**The Impact of Menopausal Status on Cardiac Responses to Exercise Training and Lower Body Negative Pressure**

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Introduction: Training status and sex hormones influence the cardiovascular response to orthostatic stress. The aim of this study was to investigate the impact of menopausal status on left ventricular (LV) function and rotational mechanics in response to exercise training and lower body negative pressure (LBNP).

Methods: Twenty-five healthy untrained middle-aged women (age 45–58 years; 11 pre-menopausal [Pre-M], 14 post-menopausal [Post-M]) completed 12 weeks of exercise training (3 sessions/week consisting of 4×4 min intervals at 90–95% maximum heart rate). Blood volume was assessed via CO-rebreathing, and maximal aerobic capacity was measured on an upright cycle ergometer before and after exercise training. LV function was assessed via echocardiography at 0, -15 and -30 mmHg LBNP.

Results and Discussion: Peak power output and maximal aerobic capacity increased after exercise training (P<0.01), but this increase was greater in pre- than post-menopausal women (mean±SD; Pre-M before 147±29 vs. after 179±28, Post-M before 145±26 vs. after 169±24 W; Pre-M before 29±5 vs. after 37±5, Post-M before 29±6 vs. after 34±5 mL/min/kg; respectively, both P<0.05). Blood volume increased after exercise training in pre- and post-menopausal women (P=0.04), resulting in a smaller decrease in end-diastolic volume during LBNP (LBNP × training P=0.06). This enhanced LV filling after exercise training was further evidenced by higher peak trans-mitral filling velocities in early diastole both at rest and during LBNP (training P<0.01). Cardiac output in pre-menopausal women during LBNP was underpinned by higher heart rates and greater peak twist, systolic twisting velocity and basal rotational mechanics, compared with post-menopausal women (menopause interactions P<0.1).

Conclusion: Pre-menopausal women show a greater aerobic adaptability to exercise training than post-menopausal women, and rely more on acute cardiac responses to cope with low levels of orthostatic stress.