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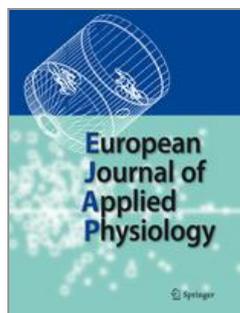
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Energy cost and intracyclic variation of the velocity of the centre of mass in butterfly stroke

Abstract

The purpose of this study was to examine the relationship between the intra-cycle variation of the horizontal velocity of displacement (dV) and the energy cost (EC) in butterfly stroke. Five Portuguese national level swimmers performed one maximal and two sub-maximal 200-m butterfly swims. The oxygen consumption was measured breath-by-breath by portable metabolic cart. A respiratory snorkel and valve system with low hydrodynamic resistance was used to measure pulmonary ventilation and to collect breathing air samples. Blood samples from the ear lobe were collected before and after each swim to analyse blood lactate concentration. Total energy expenditure (E_{tot}) and EC were calculated for each swim. The swims were videotaped in the sagittal plane with a set of two cameras providing dual projection from both underwater and above the water surface. The APAS system was used to analyse dV for the centre of mass. The E_{tot} increased linearly with the increasing V , presenting a significant correlation coefficient between these parameters ($r = -0.827$, $P < 0.001$). The increase in EC was significantly associated with the increase in the dV ($r = 0.807$, $P < 0.001$). All data were presented as the mean value and the standard deviation. It is concluded that high intra-cycle variation of the velocity of the centre of mass was related to less efficient swimming and vice versa for the butterfly stroke.



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