DESPORTO E CARDIOPATIA - RELAÇÃO IMPOSSÍVEL?

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Curso Básico de Cardiologia Pediátrica
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CHUC
HOSPITAL PEDIÁTRICO

INTRODUÇÃO

- Impacto positivo do exercício físico na promoção da saúde e prevenção de doenças
- Actividade física regular é uma das estratégias de prevenção de doenças CV

indivíduos com uma vida fisicamente activa obtêm um conjunto de benefícios para a saúde

Saúde Física:

- fortalecimento ósseo, muscular e articular
- atraso do envelhecimento
- prevenção de doenças

Saúde Mental:

- > performance académica
- prevenção doenças neuropsiquiátricas
- prevenção de comportamentos de risco

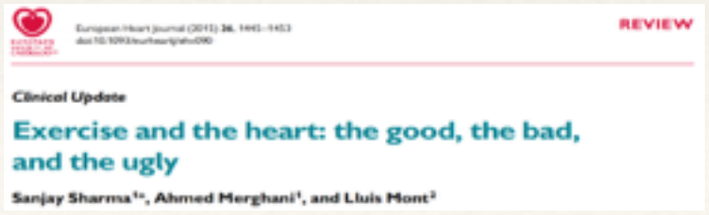
Saúde Social:

- < sentimentos de exclusão social

Será o exercício sempre saudável?

S. excesso de actividade física:

- alterações CV
- lesões
- problemas psicológicos
- doping


European Heart Journal (2011) 32, 1443–1453
doi:10.1093/eurheartj/ehr090

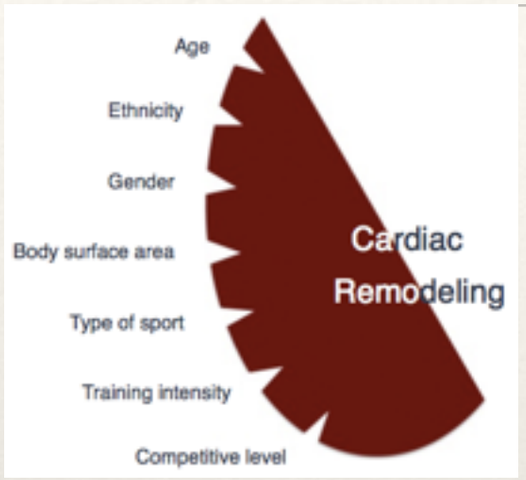
REVIEW

Clinical Update

Exercise and the heart: the good, the bad, and the ugly

Sanjay Sharma[1]*, Ahmed Merghani[1], and Lluis Mont[2]

CORAÇÃO DE ATLETA



Estruturais

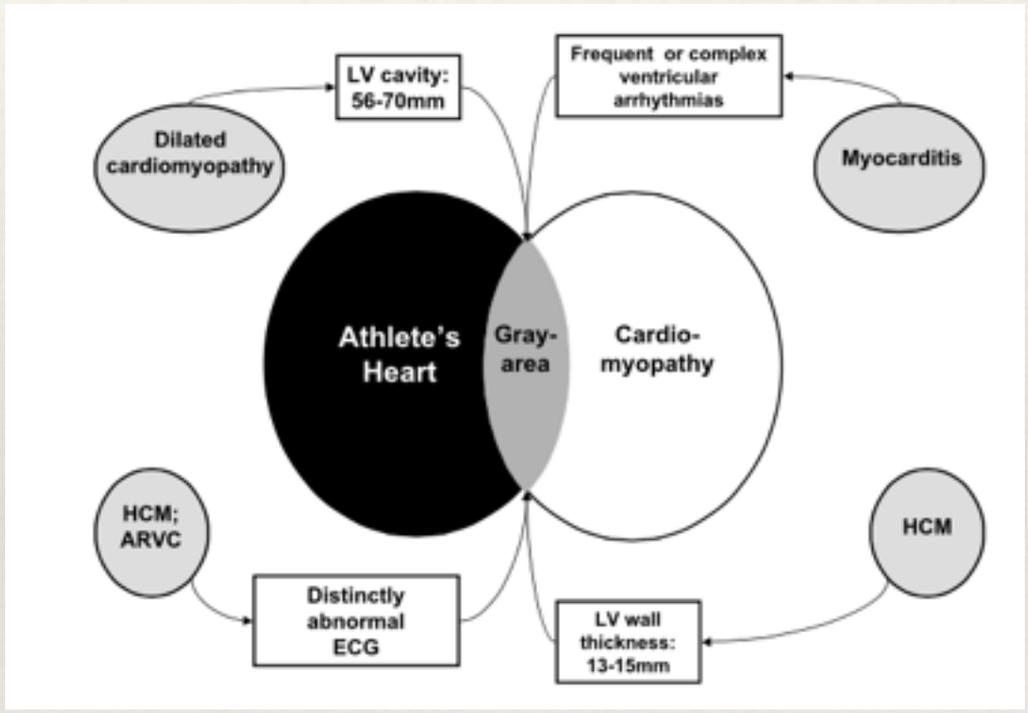
- > espessura da parede ventricular
- cardiomegália
- > VEj e volume plasmático

