



HIPERTENSÃO ARTERIAL E EXERCÍCIO: DA EXPERIMENTAÇÃO PARA A CLÍNICA

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InCor HC.FMUSP

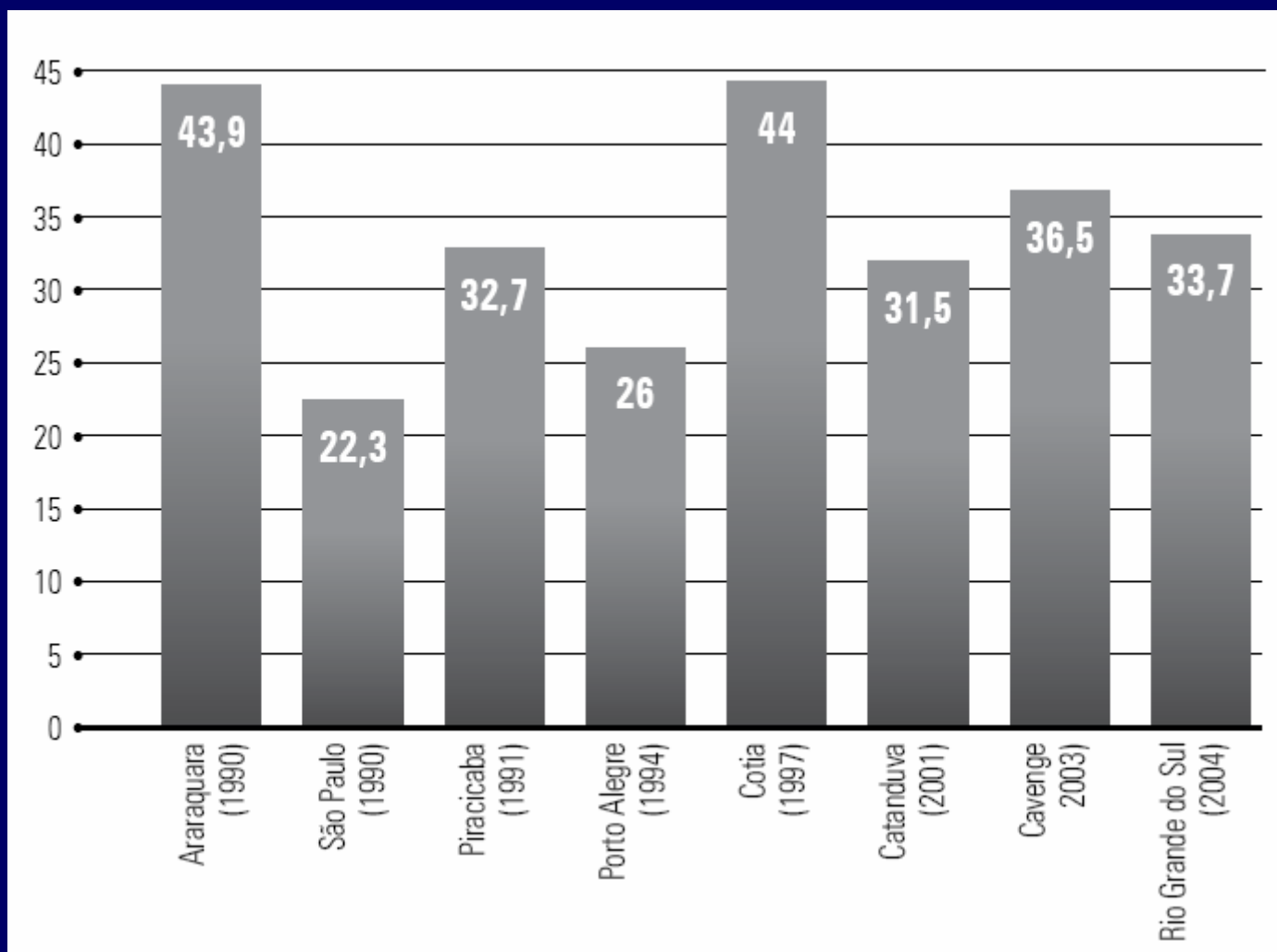
A HIPERTENSÃO ARTERIAL É UMA SÍNDROME
MULTIFATORIAL, ASSINTOMÁTICA,
CARACTERIZADA POR ELEVADOS NÍVEIS
PRESSÓRICOS.

Classificação da Pressão Arterial de Indivíduos Acima de 18 anos

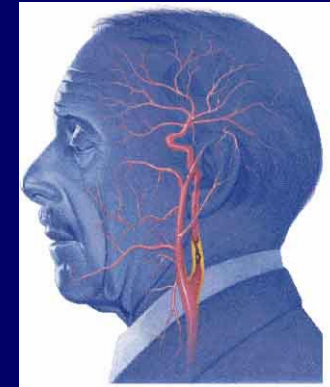
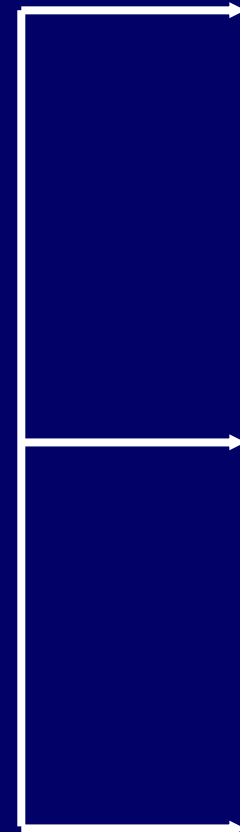
Classificação	Pressão sistólica (mmHg)	Pressão diastólica (mmHg)
Ótima	< 120	< 80
Normal	< 130	< 85
Limítrofe	130-139	85-89
Hipertensão estágio 1	140-159	90-99
Hipertensão estágio 2	160-179	100-109
Hipertensão estágio 3	≥ 180	≥ 110
Hipertensão sistólica isolada	≥ 140	< 90

Prevalência de Hipertensão Arterial

Estudos populacionais para PA \geq 140/90 mmHg



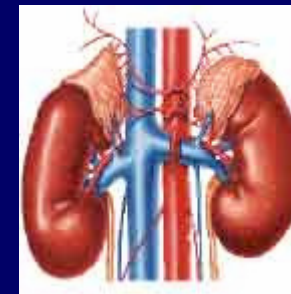
Implicações Clínicas da Hipertensão Arterial



40%



25%



Exercício é uma Conduta Efetiva para Tratar a Hipertensão Arterial?

Treinamento físico (ratos SHR)

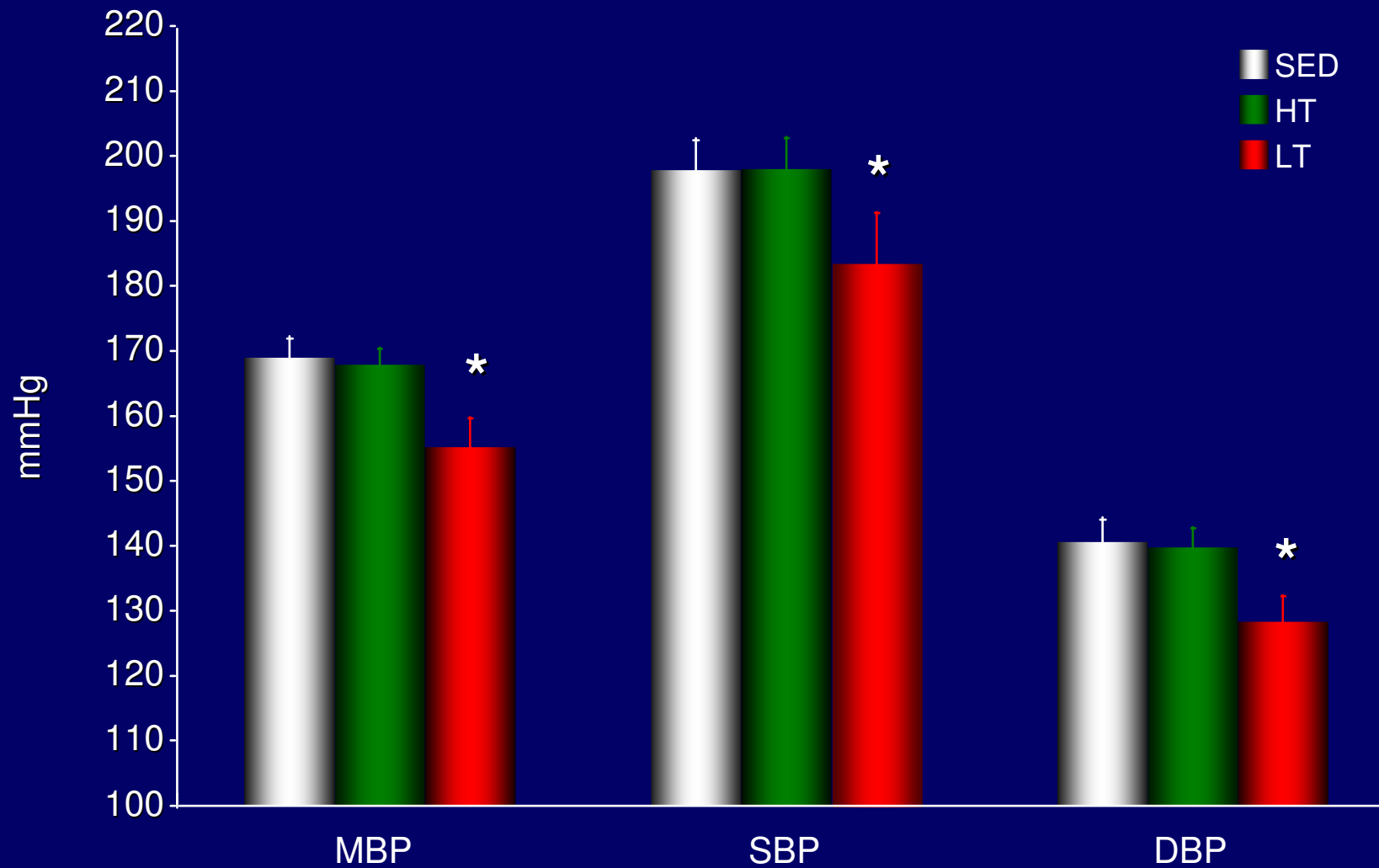
Intensidade: 55% VO_2 pico
85% VO_2 pico

