TACSM Abstract

Relationships Between Indices of Macrovascular and Microvascular Function in Young, Black Women

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ABSTRACT

Blacks (BL) exhibit an exaggerated prevalence of and mortality from cardiovascular disease (CVD) relative to other populations. Macro- and microvascular dysfunction is often a hallmark of heightened CVD risk, with both demonstrated in BL. However, data regarding this dysfunction remains sparse, particularly in BL women. Common indices of vascular function include flow-mediated dilation (FMD) and reactive hyperemia (RH) following a brief period of suprasystolic cuff occlusion and cutaneous thermal reactivity to local heating (LH). However, the relationship between these indices has not been established in BL women. **PURPOSE**: The present study aimed to test the relationship between indices of vascular function in BL women as assessed by FMD, RH, and LH. **METHODS**: To test this hypothesis, 6 white women (WW) and 6 BW (age: 22±2 vs. 21±3, respectively) were studied. FMD and RH were assessed following a period of suprasystolic cuff occlusion. Briefly, a rapid inflation cuff was secured just distal to the antecubital fossa for arterial occlusion. Blood velocity (V_{mean}; cm · s^{-1}) and vessel diameter (d; mm) were measured continuously via high-resolution, duplex Doppler ultrasound during a 2-min baseline, 5-min of cuff occlusion, and 3-min of recovery. FMD was determined as the percent dilation from baseline (%FMD) while RH was determined as the peak and area under the curve (AUC) responses for shear rate ($8 \cdot V_{mean} \cdot d^{-1}$) and blood flow ($V_{mean} \cdot \pi \cdot (d \cdot 20^{-1})^2 \cdot 60$). Cutaneous thermal reactivity was assessed using laser-Doppler flowmetry during a standard LH protocol and reported as cutaneous vascular conductance (CVC; red blood cell flux/mean arterial pressure). Following a baseline with local skin temperature clamped at 33°C, a 39°C heat stimulus was applied to induce cutaneous vasodilation for ~30-min. The sustained vasodilation at the end of heating is predominantly nitric oxide mediated and provides an index of microvascular function. As the LH component served as part of a larger intradermal microdialysis protocol, maximal blood flow responses were elicited via combined intradermal sodium nitroprusside (28mM) infusion and 43°C heating. CVC during the 39°C plateau was normalized to maximal CVC (%CVC_{max}) to account for intersite variability. Pearson correlations were then performed between the FMD, RH, and LH responses. **RESULTS**: Significant relationships were observed between %FMD and shear AUC (r = 0.89; P = 0.02), and blood flow AUC (r = 0.92; P = 0.01) in WW, but not in BW (r = 0.63; P = 0.18 and r = -0.24; P = 0.65, respectively). However, neither FMD nor RH correlated with the cutaneous blood flow responses to LH (P > 0.05) in either WW or BW. **CONCLUSION**: These preliminary data suggest that FMD is highly correlated to some indices of RH in WW, but that this relationship does not hold in BW. Further, there appears to be no relationship between microvascular function as assessed by RH and LH in either population.