

## Electrocardiogram screening in athletes:

### A Good Return on Investment?

In Austin, Texas, a bill requiring an electrocardiogram (ECG/EKG) as part of high-school athletes almost passed. An ECG is a non-invasive electrical tracing of the heart, which can reveal underlying heart conditions associated with sudden cardiac death before the occurrence of a fatal heart-related event, thus potentially saving their lives. Sudden cardiac death (cardiac arrest) is the number one medical killer of young athletes. Unfortunately, in most cases, the first time anyone knows there is a problem is when the cardiac arrest happens.

Throughout the world, large organizations such as the European Society of Cardiology, International Olympic Committee, Israel Ministry of Health, and FIFA recommend the addition of an ECG screening for all of their athletes.

**Table** History and Physical Screening vs Electrocardiogram Screening in Young Athletes

Characteristics	History and Physical Screening	Electrocardiogram Screening
Who performs	Primary health care providers even including nonphysician examiners	Electrocardiogram Technologist
Time to perform	~ 10 minutes	~ 5 minutes
Remote data gathering available	No – person performing needs to be present to ask questions and perform physical examination	Yes – electrocardiogram can be read remotely
Who interprets data	Primary health care providers, even including nonphysician examiners	Family physician, Internist, Cardiologist, Pediatric Cardiologist
Data interpretation	Highly subjective	Highly objective
Number of items on checklist	14 – American Heart Association Elements	16 – Seattle criteria
Sensitivity	1%-20% (average 10%) <sup>4</sup>	79%-98% (average 94%) <sup>4</sup>
False positive	8%-24% <sup>3,4</sup>	4%-8% <sup>4</sup>

Here are some key points to consider in screening athletes with ECGs:

Why not stick with the history and physical? Unfortunately the history and physical exam, even when administered by an expert in detail and under ideal conditions, are just not sufficient, and miss on average 9 out of every 10 cases of underlying heart disease. In addition, they are poorly adhered to, are sometimes performed by nonmedical examiners, their interpretation is subjective, responses vary by sex/culture/age, and answers are omitted by athletes for fear of being restricted..

Who to screen? Athletes are at higher risk for SCD due to the fact that many underlying cardiac conditions associated with SCD will cause their collapse under stressful situations such as high intensity sports. Therefore, targeting athletes with ECG screenings is the first step in tackling SCD.

Isn't this like trying to find a needle in a haystack? ECG screenings will detect about one

child that has a major underlying cardiovascular problem in every 200 screened. Most importantly, many of the conditions that are associated with sudden cardiac death are inherited in a 50/50 manner, so, identifying one person could save others in their family! How reliable is an ECG screening? The success of an ECG screening for detecting most conditions associated with sudden cardiac death is very high, around 90%. While it is not perfect, it is nearly ten times more accurate than history and physical exam. False positives? Like any test, false positives happen. However, most cases of these false positives can be clarified with a single additional test and a doctor's visit, at an affordable cost.

Costs of screening? The costs vary, but most school associated ECG screenings are offered for \$15 or less which includes interpretation from a cardiologist.

Infrastructure – Can we do it? Given the widespread availability of ECG machines in most medical facilities, the ability of a technician to perform an ECG in about 5 minutes in a safe and noninvasive manner, the many doctors available to review abnormal ECGs, and the ability for remote reading, it is feasible to perform large-scale screenings.

What do medical professionals think? In two recent polls, one conducted by the American Heart Association in Dallas in 2013, and the other by the New England Journal of Medicine, the majority ~ 60% of doctors prefer to include the ECG screening for young athletes.

Isn't finding a heart defect like finding a needle in a haystack? Yes; that is a great analogy: Using the history and physical approach is almost like trying to find the needles with your bare hands! While using the ECG is like using metal detector... By using the proven and inexpensive method, you will find many more needles in a more efficient manner.

We believe the ECG is a GREAT Return on Investment!!!

## **Publication**

[Electrocardiogram Screening in Athletes: A Good Return on Investment?](#)

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