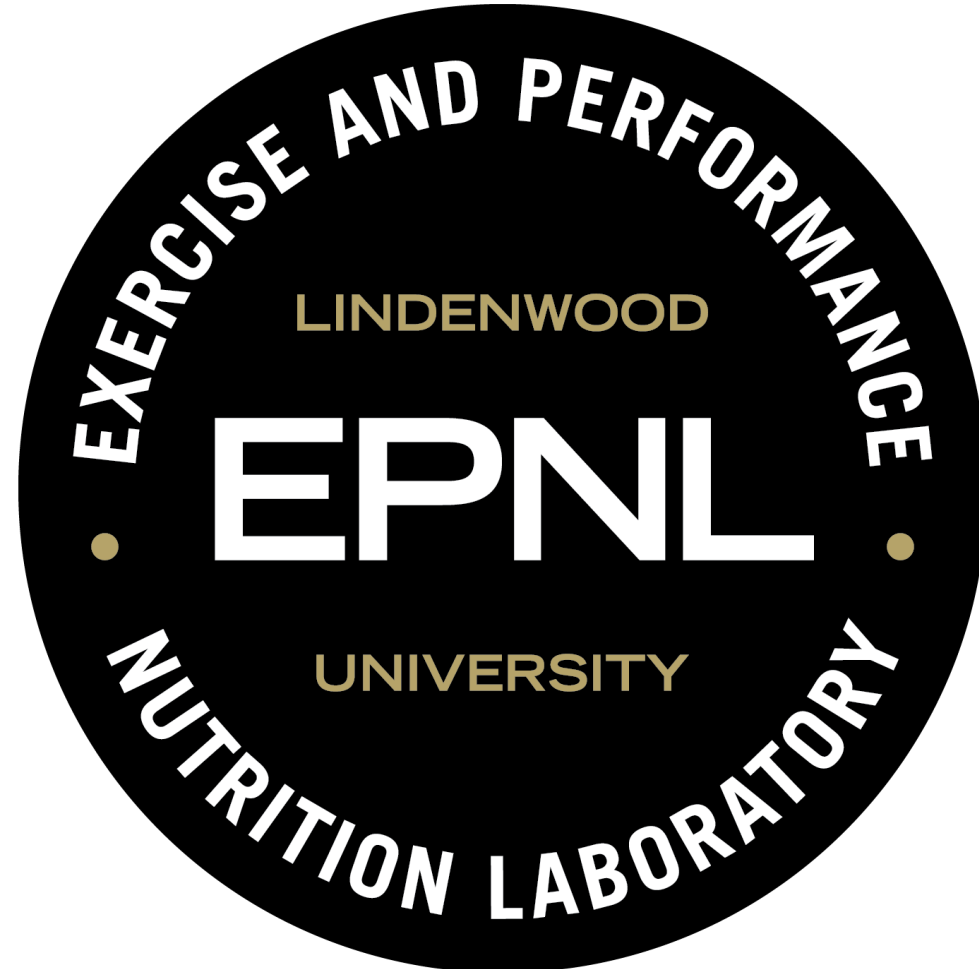


# Impact of *Veillonella atypica* FB0054 Supplementation on Exercise Performance and Lactate Changes: A Randomized, Crossover Pilot Study



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## Abstract

**Objective:** Endurance exercise increases relative *Veillonella atypica* (VA) abundance and VA supplementation enhances athletic performance in mice. This pilot study is the first human supplementation study assessing the health and performance outcomes associated with VA supplementation.

**Methods:** In a randomized, double-blind, placebo-controlled, crossover fashion, 7 healthy, physically active men and women (30.7±7.5 years, 172.7±8.7 cm, 70.4±11.6 kg, 23.6±4.1 kg/m<sup>2</sup>, 49.2±8.4 mL/kg/min) supplemented for 14 days with a placebo (PLA) or 1x10<sup>9</sup> CFU doses of VA FB0054 (FitBiomics, New York, NY). Before and after supplementation, study participants had complete blood counts, comprehensive metabolic panels, resting hemodynamics, and running time to exhaustion at 100% peak VO<sub>2</sub> evaluated. Capillary lactate was assessed before, immediately, and 5 minutes after each treadmill run.

