CONGRESSO DA CORRIDA

Profº. Mário Moniz Pereira

02. DEZEMBRO 2018
FÓRUM BRAGA

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Braga 2018 Cidade Europeia do Desporto

FEDERAÇÃO PORTUGUESA ATLETISMO

INSTITUTO PORTUGUÊS DO DESPORTO E JUVENTUDE, I. P.

programa nacional de marcha e corrida

Parceiro:

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PROGRAMA NACIONAL DE MARCHA E CORRIDA

CONGRESSO DA CORRIDA

"Profº.Mário Moniz Pereira

Fórum Braga

02 de Dezembro de 2018

A importância da Nutrição na Corrida

Filipa Vicente

1369N

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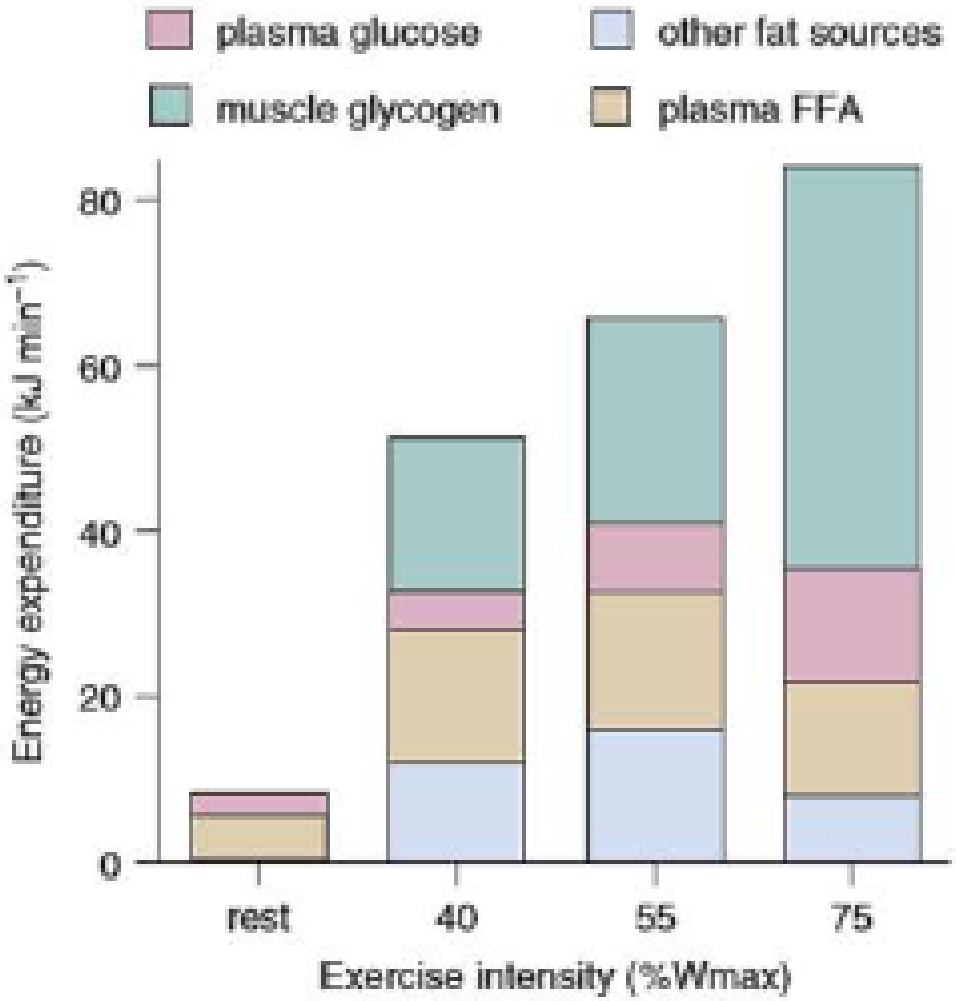
Qual o papel da nutrição?

