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Avaliação Médica para a Prática Desportiva

Deve ser feito um rastreio alargado

Joana Novais Pimenta

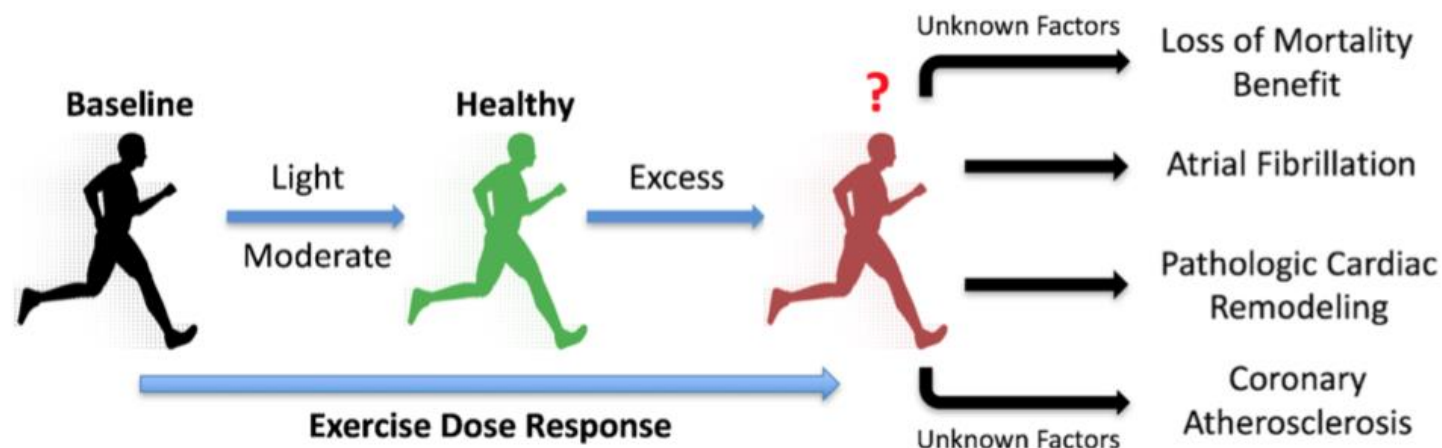
Serviço de Cardiologia Pediátrica

Centro Hospitalar Universitário de São João, Porto

- Atividade física regular apresenta benefícios inquestionáveis para a saúde
- Exercício vigoroso e repetitivo leva a adaptação cardíaca funcional e estrutural



Pode atuar como *trigger* para eventos adversos em indivíduos com doença cardíaca desconhecida

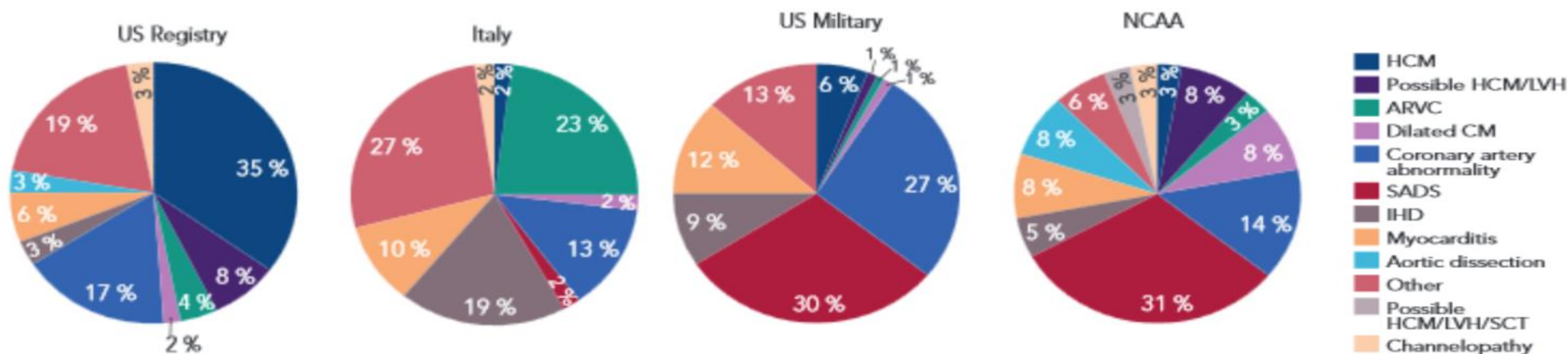


Gleason PT *et al.* Curr Treat Options Cardiovasc Med. 2017 Sep 14;19(10):79



Morte súbita em atletas

- Evento raro mas devastador com muito impacto social e familiar
- Ausência de registos sistemáticos e adequados
- Estima-se em 0,5-13 / 100 000 atletas
- Estudo Italiano – jovens atletas tem risco 2,8x superior de morte súbita em relação a não atletas. Estudos posteriores falharam em demonstrar essa associação



Corrado D, *et al* Does sports activity enhance the risk of sudden death in adolescents and young adults? J Am Coll Cardiol 2003; 42: 1959–63

Holst AG *et al* Incidence and etiology of sports-related sudden cardiac death in Denmark—implications for pre-participation screening. Heart Rhythm 2010; 7: 1365–71



Programas de rastreio para a prática de exercício

- Tem como objetivo identificar atletas em risco
- Dados na literatura discordantes originam muita controvérsia em relação ao melhor programa de rastreio
 - AHA → história clínica + exame objetivo
 - ESC e AEPC → história clínica + exame objetivo + ECG
- Programas de rastreio menos alargados
 - Risco dos falsos positivos
 - Custo/Benefício



Morte súbita em atletas

Context A nationwide systematic preparticipation athletic screening was introduced in Italy in 1982. The impact of such a program on prevention of sudden cardiovascular death in the athlete remains to be determined.

