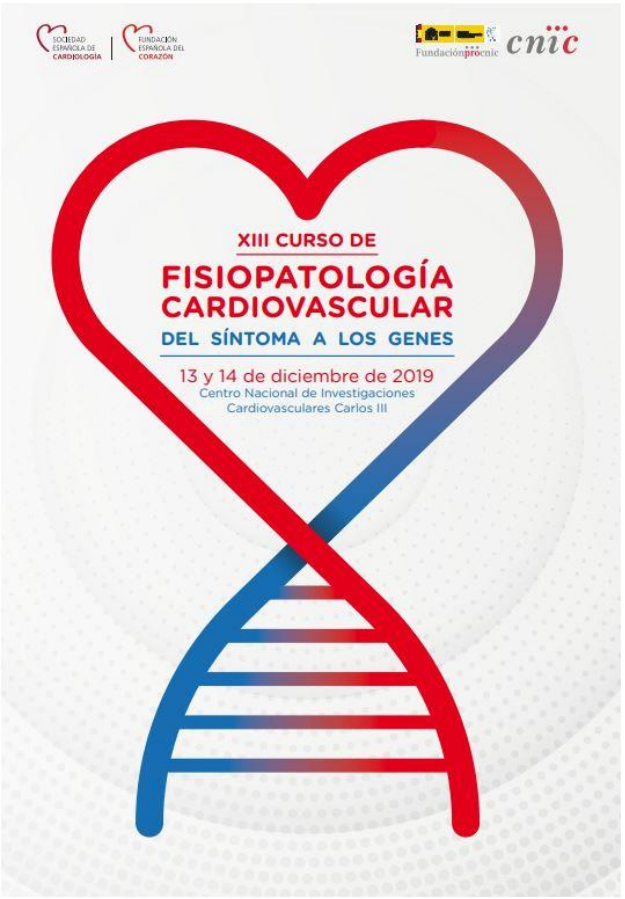


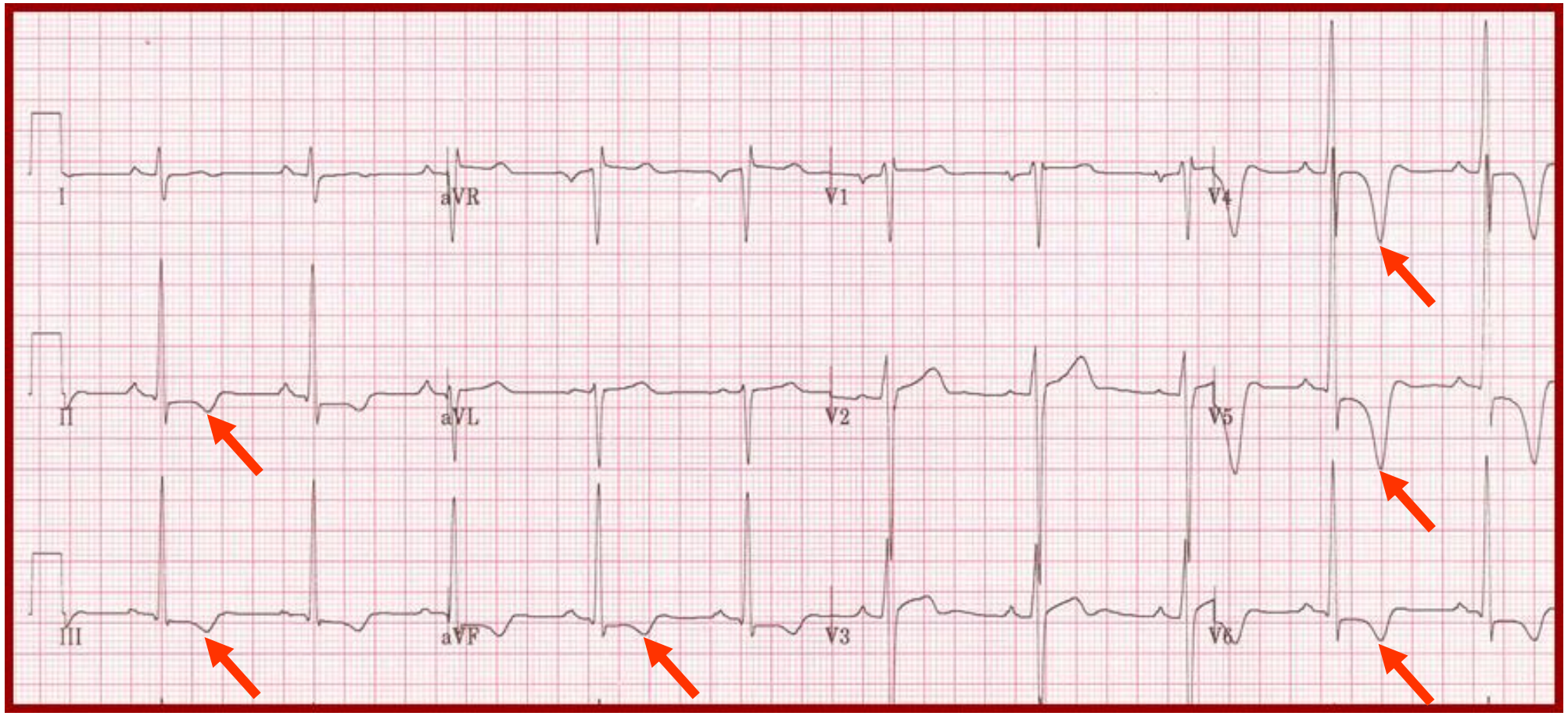

# *Recomendaciones para la práctica deportiva en miocardiopatías ESC-EAPC 2019*

*Luis Serratosa, MD, PhD*

quirónsalud

# *Baloncesto professional, 24 a*

*Asintomático, historia personal y familiar normal, caucásico*



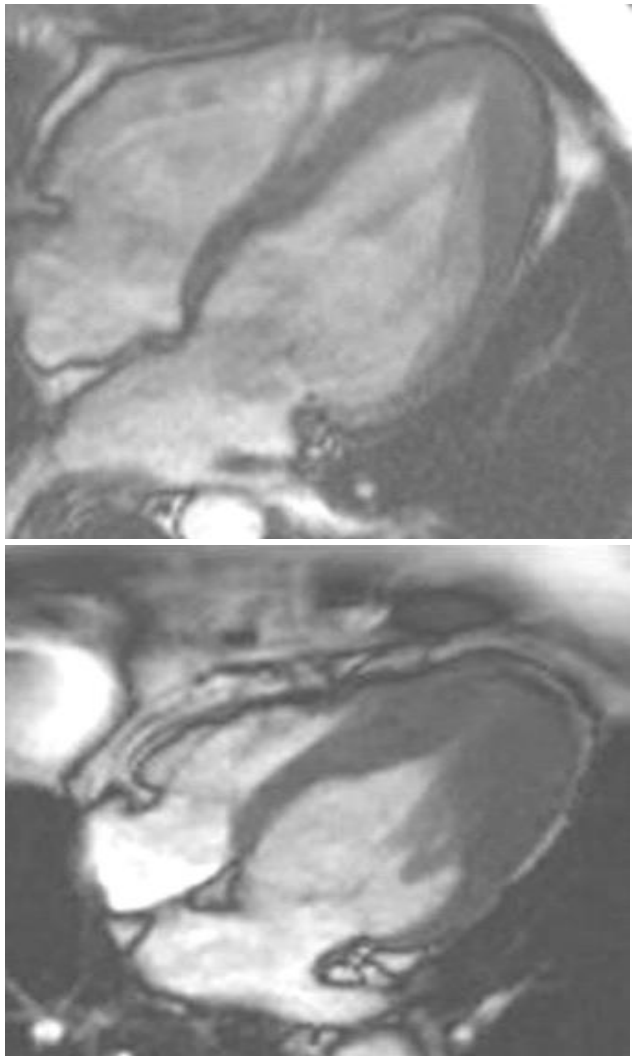
*ECHO:*

- *Left & right apical hypertrophy up to 18 mm*
- *LVDd 52 mm*
- *Normal systolic and diastolic function*

*CPX & ECG Holter monitoring:*

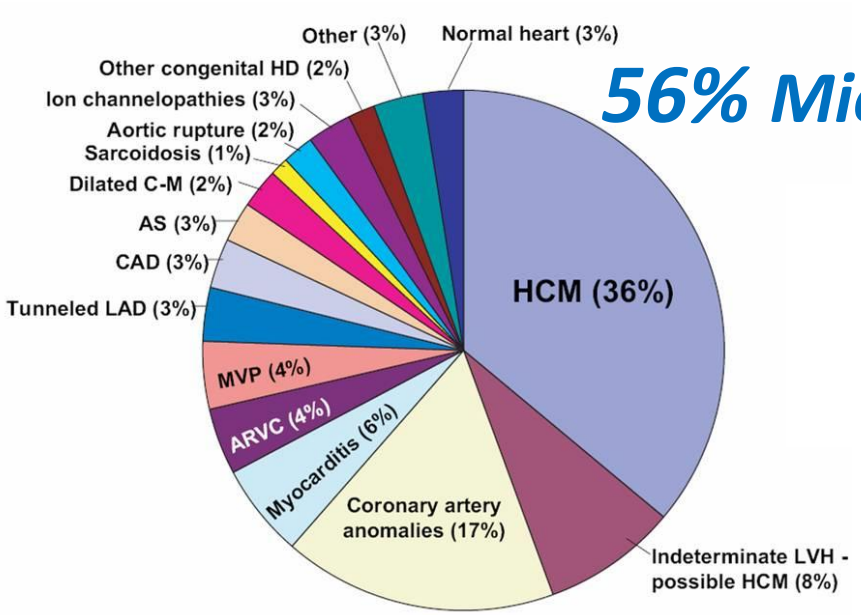
- *NO arrhythmias / Normal exercise BP response*
- *$VO_2$max < 50 ml/kg/min*

