

Circulating Inflammatory and Oxidative Stress Responses to Steady-State Moderate-Intensity and High-Intensity Interval Exercise in Mid-Spectrum Chronic Kidney Disease

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ABSTRACT

Inflammation and oxidative stress can be potent modulators of vascular function. These factors may transiently respond to moderate-intensity steady state exercise (SSE) in a manner that improves post-exercise vascular function in healthy adults. Whether exercise imparts similar effects in adults with Stage 3 or 4 chronic kidney disease (CKD) remains understudied. Moreover, a comparison of SSE and high-intensity interval exercise (HIIE) may add to clinically-relevant findings for improving vascular function in mid-spectrum CKD. **PURPOSE:** To determine the influence of SSE and a comparable amount of HIIE on post-exercise inflammation and oxidative stress in patients diagnosed with secondary Stage 3 or 4 CKD. **METHODS:** Twenty participants (n = 6 men; n = 14 women; age 62.0 ± 9.9 yr; weight 80.9 ± 16.2 kg; body fat $37.3 \pm 8.5\%$ of weight; $VO_2\text{max}$ 19.4 ± 4.7 ml/kg/min) completed 30 min of SSE at 65% $VO_2\text{reserve}$ or HIIE by treadmill walking (90% and 20% of $VO_2\text{reserve}$ in 3:2 min ratio) in a randomized crossover design. Both exercise conditions averaged ~ 65% $VO_2\text{reserve}$. Blood samples were obtained by the same technician under standardized conditions just before, 1hr and 24hrs after exercise. Total antioxidant capacity (TAC), paraoxonase1 (PON1), asymmetric dimethylarginine (ADMA), ³nitrotyrosine (³NT) and interleukin-6 (IL6) responses were analyzed using 2 (condition) by 3 (sample point) repeated measures ANOVAs. **RESULTS:** Relative to pre-exercise measures: TAC increased by 4.3% 24hr after exercise (p = 0.012). PON1 was maintained 1hr and elevated by 6.1% 24hr after SSE, but not HIIE (p = 0.035). When corrected for plasma volume shifts, ADMA increased 30 ng/ml at 1hr but was 58 ng/ml lower 24hrs after exercise (p = 0.0006). ³NT and IL6 remained stable in the hours after exercise (p > 0.05). **CONCLUSION:** Modest inflammatory and oxidative stress marker responses to either SSE and HIIE may contribute to improved vascular function in mid-spectrum CKD.