Objective To analyze trends in incidence rates and cardiovascular causes of sudden death in young competitive athletes in relation to preparticipation screening.

Design, Setting, and Participants A population-based study of trends in sudden cardiovascular death in athletic and nonathletic populations aged 12 to 35 years in the Veneto region of Italy between 1979 and 2004. A parallel study examined trends in cardiovascular causes of disqualification from competitive sports in 42 386 athletes undergoing preparticipation screening at the Center for Sports Medicine in Padua (22 312 in the early screening period [1982-1992] and 20 074 in the late screening period [1993-2004]).

Results During the study period, 55 sudden cardiovascular deaths occurred in screened athletes (1.9 deaths/100 000 person-years) and 265 sudden deaths in unscreened non-athletes (0.79 deaths/100 000 person-years). The annual incidence of sudden cardiovascular death in athletes decreased by 89% (from 3.6/100 000 person-years in 1979-1980 to 0.4/100 000 person-years in 2003-2004; P for trend $< .001$), whereas the incidence of sudden death among the unscreened nonathletic population did not change significantly. The mortality decline started after mandatory screening was implemented and persisted to the late screening period. Compared with the prescreening period (1979-1981), the relative risk of sudden cardiovascular death in athletes was 0.56 in the early screening period (95% CI, 0.29-1.15; $P = .04$) and 0.21 in the late screening period (95% CI, 0.09-0.48; $P = .001$). Most of the reduced mortality was due to fewer cases of sudden death from cardiomyopathies (from 1.50/100 000 person-years in the prescreening period to 0.15/100 000 person-years in the late screening period; P for trend = .002). During the study period, 879 athletes (2.0%) were disqualified from competition due to cardiovascular causes at the Center for Sports Medicine: 455 (2.0%) in the early screening period and 424 (2.1%) in the late screening period. The proportion of athletes who were disqualified for cardiomyopathies increased from 20 (4.4%) of 455 in the early screening period to 40 (9.4%) of 424 in the late screening period ($P = .005$).

Corrado D. *et al.* Trends in sudden cardiovascular death in young competitive athletes after implementation of a preparticipation screening program. JAMA. 2006 Oct 4;296(13):1593-601.



Programas de rastreio para a prática de exercício

Sporting Federation	Mandatory or recommended	Screening protocol	Primary screening methodology			
			Physical examination	Personal symptom and FH	12-lead ECG	Echocardiography
International Olympic Committee	Recommend	IOC	✓	✓	✓	✓
International Paralympic Committee	Recommend	IOC	✓	✓	✓	✓
Fédération Internationale de Football Association	Mandate	Self-imposed	✓	✓	✓	✓
Union of European Football Associations	Mandate	Self-imposed	✓	✓	✓	✓
Union Cycliste Internationale	Mandate	Self-imposed	✓	✓	✓	✓
Fédération Internationale de Motocyclisme	Mandate	Self-imposed	✓	✓	✓	✓
Fédération Internationale de l'Automobile	Mandate	Self-imposed	✓	✓	✓	✓
International Association of Athletic Federations	Recommend	IOC	✓	✓	✓	✓
National Basketball Association (USA)	Recommend	AHA	✓	✓	✓	✓
National Football League (USA)	Recommend	AHA	✓	✓	✓	✓
Major League Baseball (USA)	Recommend	AHA	✓	✓	✓	✓
National Hockey League (USA)	Recommend	AHA	✓	✓	✓	✓
World Rugby	Recommend	Self-imposed	✓	✓	✓	✓
Fédération Internationale de Natation	Recommend	Self-imposed	✓	✓	✓	✓
World Boxing Federation	Recommend	Self-imposed	✓	✓	✓	✓
International Handball Federation	Recommend	IOC	✓	✓	✓	✓
International Triathlon Union	Recommend	IOC	✓	✓	✓	✓
Fédération Internationale de Ski	Recommend	IOC	✓	✓	✓	✓
Fédération International des Sociétés d'Avion	Mandate	IOC	✓	✓	✓	✓

Country	Medical/sports Associations	Target athletic population	Screening protocol
Luxemburg	National Sports Ministry, Olympic Medical Committee, National Association of Sports Physicians	Competitive athletes of all sports	History, physical examination, ECG (required)
Sweden	National Board of Health and Welfare, National Federation of Sports	Elite athletes of all sports	History, physical examination, ECG (recommended)
Norway	Norwegian Football Association Medical Committee	Professional football players	History, physical examination, ECG, <u>echocardiography (required)</u>
Germany	German Association of Sports Medicine, National Sports Federations	Elite athletes of all sports	History, physical examination, ECG, <u>echocardiography, exercise testing (required)</u>
Poland	Ministry of Sports and Tourism, Ministry of Health, Polish Cardiac Society, Sports Federations	Competitive athletes (age <23 years) of all sports and national team members	History, physical examination, ECG (required)
France	National Sports Ministry	Professional athletes of all sports	History, physical examination, ECG, <u>echocardiography, exercise testing (required)</u>
	French Society of Cardiology	Competitive athletes of all sports	History, physical examination, ECG (recommended)
Scotland	Government, Department of Health	Football, competitive athletes >16 years old	History, physical examination, ECG (required)
England	British Lawn Tennis and Football Associations	Competitive athletes	History, physical examination, ECG (required)
Greece	Hellenic College of Sports Medicine, National Sports Federations	Competitive athletes of all sports	History, physical examination, ECG (recommended)
Belgium	National Sports Federations	Athletes of cycling and motocross sports	History, physical examination, ECG (required)
Spain	High Sports Government Council	Competitive athletes of all sports	History, physical examination, ECG (recommended)
The Netherlands	Working group of Cardiovascular Prevention and Rehabilitation, National Olympic Committee, National Sports Federations, Netherland Society of Cardiology	Elite competitive athletes (age <35 years) of all sports	History, physical examination, ECG (required)
		Professional football players	History, physical examination, ECG, <u>echocardiography (required)</u>
		Elite athletes of cycling, motor and flying sports and diving	History, physical examination, ECG (required)

