

Renal Function Responses to Steady-State Moderate-Intensity and High-Intensity Interval Exercise in Mid-Spectrum Chronic Kidney Disease

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ABSTRACT

Efficacy of exercise to improve renal function remains understudied in adults with mid-spectrum chronic kidney disease (CKD). In addition, a comparison of steady-state exercise (SSE) and high-intensity interval exercise (HIIE) may contribute clinically-relevant information for exercise-related augmentation of renal function in mid-spectrum CKD. **PURPOSE:** To determine the influence of SSE and a comparable amount of HIIE on indicators of post-exercise renal function 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 + 8.5% of weight; VO₂max 19.4 + 4.7 ml/kg/min) completed 30 min of SSE at 65% VO₂reserve or HIIE by treadmill walking (90% and 20% of VO₂reserve in 3:2 min ratio) in a randomized crossover design. Both exercise conditions averaged ~ 65% VO₂reserve. Blood and urine samples were obtained by the same technician under standardized conditions just before, 1hr and 24hrs after exercise. Serum creatinine (sCR), urine epidermal growth factor ratio (uEGFr), cystatin C and estimates of glomerular filtration rate - modification of diet in renal disease (MDRD) and the CKD-EPI - responses were analyzed using 2 (condition) by 3 (sample point) repeated measures ANOVAs. **RESULTS:** sCR decreased from 1.45 + 0.05 pre-exercise to 1.26 + 0.05 mg/dl (-13%) 1hr after exercise and returned to pre-exercise levels by 24hr (p = 0.009). Both MDRD and CKD-EPI estimates of glomerular filtration rate were 16 to 19% higher at 1hr, returning to pre-exercise values by 24hrs after exercise. The MDRD estimate increased from 43.1 + 1.9 pre-exercise to 50.3 + 2.1 ml/min/1.73m² 1hr after exercise (p = 0.007) and CKD-EPI from 45.2 + 2.1 to 53.8 + 2.4 ml/min/1.73m² at 1hr post-exercise (p = 0.009). Relative to pre-exercise measures, uEGFr remained stable with SSE but was 5.4% greater 24hr after HIIE (p = 0.052). Cystatin C remained stable in the hours after exercise (p > 0.05). **CONCLUSION:** By clinical estimates, renal function was not normalized but transiently improved with SSE and HIIE in mid-spectrum CKD.