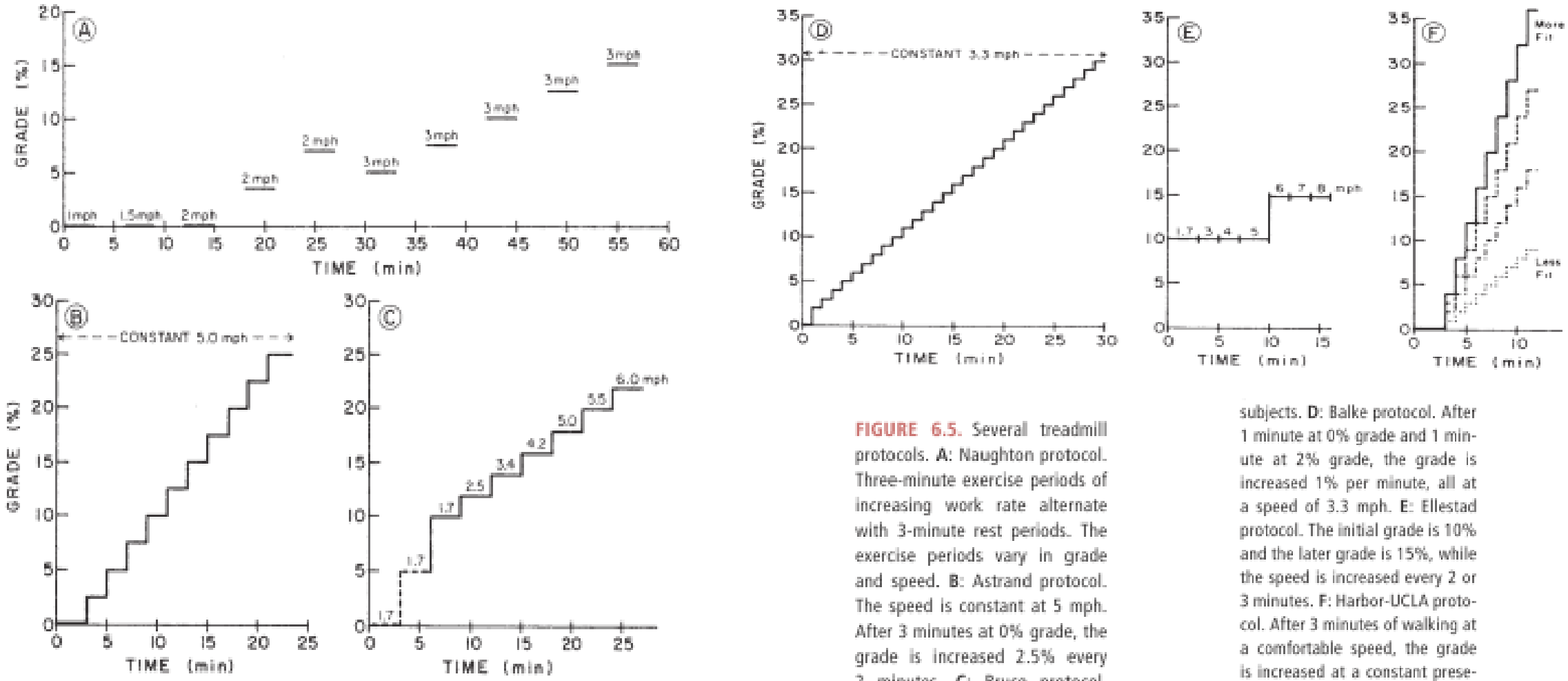


FIGURE 6.5. Several treadmill protocols. **A:** Naughton protocol. Three-minute exercise periods of increasing work rate alternate with 3-minute rest periods. The exercise periods vary in grade and speed. **B:** Astrand protocol. The speed is constant at 5 mph. After 3 minutes at 0% grade, the grade is increased 2.5% every 2 minutes. **C:** Bruce protocol. Grade and speed are changed every 3 minutes. The 0% and 5% grades are omitted in healthier subjects. **D:** Balke protocol. After 1 minute at 0% grade and 1 minute at 2% grade, the grade is increased 1% per minute, all at a speed of 3.3 mph. **E:** Ellestad protocol. The initial grade is 10% and the later grade is 15%, while the speed is increased every 2 or 3 minutes. **F:** Harbor-UCLA protocol. After 3 minutes of walking at a comfortable speed, the grade is increased at a constant preselected amount each minute—1%, 2%, or 3%—so that the subject reaches his or her peak $\dot{V}O_2$ in approximately 10 minutes.


Eupkiye
LEGANO

Physiol. Res. 72: 707-000, 2023 *https://doi.org/10.33549/physiolres.935132*

Effects of Sixty-Minute Race-Pace Running on Cardiac Stress Biomarkers in Recreational Distance Runners

Özgür GÜNAŞTI[1], Çiğdem ÖZDEMIR[1], Kerem T. ÖZGÜNEN[1], Selcen KORKMAZ-ERYILMAZ[2], Ertuğrul GEZGIN[1], Cumhur BOYRAZ[2], Abdullah KILCI[2], Ümüt ADAŞ[2], Çağlar ÖZMEN[3], Hatice RAHIOMOVA[3], Rabia AKILLI[3], Mustafa DEMIRTAŞ[3], Sanli Sadi KURDAK[1]

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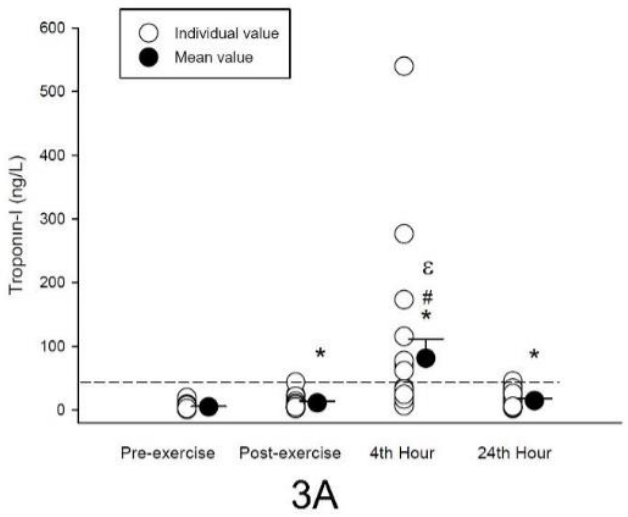
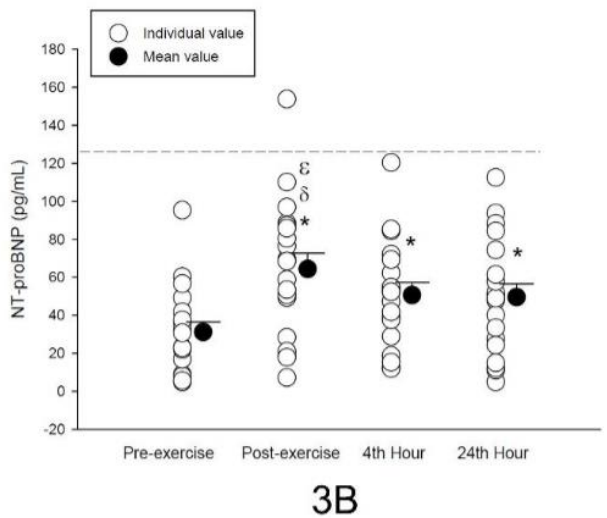


3A



3B

In recent years, it has been observed that there has been an increase in participation in sports. However, it is also stated that some cardiac complications and even sudden cardiac death (SCD) may occur during or after physical activities such as marathons and ultramarathon running. The actual frequency of SCD during exercise is unknown, but some studies reported that it has increased from around 1:300.000 in the 1990s to 1:50.000 in 2021 [1,2]. Three-fourths of the SCDs occur during or just after physical activity, and most of these events develop in adults over 35 years old [3].

Clinical Autonomic Research
https://doi.org/10.1007/s10286-022-00878-x

RESEARCH ARTICLE

The relationship between cardiac damage biomarkers and heart rate variability following 60 min of running

Kerem Özgünen[1] · Özgür Günaştı[1] · Çiğdem Özdemir[1] · Selcen Korkmaz Eryılmaz[2] · Ertuğrul Gezgin[1] · Cumhur Boyraz[2] · Abdullah Kılcı[2] · Ümit Adaş[2] · Sadi S. Kurdak[1]

Received: 16 May 2022 / Accepted: 6 July 2022

Table 2 Changes in HRV measures following 60 min of running at a half-marathon pace

	Before	Immediately after	1 h after	4 h after	24 h after
Time-domain measures					
Mean HR (bpm)	64.7 ± 10.5	91.2 ± 10.9[a]	78.8 ± 11.1[a,b]	73.7 ± 11.4[a,b]	62.1 ± 8.0[b,c,d]
SDNN (ms)	39.2 ± 14.0	25.7 ± 16.2[a]	27.9 ± 13.8[a]	30.8 ± 15.6[a]	41.7 ± 21.2[b,c,d]
RMSSD (ms)	32.0 ± 14.6	17.7 ± 18.4[a]	17.6 ± 8.9[a]	21.3 ± 11.7[a,c]	34.1 ± 20.2[b,c,d]
pNNx (%)	10.2 ± 9.6	4.7 ± 12.4[a]	2.1 ± 3.4[a]	4.3 ± 6.5[a,c]	12.4 ± 15.5[b,c,d]
Frequency-domain measures					
LF (ms^2)	1020.8 ± 679.0	705.1 ± 1059.2	851.0 ± 1036.5	940.8 ± 1142.3	1354.5 ± 1494.5[b,d]
HF (ms^2)	398.2 ± 601.8	117.5 ± 174.1[a]	107.4 ± 109.1[a]	129.7 ± 147.8[a]	373.5 ± 532.3[b,c,d]
LF (nu)	76.2 ± 15.2	85.3 ± 18.6[a]	85.4 ± 12.9[a]	86.0 ± 15.4[a]	79.0 ± 9.7[b,c,d]
HF (nu)	23.8 ± 15.2	14.7 ± 18.5[a]	14.5 ± 12.9[a]	14.0 ± 15.3[a]	20.9 ± 9.6[b,c,d]
Log LF (ms^2)	6.5 ± 0.9	5.8 ± 1.2	6.2 ± 1.0	6.4 ± 0.9	6.7 ± 1.0[b,c,d]
Log HF (ms^2)	5.4 ± 1.1	3.7 ± 1.6[a]	4.2 ± 1.1[a]	4.3 ± 1.2[a]	5.3 ± 1.1[c,d]
LF/HF ratio	5.0 ± 4.4	11.3 ± 6.4[a]	10.6 ± 7.8[a]	11.4 ± 8.9[a]	4.8 ± 2.6[b,c,d]
Nonlinear measures					
SD1 (ms)	22.7 ± 10.4	12.5 ± 13.0[a]	12.4 ± 6.3[a]	15.1 ± 8.3[a,c]	24.1 ± 14.3[b,c,d]
SD2 (ms)	50.3 ± 17.6	33.2 ± 20.5[a]	37.3 ± 18.9[a]	40.5 ± 21.2[a]	53.5 ± 26.6[b,c,d]
SD2/SD1	2.4 ± 0.6	3.5 ± 1.1[a]	3.3 ± 1.0[a]	3.0 ± 0.9[a,b]	2.3 ± 0.5[b,c,d]

Values are the mean ± SD. *SDNN* the standard deviation of all normal R-R intervals, *RMSSD* the root mean square difference of successive normal R-R intervals, *pNN50* the percentage of successive R-R intervals that differ by more than 50 ms

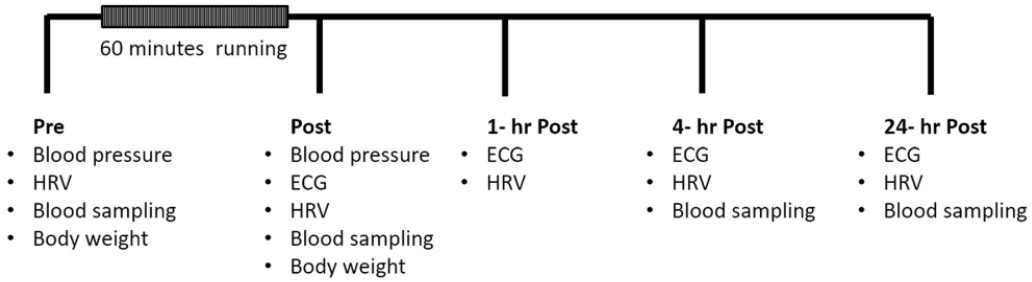
LF low frequency, *HF* high frequency, *SD1* the standard deviation of Poincaré plot perpendicular to the line-of-identity, *SD2* the standard deviation of the Poincaré plot along the identity line, *SS* stress score, *S/PS* sympathetic-parasympathetic ratio

[a]Represents a significant difference from pre-running

[b]Represents a significant difference from post-running

[c]Represents a significant difference from 1 h post-running

[d]Represents a significant difference from 4 h post-running



	Before	Immediately after	4 h after	24 h after
CK (IU/l) (170 IU/l)	164.3 ± 100.0 (91–494)	226.4 ± 141.9[a] (124–682)	281.2 ± 257.2[a] (119–1188)	425.8 ± 623.5[a,b,c] (102–2839)
CK-MB (ng/ml) (4.9 ng/ml)	4.4 ± 3.1 (1.5–14.2)	6 ± 4.2[a] (2.0–19.2)	7.9 ± 7.1[a,b] (3.3–31.7)	10.5 ± 13.5[a,b] (2.6–61.1)
CK-index (%) (2.5%)	2.8 ± 1.4 (1.3–7.0)	2.8 ± 1.4 (1.3–6.9)	3.0 ± 1.3[a,b] (1.2–7.0)	2.8 ± 1.3 (1.2–6.4)
cTnI (ng/l) (40 ng/l)	5.0 ± 5.0 (1.2–19.6)	11.5 ± 10.9[a] (2.4–43.9)	84.2 ± 133.6[a,b,d] (7.0–539.9)	15.3 ± 14.1[a] (2.6–45.7)

Data are presented as the mean ± SD (min–max). The values in parentheses in the first column refer to the upper cutoff levels of the biomarkers

[a]Represents a significant difference from pre-running

[b]Represents a significant difference from post-running

[c]Represents a significant difference from 4 h post-running

[d]Represents a significant difference from 24 h post-running


STERNUM
APEX
DISCHARGE
OPERATION PROCEDURE
DEFIBRILLATION
AUTOMATED EXTERNAL DEFIBRILL
MONITORING
MAINTENANCE
DANGER
Do not use the defibrillator in a flammable atmosphere (areas of flammable anesthetics, concentrated oxygen or hyperbaric oxygen).
WARNING
• The defibrillator must only be operated by trained and qualified medical personnel.
• Do not touch the patient during defibrillation.
• When using an ESU, only use the defibrillator in the monitor mode and do not use the disposable pads.
TEC-7721K
NIHON KOHDEN
cardiolife
SYNC
CHARGE

t	Rf	VT	VE	IV	VO2	VCO2	RQ	O2exp	CO2exp	VE/VO2	VE/VCO2	VO2/Kg	METS	HR	VO2/HR	FeO2	FeCO2	FetO2	FetCO2	FiO2	FiCO2	PeO2	PeCO2	PetO2	PetCO2	SpO2	Grade	Speed	Phase	Marker	A
09:40	29,1	1,751	50,942	1804	2408,473212	2076,062133	0,86	266,2783333	88,43	20,3	23,6	40,14	11,5	140	17,2	15,21	5,05	13,26	6,86	20,8	0,08	108	36	94	48	0			NONE	180	
09:50	28,56	1,766	50,423	1822	2382,006046	2069,64817	0,87	268,2183333	89,8233333	20,3	23,4	39,7	11,3	140	17	15,19	5,09	13,23	6,93	20,8	0,08	107	36	94	49	0			NONE	180	
10:00	29,1	1,75	50,925	1808	2412,155551	2091,113972	0,87	265,5116667	89,19	20,3	23,4	40,2	11,5	139	17,4	15,17	5,1	13,2	6,93	20,8	0,08	107	36	93	49	0			NONE	180	
10:10	30,34	1,74	52,794	1793	2465,511798	2153,577309	0,87	265,1255556	88,0844444	20,6	23,5	41,09	11,7	139	17,7	15,24	5,06	13,26	6,92	20,8	0,08	108	36	94	49	0			NONE	180	
10:20	31,62	1,724	54,522	1780	2535,218688	2231,859619	0,88	263,0255556	87,5644444	20,6	23,4	42,25	12,1	141	18	15,25	5,08	13,31	6,92	20,8	0,08	108	36	94	49	0			NONE	210	
10:30	30,95	1,806	55,895	1863	2578,215775	2305,240378	0,89	275,9988889	92,3044444	20,8	23,3	42,97	12,3	145	17,8	15,28	5,11	13,39	6,94	20,8	0,08	108	36	95	49	0			NONE	210	
10:40	31,45	1,817	57,149	1874	2637,420414	2363,677739	0,9	277,5466667	93,0666667	20,8	23,2	43,96	12,6	148	17,8	15,27	5,12	13,39	6,96	20,8	0,07	108	36	95	49	0			NONE	210	
10:50	30,9	1,885	58,243	1946	2661,274982	2406,75438	0,9	288,8666667	96,4266667	21,1	23,3	44,35	12,7	149	17,9	15,32	5,12	13,45	6,94	20,8	0,07	108	36	95	49	0			NONE	210	
11:00	32,12	1,864	59,882	1927	2725,438651	2462,005784	0,9	286,1711111	95,0055556	21,1	23,4	45,42	13	149	18,3	15,35	5,1	13,48	6,93	20,8	0,08	109	36	95	49	0			NONE	210	
11:10	32,85	1,9	62,409	1956	2807,480474	2564,301088	0,91	292,6122222	96,8211111	21,4	23,4	46,79	13,4	149	18,8	15,4	5,1	13,58	6,9	20,8	0,08	109	36	96	49	0			NONE	210	
11:20	34,65	1,894	65,623	1950	2857,617076	2643,8374	0,93	294,6444444	94,6833333	22,1	23,9	47,63	13,6	150	19,1	15,56	5	13,76	6,8	20,8	0,08	110	35	97	48	0			NONE	240	
11:30	35,9	1,907	68,483	1947	2942,948712	2758,833209	0,94	297,55	95,25	22,4	23,9	49,05	14	153	19,2	15,6	4,99	13,87	6,76	20,8	0,08	110	35	98	48	0			NONE	240	
11:40	34,35	1,919	65,919	1974	2894,989642	2707,973447	0,94	297,1955556	97,6477778	21,9	23,5	48,25	13,8	155	18,7	15,49	5,09	13,75	6,85	20,8	0,07	110	36	97	48	0			NONE	240	
11:50	34,93	1,949	68,07	2005	2997,531932	2802,802092	0,94	301,5344444	99,3922222	21,9	23,4	49,96	14,3	158	19	15,47	5,1	13,77	6,84	20,8	0,07	109	36	97	48	0			NONE	240	
12:00	34,73	1,976	68,641	2039	2985,158454	2800,383893	0,94	307,1844444	99,9009524	22,2	23,6	49,75	14,2	159	18,8	15,54	5,05	13,8	6,83	20,8	0,07	110	36	98	48	0			NONE	240	
12:10	36,36	1,988	72,294	2050	3057,676381	2890,258168	0,95	312,0111111	98,507619	22,8	24,1	50,96	14,6	161	19	15,69	4,95	13,94	6,76	20,8	0,07	111	35	99	48	0			NONE	240	
12:20	37,25	1,977	73,642	2031	3099,999212	2934,32357	0,95	310,5666667	97,6314286	22,9	24,2	51,67	14,8	162	19,1	15,71	4,94	13,94	6,76	20,8	0,07	111	35	99	48	0			NONE	270	
12:30	37,87	1,974	74,741	2030	3137,213457	2987,364074	0,95	310,0714286	97,8219048	23	24,1	52,29	14,9	164	19,1	15,71	4,96	13,96	6,76	20,8	0,08	111	35	99	48	0			NONE	270	
12:40	38,44	1,982	76,186	2040	3199,890155	3055,135168	0,95	310,8714286	98,6552381	23	24,1	53,33	15,2	166	19,3	15,68	4,98	13,95	6,79	20,8	0,08	111	35	99	48	0			NONE	270	
12:50	35,96	2,054	73,863	2094	3240,096375	3065,604114	0,95	317,8769841	106,0703175	22	23,3	54	15,4	167	19,4	15,48	5,16	13,72	6,96	20,8	0,1	109	37	97	49	0			NONE	270	
13:00	36,03	2,106	75,894	2150	3316,905381	3150,129942	0,95	326,6293651	108,8369841	22,1	23,3	55,28	15,8	167	19,9	15,51	5,17	13,76	6,96	20,8	0,1	110	37	97	49	0			NONE	270	
13:10	37,99	2,077	78,915	2115	3373,707002	3239,00581	0,96	324,2722222	106,2007937	22,6	23,5	56,23	16,1	168	20,1	15,61	5,11	13,89	6,9	20,8	0,1	110	36	98	49	0			NONE	270	
13:20	42,11	2,041	85,959	2089	3431,112229	3387,51337	0,99	324,8714286	100,0666667	24,2	24,5	57,19	16,3	169	20,3	15,92	4,9	14,26	6,68	20,8	0,09	113	35	101	47	0			NONE	300	
13:30	42,71	2,026	86,522	2069	3429,979314	3423,684886	1	322,6761905	99,5428571	24,4	24,4	57,17	16,3	171	20,1	15,93	4,91	14,28	6,69	20,8	0,08	113	35	101	47	0			NONE	300	
13:40	42,84	2,031	87,011	2070	3451,629366	3450,296527	1	323,5714286	99,8714286	24,3	24,3	57,53	16,4	172	20,1	15,93	4,92	14,28	6,69	20,8	0,08	113	35	101	47	0			NONE	300	
13:50	41,33	2,08	85,976	2137	3430,795658	3451,952144	1,01	330,9238095	103,4095238	24,2	24,1	57,18	16,3	173	19,8	15,91	4,97	14,24	6,76	20,8	0,07	112	35	101	48	0			NONE	300	
14:00	42,88	2,094	89,781	2139	3548,164632	3585,040289	1,01	333,9535714	103,5785714	24,5	24,2	59,14	16,9	174	20,4	15,95	4,95	14,27	6,75	20,8	0,07	113	35	101	48	0			NONE	300	
14:10	44,37	2,153	95,535	2187	3643,610496	3753,172455	1,03	346,4916667	104,8785714	25,4	24,6	60,73	17,4	175	20,8	16,09	4,87	14,47	6,65	20,8	0,08	114	34	102	47	0			NONE	300	
14:20	45,22	2,165	97,912	2196	3686,600196	3826,379704	1,04	349,4107143	104,9880952	25,7	24,8	61,44	17,6	177	20,8	16,14	4,85	14,54	6,62	20,8	0,08	114	34	103	47	0			NONE	330	
14:30	44,45	2,191	97,392	2228	3640,081508	3811,883939	1,05	353,8482143	106,4297619	25,9	24,7	60,67	17,3	178	20,4	16,15	4,86	14,57	6,62	20,8	0,08	114	34	103	47	0			NONE	330	
14:40	43,18	2,222	95,965	2265	3641,982145	3813,658387	1,05	357,0720238	109,6964286	25,5	24,4	60,7	17,3	178	20,5	16,07	4,94	14,47	6,72	20,8	0,09	114	35	102	48	0			NONE	330	
14:50	44,7	2,232	99,779	2278	3705,82971	3922,222139	1,06	360,4958333	109,3440476	26,1	24,6	61,76	17,6	179	20,7	16,15	4,9	14,59	6,66	20,7	0,1	114	35	103	47	0			NONE	330	
15:00	46,61	2,309	107,607	2349	3820,091743	4122,078073	1,08	377,3416667	110,302381	27,3	25,3	63,67	18,2	180	21,2	16,35	4,78	14,85	6,5	20,8	0,1	116	34	105	46	0			NONE	330	
15:10	48,99	2,325	113,875	2372	3870,027466	4257,843029	1,1	384,3305556	108,3722222	28,5	25,9	64,5	18,4	181	21,4	16,53	4,66	15,1	6,32	20,8	0,1	117	33	107	45	0			NONE	330	
15:20	49,6	2,379	117,986	2401	3937,232816	4367,428345	1,11	395,1347222	109,6055556	29,1	26,2	65,62	18,7	183	21,5	16,61	4,61	15,18	6,27	20,8	0,09	117	33	107	44	0			NONE	360	
15:30	47,08	2,397	112,837	2424	3886,576774	4301,044364	1,11	394,9978175	113,584127	28,2	25,5	64,78	18,5	184	21,1	16,48	4,74	15,04	6,43	20,8	0,09	117	34	106	45	0			NONE	360	
15:40	46,63	2,441	113,845	2458	3953,167643	4375,245946	1,11	401,5380952	116,5785714	28	25,3	65,89	18,8	185	21,4	16,45	4,77	15,01	6,48	20,8	0,08	116	34	106	46	0			NONE	360	
15:50	45,97	2,424	111,439	2453	3926,243318	4369,18766	1,11	397,1464286	117,9035714	27,6	24,8	65,44	18,7	185	21,2	16,38	4,86	14,96	6,56	20,8	0,08	116	34	106	46	0			NONE	360	
16:00	49,95	2,4	119,851	2421	4021,585704	4523,757823	1,12	398,4268519	112,3898148	28,9	25,7	67,03	19,2	186	21,6	16,6	4,68	15,18	6,37	20,8	0,08	117	33	107	45	0			NONE	360	
16:10	51,07	2,414	123,298	2436	4027,315396	4584,573459	1,14	403,6013889	111,5064815	29,7	26,1	67,12	19,2	186	21,7	16,72	4,62	15,29	6,28	20,8	0,08	118	33	108	44	0			NONE	360	
16:20	53,22	2,461	130,967	2483	4064,212876	4730,167842	1,16	415,6148148	110,5666667	31,3	26,9	67,74	19,4	188	21,6	16,89	4,49	15,51	6,13	20,8	0,08	119	32	110	43	0			NONE	390	
16:30	52,98	2,488	131,803	2508	4093,510079	4786,728321	1,17	419,6337963	112,6143519	31,3	26,8	68,23	19,5	189	21,7	16,87	4,53	15,51	6,15	20,8	0,09	119	32	110	43	0			NONE	390	
16:40	54,45	2,509	136,615	2518	4139,228139	4886,239539	1,18	425,6134259	111,9010185	32,1	27,2	68,99	19,7	191	21,7	16,96	4,46	15,64	6,07	20,8	0,09	120	32	111	43	0			NONE	390	
16:50	56,78	2,509	142,445	2506	4196,108143	4991,728057	1,19	429,0275	109,6891667	33	27,7	69,94	20	191	22	17,1	4,37	15,79	5,95	20,8	0,1	121	31	112	42	0			NONE	390	
17:00	57,62	2,511	144,704	2511	4058,393707	4900,105728	1,21	434,0307407	106,1118519	34,7	28,7	67,64	19,3	192	21,1	17,28	4,23	16,01	5,78	20,9	0,09	122	30	113	41	0			NONE	390	
17:10	54,17	2,472	133,878	2471	3754,916182	4599,528423	1,22	426,1015741	106,1543519	34,6	28,3	62,58	17,9	192	19,6	17,24	4,29	15,98	5,89	20,8	0,1	122	30	113	42	0			NONE	390	