Mont L. *et al.* Pre-participation cardiovascular evaluation for athletic participants to prevent sudden death: Position paper from the EHRA and the EACPR, branches of the ESC. *European Journal of Preventive Cardiology* 2017, Vol. 24(1) 41–69

Corrado D. *et al.* Risk of sports: do we need a pre-participation screening for competitive and leisure athletes? *European Heart Journal* (2011) 32, 934–944



Programas de rastreio para a prática de exercício

História Clínica e Exame Objetivo

- 80% dos atletas com MS não tinham sintomas documentados
- Subjetivo e dependente da “sinceridade” do atleta

Electrocardiograma

- 60% das doenças responsáveis por MS em jovens podem ser detetadas no ECG
- Interpretação dependente do observador → estudo com cardiologistas pediátricos, 68% de sensibilidade e 70% e especificidade
- Tem falsos negativos → idade das manifestações electrocardiográficas é variável (*timing* do rastreio?)
- Algumas causas de MS apresentam-se com ECG normais

Drezner J *et al.* AMSSM Position Statement on –cardiovascular Preparticipation Screening in Athletes: Current Evidence, Knowledge Gaps, Recommendations and Future Directions, Clin J Sport Med Sept 2016



Programas de rastreio para a prática de exercício

Ecocardiograma

- Exame não invasivo, facilmente acessível, seguro (sem radiação) e com custos pouco elevados
- Deteta patologias potencialmente causadoras de morte súbita que apresentam achados clínicos e electrocardiográficos negativos
 - Cardiomiopatias
 - Anomalias coronárias
 - Doenças da aorta



Incorporation of screening echocardiography in the preparticipation exam.

Weidenbener EJ¹, Krauss MD, Waller BF, Taliercio CP.

Author information

Abstract

We sought to evaluate the economic aspects and benefits of adding a limited screening echocardiogram to our annual athletic preparticipation examinations. It was our belief that this screening echocardiogram would add valuable information beyond the history and physical exam alone and could be included in our station-by-station format with little increase in time or cost. Controversy exists concerning the best method of detecting cardiovascular conditions that may predispose the athlete to sudden death. During our 1992 preparticipation examinations, we included a single-view parasternal long- and short-axis two-dimensional screening echocardiogram. This screening can detect four potentially fatal congenital heart defects. We performed a total of 2,997 echocardiograms at an average cost of \$7.34 per examination. Overall 64 echocardiographic abnormalities were found. Mitral valve prolapse and bicuspid aortic valve were the two most common abnormalities. The sensitivity of the history and physical examination in detecting cardiovascular abnormalities was extremely low. Incorporating the echocardiogram into our station-to-station format did not add a significant amount of time to the overall process. We conclude that a screening echocardiogram provides important information and can be used efficiently and economically in the athletic preparticipation examination.



The 5-Minute Screening Echocardiogram for Athletes

Rachael A. Wyman, MD, Regina Y. Chiu, MD, and Peter S. Rahko, MD, *Madison, Wisconsin*

Background: Echocardiography is an accurate way to identify common cardiac abnormalities that lead to sudden death. We report a screening echocardiogram protocol incorporated into the routine athletic medical assessment for all incoming college freshman athletes.

Methods: A limited 2-dimensional echocardiogram was performed on athletes as part of a routine sports physical examination. The examination was performed by sonographers and senior cardiovascular medicine fellows and interpreted in real time by cardiologists using a 1-page checklist. No images were recorded.

Results: Of the 395 athletes representing 14 sports, 192 were female. The limited 2-dimensional echocardiogram took approximately 5 minutes per athlete. The majority of studies revealed normal findings (84%). A total of 55 had minor abnormalities not requiring follow-up. Five had abnormalities requiring a full echocardiogram and consultation with a cardiologist.

Conclusion: This study demonstrates that a rapid screening echocardiogram is feasible and can be incorporated into the routine athletic medical examination for incoming varsity athletes.

Keywords: Sudden cardiac death, Athlete screening, Preparticipation screening

Wyman R A, Chiu RY, Rahko PS. The 5-minute screening echocardiogram for athletes. J Am Soc Echocardiogr 2008 ; 21 : 786 – 8



Usefulness of Echocardiography in Preparticipation Screening of Competitive Athletes



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ABSTRACT

Introduction and objectives: Despite the established diagnostic value of the electrocardiogram in preparticipation screening of athletes, some cardiac structural changes can be missed, particularly in early disease stages. The aim of this study was to evaluate the prevalence of cardiac structural changes via the systematic use of echocardiography in preparticipation screening of competitive athletes.

