



## IMAGING AND DIAGNOSTIC TESTING

### EXERCISE TRAINING IMPROVES LV MASS, LV END DIASTOLIC VOLUME AND STROKE VOLUME AND REDUCES UPRIGHT HEART RATE IN THE POSTURAL ORTHOSTATIC TACHYCARDIA SYNDROME

ACC Poster Contributions

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**Background:** Postural Orthostatic Tachycardia Syndrome (POTS), a disorder which results in profound orthostatic intolerance (lightheadness, weakness, near-syncope), affects nearly 1 million Americans, an overwhelming majority of whom (> 95%) are female. While the pathophysiology of this disorder is poorly understood, reduced left ventricular (LV) chamber dimensions and stroke volumes have been implicated in other conditions of orthostatic intolerance. As such, we sought to compare: 1) baseline LV morphology and function in patients with POTS as compared to healthy controls; and 2) the effects of a 3-month exercise training program on POTS, focusing on LV morphology, function and orthostatic heart rate (HR).

**Methods:** Nineteen (18 F, 1 M) highly screened patients with POTS and 17 age-matched healthy controls (16 F, 1 M) were enrolled. Standard diagnostic criteria was used for POTS including a HR rise  $\geq 30$  bpm or a HR > 120 bpm after 10 minutes of standing. All subjects underwent baseline cardiac magnetic resonance imaging (cMRI). POTS patients then completed a 3 month low-to-moderate intensity supervised exercise training program; at its conclusion, cMRI was repeated. T-tests were used for comparison.

**Results:** At baseline, patients with POTS had reduced LV mass index (LVMI) (POTS =  $47 \pm 6$  vs. controls =  $54 \pm 6$  g/m<sup>2</sup>; p=0.001), LV end-diastolic volume index (LVEDVI) ( $57 \pm 8$  vs.  $63 \pm 10$  mL/m<sup>2</sup>; p=0.06), stroke volume index (SVI) ( $36 \pm 5$  vs.  $42 \pm 4$  mL/m<sup>2</sup>; p=0.001) and ejection fraction (EF) ( $63 \pm 6$  vs.  $67 \pm 5$  %; p=0.02) when compared to controls. After exercise training, patients with POTS showed increases in LVMI (+ 10.8 %; p<0.001), LVEDVI (+ 8.0 % p= 0.02) and SVI (+ 7.1 %; p= 0.04) such that there were no longer statistically significant differences in LVMI or LVEDVI from healthy controls. After training, 53% of patients no longer met the diagnostic criteria for POTS.

**Conclusion:** Patients with POTS have diminished LVMI, LVEDVI and SVI at baseline when compared to healthy controls. Three months of low-to-moderate intensity exercise training normalized these indices, resulting in a cure rate of 53%. Based on these findings, POTS may be a form of cardiac deconditioning which is highly responsive to exercise training.