Embassy of Italy
London

"How can the UK learn from Italy's pre-participation screening programme to reduce the incidence of Young Sudden Cardiac Death"

Embassy of Italy, London, 28 January 2025

Ischemic heart disease

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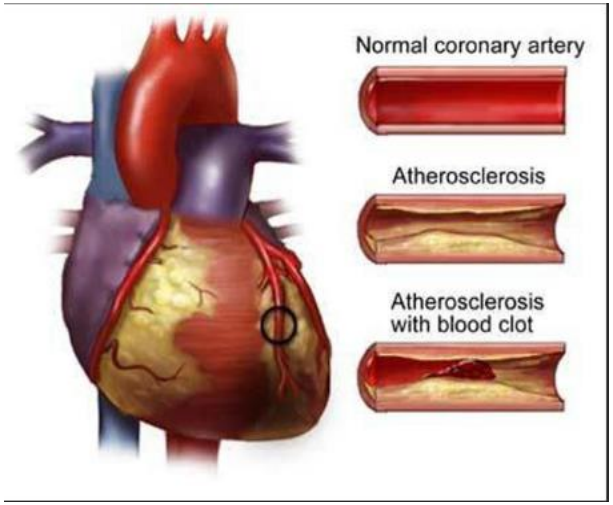
Ischemic Heart Disease in the Athletes

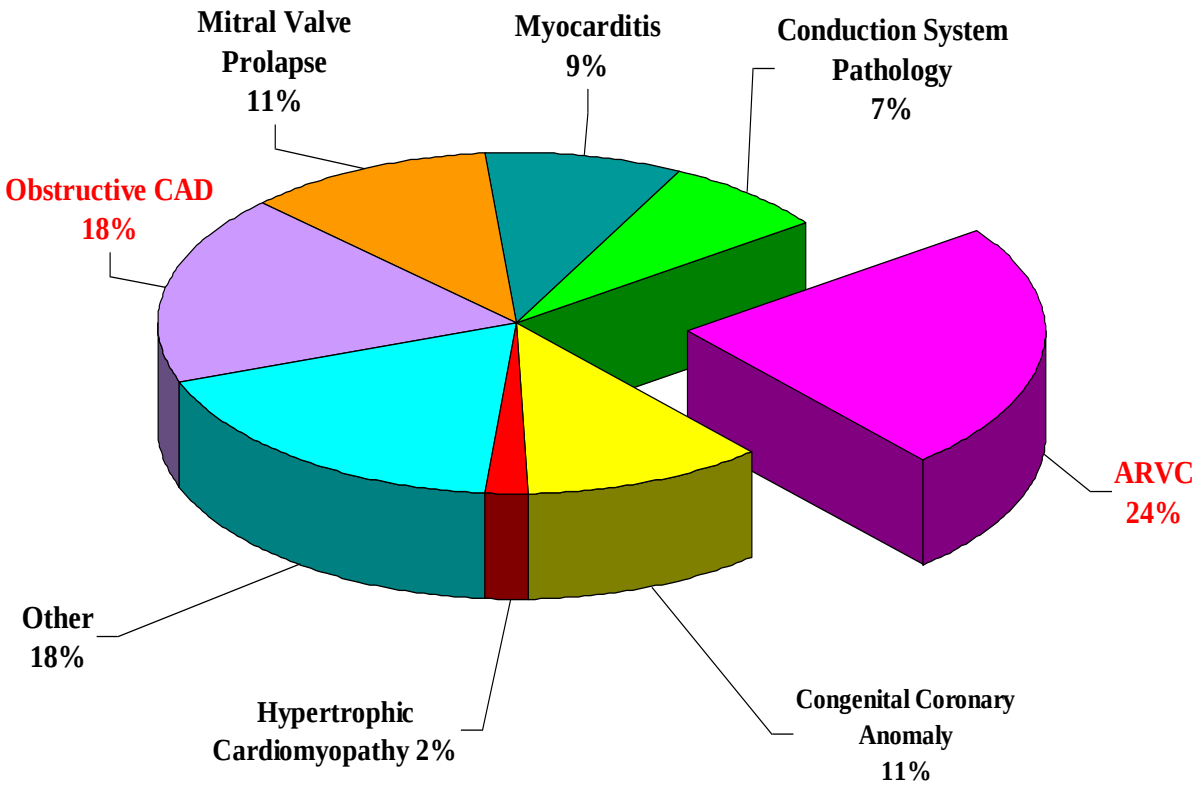
- ***Ischemic heart disease*** is principally caused by aterosclerotic plaques in the coronary arteries and represents the ***principal cause of mortality and morbility in general polpulation***

- Even if the benefits of regular exercise in ischemic heart disease appear to outweigh the risks, ***vigorous physical exercise is associated with an increased risk of coronary events*** including ***sudden death*** and ***acute myocardial infarction***

- ***Ischemic heart disease represents the most frequent cause of SCD in adult (> 35 yrs)*** athletes, but also an important cause of SCD in young athletes

