*TACSM Abstract*

# Brachial Artery FMD and Endothelial Responses to High-Intensity Interval and Steady-State Moderate-Intensity Exercise

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ABSTRACT

Brachial artery flow-mediated dilation (FMD) is a nitric oxide-dependent measure of conduit artery endothelial function that is potentiated by moderate- and high-intensity steady state exercise (SSE) for up to an hour after exercise; however, it is unclear whether high-intensity interval exercise (HIIE) provides a longer-lasting stimulus for enhancing FMD or greater oxidative and nitrative stress on the vascular endothelium than a comparable or greater amount of SSE. PURPOSE: Determine the influence of HIIE on post-exercise brachial artery FMD and the relationship between FMD and markers of endothelial function relative to a comparable amount of moderate-intensity SSE and a dose that is half that of SSE. METHODS: Seventeen male participants (age 27.8 $\pm$ 6.4 yr; weight 80.6 $\pm$ 9.0 kg; BMI 25.1 $\pm$ 2.4 kg/m2; VO2max 52.1 $\pm$ 7.5 ml/kg/min) underwent HIIE by treadmill running (90% and 40% of VO2reserve in 3:2 min ratio) to expend 500 kcals; HIIE to expend 250 kcals, and; SSE at 70% $VO_2$reserve to expend 500 kcals in a randomized crossover design. All exercise conditions averaged 70% $VO_2$reserve. Ultrasound measurements of brachial artery FMD and blood measures of total antioxidant capacity (TAC) in copper reducing equivalents, apolipoprotein A-1 (ApoA1: g/L), PON1 concentration (PON1c: µg/mL), arylesterase activity (PON1a: kU/L), soluble vascular adhesion molecule-1 (sVCAM-1: ng/mL) and nitrotyrosine (NT: nM) were obtained just before and 2 hr after exercise. FMD responses to exercise were analyzed using 3 (condition) by 2 (sample point) repeated measures ANOVAs. Pearson product-moment correlations of change variables (2 hr post-exercise – pre-exercise values) were calculated to determine relationships between FMD responses and blood variable responses to exercise. RESULTS: Brachial artery FMD responses were unaltered 2 hr after exercise in all three conditions ($p > 0.05$). FMD responses were correlated with changes in PON1c ($r = 0.221$, $p < 0.0001$) and inversely with changes TAC ($r = -0.170$, $p < 0.0001$). Changes in s-VCAM1 were correlated with change in NT ($r = 0.423$, $p < 0.0001$) and inversely with changes in PON1c ($r = -0.177$, $p < 0.0001$). SUMMARY: Brachial artery FMD is unaltered 2 hr after HIIE or SSE of moderate duration in young fit men and does not appear to be related to responses in other markers of endothelial function.