

Cardiovascular Update

July 2018 | Volume 3, Issue 4

A newsletter from the BayCare Cardiovascular Service Line

Cardiovascular Screening in Young Athletes

By Dr. Christina Canody and Dr. Ted Farrar

The summer school physical season is upon us and provides an excellent opportunity to revisit the cardiac screening guidelines for young athletes. The 14-Element Cardiovascular Screening Checklist for Congenital and Genetic Heart Screening is recommended in the U.S. for athletes beginning in adolescence. The AHA/ACC defines a competitive athlete as “one who participates in an organized team or individual sport that requires regular competition against others as a central component, places a high premium on excellence and achievement, and requires some form of systematic (and usually intense) training.”¹ Pre-participation screening is an integral part of identifying individuals who may be at risk for cardiac problems including sudden cardiac arrest and sudden cardiac death (SCD). We know that cardiomyopathy and coronary anomalies account for approximately 50 percent of these cases, with exercise as a known trigger that may be compounded by extreme environmental conditions, age, race, sport and level of play.²

This screening tool is designed for use alongside clinical judgement to assess cardiac risk with sports participation. Eligibility is multi-factorial, and acknowledging athletes who need additional consultation or cardiac testing is crucial. Although the overall scientific evidence is imperfect, the Bethesda Conferences have published consensus recommendations based on the expertise of panelists and the data currently available.³

In particular, the tool includes elements of personal history, family history and physical examination. It helps identify persons with symptoms or history that could indicate underlying cardiovascular disease. It screens for symptoms of chest pain or discomfort in varying forms, excessive dyspnea or fatigue, and palpitations. Syncope or near-syncope may also indicate underlying SCD risk. Additional history of a heart murmur, elevated blood pressure, prior cardiac evaluation or prior restrictions from sports participation can be elements of concern and would warrant investigation.

Upcoming Conference

Saturday, October 27 | 8am–3pm

BayCare C.A.S.E. (Cardiovascular, Arrhythmia, Surgery, Endovascular) Symposium

Renaissance Tampa International Plaza Hotel | Tampa

To register: BayCareCardioConference.org



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The most important cardiac screening question for determining a risk of cardiomyopathy in young athletes is a family history of sudden death in at least one family member under age 50. Also, a family history of disability due to heart disease in a relative under age 50 or history of cardiomyopathy, arrhythmias, Marfan syndrome or specific knowledge of familial cardiac conditions, is important to assess risk. The physical examination should include auscultation of the heart and assessment for heart murmurs. Examination of femoral pulses to exclude coarctation of the aorta and brachial artery blood pressure should also be performed, and observation for Marfanoid appearance. Any abnormalities necessitate further evaluation for cardiac disease.

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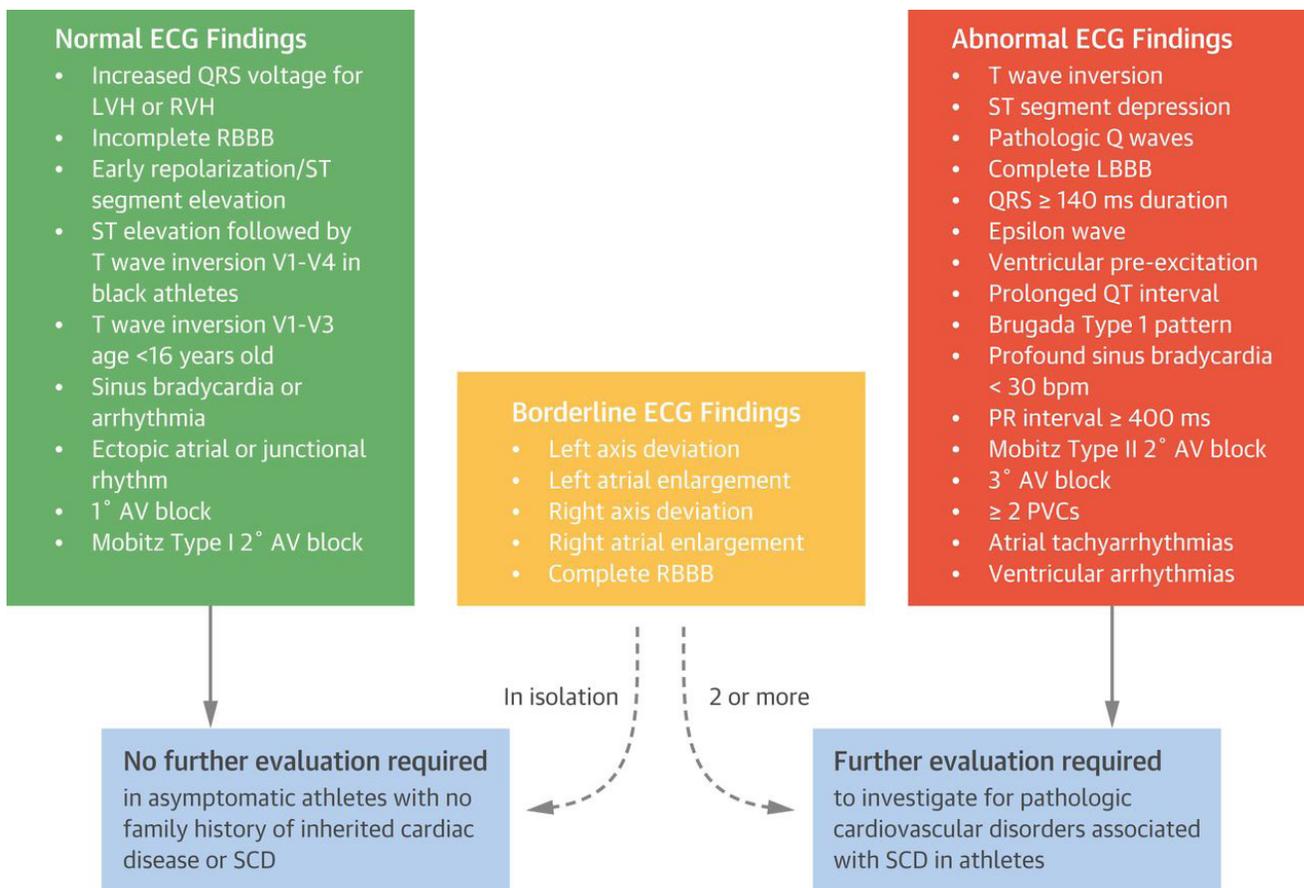
The most frequent additional test recommended as a result of the screening is the ECG, and its interpretation in athletes can be complicated. Understanding potential ECG changes in athletes is crucial since research has demonstrated that around 40 percent of sudden cardiac deaths (SCDs) are conditions identifiable on ECG.⁴ Figure 1 lists some of these ECG changes in athletes.

