

P4511

Characteristic hemodynamic and metabolic response patterns differ between patients with stable chronic left vs right heart failure

D. Dumitrescu¹, H. Ten Freyhaus², H. Hagmanns², F. Gerhardt², S. Baldus², S. Rosenkranz²¹Heart and Diabetes Center NRW, Bad Oeynhausen, Germany; ²Cologne University Hospital - Heart Center, Cologne, Germany**Funding Acknowledgement:** This project was partly funded by Actelion Pharmaceuticals

Background: Patients with chronic left and right heart failure show a reduction in peak oxygen uptake (VO₂), even with optimal medical therapy. A non-invasive determination whether the mechanism of exercise limitation is primarily due to left or right-heart failure may be a challenge in clinical practice. The simultaneous analysis of metabolic and hemodynamic responses during exercise may allow an improved differentiation of exercise limitation. However, only little is known about the combined hemodynamic/metabolic exercise response patterns in these patients.

OBJECTIVES

We sought to characterize the simultaneous hemodynamic and metabolic response to exercise in stable patients with chronic, isolated left vs right heart failure.

Methods: We analyzed a cohort of highly selected patients with isolated right heart failure (group 1) and isolated left heart failure (group 2). All patients were in functional class II and III, and under stable medical Treatment. All patients had received right heart catheterization before enrollment. All of the patients in group 1 and none of the patients in group 2 showed an elevated pulmonary vascular resistance (PVR). All patients received a cardiopulmonary exercise test (CPET) with a ramp protocol up to maximal exercise tolerance. During a second visit, a combined CPET/stress echocardiography was performed with a two step constant work rate protocol. For step 1, a workrate below the patients' anaerobic threshold was chosen. For step 2, 80% of the patients' maximum workrate

from the ramp test was chosen. Each step was performed until a complete echocardiographic image acquisition was obtained. Echocardiographic parameters, including stroke volume measurements, were obtained once at rest and for each of the two exercise steps.

Results: We recruited 18 patients (n=9 in group 1, n=9 in group 2). There were no significant differences in demographic baseline characteristics. There were no adverse events. In the initial ramp CPET, both groups showed a moderate reduction in peak VO₂ (53,0±12,4 vs 63,3±12,8% of predicted). The absolute peak VO₂ values, corrected for body weight, showed no significant difference (16,7±4,5 vs 16,5±5,1 ml/min/kg). While the increase in VO₂ (Figure 1A) and cardiac index (Figure 1B) during step 1 and step 2 of the simultaneous CPET/stress echocardiography was similar between both groups, the increase of stroke volume index with exercise was significantly reduced in the group with right heart failure, while the group with left heart failure increased stroke volume index during exercise (Figure 1C).

Conclusions: The simultaneous evaluation of hemodynamic and metabolic parameters by CPET/stress echocardiography is safe and may reveal characteristic response patterns to exercise in patients with chronic left vs right heart failure. Patients with right heart failure seem to be less able to increase stroke volume during exercise than patients with left heart failure.

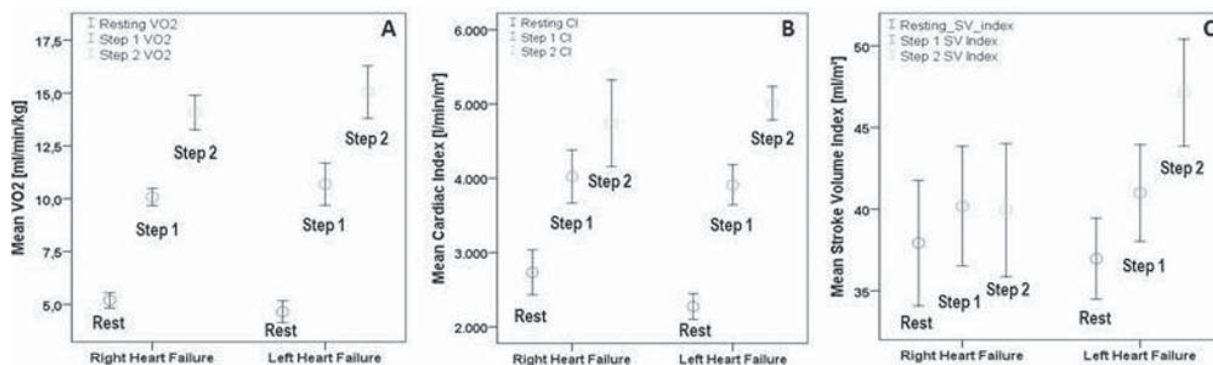


Figure 1