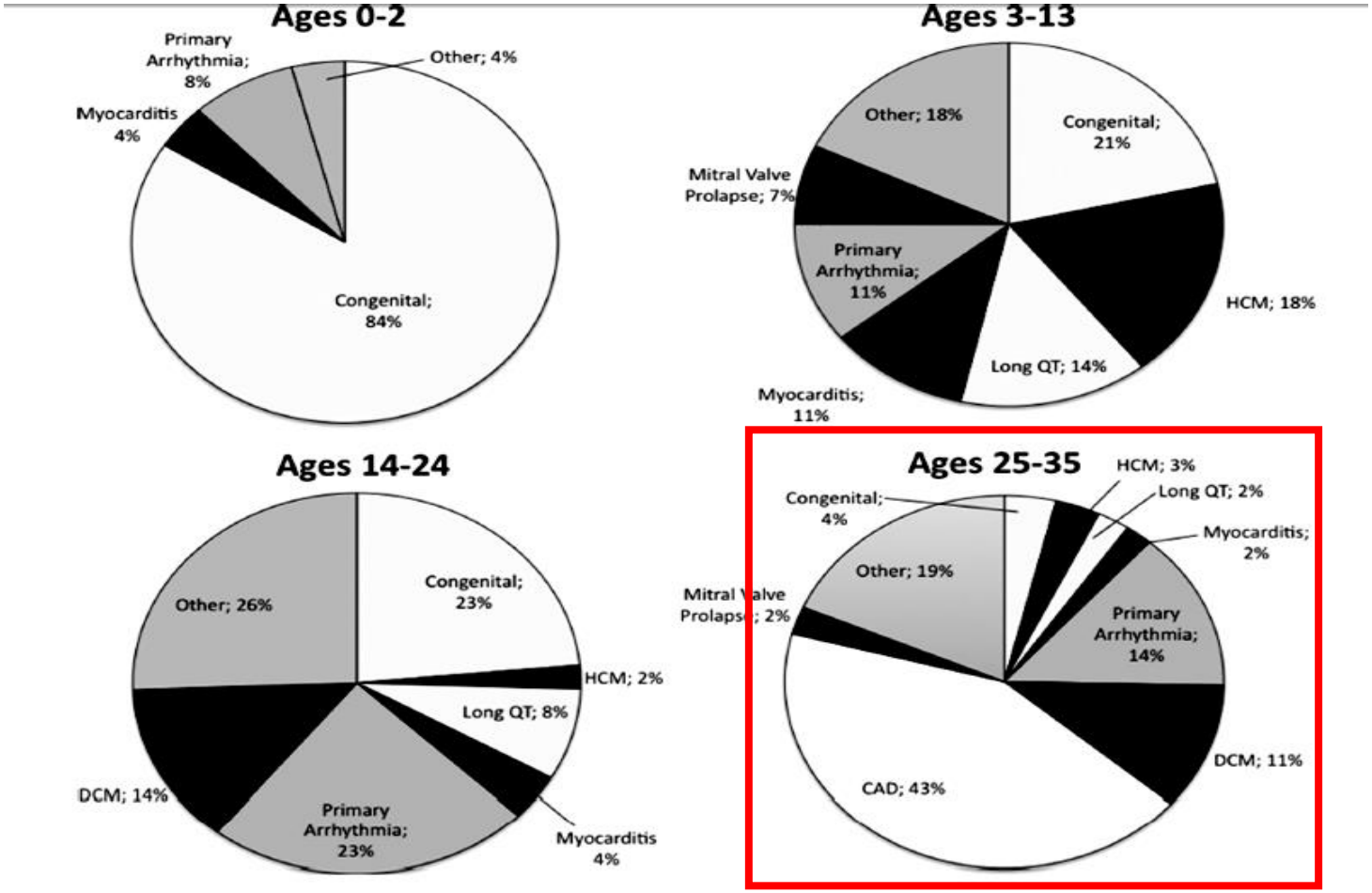


Causes of SCD in young athletes (<35yrs) in the Veneto Region, Italy



Corrado et al N Engl J Med 1998; 339: 364-369

Causes of SCD in young athletes: stratification by age decades



Causes of SCD in young athletes (<35yrs) in the Veneto Region, Italy

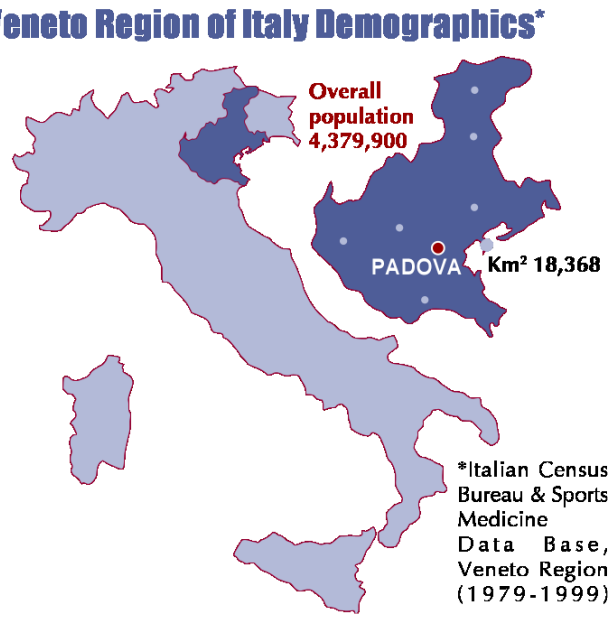
Cardiomyopathies

Valvular Diseases

Others

80 %

Ischemic Heart Disease



Arrhythmia/Electrophysiology

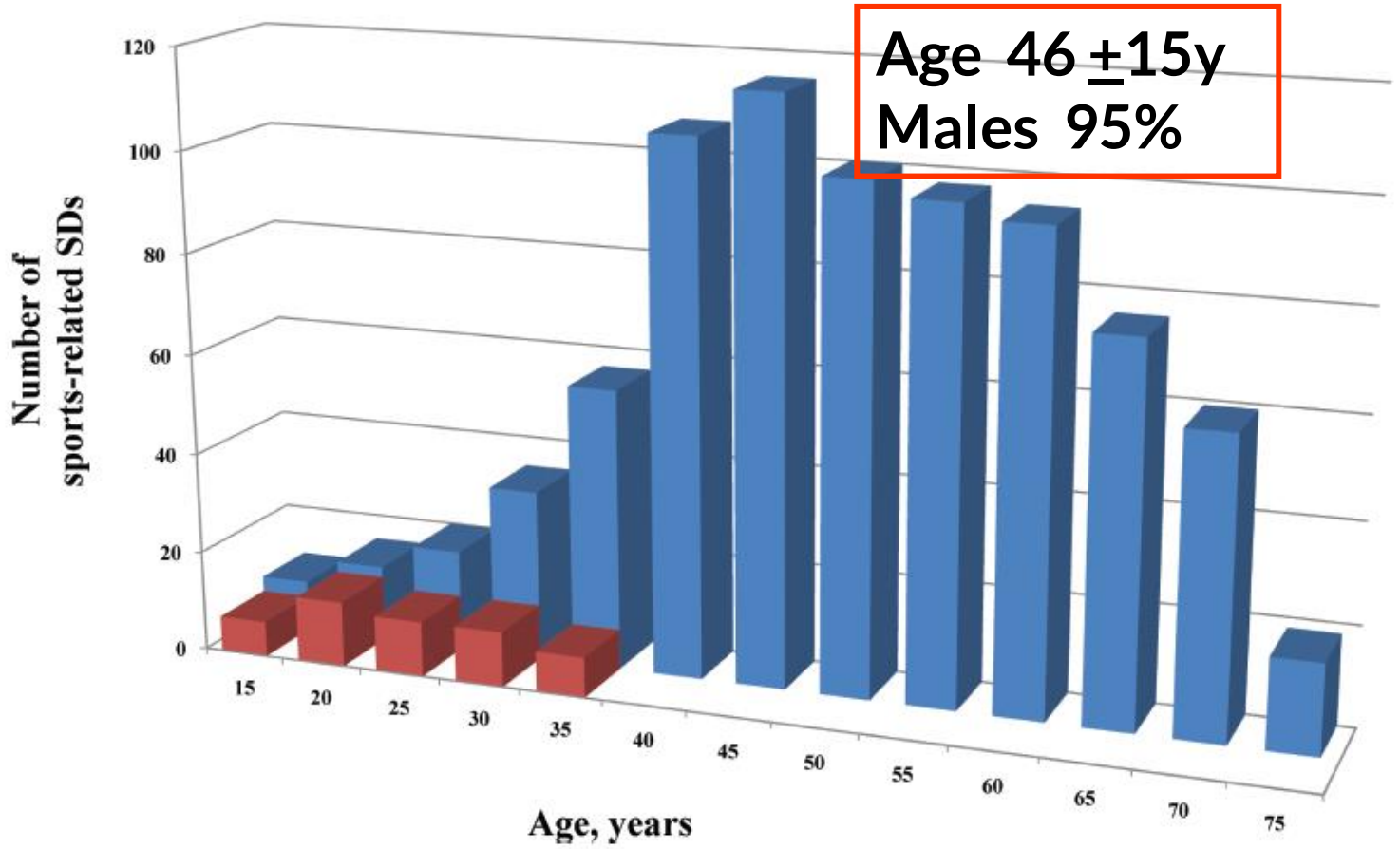
Sports-Related Sudden Death in the General Population

Eloi Marijon, MD; Muriel Tafflet, PhD; David S. Celermajer, PhD, FRACP; Florence Dumas, MD; Marie-Cécile Perier, MSc; Hazrije Mustafic, MD; Jean-François Toussaint, MD, PhD; Michel Desnos, MD; Michel Rieu, MD; Nordine Benameur, MD; Jean-Yves Le Heuzey, MD; Jean-Philippe Empana, MD, PhD; Xavier Jouven, MD, PhD

Five-year observational study (2005-2010) about ***sports-related SCA in the general population 10 -75 years*** of France (not only among young competitive athletes but also in adult/senior recreational athletes)

Circulation. 2011;124:672-681

Sports-Related Sudden Death in the General Population



Circulation. 2011;124:672-681

Young Competitive Athletes (50 SCA, 6%)

Recreational Athletes (770 SCA, 94%)

Profile of victims of SCD/SCA

- Middle-aged adult males
- Asymptomatic
- No prior documentation of heart disease
- Engaged in high intensity non competitive sports activities
- Cardiac arrest due to FV
- Autopsy: atherosclerotic plaque lesions obstructing ≥ one epicardial coronary vessel(s)

Sport-related adverse CV events in Adult Subjects: AMI during Exercise

- ***AMI linked to exertion in males***: 4-10 % of all AMIs
- ***In healthy adult males:*** relative risk vs rest 2 – 10
- ***In CAD pts:*** relative risk vs rest mean 17