60 min/dia
5 X semana

12 semanas

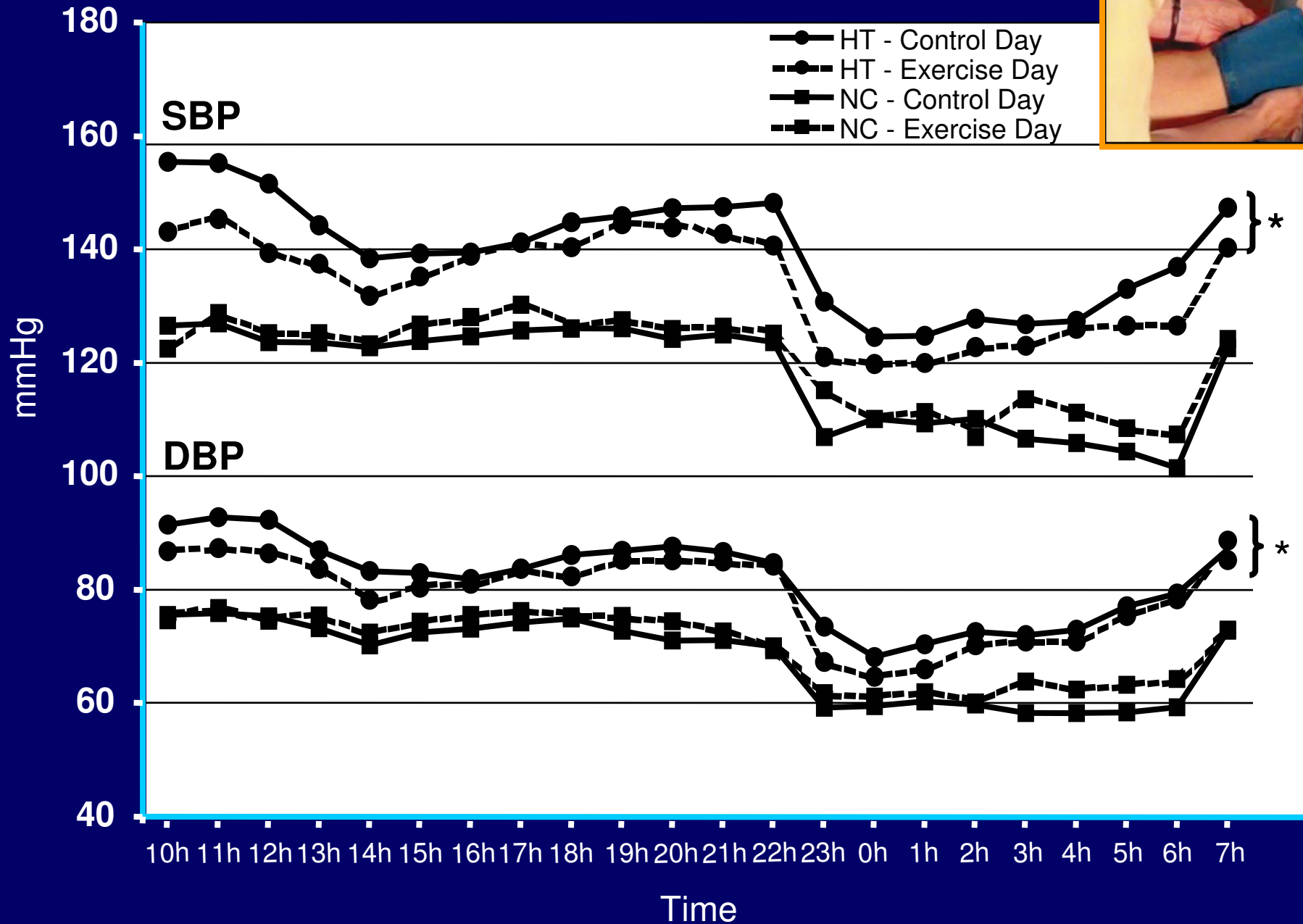


Influência do Treinamento Físico na PA de Ratos SHR

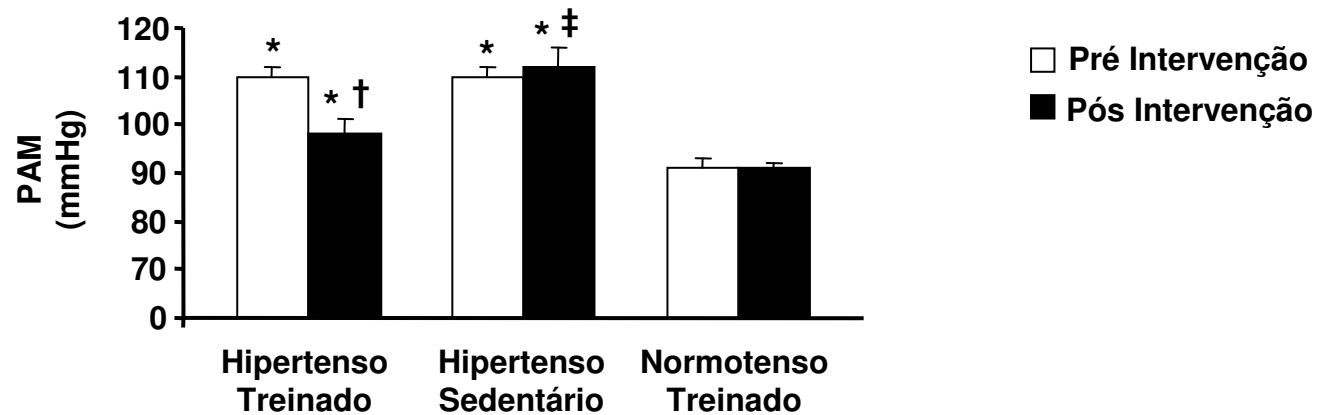
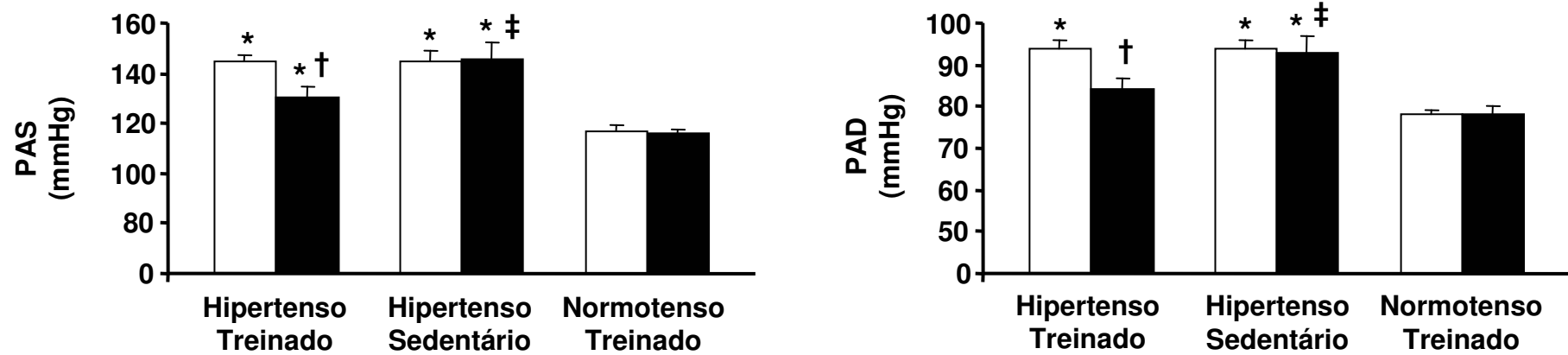


* $p < 0.05$

Véras-Silva et al. *Am.J. Physiol.* 273 (Heart Circ. Physiol. 42): H2627-H2631, 1997



Efeito do Treinamento Físico na Pressão Arterial



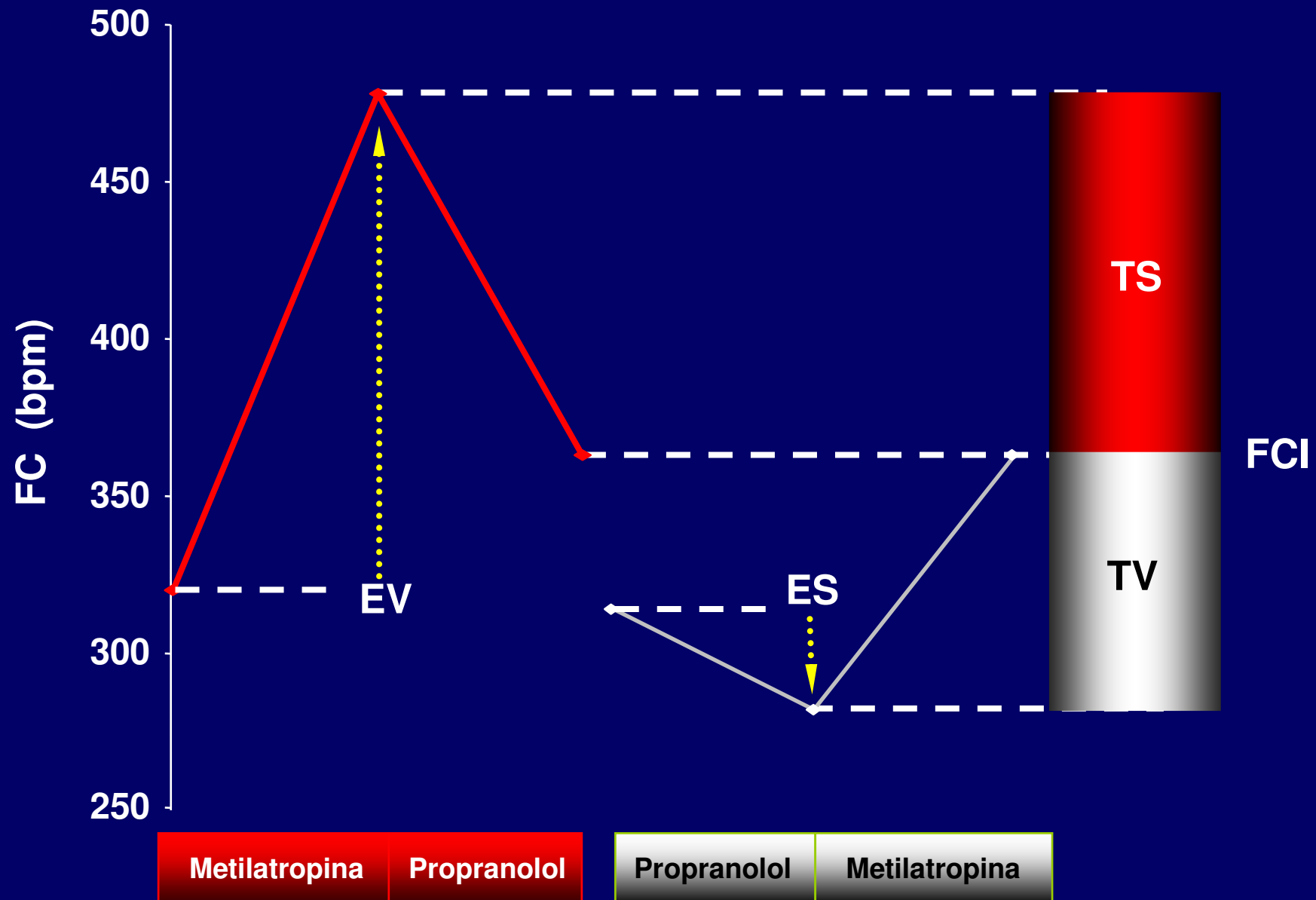
* = Diferença vs. normotenso controle, $P < 0,05$

