Fisiologia dos esforços repetidos

Fisiologia do Esporte - EFE0170

Valéria Ieme Gonçalves Panissa

(2021)

Objetivos da aula

- Caracterização de esforços repetidos
- Contribuição dos sistemas de transferência de energia
- Efeitos no desempenho

REVIEW ARTICLE

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Multiple Sprint Work

Physiological Responses, Mechanisms of Fatigue and the Influence of Aerobic Fitness

Mark Glaister

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Repeated-Sprint Ability – Part I

Factors Contributing to Fatigue

Olivier Girard,[1] *Alberto Mendez-Villanueva*[2] and *David Bishop*[3]

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2 Physiology Unit, Sport Science Department, ASPIRE Academy for Sport Excellence, Doha, Qatar
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Sports Med
DOI 10.1007/s40279-015-0324-9

SYSTEMATIC REVIEW

The Effects of Repeated-Sprint Training on Field-Based Fitness Measures: A Meta-Analysis of Controlled and Non-Controlled Trials

Jonathan Taylor[1] · Tom Macpherson[1] · Iain Spears[1] · Matthew Weston[1]

Repeated-Sprint Ability – Part II

Recommendations for Training

David Bishop,[1] *Olivier Girard*[2] and *Alberto Mendez-Villanueva*[3]

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2 ASPETAR – Qatar Orthopaedic and Sports Medicine Hospital, Research and Education Ce Doha, Qatar
3 Physiology Unit, Sport Science Department, ASPIRE Academy for Sport Excellence, Doha,

Muscle Fatigue in Males and Females during Multiple-Sprint Exercise

François Billaut[1] and *David Bishop*[2]

1 Department of Kinesiology, University of Lethbridge, Lethbridge, Alberta, Canada
2 Team Sport Research Group, Facoltà di Scienze Motorie, Università degli Studi di Verona, Verona, Italy

Energy System Interaction and Relative Contribution During Maximal Exercise

Paul B. Gastin

Victorian Institute of Sport, Melbourne, Australia

Esforços Repetidos ou Repeated Sprint Training (RST)

- Esforços máximos ou próximos do máximo intercalados por períodos de recuperação (passiva ou ativa porém com baixa intensidade)

- Curta duração (<10 segundos)

Esportes intermitentes

- Ex. basquete, handebol, rúgbi e futebol
- Duração média do esforço entre 4 e 7s
- Relação esforço-pausa 1:6 até 1:14

(Glaister, 2005)

Sprints repetidos no esporte

- Modalidades esportivas coletivas e de raquetes: atividade intensa com intervalos em intensidade moderada
- Duração: 1-4h
- *Sprint*: 1-10% da distância percorrida; 1-3% do tempo efetivo de jogo
- Definição: exercícios com até 10s de duração, sem queda de desempenho durante a ação

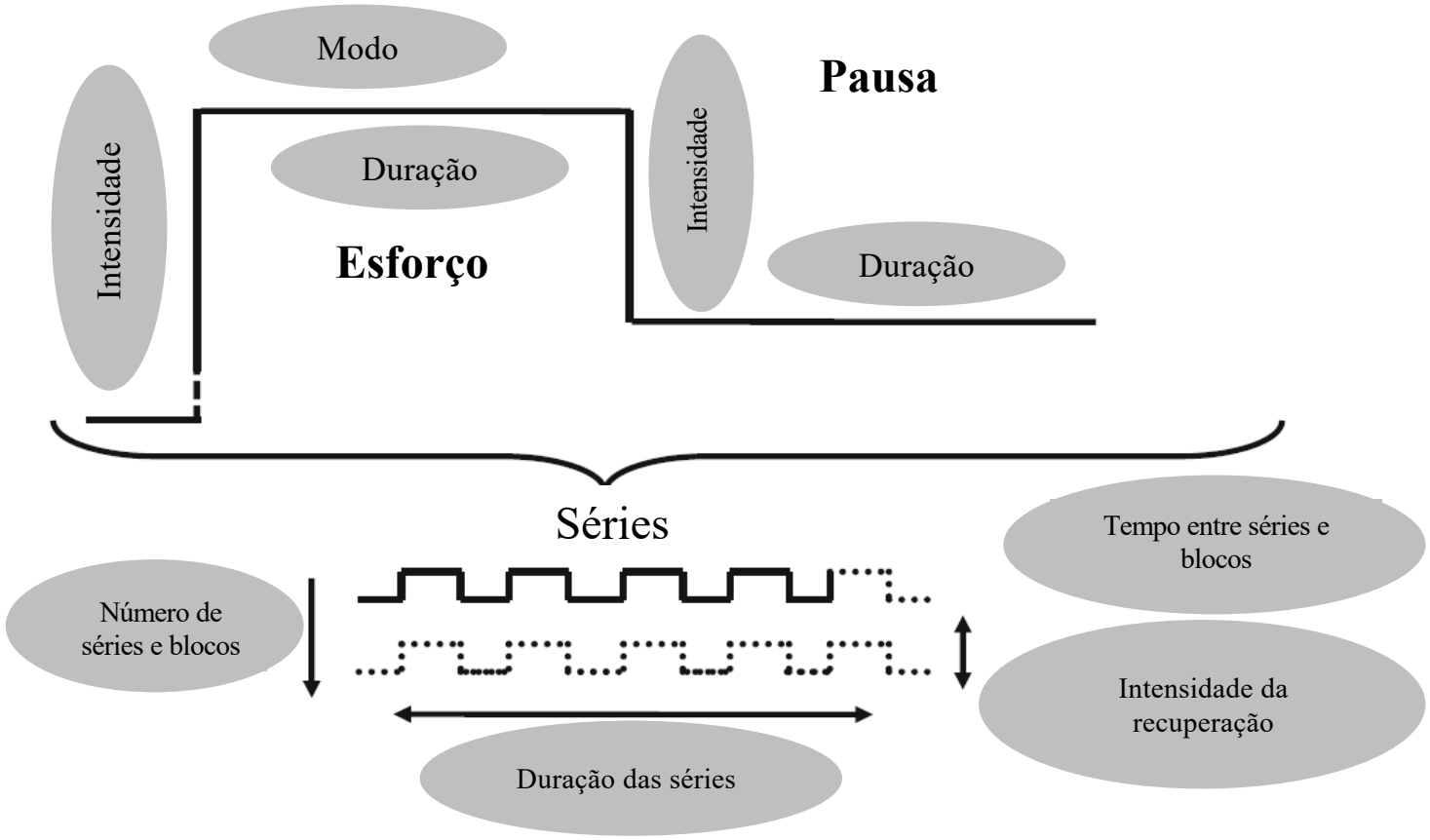
(Girard et al. 2011)

Exercícios intervalados de alta intensidade

Períodos de esforço realizados em alta intensidade intercalados por períodos de recuperação (ativa ou passiva)

Variáveis envolvidas na organização

- Relação esforço-pausa



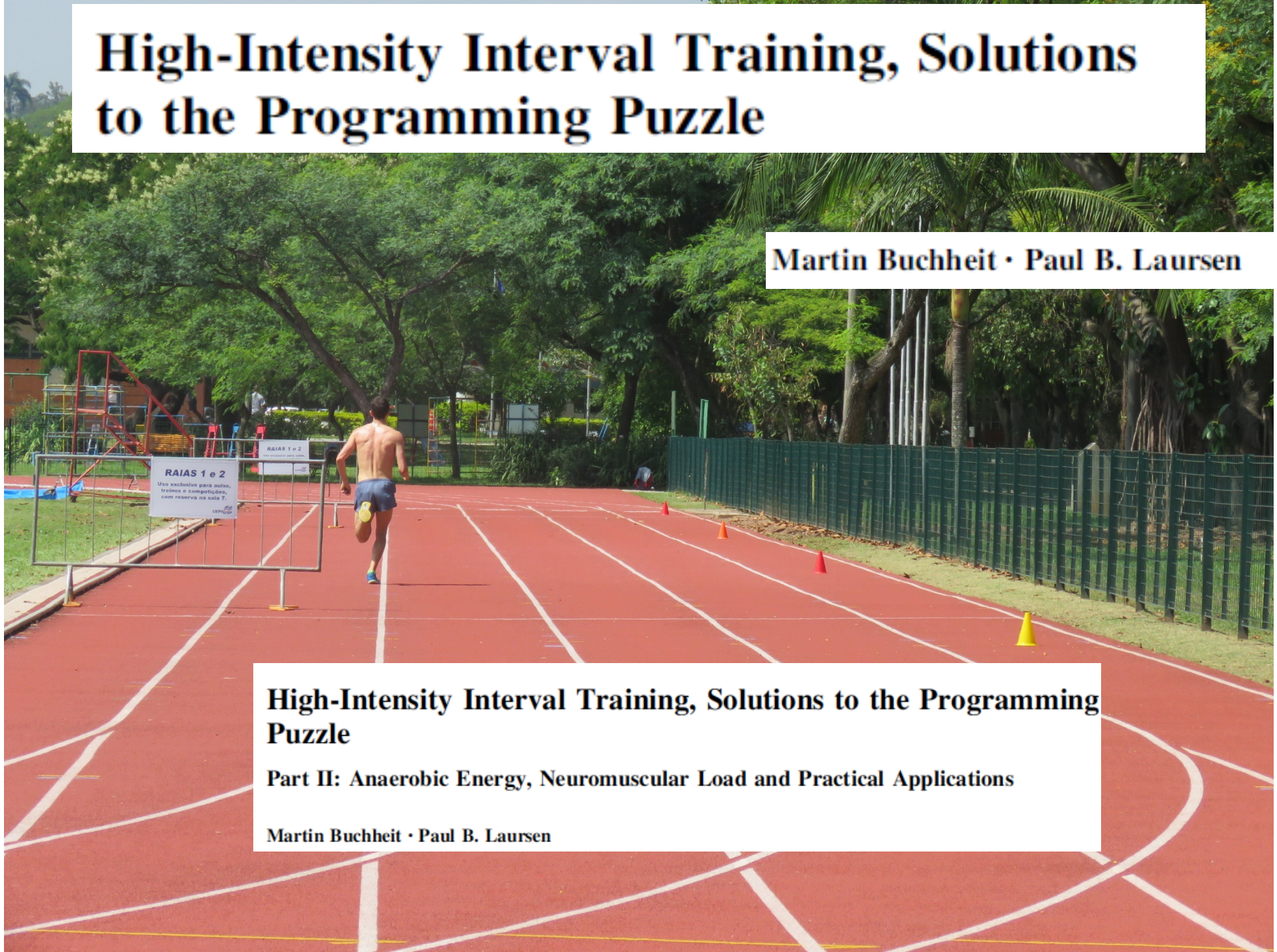
(Buccheit e Laursen, 2013)

Organização de protocolos intervalados de intensidade

- Combinação infinita?
- Como organizar?

High-Intensity Interval Training, Solutions to the Programming Puzzle

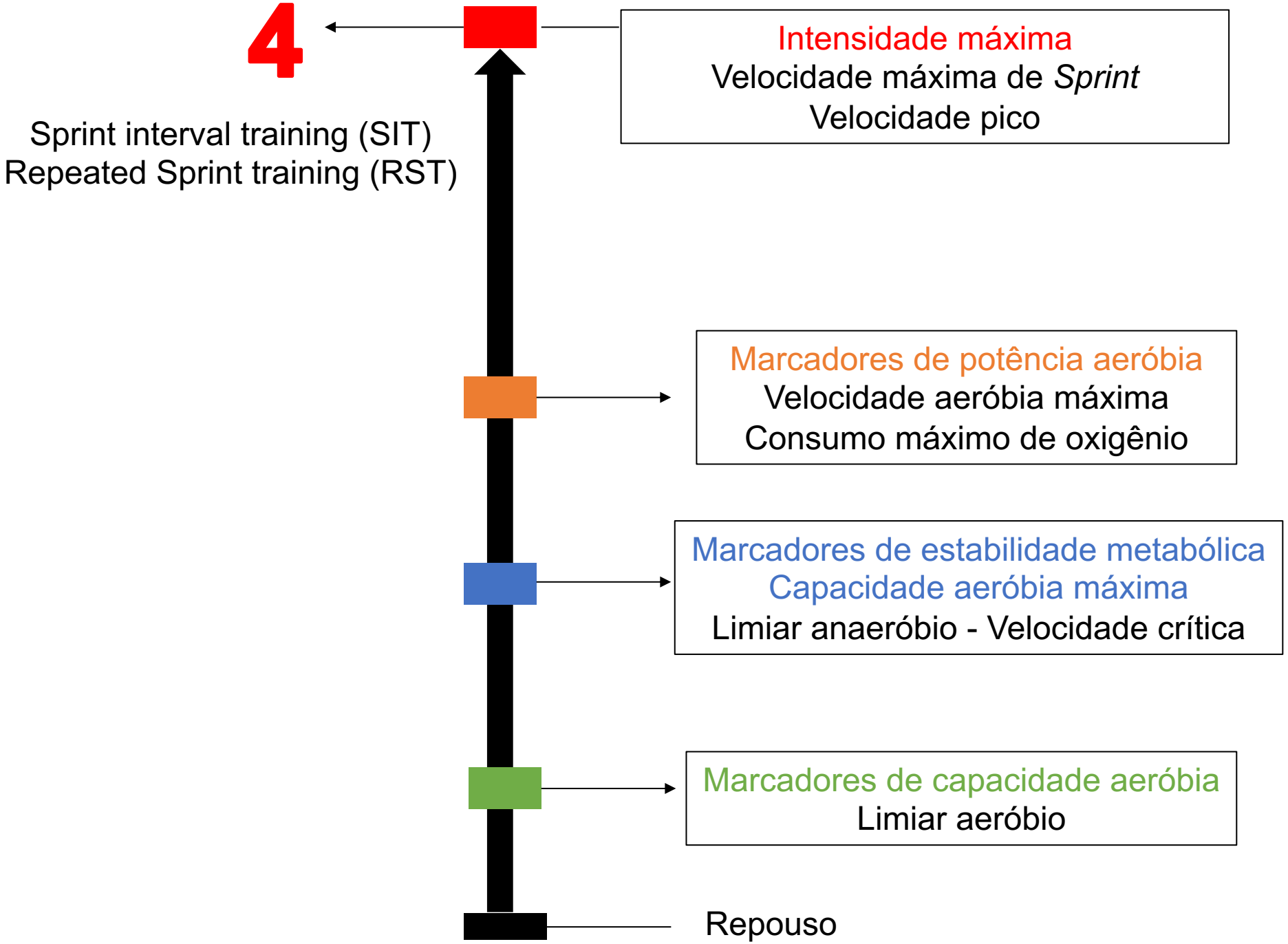
Martin Buchheit · Paul B. Laursen



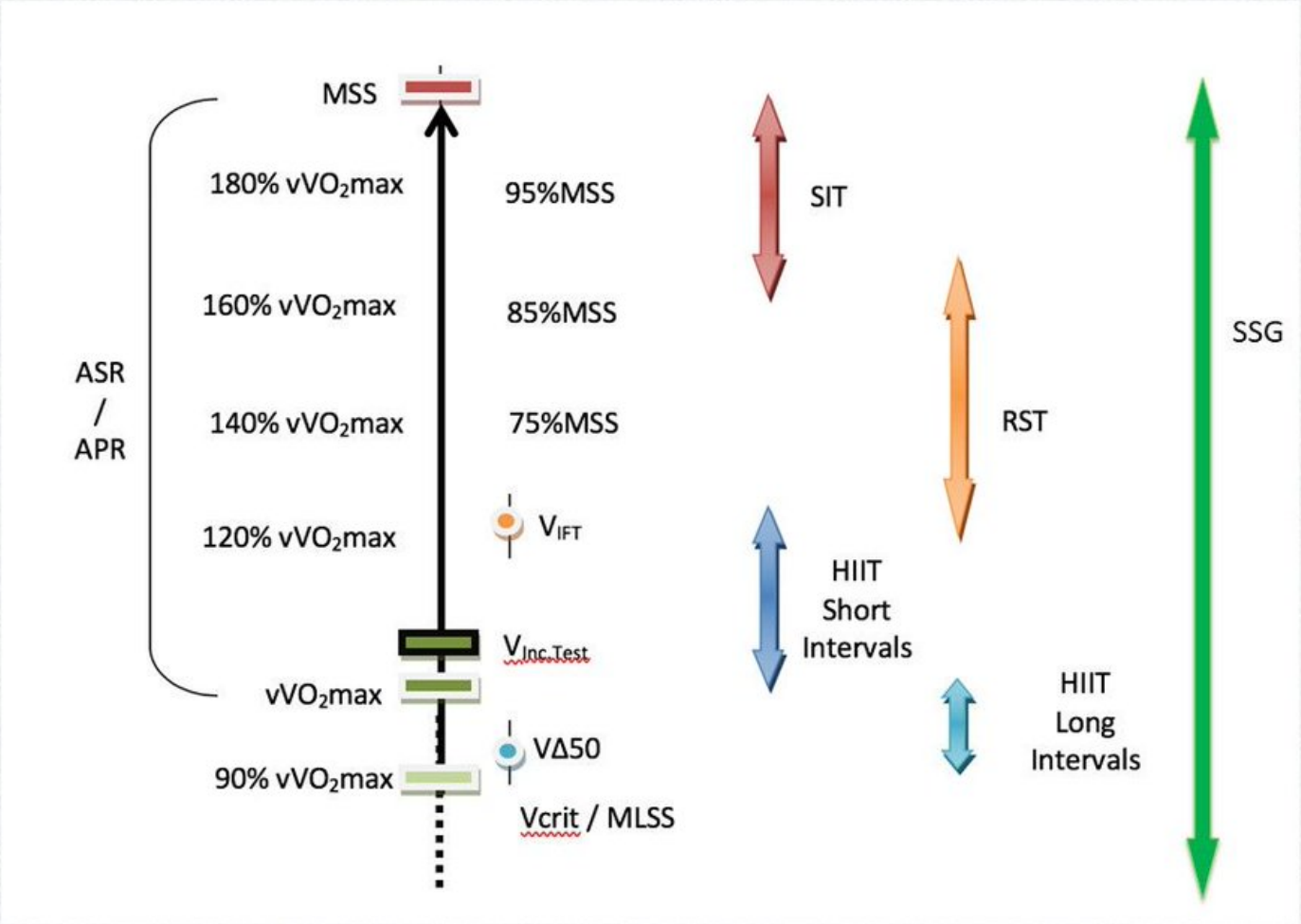
High-Intensity Interval Training, Solutions to the Programming Puzzle