Methods: Professional athletes or participants in a competitive athletic program underwent a screening that included family and personal medical history, physical examination, electrocardiography, exercise testing, and Doppler echocardiography.

Results: A total of 2688 athletes (67% men; mean age [standard deviation], 21 [10] years) were included. Most of the echocardiographic evaluations (92.5%) were normal and only 203 (7.5%) showed changes; the most frequent change was left ventricular hypertrophy, seen in 50 athletes (1.8%). Cessation of athletic activity was indicated in 4 athletes (0.14%): 2 for hypertrophic cardiomyopathy (electrocardiography had shown changes that did not meet diagnostic criteria), 1 pectus excavatum with compression of the right ventricle, and 1 significant pulmonary valve stenosis; the rest of the changes did not entail cessation of athletic activity and only indicated periodic monitoring.

Conclusions: Although rare, some cardiac structural changes can be missed on physical examination and electrocardiography; in contrast, they are easily recognized with echocardiography. These findings suggest the use of echocardiography in at least the first preparticipation screening of competitive athletes to improve the effectiveness of programs aimed at preventing sudden death in athletes.

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Structural cardiac disease diagnosed by
echocardiography in asymptomatic young male
soccer players: implications for pre-participation
screening

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ABSTRACT

Purpose To evaluate the prevalence of structural cardiac lesions using echocardiography in apparently healthy boys referred for pre-participation screening (PPS).

Subjects and methods 3100 male soccer players were evaluated by echocardiography in addition to the standard PPS.

Results In 56 subjects (1.8%), a structural cardiac lesion with potential future complication was detected. Specifically, hypertrophic cardiomyopathy (HCM) was found in two boys; bicuspid aortic valve (BAV) in 24; mitral valve prolapse in 10 and atrial septal defects (ASDs) in 20. Resting physical examination (PE) failed to identify any abnormalities in the majority of the subjects. All the boys presented an uncomplicated echocardiography, except two boys with HCM, one with BAV associated with aortic dilatation and one with a large ASD.

Conclusion Asymptomatic young athletes may have a structural cardiac alteration with the potential of present or future haemodynamic and arrhythmic consequences. A majority of mild cardiac lesions are difficult to diagnose or suspect by the current screening based on medical history, PE and ECG. Transthoracic echocardiography significantly improves the diagnostic power of screening in the detection of both mild and serious cardiac conditions in the athletic population.

Biomédiques August Pi i Sunyer,

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of competitive athletes.
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electrocardiography, exercise

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den death in athletes.
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Echocardiography in the evaluation of athletes [v1; ref status: indexed, <http://f1000r.es/5gqj>]

Gonzalo Grazioli*, Maria Sanz*, Silvia Montserrat, Bàrbara Vidal, Marta Sitges

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Hypertrophic cardiomyopathy constitutes the leading cause of SCD in young athletes¹³. The ECG has demonstrated a high sensitivity in the diagnosis of this entity, but there is still around 10% of patients with hypertrophic cardiomyopathy, who have abnormal ECGs¹⁴⁻¹⁶. On the other hand, 9% of the athletes with mild adaptive left ventricular (LV) hypertrophy show pathological changes in the ECG¹⁷. In both situations an echo scan would help to achieve the correct diagnosis.