† = Diferença entre pré vs. pós intervenção, $P < 0,05$

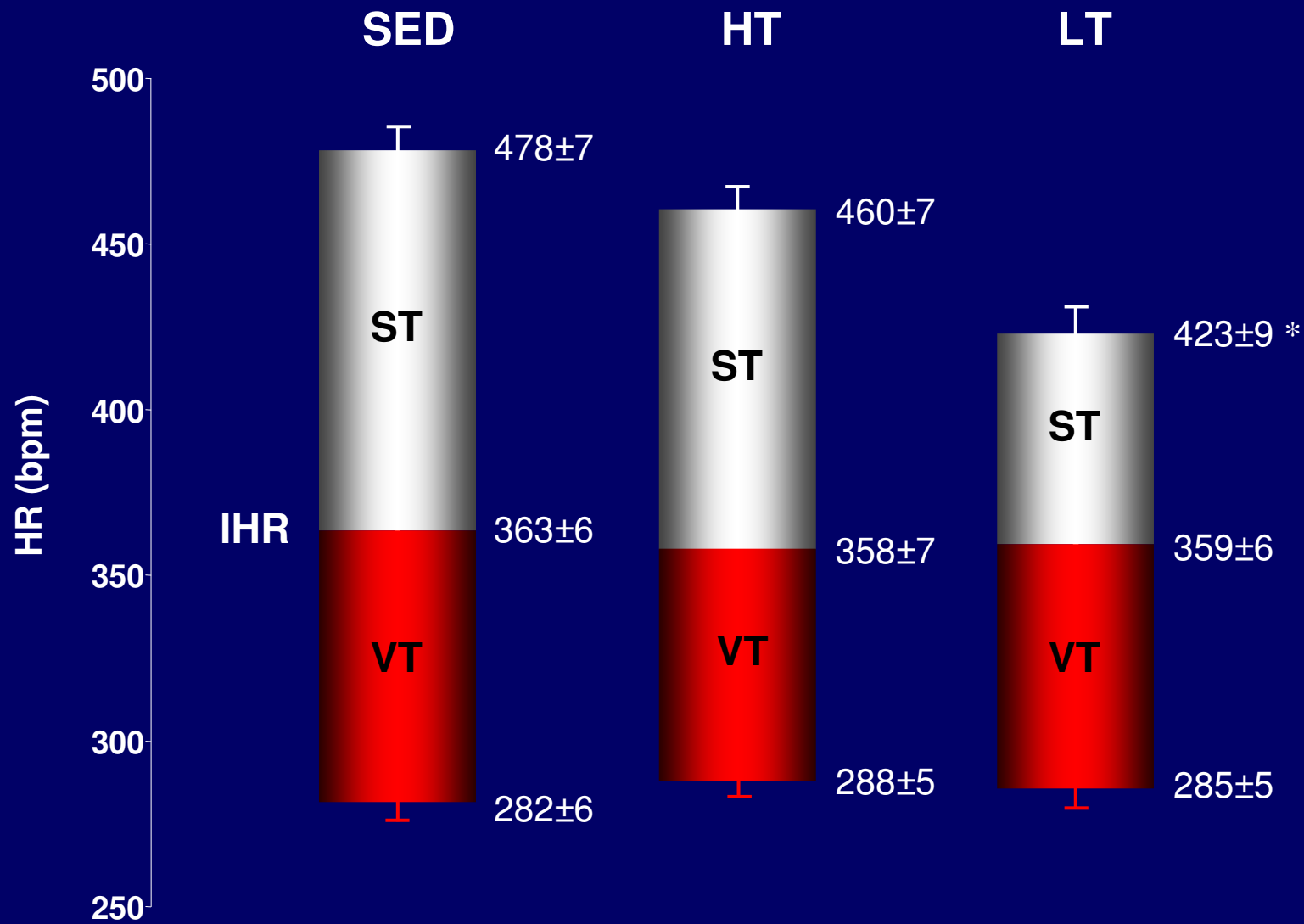
‡ = Diferença vs. hipertenso treinado, $P < 0,05$

**Mecanismos Responsáveis pela
Diminuição da Pressão Arterial
Pós-treino Físico**

Avaliação do “Efeito”, “Tônus” e “FC intrínseca”



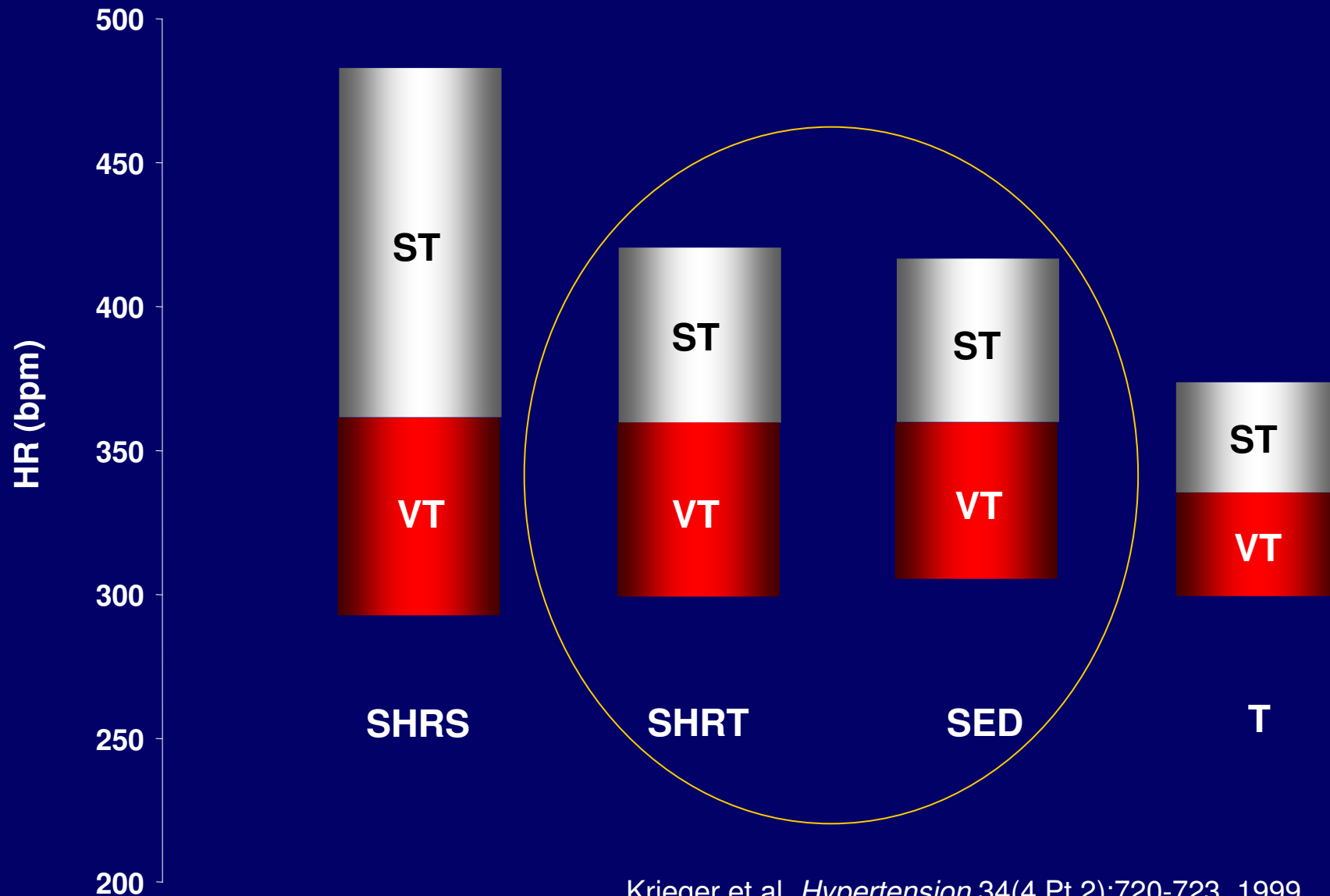
Tônus Simpático e Vagal em Ratos Espontaneamente Hipertensos



* = $P < 0.05$

Gava et al. *Hypertension* 26(part2):1129-1133, 1995

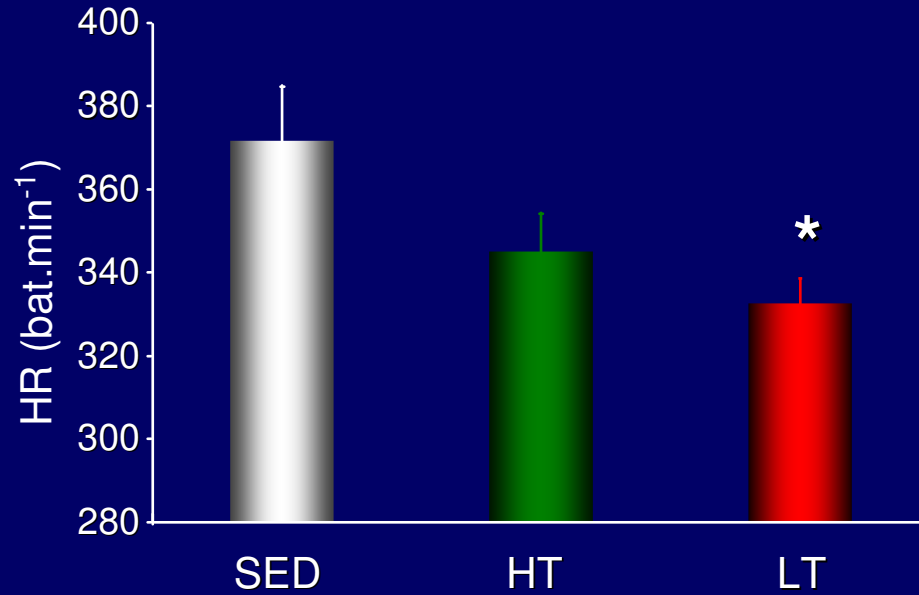
Tônus Simpático e Vagal em Ratos Sedentários e Treinados, Normotensos e Hipertensos



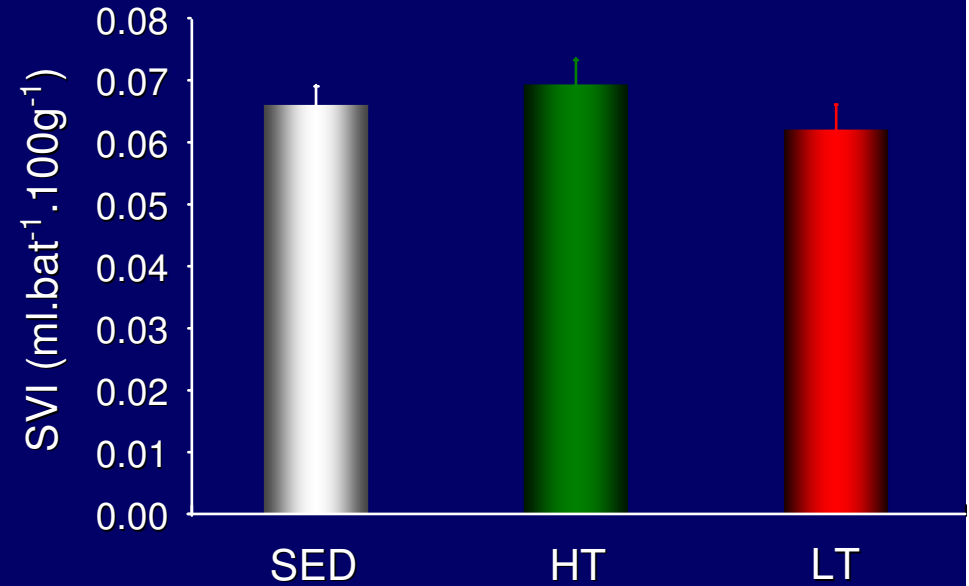
Krieger et al. *Hypertension* 34(4 Pt 2):720-723, 1999.

