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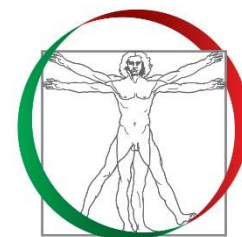
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# The Italian Cardiological Protocols (COCIS) in Sudden Cardiac Death Prevention: Cardiomyopathies



**F.I.C.**

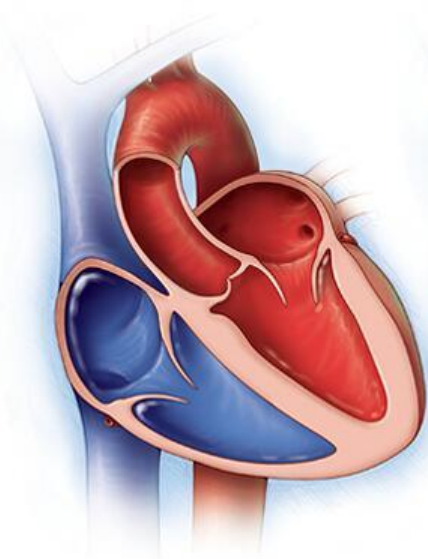


# What is a cardiomyopathy?

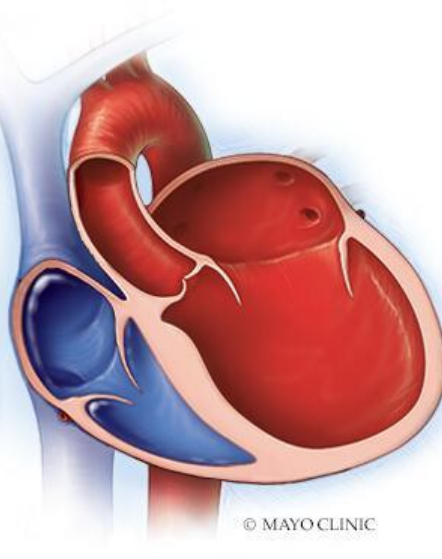