**Results:** Exhaustion times in seconds (s) were not different between groups (PLA: 346±205s; VA: 320±318s,  $p=0.37$ ). Forced post-hoc analysis revealed a tendency for exercise performance to decrease by 23.1% in PLA (-61.1±72s; 95% CI -5.5, 127.8s,  $p=0.07$ ) while no difference in performance (4.1%) was observed with VA supplementation (-13.3±100s, 95% CI: -79.3, 105.9s,  $p=0.74$ ). Lactate concentrations at all time points were similar ( $p>0.05$ ) between groups. No between-group differences ( $p>0.05$ ) in resting heart rate or diastolic blood pressure and a trend ( $p=0.07$ ) for systolic blood pressure to be improved with VA.

**Conclusion:** *Veillonella* supplementation-maintained endurance performance that tended to decline in PLA group with no differences in lactate concentrations. VA supplementation was well tolerated with no differences in hemodynamic or clinical markers of safety with a tendency for systolic blood pressure to improve.

## Introduction

- Exercise and physical activity instigate changes in the composition and function of the gut microbiome.
- Preliminary work indicated that VA increases in abundance in endurance runners and can improve running capacity in laboratory mice.
- The extent to which these outcomes can be translated to a human model are largely unknown.
- This study aimed to evaluate the impact of VA supplementation on exercise performance and broad health outcomes.

## Methods

### Participants

- 7 healthy, physically active men and women (30.7 ± 7.5 years, 172.7 ± 8.7 cm, 70.4 ± 11.6 kg, 23.6 ± 4.1 kg/m<sup>2</sup>, 49.2 ± 8.4 mL/kg/min) participated in this study.

