

# New scientific advances in sports cardiology- Europrevent 2009 Highlights



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090831

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# EuroPrevent, 2009

- Organized by the European Association of Cardiovascular Prevention and Rehabilitation-EACPR, within the ESC
- 1300 participants, May 6-9, Stockholm
- Section of Sports Cardiology, one of six sections of EACPR
- Scientific programme in sports cardiology: symposia, abstracts, cases and debate

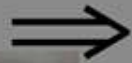
# Symposia:

## Is now the time for universal preparticipation screening?

# Two extremes of sports



JOY!



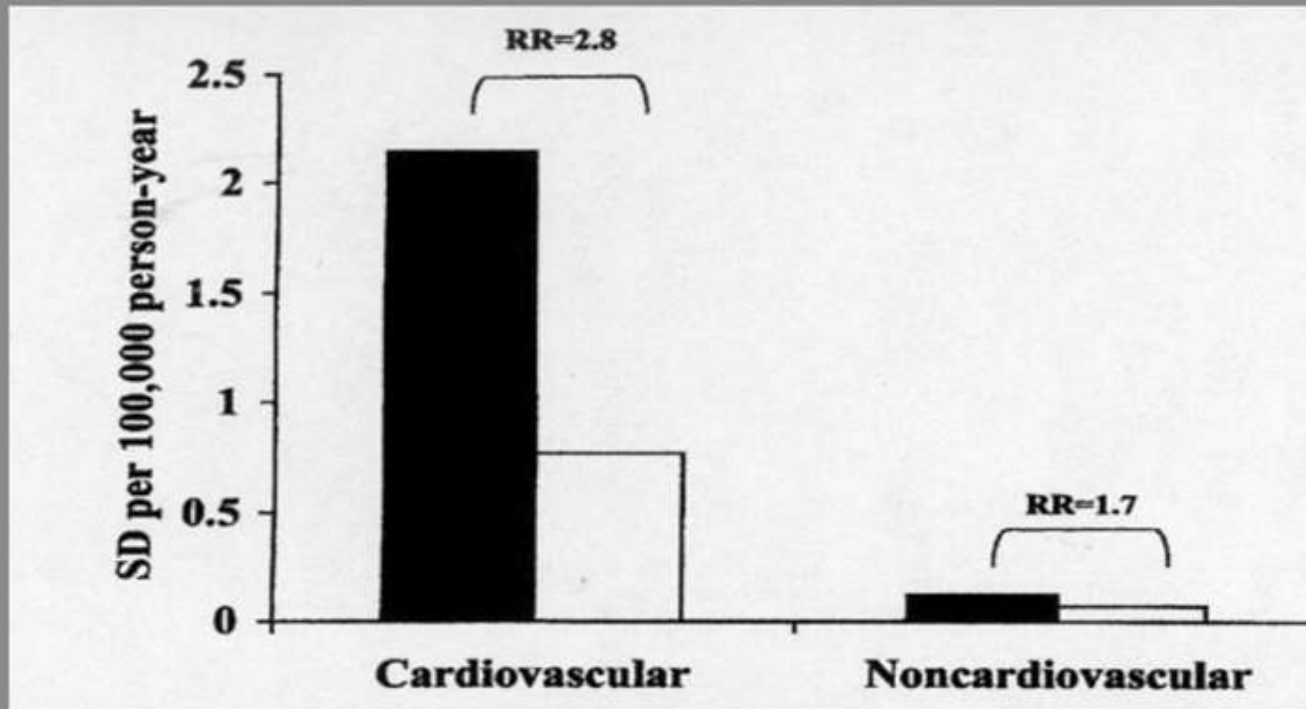
SCD!



Antonio Puerta  
\*01.05.1975 - 28.8.2007  
FC Sevilla - FC Getafe

# Athletes: increased risk for SCD

(ref: Corrado D, JACC, 2003)



- Competitive athletes have a higher risk than the population at large.



