



1

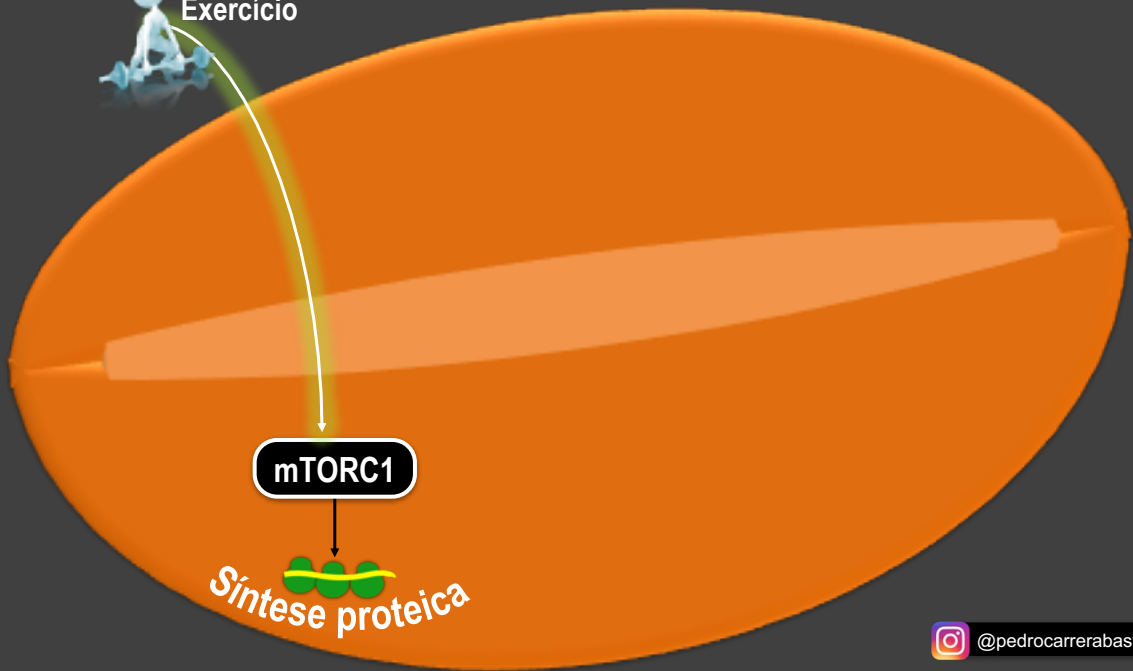


2

O que fazer?

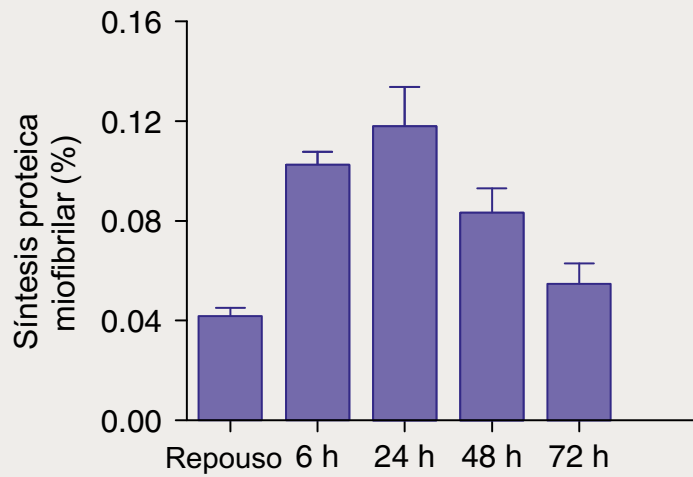


3



4

Treinamento de força aumenta síntese proteica miofibrilar até 72 h



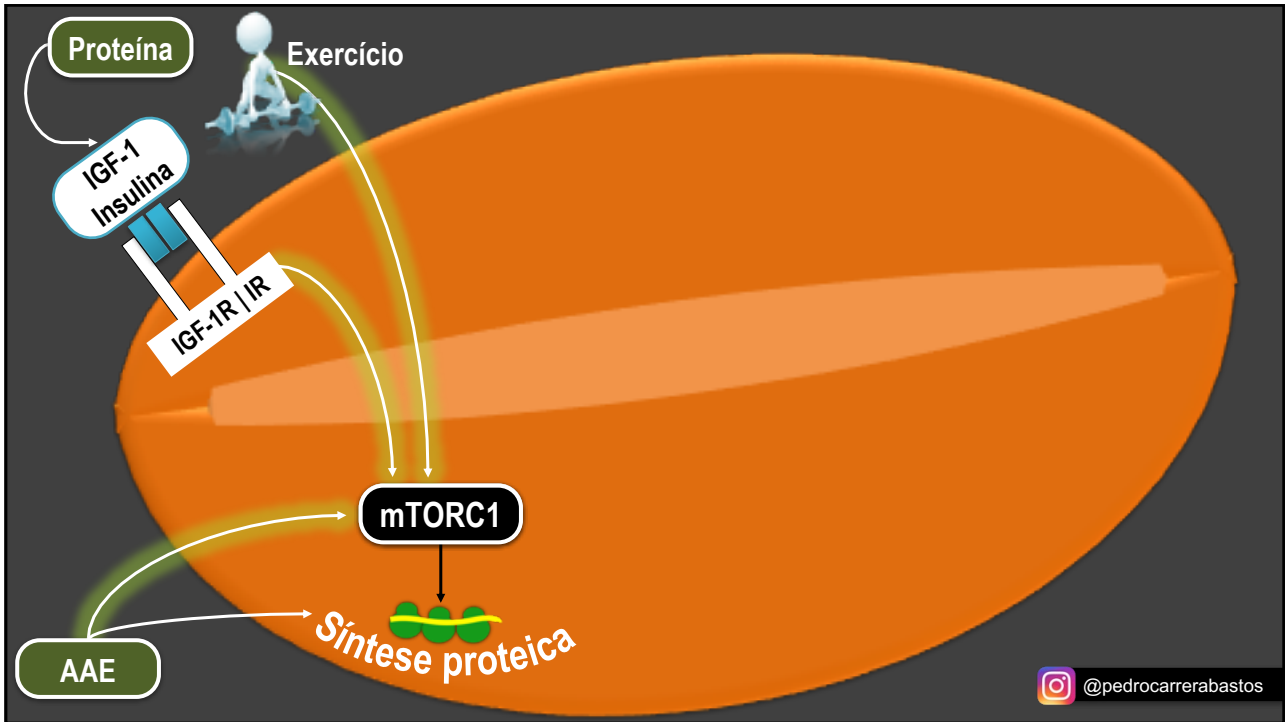
Wackerhage H. Molecular exercise physiology: an introduction. Routledge; 2014.

5

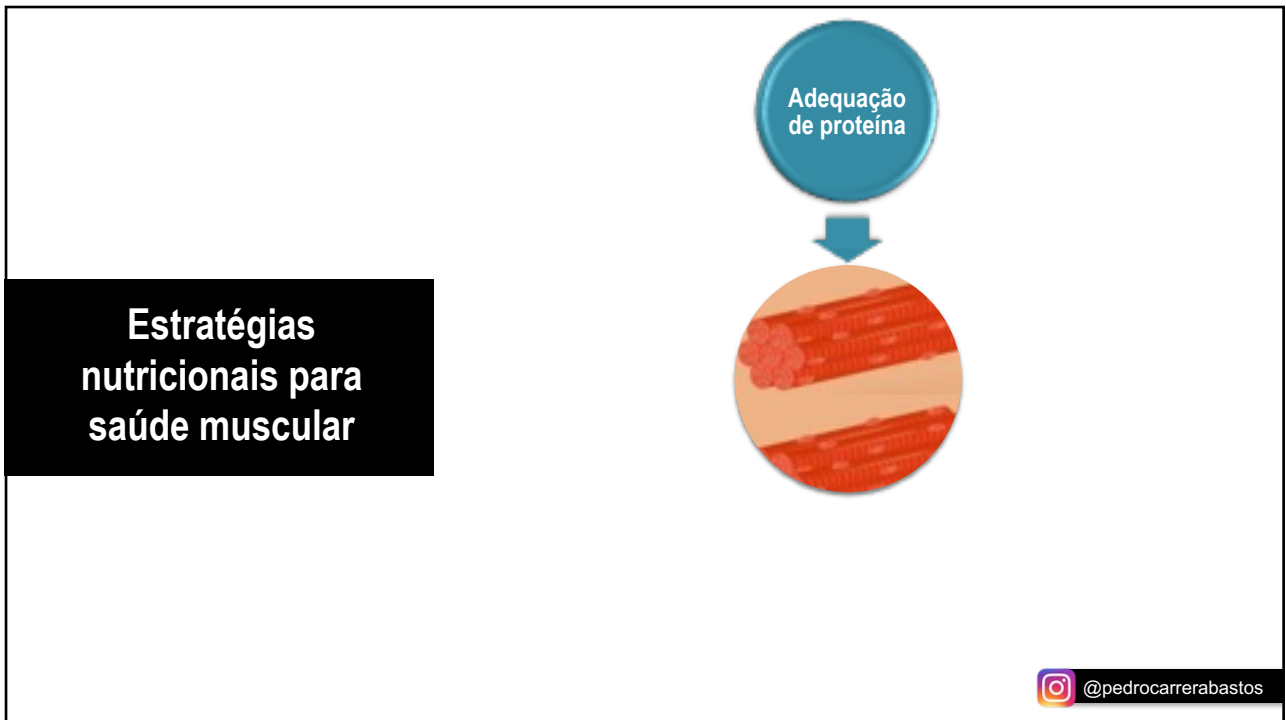


Como maximizar os efeitos do treinamento de força?

6



7



8

Qual a dose?



9

REVISÃO SISTEMÁTICA E META-ANÁLISE

Systematic review and meta-analysis of protein intake to support muscle mass and function in healthy adults

Everson A. Nunes^{1,2}, Lauren Colenso-Semple³, Sean R. McKellar¹, Thomas Yau⁴, Muhammad Usman Ali⁵, Donna Fitzpatrick-Lewis⁶, Diana Sherifali⁷, Claire Gaudichon⁸, Daniel Tomé⁹, Phillip J. Atherton⁶, Maria Camprubi Robles⁷, Sandra Naranjo-Modad⁸, Michelle Braun⁹, Francesco Landi¹⁰ & Stuart M. Phillips¹⁴

¹Exercise Metabolism Research Group, Department of Kinesiology, McMaster University, Hamilton, Ontario, Canada, ²Laboratory of Investigation of Chronic Diseases, Department of Physiological Sciences, Federal University of Santa Catarina, Florianópolis, Brazil, ³McMaster Evidence Review and Synthesis Centre, McMaster University, Hamilton, Ontario, Canada, ⁴School of Nursing, Faculty of Health Sciences, McMaster University, Hamilton, Ontario, Canada, ⁵Université Paris-Saclay, AgroParisTech, INRAE, UMR PNCA, Paris, France, ⁶MRC Versus Arthritis Centre of Excellence for Musculoskeletal Ageing Research (CMAR), NIHR Biomedical Research Centre, School of Medicine, University of Nottingham, Nottingham, UK, ⁷Abbott Nutrition, Research and Development, Granada, Spain, ⁸Novus, Research and Development, Avignon, France, ⁹International Flavors & Fragrances, Research and Development, St. Louis, MO, USA, ¹⁰Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy

≥ 1,6 g/kg/d para ↑ MM
em **< 65 anos** que
fazem treinamento
resistido



Nunes EA, et al. J Cachexia Sarcopenia Muscle. 2022;13(2):795-810.