HEMODYNAMIC RESPONSES

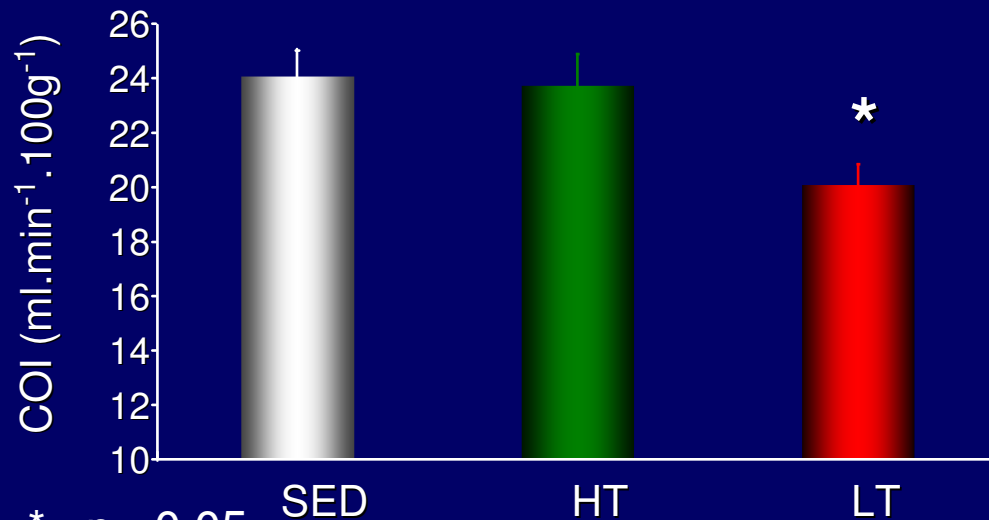
HEART RATE



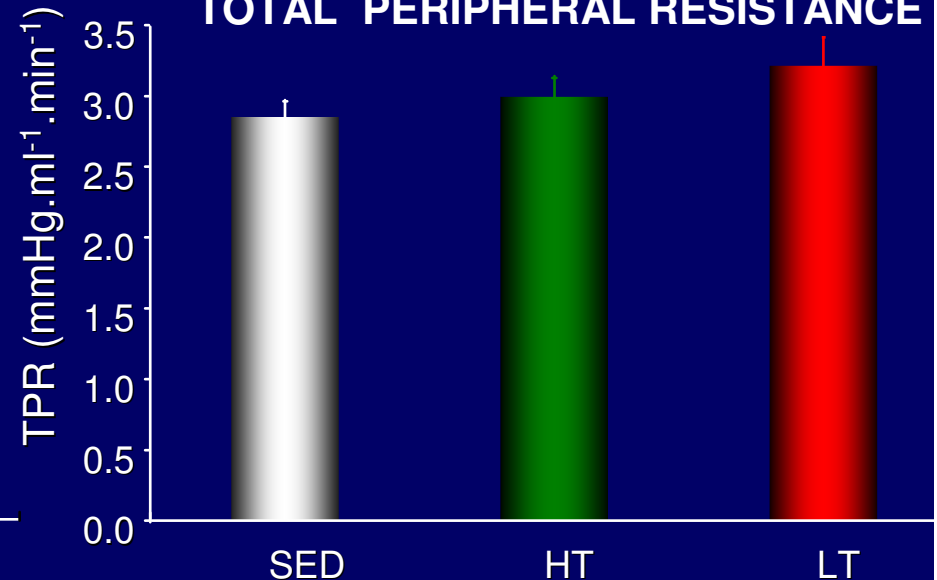
STROKE VOLUME INDEX



CARDIAC OUTPUT INDEX

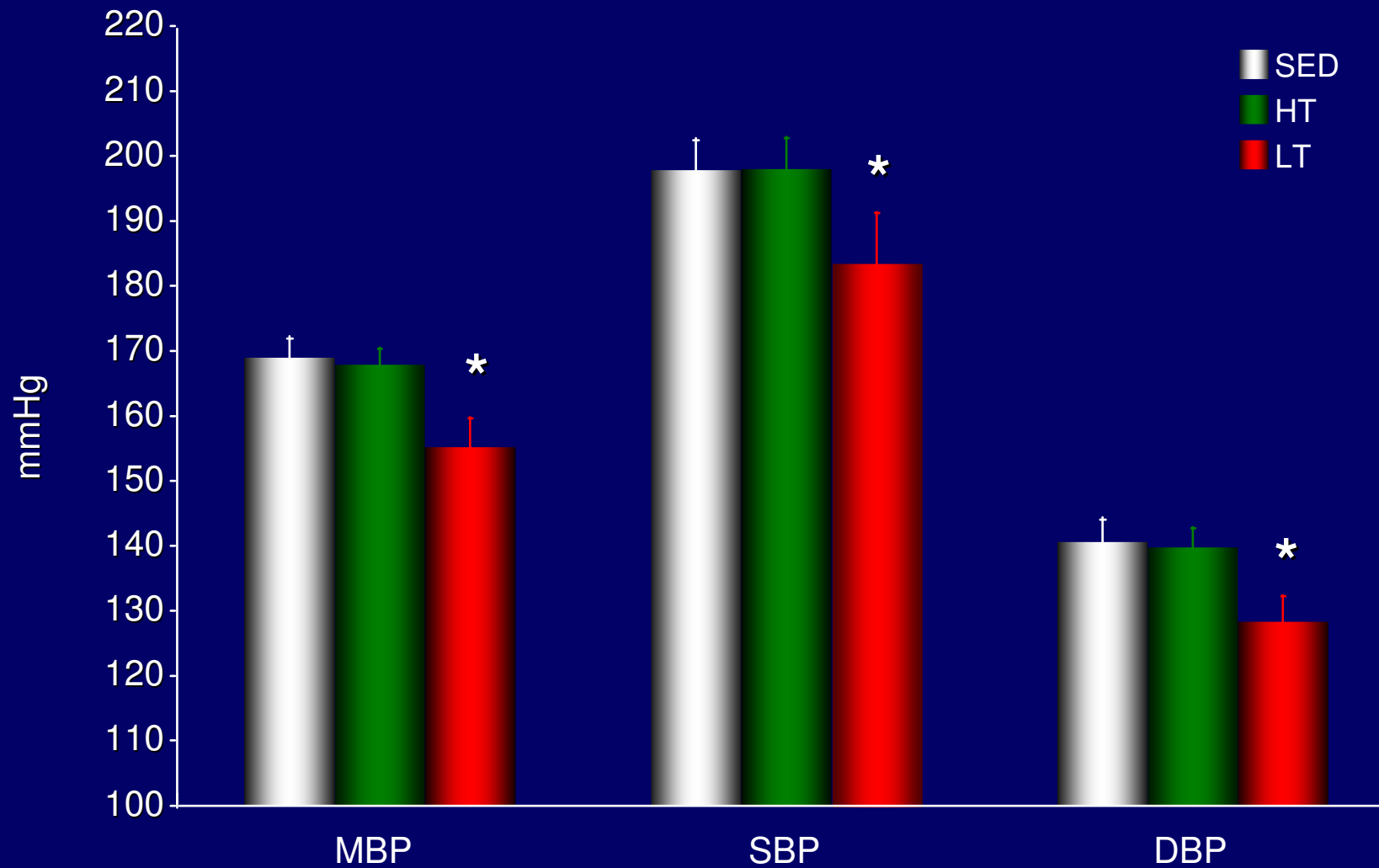


TOTAL PERIPHERAL RESISTANCE



* p < 0.05

Influência do Treinamento Físico na PA de Ratos SHR

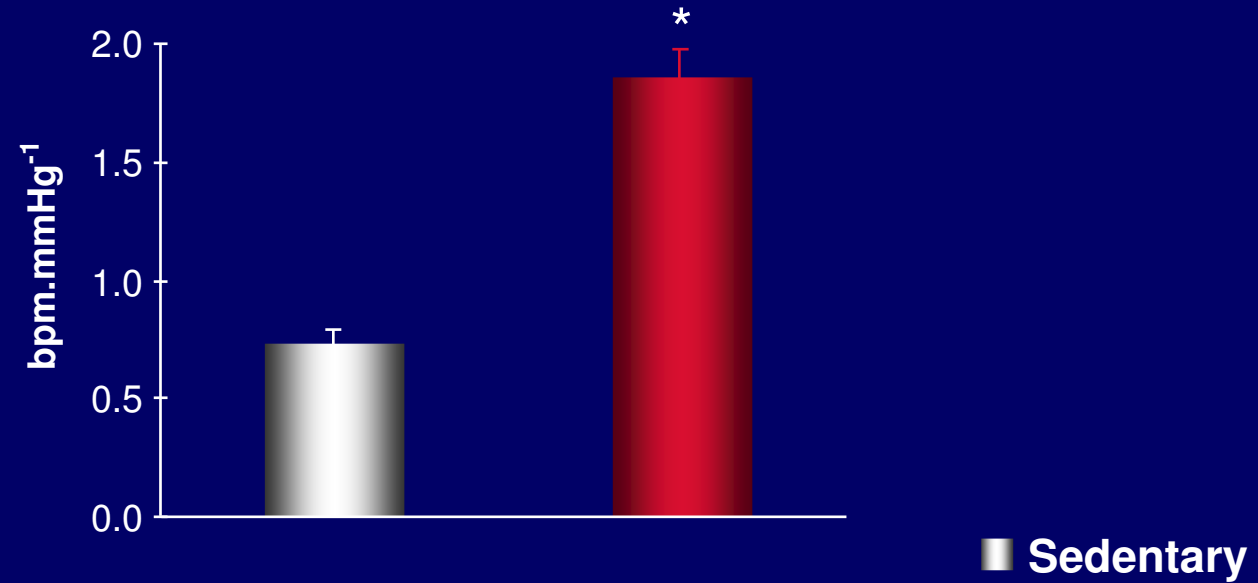


* $p < 0.05$

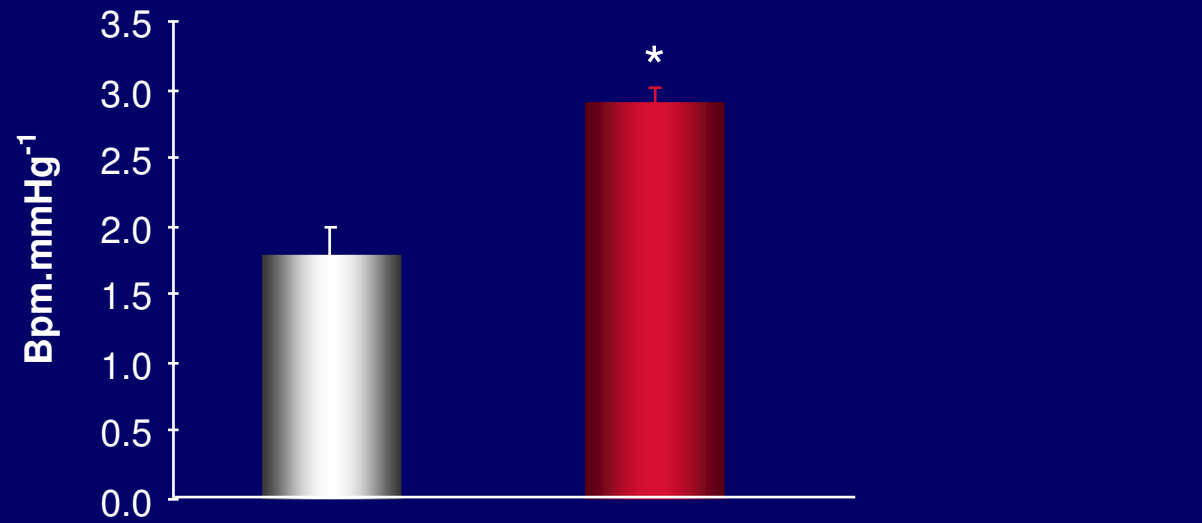
Véras-Silva et al. *Am.J. Physiol.* 273 (*Heart Circ. Physiol.* 42): H2627-H2631, 1997

