

Poster presentation

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Cardiac reserve index as a novel method for diagnosing heart failure: a cardiac magnetic resonance study in heart failure patients, healthy volunteers and athletes

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Introduction

An early sign of HF is a decreased cardiac reserve or inability to increase cardiac output to meet the metabolic requirements during exercise. Under normal circumstances maximal cardiac output is closely related to $VO_2\text{max}$ which has recently been shown to be closely related to THV.

Purpose

The aim of this study was to a novel cardiac reserve index ($VO_2\text{max}/\text{THV}$) and test the hypothesis this index can be used to distinguish patients with HF from healthy volunteers and endurance athletes.

Methods

Twenty-six patients with clinical HF of different etiologies were retrospectively included and 131 control subjects (60 healthy volunteers and 71 athletes) were prospectively enrolled. Peak oxygen uptake was determined by maximal exercise test and THV was determined by cardiac magnetic resonance. A novel cardiac reserve index, calculated as $VO_2\text{max}/\text{THV}$, was then derived and tested.

Results

Peak oxygen uptake was strongly correlated to THV ($r^2 = 0.74$, $P < 0.001$) in the control subjects, but not for the patients ($r^2 = 0.0006$, $p = 0.90$). The cardiac reserve index differed significantly between control subjects and

patients (Figure 1A), even in patients with normal ejection fraction and after normalizing for hemoglobin levels ($P < 0.001$, Figure 1B). In both figures, the box represents the median, the 25th and the 75th percentile and the whiskers represent minimum and maximum values. In a multivariate analysis the cardiac reserve index was the only independent predictor of presence of HF ($P < 0.001$).

Conclusion

The cardiac reserve index $VO_2\text{max}/\text{THV}$ can be used to distinguish patients with HF from healthy volunteers and athletes, even in patients with preserved systolic left ventricular function and after normalizing for hemoglobin levels.

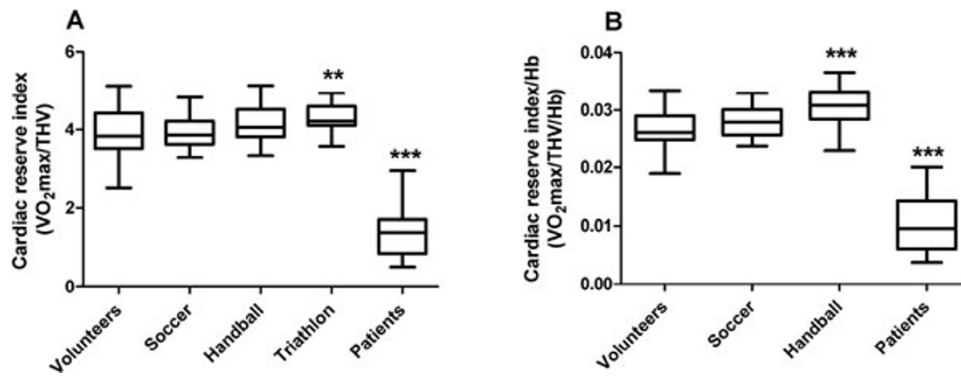


Figure 1

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