

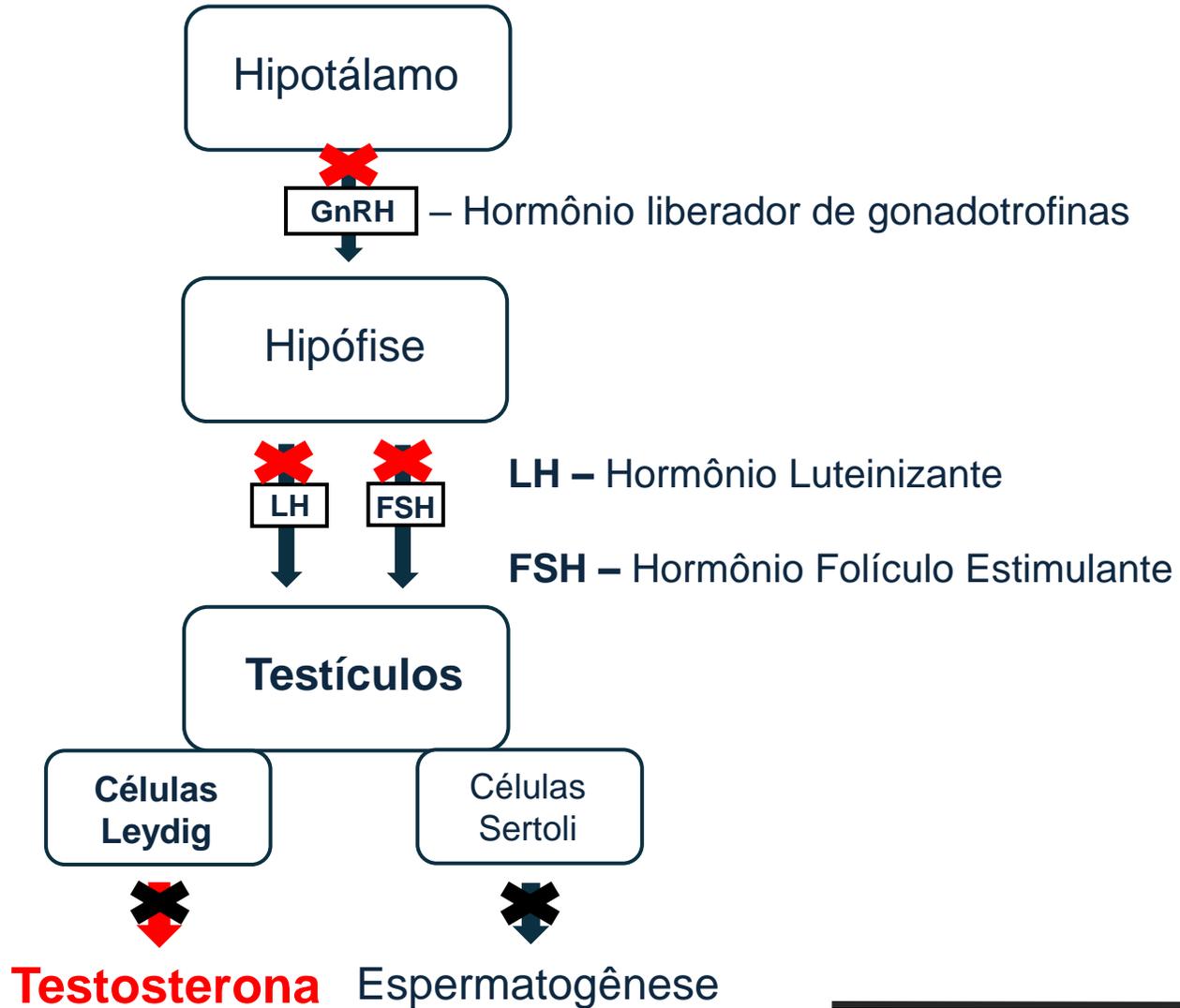


Uso abusivo de anabolizantes

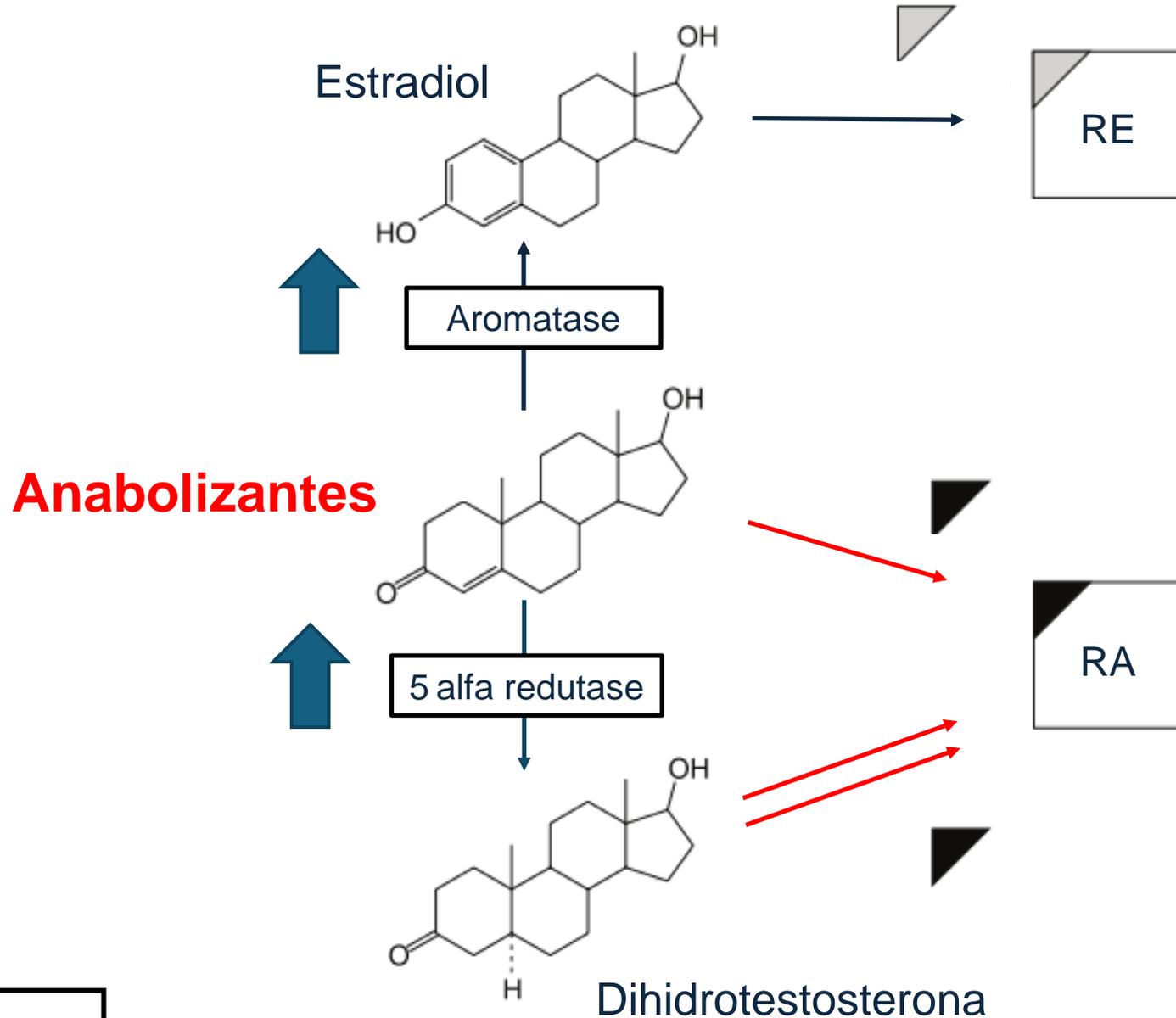
e

alterações no sistema cardiovascular

Bloqueio do eixo Hipotálamo - Hipófise - Testículo



Ginecomastia



Tamoxifeno (Novaldex)
Aromasin
Letrozol / Anastrozol

Função anabólica

O uso de anabolizantes e morte

Acute myocardial infarction in a 22-year-old world class weight lifter using anabolic steroids.

McNutt RA¹, Ferenchick GS, Kirilin PC, Hamlin NJ. **(Infarto associado ao uso de anabolizantes, 22 anos)**

⊕ Author information

J Forensic Sci. 1990 Nov;35(6):1441-7.

(Morte súbita associado ao uso de anabolizantes, 21 anos)

Sudden cardiac death during exercise in a weight lifter using anabolic androgenic steroids: pathological and toxicological findings.

Luke JL¹, Farb A, Virmani R, Sample RH.

⊕ Author information

Abstract

A 21-year-old, previously healthy weight lifter collapsed during a bench press workout. He had taken anabolic androgenic steroids parenterally for the previous several months. Pertinent autopsy findings included **marked cardiac and renal hypertrophy and hepatosplenomegaly, with regional myocardial fibrosis and focal myocardial necrosis**. Nandrolone (19-nor-testosterone) metabolites were identified in postmortem urine. The possible etiologies of the cardiac findings are discussed.

<https://www.ncbi.nlm.nih.gov/pubmed>

O uso de anabolizantes e morte

Sudden cardiac death in a 20-year-old bodybuilder using anabolic steroids.

Dickerman RD¹, Schaller F, Prather I, McConathy WJ. (Morte súbita associada ao uso de anabolizantes, 20 anos)

+ Author information

Abstract

Anabolic steroid use is widespread and has been associated with a variety of pathological conditions. The subject of this case is a 20-year-old amateur bodybuilder who died of sudden cardiopulmonary arrest. He had no previous medical complaints but had a history of anabolic steroid abuse and a hypertrophic heart (515 g) at autopsy. This case presentation will discuss the cardiovascular effects of these drugs and the possible impact of long-term abuse.

AUTOPSY FINDINGS:

1. Severe cardiomegaly (833 gram heart) with concentric left ventricular hypertrophy
2. Coronary artery atherosclerosis (severe in left anterior descending; moderate in right coronary)
3. Heavy lungs (617 grams right; 619 grams left) without hyperinflation or mucus plugging
4. Hepatomegaly (4,593 gram liver)
5. Minimal nephrosclerosis, and hypertrophy of kidneys (456 gram right; 503 gram left)
6. Papillary thyroid carcinoma (non-contributory)

CAUSE OF DEATH: Severe Concentric Left Ventricular Hypertrophy with Coronary Artery Atherosclerosis

CONTRIBUTING CONDITIONS: Chronic Use of Exogenous Steroid and Non-Steroid Hormones

MANNER OF DEATH: Natural

O uso de anabolizantes e morte súbita

Sudden cardiac death during anabolic steroid abuse: morphologic and toxicologic findings in two fatal cases of bodybuilders.

Fineschi V¹, Riezzo I, Centini F, Silingardi E, Licata M, Beduschi G, Karch SB.

(2 casos de Morte súbita associada ao uso de anabolizantes, 2007)

Caso 1: 29 anos (testosterone, nandrolone, stanozolol)

Sintomas: Assintomático

Necropsia: fibrose focal no coração

Caso 2: 30 anos (nandrolone)

Sintomas: Assintomático

Necropsia: fibrose focal no coração, atrofia testicular, aterosclerose.



Qual é o efeito na pressão



Controle Autônômico

Abnormal Neurovascular Control in Anabolic Androgenic Steroids Users

MARIA JANIEIRE NAZARÉ NUNES ALVES¹, MARCELO RODRIGUES DOS SANTOS¹,
RODRIGO GONÇALVES DIAS¹, CÉSAR ABREU AKIHO¹, MATEUS CAMAROTI LATERZA¹,
MARIA URBANA PINTO BRANDÃO RONDON¹, REGINA LUCIA DE MORAES MOREAU²,
and CARLOS EDUARDO NEGRÃO^{1,3}

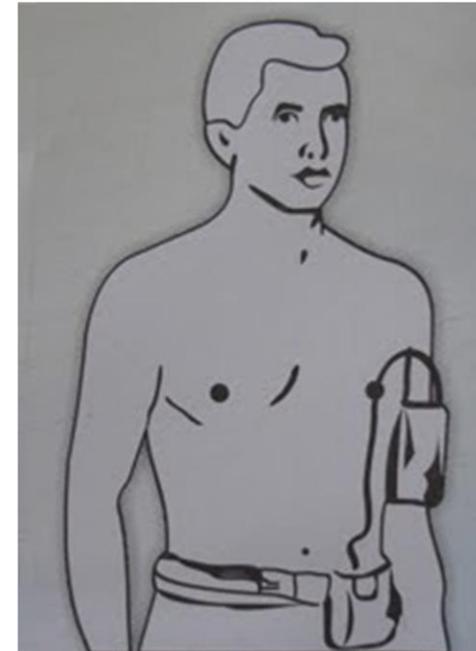
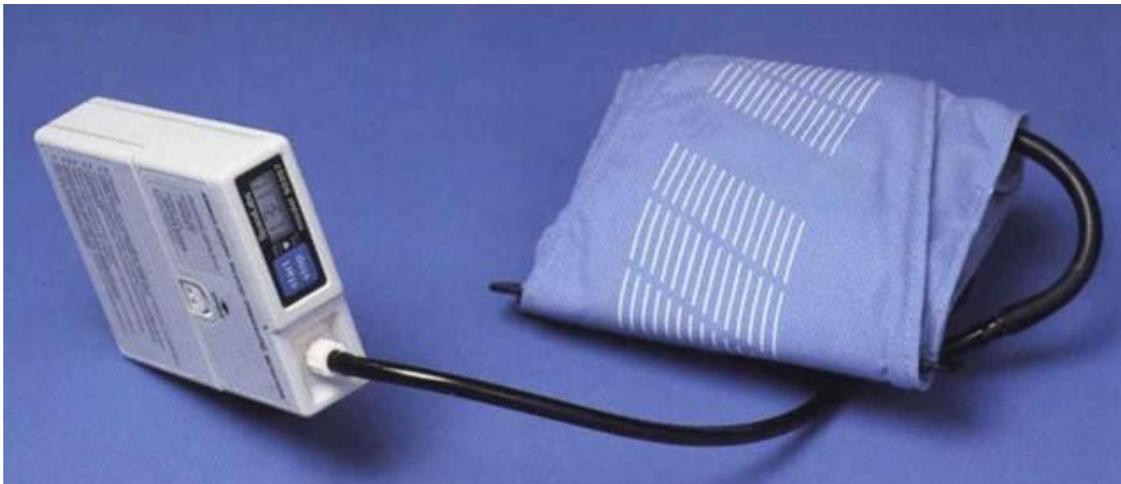
¹Heart Institute (InCor), University of São Paulo Medical School, São Paulo, BRAZIL; ²College of Pharmaceutical Sciences, Toxicology, University of São Paulo, São Paulo, BRAZIL; and ³School of Physical Education and Sport, University of São Paulo, São Paulo, BRAZIL

CLINICAL SCIENCES

Anabolizantes e pressão arterial

Medidas e Procedimentos

- Monitorização Ambulatorial da Pressão Arterial de 24 horas (MAPA 24h)



Abnormal Neurovascular Control in Anabolic Androgenic Steroids Users

MARIA JANIEIRE NAZARÉ NUNES ALVES¹, MARCELO RODRIGUES DOS SANTOS¹,
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MARIA URBANA PINTO BRANDÃO RONDON¹, REGINA LUCIA DE MORAES MOREAU²,
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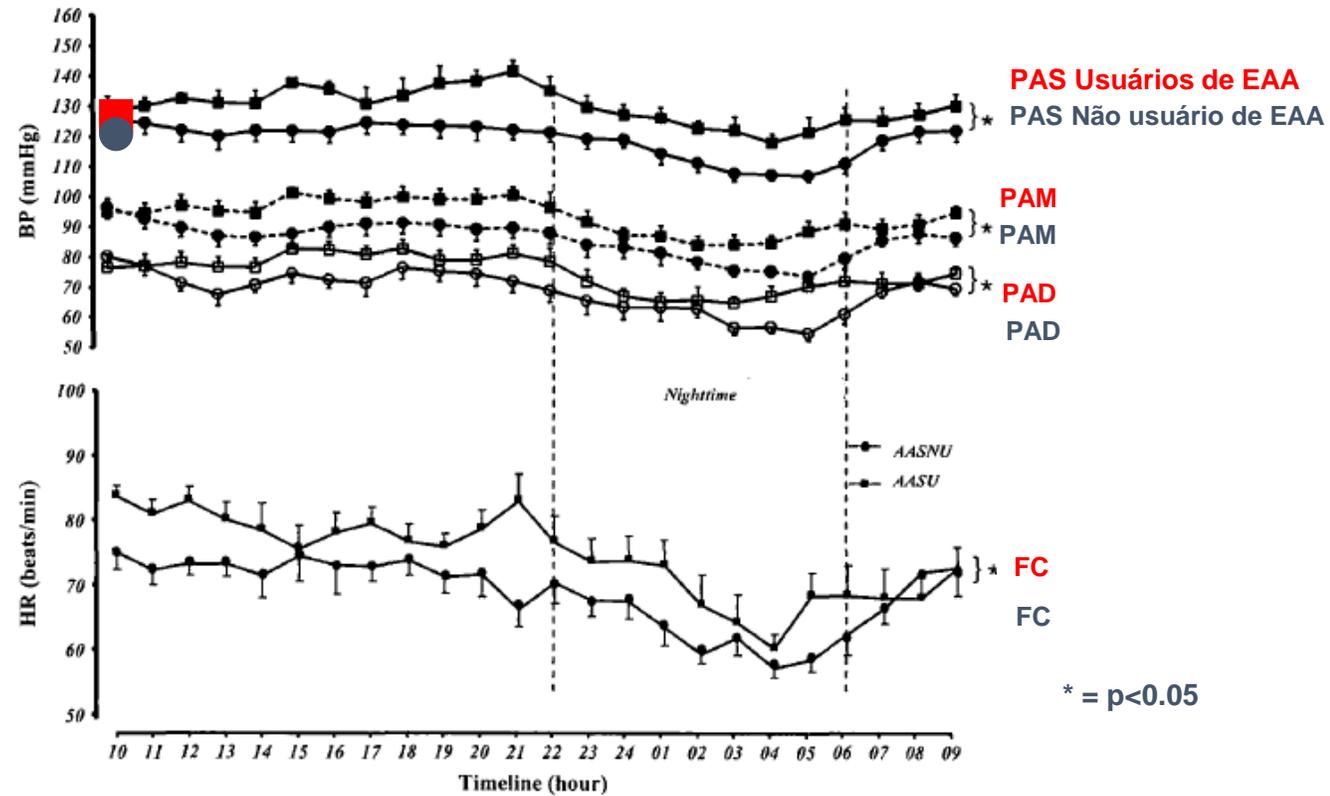
¹Heart Institute (InCor), University of São Paulo Medical School, São Paulo, BRAZIL; ²College of Pharmaceutical Sciences, Toxicology, University of São Paulo, São Paulo, BRAZIL; and ³School of Physical Education and Sport, University of São Paulo, São Paulo, BRAZIL