**Efeito do treinamento físico no
controle barorreflexo**

BAROREFLEX BRADYCARDIA



BAROREFLEX TACHYCARDIA

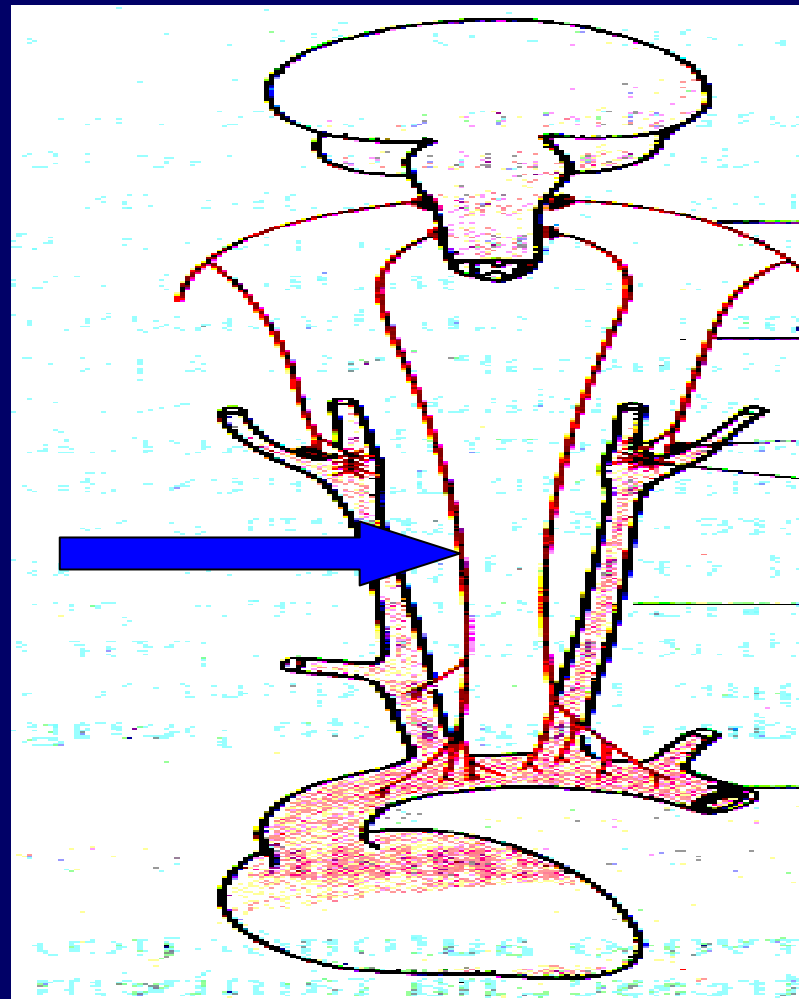


* $p < 0.05$

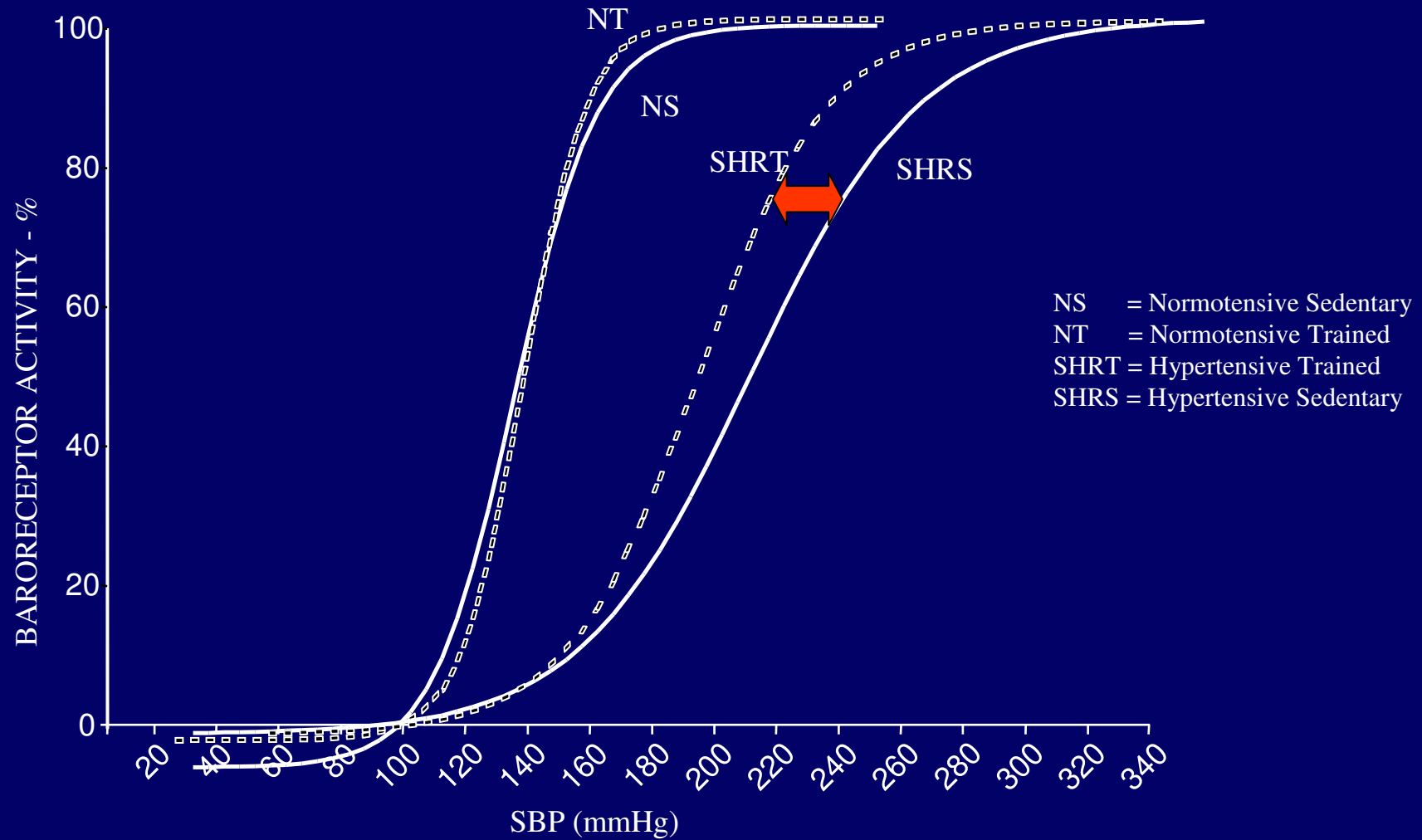
SILVA et al. *Hypertension* 30 (Pt 2): 714-719, 1997

Em que nível do arco-reflexo ocorre a alteração?

Nervo Aferente Depressor Aórtico?



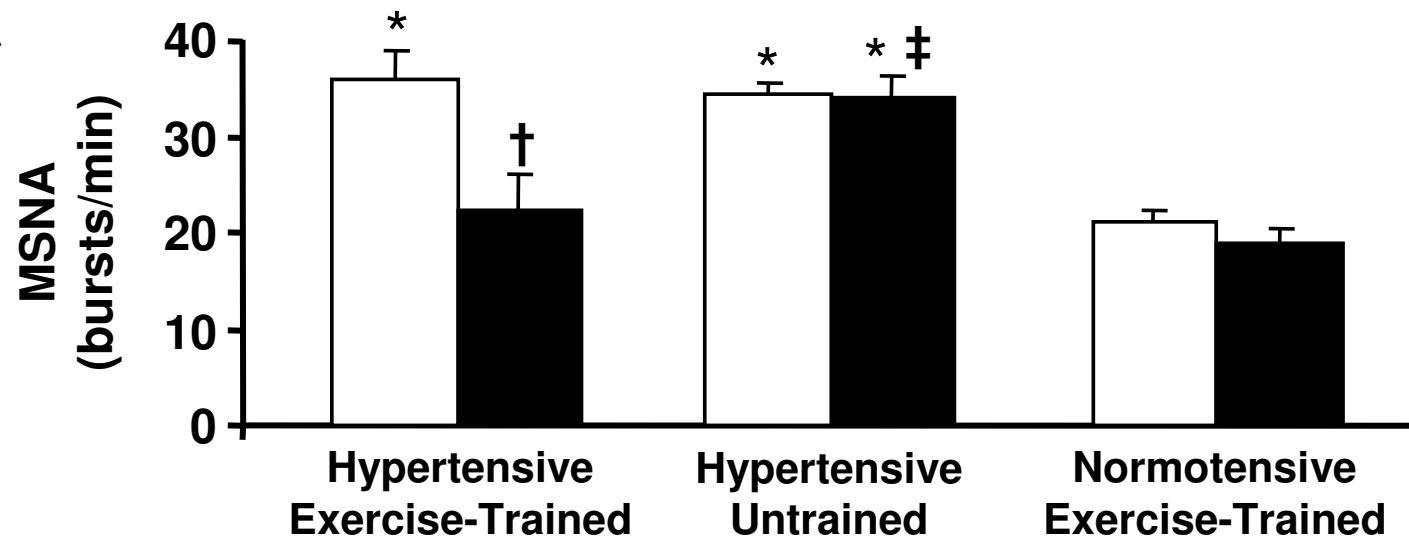
Efeito do treinamento físico na sensibilidade aórtica



Quais os mecanismos de redução da pressão arterial no homem?

