



## Mid Atlantic Regional Chapter of the American College of Sports Medicine

46<sup>th</sup> Annual Scientific Meeting, November 3<sup>rd</sup> - 4<sup>th</sup>, 2023  
Conference Proceedings

International Journal of Exercise Science, Issue 9, Volume 12



### Effects of A Betalain-Rich Concentrate on Respiratory Exchange Ratio, Lactate, and Skeletal Muscle Oxygen Uptake

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Beetroot juice (BRJ) has become a popular supplement for improving athletic performance during exercise. Betalains, bioactive pigments contained within BRJ, have been shown to improve vascular function due to their antioxidant and anti-nitrosative properties; however, these effects have not been substantiated in response to acute running exercise on substrate utilization, lactate (LAC) accumulation, and localized skeletal muscle oxygen (SMO<sub>2</sub>) consumption. **PURPOSE:** To determine whether consuming a betalain-rich concentrate (BRC) improves respiratory exchange ratio (RER), LAC, and SMO<sub>2</sub> compared to a placebo in college-age students. **METHODS:** Seventeen college-age male students consumed 100 mg of freeze-BRC containing 25% betalains and 100 mg of dextrose (placebo, [PLAC]) in a randomized, counterbalanced, double-blinded, placebo control trial. Participants were instructed to consume BRC or PLAC 2 hr before completing a running economy protocol, where participants ran at submaximal velocities corresponding to 60% and 80% of their peak oxygen consumption (VO<sub>2max</sub>) for 5 min, and a VO<sub>2max</sub> test immediately thereafter. Respiratory exchange ratio (RER) was recorded during the last 30 s of each velocity of the running economy protocol. SMO<sub>2</sub> was recorded at the end of every min for 5 min following the VO<sub>2max</sub> test. LAC was measured at 3-, 6-, 9-, and 12-min post-exercise. Repeated measures analyses of variance were performed with posthoc pairwise comparison, simple effects tests, and Bonferroni adjustments to assess differences between BRC and PLAC and protect the familywise error rate at  $p < .05$ . **RESULTS:** On average, participants were younger ( $19.0 \pm 1.8$  years), normal weight ( $70.6 \pm 8.1$  kg) and had good body composition ( $12.80 \pm 0.03$  %). SMO<sub>2</sub> was statistically significant between BRC and PLAC between minute 4 (SMO<sub>2</sub>:  $68.47 \pm 9.80$ ,  $p = .017$ ) and 5 (SMO<sub>2</sub>:  $69.06 \pm 9.85$ ,  $p = .014$ ) post-exercise. No other mean differences were observed for SMO<sub>2</sub>, RER, or LAC between BRC and PLAC during exercise testing, and furthermore, no differences were observed between BRC and PLAC for LAC post-exercise ( $p > .05$ ). **CONCLUSION:** We found significant post-exercise differences in SMO<sub>2</sub> between BRC and PLAC but neglected to find differences for RER or LAC at any time point. **SIGNIFICANCE/NOVELTY:** Our findings indicate that a 100 mg BRC supplement may enhance post-exercise blood flow, and perhaps recovery following exhaustive running exercise. Replication studies exploring the acute and chronic effects of BRC in larger and more diverse samples with varying interventions are encouraged and warranted.