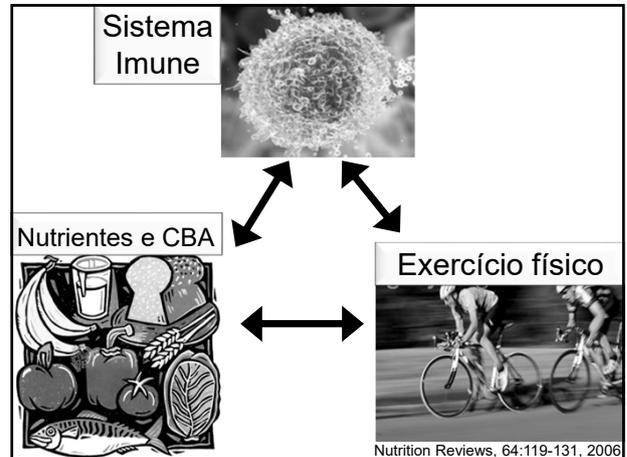


# Nutrição, Exercício Físico e Sistema Imune



**Prof. Dr. Marcelo Rogero**  
Laboratório de Genômica Nutricional e Inflamação – GENUIN  
Departamento de Nutrição  
Faculdade de Saúde Pública – USP  
e-mail: mmrogero@usp.br

