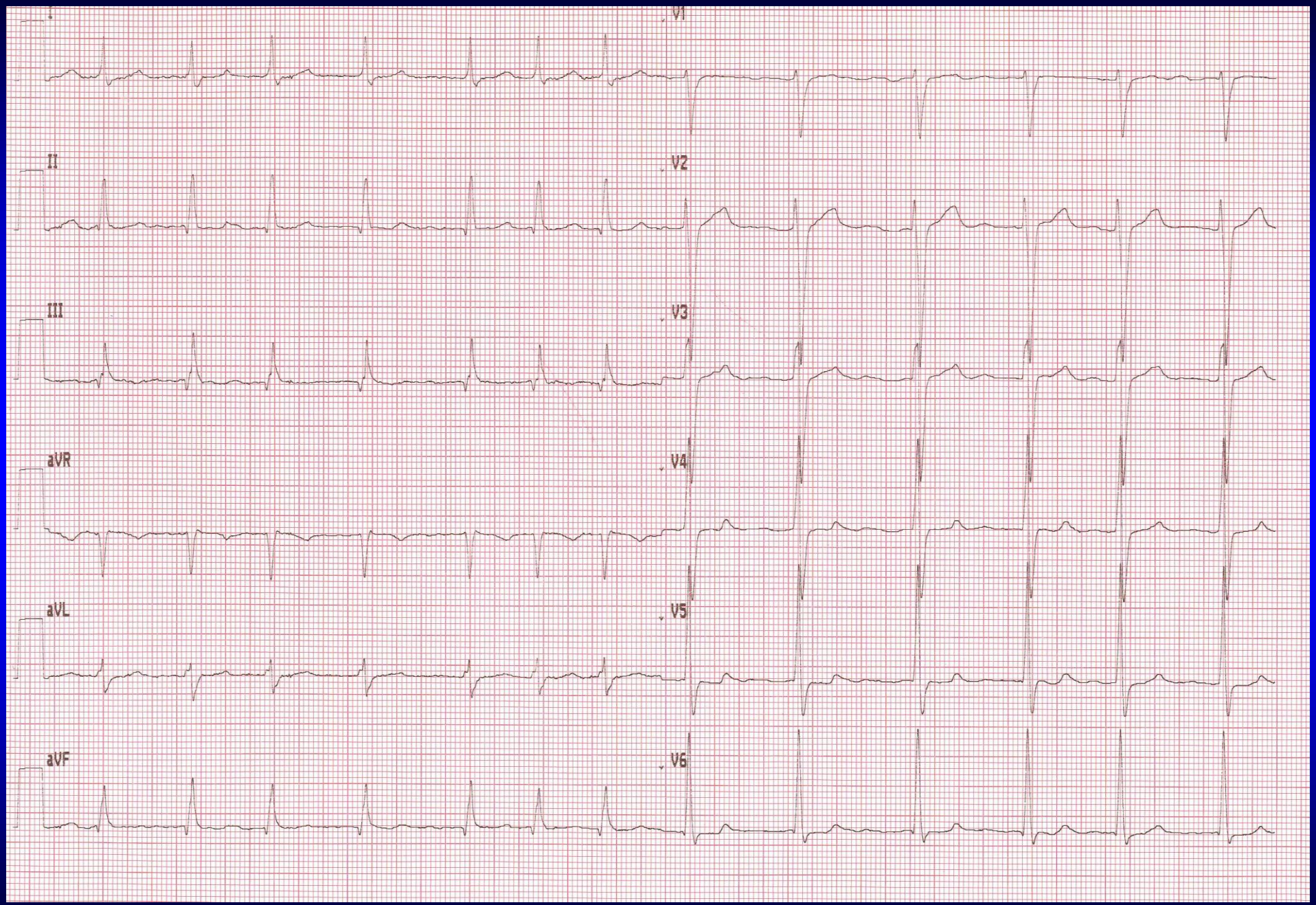
31 GIORNATE CARDIOLOGICHE TORINESI

Sport and Supraventricular Arrhythmias: AF

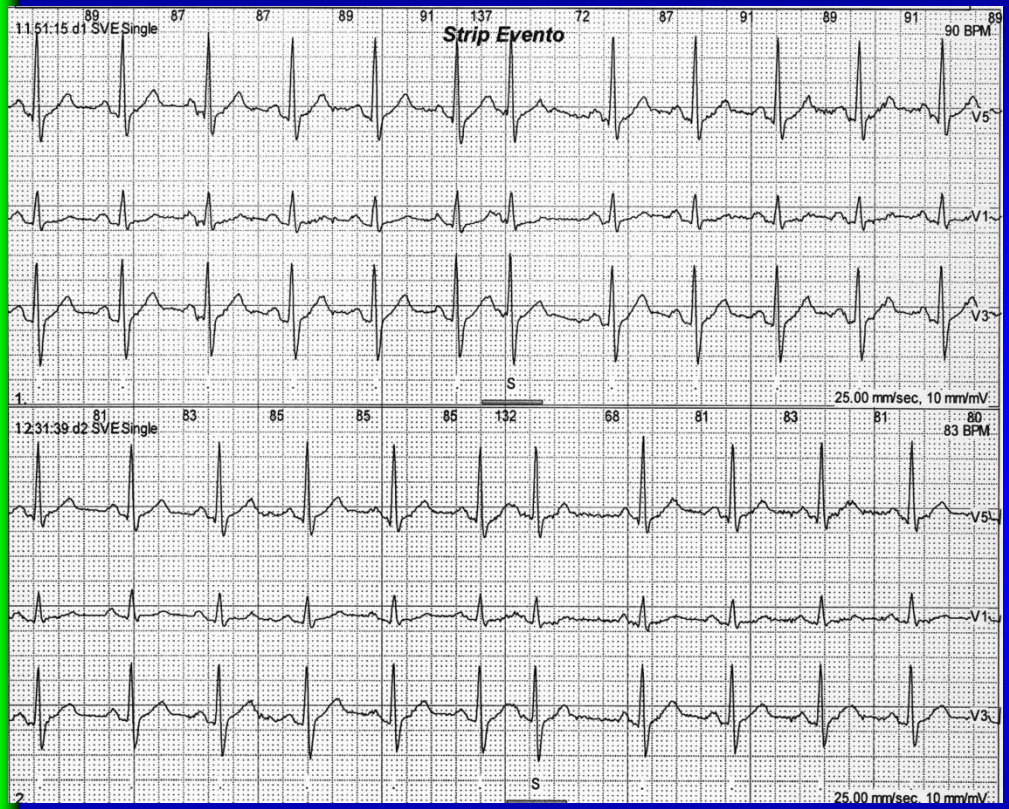
Prof F. Gaita

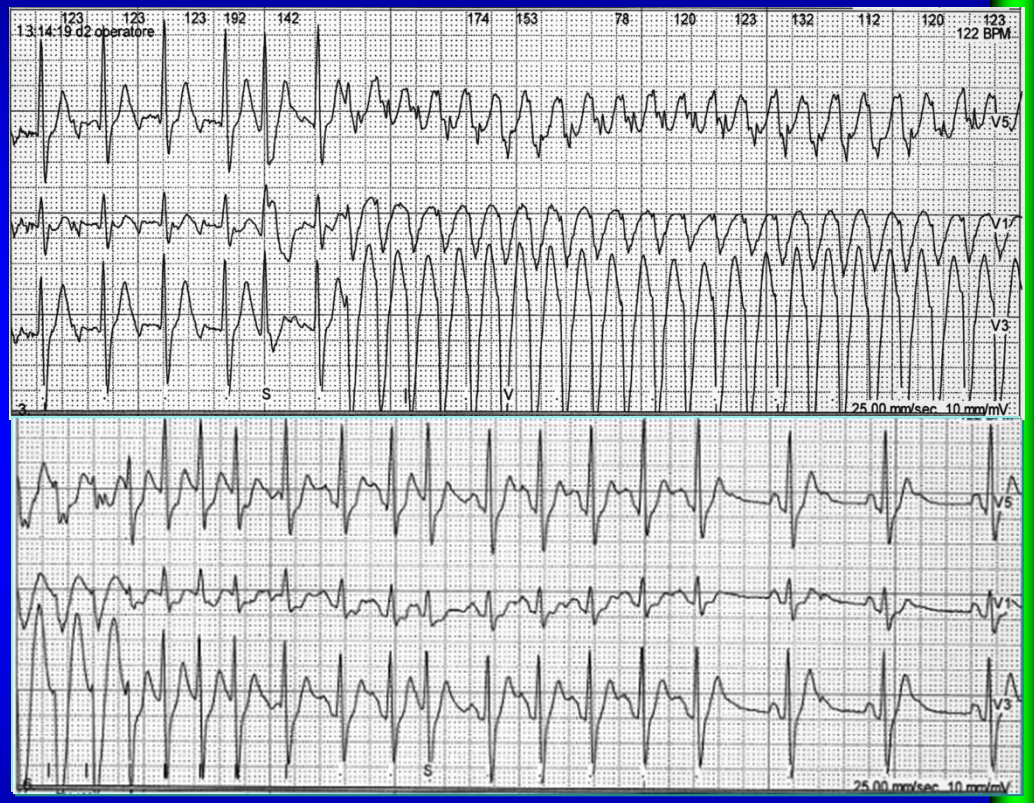
Muhammad Alì vs Joe Frazier

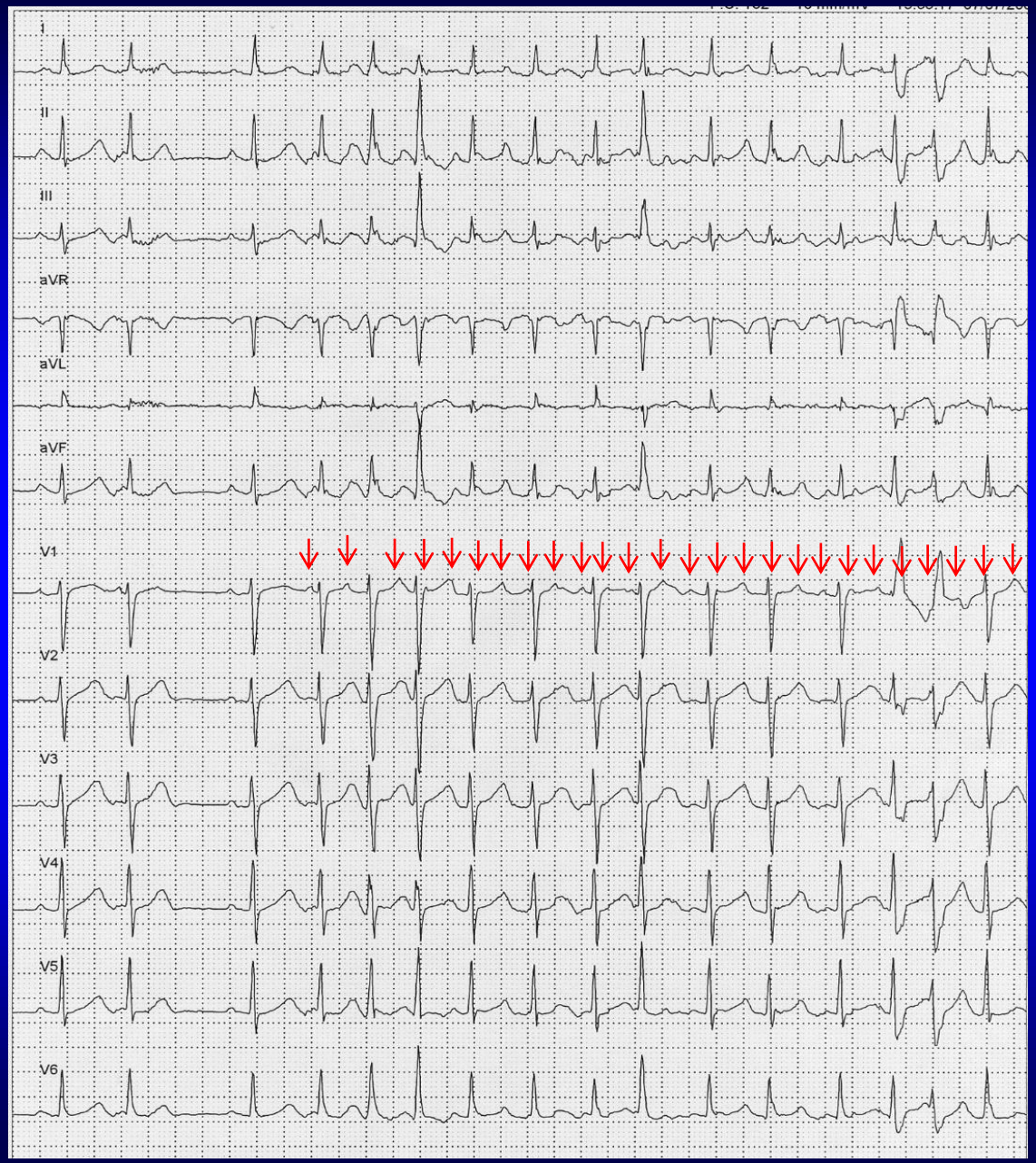
''The fight of the century'' 1971


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

ECG Holter during training…



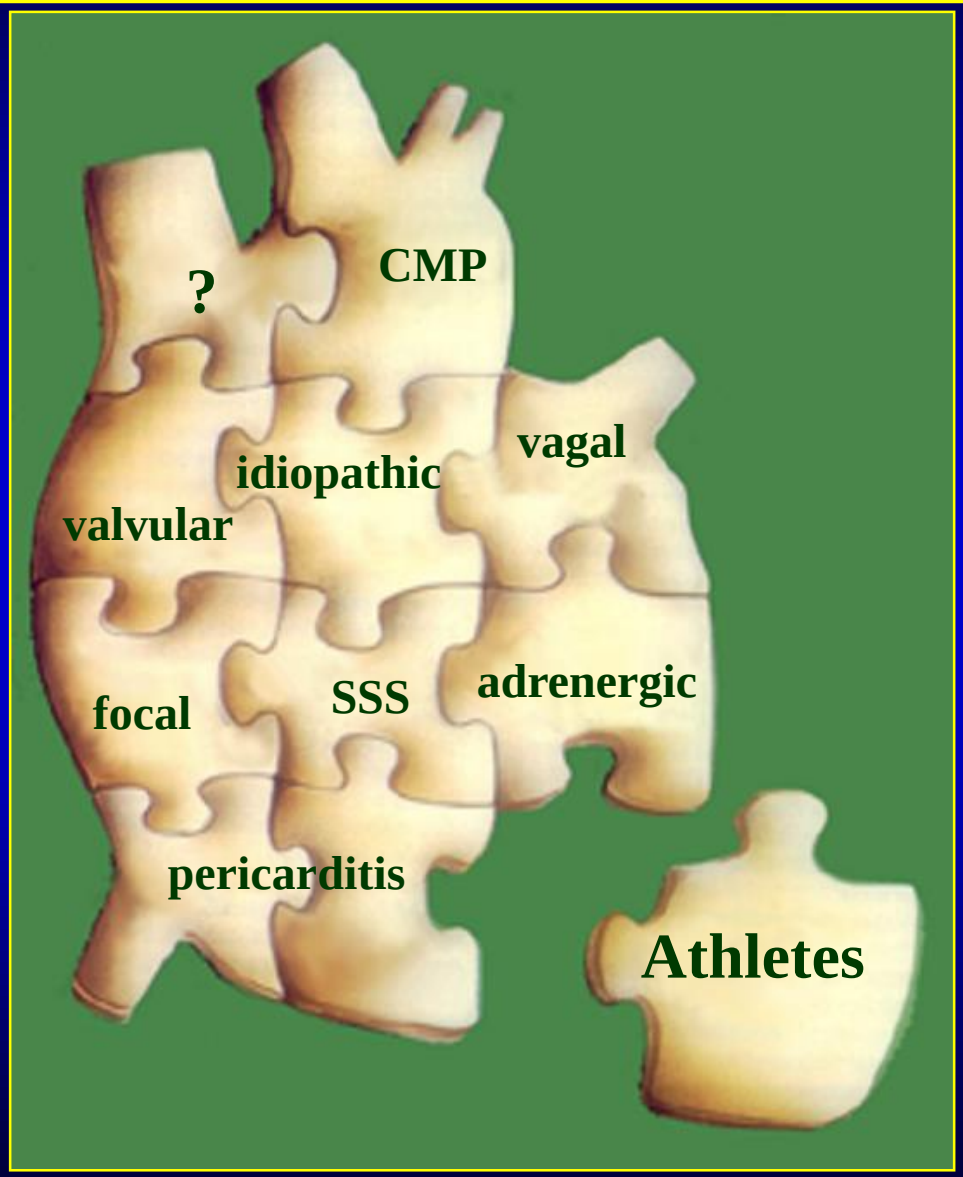



I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6

Atrial Fibrillation in the Athlete

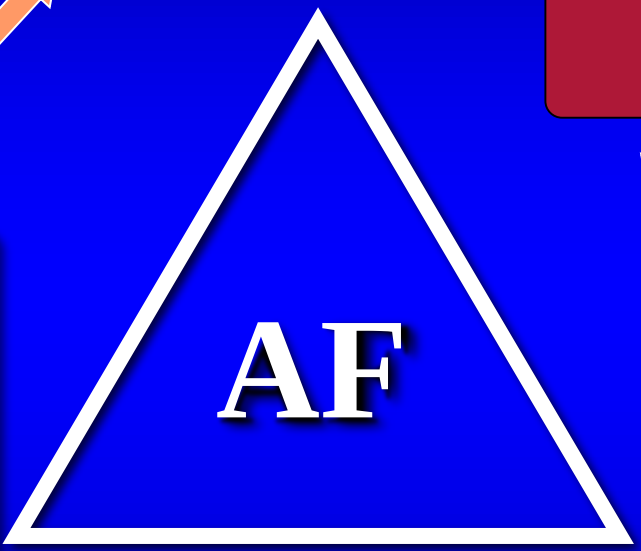
- Pathophysiology of sport-related atrial fibrillation