Funcionais

- ↑ função diastólica VE
- ↑ função sistólica biventricular

Eléctricas

- hipertonicidade vagal
- BIRD
- HVE isolada
- padrão de repolarização precoce

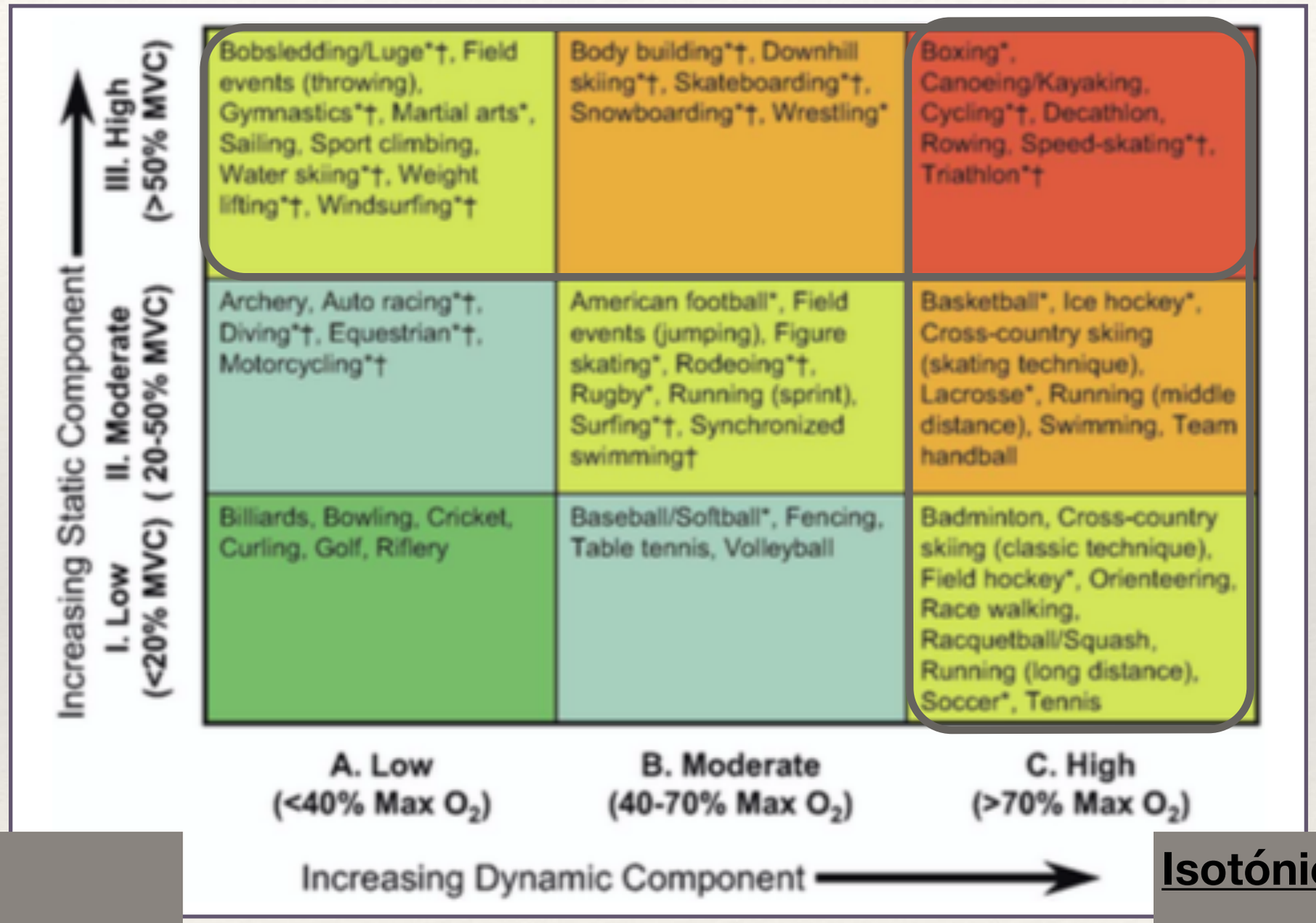


Rev Port Cardiol. 2015; 34 (12): 753-770

JACC 2005; vol 45, nº 8

Tipos de exercício

JACC 2005; vol 45, nº 8



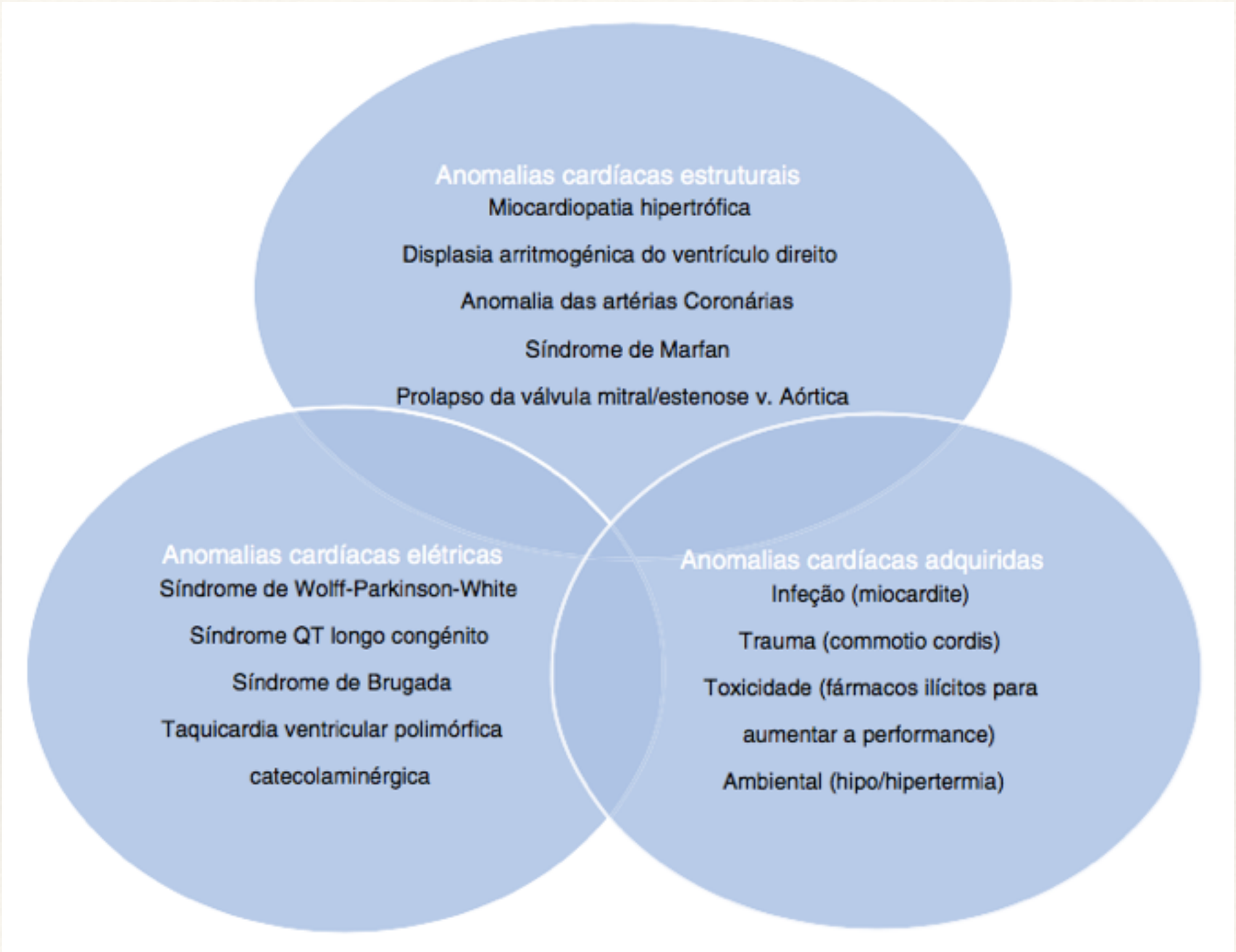
Isométrico:

- ≈↑ Qs
- ↑↑ TA sist, ↑↑ TA diast
- ↑ RVP

Isotónico:

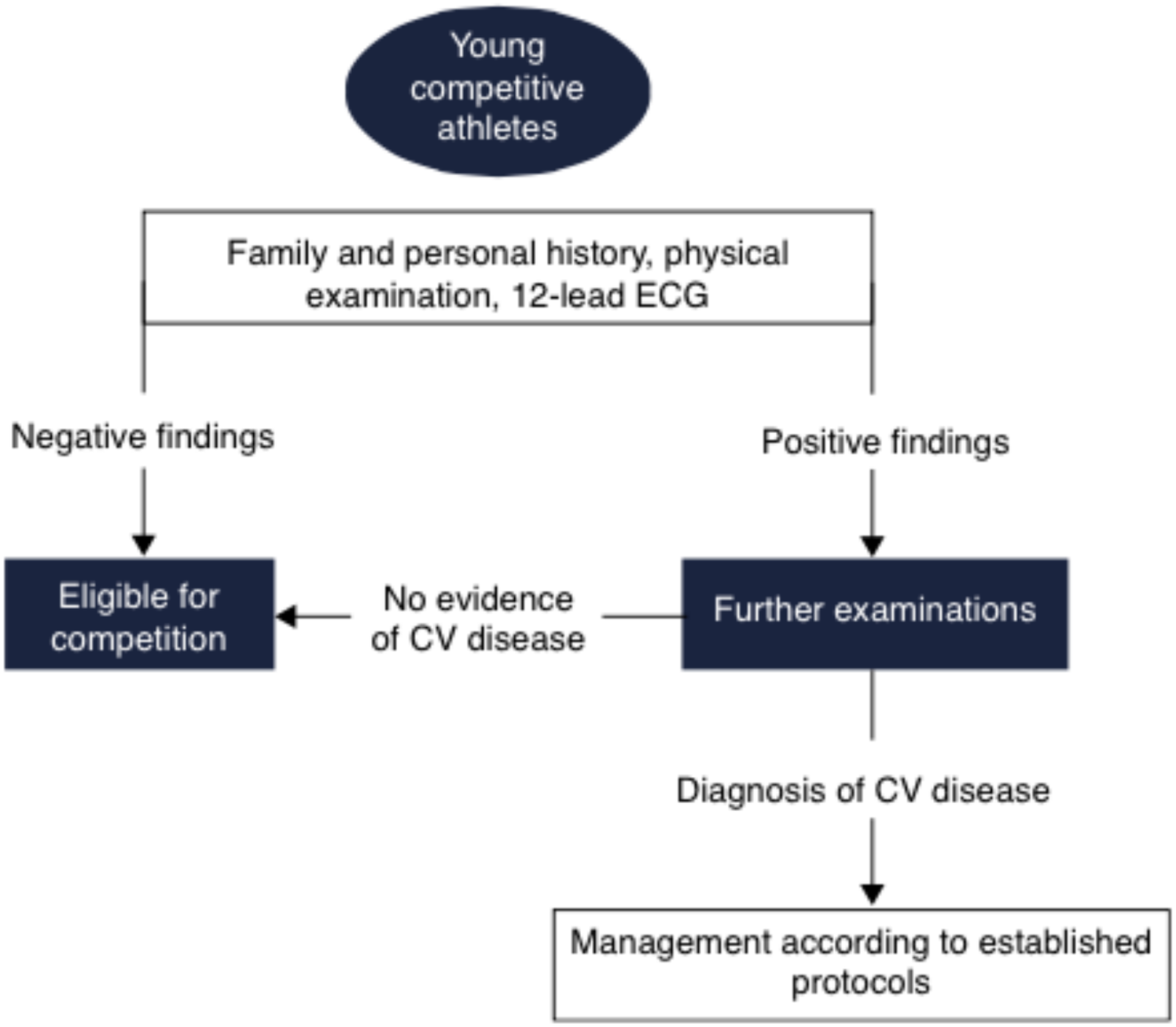
- ↑ Qs
- ↑ TA sist, ↓ TA diast
- ↓ ≈ RVP

MORTE SÚBITA CARDÍACA



Rev Port Cardiol. 2015; 34 (12): 753-770

RASTREIO MÉDICO-DESPORTIVO



História Pessoal:
Dor torácica
Lipotímia ou Síncope
Palpitações
Dispneia
Fadiga

História Familiar:
MSC
Dça coronária
Miocardiopatias
Arritmias

Exame Objectivo:
Estigmas doenças
HTA
Sopro
Pulsos femorais

Rev Port Cardiol. 2015; 34 (1): 51-64

Group 1: common and training-related ECG changes	Group 2: uncommon and training-unrelated ECG changes
Sinus	
First-d	
Incom	
Early	
Isolate left	

Seattle Criteria Abnormal Findings in Athletes

- T-wave inversion beyond V2 in WAs and V4 in BAs†
- ST-segment depression
- Pathological Q-waves
- Left atrial enlargement
- Right atrial enlargement
- Right ventricular hypertrophy pattern
- Short-QT interval ≤320 ms
- Brugada-like ECG pattern
- Profound sinus bradycardia (<30 bpm)

Refined Criteria Training Related Normal Variants

*Not Warranting Further Investigation**

- Sinus bradycardia
- First-degree AV block
- Incomplete RBBB
- Early repolarisation
- Isolated QRS voltage criteria for LVH