Ischemic Heart Disease and sport-related adverse CV events the athletes

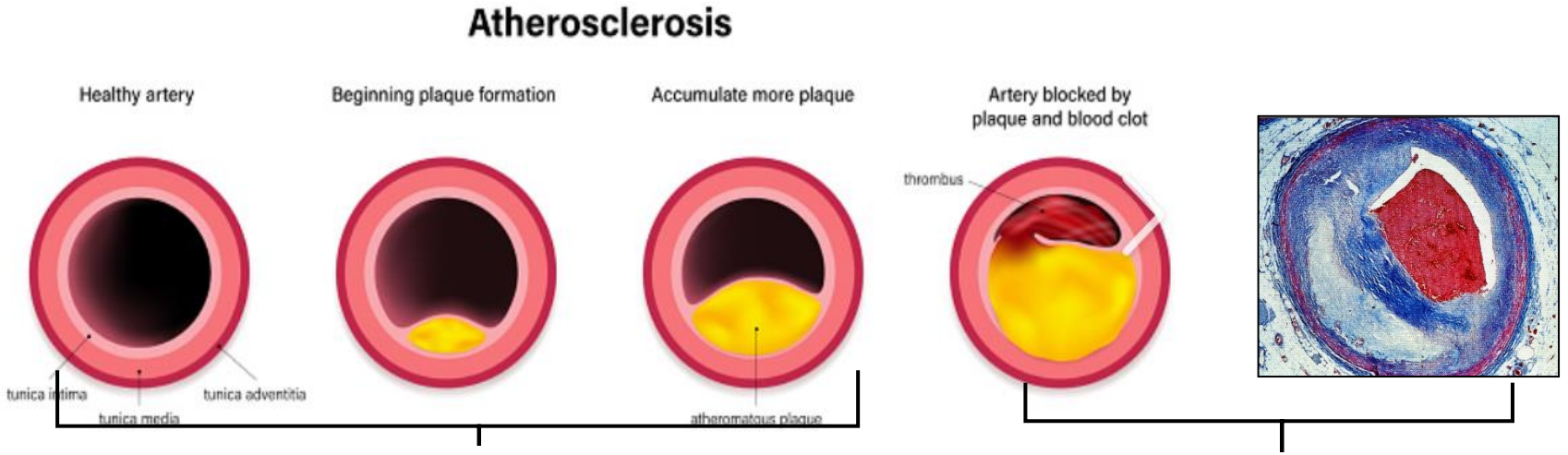
- All sport-related adverse CV events (fatal and non fatal) are more frequent in adult athletes respect to young athletes.

- The principal cause of such adverse CV events in adult athletes is ***ischemic heart disease***.

- These data underline the ***importance of pre-participation CV screening also in adult athletes***, which must target the high prevalence of subclinical ischemic heart disease in this population.

Difficulties for screening adult asymptomatic athletes for Ischemic heart disease (1)

Clinical presentation of ischemic heart disease: IHD is a pathological process characterized by progressive plaque accumulation in coronary arteries, with a long, stable and asymptomatic periods. However, it can also become unstable at any time, typically due to an acute atherothrombotic event caused by plaque rupture or erosion, with AMI or SCD



Years of asymptomatic subclinical phase

Acute phase with AMI or SCD

Difficulties for screening adult asymptomatic athletes for Ischemic heart disease (2)

Screening strategy: on the contrary of young athletes, recommendations and evidence base for CV screening in adult athletes are limited; indeed, the utility of preparticipation screening based on **resting ECG** and **exercise stress testing** remains unproven

Diagnostic value of resting ECG in CV screening of adult athletes

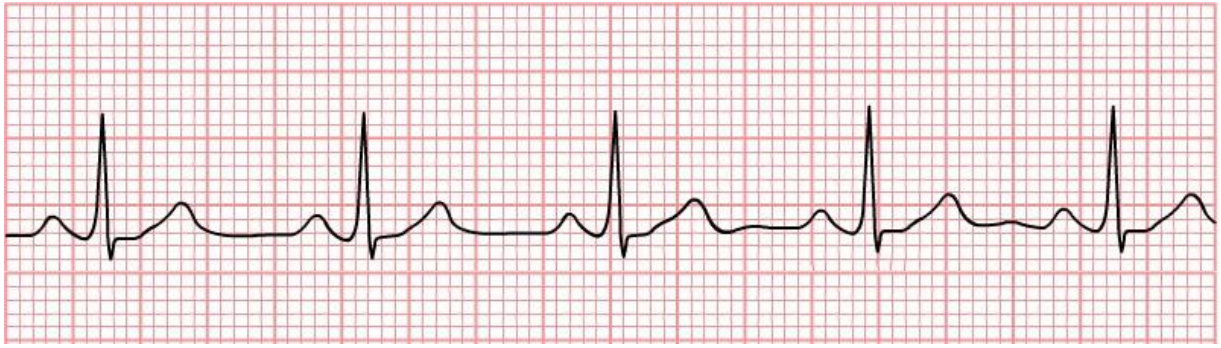
Young athletes (age ≤35 years):

Good sensitivity

- Hypertrophic cardiomyopathy (96%)
- Arrhythmogenic right ventricular cardiomyopathy (88%)
- Pre-excitation syndromes and conduction diseases (100%)
- Ion channel diseases (100%)

Adult asymptomatic athletes (age >35 years):

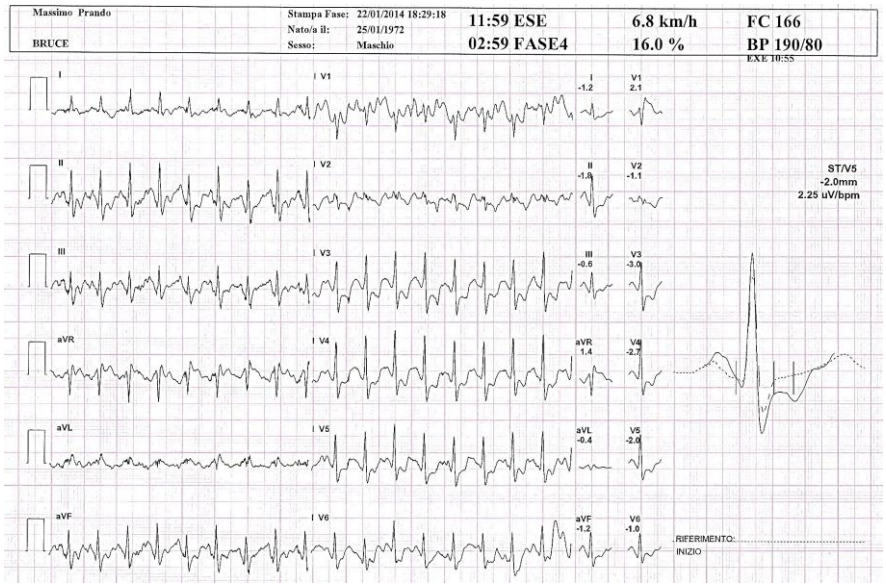
- Ischemic heart disease



Poor sensitivity

Diagnostic value of exercise stress testing in CV - CV screening of adult athletes

- EST has an established prognostic value, widespread availability and low cost, but a low predictive value for Ischemic heart disease in the general asymptomatic population
- Its diagnostic value increases in a patient population with symptoms and/or risk factors for ischemic heart disease



So: which CV screening in adult athletes?