Heterogeneous Substrate of AF



Gaita F. NASPE 1998

AF in athletes



Trigger

Premature atrial contraction, stretching for pressure and volume

Substrate

Pressure and volume overload

↓

Atrial enlargement

↓

Inflammatory response

↓

Atrial fibrosis

DOPING

Autonomic Nervous System

Icreased vagal and sympathetic tone

Physical activity, height, and left atrial size are independent risk factors for lone atrial fibrillation in middle-aged healthy individuals

Lluís Mont[1]*, David Tamborero[1], Roberto Elosua[3], Irma Molina[1], Blanca Coll-Vinent[2], Marta Sitges[1], Bárbara Vidal[1], Andrea Scalise[1], Alejandro Tejeira[1], Antonio Berruezo[1], and Josep Brugada[1] on behalf of the GIRAFA (Grup Integrat de Recerca en Fibril-lació Auricular) Investigators

[1]Thorax Institute, Hospital Clínic, University of Barcelona, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), C/Villarroel 170, Barcelona, 08036 Catalonia, Spain; [2]Emergency Department, Hospital Clínic, University of Barcelona, Catalonia, Spain; and [3]Lipids Unit, Institut Municipal Investigacions Mèdiques (IMIM), Autonomous University of Barcelona, Catalonia, Spain

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See page 6 for the editorial comment on this article (doi: 10.1093/europace/eum274)

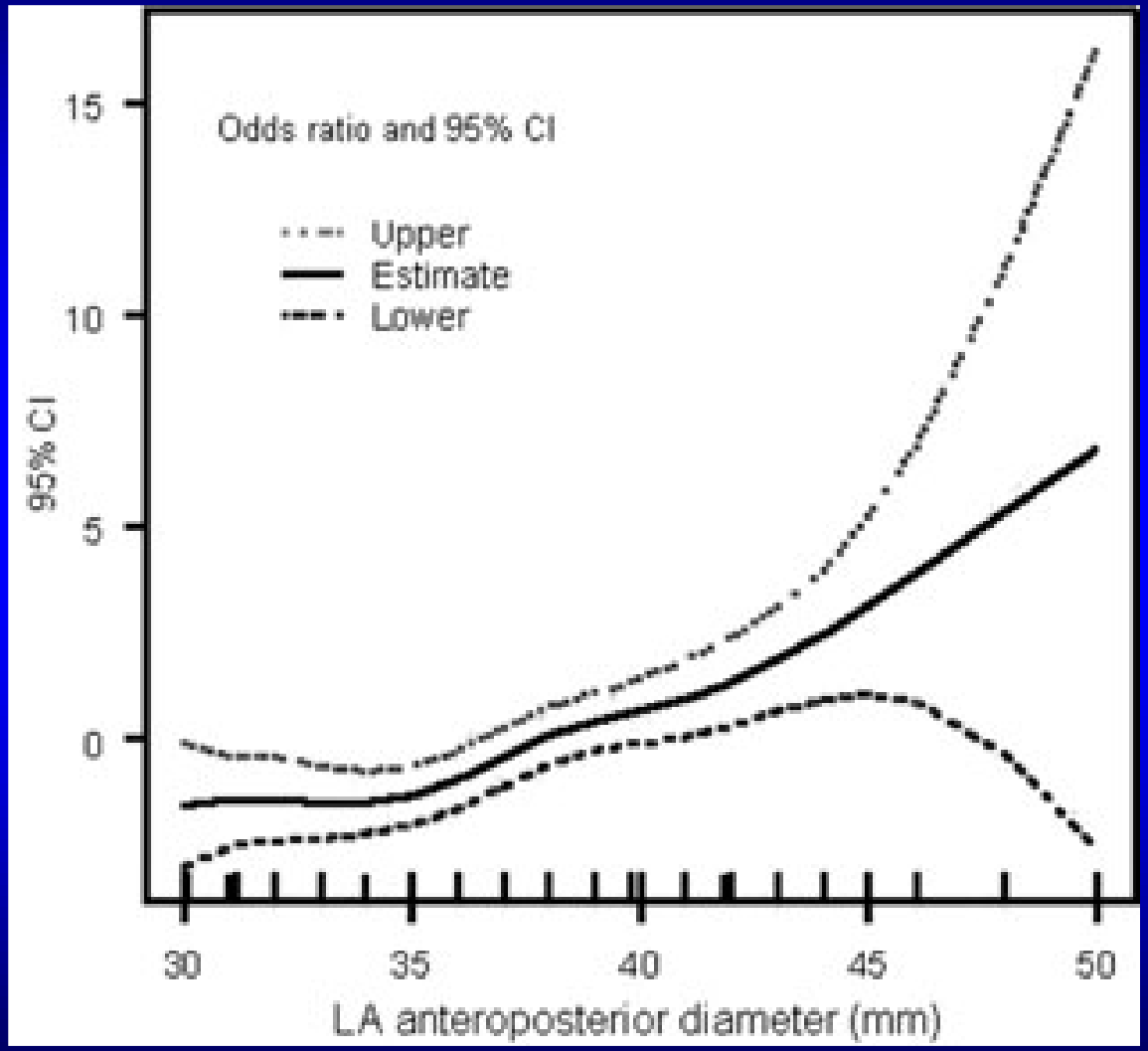
KEYWORDS
Lone atrial fibrillation;
Exercise;
Endurance sports;
Physical activity;
Atrial volume

Aims The aetiology of atrial fibrillation (AF) remains unknown in some patients. The aim of the study was to identify new risk factors for developing lone AF (LAF).

Methods and results A series of 107 consecutive patients younger than 65, seen in the emergency room for an episode of LAF of <48 h duration were included in the study. A group of 107 healthy volunteers matched for age and sex were recruited as controls. All subjects answered a validated questionnaire concerning leisure and occupational activities performed throughout their lifetimes to estimate accumulated hours of physical effort, classified in four levels of intensity. Demographic and echocardiographic measurements were also recorded. There were 69% of males and mean age was 48 ± 11 years. AF was paroxysmal in 57% and persistent in the remaining 43%. Patients with AF performed more hours of both moderate and heavy intensity physical activity. They also were taller, and had a larger left atria, ventricle, and body surface area. At the multivariable analysis, only moderate and heavy physical activity, height, and anteroposterior atrial diameter were independently associated with LAF.

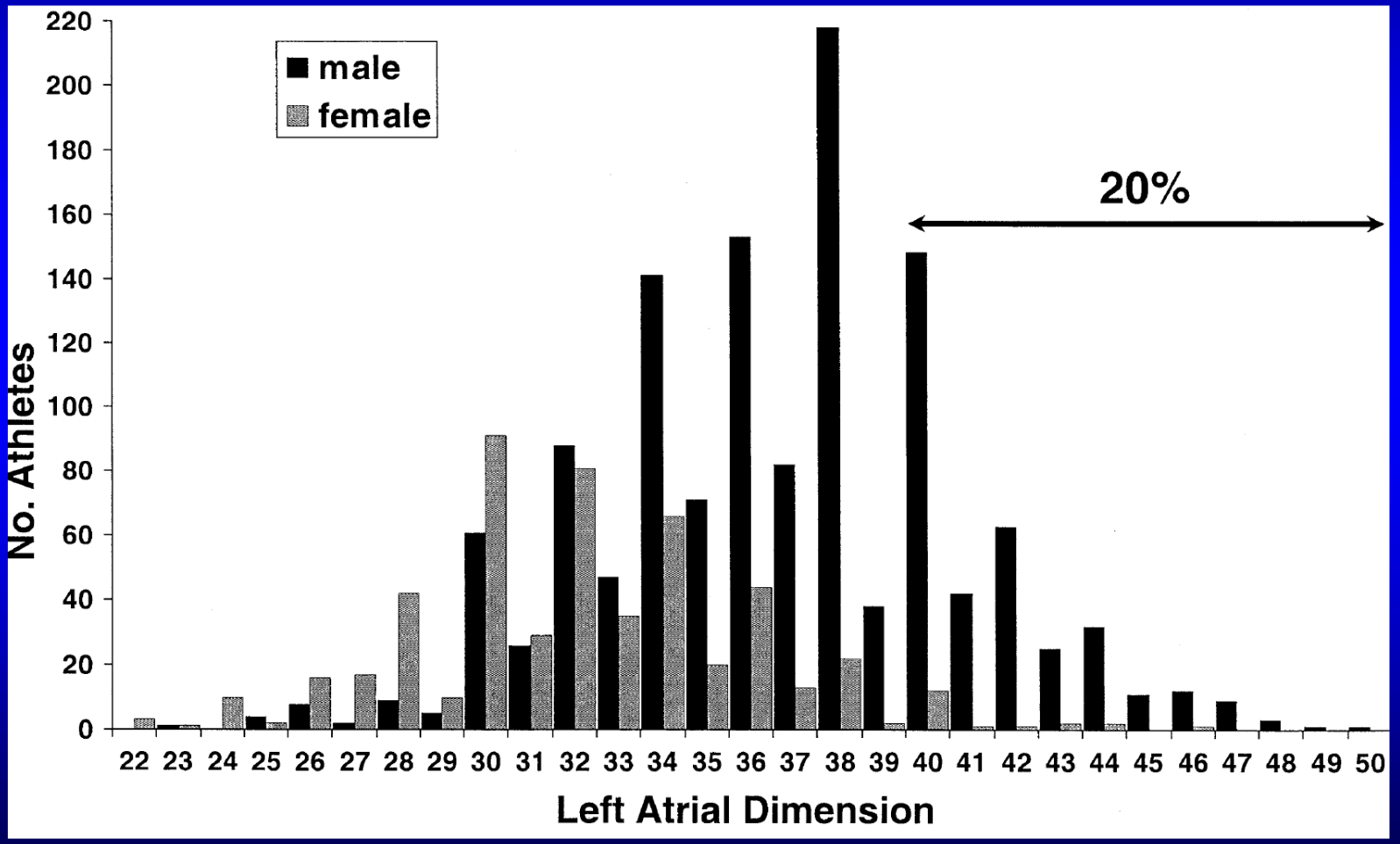
Conclusions Accumulated lifetime physical activity, height, and left atrial size are risk factors for LAF in healthy middle-aged individuals.

Linear relation between left atrial diameter and occurrence of lone AF



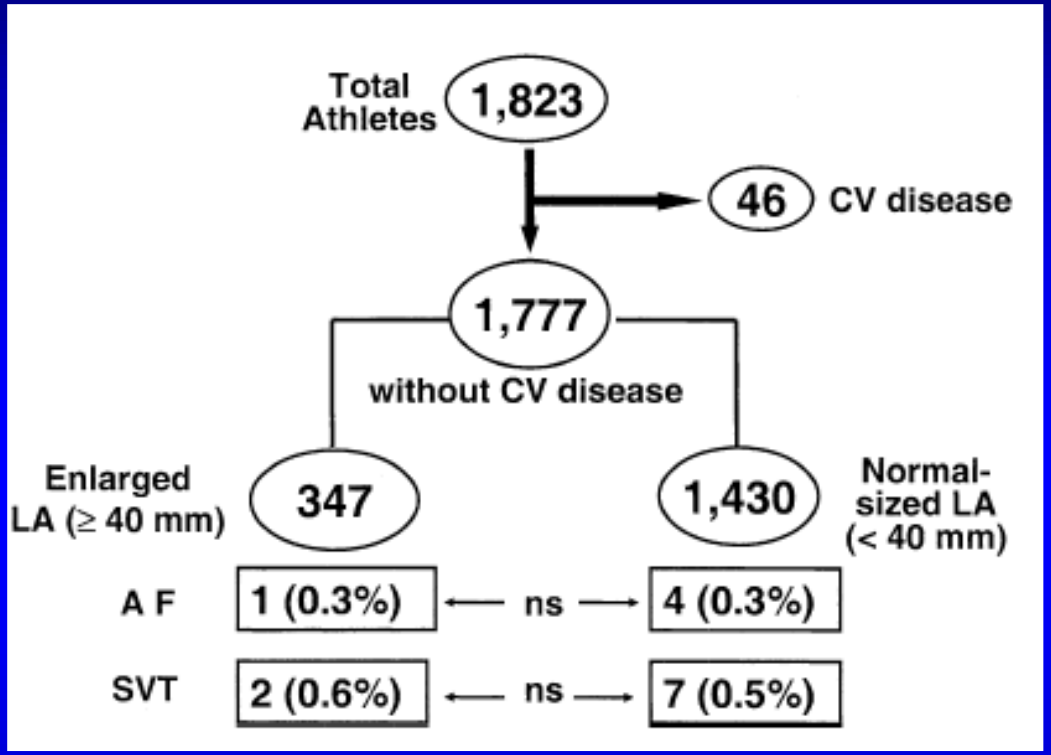
Mont et al (GIRAFA study) Europace 2008

Prevalence of Left Atrial Remodeling in Competitive Athletes



Pelliccia et al. J Am Coll Cardiol 2005;46:690–6

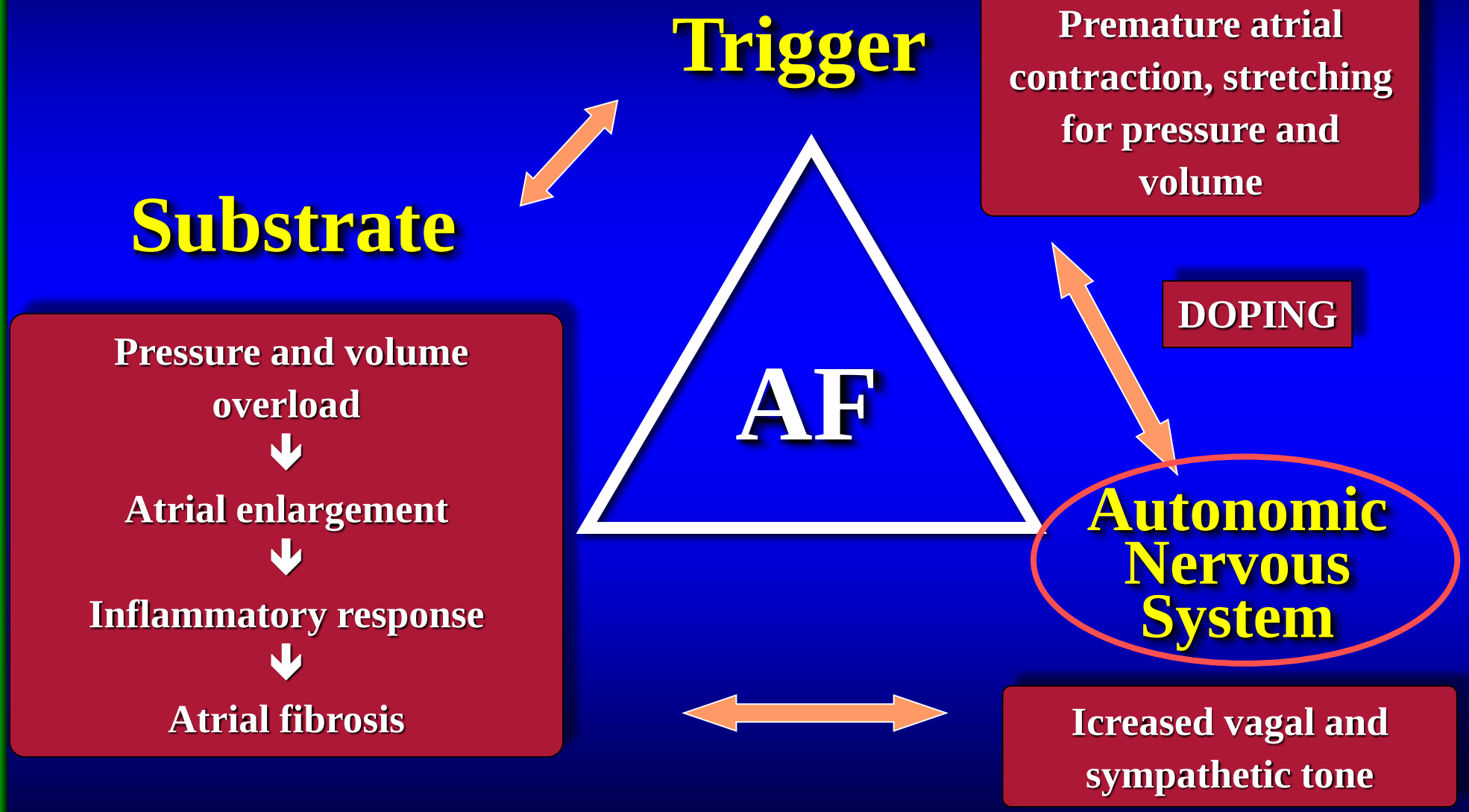
Prevalence and Clinical Significance of Left Atrial Remodeling in Young Competitive Athletes