Refined Criteria Borderline Variants

Potentially Warranting Further Investigation

- Left atrial enlargement
- Right atrial enlargement
- Left axis deviation
- Right axis deviation
- Right ventricular hypertrophy
- TWI up to V4 in BAs†

Refined Criteria Training Unrelated Changes

Warranting Further Investigation

- ST-segment depression
- Pathological Q-waves
- Ventricular pre-excitation
- TWI beyond V1 in WAs beyond V4 in BAs
- Complete LBBB or RBBB
- QTc ≥470 ms in males ≥480 ms in females
- Brugada-like ER
- Atrial or vent. arrhythmias
- ≥2 PVCs per 10 sec tracing

*If present in **ISOLATION****

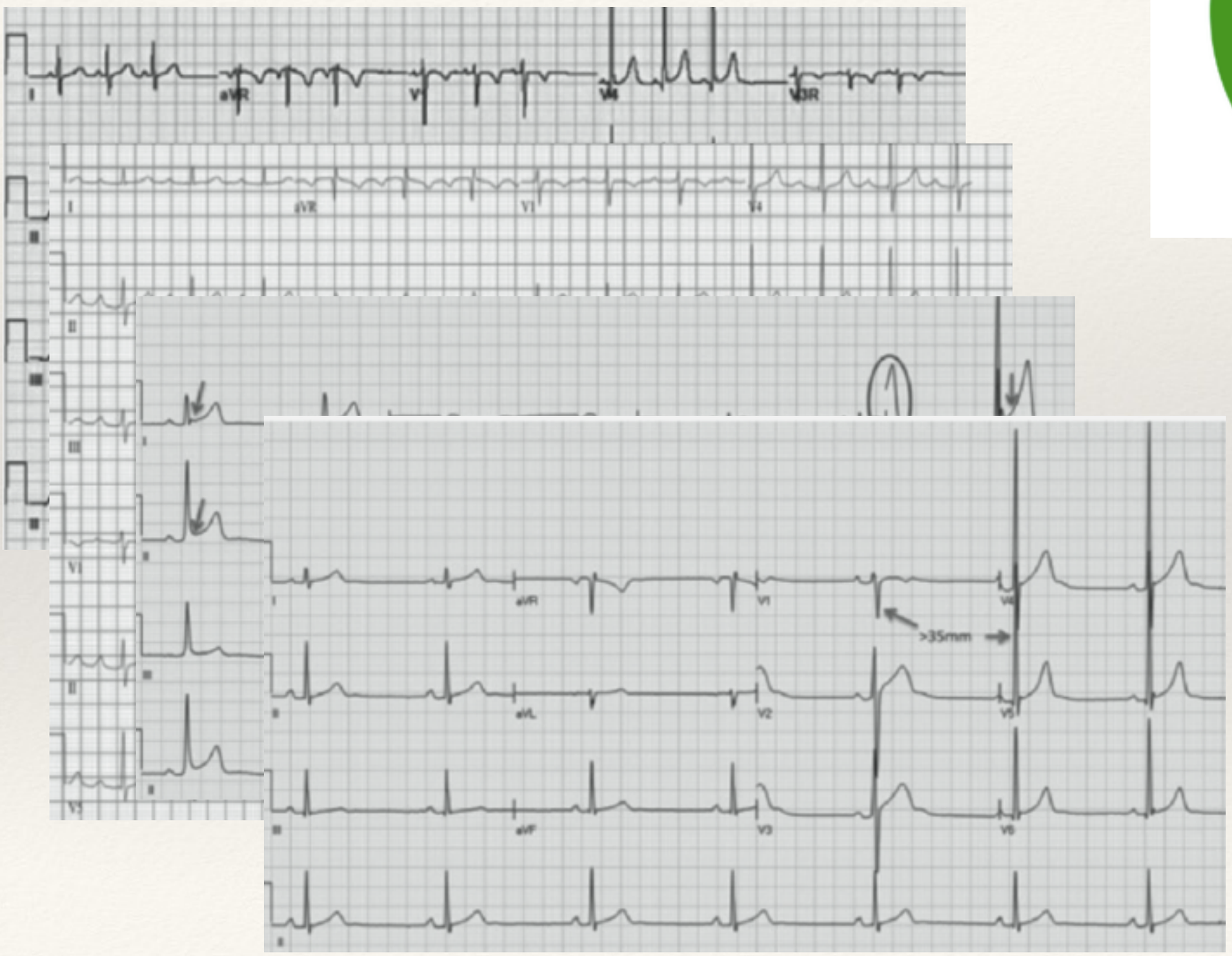
*If **TWO OR MORE** present*

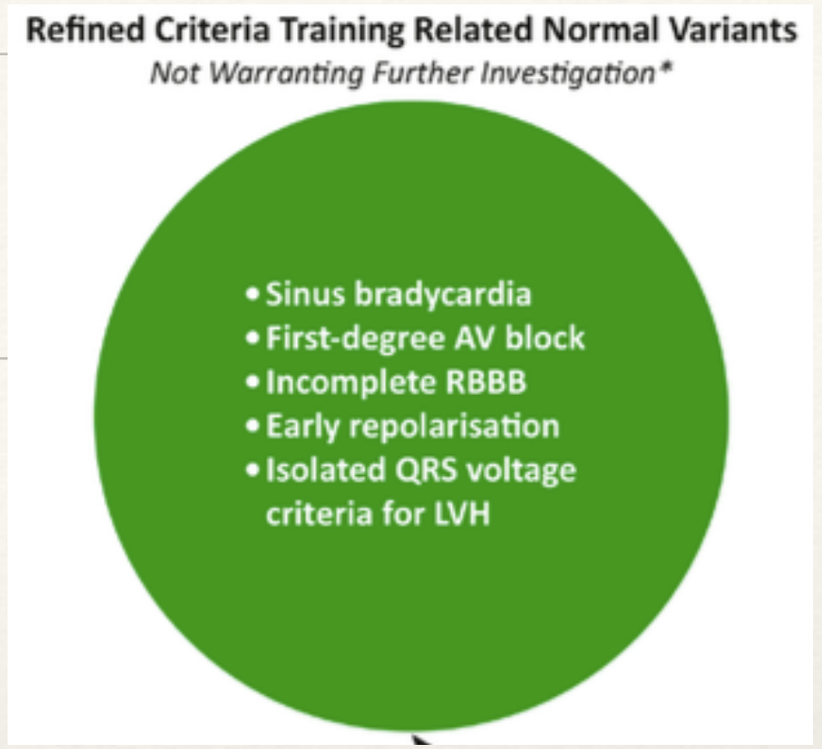
European Heart Journal 2010; 31, 243-259