*MRI: NO LGE*



# *Apical Hypertrophic Cardiomyopathy*

# MUERTE SÚBITA CARDIACA EN DEPORTISTAS: CAUSAS

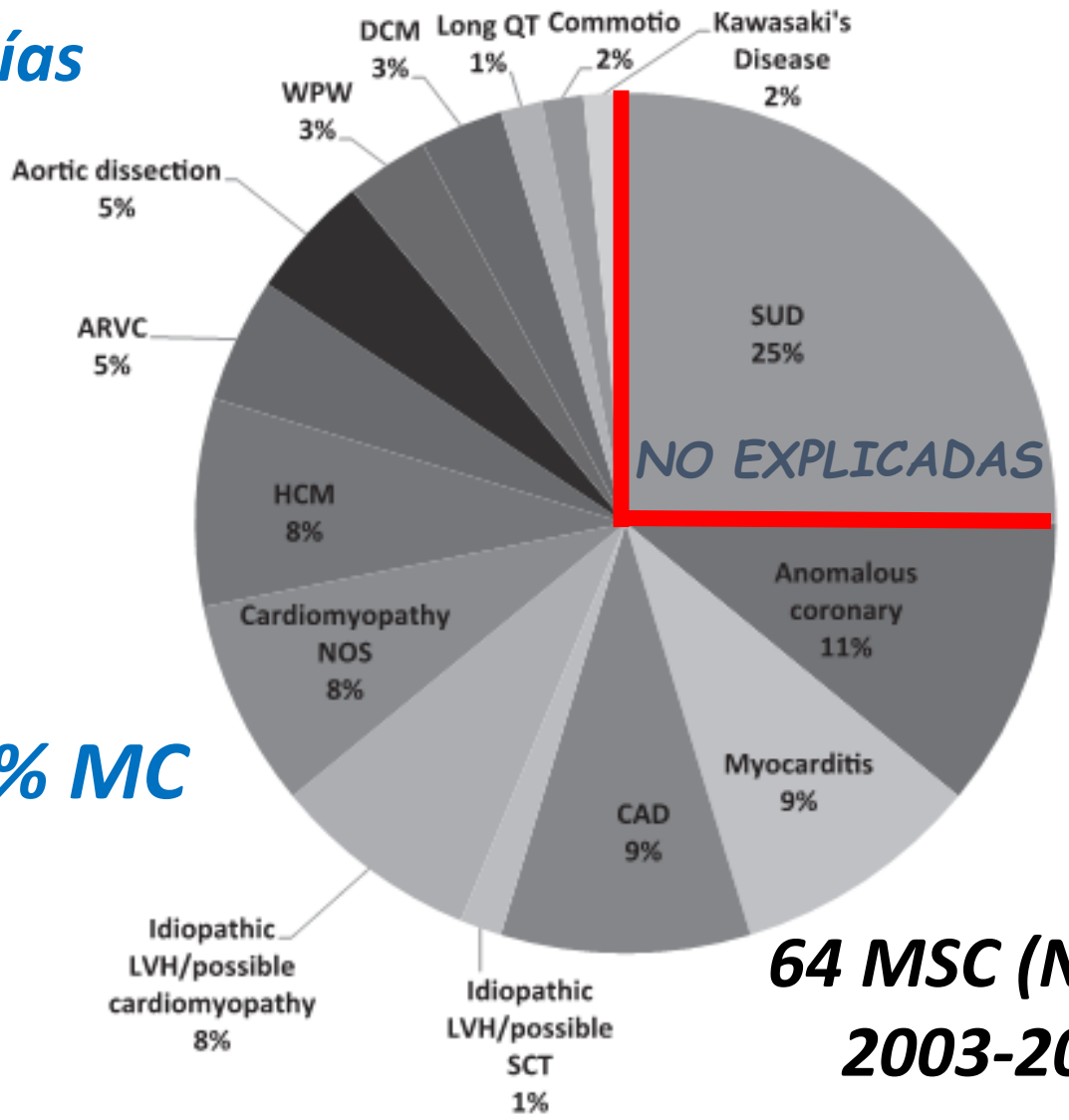



**56% MioCardiopatías**

**1435 MSC (jóvenes)**
**1980-2005**

*Maron et al. Circulation 2007*

**42 % MC**




***64 MSC (NCAA)***
***2003-2013***

*Harmon et al. Circulation 2015*

***1994-2014***

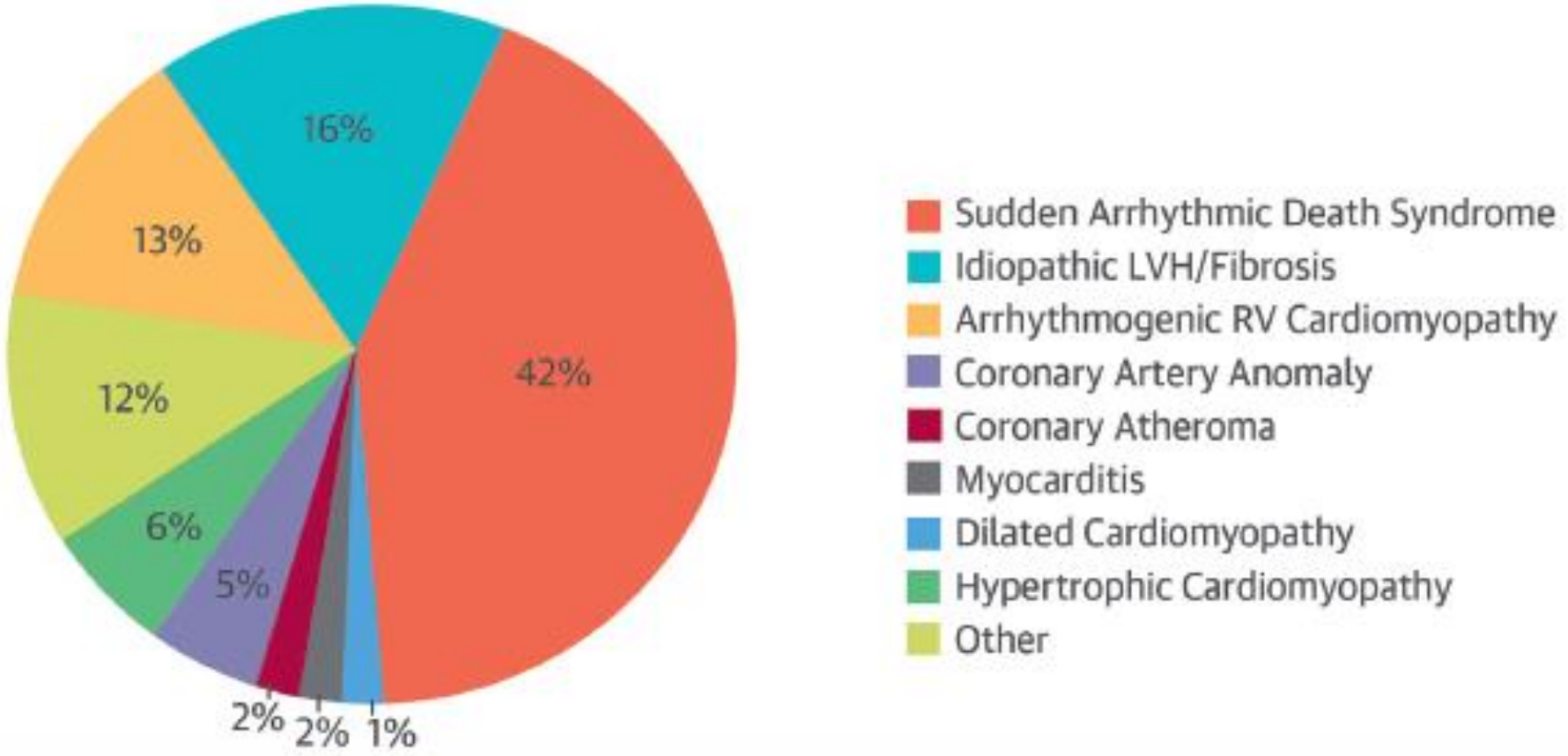
***n: 357 MSC***

*29 ± 11 a (7-67 a)*

*69 % Competición*

*25 % Fútbol*

## *38 % Miocardiopatías*




*Finocchiaro et al. JACC 2016*

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

# Outcomes of Cardiac Screening in Adolescent Soccer Players

*Malhotra et al. NEJM 2018*

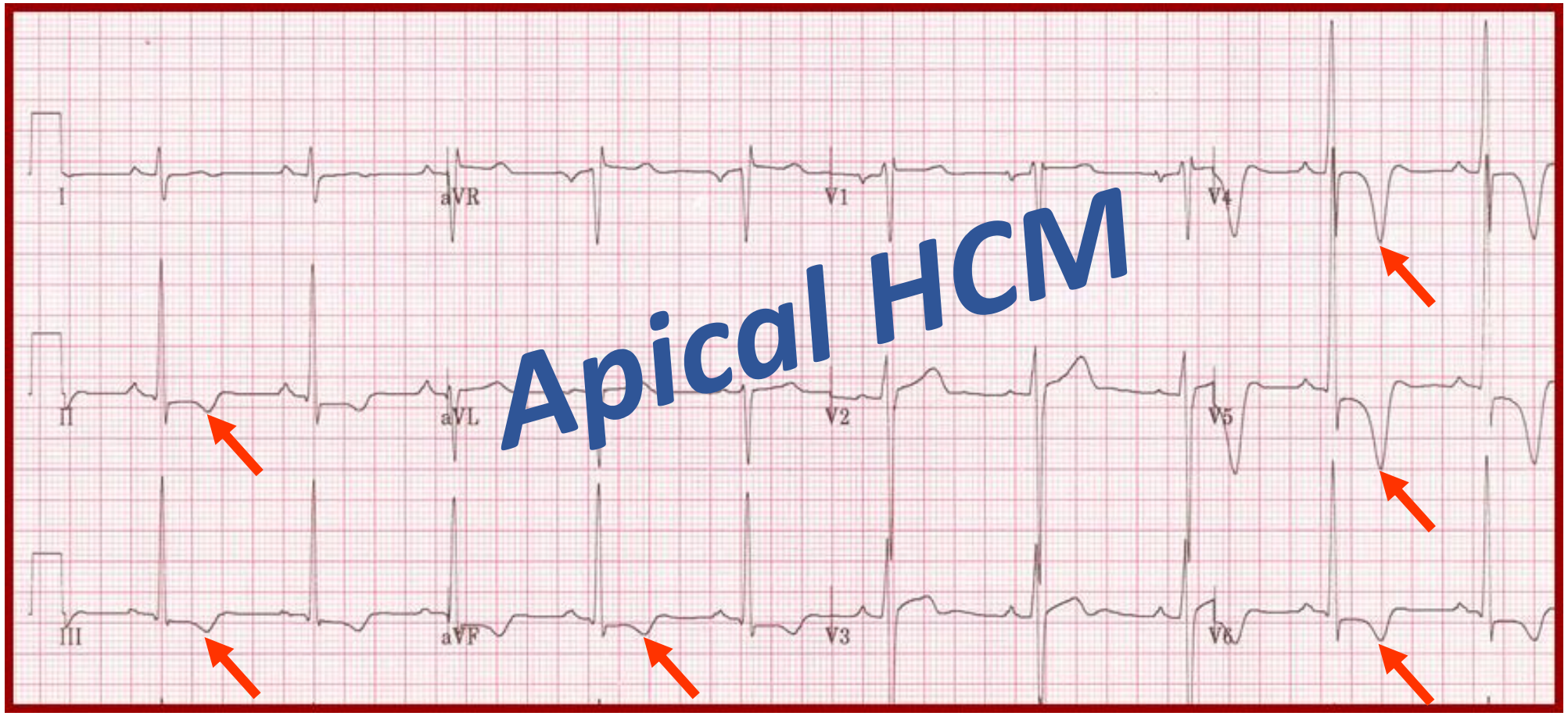
- *1996-2016*
- *11168 jugadores fútbol (15-17 a, FA)*
- *0,38% con cardiopatías riesgo MSC*
- ***8 casos de MSC: 7 miocardiopatías (3 MCH**, 6 recon normal)*
- *MSC: 1/14794/año (6,8/100000/año)*

# *Valoración riesgo*

- *MSC/PC*
- *Arritmias*
- *Acelerar progressión de la cardiopatía*

# *Baloncesto professional, 24 a*

*Asintomático, historia personal y familiar normal, caucásico*



## Recommendations for competitive sports participation in athletes with cardiovascular disease

**2005**

A consensus document from the Study Group of Sports 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

AHA/ACC SCIENTIFIC STATEMENT

**2015**

## Eligibility and Disqualification Recommendations for Competitive Athletes With Cardiovascular Abnormalities: Task Force 3: Hypertrophic Cardiomyopathy, Arrhythmogenic Right Ventricular Cardiomyopathy and Other Cardiomyopathies, and Myocarditis

A Scientific Statement From the American Heart Association and American College of Cardiology

*"Athletes with a probable or unequivocal clinical expression and diagnosis of HCM (ie, with the disease phenotype of LV hypertrophy)* ***SHOULD NOT PARTICIPATE*** *in most competitive sports, with the exception of those of low intensity (class IA sports)"*

# Sport Disciplines

## Skill

| | |
|---|---|
| Isometric | +/- |
| Isotonic | +/- |
| Cardiac remodeling | +/- |

- Golf
- Archery
- Sailing
- Table Tennis
- Equestrian
- Karate
- Shooting/Rifle
- Curling
- Sled disciplines
- Ski Jumping

## Power

| | |
|---|---|
| Isometric | +++/++++ |
| Isotonic | +/++ |
| Cardiac remodeling | +/++ |

- Weightlifting
- Wrestling / Judo
- Boxing
- Short distance running
- Shot-putting
- Discus / Javelin
- Artistic gymnastics
- Bobsleigh
- Short-track skating
- Alpine skiing
- Snowboarding

## Mixed

| | |
|---|---|
| Isometric | ++/+++ |
| Isotonic | ++/+++ |
| Cardiac remodeling | ++/+++ |

- Soccer
- Basketball
- Volleyball
- Waterpolo
- Badminton
- Tennis
- Fencing
- Handball
- Rugby
- Hockey / Ice-hockey

## Endurance

| | |
|---|---|
| Isometric | ++/+++ |
| Isotonic | +++/++++ |
| Cardiac remodeling | ++++ |

- Cycling
- Rowing
- Mid/long distance swimming
- Mid/long distance running
- Canoeing
- Triathlon
- Pentathlon
- X-country skiing
- Biathlon
- Long distance skating

*Borjesson et al. EHJ 2019*

# Surviving Competitive Athletics with Hypertrophic Cardiomyopathy

Barry J. Maron, MD, and Heinrich G. Klues, MD ***AJC 1994***

*n:* ***14*** *(13 males)*
*43 yrs (30-66)*
*HCM identified at 34 (24-57)*
*LVWTh 18-28 mm*
*Sports (distance running, swimming, triathlon, basketball, football)*
*Training 15 yrs (6-22)*
***12/14 performed either at the national, collegiate or professional level***

*"It is possible for* ***some patients with HCM to tolerate particularly intense athletic training and competition for many years,*** *and even maintain high levels of achievement without incurring symptoms and disease progression or dying suddenly. The explanation for such a favourable clinical course in these particular athletes with HCM is uncertain, and provides an* ***incentive for further efforts at risk stratification in such persons****"*

# *ICD Multinational Registry (Lampert et al. Circulation 2013)*

*n= **372** (60+72 competitive)*

*5 hrs/wk (13 hrs/wk)*

***33 yrs** (10-60)*

*n= 89<20 yrs*

*33% Female*