Physiologic left atrial remodeling associated with intensive exercise and chronic athletic conditioning does not predispose per se to supraventricular tachyarrhythmias

Pelliccia et al. J Am Coll Cardiol 2005;46:690–6

AF in athletes

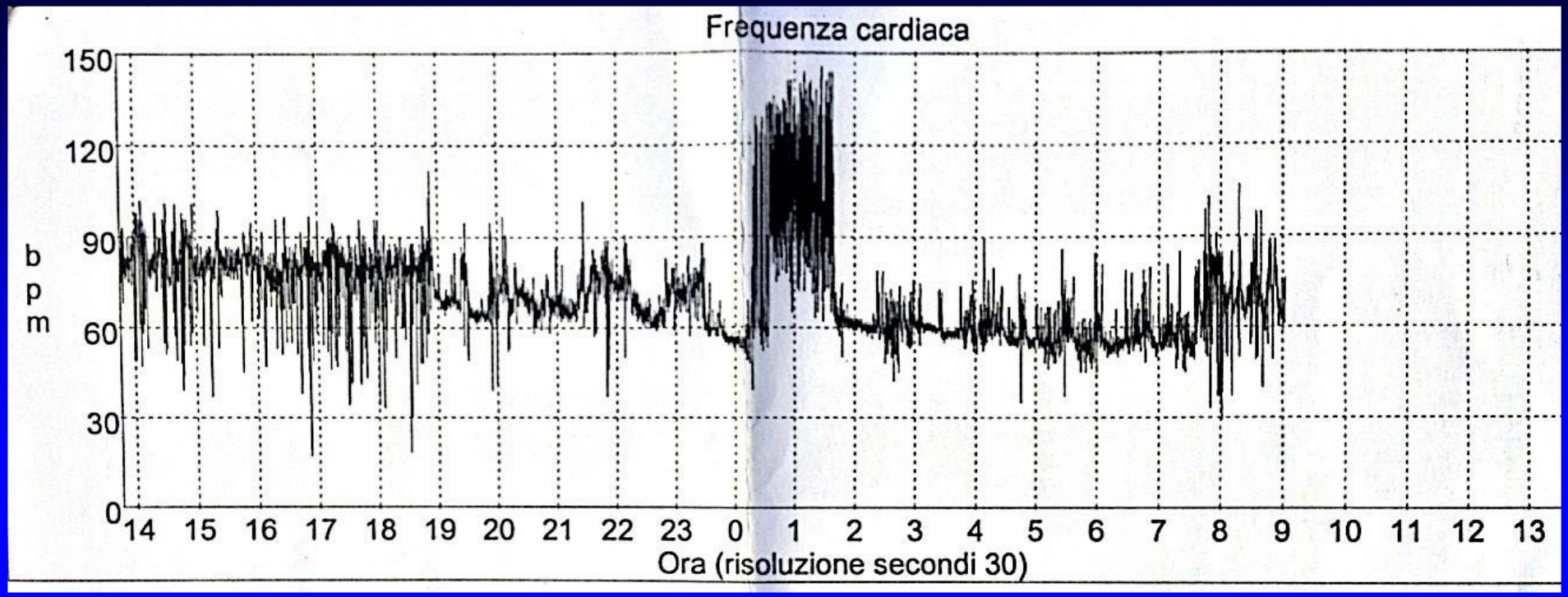


Lone Atrial Fibrillation (vagal)

Triggered by vagal context (post-exercise, post-prandium, during the night).

Due to:

- **reduction of atrial refractory periods**
- **dispersion of atrial refractoriness**
- **triggered activity from pulmonary veins.**


Frequenza cardiaca
150
120
90
60
30
0
b
p
m
14 15 16 17 18 19 20 21 22 23 0 1 2 3 4 5 6 7 8 9 10 11 12 13
Ora (risoluzione secondi 30)


S1 S1 S1 S1 S1 S1 S1 S1 S1 S1 S1
1235 1165 1230 1190 1150 560 405 465 425 395 560

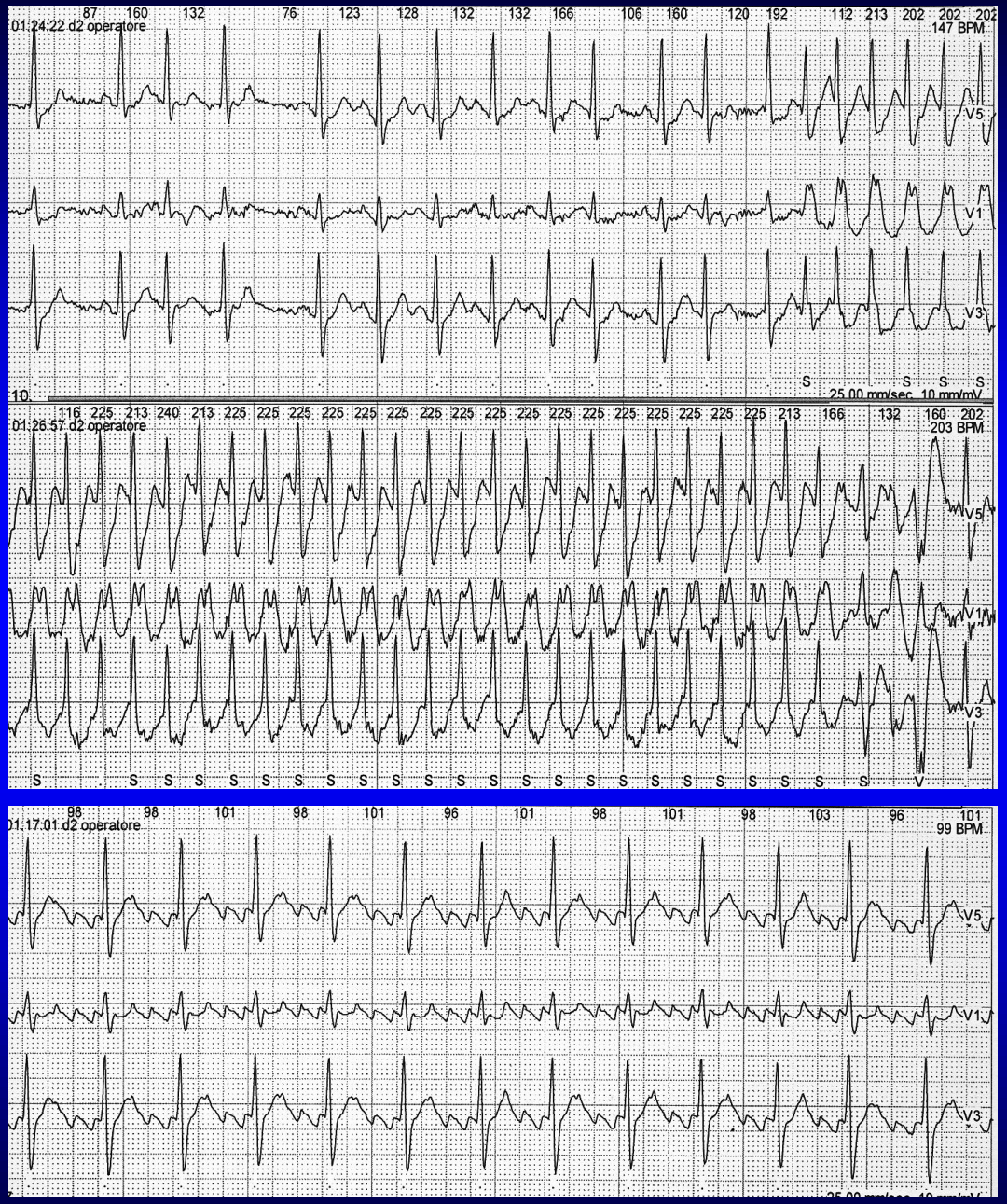
Lone Atrial Fibrillation (adrenergic)

Related to

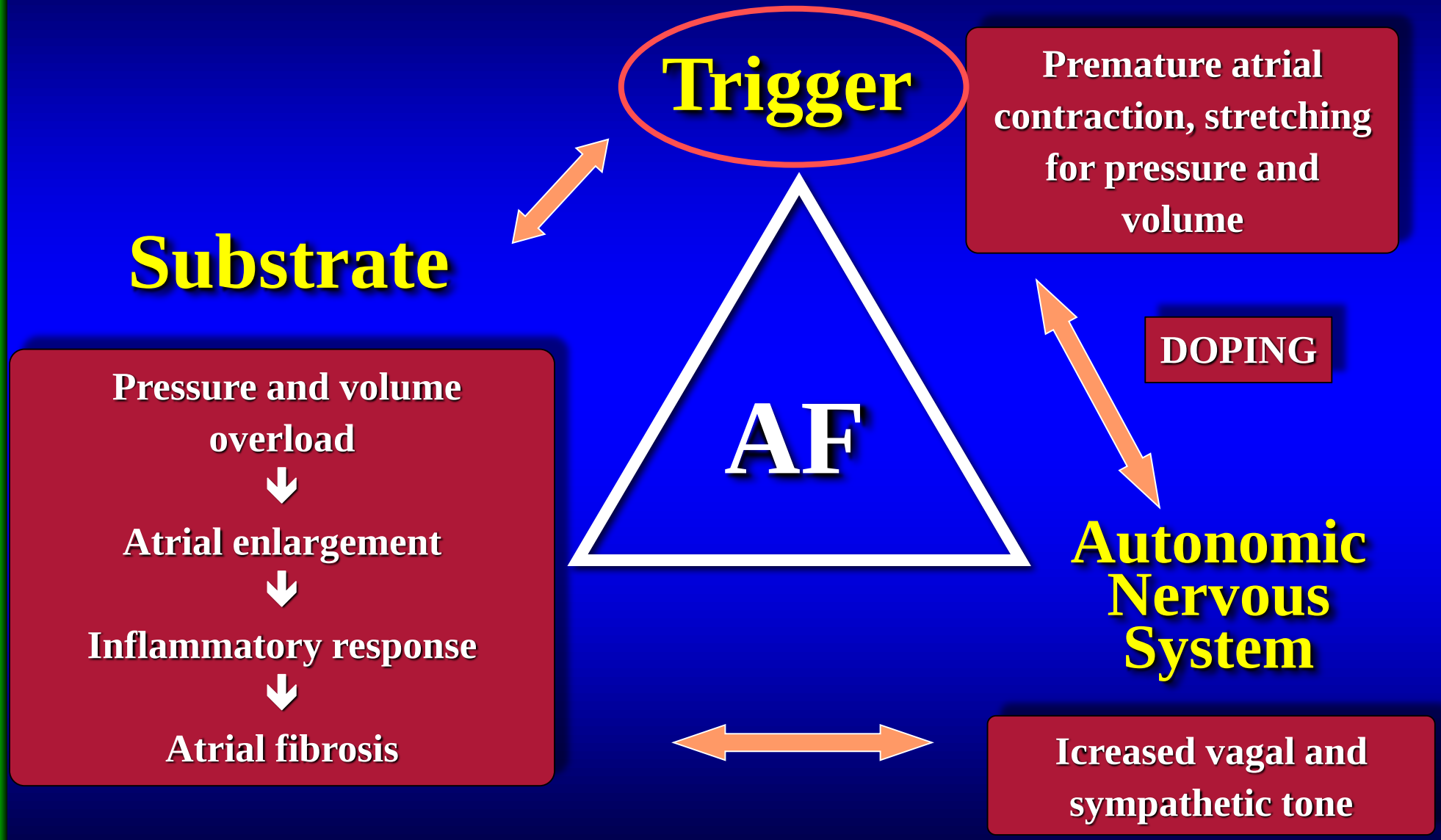
Physical Stress

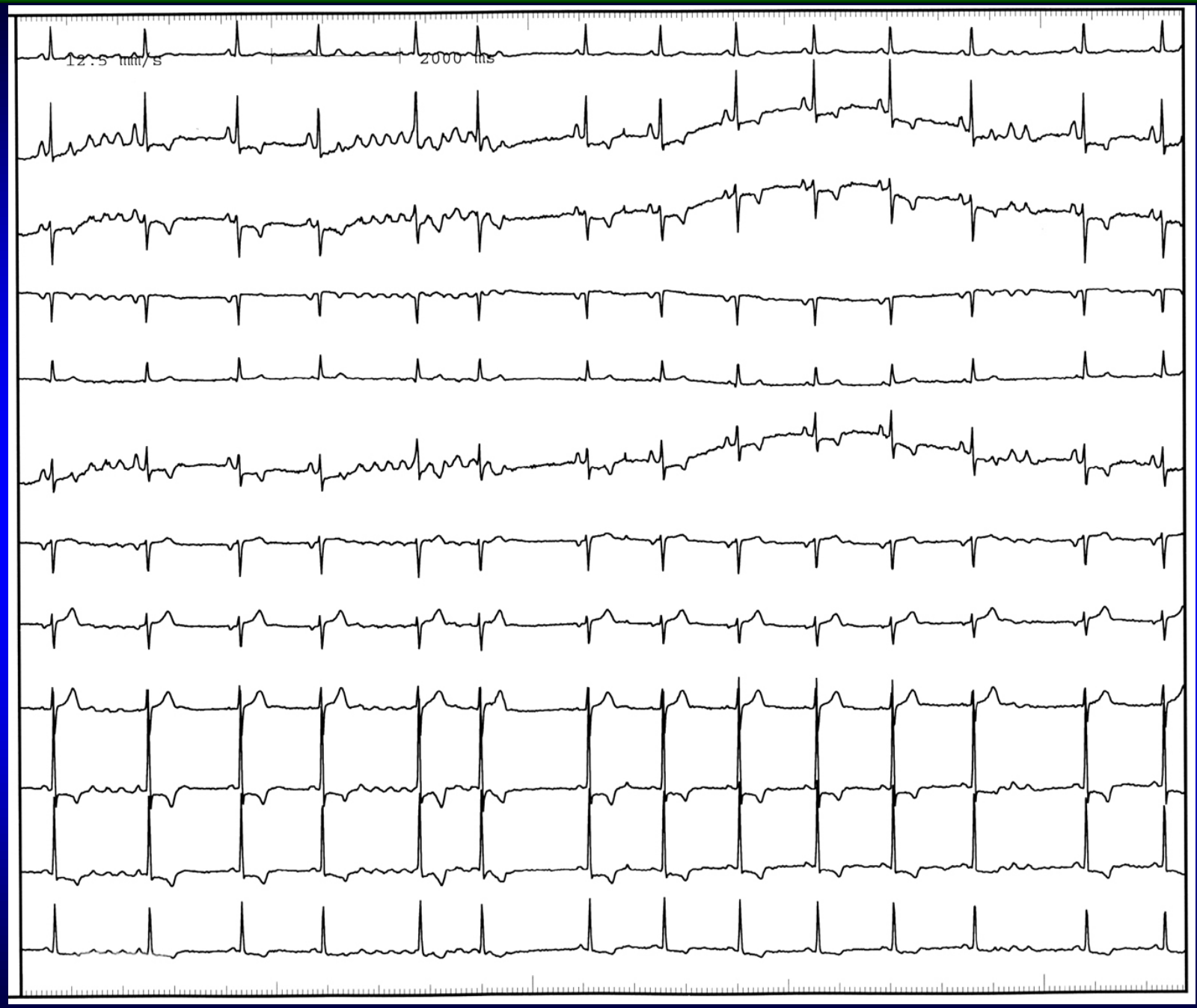
Emotional Stress

Responsive to B-blockers therapy


87 160 132 76 123 128 132 132 166 106 160 120 192 112 213 202 202 202
01:24:22 d2 operatore
147 BPM
V5
V1
V3
S S S S
10
25.00 mm/sec 10 mm/mV
116 225 213 240 213 225 225 225 225 225 225 225 225 225 225 225 225 225 225 225 225 213 166 132 160 202
01:26:57 d2 operatore
203 BPM
V5
V1
V3
S S S S S S S S S S S S S S S S S S S S S S S V
98 98 101 98 101 96 101 98 101 98 103 96 101
01:17:01 d2 operatore
99 BPM
V5
V1
V3