BR J Sports Med 2013; 47: 122-124

Circulation. 2014; 129:1637-1649

Alterações benignas

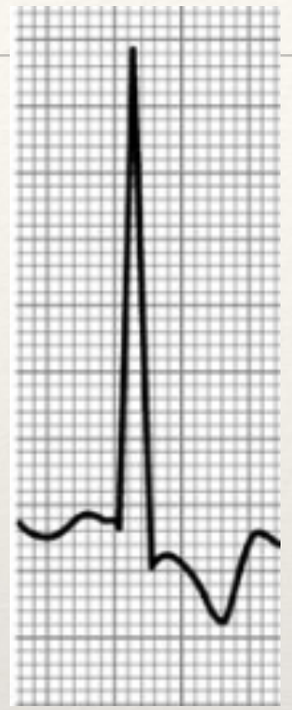


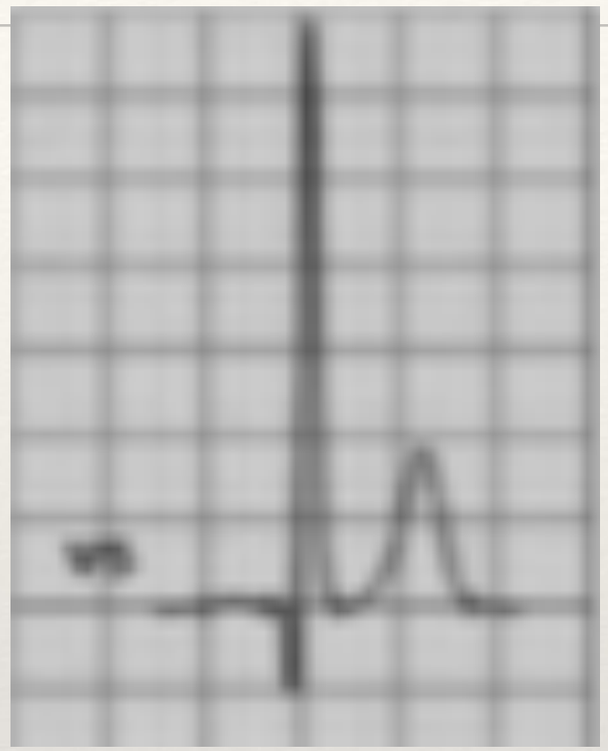


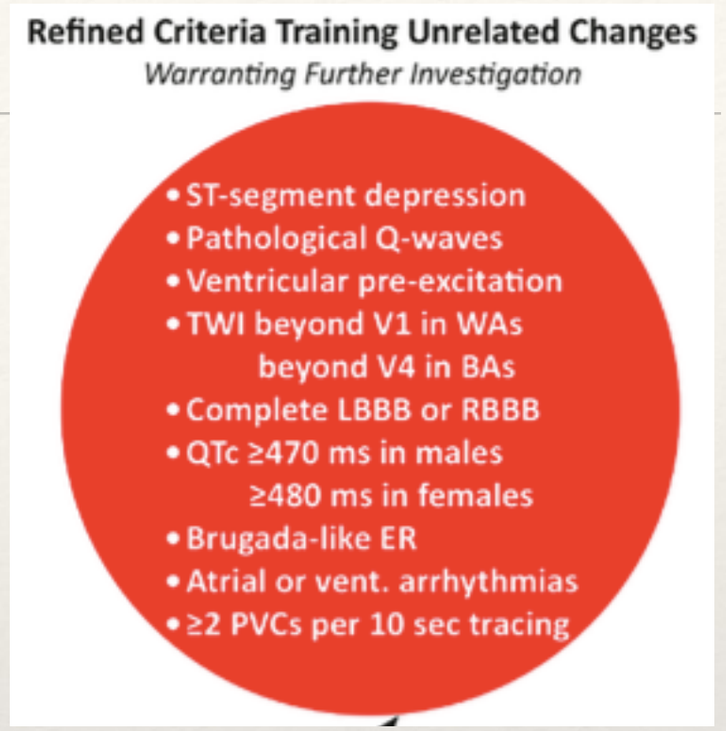
Circulation. 2014; 129:1637-1649

Rev Port Cardiol. 2015; 34 (12): 753-770

Alterações patológicas - estruturais



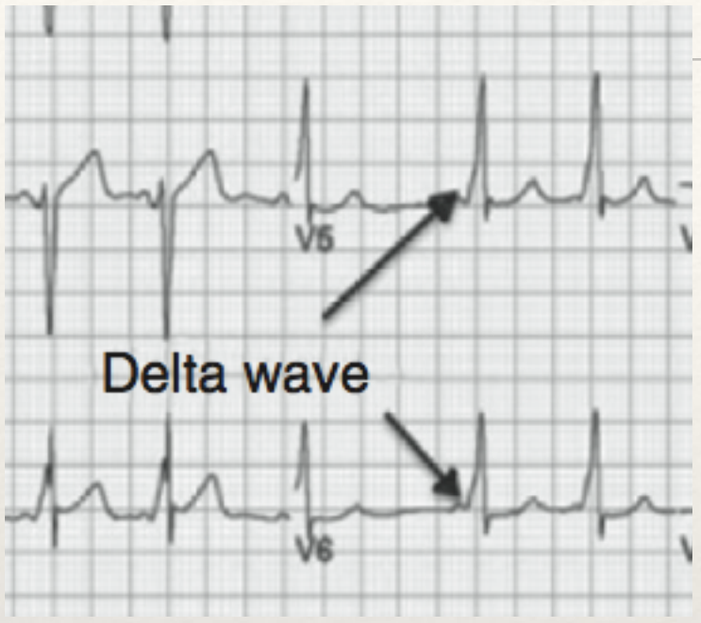


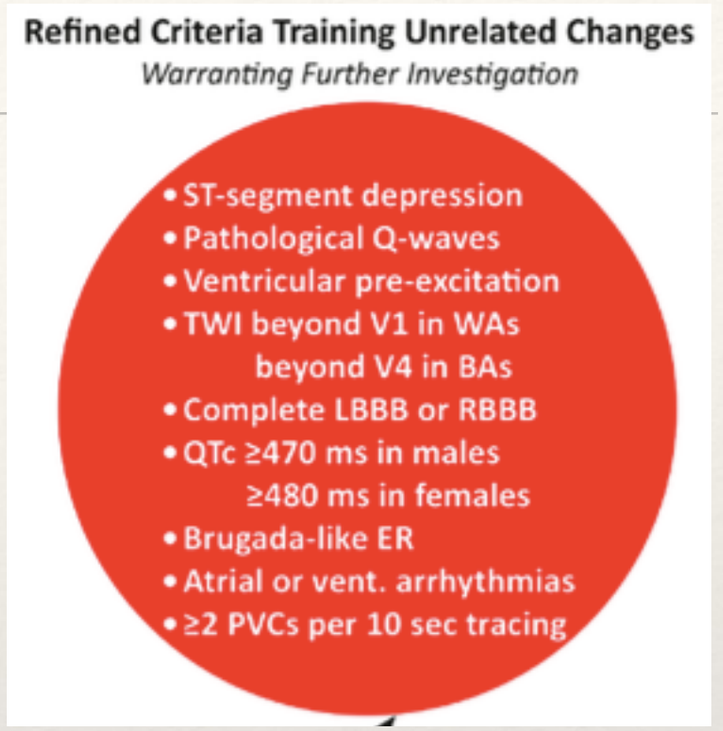


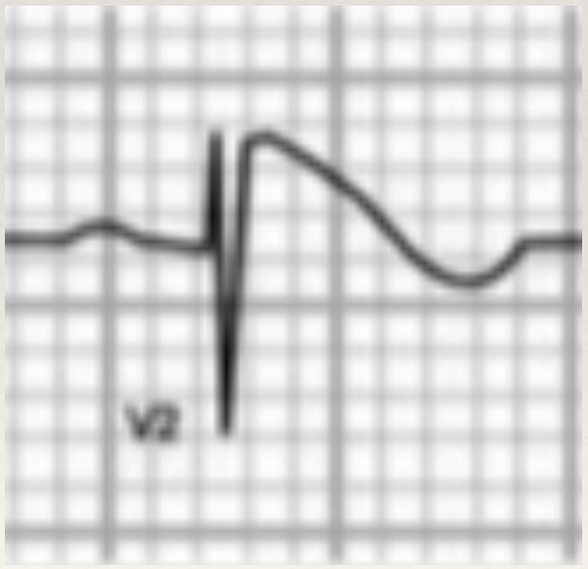
Circulation. 2014; 129:1637-1649

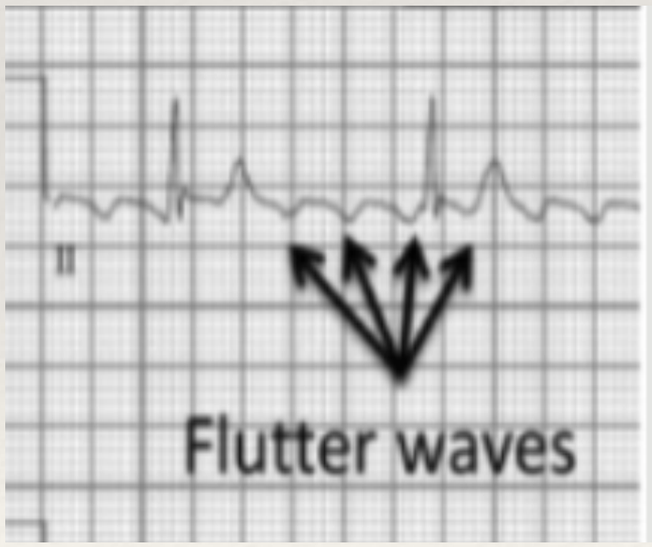
Rev Port Cardiol. 2015; 34 (12): 753-770

Alterações patológicas - eléctricas









Circulation. 2014; 129:1637-1649

Rev Port Cardiol. 2015; 34 (12): 753-770

DESPORTO EM CARDIOPATIAS

Bethesda Conference #36 and the European Society of Cardiology Consensus Recommendations Revisited

Eligibility Recommendations for
Competitive Athletes With Cardiovascular Abnormalities

JACC 2005; vol 45, nº 8

CIA

Recommendations:

1. Athletes with small defects, normal right heart volume, and no pulmonary hypertension can participate in all sports.
2. Athletes with a large ASD and normal pulmonary artery pressure can participate in all competitive sports.
3. Athletes with an ASD and mild pulmonary hypertension can participate in low-intensity competitive sports (class IA). Patients with associated pulmonary vascular obstructive disease who have cyanosis and a large right-to-left shunt cannot participate in competitive sports.

Recommendations:

1. Three to six months after the operation or intervention, patients can participate in all sports unless the following are present: 1) evidence of pulmonary hypertension; 2) symptomatic atrial or ventricular tachyarrhythmias or second- or third-degree heart block; and 3) evidence of myocardial dysfunction.

JACC 2005; vol 45, nº 8 Task Force 2: Congenital Heart Disease

Recommendations:

1. Athletes with a VSD and normal pulmonary artery pressure can participate in all sports.
2. Athletes with a large VSD who do not have marked elevation of pulmonary resistance are candidates for repair, and full participation in all sports would normally occur after a successful VSD closure.

Recommendations:

1. At three to six months after repair, asymptomatic athletes with no defect or only a small residual defect can participate in all competitive sports if they have no evidence of pulmonary artery hypertension, ventricular or atrial tachyarrhythmia, or myocardial dysfunction.
2. Athletes with symptomatic atrial or ventricular tachyarrhythmias or second- or third-degree atrioventricular (AV) block should follow the recommendations in Task Force 7: Arrhythmias. Athletes with mild-to-moderate pulmonary hypertension or ventricular dysfunction should follow the recommendations in the section entitled Elevated Pulmonary Resistance or Ventricular Dysfunction After Cardiac Surgery.
3. Athletes with persistent, severe pulmonary hypertension cannot participate in competitive sports (see section entitled Elevated Pulmonary Resistance).

