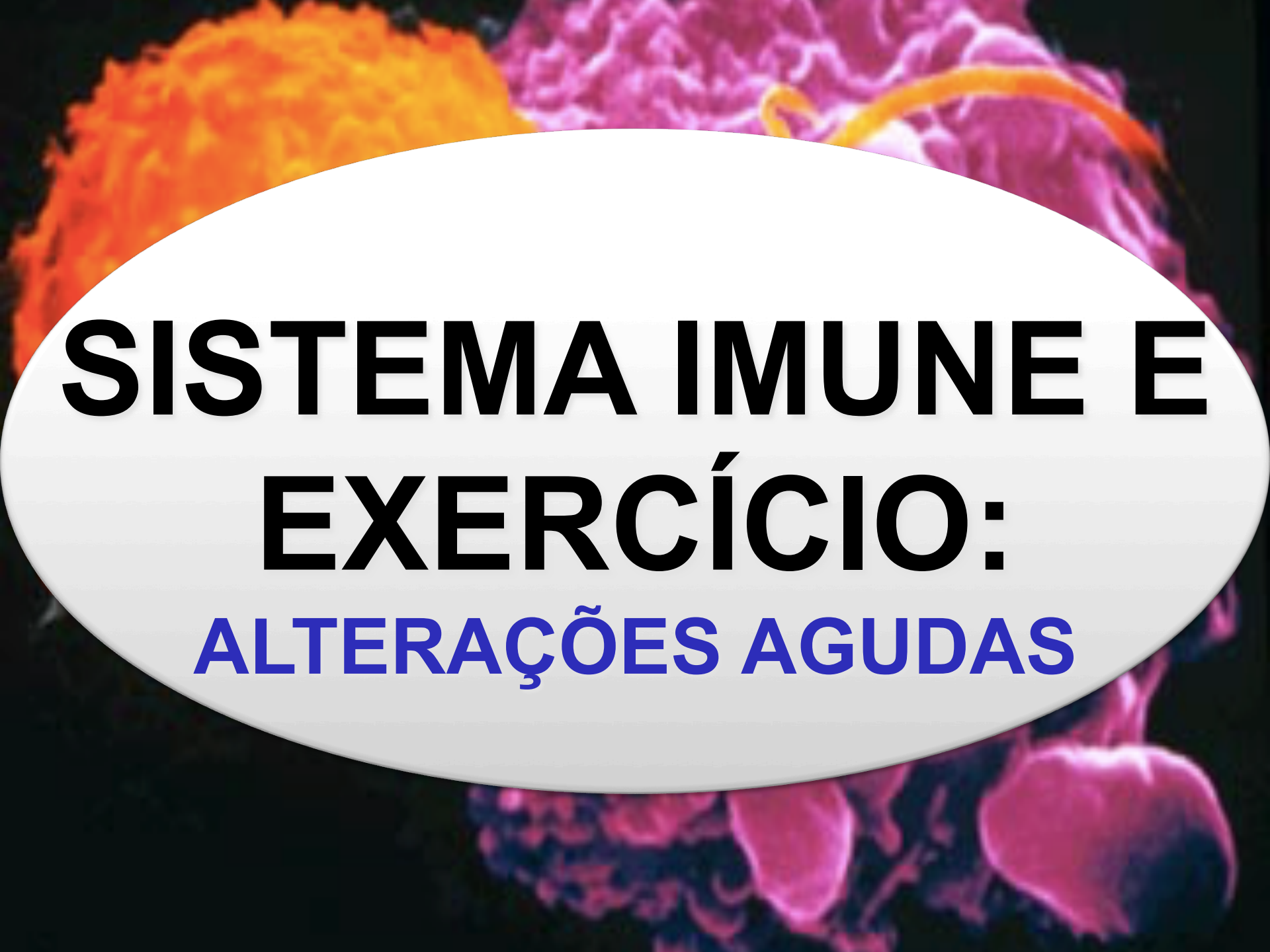


SISTEMA IMUNE E EXERCÍCIO:

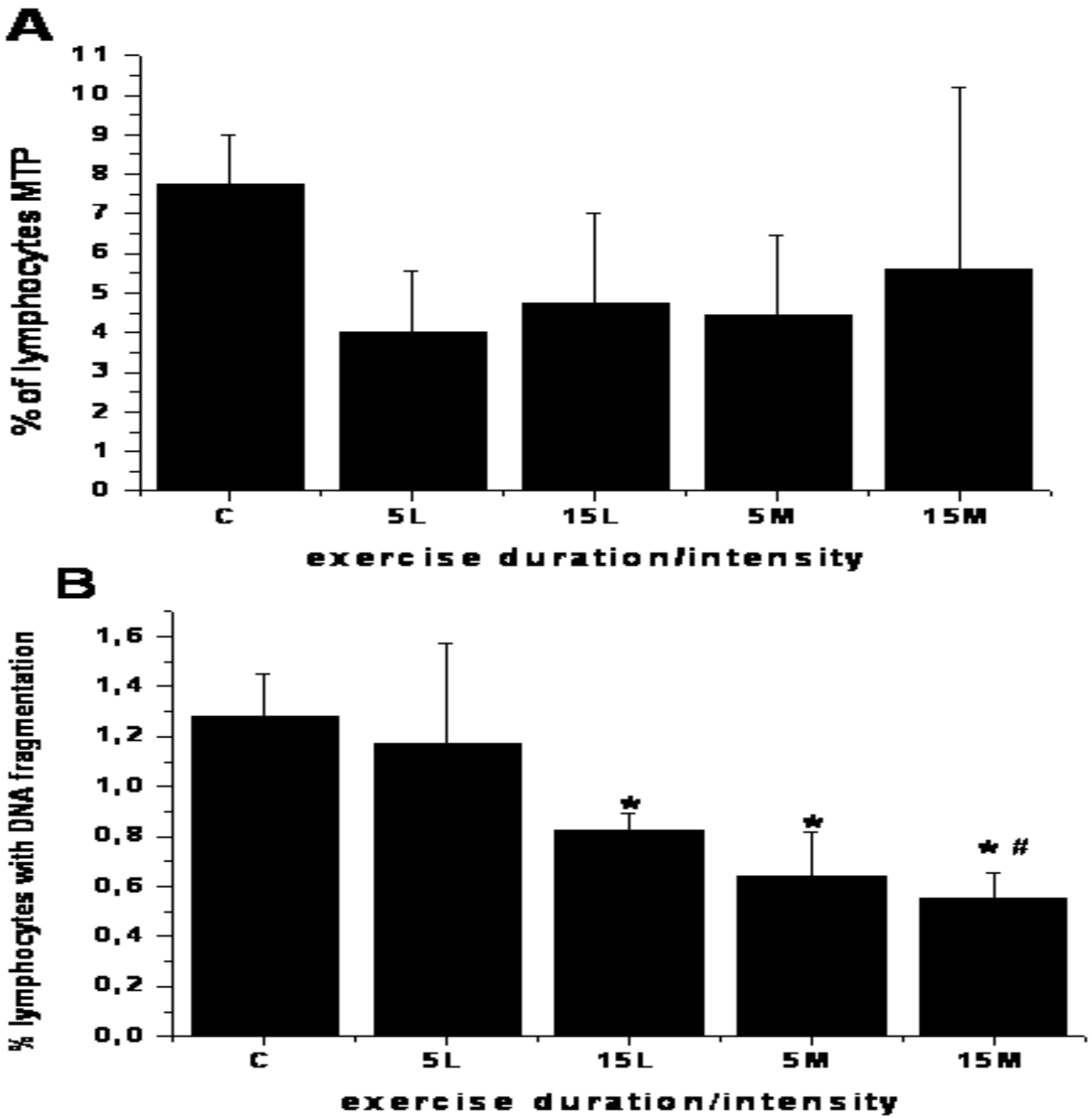
ALTERAÇÕES AGUDAS

Lymphocyte and Cytokines after Short Periods of Exercise

Authors

J. Prestes[1], C. K. de O. Ferreira[2], R. Dias[2], A. B. Frollini[2], F. F. Donatto[2], M. F. Cury-Boaventura[3], M. G. Guereschi[2], T. C. Pithon-Curi[3], R. Verlengia[2], A. C. Palanch[2], R. Curi[3], C. R. Cavaglieri[2]

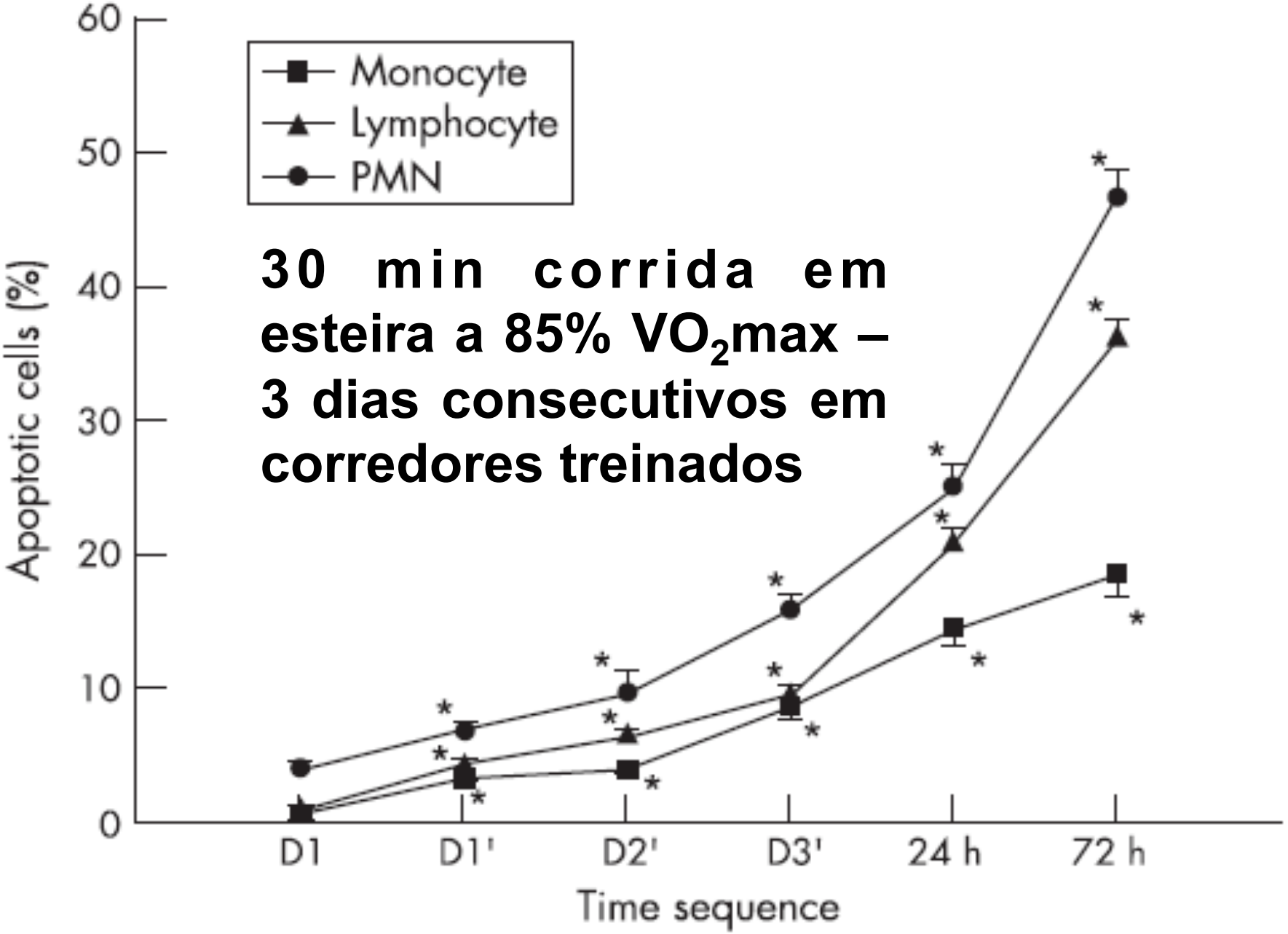
Prestes J et al. Lymphocyte and Cytokines ... Int J Sports Med 2008; 29: 1 – 5

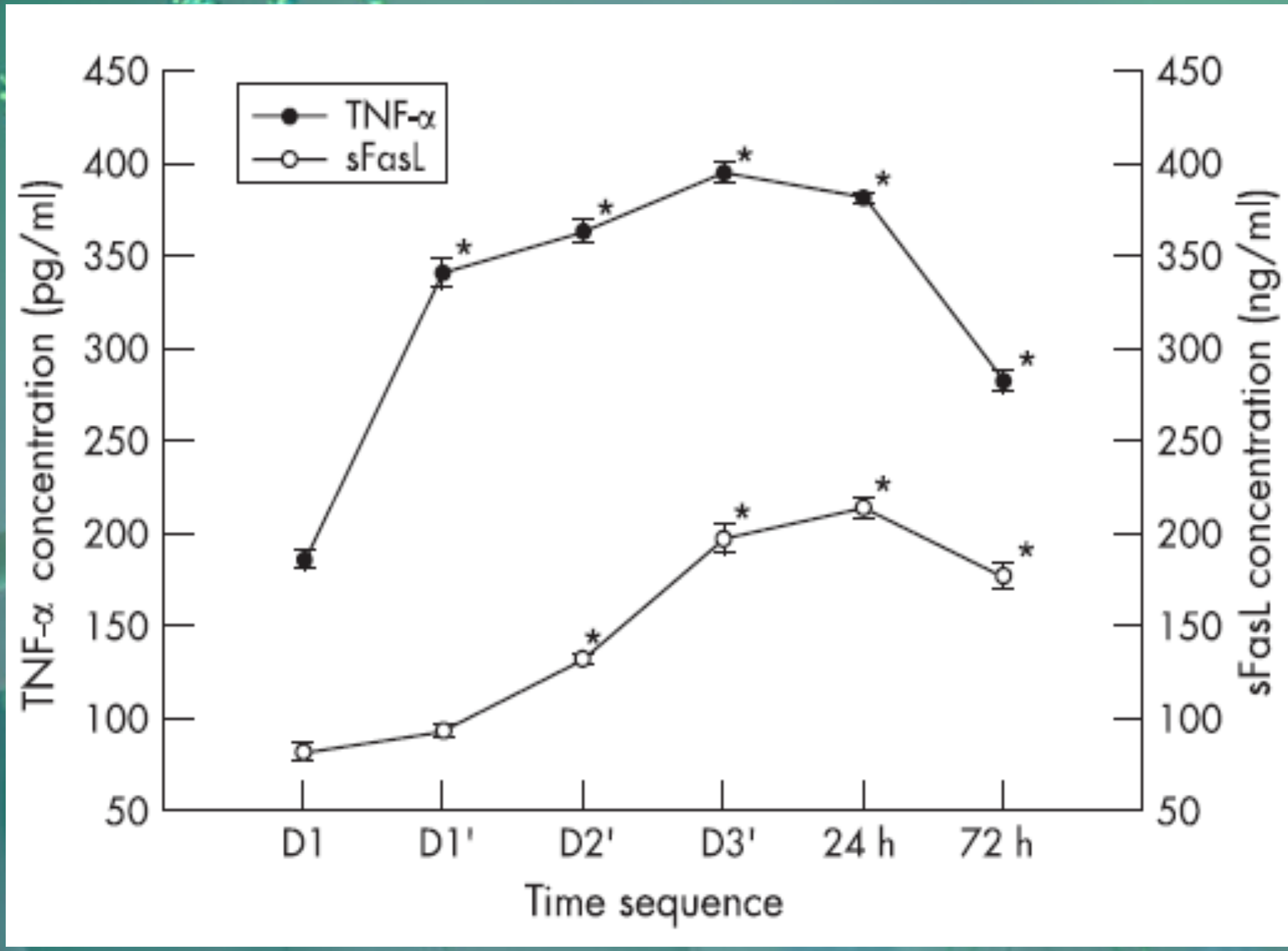

A
% of lymphocytes MTP
0
1
2
3
4
5
6
7
8
9
10
11
C
5L
15L
5M
15M
exercise duration/intensity
B
% lymphocytes with DNA fragmentation
0,0
0,2
0,4
0,6
0,8
1,0
1,2
1,4
1,6
*
*
* #
C
5L
15L
5M
15M
exercise duration/intensity

Deleterious effects of short-term, high-intensity exercise on immune function: evidence from leucocyte mitochondrial alterations and apoptosis

T-C Tuan, T-G Hsu, M-C Fong, C-F Hsu, K K C Tsai, C-Y Lee and C-W Kong

Br. J. Sports Med. 2008;42;11-15


Monocyte
Lymphocyte
PMN
30 min corrida em esteira a 85% VO2max – 3 dias consecutivos em corredores treinados
Apoptotic cells (%)
60
50
40
30
20
10
0
D1
D1'
D2'
D3'
24 h
72 h
Time sequence


TNF-α
sFasL
450
400
350
300
250
200
150
100
50
TNF-α concentration (pg/ml)
sFasL concentration (ng/ml)
D1
D1'
D2'
D3'
24 h
72 h
Time sequence
*

Immune Response to a 30-Minute Walk

DAVID C. NIEMAN, DRU A. HENSON, MELANIE D. AUSTIN, and VICTOR A. BROWN

Department of Health, Leisure, and Exercise Science; Appalachian State University, Boone, NC

Med. Sci. Sports Exerc., Vol. 37, No. 1, pp. 57–62, 2005.

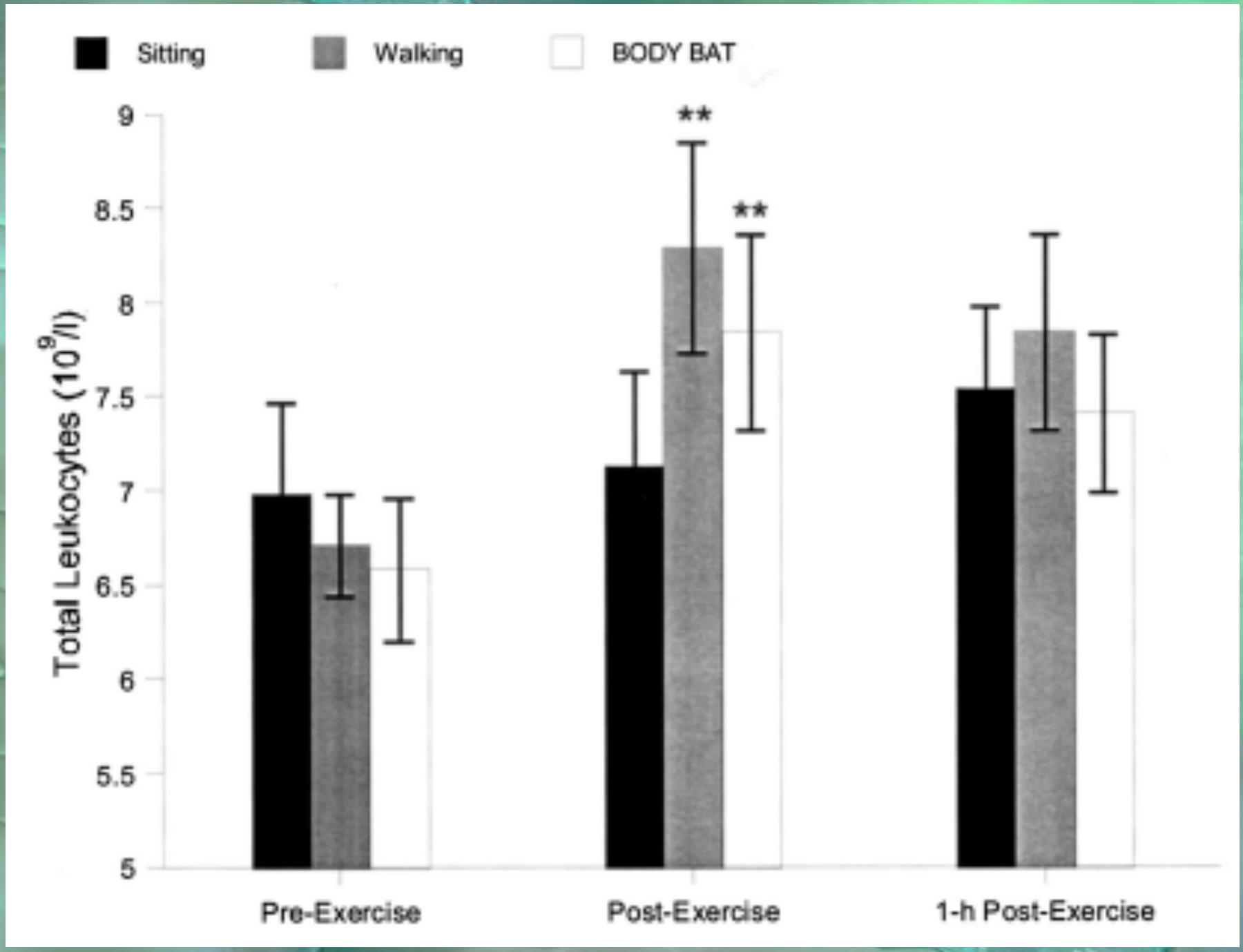
Resposta imune a 30 minutos de caminhada

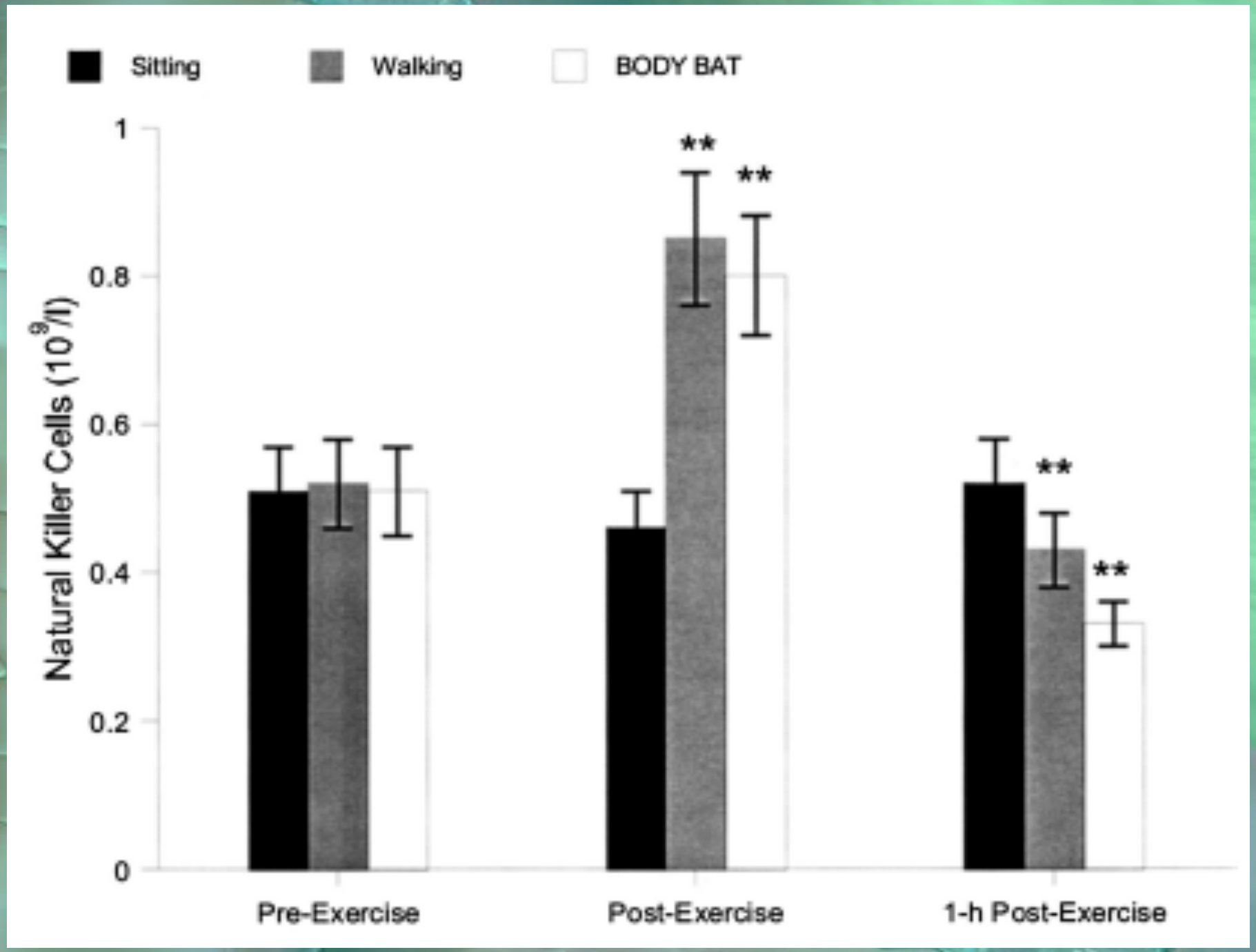
TABLE 1. Subject characteristics (N = 15) (mean ± SE).