AF in athletes

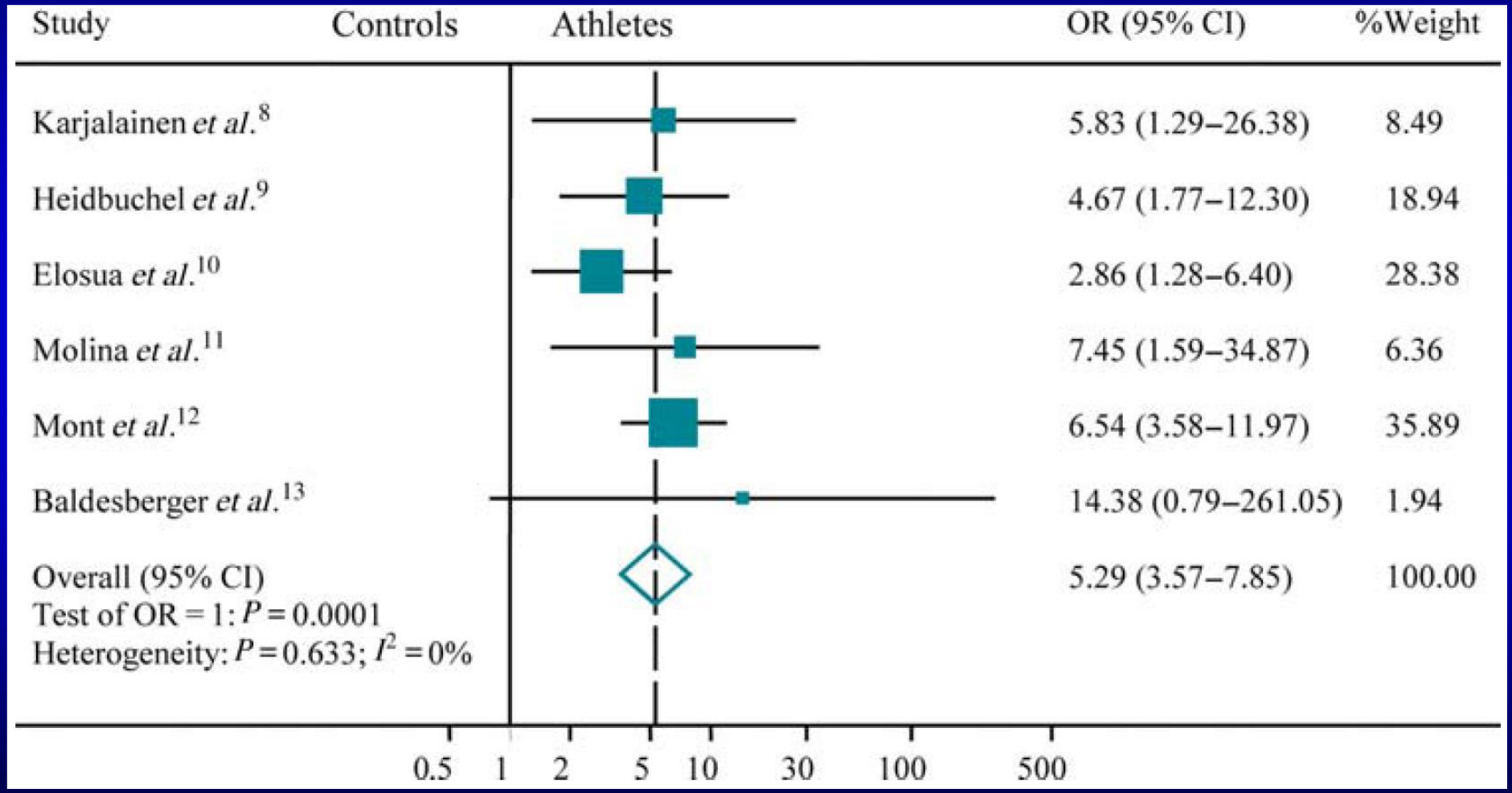



12.5 mm/s
2000 ms

Atrial Fibrillation in the Athlete

- Pathophysiology of sport-related atrial fibrillation
- Prevalence of atrial fibrillation in athletes

Meta-analysis of AF risk in athletes compared with general population



Abdulla J & Nielsen JR Europace 2009; 11, 1156–1159

Systematic Review and Meta-Analysis

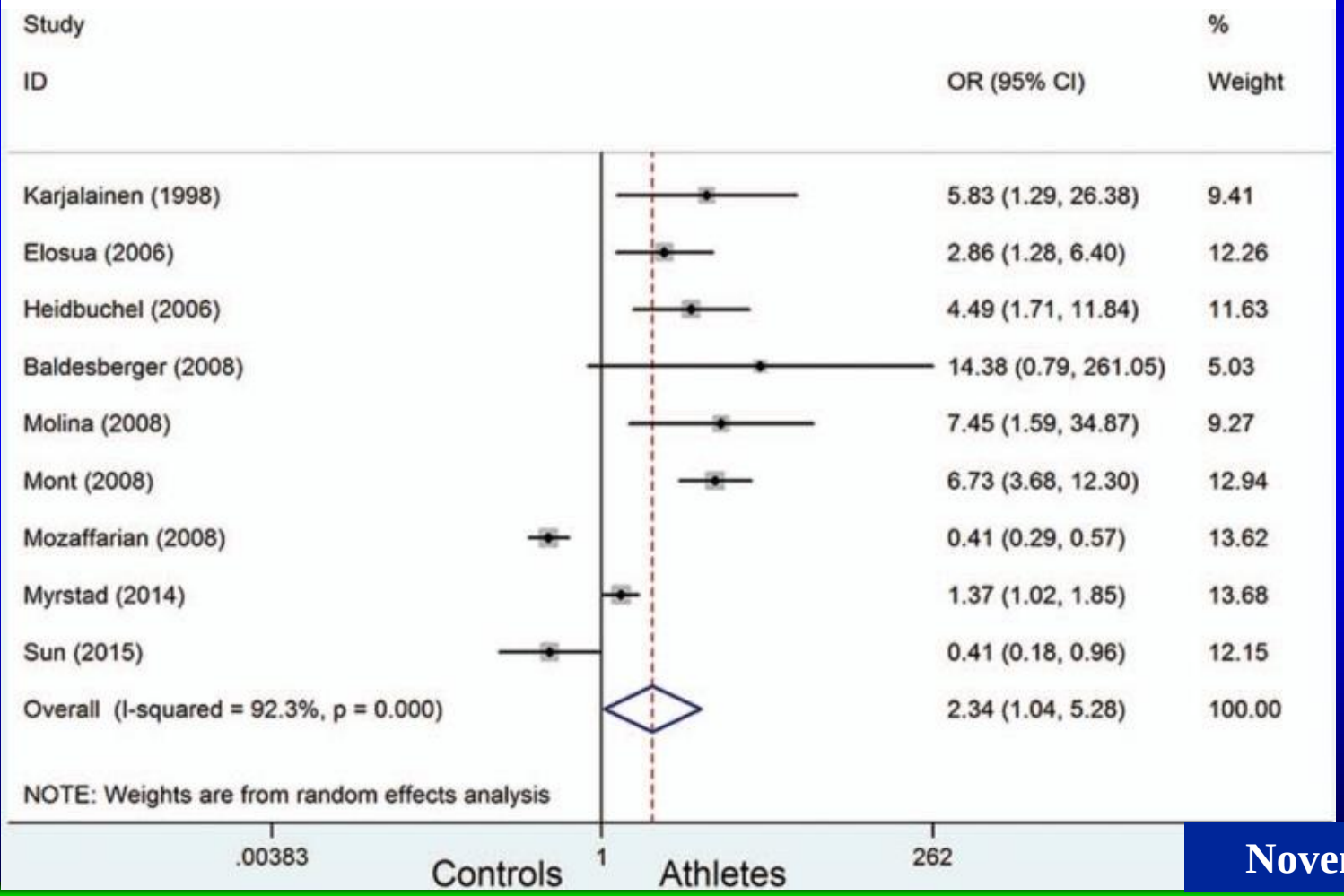
Medicine

OPEN

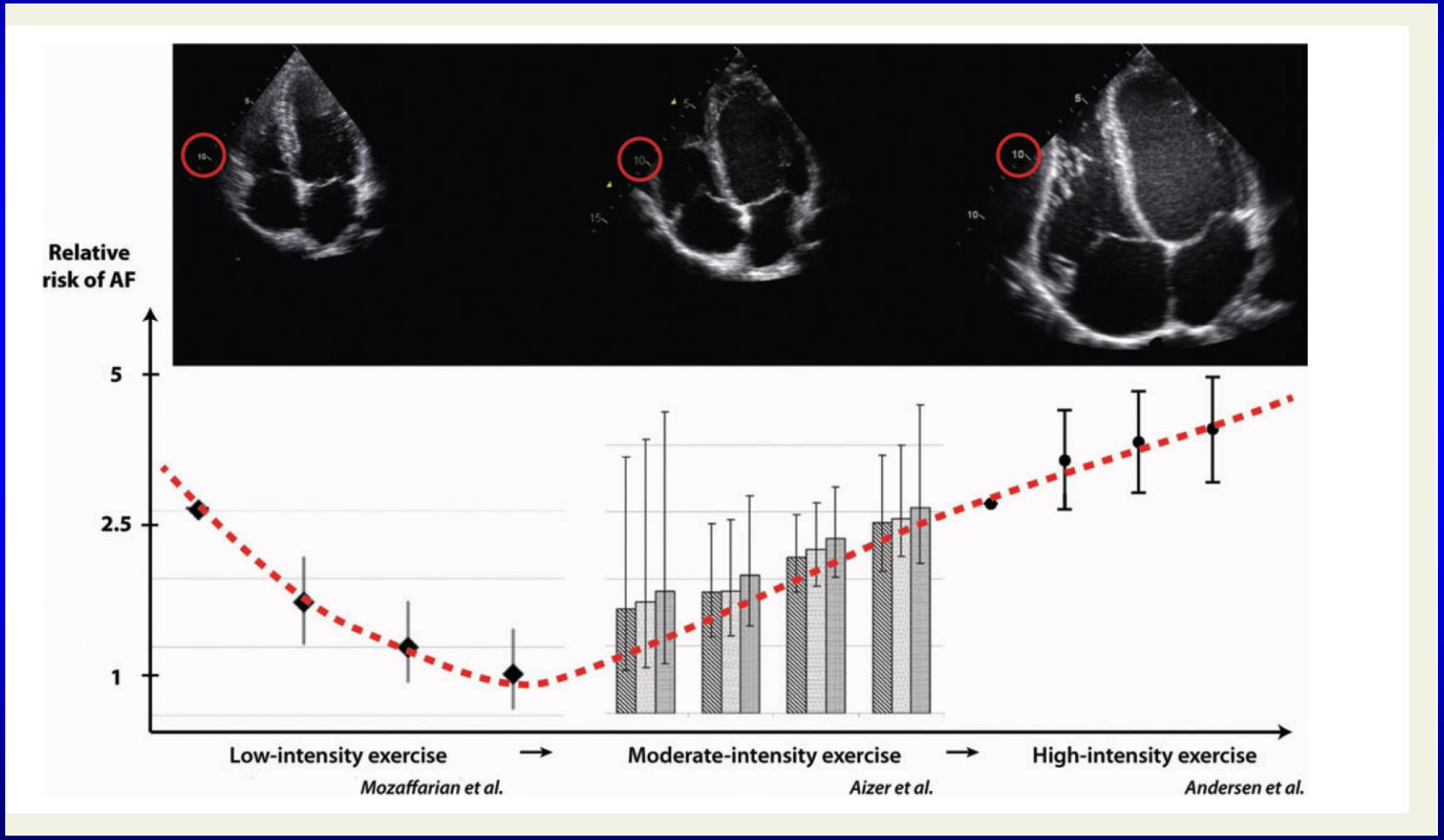
Atrial fibrillation in athletes and general population

A systematic review and meta-analysis

Xiangdan Li, MD[a], Songbiao Cui, MD[b], Dongchun Xuan, MD[a], Chunhua Xuan, MD[c], Dongyuan Xu, MD[a,*]

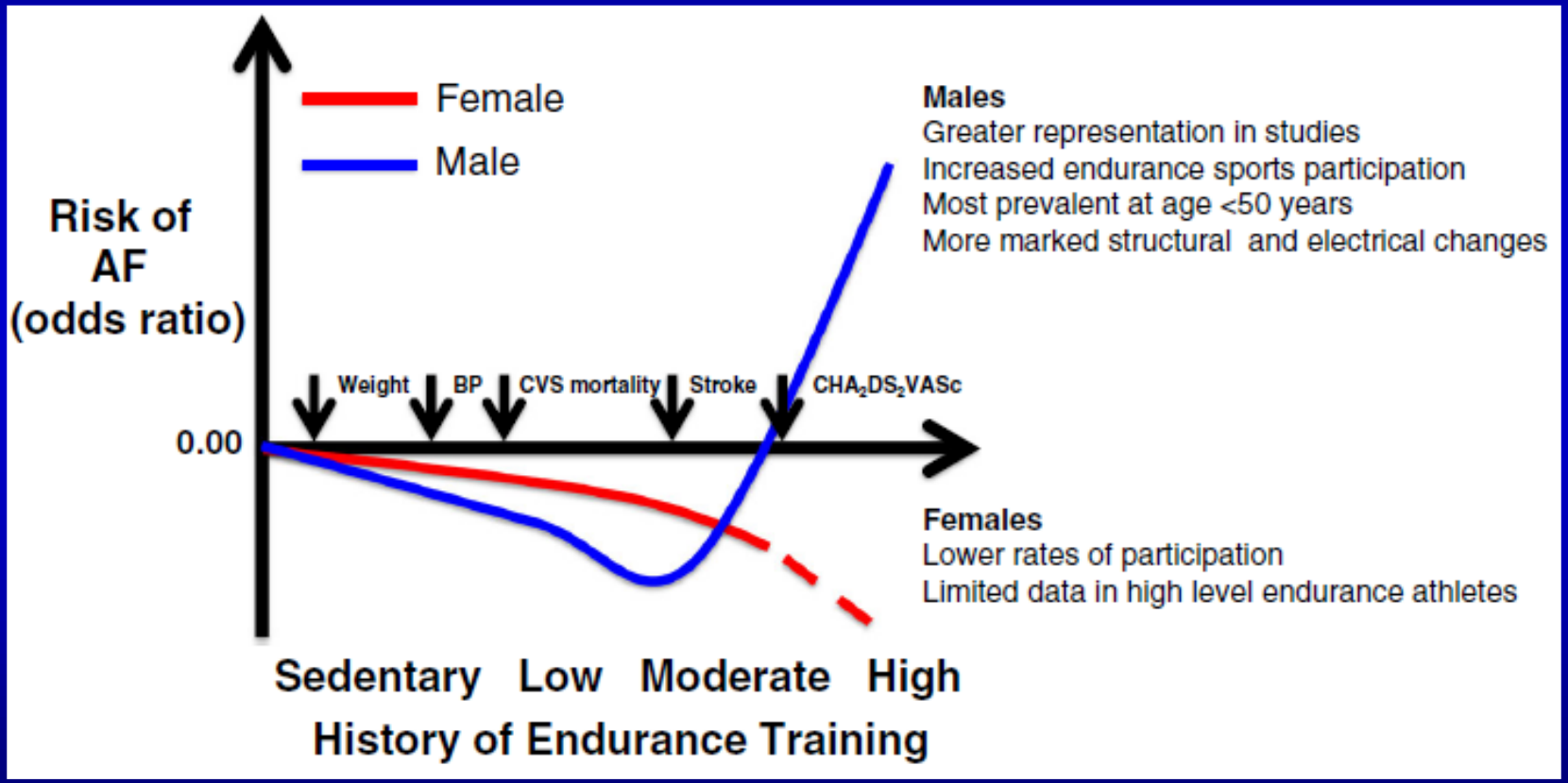


J-shaped relationship between the exercise dose and the relative risk of developing atrial fibrillation