*62% on β-blockers*

*42% ICDs 2ndary prevention*

***31 months follow-up***

**Shocks due to VT/VF during training/competition (n= 21), n (%)**

| Cardiac diagnosis | | |
|---|---|---|
| Idiopathic VT/VF (normal heart) | 33 | 4 (12) |
| CAD | 39 | 3 (8) |
| ARVD | 53 | 8 (15) |
| HCM | 65 | 1 (2) |
| LQTS | 73 | 2 (3) |
| Others | 109 | 3 (3) |

***HCM with ICD: same frequency of shocks exercise vs rest***

- ***88 athletes with HCM***
- *71% asymptomatic (11% syncope/presyncope)*
- *88% low risk, 9% intermediate risk, 3% high risk*
- *Football, athletics, rowing, swimming, basket, cycling, triathlon…….*
- ***7 yr follow-up***
- ***61 stopped or leisure-time sport***

  *1 SCD, 1 SCA, **23%** symptoms (3 syncope, 7 palpitations, 2 dyspnea, 2 chest pain)*
- ***27 continued training & competition***

  *No SCA/SCD, **15%** symptoms (1 syncope, 3 palpitations)*

***Pelliccia et al. Circulation 2018 & Europrevent 2019***

*"In the absence of robust evidence, these guidelines largely reflect **EXPERT OPINION** and **canNOT be considered as LEGALLY BINDING**"*

*"the present document encourages **SHARED DECISION MAKING** with the athlete and respects the autonomy of the athlete **after careful information** about the potential risks of an adverse event"*

# *High Risk HCM: absolute contraindication*

- *History of aborted SCD/CA*
- *Symptoms, particularly unheralded syncope*
- *Exercise-induced ventricular tachycardia*

**Class IIb/Level C**

- *High ESC 5-year risk score**
- *Significant increase in LV outflow gradient (>50 mmHg)*
- *Abnormal blood pressure response to exercise (*<20 mmHg increase in SBP, or exercise-induced hypotension)

**Pelliccia et al. EHJ 2019**

# HCM Risk-SCD Calculator

EUROPEAN SOCIETY OF CARDIOLOGY®

| | | |
|---|---|---|
| **Age** | **Years** | *Age at evaluation* |
| **Maximum LV wall thickness** | **mm** | *Transthoracic Echocardiographic measurement* |
| **Left atrial size** | **mm** | *Left atrial diameter determined by M-Mode or 2D echocardiography in the parasternal long axis plane at time of evaluation* |
| **Max LVOT gradient** | **mmHg** | *The maximum LV outflow gradient determined at rest and with Valsalva provocation (irrespective of concurrent medical treatment) using pulsed and continuous wave Doppler from the apical three and five chamber views. Peak outflow tract gradients should be determined using the modified Bernouilli equation: Gradient= $4V^2$, where V is the peak aortic outflow velocity* |
| **Family History of SCD** | ○ No ○ Yes | *History of sudden cardiac death in 1 or more first degree relatives under 40 years of age or SCD in a first degree relative with confirmed HCM at any age (post or ante-mortem diagnosis).* |
| **Non-sustained VT** | ○ No ○ Yes | *3 consecutive ventricular beats at a rate of 120 beats per minute and <30s in duration on Holter monitoring (minimum duration 24 hours) at or prior to evaluation.* |
| **Unexplained syncope** | ○ No ○ Yes | *History of unexplained syncope at or prior to evaluation.* |

| | |
|---|---|
| **Risk of SCD at 5 years (%):** | |
| **ESC recommendation:** | |

**Should not be used in elite/competitive athletes**

2014 ESC Guidelines on Diagnosis and Management of Hypertrophic Cardiomyopathy (Eur Heart J 2014 – doi:10.1093/eurheartj/ehu284)

O'Mahony C et al Eur Heart J (2014) 35 (30): 2010-2020

***HCM Risk-SCD should not be used in:***

- ***Paediatric patients ( <16 years)***
- ***Elite/competitive athletes***
- ***HCM associated with metabolic diseases (e.g. Anderson-Fabry disease), and syndromes (e.g. Noonan syndrome).***
- ***Patients with a previous history of aborted SCD or sustained ventricular arrhythmia who should be treated with an ICD for secondary prevention.***

***Caution should be exercised when assessing the SCD in patients following invasive reduction in left ventricular outflow tract obstruction with myectomy or alcohol septal ablation.***

***Pending further studies, HCM-RISK should be used cautiously in patients with a maximum left ventricular wall thickness ≥35 mm.***