10

REVISÃO SISTEMÁTICA E META-ANÁLISE

Systematic review and meta-analysis of protein intake to support muscle mass and function in healthy adults

Everson A. Nunes^{1,2}, Lauren Colenso-Semple¹, Sean R. McKellar¹, Thomas Yau¹, Muhammad Usman Ali³, Donna Fitzpatrick-Lewis⁴, Diana Sherifali⁴, Claire Gaudichon⁵, Daniel Tomé⁶, Philip J. Atherton⁶, Maria Camprubi Robles⁷, Sandra Naranjo-Modad⁸, Michelle Braun⁹, Francesco Landi¹⁰ & Stuart M. Phillips¹¹

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1,2 – 1,59 g/kg/d para
↑ MM em **≥ 65 anos** que
fazem treinamento
resistido



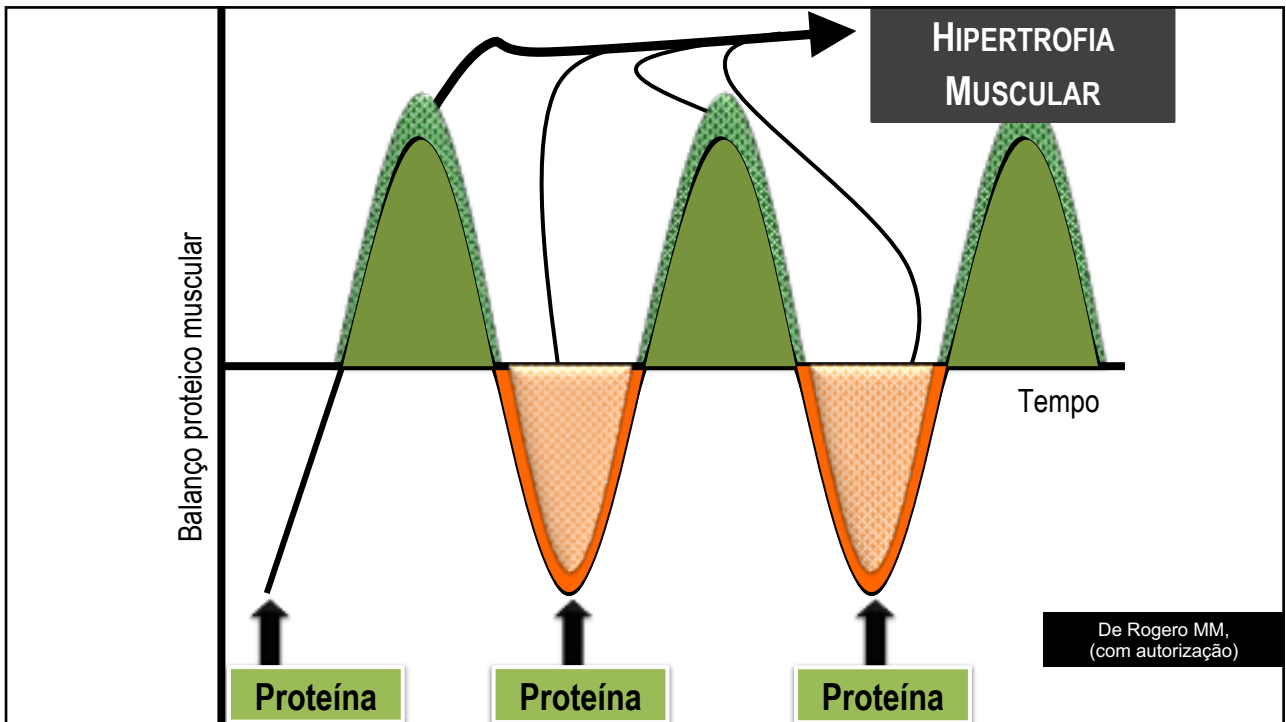
Nunes EA, et al. J Cachexia Sarcopenia Muscle. 2022;13(2):795-810.

11

Como repartir a proteína?



12



13

Que quantidade de proteína por refeição?

14

PROTEÍNA POR REFEIÇÃO

- ✓ $\geq 0,4$ g proteína/kg
- ✓ Maior quantidade no **café da manhã**

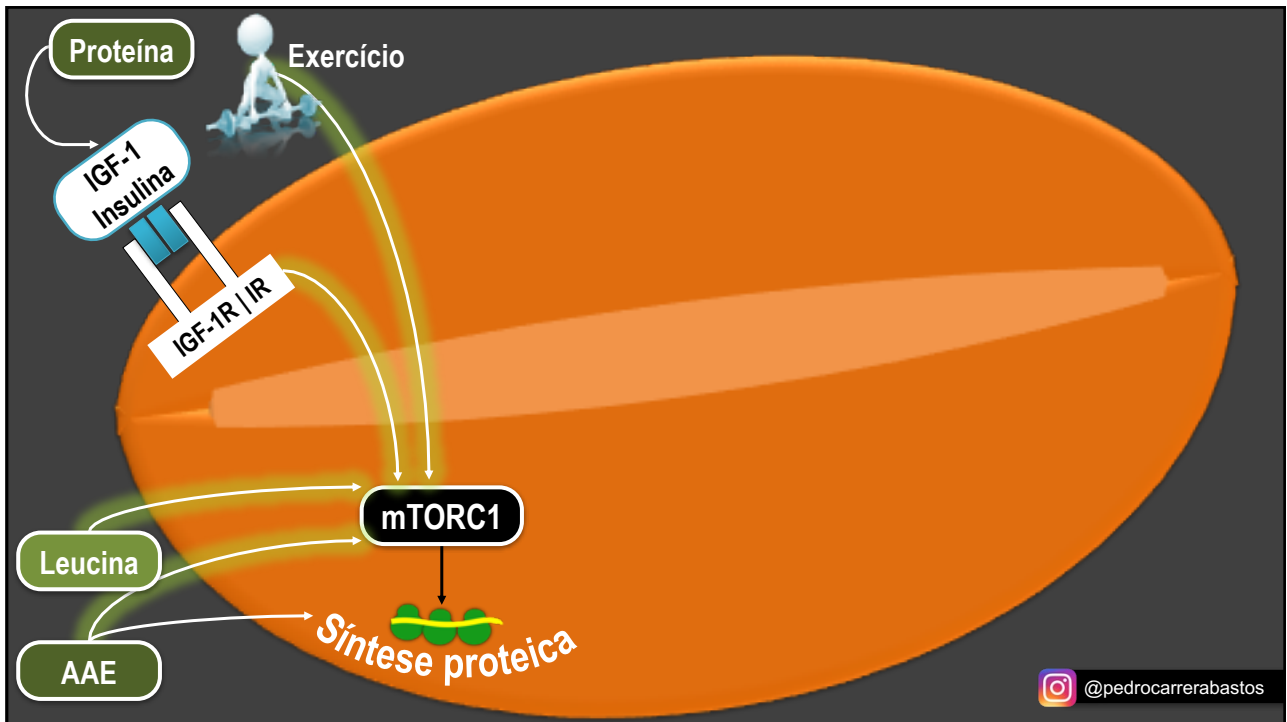


1. Weiler M, Hertzler SR, Dvoretzkiy S. *Nutrients*. 2023;15(4):838.
2. Morgan PT, Witard OC, Højfeldt G, Church DD, Breen L. *Proc Nutr Soc*. Published online October 11, 2023;1-14.

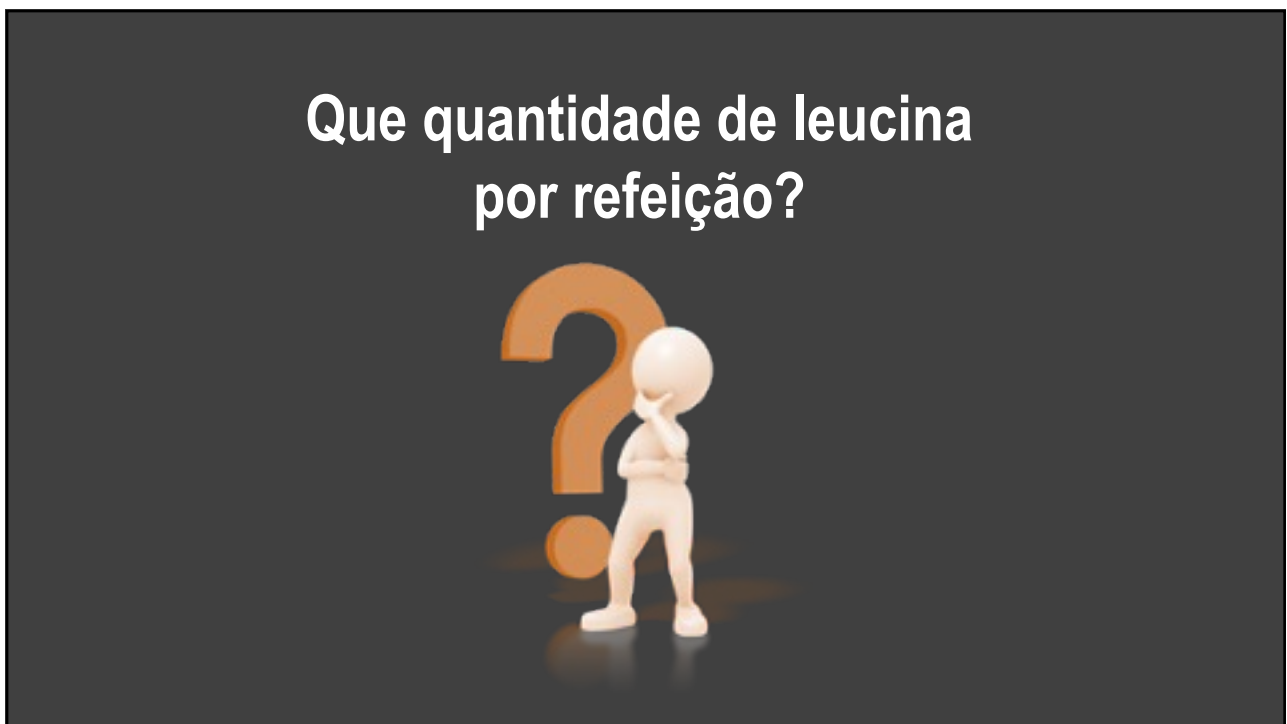
15

NÃO ESQUECER...

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17



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REVISÃO SISTEMÁTICA

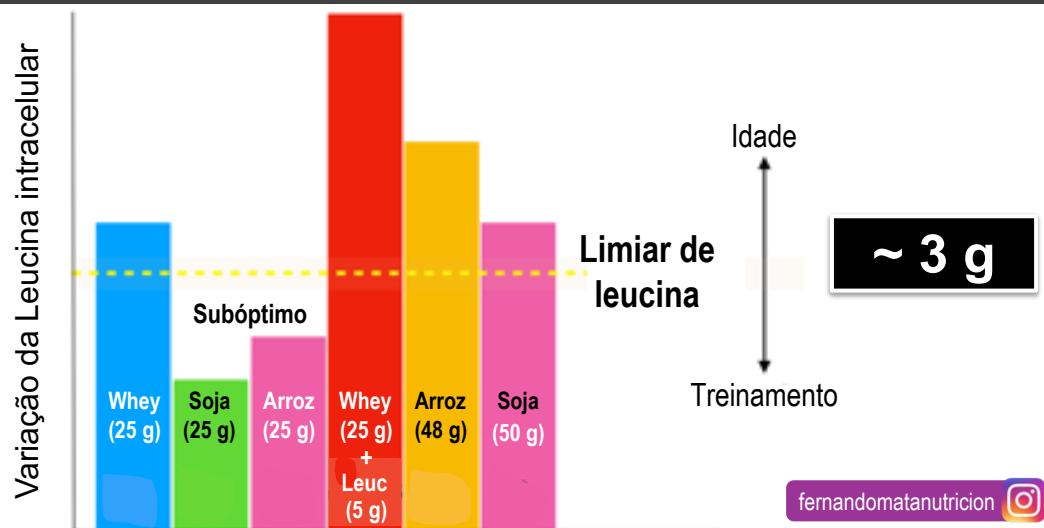
Evaluating the Leucine Trigger Hypothesis to Explain the Post-prandial Regulation of Muscle Protein Synthesis in Young and Older Adults: A Systematic Review

~3 g de Leucina por refeição

Zaromskye, et al. Front. Nutr. 2021;8:685165.

19

Concentração de leucina intracelular após o consumo de várias doses de diferentes proteínas em indivíduos jovens



De Mata F, 2021 (com autorização)

20



✓ Proteínas **animais**, comparadas com vegetais resultam em maior disponibilidade de AA e **estimulam mais a síntese proteica**

