

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

FERNANDO GUTIERREZ¹, JEFFREY S. FORSSE¹, MATTHEW N. PETERSON¹, ZACHARIAS PAPDAKIS¹, NICHOLAS SCHWEDOCK², BURRITT W. HESS², JACKSON O. GRIGGS², D. CRAWFORD ALLISON³, RON L. WILSON³, and PETER W. GRANDJEAN¹ (FACSM)

¹Baylor Laboratories for Exercise Science and Technology; Department of Health, Human Performance, and Recreation; Baylor University; Waco, TX

²Family Health Center; Waco, TX

³Baylor Scott & White Health; Waco, TX

Category: Undergraduate

Advisor / Mentor: Grandjean, Peter (peter_grandjean@baylor.edu)

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 $37.3 \pm 8.5\%$ of weight; $VO_2\max$ 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% $VO_2\text{reserve}$. 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 = $17.2^* \pm 1.8$; 24 hr = $14.0^* \pm 1.1\%$) HIIE (pre-exercise = 12.5 ± 1.3 ; 1 hr = $15.6^* \pm 1.5$; 24 hr = $15.8^* \pm 1.2\%$) **CONCLUSION:** 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 $VO_2\text{reserve}$, is equally effective at transiently improving conduit artery vascular function in this clinical population.