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Research article

Indirect Determination of Lactate Minimum Speed from a Single Maximal Performance in Young Swimmers

Paulo V. Mezzaroba, Fabiana A. Machado

ABSTRACT

This study aimed to generate equations for the indirect determination of lactate minimum (LM) intensity from short-distance maximal performances in 10- to 17-year-old swimmers. Seventy-one male (n = 41) and female (n = 30) competitive swimmers were divided into subgroups: one to generate predictive equations for LM (~70% of the sample), and the second to cross-validate the proposed equations (~30% of the sample). All participants swam maximally short-distance using front crawl stroke, and mean speed of the 100 (S100), 200 (S200), and 400 m (S400) performances were calculated in $m \cdot s^{-1}$. The LM protocol was measured after an 8 min of passive recovery from the S200, consisting of five progressive 200 m performances (~80%, 84%, 88%, 92%, and 96% of S200). Multiple linear regressions generated predictive equations for LM from single performances (S100, S200, and S400), also considering as independent variables age, pubic hair index, body mass, height, and body fat. The relationships between variables were examined using standard error of estimate (SEE). Nevertheless, age, biological maturation and anthropometric variables did not contribute to explain LM. Further, for both genders, S200 was the best predictor for LM, contributing to 95% of LM variation in males and 81% in females. The generated equations were: "LM = 0.24 + 0.67 × S200" (adjusted R^2 = 0.95; SEE = 0.03 $m \cdot s^{-1}$) for boys and "LM = 0.13 + 0.79 × S200" (adjusted R^2 = 0.81; SEE = 0.03 $m \cdot s^{-1}$) for girls. The predicted LM did not differ from the measured LM during cross-validation analysis. A single performance was found to be a valid LM predictor in 10- to 17-year-old swimmers regardless of gender, age and biological maturation. Thus, this is a

practical, non-invasive, and economical alternative to estimate the aerobic capacity in young swimmers.

Key words: sexual maturation, anaerobic threshold, children, adolescents, swim

Key Points

- LM can be estimated from a single maximal swimming performance for boys and girls, regardless age, sexual maturity, anthropometrical and body composition parameters.
- For boys, S200 was the best LM predictor (LM = 0.24 + 0.67 x S200), explaining 95% of LM variation with great cross validation parameters.
- For girls, S200 was also the best LM predictor (LM = 0.13 + 0.79 x S200), explaining 81% of LM variation with great cross validation parameters.