PAS, PAD e
PAM de 24h (MAPA)



FC de 24h (MAPA)



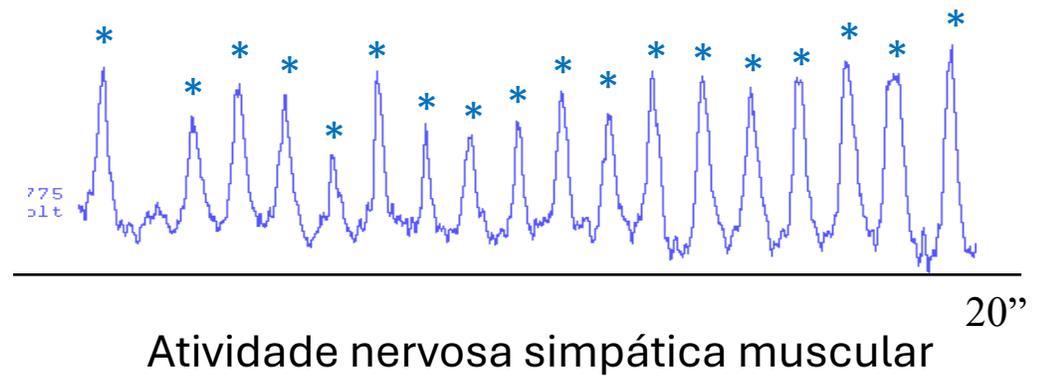
* = p < 0.05



Qual é o efeito no sistema nervoso



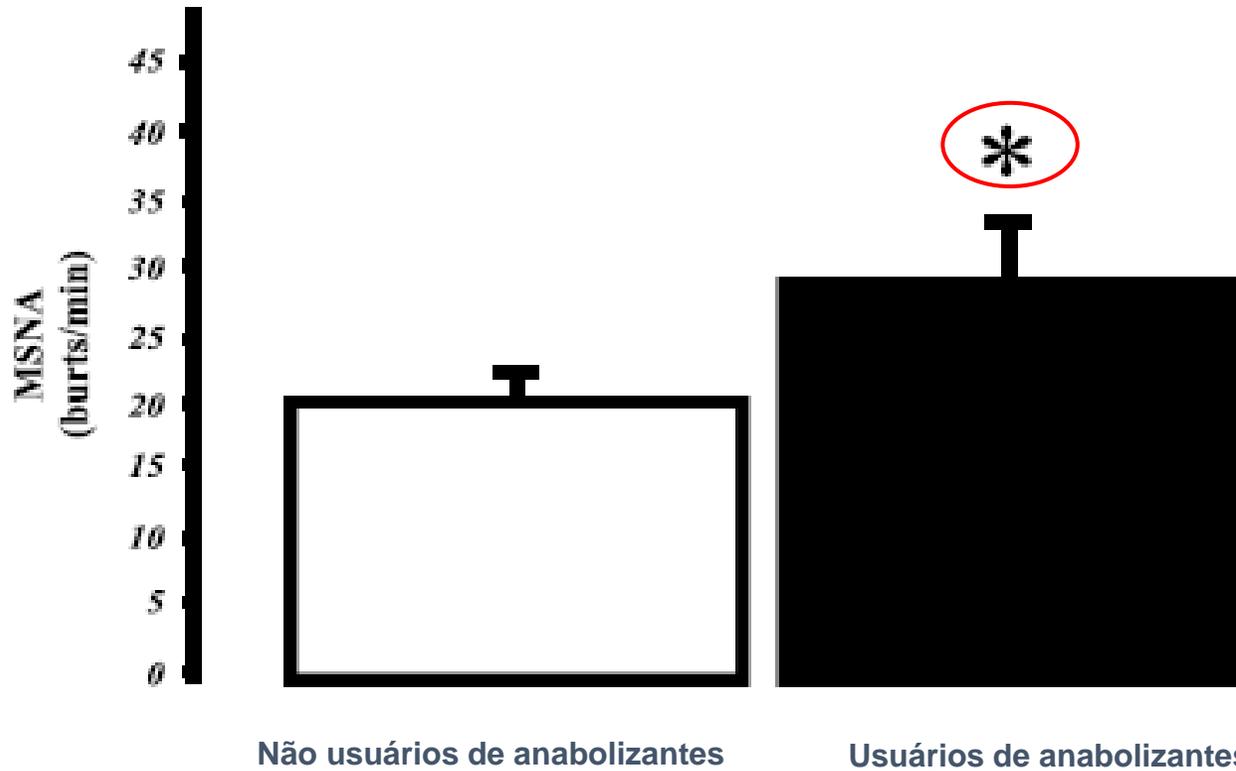
Microneurografia



Abnormal Neurovascular Control in Anabolic Androgenic Steroids Users

MARIA JANIEIRE NAZARÉ NUNES ALVES¹, MARCELO RODRIGUES DOS SANTOS¹,
RODRIGO GONÇALVES DIAS¹, CÉSAR ABREU AKIHO¹, MATEUS CAMAROTI LATERZA¹,
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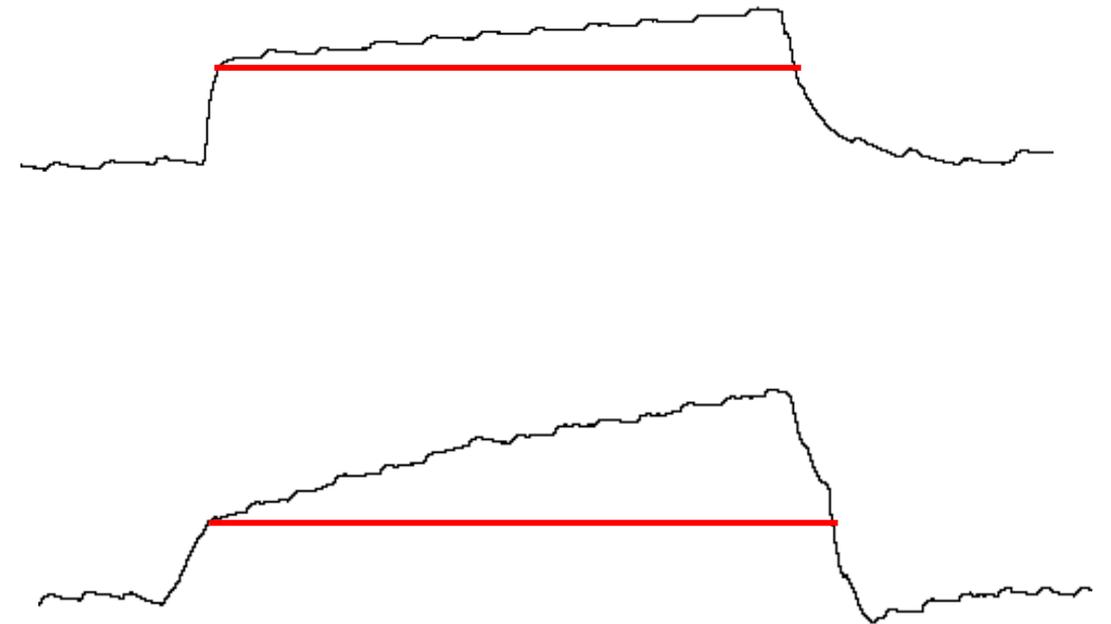
* = p<0.05



**Atividade Nervosa Simpática Muscular
(ANSM disparos/min)**

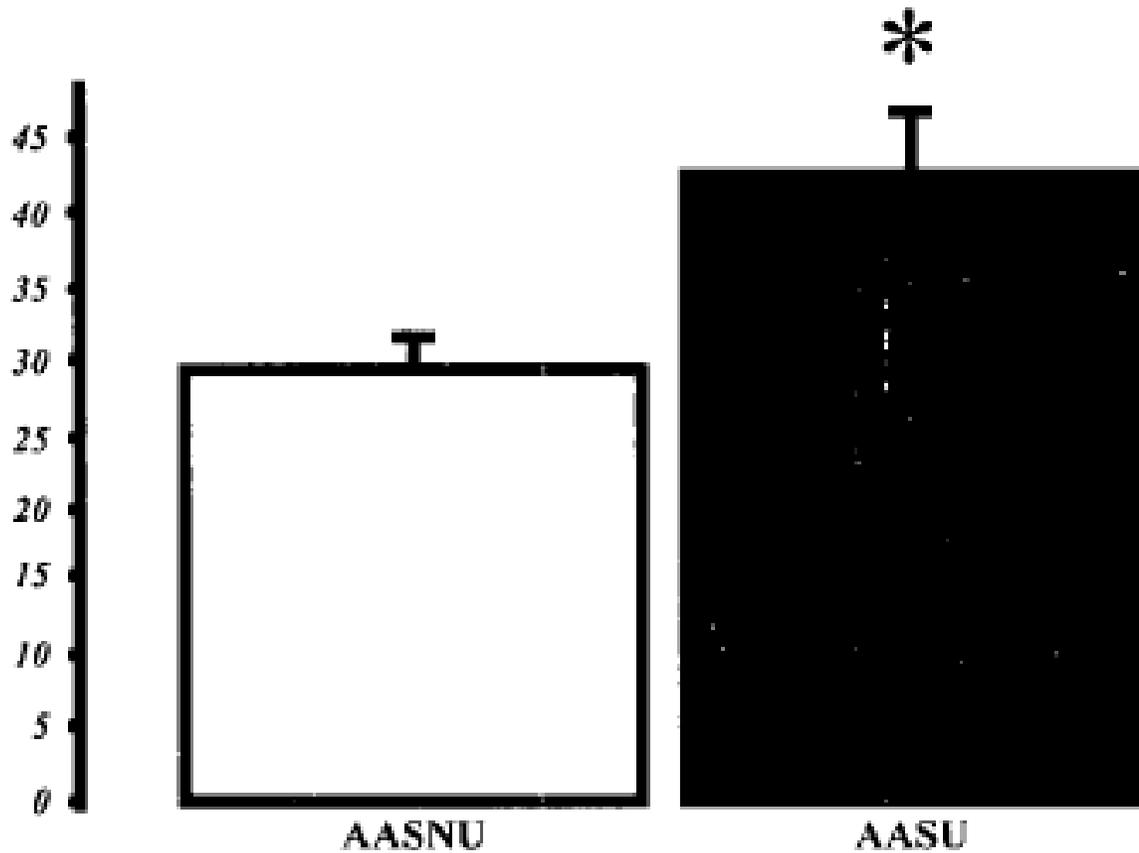
Pletismografia de oclusão venosa

➤ Fluxo sanguíneo do antebraço:

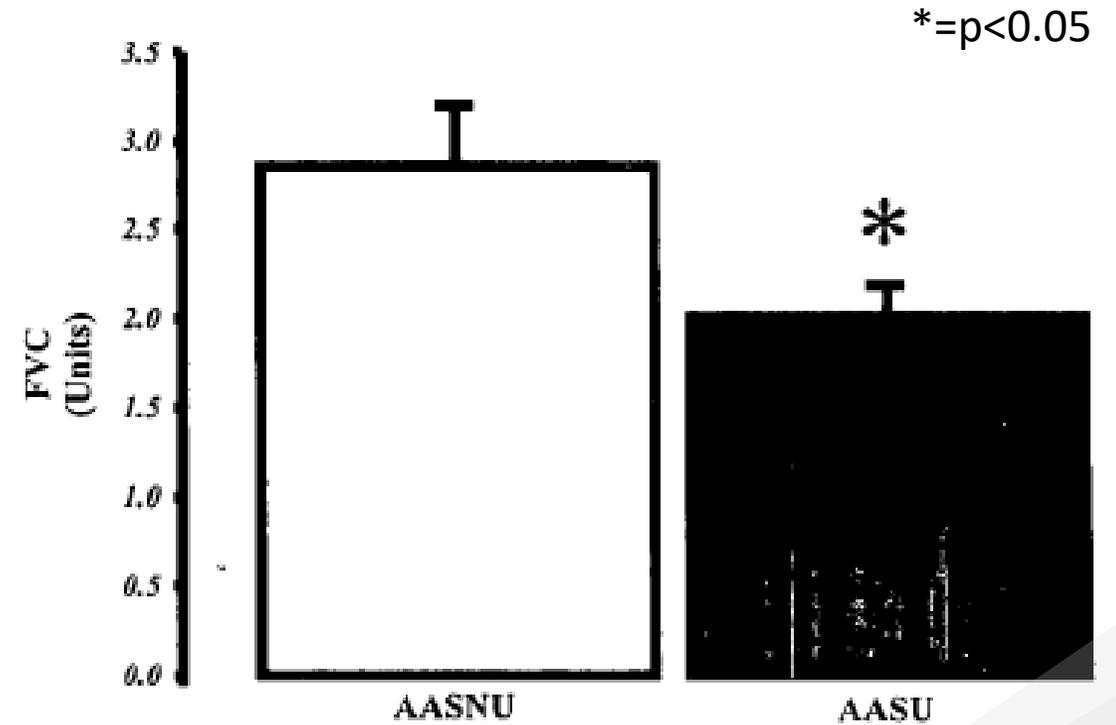


Medida Basal Neural e Vascular

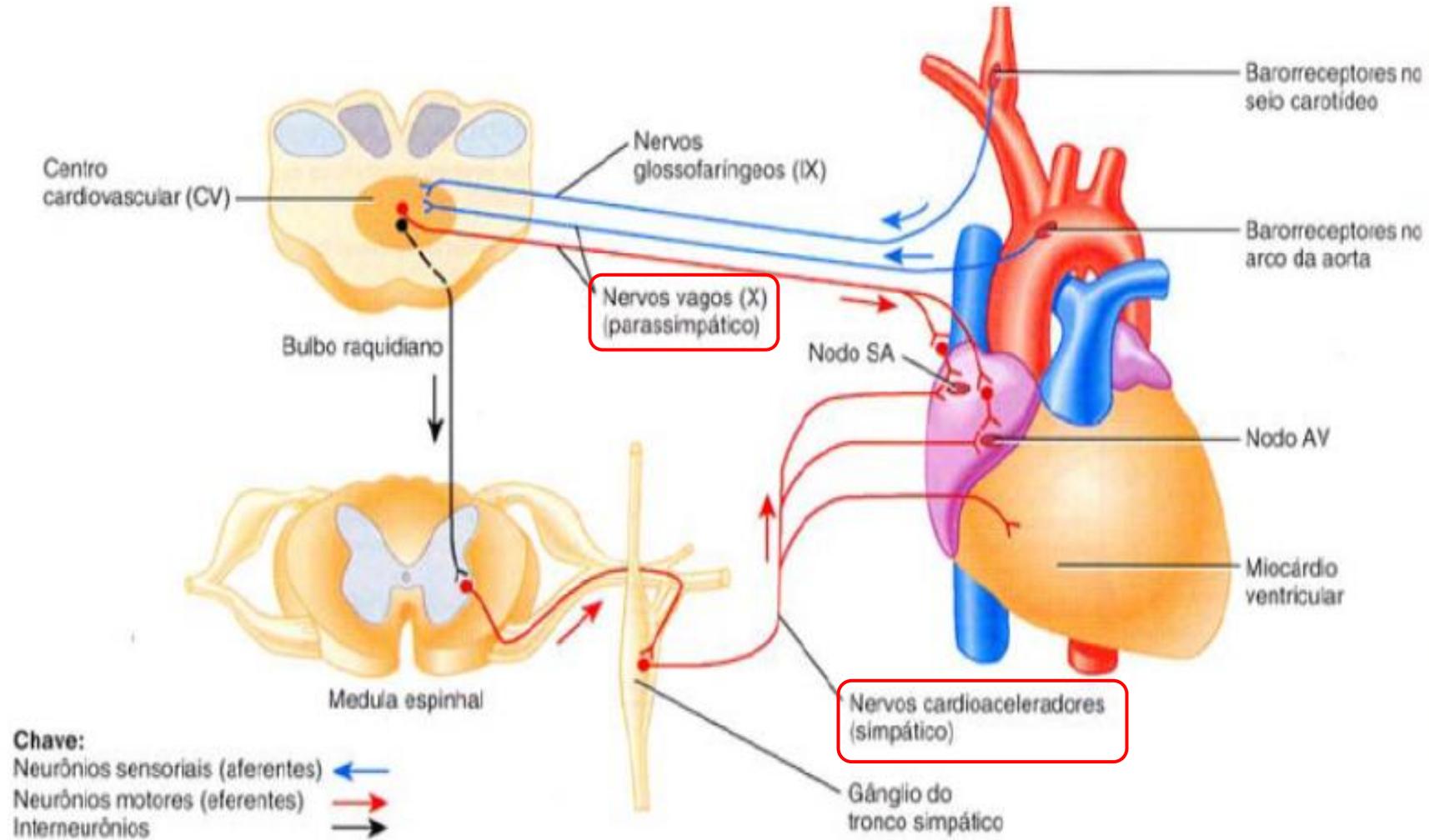
Atividade Nervosa Simpática Muscular
(ANSM disparos/min)