### Cardiovascular pre-participation screening of young competitive athletes for prevention of sudden death: proposal for a common European protocol

Consensus Statement of the Study Group of Sport Cardiology of the Working Group of Cardiac Rehabilitation and Exercise Physiology and the Working Group of Myocardial and Pericardial Diseases of the European Society of Cardiology

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**young competitive athletes**

**family and personal history, physical examination, 12-lead ECG**

**negative findings**

**positive findings**

**eligibility for competition**

**no evidence of cardiovascular disease**

**further examinations (echo, stress test, 24-h Holter, cardiac MRI, angio/EMB, EPS)**

**diagnosis of cardiovascular disease**

**management according to established protocols**

# Arguments for and Against Screening

## Against

Sudden deaths in athletes uncommon; 1 in 50,000-1 in 200,000

Rare disorders. Diverse pathology

Elaborate screening programmes not cost effective

Unacceptable number of false positives

## For

Highly visible events

Loss of numerous years of life

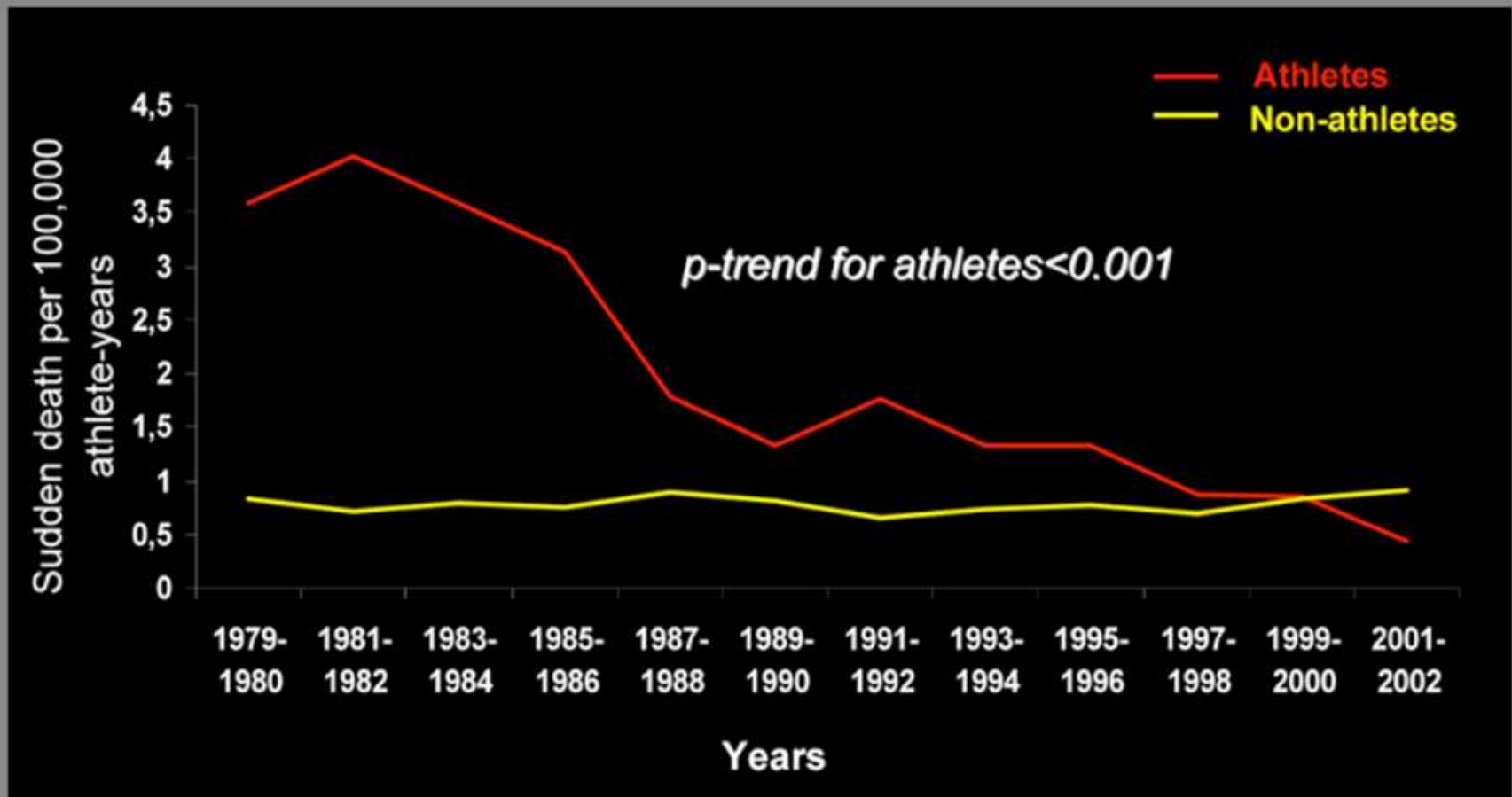
Association between exercise and sudden death