Atividade Nervosa Simpática Muscular Basal

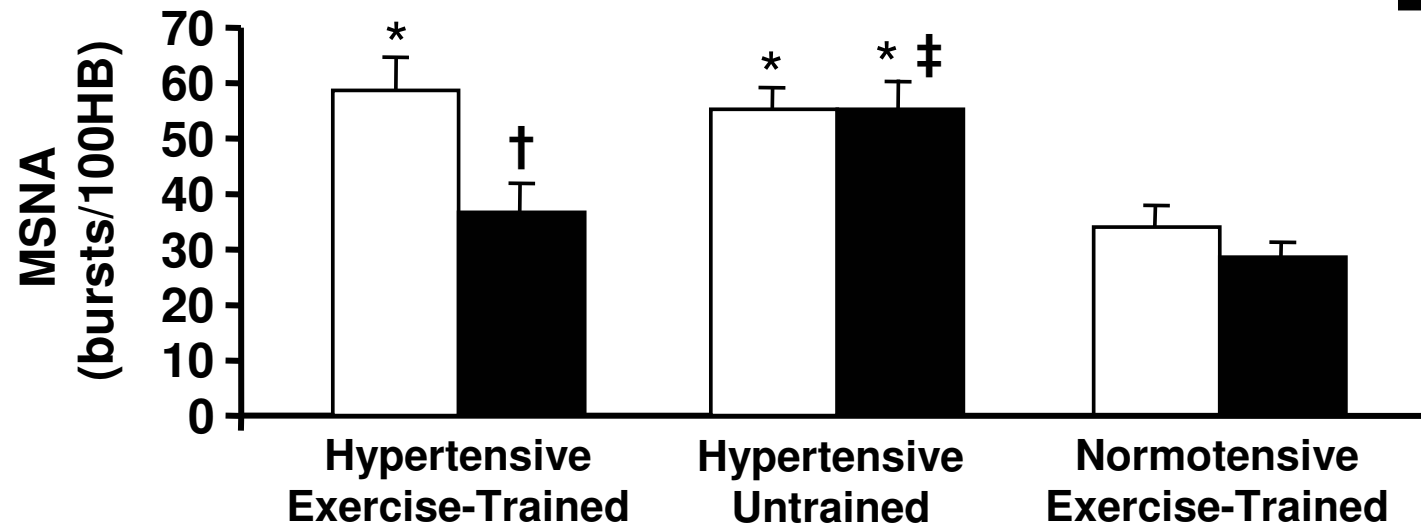
A



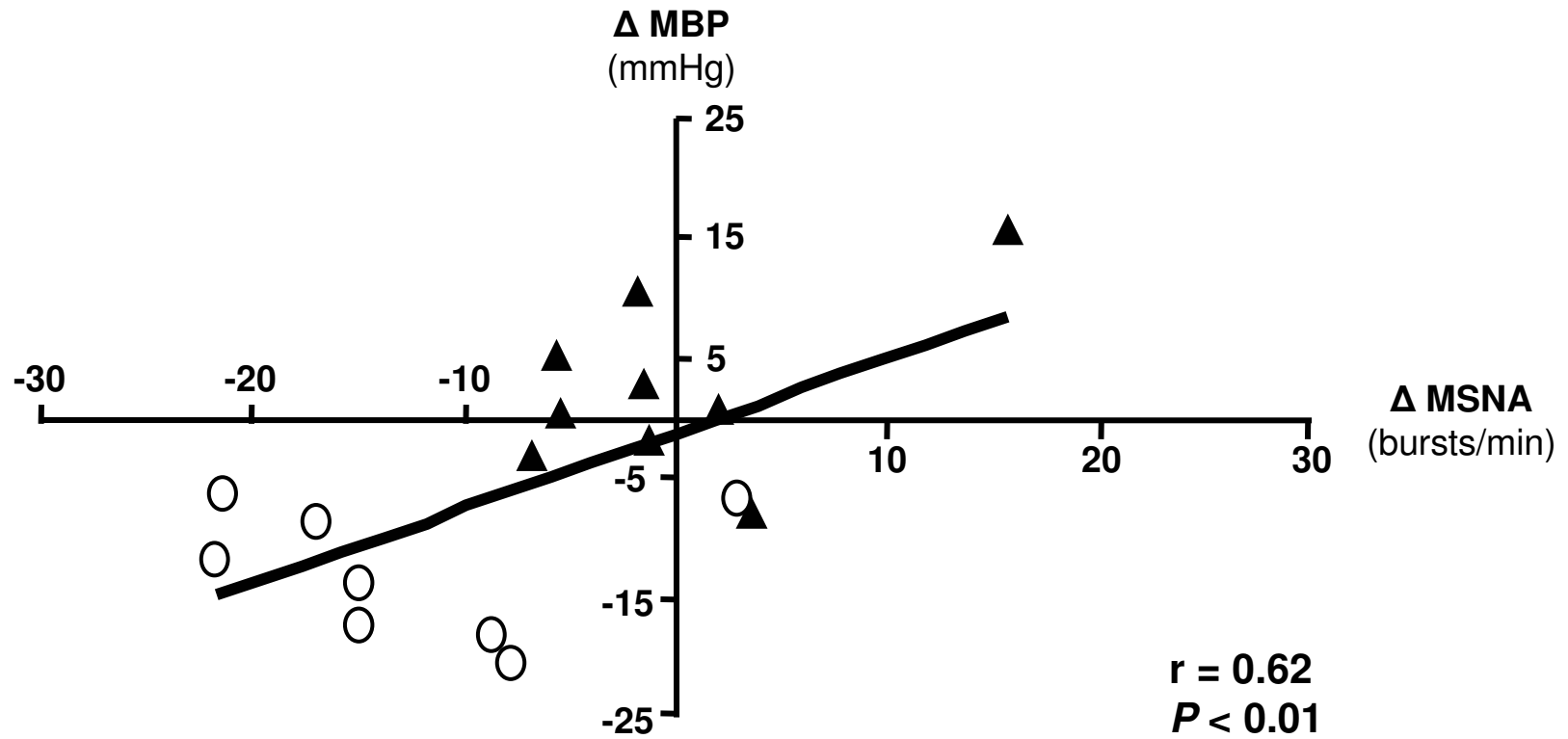
□ Pre Intervention

■ Post Intervention

B

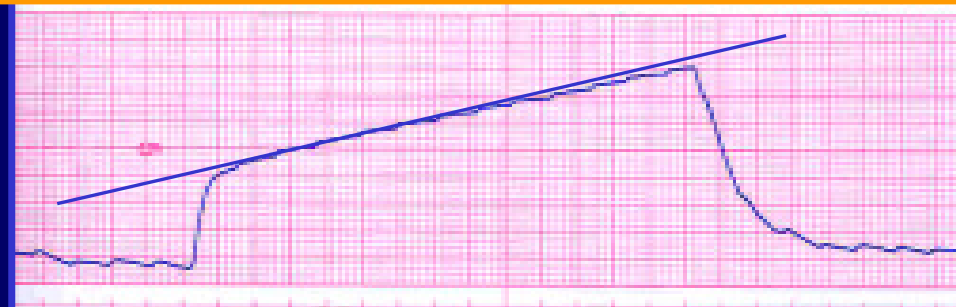
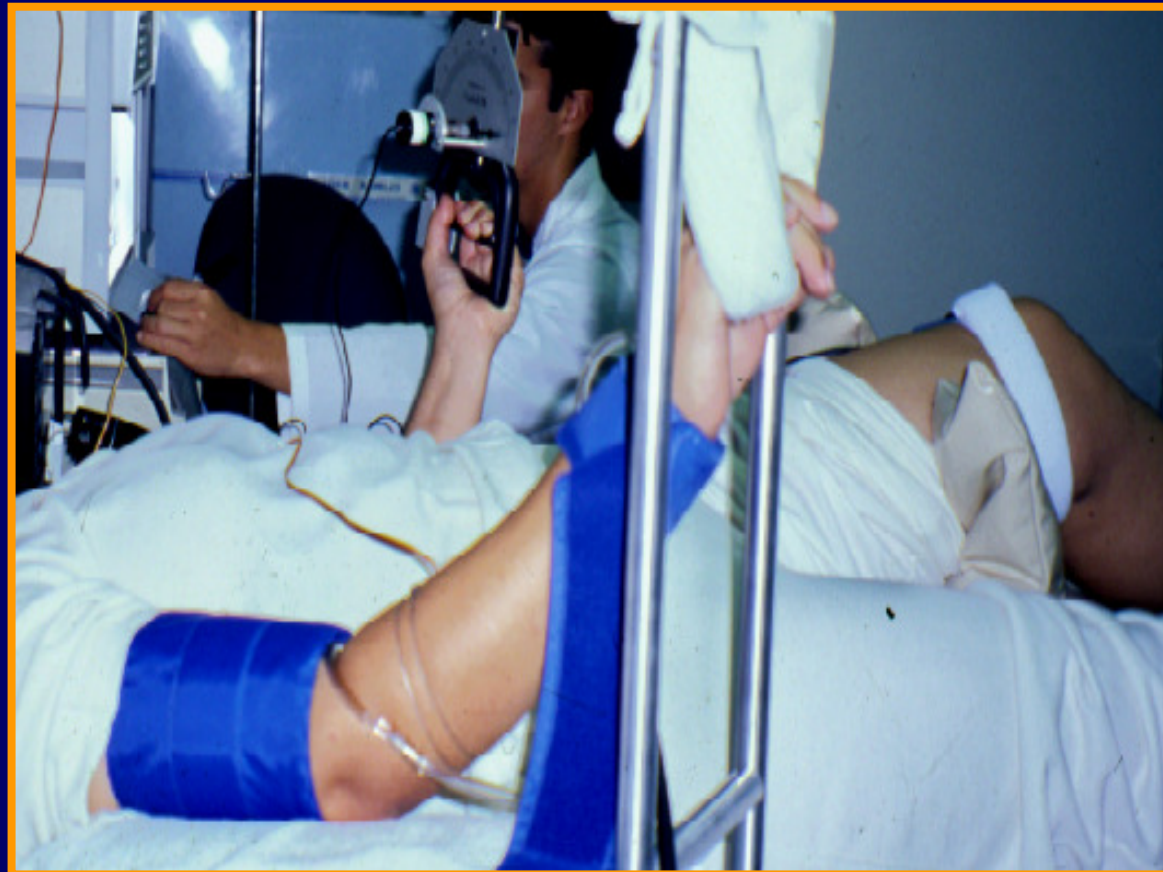