Eşik Verilerinin Hesaplanmaları

Laktat Eşiği → aerobik, anaerobik

Solunumsal Eşik → VT1 – VT2 – MLSS

CP

FTP

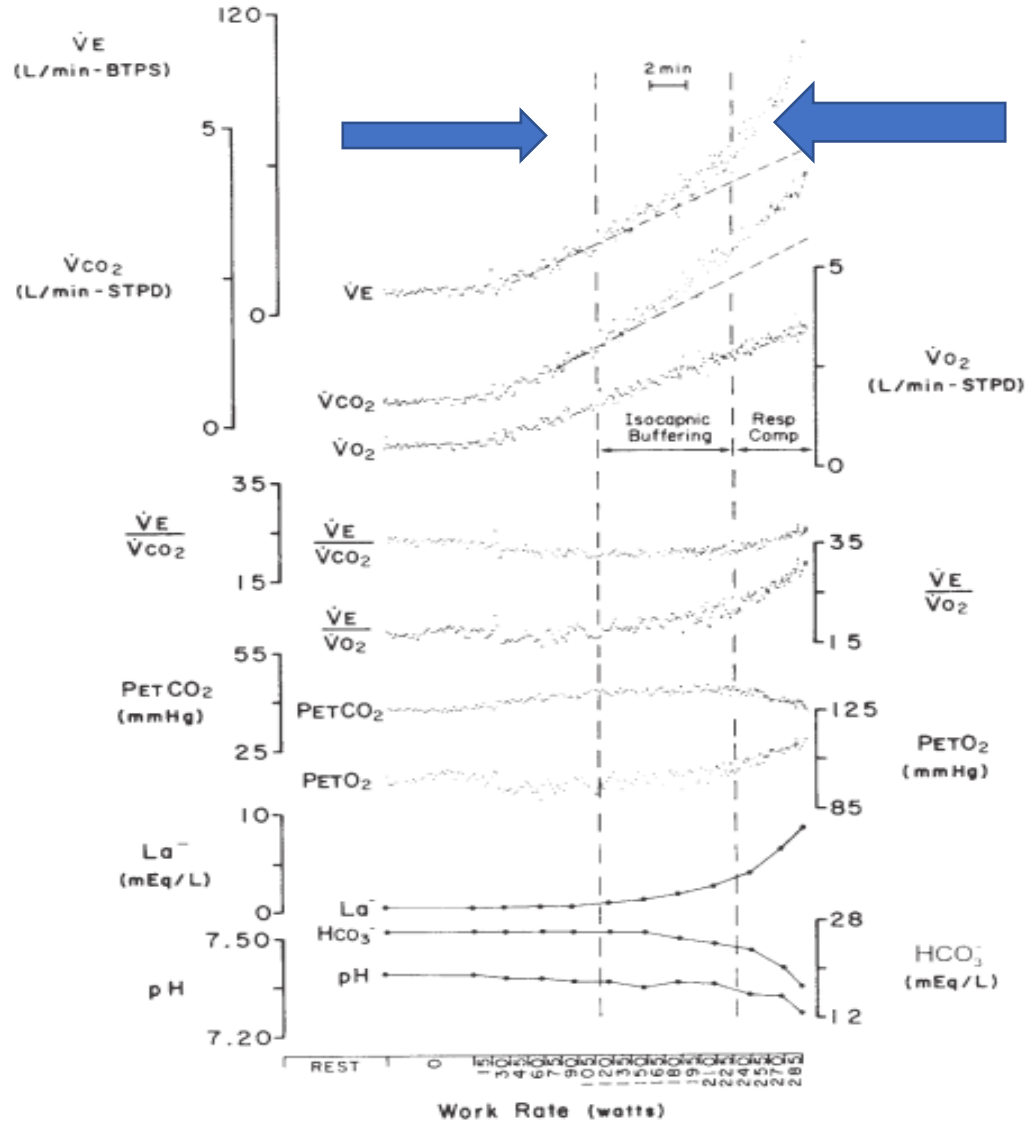
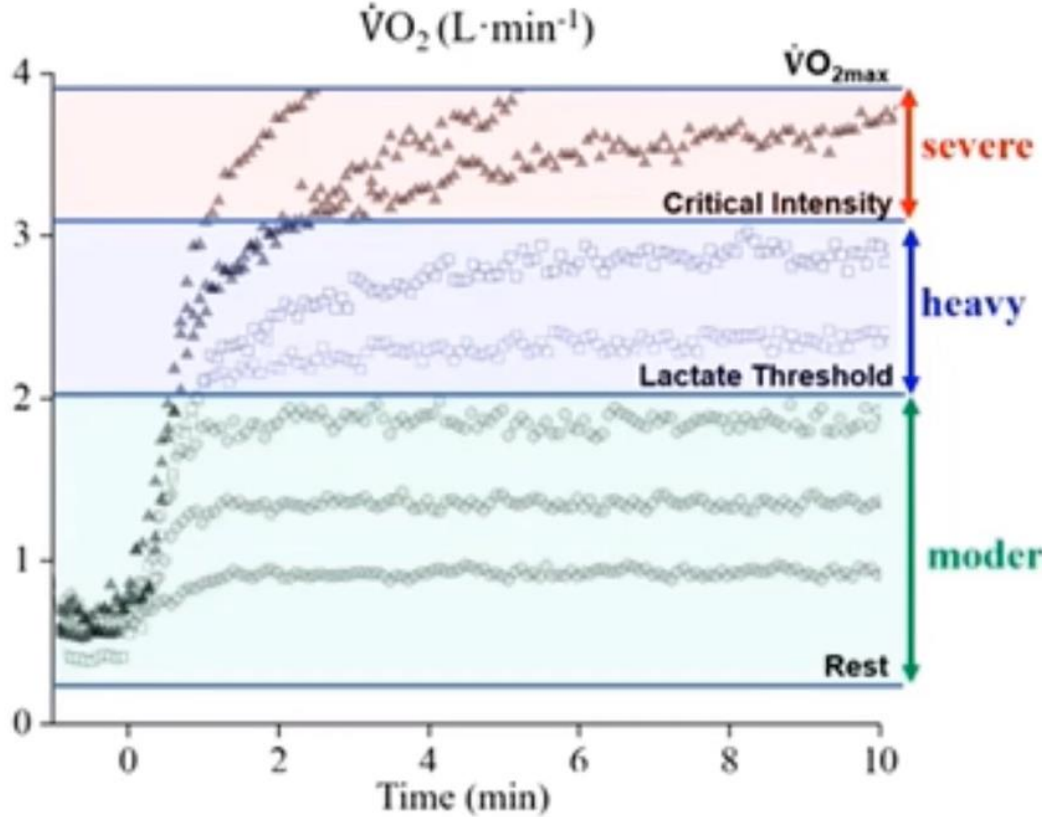
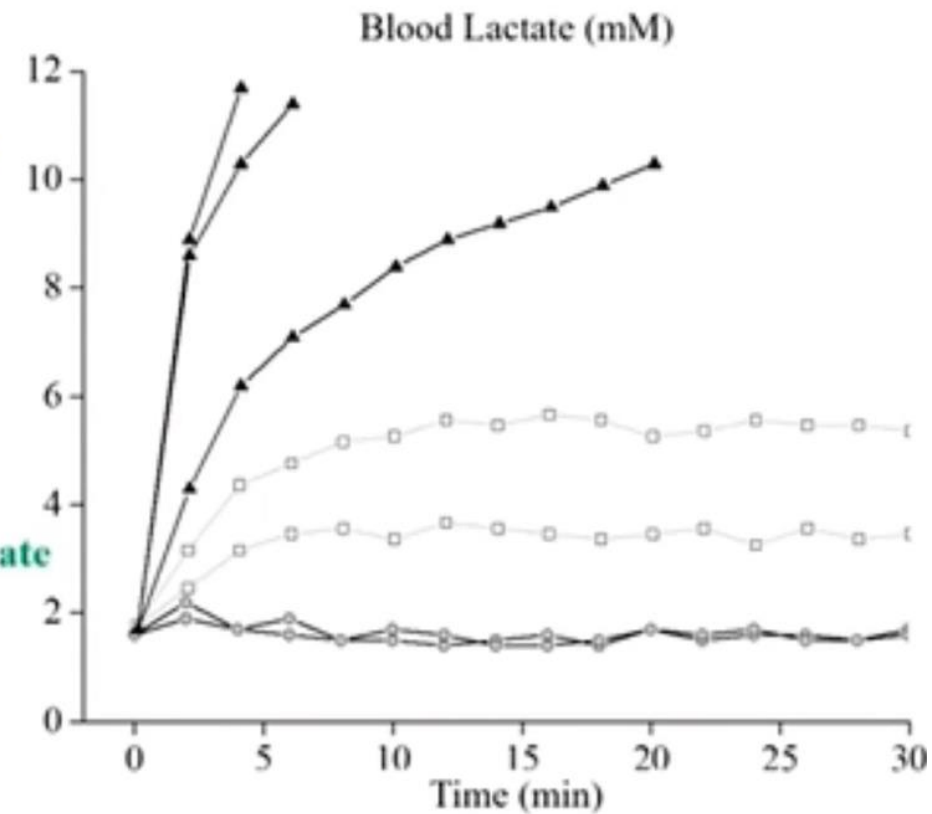


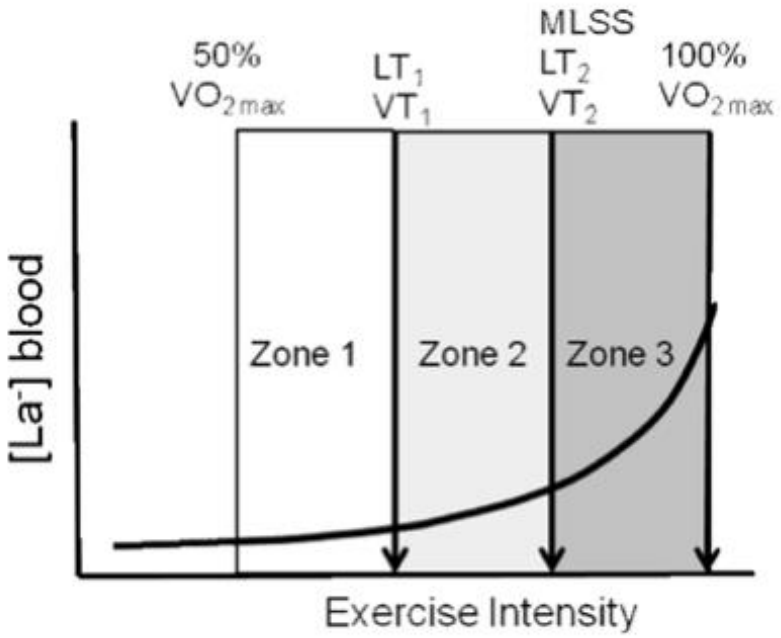
FIGURE 2.30. Breath-by-breath measurements of minute ventilation ($\dot{V}_E$), CO_2 output ($\dot{V}CO_2$), O_2 uptake ($\dot{V}O_2$), $\dot{V}_E/\dot{V}CO_2$, $\dot{V}_E/\dot{V}O_2$, $P_{ET}CO_2$, $P_{ET}O_2$, arterial lactate and bicarbonate, and pH for a 1-minute incremental exercise test on a cycle ergometer. The lactate threshold (*LT*) occurs when lactate increases (*left vertical dashed line*). This is followed by a fall in HCO_3^- *(LAT)* and generally an increase in $\dot{V}_E/\dot{V}O_2$. *Isocapnic buffering* refers to the period when $\dot{V}_E$ and $\dot{V}CO_2$ increase curvilinearly at the same rate without an increase in $\dot{V}_E/\dot{V}CO_2$, thus retaining a constant $P_{ET}CO_2$. After the period of isocapnic buffering, $P_{ET}CO_2$ decreases and $\dot{V}_E/\dot{V}CO_2$ increases, reflecting ventilatory compensation for the metabolic acidosis of exercise.

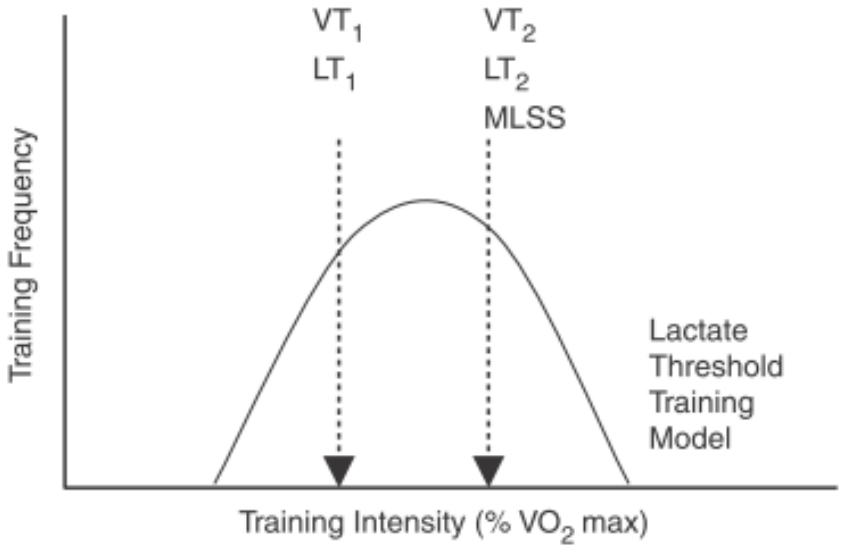
Exercise Intensity "Domains"

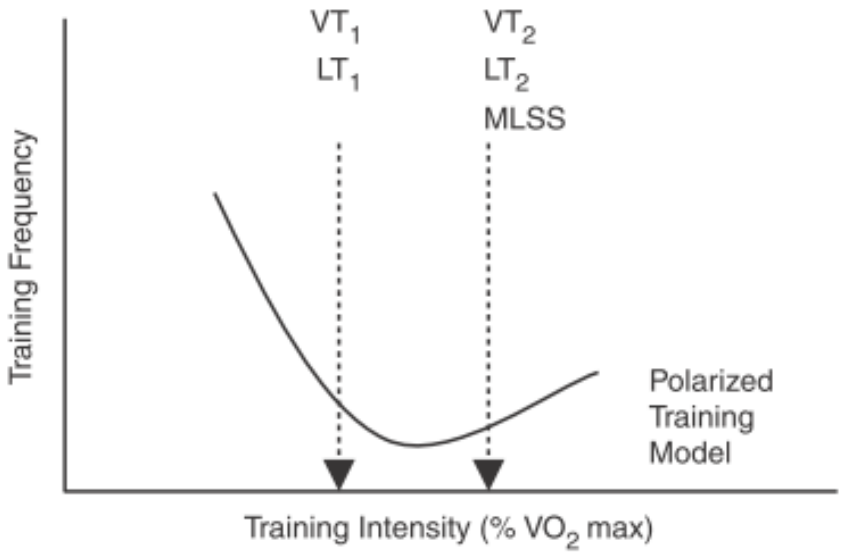
A landmark discovery often ignored…





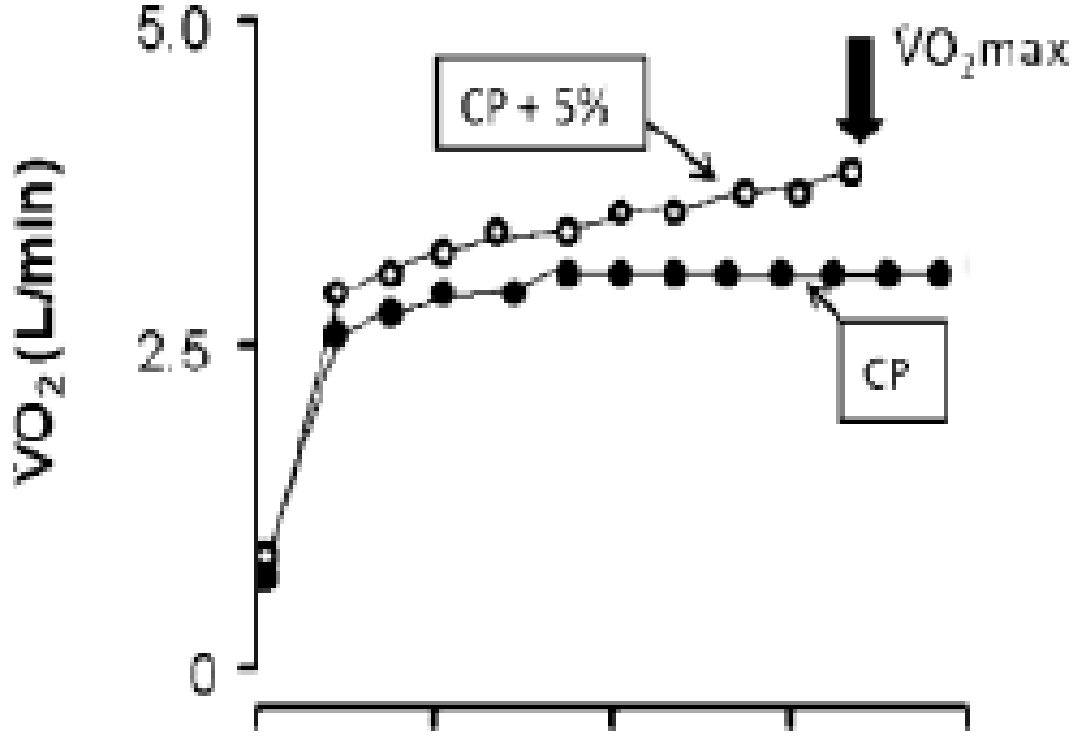

50%
$VO_{2\,max}$
LT_1
VT_1
MLSS
LT_2
VT_2
100%
$VO_{2\,max}$
[La⁻] blood
Zone 1
Zone 2
Zone 3
Exercise Intensity

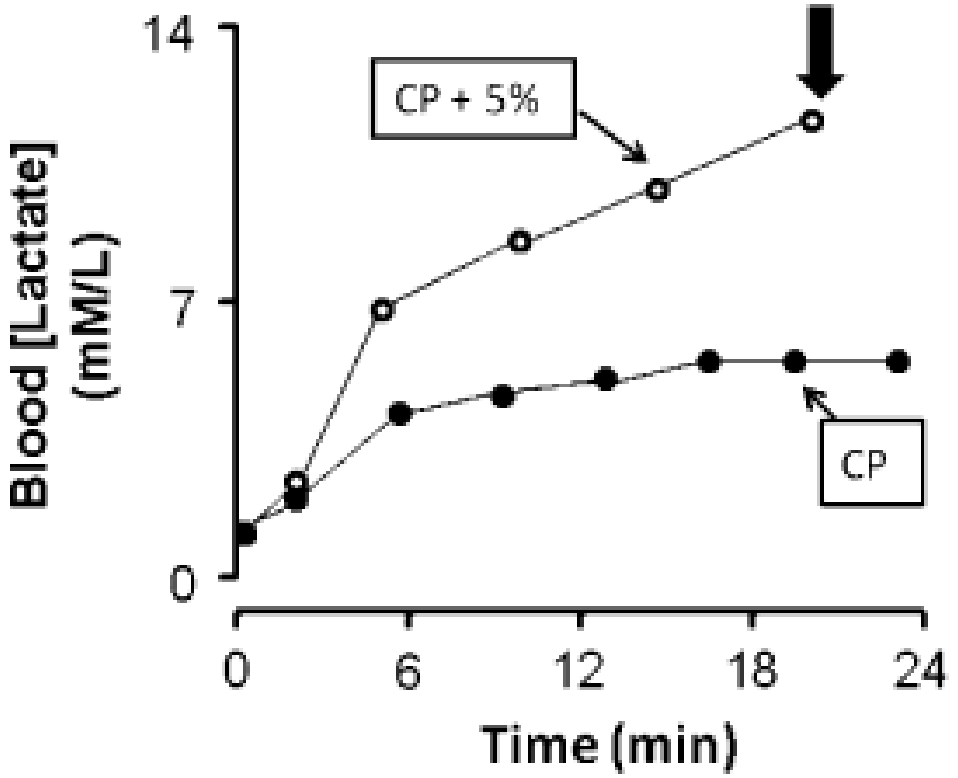

VT_1
LT_1
VT_2
LT_2
MLSS
Training Frequency
Lactate
Threshold
Training
Model
Training Intensity (% VO_2 max)


VT_1
LT_1
VT_2
LT_2
MLSS
Training Frequency
Polarized
Training
Model
Training Intensity (% VO_2 max)

