

Exercise Performance and Beetroot Juice
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Study: In a double-blind, placebo-controlled, crossover study involving 8 men aged 19-38 years, results indicate that consumption of nitrate-rich beetroot juice may enhance exercise endurance. The participants were randomized to 500 mL per day of either beetroot juice (BR, containing 11.2 mM of nitrate) or a placebo juice (negligible nitrate content) for a period of 6 days, following which the interventions were crossed over for another 6 days. On the last 3 days of each intervention phase, the men completed a series of 'step' moderate-intensity and severe-intensity exercise tests. Dietary nitrate supplementation (beetroot juice) was associated with significantly greater plasma nitrite, significantly lower systolic blood pressure, and reduced muscle fractional O₂ extraction, compared with placebo. Additionally, beetroot juice consumption was found to significantly reduce the O₂ cost of moderate exercise and increase the time to task failure during severe exercise. Thus, the authors of this study conclude, "The principal original finding of this investigation is that three days of dietary supplementation with nitrate-rich beetroot juice (which doubled the plasma nitrite) significantly reduced the O₂ cost of cycling at a fixed sub-maximal work rate and increased the time to task failure during severe exercise."

Dietary nitrate supplementation reduces the O₂ cost of low-intensity exercise and enhances tolerance to high-intensity exercise in humans, Bailey SJ, Jones AM, et al, J Appl Physiol, 2009 Aug 6; [Epub ahead of print]. (Address: Exeter University. E-mail: a.m.jones@exeter.ac.uk).

Interview with Dr. Andrew Jones on the study results by Kirk Hamilton:

Kirk Hamilton: Can you please share with us your educational background and current position?

Andrew M. Jones: I have a PhD in exercise physiology and presently am Professor of Applied Physiology and Head of Sport and Health Sciences at the University of Exeter, United Kingdom.

KH: What got you interested in studying the effect of beetroot juice on exercise performance?

AMJ: A 2007 paper showed that sodium nitrate reduced the oxygen cost of submaximal cycling. We recognized this might translate into enhanced performance and used beetroot juice as the source of nitrate.

KH: What is the biochemistry of beetroot juice that might alter the pathophysiology of vascular disease or enhance exercise performance?

AMJ: Beetroot (and its juice), as well as a variety of green leafy vegetables, contain a lot of inorganic nitrate. In the body, this can be converted into nitrite and then to nitric oxide, a vasodilator molecule that also influences muscle contractility and mitochondrial respiration.

KH: Where did you come up with a daily dose of 140 or 280 ml of beet root juice? How much nitrate did that produce respectively? How was that measured? How was the beetroot taken? With meals or away from meals? In a single dose or divided dose?

AMJ: In our recent dose-response study we found that 140 ml of concentrated beetroot juice (containing 8 mmol nitrate) was necessary for exercise performance to be enhanced. The juice is consumed 2-3 hours before exercise to coincide with the peak in plasma [nitrite].

KH: Were blood levels of nitrate, or other biochemical markers like endothelial function taken before, during or after the intervention? If so did they correlate with symptoms and supplementation with beetroot juice?

AMJ: We measured plasma nitrate and nitrite concentrations. The peak values were reached at the same time that resting blood pressure was most reduced.

KH: Can you tell us about your study and the basic results?

AMJ: In 10 healthy males who ingested 70, 140 or 280 ml of concentrated BR (containing 4.2, 8.4 and 16.8 mmol NO₃⁻, respectively) or no supplement, plasma [NO₂⁻] increased in a dose-dependent manner, with the peak changes occurred at ~2-3 hours after ingestion. Ten subjects completed moderate-intensity and severe intensity cycle exercise tests 2.5 hours post-ingestion of 70, 140 and 280 ml BR, or NO₃⁻-depleted BR as placebo (PL). 140 and 280 ml BR reduced the steady-state VO₂ during moderate-intensity exercise by 1.7%.

Recommendation: AF Betafood by Standard Process (Beet Root Concentrate): Take 6 Tablets 1 hour before working out with 8 ounces of water.