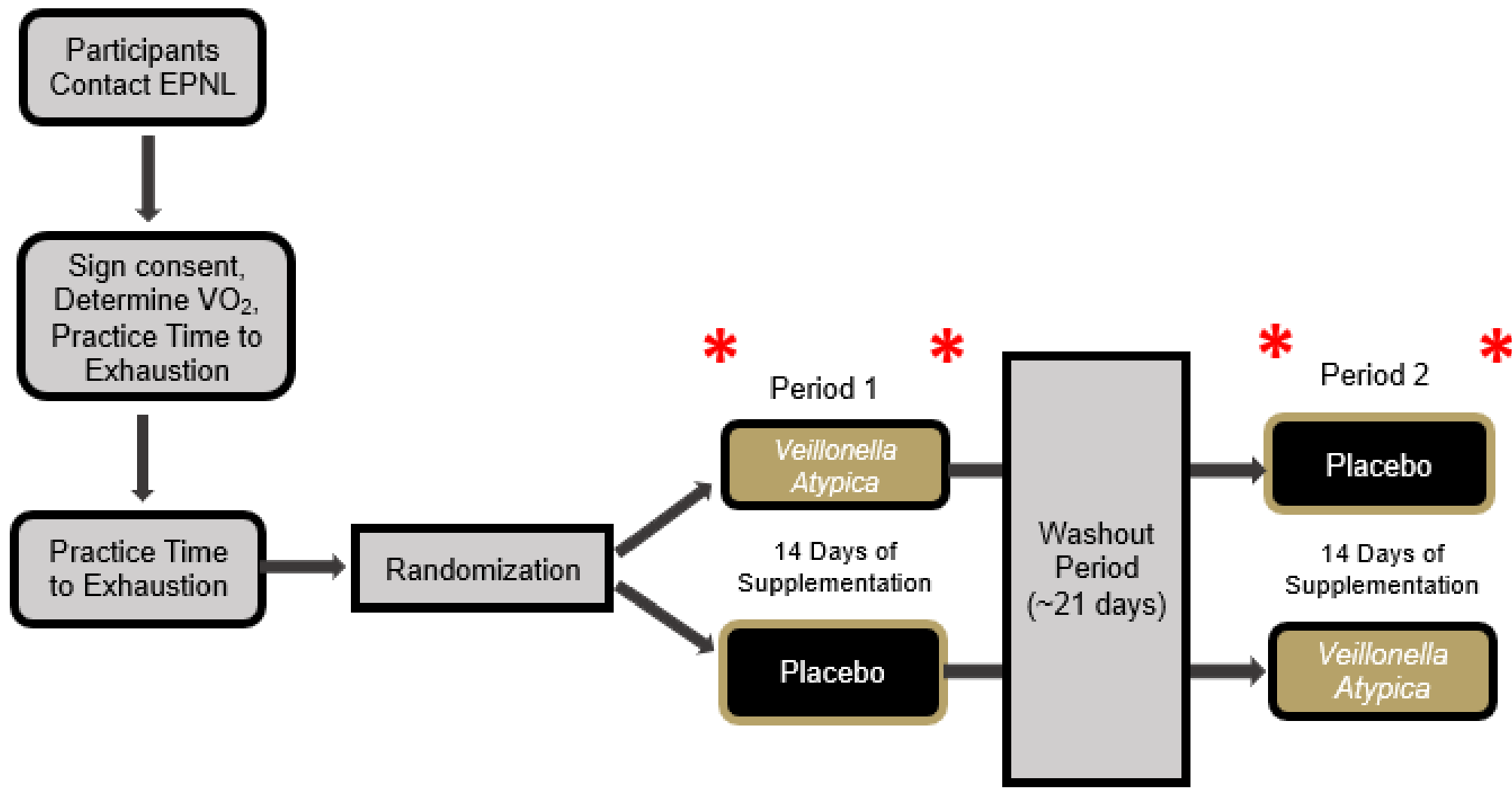
### Experimental Procedure

- Randomized, double-blind, placebo controlled, crossover design.
- Participants supplemented for 14 days prior to completing a running time to exhaustion exercise bout at 100% VO<sub>2</sub>Peak.
- Before and after supplementation:
  - Complete Blood Counts
  - Comprehensive Metabolic Panel
  - Resting Hemodynamics
- Blood lactate measured before, immediately after, and 5 minutes after running bout.

### Supplementation Protocol

- Participants supplemented with either a placebo (PLA) or 1 x 10<sup>9</sup> CFU daily *Veillonella atypica* FB0054 daily for 14 days.
- Participants were instructed to ingest all doses at roughly the same time each day with water and not within two hours of consuming a meal