PCA

Recommendations:

1. **Athletes with a small PDA and normal left heart chamber dimension can participate in all competitive sports.**
2. **Athletes with a moderate or large PDA, causing left ventricular (LV) enlargement, should undergo surgical or interventional catheterization closure before unrestricted competition.**

Recommendations:

1. **Three months after PDA closure, patients with no symptoms, with normal cardiac examination, and with no evidence of pulmonary hypertension or LV enlargement can participate in all competitive sports.**
2. **For athletes with residual pulmonary artery hypertension see the section entitled Elevated Pulmonary Resistance.**

Recommendations:

1. Athletes with a peak systolic gradient less than 40 mm Hg and normal right ventricular function can participate in all competitive sports if no symptoms are present. Annual re-evaluation is recommended.
2. Athletes with a peak systolic gradient greater than 40 mm Hg can participate in low-intensity competitive sports (classes IA and IB). Patients in this category usually are referred for balloon valvuloplasty or operative valvotomy before sports participation.

Recommendations:

1. Athletes with no or only residual mild PS and normal ventricular function without symptoms can participate in all competitive sports. Participation in sports can begin two to four weeks after balloon valvuloplasty. After operation, an interval of approximately three months is suggested before resuming sports participation.
2. Athletes with a persistent peak systolic gradient greater than 40 mm Hg should follow the same recommendations as those for patients before treatment.
3. Athletes with severe pulmonary incompetence characterized by a marked right ventricular enlargement can participate in class IA and IB competitive sports.

EAo

Recommendations:

1. Athletes with mild AS can participate in all competitive sports if they have a normal ECG, normal exercise tolerance, and no history of exercise-related chest pain, syncope, or atrial or ventricular tachyarrhythmia associated with symptoms.
2. Athletes with moderate AS can participate in low static/low-to-moderate dynamic, and moderate static/low-to-moderate dynamic (classes IA, IB, and IIA) competitive sports if the following conditions are met:
   - Mild or no LV hypertrophy by echocardiography and the absence of LV strain pattern on the ECG.
   - Normal exercise test without evidence of myocardial ischemia or atrial or ventricular tachyarrhythmia and with normal exercise duration and blood pressure response. Those athletes with supraventricular tachycardia or multiple or complex ventricular tachyarrhythmias at rest or with exercise can participate only in low-intensity competitive sports, classes IA and IB.
   - Absence of symptoms, as defined in the preceding text.
3. Athletes with severe AS should not participate in competitive sports.

JACC 2005; vol 45, nº 8 Task Force 2: Congenital Heart Disease

CoAo

Recommendations:

1. Athletes with mild coarctation and the absence of large collateral vessels or significant aortic root dilation (*z*-score 3.0 or less) (score 3.0 = 3 standard deviations from the mean for patient size), with a normal exercise test and a small pressure gradient at rest (usually 20 mm Hg or less between upper and lower limbs), and a peak systolic blood pressure 230 mm Hg or less with exercise can engage in all competitive sports.
2. Athletes with a systolic arm/leg gradient more than 20 mm Hg or exercise-induced hypertension with a systolic blood pressure more than 230 mm Hg can engage in only low-intensity competitive sports (class IA) until treated.

Recommendations:

1. Participation in sports, three or more months after surgical or balloon angioplasty for coarctation of the aorta, is permitted for athletes with a 20 mm Hg or less arm/leg blood pressure gradient at rest and a normal peak systolic blood pressure during rest and exercise.
2. During the first postoperative year, athletes should refrain from high-intensity static exercise (classes IIIA, IIIB, and IIIC) and sports that pose the danger of bodily collision.
3. After three months, if patients continue to be asymptomatic, with normal blood pressure at rest and exercise, all sports are permissible except those with a large static component (particularly, classes IIIA, IIIB, and IIIC).
4. For athletes with evidence of significant aortic dilation, wall thinning, or aneurysm formation, participation should be restricted to low-intensity competitive sports (classes IA and IB).

Recommendations:

1. Athletes with an excellent repair should be allowed to participate in all sports, providing that the following criteria are met:
   - Normal or near-normal right heart pressure
   - No or only mild right ventricular volume overload
   - No evidence of a significant residual shunt
   - No atrial or ventricular tachyarrhythmia abnormality on ambulatory ECG monitoring or exercise testing
2. Patients with marked pulmonary regurgitation and right ventricular volume overload, residual right ventricular hypertension (peak systolic right ventricular pressure greater than or equal to 50% systemic pressure), or atrial or ventricular tachyarrhythmias, should participate in low-intensity competitive sports only (class IA).

D-TGA

Recommendations:

1. Athletes with normal ventricular function, normal exercise test, and no atrial or ventricular tachyarrhythmias can participate in all sports.
2. Athletes with more than mild hemodynamic abnormalities or ventricular dysfunction can participate in low and moderate static/low dynamic competitive sports (classes IA, IB, IC, and IIA), provided that their exercise test is normal.

Recommendations:

1. Selected patients can engage in low and moderate static/low dynamic competitive sports (classes IA and IIA) provided there is:
   - Mild or no cardiac chamber enlargement on chest radiograph, echocardiography, or CMR
   - No history of atrial flutter, supraventricular tachycardia, or ventricular tachyarrhythmia
   - No history of syncope or other cardiac symptoms
   - A normal exercise test defined as normal duration, workload, heart rate, ECG, and blood pressure response for age and gender.

C. Fontan

Recommendations:

1. **Athletes can participate in low-intensity competitive sports (class IA).**
2. **Athletes can engage in class IB sports if they have normal ventricular function and oxygen saturation.**

JACC 2005; vol 45, nº 8 Task Force 2: Congenital Heart Disease

S. Kawasaki

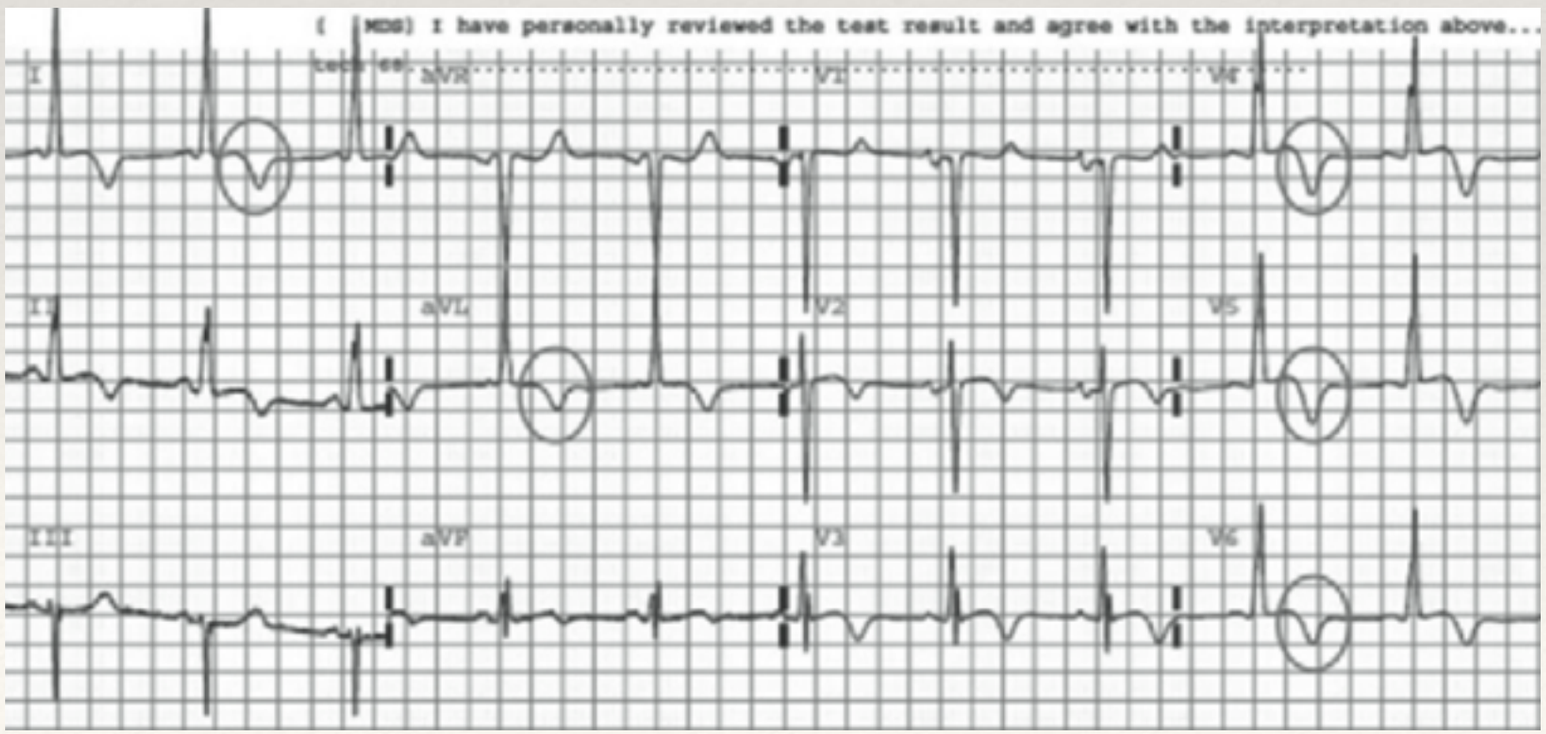
Recommendations:

1. Patients with no coronary artery abnormalities or transient coronary artery ectasia resolving during the convalescent phase of the disease are encouraged to participate in all sports after six to eight weeks.
2. Patients with regressed aneurysms can participate in all competitive sports if they have no evidence of exercise-induced ischemia by stress testing with myocardial perfusion imaging.
3. Patients with isolated small- to medium-sized aneurysms in one or more coronary arteries and judged to be at low risk for ischemic complications (normal left ventricular function, absence of exercise-induced ischemia or arrhythmia) may participate in low to moderate static and dynamic competitive sports (classes IA, IB, IIA, and IIB). Stress testing with evaluation of myocardial perfusion should be repeated at one- to two-year intervals to monitor ischemia and guide further recommendations about sports competition.
4. Patients with one or more large coronary aneurysms or multiple (segmented) or complex aneurysms with or without obstruction to coronary flow may participate in class IA and IIA sports if they have no evidence of reversible ischemia on stress testing, normal LV function, and absence of exercise-induced arrhythmia. Stress testing with evaluation of myocardial perfusion should be repeated at one-year intervals to monitor ischemia and guide further recommendations about sports competition.
5. Athletes with recent MI or revascularization should avoid competitive sports until their recovery is complete—usually six to eight weeks. Those with normal LV ejection fraction, exercise tolerance, absence of reversible ischemia or myocardial perfusion testing, and absence of exercise-induced arrhythmias can participate in class IA and IB sports. Those with left ventricular ejection fraction less than 40%, exercise intolerance, or exercise-induced ventricular tachyarrhythmias should not participate in competitive sports.
6. Patients with coronary lesions who are taking anticoagulants and/or antiplatelet drugs (aspirin, clopidogrel) should not participate in sports that pose a danger of high speed collision.

MCH

Recommendations:

1. Athletes with a probable or unequivocal clinical diagnosis of HCM should be excluded from most competitive sports, with the possible exception of those of low intensity (class IA). This recommendation is independent of age, gender, and phenotypic appearance, and does not differ for those athletes with or without symptoms, LV outflow obstruction, or prior treatment with drugs or major interventions with surgery, alcohol septal ablation, pacemaker, or implantable defibrillator.
2. Although the clinical significance and natural history of genotype positive-phenotype negative individuals remains unresolved, no compelling data are available at present with which to preclude these patients from competitive sports, particularly in the absence of cardiac symptoms or a family history of sudden death.



Rev Port Cardiol. 2015; 34 (12): 753-770

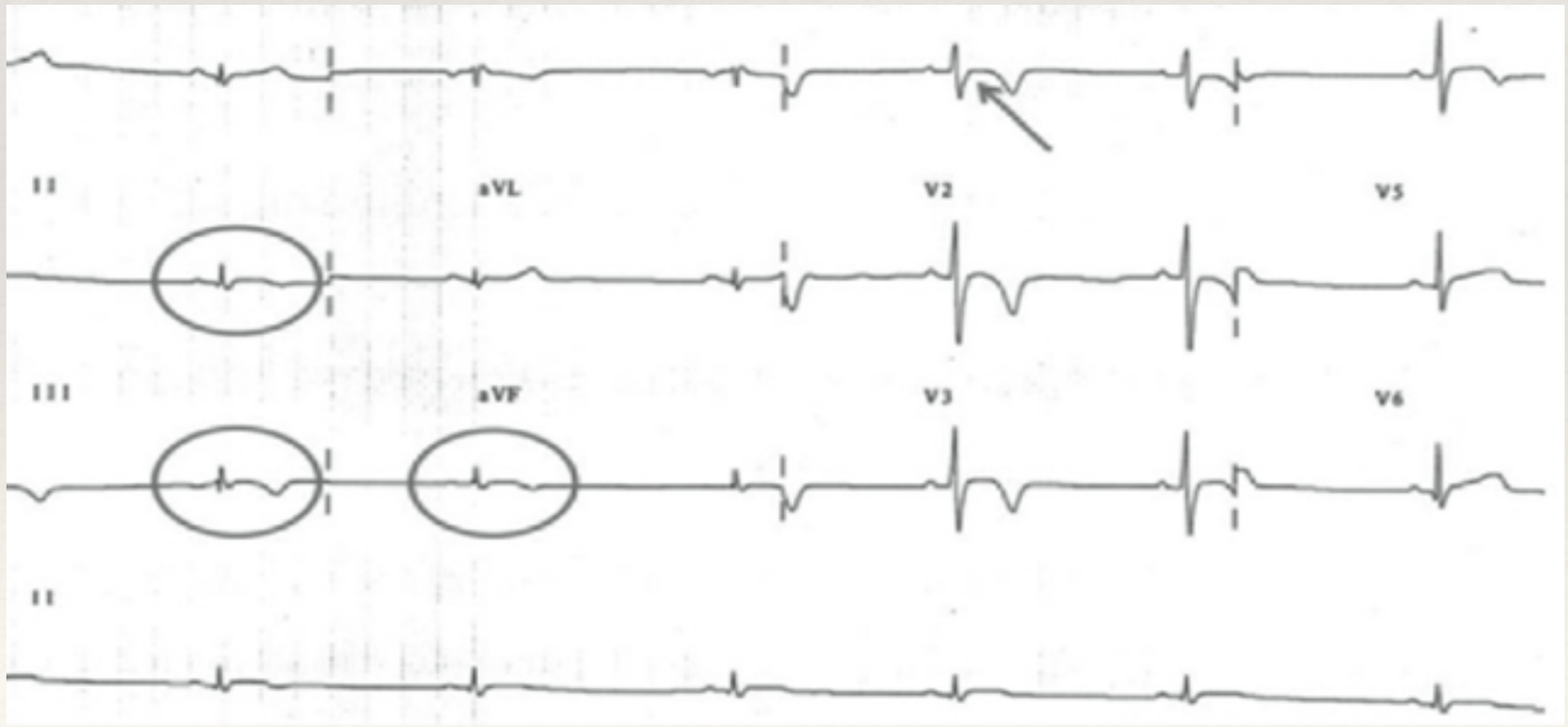
JACC 2005; vol 45, nº 8

Task Force 4: HCM and Other Cardiomyopathies, Mitral Valve Prolapse, Myocarditis, and Marfan Syndrome

DAVD

Recommendation:

1. **Athletes with probable or definite diagnosis of ARVC should be excluded from most competitive sports, with the possible exception of those of low intensity (class IA).**



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JACC 2005; vol 45, nº 8

Task Force 4: HCM and
Other Cardiomyopathies, Mitral Valve
Prolapse, Myocarditis, and Marfan Syndrome

Miocardite

Recommendations:

1. Athletes with probable or definite evidence of myocarditis should be withdrawn from all competitive sports and undergo a prudent convalescent period of about six months following the onset of clinical manifestations.
2. Athletes may return to training and competition after this period of time if:
   a. LV function, wall motion, and cardiac dimensions return to normal (based on echocardiographic and/or radionuclide studies at rest and with exercise)
   b. clinically relevant arrhythmias such as frequent and/or complex repetitive forms of ventricular or supraventricular ectopic activity are absent on ambulatory Holter monitoring and graded exercise testing
   c. serum markers of inflammation and heart failure have normalized
   d. the 12-lead ECG has normalized. Persistence of relatively minor ECG alterations such as some ST-T changes are not, per se, the basis for restriction from competition.

Pericardite

Recommendation:

1. Athletes with pericarditis, regardless of etiology, should not participate in competitive sports during the acute phase. Such athletes can return to full activity when there is no longer evidence of active disease, including effusion by echocardiography, and when serum markers of inflammation have normalized. For pericarditis associated with evidence of myocardial involvement, eligibility recommendations should also be based on the course of myocarditis. Chronic pericardial disease that results in constriction disqualifies one from all competitive sports.

JACC 2005; vol 45, nº 8

Task Force 4: HCM and Other Cardiomyopathies, Mitral Valve Prolapse, Myocarditis, and Marfan Syndrome

S. Marfan

Recommendations:

1. Athletes with Marfan syndrome can participate in low and moderate static/low dynamic competitive sports (classes IA and IIA) if they *do not* have one or more of the following:
   a. aortic root dilatation (i.e., transverse dimension 40 mm or greater in adults, or more than 2 standard deviations from the mean for body surface area in children and adolescents; *z*-score of 2 or more)
   b. moderate-to-severe mitral regurgitation
   c. family history of dissection or sudden death in a Marfan relative

   It is recommended, however, that these athletes have an echocardiographic measurement of aortic root dimension repeated every six months, for close surveillance of aortic enlargement.
2. Athletes with unequivocal aortic root dilatation (transverse dimension 40 mm or greater in adults or greater than 2 standard deviations beyond the mean for body surface area in children and adolescents; *z*-score of 2 or more) (41,43), prior surgical aortic root reconstruction, chronic dissection of aorta or other artery, moderate-to-severe mitral regurgitation, or family history of dissection or sudden death can participate only in low-intensity competitive sports (class IA).
3. Athletes with Marfan syndrome, familial aortic aneurysm or dissection, or congenital bicuspid aortic valve with any degree of ascending aortic enlargement (as defined in 1 and 2 above) also should not participate in sports that involve the potential for bodily collision.
4. Recommendations related to aortic regurgitation are the same as those in Task Force 3.