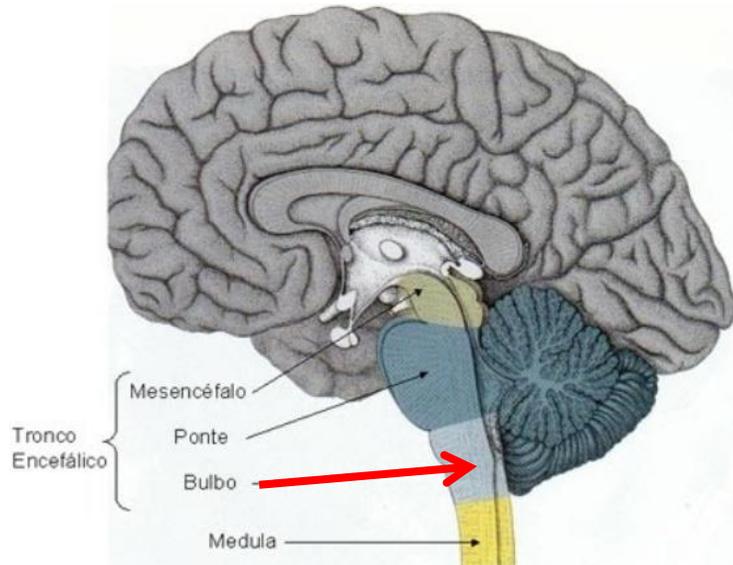
Fluxo sanguíneo do antebraço



Sistema barorreflexo

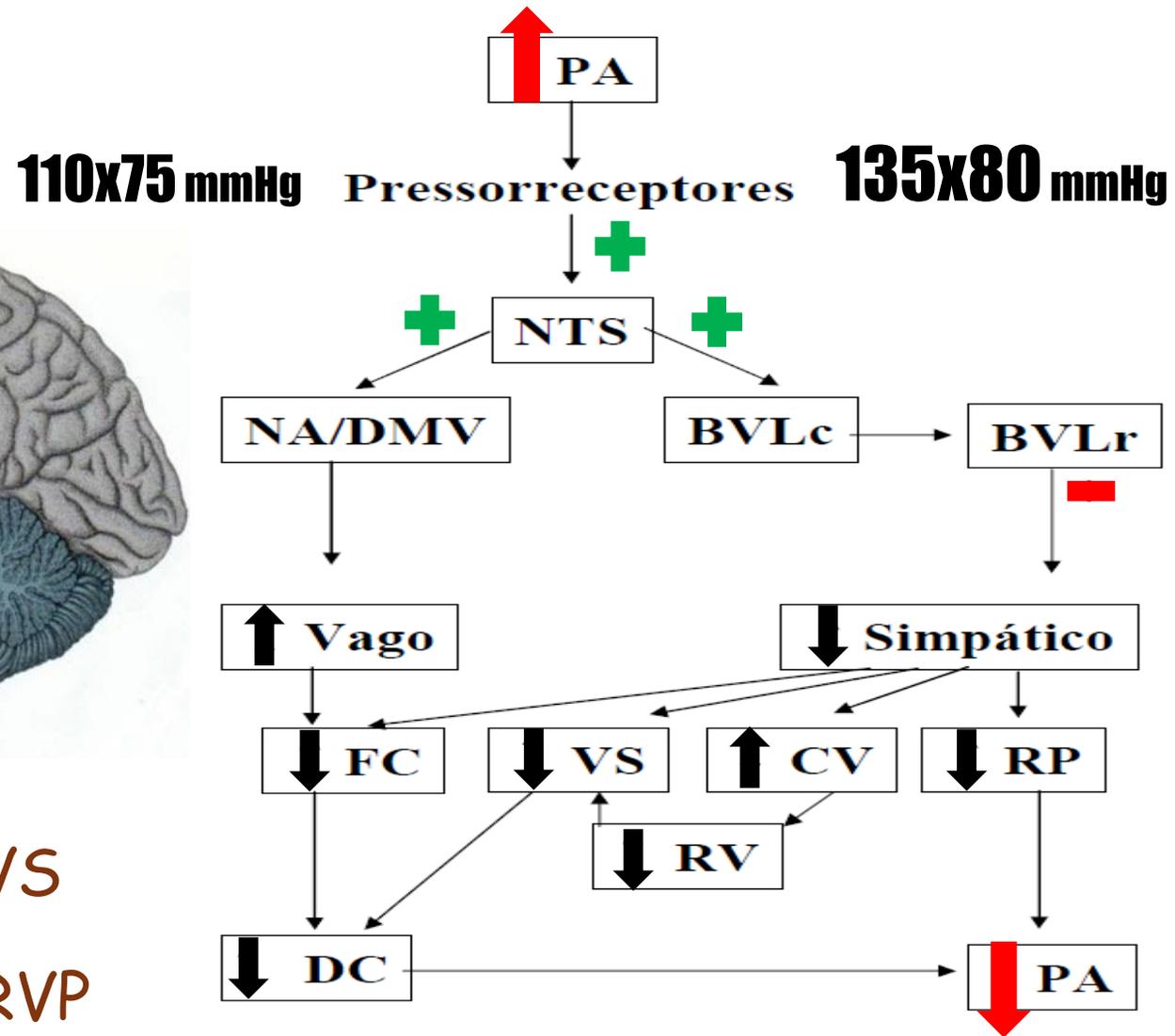


Controle da PA pelos Barorreceptores

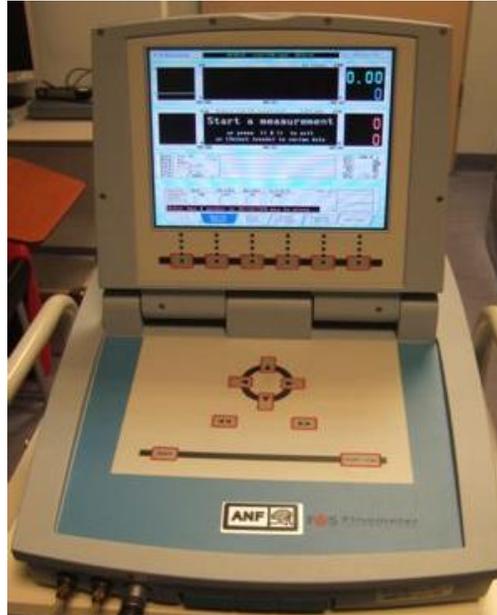


$$DC = FC \times VS$$

$$PA = DC \times RVP$$



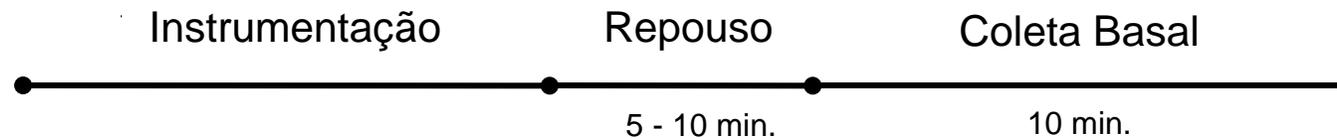
Medida de pressão arterial e frequência cardíaca



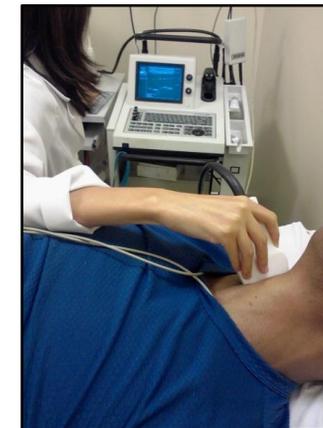
Finometer
Pressão Arterial



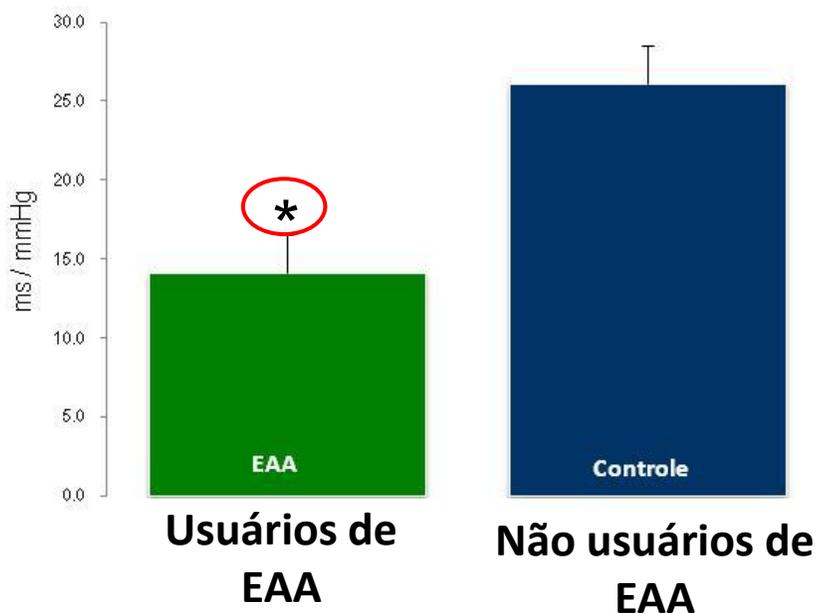
Eletrocardiograma
Frequência Cardíaca



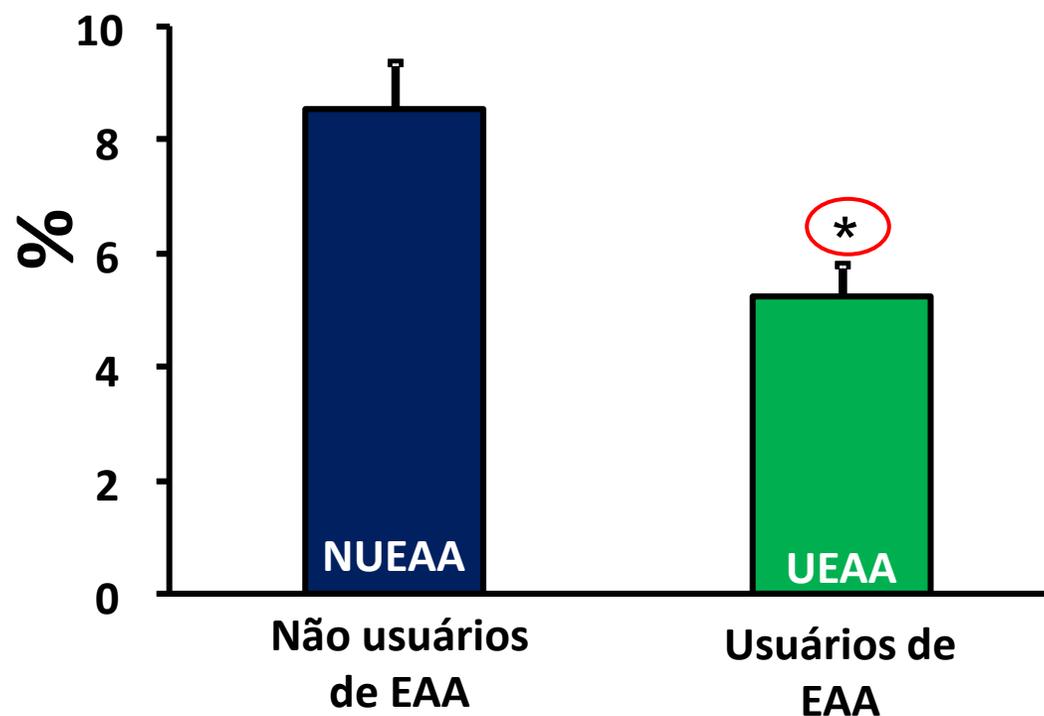
Resting spontaneous baroreflex sensitivity and cardiac autonomic control in anabolic androgenic steroid users



Sensibilidade barorreflexa



Distensão da Carótida



* = $p < 0.05$

Neurovascular Response during Exercise and Mental Stress in Anabolic Steroid Users

RAFAEL ARMANI PORELLO¹, MARCELO RODRIGUES DOS SANTOS¹, FRANCIS RIBEIRO DE SOUZA¹, GUILHERME WESLEY PEIXOTO DA FONSECA¹, ANA LUIZA CARRARI SAYEGH¹, TIAGO FRANCO DE OLIVEIRA², CÉSAR ABREU AKIHO¹, MAURÍCIO YONAMINE², ROSA MARIA RODRIGUES PEREIRA³, CARLOS EDUARDO NEGRÃO^{1,4}, and MARIA-JANIEIRE DE NAZARÉ NUNES ALVES¹



Stroop Color Word Test

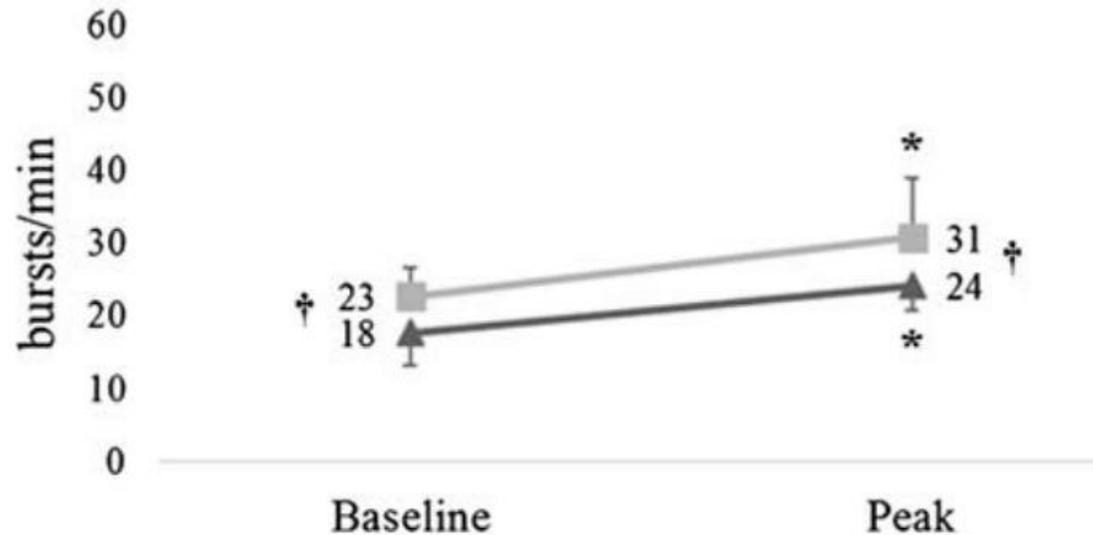


Neurovascular Response during Exercise and Mental Stress in Anabolic Steroid Users



RAFAEL ARMANI PORELLO¹, MARCELO RODRIGUES DOS SANTOS¹, FRANCIS RIBEIRO DE SOUZA¹, GUILHERME WESLEY PEIXOTO DA FONSECA¹, ANA LUIZA CARRARI SAYEGH¹, TIAGO FRANCO DE OLIVEIRA², CÉSAR ABREU AKIHO¹, MAURÍCIO YONAMINE², ROSA MARIA RODRIGUES PEREIRA³, CARLOS EDUARDO NEGRÃO^{1,4}, and MARIA-JANIEIRE DE NAZARÉ NUNES ALVES¹

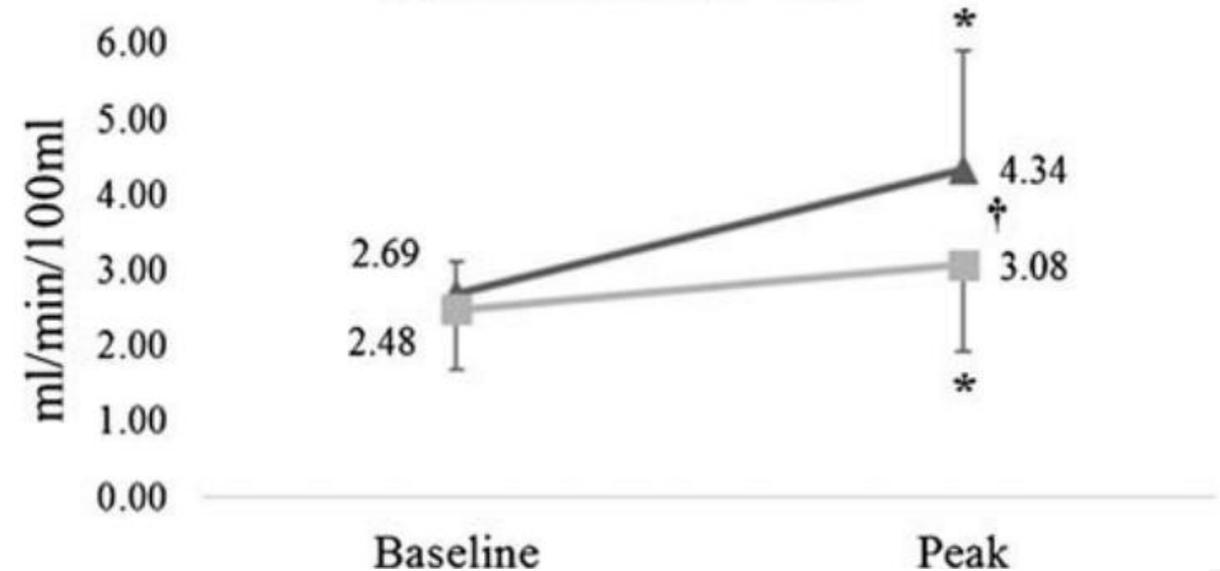
Atividade Nervosa Simpática Muscular (ANSM disparos/min)



*P<0.05 vs baseline
†P<0.05 vs group

▲ AASNU ■ AASU

Fluxo sanguíneo do antebraço



Impaired Post Exercise Heart Rate Recovery in Anabolic Steroid Users

Authors

M. R. dos Santos¹, R. G. Dias¹, M. C. Laterza¹, M. U. P. B. Rondon¹, A. M. F. W. Braga¹,
R. L. de Moraes Moreau², C. E. Negrão¹, M.-J. N. N. Alves¹

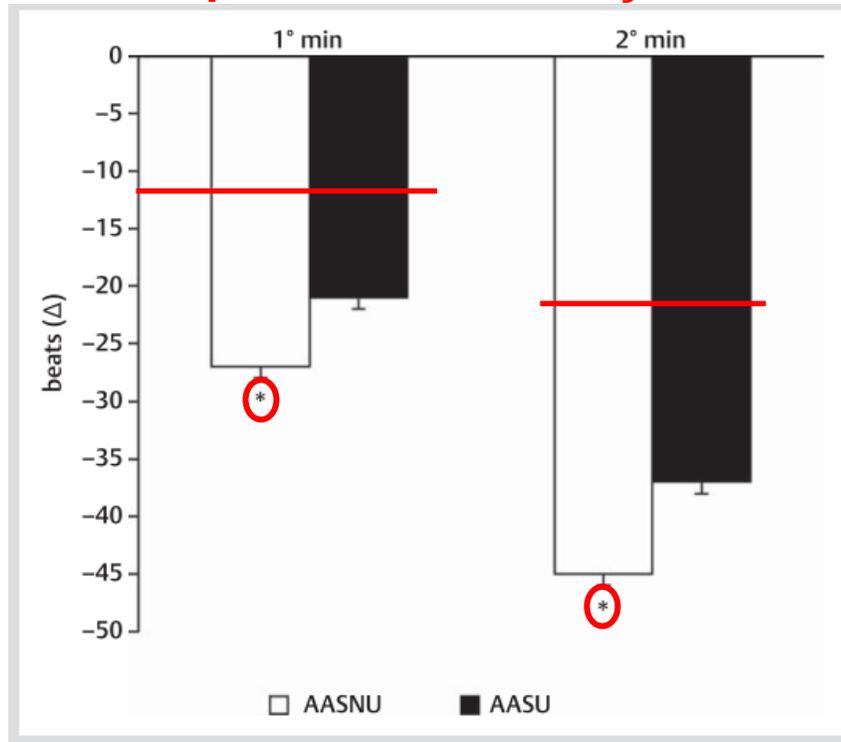
Affiliations

¹ Cardiac Rehabilitation and Exercise Physiology, Heart Institute (InCor), University of São Paulo Medical School, Sao Paulo, Brazil

² College of Pharmaceutical Sciences, University of São Paulo, Toxicology, Sao Paulo, Brazil



Frequência Cardíaca (FC) de recuperação após teste de esforço



* = p<0.05



Capacidade Funcional

Consumo máximo de oxigênio (VO₂máx)

Table 2 Cardiorespiratory variables at VAT, RCP and peak of exercise in anabolic androgenic steroids users (AASU) and anabolic androgenic steroids nonusers (AASNU).