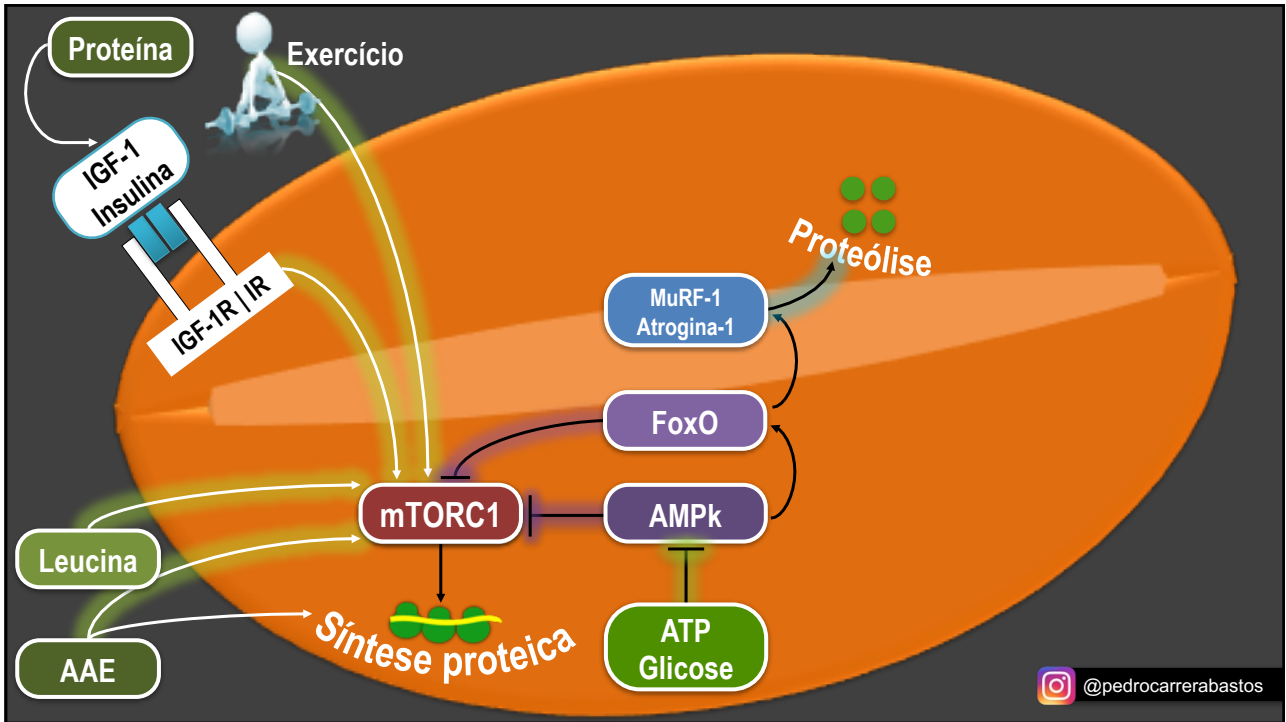
21



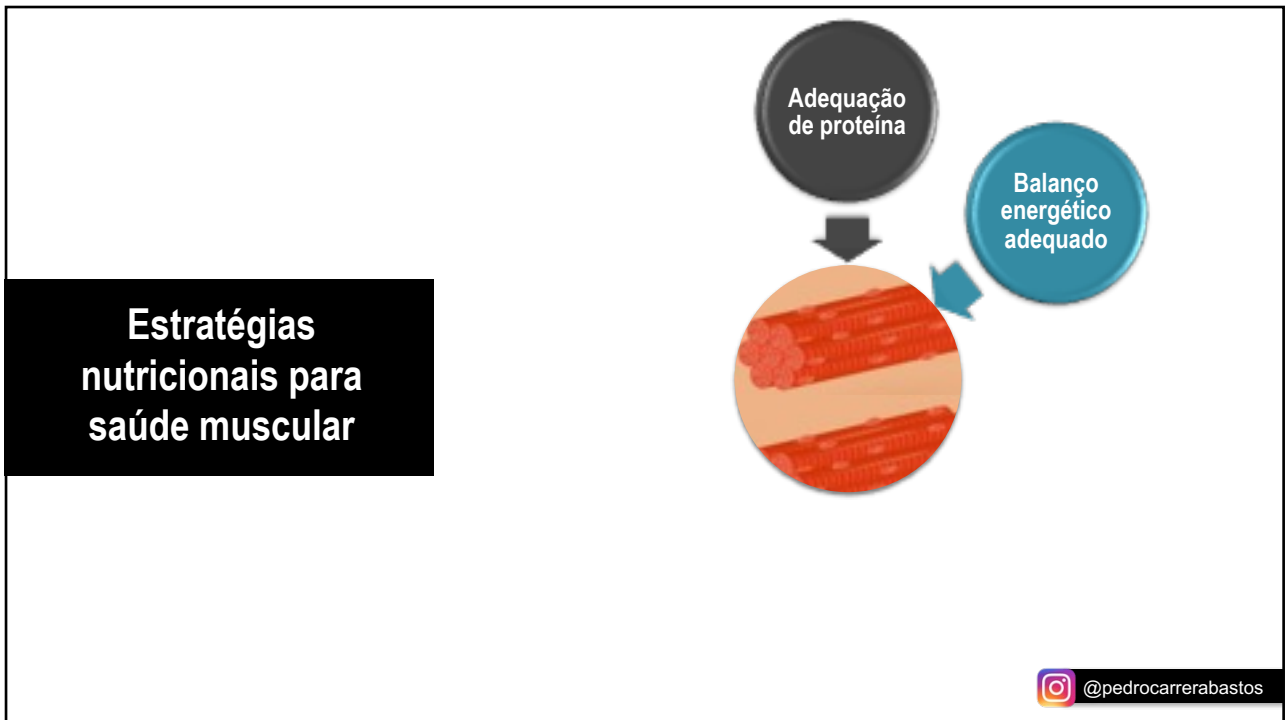
✓ Proteínas **animais**, comparadas com vegetais resultam em maior disponibilidade de AA e **estimulam mais a síntese proteica**

✓ Suplementos de **proteínas vegetais isoladas** ou com adição de AA essenciais (Leucina) têm **resultados similares** a proteínas animais

22

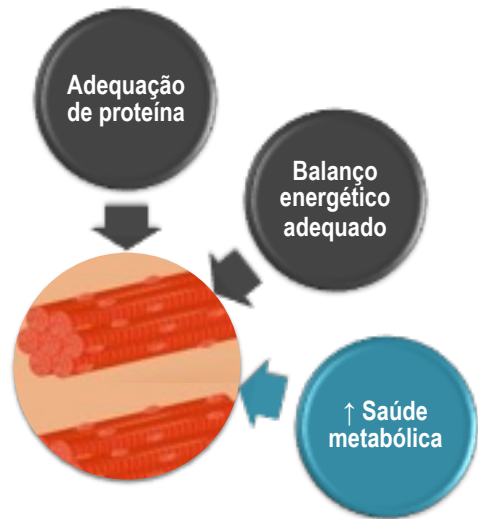


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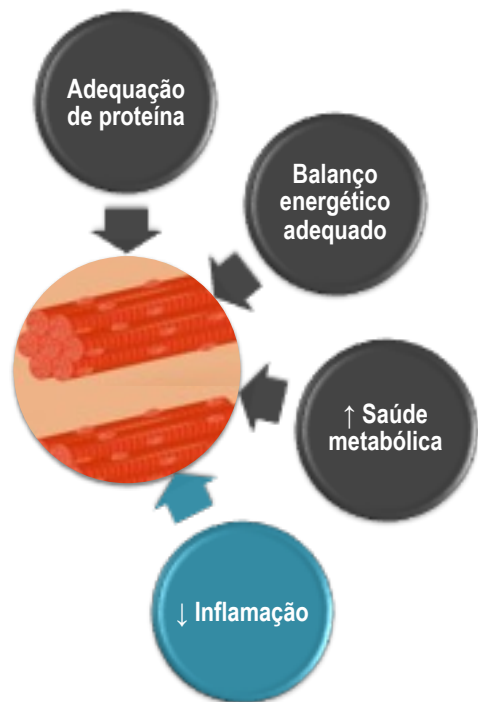
Estratégias nutricionais para saúde muscular



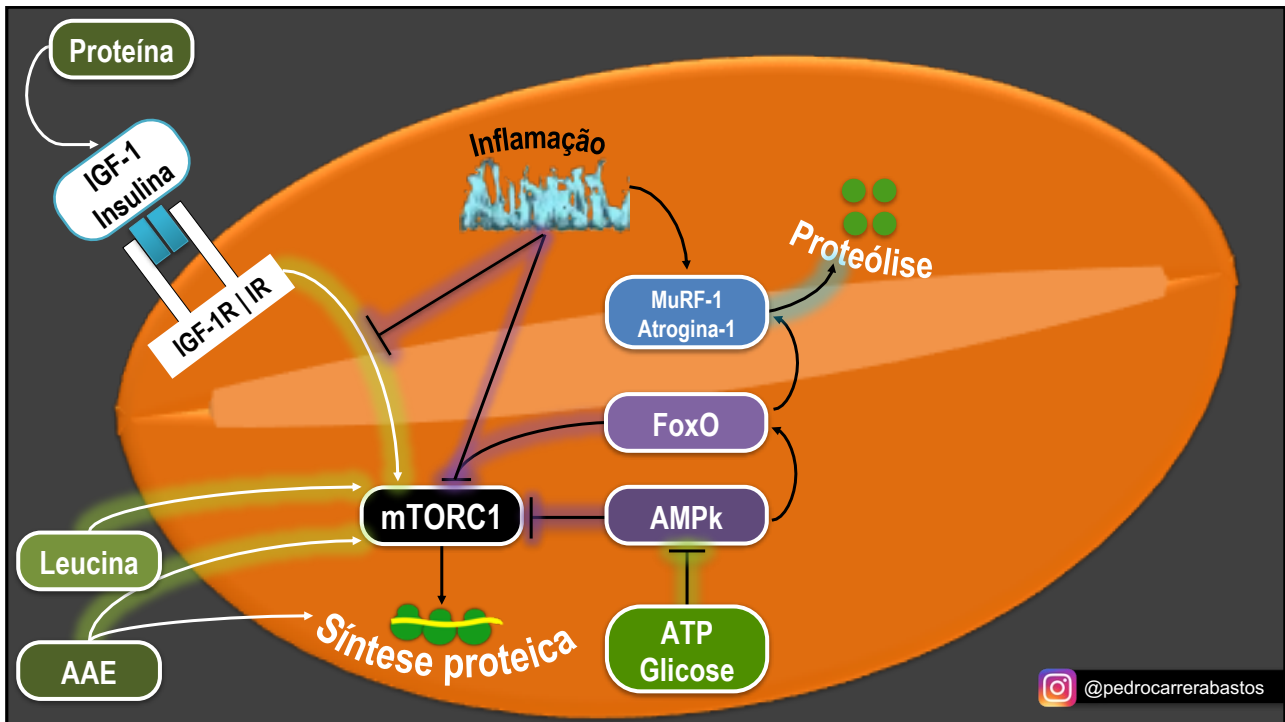
 @pedrocarrerabastos

25

Estratégias nutricionais para saúde muscular



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27

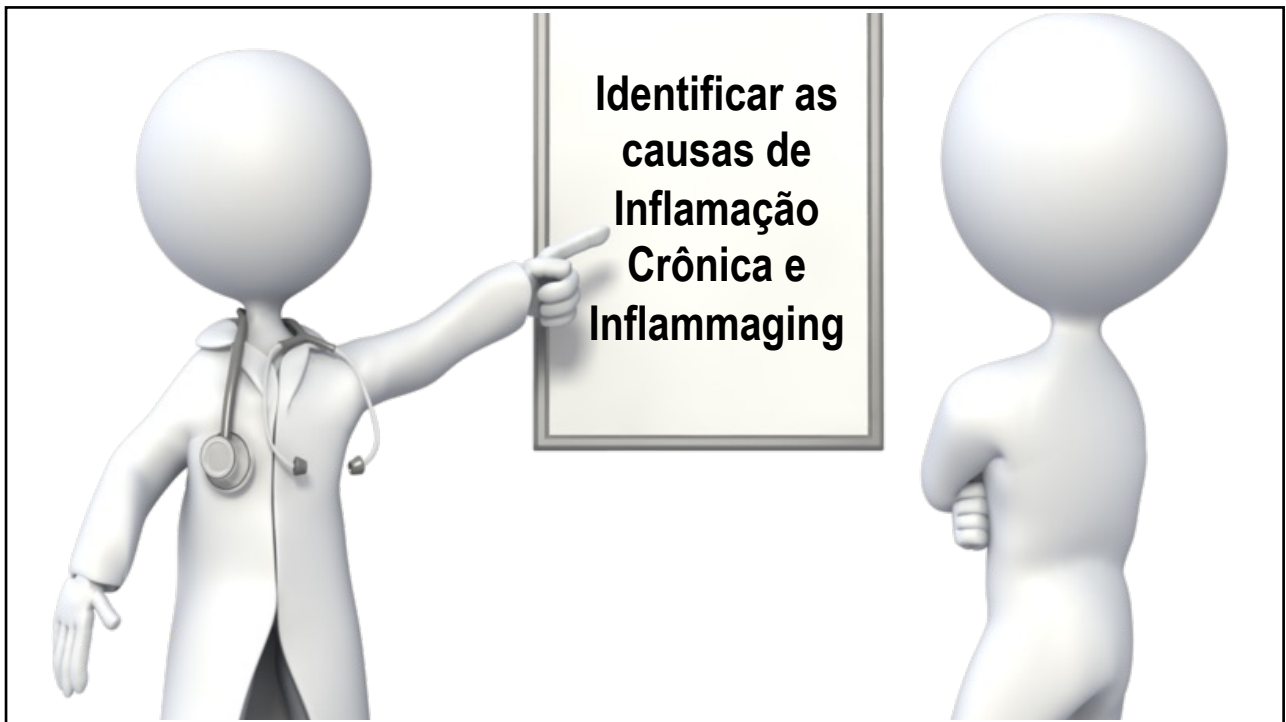
INFLAMMAGING

Indivíduos **idosos** apresentam níveis mais altos de **marcadores inflamatórios**

(IL-1, IL-1RN, IL-6, IL-8, IL-13, IL-18, PCR, IFN α , IFN β , TGF β , TNF)

1. Ferrucci L, Fabbri E. Nat Rev Cardiol 2018;15:505–522.
2. Walker KA, Basisty N, Wilson DM 3rd, Ferrucci L. J Clin Invest. 2022;132(14):e158448.