- Fornecer energia
- Constituir reservas (para esforços longos)
- Manter o peso e massa gorda sob controlo

3 ELEMENTOS CHAVE

HIDRATOS DE CARBONO


plasma glucose
other fat sources
muscle glycogen
plasma FFA
Energy expenditure (kJ min⁻¹)
0
20
40
60
80
rest
40
55
75
Exercise intensity (%Wmax)

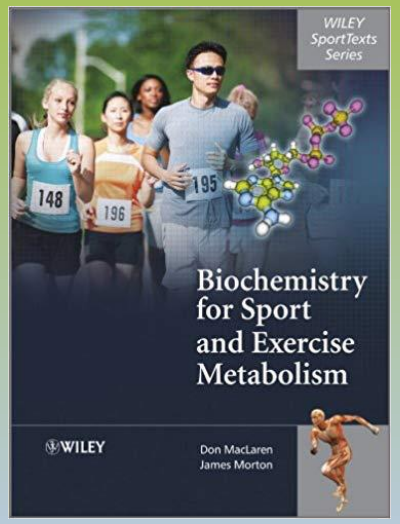
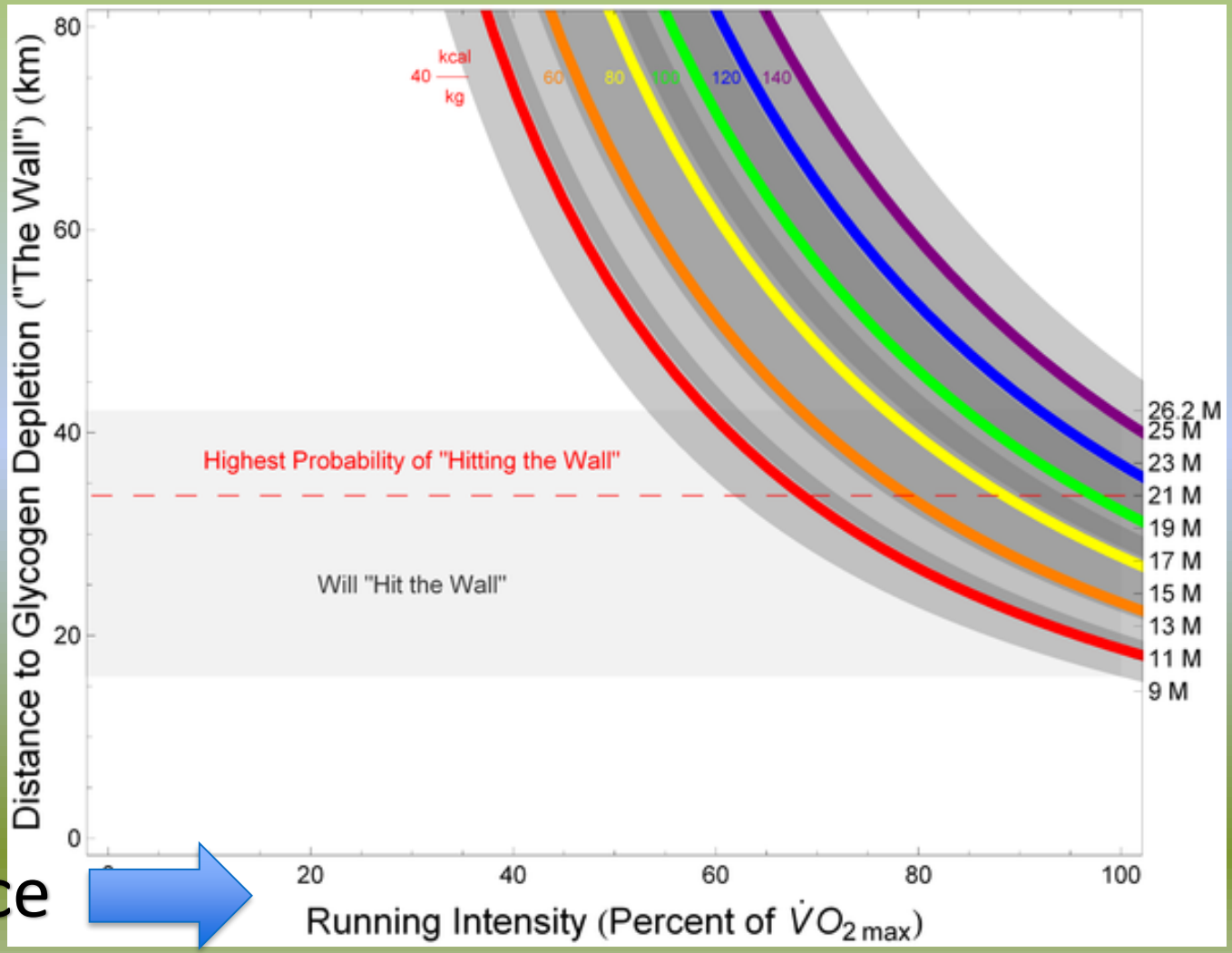

WILEY
SportTexts
Series
148
196
195
Biochemistry
for Sport
and Exercise
Metabolism
WILEY
Don MacLaren
James Morton

Figure 3. Distance to 'The Wall' for endurance runners.