A DISEASE OF THE MYOCYTES (THE HEART CELLS)  
CAUSED BY GENETIC MUTATIONS OR EXTERNAL FACTORS

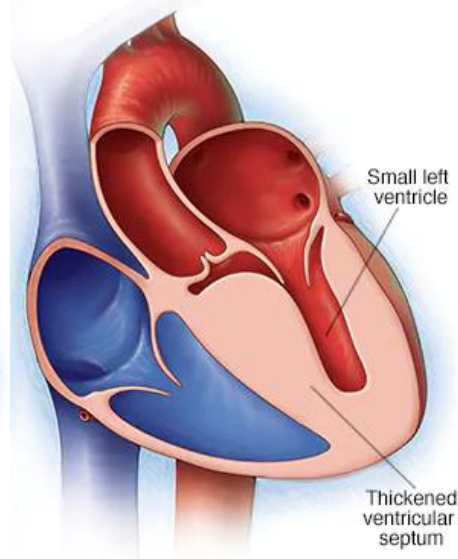
Typical heart



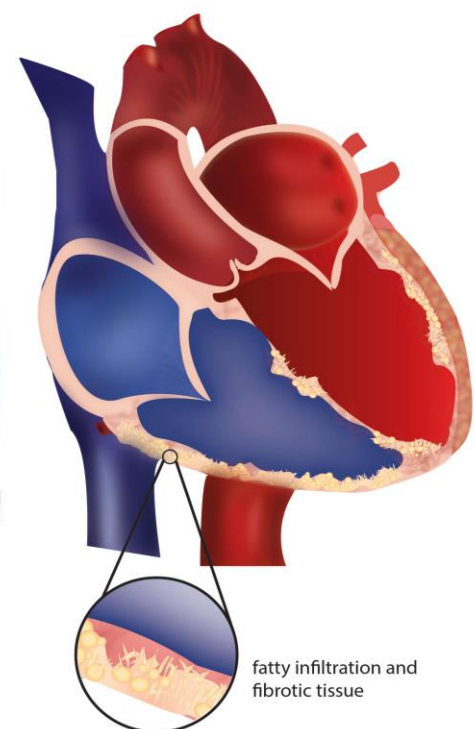
Dilated cardiomyopathy



Hypertrophic cardiomyopathy

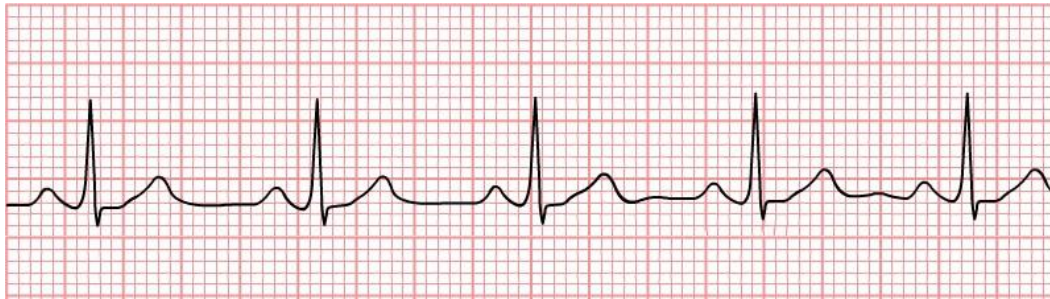


Arrhythmogenic cardiomyopathy



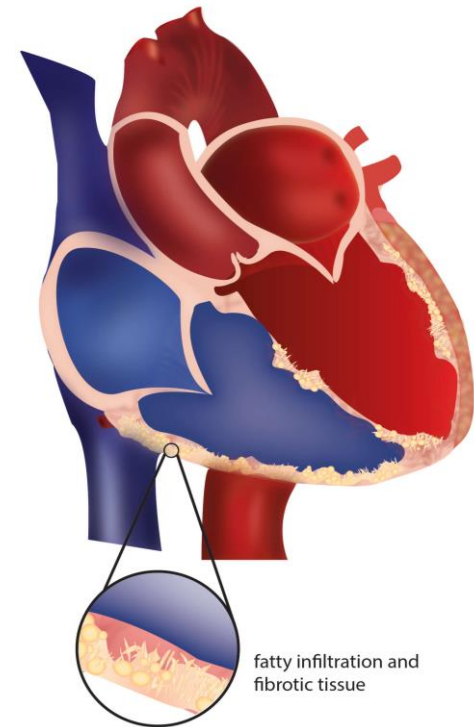
# Cardiomyopathy and sport: a dangerous union

