Brachial Artery FMD Responses to Steady-State Moderate-Intensity and High-Intensity Interval Exercise in Mid-Spectrum Chronic Kidney Disease

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ABSTRACT
Brachial artery flow-mediated dilation (FMD) is a nitric oxide-dependent measure of conduit artery endothelial function that is transiently potentiated by moderate-intensity steady state exercise (SSE) in healthy adults. Whether exercise imparts similar effects in adults with Stage 3 or 4 chronic kidney disease (CKD) has not been reported. 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 brachial artery FMD in patients diagnosed with secondary Stage 3 or 4 CKD.

METHODS: Twenty participants (n = 10 men; n = 10 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% VO2 reserve or HIIE by treadmill walking (90% and 20% of VO2max in 3:2 min ratio) in a randomized crossover design. Both exercise conditions averaged ~65% VO2reserve. Ultrasound measurements of brachial artery FMD were obtained by the same technician under standardized conditions just before, 1 hr and 24 hrs after exercise. FMD responses were analyzed using 2 (condition) by 3 (sample point) repeated measures ANOVAs.

RESULTS: Brachial artery FMD responses were augmented 1 hr after exercise in both exercise conditions (p < 0.005 versus pre-exercise FMD). SSE (pre-exercise = 11.5 ± 1.3; 1 hr = 17.2 ± 1.8; 24 hr = 14.0 ± 1.1%) HIIE (pre-exercise = 12.5 ± 1.3; 1 hr = 15.6 ± 1.5; 24 hr = 15.8 ± 1.2%) COCLUSION: We report for the first time that brachial artery FMD can be augmented by a single episode of exercise in mid-spectrum CKD. SSE and HIIE, averaging ~65% of VO2reserve, is equally effective at transiently improving conduit artery vascular function in this clinical population.