These conditions are further broken down into electrical disorders and cardiomyopathies, and should be understood in the context of normal changes for athletes.⁵

Cardiomyopathies are considered the most common cause of SCD in young athletes. They may have ECG changes that can be difficult to distinguish from normal athletic adaptations as opposed to primary electrical disorders, which are not adaptations to regular exercise. Both are often asymptomatic, and Table 1 lists the common ones encountered.⁶

The AHA and the current literature doesn't support universal screening in the U.S.^{7,8} The American Medical Society of Sports Medicine (AMSSM) reinforces that recommendation, but acknowledges certain groups (NCAA men's basketball) may benefit from screening. If adding routine ECG screening, it's recommended that the infrastructure be in place to have expert interpretation.^{9,10} It's also recommended that physicians improve their competency, and this is a part of primary care sports medicine training. The recent 2017 international recommendations and CME (<http://Learning.bmj.com/ECGathlete>) from the BJSM are invaluable in this regard.¹¹

Figure 1 – Normal and Abnormal ECG Findings Common in Trained Athletes



Sharma S, Drezner JA, et al. International Recommendations for Electrocardiographic Interpretation in Athletes. *J Am Coll Cardiol* 2017;69(8):1057-1075. (Used with permission)

Table 1 – Common Cardiomyopathies and Electrical Disorders Found in Athletes

Cardiomyopathies	Electrical Disorders
Hypertrophic cardiomyopathy	Long QT syndrome
Arrhythmogenic right ventricular cardiomyopathy	Sinus bradycardia <30bpm
Dilated cardiomyopathy	Atrial tachyarrhythmias
Left ventricular non-compaction	PVC's >2/10sec
	Ventricular pre-excitation (WPW)
	Brugada type I pattern

Footnotes

1. Maron BJ, Zipes DP. 36th Bethesda Conference: introduction: eligibility recommendations or competitive athletes with cardiovascular abnormalities. *J Am Coll Cardiol* 2005;45:1318-21.
2. Maron BJ, Shirani J, Poliac LC, Mathenge R, Roberts WC, Mueller FO. Sudden death in young competitive athletes: clinical, demographic, and pathological profiles. *JAMA* 1996;276:199-204.
3. Maron BJ, Zipes DP, et al. Eligibility and Disqualification Recommendations for Competitive Athletes with Cardiovascular Abnormalities: Preamble, Principles, and General Considerations. *Circulation* 2015;132:e256-e261.
4. Harmon KG, Asif IM. Incidence of Sudden Cardiac Death in National Collegiate Athletic Association Athletes. *Circulation* 2011;123:1594-1600.
5. Drezner JA, ischbach P, et al. Normal electrocardiographic findings: Recognizing physiological adaptations in athletes. *Br J Sports Med* 2013;47:125-136.
6. Drezner JA, Ackerman MJ, et al. Abnormal electrocardiographic findings in athletes: Recognizing changes suggestive of primary electrical disease. *Br J Sports Med* 2013;47:153-167.
7. Maron BJ, Friedman RA, et al. Assessment of the 12-Lead ECG as a Screening Test for Detection of Cardiovascular Disease in Healthy General Populations of Young People (12-25 Years of Age): A Scientific Statement from the American Heart Association and the American College of Cardiology. *Circulation* 2014;130:00-00.
8. Maron BJ, Zipes DP, et al. AHA/ACC Scientific Statement. Eligibility and Disqualification Recommendations for Competitive Athletes with Cardiovascular Abnormalities: Preamble, Principles, and General Considerations. *J Am Coll Cardiol* 2015;66(21):2343-2349.
9. Drezner JA, O'Connor FG, et al. AMSSM Position Statement on Cardiovascular Preparticipation Screening in Athletes: Current Evidence, Knowledge Gaps, Recommendations, and Future Directions. *Clin J Sport Med* 2016;26(5):347-361.
10. Harmon KG, Asif IM, et al. Incidence, Cause, and Comparative Frequency of Sudden Cardiac Death in National Collegiate Athletic Association Athletes: A Decade in Review. *Circulation* 2015;132:10-19.
11. Sharma, S, Drezner JA, et al. International Recommendations for Electrocardiographic Interpretation in Athletes. *J Am Coll Cardiol* 2017;69(8):1057-1075.

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