	VAT		RCP		Peak	
	AASNU	AASU	AASNU	AASU	AASNU	AASU
HR (bpm)	136±6	122±5	179±2	163±5*	188±3	180±3
O ₂ pulse (mL/beat)	19.4±1.6	15.2±0.7*	22.1±1.6	19.5±1.0	22.6±1.5	20.6±0.9
RER	0.86±0.02	0.92±0.02	1.10±0.02	1.10±0.03	1.24±0.04	1.24±0.03
VO ₂ (mL/kg/min)	32.50±3.0	21.50±1.70*	47.90±1.60	36.20±2.10*	52.70±1.68	43.66±2.24*
VO ₂ (%)	61±5	49±2*	91±2	83±2*		
work load (watts)					326±13	312±19

Values are means ± SE. VAT, ventilatory anaerobic threshold; RCP, respiratory compensation point; HR, heart rate; RER, respiratory exchange ratio; VO₂, oxygen consumption; O₂ pulse, oxygen pulse. *vs. AASNU (*P*<0.05)



Qual é o efeito na função e estrutura do coração?



Alterações estruturais no coração

Table 2
Standard Doppler echocardiographic data

Variable	Sedentary Men (n = 15)	Drug-Free Bodybuilders (n = 9)	Drug-Using Bodybuilders (n = 6)
Septal wall thickness (mm)	9.5 ± 1.9	9.7 ± 1.7	10.8 ± 1.3
Posterior wall thickness (mm)	9.3 ± 0.12	10.3 ± 0.9	10.0 ± 1.4
LV end-diastolic diameter (mm)	52 ± 5	53 ± 5	58 ± 4*‡
LV end-systolic diameter (mm)	33 ± 3	34 ± 4	37 ± 5
LV mass (g)	182 ± 53	202 ± 52	249 ± 33*‡
LV end-diastolic volume	92 ± 22	106 ± 27	124 ± 25 [†]
LV end-systolic volume	34 ± 8	40 ± 10	49 ± 12 [†]
Ejection fraction (%)	62 ± 3	62 ± 3	61 ± 3
Stroke volume (ml)	99 ± 19	114 ± 18	111 ± 20
Heart rate (beats/min)	66 ± 7	68 ± 14	72 ± 6
Cardiac output (L)	6.6 ± 0.7	7.6 ± 1.8	8.0 ± 0.9

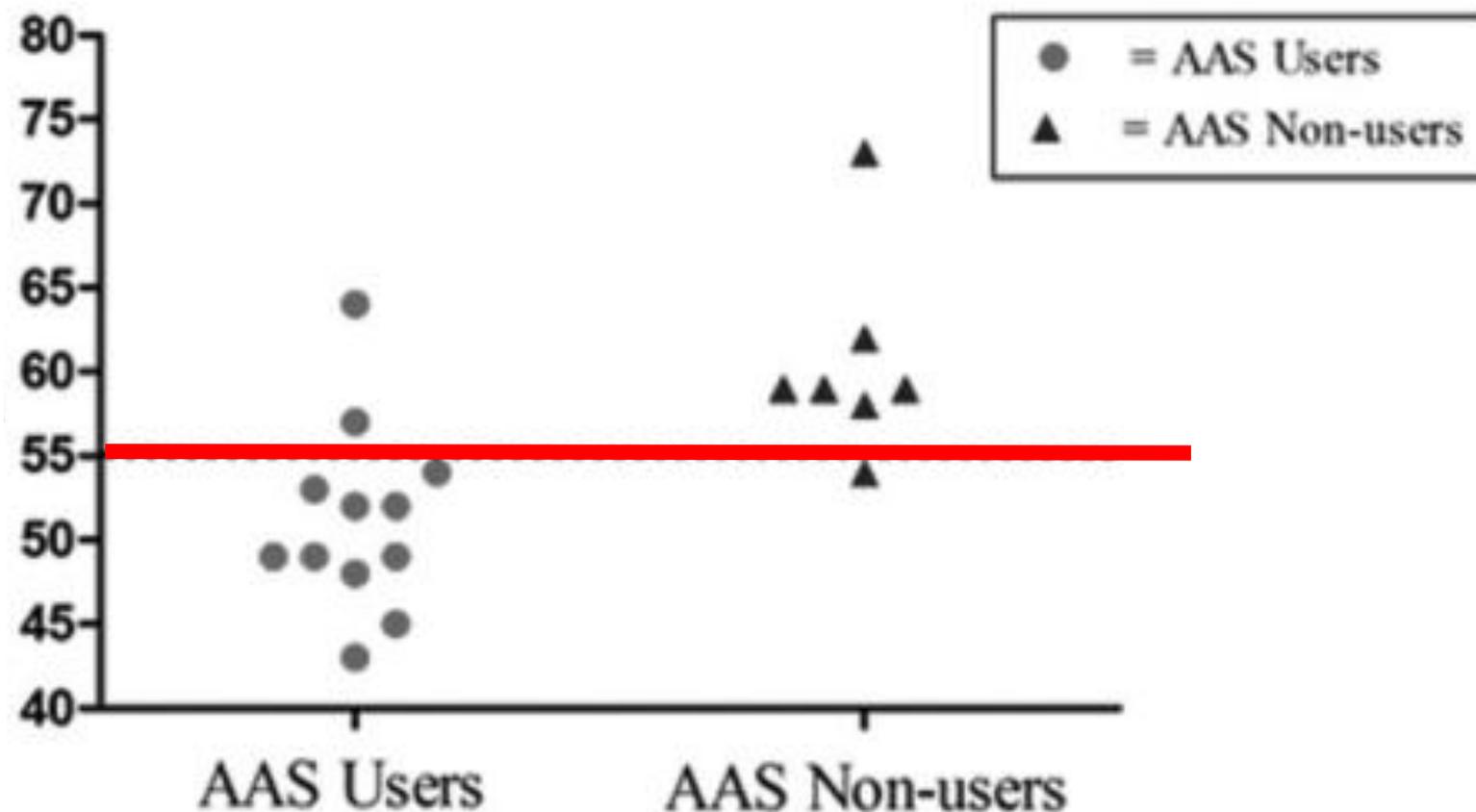
**Hipertrofia
cardíaca**

Significantly different from sedentary men: *p <0.05; [†]p <0.01.
Significantly different from drug-free bodybuilders: [‡]p <0.05.

Long-Term Anabolic-Androgenic Steroid Use Is Associated With Left Ventricular Dysfunction

Aaron L. Baggish, MD; Rory B. Weiner, MD; Gen Kanayama, MD, PhD; James I. Hudson, MD, ScD; Michael H. Picard, MD; Adolph M. Hutter, Jr, MD; Harrison G. Pope, Jr, MD

Fração de Ejeção do VE (%)



Alterações do sistema renina angiotensina

Am J Physiol Heart Circ Physiol 293: H3575–H3583, 2007.
First published September 28, 2007; doi:10.1152/ajpheart.01251.2006.

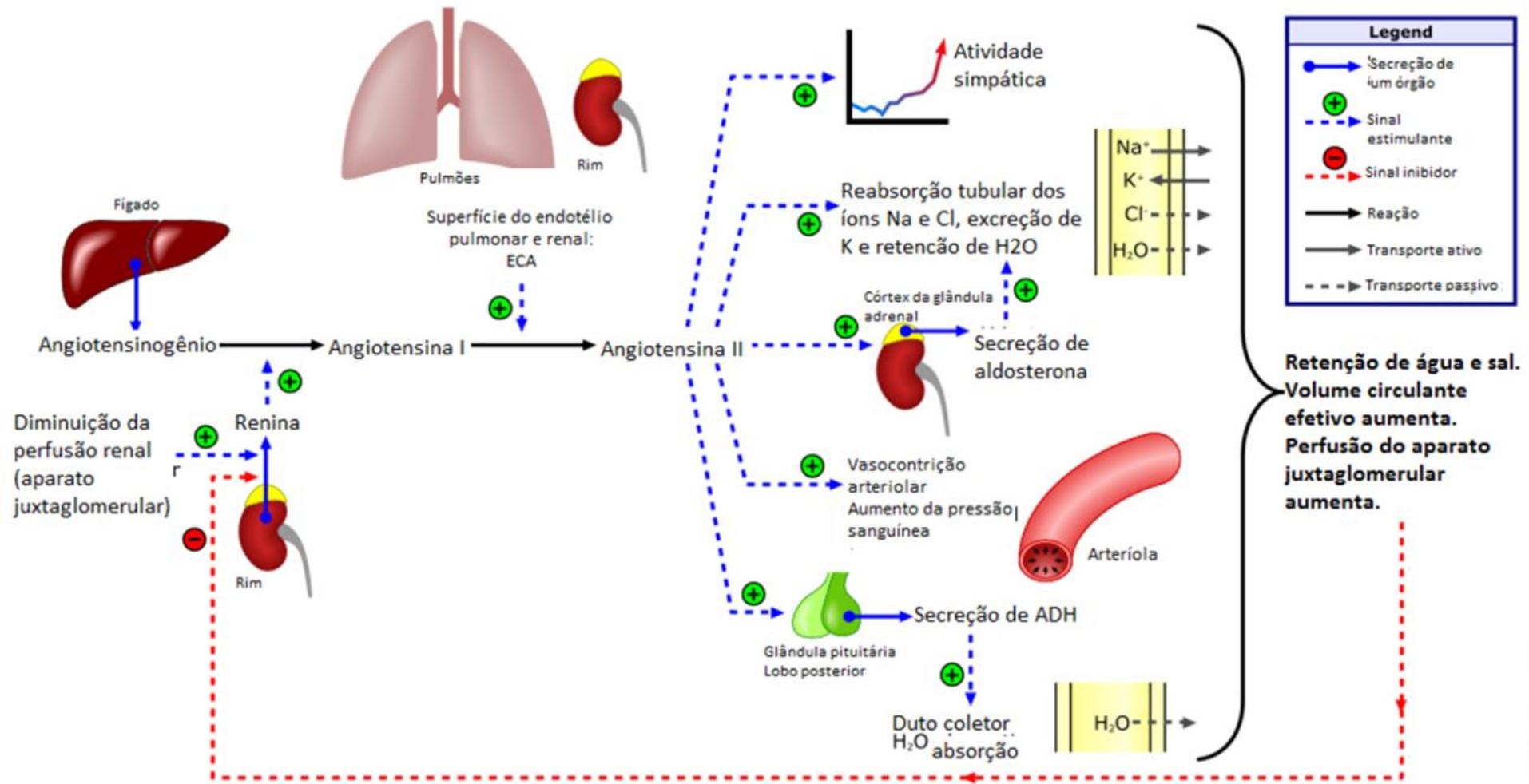
Anabolic steroids induce cardiac renin-angiotensin system and impair the beneficial effects of aerobic training in rats

**F. L. Rocha,¹ E. C. Carmo,¹ F. R. Roque,¹ N. Y. Hashimoto,¹ L. V. Rossoni,³ C. Frimm,² I. Anéas,²
C. E. Negrão,^{1,2} J. E. Krieger,² and E. M. Oliveira¹**

¹Laboratory of Biochemistry, School of Physical Education and Sport, University of São Paulo; ²Heart Institute (InCor), University of São Paulo Medical School; and ³Biomedical Sciences Institute, University of São Paulo, São Paulo, Brazil

Alterações do sistema renina angiotensina

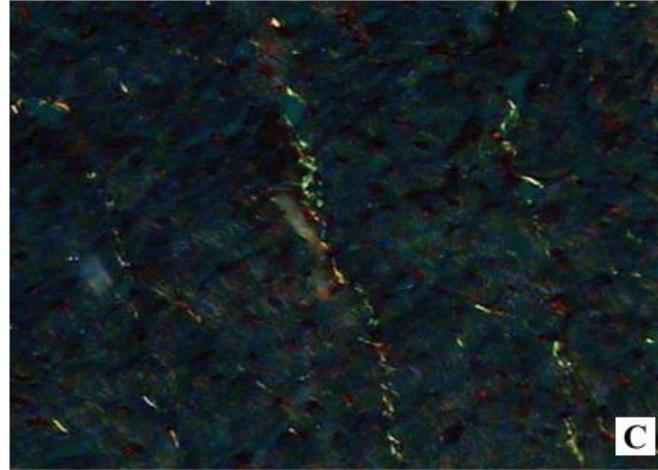
Sistema renina- angiotensina



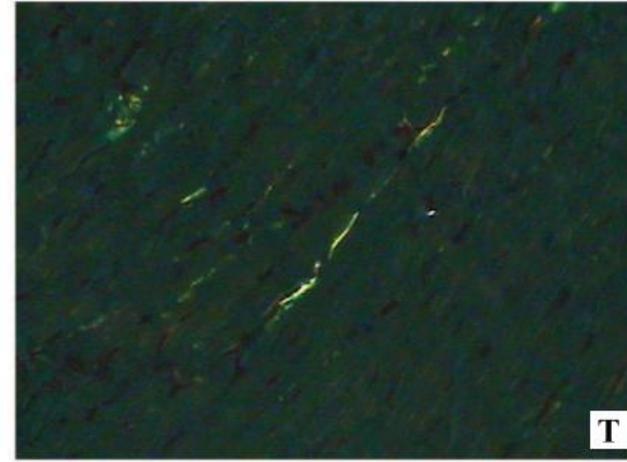
© Arla Rad - 2006

Depósito de colágeno no miocárdio

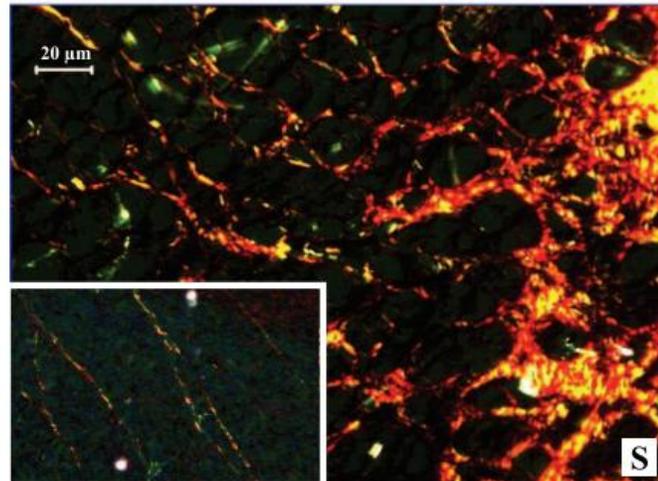
Controle



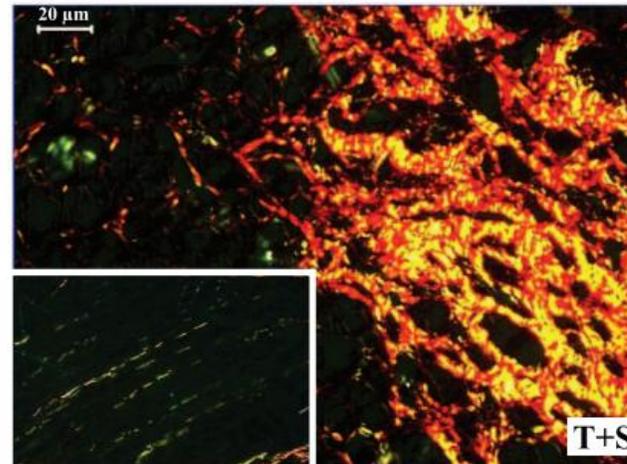
Exercício físico



Anabolizantes



Exercício físico +
anabolizantes

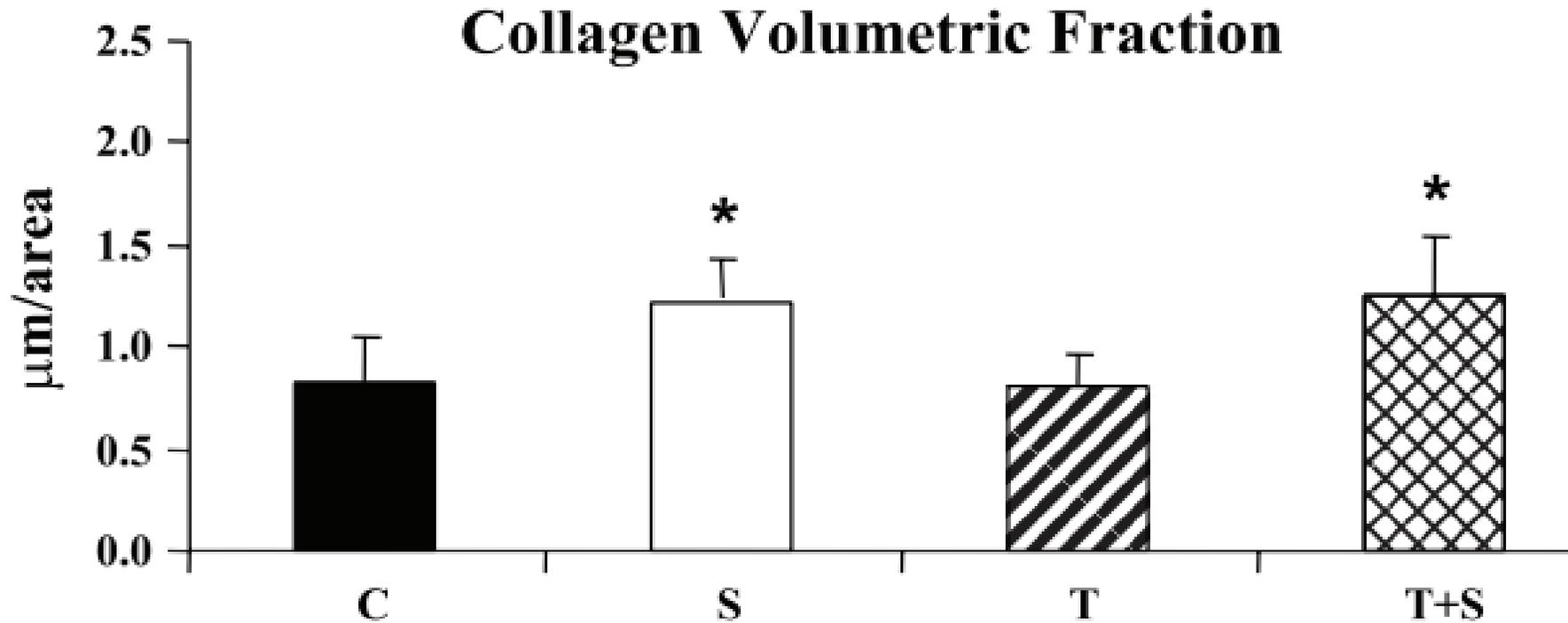


Depósito de colágeno no miocárdio

Losartana (AT1)

Angiotensina II
(AT1)?