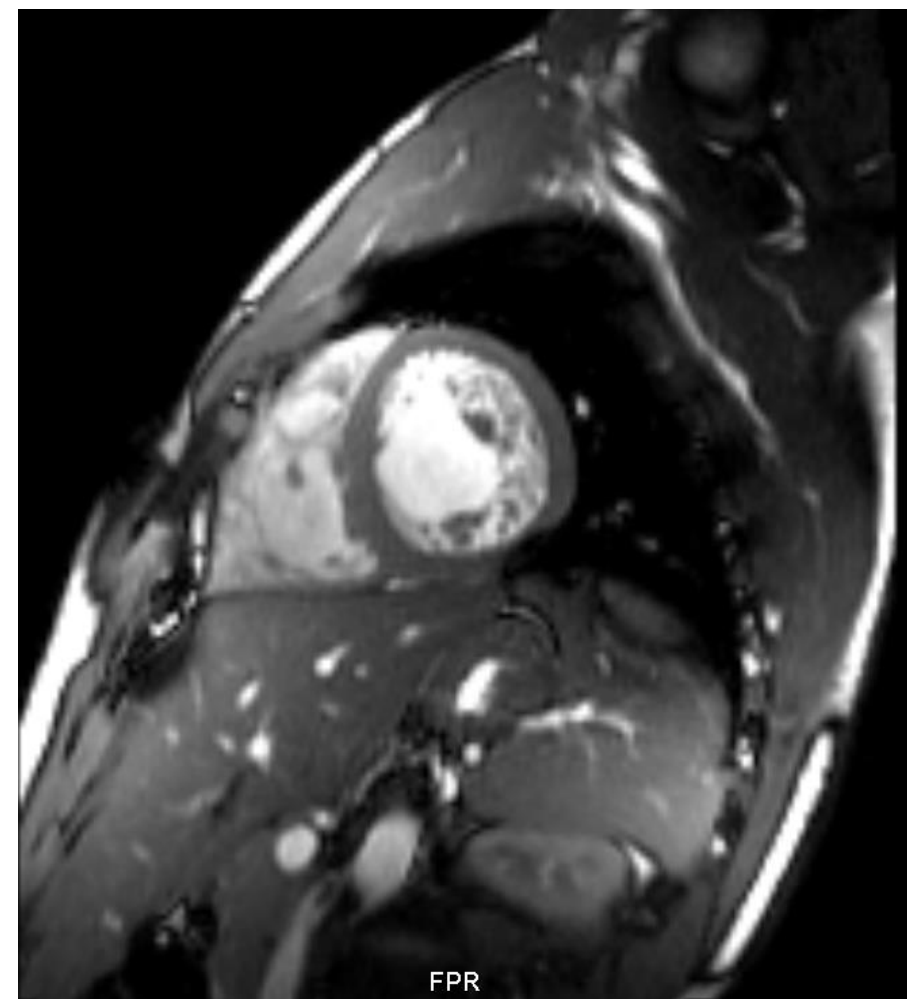
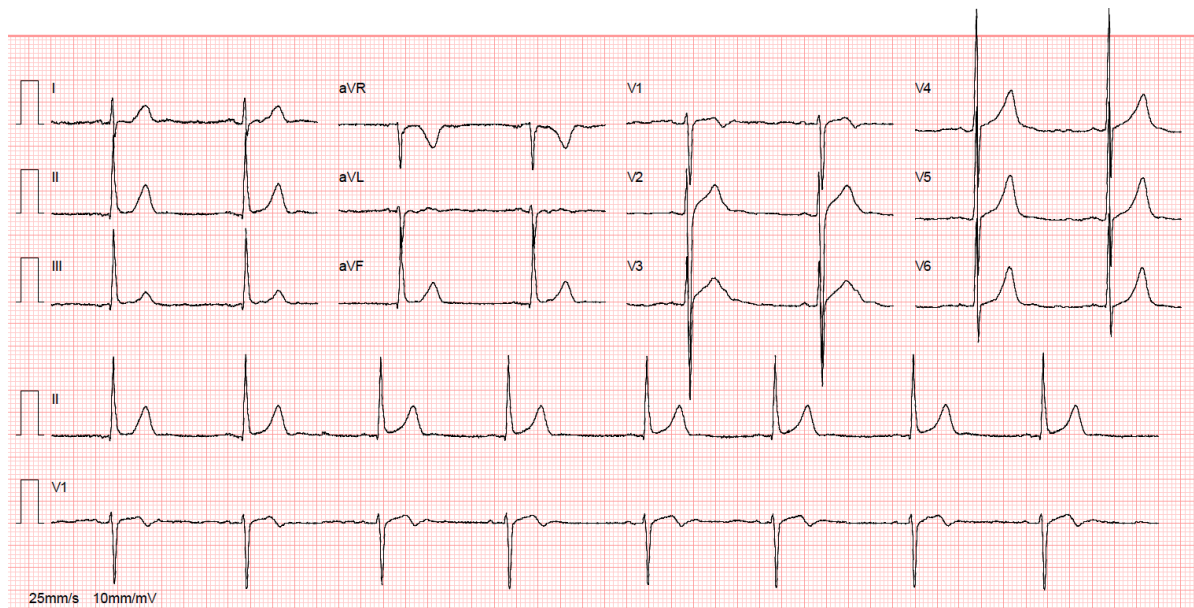
Aortic root diseases are an infrequent cause of SCD in young people¹⁷, although they seem to be a more prevalent cause of SCD in athletes¹⁹. Echocardiogram allows for the diagnosis as well as the follow up of these patients. Similarly, bicuspid aortic valve without significant functional abnormalities would not be diagnosed in a regular PPS, and again, the echocardiogram would allow for an early diagnosis and a proper follow up²⁰.