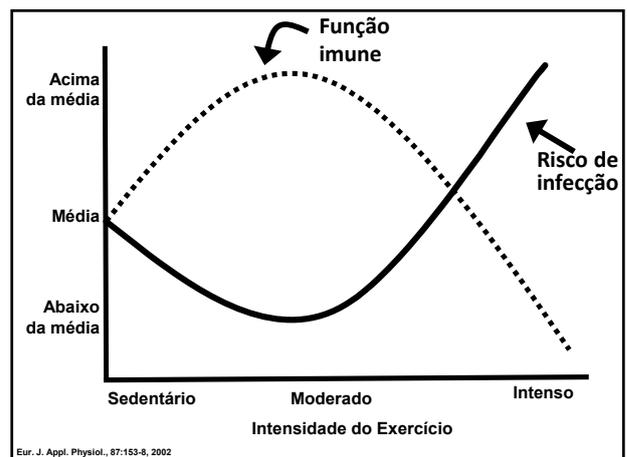
1



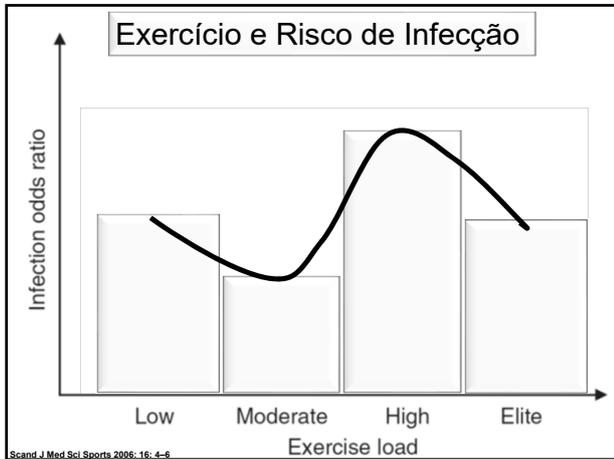
2

# O exercício físico modula a imunocompetência?

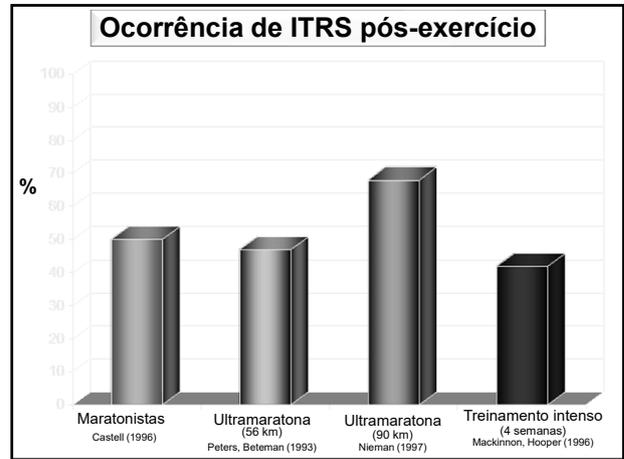
3



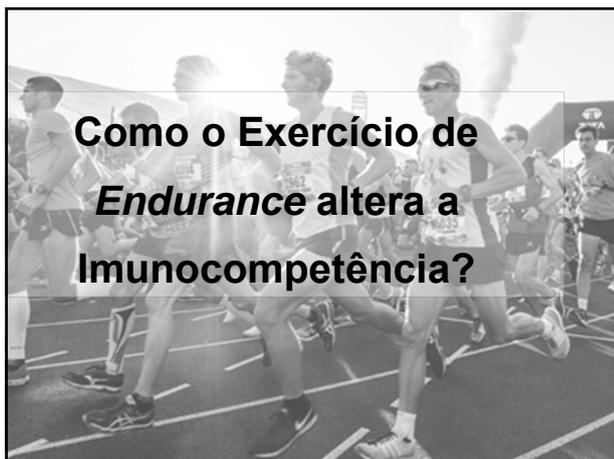
4



5



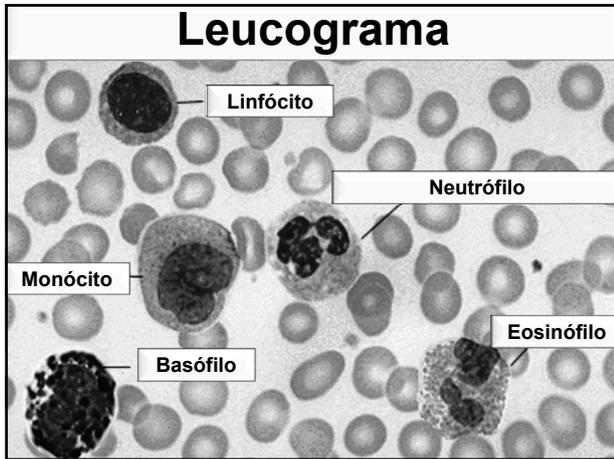
6



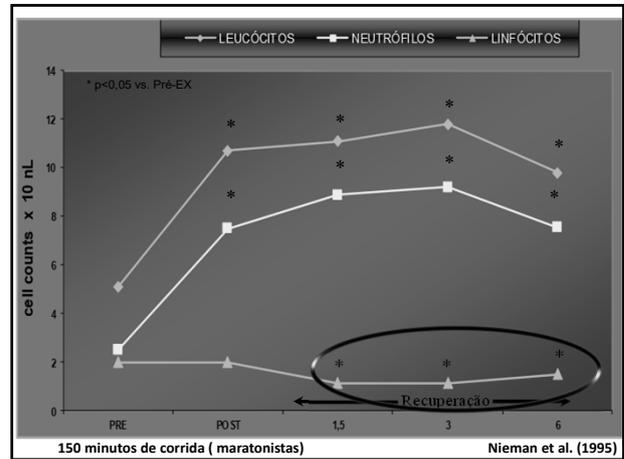
7



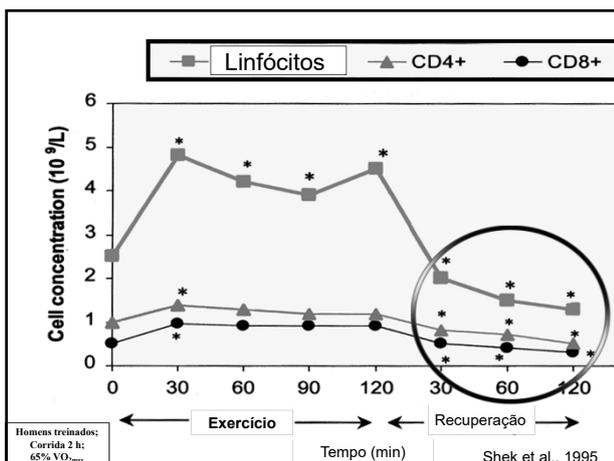
8



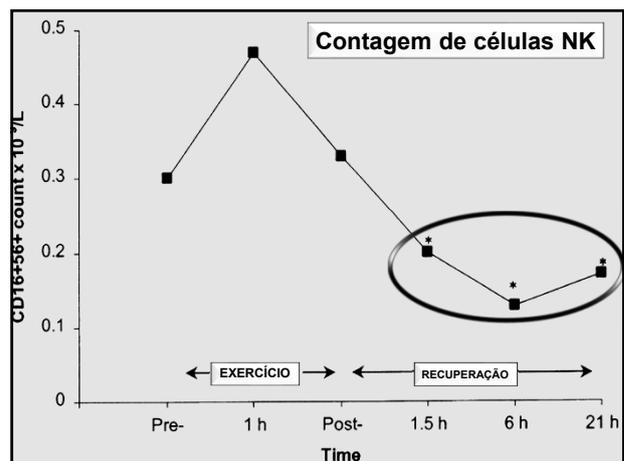
9



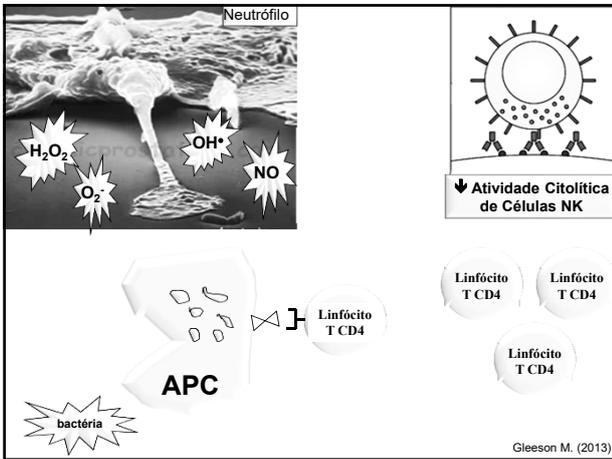
10



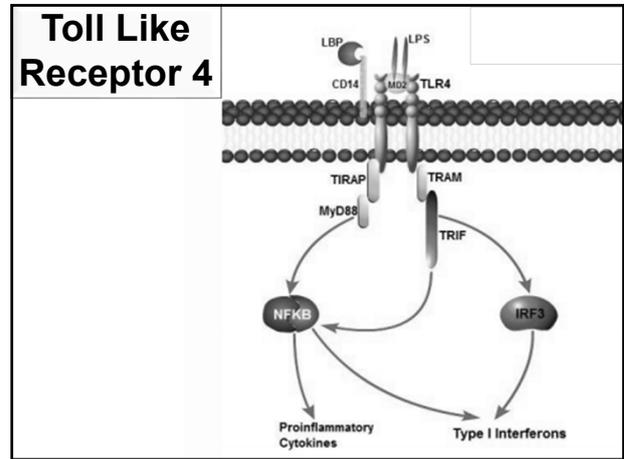
11



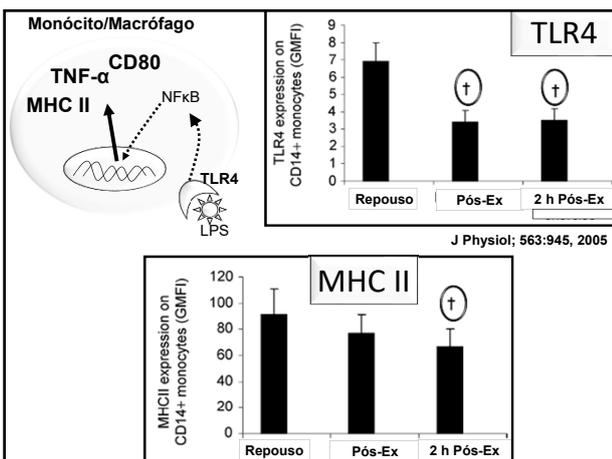
12



13



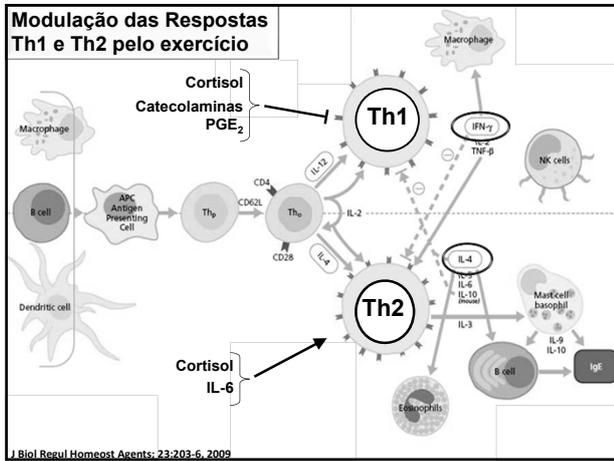
14



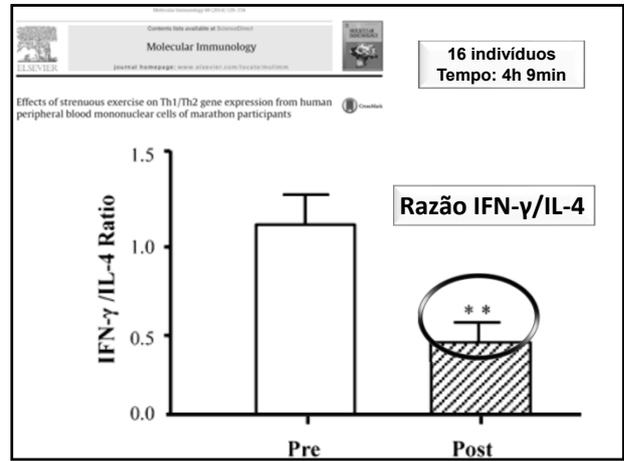