Figure 1: Research Design Overview



## Statistical Analysis

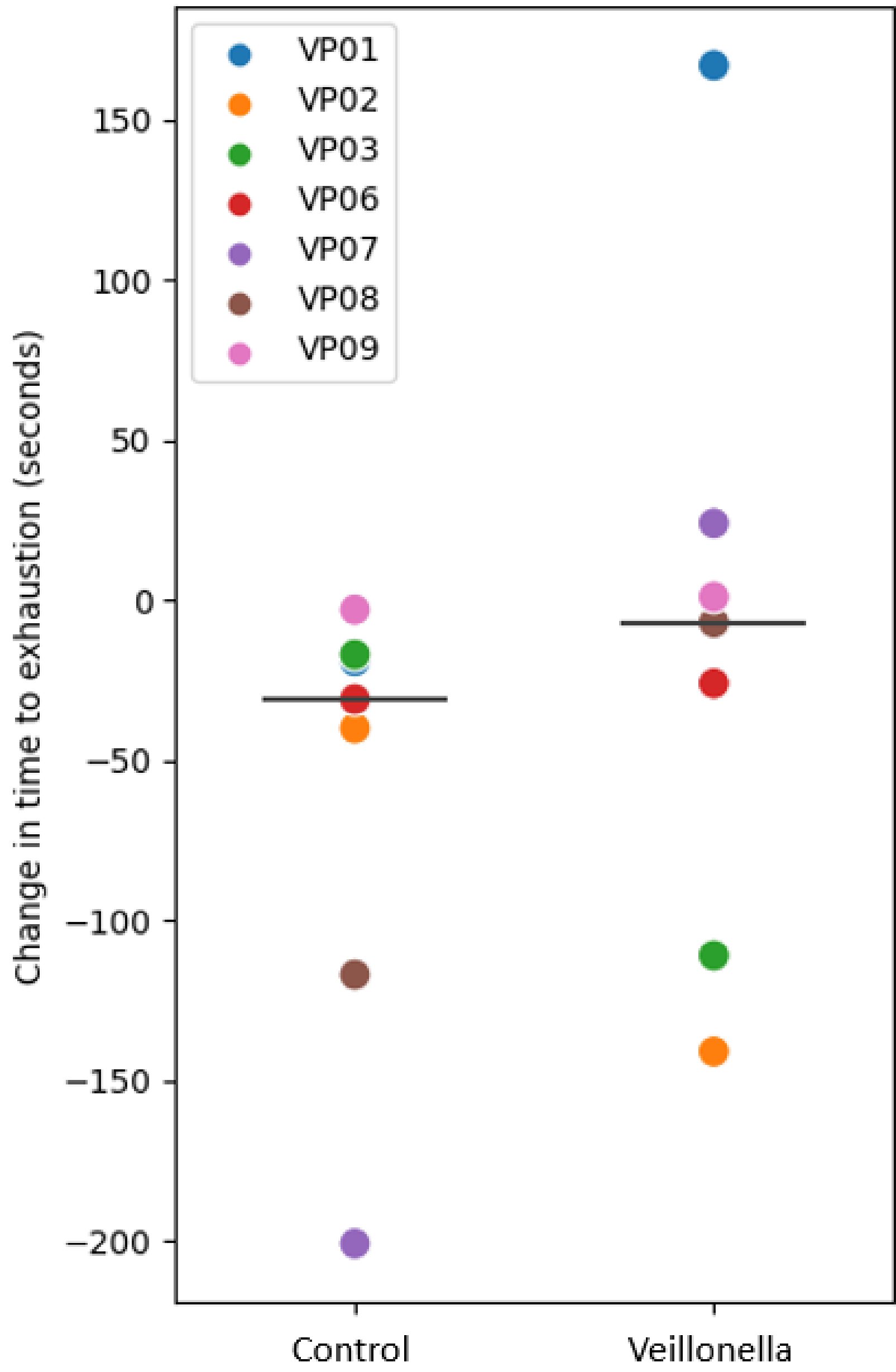
- All data is presented as means ± standard deviations and analyzed using IBM SPSS 27 and graphs were generated using GraphPad and Python.
- A p-value of 0.05 was used to make all statistical determination.
- Changes in performance and lactate responses were calculated between conditions and assessed using paired samples t-tests. Mixed (condition x time) factorial ANOVAs were used to assess differences between conditions across time for hemodynamics, hematology, and all clinical safety parameters.

## Results

### Time to Exhaustion

- Changes in endurance performance were similar between groups ( $p = 0.37$ )
- Exercise performance in PLA after supplementation decreased by 21% (-61.1 ± 72 seconds), which tended to be statistically different ( $p = 0.07$ ) from pre-supplementation values.
- Exercise performance in VA after supplementation by 4.1% (-13.3 ± 100 seconds) and was not statistically different ( $p = 0.74$ ) from pre-supplementation values.

