RELATIONSHIPS BETWEEN SOME WELL KNOWN INDICATORS OF AEROBIC RESISTANCE OF SWIMMERS

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The concept of the anaerobic threshold (AT) at swimming velocity corresponding to 4 mmol.l-1 blood lactate concentrations (v4), introduced by Mader et al. (1976) and further developed by following authors, was used by a large number of scientists and swimming coaches for training and diagnostic purposes. Although it's considered a good indicator of aerobic capacity of swimmers, some authors disagree of that fixed value, arguing that the individual AT varies a lot, namely between 2 and 5 mmol.l-1 (Madsen e Lohberg, 1987). The purpose of this study is to verify the adequacy of the v4 in swimming, comparing it with two other valid indicators of the AT: critical velocity (cv) and the mean velocity of the 30 min test (vT30).

Subjects were 30 juvenile swimmers of the Porto regional swimming team (with ages between 12 and 15 years). V4 was determined according to the 2 x 400m protocol, being the first repetition performed at 85% of the personal best and the second one at maximum speed (a rest period higher than 30 min was respected between repetitions). Samples of 25 µl of capillary blood were collected at 3, 5 and 7 min of recovery and analysed for blood lactate concentration with an Accusport analyser (Boheringer Manheim). CV was assessed based in the results of maximal tests of 100 e 400m and was considered as the slope of the regression line calculated between the test distances and the respective times. The ratio between the distance achieved and the duration of the test, i.e., 30 min of continuous swimming assessed the vT30.

The mean values of the different variables are presented in Table 1. These results showed that the mean values of v3, v4 and v5, cv and vT30 are very similar; only v8 is statistically different of some other parameters (v3, v4, cv and vT30). We can also see strong positive correlation ($r^3$0.91) between all the parameters (with exception of v8) regardless the stronger values between V5 and the other two tests.

Tab.1. Mean, standard deviation and correlation values of the results of: cv, vT30 and v3, v4, v5 and v8 (there weren't any means statistically different for µ=0.05). The results are expressed in m.s-1. N=30.

	V3 / CV		V3 / VT30		V4 / CV		V4 / VT30		V5 / CV		V5 / VT30		V8 / CV		V8 / VT30	
Mean ± standard deviation	1.23 ± .13	1.26 ± .12	1.23 ± .13	1.22 ± .11	1.25 ± .12	1.26 ± .12	1.25 ± .12	1.22 ± .11	1.27 ± .12	1.26 ± .12	1.27 ± .12	1.22 ± .11	1.33 ± .12	1.26 ± .12	1.33 ± .12	1.22 ± .11
Correlation (r)	0.91		0.92		0.96		0.95		0.98		0.97		0.91		0.87	

The strong positive correlation values between v4 and cv and between v4 and vT30 are already present in the specialised literature (cf. Wakayoshi et al, 1992c and Fernandes, 1999). Nevertheless, we never found stronger relationships between v5 and cv and between v5 and vT30. These results seem to indicate that the swimming velocity corresponding to 5 mmol.-1 lactate is a better indicator of AT. Nevertheless it is also possible to refer that CV and VT30 may over-estimate AT.

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