Correlação entre ANSM e PAM



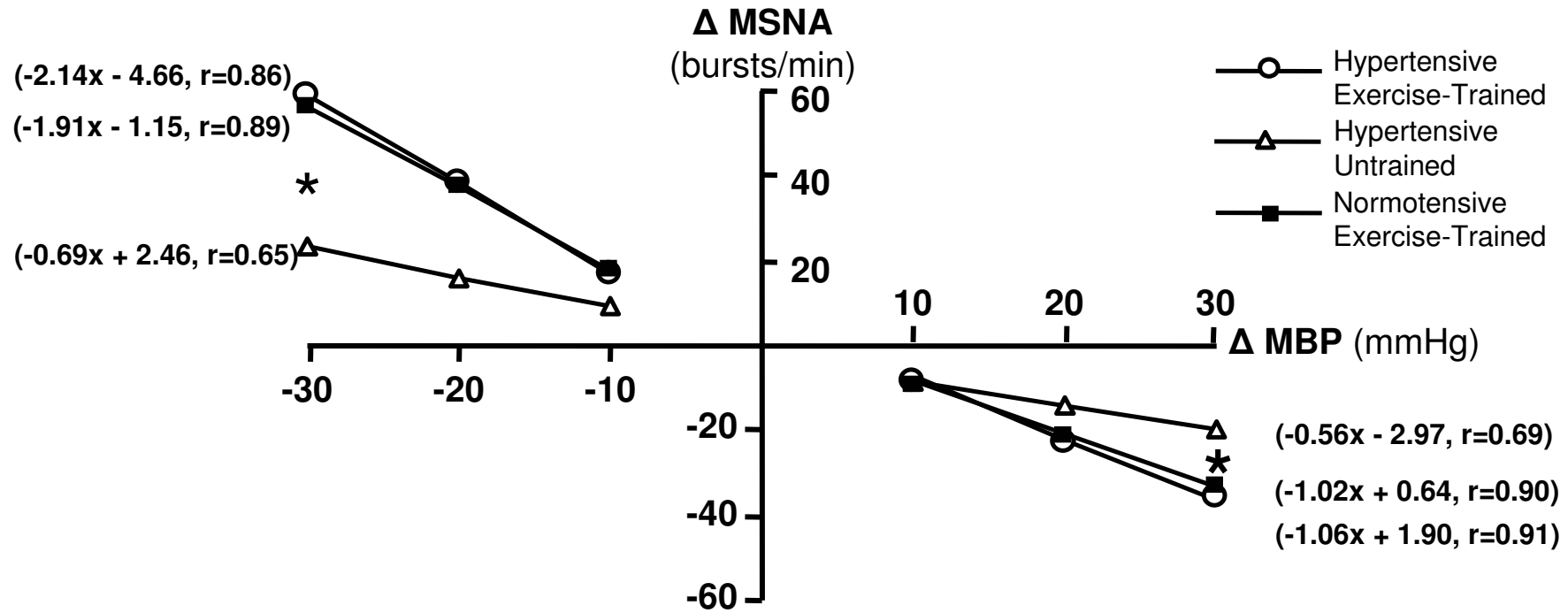
Fluxo Sangüíneo Muscular no Antebraço

Técnica de pletismografia de oclusão venosa

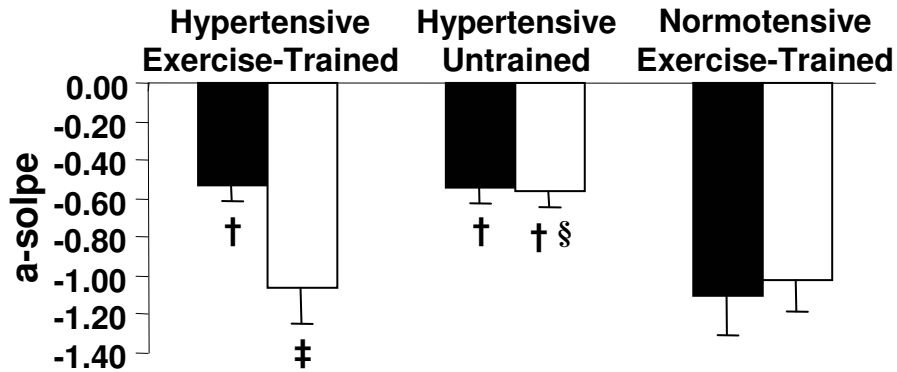


**Efeito do treinamento físico no
controle barorreflexo
no homem**

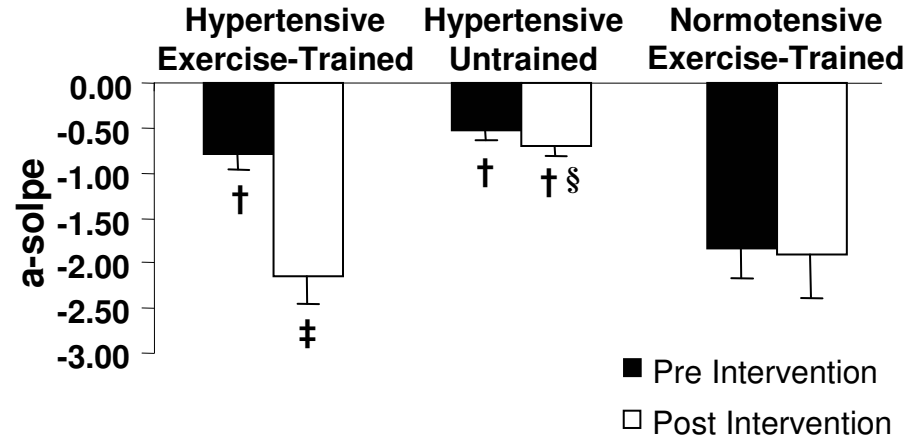
Sensibilidade Barorreflexa da ANSM



Phenylephrine

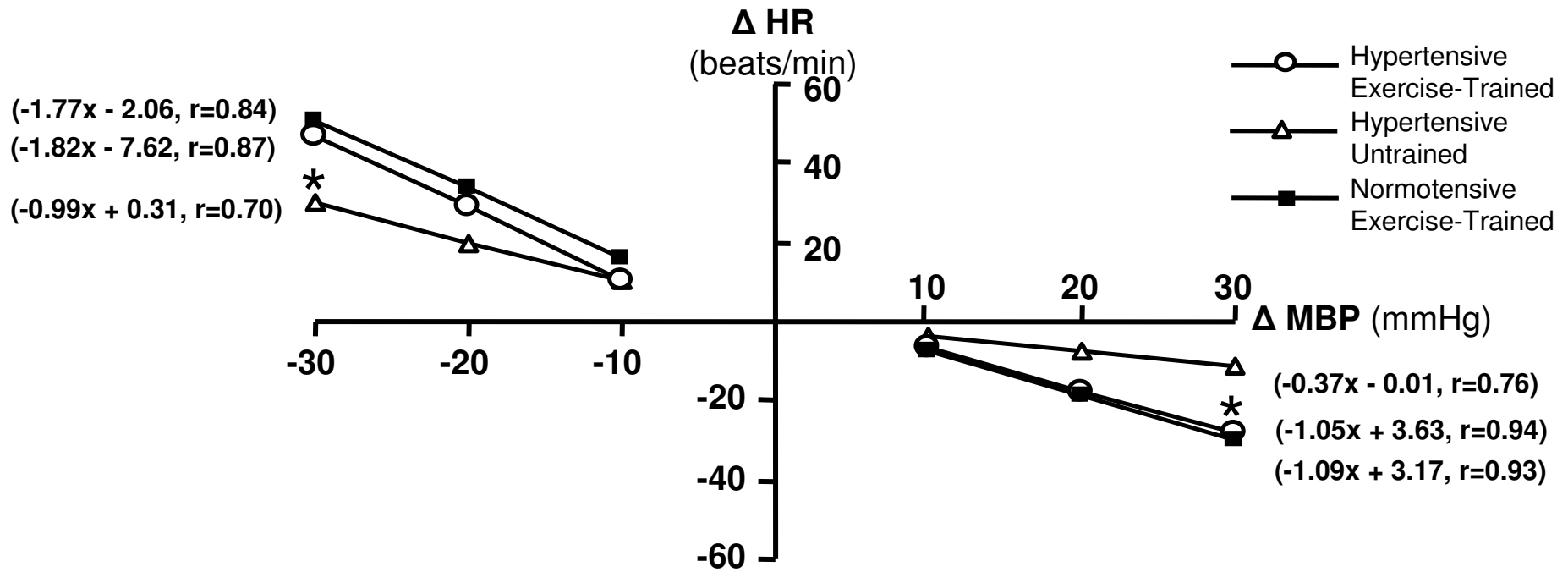


Sodium Nitroprusside

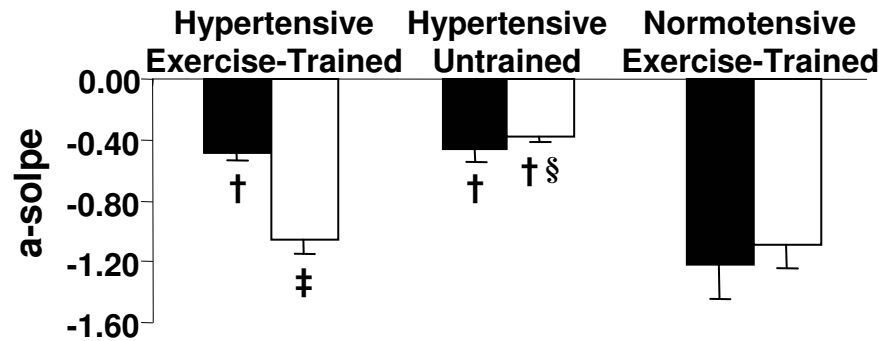


*= among groups difference at post intervention, $P < 0.05$
 += vs. normotensive exercise training, $P < 0.05$
 ‡= pre vs. post intervention, $P < 0.05$
 §=vs. hypertensive exercise trained, $P < 0.05$