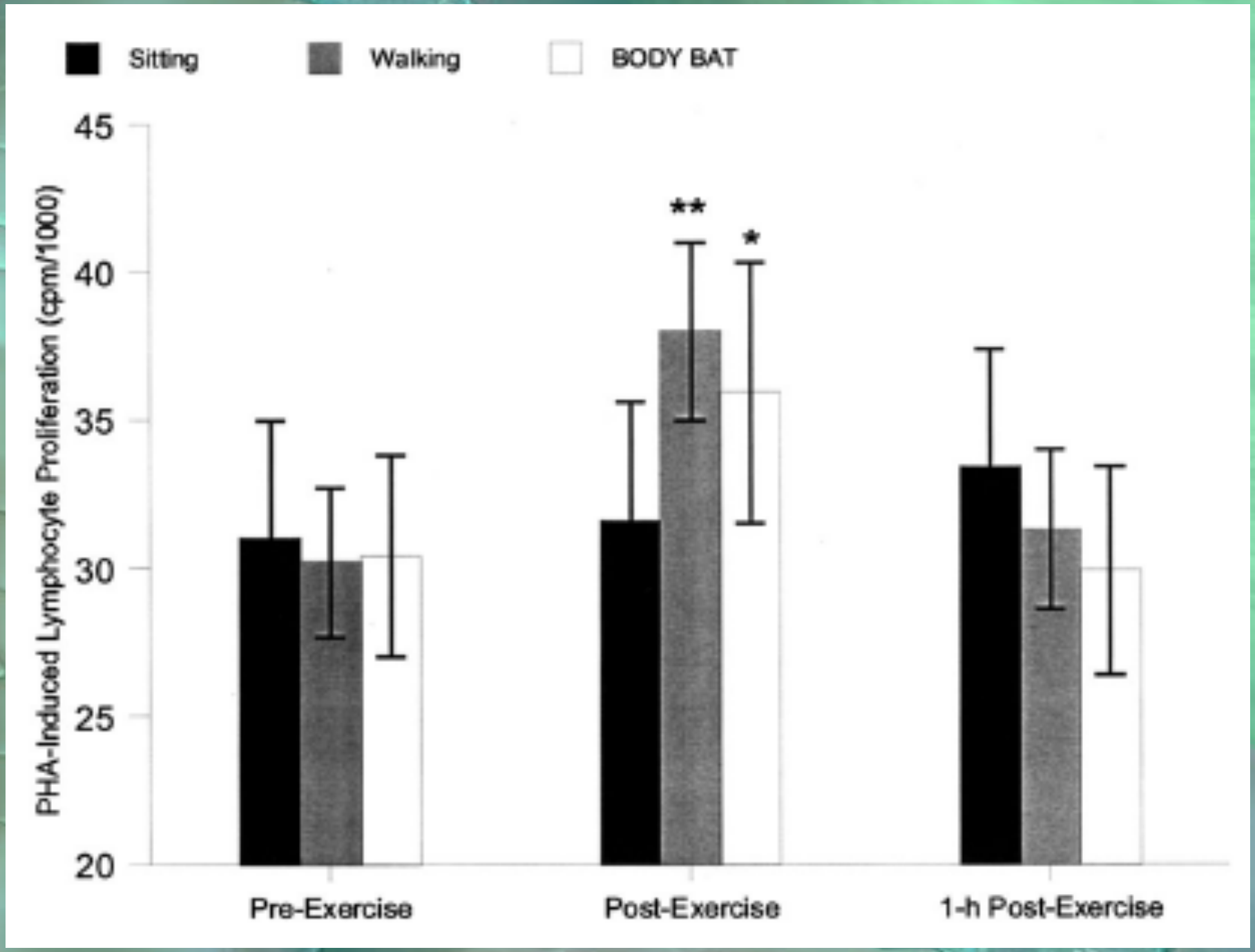
Variable	Subjects (N = 15)	Range
Age (yr)	37.5 ± 3.1	(20–55)
Stature (m)	1.65 ± 0.01	(1.59–1.72)
Body mass (kg)	68.2 ± 3.4	(53.2–101.8)
Skinfold sum (mm)	67.0 ± 5.5	(41–117)
$\dot{V}O_{2max}$ ($mL \cdot kg^{-1} \cdot min^{-1}$)	34.4 ± 1.4	(23.4–46.0)
HR_{max} ($beats \cdot min^{-1}$)	184 ± 3	(164–198)
RR_{max} ($breaths \cdot min^{-1}$)	43.7 ± 1.8	(31–54)
RER_{max}	1.27 ± 0.02	(1.06–1.43)
$\dot{V}E_{max}$ ($L \cdot min^{-1}$)	90.7 ± 4.9	(45.0–116.0)

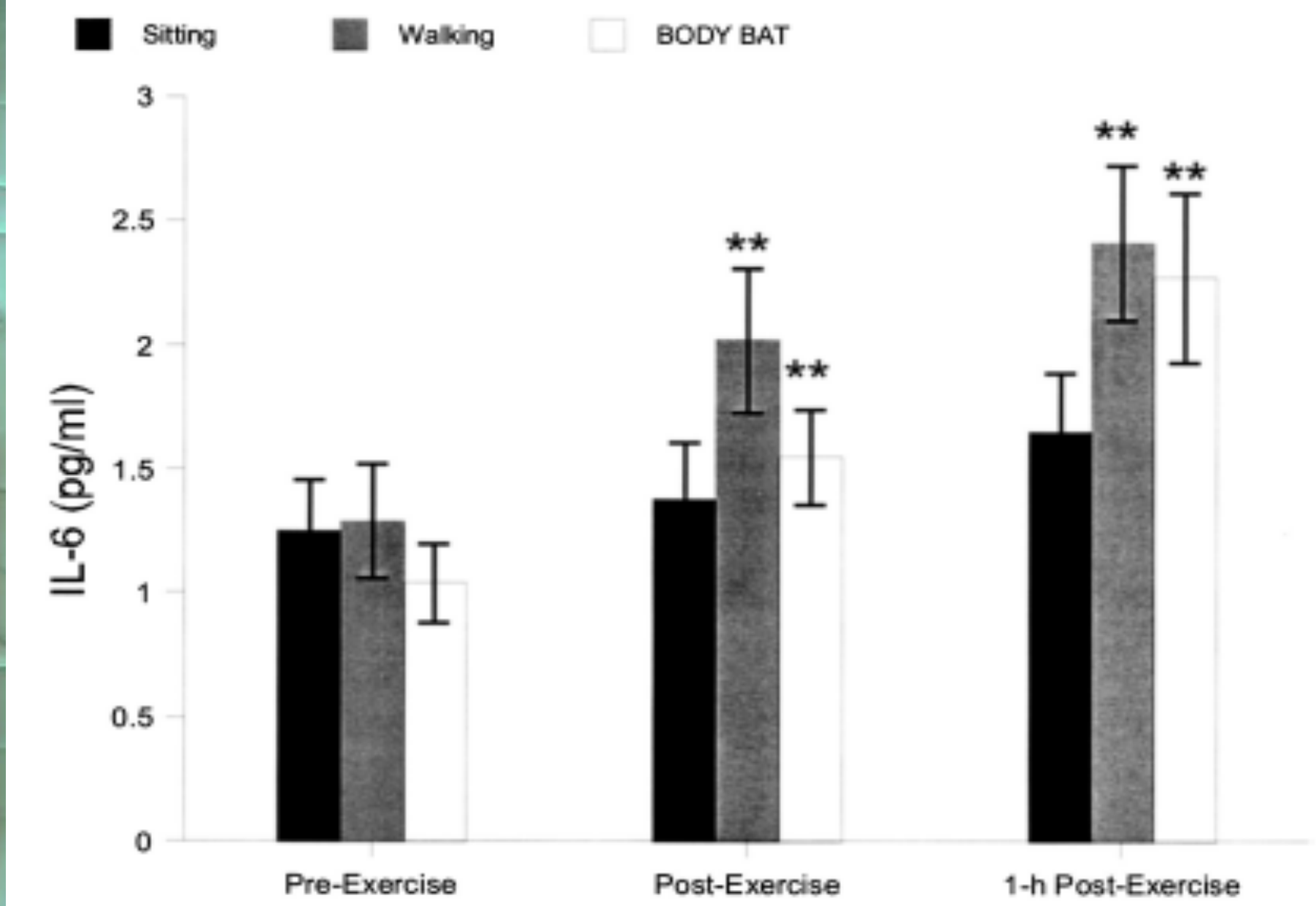
$\dot{V}O_2$, rate of oxygen consumption; HR, heart rate; RR, respiratory rate; RER, respiratory exchange ratio; $\dot{V}E$, ventilation rate.

Caminhada de 30 minutos em esteira c/ e s/ aparato nas mãos a 60-65% do VO_2max.


Sitting
Walking
BODY BAT
Total Leukocytes (10^9/l)
9
8.5
8
7.5
7
6.5
6
5.5
5
**
**
Pre-Exercise
Post-Exercise
1-h Post-Exercise


Sitting
Walking
BODY BAT
Natural Killer Cells (10^9/l)
1
0.8
0.6
0.4
0.2
0
**
**
**
**
Pre-Exercise
Post-Exercise
1-h Post-Exercise


Sitting
Walking
BODY BAT
PHA-Induced Lymphocyte Proliferation (cpm/1000)
45
40
35
30
25
20
**
*
Pre-Exercise
Post-Exercise
1-h Post-Exercise


Sitting
Walking
BODY BAT
IL-6 (pg/ml)
3
2.5
2
1.5
1
0.5
0
**
**
**
**
Pre-Exercise
Post-Exercise
1-h Post-Exercise

CONCLUSÕES DO ESTUDO

Caminhada de 30 min c/ ou s/ aparato provocou **alterações imunes transitórias;**

Comparado a situação de repouso;

Principais aumentos ocorreram na **proliferação de linfócitos induzidos por PHA, IL-6, células NK e leucócitos totais.**

Journal of Strength and Conditioning Research, 2005, 19(1), 16–22

REST-INTERVAL LENGTH AFFECTS LEUKOCYTE LEVELS DURING HEAVY RESISTANCE EXERCISE

DAVID L. MAYHEW,[1] JOHN P. THYFAULT,[2] AND ALEXANDER J. KOCH[1]

[1]Human Performance Laboratory, Truman State University, Kirksville, Missouri 63501; [2]Department of Physiology, East Carolina University, Greenville, North Carolina 27858.

A Duração do Intervalo de Recuperação Afeta os Níveis de Leucócitos Durante o TF Pesado

METODOLOGIA

9 sujeitos, treinados recreacionalmente;

2 séries de aquec. a 40% e 50% de 1RM, 10 x 10 reps a 65% de 1RM no leg press;

1ª sessão: 1 min de intervalo entre as séries;

7 dias após, mesmo protocolo, porém c/ 3 min de intervalo entre as séries.

TABLE 1. Physical characteristics of the nine weight-trained men.*

Variable	Mean ± *SEM*
Age (y)	22.2 ± 0.3
Height (cm)	180.7 ± 2.5
Body mass (kg)	77.05 ± 3.06
Percent fat (%)	8.89 ± 0.75
1RM Leg press (kg)	263.4 ± 56.6
Training experience (y)	5.9 ± 2.2

* 1RM = one repetition maximum.

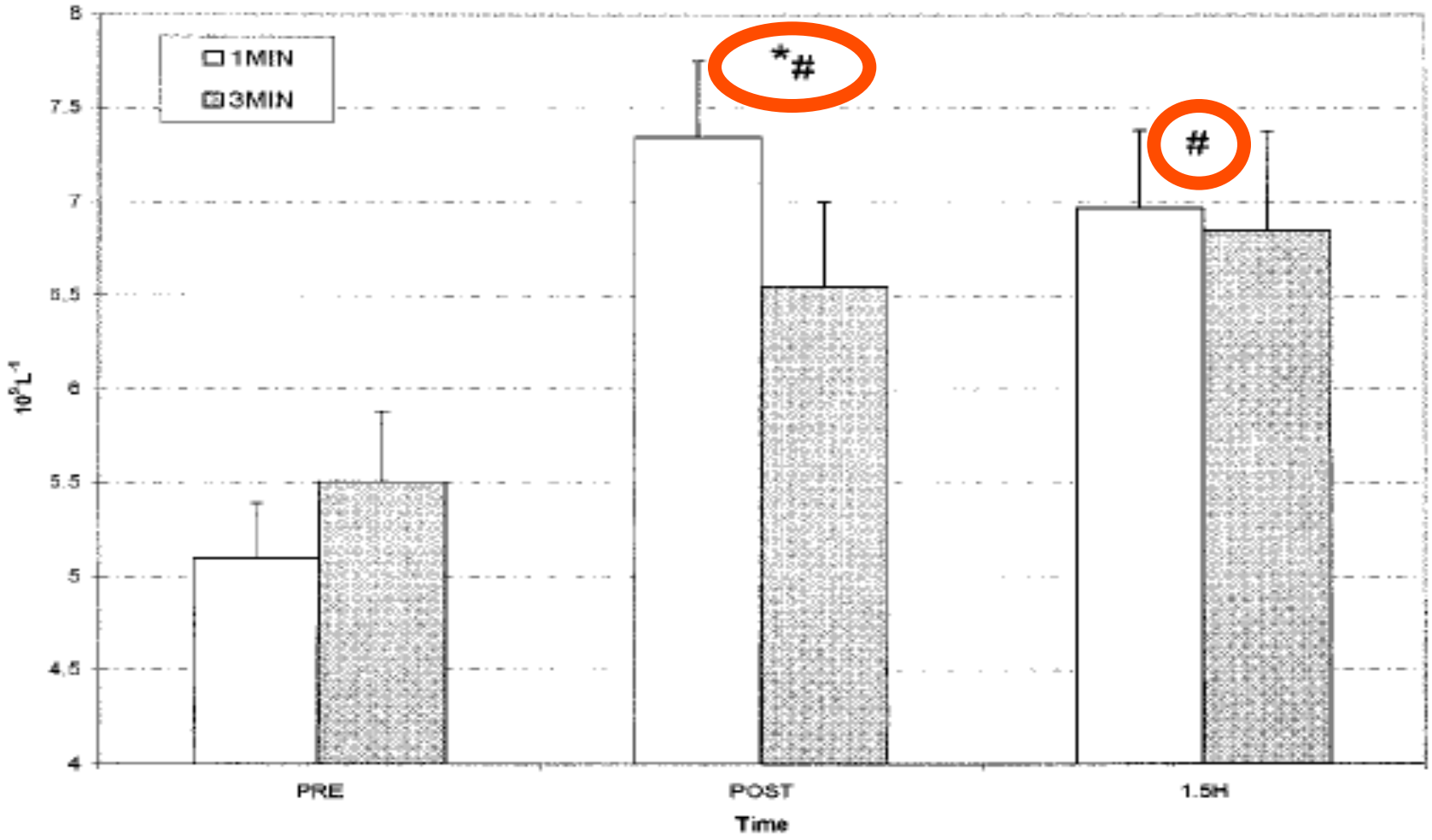


FIGURE 1. Leukocyte levels following 10 × 10 leg presses compared between 1-minute and 3-minute rest intervals. Data shown are mean ± *SEM*. * indicates $p \leq 0.025$ between-treatments difference from PRE measure. # indicates within-treatments difference from PRE measure.

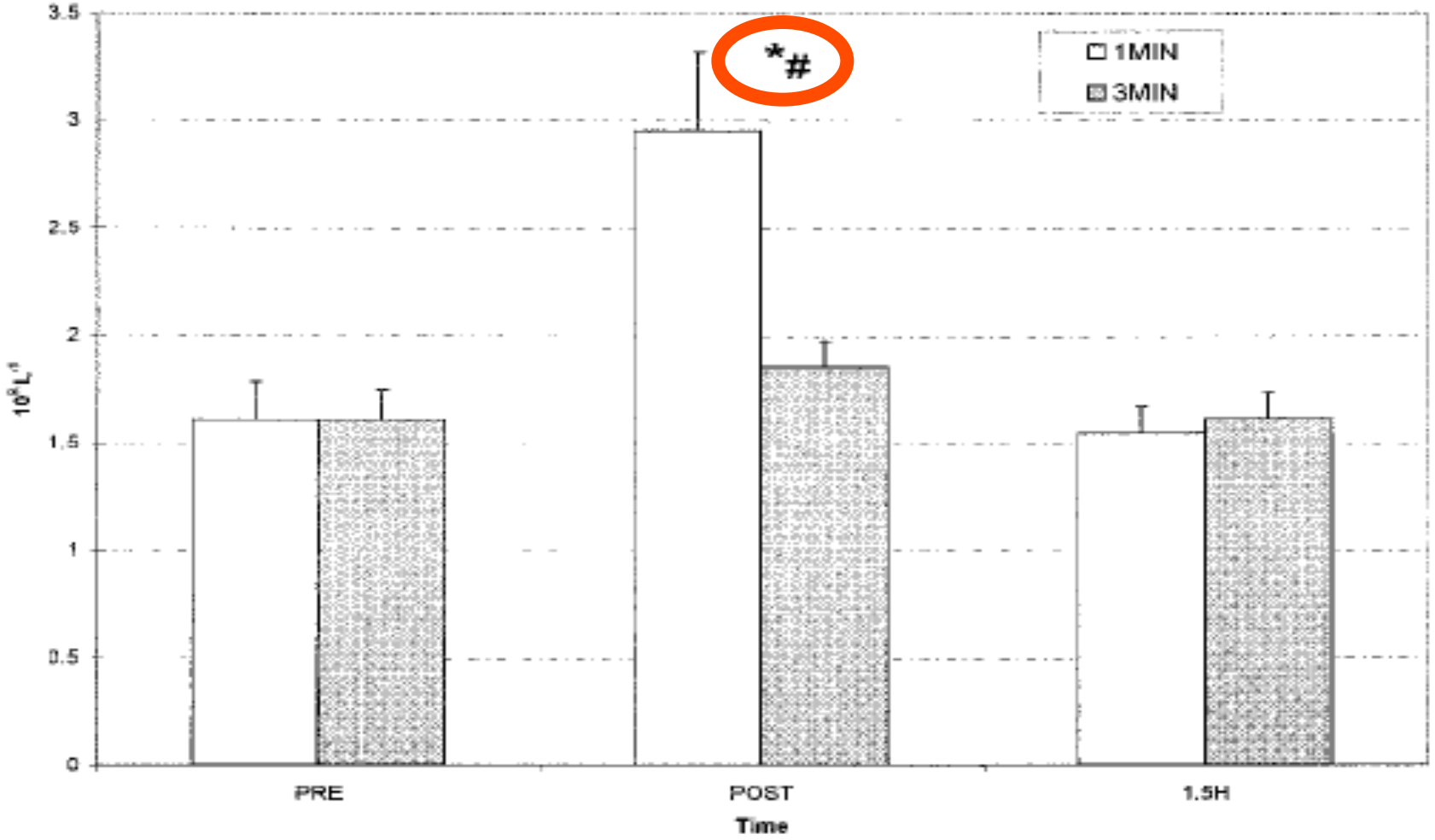


FIGURE 2. Lymphocyte levels following 10 × 10 leg presses compared between 1-minute and 3-minute rest intervals. Data shown are mean ± *SEM*. * indicates $p \leq 0.025$ between-treatments difference from PRE measure. # indicates within-treatments difference from PRE measure.