Acceptable interventions to prevent fatalities

# TIME-TREND OF SUDDEN CARDIAC DEATH INCIDENCE IN ATHLETES VS NON-ATHLETES



## Veneto Region of Italy 1979-2002



# Screening Athletes for Cardiac Diseases

- Experience outside Italy
- Role of screening children
- Role in evaluating older (over 40 years) athletes
- Exercise guidelines in middle aged athletes with cardiac disease



# Pre-Participation Screening of Young Athletes in Other European Countries

**Georgia**      N = 324 (L Maskhulia, Georgia); male soccer players  
ECG abnormalities in 18%  
1 major cardiac problem (HCM)  
False positive 15.4%

**Greece**      N = 20,197 (E Koudi, Greece); Age 5-39 years-old.  
63% Males ; 39 Sporting disciplines.  
45% had abnormalities on 12-lead ECG  
48 (0.24%) increased wall thickness;  
9 (0.05%) disqualified

# Sports mit Herz-Evaluation of the implementation of a German preparticipation screening programme (A Treusch, Bad Oeynhausen, GER)

N=742; age 36,5 years, male 74%, using history, phys ex, ECG and echo

Results: 13 % needed further evaluation, three athletes had to be excluded.

Conclusion: By the wellstructured organisation we could strenghten the trust and reputation in athletes.

As many athletes had surprisingly elevated blood pressure at rest, more screening and therapy towards hypertension control seems to be helpful

# Effect of age and gender on echo (F Carre, Rennes, FRA)



- 1221 French asymptomatic top-level younger athletes, aged 7 to 16 yrs
- According to their age and gender  $\Rightarrow$  4 groups

	«Young» Girls 10 - 12 yrs	«Old» Girls 13 - 16 yrs	«Young» Boys 7 - 13 yrs	«Old» Boys 14 - 16 yrs
<i>Number</i>	58	495	107	561
<i>Age (yrs old)</i>	11.6 $\pm$ 0.5 &	14.7 $\pm$ 1.0* &	12.5 $\pm$ 0.9	15.2 $\pm$ 0.7 *
<i>BSA (m<sup>2</sup>)</i>	1.30 $\pm$ 0.2 &	1.60 $\pm$ 0.2 * &	1.50 $\pm$ 0.2	1.80 $\pm$ 0.2 *

➤ Physical exam

➤ 12-lead resting ECG

➤ Resting echocardiography (ASE recommendations) :  
*absolute and indexed values by body surface area,  
normal values (Henry et al., 1980, Circulation)*

& gender effect  $p < 0.05$

\* age effect  $p < 0.001$

# Echocardiographic Findings in Child and Adolescent Athletes

-Older athletes had greater LV dimensions than younger athletes.

-Males had greater absolute dimensions than females.

Maximal Values	Males	Females
LV Wall Thickness	14.5 mm	12 mm
LV Cavity Size	63 mm	60 mm

# Secondary cardiovascular assessment of referred master athletes

(N Panhuysen-Goedkoop, Arnhem, NE)

Master athletes with symptoms or abnormal ECG

N = 239; 79% Male; mean age 50.5 years.  
50% competitive athletes.

66% were diagnosed with a cardiac disorder  
(Arrhythmia (AF)= 17%; CAD =7%, HT =23%,  
Valvular heart disease and cardiomyopathy =19%

⇒ 75/239 some restriction of sports activity



# Abstract:

## NT-proBNP in senior athletes detects severe cardiovascular disease (A Sahlen, Sweden)

- N=185 from 30 km cross-country race
- 71% male; mean age 62y; no known cardiac disease
- NT-pro BNP and hs-CRP measured
- Results: 15 NT-proBNP >194 ng/L