Le Gerche et al. EHJ 2013;34:3599–3602

SPORT and AF

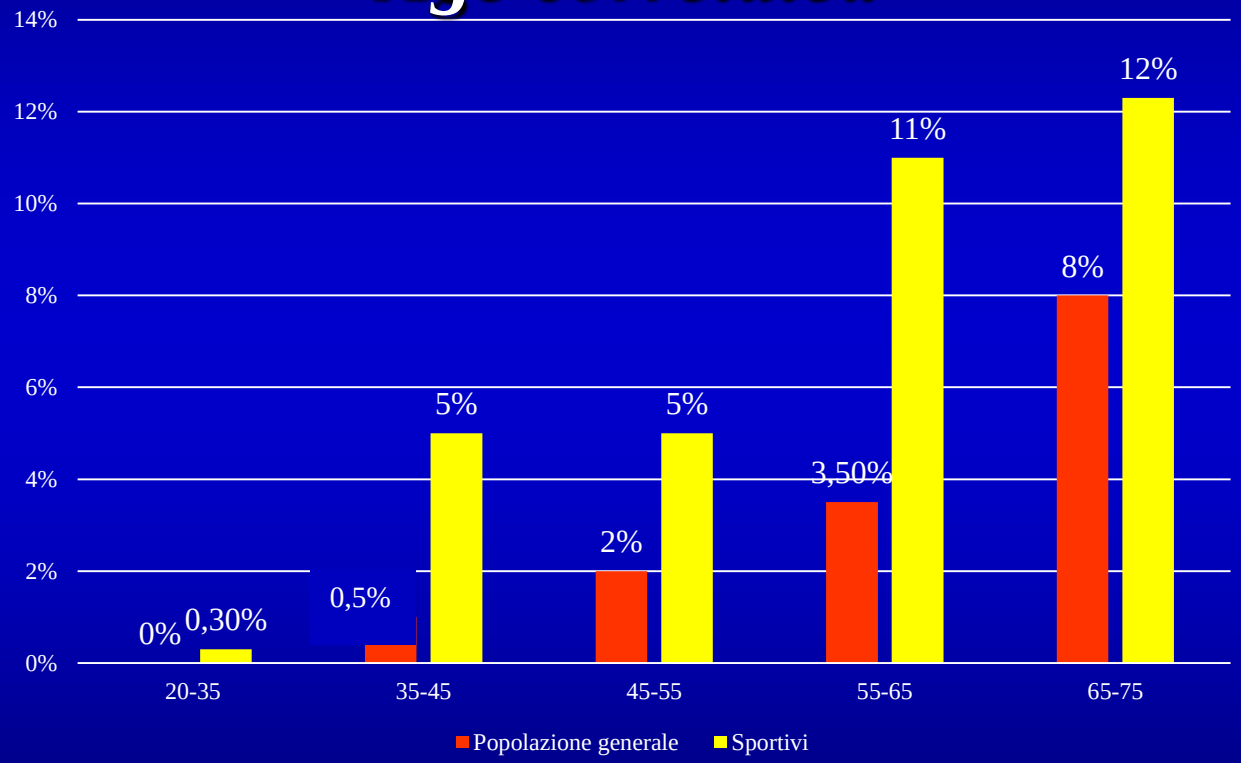


Mohanty S, Mohanty P, Tamaki M, et al. Differential association of exercise intensity with risk of atrial fibrillation in men and women: evidence from a meta-analysis. J Cardiovasc Electrophysiol 2016;27:1021–9.

AF PREVALENCE

in general population and in athletes

Age correlated



Coelho A. 1986; Karjalainen J 1998; Pelliccia A 2005; Elousa R. 2006: Baldesberger S. 2008; Van Buren F 2012; Gaita F 2013; Myrstad M 2016; Herm J2017; Boraita A 2018

Framingham Study; Western Australia Study; Mayo Clinic Study; Cardiovascular Health Study

Atrial Fibrillation in the Athlete

- Pathophysiology of sport-related atrial fibrillation
- Prevalence of atrial fibrillation in athletes
- Management of AF in the Athlete

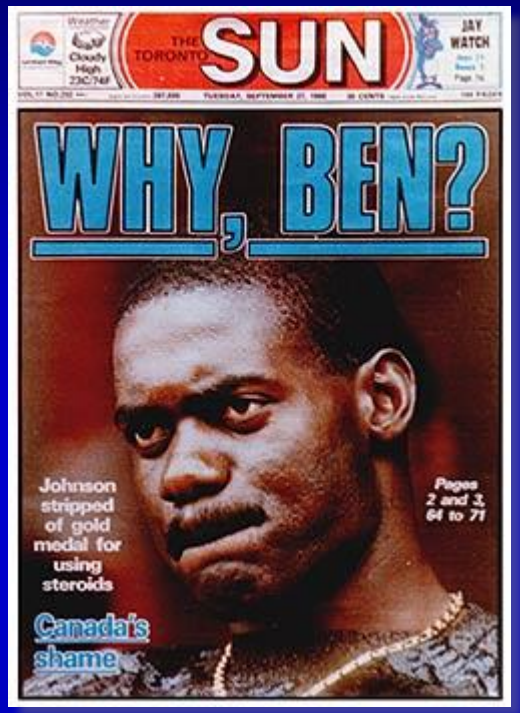
Why to treat AF in athletes?

Worsening of symptoms and quality of life

Reduction of physical performance

Non-eligibility to some competitive sports

AF THERAPY: rule out *DOPING*



Anabolic steroids and bromocriptine Manoharan Br J Sports Med. 2002

Consumption of large amount of alcohol Whyte Br J Sports Med. 2004

Consumption of these agents → hypertension, ischemic heart disease, hypertrophic cardiomyopathy, sudden death, AF. Sullivan J Emerg Med. 1999

AF THERAPY

IN ATHLETES

LOOK FOR UNDERLYING DESEASES

And

REMOVE IF POSSIBLE

Atrial Fibrillation

Associated to structural heart disease:

- Valvular heart disease (mitral)
- Coronary artery disease
- Systemic hypertension
- Hypertrophic cardiomyopathy
- Dilated cardiomyopathy
- Congenital cardiomyopathy (septum)
- Cardiomyopathy restrictive
- Cardiac tumors
- Pericarditis
- Cor pulmonale

"Lone atrial fibrillation"

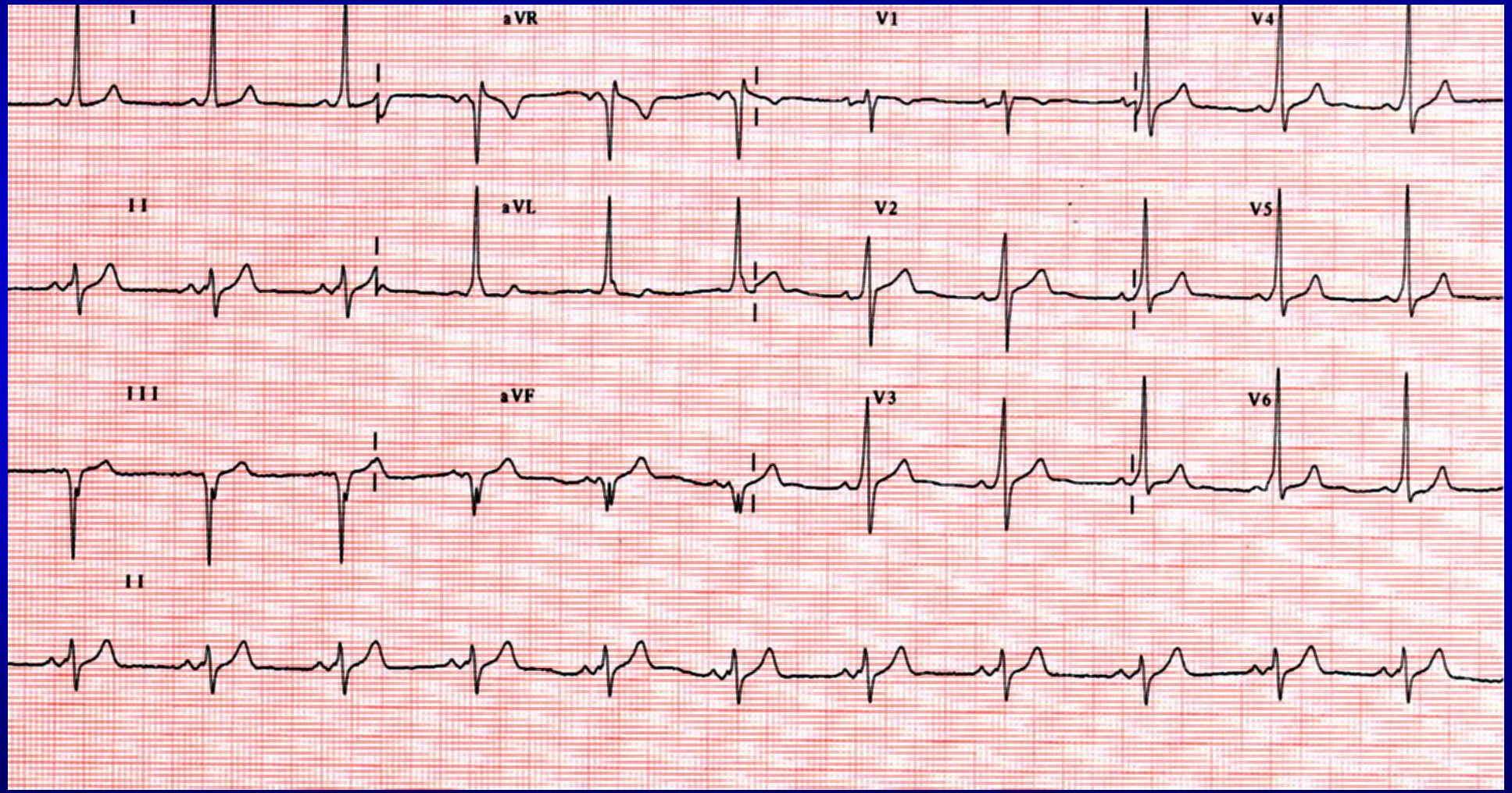
Not associated to structural heart disease:

- Sinus node dysfunction
- WPW syndrome
- Brugada syndrome
- Short QT syndrome

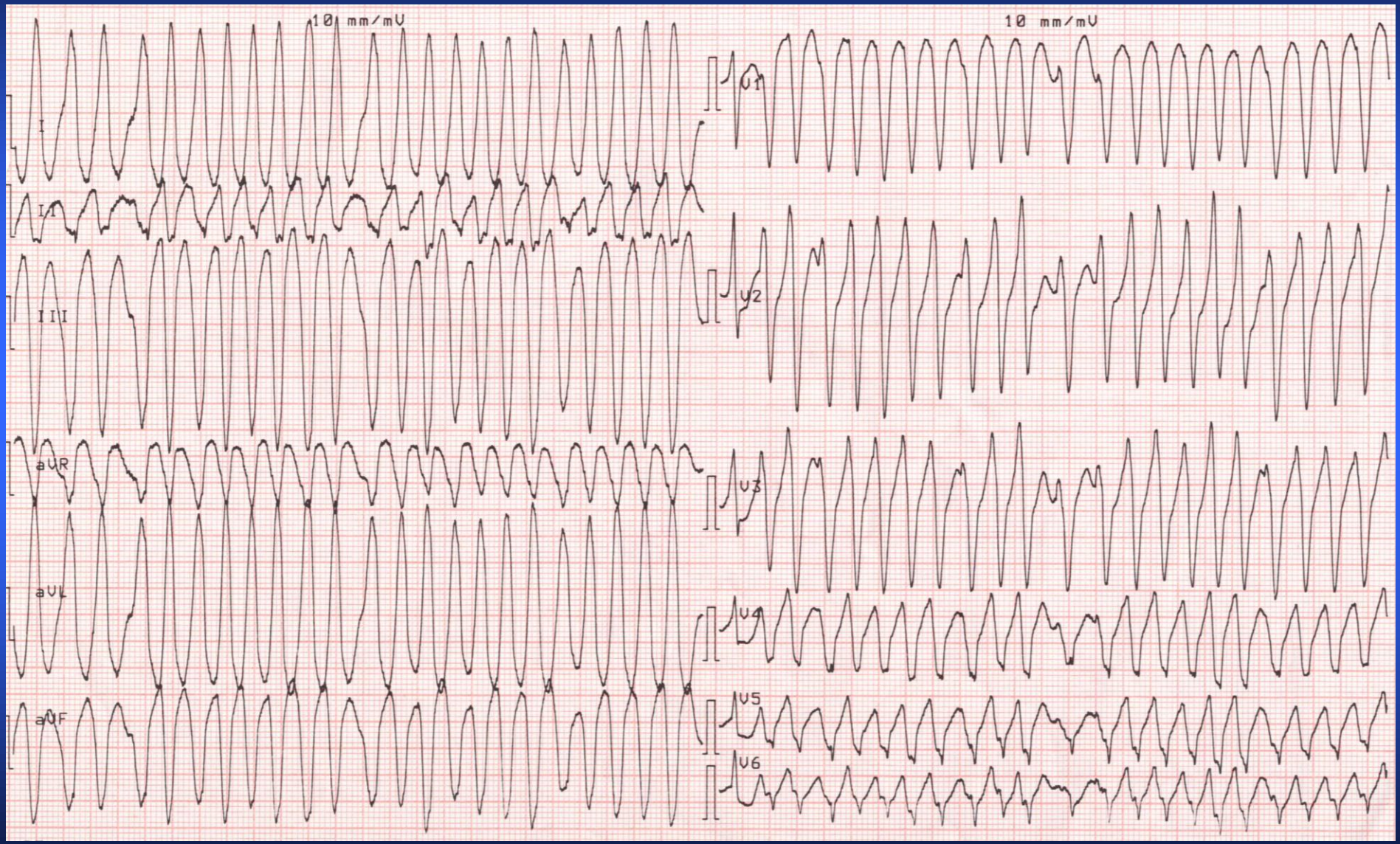
Associated to other conditions:

- Hyperthyroidism
- Sleep apnoea syndrome
- Emery-Dreyfus dystrophy

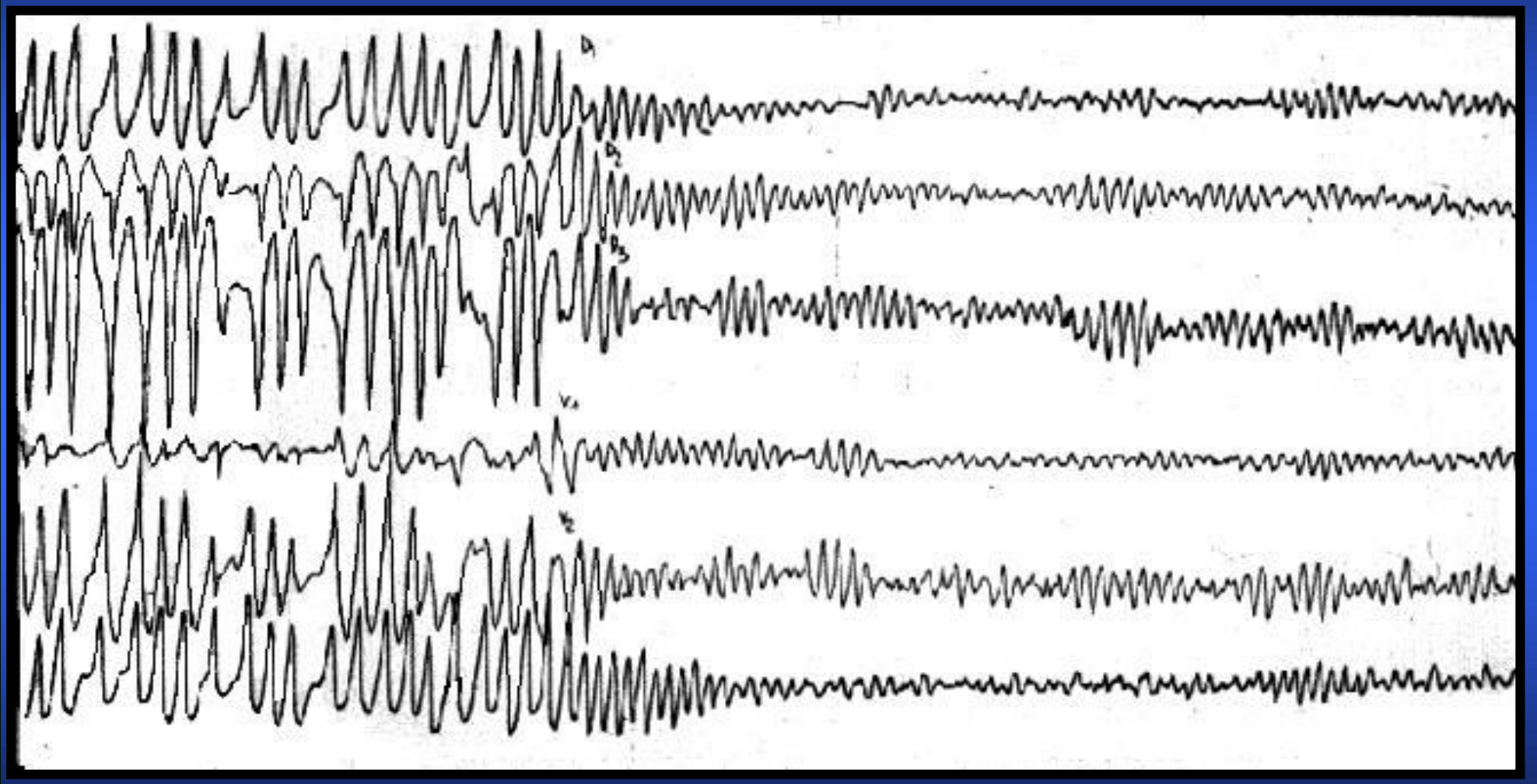
WPW



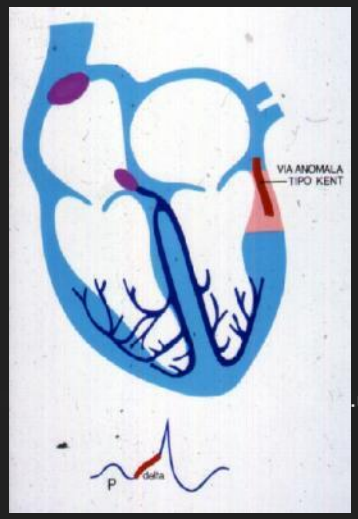
WPW and AF

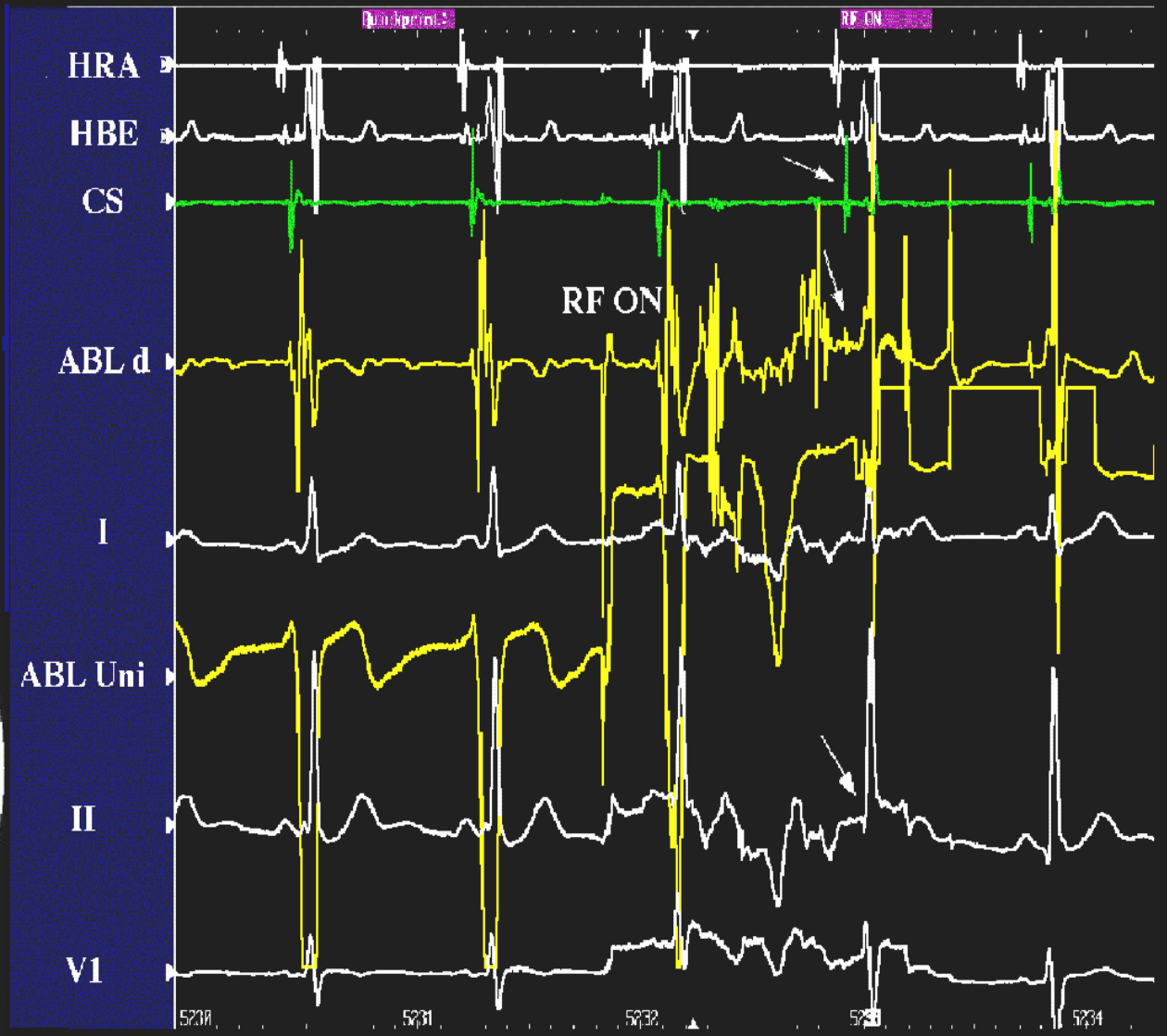


WPW degeneration of AF in VF



LEFT POSTERIOR WPW ABLATION

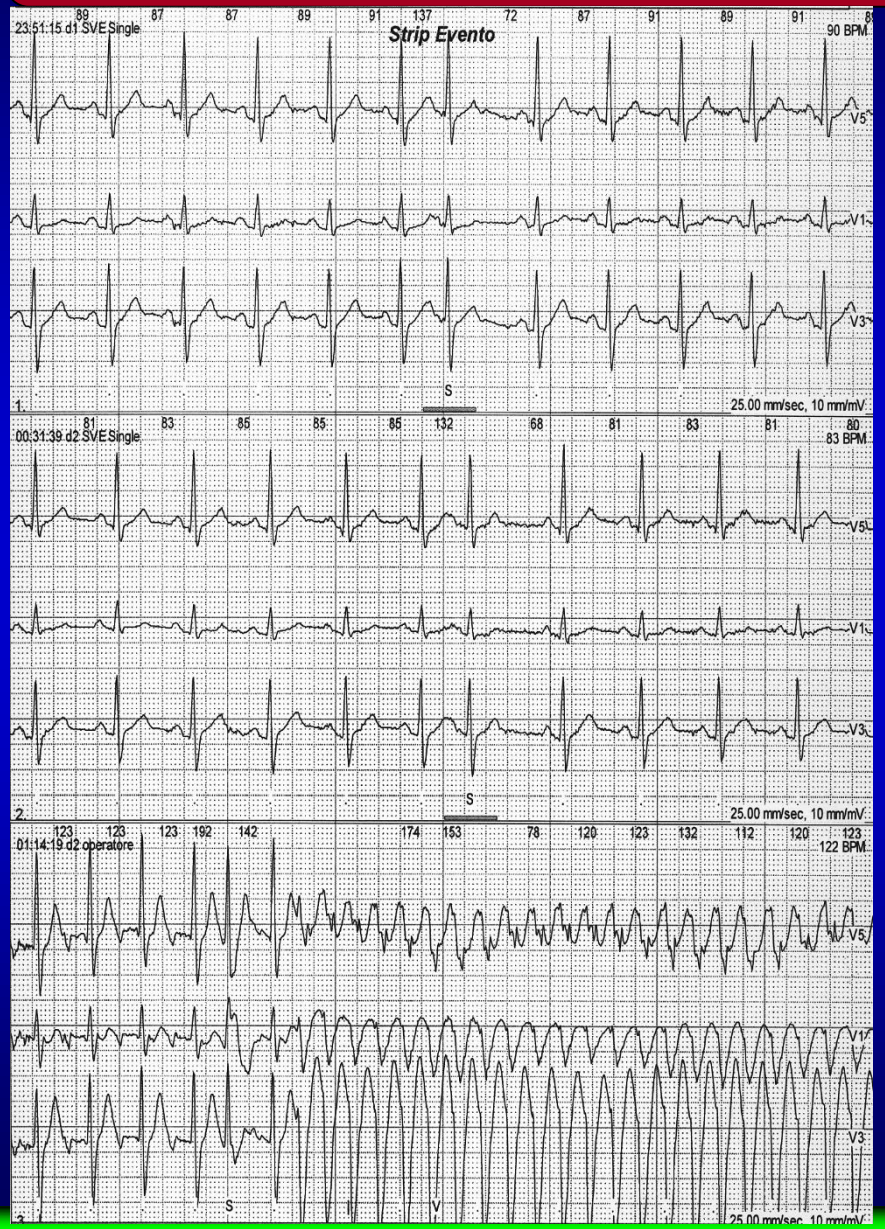


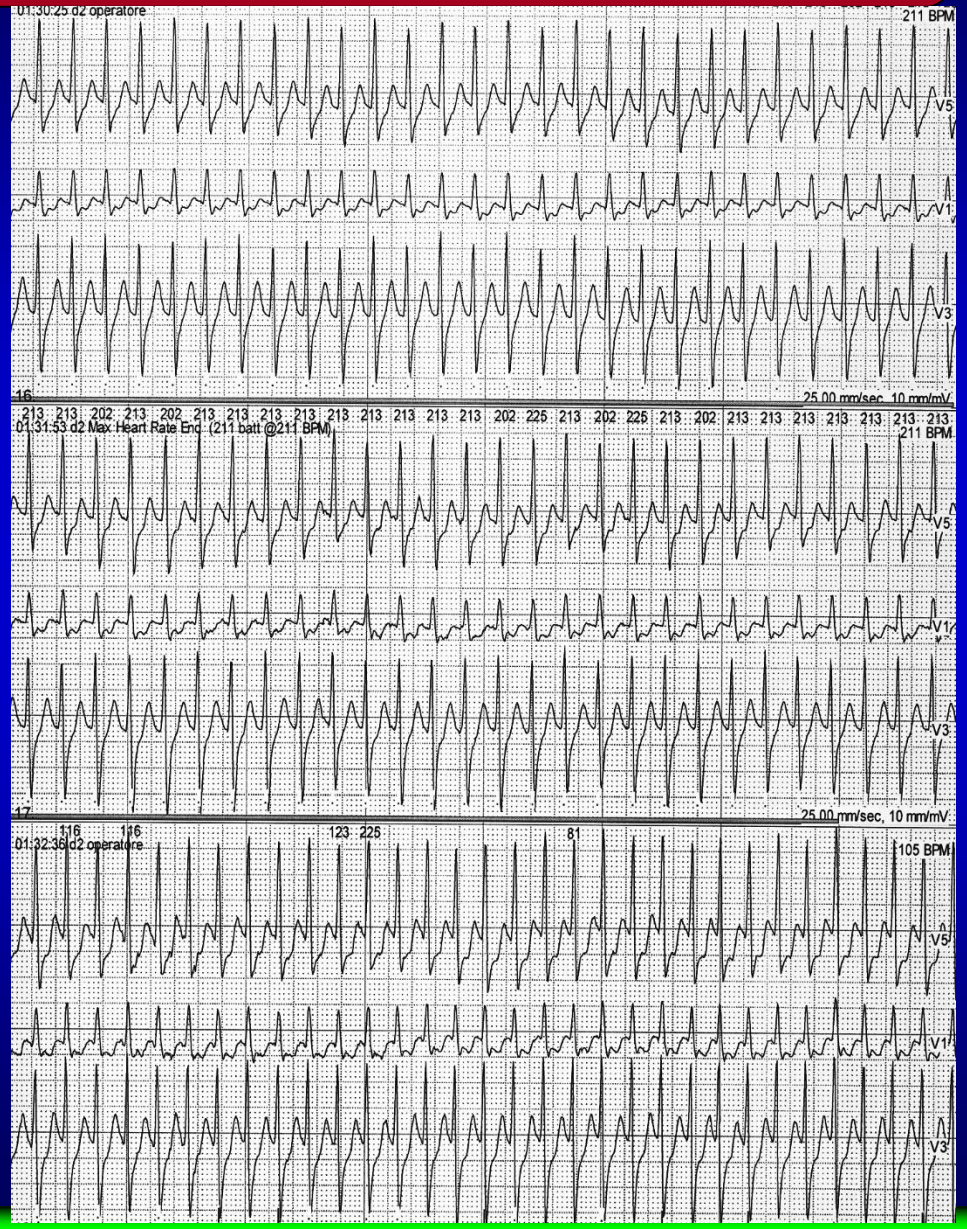


Problems with management of AF in athletes

- ANTICOAGULATION cannot be used in individuals participating in sporting activities (specially those at risk of bodily collision)
- RATE CONTROL is difficult to reach; beta-blockers are not well tolerated or even prohibited
- RHYTHM CONTROL with antiarrhythmic drugs is limited by proarrhythmic effects

Atrial Flutter 1:1





Management of AF in athletes

- ANTICOAGULATION cannot be used in individuals participating in sporting activities (specially those at risk of bodily collision)
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CATHETER ABLATION

first choice therapy in athletes ?