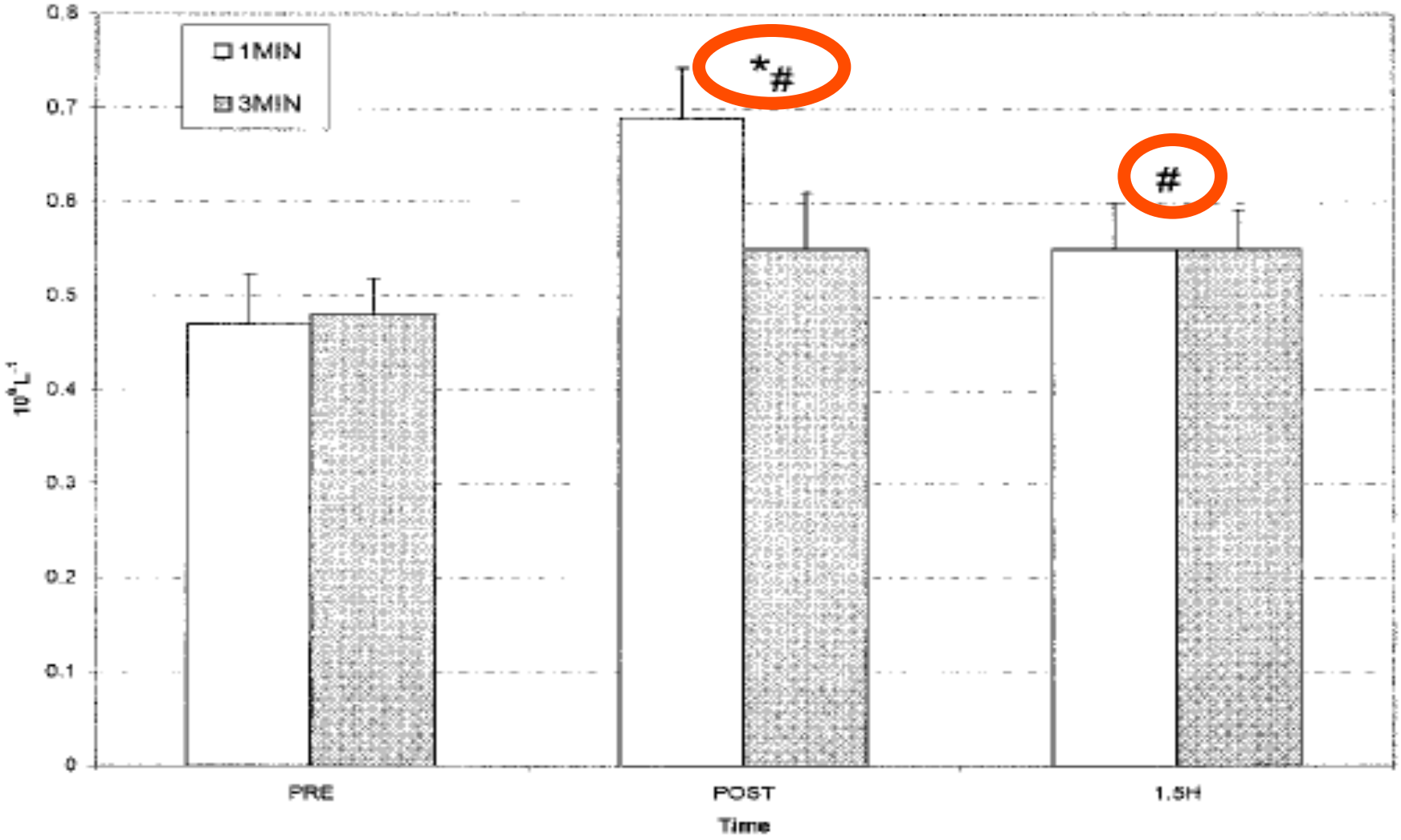


FIGURE 3. Monocyte levels following 10 × 10 leg presses compared between 1-minute and 3-minute rest intervals. Data shown are means ± *SEM*. * indicates $p \leq 0.025$ between-treatments difference from PRE measure. # indicates within-treatments difference from PRE measure.

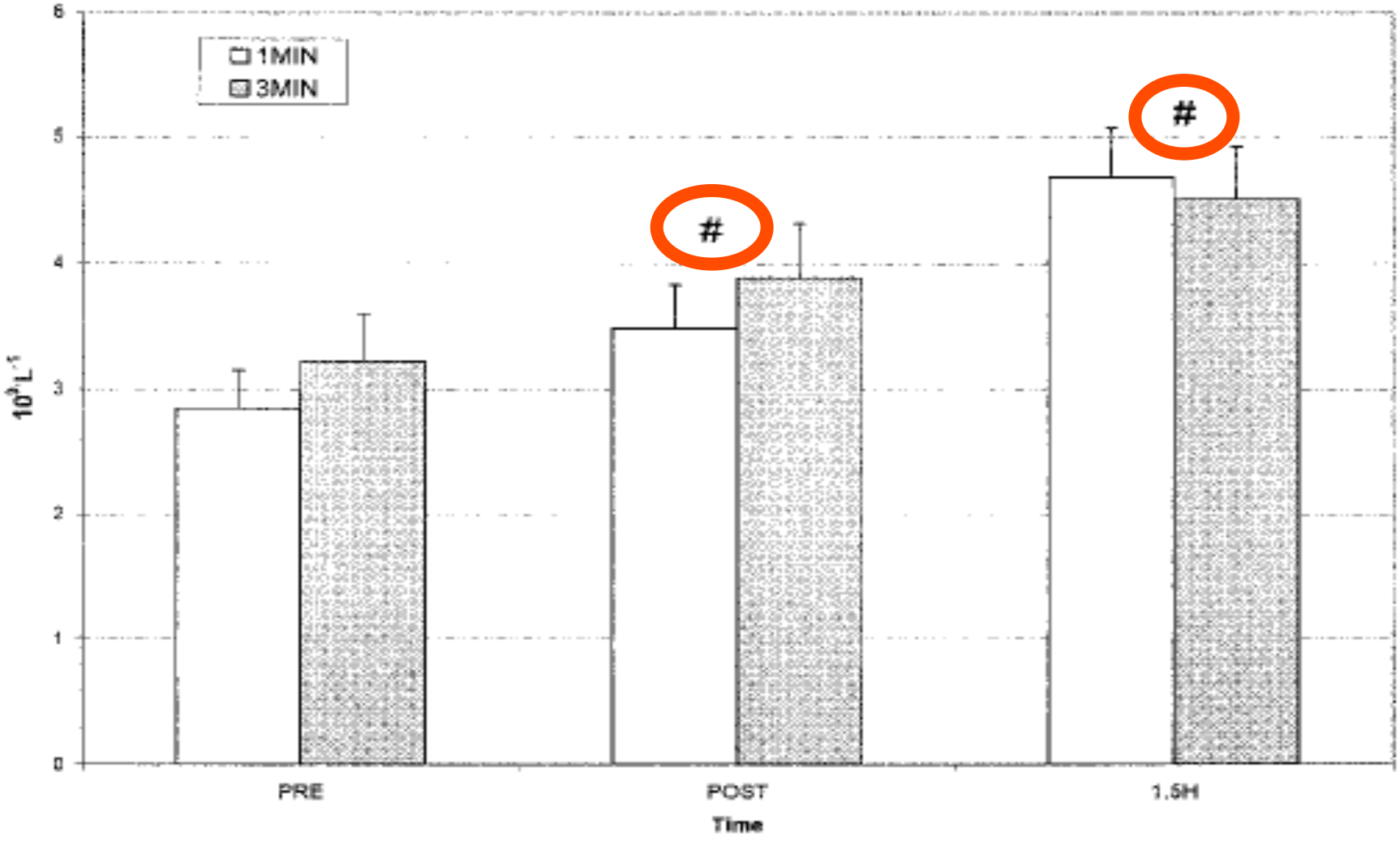


FIGURE 4. Neutrophil levels following 10 × 10 leg presses compared between 1-minute and 3-minute rest intervals. Data shown are mean ± *SEM*. # indicates within-treatments difference from PRE measure.

CONCLUSÕES DO ESTUDO

TF com **intervalos mais curtos** induz ao maior tráfico dos leucócitos, monócitos e linfócitos circulantes;

As **implicações clínicas** ainda precisam ser melhor estabelecidas;

Essas alterações podem ser respostas **fisiológicas normais** ao treinamento.

Respostas hormonais e imunes agudas decorrentes do treinamento de força em Bi-Set

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[2] Universidade Metodista de São Paulo/SP
[3] Faculdade de Ciências da Saúde

Fit Perf J	Rio de Janeiro	v. 6	nº1	37-44	Jan/Fev 2007

Tabela 1

Características antropométricas dos voluntários (n=9)

Variáveis	X	DP	min	máx
Massa corporal total (Kg)	77,8	12,3	60,6	106,5
Estatura (cm)	175,9	5,5	165,0	185,0
Idade (anos)	22,2	1,9	20,0	25,0
% de gordura	10,6	4,7	4,7	19,1
Massa gorda (Kg)	8,9	5,2	2,8	20,4
Massa magra (Kg)	69,8	8,0	57,8	86,1

Os valores estão expressos em média+DP. Média amostral (X), desvio padrão (dp), valor mínimo (min) e valor máximo (máx)

Tabela 2

Combinações dos exercícios

	Adução horizontal de ombro	Flexão de cotovelo
Combinação 1	Fly inclinado com halteres	Rosca martelo
Combinação 2	Supino inclinado	Rosca scott
Combinação 3	Supino Reto	Rosca direta

Tabela 3

Comparação da concentração de testosterona, cortisol e a razão T/C entre os tempos: "Antes" e "Após" a intervenção (n=9)

Variáveis	X	dp	min	máx	perc 25	perc 50	perc 75
Testosterona Antes (nmol/L)	14,7	4,7	9,4	24,0	11,0	12,5	18,2
Testosterona Após (nmol/L)	16,5	5,2	6,5	22,8	13,6	16,1	21,9
Cortisol Antes (nmol/L)	343,2	115,5	148,9	508,9	259,5	340,8	442,1
Cortisol Após (nmol/L)	516,8*	181,6	216,7	750,6	411,0	456,4	719,9
Razão T/C Antes	0,048	0,026	0,025	0,104	0,03	0,039	0,064
Razão T/C Após	0,035	0,017	0,016	0,071	0,021	0,031	0,044

Os dados apresentados na tabela representam a média amostral (X), desvio padrão (dp), valor mínimo (min), valor máximo (máx), percentil 25, percentil 50 e percentil 75.

**Diferença estatisticamente significativa da concentração da variável cortisol no tempo "Após" em relação ao tempo "Antes". Análise por Oddis Ratio (OR) ou Razão de chances (p<0,05)*

Foschini D, Prestes J.

Fit Perf J, Rio de Janeiro, v. 6, n. 1, p.38-44, Jan/Fev 2007

Tabela 4

Número de leucócitos (mm3), neutrófilos (mm3), linfócitos (mm3) e monócitos (mm3), nos tempos "Antes" e "Após" a intervenção (n=9)

Variáveis	X	dp	min	máx	perc 25	perc 50	perc 75
Leucócitos Antes	6888,9	1199,3	5300	8630	5720,0	6850	8040,0
Leucócitos Após	9585,6*	2017,6	7700	14090	7945,0	8950	10455,0
Neutrófilos Antes	3663,8	1371,3	1695	6472	2813,5	3300	4409,0
Neutrófilos Após	4683,9*	2038,7	2860	9300	3164,5	4157	5537,0
Linfócitos Antes	2080,3	627,2	1122	3080	1663,5	2034	2564,0
Linfócitos Após	3678,4*	809,4	2239	4664	3067,5	3922	4330,5
Monócitos Antes	769,7	187,1	530	1013	597,5	770	952,0
Monócitos Após	1209,8*	351,9	618	1656	861,5	1318	1465,5

Os dados apresentados na tabela representam a média amostral (X), desvio padrão (dp), valor mínimo (min), valor máximo (máx), percentil 25, percentil 50 e percentil 75. Média amostral (X), desvio padrão (dp), valor mínimo (min) e valor máximo (máx).

**Diferença estatisticamente significativa da concentração da variável no tempo "Após" em relação ao tempo "Antes". Análise por Oddis Ratio (OR) ou Razão de chances (p<0,05)*

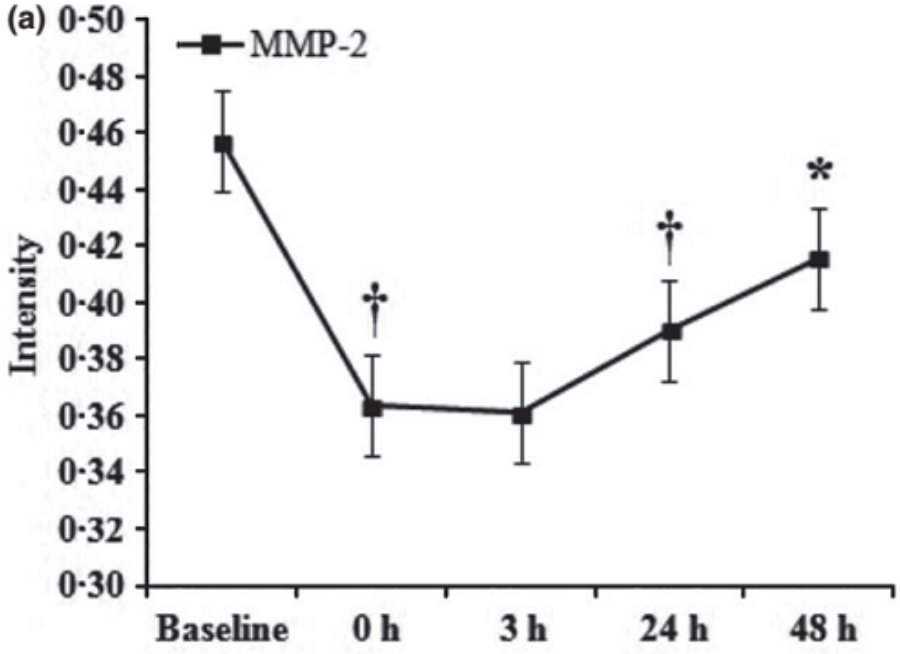
Foschini D, Prestes J.

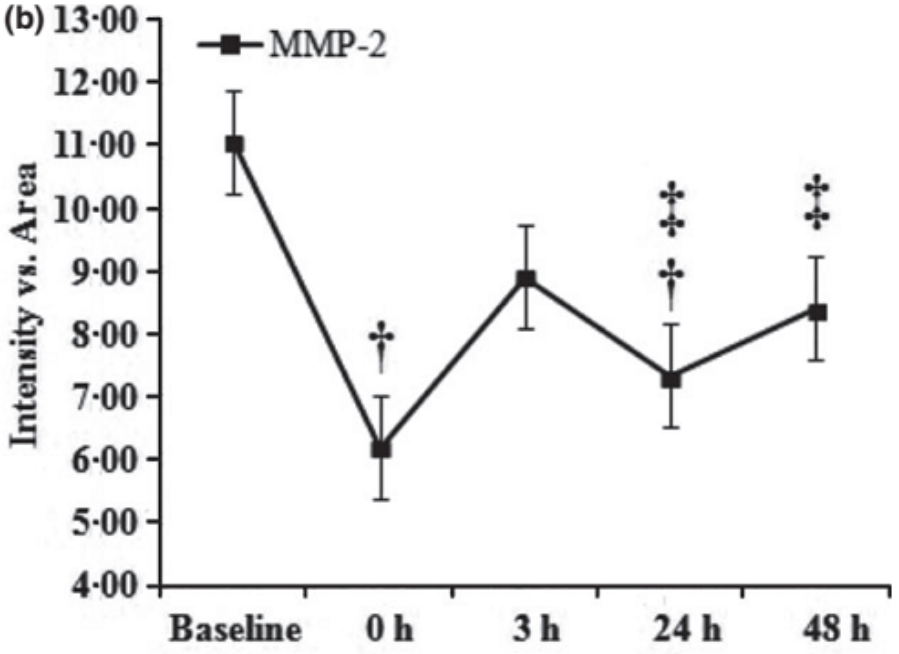
Clin Physiol Funct Imaging (2014) doi: 10.1111/cpf.12207

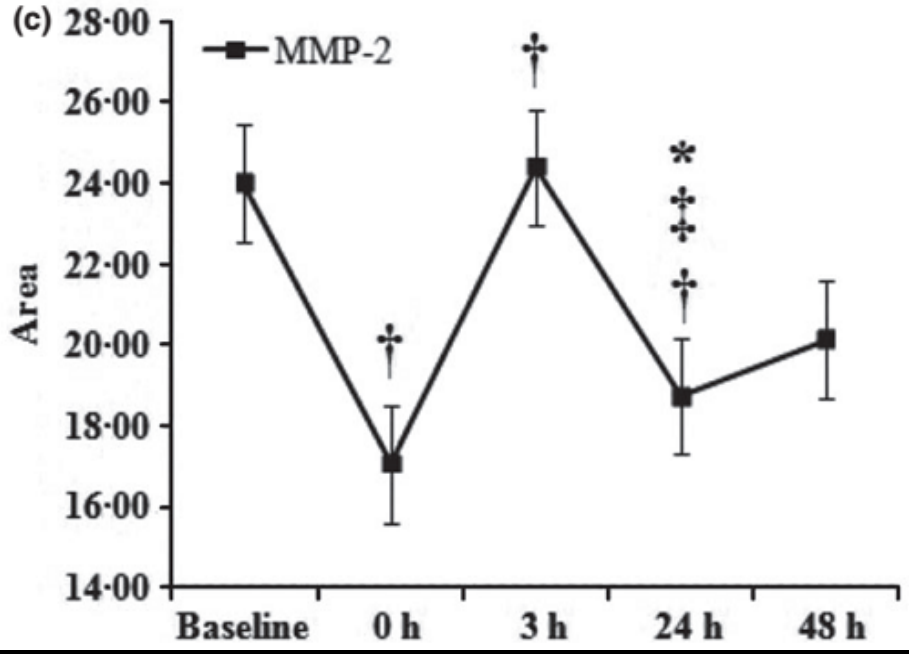
Acute eccentric resistance exercise decreases matrix metalloproteinase activity in obese elderly women

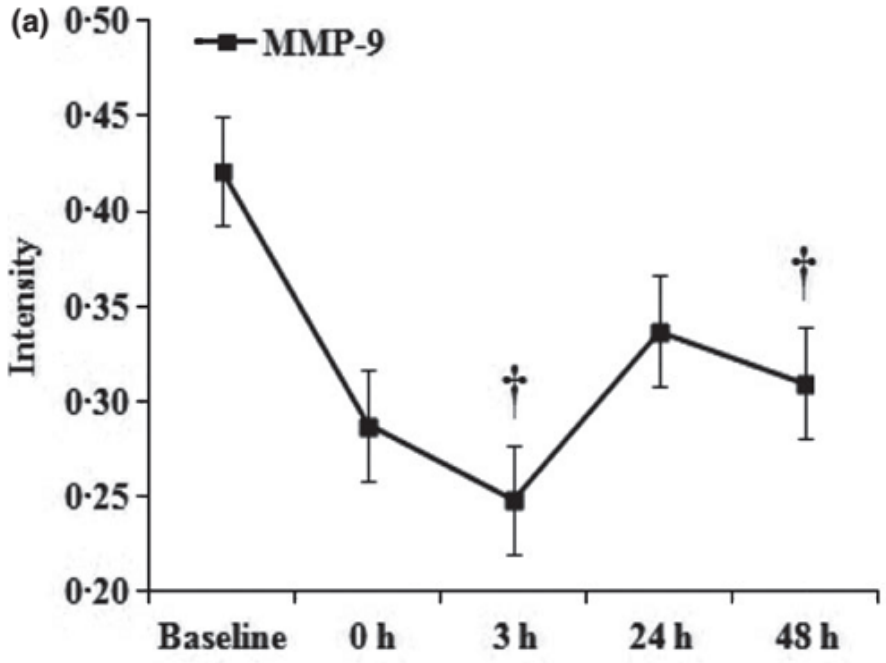
Dahan da Cunha Nascimento[1], James Wilfred Navalta[2], João Luiz Quagliotti Durigan[3], Rita de Cassia Marqueti[3,5], Ramires Alsamir Tibana[1], Octavio Luiz Franco[4], Jesser Alves de Almeida[4,5], Nathalia Ferreira Camarço[1], Ivo Vieira de Sousa Neto[1] and Jonato Prestes[1]

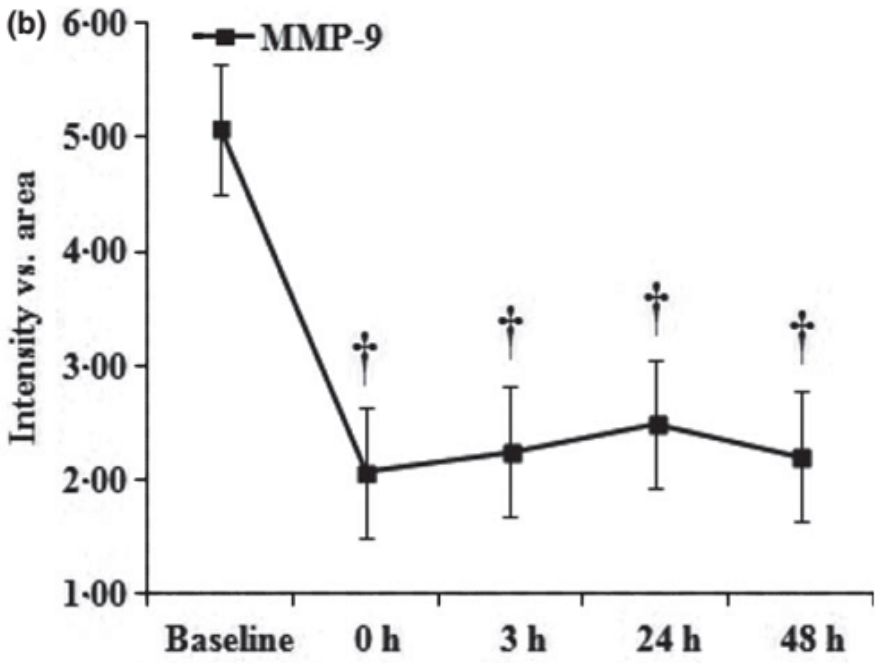
[1]Graduate Program on Physical Education, Catholic University of Brasilia, Brasilia, Brazil, [2]Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, NV, USA, [3]University of Brasilia, [4]Center for Proteomic and Biochemical Analyses, Graduate Program in Genomic Sciences and Biotechnology, Catholic University of Brasilia, and [5]Graduate Program in Health Sciences and Technologies, University of Brasilia, Brasilia, Brazil