⇒ 4 of those severe CVD

1 Male 57; BNP 219; CRP 0.2; BP 176/108+ ascending aortic aneurysm

2 Male 74; BNP 2250; CRP 2.6; LVH, EF 30%, atrial fibrillation

Male 65; BNP 339; CRP 2.4; severe CAD leading to CABG

4 Male 69; BNP 363; CRP 2.0; SCD, severe CAD, silent MI, LVH

# Symposia: Cardiac fatigue in overtraining syndrome?



- Overtraining: physiology, psychology, or both-  
G Kenttä, Sweden
- Cardiac findings in overtrained athletes-  
A Urhausen, Luxembourg
- Sports-induced cardiac enzyme and BNP rises: causes and significance  
J Scharhag, Germany
- Cardiac autonomic system disorders in overtraining syndrome  
F Carre, France

# Background:

## Studies investigating cardiac troponins as biomarkers of myocardial damage after marathons

Study	Year	Findings
Cummins	1987	Mean cTnI not elevated
Koller	1995	cTnT elevated in 1/19
Siegel	1995	cTnT in range of AMI in 3 out of 4
Siegel	1997	cTnT (2 <sup>nd</sup> gen) not elevated
Lucia	1999	cTnI elevated in 1 runner
Siegel	2001	cTnI 6-fold rise (high sensitive method)
Shave	2005	cTnT (2 <sup>nd</sup> gen) elevated > 0.05 in 36%
Whyte	2005	cTnT (2 <sup>nd</sup> gen) elevated > 0.05 in 38%
Nielen	2006	cTnT (2 <sup>nd</sup> gen) elevated > 0.03 in 40%



# Results of Left Ventricular Function Assessment after Marathon Run in Trained and Untrained Subjects

Study	Year	Left Ventricular Function	
		Systolic	Diastolic

Manier	1991	↓	↓
Lucia	1999	Unchanged	↓
Shave	2002	↓	↓
Whyte	2005	Unchanged	↓
Neilan	2006*	Unchanged	↓
Neilan	2006**	↓	↓



\* RV dysfunction

\*\* Using tissue velocity imaging

# Data from Veteran Athletes

- Increased prevalence of episodes of asystole as well as 2<sup>nd</sup> and 3<sup>rd</sup> degree AV block during sleep
- Higher prevalence of atrial fibrillation
- Increased frequency of non-complex ventricular arrhythmias
- Case reports of left ventricular dysfunction in the absence of coronary disease



# Marathon Running

Adverse atrial remodelling

Sudden death from coronary disease

Atrial fibrillation

High degree AV block

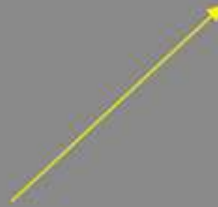
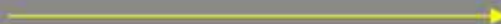
Myocyte necrosis  
(cTn rise)

Pathological LVH

Ventricular arrhythmias

Dilated Cardiomyopathy  
or Arrhythmogenic right  
ventricular  
cardiomyopathy

Myocardial scars



# Conclusions from Symposium

Prolonged exercise appears to be associated with mild and, transient cardiac dysfunction

No conclusive evidence of immediate or intermediate clinical consequences

Descriptive studies relating to cardiac disease in veteran athletes are very small

The long term impact of ultra-endurance sports on the heart require larger longitudinal studies of veteran athletes with more sophisticated imaging techniques



Abstract: **Cardiac markers vary by exercise duration and intensity**

(de La Gerche, BE)

N=40 ; measured at baseline+ max exercise+ post-endurance/ultra event

Measurements: BNP, CRP, IL, cortisol

Results: Tni, CK, IL, cortisol increased post-endurance, but BNP and CK only with ultra-events