AF ABLATION IN ATHLETS

Radiofrequency Catheter Ablation of Atrial Fibrillation in Athletes Referred for Disabling Symptoms Preventing Usual Training Schedule and Sport Competition

FRANCESCO FURLANELLO, M.D. * PIERPAOLO LUPO, M.D. * MARIO PITTALIS, M.D. *
SARA FORESTI, M.D.
GUIDO DE AMBROG
GIUSEPPE INAMA, M.D.,§

Efficacy of circumferential pulmonary vein ablation of atrial fibrillation in endurance athletes

Naiara Calvo†, Lluís Mont*†, David Tamborero, Antonio Berruezo, Graziana Viola, Eduard Guasch, Mercè Nadal, David Andreu, Barbara Vidal, Marta Sitges, and

Efficacy of radiofrequency catheter ablation in athlete

Pieter Koopman
Stijn De Buck, L
and Hein Heidbu

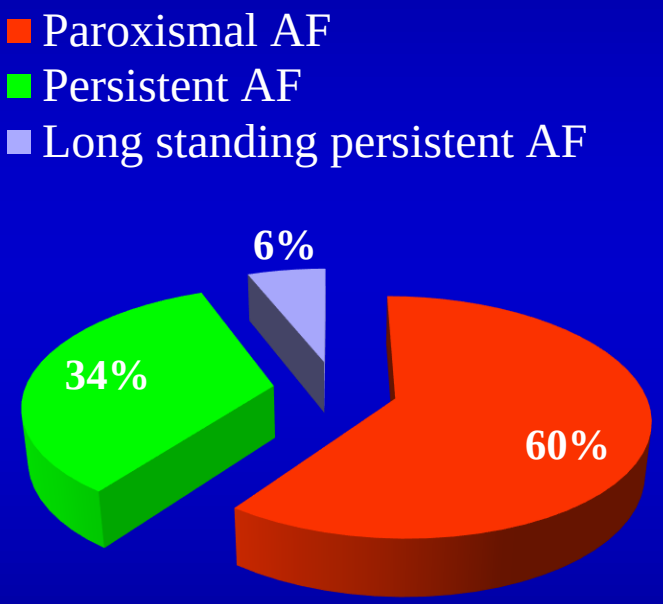
No impact of sports practice before or after atrial fibrillation ablation on procedure efficacy in athletes: a case–control study

Marie Decroocq [1]*, Sandro Ninni[1], Cédric Klein[1], François Machuron[2], Eric Verbrugge[1], Didier Klug[1], François Brigadeau[1], and Dominique Lacroix[1]

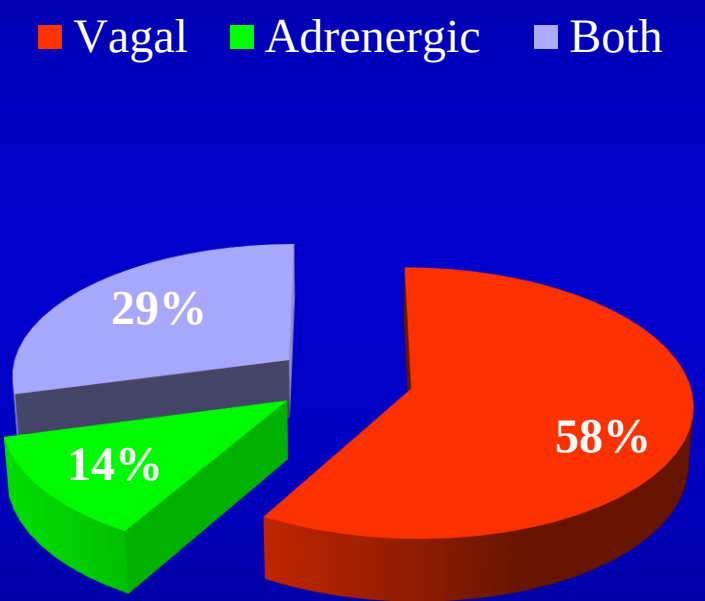
[1]Department of Cardiovascular Medicine, Univ. Lille, CHU Lille, Clinique de Cardiologie, F-59000 Lille, France; and [2]Department of Methodology, Biostatistics and Data Management, Univ. Lille, CHRU de Lille, F-59000 Lille, France

143 COMPETITIVE ATHLETES (127 Master)

AF Type

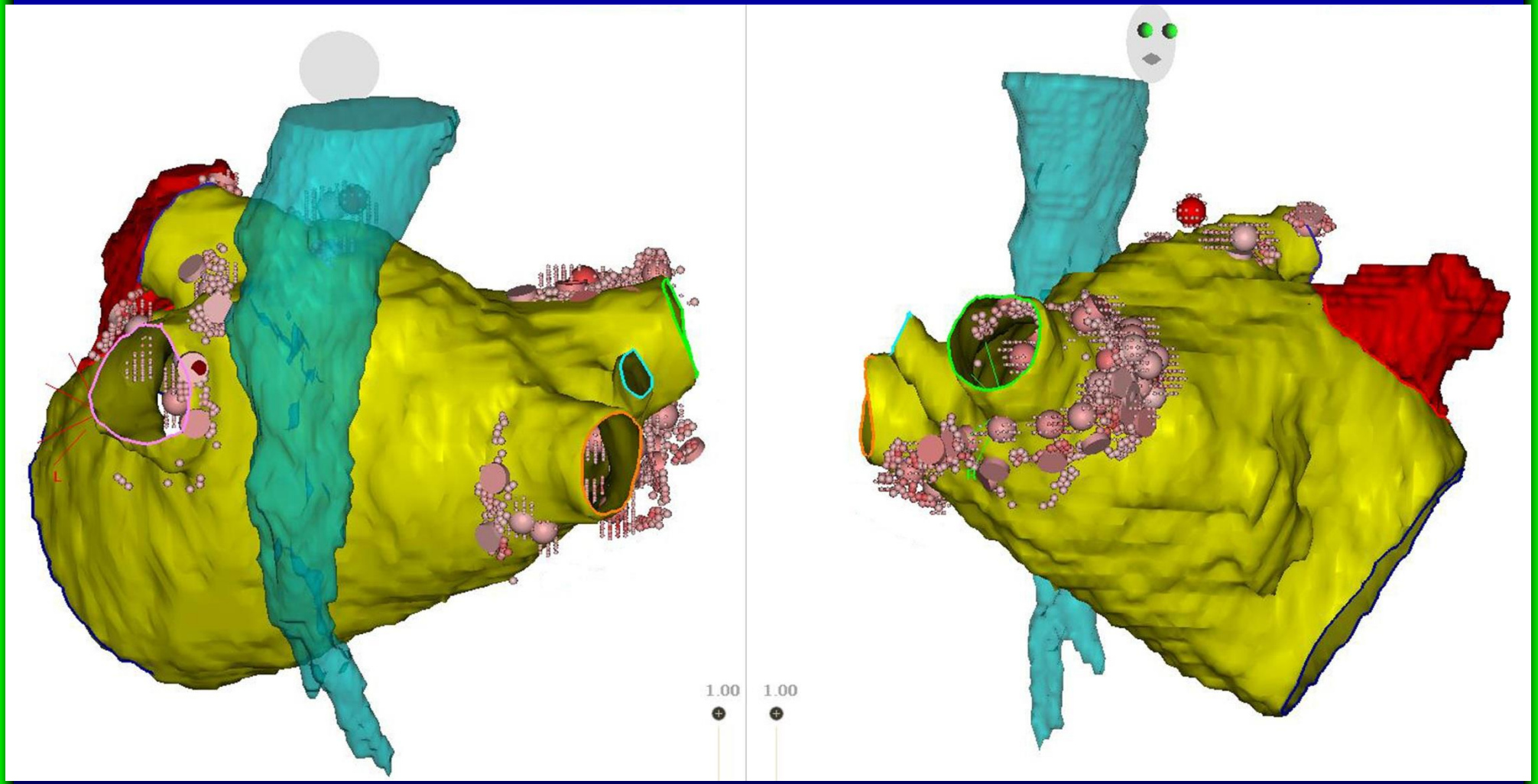


AF trigger

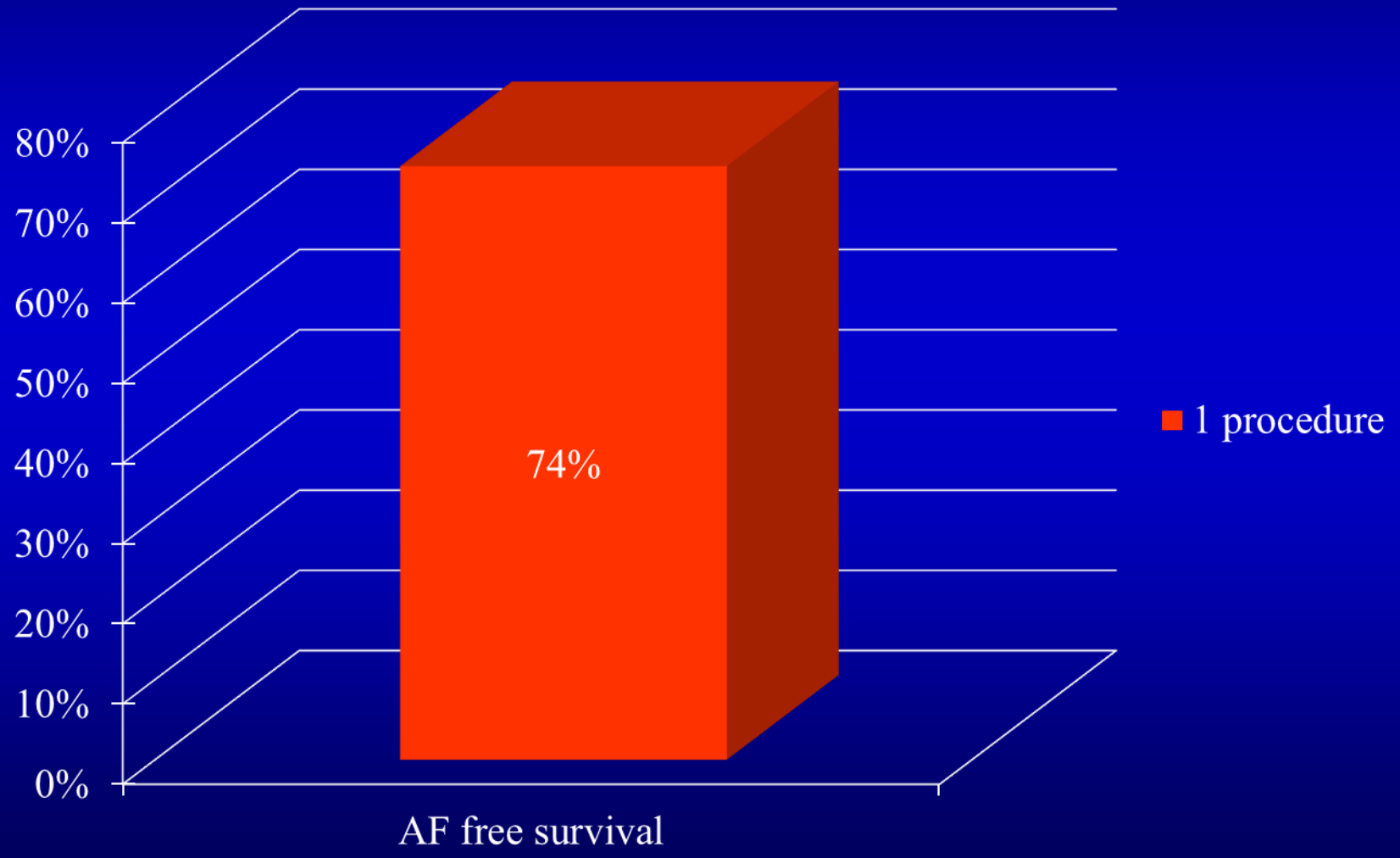


Typical or Non-tipycal Flutter or Foci 43%

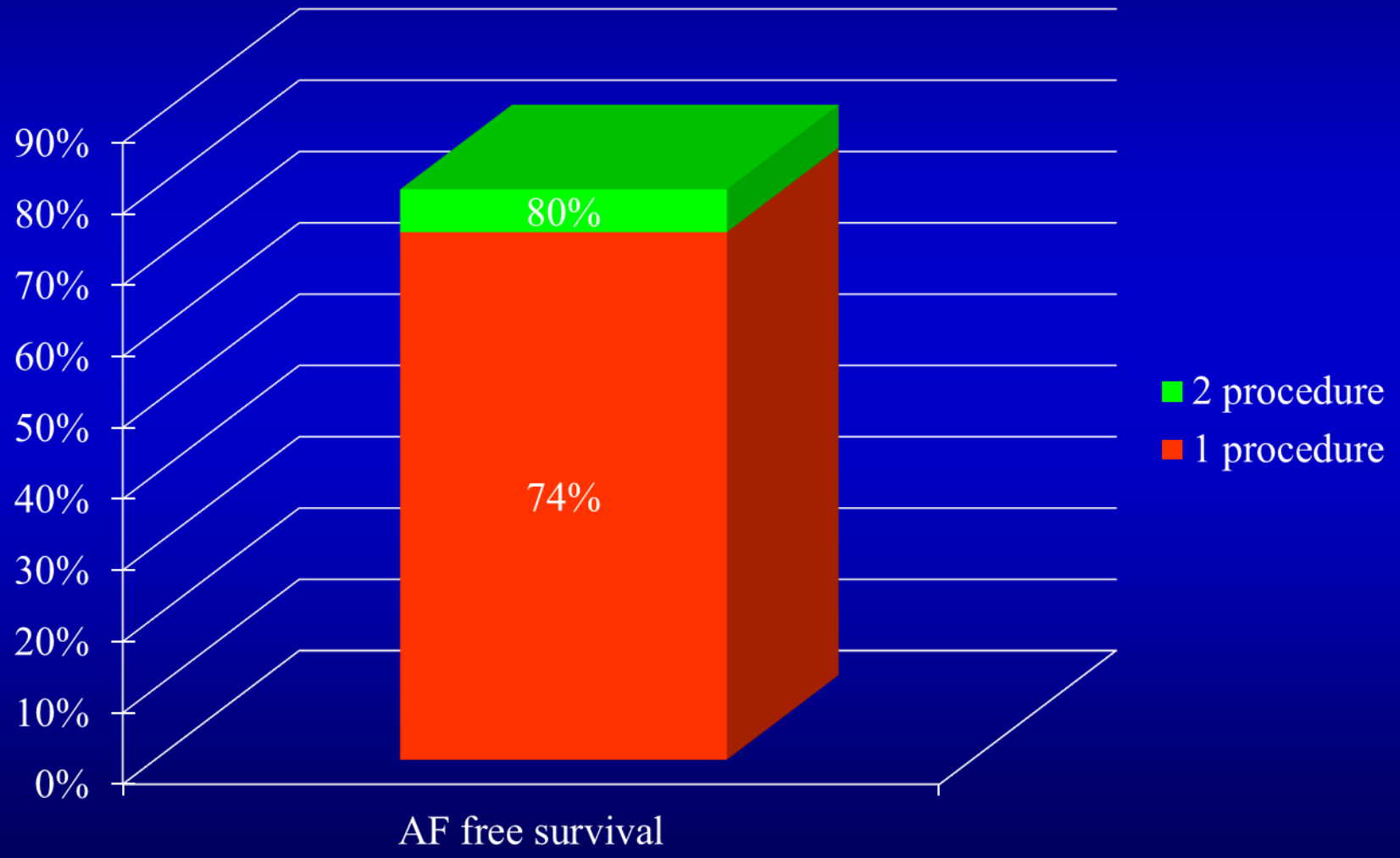
Pulmonary Veins Ablation alone was performed in 57% athletes