The ESC proposal for CV screening in adult athletes: assumptions

3.7 Screening for cardiovascular disease in older athletes

The recommendations and evidence base for CV screening in athletes >35 years of age are limited. CV screening in adult and senior athletes must target the higher prevalence of atherosclerotic CAD. However, routine screening for ischaemia with exercise testing in asymptomatic adults has a low positive predictive value and a high number of false-positive tests and is not recommended.[78–80]

on pre-participation CV screening, exercise ECG testing should be reserved for symptomatic athletes or those deemed at high risk of

The ESC proposal for CV screening in adult leisure-time athletes

European Journal of Cardiovascular Prevention & Rehabilitation

EUROPEAN SOCIETY OF CARDIOLOGY®

Review

Cardiovascular evaluation of middle-aged/senior individuals engaged in leisure-time sport activities: position stand from the sections of exercise physiology and sports cardiology of the European Association of Cardiovascular Prevention and Rehabilitation

European Journal of Cardiovascular Prevention & Rehabilitation
0(00) 1–13

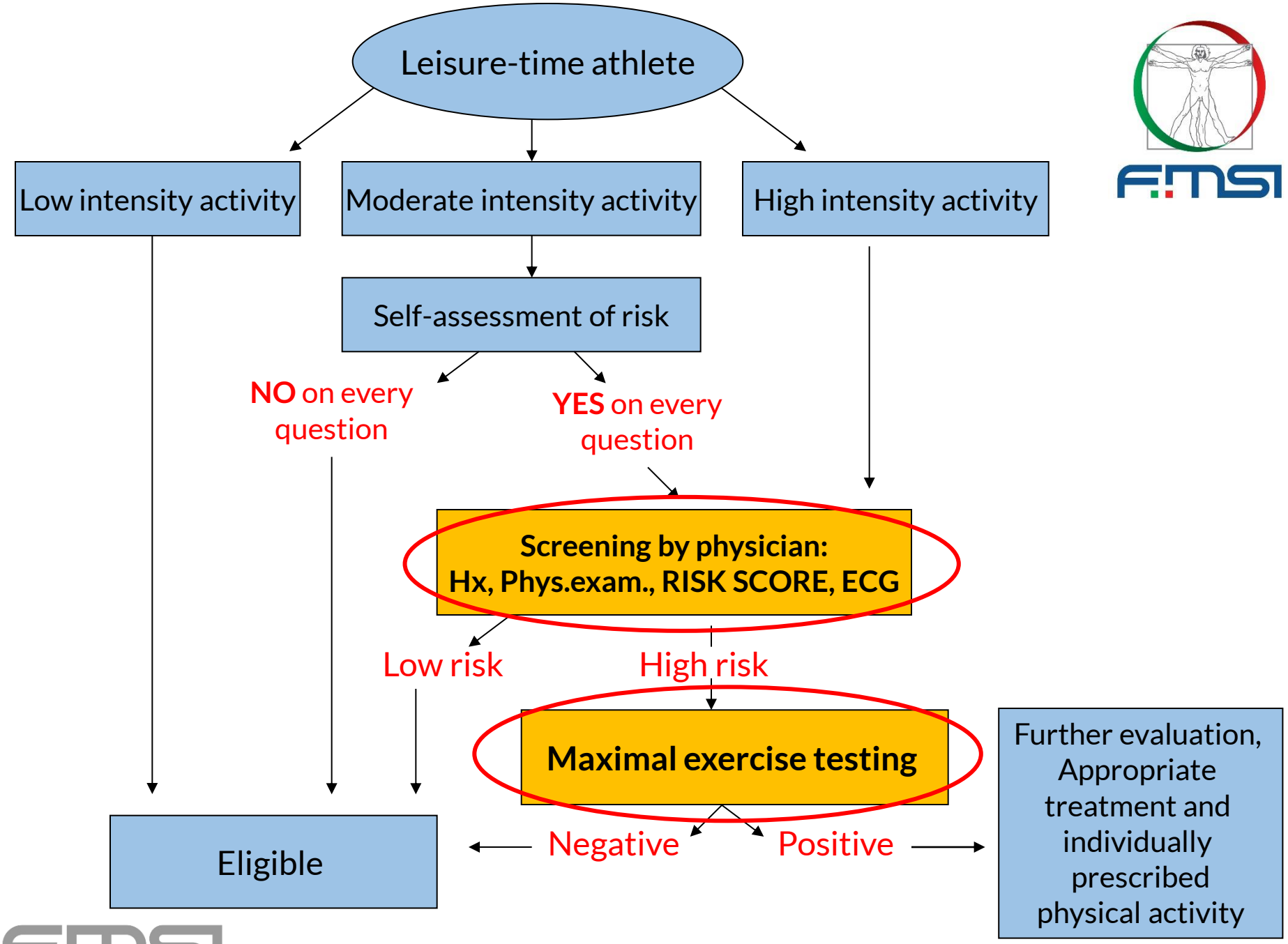
DOI: 10.1177/HJR.0b013e32833bo969
ejcpr.sagepub.com
SAGE

Resting ECG and exercise stress testing:
second line examinations (IIa indication)

Cardiovascular evaluation of adut atheletes engaging in leisure-time sports activities

- ***Self-assessment of individual risk profile:*** risk factors for CAD by means of questionnaires (?)
- ***Self-assessment of current level of habitual physical activity:*** sedentary individuals (< 2MET-h/w) or active individuals (> 2MET-h/w) (?)
- ***Self-assessment of intensity of intended physical activity:*** low intensity (< 3 MET), moderate intensity (3-6 MET), or high intensity (> 6 MET) (?)