Performance

PLOS Computational Biology 6(10): e1000960

Location	g	kcal
Carbohydrate		
Liver glycogen	110	451
Muscle glycogen	500	2,050
Glucose in body fluids	15	62
Fat		
Subcutaneous and visceral	7,800	73,320
Intramuscular	161	1,513
Total	7,961	74,833

Note. These estimates are based on a body weight of 65 kg (143 lb) with 12% body fat.

Saber utilizar

Uma estratégia ergogénica

COMO?

- Maximizar as reservas de glicogénio muscular e utilizá-las de forma “optima”
- Ensinar o corpo a usar mais gordura (ácidos gordos livres e triglicéridos intra musculares)
- Aumentar a capacidade oxidativa do corpo (biogénese mitocondrial)

1

2x

TWICE PER DAY
Yeo et al. 2008

2

NO SPORTS DRINKS
Morton et al. 2009

3

FASTED
Van Proyen et al. 20

Reference: James Morton

TRAINING LOW STRATEGIES

Deliberately training in conditions of reduced carbohydrate availability can promote training-induced adaptations

INCREASED MAXIMAL MITOCHONDRIAL ENZYME ACTIVITIES

INCREASED MITOCHONDRIAL CONTENT

INCREASED RATES OF LIPID OXIDATION

IMPROVED EXERCISE CAPACITY
in some instances

Designed by @YLMSportScien

SLEEP LOW / TRAIN LOW
Bartlett et al. 2013
Lane et al. 2015

4

RECOVER LOW
Pilegaard et al. 2005

5

PROTEIN / CAFFEIN
Taylor et al. 2013
Lane et al. 2013

6

Daily needs for fuel and recovery for athletes

Activity		Daily carbohydrate intake target
Light	low intensity or skill-based activities	3-5 g/kg/day
Moderate	Moderate exercise program (eg 1h per day)	5-7 g/kg/day
High	Endurance program 1-3h a day moderate-high intensity	6-10 g/kg/day
Very high	Extreme commitment 4-5h a day moderate-high intensity	8-12 g/kg/day

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Table 1. The effect of pre-exercise carbohydrate feedings on performance or exercise capacity.

Study	Year	*n*	Treatments	Timing Prior	Protocol	Results	Performance
Foster *et al.* [17]	1979	16	P, 75 g G, mixed beverage	30 min	TTE cycling 100% and 80% VO_{2max}	43.2 min (G) *vs.* 53.2 min (P)	↓
McMurray *et al.* [26]	1983	6	P, 90 g G, 90 g F	45 min	TTE running 80% VO_{2max}	63.9 min (G) *vs.* 52.2 min (P) 61.9 min (F) *vs.* 52.2 min (P)	↑ ↑
Devlin *et al.* [18]	1986	8	P, CHO bar (43 g, 9 g fat, and 3 g protein)	30 min	TTE intermittent cycling 70% VO_{2max} (15 min exercise, 5 min rest)	52 min (CHO) *vs.* 48 min (P)	↔
Hargreaves *et al.* [14]	1987	6	P, 75 g G, 75 g F	45 min	TTE cycling 75% VO_{2max}	92.8 min (G) *vs.* 92.7 min (P) 90.6 (F) *vs.* 92.7 (P)	↔ ↔
Okano *et al.* [30]	1988	12	P, 60 g (F), 85 g (F)	60 min	TTE cycling ~80% VO_{2max} (following 65% VO_{2max} preload)	145 min (F) *vs.* 131 min (P)	↑
Sherman *et al.* [41]	1991	9	P, 1.1 g/kg BM G (LC), 2.2 g/kg BM G + MD (HC)	60 min	90 min cycling 70% VO_{2max}, ~45 min TT	LC and HC avg. 12.5% faster *vs.* P	↑
Thomas *et al.* [27]	1991	8	P, 1 g/kg BM CHO-lentils (LGI), potato (HGI), G	60 min	TTE cycling 70% VO_{2max}	LGI *vs.* P HGI *vs.* P G *vs.* P LGI *vs.* HGI	↑ ↑ ↑ ↑
Wright *et al.* [28]	1991	9	P, 5 g/kg BM (G + Suc)	3 h	TTE cycling 70% VO_{2max}	237 min (G + Suc) *vs.* 201 min (P)	↑
Chryssanthopoulos *et al.* [19]	1994	9	P, 75 g G	30 min	TTE running 70% VO_{2max}	133.8 min (G) *vs.* 121.2 (P)	↔
Sparks *et al.* [20]	1998	8	P, 1 g/kg BM (HGI), 1 g/kg BM (LGI)	45 min	50 min cycling at ~65% VO_{2max}, 15 min TT	249 kJ (HGI) *vs.* 254 kJ (P) 253 kJ (LGI) *vs.* 254 kJ (P)	↔ ↔
Whitley *et al.* [21]	1998	8	P, HCM (215 g CHO, 26 g protein, 3 g fat), HFM (50 g CHO, 14 g protein, 80 g fat)	4 h	90 min cycling 70% VO_{2max}, 10 km TT	14.63 min (HCM) *vs.* 14.56 min (P) 14.23 min (HFM) *vs.* 14.56 min (P)	↔ ↔