NORMAL RHYTHM



CAOTIC RHYTHM

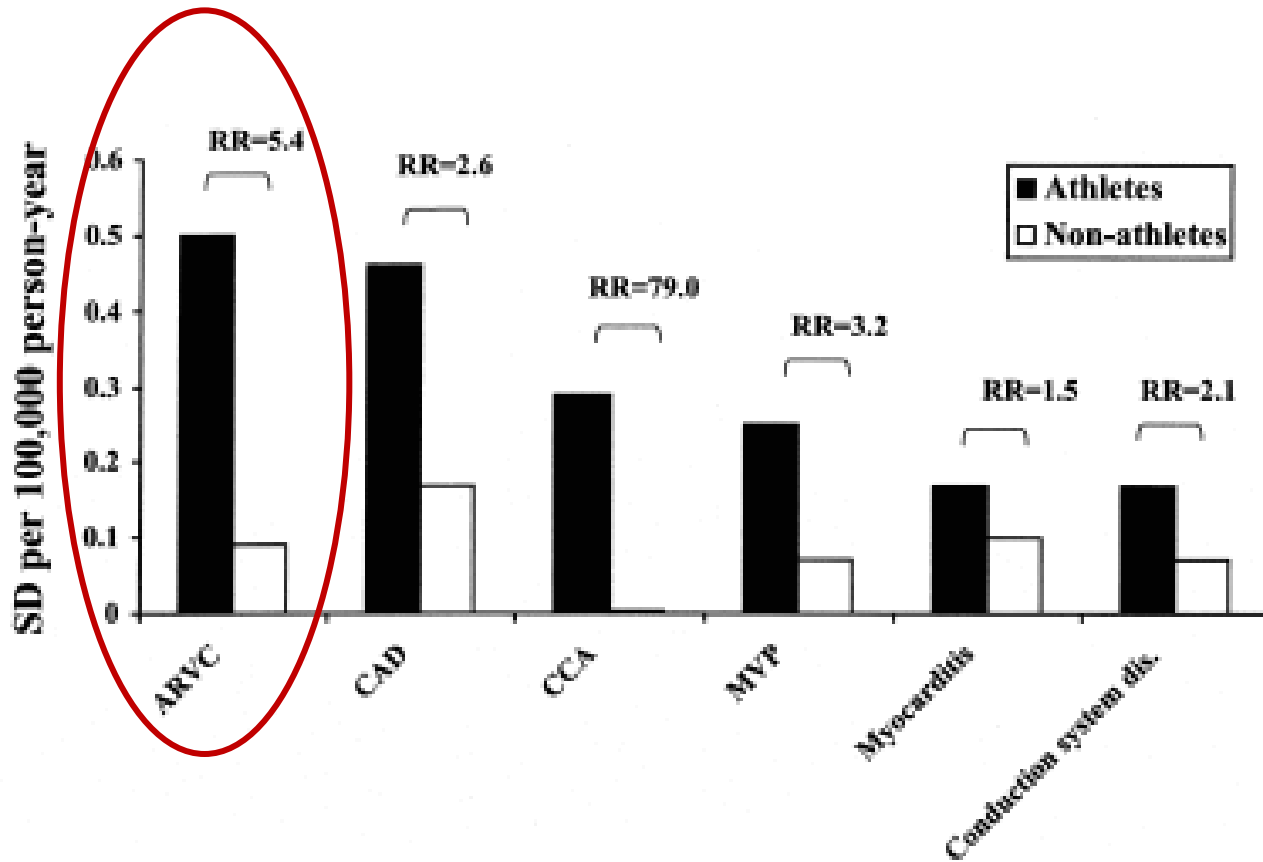
Arrhythmogenic cardiomyopathy



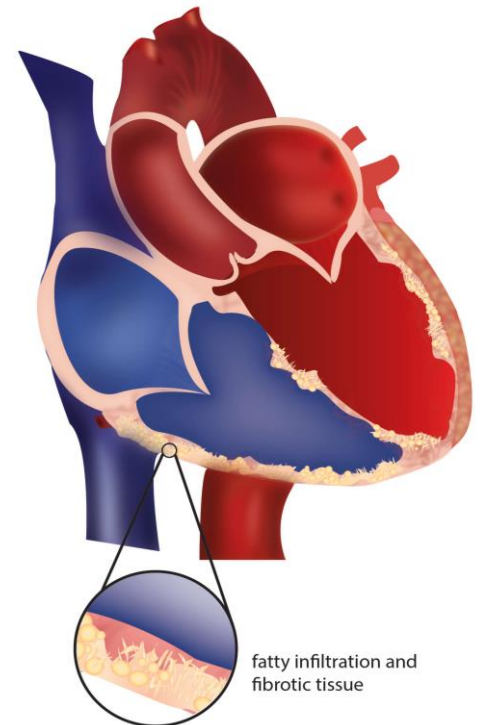
# Cardiomyopathy and sport: a dangerous union



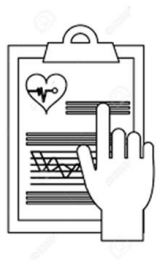
# Cardiomyopathy and sport: a dangerous union



Arrhythmogenic cardiomyopathy



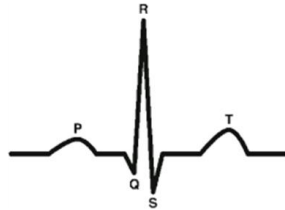
# How can PPS identify athletes with CMP? The Italian model