Domain	Region	Training Type	Stress	Adaptations (?)
Moderate	Closer to rest	recovery	• cardiorespiratory	
	Closer to LT	distance 3+ hours	• ↑ cardiorespiratory	
Heavy	Above LT	distance 1-3 hours (tempo)	• ↑↑ cardiorespiratory • metabolic • buffering	
	Closer to CI	distance up to 1 hour (race pace)	• ↑↑ cardiorespiratory • ↑ metabolic • ↑ buffering	
Severe	Slightly above CI	high speed 20-30 min max	• ↑↑ cardiorespiratory • ↑↑metabolic • ↑↑ buffering	
	Far above CI	short bouts accumulation of 15 min max	• ↑ cardiorespiratory • ↑↑↑ metabolic • ↑↑ buffering	

body mass
fat metabolism
insulin sensitivity
inflammation
cardiac function
hemoglobin
blood volume
sympatholysis
vascular function
mitochondrial biogenesis
aerobic enzymes
capillarization
fibre hypertrophy


5.0
2.5
0
VO_2 (L/min)
VO_2max
CP + 5%
CP


14
7
0
Blood [Lactate] (mM/L)
CP + 5%
CP
0
6
12
18
24
Time (min)

% Training Time

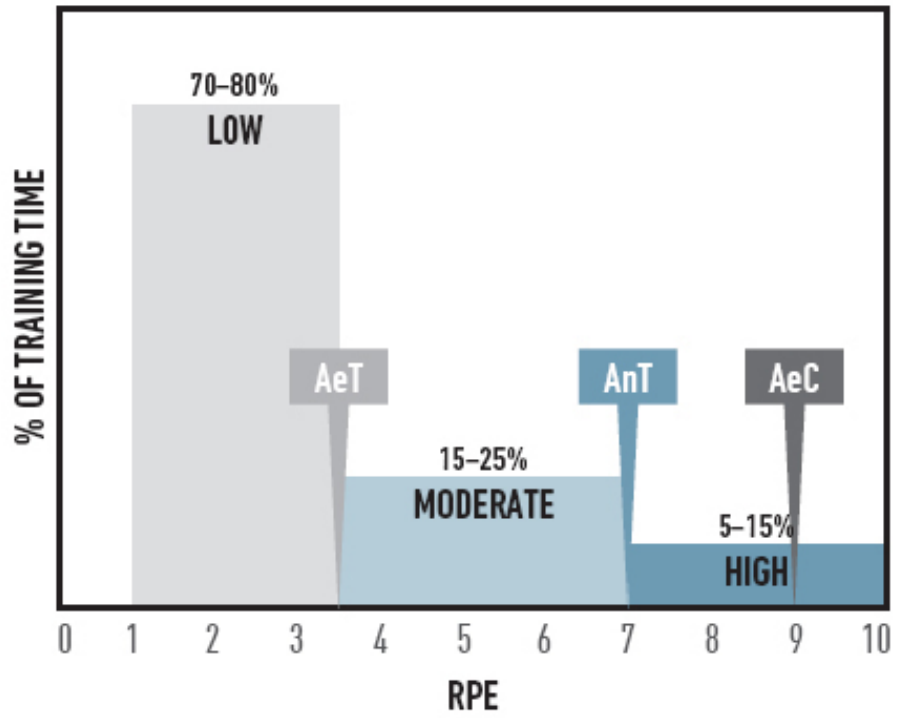


FIGURE 4.3 Seasonal training time distribution relative to the AeT and AnT reference points

All activities

Activities	Weeks	Days	Active	Distance	Time	Coasting	Climbing	Load	Weight Lifted	kcal	Work
46	6	39	33	510km	40h44m	8m	1257m	1536	0 kg	18568	15986 kJ

17h54m	405km	11h29m	104km
20	Load 726	13	Load 810

7	1h39m	6	9h41m

Combined Zones

Z1	13h23m	46.5%
Z2	8h42m	30.2%
Z3	3h17m	11.4%
Z4	1h44m	6.1%
Z5	42m2s	2.4%
Z6	32m13s	1.9%
Z7	26m44s	1.5%
SS	1h29m	5.2%

Power Zones

Z1	11h2m	38.8%
Z2	5h36m	19.7%
Z3	2h12m	7.8%
Z4	1h58m	7.0%
Z5	1h52m	6.6%
Z6	4h7m	14.5%
Z7	1h35m	5.6%
SS	2h21m	8.3%

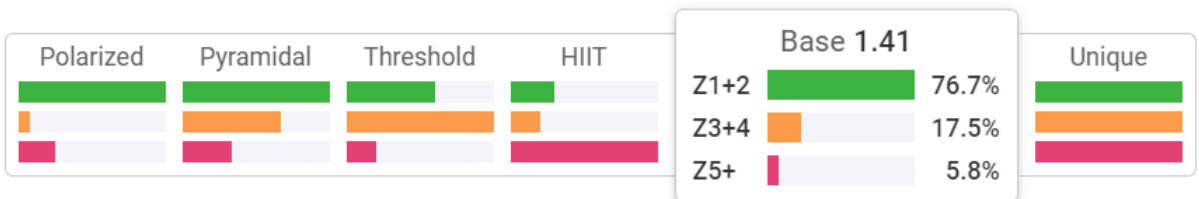
Heart Rate Zones

Z1	16h38m	57.6%
Z2	6h50m	23.7%
Z3	3h53m	13.5%
Z4	1h17m	4.5%
Z5	9m16s	0.5%
Z6	2m48s	0.2%
Z7	70s	0.1%

Pace Zones

Z1	4h17m	37.1%
Z2	3h34m	30.9%
Z3	1h28m	12.8%
Z4	59m28s	8.6%
Z5	23m55s	3.5%
Z6	24m29s	3.5%
Z7	25m	3.6%

The combined zones uses one of the power, heart rate or pace "time in zones" respectively for each activity to calculate the totals for the time period



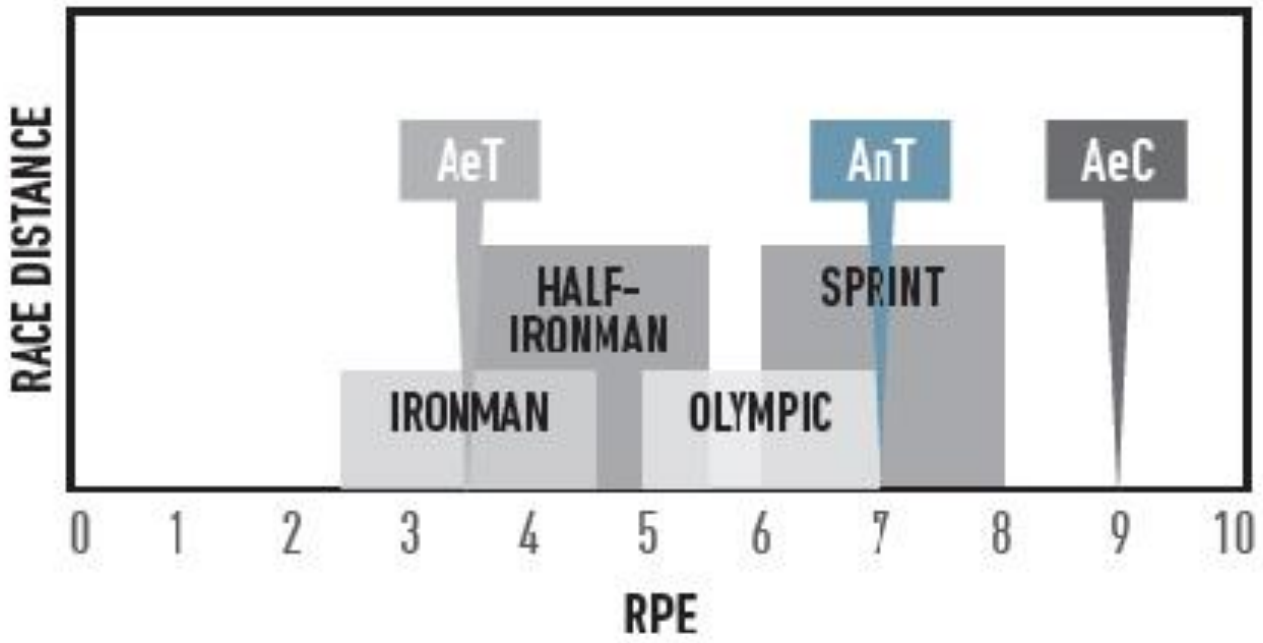


FIGURE 4.2 Intensity reference points compared with RPE and standard triathlon race distances

Fatmax – MFO- Fat Oxidation Rat

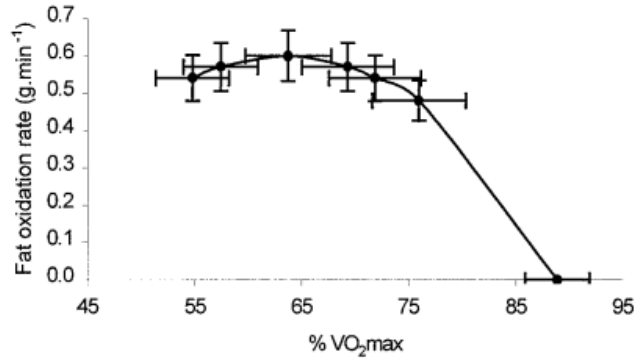
Yağ yakımının (enerji metabolizmasında substrat olarak yağların tercih edilmesi) optimal olduğu aralığın belirlenmesi için uygulanır.

Farklı protokoller ve formüllerle hesaplanmaktadır.

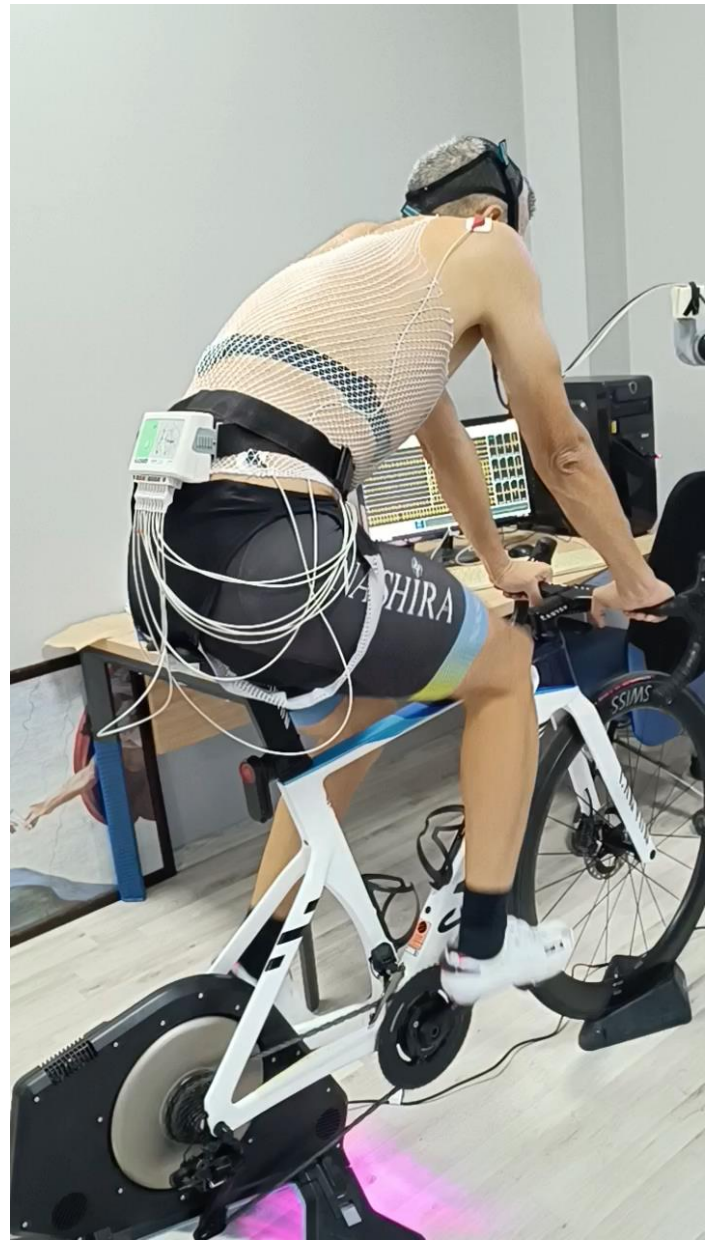
Bu sürelerin tamamı veya steady state oluştuktan sonraki kısımları kullanılır.

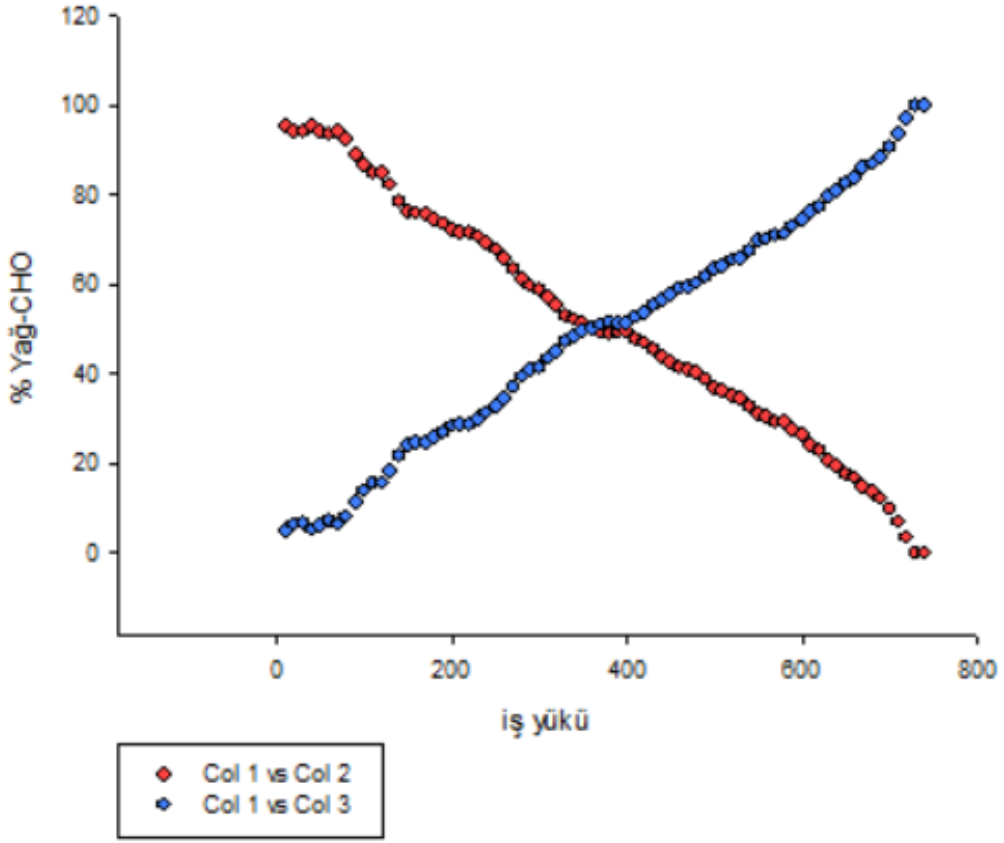
- 45-75% FTP
- %55 → maxVO2
- MAP-MAS → %35 - %65
- %60 → maxHR
- La → 1.8-1.9 mmol/dl

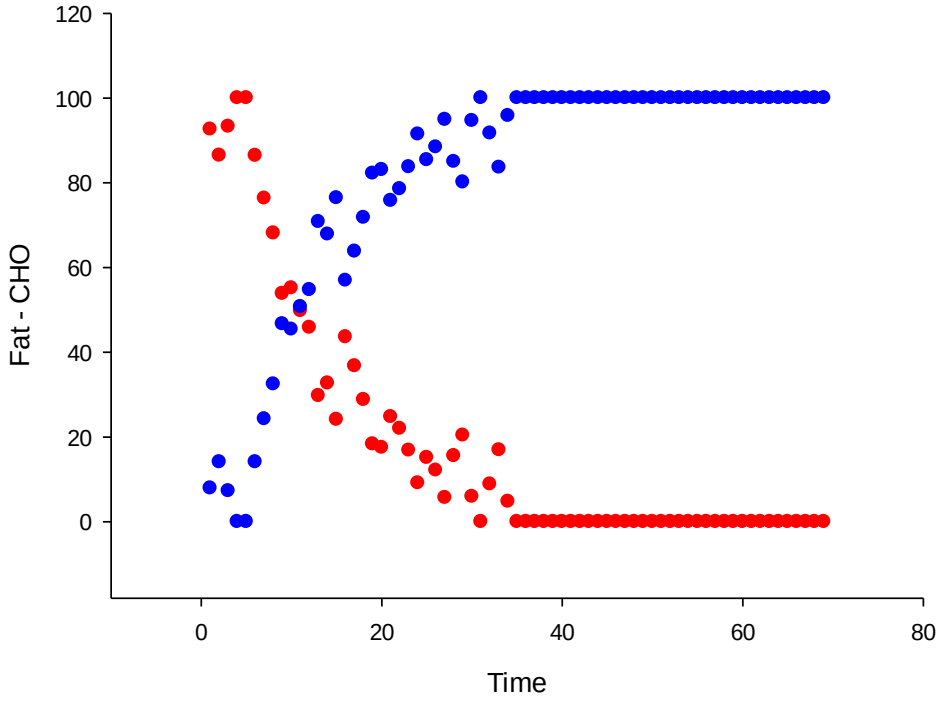
Generally, the highest rates of fat oxidation are found at low to moderate exercise intensities (range 33–65% $\dot{V}O_{2max}$) (1,2,4,11,16,20,28–31). Most studies, however, measured fat oxidation at only two (1,4,11,20,30,31), three

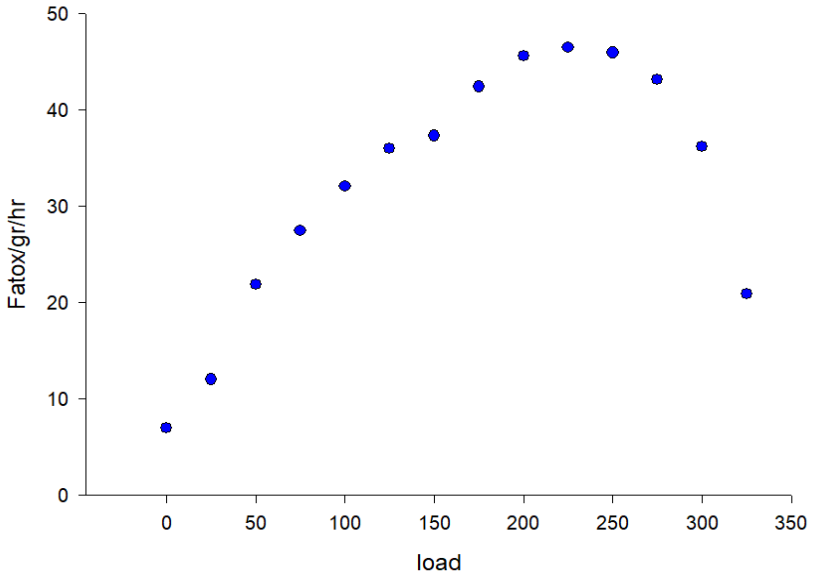


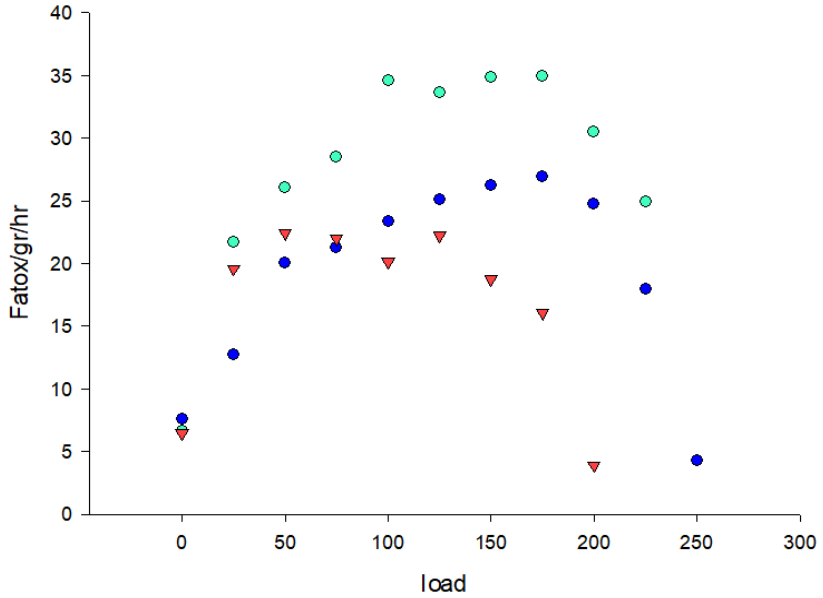
Lipids are oxidized predominantly at submaximal exercise intensities (< 65% $\dot{V}O_{2max}$); however, an exercise intensity that exceeds 65% $\dot{V}O_{2max}$ produces a shift in energy contribution favoring carbohydrates (Purdom et al., 2018). Therefore, Fatmax can be achieved at low-to-moderate exercise intensities (35–65% $\dot{V}O_{2max}$) (Jeukendrup and Wallis, 2005). Different approaches have been pro-


SHIRA


120
100
80
60
40
20
0
% Yağ-CHO
0
200
400
600
800
iş yükü
Col 1 vs Col 2
Col 1 vs Col 3


120
100
80
60
40
20
0
Fat - CHO
0
20
40
60
80
Time





Sports Med (2018) 48:467–479
https://doi.org/10.1007/s40279-017-0751-x

ORIGINAL RESEARCH ARTICLE

Assessment of Metabolic Flexibility by Means of Measuring Blood Lactate, Fat, and Carbohydrate Oxidation Responses to Exercise in Professional Endurance Athletes and Less-Fit Individuals

Iñigo San-Millán[1,2] · George A. Brooks[3]

Table 2 Average rates of fat and carbohydrate oxidation and blood lactate levels in an incremental exercise test until volitional exhaustion in international-level professional endurance athletes ($n = 22$)

Power (W)	FATox (g·min^{-1})	[La$^-$] (mmol·L^{-1})	CHOox (g·min^{-1})
136.5 ± 10.4	0.50 ± 0.12	0.67 ± 0.12	1.46 ± 0.30
170.6 ± 13.2	0.57 ± 0.13	0.67 ± 0.14	1.86 ± 0.34
204/7 ± 15.6	0.65 ± 0.15	0.74 ± 0.18	2.27 ± 0.37
238.8 ± 18.2	0.67 ± 0.12	0.92 ± 0.27	2.78 ± 0.46
272.9 ± 20.8	0.62 ± 0.14	1.32 ± 0.47	3.31 ± 0.51
307.1 ± 23.4	0.42 ± 0.18	2.55 ± 1.11	4.24 ± 0.68
341.2 ± 26.1	0.17 ± 0.17	4.91 ± 1.82	5.35 ± 0.68
371.9 ± 30.2	0.02 ± 0.07	7.77 ± 1.72	6.02 ± 0.75
396.9 ± 35.4	0.00 ± 0.00	8.37 ± 1.90	6.37 ± 1.06

Relationships:

[La$^-$] and FATox: $r = -0.97$, $p < 0.01$

[La$^-$] and CHOox: $r = 0.94$, $p < 0.01$

FATox and CHOox: $r = -0.90$, $p < 0.01$

FATox fat oxidation, *CHOox* carbohydrate oxidation, *[La$^-$]* blood lactate concentration

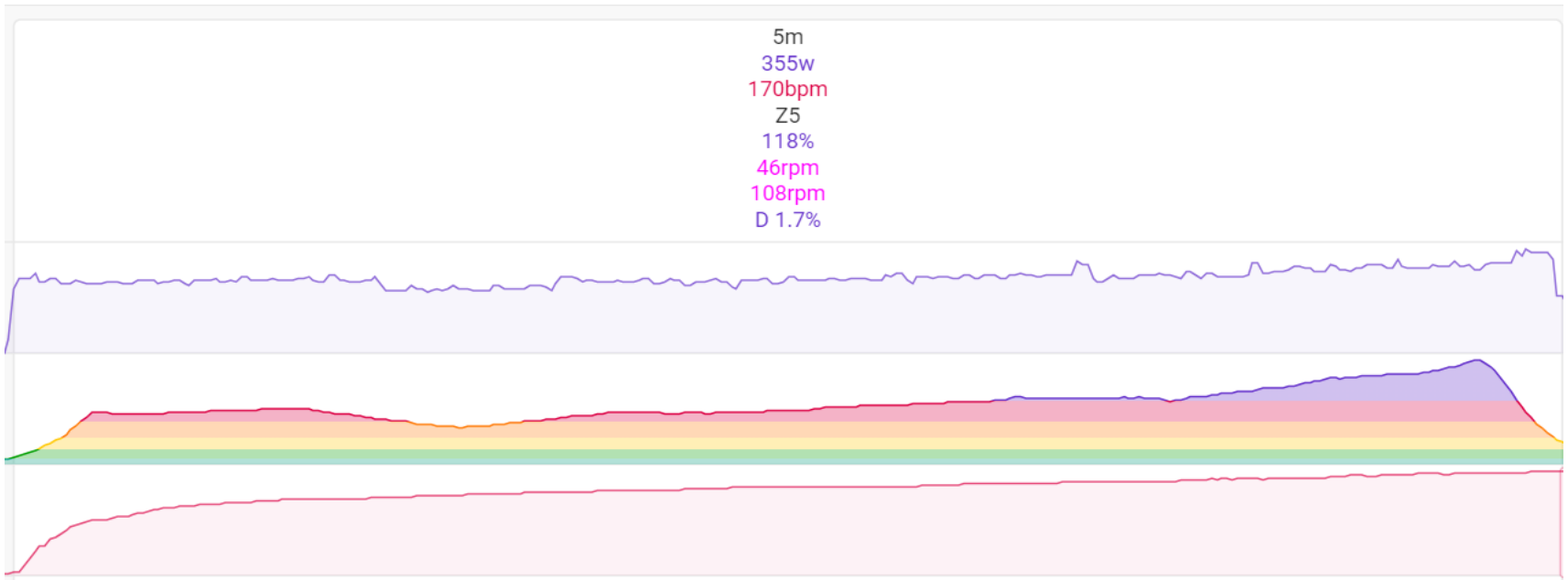
Int J Sports Physiol Perform. 2022 Jan 1;17(1):9-15. doi: 10.1123/ijspp.2020-0923. Epub 2021 Jul 5.

