

Association between T-Wave Inversion in the Exercise ECG and Aerobic Capacity in Cross-Country Skiers

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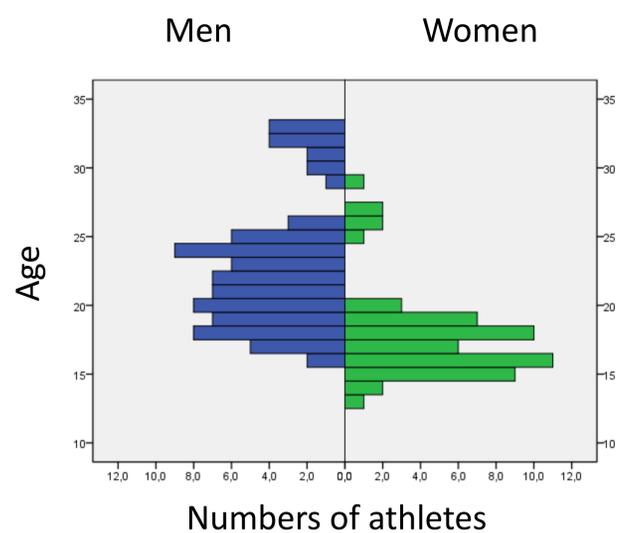
Negative T-waves in resting ECGs in athletes are considered a marker of the increased risk of adverse cardiac events. The prognostic significance of the development of T-wave inversion in the course of exercise remains largely unknown. It is not clear if this phenomenon can be used for the prediction of performance during exercise.

Aim: evaluation of an association between exercise-induced T-wave inversion and parameters of aerobic performance in cross-country skiers during cycling ergometry test.

Methods:

- 51 male (age 16-33 years) and 18 female (age 15-27 years) cross-country skiers (a total of 157 studies);
- graded all-out cycling ergometry test: initial level 120 W, stepwise load increase by 40 W in 2 min time increments («Ergoselect-100», Ergoline GmbH, Germany);
- maximal power output;
- maximal oxygen consumption (VO₂max) (Oxycon Pro, CareFusion, Jaeger, Germany);
- continuous standard 12-lead ECG.

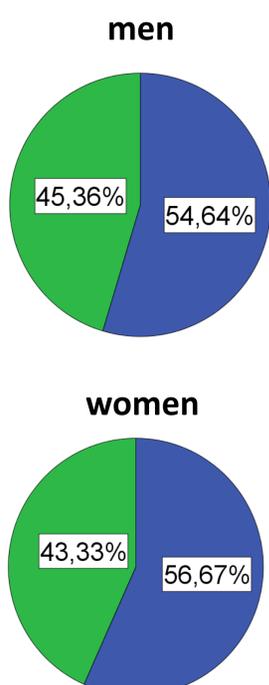
Distribution of skiers by sex and age



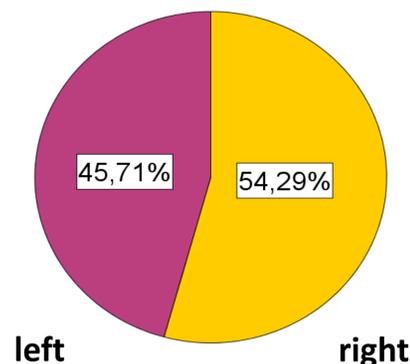
Results:

- At rest, all the subjects had upright T-waves.
- T-wave inversion was observed during exercise at different levels of power output in 45% and 44% of male and female athletes, respectively ($p > 0.05$).
- T-wave inversion developed in aVL and anterior precordial (V1 and/or V2) leads.
- In logistic regression analysis, the occurrence of the negative T-waves was not associated with maximal VO₂ and maximal power output.
- The power output at which T-wave inversion developed was associated with the maximal VO₂ in linear regression analysis (regression coefficient 0.003, 95%CI 0.002-0.005, $p < 0.001$).

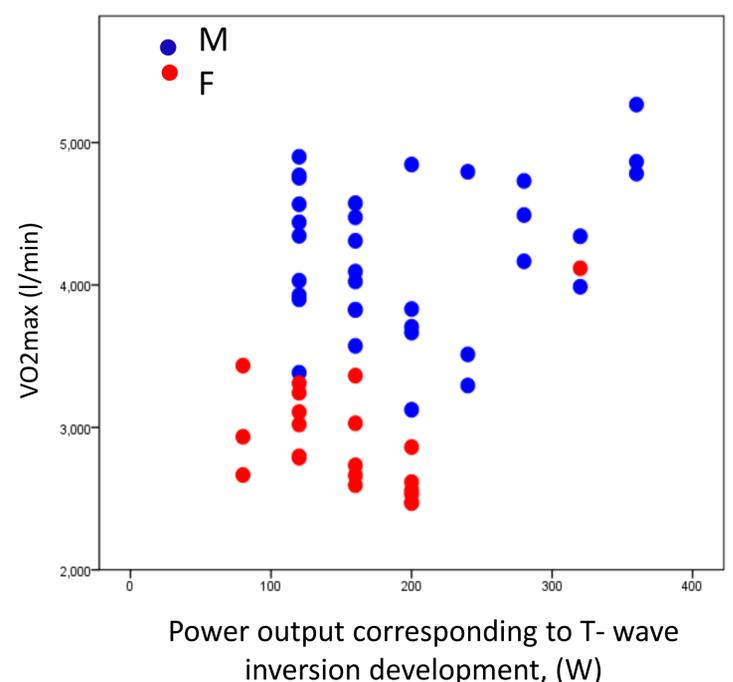
Occurrence of T - wave inversion



Frequency of T- wave inversion in leads



Aerobic performance in T- wave inversion



Conclusion: aerobic capacity was not associated with the presence of negative T-waves in exercise ECG. However, the development of T-wave inversion at a lower power output can serve as an index of poor prognosis of aerobic capacity.