Mats Borjesson et al. EJCPR 2011


Leisure-time athlete
Low intensity activity
Moderate intensity activity
High intensity activity
Self-assessment of risk
NO on every question
YES on every question
Screening by physician:
Hx, Phys.exam., RISK SCORE, ECG
Low risk
High risk
Maximal exercise testing
Eligible
Negative
Positive
Further evaluation, Appropriate treatment and individually prescribed physical activity

The ESC proposal for CV screening in adult competitive athletes

ESC European Society of Cardiology

European Heart Journal (2020) **00**, 1–80
doi:10.1093/eurheartj/ehaa605

ESC GUIDELINES

2020 ESC Guidelines on sports cardiology and exercise in patients with cardiovascular disease

The Task Force on sports cardiology and exercise in patients with cardiovascular disease of the European Society of Cardiology (ESC)

Authors/Task Force Members: Antonio Pelliccia* (Chairperson) (Italy), Sanjay Sharma* (Chairperson) (United Kingdom), Sabiha Gati (United Kingdom), Maria Bäck (Sweden), Mats Börjesson (Sweden), Stefano Caselli (Switzerland), Jean-Philippe Collet (France), Domenico Corrado (Italy), Jonathan A. Drezner

Resting ECG and exercise stress testing: second line examinations (IIa indications)

Recommendations for cardiovascular evaluation and regular exercise in healthy individuals aged >35 years

Recommendations	Class[a]	Level[b]
Among individuals with low to moderate CVD risk, the participation in all recreational sports should be considered without further CV evaluation.	IIa	C
Cardiac screening with family history, symptoms, physical examination, and 12-lead resting ECG should be considered for competitive athletes.	IIa	C
Clinical evaluation, including maximal exercise testing, should be considered for prognostic purposes in sedentary people and individuals with high or very high CV risk who intend to engage in intensive exercise programmes or competitive sports.	IIa	C
In selected individuals without known CAD who have very high CVD risk (e.g. SCORE>10%, strong family history, or familial hypercholesterolaemia) and want to engage in high- or very high-intensity exercise, risk assessment with a functional imaging test, coronary CCTA, or carotid or femoral artery ultrasound imaging may be considered.	IIb	B

The Italian proposal for CV screening in adult athletes: assumptions

- Because resting ECG and exercise stress testing have a low predictive value to identify subclinical ischemic heart disease in this population

- In order to respond to the **mandatory Italian medical-legal requirements,** it is therefore necessary to add, to resting ECG and exercise stress testing, another high sensitivity examination for ischemic heart disease: **coronary CT**

The Italian proposal for CV screening in adult competitive athletes

History, Physical examination
Resting ECG and Exercise stress testing

Negative findings

Positive findings

Low-moderate Score 2 Risk

High-very high Score 2 Risk AND high intensity sports

Further examinations

Elegibility for competition

Coronary CT

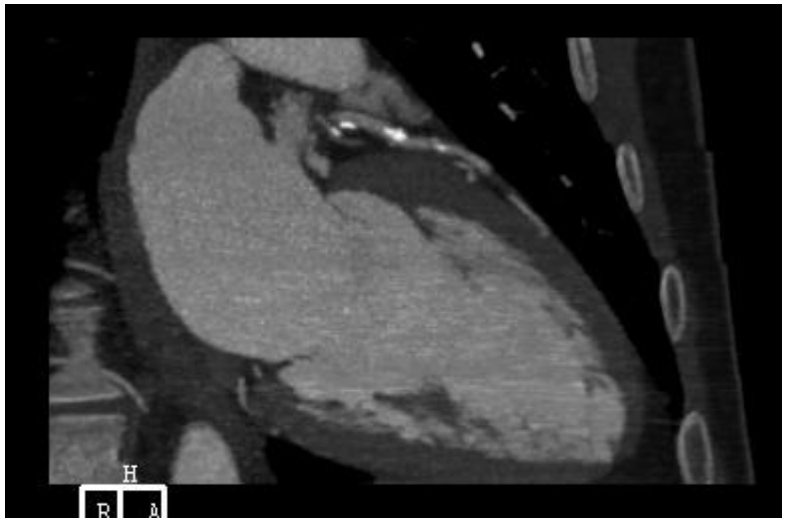
Resting ECG and exercise stress testing:
first line examinations (Ia indications)

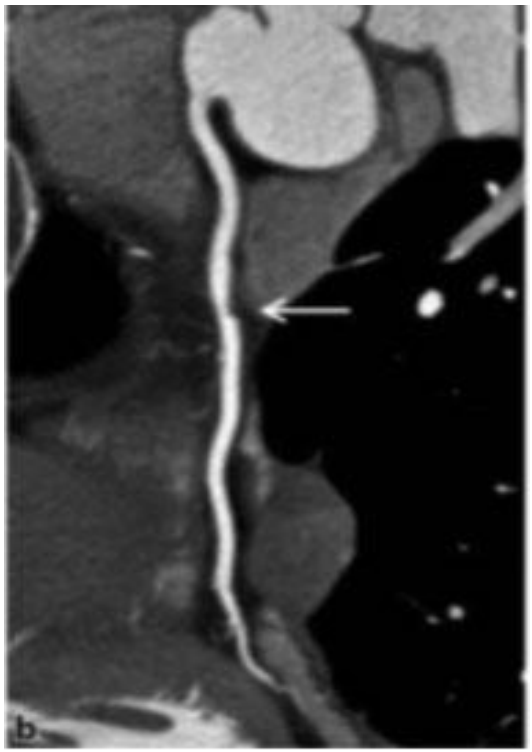
Why all this emphasys for coronary CT ?