Table 1. *Cont.*

Study	Year	*n*	Treatments	Timing Prior	Protocol	Results	Performance
Schabort *et al.* [31]	1999	7	Fasted, 100 g CHO	3 h	TTE cycling 70% VO_{2max}	136 min (CHO) *vs.* 109 min (fasted)	↑
Febbraio *et al.* [22]	2000	7	P, 2 g/kg BM G	30 min	120 min cycling 70% VO_{2max}, ~45 min TT	G finishing time no different *vs.* P	↔
Febbraio *et al.* [8]	2000	8	P, 1 g/kg BM (HGI), 1 g/kg BM (LGI)	30 min	120 min cycling 70% VO_{2max}, 30 min TT	LGI not different from P HGI not different from P HGI not different from LGI	↔ ↔ ↔
Kirwan *et al.*						165 min (MGI) *vs.* 141 min (P)	↑
Chryssantho *et al.* [3							
Jentjens *et al.* [24]	2003	9	P, 25 g G, 75 g G, 200 g G	45 min	~40 min TT	43.1 min (75g G) *vs.* 42.5 min (P) 42.2 min (200g G) *vs.* 42.5 min (P)	↔ ↔
Pritchett *et al.* [25]	2008	10	P, bar (20 g CHO, 12 g protein and 4.5 g fat)	15 min (S), 60 min (L)	Repeated cycling Wingate bouts	112 kJ (S) *vs.* 106 kJ (P) 115 kJ (L) *vs.* 106 kJ (P)	↔ ↔
Tokmakidis *et al.* [33]	2008	11	P, 1 g/kg BM G	15 min	TTE running 80% VO_{2max} (following 5 min 60% VO_{2max} and 45 min 70% VO_{2max})	83 min (G) *vs.* 76 min (P)	↑
Chen *et al.* [34]	2009	8	P, ~100 g CHO (LGI), ~100 g CHO (HGI)	2 h	5 km running 70% VO_{2max}, 16 km TT	91.5 min (HGI) *vs.* 93.6 min (P) 92.4 min (LGI) *vs.* 93.6 min (P) 92.4 min (LGI) *vs.* 91.5 min (HGI)	↑ ↔ ↔

Ingerir hidratos de carbono 2-3h antes aumenta a performance
Há alguma vantagem na ingestão 1h antes
Mas mais perto do treino, os resultados são inconsistentes