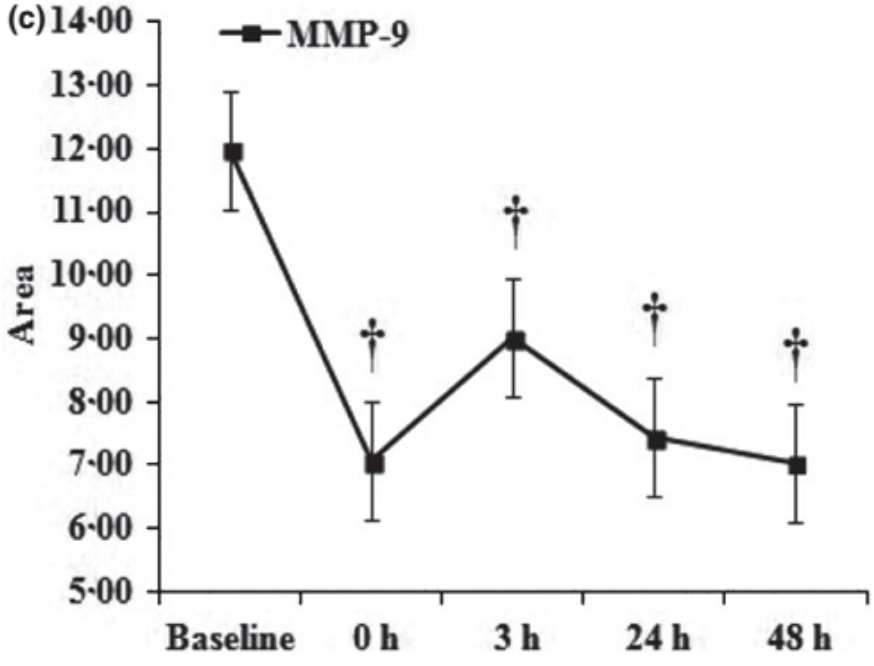

(a)
MMP-2
Intensity
0·50
0·48
0·46
0·44
0·42
0·40
0·38
0·36
0·34
0·32
0·30
Baseline
0 h
3 h
24 h
48 h

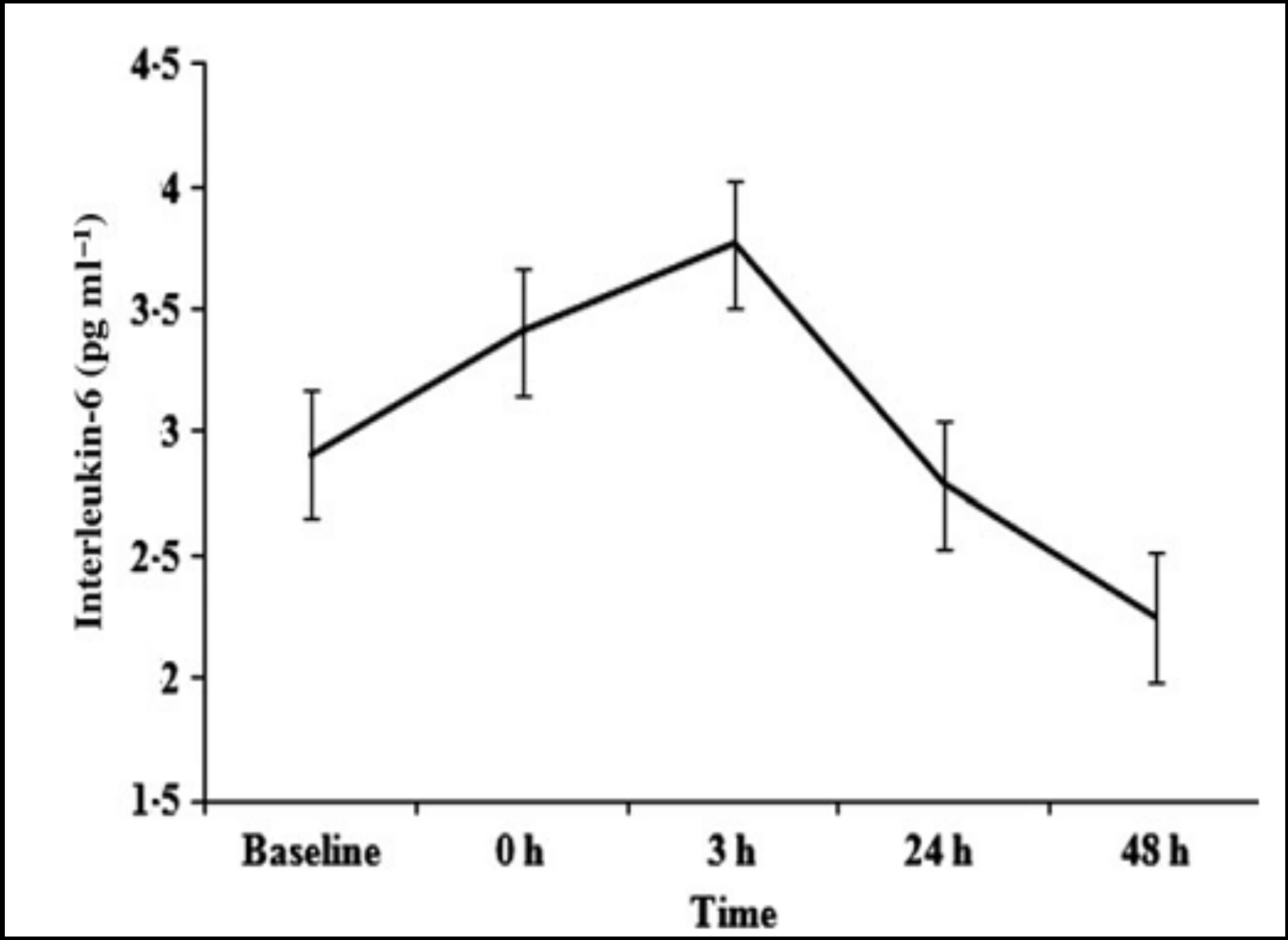

(b)
MMP-2
Intensity vs. Area
13·00
12·00
11·00
10·00
9·00
8·00
7·00
6·00
5·00
4·00
Baseline
0 h
3 h
24 h
48 h


(c)
MMP-2
Area
28·00
26·00
24·00
22·00
20·00
18·00
16·00
14·00
Baseline
0 h
3 h
24 h
48 h


(a)
MMP-9
Intensity
0·50
0·45
0·40
0·35
0·30
0·25
0·20
Baseline
0 h
3 h
24 h
48 h


(b)
MMP-9
Intensity vs. area
6·00
5·00
4·00
3·00
2·00
1·00
Baseline
0 h
3 h
24 h
48 h


(c)
MMP-9
Area
14·00
13·00
12·00
11·00
10·00
9·00
8·00
7·00
6·00
5·00
Baseline
0 h
3 h
24 h
48 h


4·5
4
3·5
3
2·5
2
1·5
Interleukin-6 (pg ml⁻¹)
Baseline
0 h
3 h
24 h
48 h
Time

The Acute Response of Apoptosis and Migration to Resistance Exercise Is Protocol-Dependent

Authors

J. Prestes[1], G. B. Pereira[2], R. A. Tibana[1], J. W. Navalta[3]

Affiliations

[1] Graduation Program on Physical Education, Catholic University of Brasilia, Brasilia, Brazil
[2] Physical Education Department, Federal University of Maranhao, Sao Luis, Brazil
[3] Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, United States

Int J Sports Med 2014; 35: 1051–1056

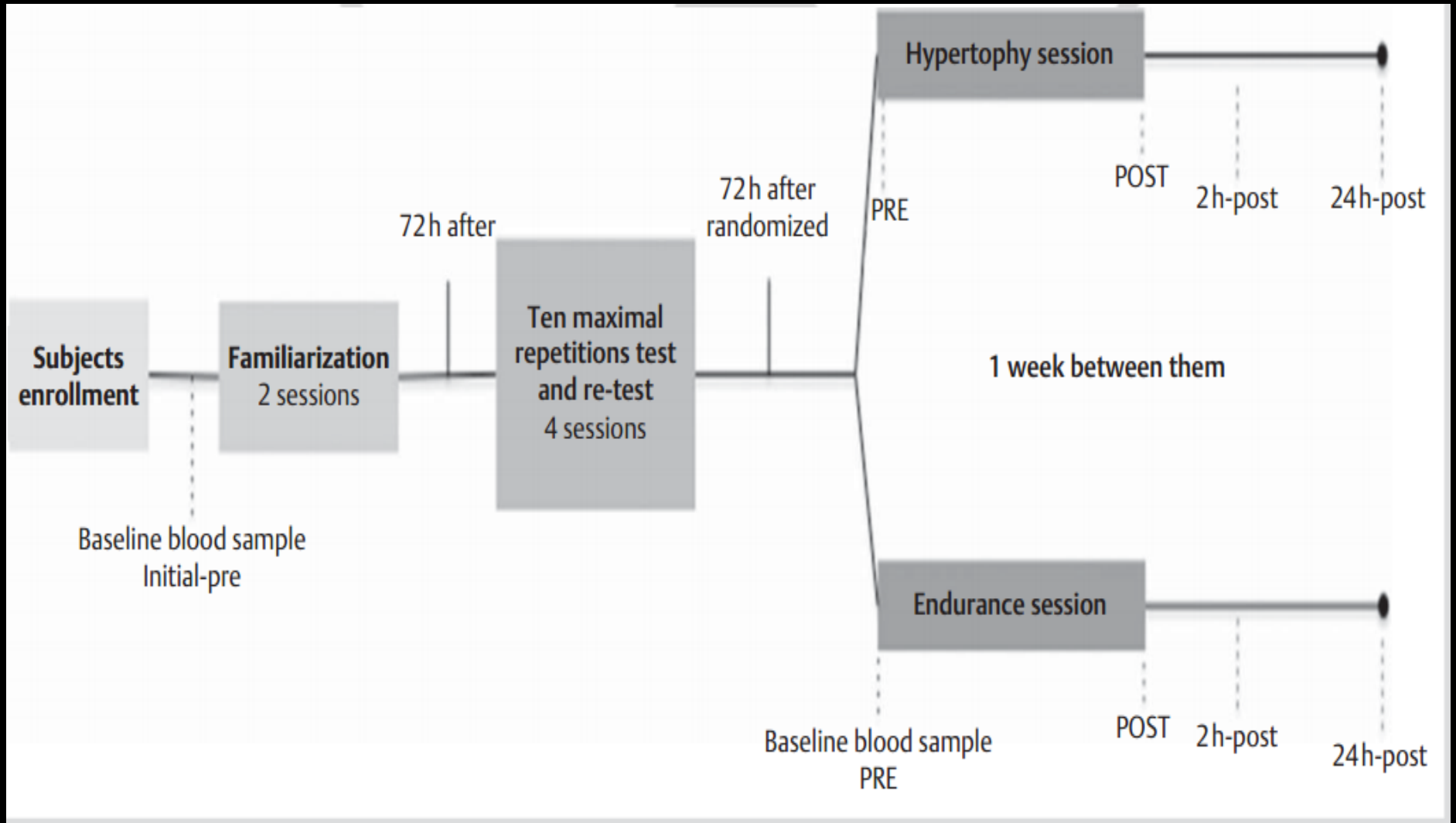


Fig. 1 Study design.

Table 1 Total number of repetitions and volume for Hypertrophy and Local Muscle Endurance (LME) protocols.

	Hypertrophy	LME	*P*
Total number of repetitions			
chest press	26.4 ± 1.0	43.6 ± 1.7	<0.001
leg press	36.7 ± 1.7	63.2 ± 2.8	<0.001
front lat pull-down	28.0 ± 1.0	51.5 ± 3.1	<0.001
knee extension	29.0 ± 1.4	43.2 ± 2.1	<0.001
upright row	26.5 ± 1.1	46.5 ± 2.1	<0.001
leg curl	28.3 ± 1.0	48.5 ± 1.8	<0.001
triceps extension	26.0 ± 1.8	50.7 ± 3.2	<0.001
calf press	38.2 ± 2.4	55.2 ± 1.9	<0.001
biceps curl	27.0 ± 1.5	43.9 ± 1.6	<0.001
Total volume (kg)			
chest press	881.4 ± 85.6	1009.6 ± 87.8	0.002
leg press	2900.9 ± 209.7	3562.6 ± 342.6	0.05
front lat pull-down	938.0 ± 50.1	1239.7 ± 113.3	0.009
knee extension	1748.3 ± 128.9	1901.9 ± 206.5	0.25
upright row	508.5 ± 27.4	631.9 ± 37.7	<0.001
leg curl	1442.8 ± 72.9	1761.4 ± 115.4	<0.001
triceps extension	454.0 ± 40.8	632.5 ± 52.9	0.004
calf press	3230.2 ± 190.7	3174.0 ± 238.2	0.13
biceps curl	542.0 ± 75.6	616.8 ± 36.6	0.05

Data are means ± SEM. *Significantly different from Hyper-1, P<0.05

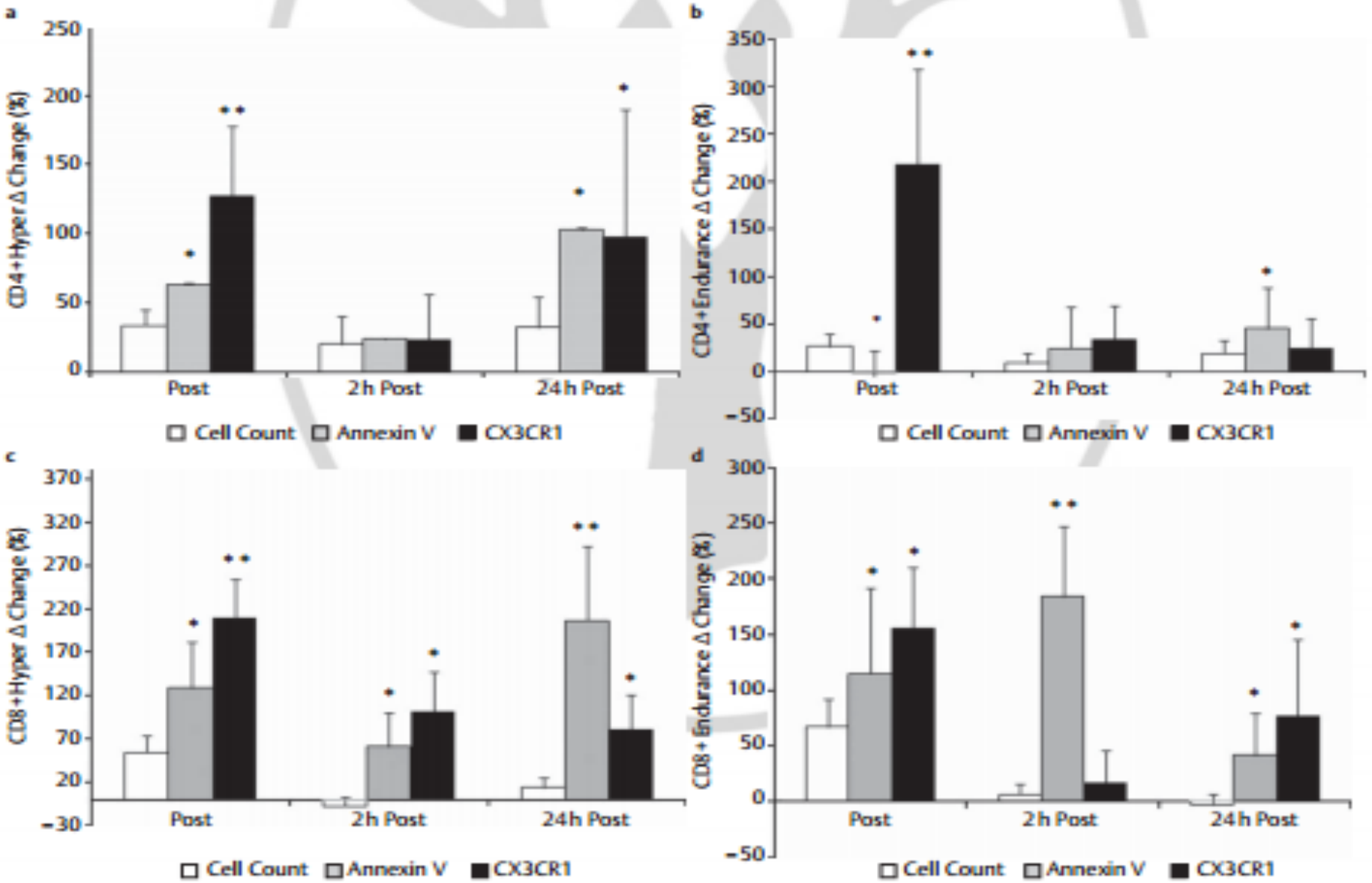


Fig. 2 Data (average ± SEM) is for cell count, apoptosis (annexin V+) and cellular migration (CX3CR1) in CD4+ panel a (hypertrophy protocol) and b (local muscle endurance protocol) and CD8+ lymphocytes panel c (hypertrophy protocol) and d (local muscle endurance protocol) immediately following the resistance exercise and 2 h and 24 h following bouts. Significance was determined using the Chi squared test ($\chi 2$) comparing the observed changes in annexin V and CX3CR1 to the expected changes in cell count. *Indicates significant difference at $p = 0.01$; **indicates significant difference at $p = 0.001$.

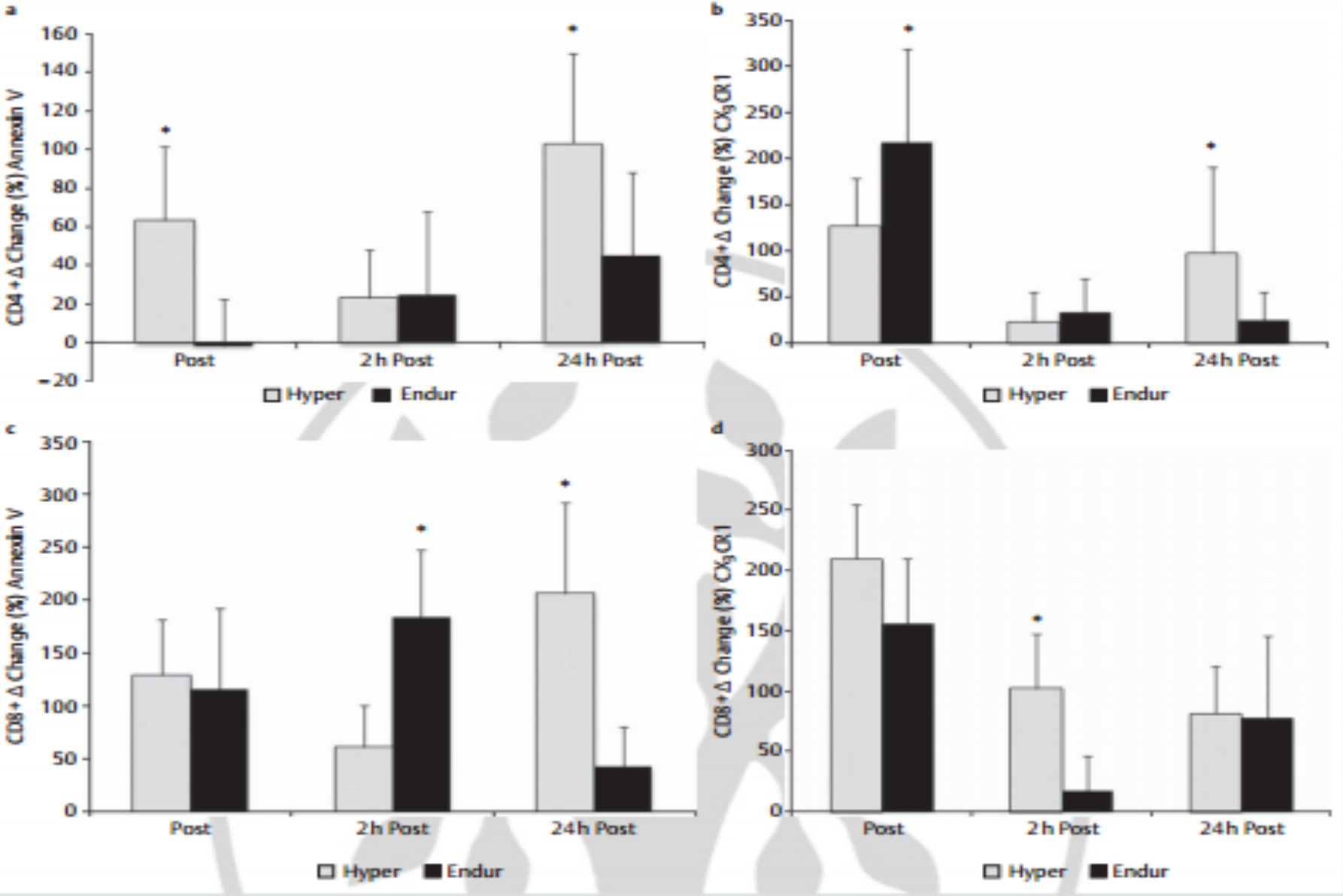
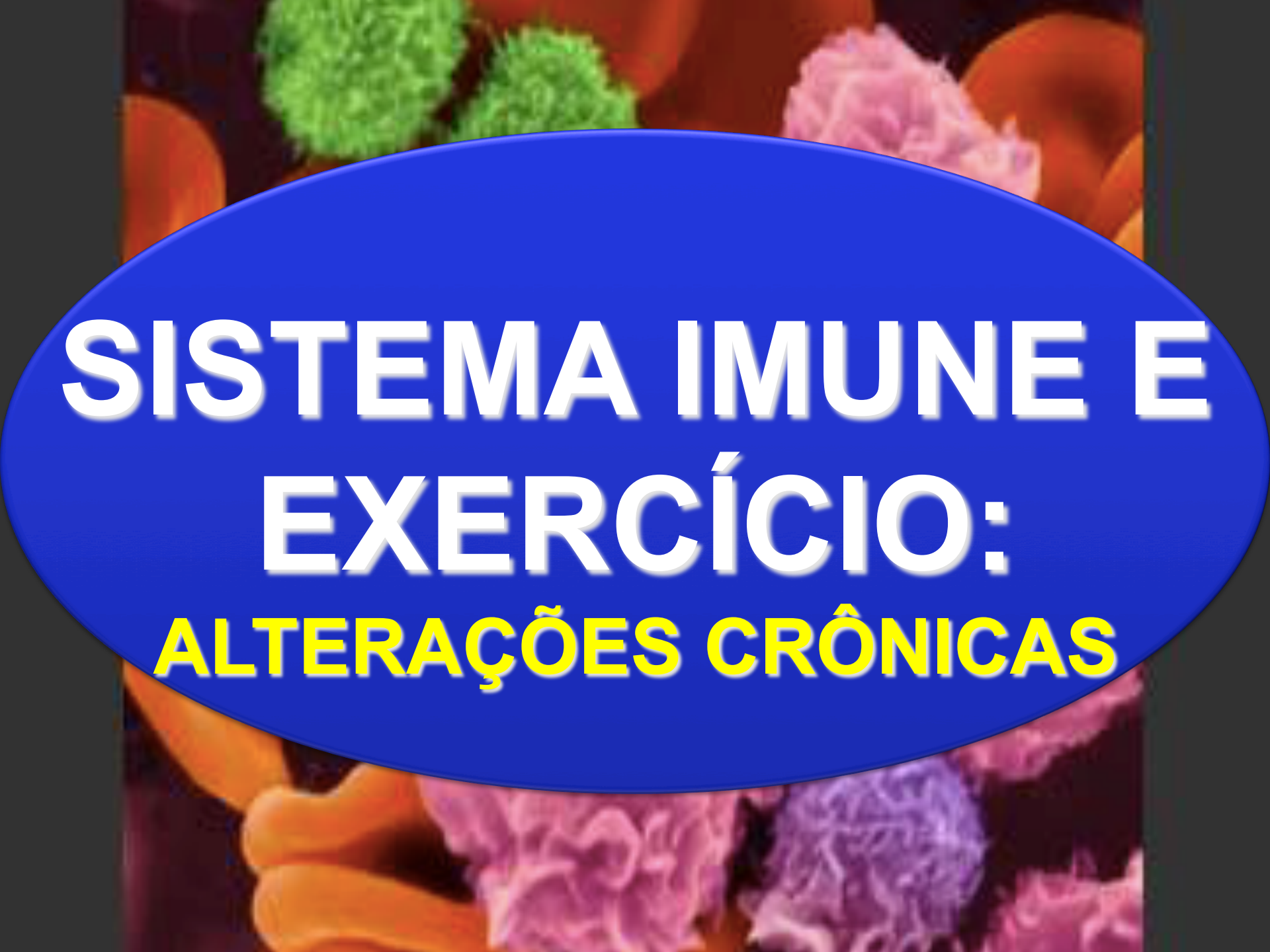