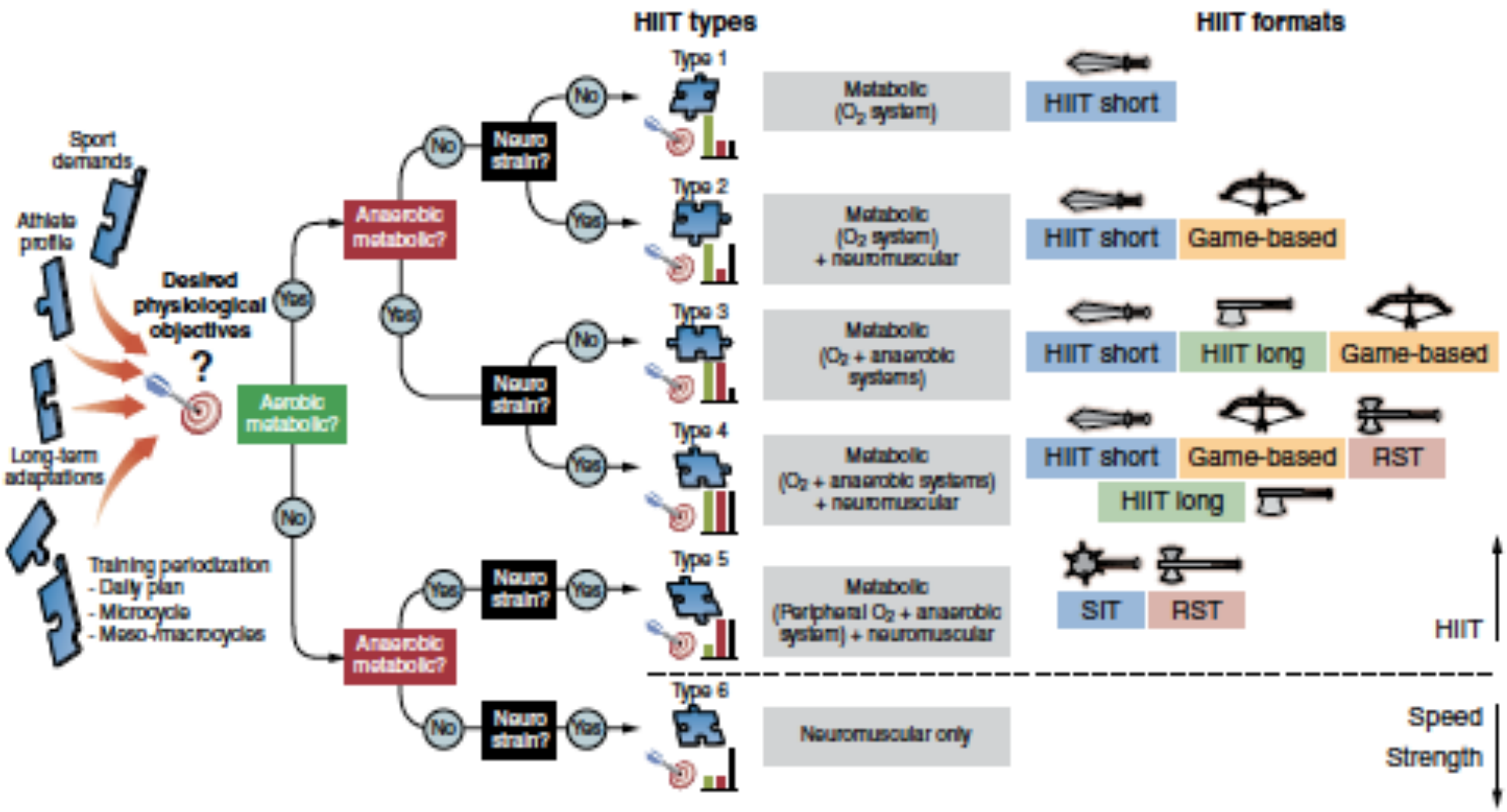
Part II: Anaerobic Energy, Neuromuscular Load and Practical Applications

Martin Buchheit · Paul B. Laursen


4
Sprint interval training (SIT)
Repeated Sprint training (RST)
Intensidade máxima
Velocidade máxima de *Sprint*
Velocidade pico
Marcadores de potência aeróbia
Velocidade aeróbia máxima
Consumo máximo de oxigênio
Marcadores de estabilidade metabólica
Capacidade aeróbia máxima
Limiar anaeróbio - Velocidade crítica
Marcadores de capacidade aeróbia
Limiar aeróbio
Repouso

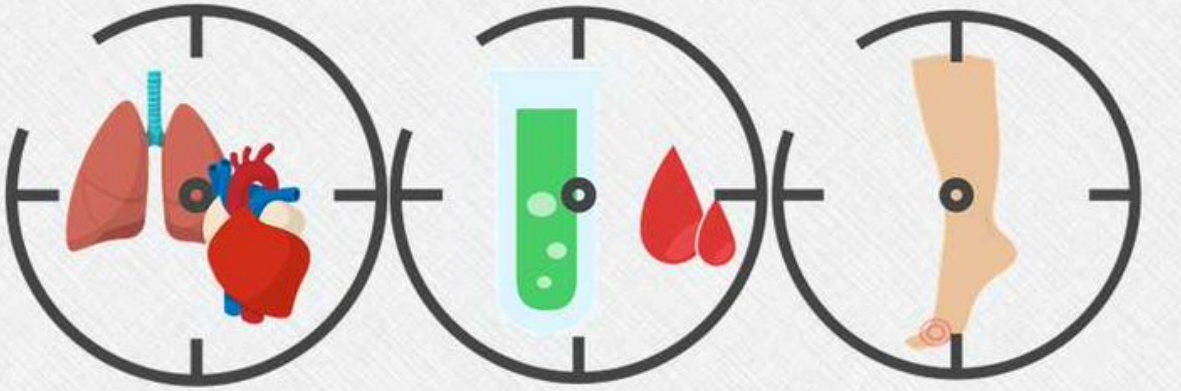
CLASSIFICAÇÃO DO HIIT





*não tem distinção de potência e capacidade

Physiological Targets of HIIT



Aerobic Anaerobic Neuromuscular

HIIT science

Esforços repetidos - RST

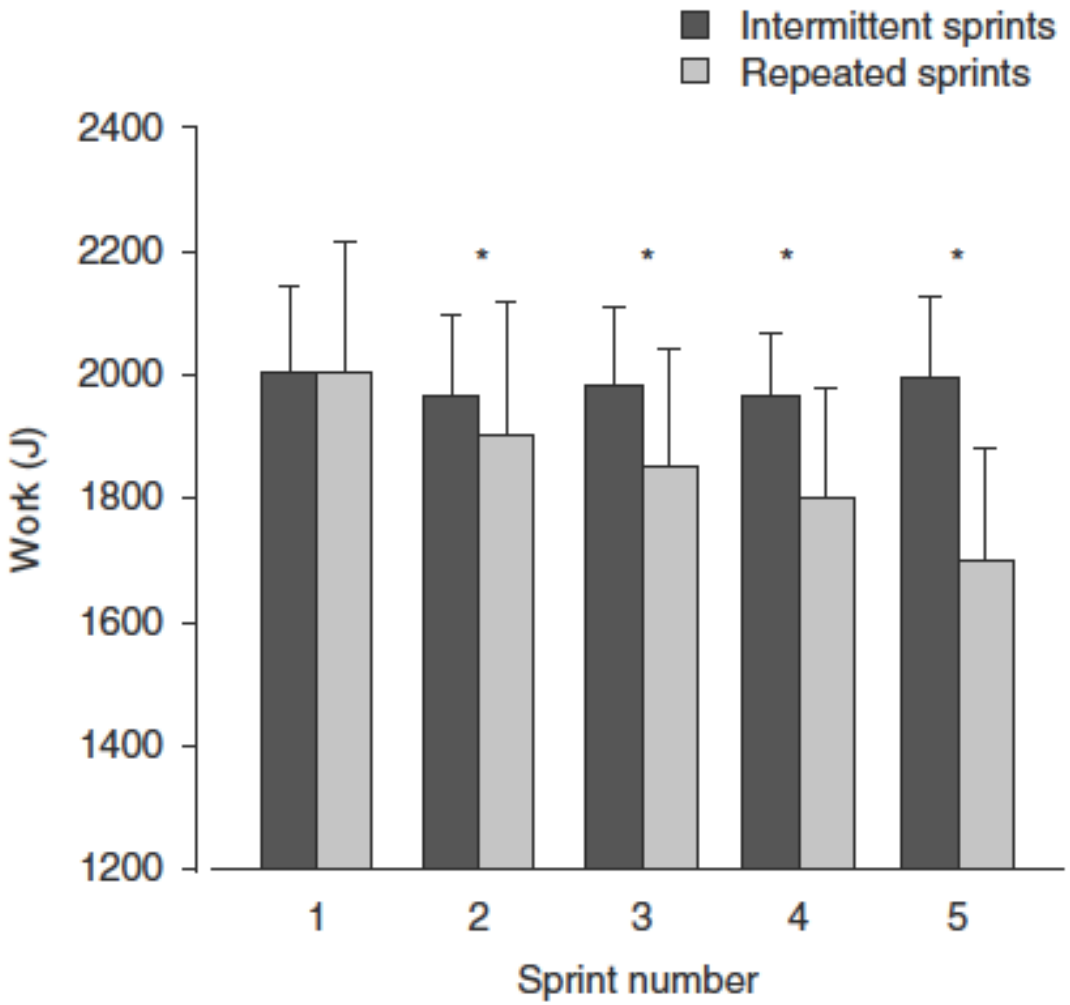
- Característica central – tiros de 3 a 10s com intervalos inferiores a 1 min
- *All out* ou próximo da potência anaeróbia máxima
- Intervalos que permitam recuperação completa ou quase completa
- Séries 10 a 20
- Relação esforço pausa ~1:6
- Ex. 10x 6s:30s

Esforços repetidos vs Esforços intervalados

- Intervalados= 10s : 60 a 300s → Velocidade máxima
- Repetidos= 10s : < 60s → Resistência de velocidade

(Girard et al., 2011)

Desempenho



(Girard et al., 2011)

Índice de fadiga e decréscimo de desempenho

$$FI = 100 \times \frac{(S_{best} - S_{worst})}{S_{best}}$$

FI = 100 x (600 – 200 / 600) =

$$S_{dec}(\%) = \left\{ 1 - \frac{(S_1 + S_2 + S_3 + \ \ldots \ + S_{final})}{S_{best} \times \text{number of sprints}} \right\} \times 100$$

= 1- (600 + 500 + 400 + 200 / 600 x 4) x 100 =

$$S_{dec}(\%) = \left\{ \frac{(S_1 + S_2 + S_3 + \ \ldots \ + S_{final})}{S_{best} \times \text{number of sprints}} - 1 \right\} \times 100$$

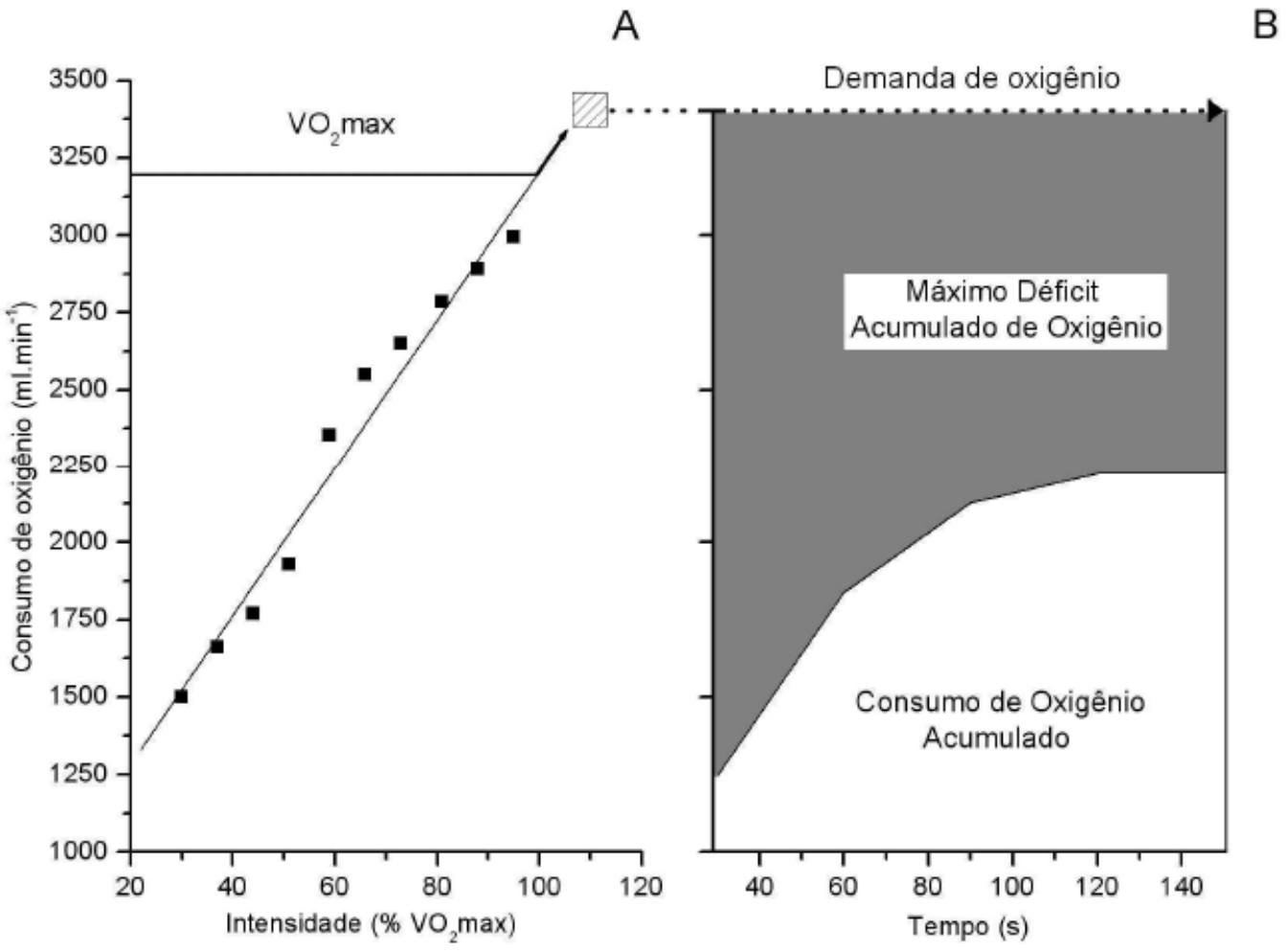
= (7 + 10 + 15 + 20 / 7 x 4) -1 x 100 =

Girard et al. (2011)

Métodos para quantificar a contribuição anaeróbia

- Biópsia (atividade enzimática)
- Déficit de oxigênio (Medbo et al., 1988)
- EPOC+ lactato (Margaria et al., 1933; di Prampero e Ferretti, 1999)
- Modelos matemáticos

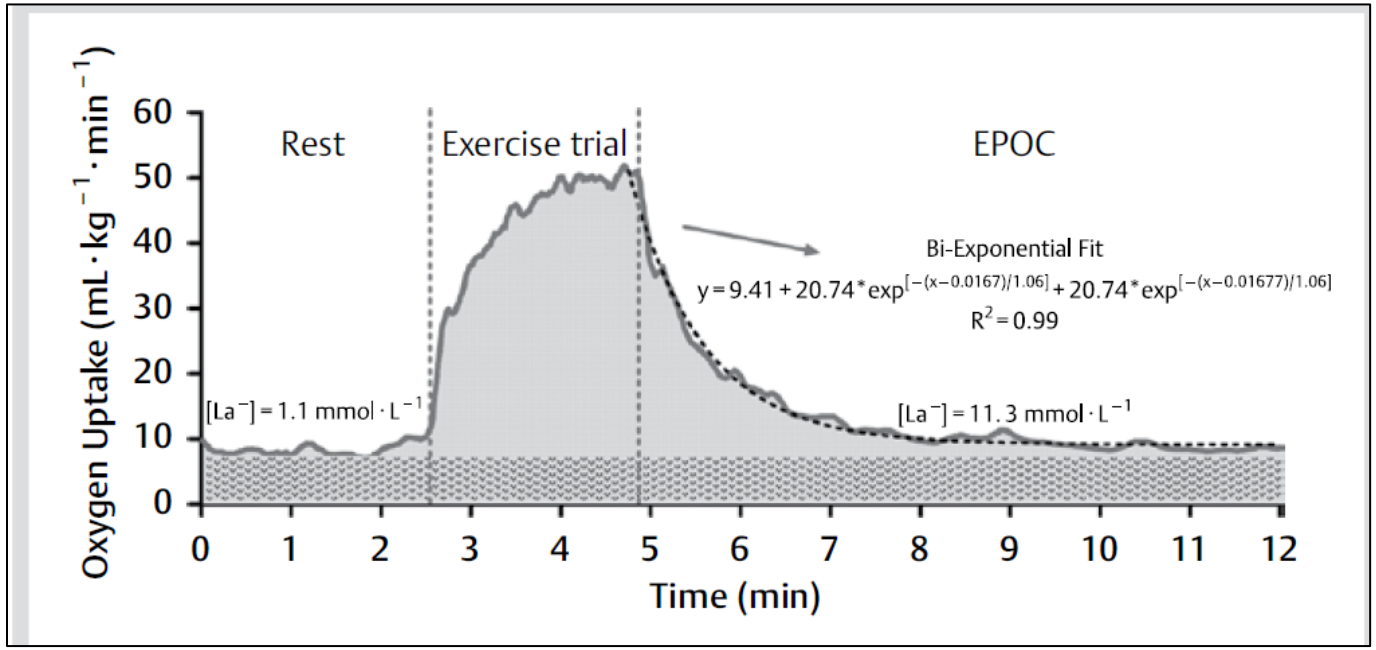
Déficit de oxigênio



(Bertuzzi et al., 2009)

EPOC + Lactato

- EPOC = Creatina fosfato
- Lactato = Glicolítico



1mmol = 3ml/kg/O2
10mmol = 30ml/kg/O2

30ml*70kg/O2 = 2100ml/O2

2,1 L/O2 * 5kcal = 10,5kcal

(Bertuzzi et al. 2010)

Contribuição dos sistemas em um único esforço máximo

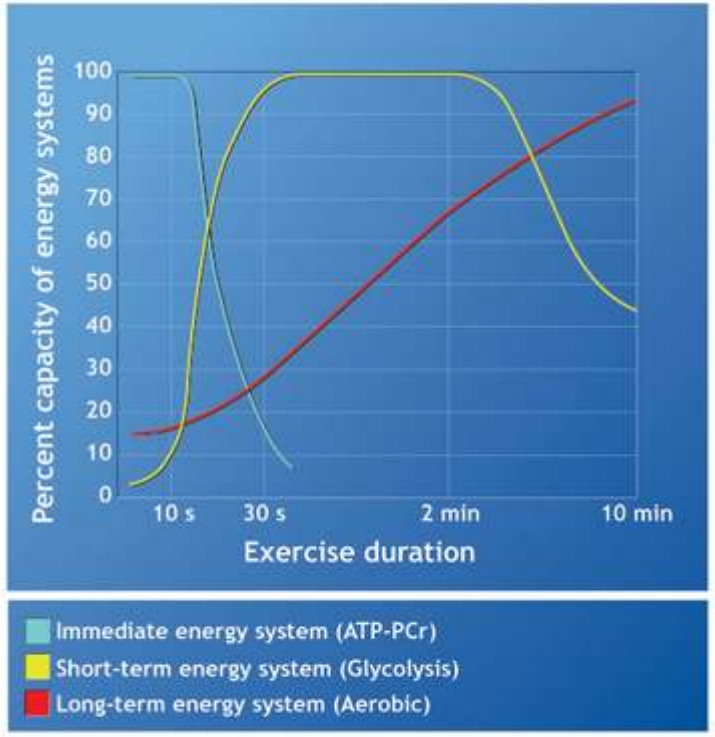


Figure 11.2. The three systems of energy transfer and their percentage contributions to total energy output during all-out exercise of different durations.

