

Exercise Performance during a 5km Time-trial in Healthy College-aged Males: The Role of Redox Balance

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Abstract

The oxidant-antioxidant (redox) balance during exercise influences skeletal muscle contractility, hemodynamics, and fatigue responses. Breathing supplemental oxygen has been shown to induce an increase in free radicals, which could be detrimental to performance. Conversely, vitamin C, vitamin E, and α -lipoic acid are antioxidants known to significantly reduce circulating free radicals. The effects of altered redox balance on exercise performance remain poorly understood. Using a single blind, placebo-controlled, and counterbalanced design, this study examined the effects of increasing free radicals, via breathing 100% oxygen, and/or increasing antioxidant capacity, through consuming an antioxidant cocktail (AOC; vitamin C, vitamin E, and α -lipoic acid), on 5-kilometer (km) time-trial performance, the physiological and fatigue responses in healthy college-aged males. The AOC significantly reduced power output, economy, increased 5km time, and suppressed the ventilatory responses (VE , VE/VO_2) during the 5km time-trial. Participants in the AOC treatment experienced greater perception of fatigue as opposed to the placebo. Breathing 100% oxygen prior to the 5km time-trial had no effect on performance or the physiological responses in the AOC or placebo trials. In conclusion, our data demonstrated that an AOC could disrupt the delicate balance between pro- and antioxidant forces in a college-aged population, which can negatively impact physiological responses, economy, and performance.

Key words: Redox balance, free radicals, antioxidants, vitamin E, vitamin C, α -lipoic acid, exercise performance