***HCM = hypertrophic cardiomyopathy; LV = left ventricular; LVOT = left ventricular outflow tract; NSVT = non-sustained ventricular tachycardia; SCD = sudden cardiac death; VT = ventricular tachycardia***

# *HCM*

*Following comprehensive evaluation and **explanation** of the disease characteristics, **risk factors** and **potential outcomes** and assuring that a reasonable understanding and **AGREEMENT** has been reached between the athlete and the physician, it seems reasonable that adult athletes with:*

- ***Mild clinical expressions of HCM***
- ***Low ESC risk score ****
- ***Adult age***

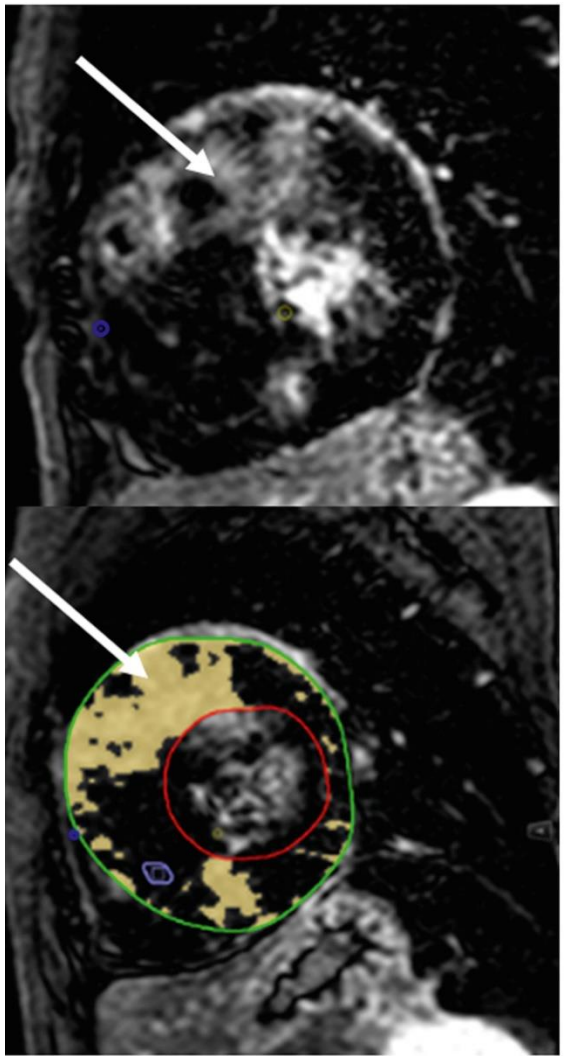
**Class IIb/Level C**

*MAY **selectively** BE **ALLOWED** to participate in **all competitive sports**, with **exception of those where occurrence of syncope may be associated with harm or death**.*

*Such athletes should be **reviewed annually** to assess symptoms and changes in risk profile.*

**Pelliccia et al. EHJ 2019**

# *MRI & HCM Risk*

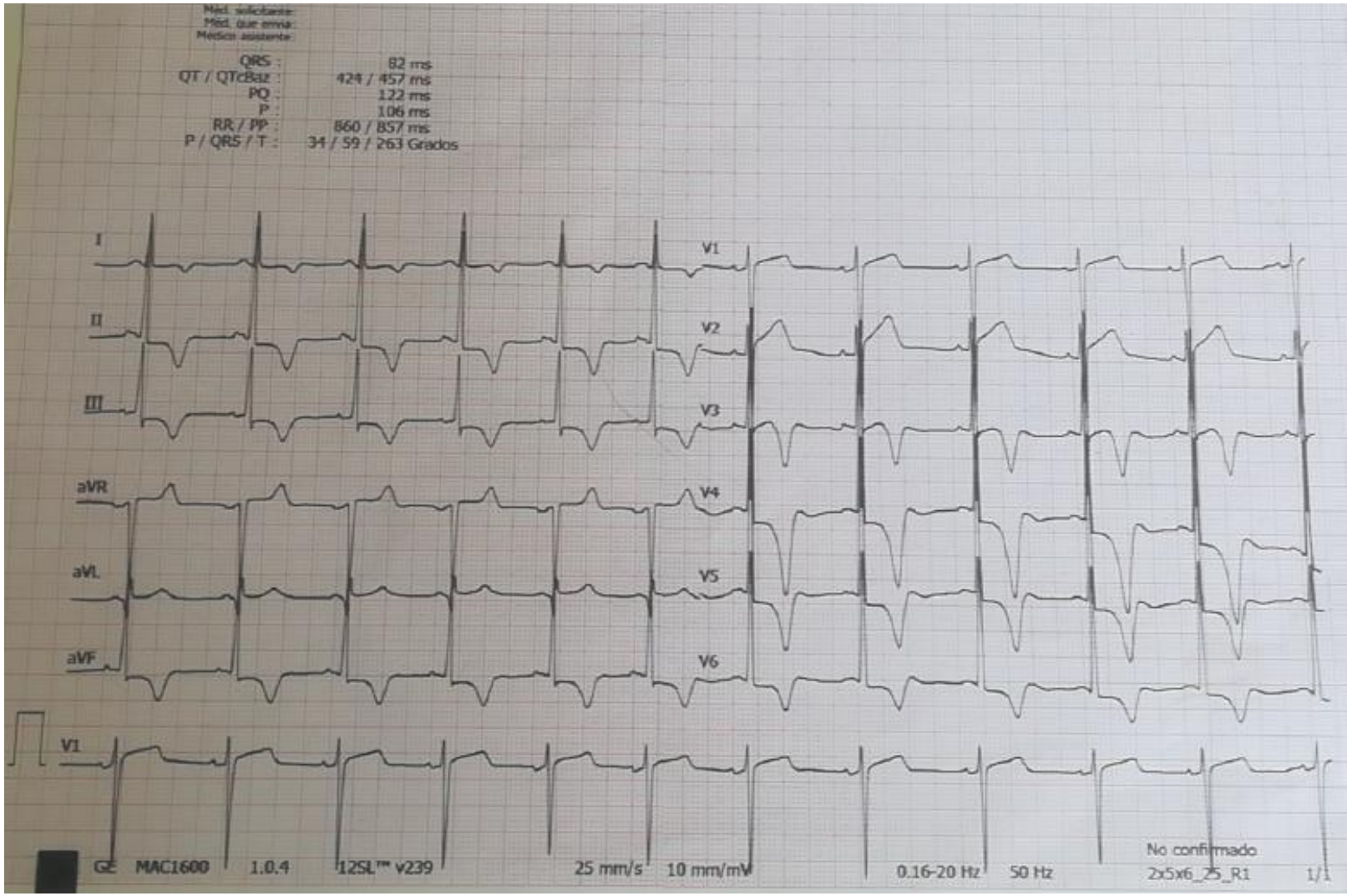


*1423 low-/intermediate-risk patients with HCM*
*≥18 yrs (66 ± 14 yrs), 60% men*
*Preserved LVEF*
*5-year SCD risk score 2.3 ± 2.0*
*Primary endpoint: SCD and ICD appropriate shocks*

***Extensive LGE (≥ 15% of LV myocardium)***
***> Risk Ventricular Arrhythmias***
***> SCD***

***Mentias et al. JACC 2018***

*24 yr female, west african, asymptomatic pro football player*




# Apical HCM

## MRI:13.5 mm
## NO LGE

*No LVOT gradient*
*No arrhytmias*
*Normal BP at Exercise*
*Low ESC Risk Score*

*Family history?*

# *Hypertrophic cardiomyopathy (G+ P-)*

1. ***G+P-*** *individuals should be assessed to exclude the broader phenotypic and clinical features of HCM (with ECG, CMR, exercise test, and 24-h ECG monitoring). In the absence of phenotypic features of HCM, these athletes* ***may be allowed to engage in all competitive sports****.*

***Class IIa/Level C***

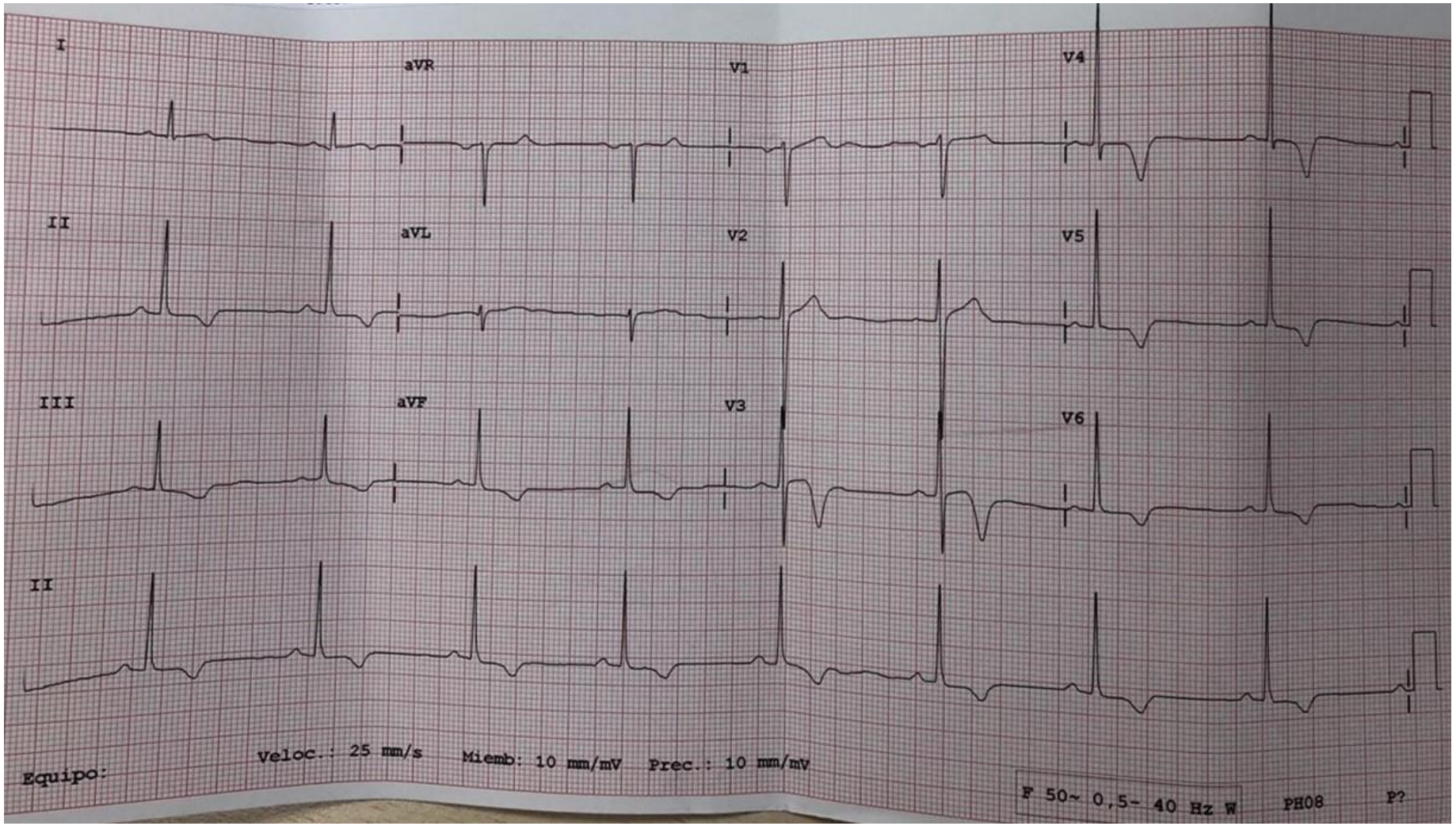
*2. There is limited data in individuals with* ***positive genotype, negative phenotype, and an abnormal ECG in isolation****; therefore, until further data is available it is recommended that such individuals are managed similarly to those without LV hypertrophy.*