15

**Exercício de *Endurance* e Respostas Th1 e Th2**

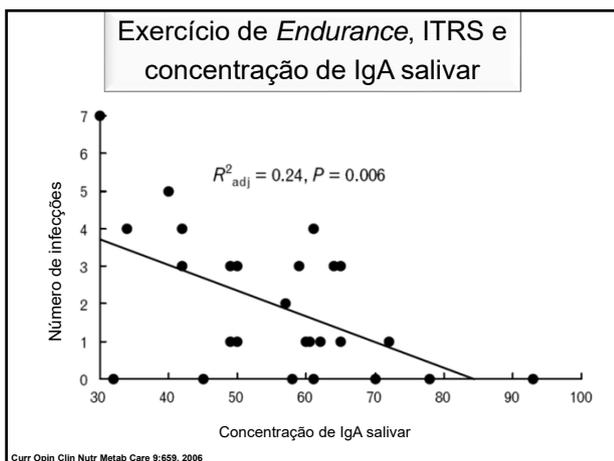
16



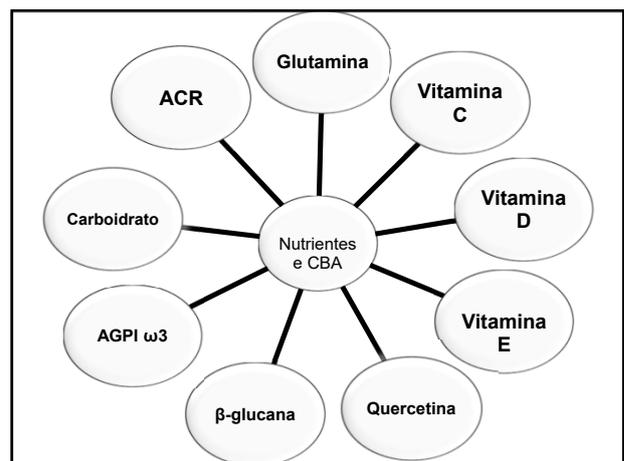
17



18



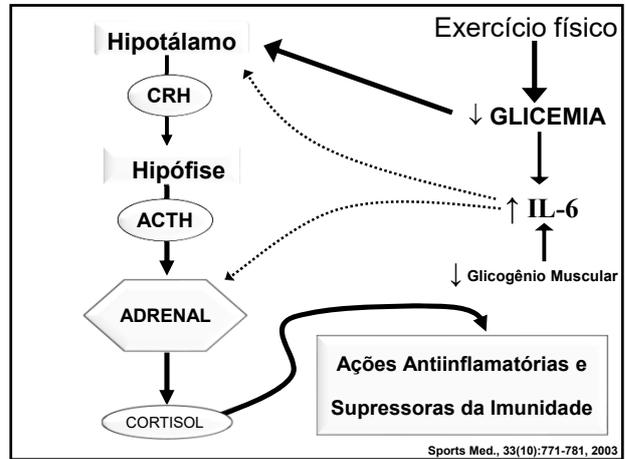
19



20

# Carboidratos e Imunocompetência

21



22

**Pre-Exercise Carbohydrate Status and Immune Responses to Prolonged Cycling:  
II. Effect on Plasma Cytokine Concentration**  
*International Journal of Sport Nutrition and Exercise Metabolism, 2001, 11, 503-512*

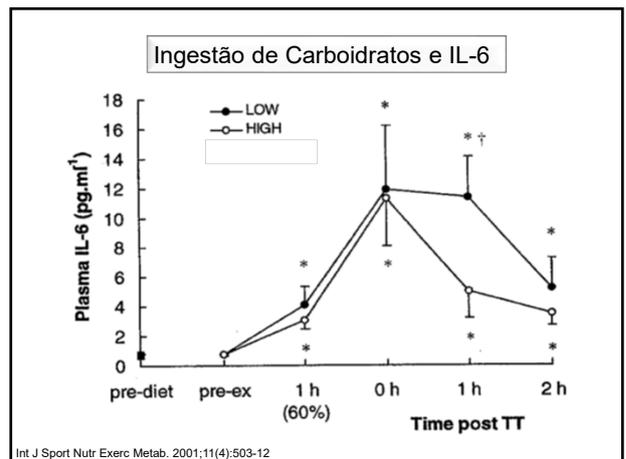
7 ciclistas treinados

CHO: 70% VCT

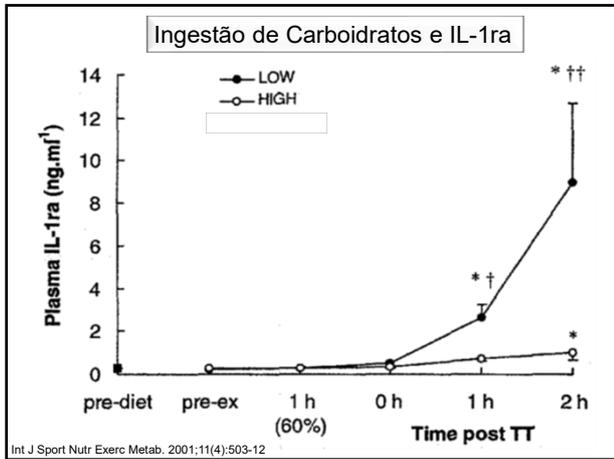
CHO: 10% VCT

1 h (60% Wmax) +  
Teste de exaustão  
(80% Wmax)

