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Title: Supplemental dietary nitrate for COPD: A randomized, double-blind, placebo-controlled, crossover trial

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Body: Introduction: Nitric oxide (NO) is an important systemic and pulmonary arterial vasodilator. The conversion of nitrite (derived from dietary nitrate) to nitric oxide can occur independent of nitric oxide synthase in a process that is upregulated in hypoxic conditions. Since COPD patients commonly suffer hypoxaemia during exercise, we hypothesized that dietary nitrate supplementation might acutely improve exercise capacity in hypoxic COPD patients through enhanced production of nitric oxide. Aims & objectives: We wanted to compare the effect of a single drink of beetroot juice (containing 14 mmol of nitrate) on exercise capacity (incremental shuttle walk test) and arterial blood pressure (BP) in COPD patients compared to a matched placebo drink (containing less than 0.5mmol of dietary nitrate). Methods: Twelve subjects (6 male) with COPD were recruited. Plasma nitrate and BP were assessed. Oximetry and self-reported dysnoea (Borg scale) were assessed pre- and post-incremental shuttle walk test (ISWT). Subjects were then randomized to drink beetroot juice or a matched placebo and the protocol was repeated 3 hours later. After a 7-day washout period, the protocol was repeated with the crossover beverage. Results: COPD subjects who took dietary nitrate walked significantly further than when they took placebo (+23 ± 9 vs. -13 ± 5 metres; $p < 0.01$) and had a reduction in systolic BP (-13 ± 5 vs. 0 ± 1 mmHg; $p < 0.05$) Conclusion: Acute consumption of dietary nitrate can improve exercise tolerance and lower blood pressure in COPD patients.