Recommendations chart

Carbohydrate intake **during** exercise

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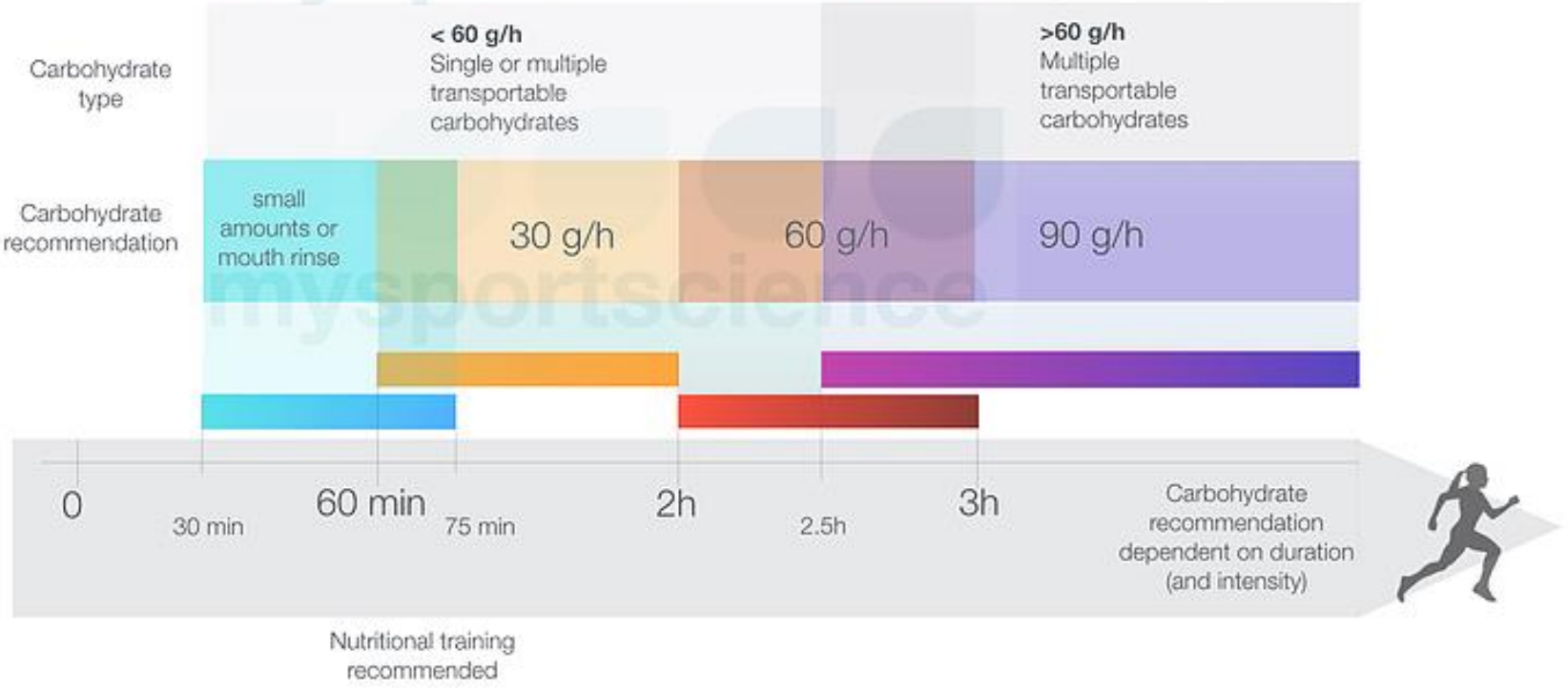

Drinks or gels?

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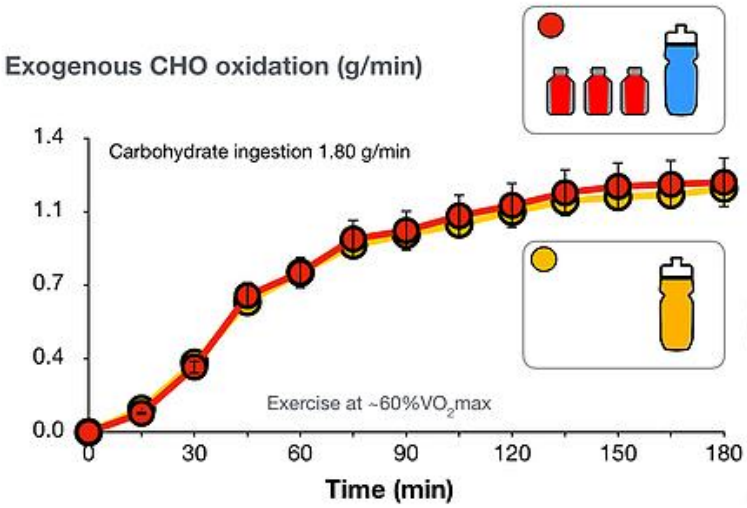

Pfeiffer et al MSSE Med Sci Sports Exerc 42(11): 2038-45, 2010

Drinks or energy bars?