Fig. 3 Comparison data between hypertrophy and local muscle endurance protocols (average ± SEM) is for apoptosis (annexin V), and cellular migration (CX3CR1) in CD4+ (panels a and b) and CD8+ lymphocytes (panels c and d) immediately following the resistance exercise and 2 h and 24 h following bouts. Significance was determined using the Chi squared test ($\chi 2$) comparing the observed changes in annexin V and CX3CR1 to the expected changes in cell count. *Indicates significant difference between protocols at $p = 0.01$.



SISTEMA IMUNE E EXERCÍCIO:

ALTERAÇÕES CRÔNICAS

Immunology and Cell Biology (2000) **78**, 545–553

Special Feature

Exercise-induced modulation of macrophage function

JA WOODS, Q LU, MA CEDDIA and T LOWDER

Department of Kinesiology, University of Illinois at Urbana/Champaign, Urbana, Illinois, USA

Chronic exercise increases macrophage-mediated tumor cytolysis in young and old mice

Q. LU,[1,2] M. A. CEDDIA,[1] E. A. PRICE,[1] S.-M. YE,[3] AND J. A. WOODS[1,2]
Departments of [1]Kinesiology and [3]Animal Science and [2]Division of Nutritional Sciences, University of Illinois, Urbana, Illinois 61801

Am J Physiol Regulatory Integrative Comp Physiol 276:482-489, 1999.

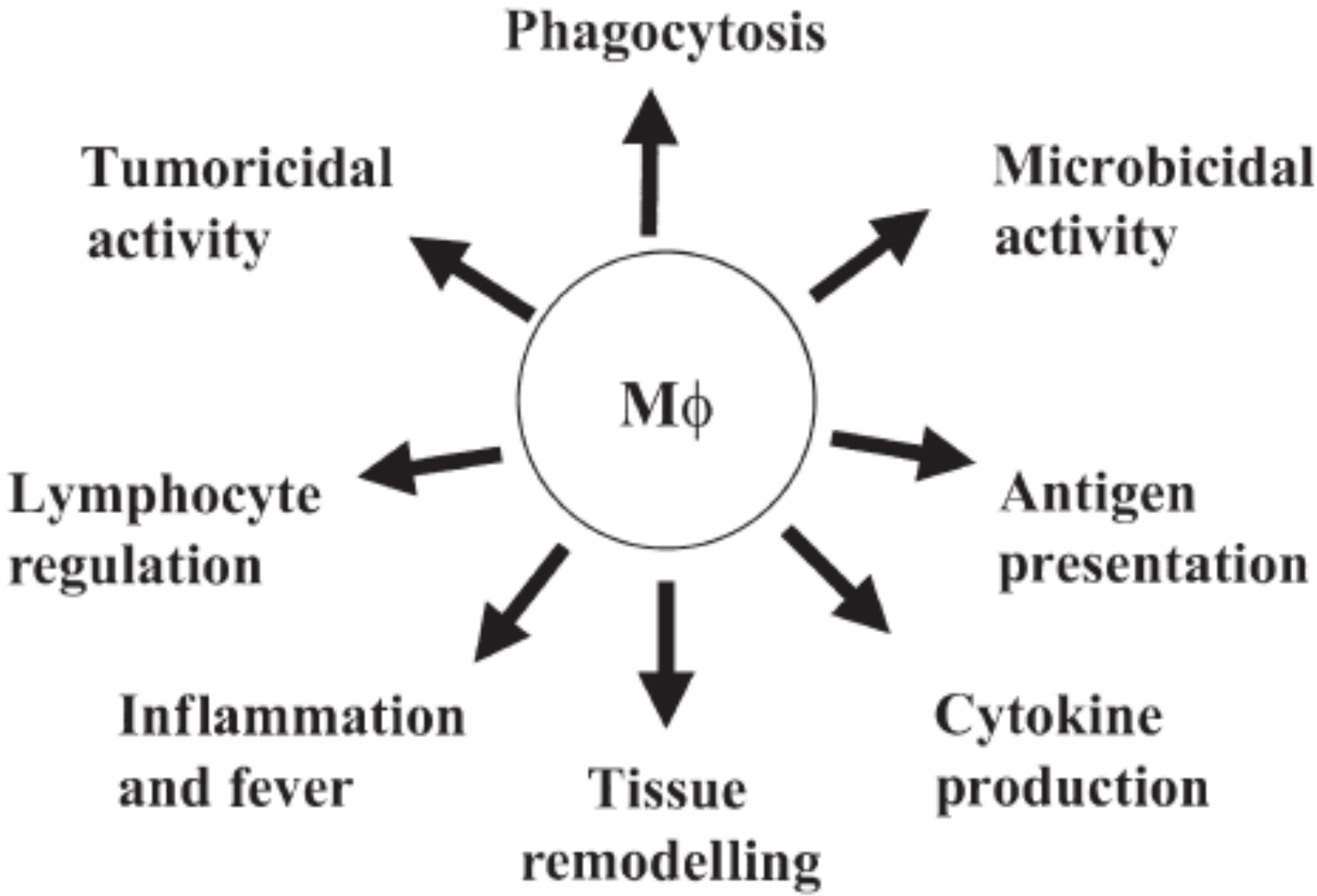
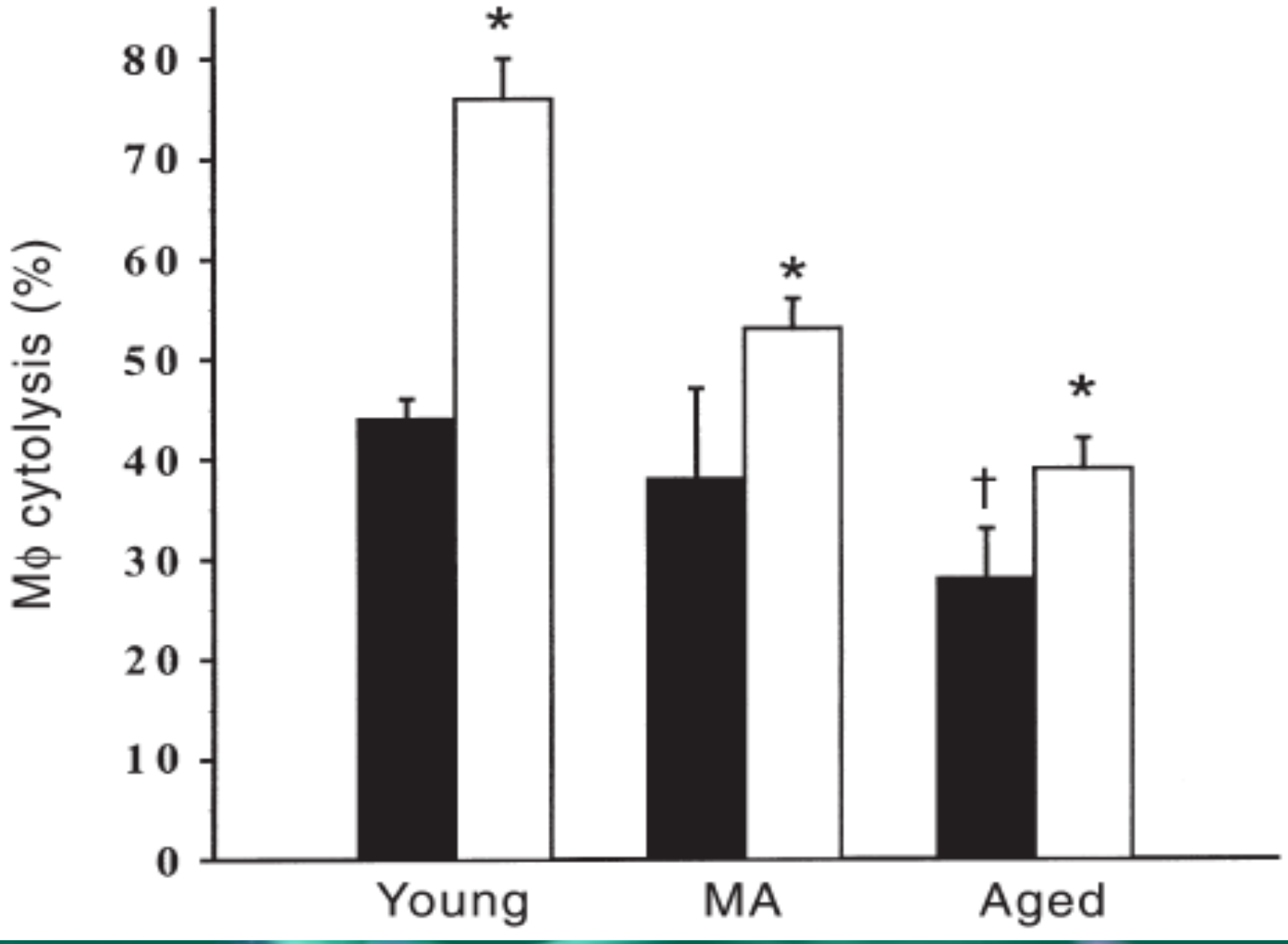
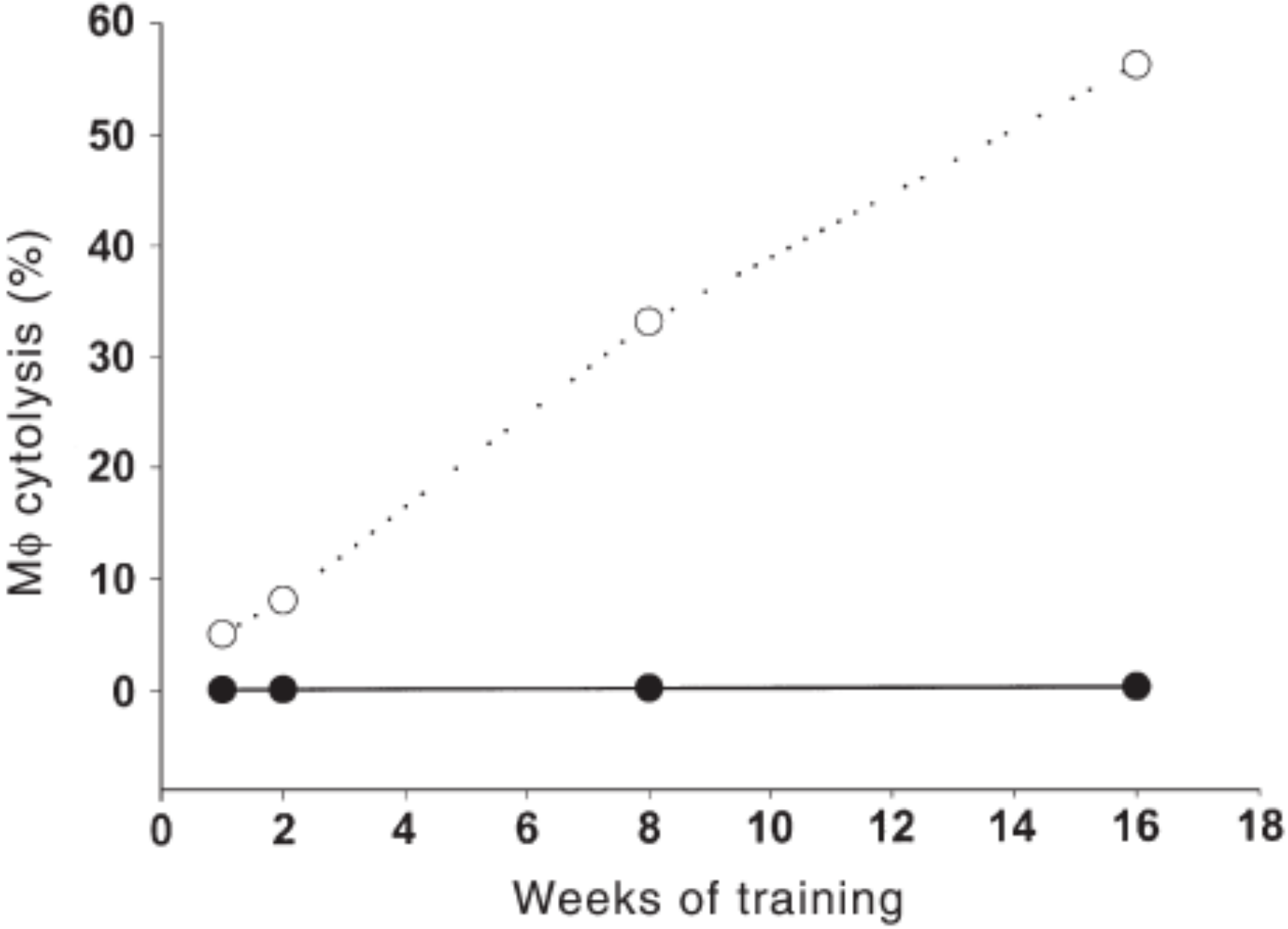


Figure 1 Major macrophage (Mϕ) functions.

METODOLOGIA

- 16 semanas de treinamento aeróbio em camundongos;
- Corrida em esteira a 75% do VO_2max, 45 min, 5 x semana;
- Animais jovens, meia idade e idosos.


Mϕ cytolysis (%)
80
70
60
50
40
30
20
10
0
*
*
*
†
Young
MA
Aged


60
50
40
30
20
10
0
Mϕ cytolysis (%)
0
2
4
6
8
10
12
14
16
18
Weeks of training

CONCLUSÕES

- Parece que pelo menos 8 semanas de TA são necessárias para aumentar a atividade antitumoral de macrófagos;

- Exercício aeróbio crônico aumentou a atividade citolítica de macrófagos peritoneais em todas as faixas etárias;

- Intensidade testada: 75% do VO_2max.

Circuit resistance training in sedentary women: body composition and serum cytokine levels

Fabiano Candido Ferreira, Alexandra Ivo de Medeiros, Cristiane Nicioli, João Elias Dias Nunes, Gilberto Eiji Shiguemoto, Jonato Prestes, Roberto Mário Machado Verzola, Vilmar Baldissera, and Sérgio Eduardo de Andrade Perez

Appl. Physiol. Nutr. Metab. 35: 163–171 (2009)

Received 8 June 2009. Accepted 2 December 2009. Published on the NRC Research Press Web site at apnm.nrc.ca on 1 April 2010.

TREINAMENTO DE FORÇA CIRCUITADO EM MULHERES SEDENTÁRIAS: COMPOSIÇÃO CORPORAL E CITOCINAS

Table 3. Pre- and post-training body composition.

Variable	Pretraining period	Post-training period	*p*
Body mass (kg)[a]	57.848±7.796 (53.347–62.350)	56.955±6.284 (53.327–60.583)	0.3703
Fat body mass (kg)[a]	21.911±8.150 (17.205–26.616)	17.824±4.235 (15.379–20.269)[b]	0.0213
Lean body mass (kg)[a]	35.937±4.926 (33.093–38.782)	39.130±4.950 (36.272–41.988)[b]	0.0006
Bone mineral content (kg)[a]	2.500±0.346 (2.300–2.700)	2.489±0.346 (2.290–2.689)	0.3591
% body fat mass[a]	37.10±10.84 (30.84–43.36)	31.19±6.06 (27.69–34.68)[b]	0.0142
Trunk fat mass (kg)[a]	8.859±2.999 (7.128–10.591)	7.327±1.920 (6.219–8.436)[b]	0.0171
Trunk lean mass (kg)[a]	16.764±2.342 (15.412–18.117)	17.809±1.861 (16.734–18.884)[b]	0.0365
% trunk fat mass[c]	36.50±10.31 (13.10–46.90)	31.30±6.88 (11.60–35.30)[d]	0.0219
Upper limb fat mass (kg)[a]	2.301±1.169 (1.626–2.976)	1.494±0.469 (1.223–1.765)[b]	0.0053
Upper limb lean mass (kg)[a]	4.199±0.727 (3.779–4.619)	4.375±0.822 (3.900–4.849)[b]	0.0198
% upper limb fat mass[a]	33.74±13.06 (26.20–41.27)	25.39±6.81 (21.46–29.33)[b]	0.0056
Lower limb fat mass (kg)[a]	9.221±3.776 (7.041–11.401)	7.735±2.124 (6.509–8.961)	0.0516
Lower limbs lean mass (kg)[a]	12.773±2.030 (11.601–13.945)	14.538±2.409 (13.147–15.929)[b]	0.0001
% lower limb fat mass[a]	40.69±10.87 (34.42–46.97)	34.50±5.90 (31.09–37.91)[b]	0.0130

Table 6. Results of serum cytokine levels after training sessions at the beginning and end of the training period.