28



29

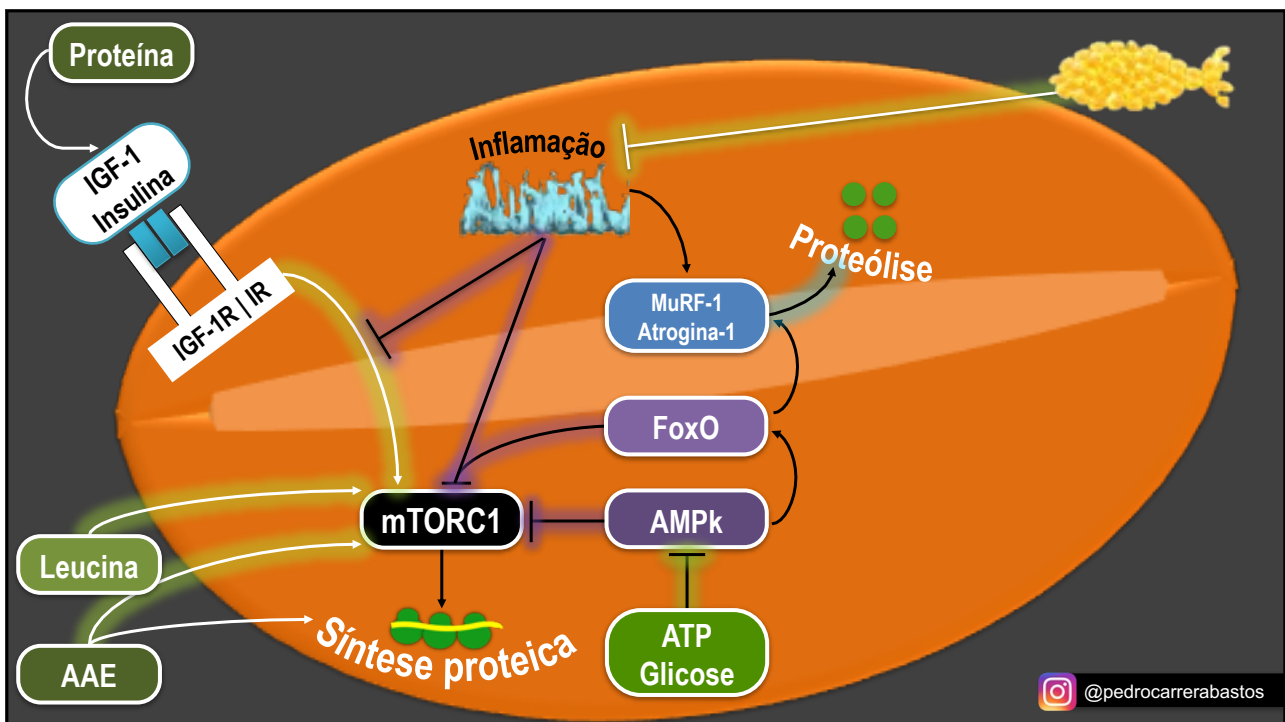


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Quais as estratégias nutricionais de modulação da inflamação?



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ÁCIDOS GRAXOS ÔMEGA-3 (EPA E DHA)



33

REVISÕES SISTEMÁTICAS E/OU META-ANÁLISES DE RCTs

Bird JK, et al.
Clinical Nutrition ESPEN 2021;46:73e86.



Meta-analysis

The effect of long chain omega-3 polyunsaturated fatty acids on muscle mass and function in sarcopenia: A scoping systematic review and meta-analysis

A suplementação com **n-3** tem um **efeito positivo na massa muscular e força do quadríceps**, embora a heterogeneidade e o tamanho pequeno dos estudos limitem a aplicabilidade desses achados.

Huaang YH, et al.
Nutrients. 2020;12:3739.

 **nutrients**



Article

Effects of Omega-3 Fatty Acids on Muscle Mass, Muscle Strength and Muscle Performance among the Elderly: A Meta-Analysis

A suplementação de **n-3** em doses **>2 g/dia** pode **aumentar a massa muscular e melhorar a velocidade de caminhada em idosos**, especialmente **após mais de 6 meses de intervenção**, embora os benefícios gerais sejam modestos.

34

Quanto?



35



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Review

Expert Opinion on Benefits of Long-Chain Omega-3 Fatty Acids (DHA and EPA) in Aging and Clinical Nutrition

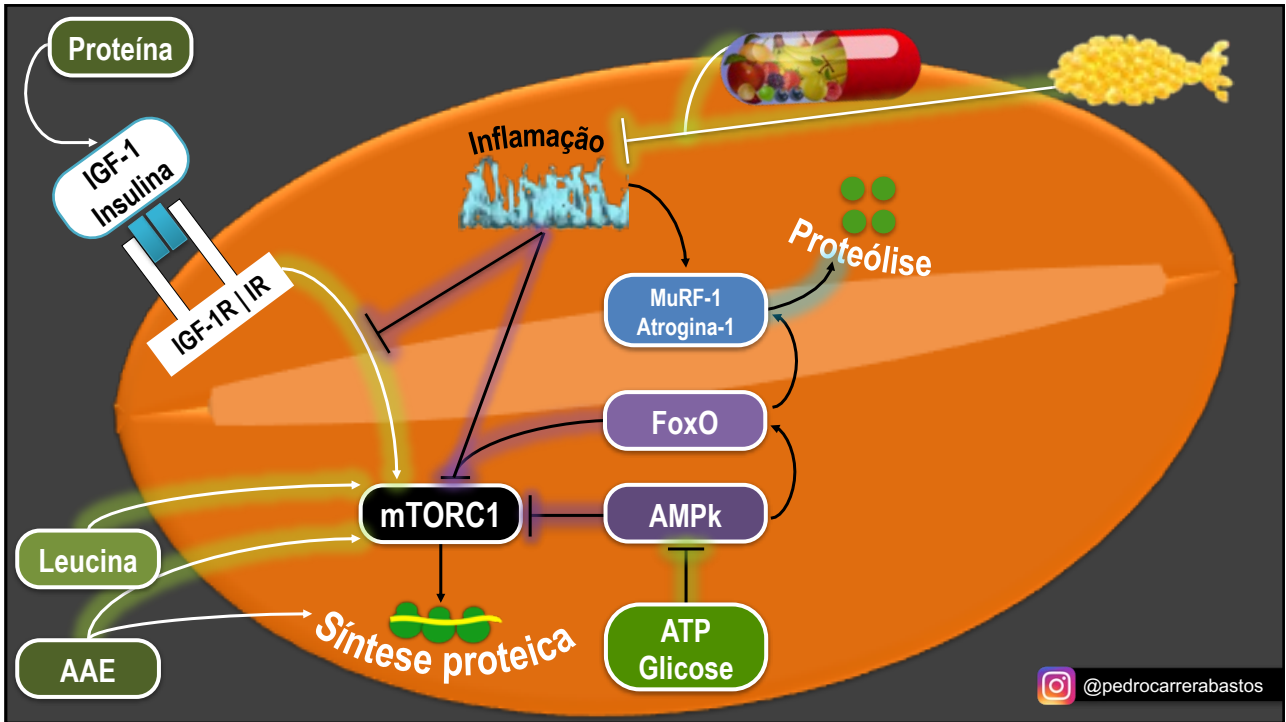
Barbara Troesch ¹, Manfred Eggersdorfer ², Alessandro Laviano ³, Yves Rolland ⁴, A. David Smith ⁵, Ines Warnke ¹, Arved Weimann ⁶ and Philip C. Calder ^{7,*}

Performance física em idosos

- Dose: **> 3 g/d** (> 0,8 g de EPA)
- Duração: **> 3 meses**

Troesch B, et al. *Nutrients*. 2020;12(9):2555.

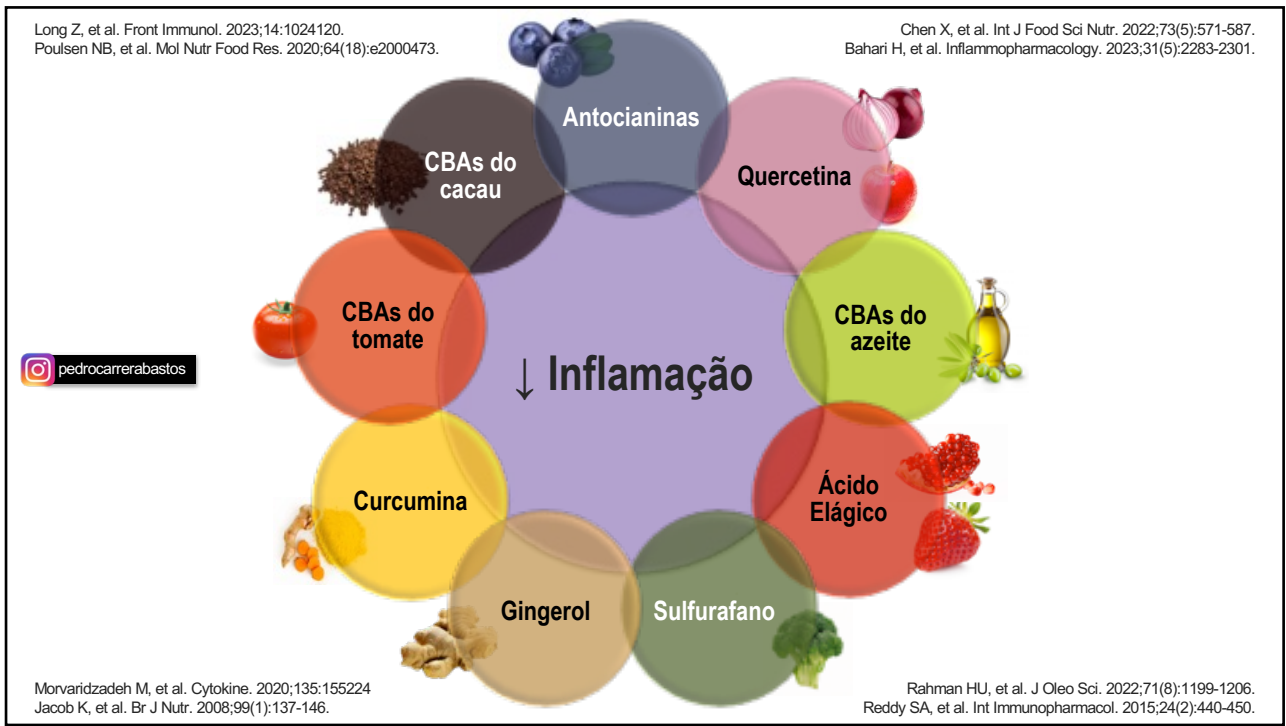
36



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38



39



40

META-ANÁLISES DE RCTs



➔ ↓ PCR

Prebióticos e simbióticos

1. Zheng HJ, Guo J, Jia Q, et al. *Pharmacol Res.* 2019;142:303-313.
2. Naseri K, Saadati S, Ghaemi F, et al. *Eur J Nutr.* 2023;62(2):543-561.
3. McLoughlin RF, Berthon BS, Jensen ME, Baines KJ, Wood LG. *Am J Clin Nutr.* 2017;106(3):930-945.

41

Effects of fruit and vegetable consumption on inflammatory biomarkers and immune cell populations: a systematic literature review and meta-analysis

10 estudos transversais e 2 de coorte

71 estudos de intervenção

ABSTRACT

Background: Inflammation is associated with an increased risk of a range of chronic diseases. A diet high in fruit and vegetables may help to reduce inflammation, as fruit and vegetables are rich sources of antioxidants and other biologically active substances, which may

be essential for protecting the body against insult and injury. However, when inflammation becomes persistent, the mediators produced by activated immune cells can lead to tissue damage and development of disease (3). A chronic inflammatory state is characterized by increased levels of circulating inflammatory

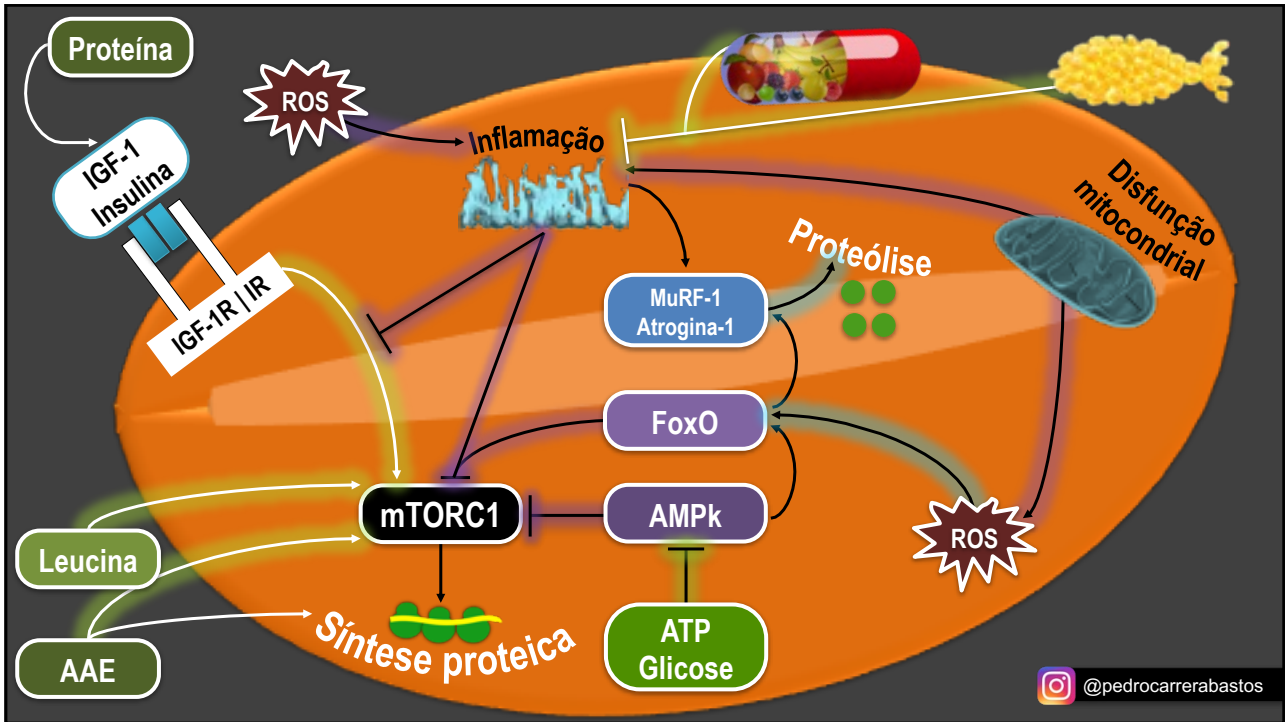
↑ consumo de fruta e hortaliças associado a ↓ de vários marcadores inflamatórios

population ($P < 0.05$).

