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Small study shows beetroot juice improves exercise function of COPD patients

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A Wake Forest University study to investigate the effects of acute beetroot juice ingestion on the exercise capacity of COPD patients shows some promise, but a larger clinical trial is needed to verify results.

The new research, published online ahead of print in the journal *Nitric Oxide: Biology and Chemistry*, looked at a small group of COPD patients who drank beetroot juice as compared to a placebo drink before exercise.

"The intent of this study was to determine if acute ingestion of beetroot juice, which is rich with nitrates, prior to exercising could improve the exercise capacity of COPD patients," said Michael Berry, who is the primary investigator and lead author of the study. As chair of Wake Forest's department of health and exercise science, Berry is interested in the potential benefits of beetroot juice on physical function.

COPD, or chronic obstructive pulmonary disease, makes it difficult for patients to breathe and worsens over time. Patients often complain of shortness of breath with exertion, so tasks like climbing steps can leave them gasping for air. In turn, they tend to limit their activities, become more sedentary, and lose fitness and physical function.

The single-blind, placebo-controlled, cross-over study was primarily funded by Wake Forest University's Translational Science Center (TSC) with additional funding from the National Institutes of Health grant NR011186. The TSC has conducted research that looks at how nitrite

and its biological precursor, nitrate (found in beetroot juice) can be utilized in treatments for a variety of conditions. In a 2010 study, Wake Forest researchers were the first to find a link between consumption of nitrate-rich beet juice and increased blood flow to the brain.

Berry said his study findings showed overall that those patients who drank beetroot juice were able to extend their exercise time, and had reduced exercise diastolic and resting systolic blood pressures. This is the first study to demonstrate beneficial effects of dietary nitrite supplementation on exercise performance and blood pressure in patients with COPD, he added.

Researchers recruited 15 COPD patients; 11 white males, one African-American male and three white females. Patients completed four visits. During visit one, they completed baseline pulmonary function testing, filled out health status questionnaires, had a brief medical examination and completed an incremental exercise test on a stationary bicycle to determine their maximal exercise work rate. The second visit one week later consisted of additional pulmonary function and lung volume testing, as well as a familiarization exercise test on an exercise bicycle at 75 percent of the patients' previously determined maximal work rates.

Berry said this type of exercise test has been used in previous trials with COPD patients examining the effects of pharmaceutical agents on exercise performance and is designed to exhaust the patient in a period of four to 10 minutes.

Participants were assigned to one of two treatments—beetroot juice (visit three) and placebo (visit four) or placebo (visit three) and beetroot juice (visit four). These visits were separated by at least a seven-day break.

All visits were performed at a similar time in the morning and the

beetroot juice or placebo juice, about three ounces of each, was ingested two-and-a-half hours before the final two visits. Prune juice was used as the placebo because it contains similar amounts of carbohydrates, sugars and fats, but does not contain any nitrates, Berry said. How long patients exercised during the third and fourth visits was recorded.

Berry said that while the study has its limitations, he is hopeful the data generated will lead to grant funding for a larger study to look at the mechanisms for how nitrates can improve the physical function of COPD patients.

"One of the benefits of exercise is that if you get positive results, you're more likely to continue doing it. If beetroot juice positively impacts those results, it could motivate COPD patients to continue to be physically active and improve their health," he said.

Provided by Wake Forest University

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