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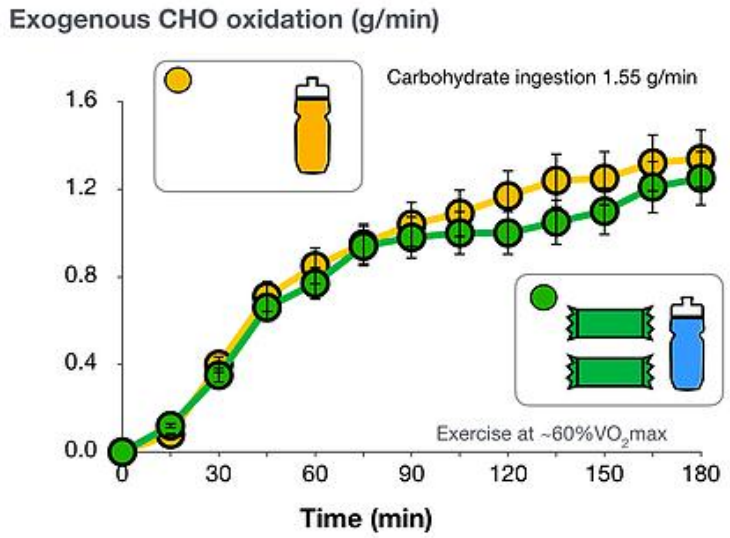
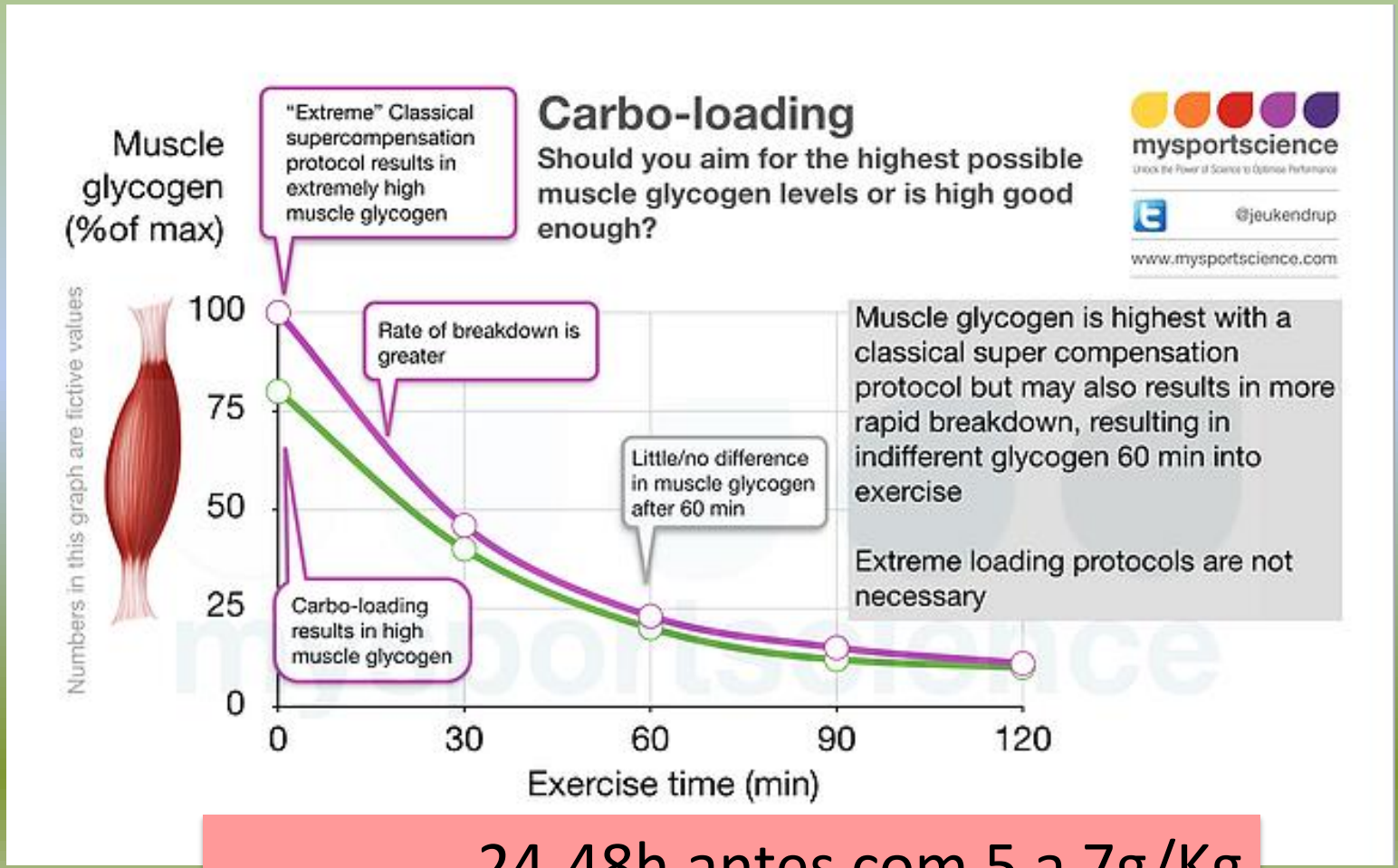