***Class III/Level C***

***Pelliccia et al. EHJ 2019***

# *Fútbol 3ª div, 25 a, raza negra*

*RM: SIV-PP 12 mm predominio apical*



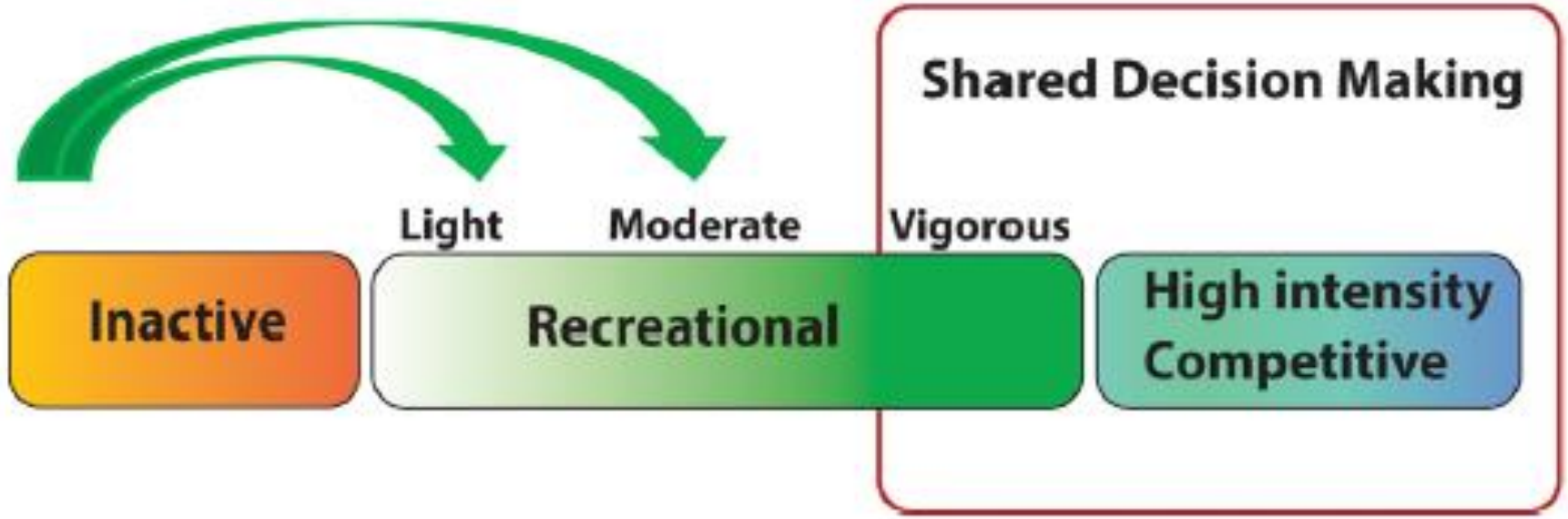
# *Miocardiopatía Hipertrófica*

PERSPECTIVE

## Exercise and Hypertrophic Cardiomyopathy

Time for a Change of Heart

*Saberi, Circulation 2018*



JAMA | Preliminary Communication

# Effect of Moderate-Intensity Exercise Training on Peak Oxygen Consumption in Patients With Hypertrophic Cardiomyopathy

## A Randomized Clinical Trial

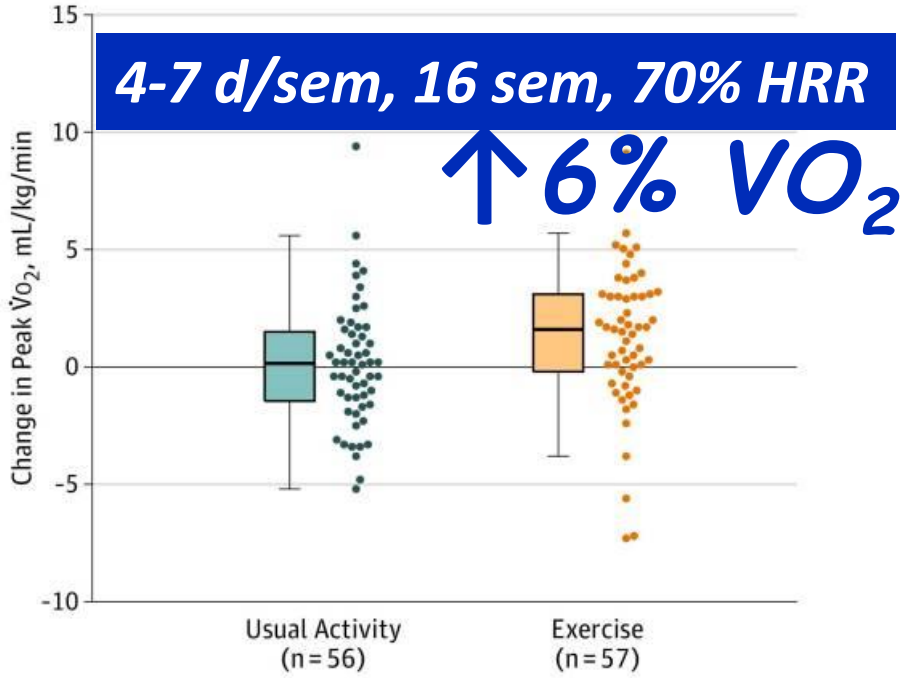
*Saberi, JAMA 2017*

***Estudio RESET HCM***

*136 pacientes*

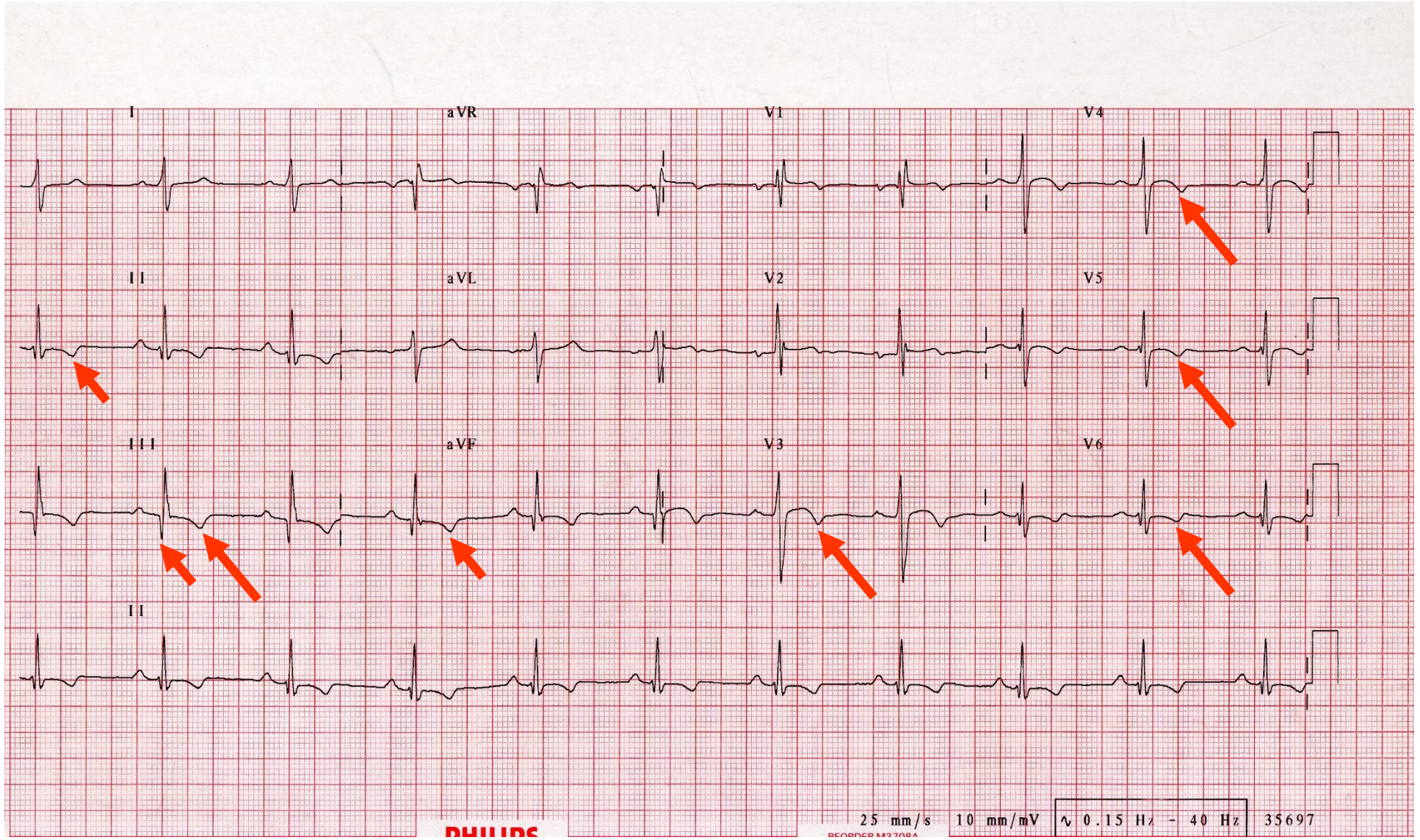
*50 años*

***SIN eventos** (AV, MS, PC, desfib)*



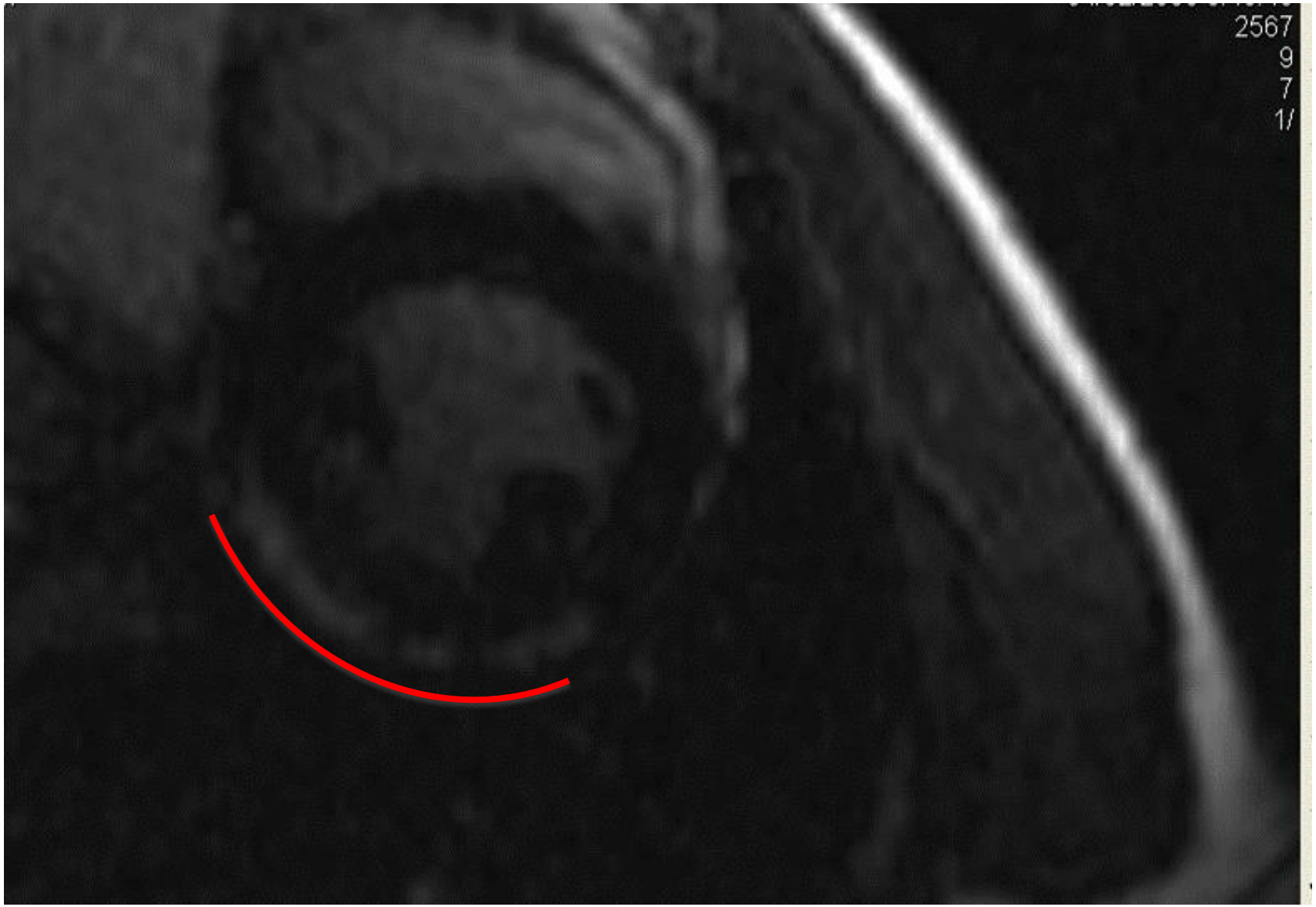