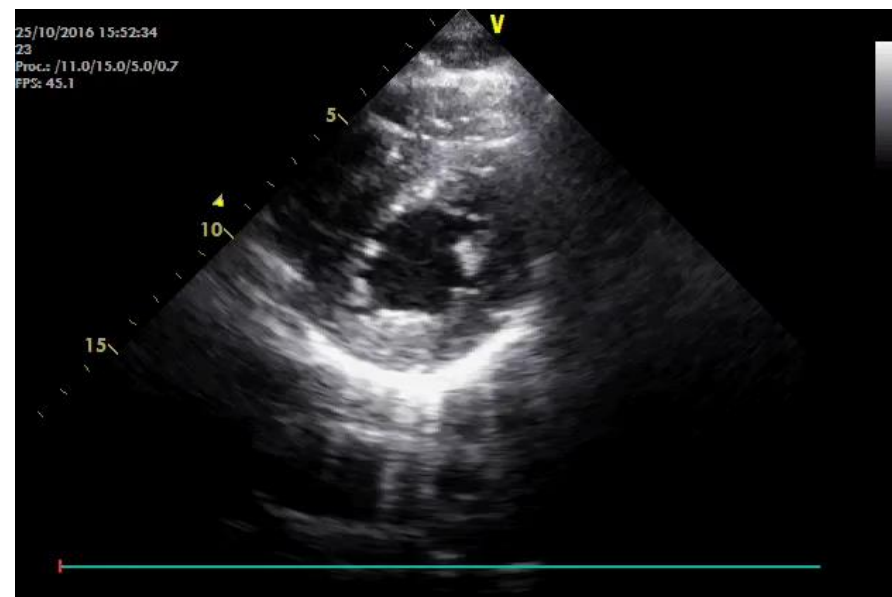
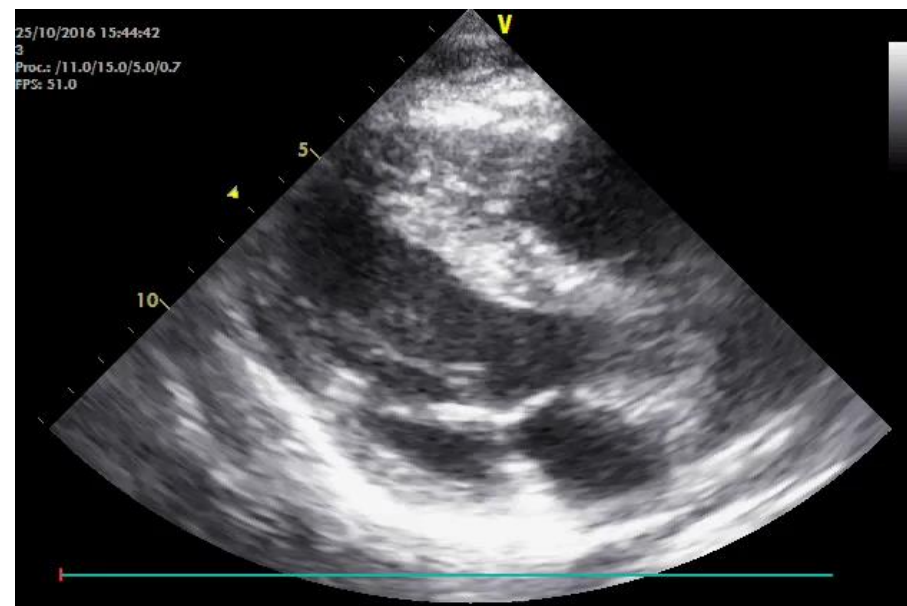
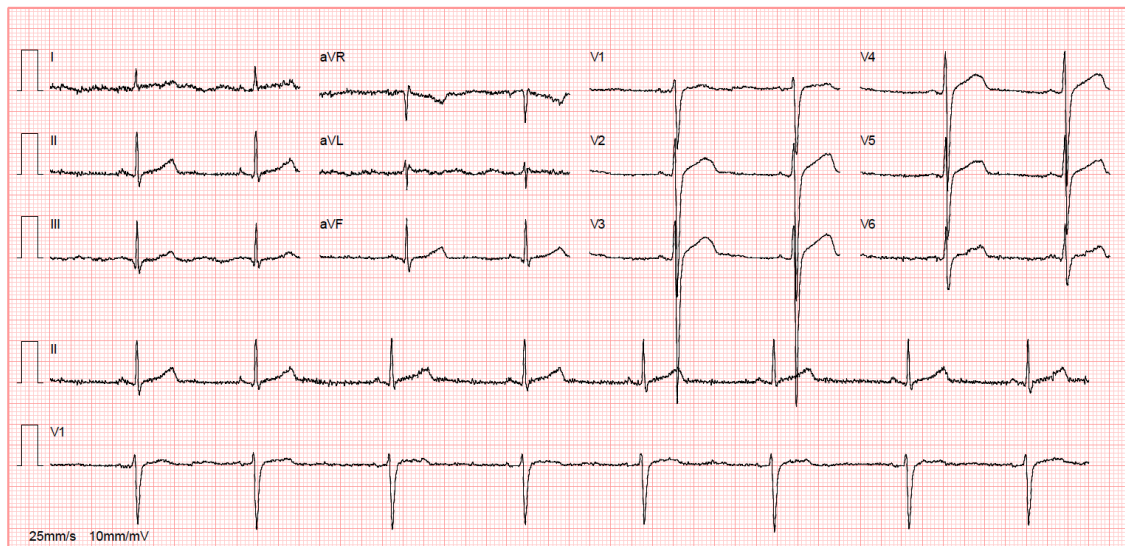
The anomalous origin of the coronary arteries was considered to be a rare cause of SCD in athletes, but nowadays it has been demonstrated that it can be related up to half of the previously asymptomatic SCD cases¹⁵. It was the second cause of sudden death associated with sports in the largest register of SCD in athletes¹³. The resting ECG of these athletes is normal, so this entity, if asymptomatic, cannot be detected in a regular PPS based on anamnesis, physical examination and ECG. It is known that an echocardiogram performed by physicians with adequate training can differentiate coronary anomalies with high sensitivity¹⁸, and therefore echo is again a key tool to unmask these asymptomatic patients.