HISTORY



P/E



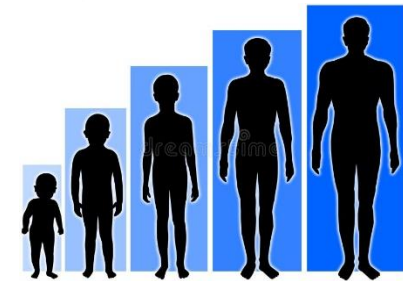
ECG

+



EXERCISE TESTING

+



ANNUAL RE-EVALUATION



# How can PPS identify athletes with CMP? Family and personal history



≈ 20% of CASES

# How can PPS identify athletes with CMP? Resting ECG



>50% of CASES

ABNORMAL

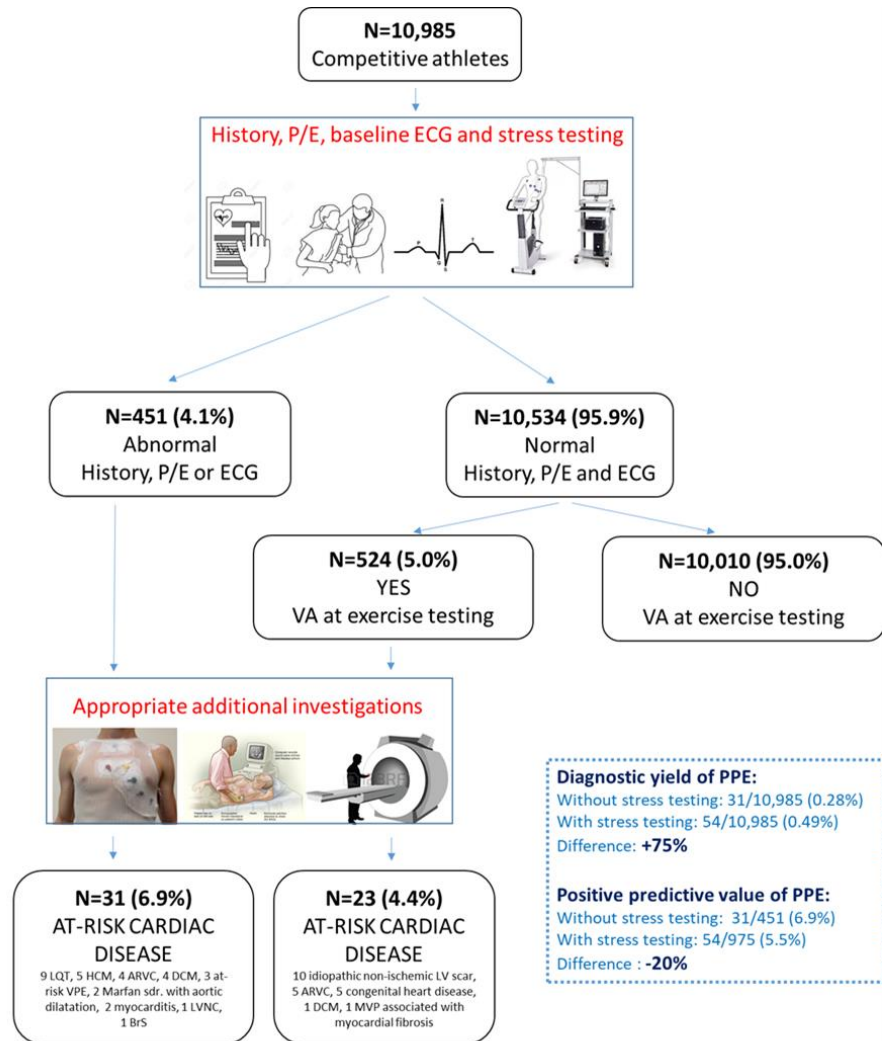


# How can PPS identify athletes with CMP? Exercise ECG



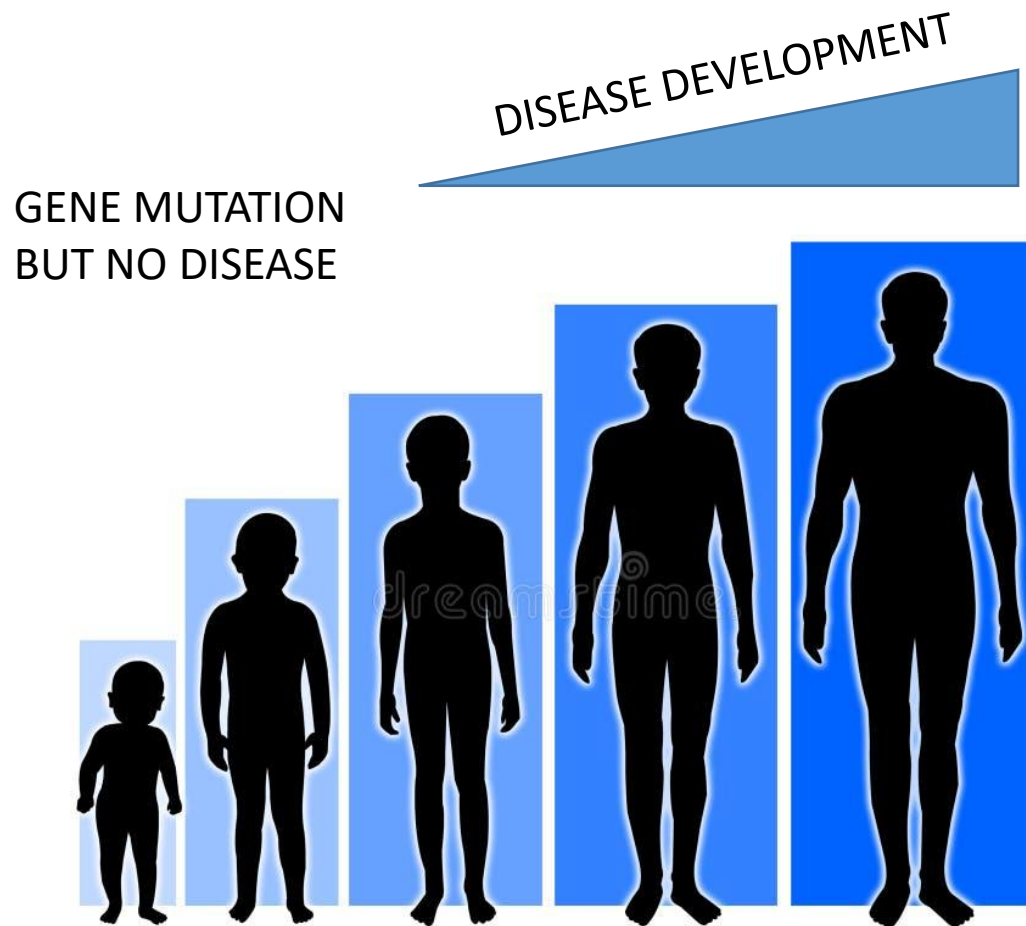
≈50% of CASES

# How can PPS identify athletes with CMP? Exercise ECG



# How can PPS identify athletes with CMP?

## Annual re-evaluation



# How can PPS identify athletes with CMP?

## Annual re-evaluation



### Cardiovascular preparticipation screening in young athletes

22,324 consecutive young athletes  
(62% males, median age 12 [IQR 10–14])

Preparticipation screening  
repeated every year (on average 2.9 times/young athlete)