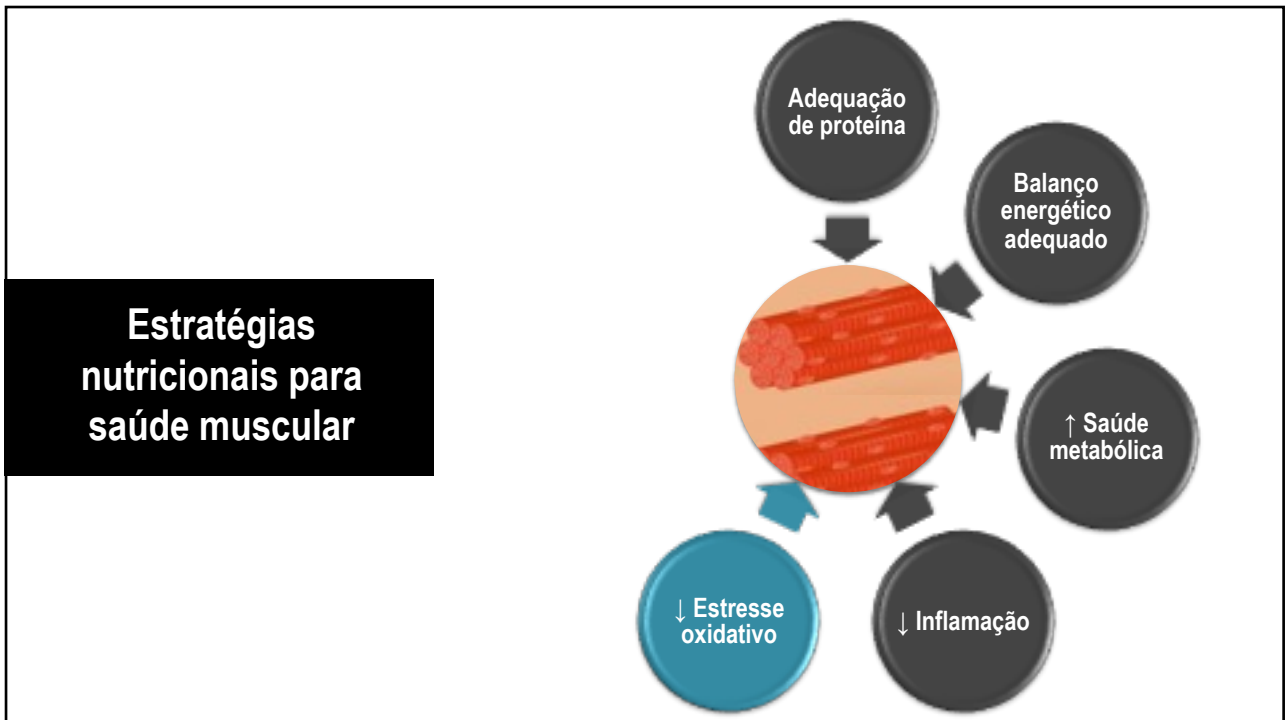
Conclusions: In conclusion, this review suggests that higher intakes of fruit and vegetables lead to both a reduction in proinflammatory mediators and an enhanced immune cell profile. *Am J Clin Nutr* 2018;108:136-155.

mediators, increased natural killer cell activity, cytotoxicity and lymphocyte proliferation have been reported following consumption of different F&V juices (8-10). In addition, some epidemiologic studies have also reported that F&V intake is inversely associ-

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REVISÕES SISTEMÁTICAS COM META-ANÁLISE

Besora-Moreno M, et al.
Clinical Nutrition 2022;41(10):2308-2324.



Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: <http://www.elsevier.com/locate/clnu>

Meta-analyses

Antioxidant-rich foods, antioxidant supplements, and sarcopenia in old-young adults ≥ 55 years old: A systematic review and meta-analysis of observational studies and randomized controlled trials

Alimentos ricos em antioxidantes e suplementos antioxidantes melhora a força e a função muscular em adultos ≥ 55 anos

Hong SH, Bae YJ.
Nutrients. 2024;16(11):1707.



nutrients



Review

Association of Dietary Vegetable and Fruit Consumption with Sarcopenia: A Systematic Review and Meta-Analysis

O consumo de **vegetais e frutas** está significativamente **associado a uma redução no risco de sarcopenia**, com um efeito mais evidente em indivíduos ≥ 60 anos

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COMPOSTOS BIOATIVOS

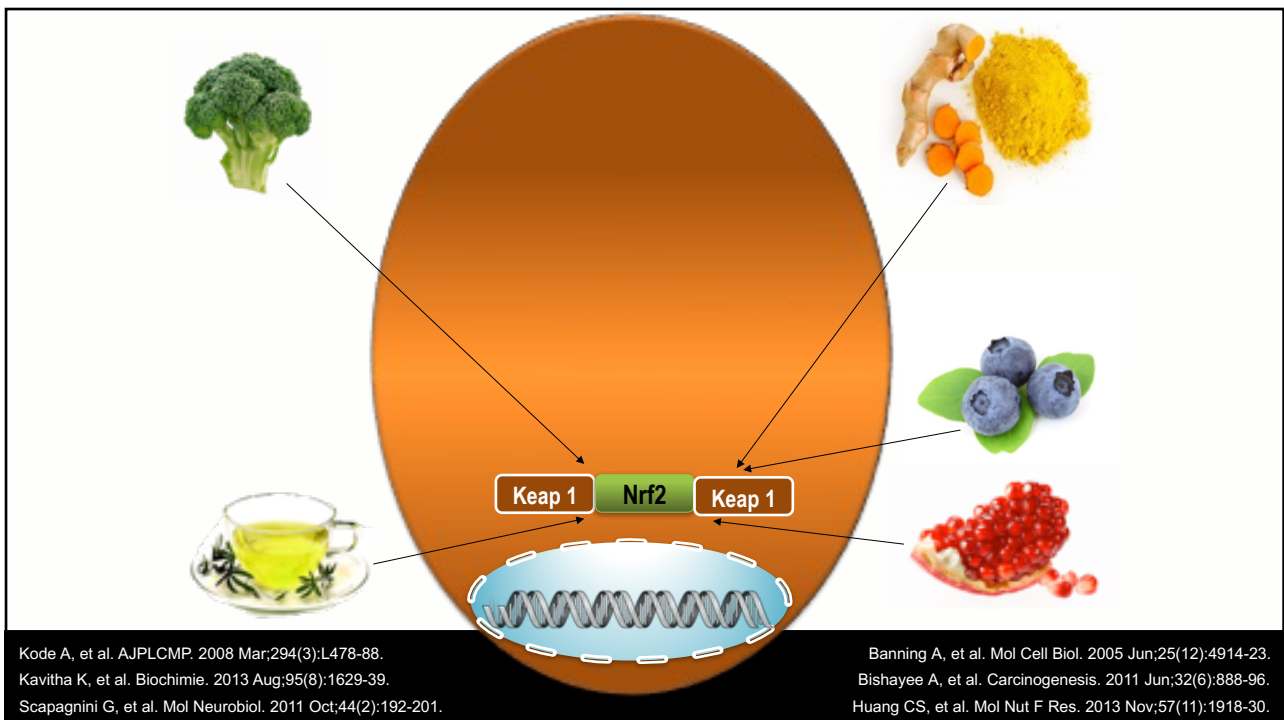


46

Como é que os CBAs neutralizam ou diminuem os ROS?



47



48

Kode A, et al. AJPLCMP. 2008 Mar;294(3):L478-88.
 Kavitha K, et al. Biochimie. 2013 Aug;95(8):1629-39.
 Scapagnini G, et al. Mol Neurobiol. 2011 Oct;44(2):192-201.

Banning A, et al. Mol Cell Biol. 2005 Jun;25(12):4914-23.
 Bishayee A, et al. Carcinogenesis. 2011 Jun;32(6):888-96.
 Huang CS, et al. Mol Nut F Res. 2013 Nov;57(11):1918-30.

49

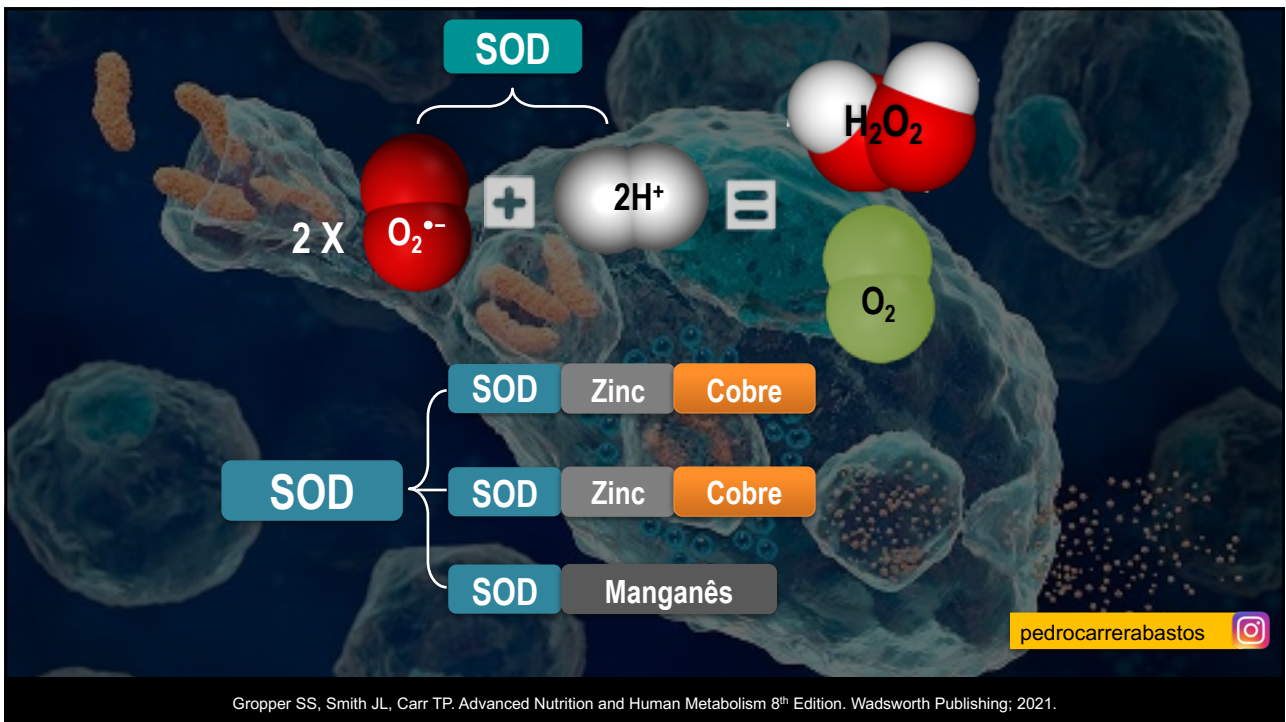
Gropper SS, Smith JL, Carr TP. Advanced Nutrition and Human Metabolism 8th Edition. Wadsworth Publishing; 2021.