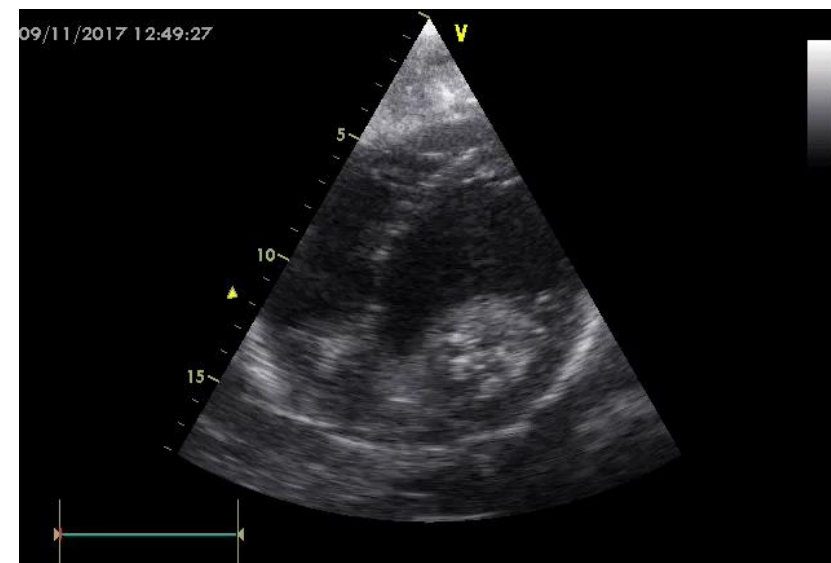
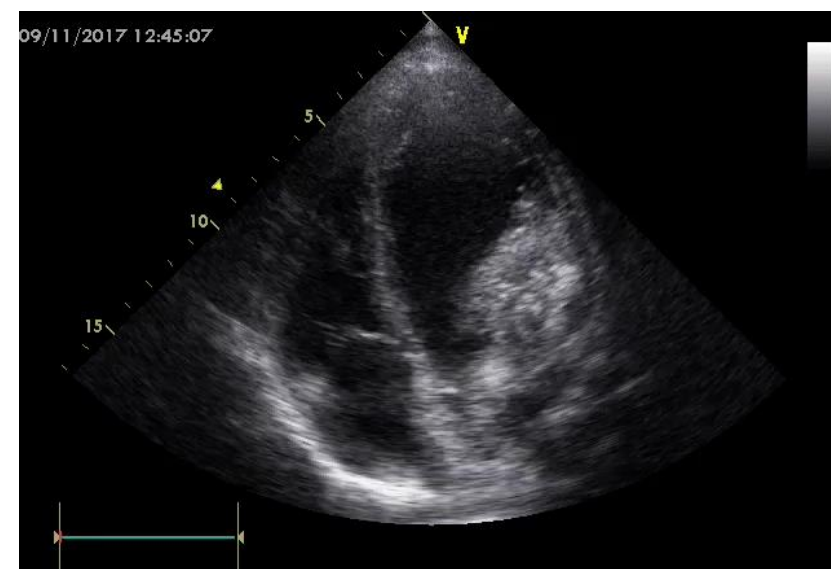
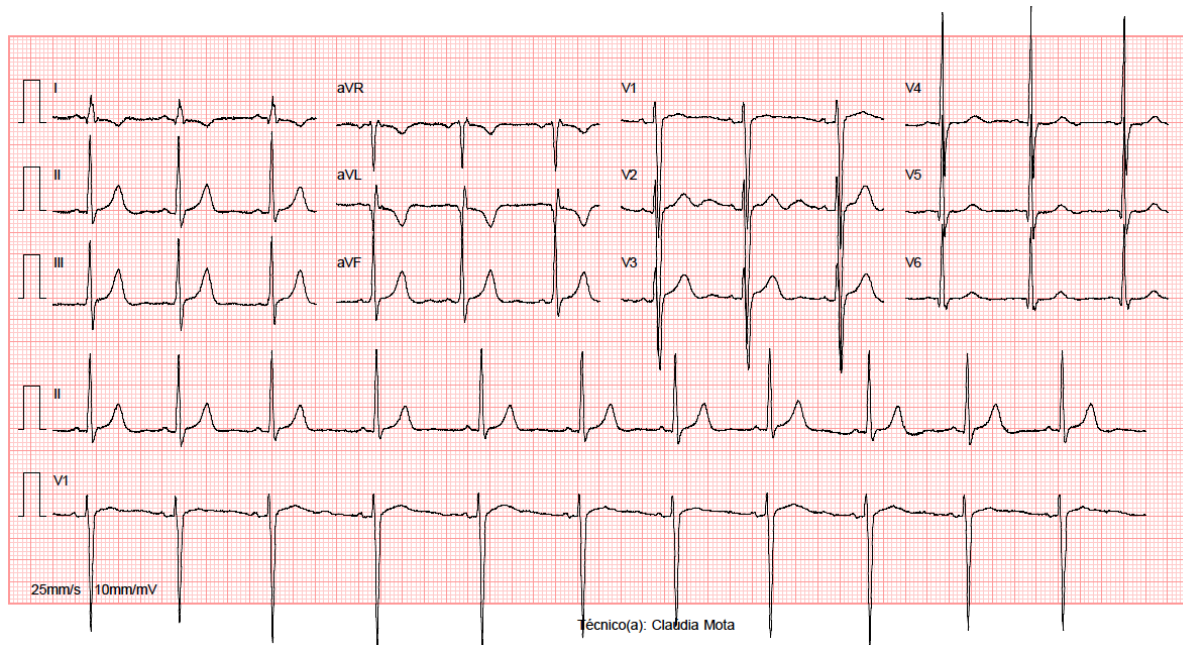
cost and the sensitivity. In our opinion, the echocardiography provides a higher sensitivity of the PPS, especially in some special populations with greater amount of cardiac disorders described such as competitive athletes⁹, sports with high static component³² or long distance endurance athletes³³. Recommendations for PPS and use of echocardiography used by our group according to the level of sport practice and training are summarized in **Table 3**.