State-of-the-Art
by EuroIntervention

EuroIntervention 2023;18:e1307-e1327 pub

Computed tomographic angiography in coronary artery disease



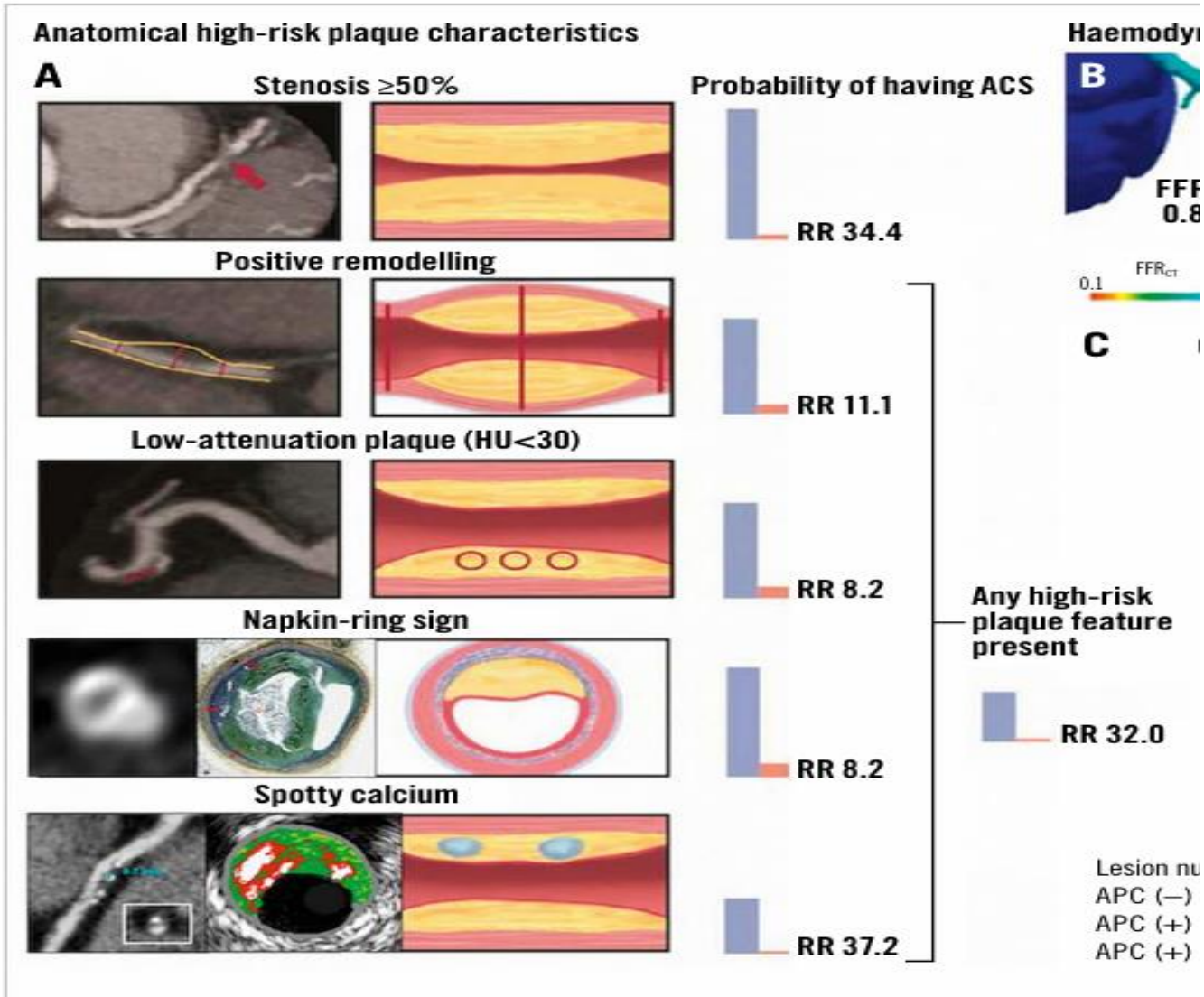


High negative predictive value of coronary CT!!

RULING OUT CAD

Prospective multicentre studies investigating the diagnostic accuracy of CCTA for detecting a narrowing in an epicardial vessel in patients with suspected but unproven CAD have reported sensitivities of 85%-99% and specificities of 64%-92% **(Supplementary**

Coronary CT: High-risk plaque characteristics



Possible limits in the estensive use of coronary CT

- Coronary CT is an expensive and not always widespread examination!

- It is well known that asymptomatic adult endurance athletes have an high prevalence of significant atheroscerotic plaques on coronary CT: this could create difficulties regarding sports elegibility in this population!

Ischemic Heart Disease and athletes: Conclusions

- Cardiovascular evaluation of adult athletes is recommended by most Associations of Cardiology and Sports Medicine

- The Italian guidelines suggests a more extensive CV screening respect to ESC guidelines, which are generally more permissive concerning sports elegibility in athletes with, or suspected, ischemic heart disease

- Both Italian and ESC guidelines give big emphasis to evaluation and aggressive control of CV risk factors in adult athletes: the preventive role of Sports Medicine!!