History



Ph. exam



ECG



Stress test

Congenital HD = 17

Ion channel dis = 14

Cardiomyopathies = 15

LV scar + arrhythm = 18

Other = 5

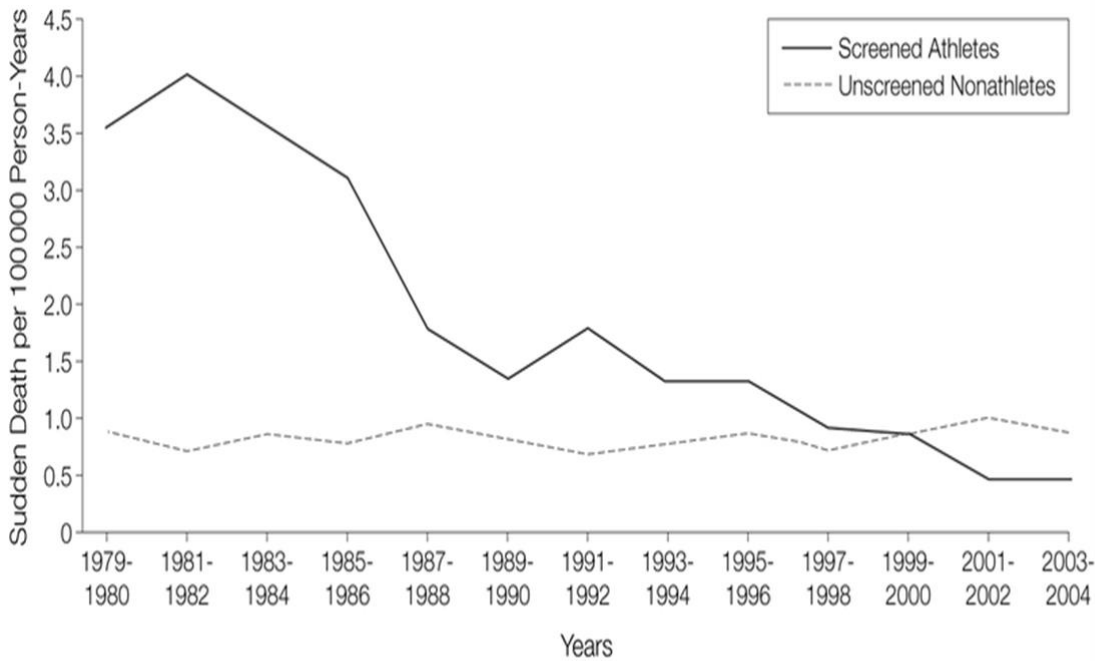
69 (0.3%)

Diseases at risk of sudden death

### Diagnostic yield of each screening session



# The results: old data



**Table 1.** Number and Annual Incidence Rates of Total and Cause-Specific Sudden Cardiovascular Death in Screened Athletes and Unscreened Nonathletes in Relation to 3 Screening Periods\*

	Periods						P for Trend	RR (95% CI)†
	Prescreening (1979-1981)		Early Screening (1982-1992)		Late Screening (1993-2004)			
	No. of Events	Incidence Rate (95% CI)	No. of Events	Incidence Rate (95% CI)	No. of Events	Incidence Rate (95% CI)		
Total sudden deaths in athletes	14	4.19 (1.78-7.59)	29	2.35 (1.94-2.75)	12	0.87 (0.46-1.28)	.001	0.21 (0.09-0.48)
Cardiomyopathies	5	1.50 (0.21-2.78)	7	0.57 (0.26-0.87)	2	0.15 (0-0.36)	.002	0.10 (0.01-0.59)
Coronary artery disease	3	0.90 (0-3.12)	5	0.41 (0.09-0.72)	3	0.22 (0-0.47)	.08	0.24 (0.03-1.81)
Cardiac conduction disease	1	0.30 (0-1.56)	2	0.16 (0-0.40)	1	0.07 (0-0.23)	.29	0.24 (0.01-19.02)
Myocarditis	1	0.30 (0-1.56)	4	0.32 (0.02-0.63)	2	0.15 (0-0.36)	.40	0.48 (0.02-28.61)
Congenital coronary anomalies	1	0.30 (0-1.56)	4	0.32 (0.02-0.63)	2	0.15 (0-0.36)	.40	0.48 (0.02-28.61)
Mitral valve prolapse	1	0.30 (0-1.56)	4	0.32 (0.02-0.63)	1	0.07 (0-0.23)	.19	0.24 (0.01-19.02)
Other‡	2	0.60 (0-1.87)	3	0.24 (0-0.52)	1	0.07 (0-0.23)	.06	0.12 (0.01-2.33)

**Table 2.** Cardiovascular Conditions Causing Disqualification From Competitive Sports in 879 Athletes Over 2 Consecutive Screening Periods (1982-1992 and 1993-2004) at the Center for Sports Medicine in Padua, Italy

Cardiovascular Causes of Disqualification	No. (%) of Disqualified Athletes			P Value
	Total Study Period (1982-2004)	Early Screening Period (1982-1992)	Late screening Period (1993-2004)	
Total No. screened*	42 386	22 312	20 074	
Total No. disqualified†	879 (2.0)	455 (2.0)	424 (2.1)	