Five-Minute Power-Based Test to Predict Maximal Oxygen Consumption in Road Cycling

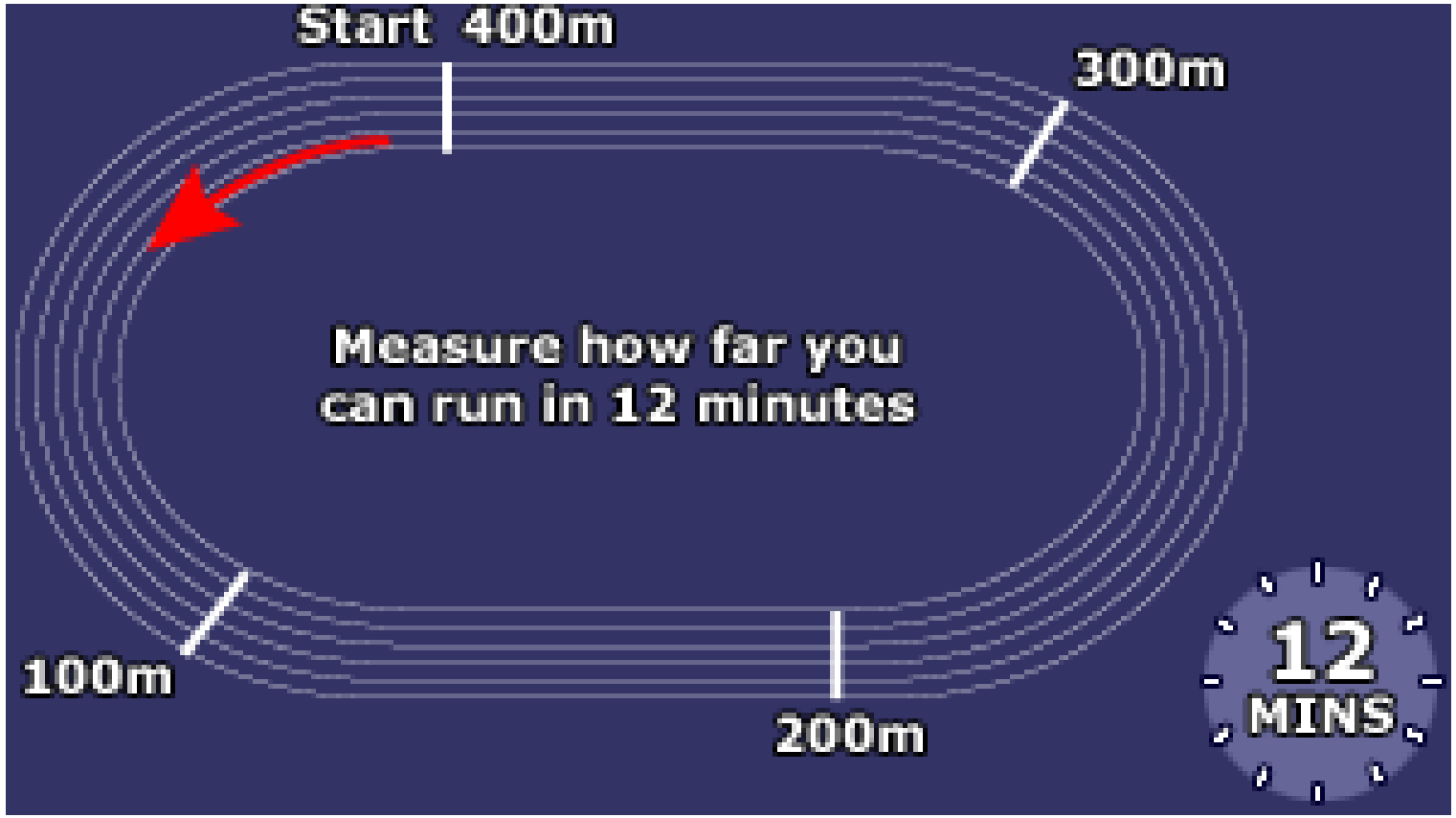
Sebastian Sitko, Rafel Cirer-Sastre, Francisco Corbi, Isaac López-Laval

PMID: 34225254 DOI: 10.1123/ijspp.2020-0923

5MT using the equation VO2max = 16.6 + (8.87 × 5-min relative power output).



Cooper


Start 400m
300m
Measure how far you
can run in 12 minutes
100m
200m
12
MINS

- 12 dakika bitiminde total mesafenin kaydedilmesi gerekir.

- 12 dakikalık süre sonrasındaki mesafenin hesaplanabilmesi için sahanın 50'şer metrelik aralıklarla işaretlenmesi önerilmektedir.

- $VO2_{max}$ değerinin hesaplanması için Cooper tarafından geliştirilen şu formül kullanılır:

- $VO2_{max}$: (22.351* km) - 11.288
- $VO2_{max}$: (35.97* mil) - 11.29

Eşik hesaplanması ???

- 30 dakika → all out

- Son 20 dk;
- Ortalama hız → Eşik Pace
- Ortalama KAS → Eşik KAS

Heart Rate Settings

Threshold HR	Max HR	HRRc Min HR
182	194	80

Heart Rate Training Zones

Z1	Recovery	0 - 84%	0 - 153
Z2	Aerobic	85% - 89%	154 - 162
Z3	Tempo	90% - 94%	163 - 171
Z4	SubThreshold	95% - 99%	172 - 181
Z5	SuperThreshold	100% - 102%	182 - 186
Z6	Aerobic Capacity	103% - 105%	187 - 192
Z7	Anaerobic	106%+	193 - 194

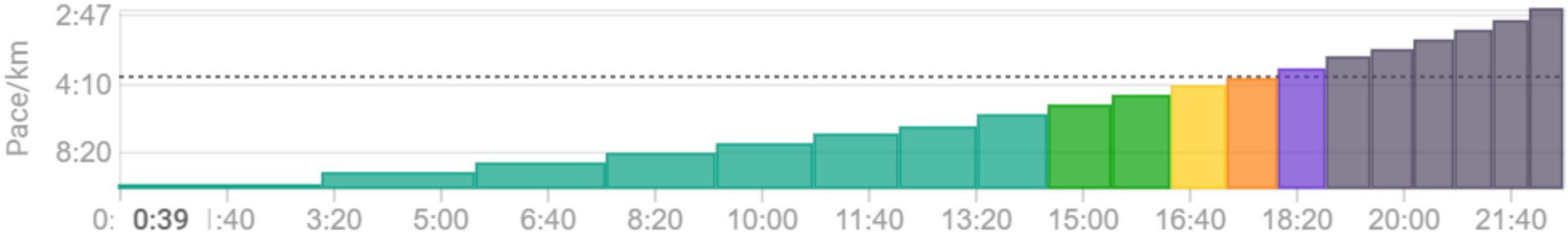
Pace Settings

Threshold Pace	Units
3:57	per km

Pace Training Zones

Z1	Zone 1	0 - 77.5%	5:06/km +
Z2	Zone 2	78.5 - 87.7%	4:30 - 5:05/km
Z3	Zone 3	88.7 - 94.3%	4:11 - 4:29/km
Z4	Zone 4	95.3 - 100%	3:57 - 4:10/km
Z5	Zone 5a	101 - 103.4%	3:49 - 3:56/km
Z6	Zone 5b	104.4 - 111.5%	3:33 - 3:48/km
Z7	Zone 5c	112.5%+	< 3:32/km

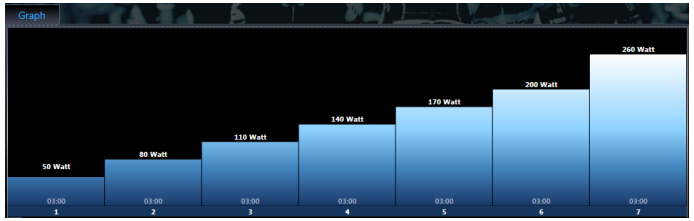
Conconi

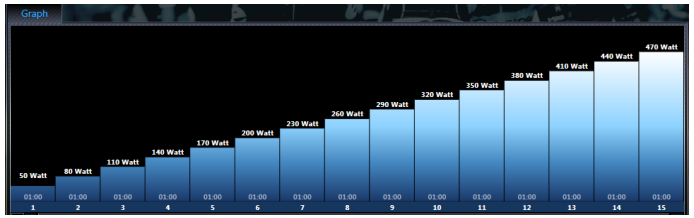


limits. For a fit athlete, the anaerobic threshold is typically in the neighborhood of 80 to 85 percent of aerobic capacity. Your sedentary neighbor's anaerobic threshold is considerably lower, probably in the range of 60 to 70 percent of his or her also-low aerobic capacity.


LactateSCOUT+


BIOSEN
EKF
DIAGNOSTIC
Sensor Replacement
Please insert sensor


Graph
50 Watt
80 Watt
110 Watt
140 Watt
170 Watt
200 Watt
260 Watt


Graph
50 Watt
80 Watt
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140 Watt
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200 Watt
230 Watt
260 Watt
290 Watt
320 Watt
350 Watt
380 Watt
410 Watt
440 Watt
470 Watt

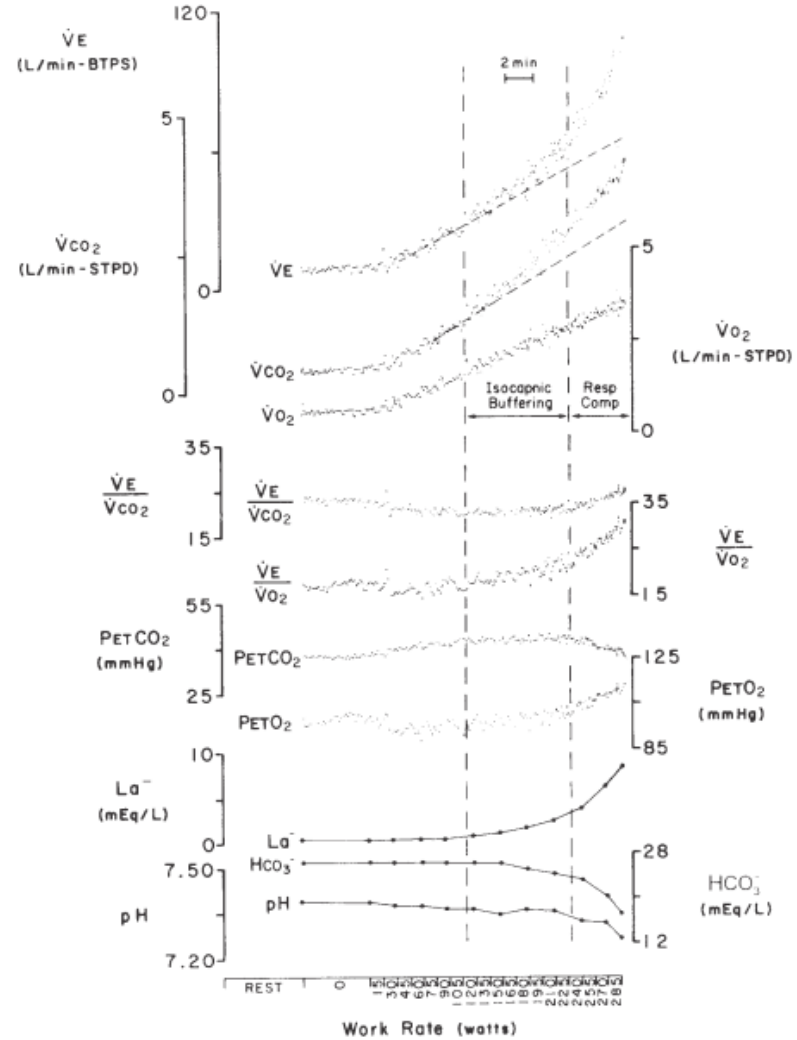
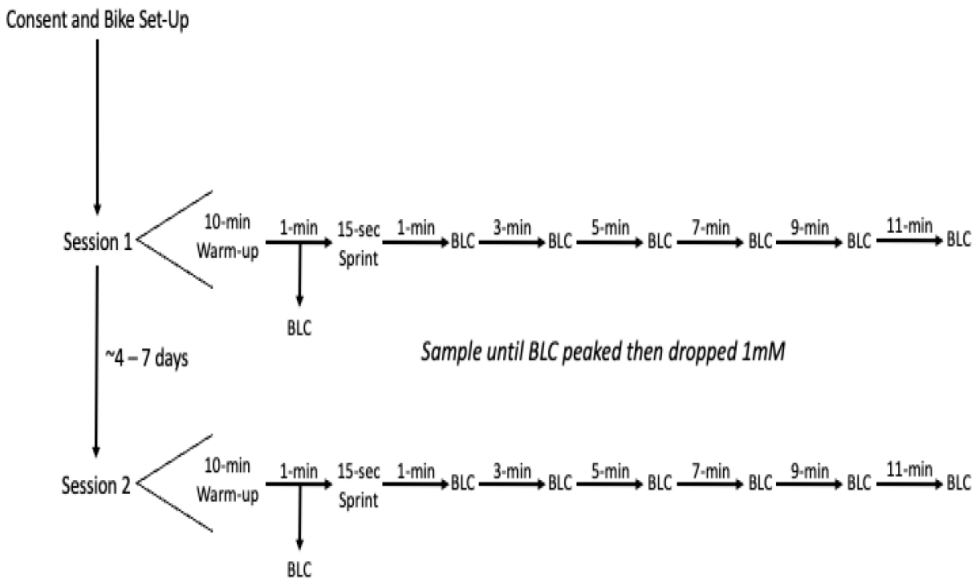


FIGURE 2.30. Breath-by-breath measurements of minute ventilation ($\dot{V}_E$), CO_2 output ($\dot{V}_{CO_2}$), O_2 uptake ($\dot{V}_{O_2}$), $\dot{V}_E/\dot{V}_{CO_2}$, $\dot{V}_E/\dot{V}_{O_2}$, P_{ETCO_2}, P_{ETO_2}, arterial lactate and bicarbonate, and pH for a 1-minute incremental exercise test on a cycle ergometer. The lactate threshold (*LT*) occurs when lactate increases (*left vertical dashed line*). This is followed by a fall in HCO_3^- *(LAT)* and generally an increase in $\dot{V}_E/\dot{V}_{O_2}$. *Isocapnic buffering* refers to the period when $\dot{V}_E$ and $\dot{V}_{CO_2}$ increase curvilinearly at the same rate without an increase in $\dot{V}_E/\dot{V}_{CO_2}$, thus retaining a constant P_{ETCO_2}. After the period of isocapnic buffering, P_{ETCO_2} decreases and $\dot{V}_E/\dot{V}_{CO_2}$ increases, reflecting ventilatory compensation for the metabolic acidosis of exercise.

Article

Reliability of the 15-s Maximal Lactate Accumulation Rate (VLamax) Test for Cycling

Christopher R. Harnish [1,*], Thomas C. Swensen [2] and Deborah King [2]



frontiers | Frontiers in Physiology

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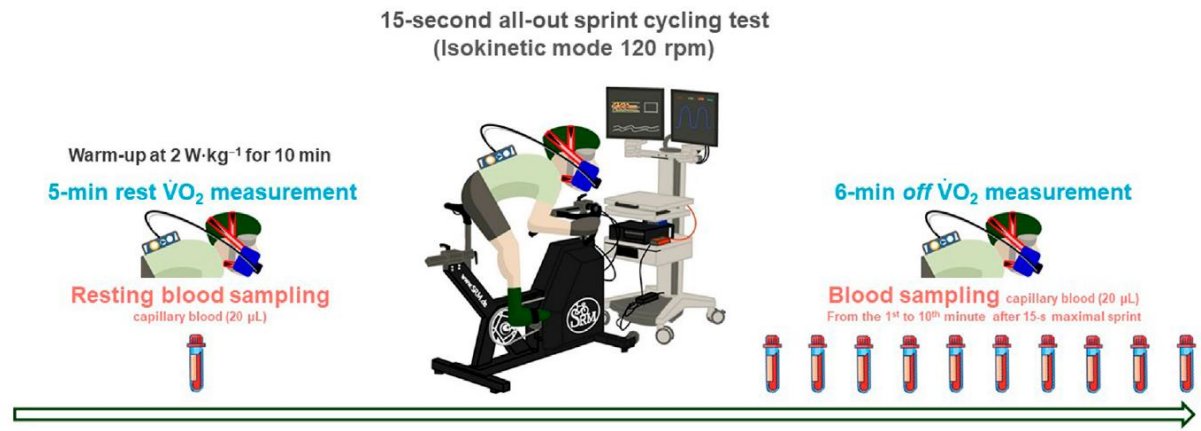
A modified formula using energy system contributions to calculate pure maximal rate of lactate accumulation during a maximal sprint cycling test

Woo-Hwi Yang [1,2*], So-Young Park [1], Taenam Kim[1], Hyung-Jin Jeon[2], Oliver Heine[3] and Sebastian Gehlert [4,5*]

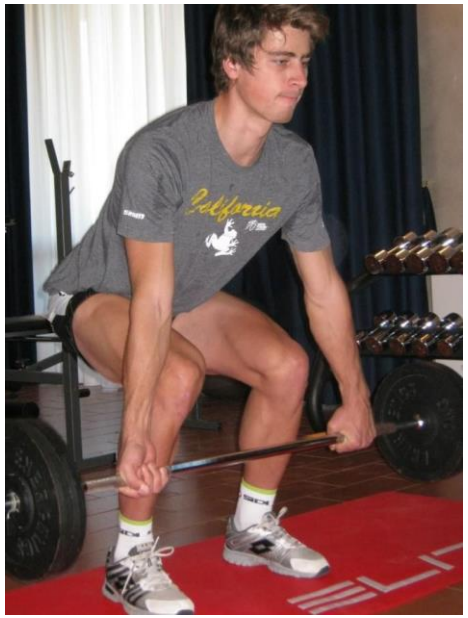


$$\dot{V}La_{max} = \frac{La_{max} - La_{Pre}}{t_{test} - t_{alac}} = \frac{La_{\Delta}}{t_{lac}}$$

$$P^{\nu}_{La.\,max}\left[mmol \cdot L^{-1} \cdot s^{-1}\right] = \frac{La_{max} - La_{rest}}{t_{Exer} - \left(t_{PCr-peak} + t_{Oxi}\right)}.$$

$$^{\nu}_{La.\,max}\left(t_{PCr-peak}\right)\left[mmol \cdot L^{-1} \cdot s^{-1}\right] = \frac{La_{max} - La_{rest}}{t_{Exer} - t_{PCr-peak}}.$$

Subj #	Sex	Wgt	Session	HLa-1	Pk BLC	Time to Pk	VLamax	Talac	Peak 15 s Watts	Peak W/kg	AVG 15 s	Avg W/kg	kJ
1	M	71.1	1	0.9	11.6	5	0.973	4	851	12.0	793	11.2	12
1	M	71.1	2	1	9.7	1	0.870	5	864	12.2	771	10.8	12
2	M	62.7	1	1.3	12.9	1	1.055	4	771	12.3	688	11.0	10
2	M	62.7	2	1.6	11.1	3	0.864	4	796	12.7	697	11.1	11
3	M	65.9	1	0.8	7.3	7	0.500	2	892	13.5	720	10.9	11
3	M	65.9	2	1.7	8.2	3	0.542	3	878	13.3	706	10.7	11
4	M	92.6	1	2.6	7.7	1	0.510	5	1217	13.1	1017	11.0	15
4	M	92.6	2	3.9	9.5	3	0.700	7	1182	12.8	1046	11.3	16
5	M	65.6	1	1.4	9.4	3	0.615	2	799	12.2	740	11.3	11
5	M	65.6	2	3.2	8.1	7	0.377	2	812	12.4	713	10.9	11




as tv

squat

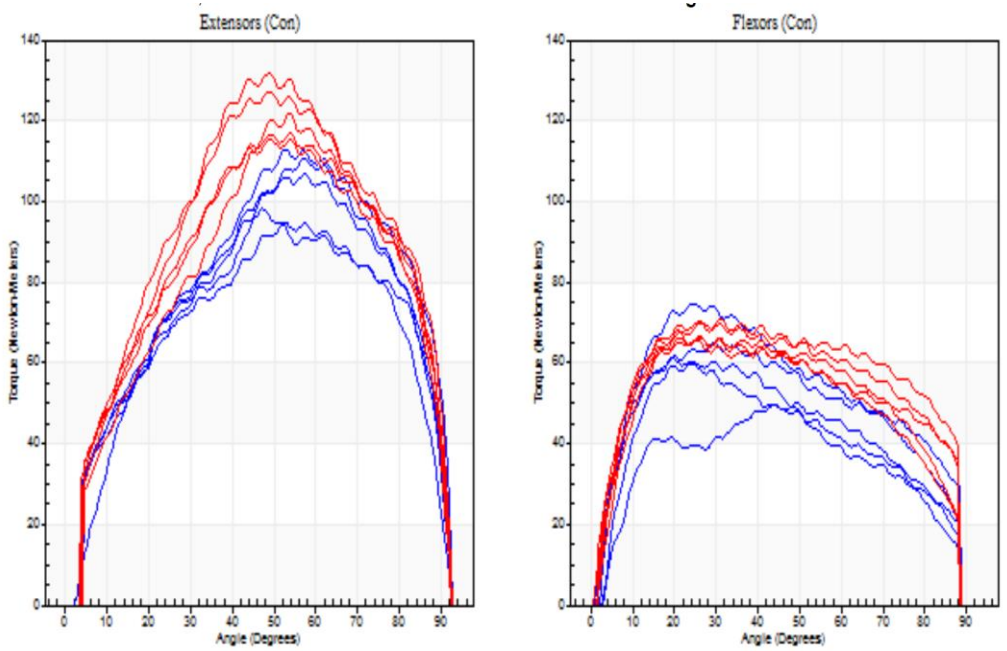
WLC Rep Max Calculator			
Input	Weight	100	Input
	Reps	8	
Results	1 RM	124	Results
	12 RM	86	
	10 RM	93	
	8 RM	100	
	6 RM	107	

You must enter the exercise and your 1 rep max in columns H and I. All of the values will be automatically calculated for you. Use the calculator above to find your 1 rep max for each exercise!

