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Influence of sport and ethnicity on early repolarization: a prospective study in an athletic population

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Background: early repolarization (ER), characterized by an elevation of the QRS-ST junction (J point) in leads other than V1 to V3, has been associated with sudden cardiac death. Little is known about the influence of sport and ethnicity on ER. We analyzed the prevalence of ER in a large population of soldiers of various ethnic and geographic origins.

Method: Three independent observers prospectively analyzed 12-lead ECG in a population of 1538 physically trained young male soldiers (age 24±0.3 years). ER was stratified according to the degree of J-point elevation (≥0.1 mV or >0.2 mV) in the inferior and/or lateral leads. We correlated ER with the ethnic and geographic origins of the subjects.

Results: ER of ≥0.1 mV was present in 202 subjects (13.1%) with significant differences between Black (30%), Asian (21%) and White (8.8%) populations (Black vs Asian: p=0.03; Black vs White: p<0.001; Asian vs White: p=0.01). Among African Black people, ER prevalence in South-East Africa is significantly lower than in Equatorial Africa (respectively 17% vs 35%, p=0.01); among White Europeans, northern populations have significantly lower prevalence than southern ones (8% vs 13%, p=0.03). ER of >0.2 mV was a rare pattern in White people (0.6%), and tended to be much more frequent in Black (3.4%) or Asian (5.3%) populations. Although there was no difference regarding sporting activity between ER and non-ER subjects, men with J-point >0.2 mV significantly practiced more sports than other ER (p=0.05). Left atrium (LA) size, and ventricular mass were higher in the ER group than in control subjects (p<0.001 and p<0.05).

Conclusion: In a large population of healthy soldiers, ER ≥0.1 mV spreads out of Africa in a West to East and South to North decreasing gradient, whereas ER ≥0.2 mV tends to concentrate in Asia. This distribution may be superimposed on roads of ancestral human migrations.

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Echocardiographic evaluation of the athlete and sedentary

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Introduction: The intense and prolonged exercise training is accompanied by modifications of echocardiography and electrocardiogram.

Objective: Our work has compared the echocardiographic and electrocardiographic parameters of sporting subjects to control subjects in good health whose main difference is the sport.

Materials and methods: We report the results of a prospective study compared 30 athletes and 30 normal subjects. This study analyzed the electrocardiogram, transthoracic echocardiography at rest and at peak of exercise. The statistical analysis used the Student test to compare means, and percentages using SPSS.

Results: The average age of our patients was 21 years and 6 months, with a male predominance (78.3%).

Clinically the two series show no statistically significant difference regarding age, weight, height and blood pressure.

At the electrocardiogram, athletes have a lower heart rate (45.2±7.0 bpm) vs (71.3±8.9 bpm) (p=0.005), a PR interval longer (0.27±0.4 s) vs (0.12±0.7 s) (p=0.05), a Sokolow largest (37.4±4.3 mm) vs (22.6±3.2 mm) (p<0.0005) and abnormal repolarization mainly represented by negative T waves (p=0.02), an ST segment elevation in V2 and V3 (p<0.0005) and a right bundle branch block (p=0.003).

Echocardiography showed dilated right cavities: right atrial (20.3±4.3 cm²) vs (10.5±3.4 cm²) (p=0.0125) and right ventricular (26.2±4.1 mm) vs (21.3±2.3 mm) (p=0.025). Left ventricular walls are thicker in athletes: septal wall (11.5±3.2 mm) vs (7.2±2.0 mm) (p=0.0125) and posterior wall (10.5±2.3 mm) vs (7.1±2.0 mm) (p=0.025).

Despite a difference in the values of left ventricular diastolic diameter (5 mm on average, between two series), the level of significance was not reached. The left atrial is also dilated (18.2±5.6 cm²) vs (13.4±4.0 cm²) (p=0.025).

The average myocardial mass indexed to body surface area was 148.3 g/m² in athletes vs 97.21 g/m² in normal subjects (p=0.005).

Conclusion: Echocardiographic and electrocardiographic changes are the result of a prolonged and intense sporting activity.

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Electrocardiographic pattern in trained athletes with marked bradycardia: comparison between male and female

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Introduction: Athlete’s heart represents the cardiovascular remodelling in trained athletes, is associated with ECG changes and have been more studied in male. The more frequent minor ECG abnormality is bradycardia, classically associated with autonomic nervous system (ANS) alteration. In order to precise the mechanism of bradycardia in athletes, we studied ECG pattern in this population and compared ECG pattern in male (M) and female (F).

Methods: 136 caucasian athletes (18-35 years) with a pronounced bradycardia (HR<50b.p.m.) have been included: 90 M (mean age: 23±4 years; strength: 27%, mixed: 32%; endurance: 41% and 46 F (mean age: 22±3 years; strength: 26%, mixed: 33%; endurance: 41%). Resting ECG has been analysed using a tracer table (RR, PR, QRS, QT intervals duration). Then, ECGs were classified as minor (except bradycardia), mild or major abnormalities according to the Pellliccia’s classification.

Results: 9 athletes (7%) had a HR<40 b.p.m., 52 (38%) had a 40<HR<54 and 75 (55%) a 45<HR<50. Mean HR was not different in the two populations. PR and QRS durations were not correlated with HR in M, F and entire population. QTc was correlated with bradycardia level (r=0.45; p<0.001), 2 endurance F athletes had a long-QTc (461 and 465ms). Respectively 37.5%, 15% and 15% of the athletes had minor, mild or major abnormalities. No difference between M and F was found for minor (39% vs 35%) and mild abnormalities (17% vs 13%). Major abnormalities were more frequent in M than F (19% vs 7% p=0.05). Repartition of mild or major abnormalities was similar whatever the bradycardia level.

Conclusion: Marked athlete’s bradycardia is more frequently associated with marked ECG abnormalities in M than F. Surprisingly other patterns classically linked to ANS physical training adaptations (PR duration, repolarisation abnormalities) were not linked to bradycardia level. Thus ECG pattern physiopathology in athletes seems multi-factorial and needs further research.