***"menor riesgo de mortalidad cardiovascular/hospitalizaciones"***

# *Fútbolista profesional, 23 a asintomático, historia familiar y exploración física normales*



- *EKG changes & 2nd-degree (type 1) AV block*
- *ECHO: low normal EF*
- *X test: sporadic isolated PVCs*
- *24 h Holter: infrequent PVCs (2 morphol), 1 triplet, 2nd degree type 1 AV block*

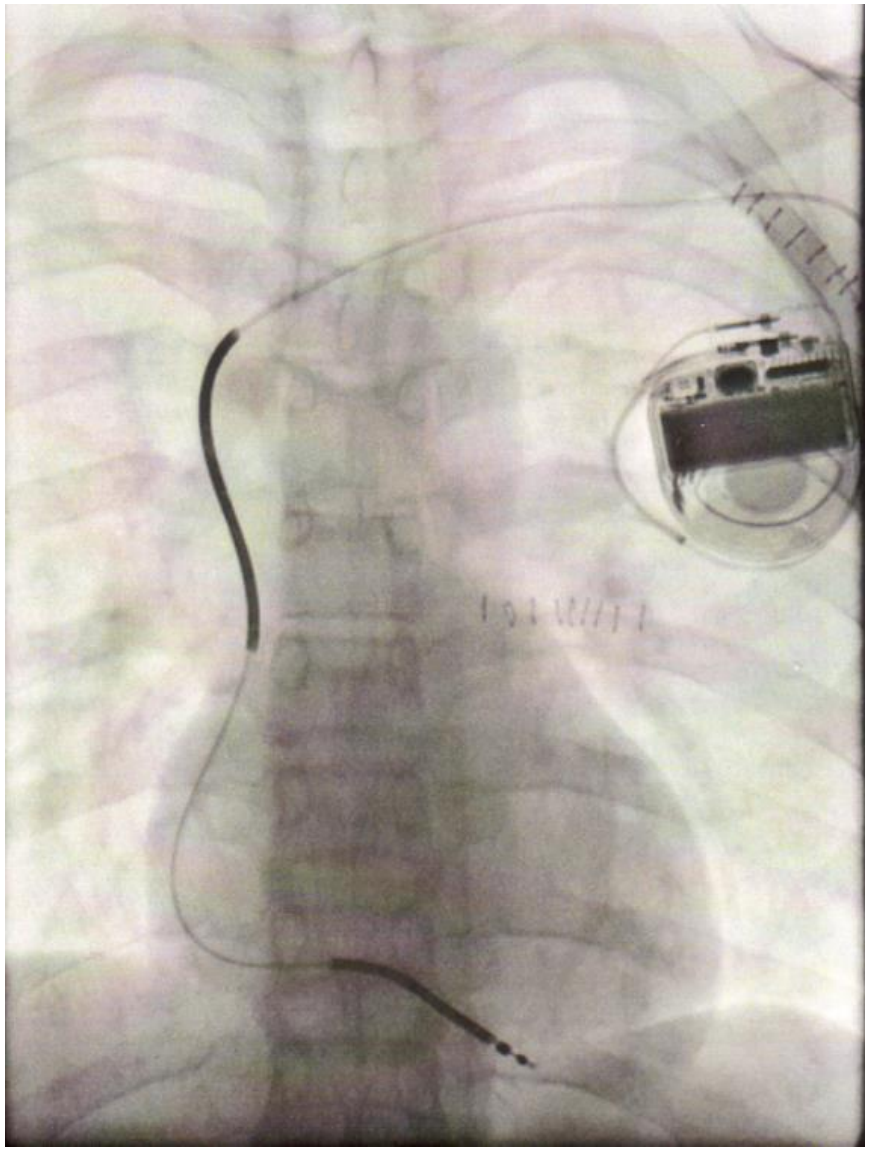
*8 days later: EFFORT SYNCOPE*




***Mid to apical inferolateral***
***LV late gadolinium enhancement***

# *Left dominant arrhythmogenic cardiomyopathy*

*18 months post syncope*
*ICD*



# *Arrhythmogenic cardiomyopathy*

*Athletes with unequivocal or probable diagnosis of AC* ***should not participate in competitive sports.***