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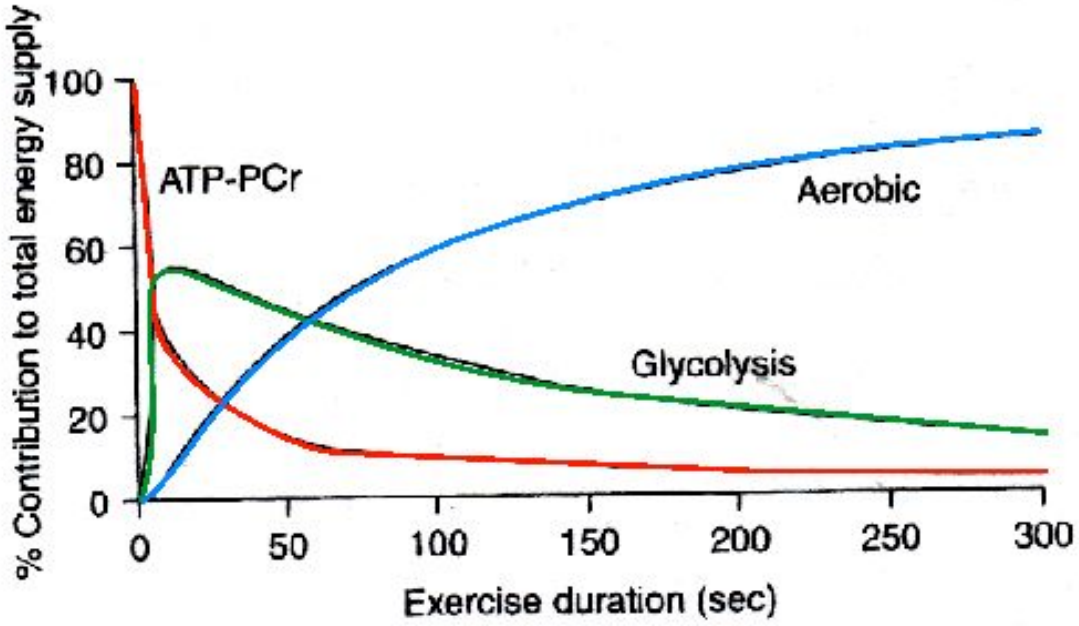
(McArdle, 2008)



(Gastin, 2001)

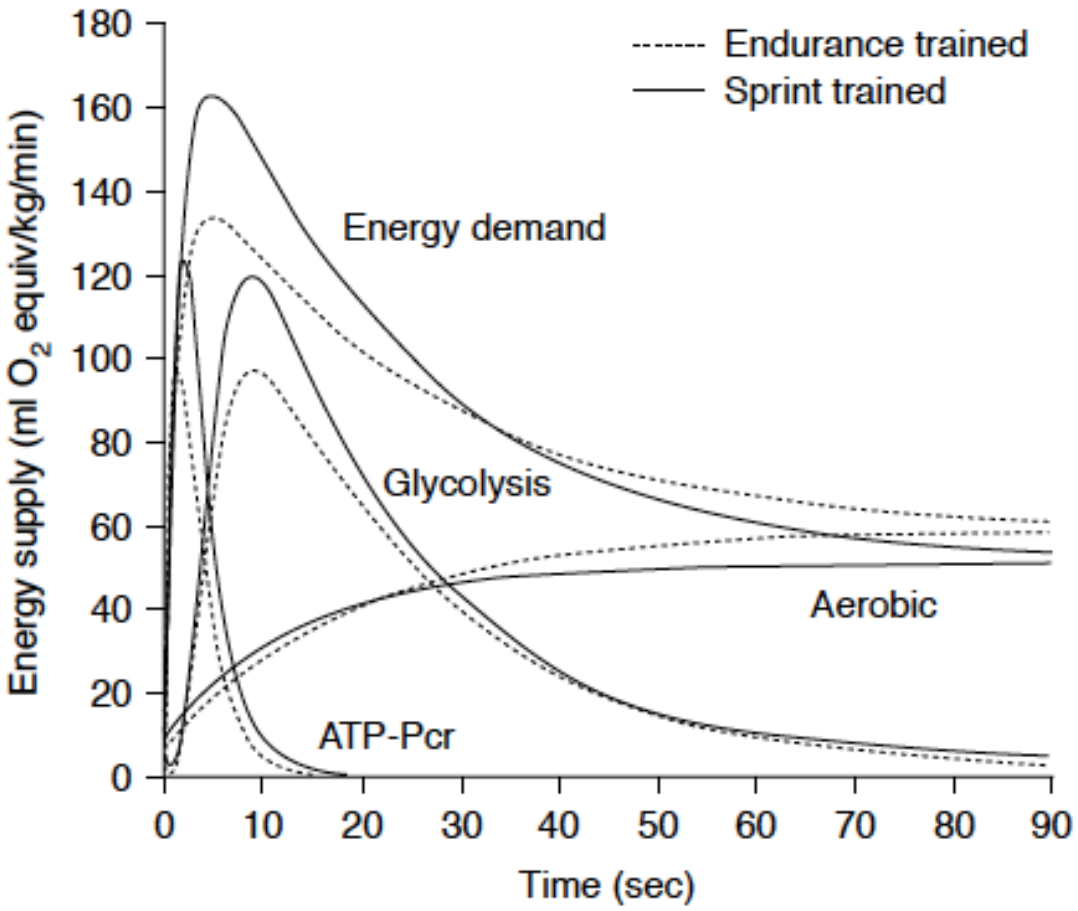


Fig. 4. Relative contribution of the 3 energy systems to the total energy supply during 90 seconds of all-out cycle exercise. Participants were 6 male sprint-trained cyclists [mean maximal oxygen uptake ($\dot{V}O_{2max}$) = 58 ml/kg/min] and 8 endurance-trained triathletes (mean $\dot{V}O_{2max}$ = 65 ml/kg/min). Data from Gastin and Lawson.[76] **ATP-PCr** = alactic component of the anaerobic energy system.

(Gastin, 2001)

Contribuição dos sistemas em um esforço máximo com diferentes durações

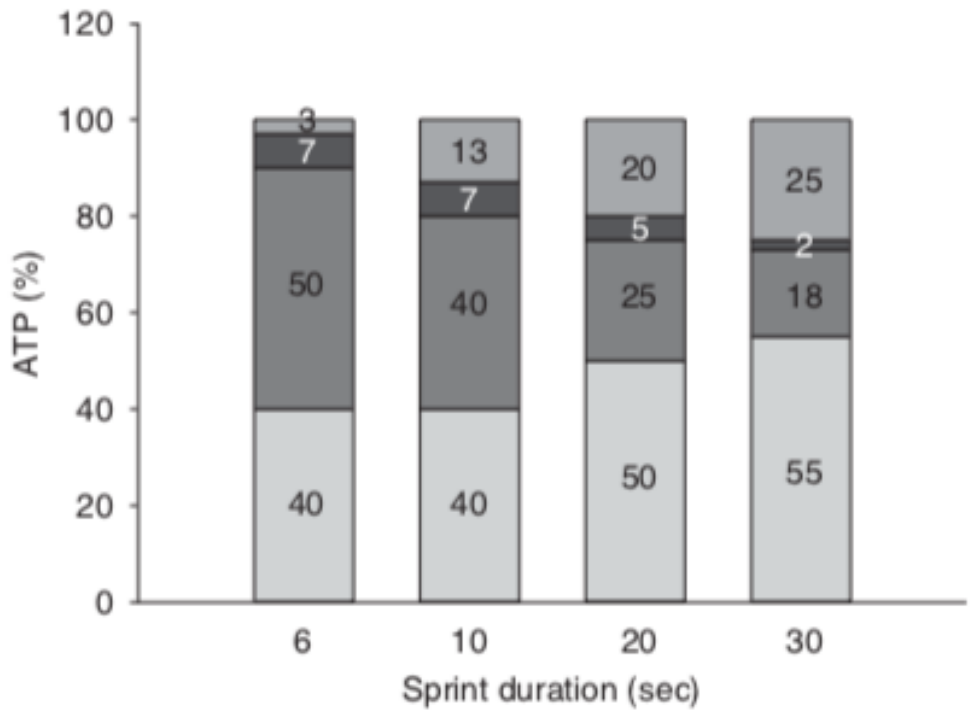


Fig. 1. Schematic illustration of relative energy system contribution to ATP resynthesis (in percentage of total energy) during sprint of varying duration (adapted from Bogdanis et al.,[128,135,136] Gaitanos et al.,[132] Medbø and Tabata[139] and Spriet et al.[138]). **PCr** = phosphocreatine.

- Aeróbio
- ATP
- ATP-CP
- Glicolítico

(Billaut e Bishop, 2009)

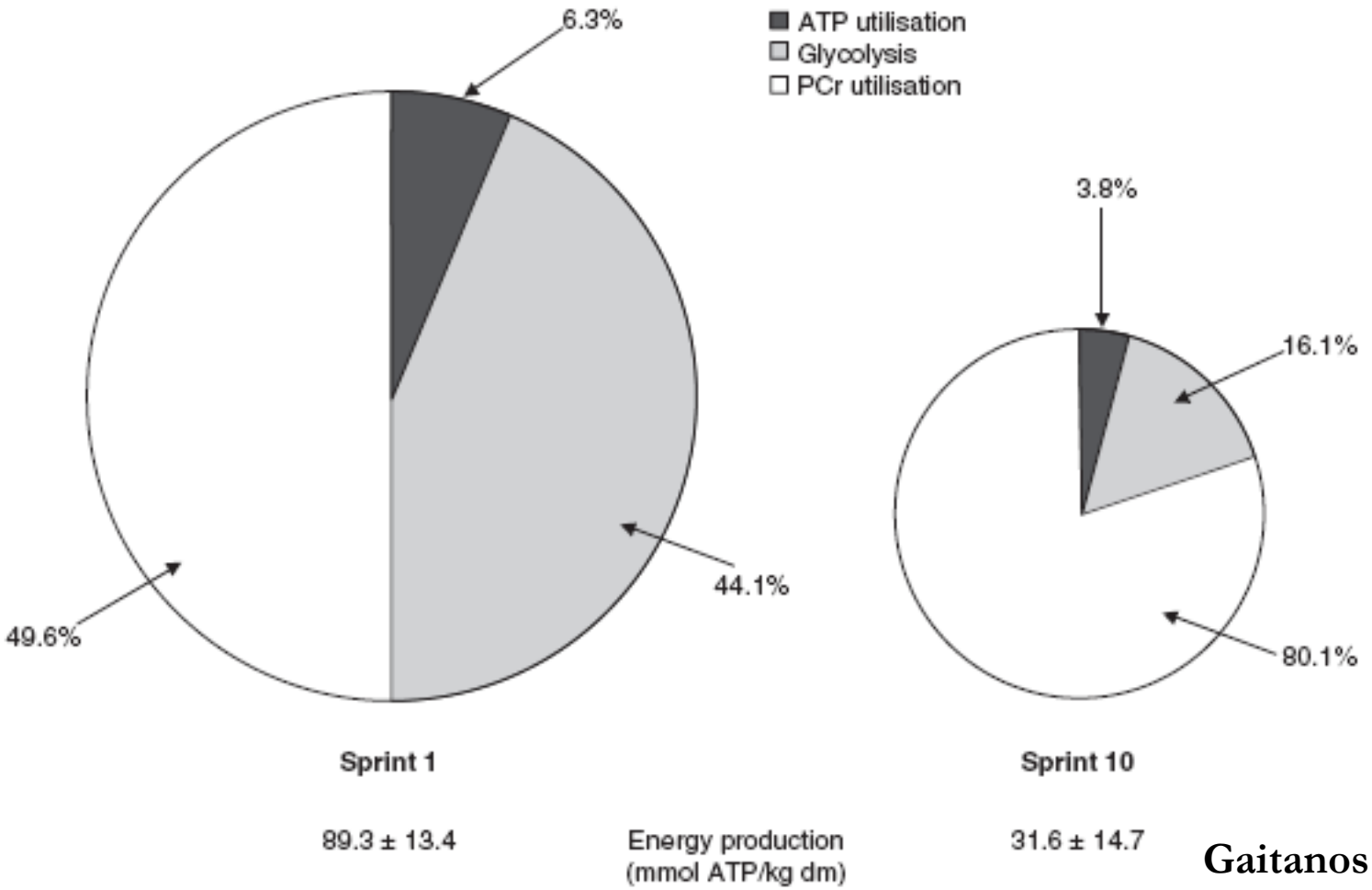
Contribuição dos sistemas em protocolo de esforços repetidos

- 10 x 6s na maior intensidade possível com 30s de intervalo

Human muscle metabolism during intermittent maximal exercise

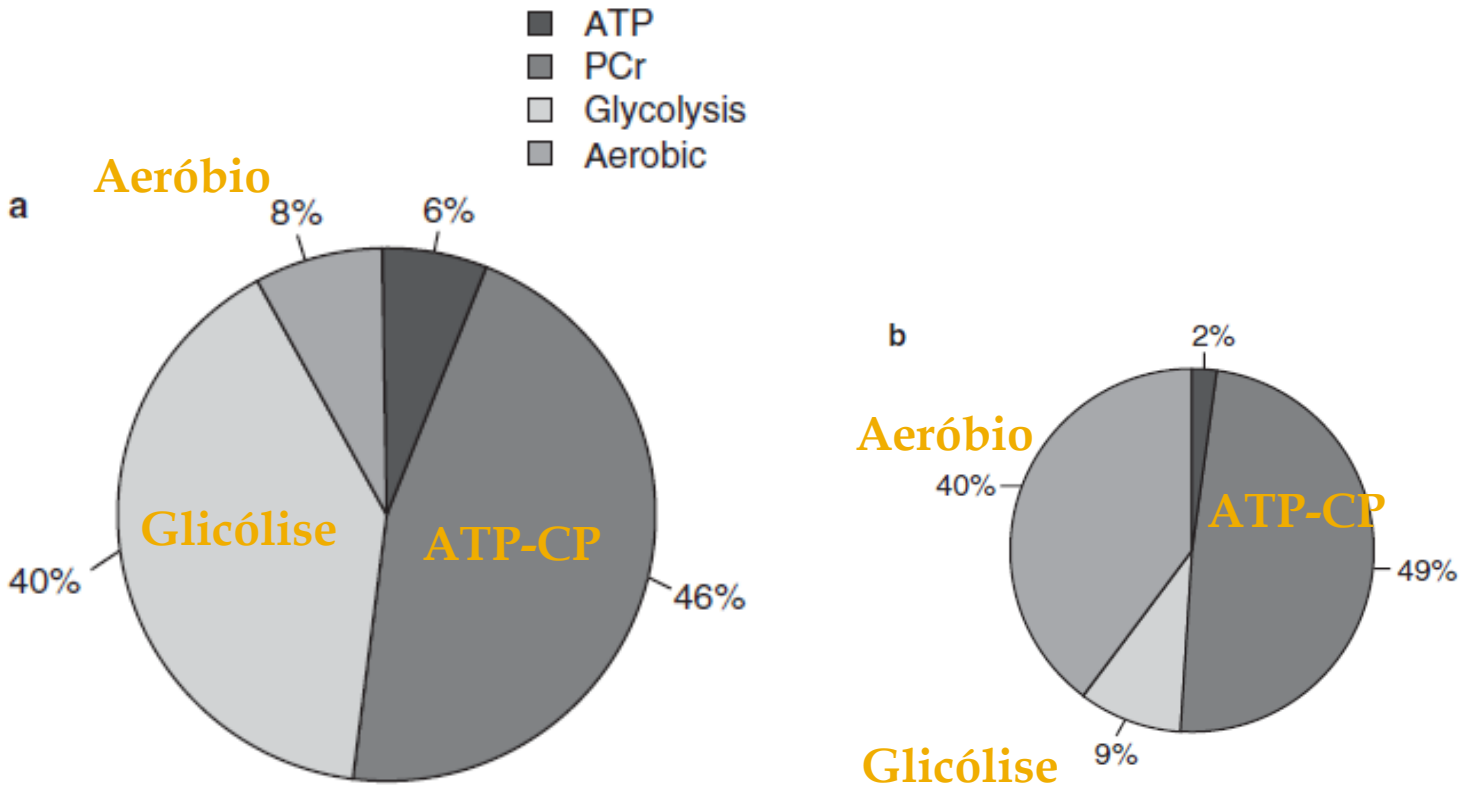
G. C. GAITANOS, C. WILLIAMS, L. H. BOOBIS, AND S. BROOKS
Department of Physical Education, Sports Science, and Recreation Management, Loughborough University, Loughborough, Leicestershire LE11 3TU, United Kingdom

Participação do metabolismo anaeróbio



Gaitanos et al. (1993)

Contribuição dos sistemas em protocolo de esforços repetidos



(Girard et al. 2005)

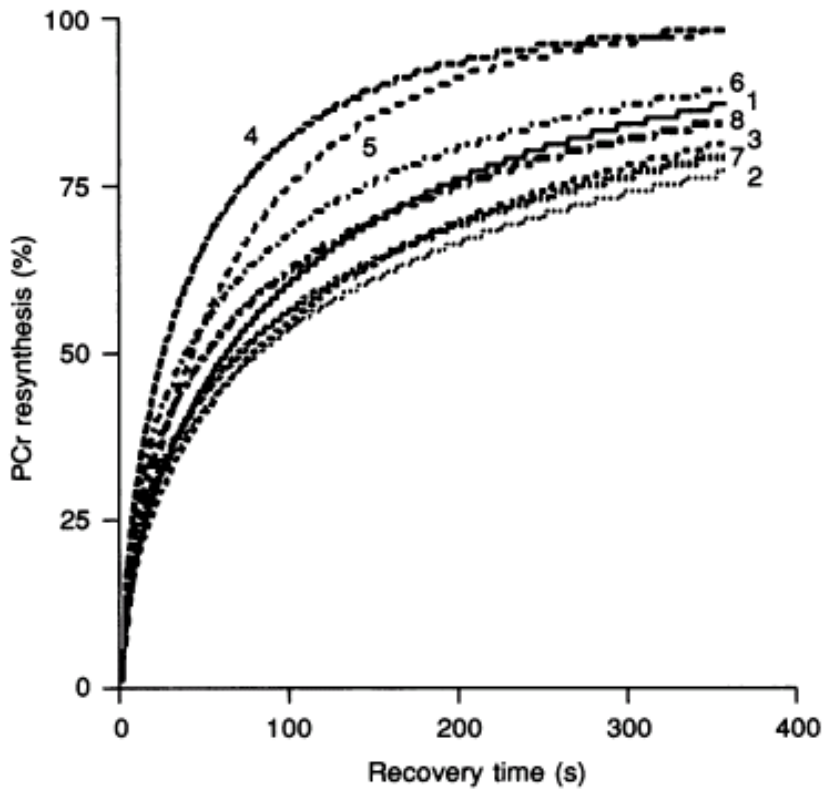
Tiros múltiplos

- Durante um único tiro de 5-6s, a CP contribui com 50% da produção anaeróbia total de ATP

- No entanto, no trabalho intermitente essa contribuição depende do quanto os estoques de CP são restaurados nos intervalos

Glaister (2005)

Sprint de 30 segundos



Meia vida = 56s

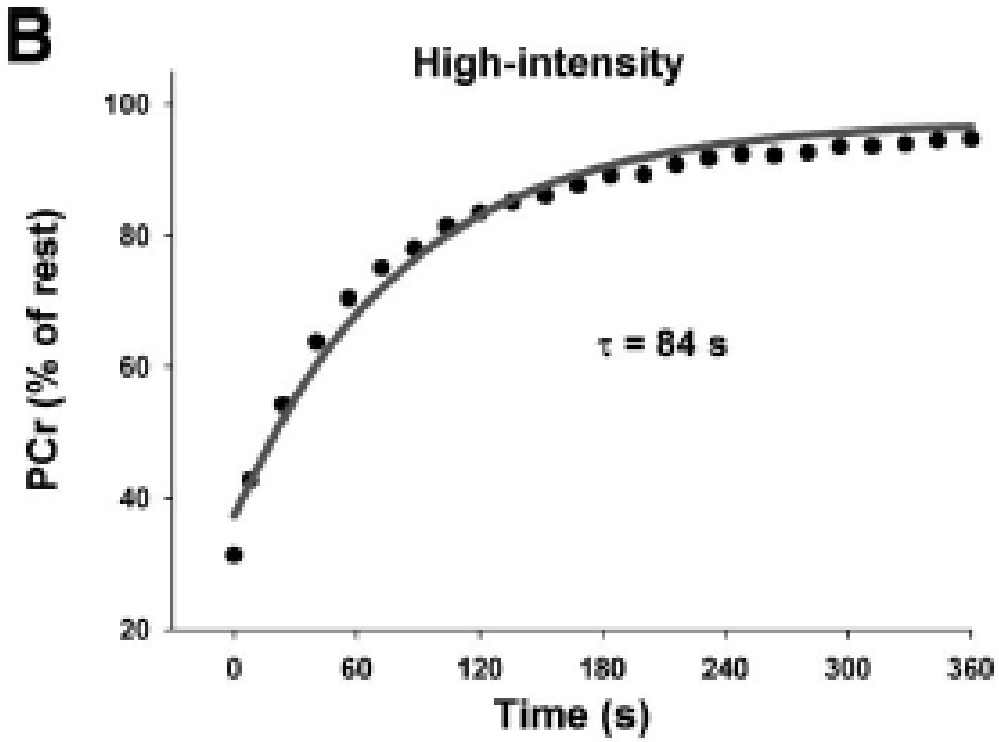
(Bogdanis et al. 1995)

Am J Physiol Regul Integr Comp Physiol 296: R161–R170, 2009.
First published October 22, 2008; doi:10.1152/ajpregu.90704.2008.