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50



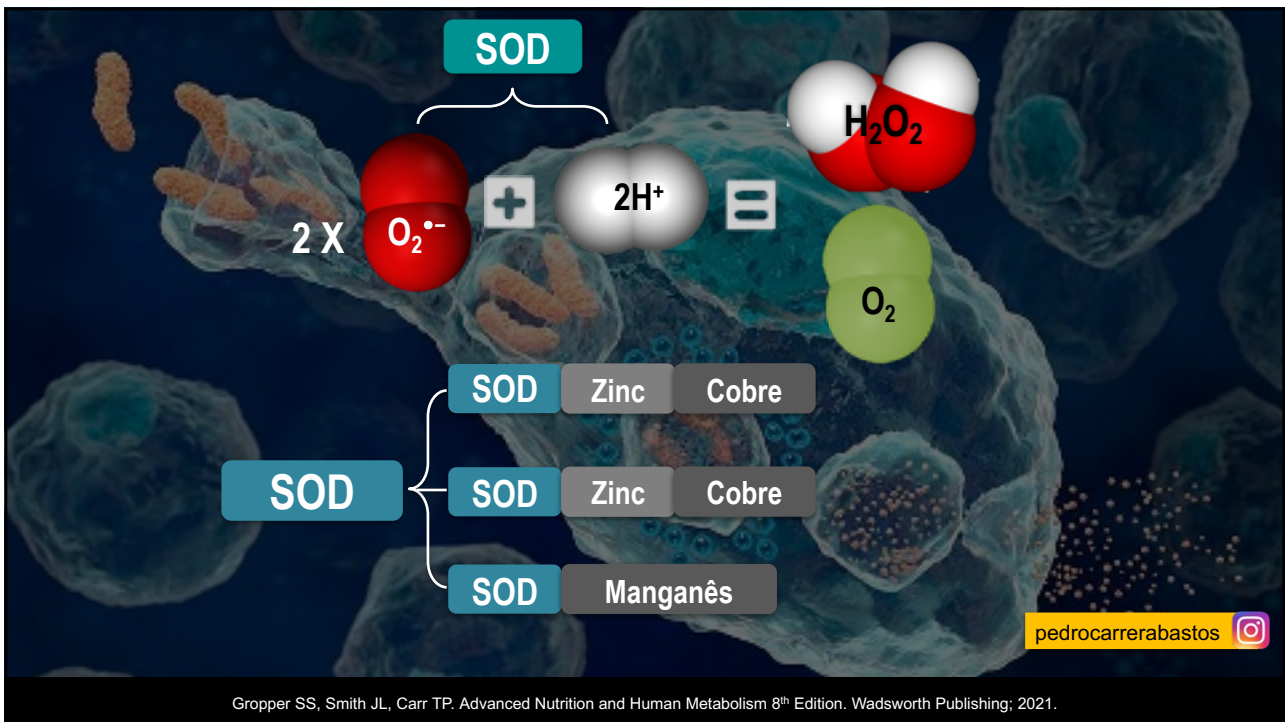
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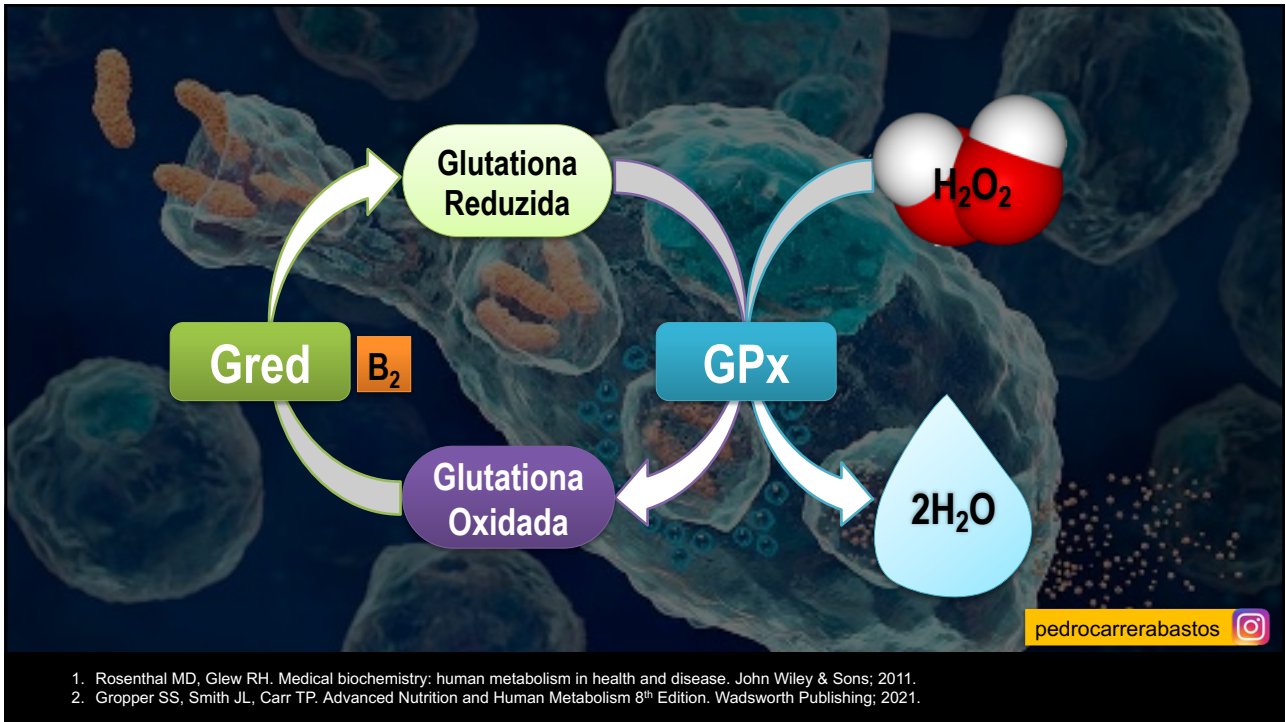
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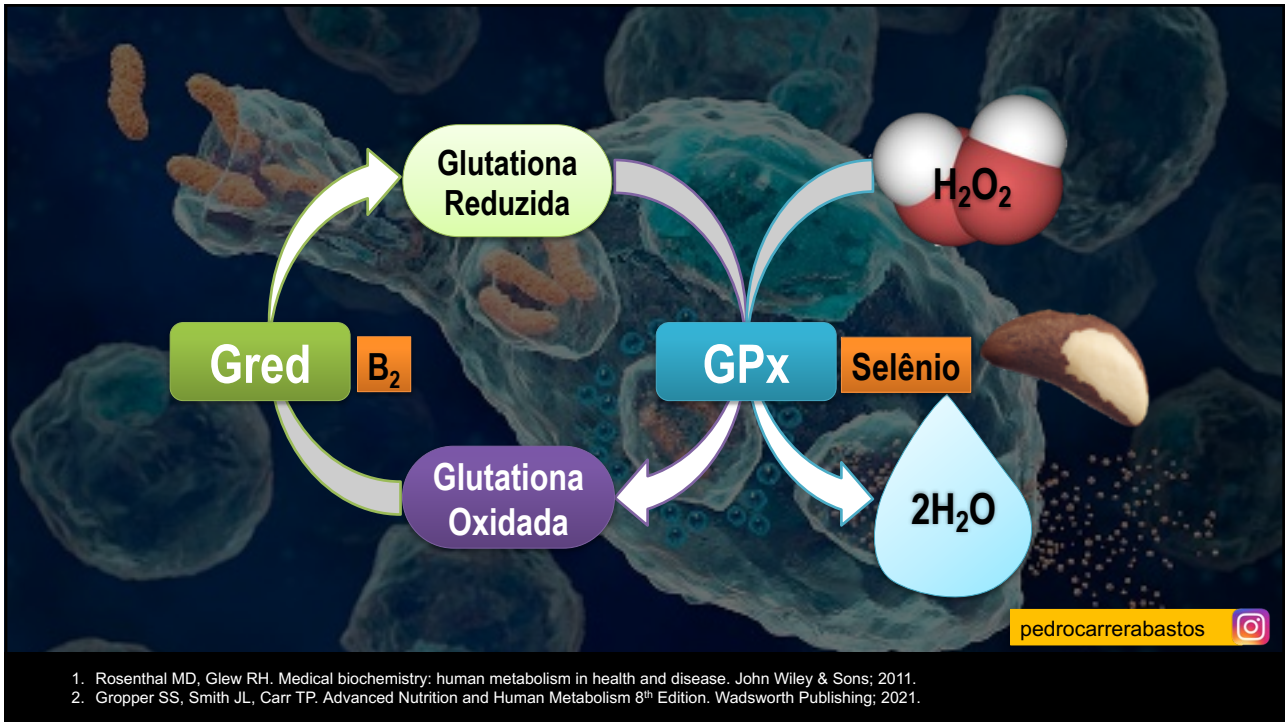
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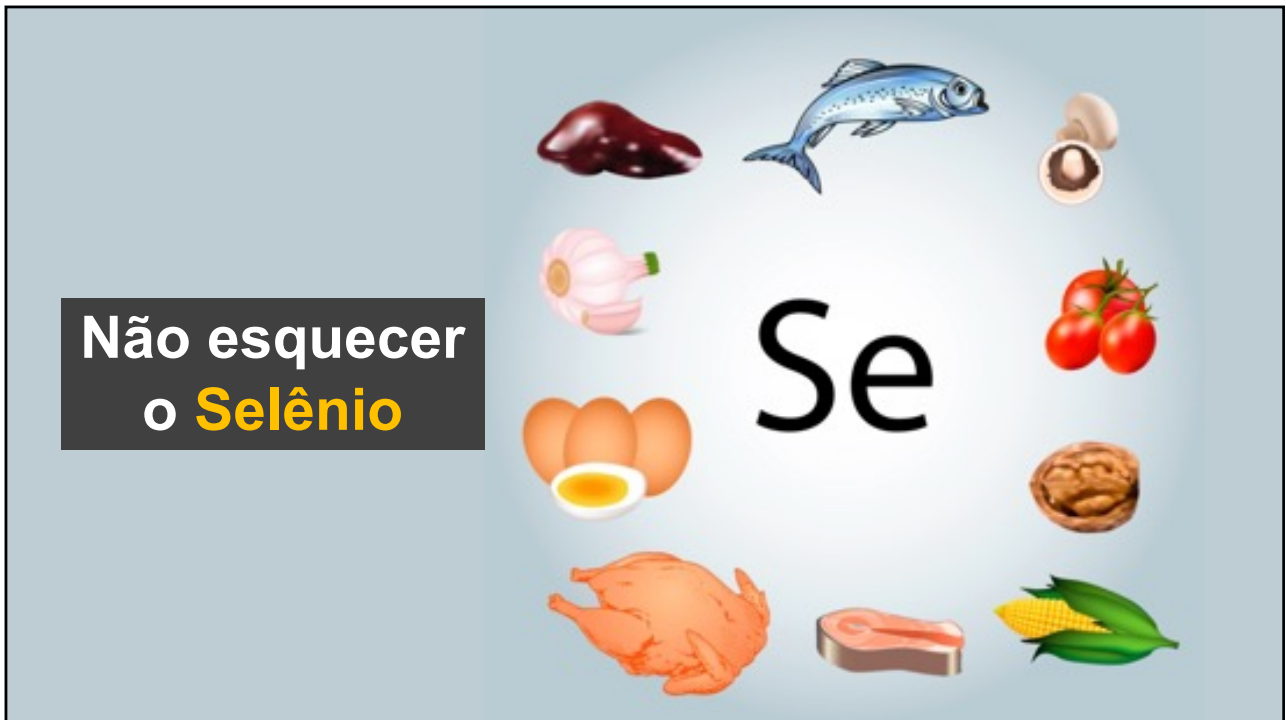
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Não esquecer a B2

