347 From arterial hypertension to left ventricular hypertrophy and heart failure: role of cardiopulmonary exercise testing in heart failure with preserved ejection fraction

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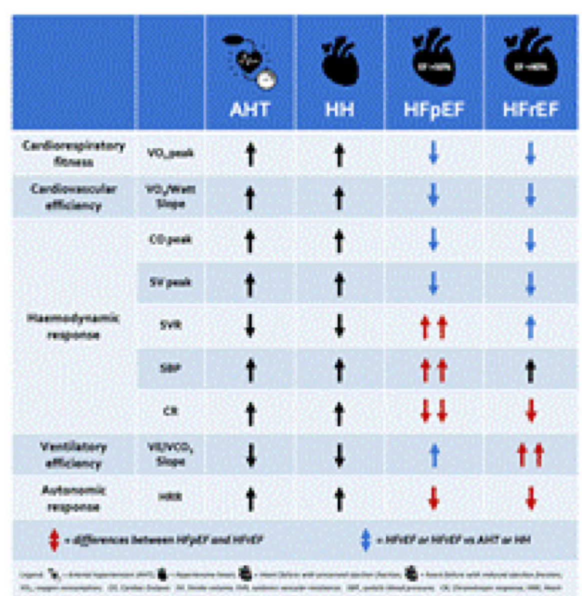
Aims: Arterial hypertension (AHT) represents the leading cause of heart failure (HF). A complex cardiovascular (CV) continuum of events leads to the progression from AHT to left ventricular hypertrophy (LVH), the hallmark of hypertensive heart (HH), towards heart failure with preserved ejection fraction (HFpEF) or reduced ejection fraction (HFrEF). Cardiopulmonary exercise testing (CPET) represents an important tool to evaluate HF patients (both with HFpEF and HFrEF) allowing quantification of functional capacity and mechanisms of dyspnoea as well as providing prognostic markers.

To: investigate CPET responses in AHT patients at various stages of disease progression from AHT to LVH and HF with preserved and reduced ejection fraction.

Methods and results: From a CPET registry of 1.397 consecutive subjects, 92 patients were selected (matched according to age, gender, BMI, CV risk factors, beta-blockers) and divided into four groups: 23 AHT patients without LVH, 23 HH patients, 23 HFpEF patients and 23 HFrEF. HFrEF were defined according to LV-EF values while HFpEF were defined according to the presence of NYHA Class $\geq$2 and HFA-PEFF Score. Mean age was 65 ± 10 years, mean BMI was 28.5 ± 5, male gender was prevalent 83% and 33% had diabetes. Both HFpEF and HFrEF showed lower cardiorespiratory fitness (peak VO_2; $P < 0.001$), cardiovascular efficiency (VO_2/Watt slope: $P < 0.001$), oxygen pulse (VO_2/HR: $P < 0.001$), cardiac output ($P < 0.001$) and stroke volume ($P < 0.001$) at peak as well as lower chronotropic response ($P < 0.001$), ventilatory efficiency (VE/VCO_2 slope: $P < 0.001$), and heart rate recovery (HRR: $P = 0.004$) compared with both AHT and HH groups. Interestingly, no differences between HFpEF and HFrEF have been found in all CPET data except for chronotropic response (using Tanaka equation), lower in HFpEF (37.5 ± 16.5 vs. 53.5 ± 20.5; $P < 0.001$) and ventilatory efficiency, lower in HFrEF (VE/VCO_2 slope: 32 ± 5 vs. 37 ± 10; $P < 0.001$). Finally, adding functional capacity (peak VO_2) data to ESC Criteria an improvement in HFpEF diagnosis accuracy was found, with 82% sensitivity and 90% specificity (AUC: 859—95% CI: 754-963; $P < 0.0001$).



Conclusions: Despite the intrinsic differences in ejection fraction, both HFpEF and HFrEF shares similar cardiopulmonary mechanisms and cardiovascular responses to exercise. CPET may represent a useful tool in order to identify and stratify hypertensive heart patients with HFpEF with high diagnostic accuracy.