B



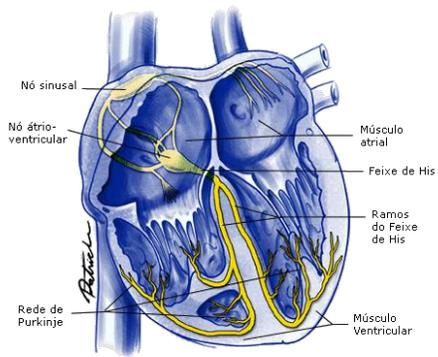
Redução de colágeno no miocárdio



**Exercício físico
+
anabolizantes**



**Exercício físico
+
anabolizantes
+
losartana**

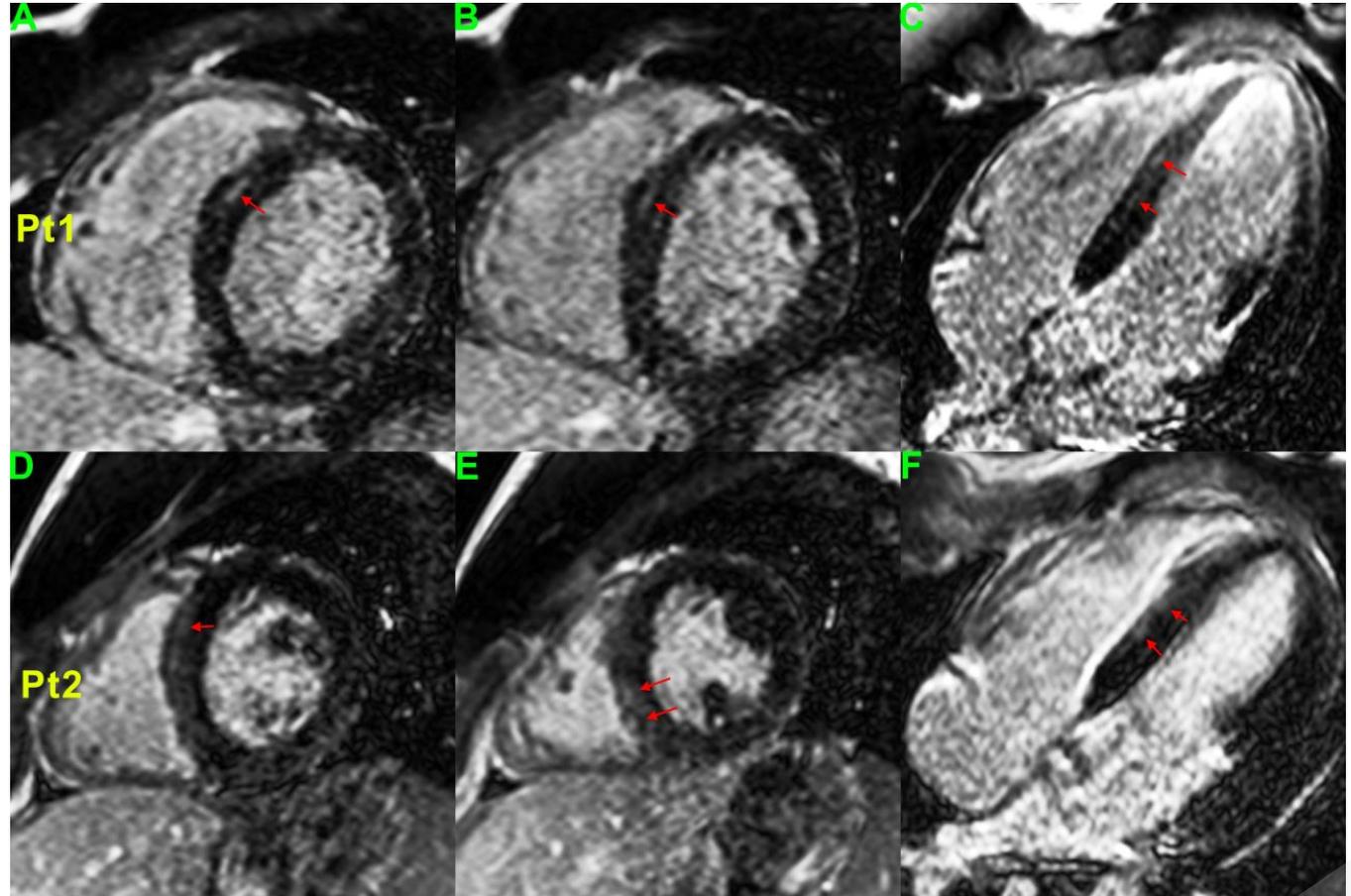


Fibrose focal no coração

2 indivíduos (11%) do grupo EAA

Participant: AFM, 27 yr
(12 years of duration of AAS abuse)

Participant: GPA, 29 yr
(6 years of duration of AAS abuse)



Óbitos associados ao uso de anabolizantes



Não usuários de anabolizantes: 6,02%

Usuários de anabolizantes: 20,43%

21/12/2015 15:11:41

Jovem morre por uso de anabolizantes

Mãe conta que filho, de 20 anos, teve três AVCs por causa dos medicamentos. Ele frequentava academia desde adolescência

IG

Inglaterra - O britânico Oli Cooney começou a frequentar a academia quando ainda era adolescente e rapidamente desenvolveu uma obsessão pela busca do corpo perfeito, o que o levou a consumir anabolizantes perigosos. Ele deixou os amigos de lado, esqueceu os passeios aos finais de semana e passou a se dedicar apenas aos exercícios físicos. A busca sem freio por músculos e pelo que julgava ser o corpo ideal o levou a consumir anabolizantes. O jovem morreu aos 20 anos e mãe de Oli relembra sua história.

"Eu não via isso como problema até a primeira vez que ele foi parar no hospital. Eu pensava que era melhor ele ir para a academia e cuidar do físico, pelo menos ele não ia sair todo final de semana e ficar bêbado com os amigos.", conta Sarah Cooney, mãe de Oli ao documentário da BBC3, "Extreme UK: Dying For A Six Pack". A história foi reproduzida pelo jornal britânico "Daily Mail".

➤ **Infarto Agudo do Miocárdio**

➤ **Arritmias cardíacas**

➤ **Morte Súbita**

Coronary Calcification in Body Builders Using Anabolic Steroids

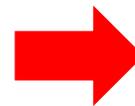
Lawrence J. Santora, MD;¹ Jairo Marin, MD;¹ Jack Vangrow, MD;¹ Craig Minegar, RDCS;¹ Mary Robinson, NP;² Janet Mora, RT;² Gerald Friede, MS²



14 homens fisiculturistas com idade de 28 a 55 (média de 39)

**7 de 14 indivíduos (50%) tiveram
escore de cálcio na artéria
coronariana**

O número esperado era de 3 (21%)



**Fator independente
de evento cardiovascular**

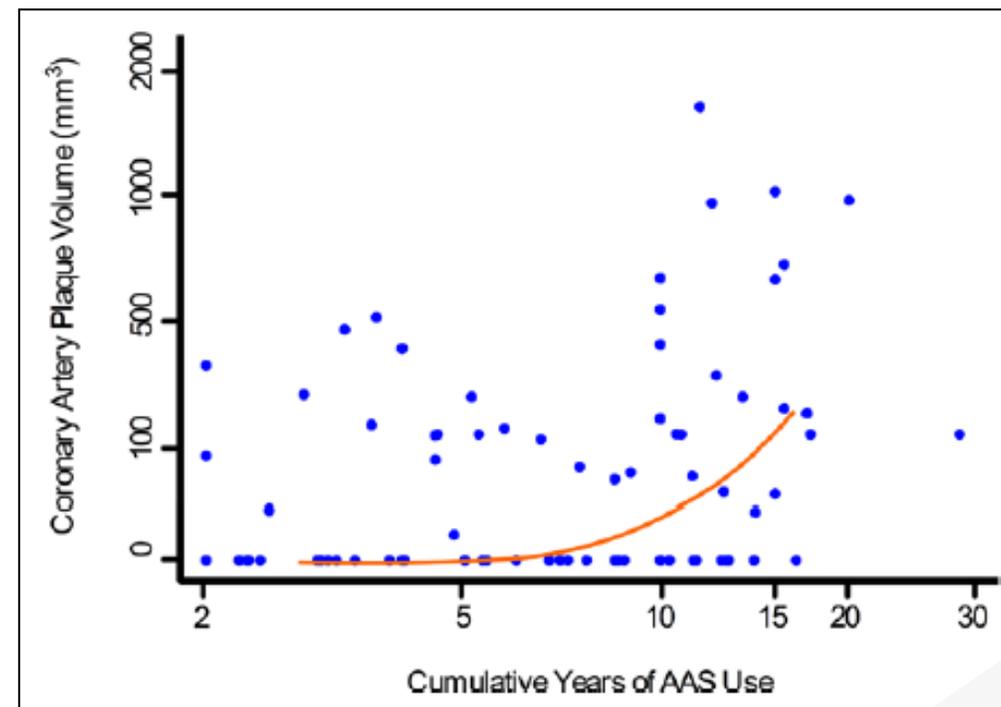
Circulation

Cardiovascular Toxicity of Illicit Anabolic-Androgenic Steroid Use

Aaron L. Baggish, Rory B. Weiner, Gen Kanayama, James I. Hudson, Michael T. Lu, Udo Hoffmann and Harrison G. Pope, Jr

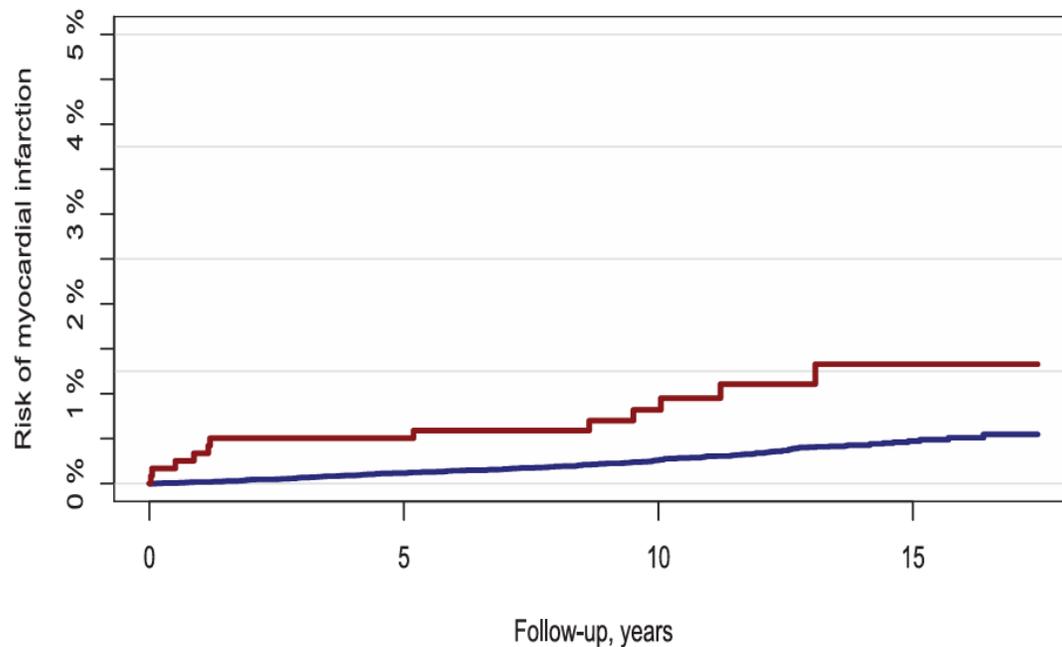
84 homens fisiculturistas com idade de 39 a 47 (mediana 42)

Variable	Users (N=84)	Nonusers (N=53)	Comparison	
			Estimated Difference in Standardized Ranks (95% Confidence Interval)†	P Value
Primary outcome				
Plaque volume, mm ³ ‡	3 (0–174)	0 (0–69)	0.46 (0.10–0.82)	0.012



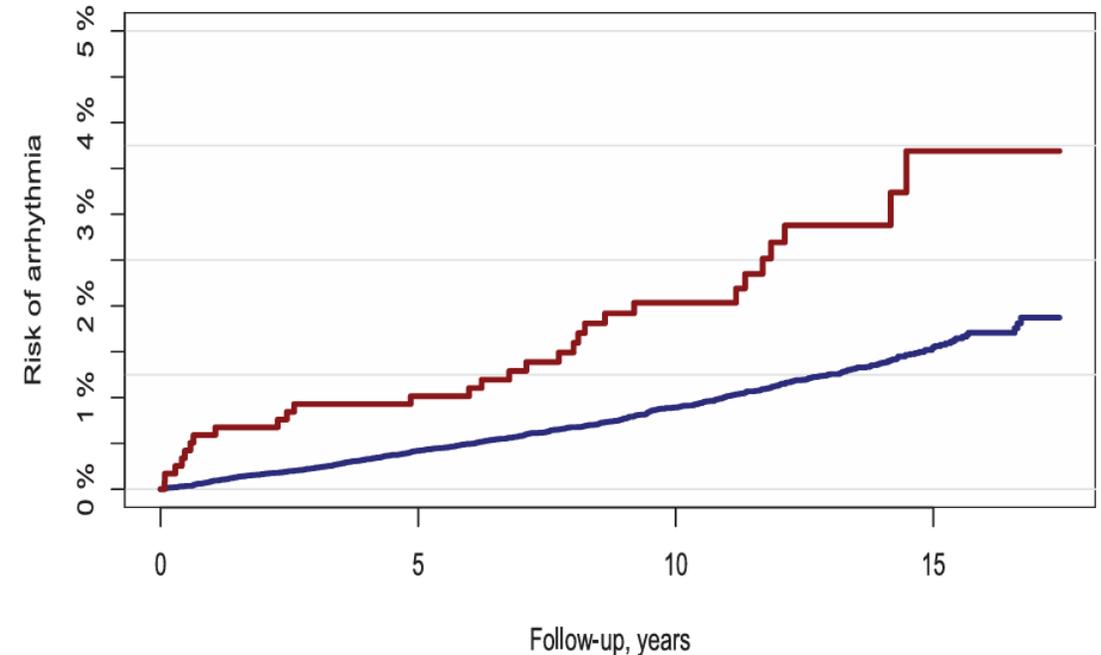
ORIGINAL RESEARCH ARTICLE

Cardiovascular Disease in Anabolic Androgenic Steroid Users



p=0.0002

OR 3.00 (1.67-5.39)

57040
115736641
7456998
141

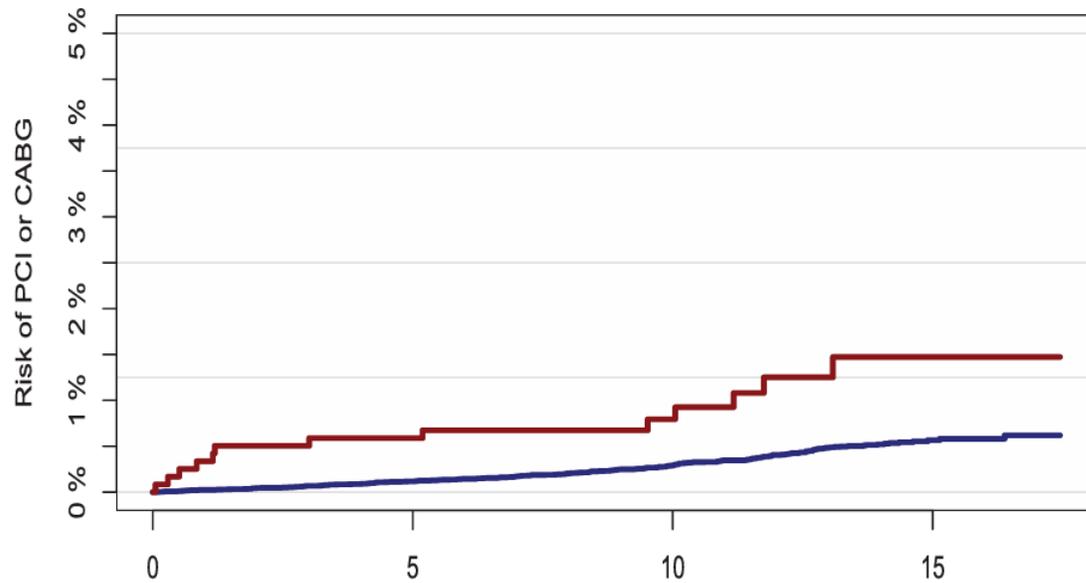
p<0.0001

OR 2.26 (1.53-3.32)