Figure 2: Time to Exhaustion



### Hemodynamics and Health Markers

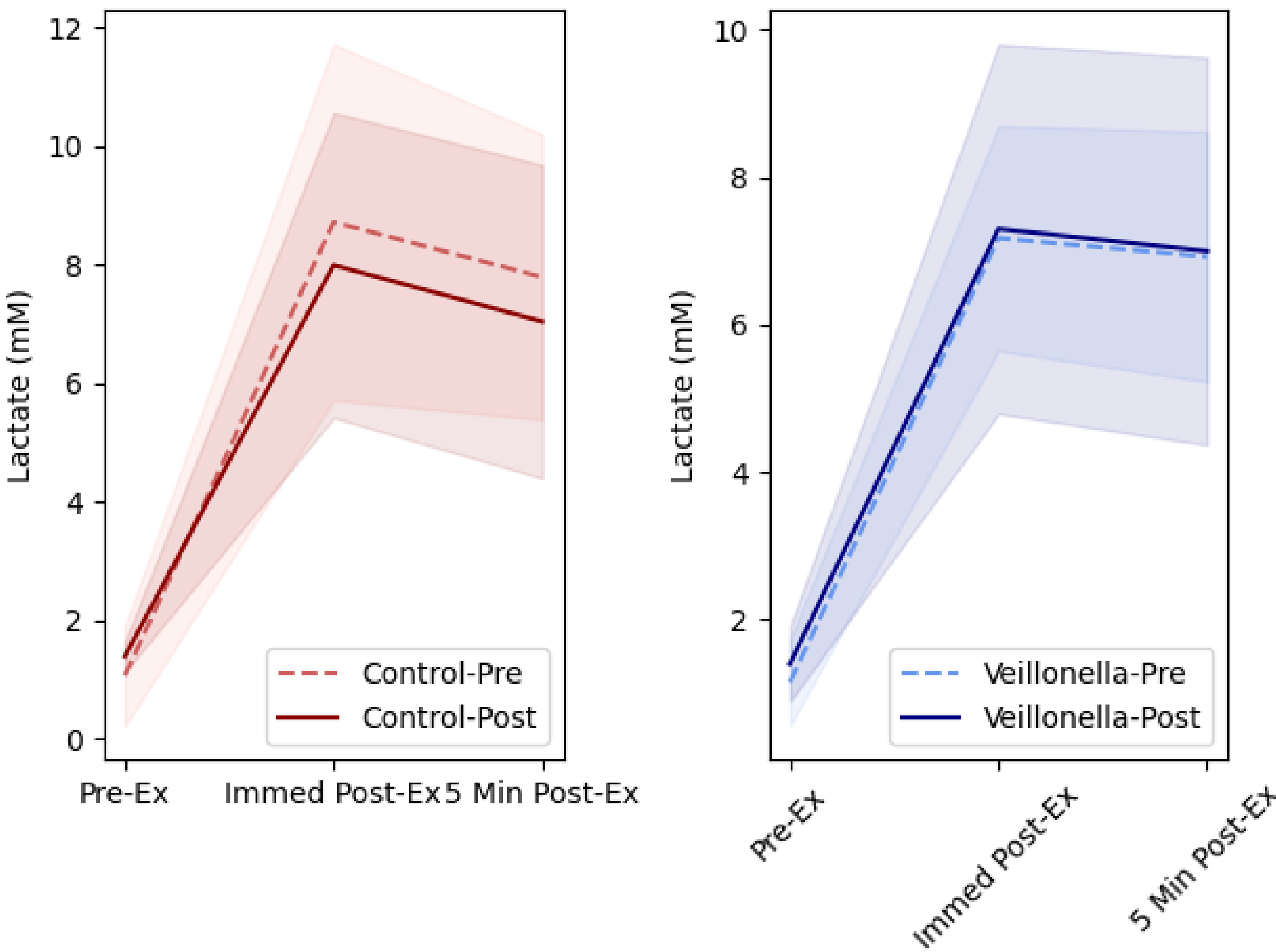
- No changes in heart rate occurred between groups ( $p = 0.51$ ). Heart rate values in VA tended to decrease ( $p = 0.06$ ) after supplementation.
- Changes in systolic blood pressure tended to be different between groups ( $p = 0.07$ ) with PLA increasing (5.0 ± 3.5 mm Hg,  $p = 0.20$ ) after supplementation and VA decreasing (-3.6 ± 15.8 mm Hg,  $p = 0.57$ ) after supplementation
- No changes in diastolic blood pressure were observed between groups ( $p = 0.15$ ).
- No changes were observed for any markers evaluated as part of a complete blood count and comprehensive metabolic panel.

## Results

### Lactate Concentration

- Lactate levels assessed before ( $p = 0.96$ ), immediately after ( $p = 0.89$ ), and 5 minutes ( $p = 0.99$ ) after exercise performance were similar between the two supplementation groups
- Immediate post-exercise lactate levels for subject VP03 were unreasonably high (21.7 mM) during condition B. When these values were removed, **a tendency in the *Veillonella* group for lactate to increase ( $p = 0.09$ ) from baseline was observed.**

Figure 3: Lactate Concentrations



## Summary

VA maintained endurance performance that tended to decline in PLA group with no differences in lactate concentrations. VA supplementation for 14 days was well tolerated with tendencies for heart rate and systolic blood pressure to improve with no observed differences in clinical markers of safety.

### Acknowledgements

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