Phosphocreatine recovery kinetics following low- and high-intensity exercise in human triceps surae and rat posterior hindlimb muscles

Sean C. Forbes,[1]* Anthony T. Paganini,[1,2]* Jill M. Slade,[2,3] Theodore F. Towse,[1] and Ronald A. Meyer[1,2]
Departments of [1]Physiology, [2]Radiology, and [3]Osteopathic Manipulative Medicine, Michigan State University, East Lansing, Michigan

Submitted 19 August 2008; accepted in final form 17 October 2008



Ressíntese de CP – flexão plantar

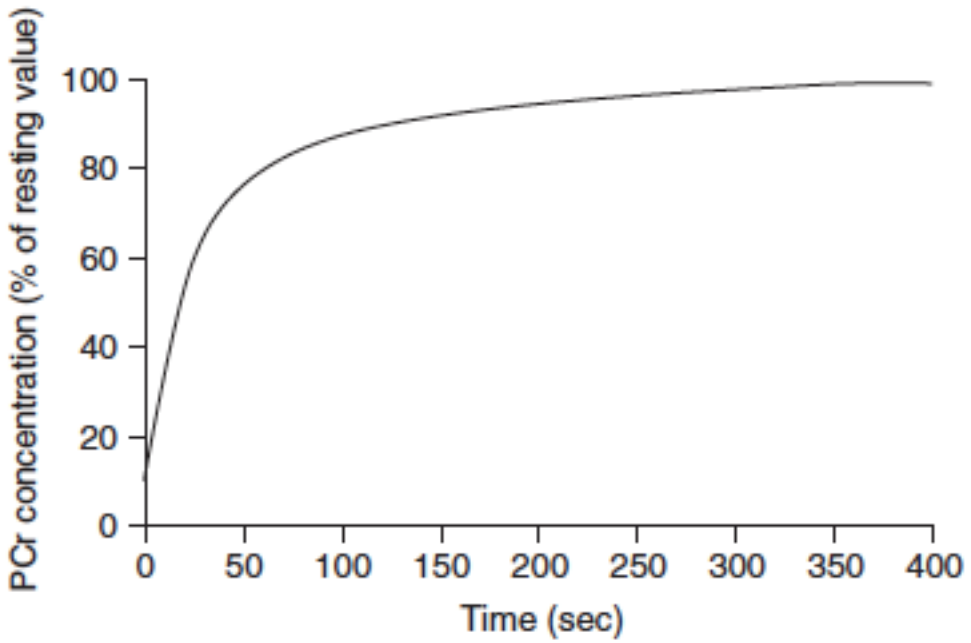


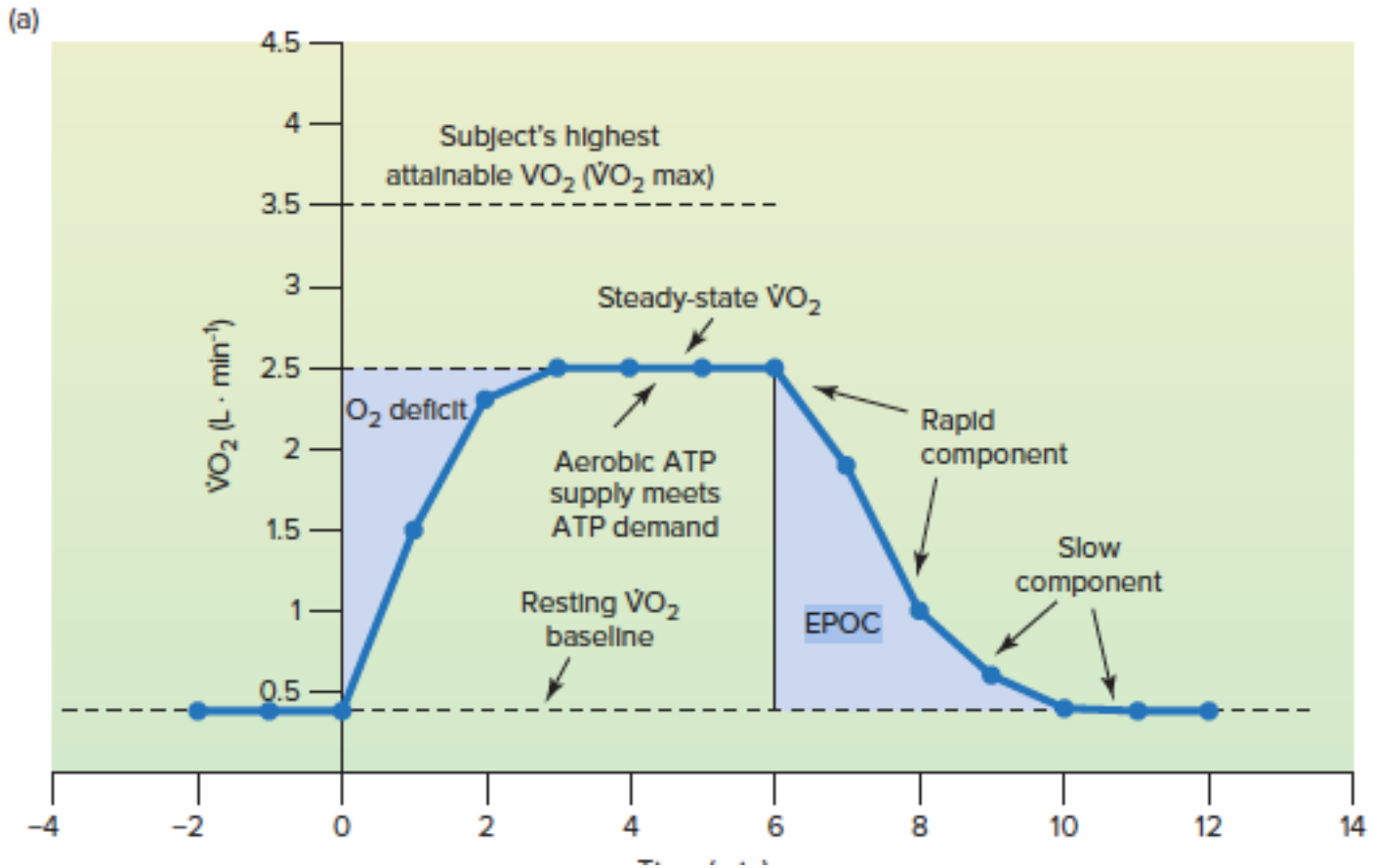
Fig. 3. Phosphocreatine (PCr) recovery kinetics of the medial gastrocnemius following 30 seconds of repeated maximal plantar flexions of the foot determined from localised nuclear magnetic resonance imaging (reproduced from Walter et al.,[36] with permission).

(Glaister, 2005)

Importância do oxigênio para a ressíntese de CP

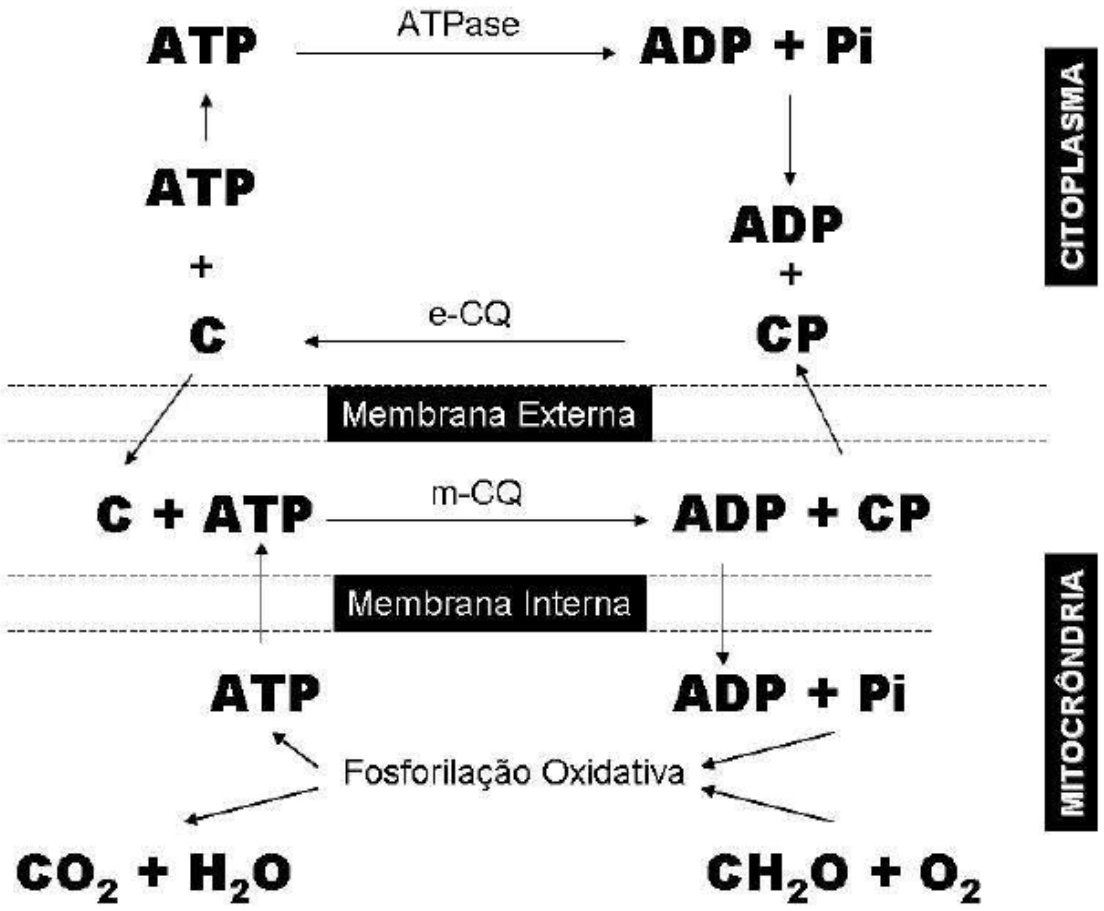
- Estudos com oclusão (Harris et al. 1976)
- Curvaturas similares de cinética on e off (Margaria et al., 1933)
- Incubação do músculo em ambiente oxigenado (Sahlin et al., 1979)
- Disponibilidade de oxigênio (Hasseler et al., 1999)

Exemplo

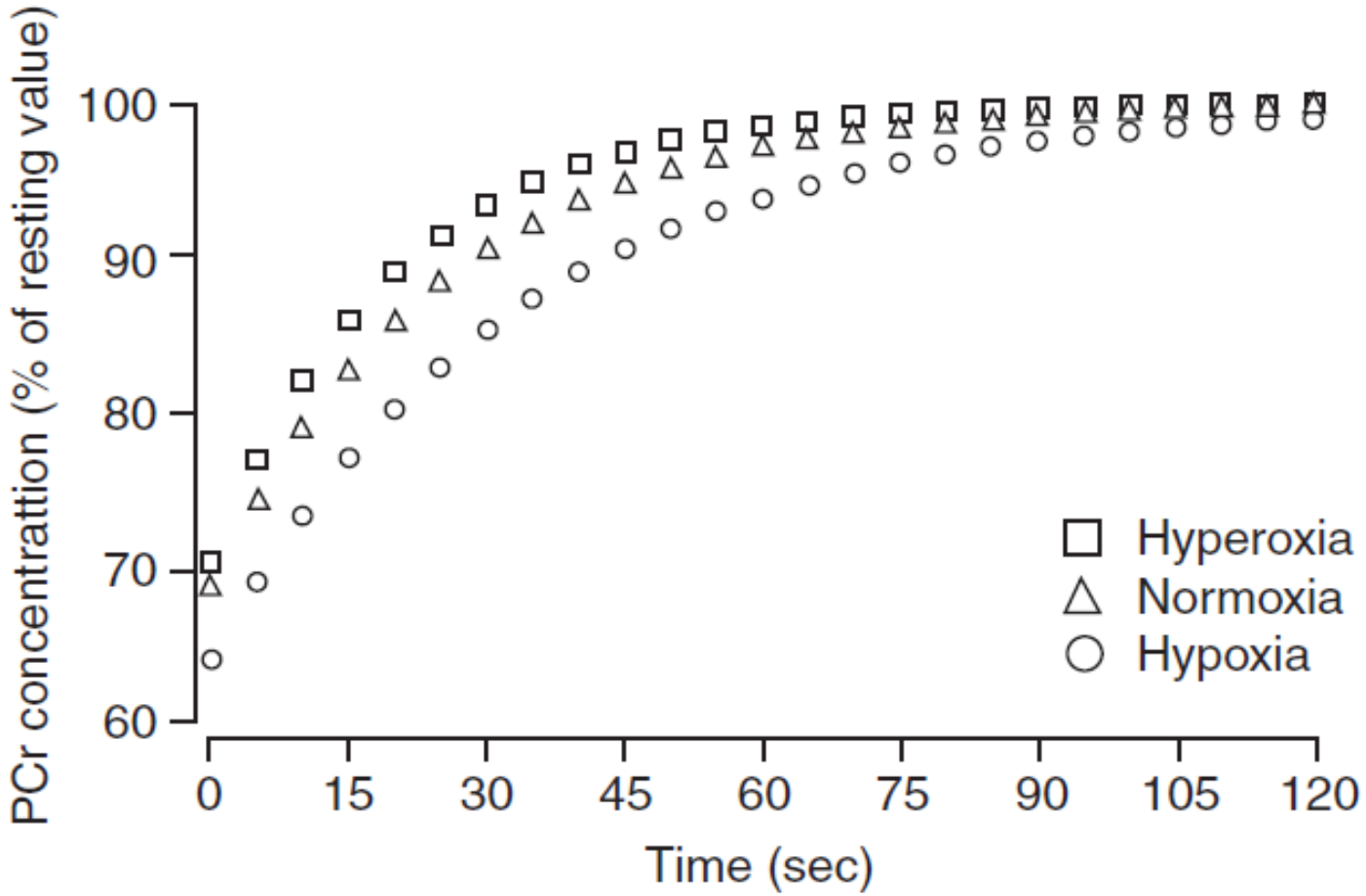


(McArdle et al., 2010)

Ressíntese de CP



Ressíntese de CP



(Glaister, 2005)

pH muscular após 6 minutos de exercício dinâmico exaustivo

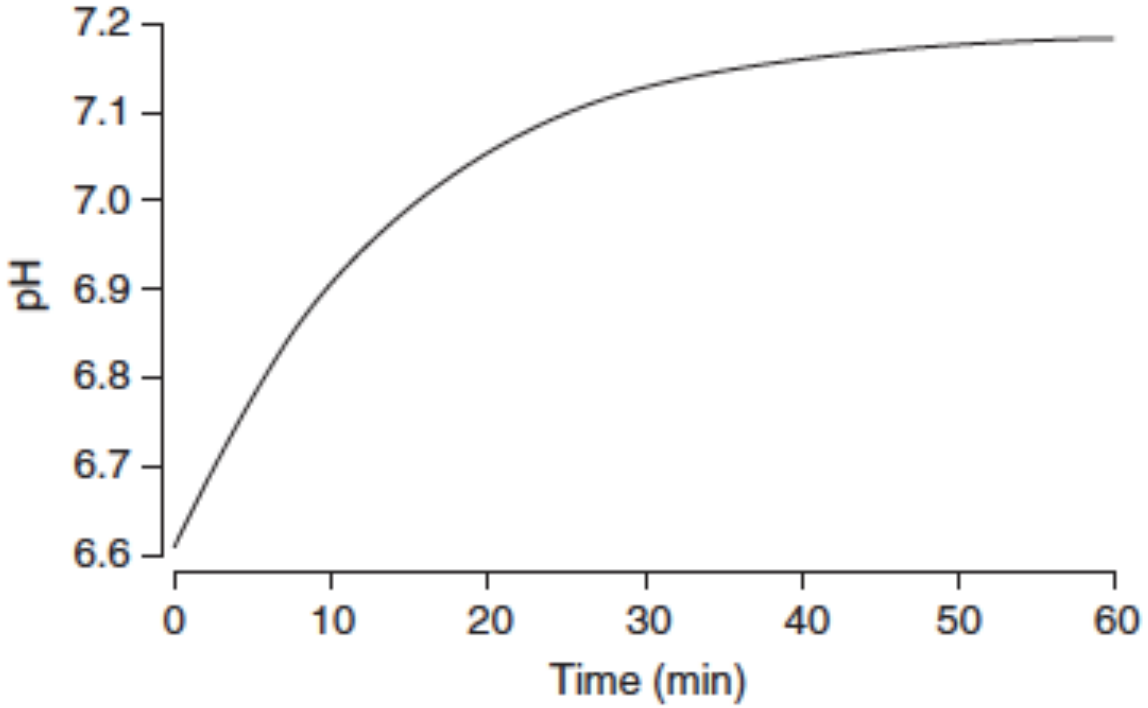


Fig. 4. Time course of muscle pH during passive recovery from 6 minutes of exhaustive dynamic exercise.[64]

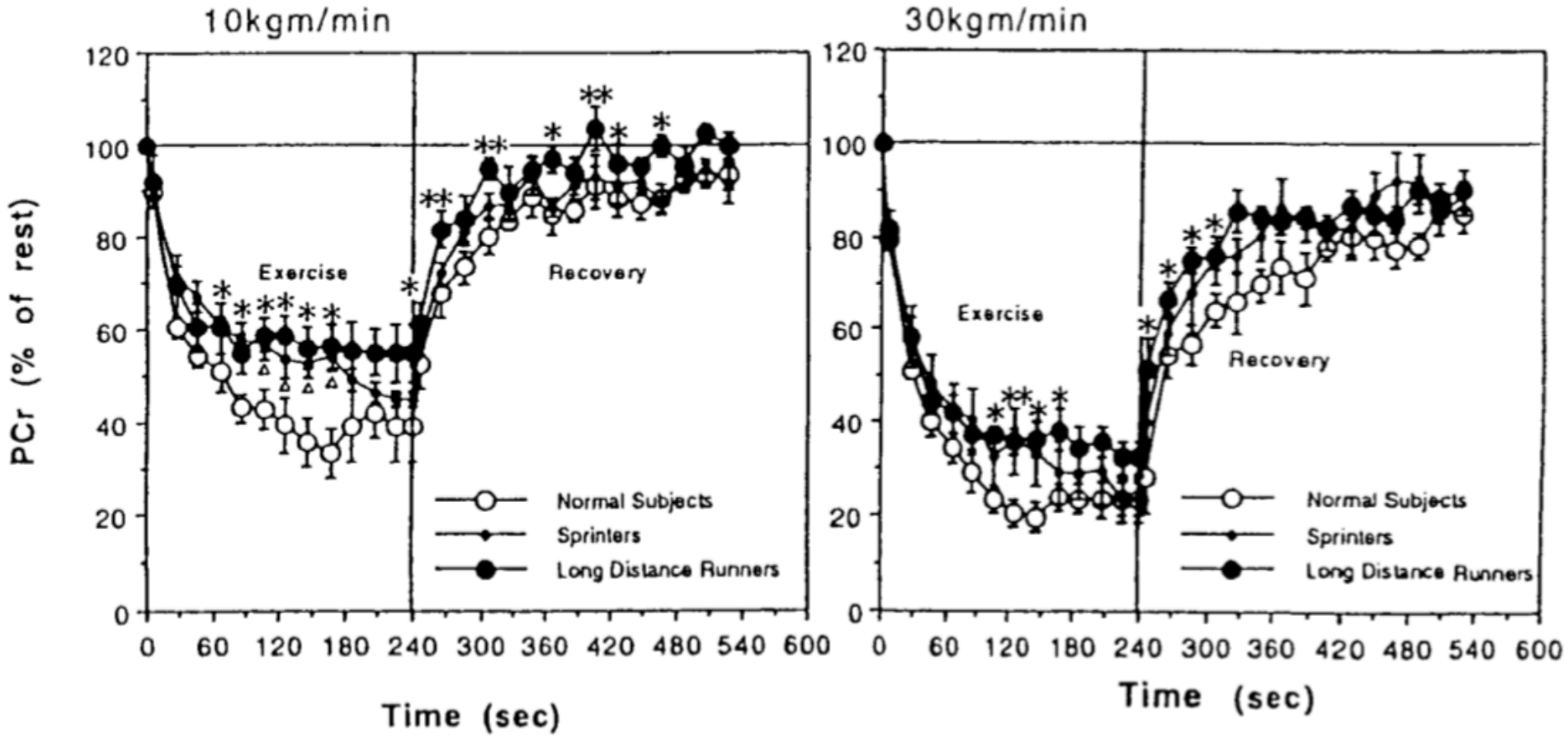
(Glaister, 2005)

Fadiga em protocolos de RST

- Excitabilidade (sódio, potássio, cálcio)
- Ressíntese de CP
- Acidose (pH)
- Fosfato inorgânico
- Drive neural

(Girard et al., 2011)

Importância da aptidão aeróbia



(Yoshida et al., 2002)

Importância da aptidão aeróbia

Table 2 The time constant values in PCr and Pi kinetics after exercise

Exercise intensity	Mild exercise	Heavy exercise
PCr		
Sedentary subjects	43.2±5.0	45.2±8.3
Sprinters	29.9±4.0	43.1±4.4
Distance runners	26.4±1.8*	27.6±4.6*
Pi		
Sedentary subjects	29.0±3.7	35.4±4.5
Sprinters	16.9±3.9*	20.0±3.4
Distance runners	16.7±1.2*	16.3±1.2*

Data are expressed in sec and mean±SEM. *$P<0.05$; vs. sedentary subject group.