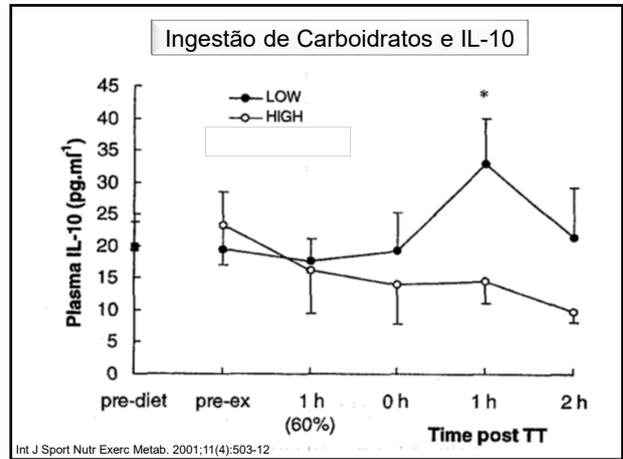
23



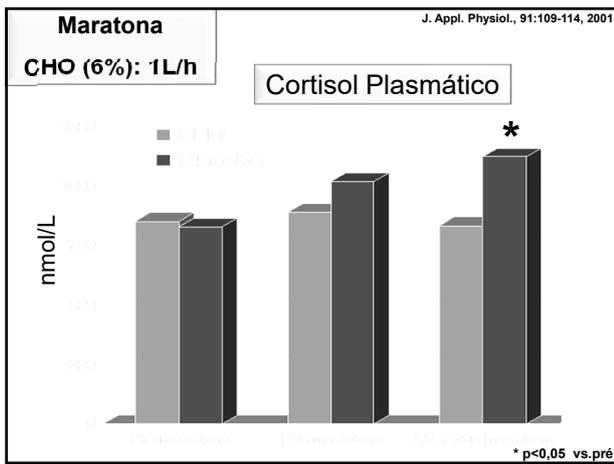
24



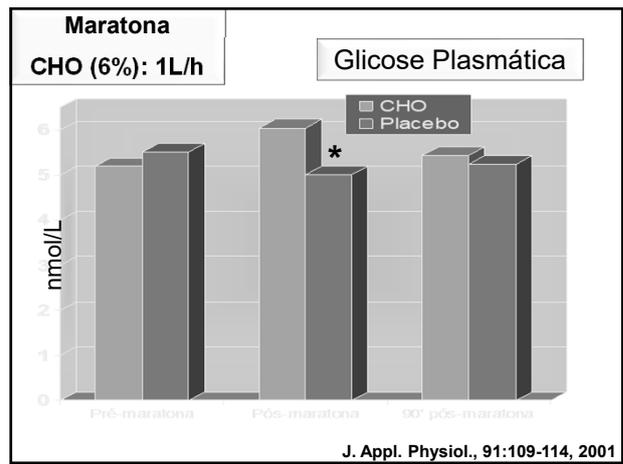
25



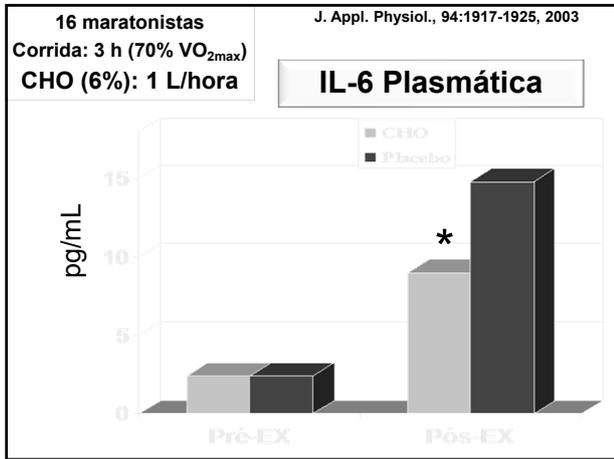
26



27



28

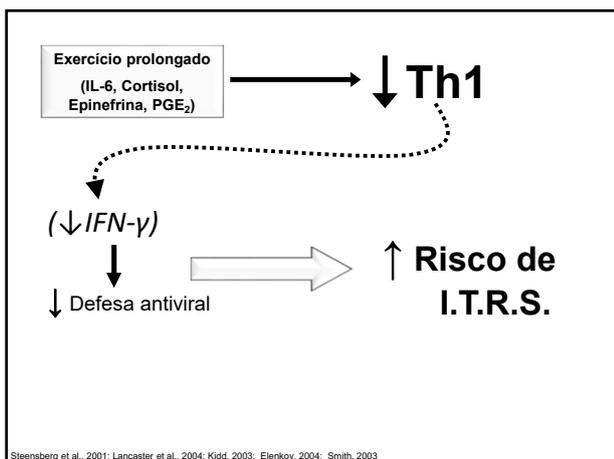


29

## Exercício prolongado, ingestão de Carboidratos e síntese de Citocinas intracelulares em Linfócitos Th1 e Th2

Exerc Immunol Rev, 10:91, 2004

30

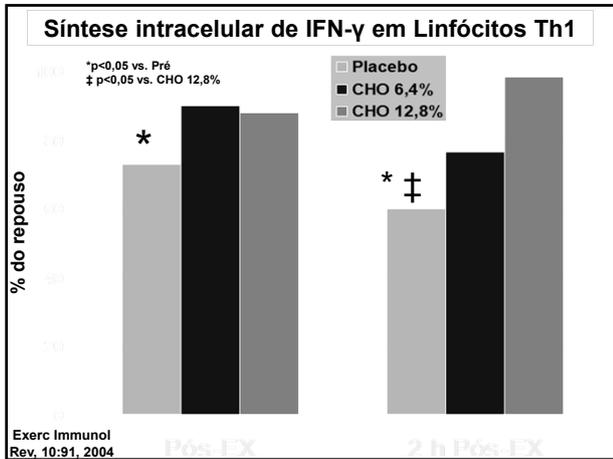


31

- ✓ 7 homens treinados
- ✓ Intensidade: ~65% VO<sub>2max</sub>; 150'
- ✓ Bebidas: Placebo; CHO (6,4% e 12,8%)
- ✓ Ingestão