#	Exercise	1 Rep Max	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%	105%	110%
1																	
2																	
3	1	120	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132
4	2	125	50	56,25	62,5	68,75	75	81,25	87,5	93,75	100	106,25	112,5	118,75	125	131,25	137,5
5	3	130	52	58,5	65	71,5	78	84,5	91	97,5	104	110,5	117	123,5	130	136,5	143
6	4	135	54	60,75	67,5	74,25	81	87,75	94,5	101,25	108	114,75	121,5	128,25	135	141,75	148,5
7	5	140	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154
8	6	145	58	65,25	72,5	79,75	87	94,25	101,5	108,75	116	123,25	130,5	137,75	145	152,25	159,5
9	7	150	60	67,5	75	82,5	90	97,5	105	112,5	120	127,5	135	142,5	150	157,5	165
10	8	155	62	69,75	77,5	85,25	93	100,75	108,5	116,25	124	131,75	139,5	147,25	155	162,75	170,5
11	9	160	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176
12	10	165	66	74,25	82,5	90,75	99	107,25	115,5	123,75	132	140,25	148,5	156,75	165	173,25	181,5
13	11	170	68	76,5	85	93,5	102	110,5	119	127,5	136	144,5	153	161,5	170	178,5	187
14	12	175	70	78,75	87,5	96,25	105	113,75	122,5	131,25	140	148,75	157,5	166,25	175	183,75	192,5
15	13	180	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198
16	14	185	74	83,25	92,5	101,75	111	120,25	129,5	138,75	148	157,25	166,5	175,75	185	194,25	203,5
17	15	190	76	85,5	95	104,5	114	123,5	133	142,5	152	161,5	171	180,5	190	199,5	209
18	16	195	78	87,75	97,5	107,25	117	126,75	136,5	146,25	156	165,75	175,5	185,25	195	204,75	214,5
19	17	200	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
20	18	205	82	92,25	102,5	112,75	123	133,25	143,5	153,75	164	174,25	184,5	194,75	205	215,25	225,5
21	19	210	84	94,5	105	115,5	126	136,5	147	157,5	168	178,5	189	199,5	210	220,5	231
22	20	215	86	96,75	107,5	118,25	129	139,75	150,5	161,25	172	182,75	193,5	204,25	215	225,75	236,5

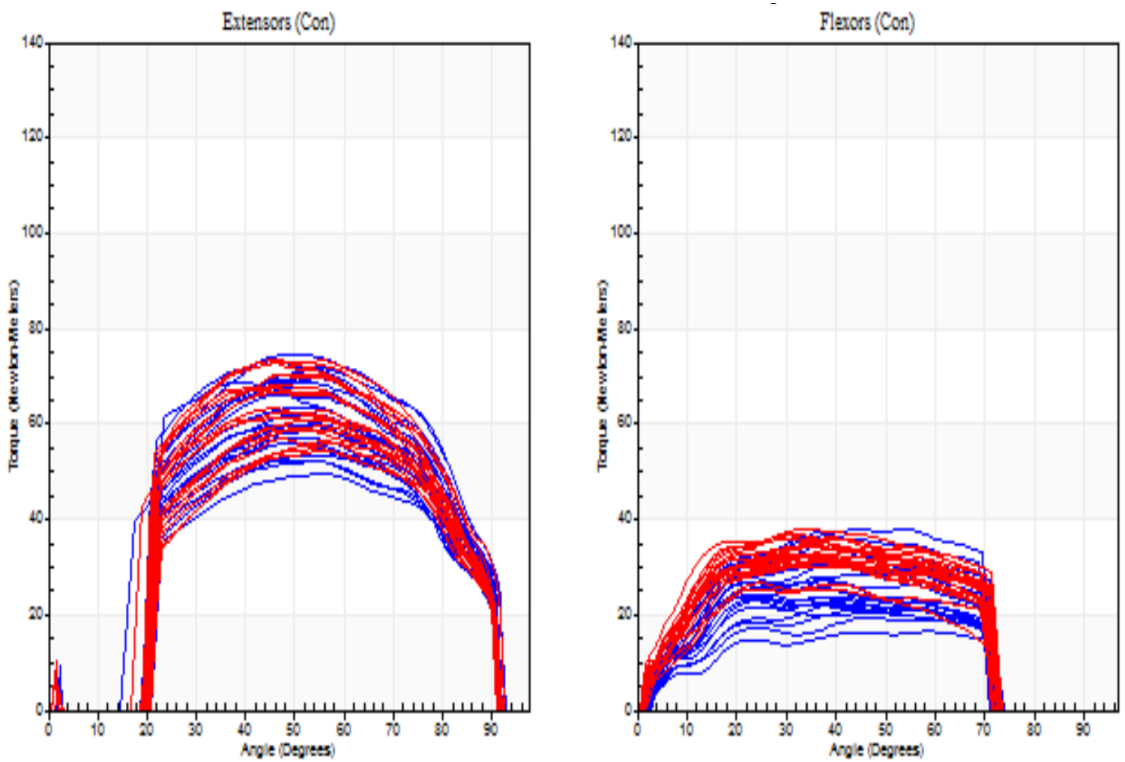
TABLE 13.1 Determining Your 1RM

REPS	FACTOR
4	0.90
5	0.875
6	0.85
7	0.825
8	0.80
9	0.775
10	0.75



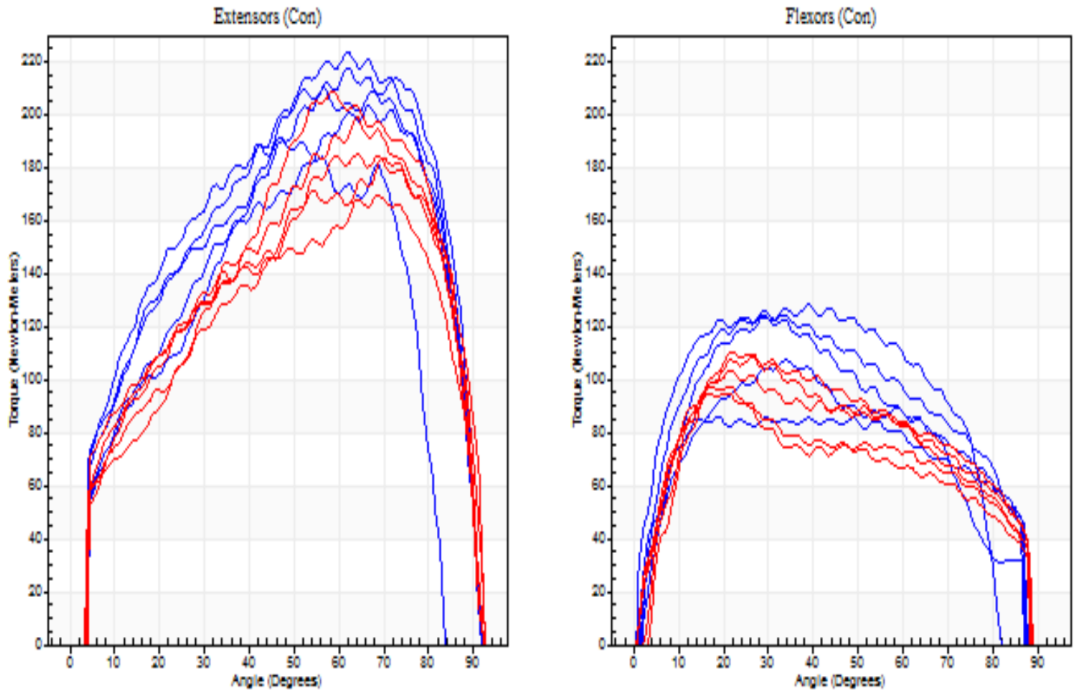
Right Side Curves Left Side Curves

Isokinetic Con/Con	Extensors (Con)			Flexors (Con)			
Speed 60/60 deg/sec 5 Reps	Value	Cof Var	%BW	Value	Cof Var	%BW	Ratio
TORQUE PARAMETERS							
Peak Torque (Newton-Meters - Best Repetition)							
Right	113	0,08	235	75	0,14	155	66
Left	132	0,06	274	71	0,03	149	54
Deficit	-14			5			
Work per Repetition (Newton-Meters - Best Repetition)							
Right	126	0,05	265	80	0,15	167	63
Left	145	0,05	304	88	0,05	185	61
Deficit	-13			-9			
Average Power per Repetition (Watts - Best Repetition)							
Right	79	0,06	165	51	0,13	108	65
Left	90	0,04	189	56	0,04	116	62
Deficit	-12			-9			



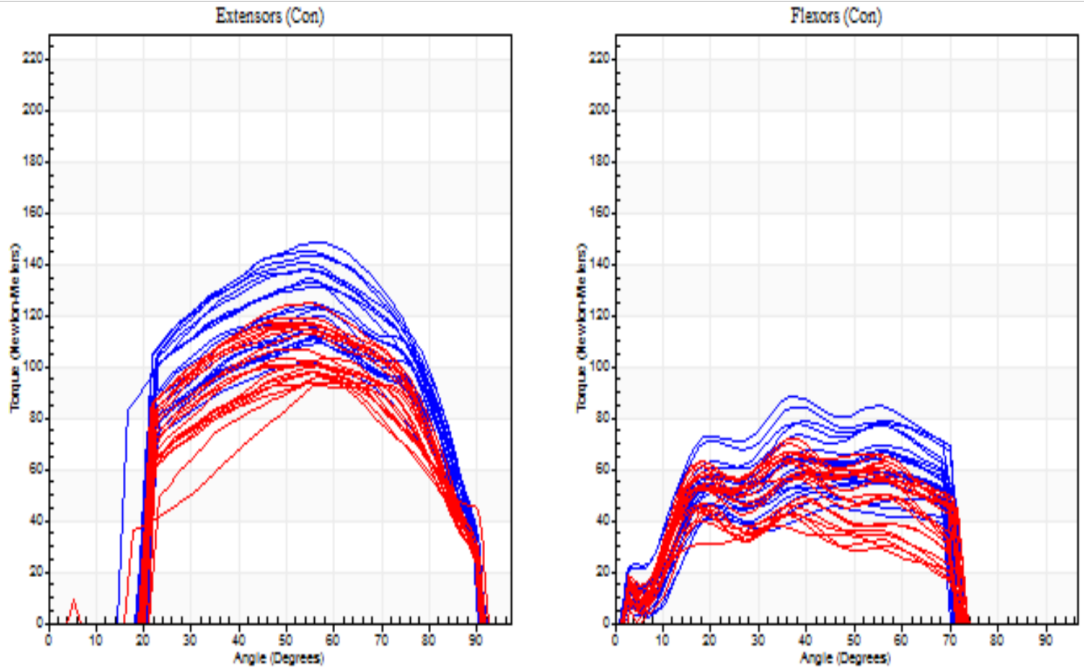
Right Side Curves Left Side Curves

Isokinetic Con/Con	Extensors (Con)			Flexors (Con)			
Speed 240/240 deg/sec 20 Reps	Value	Cof Var	%BW	Value	Cof Var	%BW	Ratio
TORQUE PARAMETERS							
Peak Torque (Newton-Meters - Best Repetition)							
Right	75	0,12	155	38	0,21	80	51
Left	73	0,10	152	38	0,10	80	52
Deficit	2			0			
Fatigue Index							
Right	30	0,00		40	0,00		
Left	23	0,00		-2	0,00		



Right Side Curves Left Side Curves

Isokinetic Con/Con	Extensors (Con)			Flexors (Con)			
Speed 60/60 deg/sec 5 Reps	Value	Cof Var	%BW	Value	Cof Var	%BW	Ratio
TORQUE PARAMETERS							
Peak Torque (Newton-Meters - Best Repetition)							
Right	224	0,06	307	129	0,16	176	58
Left	209	0,08	286	110	0,06	152	53
Deficit	7			15			
Work per Repetition (Newton-Meters - Best Repetition)							
Right	252	0,07	346	144	0,12	197	57
Left	225	0,05	310	123	0,07	170	55
Deficit	11			14			
Average Power per Repetition (Watts - Best Repetition)							
Right	158	0,05	218	98	0,13	134	62
Left	140	0,05	193	80	0,09	110	57
Deficit	11			18			

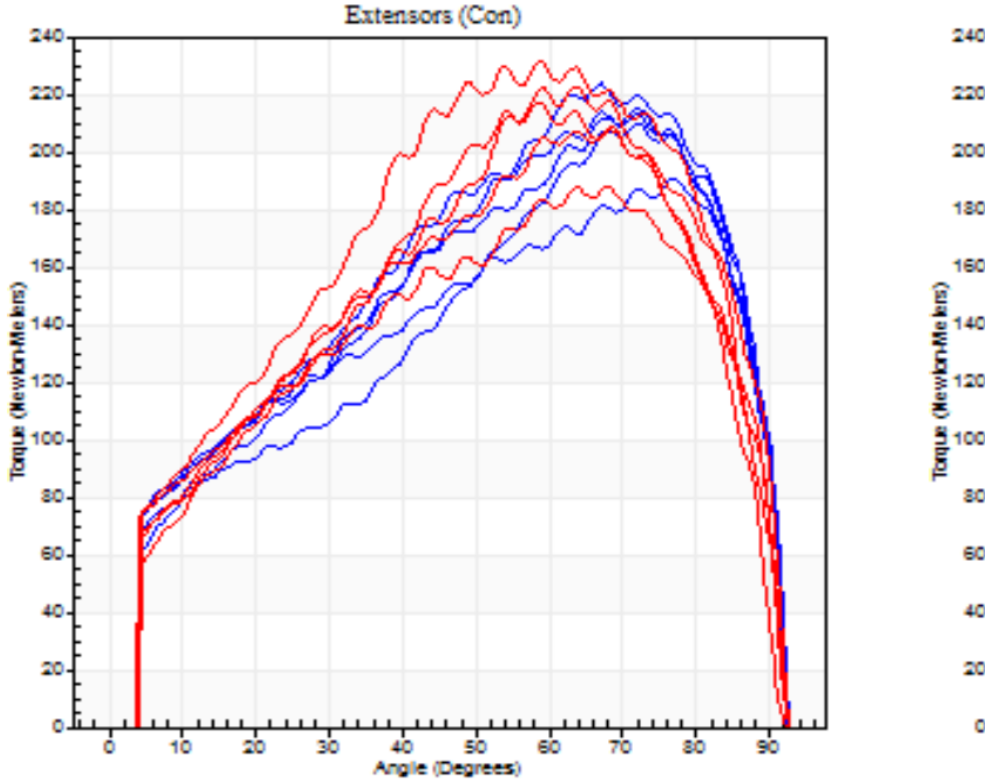


Right Side Curves Left Side Curves

Isokinetic Con/Con	Extensors (Con)			Flexors (Con)			
Speed 240/240 deg/sec 20 Reps	Value	Cof Var	%BW	Value	Cof Var	%BW	Ratio
TORQUE PARAMETERS							
Peak Torque (Newton-Meters - Best Repetition)							
Right	149	0,11	206	88	0,18	122	59
Left	125	0,09	173	72	0,18	98	58
Deficit	16			18			
Fatigue Index							
Right	25	0,00		42	0,00		
Left	10	0,00		29	0,00		
Total Work Done (Newton-Meters)							
Right	2525	0,00	3469	1215	0,00	1669	48
Left	2107	0,00	2894	1044	0,00	1433	50
Deficit	17			14			
Average Power per Repetition (Watts - Best Repetition)							
Right	323	0,12	444	176	0,18	242	54
Left	264	0,11	363	142	0,19	196	54
Deficit	18			19			

Long Form Torque vs. Position Repor

Name: boyraz, cumhur **ID:**



Right Side Curves Left Side Curves

Isokinetic Con/Con Speed 60/60 deg/sec 5 Reps	Extensors (Con) Value	Cof Var	%BW
TORQUE PARAMETERS			
Peak Torque (Newton-Meters - Best Repetition)			
Right	224	0,06	340
Left	232	0,08	352
Deficit	4		

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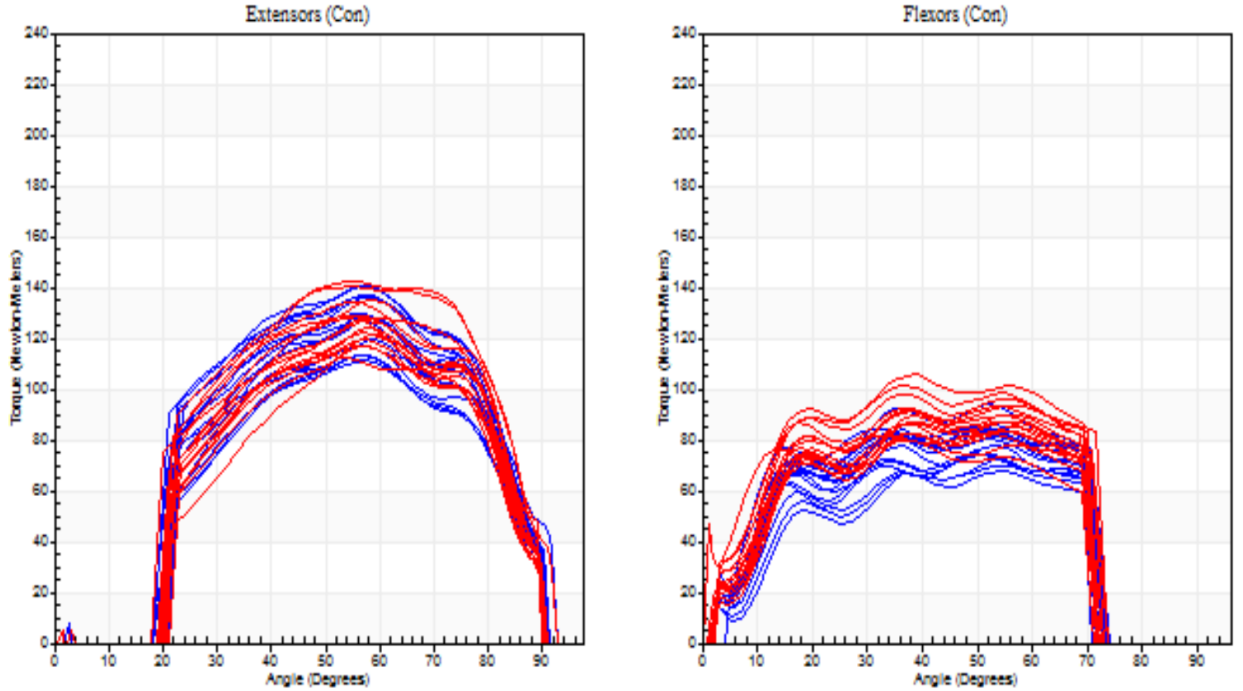
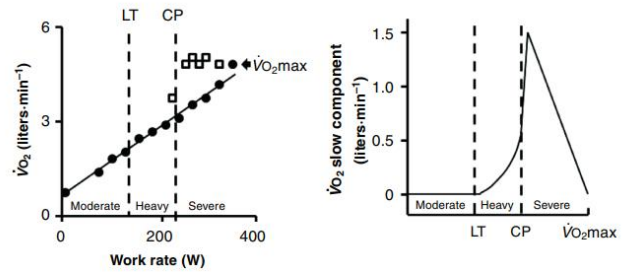
Long Form Torque vs. Position Report - Knee Extension/Flexion

Name: boyraz, cumhur **ID:** **Right/Left:** 27.12.2021 27.12.2021

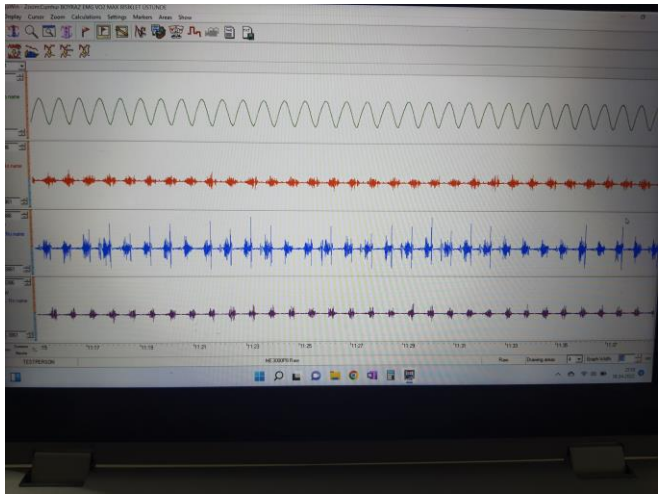


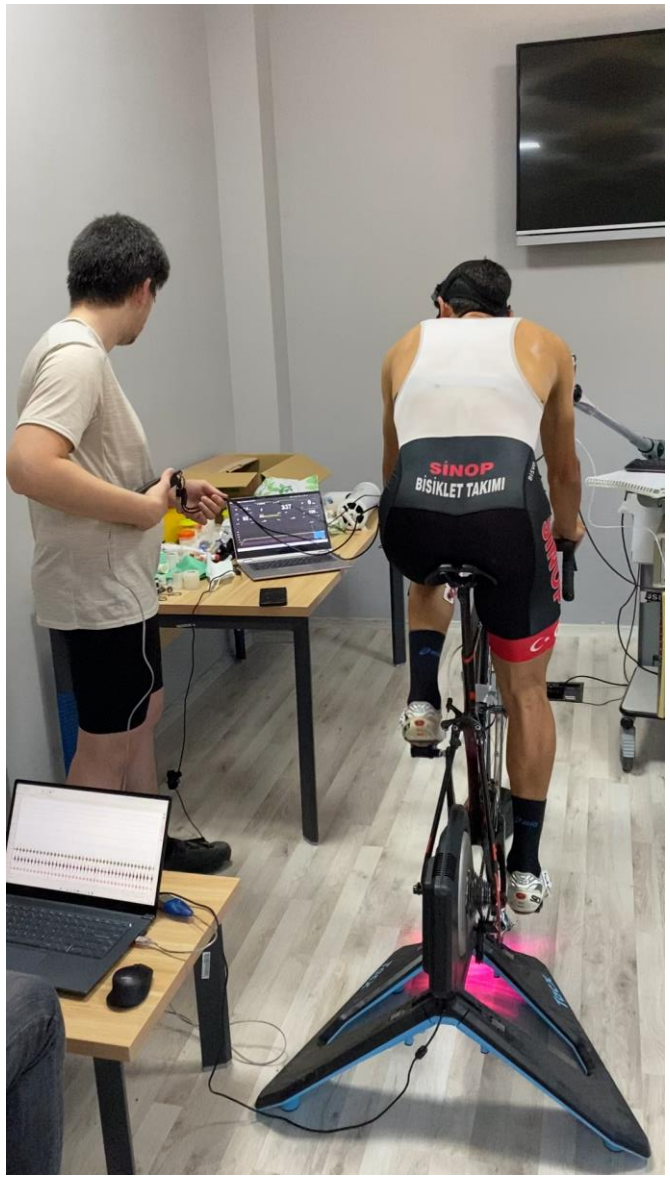
Right Side Curves Left Side Curves

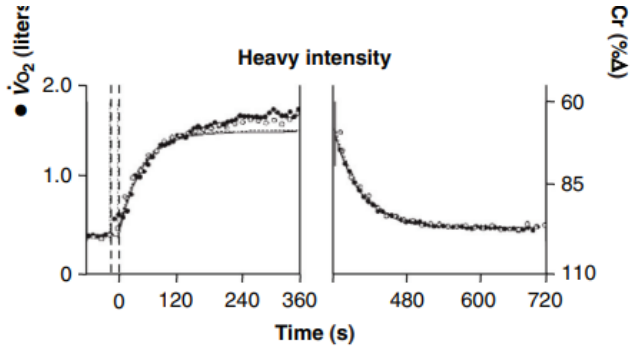
Isokinetic Con/Con Speed 240/240 deg/sec 15 Reps	Extensors (Con) Value	Cof Var	%BW	Flexors (Con) Value	Cof Var	%BW	Ratio
TORQUE PARAMETERS							
Peak Torque (Newton-Meters - Best Repetition)							
Right	141	0,08	215	94	0,09	143	66
Left	142	0,07	215	106	0,08	161	74
Deficit	1			12			
Fatigue Index							
Right	11	0,00		20	0,00		
Left	6	0,00		19	0,00		


