

SNP-induced dilation following a short-term intraluminal pressure increase in aged skeletal muscle feed arteries

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ABSTRACT

A decline in peripheral vascular function occurs with age and is associated with an increased risk for cardiovascular disease. Moderate, aerobic exercise has been documented to improve or reverse the age-related decline in vascular function. The signal(s) associated with exercise responsible for the improvement in vascular function is not known; however, increased intraluminal pressure that occurs during a bout of exercise has been proposed to play an integral role. Previously, we reported that exposure to a short-term increase in intraluminal pressure improves endothelium-dependent vasodilator responses in aged arteries. The purpose of this study was to determine whether pressure treatment enhances endothelium-independent vasodilator responses. We hypothesized that a short-term (1 h) increase in intraluminal pressure, to mimic the intraluminal pressure believed to be present during a 1 h bout of exercise, would not improve endothelium-independent vasodilator responses. Soleus muscle feed arteries from young (4 month) and old (24 month) Fischer 344 rats were isolated, cannulated, and pressurized at 90 (P90) or 130 (P130) cmH₂O for 1 h. Following the 1 h pressure treatment, intraluminal pressure was lowered to 90 cmH₂O for all vessels and SNP-induced vasodilation was assessed immediately or following a 2 h recovery period. SNP-induced dilation was significantly blunted in old P90 SFA when compared to young P90 SFA. Pre-treatment with increased intraluminal pressure for 1 h improved SNP-induced vasodilator responses and abolished the age group difference between the old and young SFA. Maximal dilation to SNP was greater in the young P130 compared to the young P90 SFA. The effects of the 1 h increased intraluminal pressure treatment were no longer present following a 2 h recovery period. Collectively, these results indicate that treatment of aged arteries with a short-term increase in intraluminal pressure to mimic pressure during a bout of exercise improves endothelium-independent dilation in aged arteries. In addition, these results suggest that a short-term increase in intraluminal pressure, associated with a single bout of exercise, is one signal contributing to the beneficial effect of exercise on vasodilator responses in aged arteries.