Antes: 500 mL + Durante: 200 mL a cada 20 minutos = 0

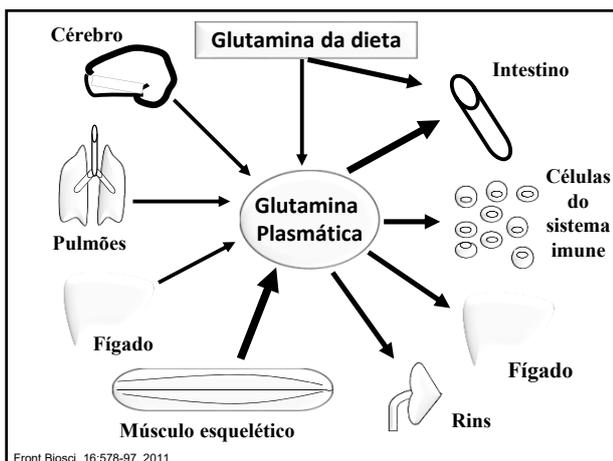
32



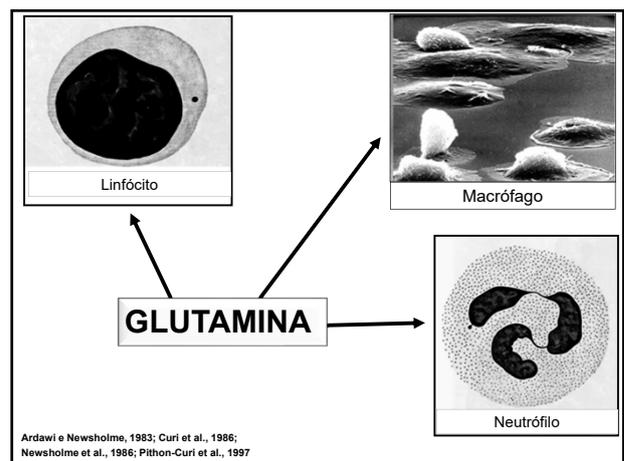
33



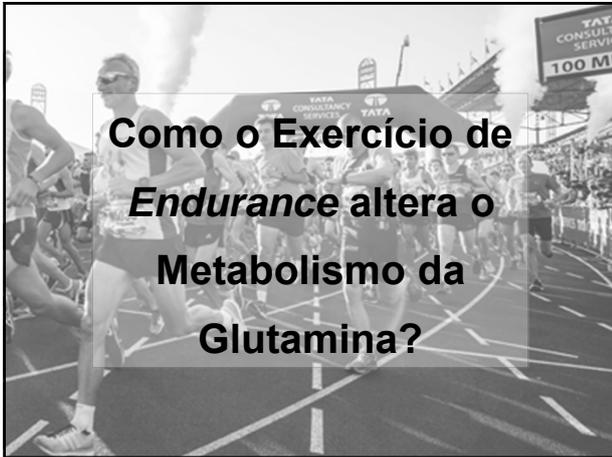
34



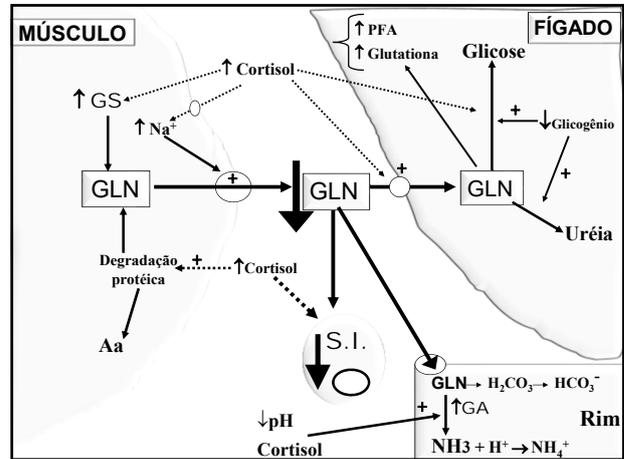
35



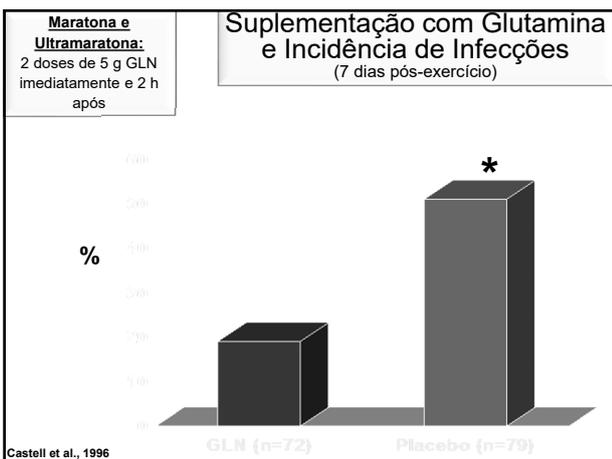
36



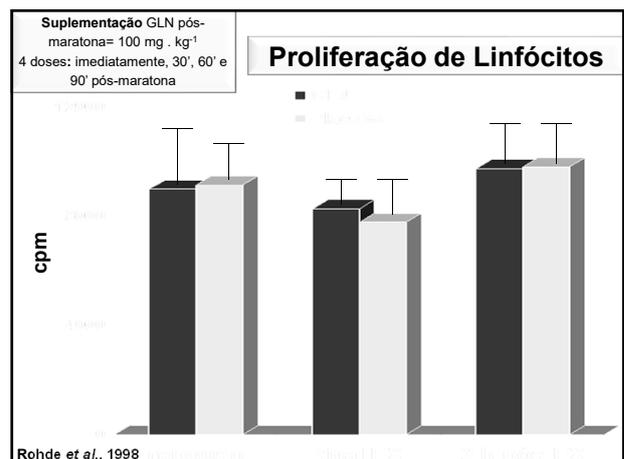
37



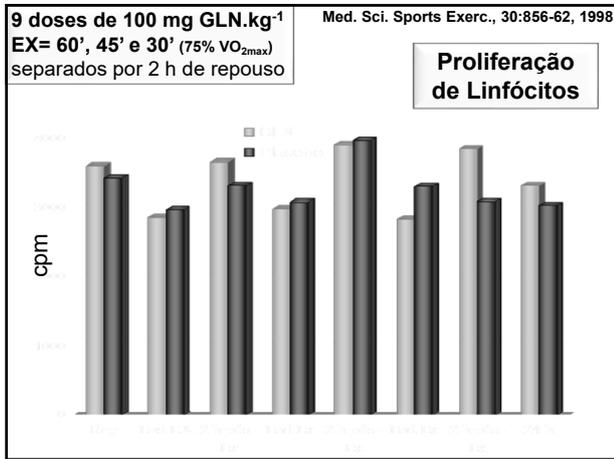
38



39



40



41

ELSEVIER Nutrition Research 24 (2004) 261–270 www.elsevier.com/locate/nutres

**NUTRITION RESEARCH**

Plasma and tissue glutamine response to acute and chronic supplementation with L-glutamine and L-alanyl-L-glutamine in rats

Marcelo Macedo Rogero<sup>a</sup>, Julio Tirapegui<sup>b</sup>, Rogério Graça Pedrosa, Ivair Santana de Oliveira Pires, Inair Alves de Castro

ELSEVIER Nutrition 21 (2004) 364–373 www.elsevier.com/locate/nut

Basic nutritional investigation

Effect of alanyl-glutamine supplementation on plasma and tissue glutamine concentrations in rats submitted to exhaustive exercise

Marcelo Macedo Rogero, M.Sc., Julio Tirapegui, Ph.D., Rogério Graça Pedrosa, M.Sc., Inair Alves de Castro, Ph.D., and Ivair Santana de Oliveira Pires, B.Chem.

Revista Brasileira de Ciências Farmacológicas Brazilian Journal of Pharmaceutical Sciences vol. 46, n. 4, out/2002

**RBCF**

Efeito da suplementação com L-alanyl-L-glutamina sobre a resposta de hipersensibilidade do tipo tardio em ratos submetidos ao treinamento intenso

Marcelo Macedo Rogero<sup>a</sup>, Julio Tirapegui<sup>b</sup>, Rogério Graça Pedrosa<sup>a</sup>, Inair Alves de Castro<sup>a</sup>, Ivair Santana de Oliveira Pires<sup>a</sup>, Antônio Aluísio Magalhães de Oliveira<sup>a</sup>, Mariêlda Marques Siqueira<sup>a</sup>, Agnaldo Roberto Pinto<sup>a</sup>, Mônica Leida<sup>a</sup>