Importância da CP para desempenho

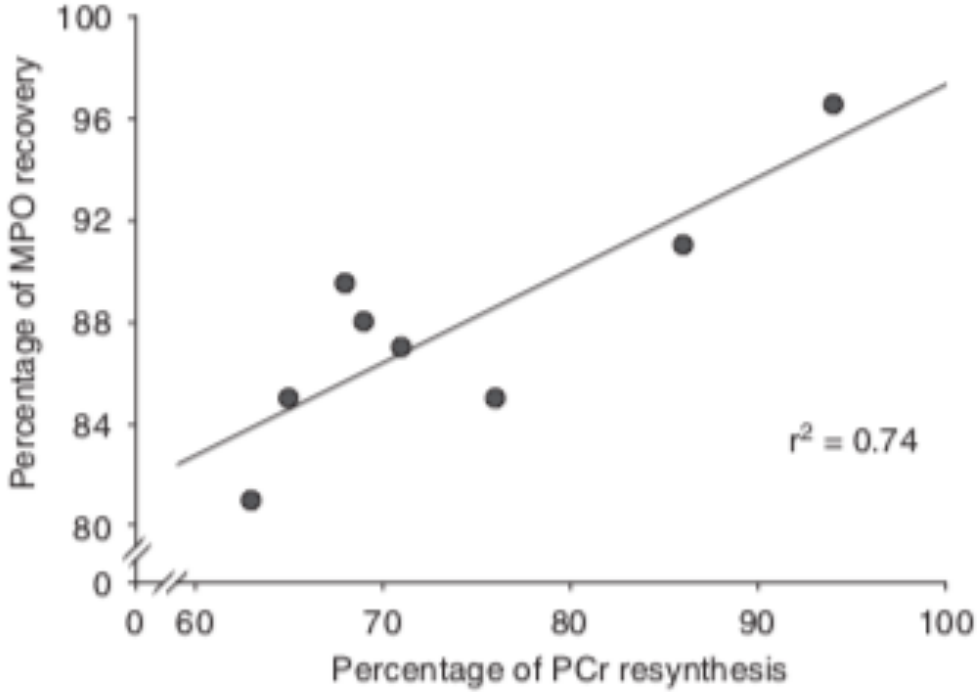


Fig. 2. Relationship between the percentage of phosphocreatine (PCr) resynthesized during the 3-minute recovery period and the mean power output (MPO) achieved during the 6-second sprint (relative to resting value) performed 3 minutes after a 30-second cycle sprint (reproduced from Bogdanis et al.[143] with permission).

(Billaut e Bishop, 2009)

Repeated-Sprint Performance in Team Sport Players: Associations with Measures of Aerobic Fitness, Metabolic Control and Locomotor Function

Author M. Buchheit[1,2,3]

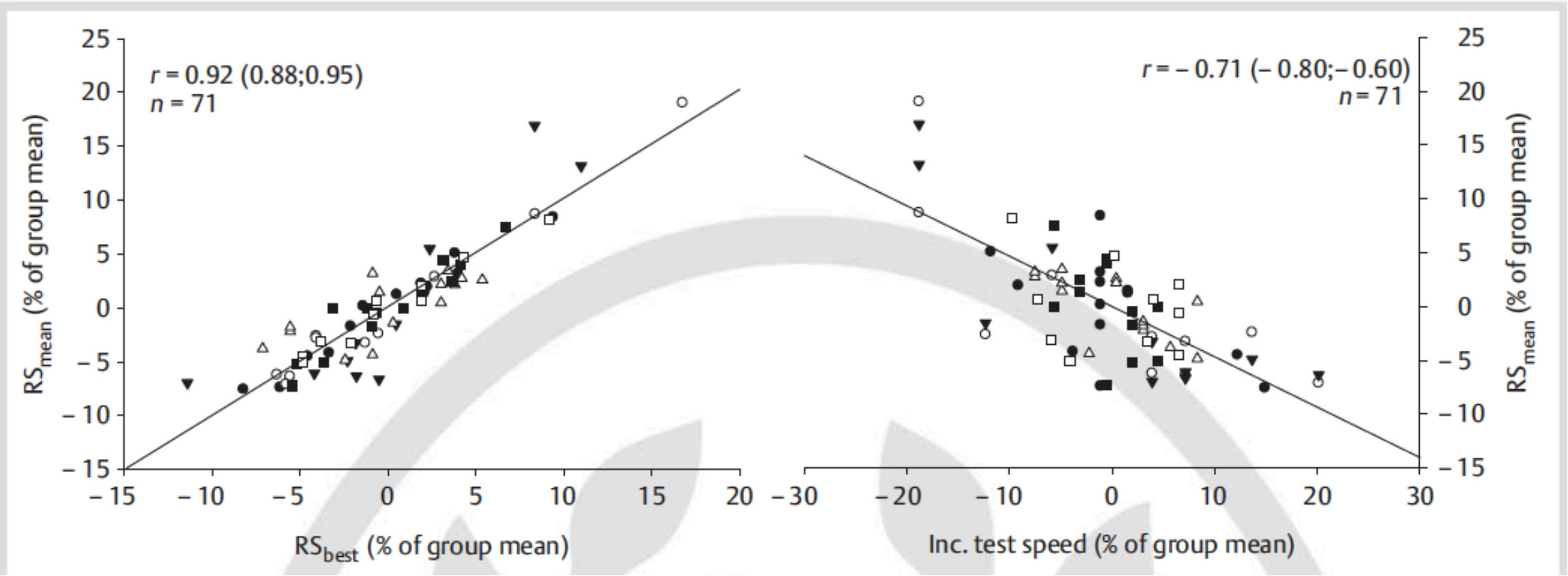
Características o estudo

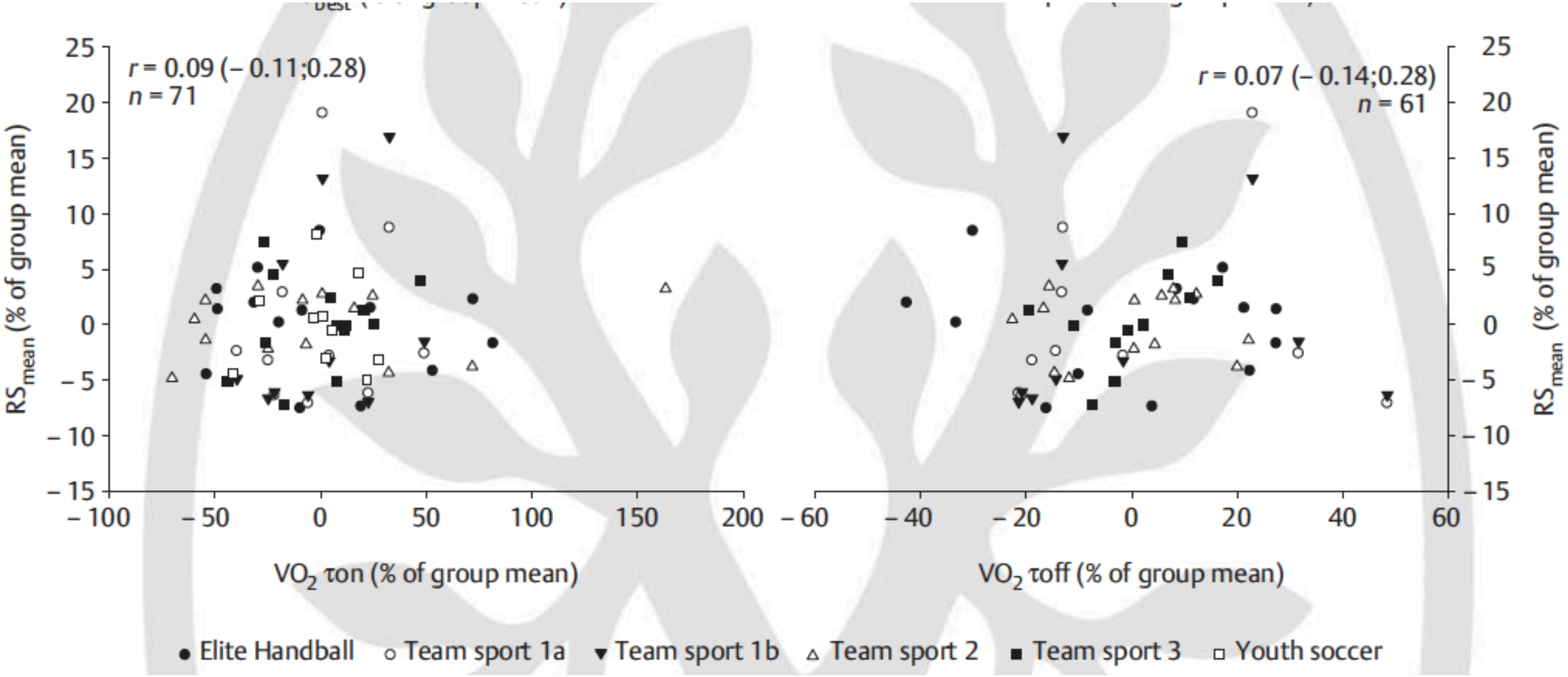
- 71 atletas de esportes de quadra
- RST (melhor Sprint, média de velocidade e % de decréscimo)
- Teste incremental ($VO_{2máx}$)
- 2-4 testes submáximos (cinética on e off)

Table 1 Description of the tests performed by each team sport group.

Group	Incremental test	Submaximal run intensity (% Incremental test speed)	Number of submaximal runs	RSS	
				Protocol	Location
youth soccer	Ramp motorized treadmill (0 % grade)	50	2 (same day)	10 × 30 m (30"; 1.8 m.s^{-1})	indoor track
elite handball	30-15$_{IFT}$	45	2 (same day)	6 × 2 × 15 m (20"; passive)	indoor track
team sport 1a	Ramp motorized treadmill (1 % grade)	60	2 (separate days)	6 × 16 m (25"; passive)	non-motorized treadmill
team sport 1b				6 × 16 m (25"; 2.0 m.s^{-1})	non-motorized treadmill
team sport 2	30-15$_{IFT}$	65	2 (same day)	20 × 15 m (20"; passive)	indoor track
team sport 3	30-15$_{IFT}$	45	4 (separate days)	6 × 25 m (25"; 2.0 m.s^{-1})	indoor track

Note that players from the team sport 1 group performed 2 different RSS protocols; their data were therefore analyzed twice (i.e., team sport 1a and team sport 1b).
30-15$_{IFT}$: 30-15 Intermittent Fitness test. RSS: repeated-sprint sequence. Data in brackets for RSS stand for between-sprint recovery duration and recovery intensity


r = 0.92 (0.88;0.95)
n = 71
RSmean (% of group mean)
RSbest (% of group mean)
r = – 0.71 (– 0.80;– 0.60)
n = 71
Inc. test speed (% of group mean)
RSmean (% of group mean)


r = 0.09 (– 0.11;0.28)
n = 71
r = 0.07 (– 0.14;0.28)
n = 61
RSmean (% of group mean)
VO2 τon (% of group mean)
VO2 τoff (% of group mean)
Elite Handball
Team sport 1a
Team sport 1b
Team sport 2
Team sport 3
Youth soccer

Pausa ativa e passiva

Muscle Deoxygenation during Repeated Sprint Running: Effect of Active vs. Passive Recovery

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[2] School of Exercise, Biomedical and Health Sciences, Edith Cowan University, Perth, Australia

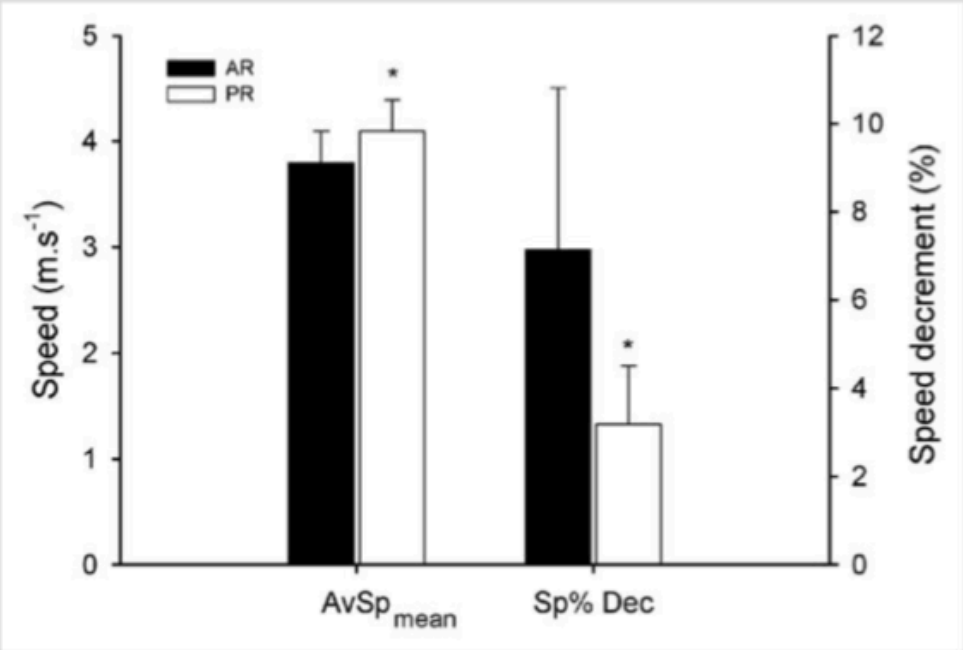
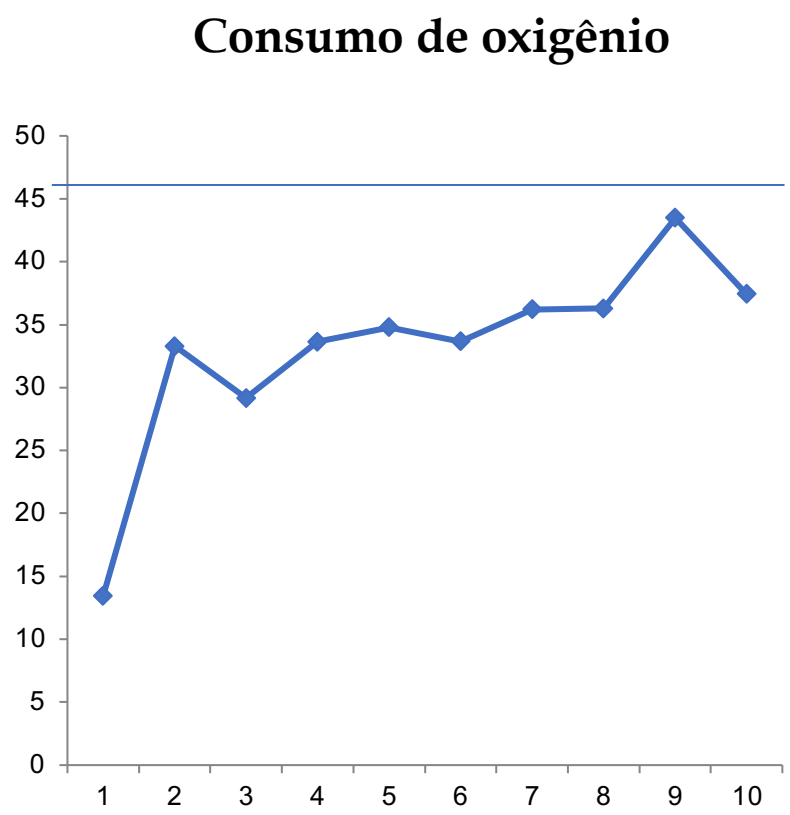
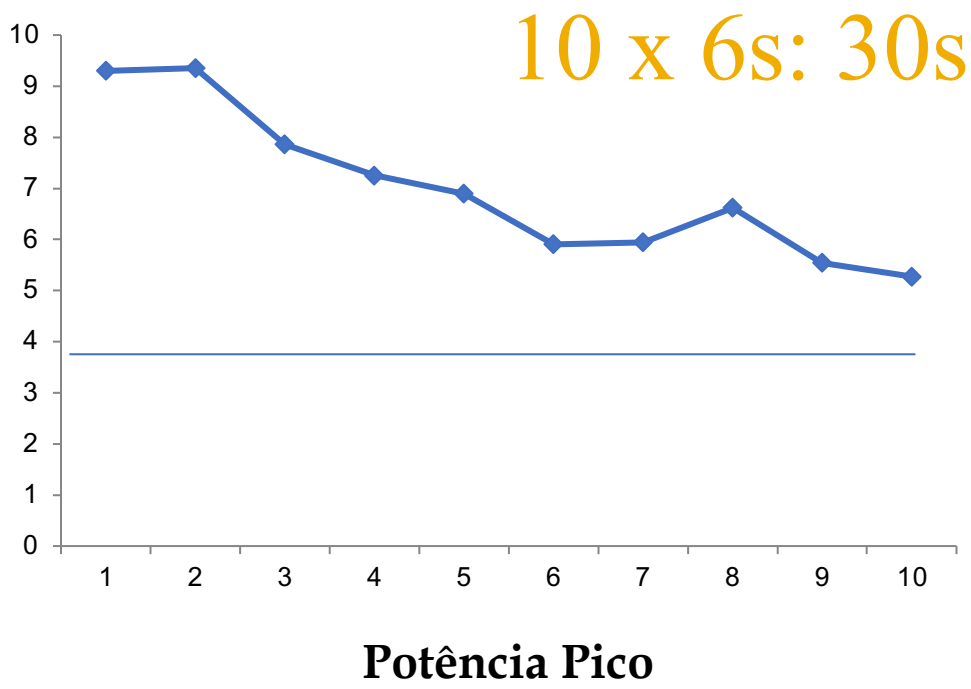


Fig. 1 Mean average speed ($AvSp_{mean}$, $m.s^{-1}$) and percentage of speed decrement (Sp%Dec, %) during the six 4-s all-out sprints with 21 s of active (AR) or passive recovery (PR) between sprints. Values are mean ± SD (n = 10). *Significant difference vs. AR ($P<0.05$).