Corrado D et al. JAMA 2006

# The results: recent data



## Cardiovascular preparticipation screening in young athletes

22,324 consecutive young athletes  
(62% males, median age 12 [IQR 10–14])



Preparticipation screening  
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Diseases at risk of sudden death

### Diagnostic yield of each screening session



Follow-up (7.5 ± 3.7 years)

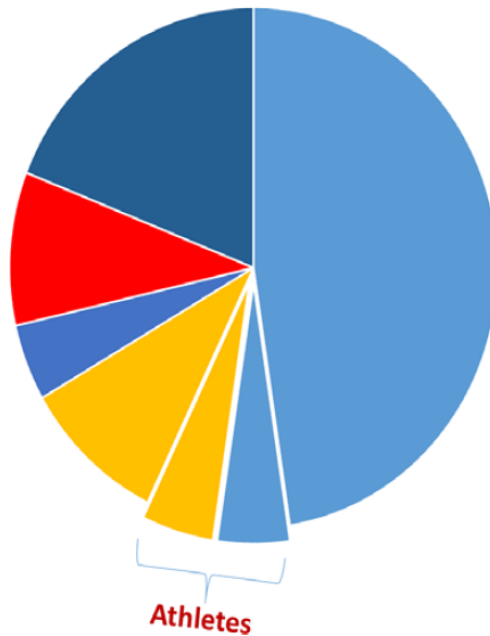


1 case of resuscitated cardiac arrest (0.6/100.000/year)

# The results: recent data



- Structurally normal heart
- Arteritis
- Congenital heart diseases
- Myocarditis
- Cardiomyopathies



	Total	Athletes
Congenital coronary abn.	2	
Congenital aortic stenosis	2	
Hypertrophic cardiomyopathy	1	
Arrhythmogenic cardiomyopathy	1	
Arteritis	1	
Acute myocarditis	3	1
CPVT	1	
Unexplained SCD	10	1

**Figure 1** Causes of sudden cardiac death in the Veneto region of Italy in children aged 8–15 years. CPVT, catecholaminergic polymorphic ventricular tachycardia; SCD, sudden cardiac death.