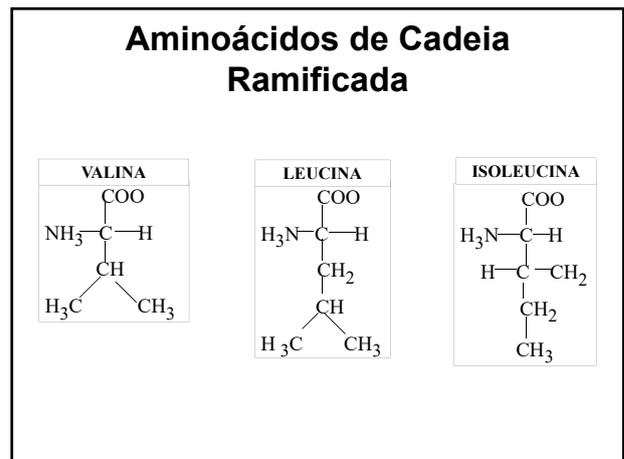
42

AMINOÁCIDOS DE CADEIA RAMIFICADA

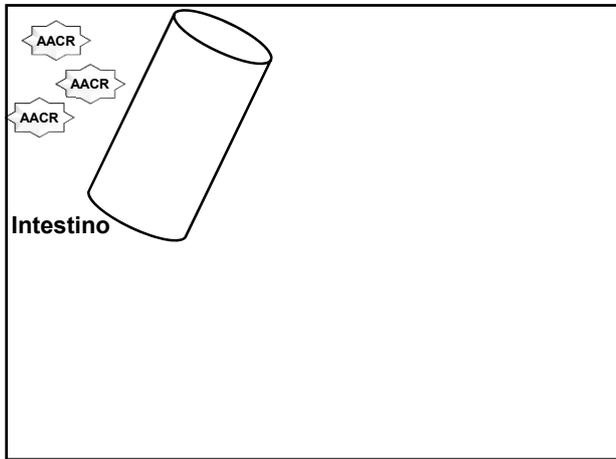
E

IMUNOCOMPETÊNCIA

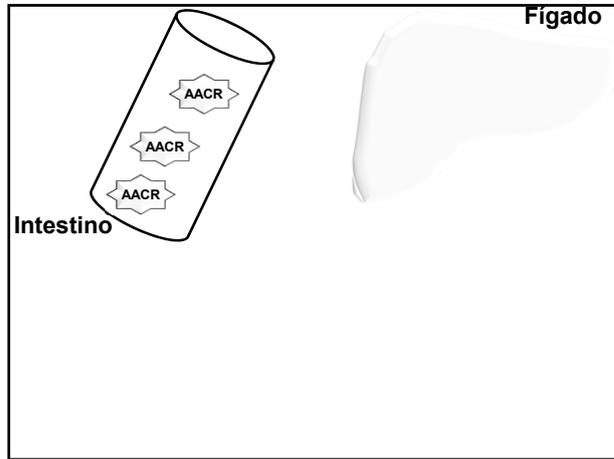
43



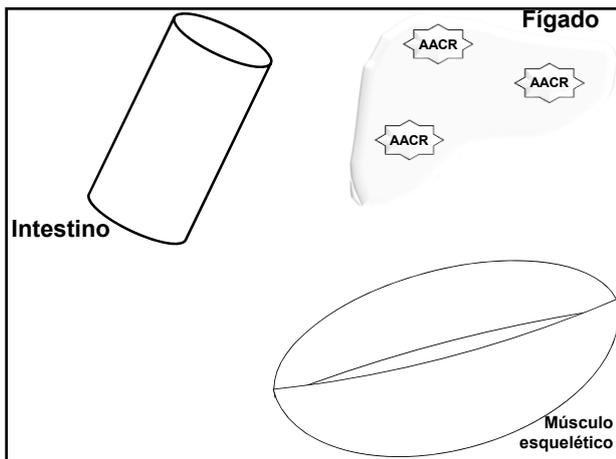
44



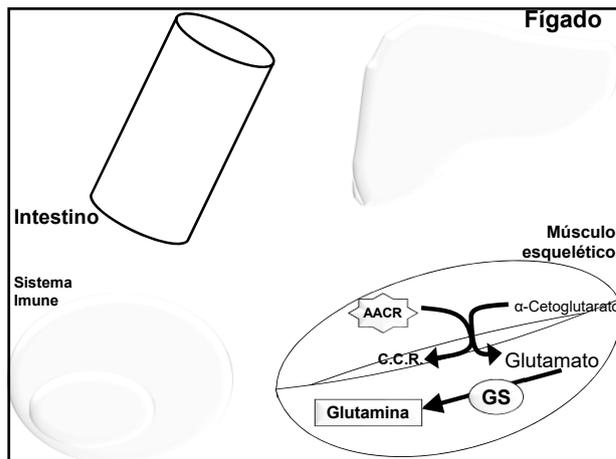
45



46



47



48

**Suplementação com Aminoácidos de Cadeia Ramificada e Imunocompetência**

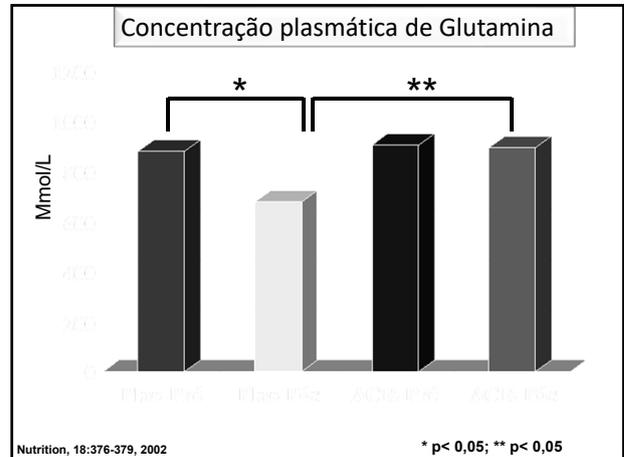
**Triatlo Olímpico (1,5 km natação; 40 km ciclismo; 10 km corrida)**

**Suplementação: 6 g ACR durante 30 dias (pré-competição)**  
 3 g ACR 30' antes da prova  
 3 g ACR durante 7 dias pós-competição