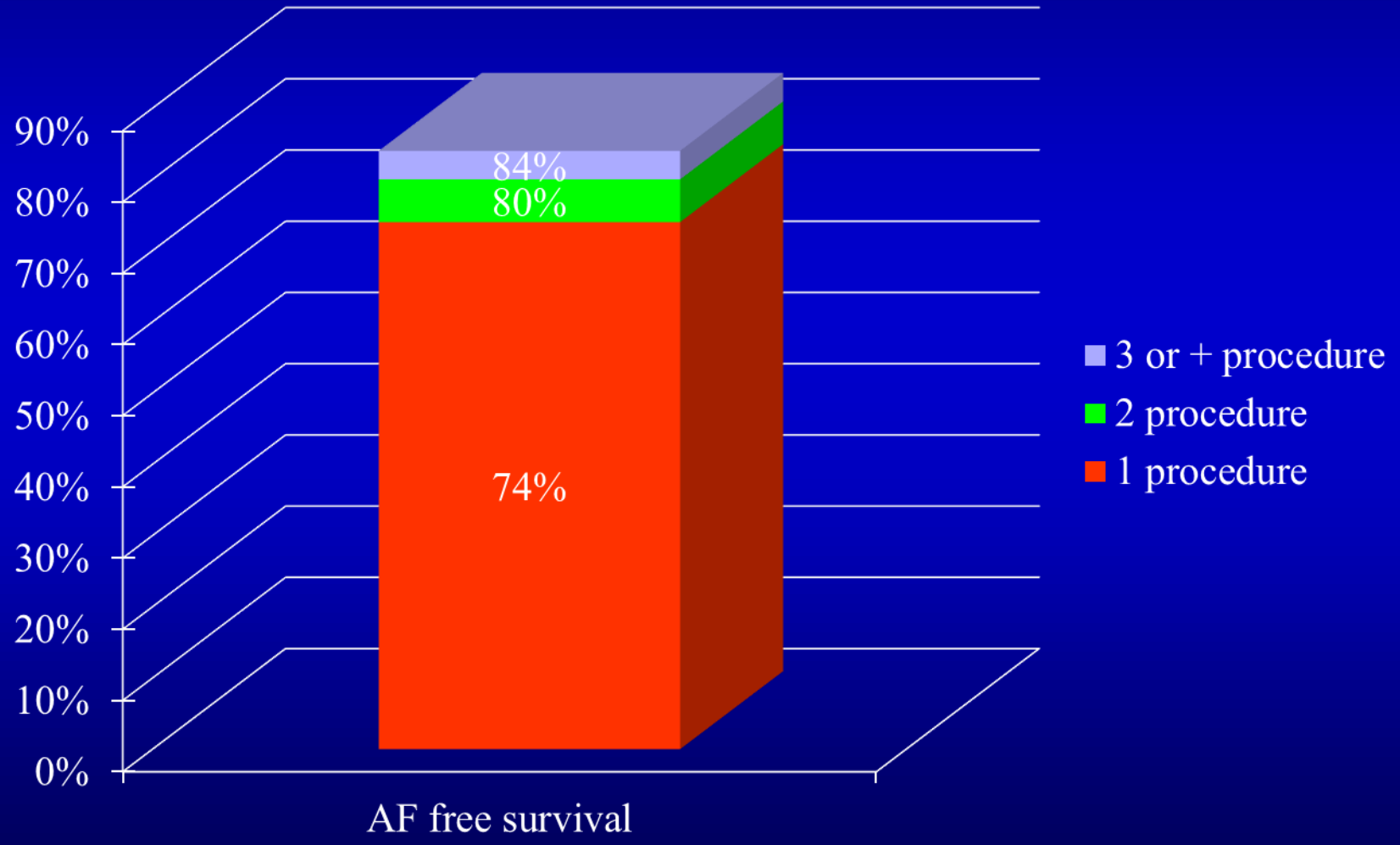
AF FREE SURVIVAL POST ABLATION IN ATHLETES (FU 9.8 years)



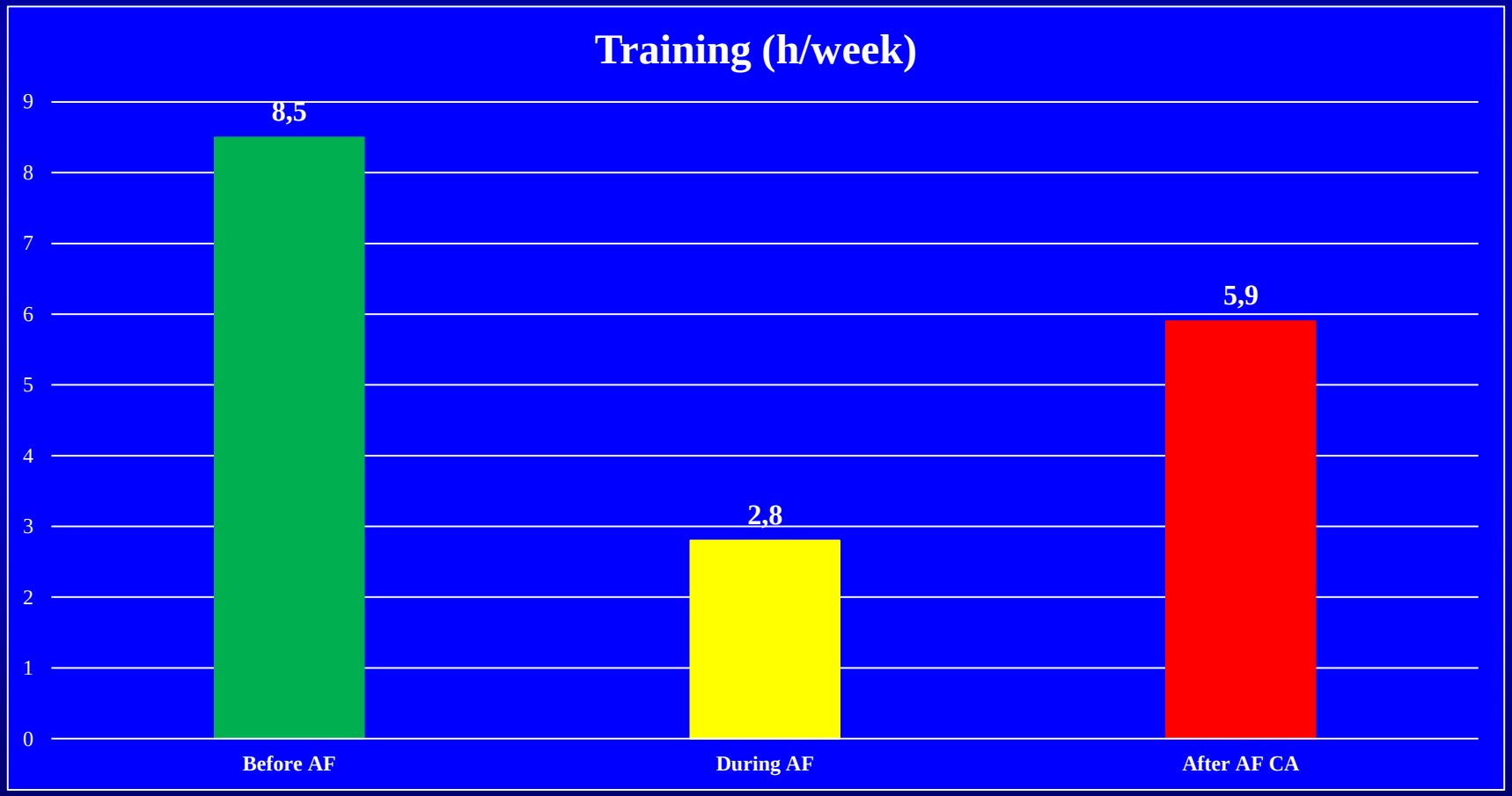
AF FREE SURVIVAL POST ABLATION IN ATHLETES (FU 9.8 years)



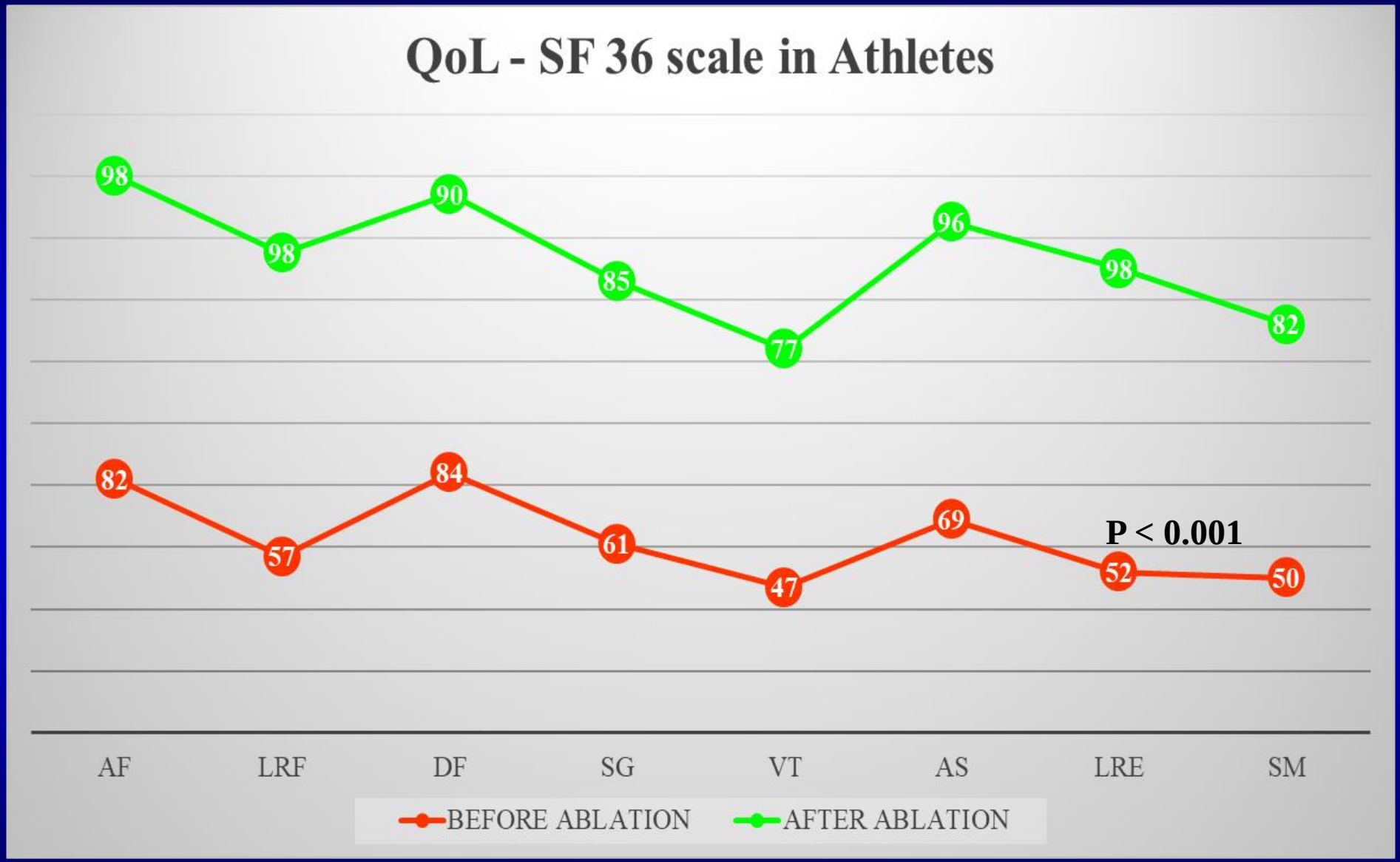
AF FREE SURVIVAL POST ABLATION IN ATHLETES (FU 9.8 years)



ATHLETES TRAINING (h/week)



P < 0.001 **P < 0.001**

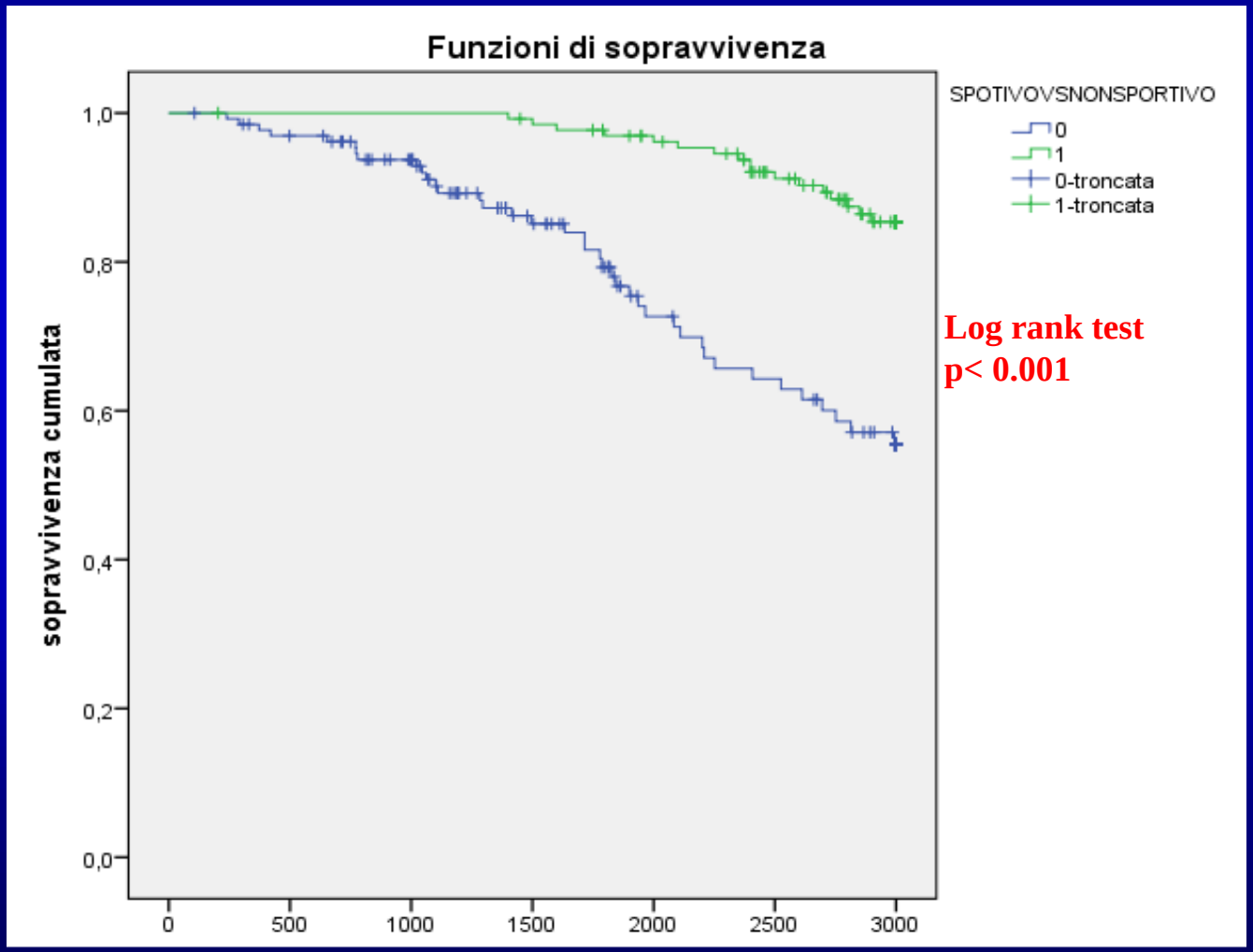

QoL - SF 36 scale in Athletes
98
98
90
85
77
96
98
82
82
57
84
61
47
69
52
50
P < 0.001
AF
LRF
DF
SG
VT
AS
LRE
SM
BEFORE ABLATION
AFTER ABLATION

ATHLETES AND GENERAL POPULATION
(POST-PROPENSITY SCORE)

Parameters	Athletes n. 133	Control n.133	P Value
Male n. (%)	128 (96)	128 (96)	1
Age (years) ± SD	48±9	46±12	0.139
Under 35 years (%)	12 (9)	18 (14)	0.333
BMI (kilograms) ± SD	25.1±2.9	24.9±3.7	0.655
Hypertension (%)	27 (20)	26 (20)	0.89
Diabetes (%)	4 (3)	4 (3)	1
CAD (%)	3 (2)	5 (4)	0.722
Previous stroke/TIA	6 (5)	14 (10)	0.102
Mean CHA_2DS_2VASC ± SD	0.7±0.7	0.6±0.6	0.151
$CHA_2DS_2VASC \geq 2$ n. (%)	19 (14)	16 (12)	0.717
Mean HASBLED ± SD	0.6±0.6	0.7±0.5	0.14
Echocardiographic features:			
Ejection Fraction (%)	59.9±6.05	58.9±7.05	0.198
EF ≤ 50 (%)	4 (3)	8 (6)	0.377
LA enlargement (%)	12 (8)	19 (14)	0.251
Arithmic features:			
AF Type:			
- Paroxysmal (%) - Persistent (%) - Long standing- persistent (%)	80 (60) 44 (33) 9 (7)	67 (50) 56 (42) 10 (8)	0.139 0.164 1
Mean history of AF (years)	4.2±4.2	5.2±5.0	0.08

AF free survival post AF ablation (FU 9y)

Athletes (GREEN) and in general population (BLUE) after propensity score matching



Log rank test
p< 0.001

CONCLUSIONS

- AF prevalence is higher in athletes than in general population and is related to type and intensity of training.
- This correlation is not demostrated in females

- Pharmacological tx presents more limitations

- AF ablation is effective and safety both in short and long term in athletes more than in general population , but it is more complex (flutter or foci association)

- Ablation should be considered as first therapeutic step in elites or competitive athletes