# Sports eligibility: always denied?



## OLD ITALIAN GUIDELINES

**A BIG NO**

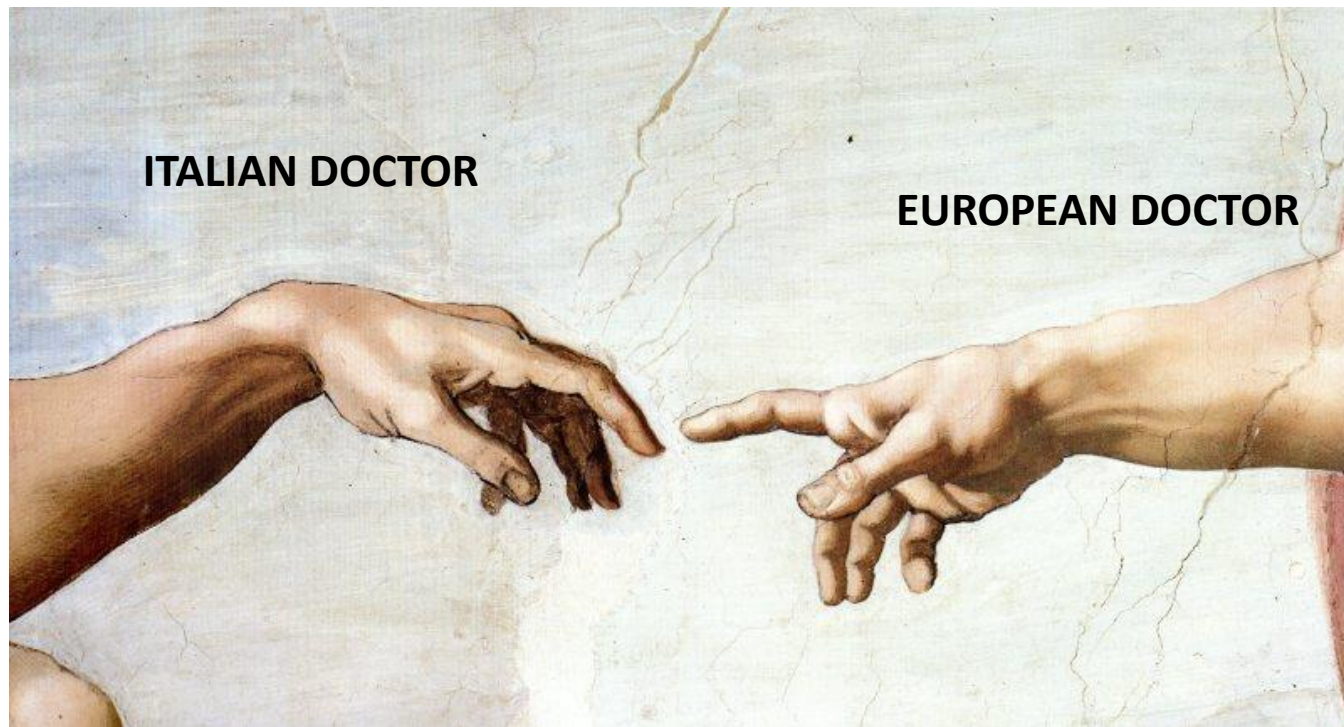
ANY CARDIOMYOPATHY

ANY SEVERITY

ANY COMPETITIVE SPORT

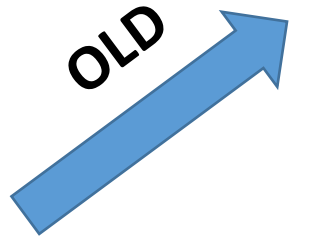


# Sports eligibility: always denied?

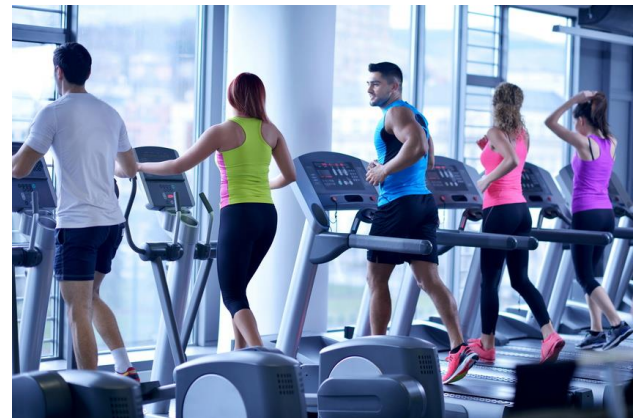


MILD CARDIOMYOPATHIES MAY CONTINUE TO PLAY SPORT  
AFTER CAREFUL EVALUATION AND RISK ASSESSMENT

# New in the 2023 GL: exercise prescription



YOU CAN'T DO SPORT



BUT YOU CAN AND SHOULD DO EXERCISE

# New in the 2023 GL: exercise prescription



*Although the diagnosis of cardiomyopathy is not compatible with competitive sports activities in most cases, this **does not mean that patients should become sedentary**. In fact, there is no clear evidence that physical activity with mild-to-moderate cardiovascular engagement increases the risk of arrhythmias or worsening of the disease phenotype, while there are **undeniable benefits for physical and mental health**, as well as for social inclusion. Patients should be evaluated at a center with proven experience, in order to receive **a personalized exercise prescription** based on the disease phenotype and clinical conditions*

Work in progress



**2025 ITALIAN RECCOMENDATION FOR EXERCISE PRESCRIPTION IN  
PATIENTS WITH CARDIOVASCULAR DISEASES**



# Key points



Cardiomyopathies are among the most dangerous conditions for athletes

The Italian preparticipation screening model is based on:

- History, physical examination and resting ECG
- + exercise testing
- + annual re-evaluation

This model increases the chances of identify cardiomyopathies

Recent data suggests a very low rate of cardiac arrests due to cardiomyopathies in Italian athletes

Although patients with moderate and severe disease should not engage in competitive sports, this does not mean that they should become sedentary