**ACR: 60% L-leucina; 20% L-isoleucina; 20% L-valina**

Nutrition, 18:376-379, 2002

49



50



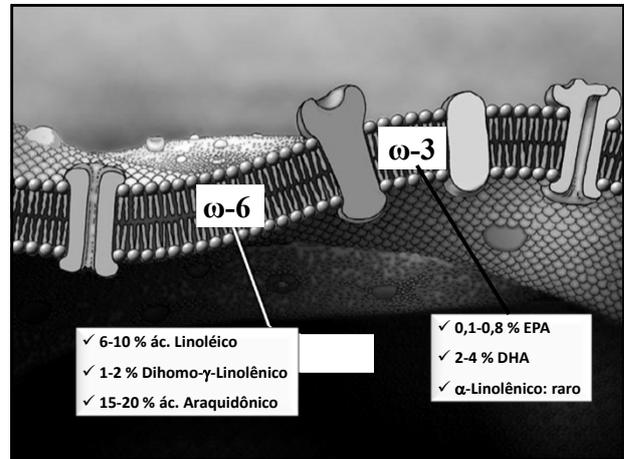
51

**Exercício,  
Inflamação e  
Ácidos Graxos  
Poliinsaturados  
ω-3**

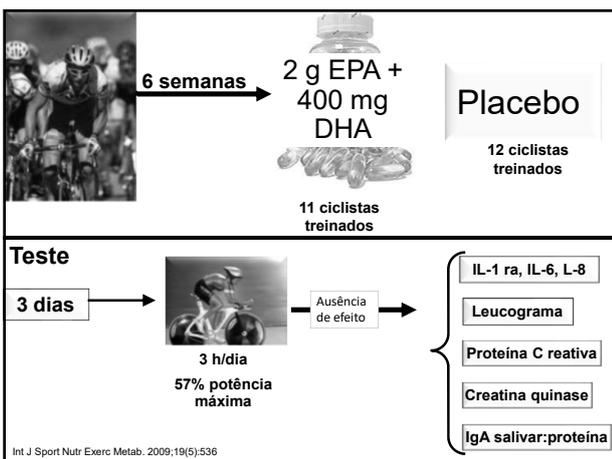
52



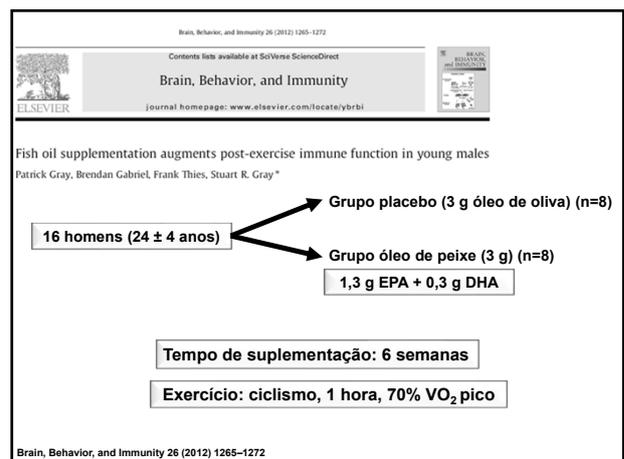
53



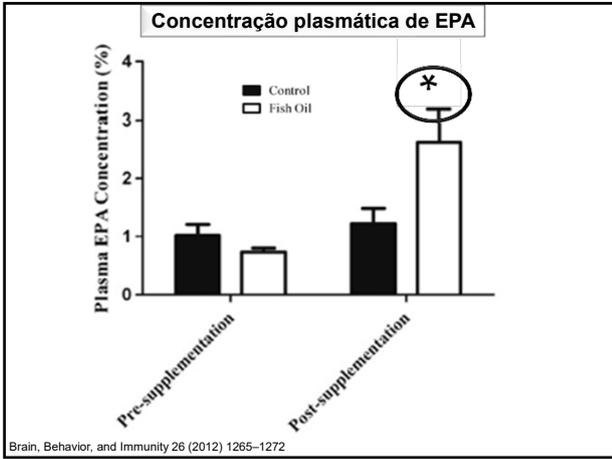
54



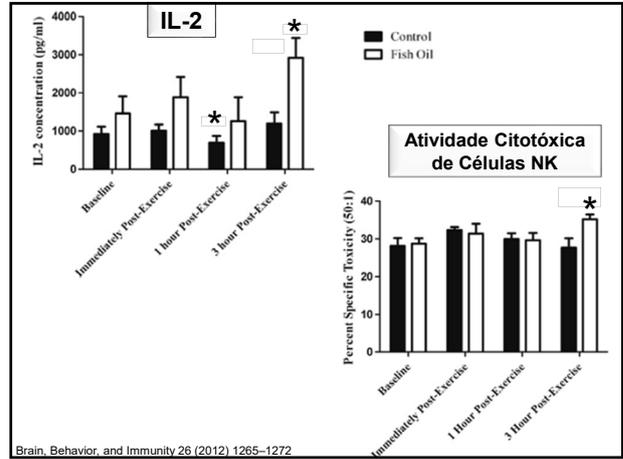
55



56



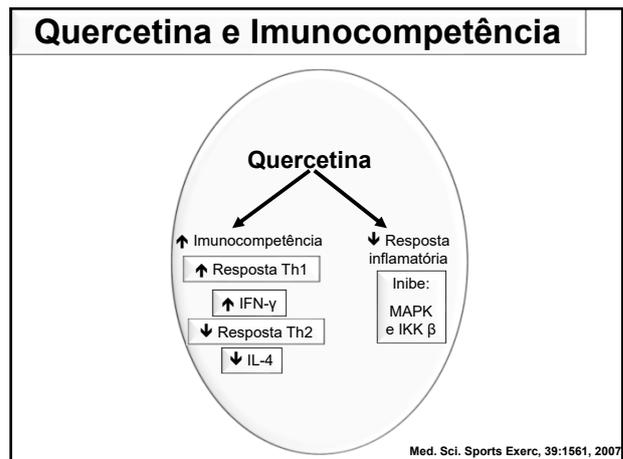
57



58



59



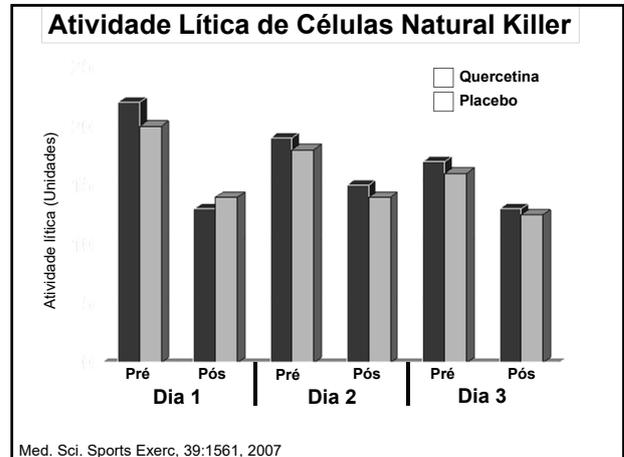
60

### Quercetina e Imunocompetência

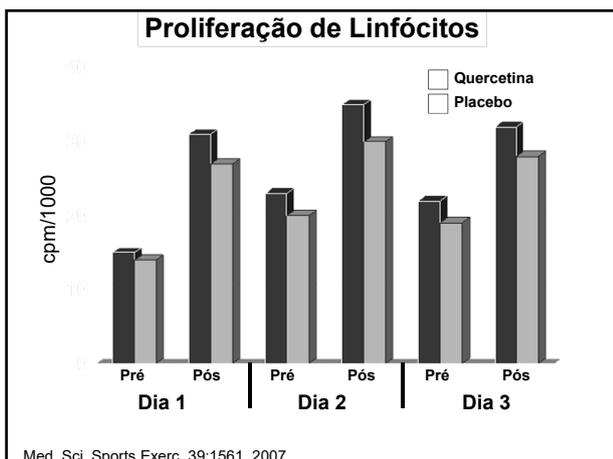
- ✓ 40 ciclistas treinados
- ✓ Quercetina (1 g/dia): 3 semanas antes; 3 dias de exercício intenso; 2 semanas após
- ✓ Protocolo: 3 horas (57% W max)

