

Acute Effects of High-Intensity Exercise on Peripheral Conduit Artery Blood Flow

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Blood flow patterns influence vascular function. Antegrade shear stress (caused by forward blood flow) promotes an antiatherogenic phenotype while retrograde shear stress (caused by backward blood flow) promotes a proatherosclerotic phenotype. Shear patterns may be influenced by regional vascular factors including vessel wall stiffness and pressure from wave reflections. **PURPOSE:** Examine the effect of acute high-intensity exercise on superficial femoral artery (SFA) stiffness, wave reflections and shear patterns. **METHODS:** 10 healthy men (age 24 ± 5 yr; BMI 25.8 ± 3.7 kg·m⁻²) completed a 5-minute time control followed by a 30-second Wingate anaerobic test (WAT). Doppler-ultrasound was used to measure SFA antegrade shear and retrograde shear from diameter and velocity profiles. Forward pressure wave intensity (W_1) and reflected pressure wave intensity (NA) were measured using wave intensity analysis and the ratio of NA/ W_1 taken as an index of wave reflection magnitude. Arterial compliance, the inverse of stiffness, was calculated from regional changes in vessel diameter and pressure. **RESULTS:** No measure was significantly altered following the time control (Table 1, $p > 0.05$). There was a significant increase in antegrade shear rate following WAT ($p < 0.05$). There were significant reductions in retrograde shear rate and NA/ W_1 following WAT ($p < 0.05$). There was no change in SFA compliance ($p > 0.05$). **CONCLUSION:** Acute high-intensity cycling exercise results in antiatherogenic shear patterns in the SFA characterized by increased antegrade and reduced retrograde shear without impacting regional vessel wall stiffness. Reductions in retrograde shear may be influenced by reductions in the magnitude of pressure from wave reflections.

Table 1. Superficial Femoral Artery Properties and Hemodynamics ($n = 10$)

Variable	Baseline	Time Control	Post-WAT	P-value
Mean SFA Diameter (mm)	5.88 ± 0.57	5.89 ± 0.64	6.15 ± 0.41	0.430
Antegrade Shear Rate (s ⁻¹)	23.91 ± 6.11	23.12 ± 5.01	48.65 ± 13.31	<0.001
Retrograde Shear Rate (s ⁻¹)	11.89 ± 3.63	12.24 ± 3.49	5.83 ± 4.34	<0.001
Reflection Magnitude (aU)	1.06 ± 0.72	2.10 ± 1.94	0.35 ± 0.41	0.042
SFA Compliance (mm ² /mmHg)	0.04 ± 0.03	0.05 ± 0.03	0.04 ± 0.03	0.780