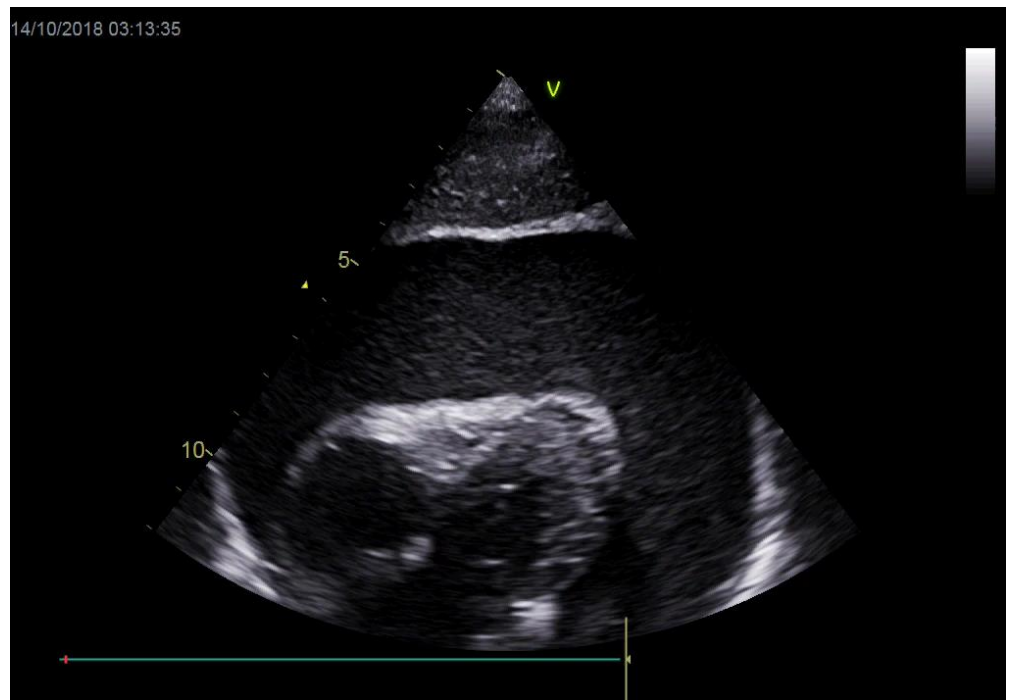
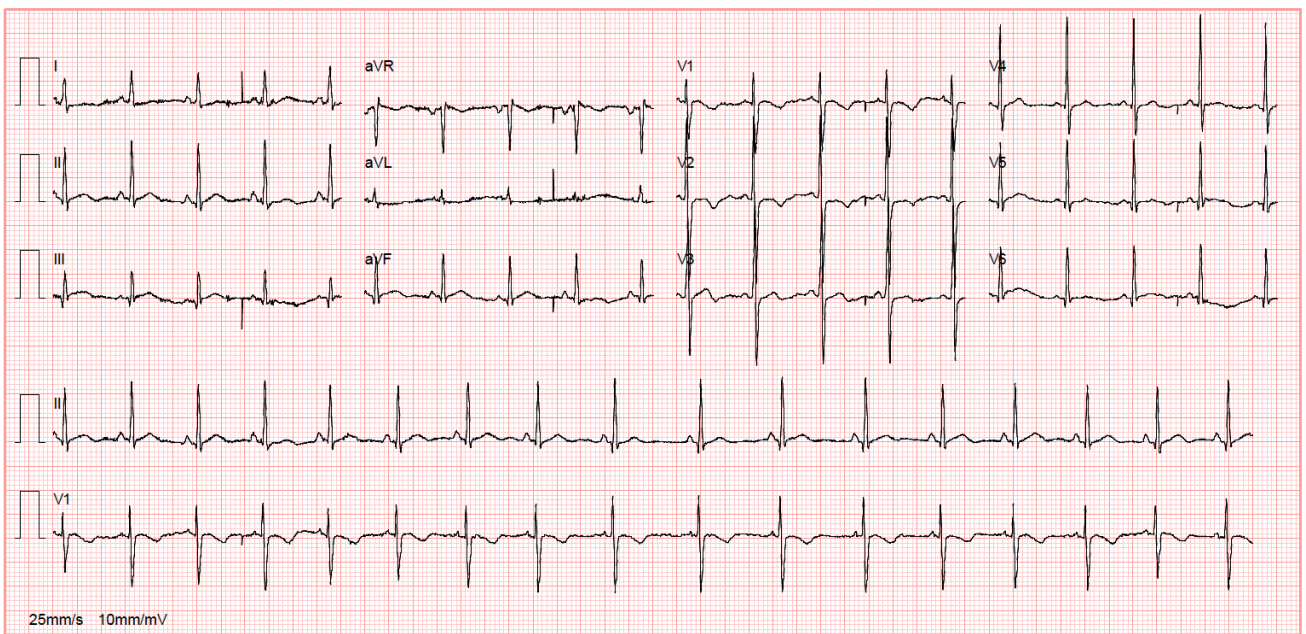
	History F&P + PE	ECG	Echocardiography
Recreational sports	Yes	Yes	No
Competitive athletes, High static and dynamic component Endurance training, > 10 hours/week	Yes	Yes	Yes











Conclusões

- Morte súbita em atletas, apesar de raro é um evento devastador
- Estudos são contraditórios, pelo que, o melhor programa de rastreio não está ainda estabelecido
- Problema do custo/benefícios
 - Custo do rastreio vs custo/impacto de uma vida perdida em idade activa
- Estudo Italiano que implementou ECG decorreu durante 25 anos → necessidade de estudos alargados que incluam outros exames nomeadamente ecocardiograma





Avaliação Médica para a Prática Desportiva

Deve ser feito um rastreio alargado

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