Consumo de oxigênio e carga mecânica





(Lopes-Silva, 2016)

20 x 20m :15s vs 10 x 40m : 30s

Journal of Exercise Science & Fitness 19 (2021) 182–188

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journal homepage: www.elsevier.com/locate/jesf

Effects of sprint distance and repetition number on energy system contributions in soccer players

Süleyman Ulupınar [a], Serhat Özbay [b], Cebrail Gençoğlu [b,*], Emerson Franchini [c], Necip Fazıl Kishalı [d], İzzet İnce [e]

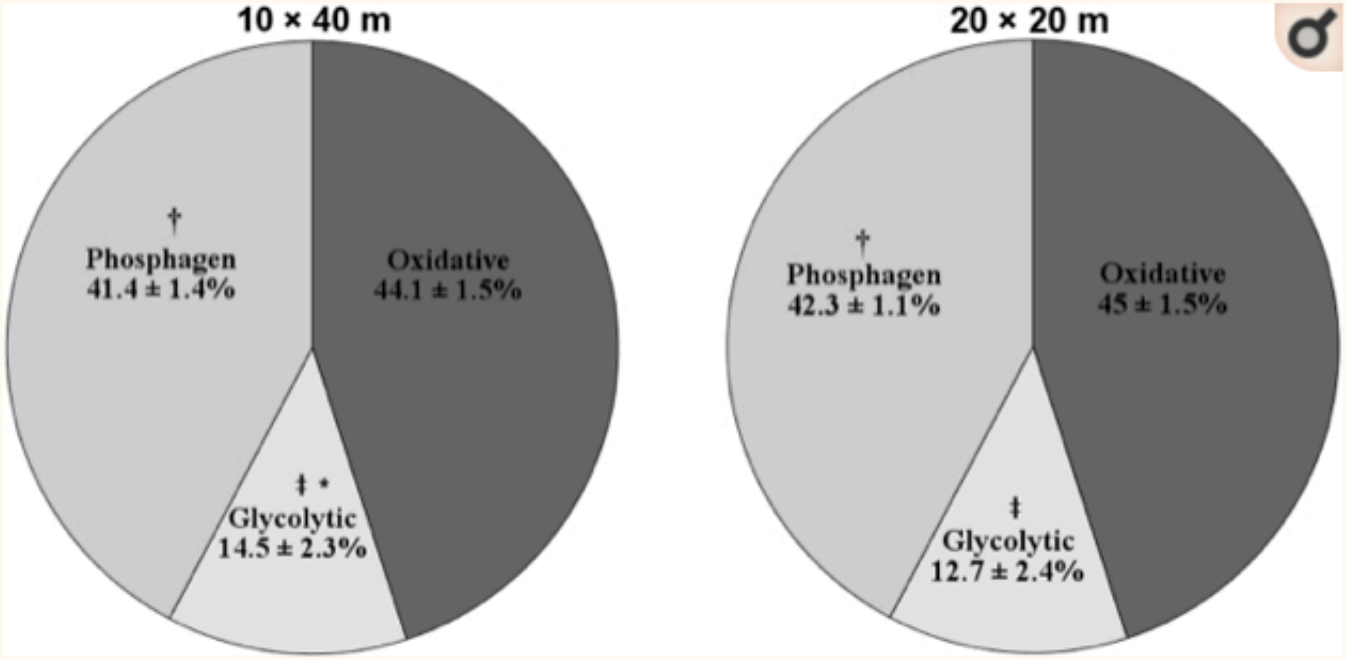


Fig. 3

Estimated relative energy contribution during 10 × 40 m and 20 × 20 m repeated sprint exercise forms. Note: † phosphagen different from oxidative and glycolytic; ‡ glycolytic different from oxidative; ∗ 10 × 40 different from the 20 × 20. $p < .05$).

Componente neuromuscular

RST/SIT

↓

Hiit curto

↓

Hiit longo

↓

Contínuo de intensidade moderada (exceto de for de longa duração)

Int J Sports Med
DOI: 10.1055/a-1263-1034

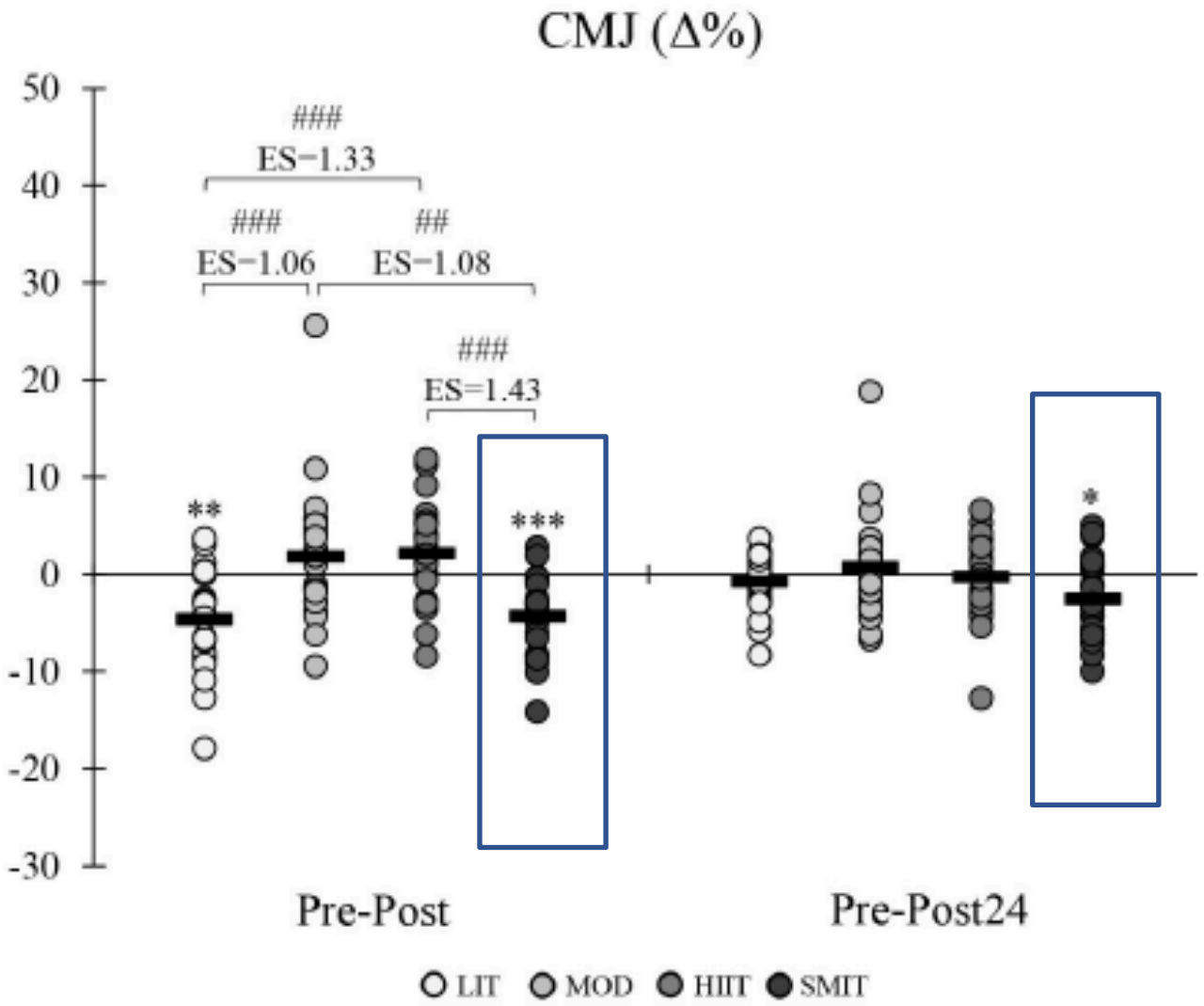
Training & Testing

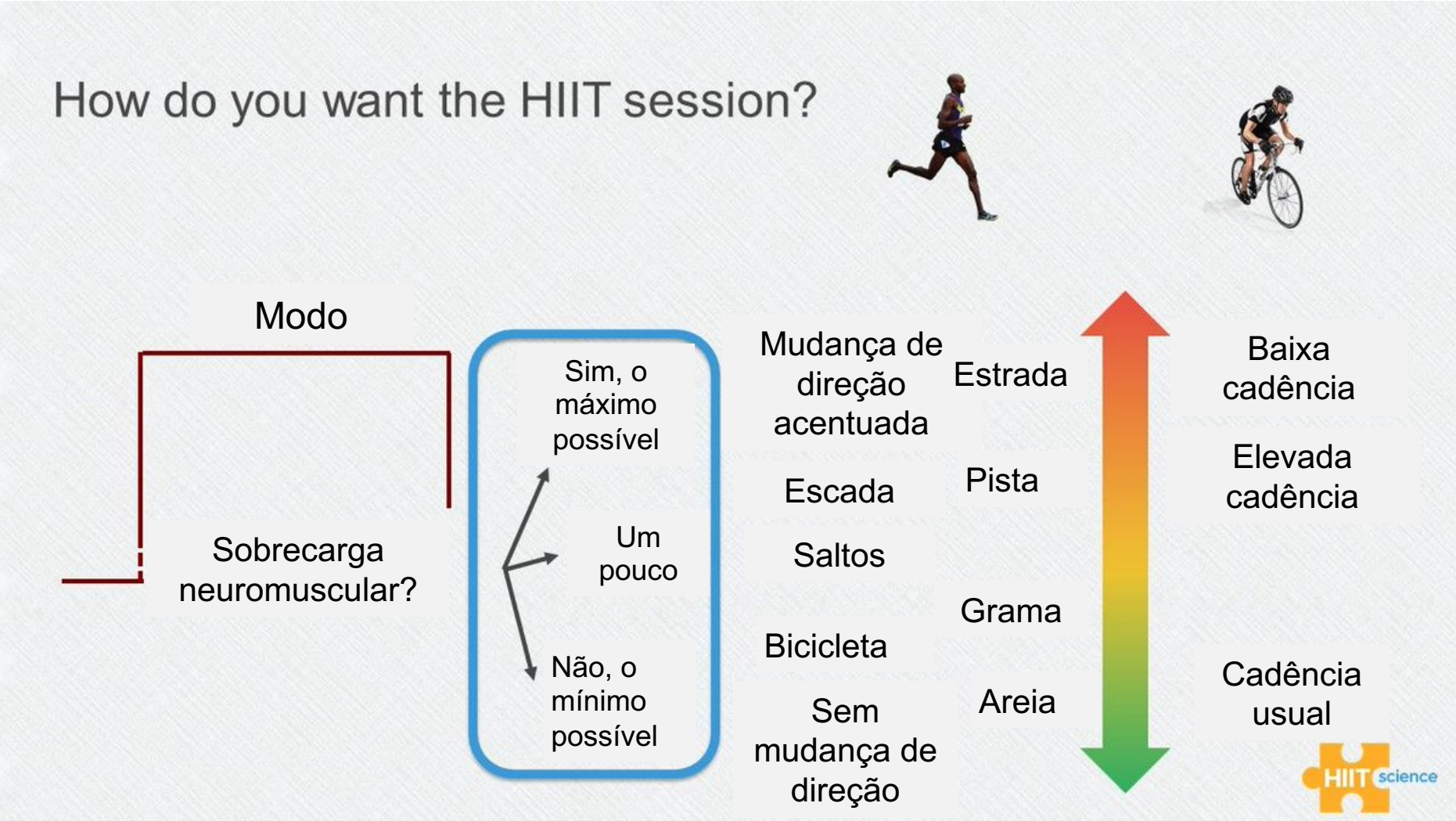
Acute Physiological Responses to Four Running Sessions Performed at Different Intensity Zones

Olli-Pekka Nuuttila, Heikki Kyröläinen, Keijo Häkkinen, Ari Nummela

Desenho experimental

- 24 homens fisicamente ativos
- LIT = 90 min a 80% do LT1
- MOD = 30 min delta 50% LT1 e LT2
- HIIT = 6 x 3 min no delta 50% LT1 e LTS : 2 min rec passiva
- SIT = 10 x 30s all out a 75% da vel pico : 2,5 rec


CMJ (Δ%)
50
40
30
20
10
0
-10
-20
-30
###
ES−1.33
###
ES−1.06
##
ES−1.08
###
ES=1.43
**
***
*
Pre-Post
Pre-Post24
LIT
MOD
HIIT
SMIT



Buchheit (2019)

2015 Jun;45(6):881-91

Sports Med
DOI 10.1007/s40279-015-0324-9

SYSTEMATIC REVIEW

The Effects of Repeated-Sprint Training on Field-Based Fitness Measures: A Meta-Analysis of Controlled and Non-Controlled Trials

Jonathan Taylor[1] · Tom Macpherson[1] · Iain Spears[1] · Matthew Weston[1]

Variáveis dependentes

- Potência (salto com contramovimento)
- Aceleração (10-30m sprints)
- Velocidade (10-30m sprints)
- RSA
- Desempenho em corrida intervalada (Yo-Yo)

Características dos estudos

- Intervenção utilizando RSA na forma de corrida ou em bicicleta
- Sprint < 10s
- Recuperação < 60s
- 2- 12 semanas de treinamento
- Indivíduos treinados

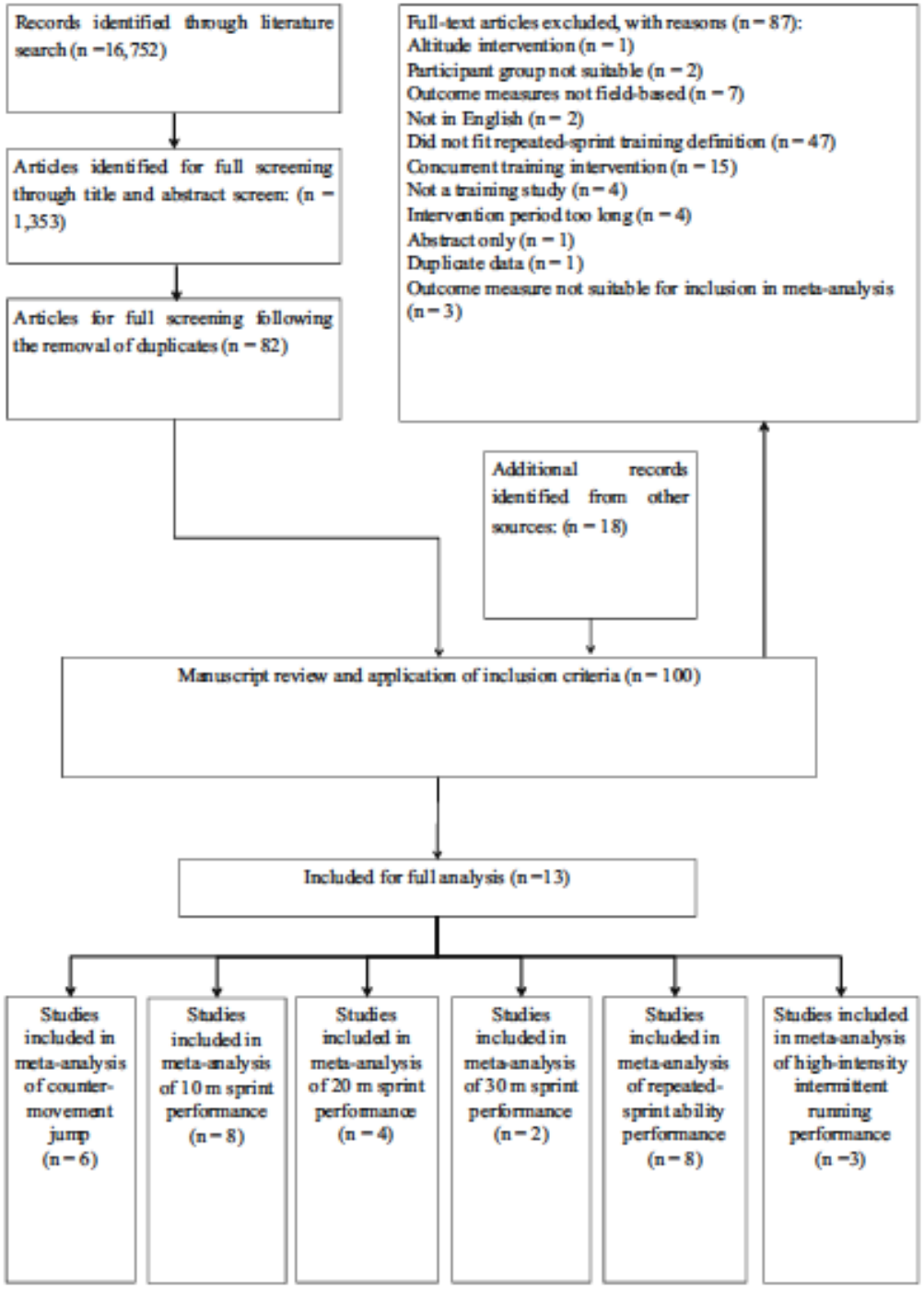

Records identified through literature search (n =16,752)
Articles identified for full screening through title and abstract screen: (n = 1,353)
Articles for full screening following the removal of duplicates (n = 82)
Full-text articles excluded, with reasons (n = 87):
Altitude intervention (n = 1)
Participant group not suitable (n = 2)
Outcome measures not field-based (n = 7)
Not in English (n = 2)
Did not fit repeated-sprint training definition (n = 47)
Concurrent training intervention (n = 15)
Not a training study (n = 4)
Intervention period too long (n = 4)
Abstract only (n = 1)
Duplicate data (n = 1)
Outcome measure not suitable for inclusion in meta-analysis (n = 3)
Additional records identified from other sources: (n = 18)
Manuscript review and application of inclusion criteria (n = 100)
Included for full analysis (n =13)
Studies included in meta-analysis of counter-movement jump (n = 6)
Studies included in meta-analysis of 10 m sprint performance (n = 8)
Studies included in meta-analysis of 20 m sprint performance (n = 4)
Studies included in meta-analysis of 30 m sprint performance (n = 2)
Studies included in meta-analysis of repeated-sprint ability performance (n = 8)
Studies included in meta-analysis of high-intensity intermittent running performance (n =3)

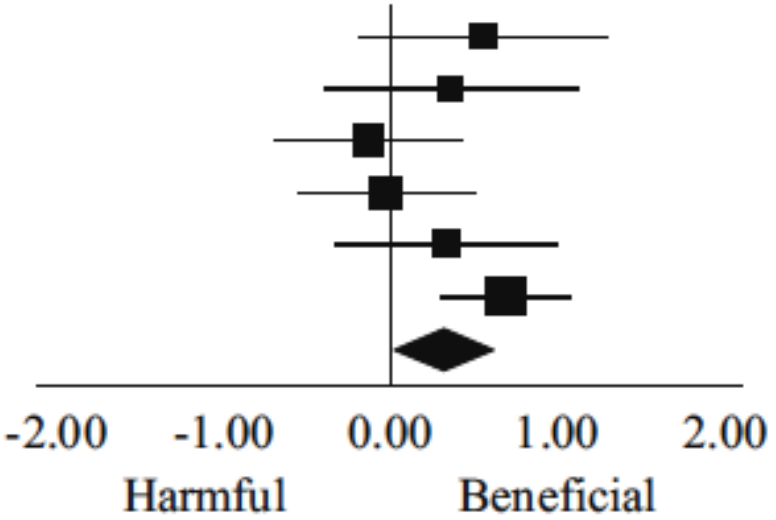
Table 1 Study and participant characteristics for the meta-analysed studies (in chronological order)

