Effects of single-dose dietary nitrate on oxygen consumption during and after prolonged submaximal exercise in healthy humans

Genevieve M. Kocoloski
University of Dayton, stander@udayton.edu

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EFFECTS OF SINGLE-DOSE DIETARY NITRATE ON OXYGEN CONSUMPTION DURING AND AFTER PROLONGED SUBMAXIMAL EXERCISE IN HEALTHY HUMANS

GENEVIEVE M. KOCOLOSKI¹ AND ANNE R. CRECELIUS¹

¹DEPARTMENT OF HEALTH AND SPORT SCIENCE, UNIVERSITY OF DAYTON, OH

INTRODUCTION

- Oxygen is the substrate for aerobic metabolism; with exercise, oxygen consumption (VO2) will increase to provide the substrate for energy production. As VO2 increases, energy expenditure (Kcal) also increases.
- As exercise begins, the amount of O2 needed increases faster than the body can increase its uptake. At cessation of exercise, the body continues to maintain an elevated VO2 rate to make up for the deficit. This continued elevated intake is referred to as excess post-exercise oxygen consumption (EPOC).
- Dietary nitrate supplementation has been shown to decrease VO2 at a given workload, increase performance in time trial time, and decrease diastolic blood pressure. However, there is a lack of published data regarding the effect of nitrate supplementation on EPOC.

METHODS

Subjects, Instrumentation and Measurements
- A total of 7 healthy, untrained, young males aged 21-31
- Parvo Medica TrueOne 2400 Metabolic Cart
- Heart rate (HR) determined by ECG
- Blood pressure (BP) measured with automatic sphygmomanometer
- RPE measured on 6-20 Borg Scale

Control Condition
- 70 ml mouthwash
- prevent conversion from NO to NOE
- Nitrate Supplementation
- 70 ml Beet It Sport Shot (BR)
- administered orally

Cycle Ergometry
- 5 experimental visits
- Maximal Exercise (Control)
- Maximal Exercise (BR)
- Prolonged (45 min) Submaximal (% of Ctrl Max) (Control)
- Prolonged (45 min) Submaximal (% of Ctrl Max) (BR)

Supplementation Efficacy at Rest

EXPERIMENTAL PROTOCOL

RESULTS

1. Subject Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SEM</th>
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<tbody>
<tr>
<td>Age (years)</td>
<td>25.5 ± 8.2</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.82 ± .392</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>77.9 ± 4.32</td>
</tr>
<tr>
<td>Body Fat (%)</td>
<td>15.8 ± 1.81</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>23.5 ± .521</td>
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</tbody>
</table>

2. Maximal Oxygen Consumption

VO2 peak = 30.97 ±6.9 mL/kg/min
VO2 peak = 37.67 ±12.56 mL/kg/min

3. Energy Expenditure

Control Nitrate

4. Dynamic Submaximal Oxygen Consumption

5. 60 Min EPOC

6. Post-Exercise Energy Expenditure (kCal)

CONCLUSIONS

- Preliminary data suggests that in our population, at a given workload, oxygen consumption is not attenuated with nitrate supplementation.
- Accordingly, contrary to our hypothesis, EPOC is not lower in this condition.
- These findings are relevant given the increase in supplementation use, particularly for both health and performance goals.
- Some experimental considerations include:
  - Subject population and number
  - Electronically-braked ergometer not used
  - No familiarization visits
  - Lack of plasma NO3 measures to support supplementation efficacy

REFERENCES


ACKNOWLEDGEMENTS

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