JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY
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THE AMERICAN COLLEGE OF CARDIOLOGY FOUNDATION
PUBLISHED BY ELSEVIER INC.

VOL. 66, NO. 21, 2015
ISSN 0735-1097/$36.00
http://dx.doi.org/10.1016/j.jacc.2015.09.034

AHA/ACC SCIENTIFIC STATEMENT

Eligibility and Disqualification Recommendations for Competitive Athletes With Cardiovascular Abnormalities: Task Force 2: Preparticipation Screening for Cardiovascular Disease in Competitive Athletes

A Scientific Statement From the American Heart Association and American College of Cardiology

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The central purpose of preparticipation screening of trained competitive athletes is to identify or raise suspicion of those cardiovascular abnormalities and diseases that are potentially responsible for sudden unexpected death on the athletic field (1-14). When such athletes are recognized, they are exposed to eligibility and disqualification decisions that become the responsibility of the practicing physician (4,15-17) and are a subject of this document. There is general (although not universal) (12) agreement with the principle that screening to detect important diseases and potentially prevent sudden death is justified and potentially beneficial (1-3,5-9,18).

There are many pathways and strategies by which competitive athletes with cardiovascular disease may be recognized: 1) comprehensive evaluation by a

*On behalf of the American Heart Association Electrocardiography and Arrhythmias Committee of the Council on Clinical Cardiology, Council on Cardiovascular Disease in the Young, Council on Cardiovascular and Stroke Nursing, Council on Functional Genomics and Translational Biology, and the American College of Cardiology.

The American Heart Association and the American College of Cardiology make every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest. The Preamble and other Task Force reports for these proceedings are available online at www.onlinejacc.org (J Am Coll Cardiol 2015;66:2343-9; 2350-5; 2362-71; 2372-84; 2385-92; 2393-7; 2398-405; 2406-11; 2412-23; 2424-8; 2429-33; 2434-8; 2439-43; 2444-6; and 2447-50).

This statement was approved by the American Heart Association Science Advisory and Coordinating Committee on June 24, 2015, and the American Heart Association Executive Committee on July 22, 2015, and by the American College of Cardiology Board of Trustees and Executive Committee on June 3, 2015.

The American College of Cardiology requests that this document be cited as follows: Maron BJ, Levine BD, Washington RL, Baggish AL, Kovacs RJ, Maron MS; on behalf of the American Heart Association Electrocardiography and Arrhythmias Committee of the Council on Clinical Cardiology, Council on Cardiovascular Disease in the Young, Council on Cardiovascular and Stroke Nursing, Council on Functional Genomics and Translational Biology, and the American College of Cardiology. Eligibility and disqualification recommendations for competitive athletes with cardiovascular abnormalities: Task Force 2: preparticipation screening for cardiovascular disease in competitive athletes: a scientific statement from the American Heart Association and American College of Cardiology. J Am Coll Cardiol 2015;66:2356-61.

This article has been copublished in *Circulation*.

Copies: This document is available on the World Wide Web sites of the American Heart Association (http://my.americanheart.org) and the American College of Cardiology (www.acc.org). For copies of this document, please contact Elsevier Inc. Reprint Department via fax (212-633-3820) or e-mail (reprints@elsevier.com).

primary care physician; 2) systematic screening of families with known genetic diseases after diagnosis in a relative; 3) incidental and fortuitous findings on clinical examination or imaging, detected during evaluation for another medical problem; 4) systematic screening of large populations, such as high school and college-aged athletes, for the purpose of determining eligibility for competitive sports, with or without diagnostic testing; and 5) symptoms associated or unassociated with sports. It is likely that a large number (or even most) athletes with cardiovascular disease come to clinical attention based on the circumstances described in items 1 through 3, rather than with formal preparticipation screening.

GENERAL CONSIDERATIONS

Currently, broad-based cardiovascular screening is practiced systematically in athletes at all levels of performance (not confined to the elite) in only 3 countries: in the United States, with personal/family history and physical examination (but without ECGs) (1-3,19,20), and in both Italy (4-6,9) and Israel (7), with 12-lead ECGs in addition to history and physical examination. In many European countries, screening of athletes is largely limited to those performing at the elite level (e.g., in international, Olympic, or professional sports) (21). The potential benefit of such initiatives is the identification of a small number of people with potentially lethal genetic or congenital cardiovascular diseases (e.g., hypertrophic cardiomyopathy) so that 1) they may be withdrawn from competitive sports to decrease their personal risk and generally make the athletic field a safer environment, and 2) in the process, some high-risk people may be recognized who may be candidates for disease-modifying medical or surgical intervention, or for prevention of sudden death with implantable defibrillators. In 1973, the Japanese School Health Law mandated cardiovascular screening with modified ECG and history/physical examination for thousands of children in the first, seventh, and tenth grades (22,23). Few disease-related data have emerged from this initiative, although a variety of generally minor cardiovascular abnormalities or arrhythmias (unassociated with underlying organic heart disease) were identified in only 2% to 3% of children (23).

DEBATE AND CONTROVERSY

Within the context of these potential benefits, there has nevertheless been substantial discussion surrounding the most appropriate and efficacious strategy for screening, including national federally sponsored and mandated cardiovascular screening. For example, Italian investigators have intensely promoted screening with a routine 12-lead ECG (as well as history and physical examination) based on a unique >30-year program mandated by Italian law and supported by sports medicine physicians dedicated full-time to the program (4-6,9). Since 1997, Israel has maintained a similar mandatory ECG-based initiative and national sports law (7). For >50 years, it has been customary practice in the United States to routinely screen high school and college-aged athletes with history and physical examination (but without noninvasive testing) (1-3,19,20). In contrast, Denmark has pointedly rejected systematic screening for cardiovascular disease in both athletes and any other segment of the population as being unjustified given the low event rate (12,13). Other than Japan (22,23), no country has systematically attempted broad-based cardiovascular screening in general healthy populations (not limited to athletes), with or without ECGs.

UNIVERSAL SCREENING: ECGs VERSUS HISTORY AND PHYSICAL EXAMINATION

Preparticipation screening for cardiovascular disease with personal/family history and physical examination has been the customary practice for all high school and college-aged competitive athletes in the United States for decades, independent of their performance level. This process is guided by the 14-point history and physical examination elements proposed by the American Heart Association (AHA) (1). The AHA recommendations acknowledge that athletes and others with underlying (but undiagnosed) cardiovascular abnormalities may well manifest clinical warning signs (e.g., chest pain, excessive exertional dyspnea, or syncope) identifiable by careful and systematic history. Because most diseases responsible for sudden death in the young are genetic/familial, a thorough family history may raise suspicion of the disorder. An organic heart murmur can alert the examining physician to valvular or other abnormalities, including left ventricular outflow tract obstruction.

A controversy persists as to whether an ECG (in addition to history and physical examination) is a superior strategy to history/physical examination alone for detecting potentially lethal cardiovascular disease, particularly when taking into account the important issues of false-negative and false-positive results, as well as cost and resource availability (1). Indeed, studies comparing these 2 strategies have failed to demonstrate a mortality benefit for ECG screening (18).

The debate between those who strongly promote routine ECGs and those opposed to ECGs as a routine screening tool is not fully resolved as yet, although a substantial literature consisting largely of editorials and viewpoint commentaries is accumulating rapidly. Nevertheless, several points are indisputable. First, the 12-lead ECG, although a mainstay of hospital-based cardiovascular practice for decades, is an unproven diagnostic tool for reliable detection of cardiovascular disease in generally