JACC 2005; vol 45, nº 8

Task Force 4: HCM and Other Cardiomyopathies, Mitral Valve Prolapse, Myocarditis, and Marfan Syndrome

Recommendations:

1. Before individuals commence training for competitive athletics, they should undergo careful assessment of BP and those with initially high levels (above 140/90 mm Hg) should have out-of-office measurements to exclude isolated office "white-coat" hypertension. Those with pre-hypertension (120/80 mm Hg up to 139/89 mm Hg) should be encouraged to modify lifestyle but should not be restricted from physical activity. Those with sustained hypertension should have echocardiography. Left ventricular hypertrophy (LVH) beyond that seen with "athletes' heart" should limit participation until BP is normalized by appropriate drug therapy.
2. The presence of stage 1 hypertension in the absence of target organ damage including LVH or concomitant heart disease should not limit the eligibility for any competitive sport. Once having begun a training program, the hypertensive athlete should have BP remeasured every two to four months (or more frequently, if indicated) to monitor the impact of exercise.
3. Athletes with more severe hypertension (stage 2), even without evidence of target organ damage such as LVH, should be restricted, particularly from high static sports (classes IIIA to IIIC), until their hypertension is controlled by either lifestyle modification or drug therapy.
4. All drugs being taken must be registered with appropriate governing bodies to obtain a therapeutic exemption.
5. When hypertension coexists with another cardiovascular disease, eligibility for participation in competitive athletics is usually based on the type and severity of the associated condition.

Extrassistolia supraventricular

Recommendation:

1. Athletes can participate in all competitive sports.

Extrassistolia ventricular

Recommendations:

1. Athletes *without* structural heart disease who have premature ventricular complexes at rest and during exercise, and exercise testing (comparable to the sport in which they compete) can participate in all competitive sports. Should the premature ventricular complexes increase in frequency during exercise or exercise testing to the extent that they produce symptoms of impaired consciousness, significant fatigue, or dyspnea, the athlete can participate in class IA competitive sports only.
2. Athletes *with* structural heart disease who are in high-risk groups and have premature ventricular complexes (with or without treatment) can participate in class IA competitive sports only. Such athletes with premature ventricular complexes that are suppressed by drug therapy (as assessed by ambulatory ECG recordings) during participation in the can compete in only class IA competitive .

Critérios de referenciação:

- Sintomas, incluindo (pre) sincope
- HF de MS
- ECG basal anormal
- EcoTT anormal
- > 10 EV/hora ou > 2000/24horas
- Aparecimento ou agravamento com o esforço
- Fenómeno de R sobre T

JACC 2005; vol 45, nº 8 Task Force 7: Arrhythmias

WPW

Referenciar para consulta

Recommendations:

1. Athletes without structural heart disease, without a history of palpitations, or without tachycardia (particularly those 20 to 25 years old or more) can participate in all competitive sports. However, in younger age groups, a more in-depth evaluation including an electrophysiologic study may be recommended before allowing participation in moderate- to high-intensity competitive sports.

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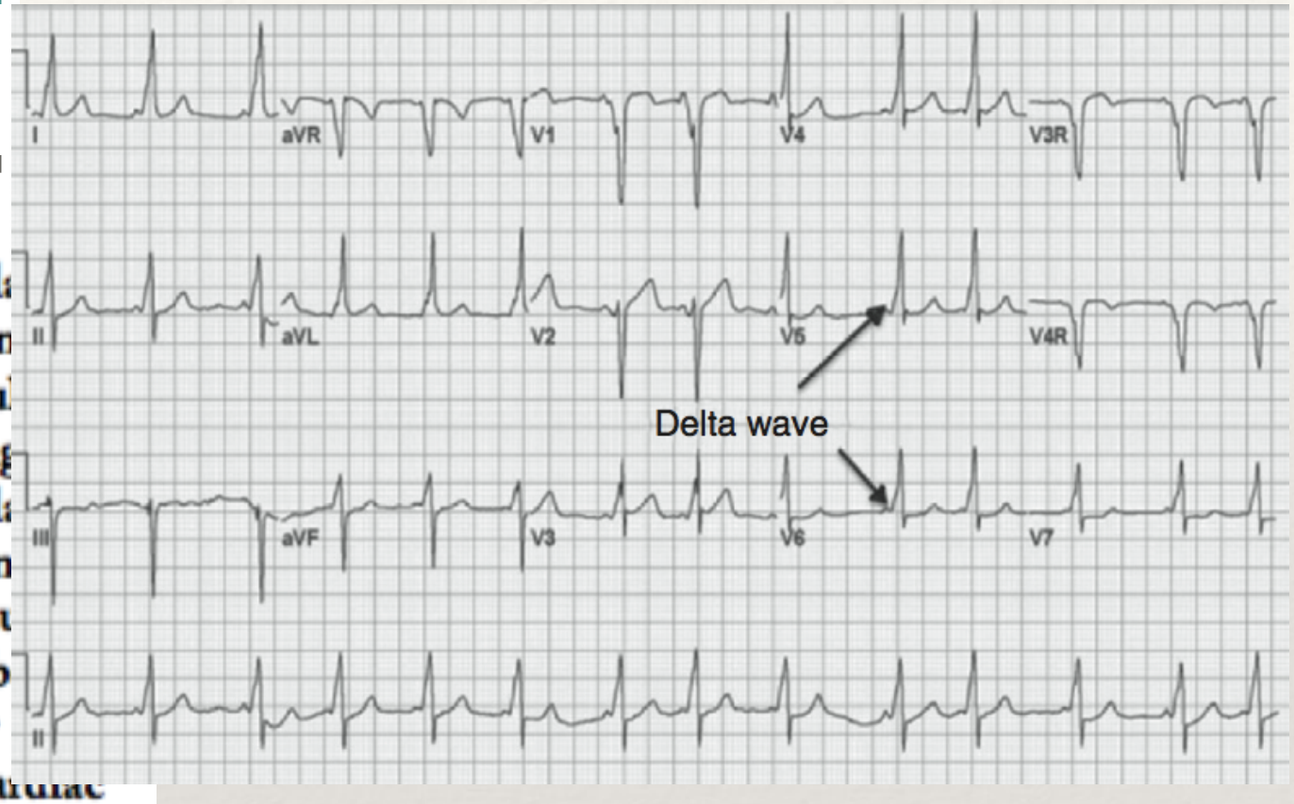
3. Athletes with episodes of atrial flutter/fibrill
and syncope or near syncope whose maximal ven
ular rate at rest (without therapy) as a resu
conduction over the accessory pathway exceedin
beats/min should be considered for catheter abl
therapy of the accessory pathway prior to contin
competition. Those whose ventricular rate du
isoproterenol administration is less than 240 b
min and who have no episodes of syncope or
syncope appear to be at low risk for sudden cardiac
death.

4. Athletes with no structural heart disease who have had successful catheter or surgical ablation of the accessory pathway, are asymptomatic, and have normal AV conduction and no inducible arrhythmia by follow-up electrophysiologic study can participate in all competitive sports in several days. Those without an electrophysiologic study and no spontaneous recurrence of tachycardia for two to four weeks after ablation can participate in all competitive sports.



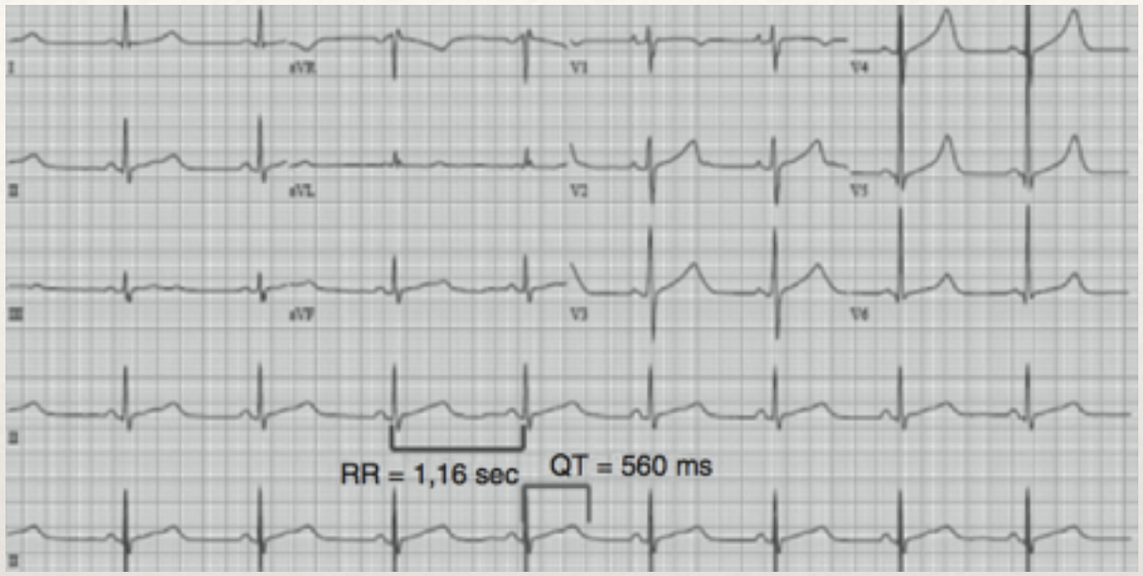
Rev Port Cardiol. 2015; 34 (12): 753-770