Pfeiffer et al MSSE Med Sci Sports Exerc. 42(11):2030-7, 2010

Mensagens importantes

- Ingerir hidratos de carbono em quantidade suficiente ao longo do dia
- Estipular uma refeição pré-treino adequada 2-3h antes (salvo em *training low*)
- Treinar abastecimentos em treinos >2h para testar 60 e 90g/hora

“Carga de glicogénio”



24-48h antes com 5 a 7g/Kg

E depois do esforço?

- As taxas mais elevadas de reposição do glicogénio muscular ocorrem durante a primeira hora após o exercício:
  - Ativação do enzima Glicogénio sintase
  - Aumento da insulino-sensibilidade
  - Aumento da permeabilidade da membrana das células musculares a glicose

- Alimentos com **IG elevado** melhoram a reposição do glicogénio muscular
  - em 24h, quando comparado com o consumo de alimentos de baixo índice glicémico

- **Treinos bidiários:**
  - **Melhora a performance após 4h de** recuperação

Decisivo em apenas algumas modalidades ou em competições com 2 eventos/dia

Erith S, Williams C, Stevenson E, Chamberlain S, Crews P, Rushbury I. The effect of high carbohydrate meals with different glycemic indices on recovery of performance during prolonged intermittent high-intensity shuttle
running Int J Sport Nutr Exerc Metab. 2006 Aug;16(4):393-404.

Necessidades proteicas

J Sports Sci. 2011;29 Suppl 1:S29-38. doi: 10.1080/02640414.2011.619204.

Dietary protein for athletes: from requirements to optimum adaptation.

Phillips SM[1], Van Loon LJ.

⊕ Author information

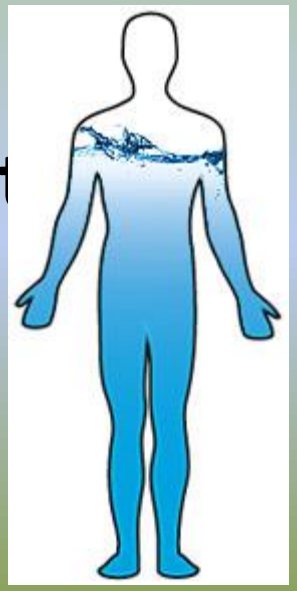
Abstract

Opinion on the role of protein in promoting athletic performance is divided along the lines of how much aerobic-based versus resistance-based activity the athlete undertakes. Athletes seeking to gain muscle mass and strength are likely to consume higher amounts of dietary protein than their endurance-trained counterparts. The main belief behind the large quantities of dietary protein consumption in resistance-trained athletes is that it is needed to generate more muscle protein. Athletes may require protein for more than just alleviation of the risk for deficiency, inherent in the dietary guidelines, but also to aid in an elevated level of functioning and possibly adaptation to the exercise stimulus. It does appear, however, that there is a good rationale for recommending to athletes protein intakes that are higher than the RDA. Our consensus opinion is that leucine, and possibly the other branched-chain amino acids, occupy a position of prominence in stimulating muscle protein synthesis; that protein intakes in the range of 1.3-1.8 g · kg(-1) · day(-1) consumed as 3-4 isonitrogenous meals will maximize muscle protein synthesis. These recommendations may also be dependent on training status: experienced athletes would require less, while more protein should be consumed during periods of high frequency/intensity training. Elevated protein consumption, as high as 1.8-2.0 g · kg(-1) · day(-1) depending on the caloric deficit, may be advantageous in preventing lean mass losses during periods of energy restriction to promote fat loss.