References	Design	Group	Sample size	Training status	Mean age (years)	Males (%)	Duration (weeks)	Frequency (per week)	Mode of exercise	Training protocol						Outcome measures
										Sets	Reps	Rep distance (m)	Rep duration (s)	Rest (s)	Inter-set rest (s)	
Nebil et al. [23]	C	RST	7	Soccer players	20.2	0	12	3	Cycling	2	15	–	5	55	900	10 m, 20 m, 30 m
Nebil et al. [23]	C	CON	7	Soccer players	19.4	0	12	–	–	–	–	–	–	–	–	10 m, 20 m, 30 m
Suarez-Arrones et al. [24]	NC	RST	8	Rugby players	27.0	100	6	2	Running	3	6	40	–	20	240	RSA[a]
Lockie et al. [25]	NC	RST	8	Team-sports players	21.3	100	6	2	Running	6–8	3–5	5–20	–	Walk back	180	10 m
Galvin et al. [34]	NC	RST	15	Rugby players	18.4	100	4	3	Running	1	10	–	6	30	300	10 m, 20 m, RSA[b], YY
Lockie et al. [26]	NC	RST	9	Field-sports players	23.3	100	6	2	Running	6–8	3–5	5–20	–	Walk back	180	CMJ[c], 10 m
Fernandez-Fernandez et al. [11]	C	RST	12	Tennis players	21.2	100	6	3	Running	3	10	22	–	20	480	CMJ[c], 20 m, RSA[d]
Fernandez-Fernandez et al. [11]	C	CON	9	Tennis players	22.1	100	6	–	–	–	–	–	–	–	–	CMJ[c], 20 m, RSA[d]
Serpiello et al. [27]	NC	RST	10	Team-sports players	22.3	70	4	3	Running	3	5	–	4	20	270	YY
Buchheit et al. [13]	NC	RST	7	Soccer players	14.5	100	10	1	Running	2–3	5–6	30–40	–	14–24	120	CMJ[c], 10 m, 30 m, RSA[e]
Buchheit et al. [35]	NC	RST	8	Handball players	15.6	100	8	2	Running	2–3	5–6	30–40	–	14–23	120	CMJ[c], 10 m, RSA[e]
Ferrari-Bravo et al. [14]	NC	RST	13	Soccer players	21.1	100	7	2	Running	3	6	40	–	20	240	CMJ[c] 10 m, RSA[a], YY
Markovic et al. [8]	C	RST	30	WT	20.1	100	10	3	Running	3	3–4	10–50	–	60	180	CMJ[f], 20 m
Markovic et al. [8]	C	CON	33	WT	20.1	100	–	–	–	–	–	–	–	–	–	CMJ[f], 20 m
Mohr et al. [36]	NC	RST	6	T	26.7	100	8	3–6	Running	1	15	–	6	60	–	RSA[g]

Salto com contra movimento

Study name	Statistics for each study		
	Pre-training (cm)	Post-training (cm)	Mean difference; ±95% CL
Buchheit et al. [35]	47.1	49.3	2.2; ±2.7
Buchheit et al. [13]	35.5	38.0	2.5; ±4.8
Fernandez-Fernandez et al. [11]	38.4	38.0	-0.4; ±2.1
Ferrari-Bravo et al. [14]	46.1	46.1	0.0; ±1.8
Lockie et al. [26]	36.1	38.1	2.0; 3.6
Markovic et al. [8]	47.3	50.6	3.3; ±1.7
Combined	**41.8**	**43.4**	**1.4; ±1.5**

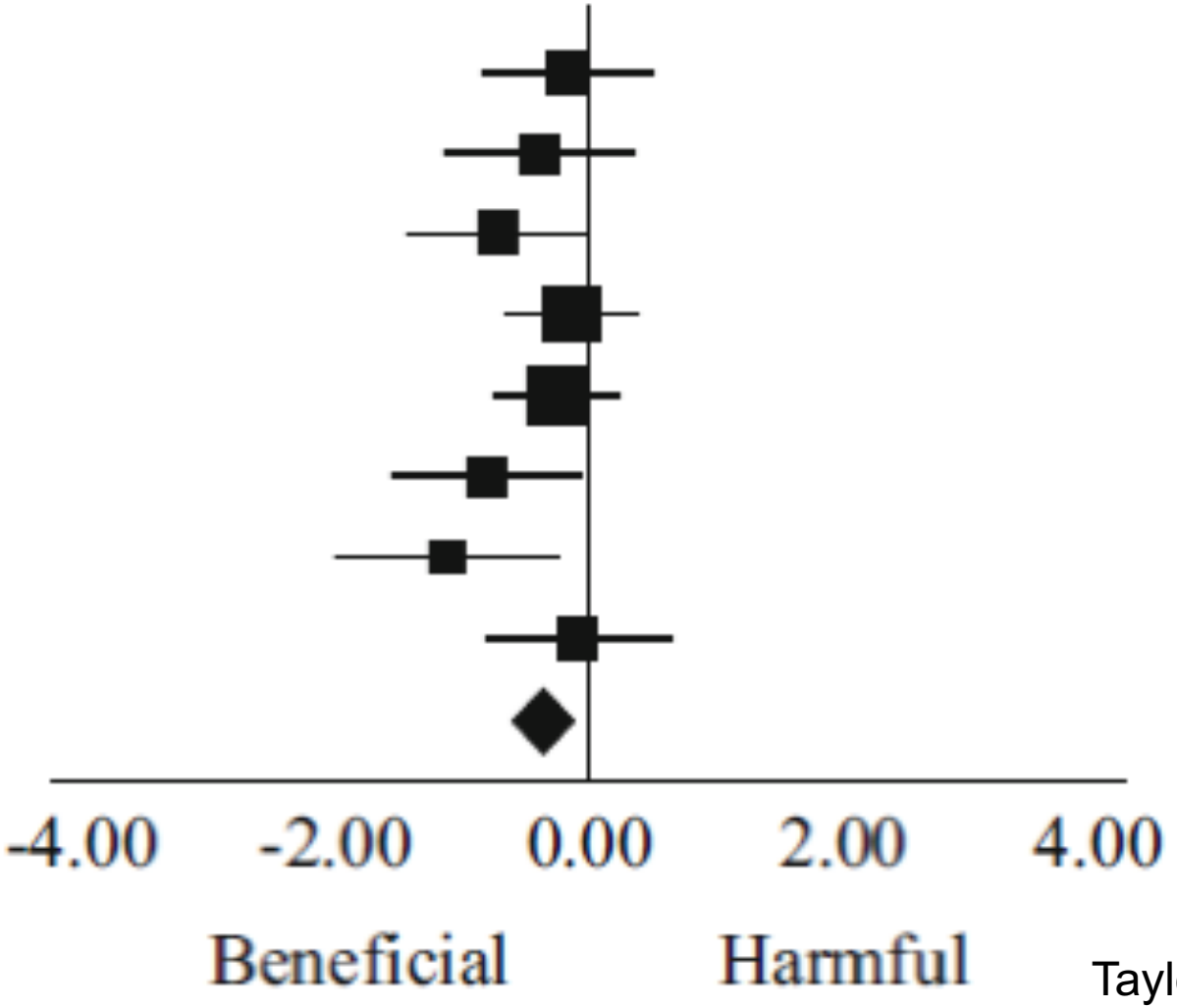
Standardised mean difference and 95% CL



Possivelmente pouco benéfico para estudos não-controlados

Possivelmente moderadamente benéfico para estudos controlados

10 metros



Taylor et al. (2015)

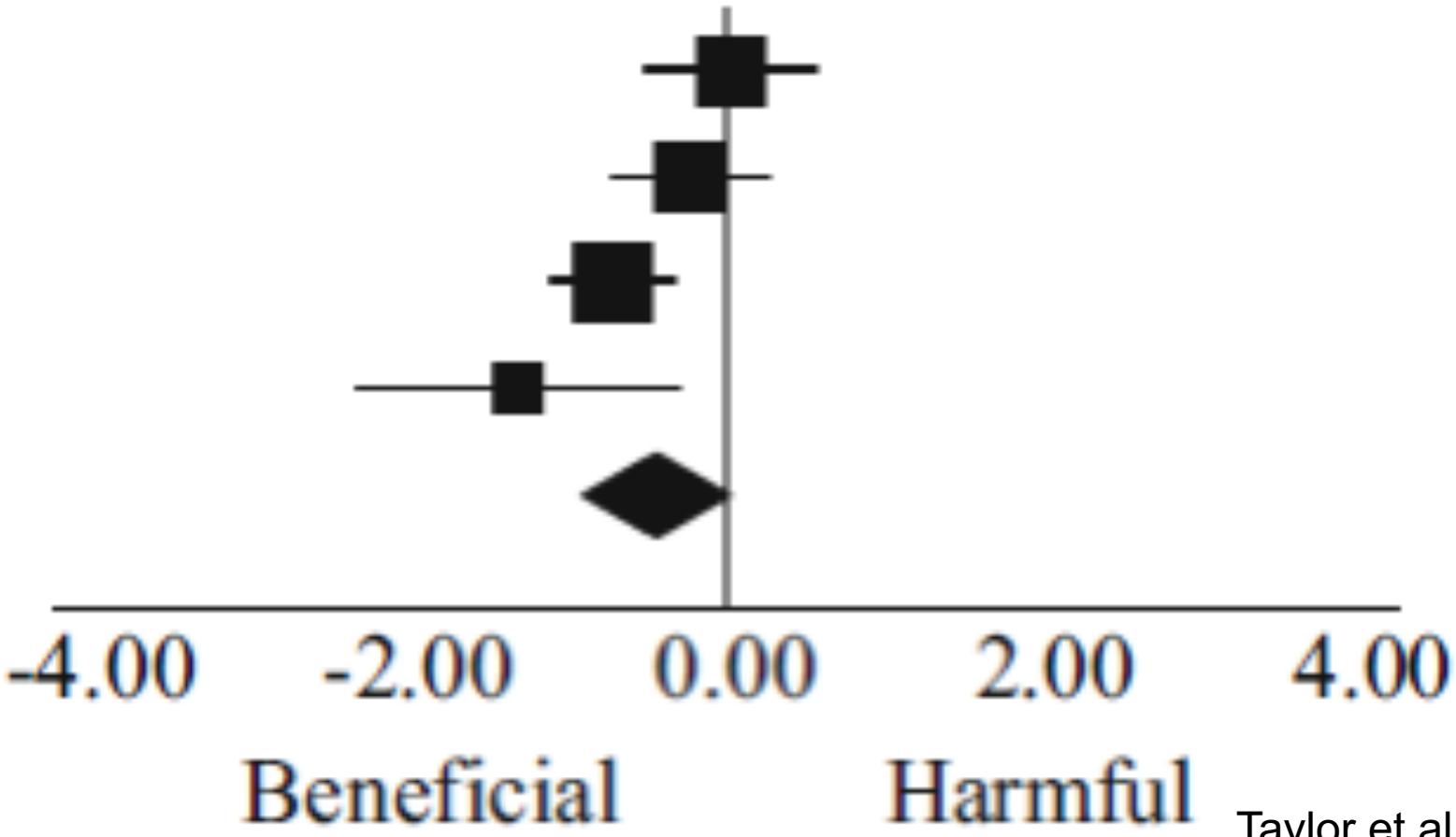
10 metros

	Pre-training (s)	Post-training (s)	Mean difference; ±95% CL
Buchheit et al. [35]	1.88	1.86	-0.02; ±0.07
Buchheit et al. [13]	1.96	1.93	-0.03; ±0.05
Dawson et al. [37]	1.87	1.81	-0.06; ±0.05
Ferrari-Bravo et al. [14]	1.77	1.76	-0.01; ±0.03
Galvin et al. [34]	1.82	1.80	-0.02; ±0.04
Lockie et al. [26]	2.08	1.99	-0.09; ±0.07
Lockie et al. [25]	2.07	1.96	-0.11; ±0.07
Nebil et al. [23]	2.44	2.42	-0.02; ±0.12
Combined	**1.99**	**1.94**	**-0.04; ±0.02**

Muito possivelmente pouco benéfico para estudos não-controlados

Taylor et al. (2015)

20 metros



Taylor et al. (2015)

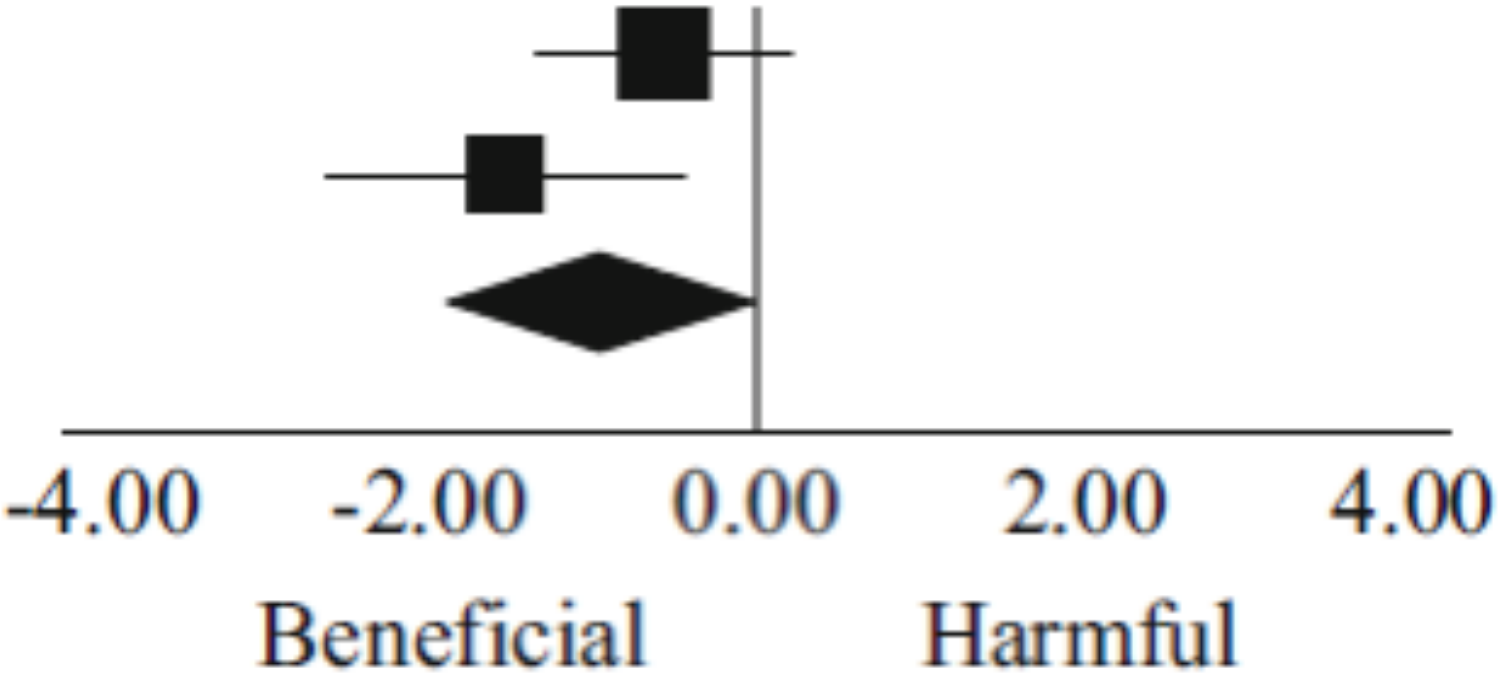
20 metros

	Pre-training (s)	Post-training (s)	Mean difference; ±95% CL
Fernandez-Fernandez et al. [11]	3.20	3.20	0.00; ±0.06
Galvin et al. [34]	3.12	3.09	-0.03; ±0.06
Markovic et al. [8]	3.23	3.14	-0.09; ±0.04
Nebil et al. [23]	3.46	2.96	-0.50; ±0.28
Combined	**3.25**	**3.10**	**-0.07; ±0.08**

Possivelmente moderadamente benéfico para estudos não-controlados e controlados

Taylor et al. (2015)

30 metros



Taylor et al. (2015)

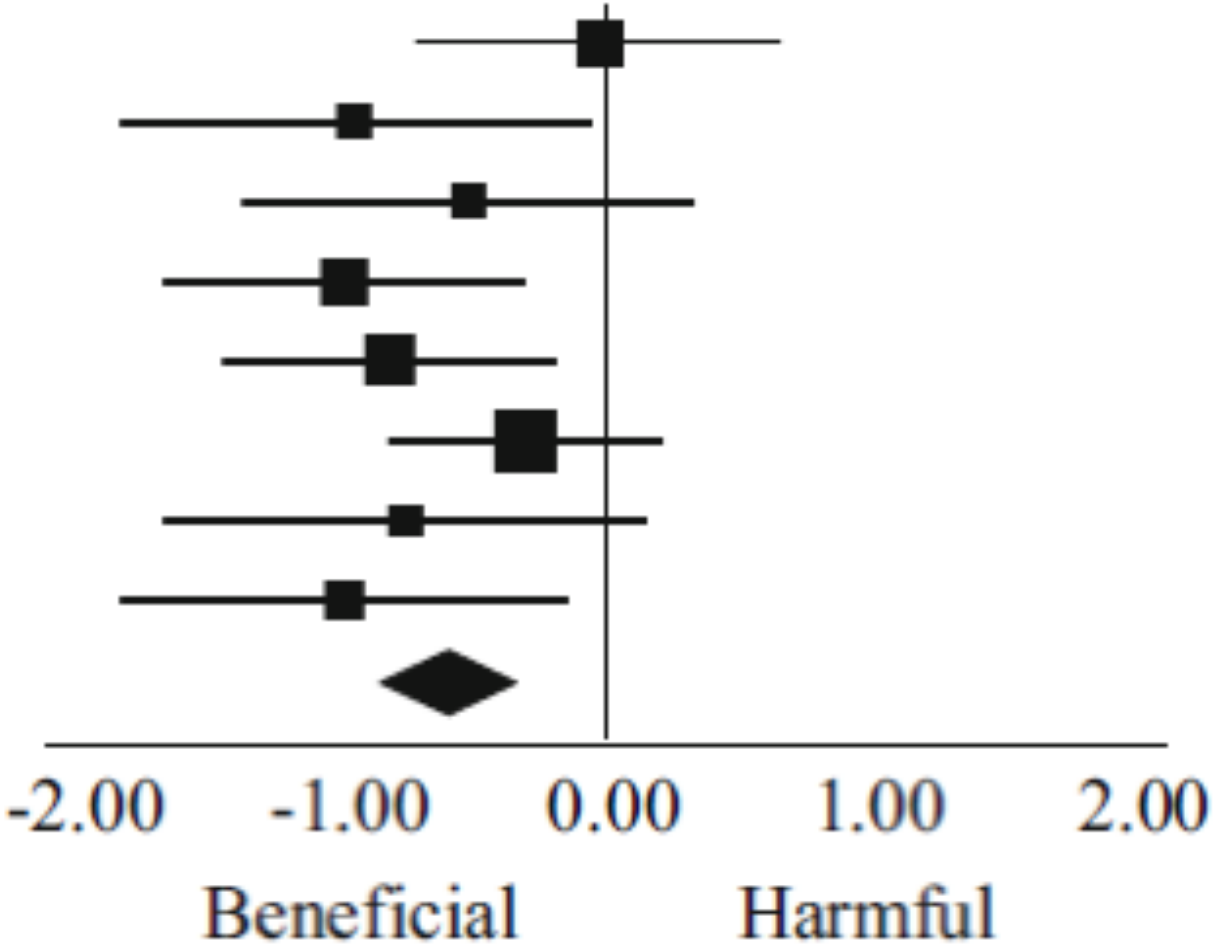
30m

	Pre-training (s)	Post-training (s)	Mean difference; ±95% CL
Buchheit et al. [13]	4.70	4.60	-0.10; ±0.12
Nebil et al. [23]	5.90	5.38	-0.52; ±0.25
Combined	**5.30**	**4.99**	**-0.30; ±0.41**

