Estimation of accumulated oxygen deficit from accumulated blood lactate concentration during supramaximal running in middle-distance runners

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Abstrak

The maximal accumulated oxygen deficit (MAOD), which is the gold standard for anaerobic energy metabolism capacity, requires multiple tests for evaluation that impose a heavy load on subjects. The maximal accumulated blood lactate (AbLa) concentration is also a measure of anaerobic energy metabolism capacity, and is related to the accumulated oxygen deficit (AOD). Thus, AOD has been estimated by using AbLa (3.0 mL02 * kg-1 * mM"1), but it is unclear if this coefficient is suitable for measurement of supramaximal running of athletes. The purpose of this study was to clarify the estimated expression of AOD by using AbLa from the relationship between MAOD and AbLa during supramaximal running in middle-distance run¬ners. Eleven male middle-distance runners (800m running velocity: 425.3 ± 7.3 m-min'1) took part in this study. They performed three running tests (maximal, submaximal and supramaximal running test) to evaluate MAOD and AbLa. MAOD and AbLa were 56.6 ± 6.0 mL02 * kg'1 and 9.9 ± 1.1 mmolL'1, respectively. We observed a significant positive relationship between MAOD and AbLa (r = 0.73); the regression line equation was y = 3.58x + 18.6. Results showed that the AOD per mM of the AbLa of athletes was 3.58 mL02*kg 1, which was 19% higher than the conventional coefficient value.