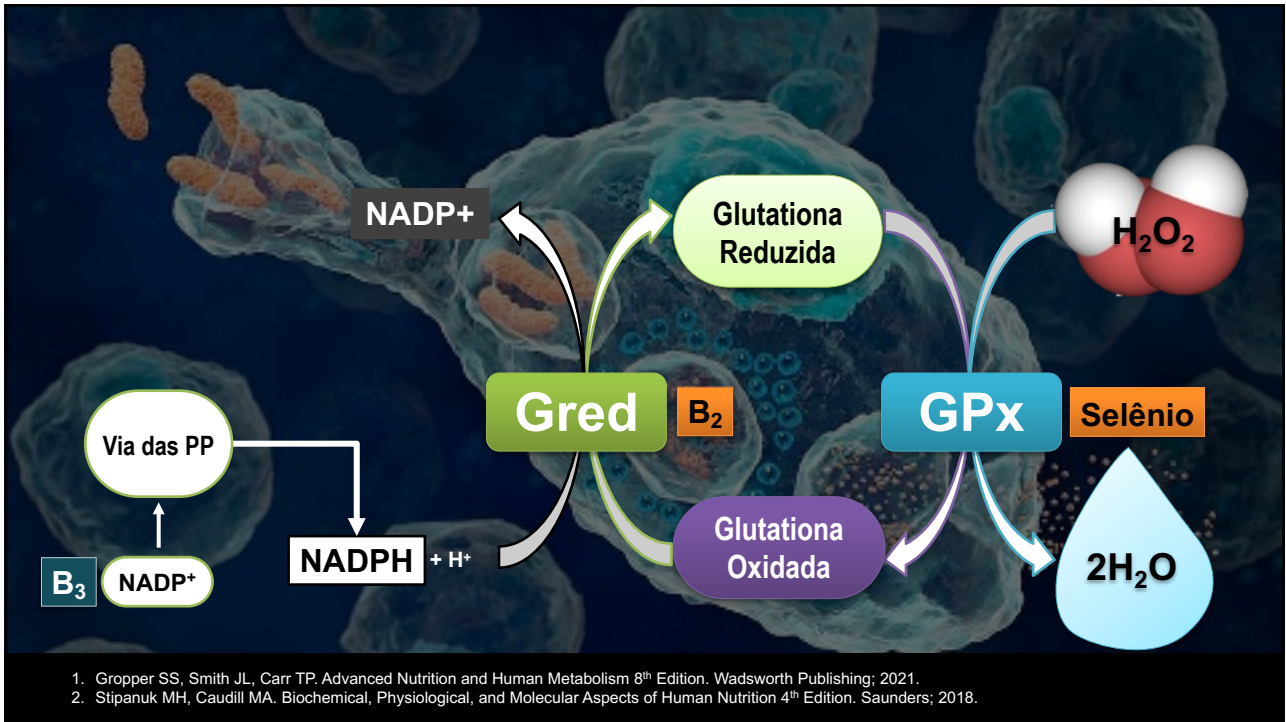
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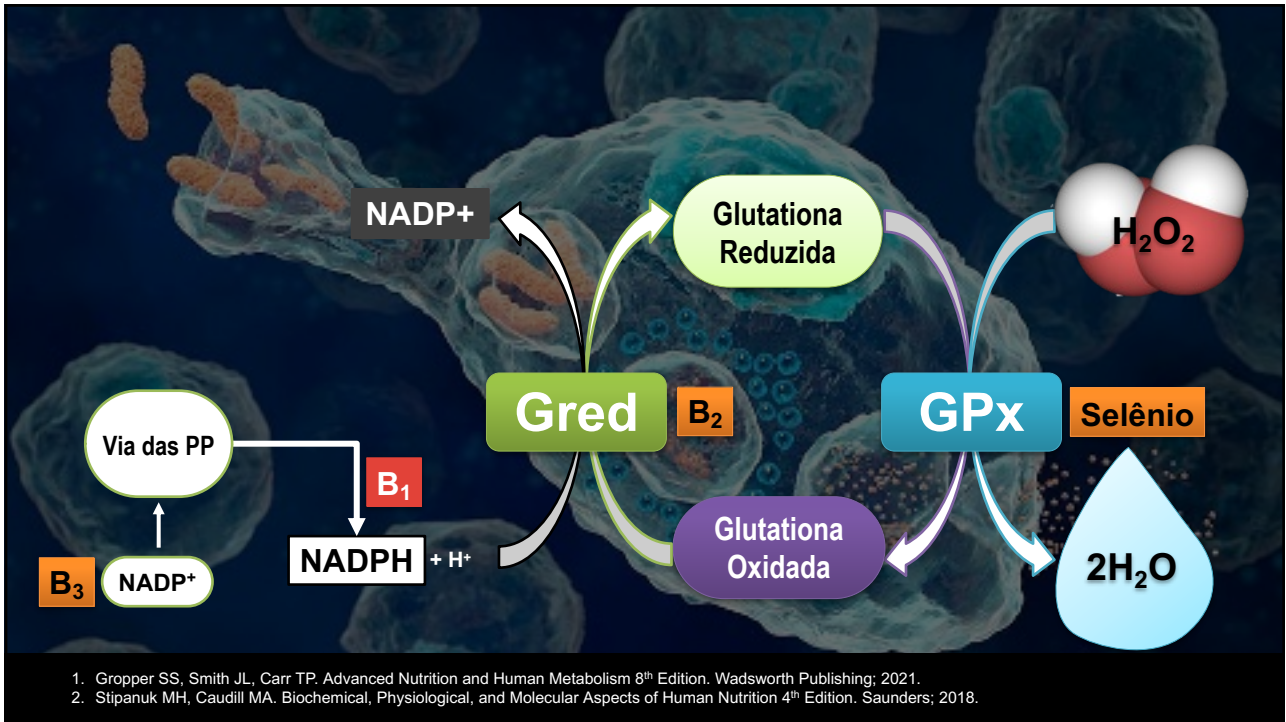
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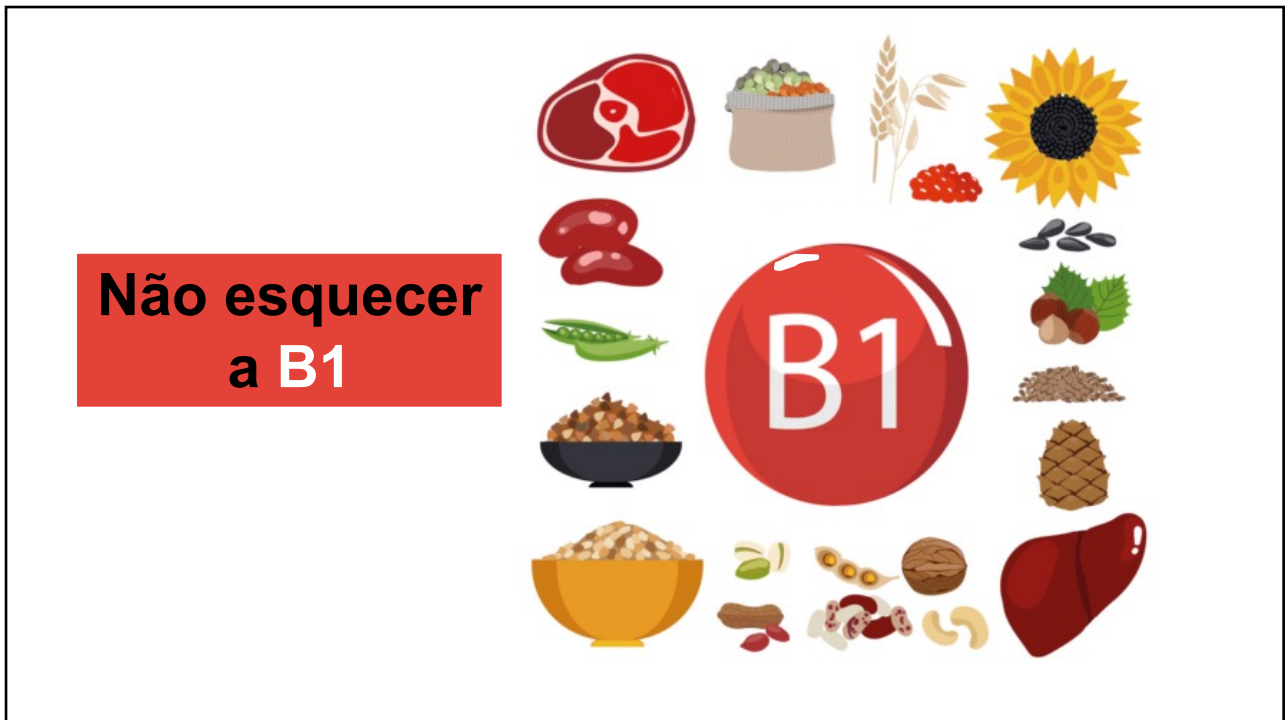
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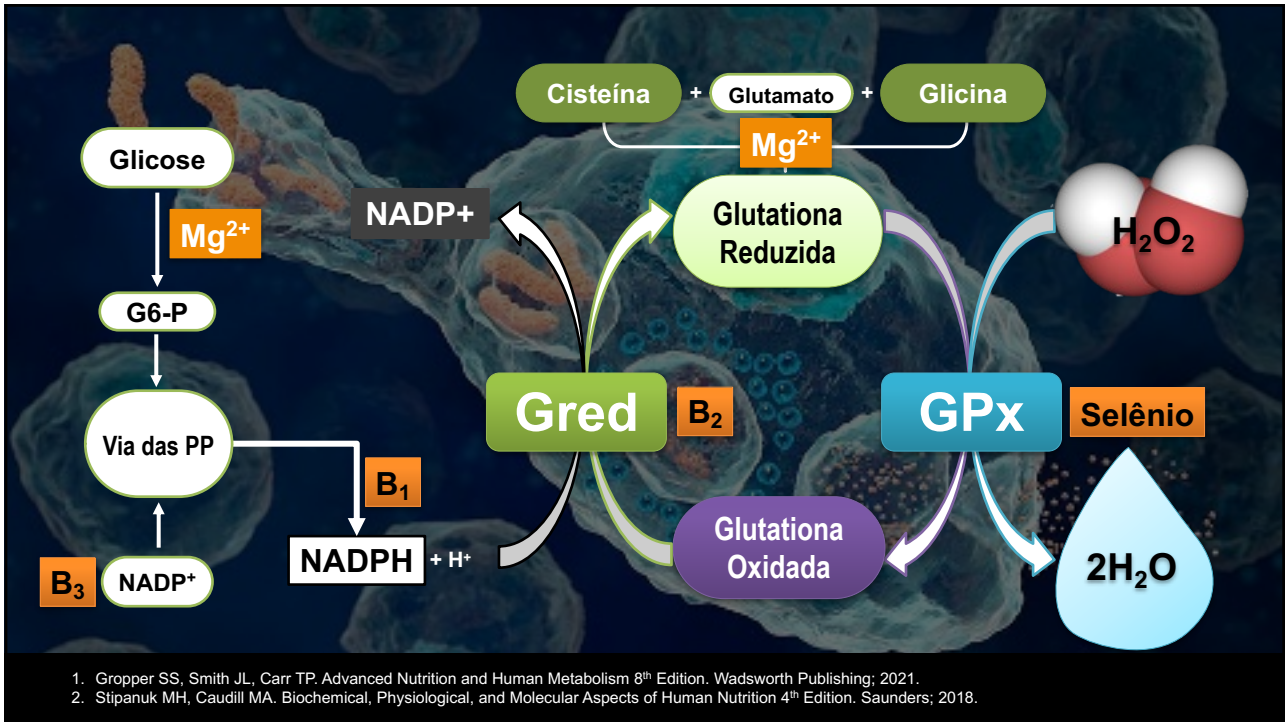
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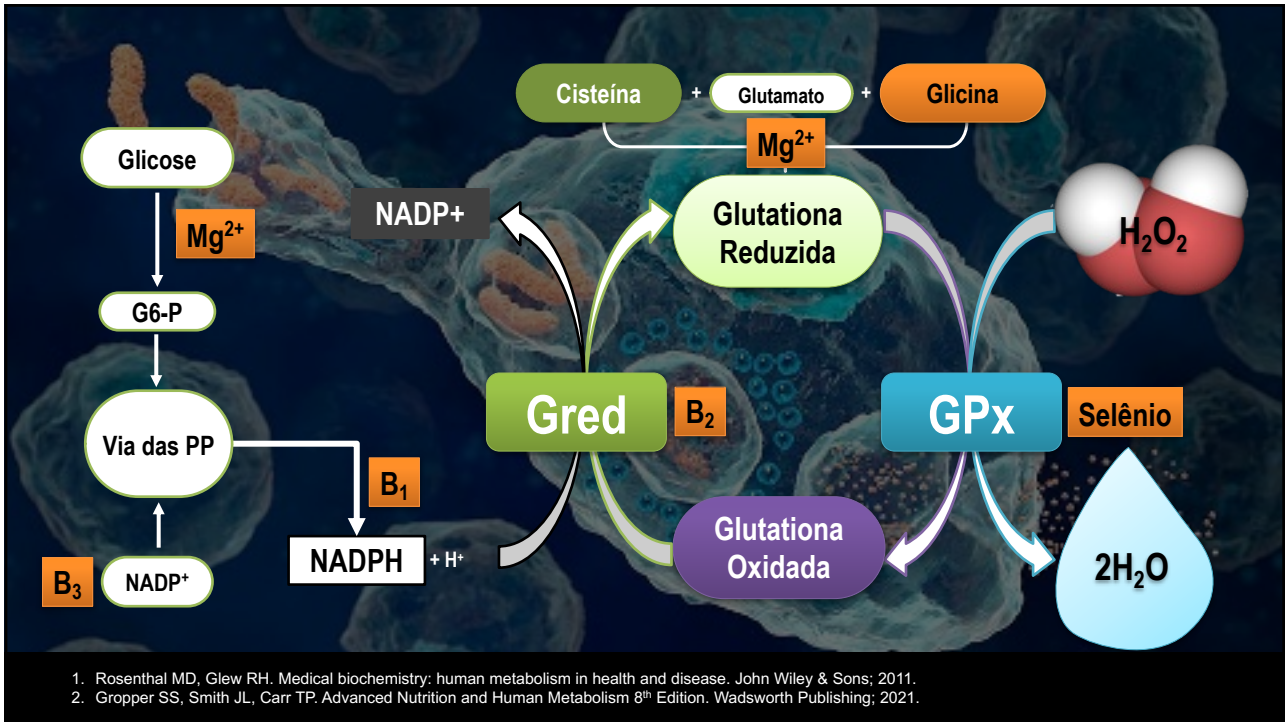
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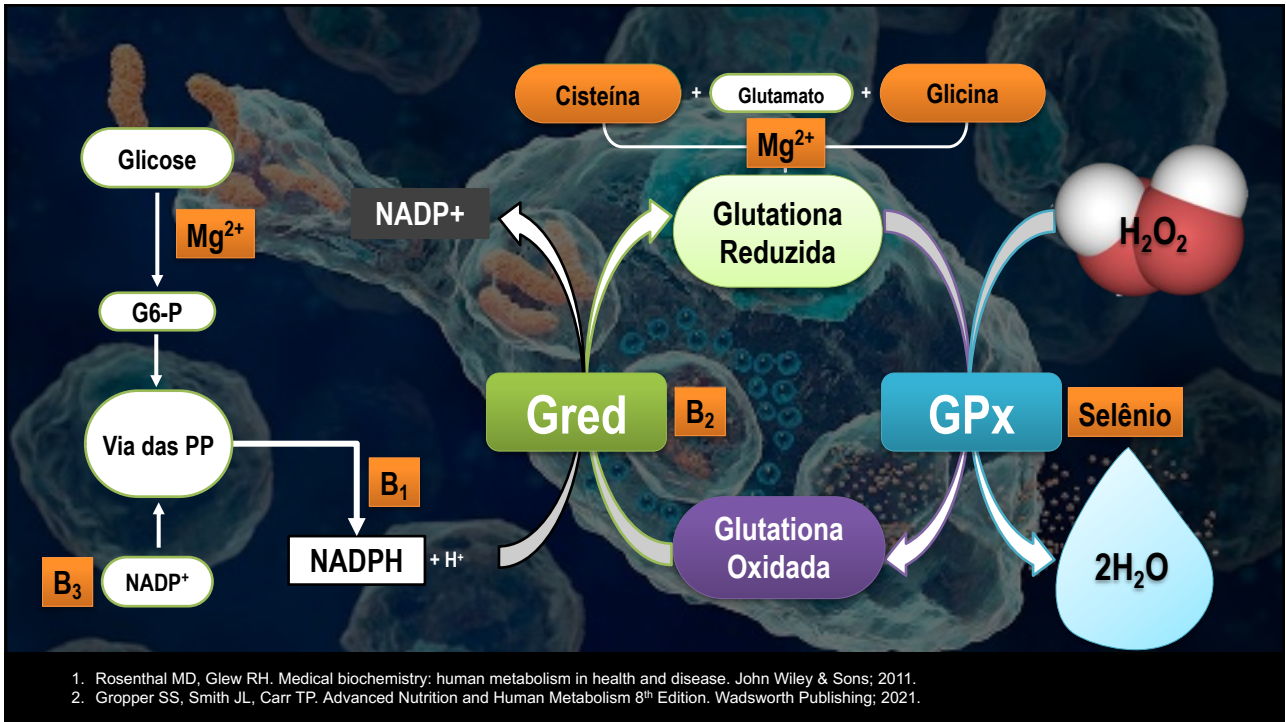
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**Mas nós não
sintetizamos Cisteína?**