Thanks for your kind attention !

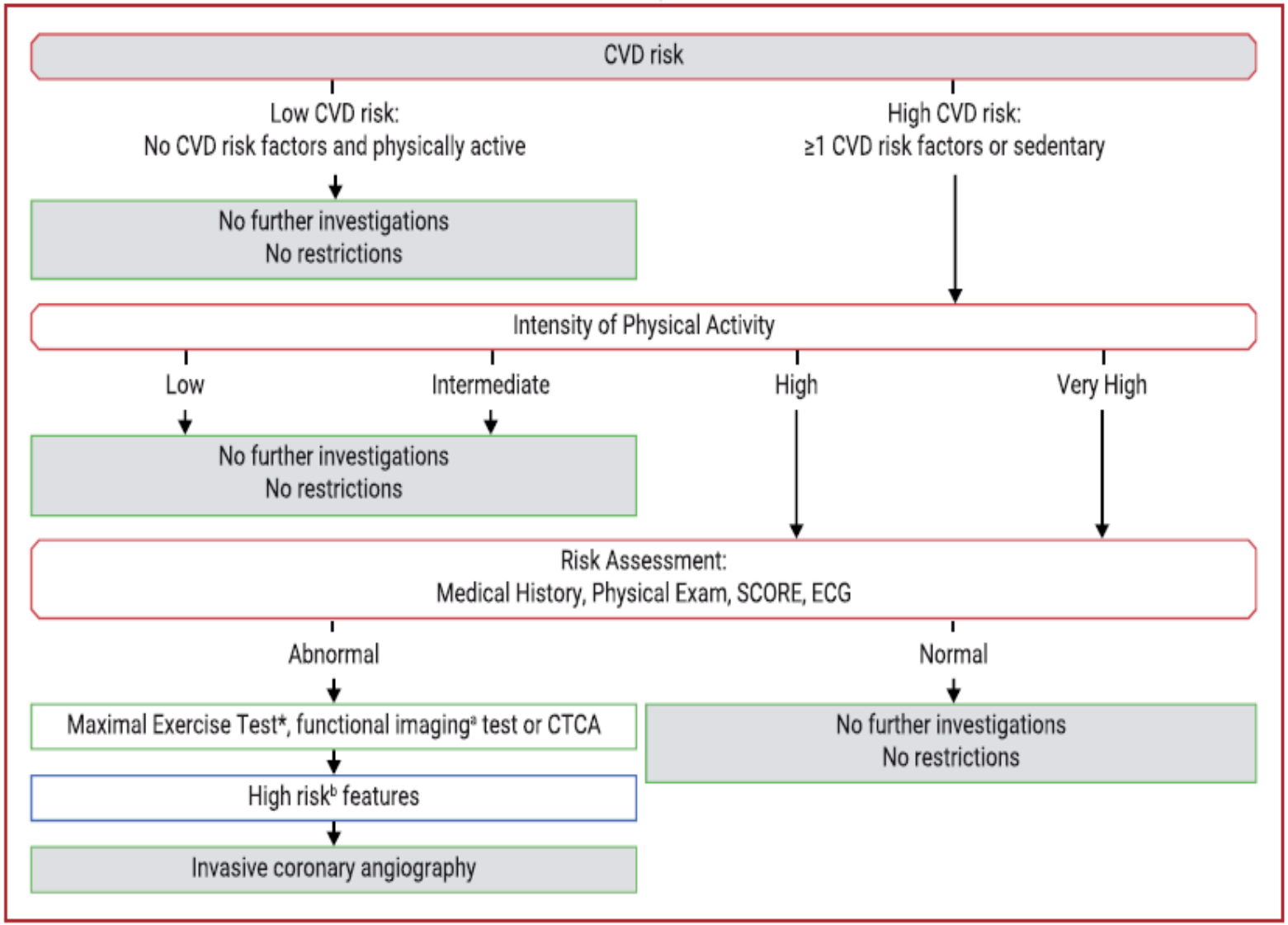
COCIS 2023 writing committee

COCIS 2023 idoneità: CAD aterosclerotica

TABLE XVI.—*Recommendations for eligibility to competitive sports in athletes with a negative history of acute coronary syndrome (ACS-) and no previous coronary revascularization (REV-) with previous imaging for coronary arteries (CCTA<24 months).*

Recommendation	LOE	COE
Sports eligibility must be denied in: • Athletes documenting 1) fibro-lipid (fibro-fatty) plaque, or 2)plaque progression with arterial expansion (positive remodeling), or 3)micro-calcifications leading to stenosis of >30% in the left main trunk or left anterior descending coronary artery • Athletes documenting stenosis of >50% in any coronary artery • Athletes with cardiac stress testing of unequivocally ischemic significance	III	C
Athletes documenting stenosis between 30-50% in ≥ 1 coronary artery, in the absence of plaques showing at least 2 of the high-risk characteristics above described (fibro-lipid plaque, positive remodeling and micro-calcifications) may be considered for group-A sports.	II	C
Subjects documenting stenosis < 30% in ≥ 1 coronary artery or documenting negative CCTA can be considered eligible for all competitive sports	I	C

ESC: CV screening in adult (> 35 yrs) asymptomatic athletes



SCD in Young Athletes (< 35 yrs)
Epidemiology

Annual Incidence → **1- 4 / 100.000**

SCD in Adult Athletes (> 35 yrs)
Epidemiology

Annual Incidence → **2- 7 / 100.000**