Cytokine levels in the times of sample collection ($pg \cdot mL^{-1}$)	Second session[a]		Last session[a]	
	Median±SD (minimum–maximum)	CV (no. detectible values; detectible % of total *n*)	Median±SD (minimum–maximum)	CV (no. detectible values; detectible % of total *n*)
IL-1β				
96 h of rest	—	—	—	—
5 min after training session	—	—	—	—
24 h after training session	—	—	—	—
48 h after training session	—	—	—	—
IL-6				
96 h of rest	ND	ND	ND	ND
5 min after training session[b]	3.43±0.82 (2.81–5.20)	23.37 (7; 50.0%)	2.93±0.68 (2.81–4.42)	20.86 (5; 35.7%)
24 h after training session	ND	ND	ND	ND
48 h after training session	ND	ND	ND	ND
IL-8				
96 h of rest[c]	6.27±2.43 (3.60–10.66)	38.78 (9; 64.3%)	6.32±1.61 (3.73–8.34)	26.28 (13; 92.9%)
5 min after training session[d]	6.84±1.86 (4.38–11.58)	26.50 (14; 100.0%)	6.11±2.89 (3.60–11.65)	43.36 (12; 85.7%)
24 h after training session[e]	6.86±1.57 (5.03–10.34)	22.35 (14; 100.0%)	6.12±1.52 (4.11–9.79)	24.35 (14; 100.0%)
48 h after training session[f]	6.15±1.11 (4.32–8.28)	17.64 (14; 100.0%)	5.86±1.49 (3.73–9.44)	25.41 (12; 85.7%)
IL-10				
96 h of rest	—	—	—	—
5 min after training session	—	—	—	—
24 h after training session	—	—	—	—
48 h after training session	—	—	—	—
IL-12p70				
96 h of rest	—	—	—	—
5 min after training session	—	—	—	—
24 h after training session	—	—	—	—
48 h after training session	—	—	—	—
TNF				
96 h of rest	—	—	—	—
5 min after training session	—	—	—	—
24 h after training session	—	—	—	—
48 h after training session	—	—	—	—

BJSM ONLINE

Effects of 12 months of exercise training on salivary secretory IgA levels in elderly subjects

T Akimoto, Y Kumai, T Akama, E Hayashi, H Murakami, R Soma, S Kuno and I Kono

Br. J. Sports Med. 2003;37;76-79
doi:10.1136/bjsm.37.1.76

Efeitos de 12 meses de um programa de exercícios sobre os níveis de IgA salivar em idosos

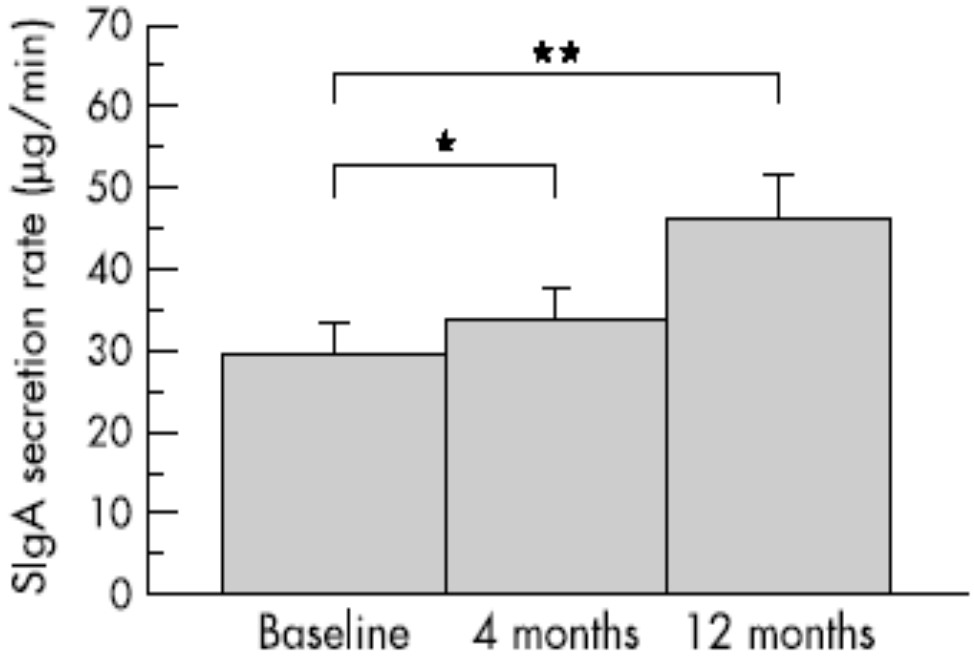
METODOLOGIA

- **45 idosos sedentários** (saudáveis), 18 homens e 27 mulheres, entre 63-67 anos

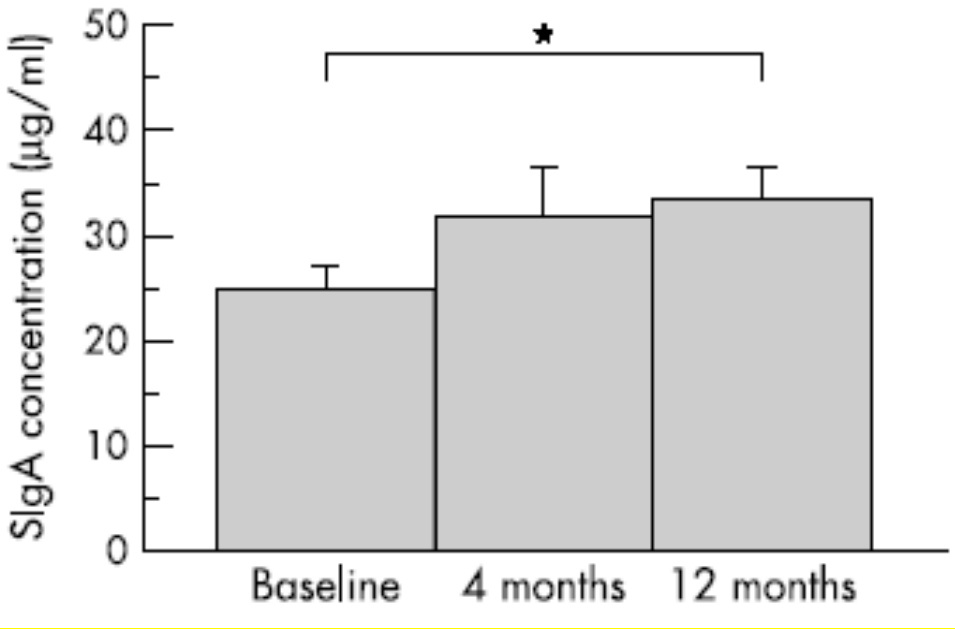
- **Treinamento:** 2 x semana, **1º dia = TF** com 2 x 8-15RM + 20-30 minutos no cicloergomêtro a 60% da FCmax

- **2º dia = endurance** (exercícios em step e jogos) FCM abaixo de 60% da FCmax

Razão de secreção da IgA salivar

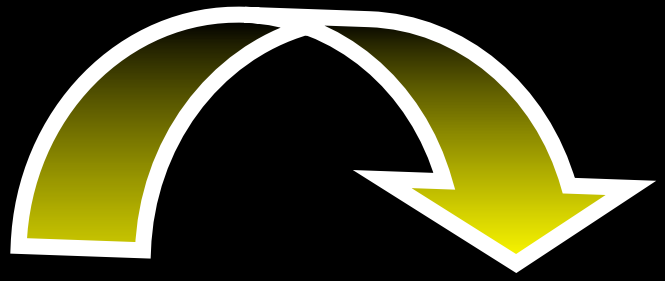


Concentração de IgA salivar



CONCLUSÕES

Após 12 meses de um programa de treinamento (TF + aeróbio), as concentrações de **IgA salivar aumentam**



Exercício melhora a função imune da mucosa

Journal of Gerontology: MEDICAL SCIENCES
2005, Vol. 60A, No. 10, 1315–1318

Chronic Resistance Exercise Training Improves Natural Killer Cell Activity in Older Women

Brian K. McFarlin,[1] Michael G. Flynn,[2] Melody D. Phillips,[3]
Laura K. Stewart,[2] and Kyle L. Timmerman[2]

[1]Department of Health and Human Performance, University of Houston, Texas.
[2]Health and Kinesiology, Purdue University, West Lafayette, Indiana.
[3]Department of Kinesiology, Texas Christian University, Fort Worth.

O Treinamento de Força Crônico Melhora a Atividade das Células NK em Mulheres Idosas

Table 1. Participant Characteristics for Women Completing 10 Weeks of Resistance Exercise Training (TR) or Control (CON)

Characteristics	TR ($N = 19$)	CON ($N = 6$)
Age, y	71.8 ± 6.5	73.1 ± 6.0
Height, cm	163.0 ± 5.6	160.1 ± 3.4
Weight, kg	67.3 ± 11.7	70.8 ± 10.5
Body fat, %	32.4 ± 5.1	33.7 ± 3.2
Before		
Chest press 8RM, kg	17.5 ± 1.4	15.6 ± 2.3
After		
Chest press 8RM, kg	23.4 ± 1.9*	14.3 ± 2.7
Before		
Leg press 8RM, kg	37.4 ± 1.7	36.4 ± 2.7
After		
Leg press 8RM, kg	46.0 ± 2.3*	33.1 ± 2.6

METODOLOGIA

1 semana de adaptação aos exercícios;

Leg press, extensão e flexão dos joelhos, chest press, Fly, puxador costas, desenvolvimento, rosca sentada e adução e abdução do quadril;

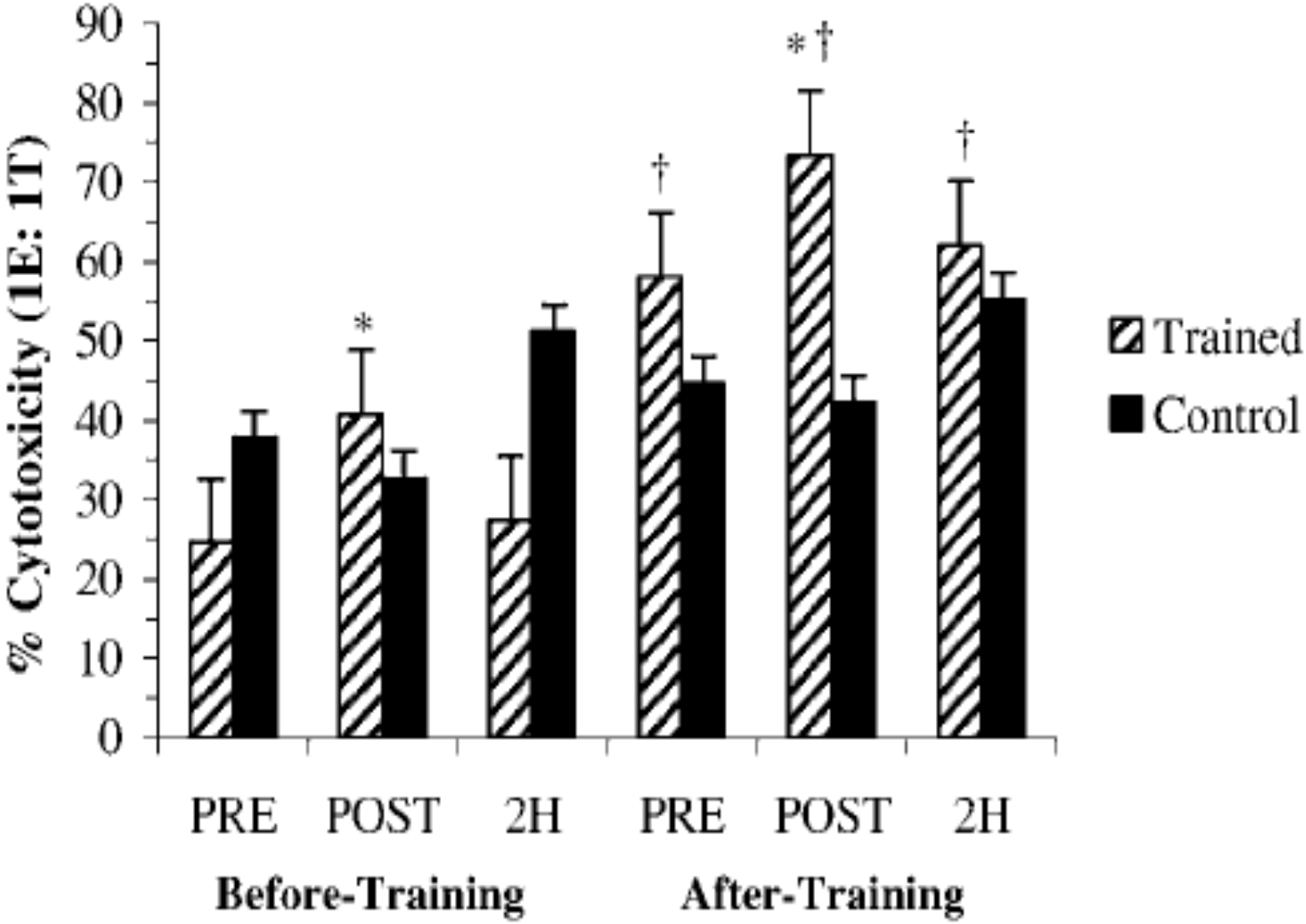
3 dias não consecutivos, dia 1: determinação 8RM; dia 2: 3 x 50% das 8RM; dia 3: reavaliação 8 RM

METODOLOGIA

1RM estimada das 8RM e foi utilizada para determinação das **cargas de treinamento;**

TF 3 x semana, **3 séries,** 1ª semana: **2 x** 8 reps a 70% de 1RM e na **3ª série** execução até a fadiga;

1 minuto de intervalo entre as séries e 2-10ª semana a carga foi de **80% de 1RM**


% Cytotoxicity (1E: 1T)
90
80
70
60
50
40
30
20
10
0
*
*†
†
†
Trained
Control
PRE
POST
2H
PRE
POST
2H
Before-Training
After-Training

CONCLUSÕES DO ESTUDO

TF crônico **não deprimiu** a atividade das células NK

Aumentou a atividade das **células NK** em repouso e após uma sessão aguda;

Treinamento de força a **80% de 1RM**

Journal of Sports Sciences, December 2009; 27(14): 1607–1615

Routledge
Taylor & Francis Group

Effects of resistance training on resistin, leptin, cytokines, and muscle force in elderly post-menopausal women

JONATO PRESTES[1], GILBERTO SHIGUEMOTO[1], JOÃO PAULO BOTERO[1], ANELENA FROLLINI[2], RODRIGO DIAS[2], RICHARD LEITE[1], GUILHERME PEREIRA[1], RODRIGO MAGOSSO[1], VILMAR BALDISSERA[1], CLAUDIA CAVAGLIERI[2], & SERGIO PEREZ[1]

[1]*Physiological Sciences, Federal University of São Carlos, São Carlos and* [2]*Health Sciences, Methodist University of Piracicaba, Piracicaba, Brazil*

Efeitos do treinamento de força sobre a resistina, leptina, citocinas e força muscular em mulheres idosas pós-menopausadas

Table I. Order of the exercises in the training sessions over a 16-week resistance training programme.

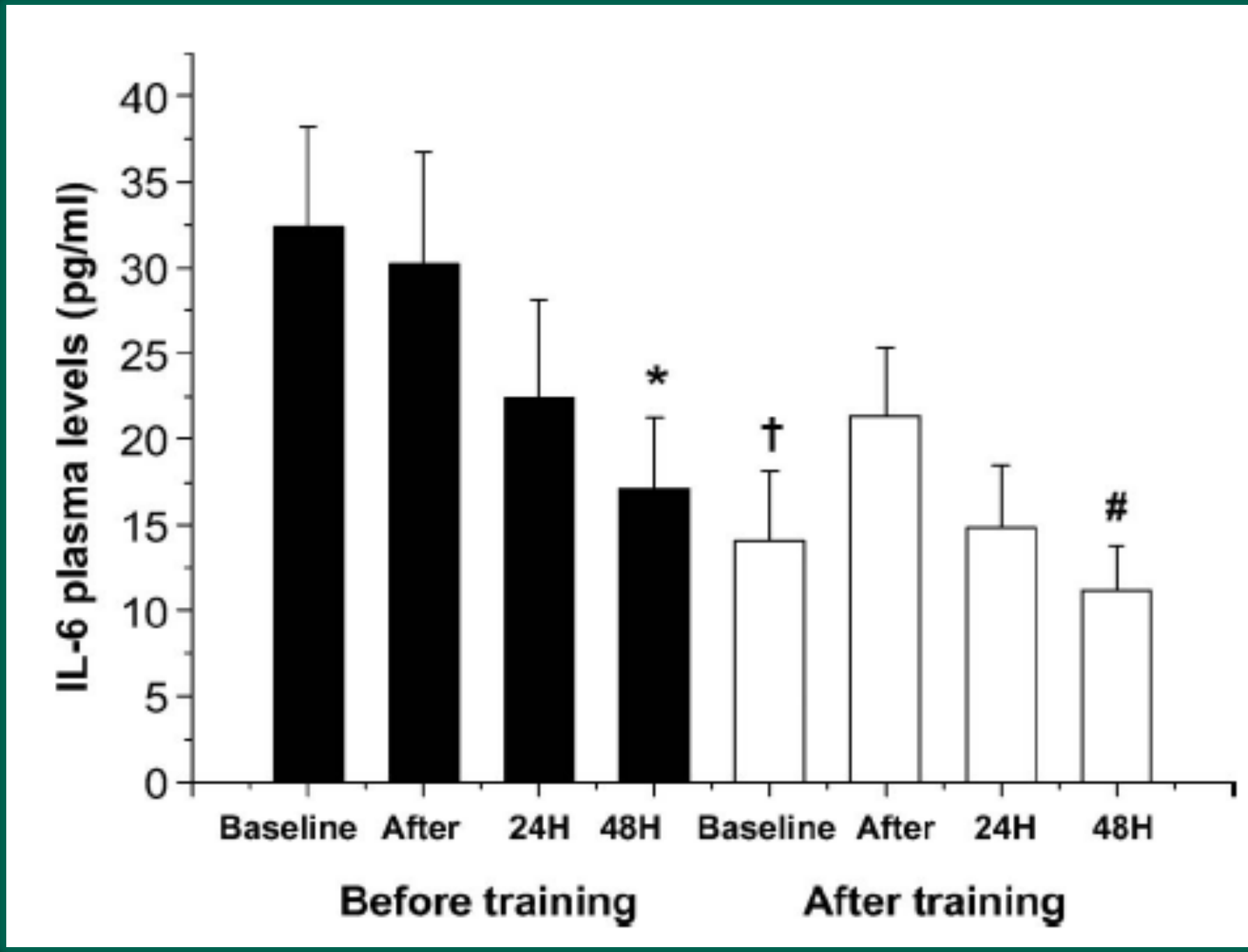
1. Barbell bench press	6. Knee flexion
2. 45° leg press	7. Arm extension
3. Seated row	8. Hip adduction and abduction
4. Knee extension	9. Arm curl
5. Lateral raise	10. Standing calf raise

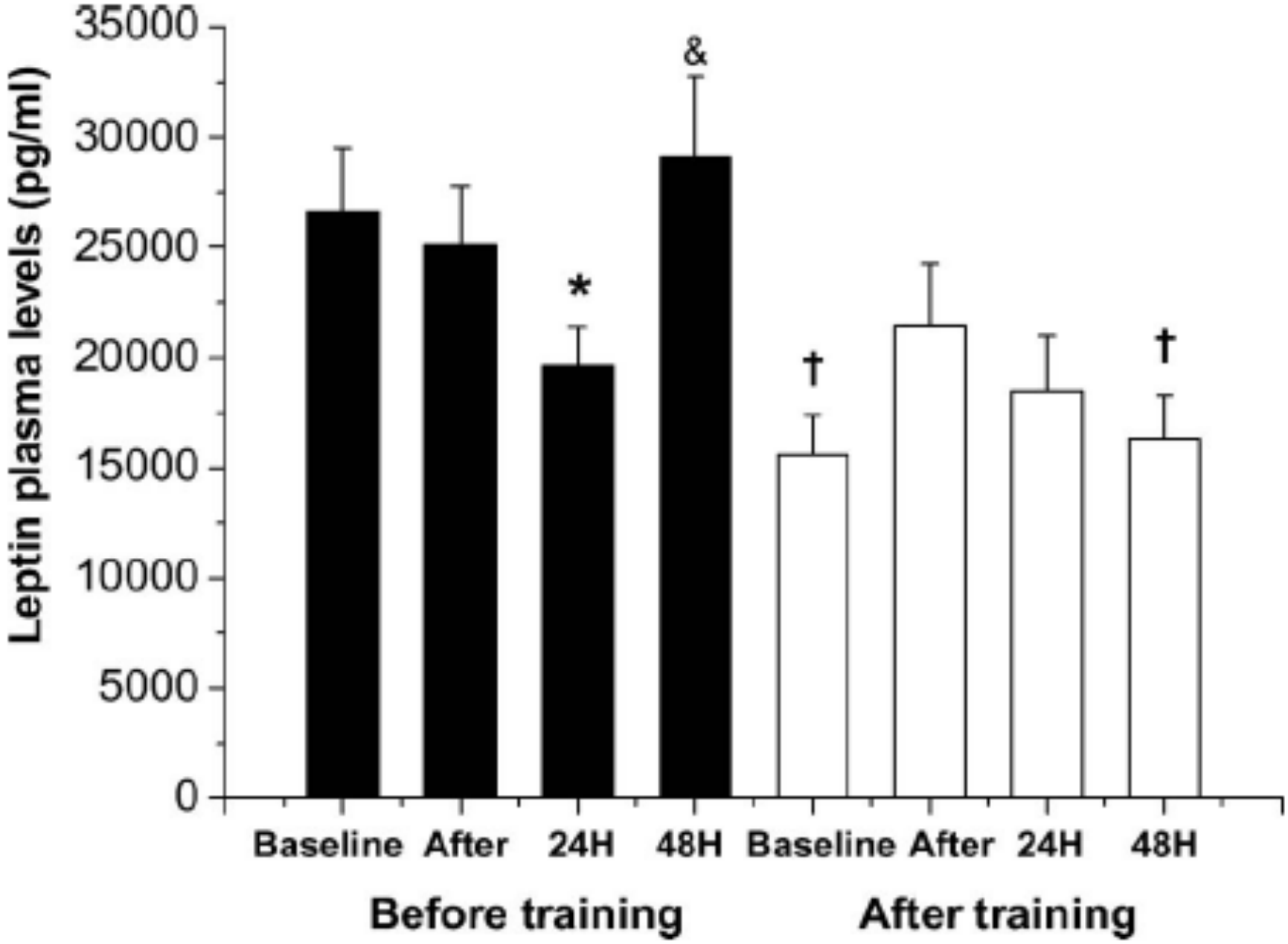
Table III. Dynamic maximal strength tests (1-RM) before and after 16 weeks of training (mean $\pm$ s_x).