56595
114836260
7326917
139

ORIGINAL RESEARCH ARTICLE

Cardiovascular Disease in Anabolic Androgenic Steroid Users

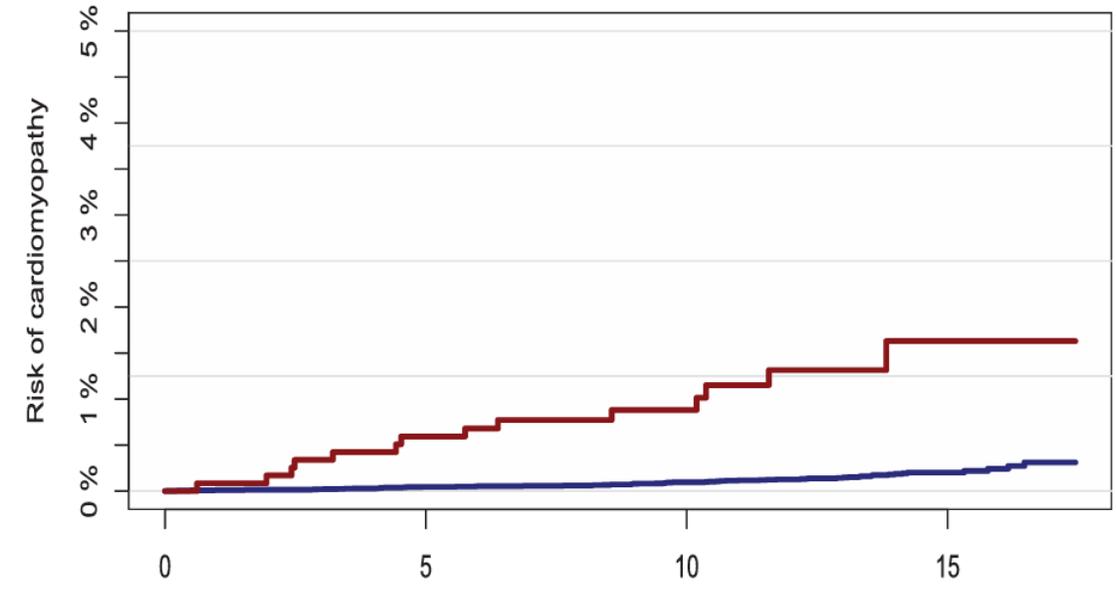


p=0.0002

OR 2.95 (1.68-5.18)

57062
1157

Follow-up, years

36657
7456998
142

p<0.0001

OR 8.90 (4.99-15.88)

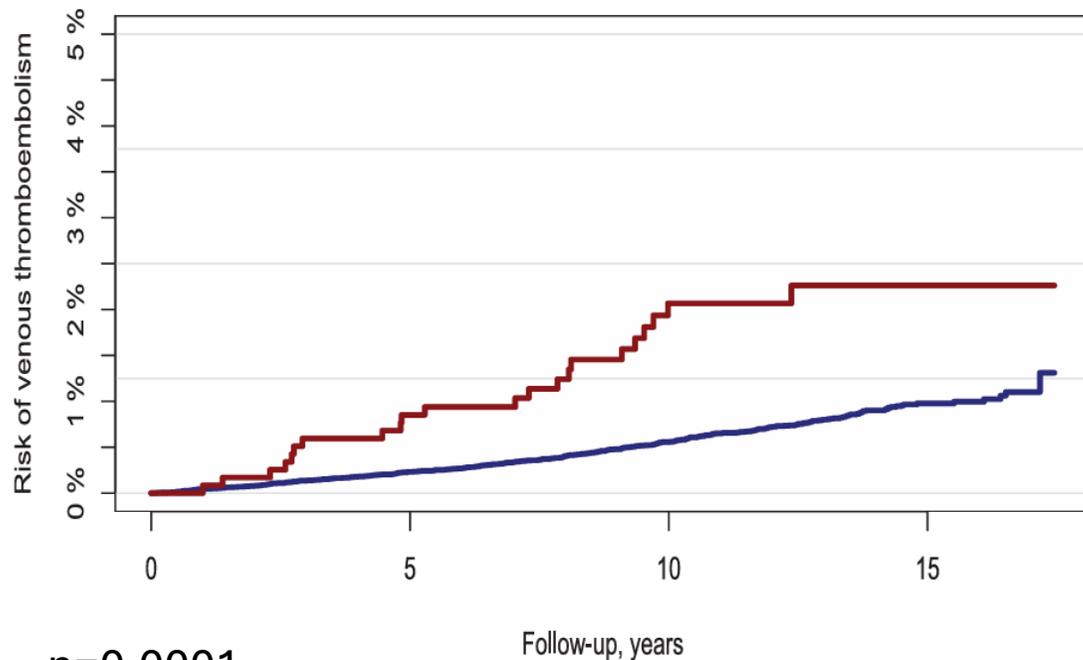
57101
1154

Follow-up, years

36714
7437005
142

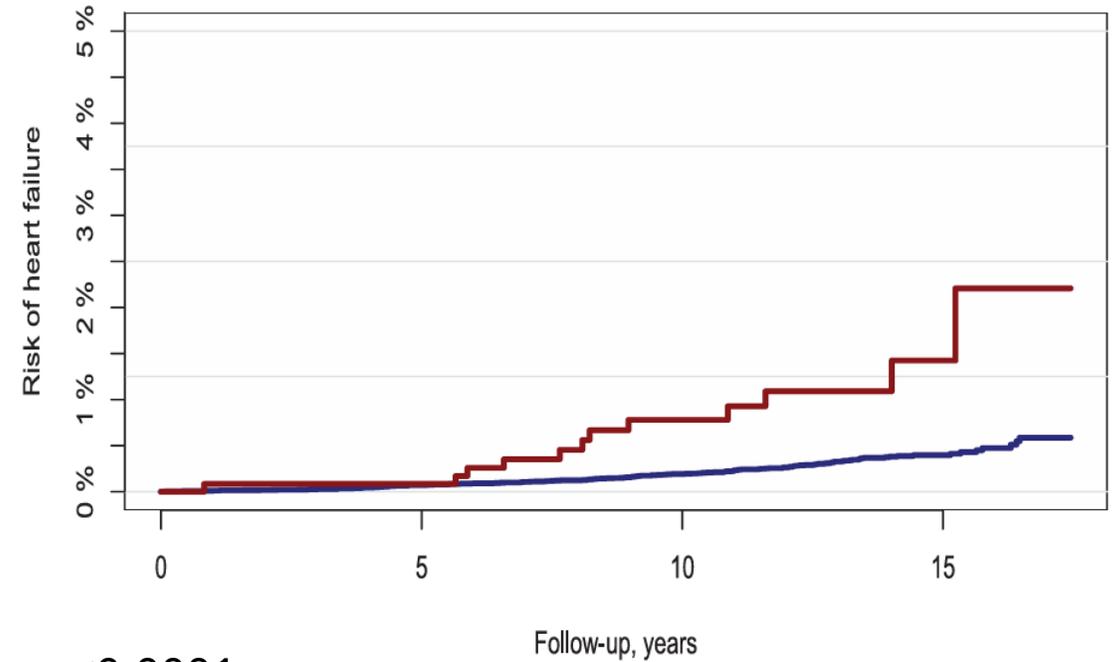
ORIGINAL RESEARCH ARTICLE

Cardiovascular Disease in Anabolic Androgenic Steroid Users



p=0.0001

OR 2.42 (1.54-3.80)

56884
114336519
7276969
141

p<0.0001

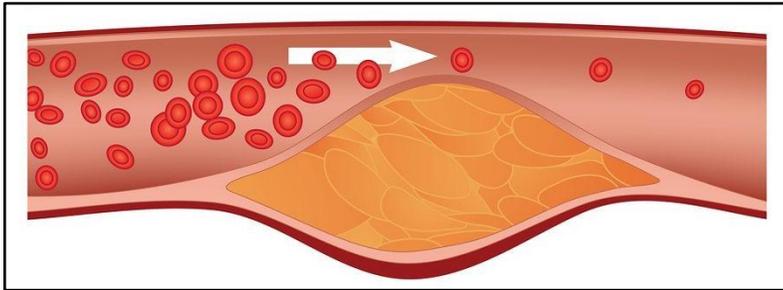
OR 3.63 (2.01-6.55)

57091
116236698
7447002
142

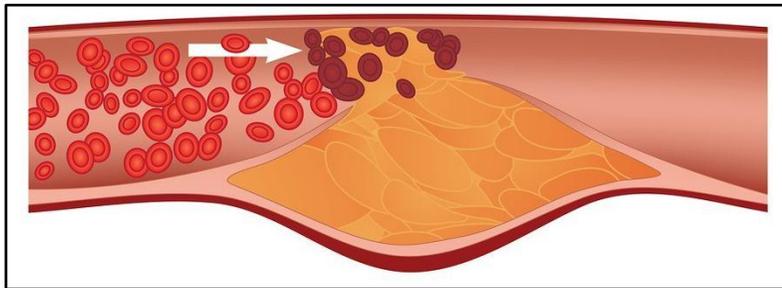
Alterações do perfil lipídico e DAC

↑ LDL

↓ HDL



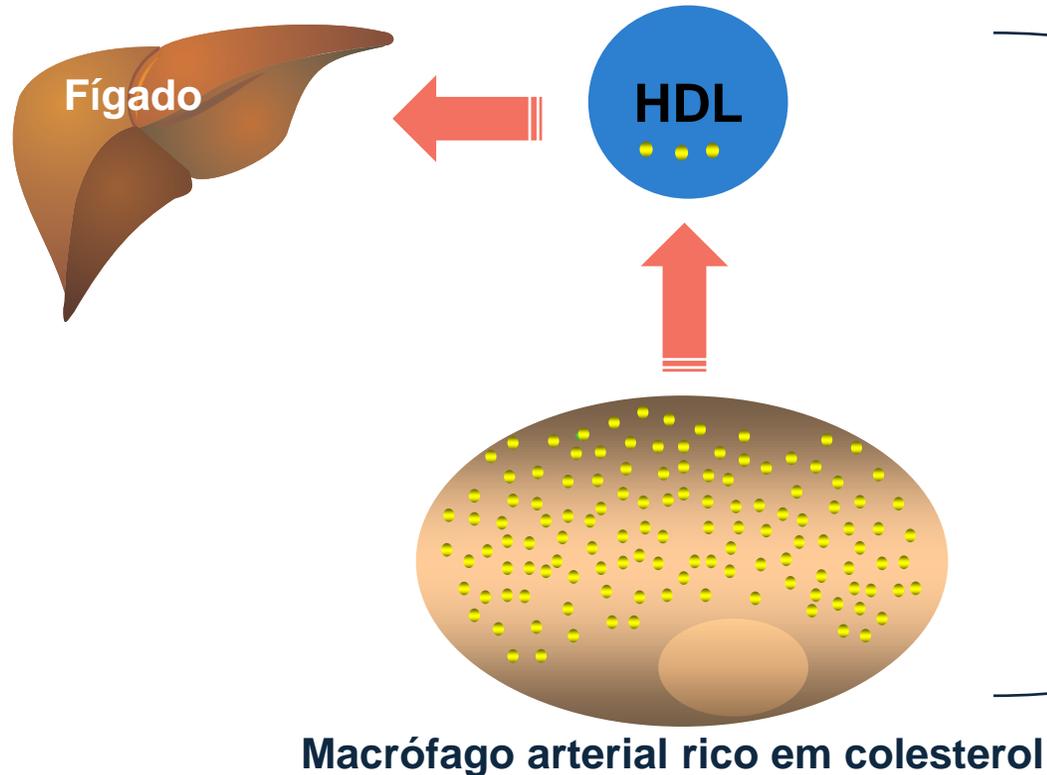
Aterosclerose (Doença Arterial Coronariana - DAC)



Infarto agudo do miocárdio (IAM)

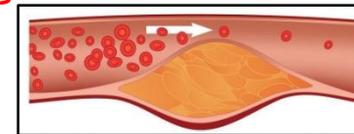
Função protetora da HDL

➤ Efluxo do colesterol mediado pela HDL



Função antiaterogênica

Doença arterial coronariana



Anabolizantes e alterações no perfil lipídico



TABLE 2. Demographic and lipid characteristics in anabolic androgenic steroid users and nonusers.

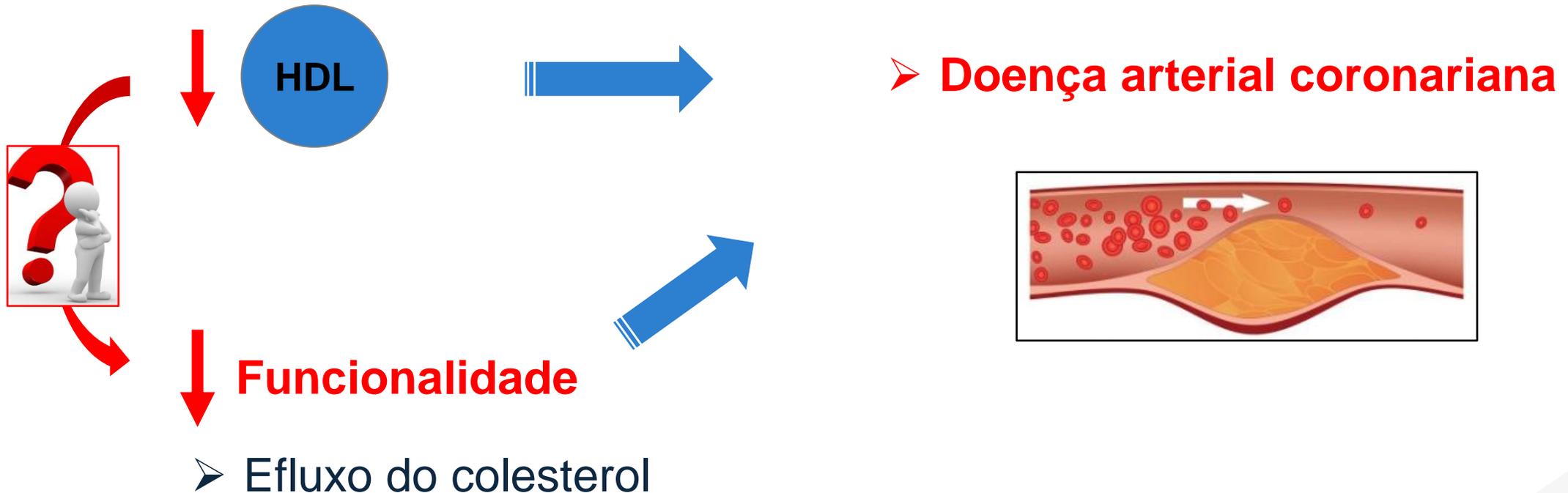
	Users	Nonusers	<i>P</i>
n	12	9	
Age (yr)	31 ± 2	29 ± 2	0.38
Weight (kg)	87.2 ± 2.8	78.2 ± 4.3	0.08
Height (cm)	174 ± 0.02	175 ± 0.03	0.81
Smokers (<i>n</i>)	0	0	
Glucose (mg·dL ⁻¹)	88 ± 2	91 ± 2	0.33
Total cholesterol (mg·dL ⁻¹)	212 ± 11	170 ± 15	0.02
LDL cholesterol (mg·dL ⁻¹)	149 ± 9	107 ± 11	0.01
HDL cholesterol (mg·dL ⁻¹)	32 ± 6	46 ± 3	0.05
Triglycerides (mg·dL ⁻¹)	107 ± 20	90 ± 14	0.55

Values are presented as mean ± SE.

Diminished cholesterol efflux mediated by HDL and coronary artery disease in young male anabolic androgenic steroid users



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Guilherme Wesley Peixoto da Fonseca^a, Ana Luiza Carrari Sayegh^a, Thaís Pinheiro Lima^a,
Fabiana Dias Ferreira^b, Tiago Franco de Oliveira^c, Maurício Yonamine^d, Liliam Takayama^e,
Rosa Maria Rodrigues Pereira^e, Carlos Eduardo Negrão^a, Marisa Passarelli^{b,f},
Carlos Eduardo Rochitte^a, Maria Janieire de Nazaré Nunes Alves^{a,*}



Características físicas

Variáveis	UEAA (20)	NUEAA (20)	CS (10)	p
Idade (anos)	29 ± 5	29 ± 5	29 ± 3	0,861
Peso (kg)	97,4 (90,1-104,9) *†	82,0 (74,0-88,0)	74,8 (70,0-87,5)	0,003
Altura (m)	1,78 ± 0,04	1,80 ± 0,09	1,76 ± 0,08	0,841
IMC (kg/m²)	31,11 ± 3,45 *†	25,45 ± 1,92	25,70 ± 3,38	<0,001
Massa magra (kg)	82,05 ± 9,18 *†	62,81 ± 7,15 *	53,94 ± 7,38	<0,001
Gordura (kg)	12,0 (9,9-15,1) *†	15,5 (11,7-18,1) *	19,5 (15,2-26,8)	0,033
Gordura (%)	13,18 ± 5,62 *†	19,27 ± 4,33 *	27,59 ± 7,49	0,005

* = p<0,05 vs. CS

† = p<0,05 vs. NUEAA

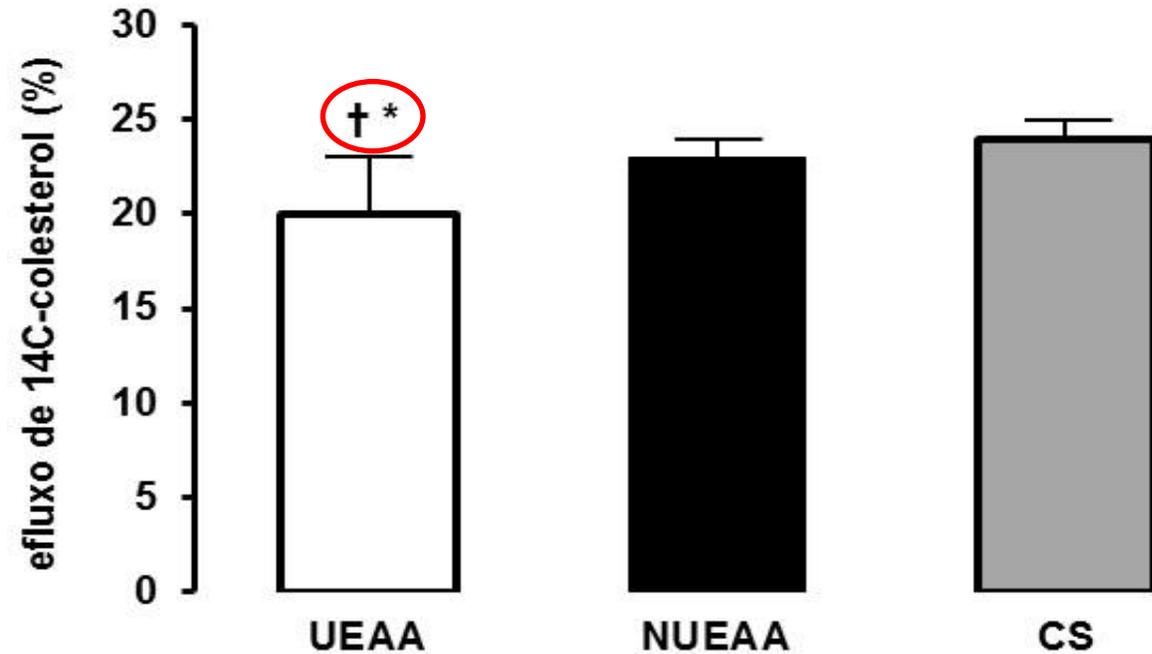
Perfil lipídico e inflamatório

Variáveis	UEAA (20)	NUEAA (20)	CS (10)	p
CT (mg/dL)	186 (143-208)	155 (134-188)	189 (175-200)	0,075
HDL (mg/dL)	19 (13-25) *†	44 (41-54)	50 (40-55)	<0,001
LDL (mg/dL)	144 (105-179) *†	96 (81-125)	122 (105-132)	0,001
TG (mg/dL)	74 ± 23	75 ± 35	98 ± 45	0,151
PCR (mg/L)	1,69 (0,68-2,51) †	0,36 (0,17-0,74)	1,00 (0,26-3,6)	<0,001

