TACSM Abstract

Influence of a short-term increase in intraluminal pressure, with and without recovery, on ACh-induced dilation in senescent skeletal muscle feed arteries

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ABSTRACT

We tested the hypothesis that a short-term increase in intraluminal pressure, to mimic a 1 h bout of exercise, would attenuate or reverse age-induced impairments in acetylcholine (ACh)-induced dilation in soleus muscle feed arteries (SFA). In addition, we hypothesized that improved endothelial function would persist following a 2 h recovery period at normal pressure. SFA were isolated from young (4 mo) and old (24 mo) Fischer 344 rats. SFA were cannulated and pressurized at 90 (p90) or 130 (p130) cm H_2O for 1 h. At the end of the 1-h treatment period, p130 SFA were lowered to 90 cm H_2O and ACh-induced vasodilation was assessed. In a separate group of SFA, pressure was raised to 130 cm H_2O for 1 h and subsequently lowered to 90 cm H_2O for a 2 h recovery period. ACh-induced vasodilator responses were significantly blunted in old p90 SFA relative to young p90 SFA. Pre-treatment with increased pressure (p130) for 1 h improved ACh-induced dilation in old (not young) SFA. The beneficial effect of pressure in old SFA was not apparent after a 2 h recovery period. To determine the importance of nitric oxide in endothelium-dependent dilation in pressure treated vessels, old SFA were pressurized at 130 cm H_2O for 1 h, reset to p90, and ACh-induced vasodilator responses were assessed in the absence or presence of a NOS Inhibitor (L-NNA). Results indicate that the beneficial effect of pressure treatment on ACh-induced dilation was eliminated in the presence of L-NNA. Collectively, these results indicate that a short-term (1 h) increase in intraluminal pressure improves endothelium-dependent dilation in old SFA due to enhanced nitric oxide bioavailability. Contrary to our hypothesis, the beneficial effect of pressure did not persist following a 2 h recovery period. Research supported by AHA grant 0765043Y (CRW), AHA grant 4150031 (CRW), and a Sydney and J.L. Huffines Institute of Sports Medicine Graduate Student Research Grant (JWS).