1,3 a 1,8g/Kg de peso/dia
Em 3 a 4 refeições "homogénas"

Hidratação

60-70%



A água é um nutriente e um componen

- Termorregulação
- Transporte de substâncias
- Meio de reação
- Lubrificante

Eur J Clin Nutr (2010) 64, 115–123

Recomendações ANTES

- Ingerir **lentamente 5 a 7ml/Kg** nas 4h anteriores ao treino/prova
- Se o indivíduo **não urina** ou tem a urina escura aumentar **3 a 5ml/Kg**
- Reforçar com sais minerais, sobretudo sódio, em condições climatéricas adversas (muito calor) ou nos “salty sweaters”

Exemplo prático:

- indivíduo 70Kg
- 1,4 a 2L nas 4h anteriores (350-500ml/hora)

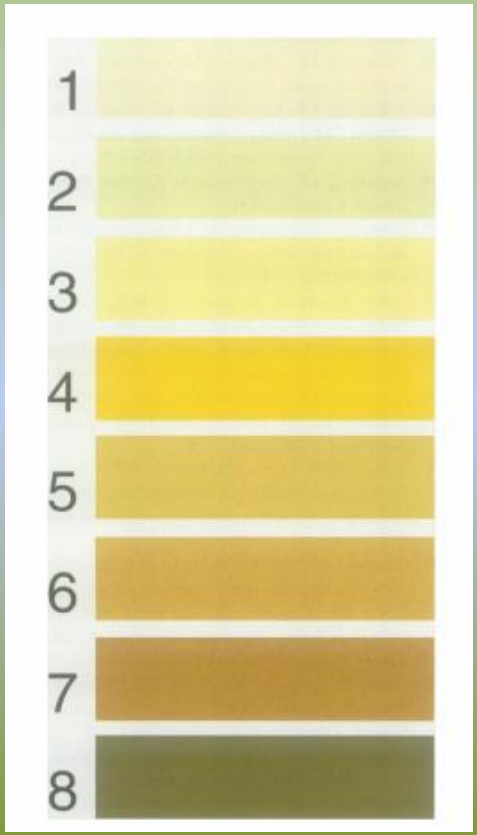
Durante o esforço

6 a 8ml de líquidos/Kg de Peso/hora de esforço
(400 a 500ml/hora ou 150-200ml cada 10-20 minutos)

A bebida deve ser servida entre os 15 e os 20ºC

Duração superior a 1hora ou condições climatéricas adversas:

- 46 a 115mg de Sódio/100ml de Bebida
- 6 a 8g de Hidratos de carbono/100ml de bebida



Hidratado

Desidratado

Muito Desidratado

The Urine Color Chart shown here will assess your hydration status (level of dehydration) in extreme environments. To use this chart, match the color of your urine sample to a color on the chart. If the urine sample matches #1, #2, or #3 on the chart, you are well hydrated. If your urine color is #7 or darker, you are dehydrated and should consume fluids.

The scientific validation of this color chart may be found in the *International Journal of Sport Nutrition*, Volume 4, 1994, pages 265-279[194] and Volume 8, 1998, pages 345-355.[195] Adapted by permission from Larry Armstrong, 2000, *Performing In Extreme Environments*, (Champaign, IL: Human Kinetics).[196]

INGESTÃO DE (APENAS) ÁGUA EM ESFORÇOS PROLONGADOS
(E EM CONDIÇÕES CLIMATÉRICAS ADVERSAS)

↓

AUMENTO DAS PERDAS DE SÓDIO NO SUOR

↓

HIPONATRÉMIA

SINTOMAS DE DESIDRATAÇÃO

Soluções práticas

Muito obrigada

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"A great diet cannot make average athletes' elite, but a poor diet can make an elite athlete average"
Asker Jeukendrup