* = p<0,05 vs. CS

† = p<0,05 vs. NUEAA

Efluxo do colesterol mediado pela HDL



*= $p < 0,05$ vs. CS

† = $p < 0,05$ vs. NUEAA

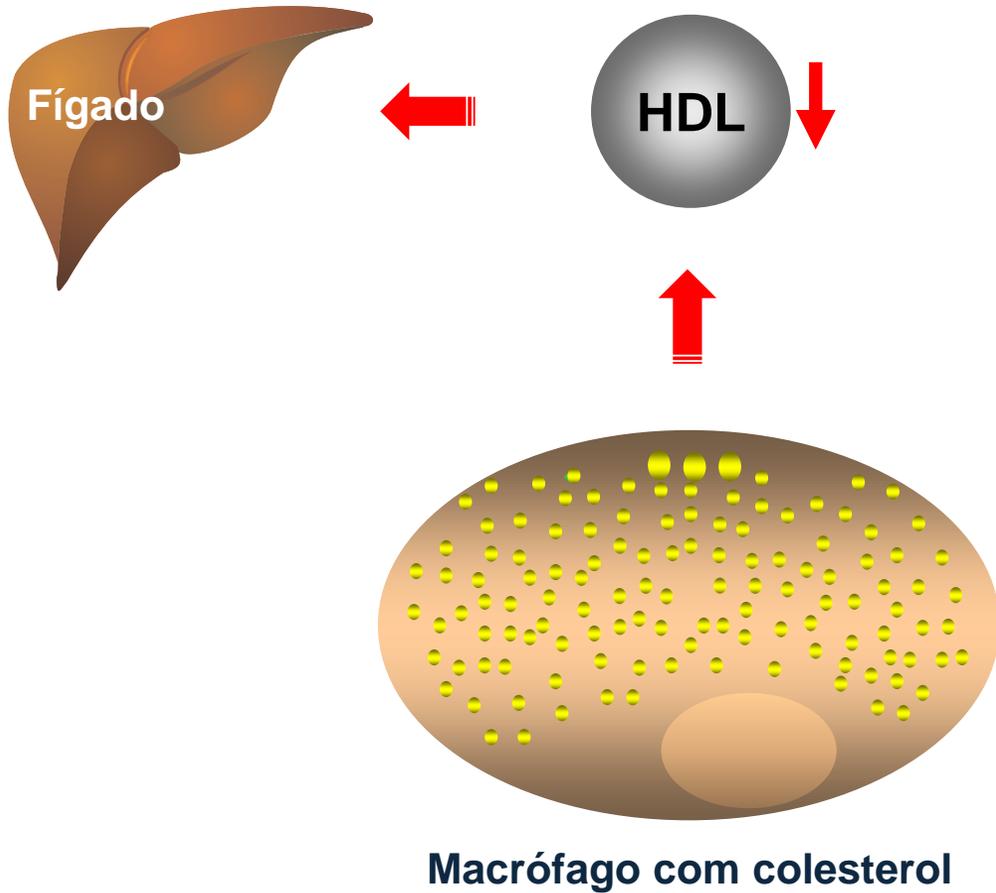
UEAA= Usuários de esteroides androgênicos anabólicos

NUEAA= não usuários de esteroides androgênicos anabólicos

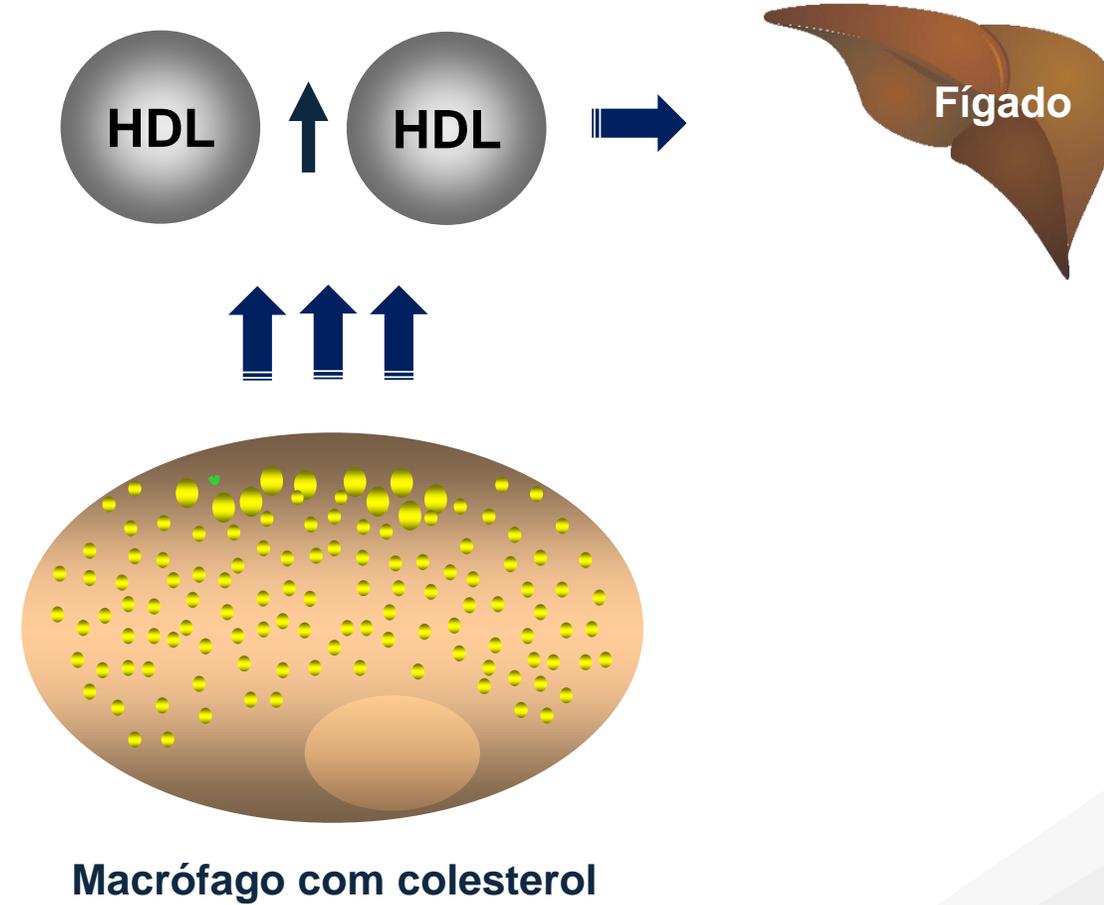
CS= controle sedentário.

Efluxo do colesterol mediado pela HDL

➤ Grupo UEAA



➤ Grupo NUEAA e CS



Angiotomografia de coronárias

	UEAA (20)	NUEAA (20)	CS (10)	p
Indivíduos com placas nas artérias coronárias (n)	5 (25%) * †	0	0	0,019
Histórico familiar para DAC (n)	1 (5%)	1 (5%)	1 (10%)	0,814

* = $p < 0,05$ vs. CS

† = $p < 0,05$ vs. NUEAA

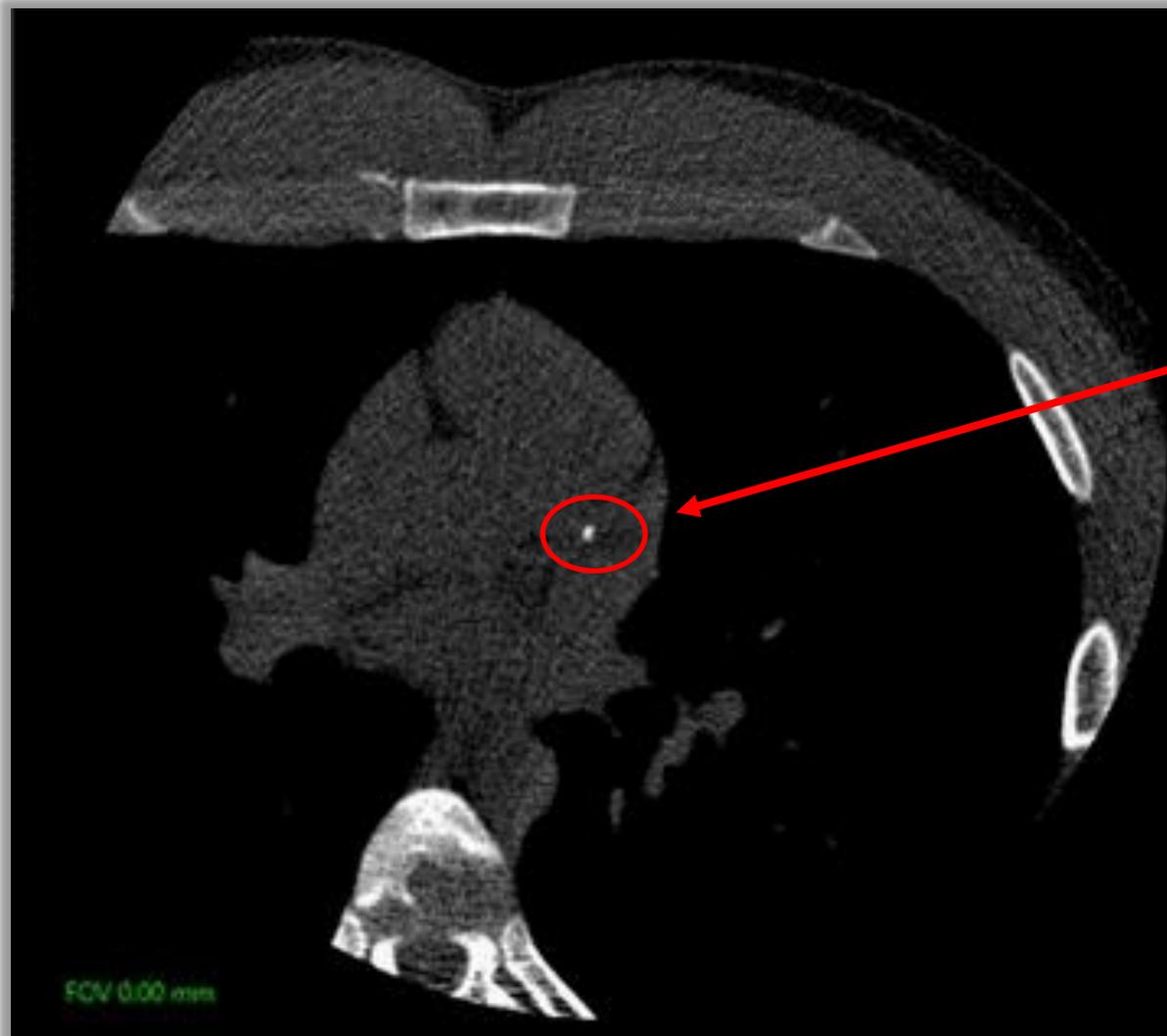
Descrição da angiotomografia de coronárias do grupo UEAA

5 indivíduos com lesões de coronárias

Número de lesões nas artérias	2,4 ± 1,5
Número de artérias lesionadas	2 ± 1
Indivíduos com Score de Cálcio (n)	3 (15%)
Volume da placa (mm ³)	274,4 ± 101,1
Grau de estenose (obstrução da arteria)	2 ± 1

Grau de estenose: 0= 0% estenose, 1= <30%, 2= 30-50%, 3= 51-70%, 4= 71-99% e 5= 100%

Imagem da angiotomografia de um usuário de anabolizantes de 27 anos



A imagem mostra a artéria descendente anterior (DA) com diminuta placa calcificada.

Tipos de anabolizantes

Variáveis	UEAA (21)	NUEAA (20)	CS (10)	p
Musculação (anos)	12 ± 5	10 ± 4	-	0,435
Tempo de uso dos EAA (anos)	8 ± 6	-	-	-
<i>Tipos de EAA</i>				
Propionato de Testosterona (mg)	575 ± 220	-	-	-
Nandrolona (mg)	630 ± 125	-	-	-
Boldenona (mg)	500 ± 100	-	-	-
Trembolona (mg)	480 ± 200	-	-	-
Estanozolol (mg)	350 ± 180	-	-	-

Anabolizantes e Shear Rate

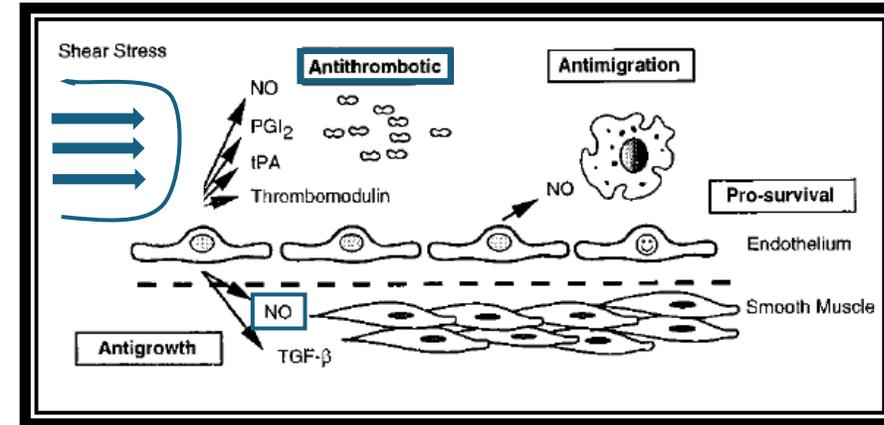
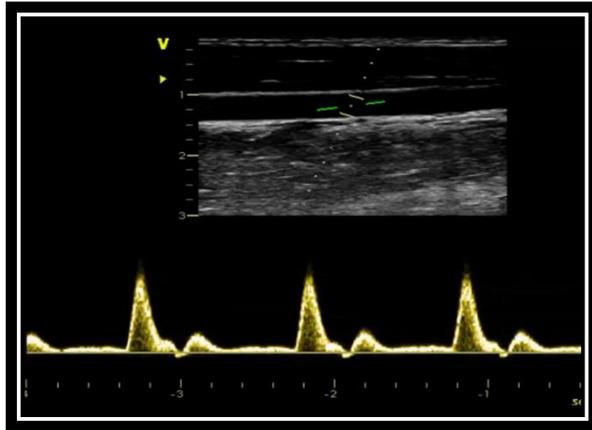
SCANDINAVIAN JOURNAL OF MEDICINE & SCIENCE IN SPORTS

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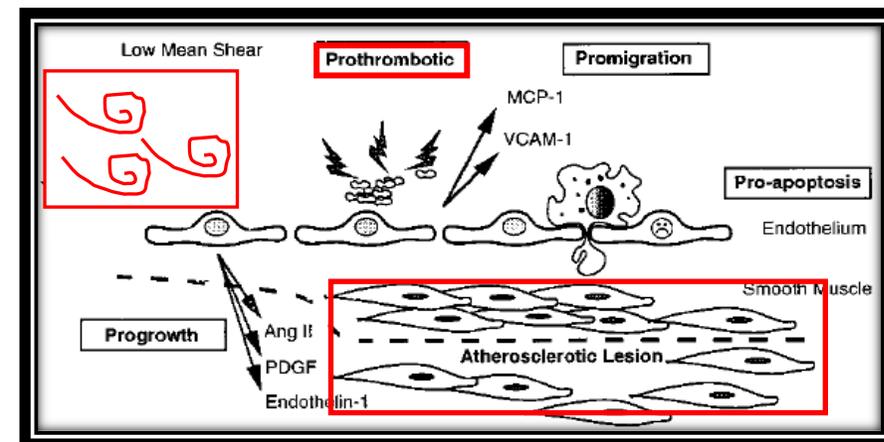
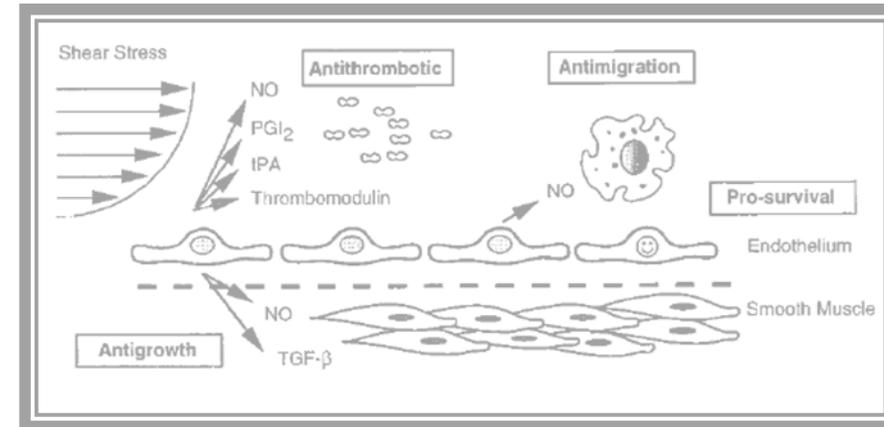
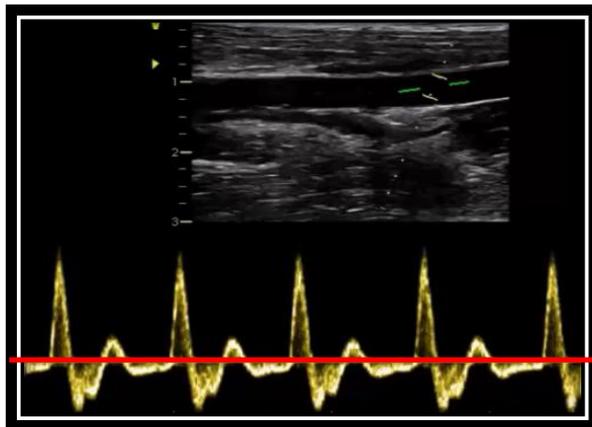
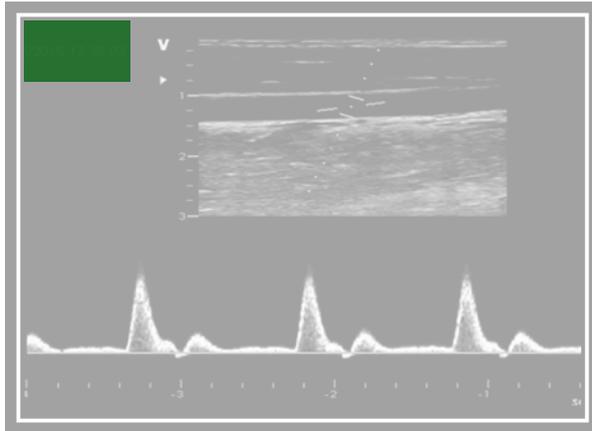
Retrograde and oscillatory shear rate in young anabolic androgenic steroid users