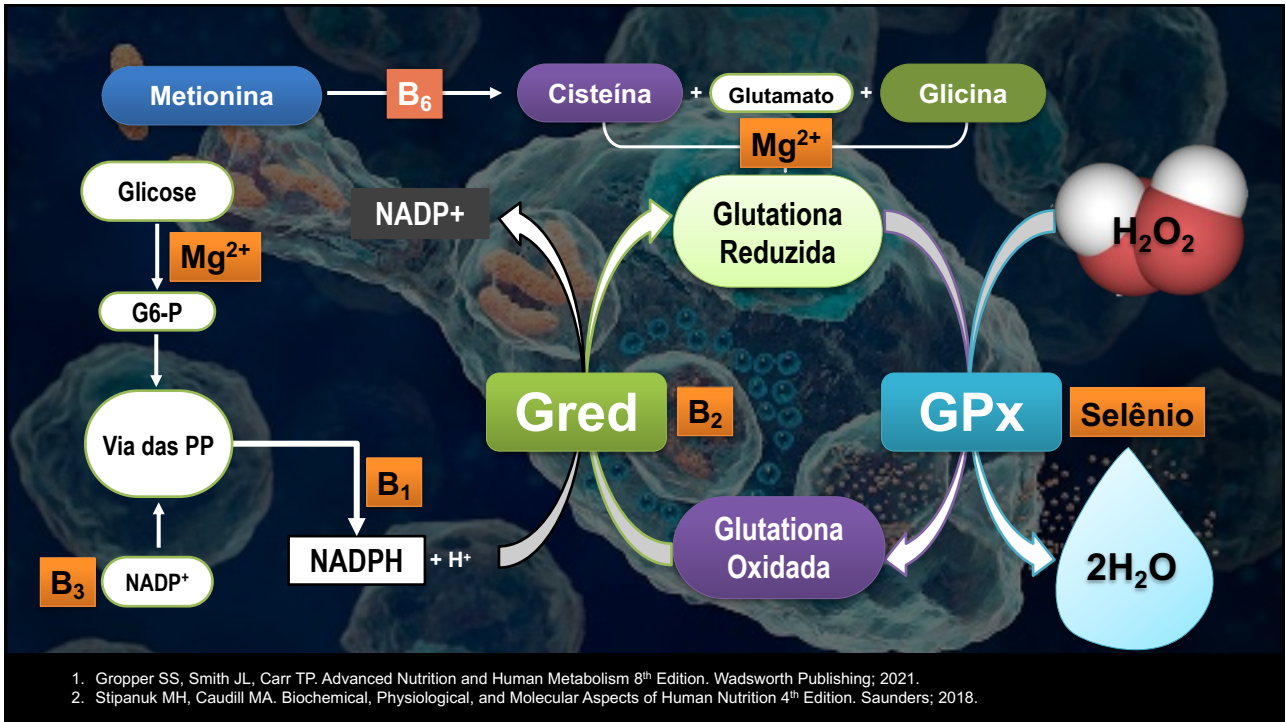


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Claro que sim!



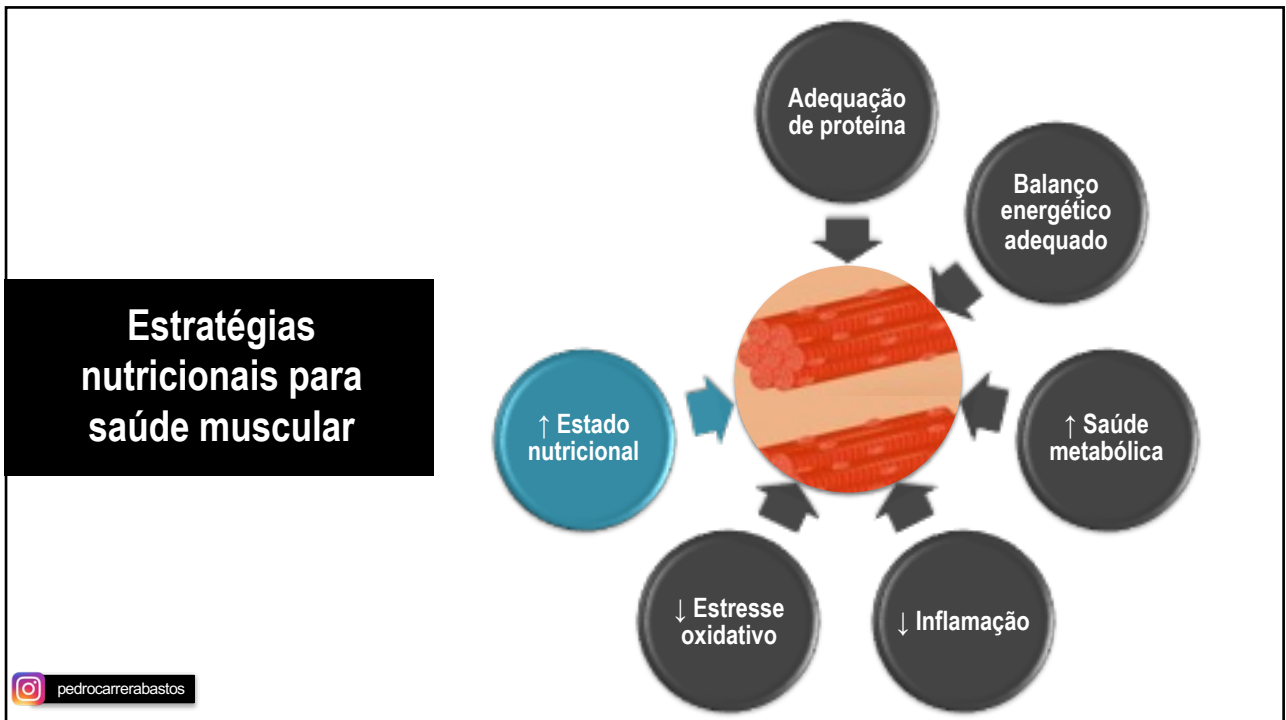
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mechanisms of ageing and development
 Mechanisms of Ageing and Development
 122 (2001) 1269–1279
 www.elsevier.com/locate/mechagedev

Cytokine production by stimulated mononuclear cells did not change with aging in apparently healthy, well-nourished women

Em mulheres **saudáveis** e com **estado nutricional adequado**, **NÃO** se observou um **aumento** nas **citocinas pró-inflamatórias** IL-1 β e IL-6 com a **idade**

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Estratégias nutricionais para saúde muscular



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REVISÃO SISTEMÁTICA COM META-ANÁLISE DE *RCTs*

nutrients

Review

Efficacy of Creatine Supplementation Combined with Resistance Training on Muscle Strength and Muscle Mass in Older Females: A Systematic Review and Meta-Analysis

Ellem Eduarda Pinheiro dos Santos ¹, Rodrigo Cappato de Araújo ², Darren G. Candow ³, Scott C. Forbes ^{4,*}, Jaddy Antunes Guijo ¹, Carla Caroliny de Almeida Santana ⁵, Wagner Luiz do Prado ⁶ and João Paulo Botero ^{7,*}

Creatina em combinação com treinamento de resistência **↑ força muscular** em **mulheres idosas**, especialmente quando a **intervenção dura ≥ 24 semanas**, embora não tenha sido observada uma melhora na massa muscular.

Dos Santos EEP, et al. Nutrients. 2021;13(11):3757.

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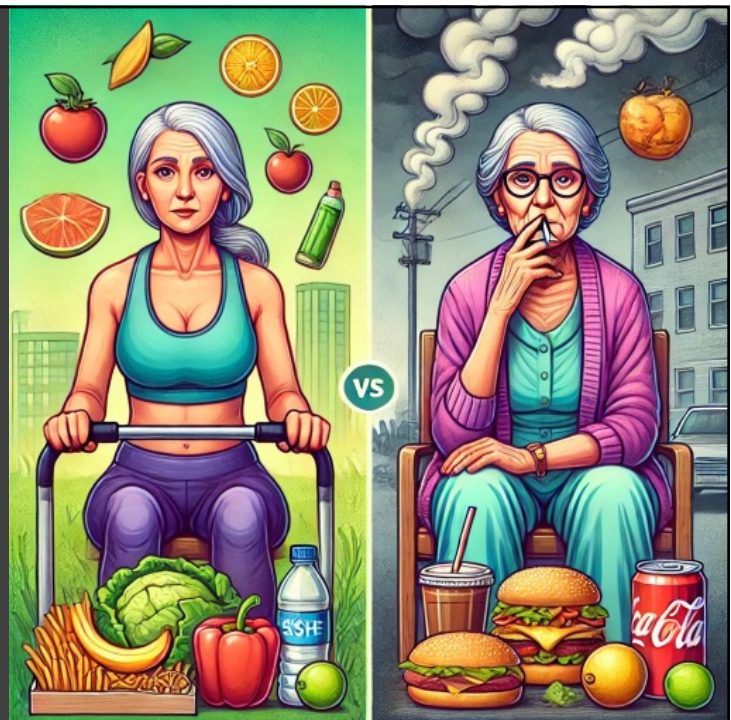


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1. **Treinamento de força** 3 a 4 x semana
2. **Ingestão proteica total diária:** 1,3 a 1,6 g/kg peso
3. **Ingestão de proteína por refeição:** $\geq 0,4$ g/kg peso
4. **Ingestão de Leucina por refeição:** ~ 3 g
5. **Dieta adequada com** balanço energético apropriado **e que forneça todos os nutrientes bem como** compostos bioativos
6. **Omega-3:** 2 a 3 g de (EPA+DHA) / dia
7. **Creatina:** 3 a 5 g / dia OU 0,1 g/kg / dia

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Os rituais diários
determinam o
nosso destino



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