Possivelmente grande efeito benéfico para estudos não-controlados

Taylor et al. (2015)

Tempo RSA



Taylor et al. (2015)

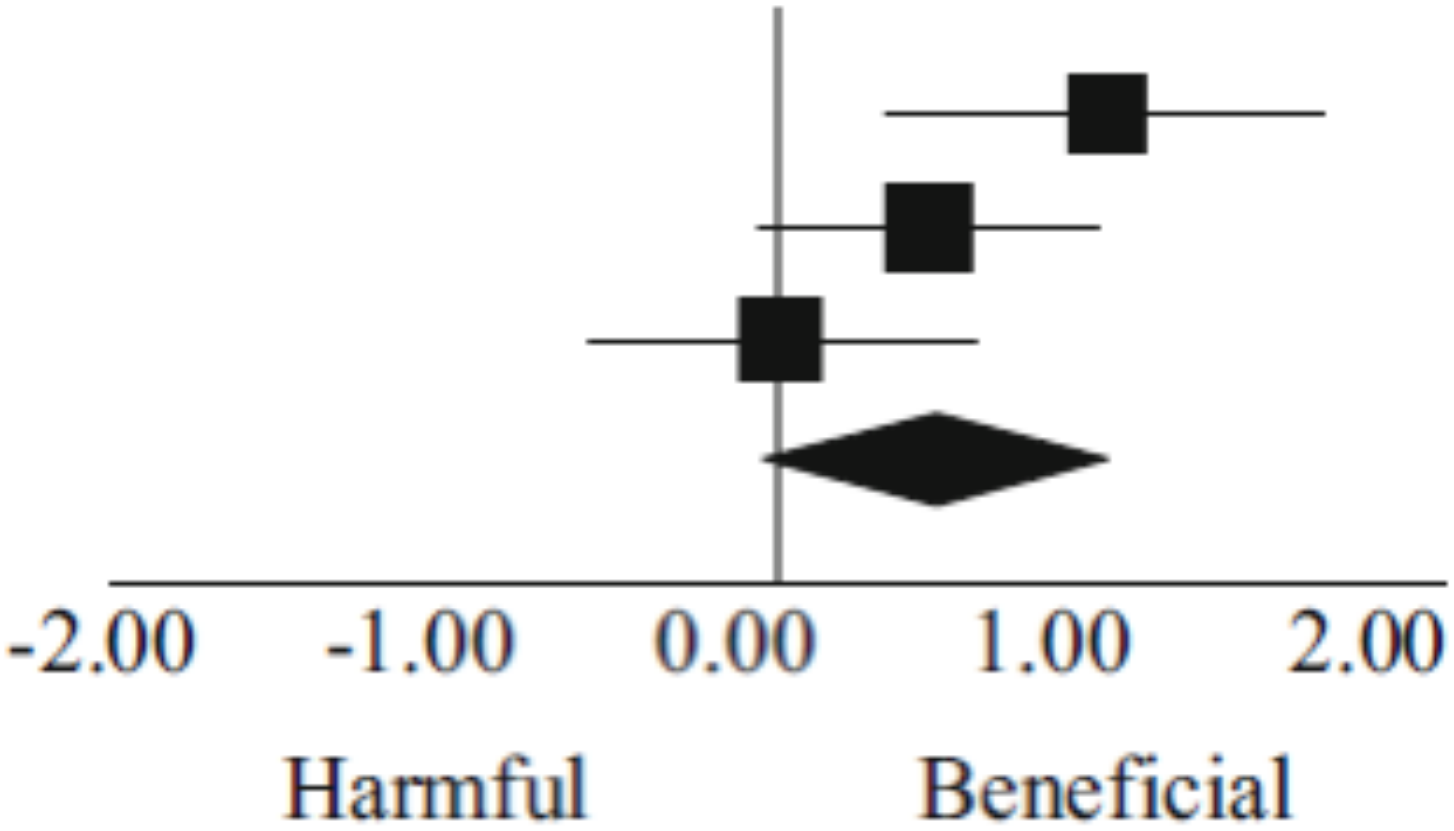
Tempo do RSA

	Pre-training (s)	Post-training (s)	Mean difference; ±95% CL
Buchheit et al. [35]	5.93	5.87	-0.06; ±1.12
Buchheit et al. [13]	6.35	6.18	-0.17; ±0.13
Dawson et al. [37]	5.94	5.81	-0.13; ±0.19
Fernandez-Fernandez et al. [11]	5.30	5.10	-0.20; ±0.11
Ferrari-Bravo et al. [14]	7.53	7.37	-0.16; ±0.10
Galvin et al. [34]	3.27	3.23	-0.04; ±0.06
Mohr et al. [36]	4.78	4.58	-0.20; ±0.21
Suarez-Arrones et al. [24]	8.00	7.80	-0.20; ±0.14
Combined	**5.89**	**5.74**	**-0.14; ±0.06**

Possivelmente moderadamente benéfico para estudos não-controlados

Taylor et al. (2015)

Yo-Yo



Taylor et al. (2015)

Yo-Yo

	Pre-training (m)	Post-training (m)	Mean difference; ±95% CL
Ferrari Bravo et al. [14]	1917	2455	538; ±253
Galvin et al. [34]	1374	1594	220; ±187
Serpiello et al. [27]	1305	1400	95; ±441
Combined	**1532**	**1816**	**309; ±248**

Possivelmente moderadamente benéfico para estudos não-controlados

Taylor et al. (2015)

Take home message

- Esforços repetidos
  - Curta duração na máxima intensidade ou próximo de
- Contribuição dos sistemas
  - elevada solicitação anaeróbia nos momentos iniciais
  - dependência da restauração de CP, alterações importantes no pH
- Desempenho
  - Melhora do desempenho em diferentes tarefas

Obrigada!

Sprint Interval Training

- Característica central – tiros de 20 a 30s com intervalos superiores a 2 min
- Recuperação passiva
- Exemplo: 4 x 30s : 4 min (wingate)
- Relação esforço-pausa = 1:8

Wingate 30 (all out) x 4 min

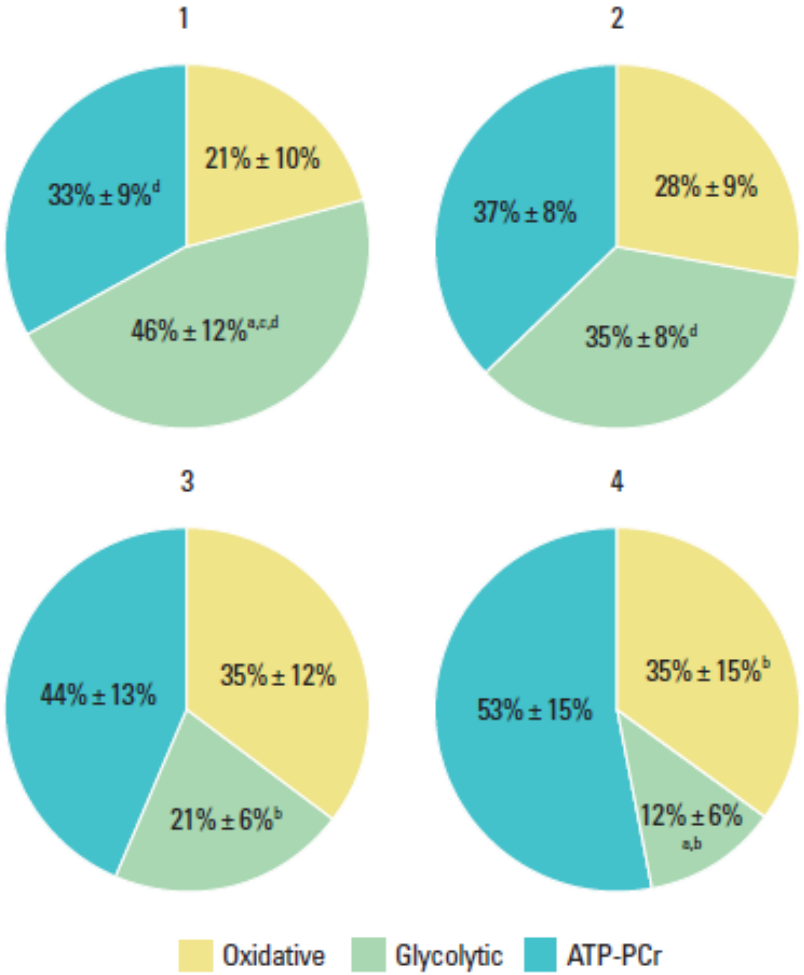
Performance and energy systems contributions during upper-body sprint interval exercise

Emerson Franchini[1], Monica Yuri Takito[2,*], Maria Augusta Peduti Dal'Molin Kiss[3]

[1]Martial Arts and Combat Sports Research Group, School of Physical Education and Sport, University of Sao Paulo, Sao Paulo, Brazil
[2]Human Movement Pedagogy Department, School of Physical Education and Sport, University of Sao Paulo, Sao Paulo, Brazil
[3]School of Physical Education and Sport, University of Sao Paulo, Sao Paulo, Brazil

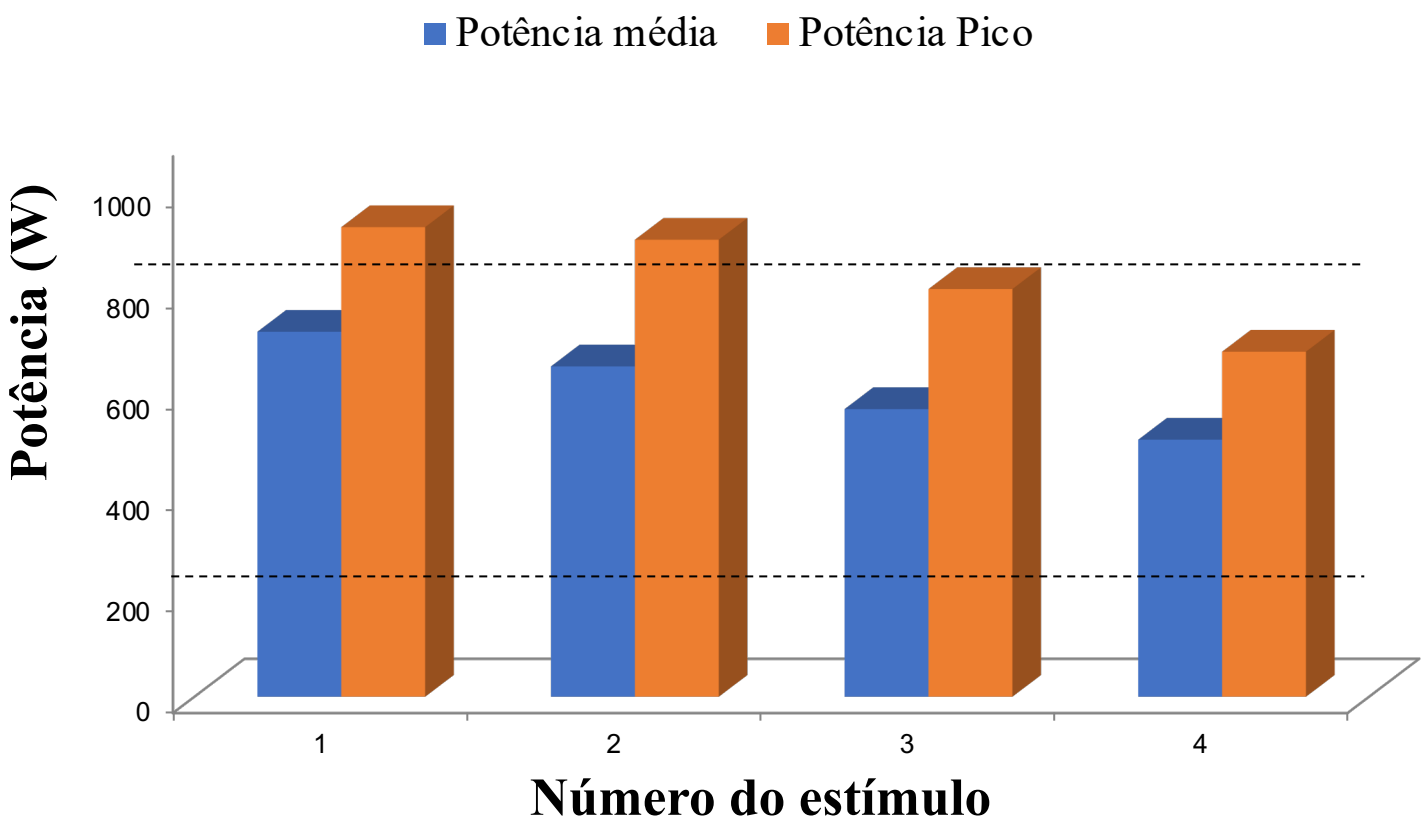
(Franchini et al., 2017)

Wingate 30 (all out) x 4 min

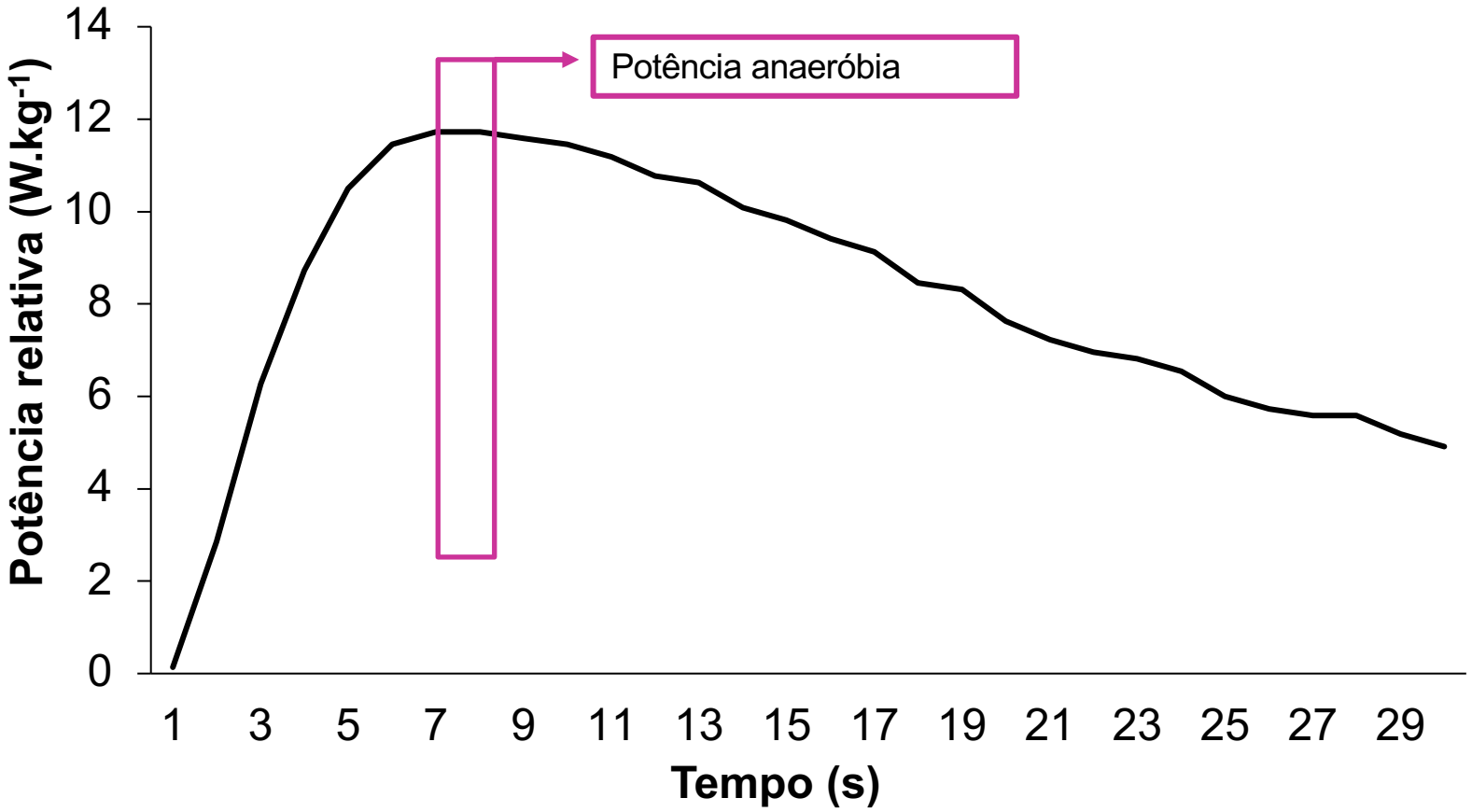
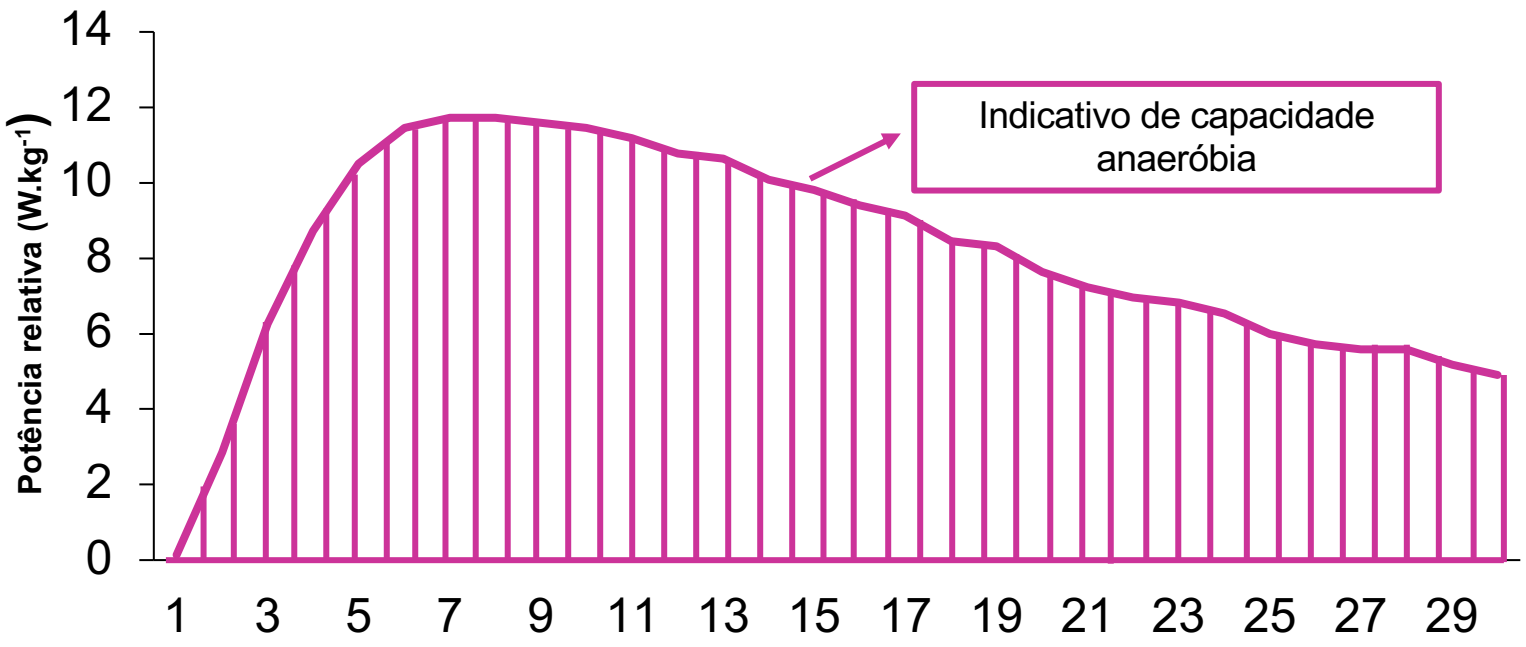


(Franchini et al., 2017)

Desempenho 4 x 30s : 4min



Aptidão anaeróbia – potência *vs* capacidade



Aptidão anaeróbia – potência *vs* capacidade