

• **Medical News: Arrhythmias**

ECG Abnormalities in Healthy Athletes May Signal Future Risks



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ROME, Jan. 9 -- Marked ECG repolarization abnormalities in apparently healthy young athletes may be an early-warning signal of future serious cardiomyopathies, researchers here reported.

Action Points

- Explain to interested patients that this study found that in healthy athletes, abnormal ECGs without evidence of structural cardiac disease may foretell future serious outcomes in a small number of them.
- Explain that the investigators in this study recommended continued medical surveillance for these athletes.

Of 81 athletes with abnormal ECGs but no sign of structural disease, cardiomyopathy developed in five, including one who died suddenly a year later, reported Antonio Pelliccia, M.D., of the Institute of Sports Medicine and Science, and colleagues in the Jan. 10 issue of the *New England Journal of Medicine*.

Moreover, evidence of other cardiovascular disorders developed in six more, for a total of 11 athletes, the investigators added.

Contrary to previous reports describing such ECG patterns as an innocent manifestation of "athlete's heart" without clinical consequences, the Italian study suggests that these abnormal ECGs may foretell trouble.

The study shows that these abnormal ECGs may represent the initial expression of genetic cardiac disease, preceding by many years phenotypic expression and adverse clinical outcomes, the investigators said.

Since 1982, the Italian government has required that anyone participating in officially sanctioned competitive sports undergo screening to rule out increased risk during training and competition, Dr. Pelliccia and colleagues noted.

To evaluate the clinical outcomes of young trained athletes with abnormal 12-lead ECGs without evidence of structural cardiac disease, the researchers used a database of 12,550 athletes. The researchers identified 81 with diffusely distributed and deeply inverted T waves (≥ 2 mm in at least three leads). They had no apparent cardiac disease and had undergone serial clinical, ECG, and echocardiographic studies for a mean of nine years.

The 81 athletes included 63 men and 18 women about age 23 (range 15 to 38). They were engaged in a variety of sports including soccer, rowing, track and field, swimming, and cycling. All had participated in regular training and competition for a mean of 12 years and 57 (70%) had received recognition at major events, including 14 who participated in the Olympics.

Comparisons were made with 229 matched control athletes with normal ECGs from the same

database.

Of the 81 athletes with abnormal ECGs, five ultimately proved to have cardiomyopathies, including one who died suddenly at the age of 24 (12 months after initial evaluation) from clinically undetected arrhythmogenic right ventricular cardiomyopathy.

Of the surviving athletes, clinical and phenotypic features of hypertrophic cardiomyopathy developed in three after 12 ± 5 years (at the ages of 27, 32, and 50), including one who had an aborted cardiac arrest after 16 years of follow-up. The fifth athlete had dilated cardiomyopathy after nine years of follow-up.

Evidence of other cardiovascular disorders developed in six for a total of 11 athletes. The disorders included systemic hypertension in three, atherosclerotic coronary artery disease (requiring bypass) in one, myocarditis in one, and supraventricular tachycardia (requiring radiofrequency ablation) in one.

In contrast, none of the 229 control athletes with normal ECGs at the outset had a cardiac event or received a diagnosis of cardiomyopathy nine years after their initial evaluation ($P=0.001$).

One insight derived from this study, the researchers said, is the potential difficulty in recognizing both arrhythmogenic right ventricular cardiomyopathy and hypertrophic cardiomyopathy, particularly in young, physically active, and asymptomatic people.

Arrhythmogenic right ventricular cardiomyopathy was not identified in the athlete who died suddenly, despite heightened awareness of that disease within the Italian national screening program.

In retrospect, the researchers said, the clinical evaluation did not create a strong suspicion because the repolarization abnormalities were not those most typically identified in the disease. The T-wave inversion was diffuse rather than confined to the anterior precordial leads, they said. Also, electrocardiography did not show marked enlargement of the right ventricular chamber.

Thus, the researchers said, athletes with ECGs showing marked repolarization abnormalities merit continued clinical surveillance. It seems likely that serial ECG alone is not sufficient for such surveillance, while echocardiography and selective additional testing are needed to clarify the diagnosis.

Conversely, finding a normal ECG during screening can be regarded as reasonably reliable evidence to exclude the presence of potentially lethal cardiac disease and can serve as a source of reassurance to young athletes, the researchers wrote.

The study was supported by the Italian National Olympic Committee.

No potential conflict of interest relevant to this article was reported.

Additional source: New England Journal of Medicine

Source reference:

Pelliccia A, et al "[Outcomes in athletes with marked ECG repolarization abnormalities](#)" *N Engl J Med* 2008; 358: 152-161.