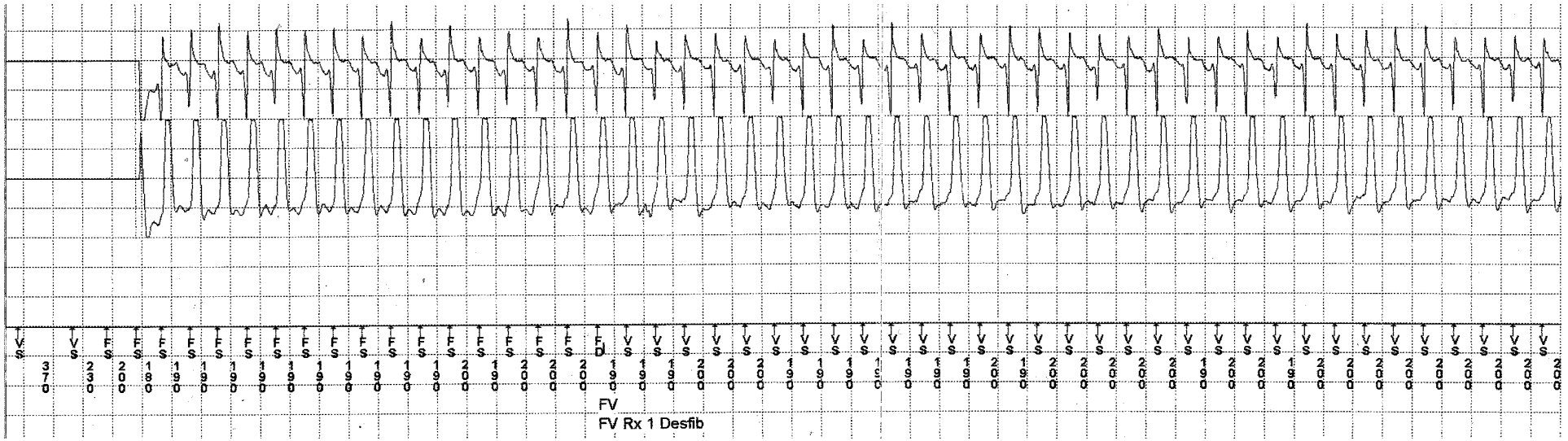
*These patients should be advised to limit their exercise programmes to* ***leisure-time activities****, and remain under clinical surveillance.*

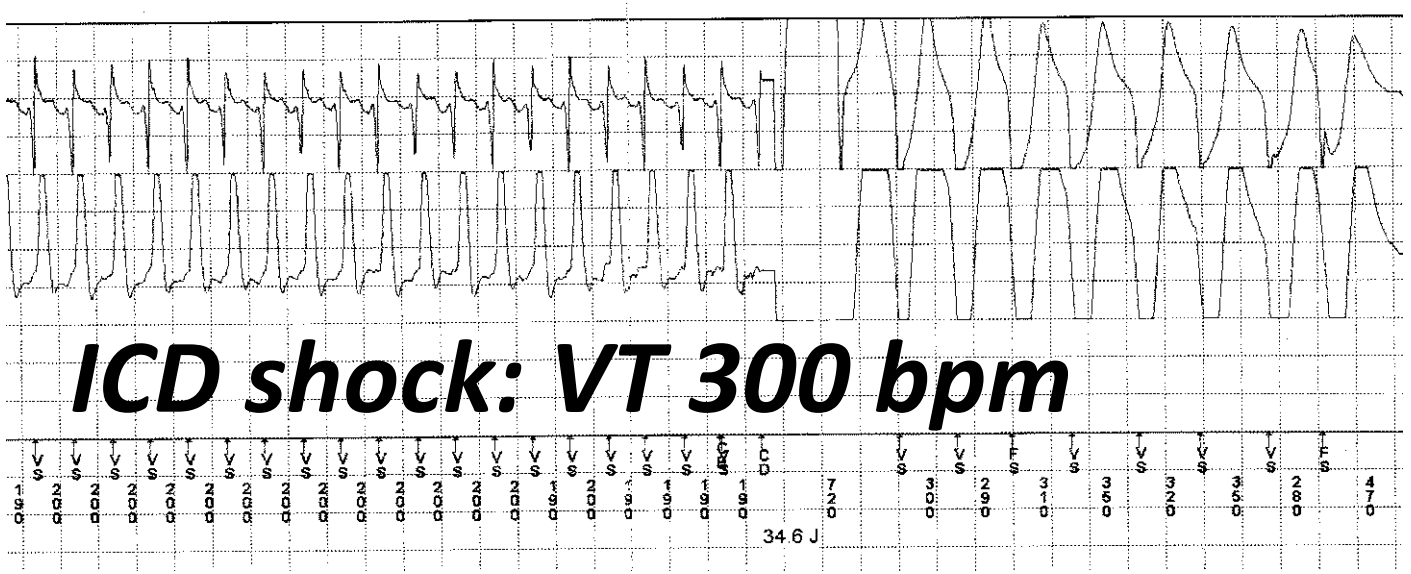
## *Class IIa/Level C*

*Athletes who are* ***genetic carriers*** *of pathogenic AC-associated desmosomal mutations (even in the* ***absence of phenotypic expression*** *of the disease)* ***should not participate in competitive sports****. These athletes should be advised to limit their exercise programmes to* ***leisure-time activities*** *and remain under clinical surveillance.*

***Pelliccia et al. EHJ 2019***

# 3 yrs post síncope




## ICD shock: VT 300 bpm

# *Myocarditis*

*General consensus exists that athletes with diagnosis of myocarditis should be restricted from exercise programmes for a period of **3–6 months**, according to the clinical severity and duration of the illness, LV function at onset, and extent of inflammation on the CMR. This time period is considered appropriate to ensure clinical and biological resolution of the disease.* ***Class IIb/Level C***

*It is reasonable for athletes to resume training and competition after a myocarditis if **ALL** of the following criteria are met:*

*(1) LV systolic function has returned to the normal range.*

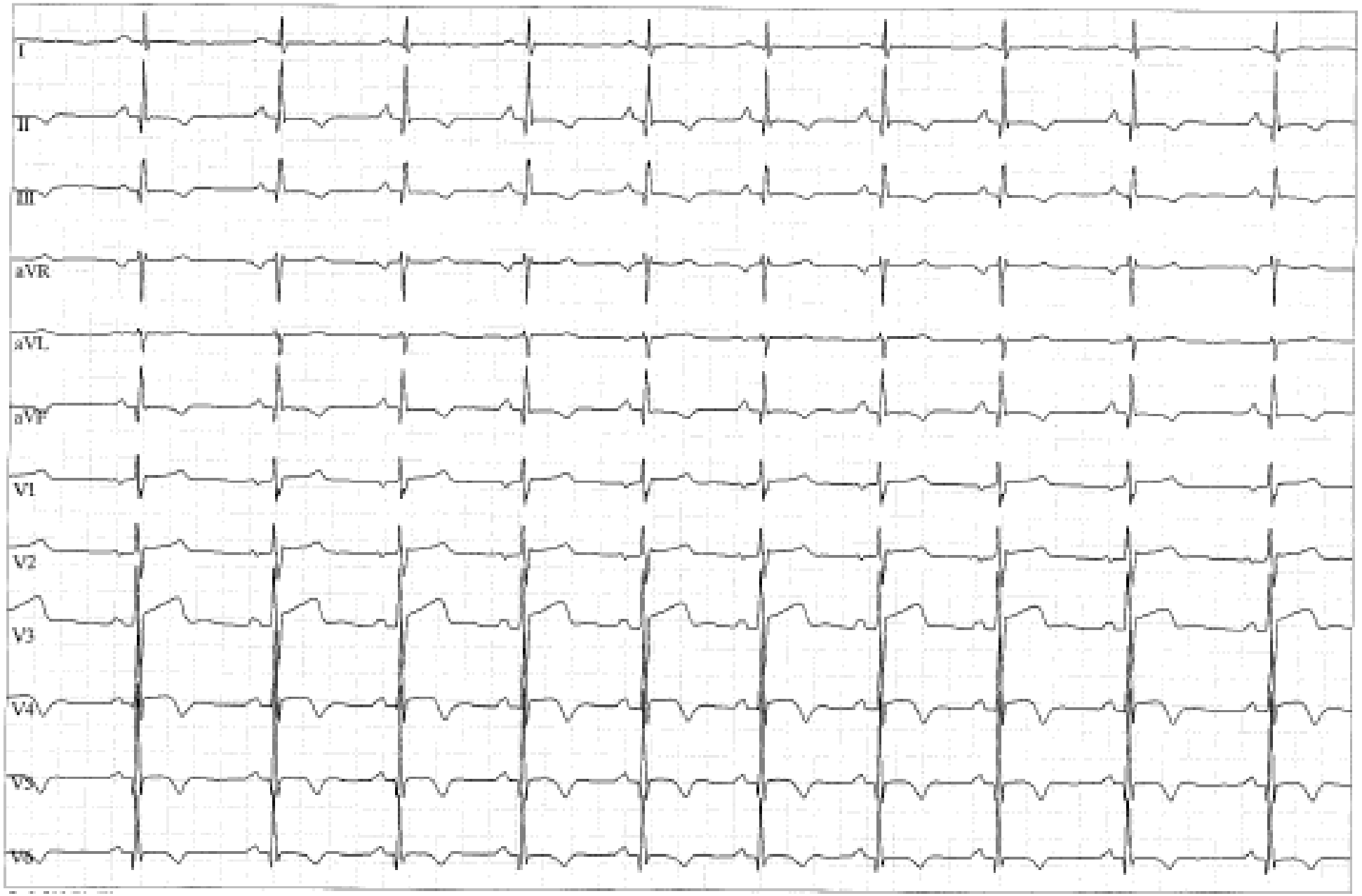
*(2) Serum biomarkers of myocardial injury have normalized.*

*(3) Clinically relevant arrhythmias, such as frequent or complex repetitive forms of ventricular or supraventricular arrhythmias are absent on 24-h ECG monitoring and exercise test.* ***Class IIa/Level C***