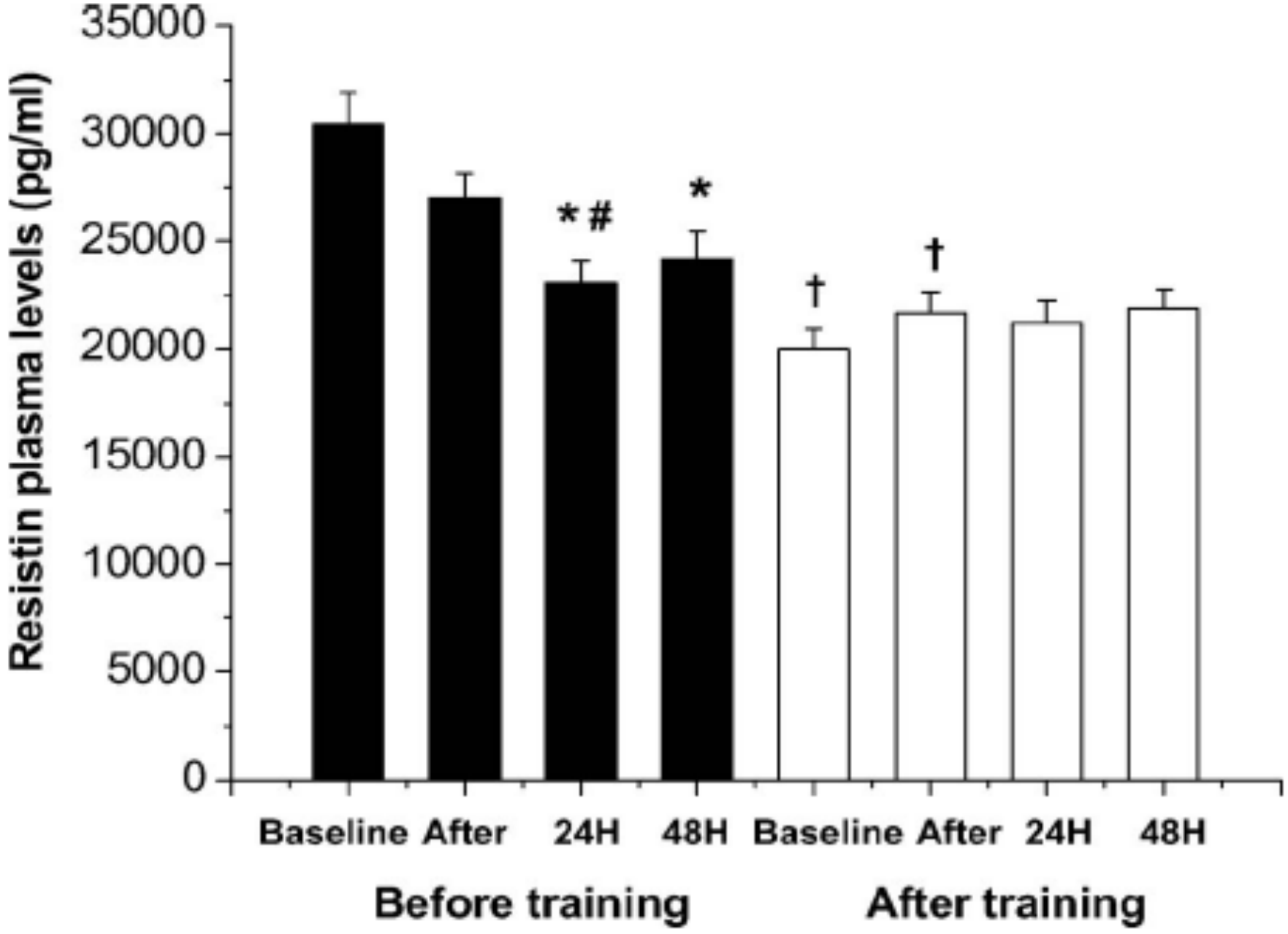
Maximal strength test (1-RM)	Evaluation before training	Evaluation after 16 weeks
Bench press (kg)	31.83 $\pm$ 0.80	38.34 $\pm$ 1.15*
45° leg press (kg)	172.21 $\pm$ 5.57	225.17 $\pm$ 7.06*
Arm curl (kg)	20.76 $\pm$ 0.45	22.75 $\pm$ 0.51*

FIGURA 1. Programa de treinamento de força – Periodização linear, adaptado de Prestes et al. (2009)

Séries x repetições (16 semanas) (microciclos 4 semanas cada)	Intervalo de descanso entre as séries e os exercícios
Micro 1 - 3 x 12-14 RM	1 minuto
Micro 2 - 3 x 10-12 RM	1 minuto e 20 segundos
Micro 3 - 3 x 8-10 RM	1 minuto e 40 segundos
Micro 4 - 3 x 6-8 RM	2 minutos


IL-6 plasma levels (pg/ml)
40
35
30
25
20
15
10
5
0
*
†
#
Baseline
After
24H
48H
Baseline
After
24H
48H
Before training
After training


Leptin plasma levels (pg/ml)
35000
30000
25000
20000
15000
10000
5000
0
&
*
†
†
Baseline
After
24H
48H
Baseline
After
24H
48H
Before training
After training


Resistin plasma levels (pg/ml)
35000
30000
25000
20000
15000
10000
5000
0
*#
*
†
†
Baseline
After
24H
48H
Baseline
After
24H
48H
Before training
After training

ORIGINAL ARTICLES

J SPORTS MED PHYS FITNESS 2013;53:289-94

Effects of long-term periodized resistance training on body composition, leptin, resistin and muscle strength in elderly post-menopausal women

J. P. BOTERO [1], G. E. SHIGUEMOTO [2, 3], J. PRESTES [4], C. T. MARIN [3], W. L. DO PRADO [5], C. S. PONTES [2], R. L. F. GUERRA [1], F. C. FERREIA [2], V. BALDISSERA [2], S. E. A. PEREZ [2]

Efeitos do treinamento de força sobre a resistina, leptina, citocinas e força muscular em mulheres idosas pós-menopausadas

TABLE I.—*One repetition maximal strength before and after the 12-month periodized resistance training.*

On-maximum repetition test (1RM)	Before training	After training	Change (%)
Bench press (kg)	31.95±0.85	41.80±1.14*	30.82
Leg press 45° (kg)	172.34±5.70	345.60±8.51*	100.9
Arm curl (kg)	21.00±0.49	26.55±0.59*	26.42

Note: The results were presented as mean±standard error of the mean (SEM). * Statistically significant difference compared with before training, (N.=23), $P<0.05$.

TABLE II.—*Body composition before and after the 12-month periodized resistance training.*

Variable	Before training	After training	%	P
Mass (kg)	67.56±2.26	66.52±2.28	1.53	0.02
BMI (kg/m²)	28.01±1.02	27.59±1.04	1.50	0.02
%Fat	37.78±1.27	36.78±1.32	2.64	0.006
FM (kg)	24.27±1.32	23.54±1.37	3.01	0.02
LM (kg)	38.88±0.93	39.50±1.12	1.59	0.009
%Fat-UL	33.77±1.26	31.96±1.37	5.35	0.008
FM-UL (kg)	2.47±0.17	2.16±0.15	12.55	0.001
LM-UL (kg)	4.49±0.17	4.53±0.15	0.89	0.55
%Fat-LL	39.26±1.21	38.70±1.29	1.43	0.01
FM-LL (kg)	8.95±0.47	8.88±0.51	0.78	0.74
LM-LL (kg)	13.39±0.31	13.91±0.33	3.88	0.02
%Fat-Tru	37.09±1.35	36.58±1.46	1.37	0.30
FM-Tru (kg)	11.43±0.72	11.12±0.75	2.71	0.25
Lm-Tru (kg)	18.51±0.58	18.52±0.59	0.05	0.89

Note: The results were presented as mean±standard error of the mean (SEM). * Statistically significant difference compared with before training (N.=23), P<0.05. FM: fat mass; LM: lean mass; %Fat-UL =% fat of upper limbs; FM-UL: fat mass of upper limbs; LM-UL: lean mass of upper limbs; %Fat-LL: % fat of lower limbs; FM-LL: fat mass of lower limbs; %Fat-Tru: % trunk fat; FM-Tru: trunk fat mass; LM-Tru: trunk lean mass.

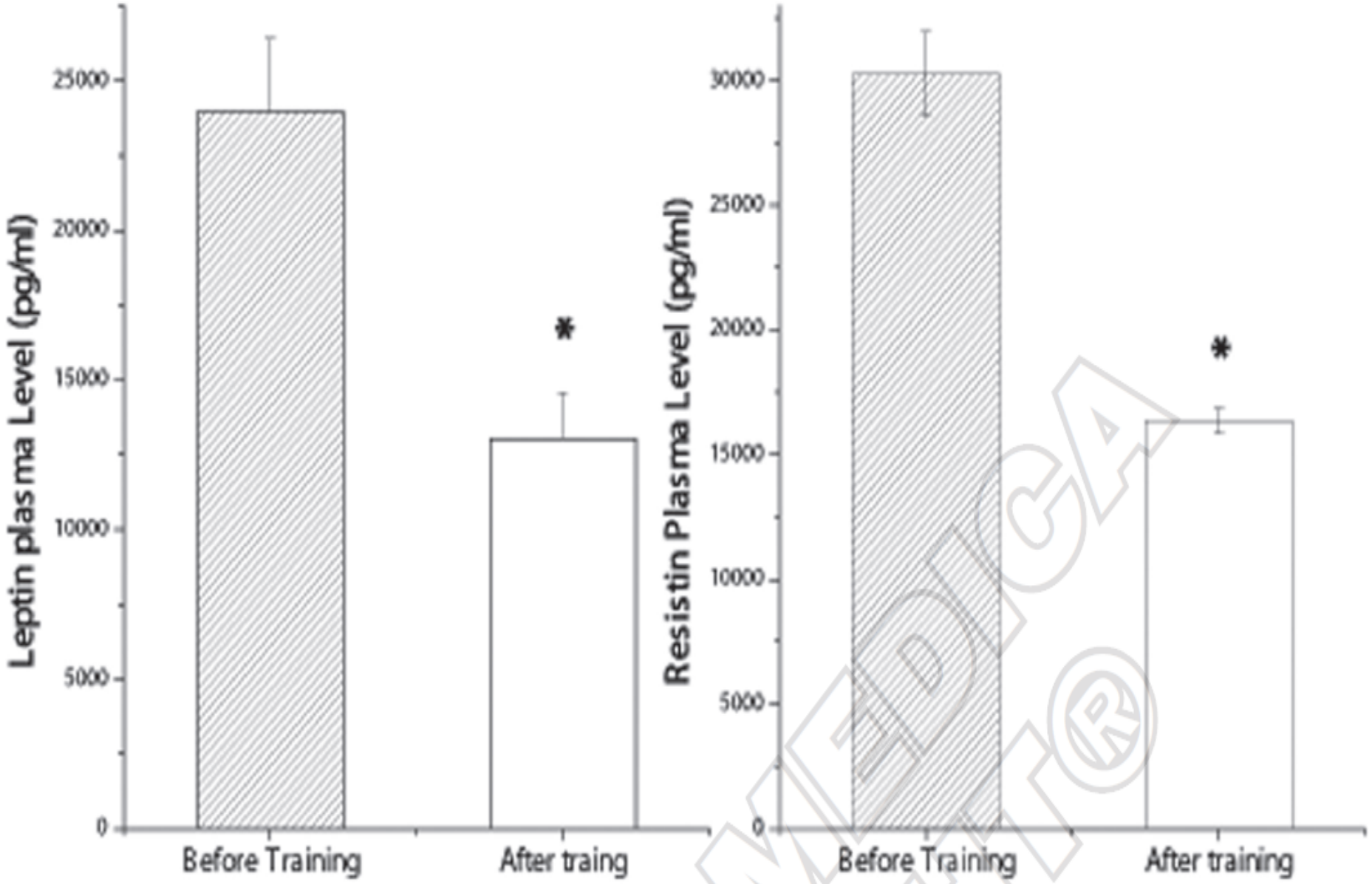


Figure 1.—Plasma concentration of leptin and resistin (pg/mL). The values are presented as mean ± standard error of mean (SEM) (N.=23), P<0.05. Leptin and resistin levels were assessed before the first training session and after the 12-month training program. *Statistically significant difference compared with before training.

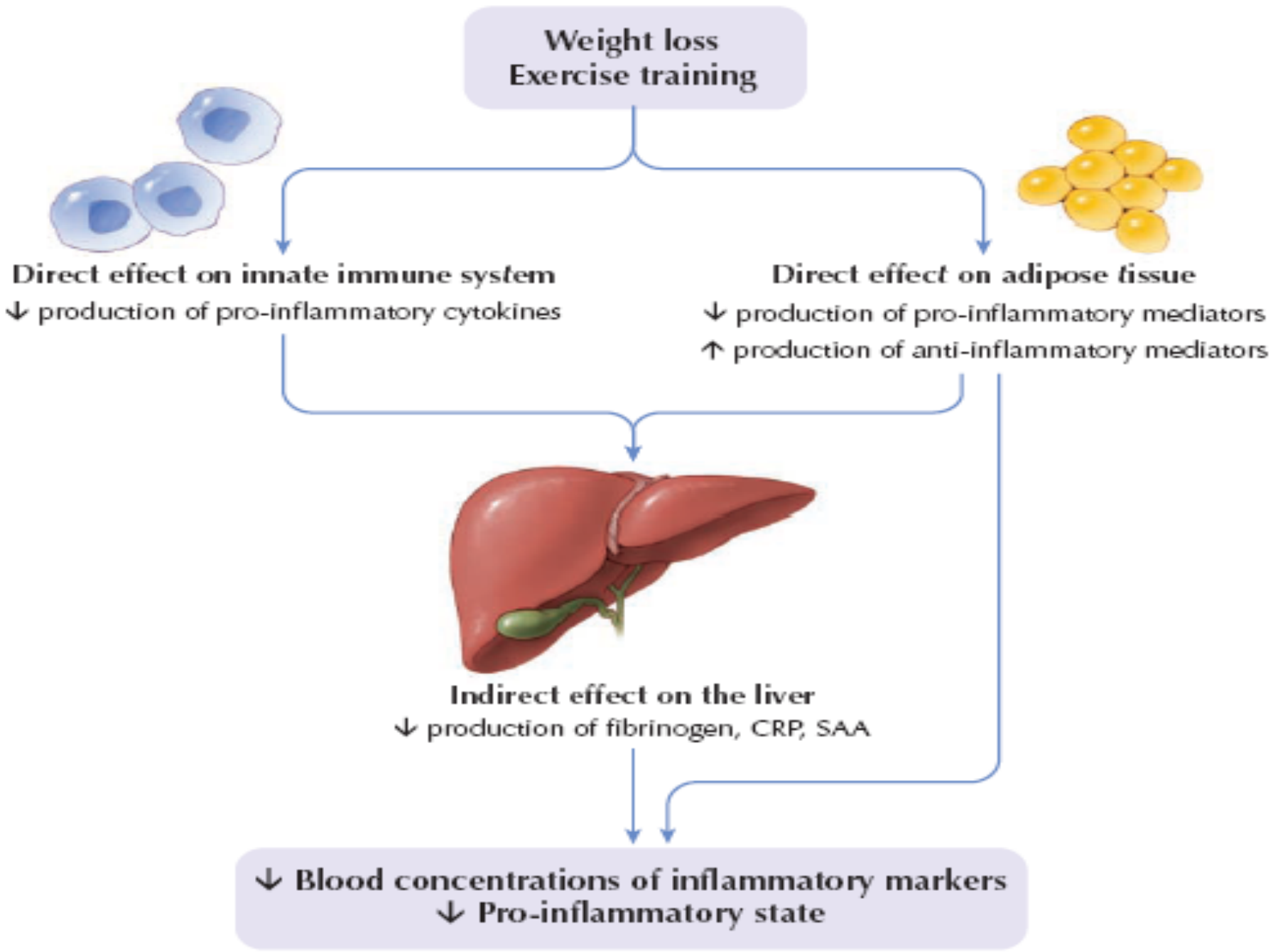
Review

Synthèse

Behavioural treatments for chronic systemic inflammation: effects of dietary weight loss and exercise training

Barbara J. Nicklas, Tongjian You, Marco Pahor

CMAJ 2005;172(9):1199-209


Weight loss
Exercise training
Direct effect on innate immune system
↓ production of pro-inflammatory cytokines
Direct effect on adipose tissue
↓ production of pro-inflammatory mediators
↑ production of anti-inflammatory mediators
Indirect effect on the liver
↓ production of fibrinogen, CRP, SAA
↓ Blood concentrations of inflammatory markers
↓ Pro-inflammatory state

Acute Interleukin-6 Administration Impairs Athletic Performance in Healthy, Trained Male Runners

Paula J. Robson-Ansley[1]*, Liesl de Milander[1], Malcolm Collins[1], and Timothy D. Noakes[1]

Catalogue Data

Robson-Ansley, P.J.; de Milander, L.; Collins, M.; and Noakes, T.D. (2004). Acute interleukin-6 administration impairs athletic performance in healthy, trained male runners. **Can. J. Appl. Physiol.** 29(4): 411-418.

Key words: *prolonged exercise, fatigue, exercise challenge*

Mots-clés: *exercice prolongé, fatigue, défi sportif*

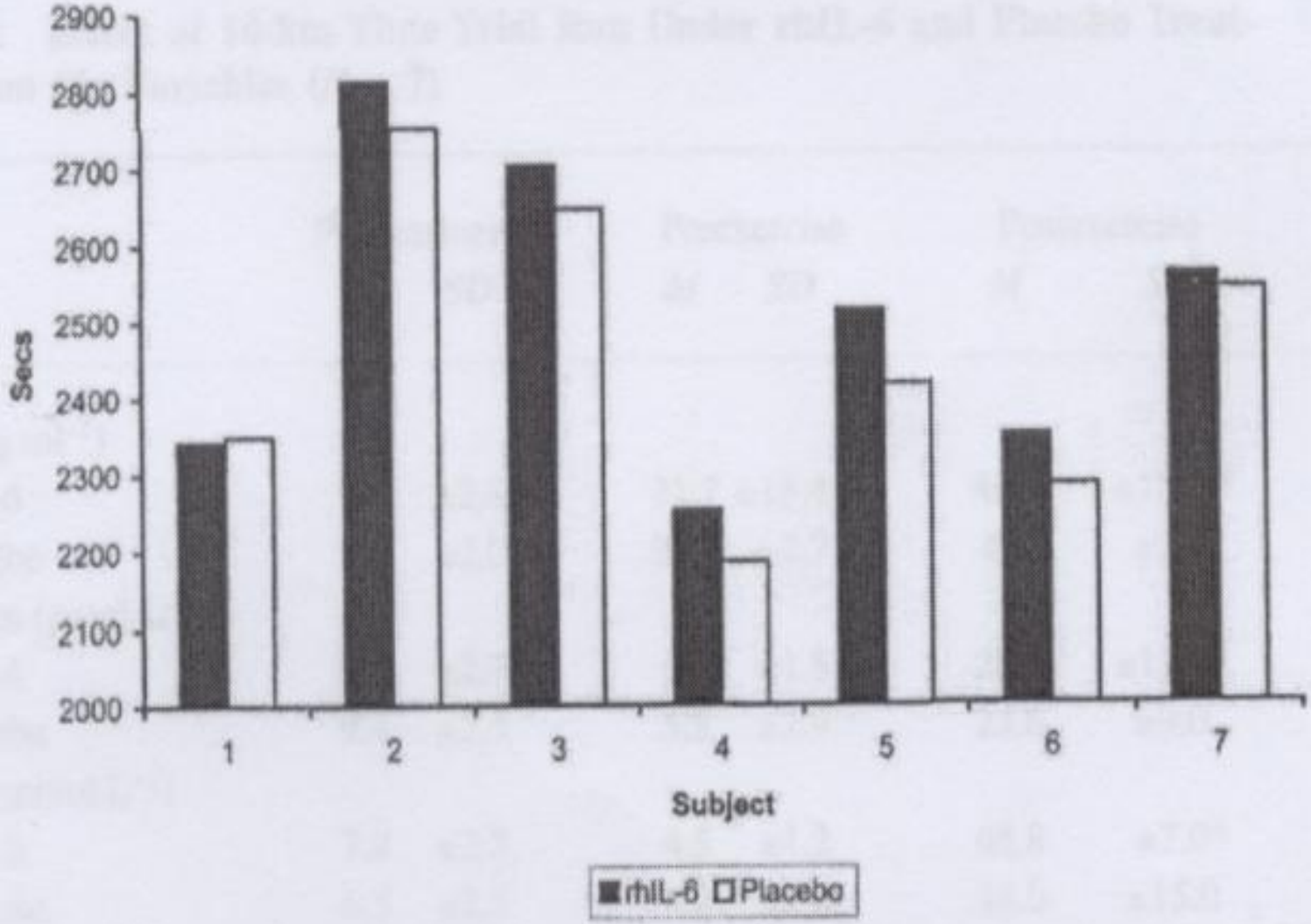


Figure 1. Effect of rhIL-6 and placebo administration on time taken to complete 10-km time trial run (individual subject data).

Table 1 Effect of 10-km Time Trial Run Under rhIL-6 and Placebo Treatments on Six Variables (N = 7)

	Pretreatment		Preexercise		Postexercise	
	M	*SD*	*M*	*SD*	*M*	*SD*
IL-6 ($pg \cdot ml^{-1}$)						
rhIL-6	2.7	±2.8	21.7	±15.4*	41.3	±18.3*
Placebo	2.4	±2.0	2.14	±2.7	6.9	±2.5
Prolactin ($pmol \cdot L^{-1}$)						
rhIL-6	8.9	±2.7	6.0	±1.8	28.9	±11.3*
Placebo	9.4	±2.5	5.8	±2.9	23.6	±9.0
ACTH ($nmol \cdot L^{-1}$)						
rhIL-6	7.8	±2.8	4.5	±1.2	65.8	±7.0*
Placebo	6.5	±2.5	4.2	±1.4	38.0	±15.0
Cortisol($nmol \cdot L^{-1}$)						
rhIL-6	694	±153	520	±178	1001	±203*
Placebo	693	±81	447	±133	767	±244
Glucose ($mmol \cdot L^{-1}$)†						
rhIL-6	4.1	±0.3	4.2	±0.3	7.1	±1.6
Placebo	4.1	±0.3	4.3	±0.2	7.0	±1.9
Lactate ($mmol \cdot L^{-1}$)†						
rhIL-6	1.5	±0.4	1.6	±1.0	7.7	±2.4
Placebo	1.3	±0.6	1.0	±0.7	6.9	±2.4

Table 2 Effect of 10-km Time Trial Run Under rhIL-6 and Placebo Treatments on Fatigue and Total Mood Disturbance ($N = 7$)

	Pretreatment $M \pm SD$	Preexercise $M \pm SD$	Postexercise $M \pm SD$
Fatigue			
rhIL-6	3 ± 3	3 ± 2	14 ± 8*
Placebo	4 ± 4	4 ± 2	11 ± 7
Total Mood Disturbance			
rhIL-6	110 ± 6	108 ± 10	121 ± 4*
Placebo	107 ± 5	109 ± 13	111 ± 11

*rhIL-6 trial significantly greater than placebo trial, $p < 0.05$.

