Increased Blood Lactate Level Deteriorates Running Economy in World Class Endurance Athletes

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Abstract

Abstract: Hoff, J, Støren, Ø, Finstad, A, Wang, E, and Helgerud, J. Increased blood lactate level deteriorates running economy in world class endurance athletes. *J Strength Cond Res* 30(5): 1373–1378, 2016—Blood lactate accumulation is associated with development of muscle fatigue and negatively correlated to endurance performance. No research has quantified the effects of lactate presence at moderate levels of lactate accumulation. The purpose of this study was to test whether 2 moderate blood lactate concentration levels affect running economy (RE) when running at the individual lactate threshold (LT). Seven male world class endurance athletes with an average $V\dot{O}_2$max of 80.7 ± 2.7 ml·kg^{-1}·min^{-1} or 5.8 ± 0.5 L·min^{-1} participated in this study. After the $V\dot{O}_2$max test, the subjects were resting or walking and in a random order tested for RE at their LT velocity when the blood lactate level reached either 3 mmol·L^{-1} or 5 mmol·L^{-1}. After a new 5-minute exercising period at maximal aerobic velocity, the crossover lactate value RE testing was performed. Running economy was significantly ($p ≤ 0.05$) deteriorated from 0.668 ± 0.044 to 0.705 ± 0.056 ml·kg$^{-0.75}$·m^{-1} or 5.5% ($p ≤ 0.05$) for blood lactate level of 3 mmol·L^{-1} compared with 5 mmol·L^{-1}, respectively. Increased lactate level from 3 to 5 mmol·L^{-1} is thus accompanied by deteriorated RE at LT running velocity. The deteriorated RE at moderate levels of lactate concentration emphasizes the importance of avoiding intensities above LT in the early parts of a dominantly aerobic endurance competition. It also emphasizes the importance of a high $V\dot{O}_2$max for aerobic endurance athletes and may partly explain the $V\dot{O}_2$ slow component as impaired RE.