JACC 2005; vol 45, nº 8 Task Force 7: Arrhythmias

SQTL

Recommendations:

1. Regardless of QTc or underlying genotype, all competitive sports, except those in class IA category should be restricted in a patient who has previously experienced either: 1) an out-of-hospital cardiac arrest, or 2) a suspected LQTS-precipitated syncopal episode.
2. Asymptomatic patients with baseline QT prolongation (QTc of 470 ms or more in males, 480 ms or more in females) should be restricted to class IA sports. The restriction limiting participation to class IA activities may be liberalized for the asymptomatic patient with genetically proven type 3 LQTS (LQT3).
3. Patients with genotype-positive/phenotype-negative LQTS (i.e., identification of a LQTS-associated mutation in an asymptomatic individual with a nondiagnostic QTc) may be allowed to participate in competitive sports. Although the risk of sudden cardiac death is not zero in such individuals, there is no compelling data available to justify precluding these individuals (who are being identified with increasing frequency) from competitive activities. Because of the strong association between swimming and LQT1, persons with genotype-positive/phenotype-negative LQT1 should refrain from competitive swimming.
4. LQTS patients with an ICD/pacemaker should not engage in sports with a danger of bodily collision because such trauma may damage the pacemaker system. The presence of an ICD should restrict individuals to class IA activities.



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SQTL

Recommendations:

1. Regardless of QTc or underlying genotype, all competitive sports, except those in class IA category should be restricted in a patient who has previously experienced either: 1) an out-of-hospital cardiac arrest, or 2) a suspected LQTS-precipitated syncopal episode.
2. Asymptomatic patients with baseline QT prolongation (QTc of 470 ms or more in males, 480 ms or more in females) should be restricted to class IA sports. The restriction limiting participation to class IA activities may be liberalized for the asymptomatic patient with genetically proven type 3 LQTS (LQT3).
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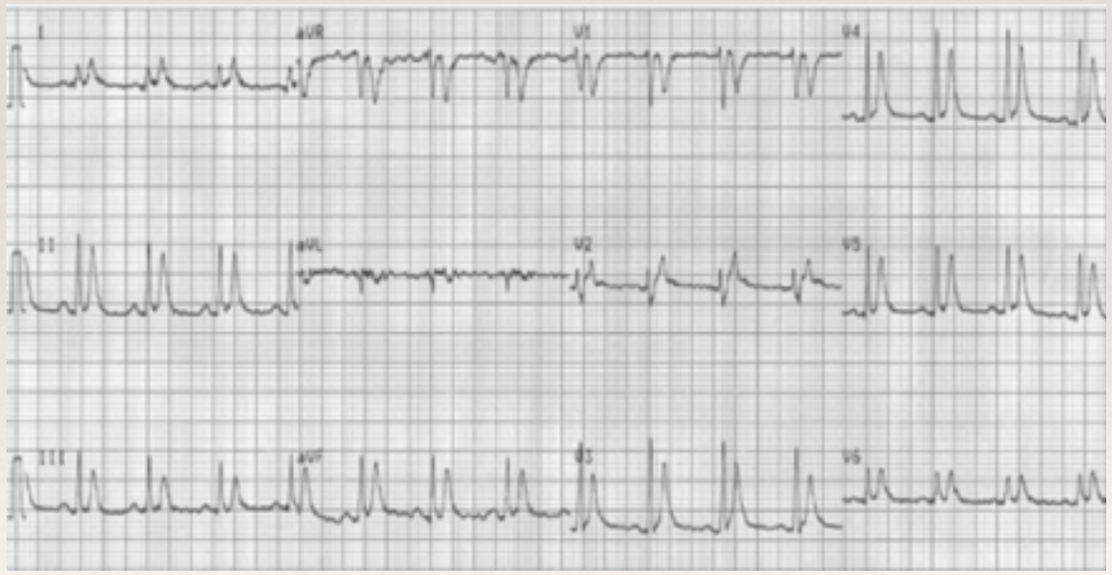
4. LQTS patients with an ICD/pacemaker should not engage in sports with a danger of bodily collision because such trauma may damage the pacemaker system. The presence of an ICD should restrict individuals to class IA activities.

SQTC

Recommendation:

1. Until the phenotype of SQTS is better understood, a universal restriction from competitive sports with the possible exception of class IA activities seems to represent the most prudent recommendation (27).



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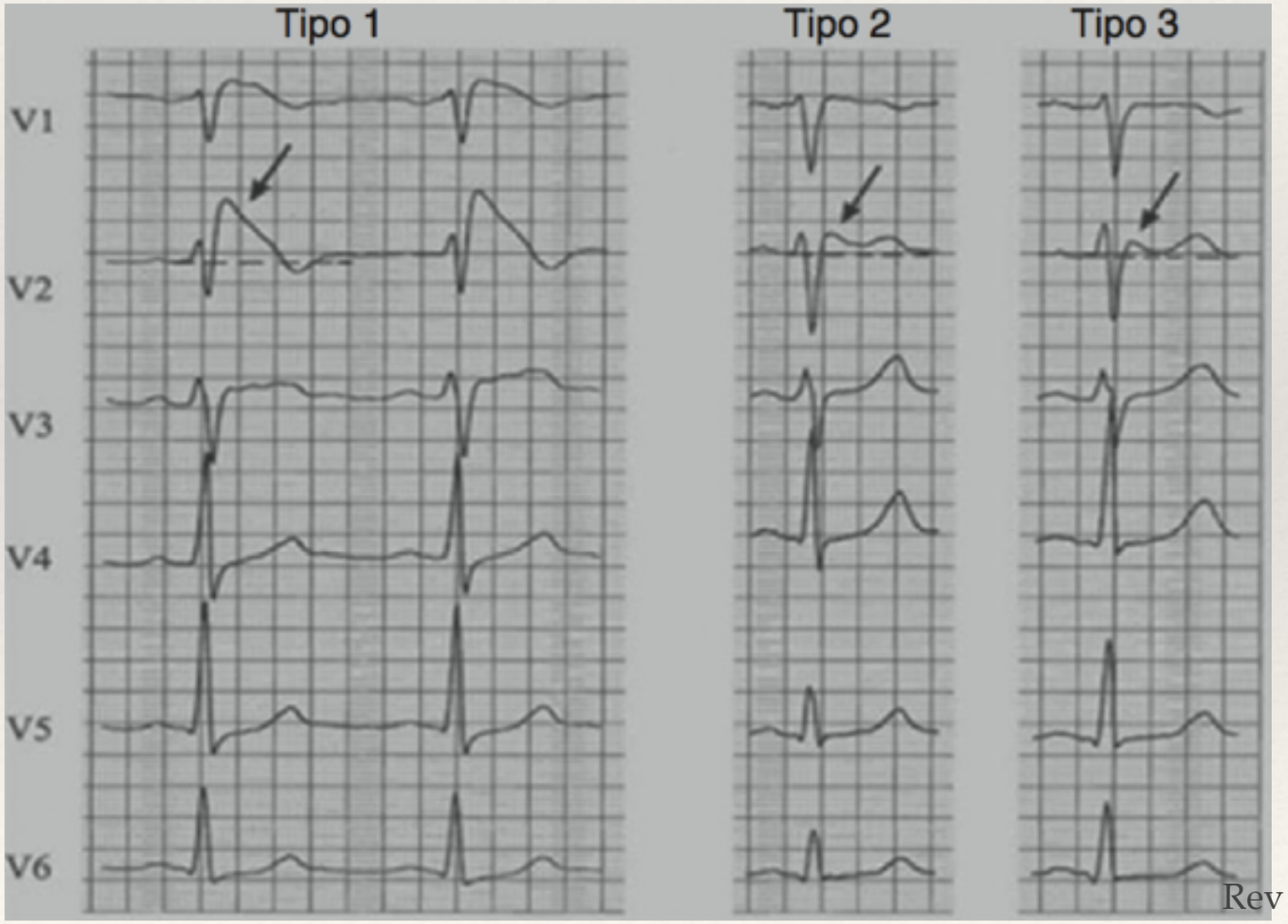
S. Brugada

Recommendations:

1. Although a clear association between exercise and sudden death has not been established, and because of the potential impact of hyperthermia, restriction to participation in class IA sports seems advisable.
2. The presence of an ICD device warrants the same restrictions to class IA sports as previously outlined.



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CONCLUSÕES

- importância da actividade física na promoção da saúde e na prevenção de doenças
    - epidemia do sedentarismo e obesidade
- rastreio médico fundamental
    - ECG com critérios de interpretação apropriados
- cardiopatias podem não ser CI à practica desportiva
    - avaliação individualizada