

Postprandial effects of beetroot enriched bread on peripheral microvascular function and blood pressure in normotensive men

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The cardio-protective effects of beetroot, such as blood pressure reduction⁽¹⁾ have been attributed to its high nitrate content⁽²⁾. Following ingestion, dietary nitrate is reduced to nitrite by oral bacteria, and further to the vasodilator nitric oxide (NO) endogenously⁽³⁾. This study investigated the effects of enriching bread with nitrate-rich beetroot on postprandial peripheral microvascular function and blood pressure (BP).

Twenty four healthy men were recruited to a randomly controlled, single blind, cross-over, postprandial test meal study. Peripheral microvascular function was measured using laser Doppler imaging (LDI) with iontophoresis at baseline, 2, 4 and 6 hours after consumption of 200 g control bread (no beetroot, <0.8 mM nitrate) or 200 g bread enriched with 100 g red beetroot 6.4 mM nitrate). Ambulatory BP (ABP) was measured at baseline, every 30 min from 8 am until 10 pm, and every 60 min from 10 pm until 8 am, and blood samples were taken at baseline and 30, 60, 90, 120, 150, 180, 210, 240, 300, 360 and 420 min after consumption of intervention breads. The participants followed a low nitrate and nitrite diet for 48 hours prior to and during the study day. A low nitrate and nitrite standard meal was provided for the evening before the study day.

Preliminary results show a significant reduction in diastolic BP (DBP) from 0 to 120 minutes post ingestion of beetroot enriched bread compared to the control bread (no beetroot) (Fig. 1A, $P = 0.025$). Endothelium-dependent (LDI-ACh, Fig. 1B) and endothelium-independent (LDI-SNP) vasodilation increased following ingestion of beetroot enriched bread, compared to the control bread (no beetroot), but did not reach statistical significance (LDI-ACh, $P = 0.08$). Plasma nitrite concentration significantly increased from 0 to 7 hours after ingestion of beetroot enriched bread compared to control (no beetroot) (Fig. 1C, $P = 0.01$).

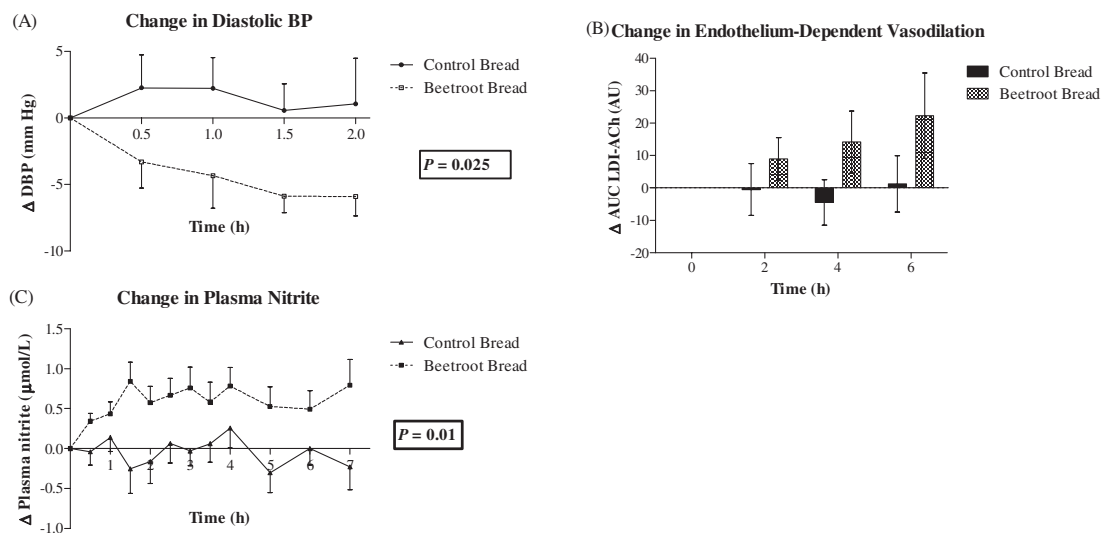


Fig. 1. The effect of beetroot enriched bread on the change from baseline in (A) diastolic BP (B) LDI-ACh response and (C) plasma nitrite concentrations. Data expressed as means \pm SEM.

In conclusion, this study demonstrated significant blood pressure lowering and a tendency for increasing peripheral microvascular function after ingestion of beetroot enriched bread, occurring in conjunction with a significant increase in plasma nitrite concentration. Beetroot enriched bread may serve as a good vehicle to increase consumption of cardio-protective beetroot in the diet.

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