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Relationship between Arm Microvascular Reactivity and Brachial Artery Flow Mediated Dilation

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Endothelial dysfunction is associated with an increased risk for cardiovascular disease. Currently, the most common noninvasive measurement used to assess endothelial function is flow mediated dilation (FMD). Unfortunately, FMD assessments require high cost equipment and are technically challenging. Recently, muscle oxygen resaturation rate in the lower leg following vascular occlusion has been shown to correlate to popliteal artery FMD. However, brachial artery FMD is far more commonly used. At present, it is unclear if a similar relationship exists between lower arm muscle oxygen resaturation and brachial artery FMD. **PURPOSE:** To determine if there is a relationship between brachial artery FMD and lower arm muscle oxygen resaturation rate following occlusion. **METHODS:** Brachial artery FMD was measured after five minutes of distal cuff occlusion of the right brachial artery. During the FMD trial three near infrared spectroscopy sensors were placed on the right arm midway between the elbow and wrist on both the anterior (AFA) and posterior (PFA) forearm and the thenar eminence (TH). **RESULTS:** Fifteen healthy participants (9M/6W, 25±2 years, 70.3±3.3kg, SBP 117±3mmHg, DBP 68±2mmHg, FMD 5.2±1%) were studied. Baseline SmO₂ (AFA 62.5±3.0%, PFA 56.2±2.7%, TH 60.0±2.5%; ANOVA p=0.118) and maximum SmO₂ (AFA 87.3±0.6%, PFA 81.0±3.4% TH 85.6±1.6%; ANOVA p=0.094) were not different between sites. Oxygen deficit integral during the occlusion time was greater at the AFA (-9852±637%) than both the PFA (-7403±690%; vs AFA p=0.043) and TH (-7075±537%; vs AFA p=0.020) sites (ANOVA p=0.015). There was no relationship between brachial artery FMD and the maximum negative SmO₂ slope during cuff occlusion (AFA -0.42±0.04%, r=0.32 p=0.29; PFA -0.41±0.04%, r=-0.13 p=0.65; TH -0.43±0.0%, r=0.07 p=0.81) or the maximum positive SmO₂ slope during reperfusion (AFA 5.43±0.71%, r=-0.30 p=0.31, PFA 4.40±0.68%, r=0.34 p=0.24, TH 4.78±0.43% r=0.17 p=0.57). **CONCLUSIONS:** This preliminary data displays no relationship between brachial artery flow mediated dilation and lower arm muscle oxygen desaturation or resaturation rate. These upper extremity tests may provide complimentary information, i.e. macro- and micro-vessel function, but they likely differ mechanistically.