

When Misread Heart Tests Eject Students From Games

By KATHERINE HOBSON (Wall Street Journal Aug 23, 2011)

Looks are deceiving. Electrocardiograms of the hearts of highly conditioned student athletes can bear a surprising resemblance to some ECGs of people with potentially dangerous heart problems, often creating false-positive results.

Now, a group of cardiologists and other experts have developed criteria physicians can use to better distinguish the normal effects of intense training from a life-threatening heart condition. The findings were published this month in the journal *Circulation*.

As more high schools and colleges require that athletes get an EKG to detect potentially deadly heart defects, an international group of experts has issued recommendations to help make the test more reliable. Katherine Hobson explains on Lunch Break (video).

Sudden cardiac death in student athletes is rare, but vigorous and frequent exercise can increase the stress on the heart and trigger an event in people with underlying conditions. Training doctors to accurately read ECGs may help detect the problems that put a small number of student athletes at risk without sending others on for unnecessary testing.

An electrocardiogram charts electrical activity in the heart using sensors attached to the skin of the chest. Between 40% and 50% of trained athletes show higher-than-normal electrical voltage on their ECGs. But high voltage also shows up when a person has heart abnormalities, such as hypertrophic cardiomyopathy, or when the left ventricle thickens, possibly causing shortness of breath and abnormal heart rhythms.

Under the new recommendations, high-voltage output wouldn't require further testing unless other warning signs were present, said Jonathan Drezner, an author of the paper.

Implementing just that recommendation would "greatly reduce" the number of false positives, added Dr. Drezner, a primary-care sports-medicine physician in the department of family medicine at the University of Washington in Seattle.

The American Medical Society for Sports Medicine plans to roll out an online training course sometime next year that would train physicians to follow the new protocol. The procedures are similar to those released by the European Society of Cardiology last year, but the latest criteria provide additional detail and also recommend specific follow-up tests if an abnormality is detected, Dr. Drezner said.

"It's an excellent effort to try to give guidance" that should minimize false-positive and false-negative results, said David E. Haines, director of the Heart Rhythm Center at Beaumont Hospital in Royal Oak, Mich., who was not part of the current study.

His hospital conducts mass screenings of high-school athletes in the community. The program has screened 6,685 students over four years, with 41 told to stop exercising pending further medical evaluation and another 663 sent on for follow-up but not told to stop exercising.

"We have our own criteria, but we will go back and revise ours according to these," Dr. Haines said.

The new recommendations come amid an ongoing debate over whether pre-participation physicals for student athletes should also include ECGs.

The American Heart Association recommends pre-participation physicals for student athletes that include specific questions about family history and personal symptoms, such as whether an athlete has experienced chest pain or fatigue. But the AHA doesn't recommend adding routine ECG screenings to these evaluations for a variety of reasons, including false-positive findings, the low rates of diseases that cause sudden cardiac death and questions about cost-effectiveness. ECGs can run

\$25 to \$75, but follow-up tests like an echocardiogram cost hundreds of dollars more.

Professional athletes are routinely screened using ECGs, but the test isn't mandated by states or by the National Collegiate Athletic Association. Some individual colleges require screening, though, and hospitals are increasingly offering community screening programs for high-school athletes.

A study published in April in *Circulation* found that 45 NCAA student athletes suffered sudden cardiac death between 2004 and 2008. That translated to one student out of every 43,770 participants each year, a greater incidence than previously thought.

Research conducted in Italy found that adding ECG screening to the usual pre-participation physical reduced sudden death among young athletes, while a study in Israel found no benefit. Neither study's findings can be directly extrapolated to the U.S., experts say.






Critics of mass screening say resources are better spent on other preventive measures, such as ensuring physicals are comprehensive, training more people to perform CPR and making sure automated external defibrillators are readily available and that people know how to use them.

Authors of the new recommendations warn that ECGs—even if interpreted accurately—could never avert all sudden cardiac deaths. The test can pick up only about half of the defects that might lead to a heart event, said Vic Froelicher, another author of the recommendations and a professor of cardiovascular medicine at the Stanford University School of Medicine. (Dr. Froelicher is a founder of a company, Cardea Associates, that aims to create a less-expensive, less-cumbersome ECG device that can be used to perform screenings outside a hospital or doctor's office.)

Doctors need to keep improving how they interpret ECGs, Dr. Froelicher said. He was an author of a study published earlier this year that quantified different ECG changes in athletes depending on what sport they played. In another study published last year, he looked at how gender affects ECGs. It's too soon to incorporate criteria based on gender, ethnicity or sport into any guidelines, he said. "This is in its infancy, but this is the direction we're going," he said.

Sports Risks

Overall rates of sudden cardiac death, from high to low, per year among NCAA college athletes, 2004-08

		OVERALL	MEN	WOMEN
	BASKETBALL	1 in 11,394	1 in 6,993	1 in 37,799
	SWIMMING	1 in 21,293	1 in 34,552	1 in 16,457
	LACROSSE	1 in 23,357	1 in 19,770	1 in 30,531
	FOOTBALL	1 in 38,497	1 in 38,497	*
	CROSS-COUNTRY	1 in 41,695	1 in 59,484	1 in 32,801

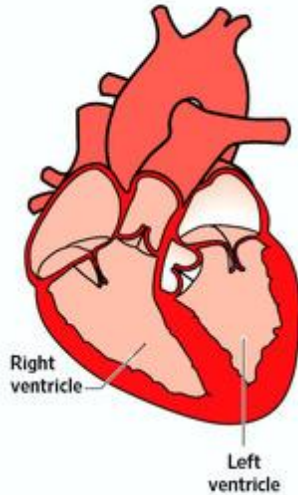
Source: *Circulation*

*Not a women's sport in NCAA

Pump Primer | A comparison of structural differences in the heart

NORMAL HEART

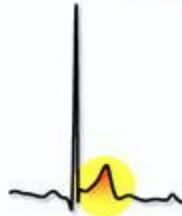
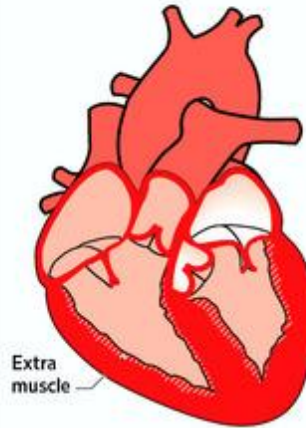
The muscle in the right and left ventricles has a uniform thickness.



An electrocardiogram that shows normal electrical heart activity.

ATHLETE'S HEART

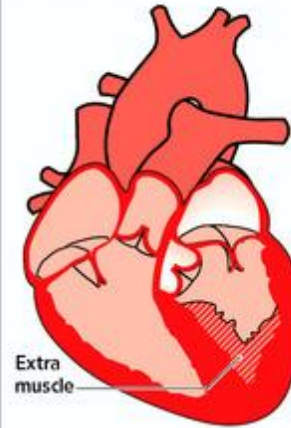
Intense training can build up the walls of both ventricles as the heart grows stronger.



The ECG shows a spike in voltage followed by a small upright wave, suggesting no further evaluation is necessary.

ABNORMALLY ENLARGED HEART

In hypertrophic cardiomyopathy, the left ventricle is abnormally thick and can cause dangerous heart rhythms.



The spike is followed by an inverted wave, which means more evaluation is necessary.