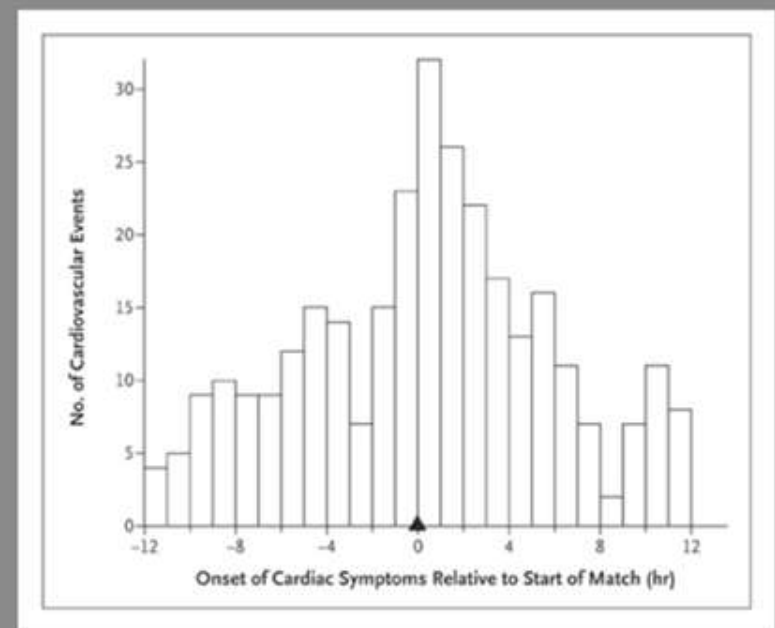
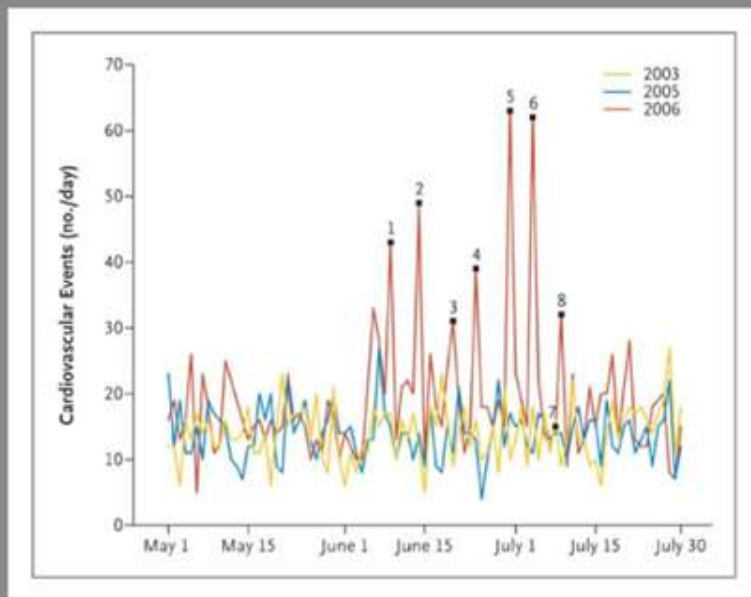
Muscle injury (skeletal and myocardial) increasingly common with duration of activity

# Abstracts sessions: SCD risk watching football increased?



# Background: SCD risk watching World Cup football

- Ref: Wilbert-Lampen U. NEJM 2008; 358: 475-83
- Cardiovascular events in Munich area, June 2006 vs 2003/2005
- Results: RR 2.66 on days of Germany games; in patients with underlying CAD increased risk first 2 hours after start of match



Abstract: **Cardiovascular events during  
FIFA soccer World Cup 2006**

D Niederseer, Austria

Data collected in Bavaria, Ger: I21-MI; I46-  
cardiac arrest; I47-parox tachyk; I48-AF; I49- other  
arrhythmias

Periods: FIFA WC 0606 31d; before WC 68d; after  
WC 20d; control periods 242d

Results: MI: 68-72-74-68 events/day; cardiac  
arrest 3-3-4-3 events/day etc - no difference over  
whole period!

# Debate:

## Sexual Activity: Another sport to prevent cardiovascular morbidity?

YES- C Araujo, Brazil  
NO- M Dellborg, Sweden

# Sexual activity

Is it a sport?

Data difficult to standardise

Parameters vary with procedure and duration of activity.

Studies rely on HR and BP data

Sex equivalent to 4-6 METS intensity. Walking 800 m slowly and climbing a flight of stairs

Benefits: Sex 20 times/week to meet health requirements

Risk: SCD during sexual activity higher for men, with alcohol and with extra-marital affairs (“a man who is too old, had too much to drink and too much to prove”).

# EACPR recommendations for master individuals



- "Cardiovascular evaluation of adult/senior individuals engaged in leisure-time physical activity or sport activities"

Position Stand on screening from the Sections of Sports Cardiology and Exercise Physiology, within the European Association for Cardiovascular Prevention and Rehabilitation (EACPR)

Screening recommendations according to:

1 Intensity-level of intended PA; 2. Risk profile; 3. Habitual exerc

**In progress**



# Thank you!

## Next EuroPrevent: Prague 2010