ARTIGO ORIGINAL

Efeitos da Suplementação de Fibras Solúveis Sobre as Células do Sistema Imune Após Exercício Exaustivo em Ratos Treinados

Effects of Soluble Fibers Supplementation on Immune System Cells after Exhausting Exercise in Trained Rats

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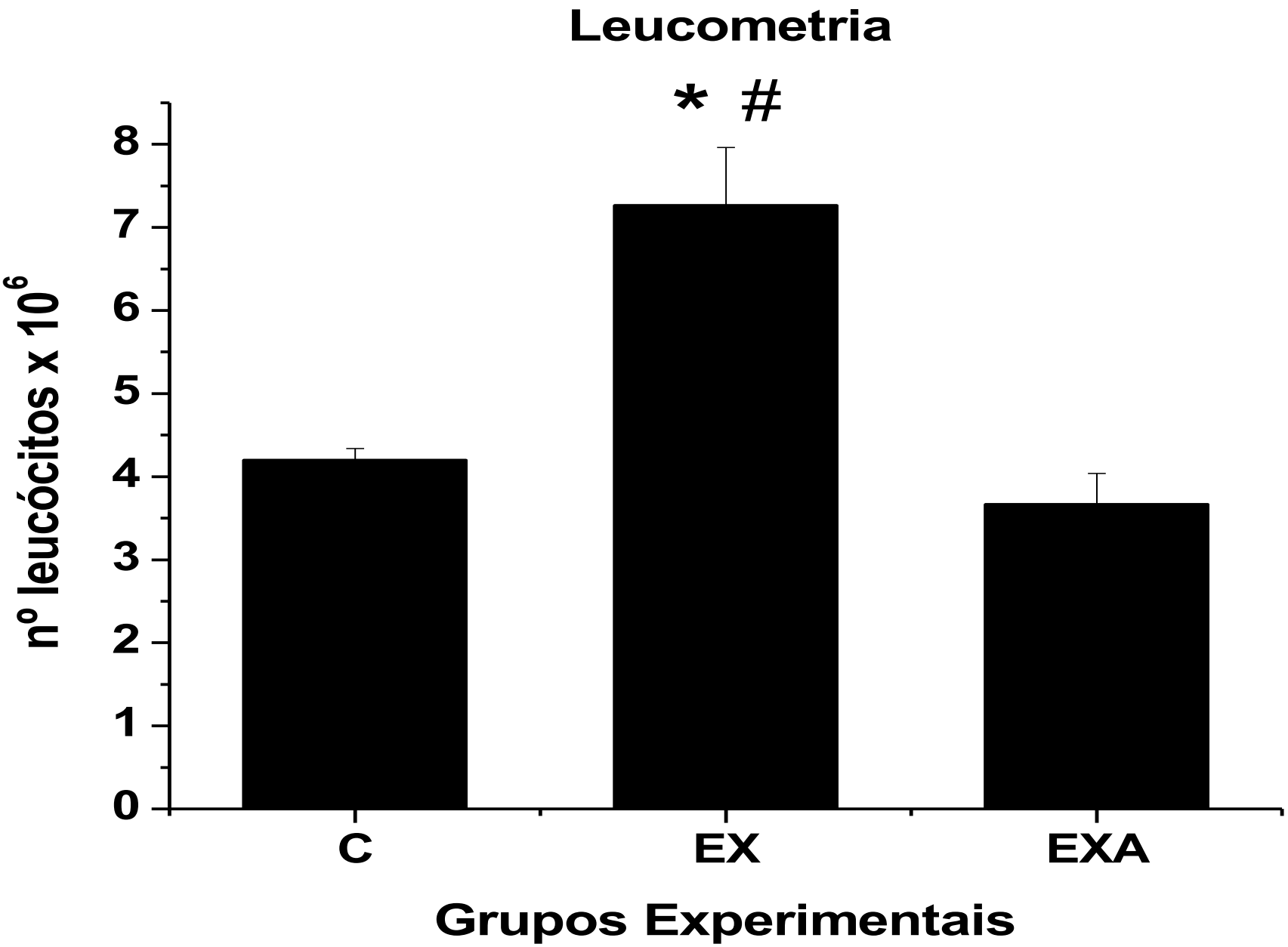
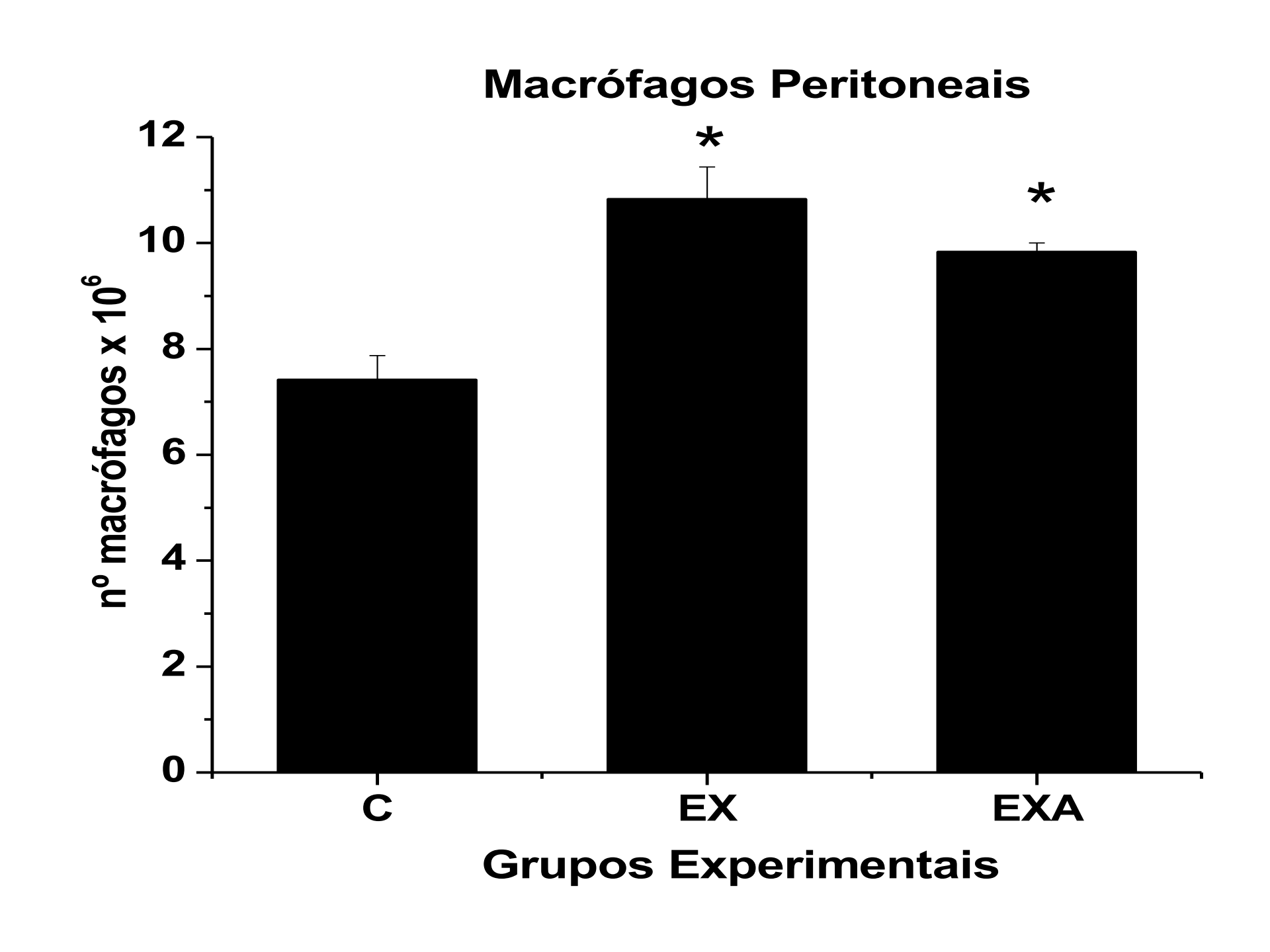
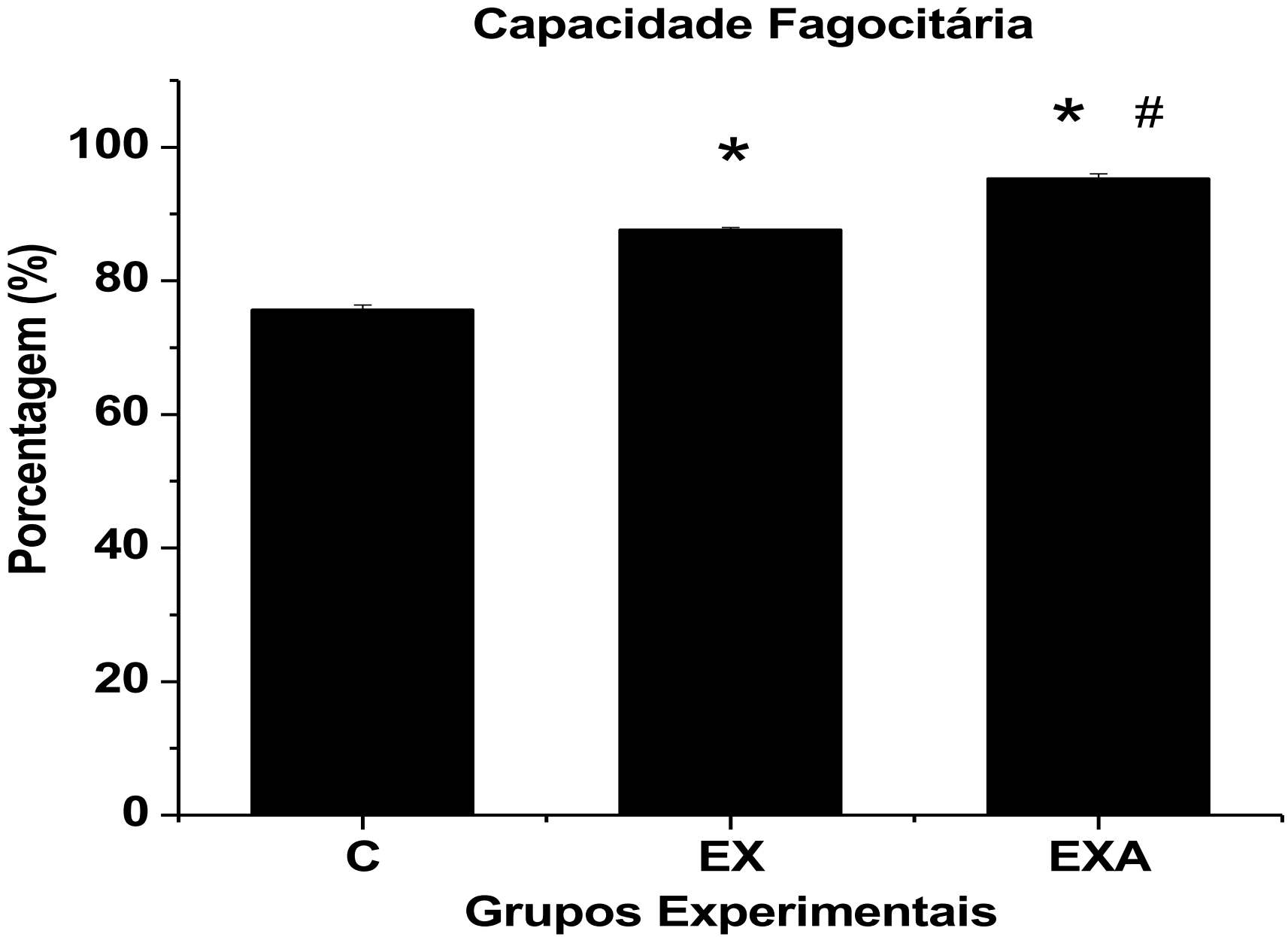

Leucometria
* #
nº leucócitos x 10^6
0
1
2
3
4
5
6
7
8
C
EX
EXA
Grupos Experimentais


Macrófagos Peritoneais
nº macrófagos x 10^6
0
2
4
6
8
10
12
*
*
C
EX
EXA
Grupos Experimentais


Capacidade Fagocitária
Porcentagem (%)
0
20
40
60
80
100
*
* #
C
EX
EXA
Grupos Experimentais

Donatto *et al. Journal of the International Society of Sports Nutrition* 2010, **7**:32
http://www.jissn.com/content/7/1/32

jissn
journal of the international society of sports nutrition

RESEARCH ARTICLE Open Access

Effect of oat bran on time to exhaustion, glycogen content and serum cytokine profile following exhaustive exercise

Felipe F Donatto[1,3*], Jonato Prestes[1,2], Anelena B Frollini[1], Adrianne C Palanch[1], Rozangela Verlengia[1], Claudia Regina Cavaglieri[1]

Efeitos do farelo de aveia sobre o tempo de exaustão, conteúdo de glicogênio e citocinas plasmáticas após exercício exaustivo

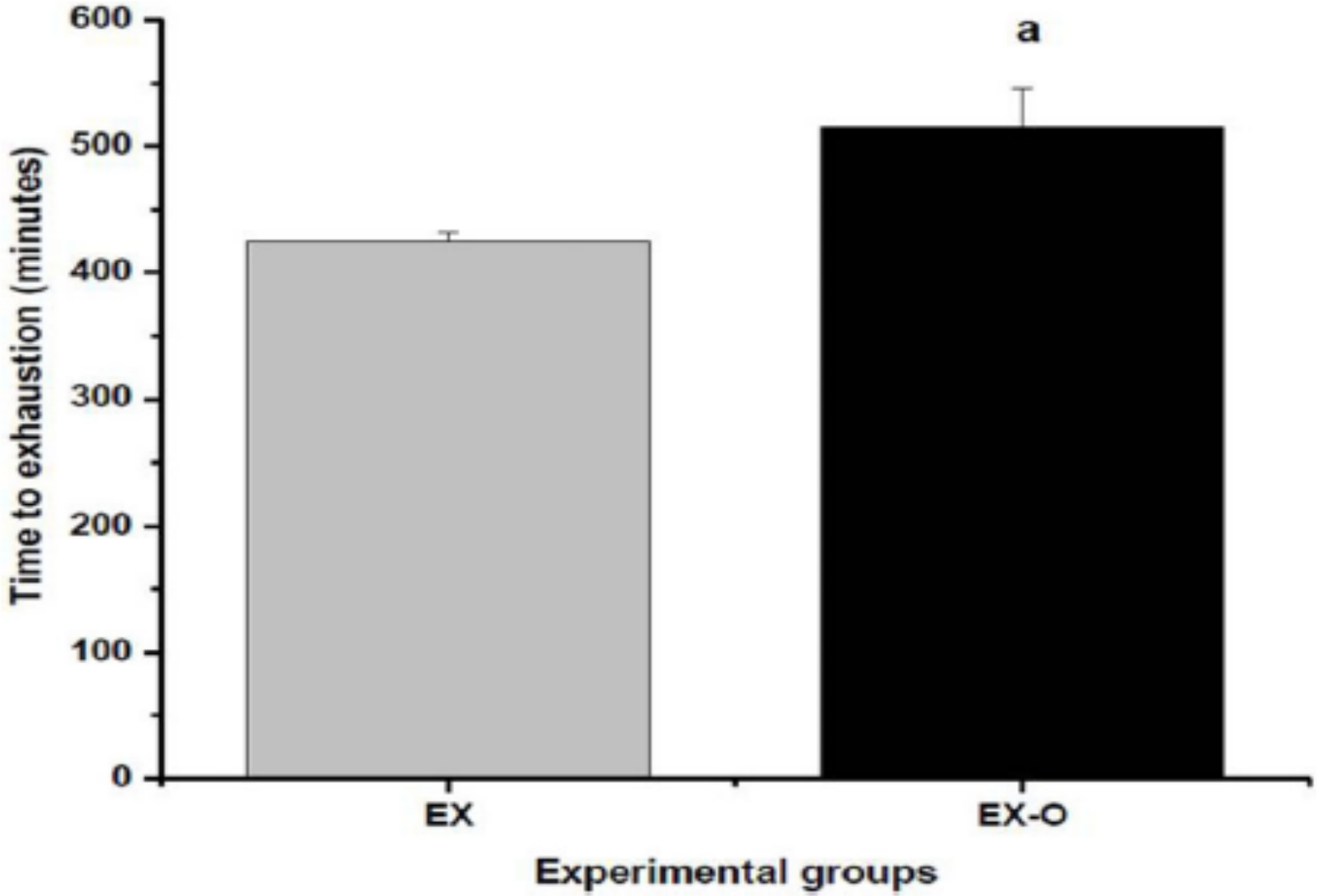


Figure 1 Time to exhaution on experimental groups. a = statistical difference to exhaution group (EX)

Table 1 Nutritional Composition in grams (g) of the chows used

NUTRIENT	CONTROL	%	EXPERIMENTAL	%
Protein (g)	18	24.8	17.4	23.5
Fat(g)	4	12.4	4.9	14.8
Carbohydrate(g)	45.5	62.7	45.6	61.6
Total fibers (g)	21.9	-	18.9	-
Insoluble fibers (g)	18	82	14.4	76.1
Soluble fibers (g)	3.9	17.8	4.5	23.8

Table 2 Plasma cytokine concentration in experimental groups

(pg/ml)	C	EX	EX-O
IL-6	11.2 ± 17	163 ± 2.7*	127 ± 3.6*#
IL-10	50.5 ± 9.4	328.5 ± 78*	84.3 ± 53.4*#
TNF-a	31.1 ± 1.34	5.58 ± 1.0*	2.6 ± 0.4*

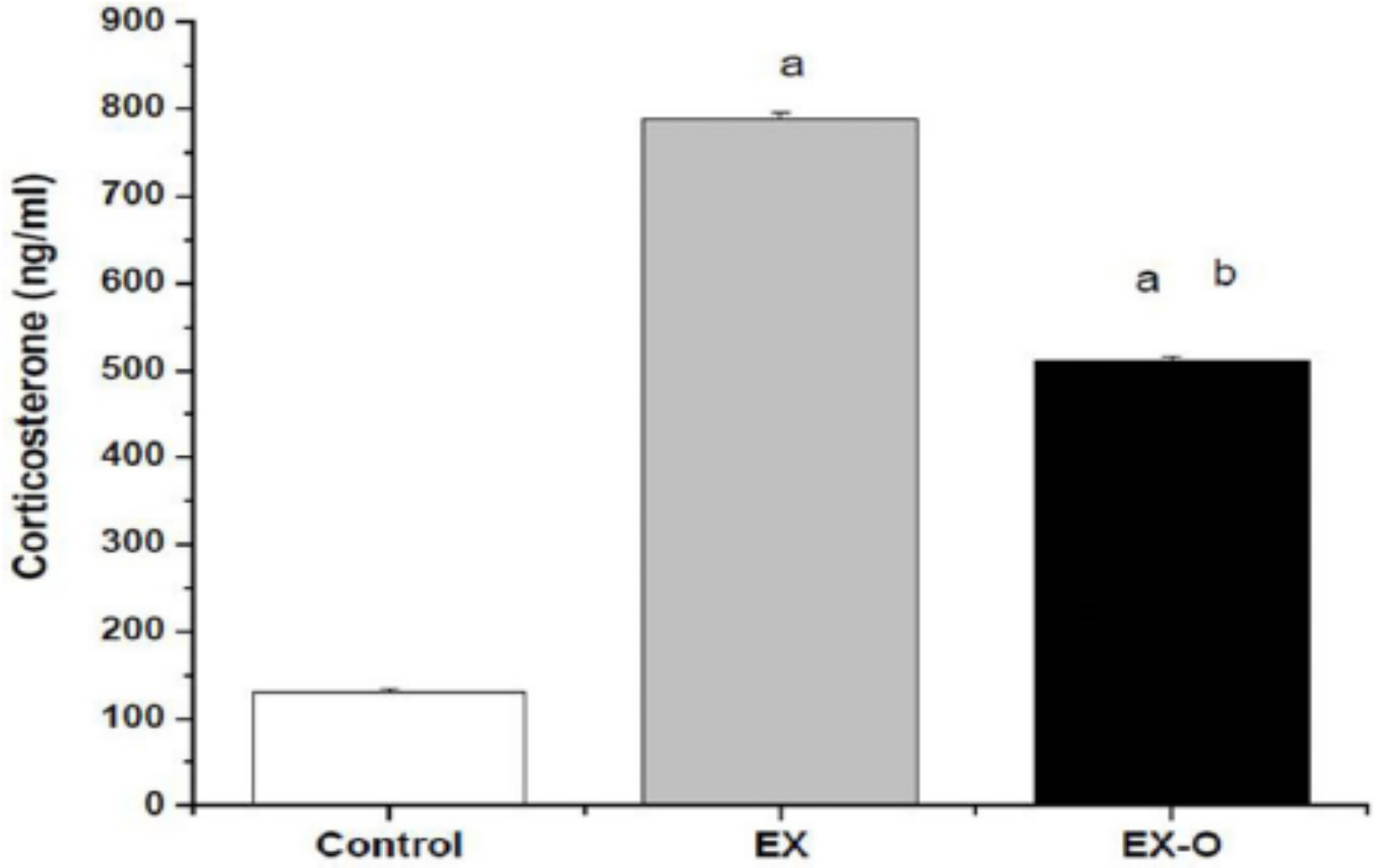


Figure 2 Corticosterone levels in experimental groups. a = statistical difference to control group b = statistical difference to EX group

Table 3 Hepatic and muscle glycogen concentration (mg/100 mg)

	C	EX	EX-O
Hepatic glycogen	5.5 ± 1.06	0.8 ± 0.09*	2.9 ± 0.64*#
White gastrocnemius	0.61 ± 0.06	0.12 ± 0.01*	0.14 ± 0.03*
Red gastrocnemius	0.53 ± 0.05	0.14 ± 0.02*	0.16 ± 0.04*
Soleus	0.70 ± 0.05	0.15 ± 0.06*	0,37 ± 0.04*#

CONCLUSÕES DO ESTUDO

A suplementação com farelo de aveia **atenua a leucocitose** induzida pelo exercício extenuante e **modula a capacidade fagocitária** em ratos treinados submetidos a um teste de exaustão.

Resultado pode ser interessante para **atletas de endurance**

“A única finalidade da vida é ser o que somos e nos tornarmos o que somos capazes de nos tornar”

ROBERT LOUIS STEVENSON


OBRIGADO!!
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