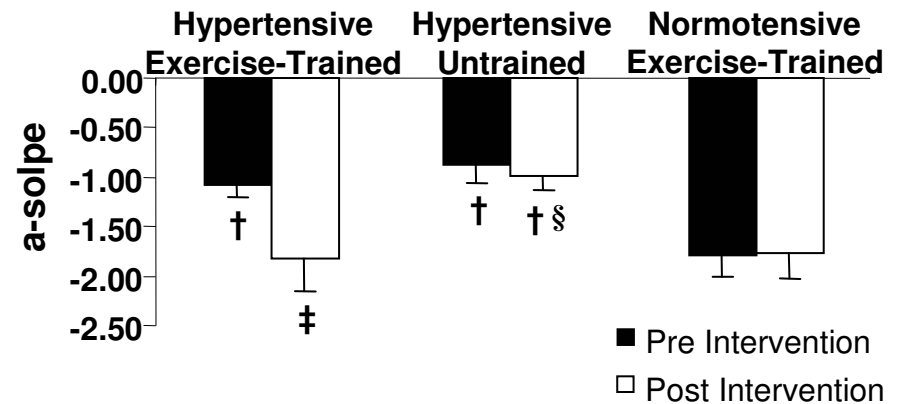
Sensibilidade Barorreflexa da FC



Phenylephrine

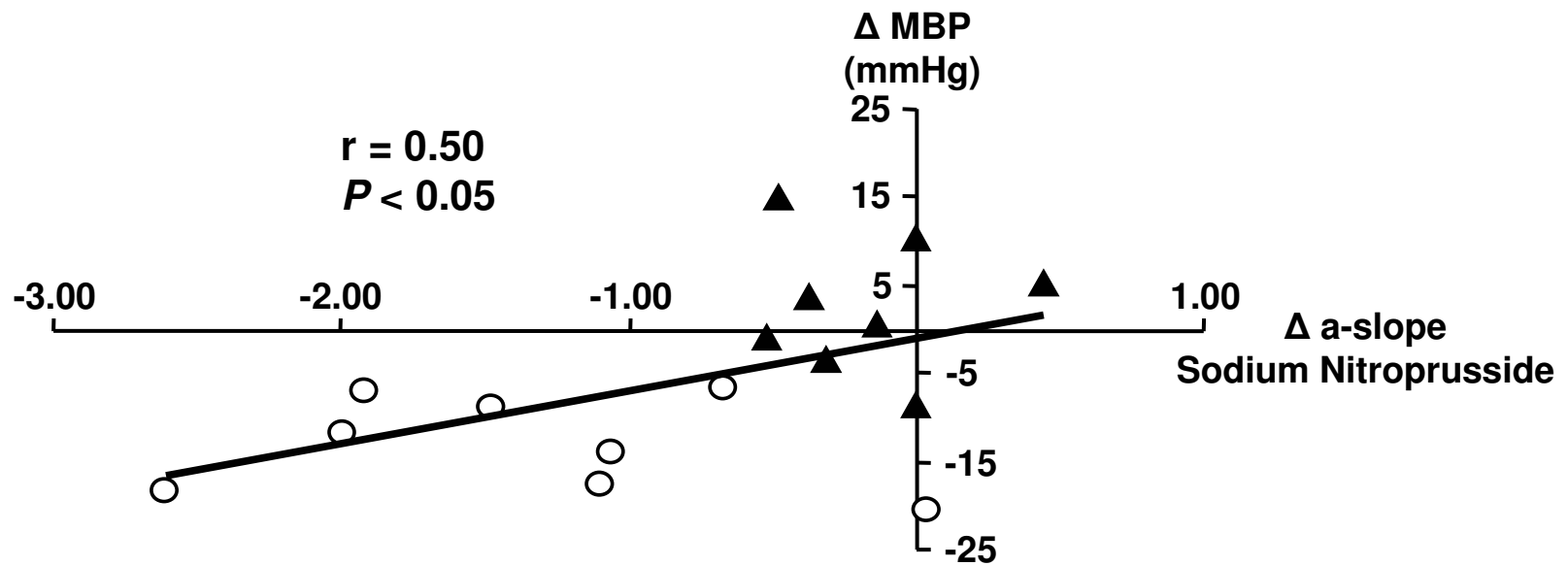
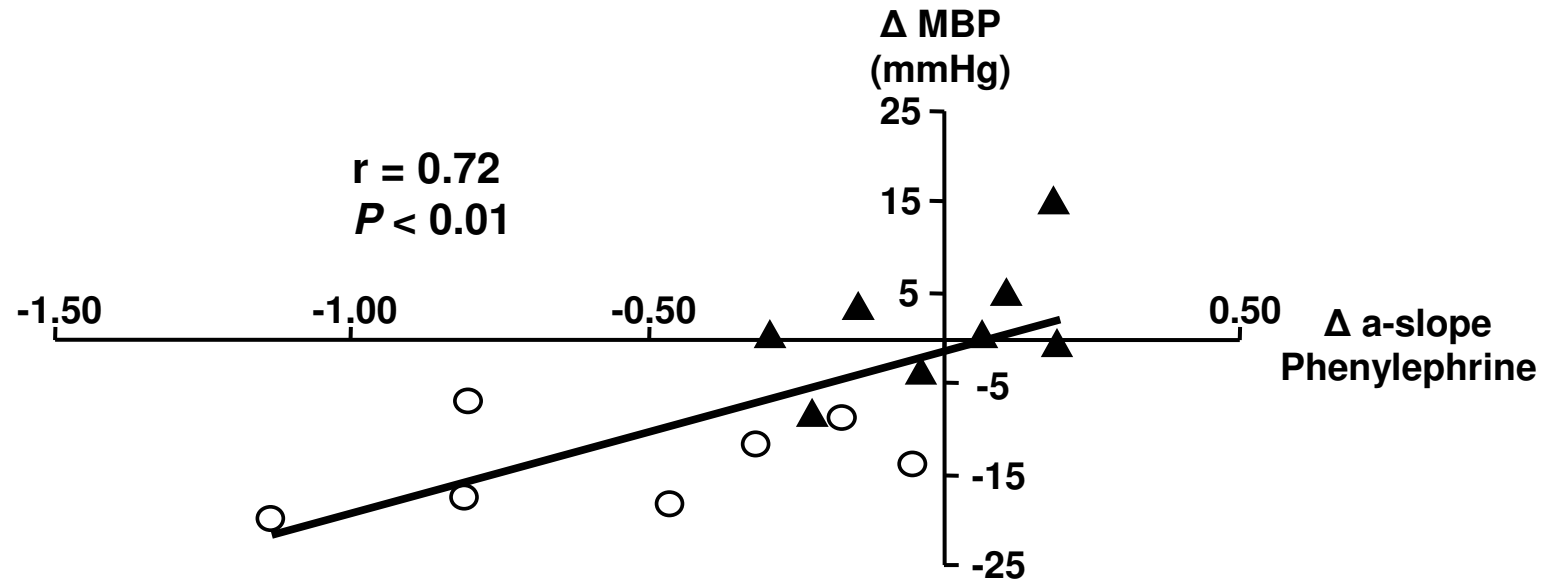


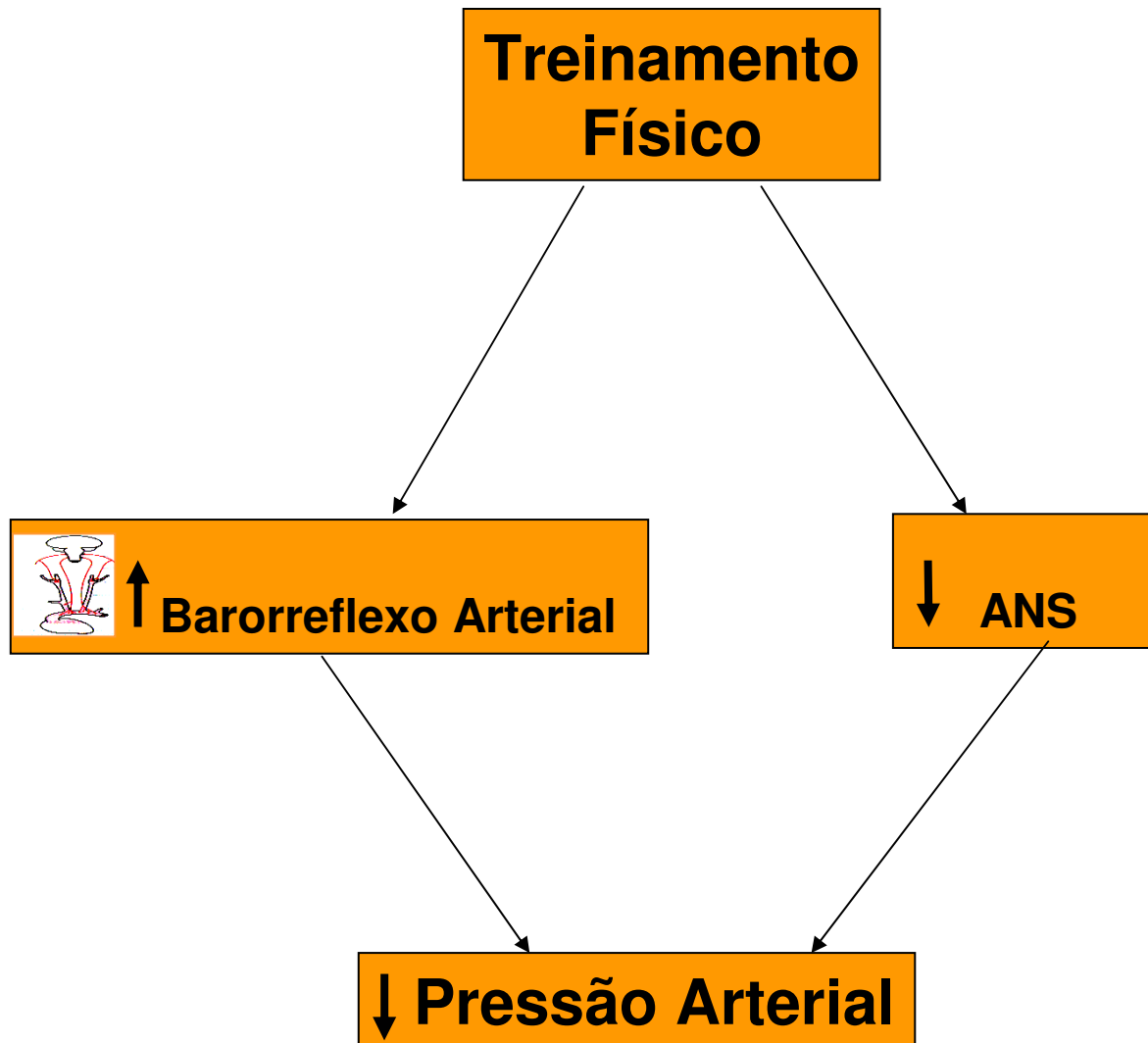
Sodium Nitroprusside



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 += vs. normotensive exercise training, $P < 0.05$
 ‡= pre vs. post intervention, $P < 0.05$
 §=vs. hypertensive exercise trained, $P < 0.05$

Correlação entre Sensibilidade Barorreflexa e PAM





Implicações Clínicas

↑ Barorreflexo

↓ Atividade Simpática

↓ Pressão Arterial

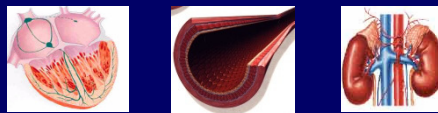
↓ SBR

- Lesões em órgãos-alvo
- ↑ Mortalidade Pós IAM

↑ SBR

- ↓ Lesões em órgãos-alvo
- ↓ Mortalidade Pós IAM

Hiperatividade Simpática



↑ Mortalidade ICC

Barretto, et al. Int J Cardiol. 2008

Reduction in SBP mmHg	% Reduction in Mortality		
	Stroke	CHD	Total
2	-6	-4	-3
3	-8	-5	-4
5	-14	-9	-7

Whelton PK, et al. JAMA. 2002;288:1284

Shan Z, et al. Am J Physiol Heart Circ Physiol. 1999;277:H1200-06

La Rovere, et al. Lancet. 1998;351:478-84

Lu Z, et al. Clin Exper Pharmacol Physiol. 2003;30:49-54

La Rovere, et al. Circulation. 2002;106:945-49

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