Francis Ribeiro de Souza¹  | Allan Robson Kluser Sales¹ | Marcelo Rodrigues Dos Santos¹ | Rafael Armani Porello¹ | Guilherme Wesley Peixoto da Fonseca¹ | Ana Luiza Carrari Sayegh¹ | Antonio Carlos Battaglia Filho¹ | Rosa Maria Rodrigues Pereira² | Liliam Takayama² | Tiago Franco de Oliveira³ | Mauricio Yonamine⁴ | Carlos Eduardo Negrão¹ | Maria Janieire de Nazaré Nunes Alves¹

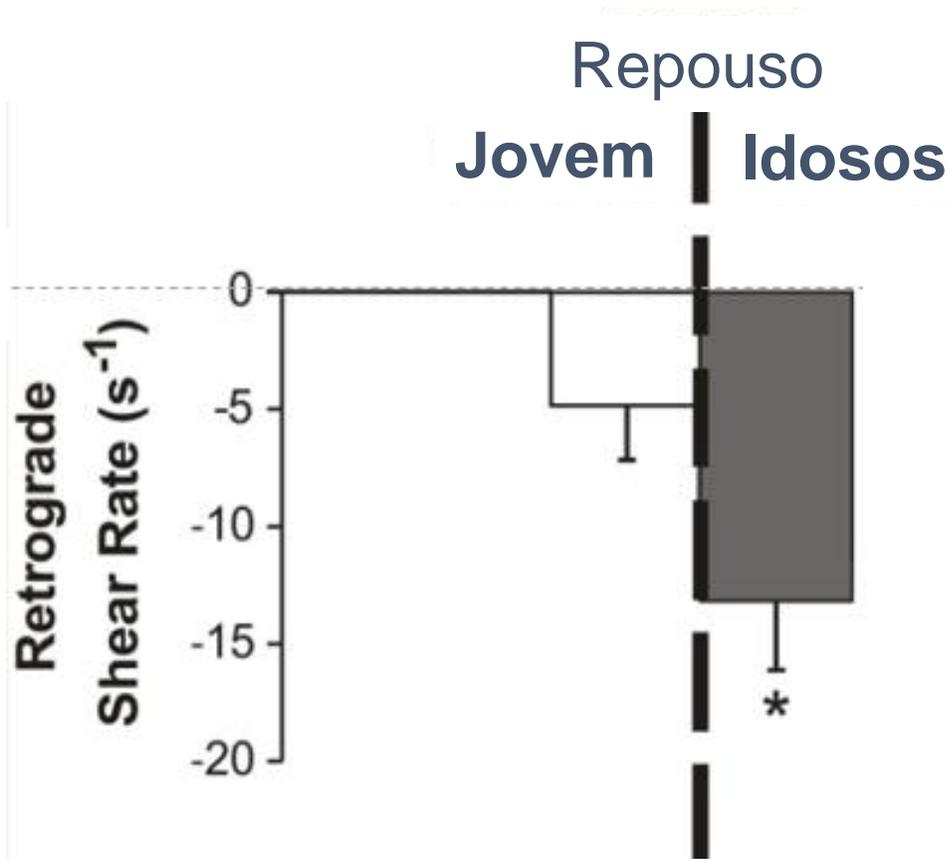
Padrão do fluxo na artéria braquial (*Shear rate*)



Distúrbio no padrão do fluxo na artéria braquial (*Shear rate*)



Distúrbio no padrão do fluxo na artéria braquial (*Shear rate*)

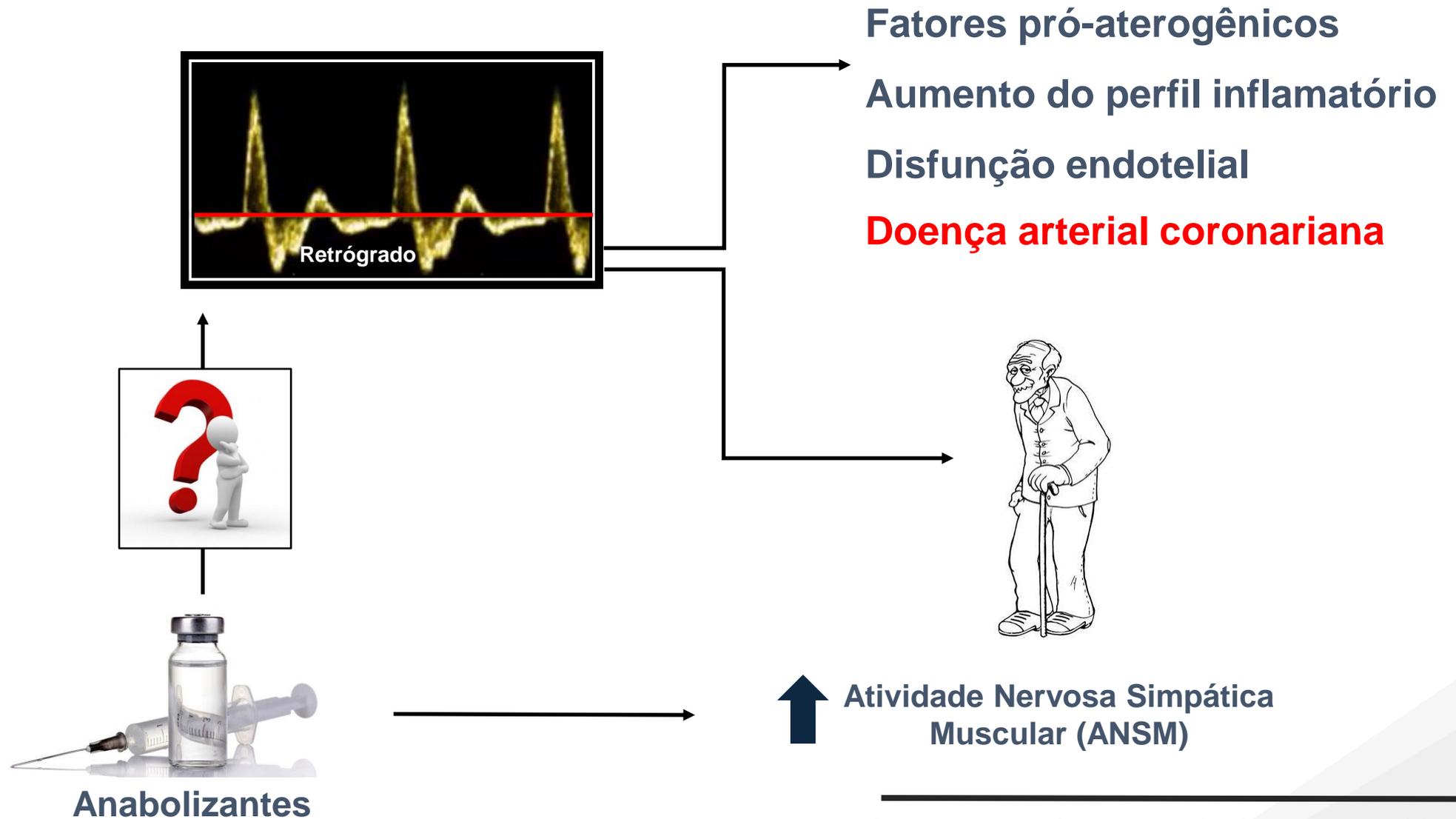


Biodisponibilidade de NO



Atividade Nervosa Simpática Muscular

Raciocínio do estudo



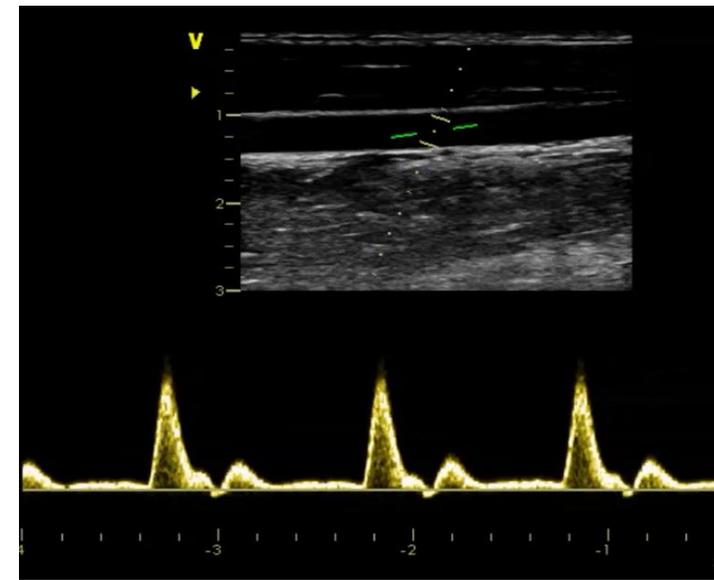
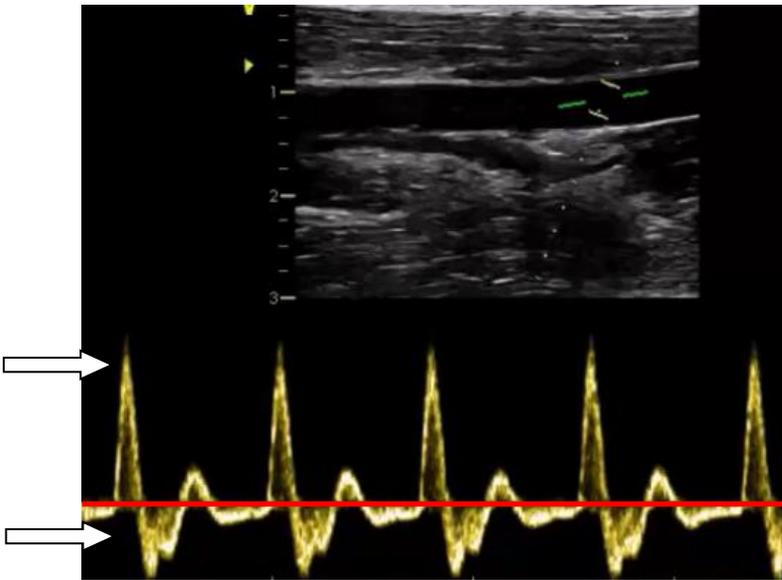
Alteração do padrão de fluxo (*Shear rate*) na artéria braquial em jovens usuários de EAA

**Usuários de anabolizantes
(média de 27 anos)**

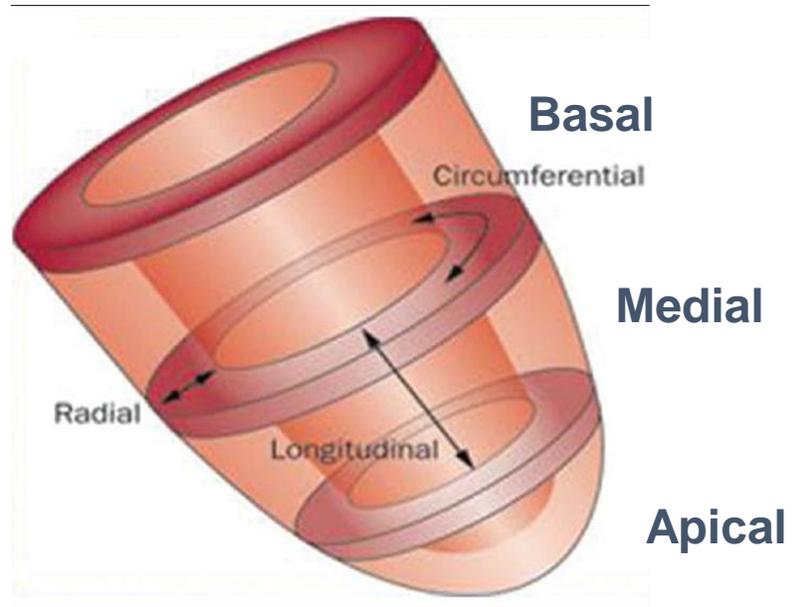
**Não usuários de anabolizantes
(média de 29 anos)**

Anterógrado

Retrógrado



Avaliação da função cardíaca “*Feature Tracking*” – *Strain*



Avaliação cardíaca - RM

Mapa T1 e Strain cardíaco em usuários de EAA

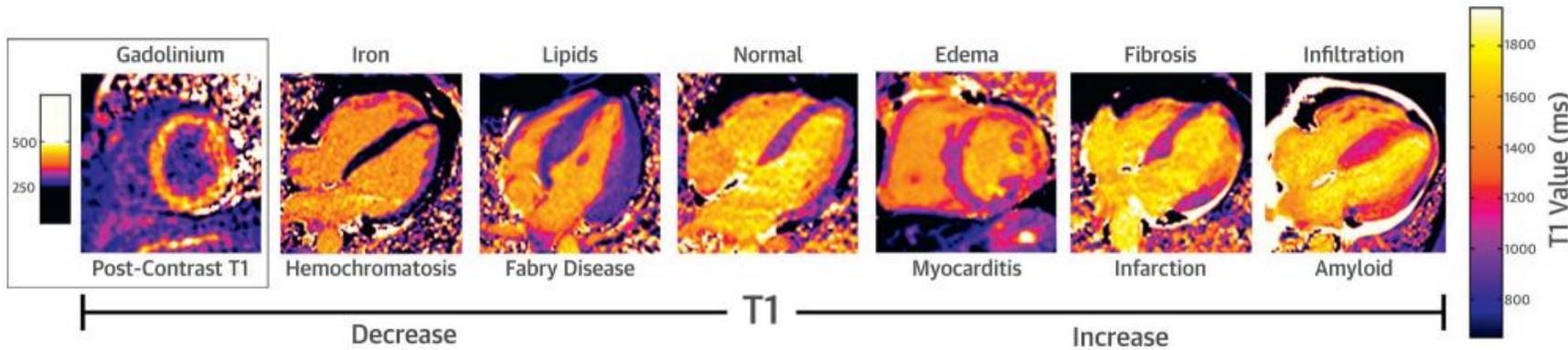
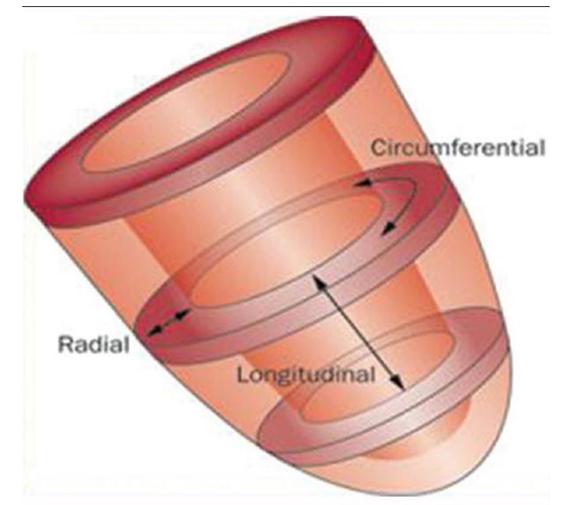


FIGURE 2. Factors Affecting Native Myocardial T1

Native T1 is decreased in the presence of iron and lipids. Native T1 is increased in the presence of edema, fibrosis, and myocardial infiltration.



Avaliação cardíaca - RM

Mapa T1 e Strain cardíaco em usuários de EAA

Clinical Sciences

 Thieme

Decreased Native T1 Values and Impaired Myocardial Contractility in Anabolic Steroid Users

Authors

Francis Ribeiro de Souza¹, Marcelo Rodrigues dos Santos¹, Carlos Eduardo Rochitte¹, Rafael Parenquine dos Santos¹, Camila Paixão Jordão¹, Ivanhoe Stuart Leite¹, Guilherme Wesley Peixoto da Fonseca¹, Rafael Almeida Fonseca¹, Tiago Franco de Oliveira², Maurício Yonamine³, Rosa Maria Rodrigues Pereira⁴, Carlos Eduardo Negrão^{1, 5}, Maria Janieire de Nazaré Nunes Alves¹

Avaliação cardíaca

Variables	AASU (n=18)	AASNU (n=19)	SC (n=7)	<i>p</i>
Native T1 values (ms)	888 ± 162 †	1020 ± 179	994 ± 73	0.047
Hematocrit (%)	51 ± 2 *†	46 ± 2	45 ± 2	<0.001
Mid ECV (%)	28 ± 10	28 ± 7	29 ± 7	0.931
LV mass index (g/m ²)	85 ± 14* †	64 ± 8	58 ± 5	<0.001
<i>Left ventricular systolic function</i>				
LV mid radial strain (%)	30 ± 8†	38 ± 6*	30 ± 3	0.003
LV mid circumferential strain (%)	-17 ± 3†	-20 ± 2	-18 ± 1	0.003
LV global longitudinal strain (%)	-17 ± 3†	-20 ± 3	-18 ± 1	0.006
LV ejection fraction (%)	60 ± 8	65 ± 8	61 ± 3	0.096

* = p<0,05 vs. CS

† = p<0,05 vs. NUEAA