Journal of Science & Cycling
Breakthroughs in Cycling & Triathlon Sciences

OPEN ACCESS

Conference Abstract

Post-Exercise Ketone Supplementation Improves Endurance Performance and Mitochondrial Adaptations During an 8-Week Endurance Training Intervention

Ruben Robberechts [1,*], Youri Bekhuis [2], Myrthe Stalmans [1], Wout Lauriks [1], Guido Claessen [3], and Chiel Poffé [1]

[1] Exercise Physiology Research Group, Department of Movement Sciences, KU Leuven, Leuven, Belgium.
[2] Department of Cardiovascular Sciences, Cardiology, KU Leuven, Leuven, Belgium.
[3] Faculty of Medicine and Life Sciences, Cardiology and Organ Systems, University of Hasselt, Hasselt, Belgium.

* Correspondence: (RR) ruben.robberechts@kuleuven.be

Received: 29 February 2024 **Accepted:** 6 March 2024 **Published:** 10 August 2024

Abstract

Introduction: We previously showed that post-exercise ketone supplementation (PEKS) suppresses the development of overtraining symptoms, stimulates muscular adaptations, and improves endurance performance during endurance overload training. However, it is unclear whether PEKS also improves endurance performance and promotes training adaptations during well-balanced training.

Methods: Therefore, 28 well-trained active males were enrolled in an 8-week fully supervised cycling training intervention. Throughout the training program, participants received post-exercise and before sleep either 25g of the ketone ester (R)-hydroxybutyl (R)-hydroxybutyrate (KE, n = 14), or an isocaloric placebo drink (CON, n = 14). Outcome parameters included exercise performance, along with muscular and cardiac adaptations and were evaluated before (PRE), after week 3 (MID) and 7 (POST), and following a taper week ($POST_{+1week}$).

Results: The training intervention improved 30-minute time trial performance (TT_{30min}), absolute and relative whole-body oxygen uptake (VO_2max), peak power output during the VO_2max test (PPO_{VO2max}), citrate synthase activity, and peak cardiac output (all $p < 0.05$ for PRE vs. POST). However, TT_{30min} (CON: 291 ± 27 W vs. KE: 302 ± 28 W, $p < 0.001$) and PPO_{VO2max} (CON: 457 ± 43 W vs. KE: 473 ± 41 W, $p = 0.091$) were 3.5% higher in KE compared to CON at POST. Furthermore, the relative VO_2max showed a greater increase in KE (+12%) compared to CON (+ 6%, $\Delta p < 0.001$). Citrate synthase activity was at POST 14% higher in KE (9.37 ± 1.36 $mol.h^{-1}.kg\ protein^{-1}$) compared to CON (8.21 ± 0.97 $mol.h^{-1}.kg\ protein^{-1}$, $p = 0.035$), and OXPHOS complex II muscle protein content increased only significant in KE (+25%, $p = 0.032$ vs. PRE).

Conclusion: In conclusion, these data indicate that PEKS is a potent nutritional strategy to improve endurance performance and mitochondrial adaptations during regular training.

Keywords: Endurance Training, Post-Exercise Ketone Supplementation, B-Hydroxybutyrate, Citrate Synthase, Endurance Performance