

Effects of Acute Dietary Nitrate Supplementation on Aortic Wave Reflection in Young Adults

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Objective: Evidence suggests that dietary nitrate supplementation (i.e. beetroot juice) decreases measures of peripheral blood pressure. However, the effects of acute dietary nitrates on central aortic pressures are unclear. Thus, the objective of this study was to investigate the effects of beetroot juice consumption on central aortic pressures and indices of aortic wave reflection.

Methods: 13 healthy, normotensive, non-smoking, untrained young adults (25±1year) consumed 500ml of beetroot juice (BR). High-fidelity radial arterial pressure waveforms using applanation tonometry and venous blood samples were taken at baseline, 60, 90, 120, 150 and 180 minutes post BR consumption (Study 1). Indices of aortic wave reflection (Augmentation Index; Alx and Alx normalized for heart rate; Alx@75bpm) were analyzed using the generated central aortic blood pressure waveforms (SphygmoCor). To control for the potential confound of fluid ingestion on blood pressure, 7 of the subjects came back for an additional study visit which consisted of drinking 500ml of water (Study 2; control trial). Applanation tonometry measurements were performed at the same time points as Study 1.

Results: Study 1: Central systolic pressures were reduced after 90 min following BR (~3-4mmHg; $P<0.05$). Additionally, Alx and Alx@75bpm were reduced at all-time points following BR ($P< 0.05$; Figure 1). Study 2: Compared to the control trial, Alx was lower at all-time points following BR ($P<0.05$). However, Alx@75bpm was only reduced relative to the control condition at 150 and 180 min post consumption ($P<0.05$; Figure 2).

Conclusion: Our data provide evidence that in addition to the beneficial effects on peripheral blood pressures, acute dietary nitrate supplementation (via beetroot juice) also decreases central aortic pressures and wave reflection in young healthy adults. These effects on central aortic hemodynamics appear to be greatest 2.5-3 hours after BR consumption and are likely mediated by an increase in NO bioavailability via nitrate-nitrite-NO pathways.

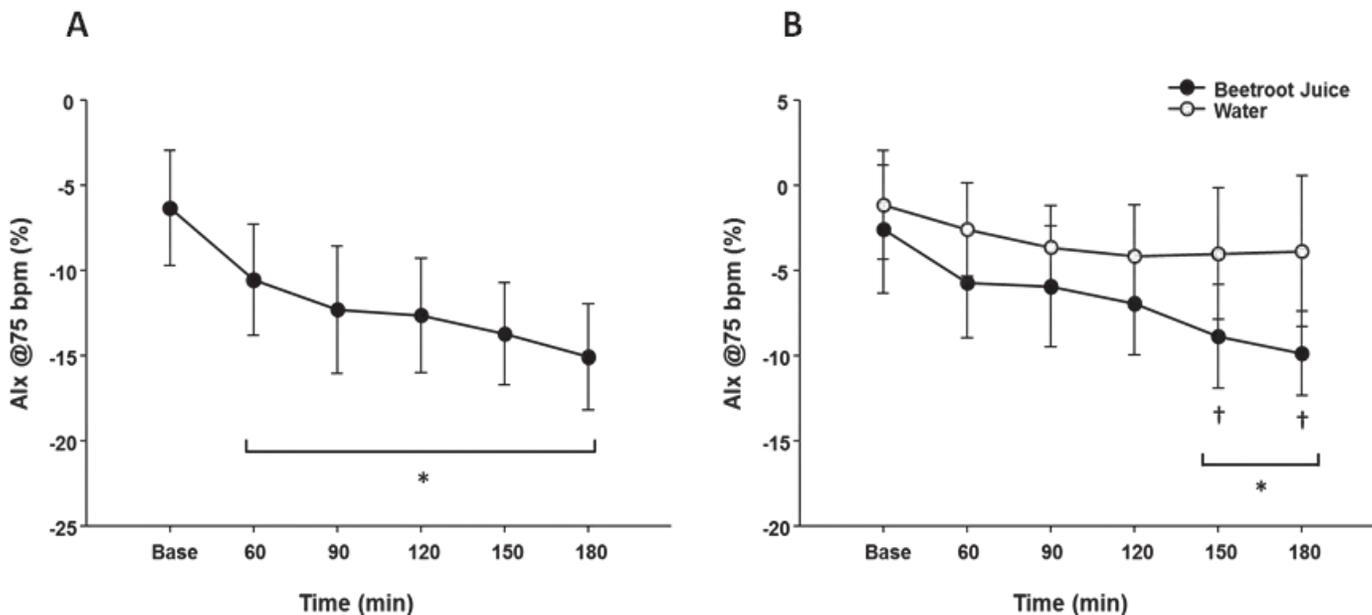


Figure 1. Beetroot juice (n=13) lowered Alx@75bpm over three hours (A; Study 1). When compared to water (control trial; n=7), BR decreased Alx@75bpm at 150 and 180 minutes post consumption (B; Study 2). * $P<0.05$ vs Baseline. † $P<0.05$ vs control.