Med. Sci. Sports Exerc, 39:1561, 2007

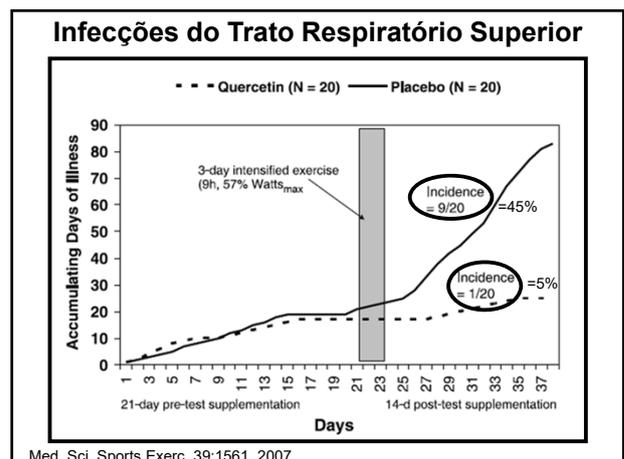
61



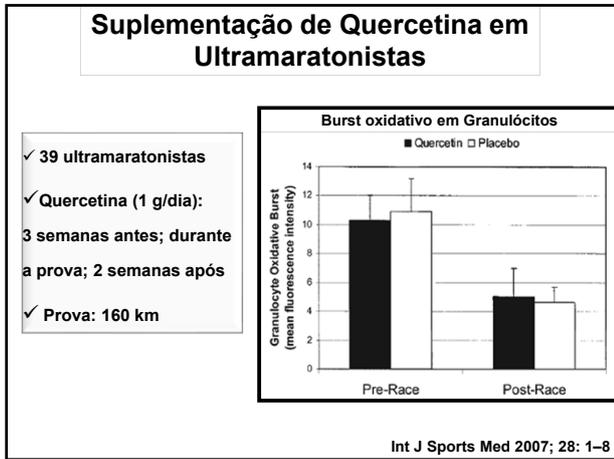
62



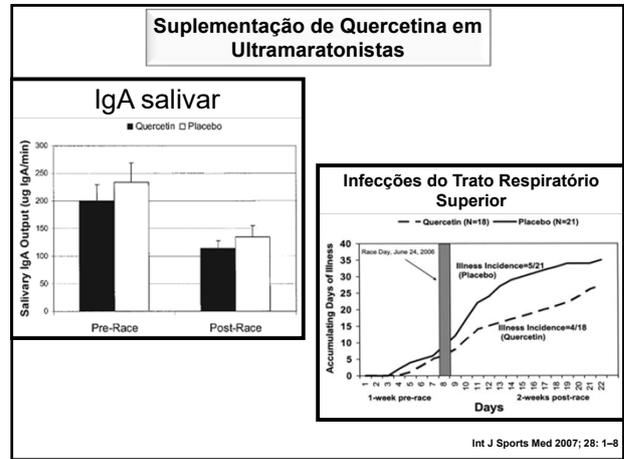
63



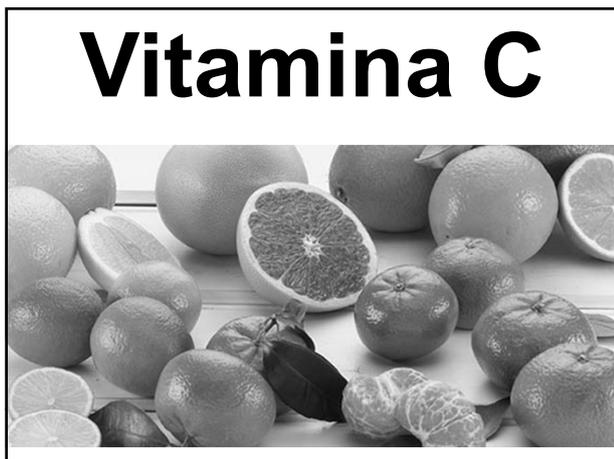
64



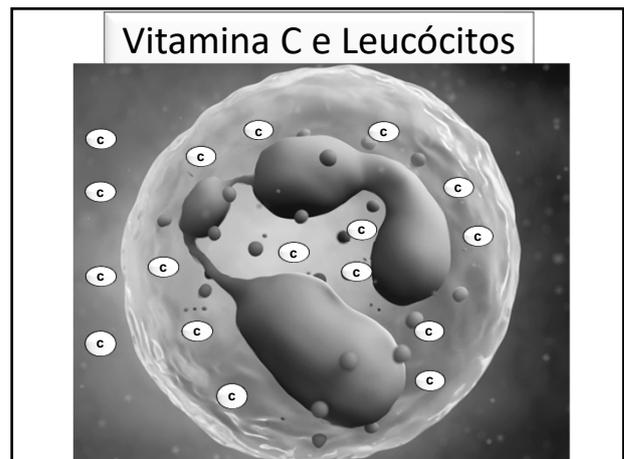
65



66



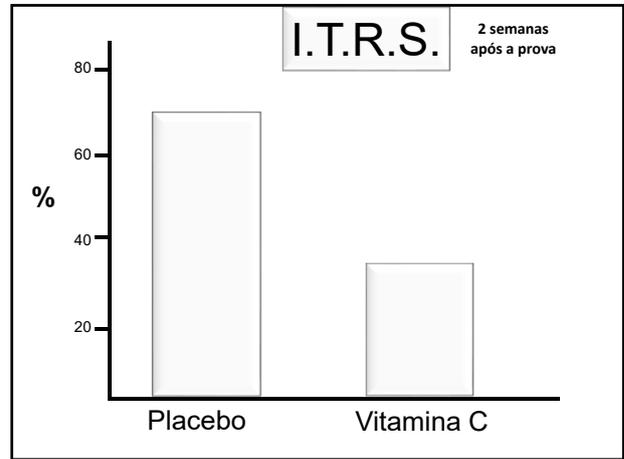
67



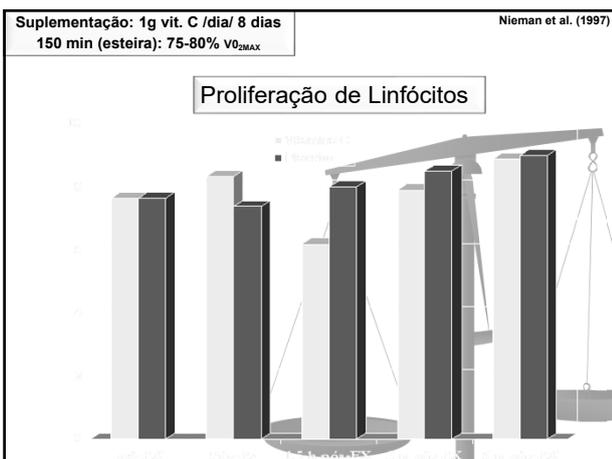
68



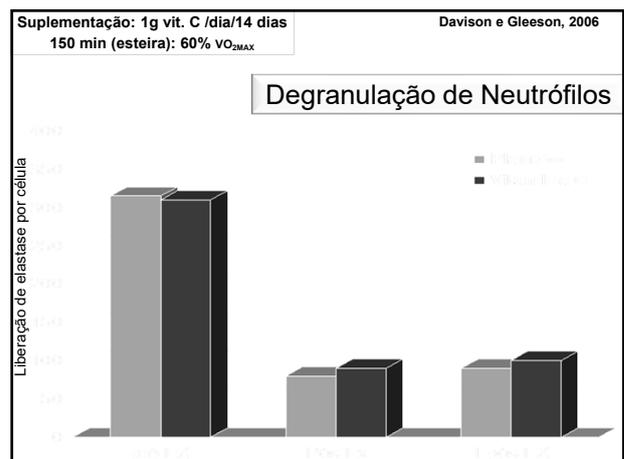
69



70



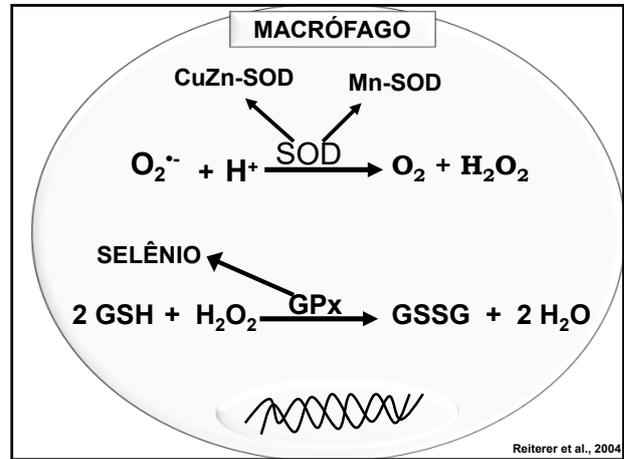
71



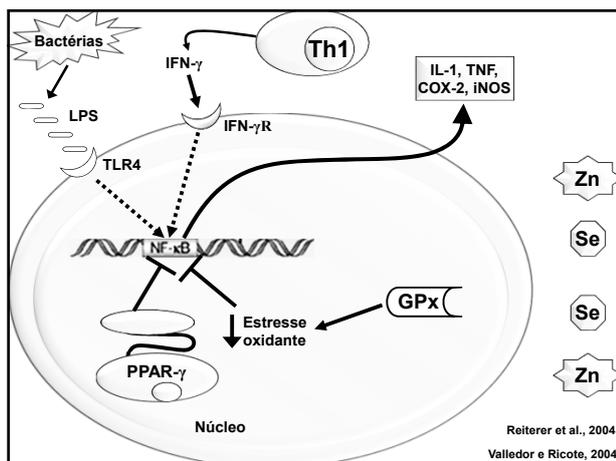
72

# Zinco e Selênio

73



74



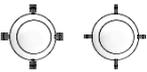
75

# Porém...

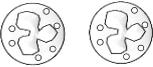
76

**25 mg Zn + 1,5 mg Cu (2 x por dia)/6 dias**

**Linfócitos**

↓ **Proliferação** 

**Neutrófilos**

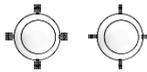
↓ **Síntese de Superóxido** 

Singh et al. (1994)

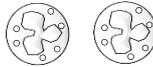
77

**Suplementação 150 mg Zn (2 x por dia/6 semanas)**

**Linfócitos**

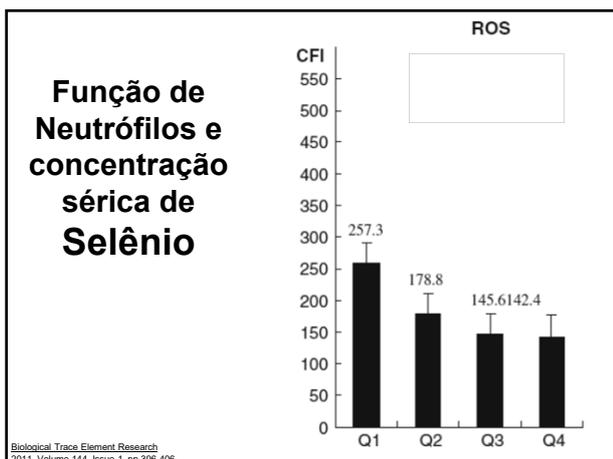
↓ **Proliferação** 

**Neutrófilos**

↓ **Fagocitose Quimotaxia** 

JAMA, 1984 Sep 21;252(11):1443-6

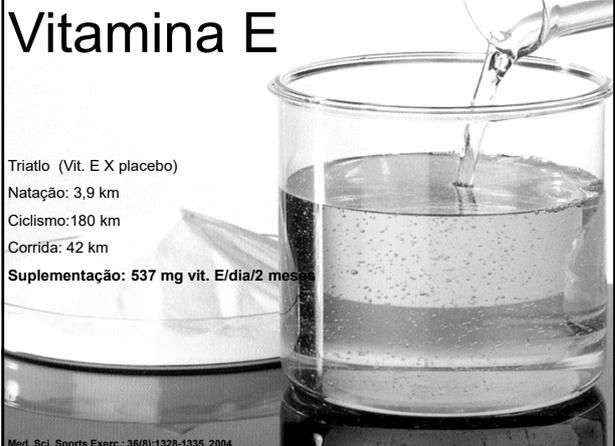
78



79

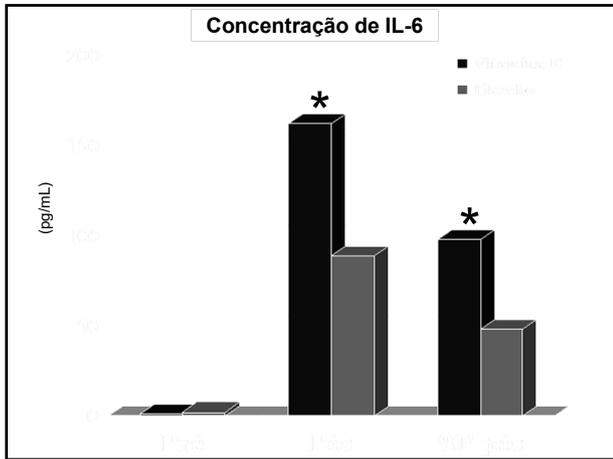
**Vitamina E**

Triatlo (Vit. E X placebo)  
Natação: 3,9 km  
Ciclismo: 180 km  
Corrida: 42 km  
**Suplementação: 537 mg vit. E/dia/2 meses**



Med. Sci. Sports Exerc.; 36(8):1328-1335, 2004

80



81