Chronic Lower Leg Heating Improves Conduit Artery Endothelial Function in Post-Menopausal Women

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Endothelial function declines sharply in women after the menopause transition. Additionally, in contrast to age-matched men, non-pharmacological therapeutic interventions such as aerobic exercise training fail to consistently improve endothelial function in post-menopausal women. We recently demonstrated that acute lower leg heating increases body core temperature and vascular shear stress while improving vasodilator function in post-menopausal women. However, the effect of chronic lower leg heating on vascular health remains unclear. Therefore, the purpose of this study was to test the hypothesis that chronic lower leg heating improves endothelial function in post-menopausal women. Five healthy post-menopausal women (age 67 ± 5 yr; height 164 ± 4 cm; weight 70 ± 8 kg; BMI 26 ± 3; mean ± SD) were exposed to 8 weeks of home-based lower leg heating. Subjects were 19 ± 3 yr from cessation of menstruation and not currently undergoing hormone replacement therapy. Subjects immersed their lower legs ~33 cm into a heated (~42°C) and circulated water bath 4 days per week, for 45 min per session. Prior to and following chronic leg heating, duplex ultrasonography was used to assess endothelial function via flow-mediated dilation of the superficial femoral artery following 5 min of arterial occlusion. Additionally, smooth muscle function was assessed by measuring the vasodilatory response to oral administration of 0.4 mg nitroglycerin. Chronic lower leg heating improved flow-mediated dilation (pre 1.8 ± 0.2% vs. post 3.4 ± 0.2%; P = 0.02), whereas nitroglycerin-mediated dilation was unchanged (pre 6.7 ± 0.6% vs. post 5.7 ± 0.9%; P = 0.3). These data suggest that 8 weeks of home-based lower leg heating improves endothelial function, but not smooth muscle function, in post-menopausal women. Chronic lower limb heating may be an effective non-pharmacological therapy to prevent or slow the rapid decline in endothelial function that occurs in women after the menopause transition.