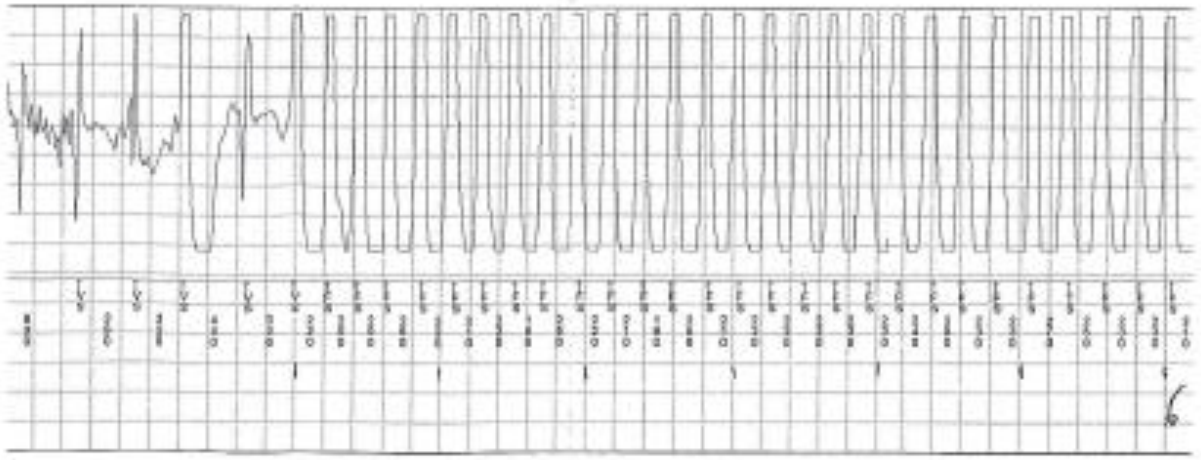
***Pelliccia et al. EHJ 2019***

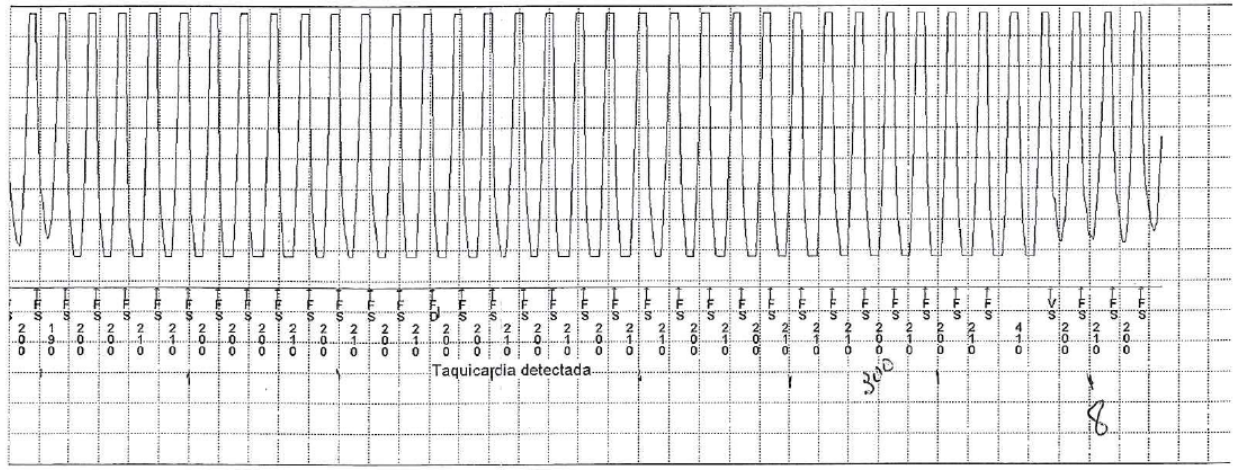
# *Fútbol profesional, 24 a, raza negra*

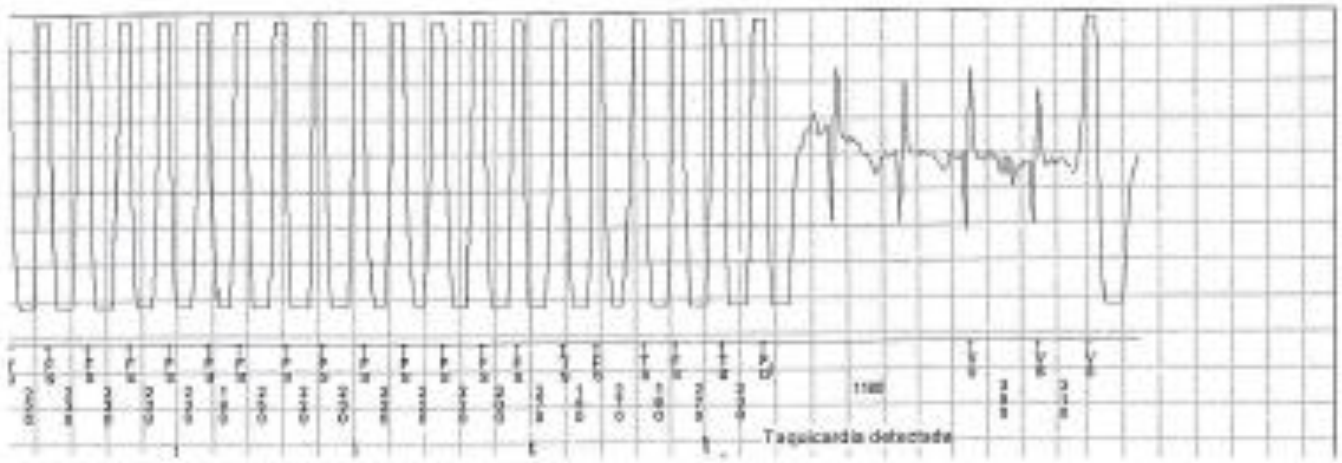
- *2ª opinión tras habérsele recomendado abandonar deporte competición*
- *Seguimiento al menos de 2 años: alteraciones repolarización en ECG reposo + fibrosis subepicárdica infero lateral apical extensa en RM + FEVI 44%*
- *Asintomático, FEVI normal, EEF -, juega 36 partidos con Reveal (sin arritmias)*
- *Siguiente temporada, juega 15 partidos, asintomático, sin arritmias*


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

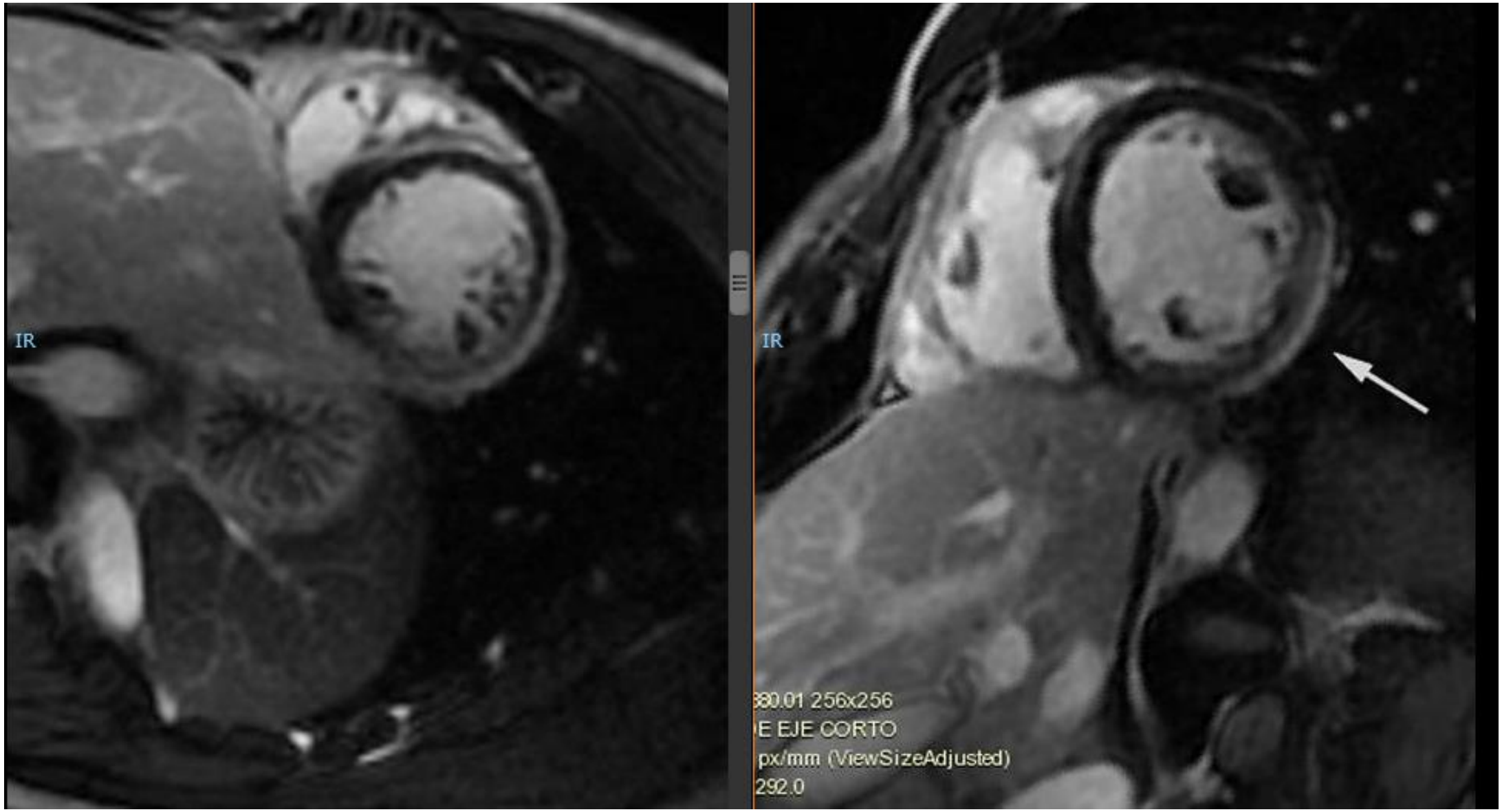
*Inicio siguiente temporada: mareos coincidiendo con rachas de TV (8-35 sg hasta 300 lpm)*





# *Extenso RT subepicárdico ínfero-lateral medio-basal y apical*



# Myocarditis

*The clinical significance of **persistent LGE** in an asymptomatic athlete with clinically healed myocarditis is **unknown**, however, myocardial scar is a potential source of ventricular tachyarrhythmias.*

*At present, it seems reasonable for these athletes to resume training and participate in competitive sport if LV function is preserved and in the absence of frequent or complex repetitive forms of ventricular or supraventricular arrhythmias during maximal exercise and on 24-h ECG monitoring (including session of training/competition).*

*Asymptomatic athletes with LGE, however, should remain under **annual clinical surveillance**.* **Class III/Level C**

Pelliccia et al. EHJ 2019

EAPC
European Association
of Preventive Cardiology

Section of Sports
Cardiology

SOCIEDAD
ESPAÑOLA DE
CARDIOLOGÍA

Grupo de
Cardiología del Deporte

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quirónsalud