LT
CP
$\dot{V}O_2$max
$\dot{V}O_2$ (liters·min^{-1})
6
3
0
Moderate
Heavy
Severe
0
200
400
Work rate (W)

$\dot{V}O_2$ slow component (liters·min^{-1})
1.5
1.0
0.5
0
Moderate
Heavy
Severe
LT
CP
$\dot{V}O_2$max




SİNOP
BİSİKLET TAKIMI


Heavy intensity
$\dot{V}O_2$ (liters
Cr (%Δ)
2.0
1.0
0
60
85
110
0
120
240
360
480
600
720
Time (s)

Güç Çıktılarına Göre Hesaplamalar

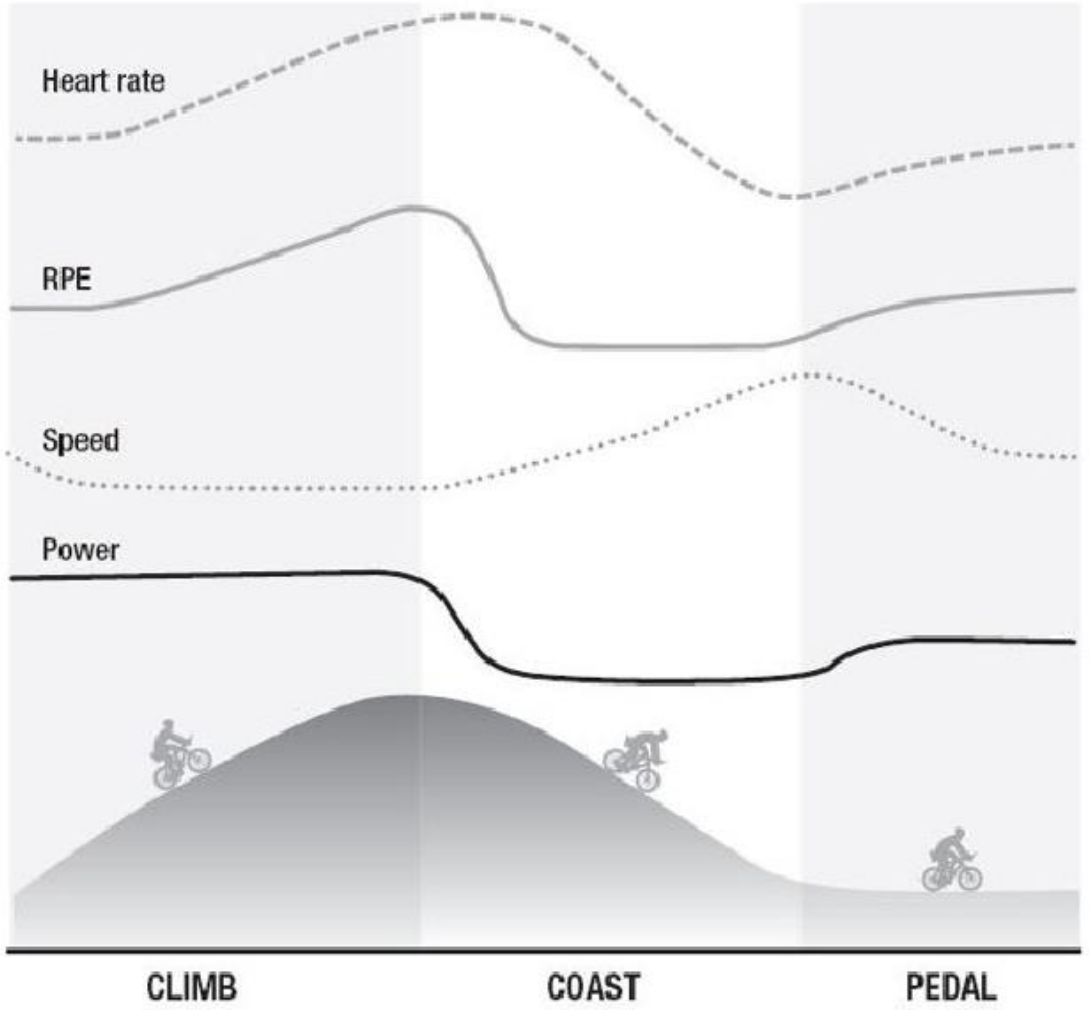


FIGURE 1.1 The responses of heart rate, rating of perceived exertion (RPE), speed, and power when climbing a hill, coasting down, and pedaling on flat terrain

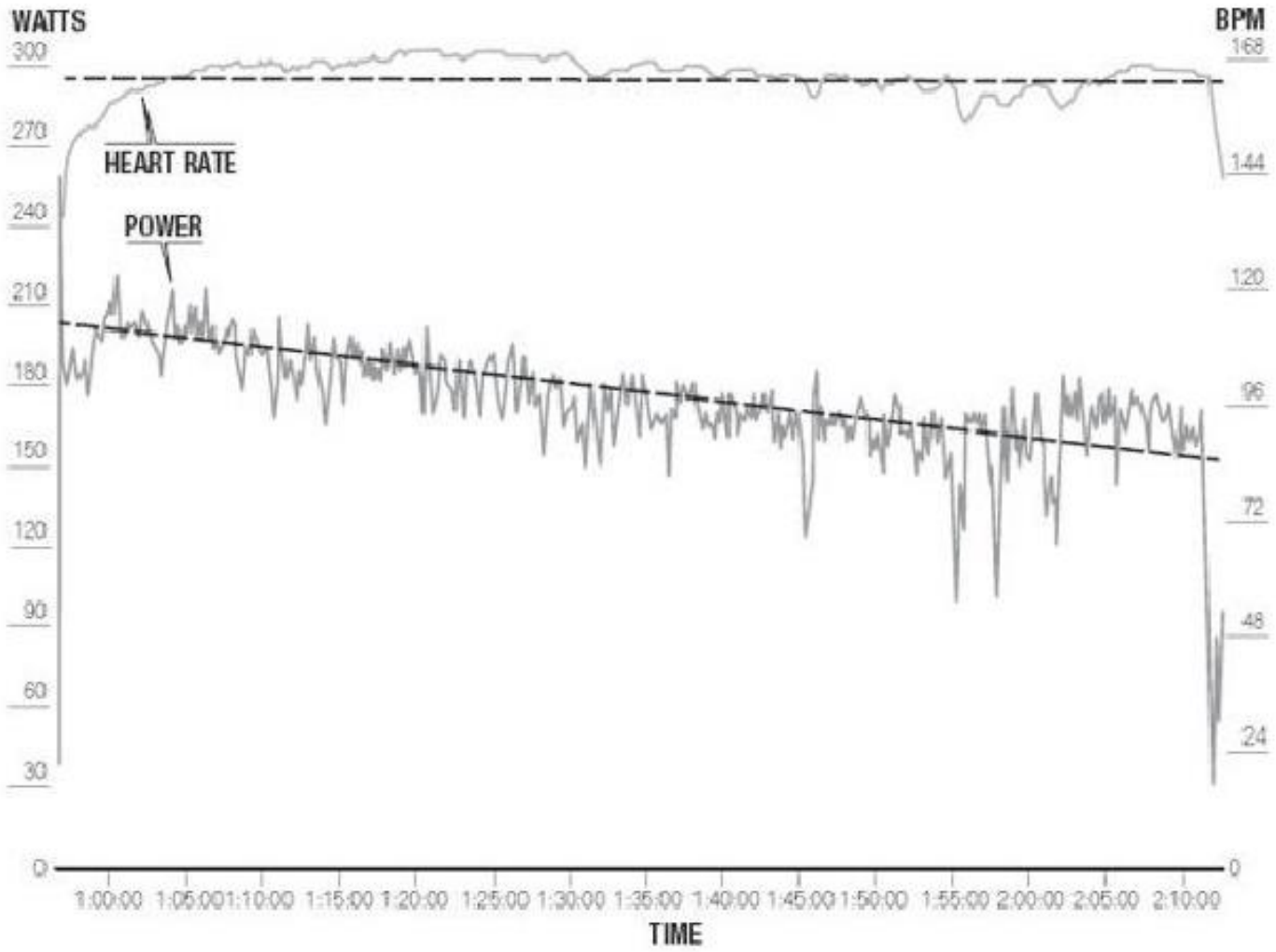
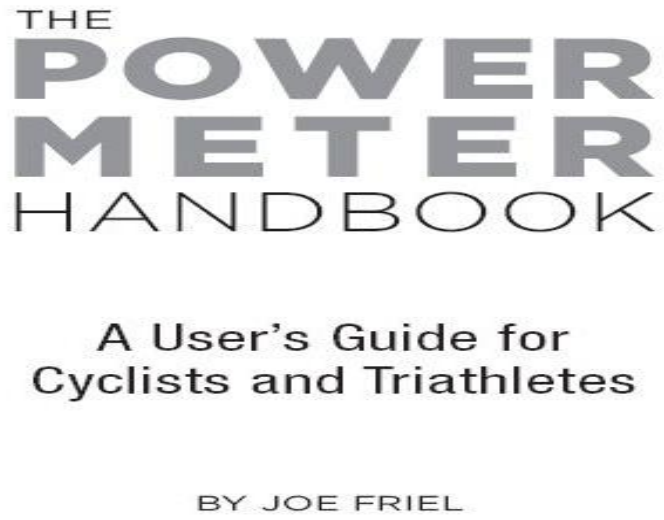


FIGURE 6.4 A steady 2-hour ride in heart rate zone 3 following a 1-hour warm-up, with 8 percent decoupling (poor aerobic endurance)

FTP →Fonksiyonel Güç Eşiği

Ortaya çıkışı sporcuların antrenman çalışma bölgelerinin hesaplanması ve 60 dakikalık (40 km time trial) efor sergileyebilecekleri maksimum güç çıktısının bulunmasına dayanmaktadır.

- 60 dakika boyunca üretilebilen en yüksek güç çıktısı.



Intensity Factor (IF):

Normalized Power değerinin Fonksiyonel Güç Eşiği değerine bölünmesi ile elde edilir. Antrenmanın yoğunluğunu ifade eder.

$$\frac{NP}{FTP}$$

299 W
Normalized Power® (NP®)

0.866
Intensity Factor® (IF®)

105.7
Training Stress Score®

345 W
FTP Ayarı

Antrenman Stres Skoru(TSS):

- Antrenmanın organizma üzerinde yarattığı varsayılan stres değeridir.
- Sporcuların FTP skorları ve vücut ağırlıklarına göre kategorize edilmeleri sonucu standart verilere göre hesaplanmaktadır.
- Müsabık bisikletçilerde uluslararası literatürde en geçerli antrenman dönemleme verisidir.
- TSS sporcuların overtraining ve yetersiz antrenman riskini ortadan kaldırır.

$$\frac{(sec * NP * IF)}{3600 * FTP} * 100$$

Perfromansın takibi için TSS ile birlikte kullanılması gereken ve overtraining, overreaching, tapering, detraining gibi performansın önemli etkenleri gölemlenebilir.

CTL → 42 günlük ortalama

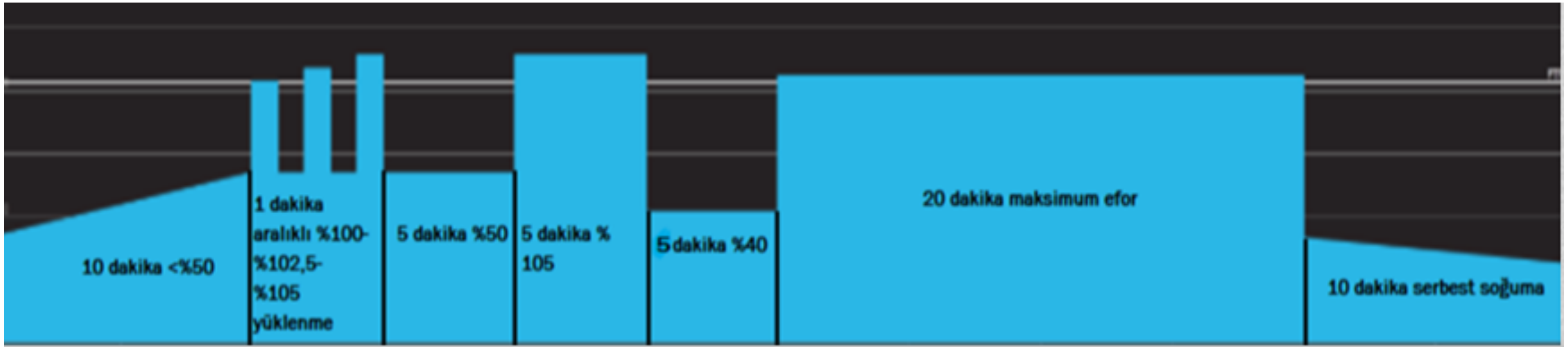
ATL → 7 günlük ortalama

TSB → ATL - CTL

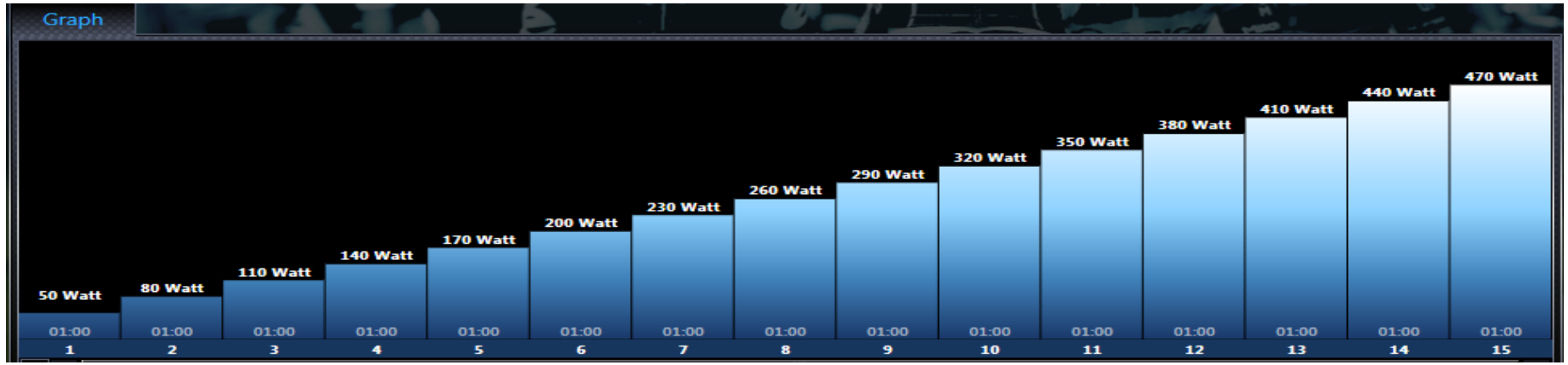
EF → NP/avgHR

RR → CTL günlük değişim oranı → TSS/gün

FTP TEST PROTOKOLÜ




Target
Completed
Heart Rate
Power
500
400
300
200
100
0
00:00
00:05
00:10
00:15
00:20
00:25
00:30
00:35
00:40
00:45
00:50
00:55
01:00



FTP → MAP X 0,75

EmaxVO_2→ 0,01141 * (value of MAP) l/min + 0,435 l/min

12’ → all out → avg W → * 0,88

The Tour de France, also possible for mortals? A comparison of a recreational and a World Tour cyclist

David Barranco-Gil, Xabier Muriel, Alejandro Lucia, Michael Joyner, Christopher A. DeSouza, and Pedro L. Valenzuela* Show fewer authors

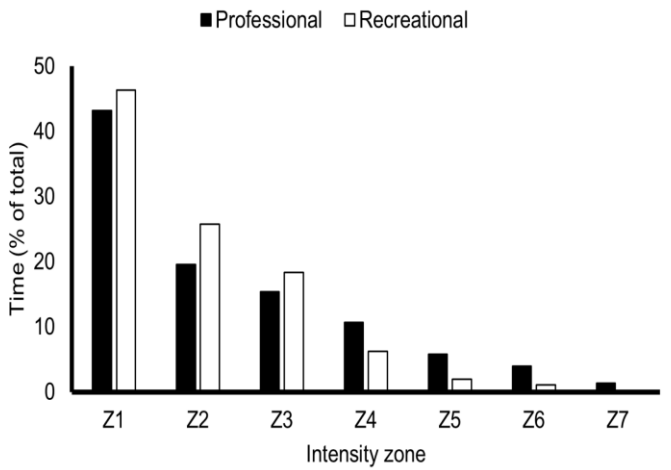
04 JAN 2024 // https://doi.org/10.1152/japplphysiol.00798.2023

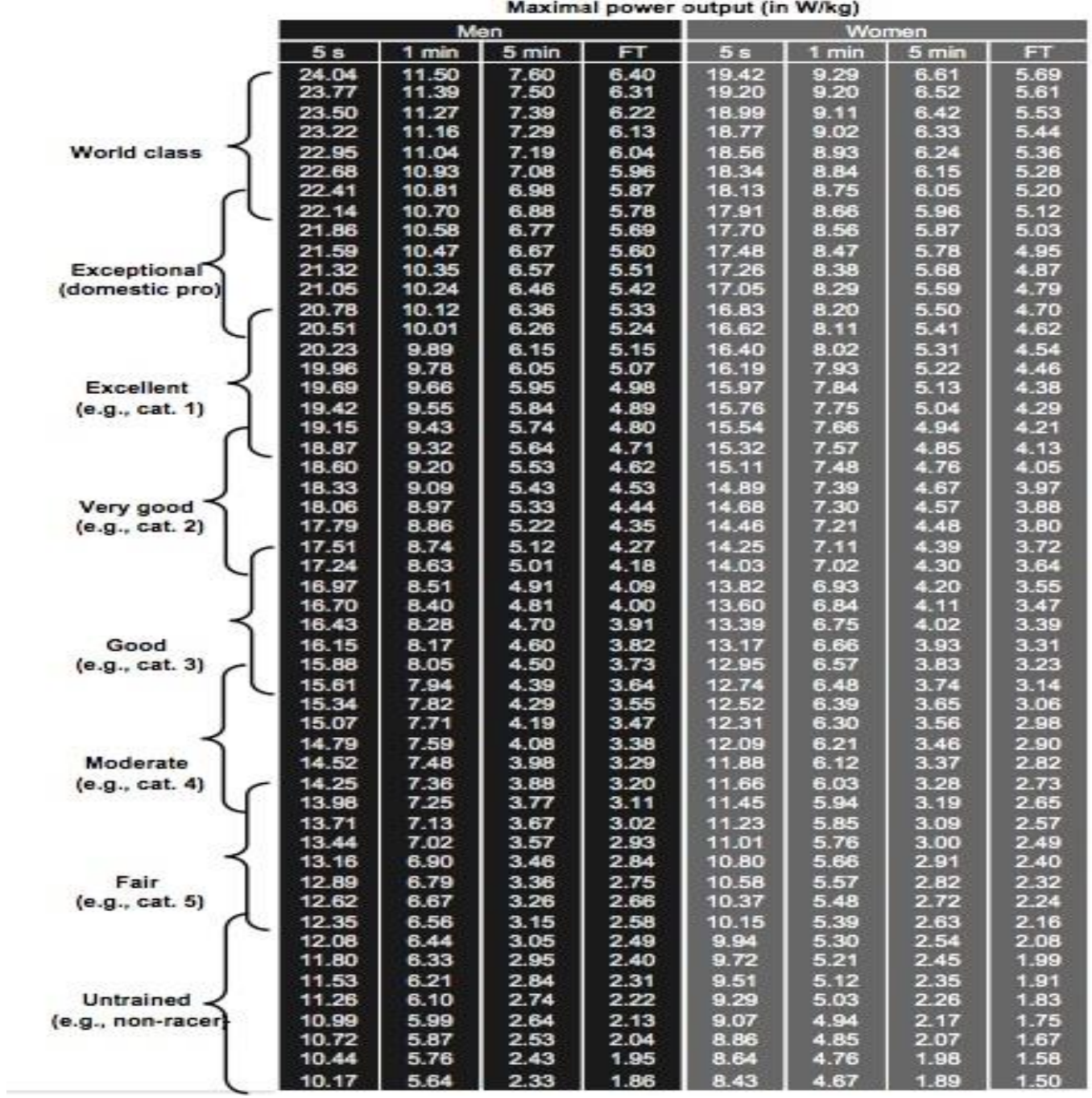
estimated as 95% of the highest mean PO value attained during a continuous 20-minute bout in the training sessions or competitions during the preceding ~6 weeks.[13,14]

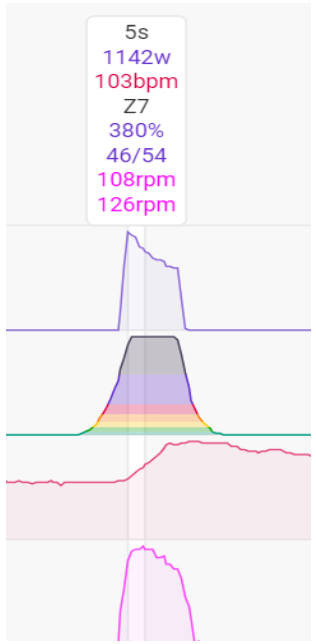
The metrics used in the present study were registered as explained elsewhere.[9] Physical demands were assessed through the Training Stress Score (TSS), which was computed using the following equation:

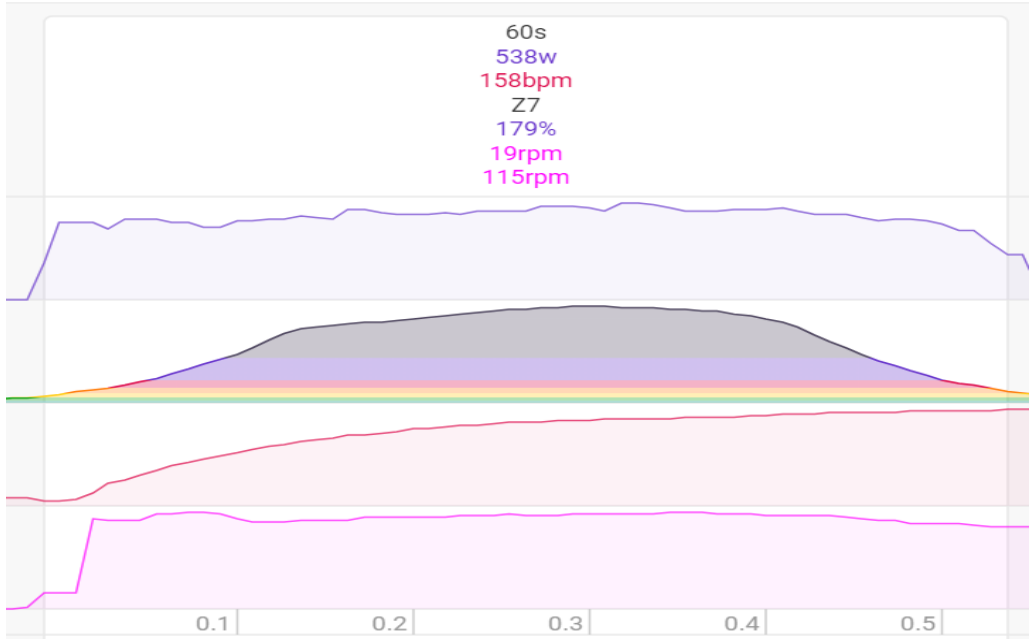
$$TSS = ((t*NP*IF)/(FTP*3600))*100$$

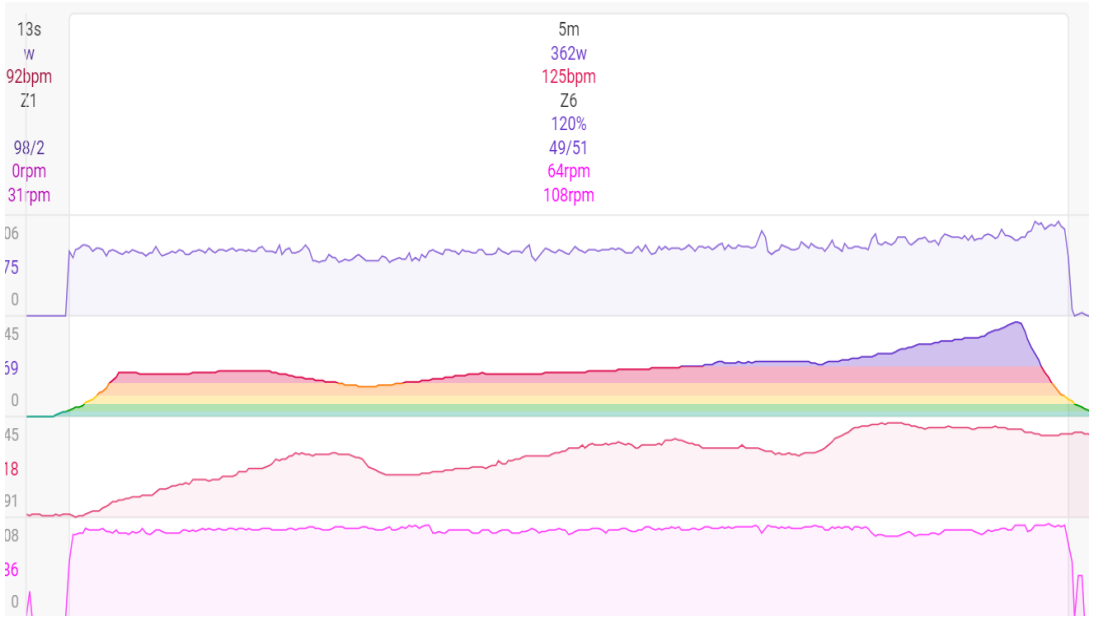
Intensity distribution was quantified by assessing the time spent in the different PO zones, which were categorized relative to the FTP as follows: zone 1 (< 56 % of FTP); zone 2 (56 to <76 % of FTP); zone 3 (76 to <91 % of FTP); 4 (91 to <106 % FTP), 5 (106 to <121 % of FTP), 6 (121 to <151 % of FTP) or 7 (≥ 151 % of FTP).[13]

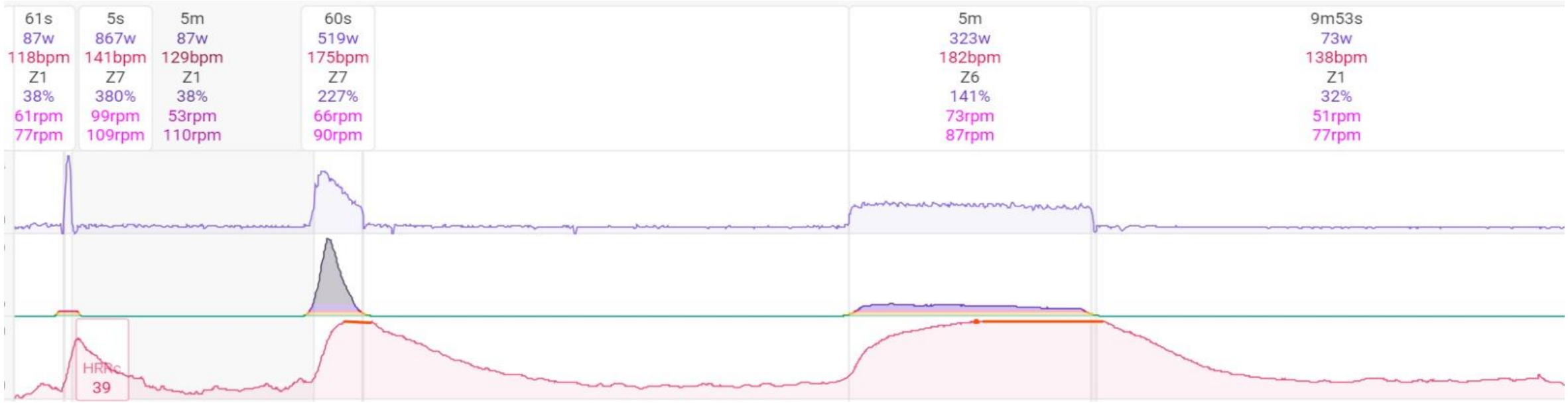



Maximal power output (in W/kg)
Men
Women
5 s
1 min
5 min
FT
5 s
1 min
5 min
FT
World class
Exceptional (domestic pro)
Excellent (e.g., cat. 1)
Very good (e.g., cat. 2)
Good (e.g., cat. 3)
Moderate (e.g., cat. 4)
Fair (e.g., cat. 5)
Untrained (e.g., non-racer)
24.04 11.50 7.60 6.40 19.42 9.29 6.61 5.69
23.77 11.39 7.50 6.31 19.20 9.20 6.52 5.61
23.50 11.27 7.39 6.22 18.99 9.11 6.42 5.53
23.22 11.16 7.29 6.13 18.77 9.02 6.33 5.44
22.95 11.04 7.19 6.04 18.56 8.93 6.24 5.36
22.68 10.93 7.08 5.96 18.34 8.84 6.15 5.28
22.41 10.81 6.98 5.87 18.13 8.75 6.05 5.20
22.14 10.70 6.88 5.78 17.91 8.66 5.96 5.12
21.86 10.58 6.77 5.69 17.70 8.56 5.87 5.03
21.59 10.47 6.67 5.60 17.48 8.47 5.78 4.95
21.32 10.35 6.57 5.51 17.26 8.38 5.68 4.87
21.05 10.24 6.46 5.42 17.05 8.29 5.59 4.79
20.78 10.12 6.36 5.33 16.83 8.20 5.50 4.70
20.51 10.01 6.26 5.24 16.62 8.11 5.41 4.62
20.23 9.89 6.15 5.15 16.40 8.02 5.31 4.54
19.96 9.78 6.05 5.07 16.19 7.93 5.22 4.46
19.69 9.66 5.95 4.98 15.97 7.84 5.13 4.38
19.42 9.55 5.84 4.89 15.76 7.75 5.04 4.29
19.15 9.43 5.74 4.80 15.54 7.66 4.94 4.21
18.87 9.32 5.64 4.71 15.32 7.57 4.85 4.13
18.60 9.20 5.53 4.62 15.11 7.48 4.76 4.05
18.33 9.09 5.43 4.53 14.89 7.39 4.67 3.97
18.06 8.97 5.33 4.44 14.68 7.30 4.57 3.88
17.79 8.86 5.22 4.35 14.46 7.21 4.48 3.80
17.51 8.74 5.12 4.27 14.25 7.11 4.39 3.72
17.24 8.63 5.01 4.18 14.03 7.02 4.30 3.64
16.97 8.51 4.91 4.09 13.82 6.93 4.20 3.55
16.70 8.40 4.81 4.00 13.60 6.84 4.11 3.47
16.43 8.28 4.70 3.91 13.39 6.75 4.02 3.39
16.15 8.17 4.60 3.82 13.17 6.66 3.93 3.31
15.88 8.05 4.50 3.73 12.95 6.57 3.83 3.23
15.61 7.94 4.39 3.64 12.74 6.48 3.74 3.14
15.34 7.82 4.29 3.55 12.52 6.39 3.65 3.06
15.07 7.71 4.19 3.47 12.31 6.30 3.56 2.98
14.79 7.59 4.08 3.38 12.09 6.21 3.46 2.90
14.52 7.48 3.98 3.29 11.88 6.12 3.37 2.82
14.25 7.36 3.88 3.20 11.66 6.03 3.28 2.73
13.98 7.25 3.77 3.11 11.45 5.94 3.19 2.65
13.71 7.13 3.67 3.02 11.23 5.85 3.09 2.57
13.44 7.02 3.57 2.93 11.01 5.76 3.00 2.49
13.16 6.90 3.46 2.84 10.80 5.66 2.91 2.40
12.89 6.79 3.36 2.75 10.58 5.57 2.82 2.32
12.62 6.67 3.26 2.66 10.37 5.48 2.72 2.24
12.35 6.56 3.15 2.58 10.15 5.39 2.63 2.16
12.08 6.44 3.05 2.49 9.94 5.30 2.54 2.08
11.80 6.33 2.95 2.40 9.72 5.21 2.45 1.99
11.53 6.21 2.84 2.31 9.51 5.12 2.35 1.91
11.26 6.10 2.74 2.22 9.29 5.03 2.26 1.83
10.99 5.99 2.64 2.13 9.07 4.94 2.17 1.75
10.72 5.87 2.53 2.04 8.86 4.85 2.07 1.67
10.44 5.76 2.43 1.95 8.64 4.76 1.98 1.58
10.17 5.64 2.33 1.86 8.43 4.67 1.89 1.50


5s
1142w
103bpm
Z7
380%
46/54
108rpm
126rpm


60s
538w
158bpm
Z7
179%
19rpm
115rpm
0.1
0.2
0.3
0.4
0.5


13s
w
92bpm
Z1
98/2
0rpm
31rpm
5m
362w
125bpm
Z6
120%
49/51
64rpm
108rpm


61s
87w
118bpm
Z1
38%
61rpm
77rpm
5s
867w
141bpm
Z7
380%
99rpm
109rpm
5m
87w
129bpm
Z1
38%
53rpm
110rpm
60s
519w
175bpm
Z7
227%
66rpm
90rpm
5m
323w
182bpm
Z6
141%
73rpm
87rpm
9m53s
73w
138bpm
Z1
32%
51rpm
77rpm
HRRc
39

Maximal power output (in W/kg)

	Men				Women			
	5 s	1 min	5 min	FT	5 s	1 min	5 min	FT
World class	24.04	11.50	7.60	6.40	19.42	9.29	6.61	5.69
	23.77	11.39	7.50	6.31	19.20	9.20	6.52	5.61
	23.50	11.27	7.39	6.22	18.99	9.11	6.42	5.53
	23.22	11.16	7.29	6.13	18.77	9.02	6.33	5.44
	22.95	11.04	7.19	6.04	18.56	8.93	6.24	5.36
	22.68	10.93	7.08	5.96	18.34	8.84	6.15	5.28
Exceptional (domestic pro)	22.41	10.81	6.98	5.87	18.13	8.75	6.05	5.20
	22.14	10.70	6.88	5.78	17.91	8.66	5.96	5.12
	21.86	10.58	6.77	5.69	17.70	8.56	5.87	5.03
	21.59	10.47	6.67	5.60	17.48	8.47	5.78	4.95
	21.32	10.35	6.57	5.51	17.26	8.38	5.68	4.87
	21.05	10.24	6.46	5.42	17.05	8.29	5.59	4.79
	20.78	[illegible]	6.36	5.33	16.83	8.20	5.50	4.70
Excellent (e.g., cat. 1)	20.51	10.01	6.26	5.24	16.62	8.11	5.41	4.62
	20.23	9.89	6.15	5.15	16.40	8.02	5.31	4.54
	19.96	[illegible]	6.05	5.07	16.19	7.93	5.22	4.46
	19.69	9.66	5.95	[illegible]	15.97	7.84	5.13	4.38
	[illegible]	9.55	[illegible]	4.89	15.76	7.75	5.04	4.29
	19.15	9.43	5.74	4.80	15.54	7.66	4.94	4.21
	18.87	9.32	5.64	4.71	15.32	7.57	4.85	4.13
Very good (e.g., cat. 2)	[illegible]	9.20	5.53	[illegible]	15.11	7.48	4.76	4.05
	18.33	9.09	5.43	4.53	14.89	7.39	4.67	3.97
	18.06	8.97	5.33	4.44	14.68	7.30	4.57	3.88
	17.79	8.86	5.22	4.35	14.46	7.21	4.48	3.80
	17.51	8.74	5.12	4.27	14.25	7.11	4.39	3.72
Good (e.g., cat. 3)	17.24	8.63	5.01	4.18	14.03	7.02	4.30	3.64
	16.97	8.51	4.91	4.09	13.82	6.93	4.20	3.55
	16.70	8.40	4.81	4.00	13.60	6.84	4.11	3.47
	16.43	8.28	4.70	3.91	13.39	6.75	4.02	3.39
	16.15	8.17	4.60	3.82	13.17	6.66	3.93	3.31
	15.88	8.05	4.50	3.73	12.95	6.57	3.83	3.23
Moderate (e.g., cat. 4)	15.61	7.94	4.39	3.64	12.74	6.48	3.74	3.14
	15.34	7.82	4.29	3.55	12.52	6.39	3.65	3.06
	15.07	7.71	4.19	3.47	12.31	6.30	3.56	2.98
	14.79	7.59	4.08	3.38	12.09	6.21	3.46	2.90
	14.52	7.48	3.98	3.29	11.88	6.12	3.37	2.82
	14.25	7.36	3.88	3.20	11.66	6.03	3.28	2.73
Fair (e.g., cat. 5)	13.98	7.25	3.77	3.11	11.45	5.94	3.19	2.65
	13.71	7.13	3.67	3.02	11.23	5.85	3.09	2.57
	13.44	7.02	3.57	2.93	11.01	5.76	3.00	2.49
	13.16	6.90	3.46	2.84	10.80	5.66	2.91	2.40
	12.89	6.79	3.36	2.75	10.58	5.57	2.82	2.32
	12.62	6.67	3.26	2.66	10.37	5.48	2.72	2.24
Untrained (e.g., non-racer)	12.35	6.56	3.15	2.58	10.15	5.39	2.63	2.16
	12.08	6.44	3.05	2.49	9.94	5.30	2.54	2.08
	11.80	6.33	2.95	2.40	9.72	5.21	2.45	1.99
	11.53	6.21	2.84	2.31	9.51	5.12	2.35	1.91
	11.26	6.10	2.74	2.22	9.29	5.03	2.26	1.83
	10.99	5.99	2.64	2.13	9.07	4.94	2.17	1.75
	10.72	5.87	2.53	2.04	8.86	4.85	2.07	1.67
	10.44	5.76	2.43	1.95	8.64	4.76	1.98	1.58
	10.17	5.64	2.33	1.86	8.43	4.67	1.89	1.50

Maximal power output (in W/kg)

	Men				Women			
	5 s	1 min	5 min	FT	5 s	1 min	5 min	FT
World class	24.04	11.50	7.60	6.40	19.42	9.29	6.61	5.69
	23.77	11.39	7.50	6.31	19.20	9.20	6.52	5.61
	23.50	11.27	7.39	6.22	18.99	9.11	6.42	5.53
	23.22	11.16	7.29	6.13	18.77	9.02	6.33	5.44
	22.95	11.04	7.19	6.04	18.56	8.93	6.24	5.36
	22.68	10.93	7.08	5.96	18.34	8.84	6.15	5.28
Exceptional (domestic pro)	22.41	10.81	6.98	5.87	18.13	8.75	6.05	5.20
	22.14	10.70	6.88	5.78	17.91	8.66	5.96	5.12
	21.86	10.58	6.77	5.69	17.70	8.56	5.87	5.03
	21.59	10.47	6.67	5.60	17.48	8.47	5.78	4.95
	21.32	10.35	6.57	5.51	17.26	8.38	5.68	4.87
	21.05	10.24	6.46	5.42	17.05	8.29	5.59	4.79
	20.78	10.12	6.36	5.33	16.83	8.20	5.50	4.70
Excellent (e.g., cat. 1)	20.51	10.01	6.26	5.24	16.62	8.11	5.41	4.62
	20.23	9.89	6.15	5.15	16.40	8.02	5.31	4.54
	19.96	9.78	6.05	5.07	16.19	7.93	5.22	4.46
	19.69	9.66	5.95	4.98	15.97	7.84	5.13	4.38
	19.42	9.55	5.84	4.89	15.76	7.75	5.04	4.29
	19.15	9.43	5.74	4.80	15.54	7.66	4.94	4.21
	18.87	9.32	5.64	4.71	15.32	7.57	4.85	4.13
Very good (e.g., cat. 2)	18.60	9.20	5.53	4.62	15.11	7.48	4.76	4.05
	18.33	9.09	5.43	4.53	14.89	7.39	4.67	3.97
	18.06	8.97	5.33	4.44	14.68	7.30	4.57	3.88
	17.79	8.86	5.22	4.35	14.46	7.21	4.48	3.80
	17.51	8.74	5.12	4.27	14.25	7.11	4.39	3.72
Good (e.g., cat. 3)	17.24	8.63	5.01	4.18	14.03	7.02	4.30	3.64
	16.97	8.51	4.91	4.09	13.82	6.93	4.20	3.55
	16.70	8.40	4.81	4.00	13.60	6.84	4.11	3.47
	16.43	8.28	4.70	3.91	13.39	6.75	4.02	3.39
	16.15	8.17	4.60	3.82	13.17	6.66	3.93	3.31
	15.88	8.05	4.50	3.73	12.95	6.57	3.83	3.23
Moderate (e.g., cat. 4)	15.61	7.94	4.39	3.64	12.74	6.48	3.74	3.14
	15.34	7.82	4.29	3.55	12.52	6.39	3.65	3.06
	15.07	7.71	4.19	3.47	12.31	6.30	3.56	2.98
	14.79	7.59	4.08	3.38	12.09	6.21	3.46	2.90
	14.52	7.48	3.98	3.29	11.88	6.12	3.37	2.82
	14.25	7.36	3.88	3.20	11.66	6.03	3.28	2.73
Fair (e.g., cat. 5)	13.98	7.25	3.77	3.11	11.45	5.94	3.19	2.65
	13.71	7.13	3.67	3.02	11.23	5.85	3.09	2.57
	13.44	7.02	3.57	2.93	11.01	5.76	3.00	2.49
	13.16	6.90	3.46	2.84	10.80	5.66	2.91	2.40
	12.89	6.79	3.36	2.75	10.58	5.57	2.82	2.32
	12.62	6.67	3.26	2.66	10.37	5.48	2.72	2.24
Untrained (e.g., non-racer)	12.35	6.56	3.15	2.58	10.15	5.39	2.63	2.16
	12.08	6.44	3.05	2.49	9.94	5.30	2.54	2.08
	11.80	6.33	2.95	2.40	9.72	5.21	2.45	1.99
	11.53	6.21	2.84	2.31	9.51	5.12	2.35	1.91
	11.26	6.10	2.74	2.22	9.29	5.03	2.26	1.83
	10.99	5.99	2.64	2.13	9.07	4.94	2.17	1.75
	10.72	5.87	2.53	2.04	8.86	4.85	2.07	1.67
	10.44	5.76	2.43	1.95	8.64	4.76	1.98	1.58
	10.17	5.64	2.33	1.86	8.43	4.67	1.89	1.50

Kategorisi Belirlenen Sporcunun Haftalık, Yıllık TSS ve Antrenman Süreleri

	Volume Guidelines for Cyclist				
Category	Annual Hours	Weekly Average	Annual TSS	Avg Weekly TSS	Target CTL
1/2	700-1000	14-20	40000-50000	770-960	105-120
3	500-700	9-14	25000-35000	480-673	85-95
4	350-500	6-10	20000-30000	385-577	70-85
5	220-350	3-8	10000-20000	192-385	50-70
Masters	350-650	8-12	15000-25000	288-480	60-100

TABLE 7.2 A Rough Guide for Determining Annual Training Volume

LONGEST RACE DURATION	FINISH THE RACE		HIGH PERFORMANCE	
	ANNUAL HOURS*	TSS*	ANNUAL HOURS*	TSS*
Up to 3 hours	300–400	(15,000–17,500)	400–800	(20,000–40,000)
3–8 hours	400–500	(17,500–22,500)	600–1,000	(30,000–50,000)
More than 8 hours	500–700	(22,500–30,000)	800–1,200	(40,000–60,000)

Table 10.3 Power Training Levels

Level	Name/purpose	% of threshold power	% of threshold HR	RPE
1	Active recovery	≤55%	≤68%	<2
2	Endurance	56.75%	69.83%	2–3
3	Tempo	76.90%	84.94%	3–4
4	Lactate threshold	91–105%	95–105%	4–5
5	$\dot{V}O_2$max	106–120%	>106%	6–7
6	Anaerobic capacity	121–150%	N/A	>7
7	Neuromuscular power	N/A	N/A	(maximal)

Adapted, by permission, from H. Allen and A. Coggan, 2010, *Training and racing with a power meter*, 2nd ed., (Boulder, Co: VeloPress), 48.

