The Effects of Dietary Nitrate on Endothelial Resistance to Ischemia Reperfusion Injury in Postmenopausal Women

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Regular aerobic exercise has been shown to enhance endothelial function in aging men, however, the same vascular benefits are not consistently observed in estrogen-deficient postmenopausal women. Consumption of nitrate and antioxidant-rich foods (beetroot, spinach, leafy greens, etc.) is an effective dietary strategy to increase bioavailability of the vasoprotective molecule, nitric oxide and improve endothelial function. PURPOSE: To determine if a single dose of nitrate-rich beetroot juice can improve endothelial resistance to- and resilience following- whole-arm ischemia-reperfusion (IR) injury (20 min. occlusion, 15 min. reperfusion) in postmenopausal women. METHODS: Healthy, physically active early- (1-6 years following their final menstrual period (FMP), MET-week: 2918 ± 3679, n=12) and late- (>6 years FMP, MET-week: 3116 ± 2240, n=12) postmenopausal women consumed a single dose of nitrate-rich (600 mg NO³⁻/ 140 mL) and nitrate-depleted (placebo, 0 mg NO³⁻/ 140 mL) BR on two separate visits. Brachial artery flow-mediated dilation was measured pre-, post-IR, and recovery (30-minutes post-IR) for each drink. RESULTS: Analyses with general linear models revealed a significant (p<0.05) time*treatment interaction (p=0.014) effect for FMD. FMD was significantly lower post-IR in comparison to all other time points with BR placebo (Early: BR placebo 2.51 ± 1.18 %, p<0.001, Late: BR placebo 1.30 ± 1.10 %, p<0.001) and was significantly lower than post-IR with BR nitrate (Early: BR nitrate 3.84 ± 1.21 %, Late: BR nitrate 3.21 ± 1.13%, p=0.045). Recovery FMD with BR nitrate (Early: BR nitrate 6.71 ± 1.14 %, p=0.023) was significantly higher in the early postmenopausal group, and with BR placebo (Early: BR placebo 6.25 ± 1.16 %, p<0.001, Late: BR placebo 5.11 ± 1.10%, p<0.001) in both groups. CONCLUSION: These results suggest that BR nitrate improves endothelial resistance to whole arm IR injury in healthy, active postmenopausal women, however, given recovery FMD was significantly higher with BR placebo in both groups might suggest that the high antioxidant capacity in BR plays an important role in endothelial resilience following IR injury. SIGNIFICANCE: Nitrate-rich beetroot juice enhances endothelial resistance to IR injury in healthy, active, postmenopausal women.

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