Power Settings

FTP	Indoor FTP	W' J	Power Spikes
390	390	18000	30%

Power Zones for FTP of 390w

Z1	Active Recovery	0% - 55%	1 - 214w
Z2	Endurance	56% - 75%	215 - 292w
Z3	Tempo	76% - 90%	293 - 351w
Z4	Threshold	91% - 105%	352 - 409w
Z5	VO2 Max	106% - 120%	410 - 468w
Z6	Anaerobic	121% - 150%	469 - 585w
Z7	Neuromuscular	151% +	586w+
SS	Sweet Spot	84% - 97%	327 - 378w

Heart Rate Settings

You have changed your zones

Click to apply the changes to existing activities for this sport

Threshold HR	Max HR	HRRc Min HR
178	190	178

Heart Rate Training Zones

Z1	Recovery	0 - 80%	0 - 143
Z2	Aerobic	81% - 89%	144 - 158
Z3	Tempo	89% - 93%	159 - 165
Z4	SubThreshold	93% - 99%	166 - 177
Z5	SuperThreshold	100% - 102%	178 - 182
Z6	Aerobic Capacity	103% - 105%	183 - 187

Run Zones

Zone 1 Less than 85% of LTHR

Zone 2 85% to 89% of LTHR

Zone 3 90% to 94% of LTHR

Zone 4 95% to 99% of LTHR

Zone 5a 100% to 102% of LTHR

Zone 5b 103% to 106% of LTHR

Zone 5c More than 106% of LTHR

Pace Settings

Threshold Pace
3:57

Units
per km

Pace Training Zones

Z1	Zone 1	0 - 77.5%	5:06/km +
Z2	Zone 2	78.5 - 87.7%	4:30 - 5:05/km
Z3	Zone 3	88.7 - 94.3%	4:11 - 4:29/km
Z4	Zone 4	95.3 - 100%	3:57 - 4:10/km
Z5	Zone 5a	101 - 103.4%	3:49 - 3:56/km
Z6	Zone 5b	104.4 - 111.5%	3:33 - 3:48/km
Z7	Zone 5c	112.5%+	< 3:32/km

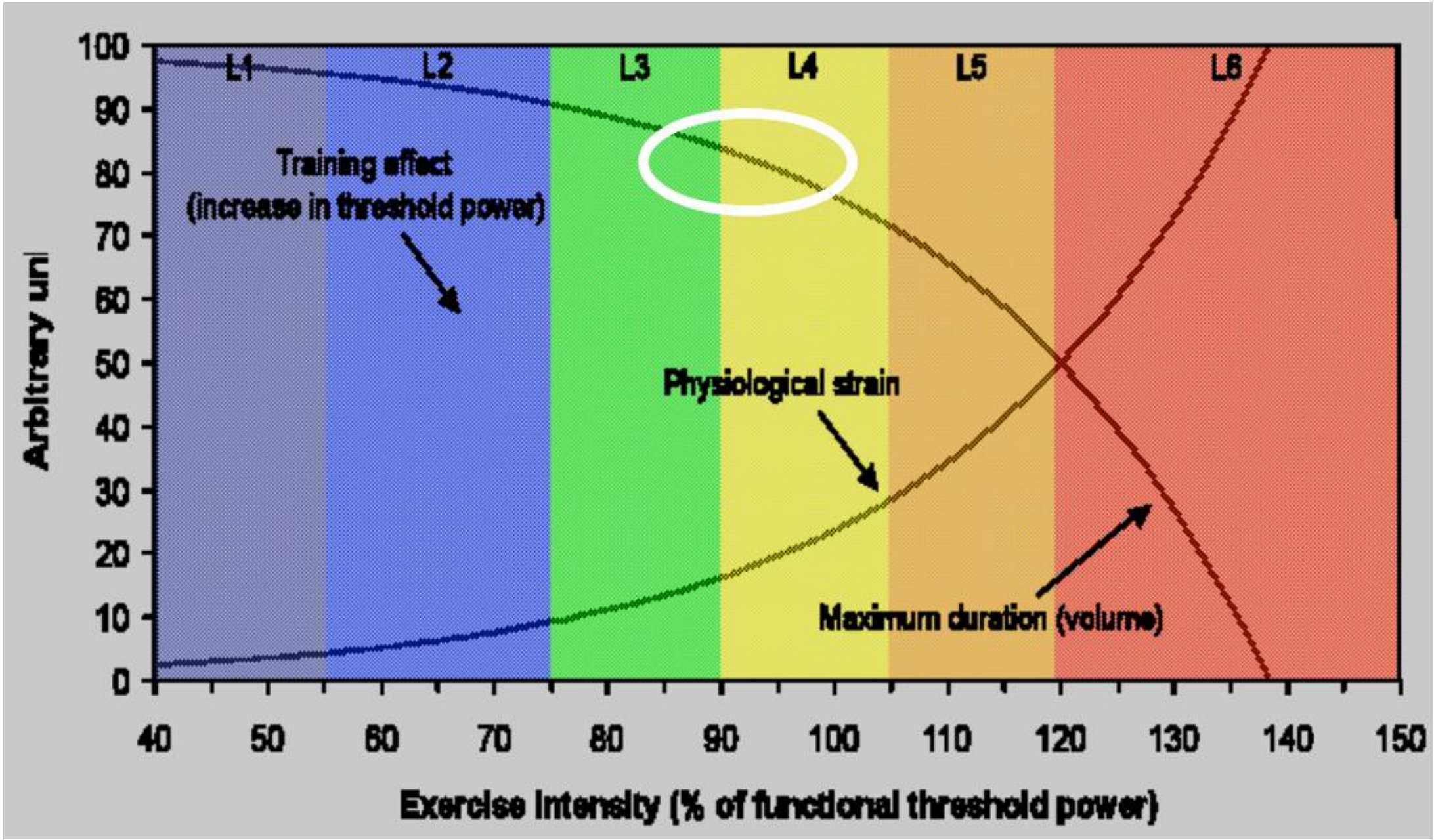

L1
L2
L3
L4
L5
L6
Training effect
(increase in threshold power)
Physiological strain
Maximum duration (volume)
Arbitrary unit
100
90
80
70
60
50
40
30
20
10
0
40
50
60
70
80
90
100
110
120
130
140
150
Exercise Intensity (% of functional threshold power)

Table 10.4 Pacing Guidelines for Triathlon Events

Type of triathlon	Distance	Intensity factor (fraction of NP)	Percentage of FTP as a percentage of average power	Corresponding Coggan training level
Sprint	10 km (6.2 mi)	1.03–1.07	100–103%	4
Olympic	40 km (24.8 mi)	0.95–1.00	95–100%	4
Half-Ironman	90 km (56 mi)	0.83–0.87	80–85%	3
Ironman	180 km (112 mi)	0.70–0.76	68–78%	3
Double Ironman	361 km (224 mi)	0.55–0.67	56–70%	2

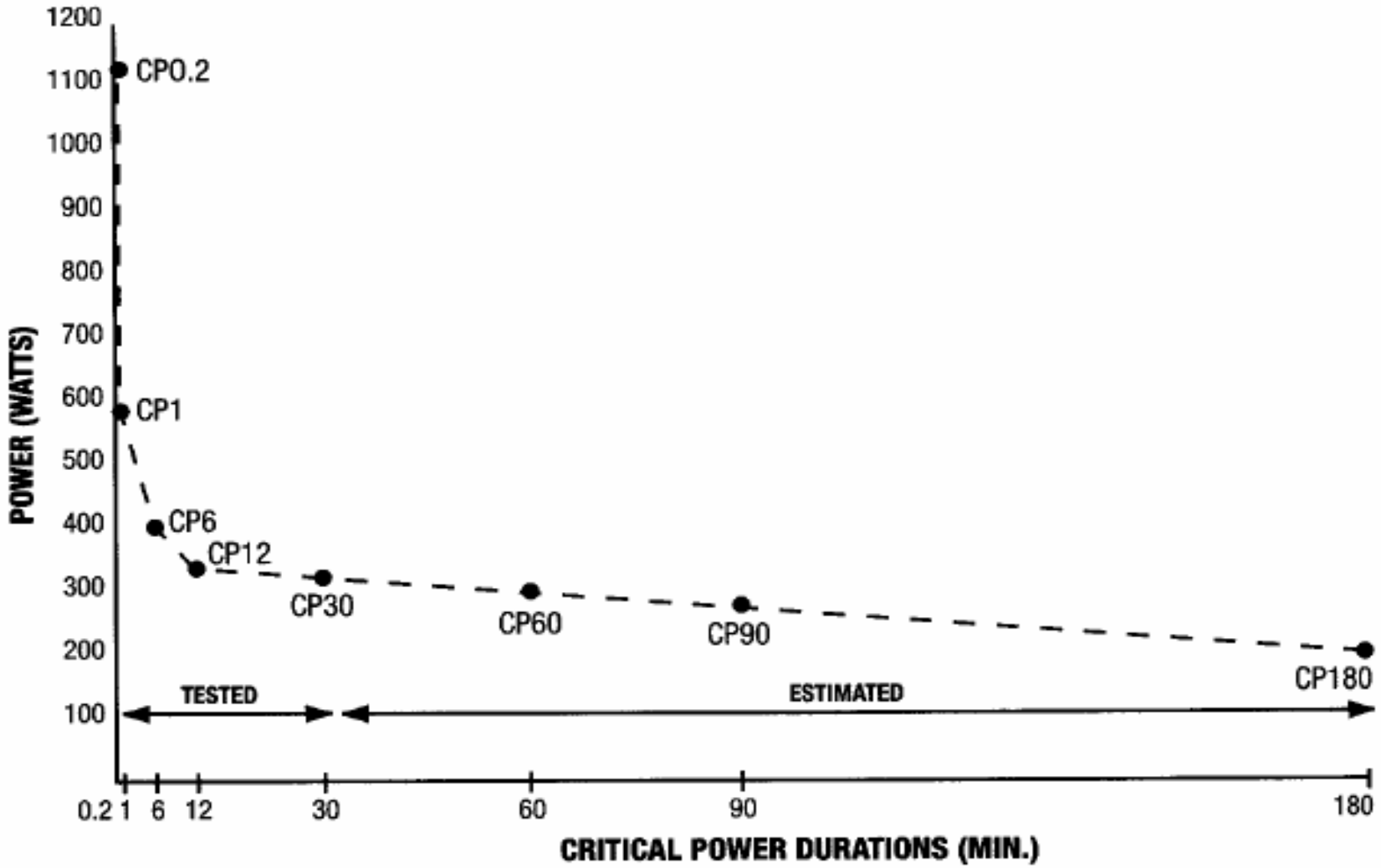
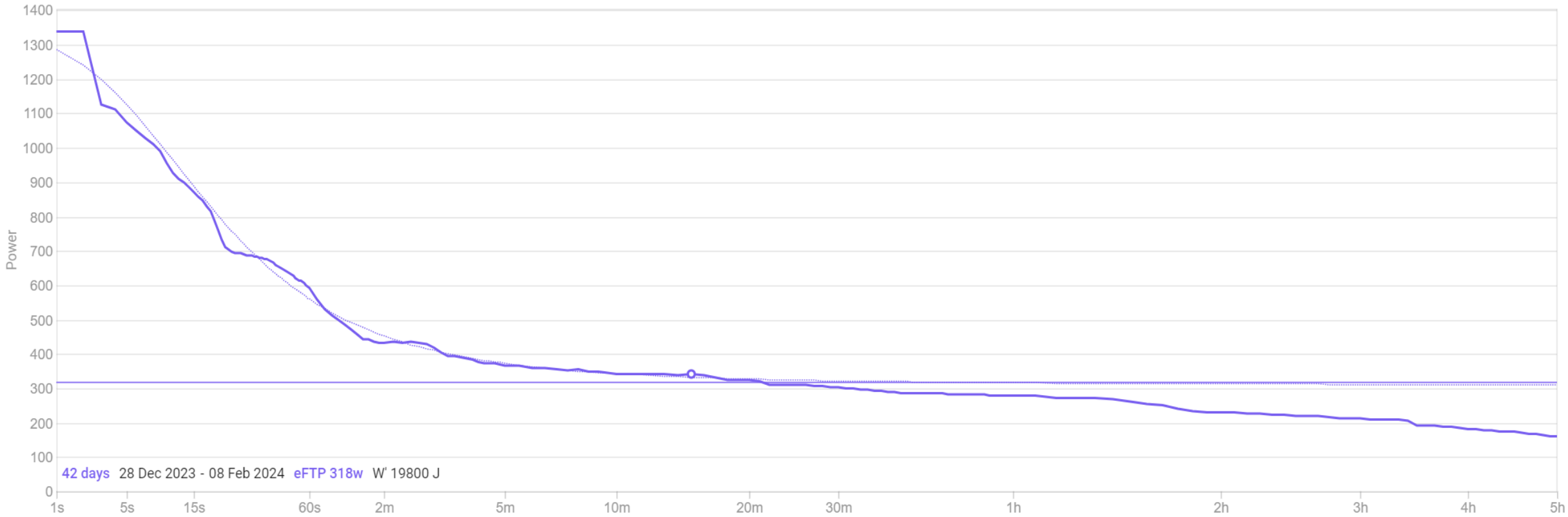
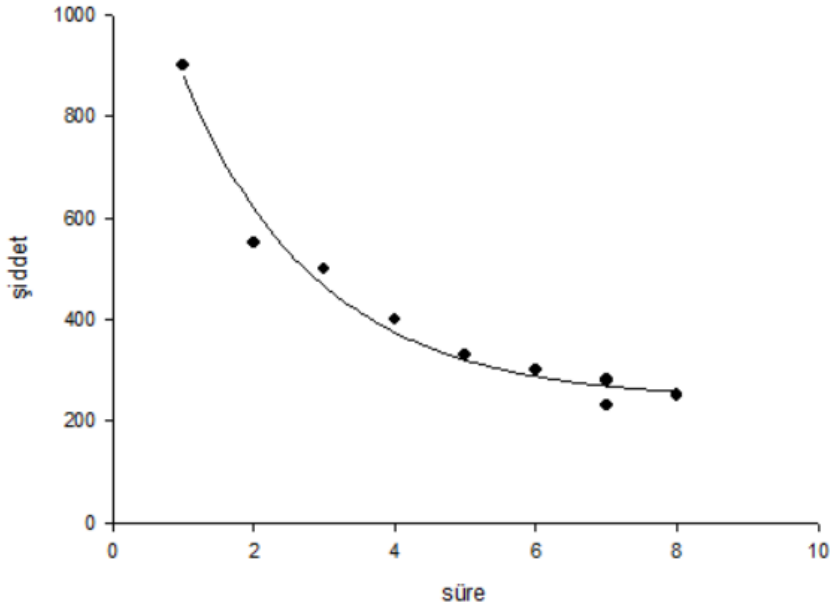


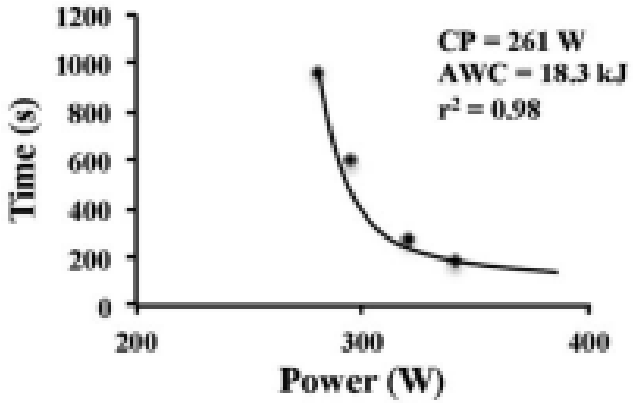
Figure 5.2
Power profiile for hypothetical rider

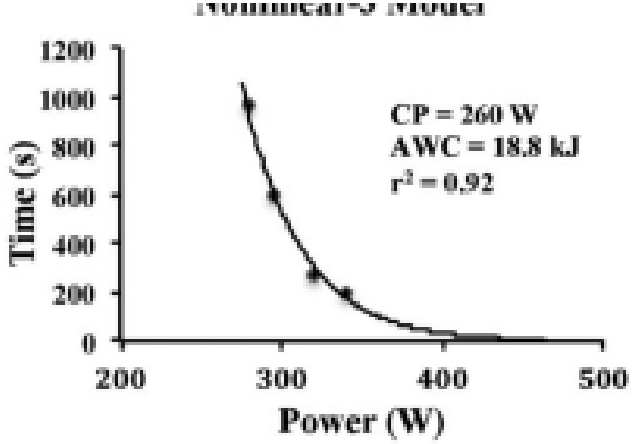

Power
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
42 days 28 Dec 2023 - 08 Feb 2024 eFTP 318w W' 19800 J
1s
5s
15s
60s
2m
5m
10m
20m
30m
1h
2h
3h
4h
5h

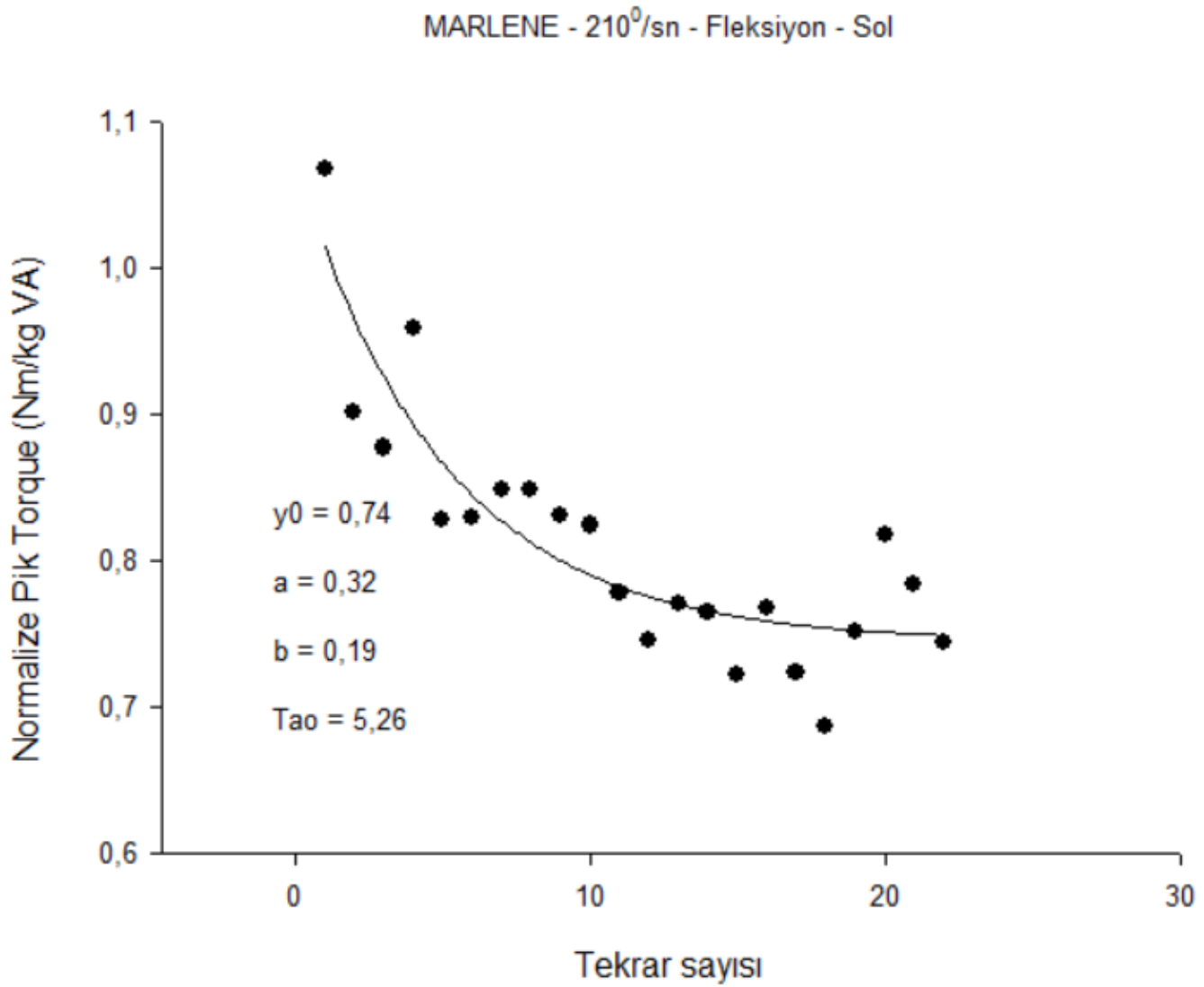


R	Rsqr	Adj Rsqr	Standard Error of Estimate
0,9874	0,9749	0,9666	38,8450

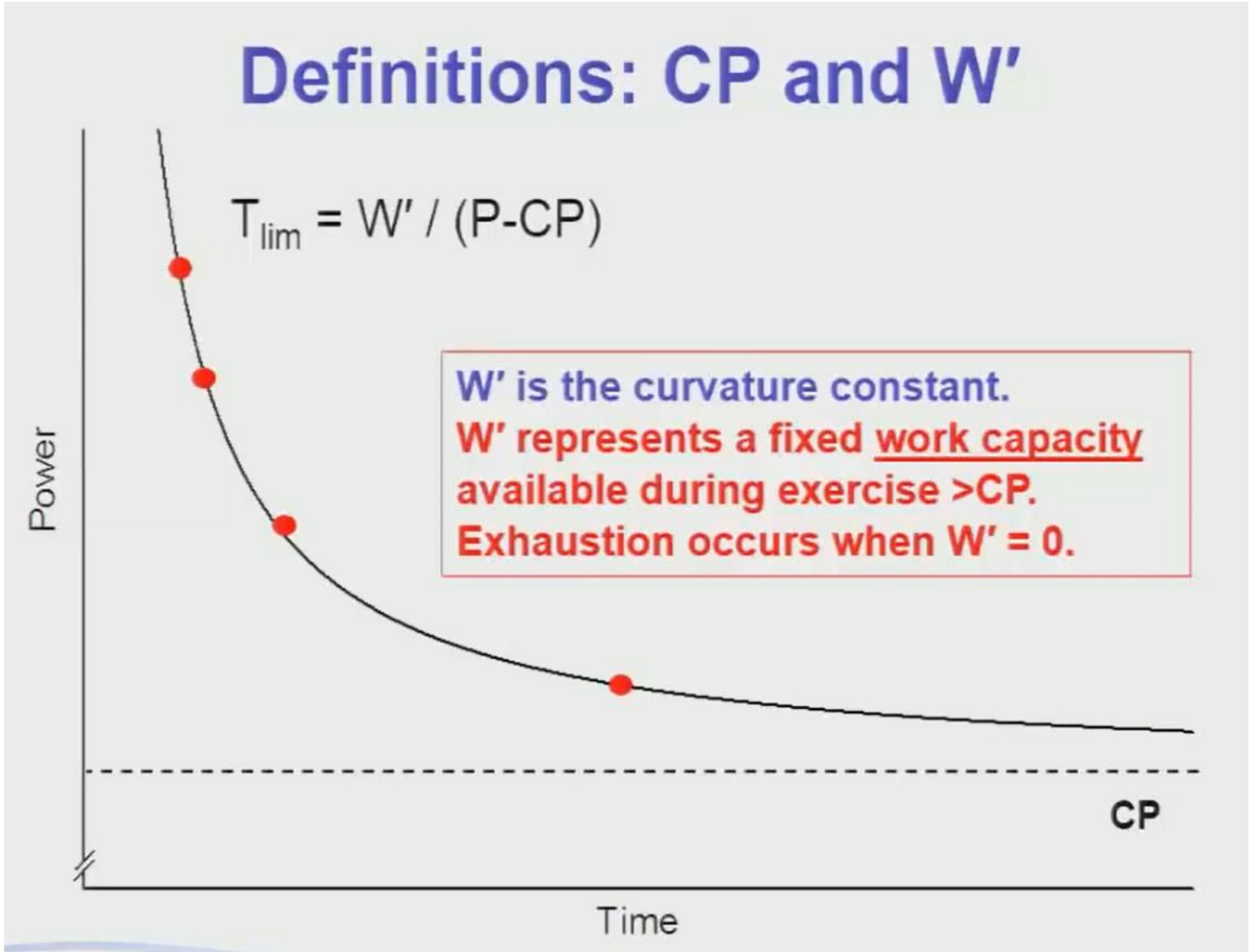
	Coefficient	Std. Error	t	P
y0	241,0348	30,6699	7,8590	0,0002
a	1071,0845	112,2956	9,5381	<0,0001
b	0,5209	0,0938	5,5504	0,0014






MARLENE - 210⁰/sn - Fleksiyon - Sol
Normalize Pik Torque (Nm/kg VA)
1,1
1,0
0,9
0,8
0,7
0,6
y0 = 0,74
a = 0,32
b = 0,19
Tao = 5,26
0
10
20
30
Tekrar sayısı

Definitions: CP and W′



- KG'yi belirleyebilmek için sabit yüklü tüketici egzersizden elde edilen tükenme süreleri (s), güç üretim düzeyleri (Watt) ya da yapılan toplam iş (kJ) gibi parametreler kullanılır.

- KG ve W' değerini belirlemede kullanılan beş temel matematiksel eşitlik;

1) Lineer iş-zaman modeli (Lineer İş Modeli)

$$W = W' + (KG \times t_{lim})$$

2) Lineer güç-1/zaman modeli (Lineer Güç Modeli)

$$P = KG + (W' \times 1/tlim)$$

3) Non-lineer zaman-güç modeli (2-Parametreli Non-lineer Model)

$$t_{lim} = W'/ (P — KG)$$

4) Non-lineer maksimum güç modeli (3-Parametreli Non-lineer Model)

$$t_{lim} = W'/ (P — KG) + P_{maks}$$

5) Non-lineer üstel model (Üstel Model)

$$P= KG +(P_{maks} — KG) \times \exp (— t_{lim}/t_{au})$$

TABLE 7.1 The Common Periods in a Linear Periodization Model

PERIOD	LENGTH	PURPOSE	PRIMARY ABILITY FOCUS
Prep	1–4 weeks	Preparing to train	Basic abilities
Base	9–12 weeks	Training to train	Basic abilities
Build	6–8 weeks	Training to race	Advanced abilities
Peak	1–2 weeks	Tapering for race	Advanced abilities
Race	1–3 weeks	Removing fatigue Sharpening fitness	Advanced abilities
Transition	1–4 weeks	Resting and recovering	Basic abilities