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An energy balance of the 200 m front crawl race.

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Abstract

The purpose of the present study was to determine the relative contribution of the aerobic (Aer), anaerobic lactic (AnL) and alactic (AnAl) energy sources during each of the four laps of a 200 m front crawl race. Additionally, energy cost (C) and arm stroke efficiency were also computed. Ten international swimmers performed a 200 m front crawl swim, as well as 50, 100, and 150 m at the 200 m pace. Oxygen consumption was measured during the 200 m swim and blood samples were collected before and after each swim; the C of swimming was calculated as the ratio of E (tot) to distance (where $E(\text{tot}) = \text{Aer} + \text{AnL} + \text{AnAl}$). Arm stroke efficiency was calculated by kinematic analysis as the speed of center of mass to the ratio of 3D hand speed. For the 200 m the contributions were 65.9% (Aer), 13.6% (AnL), and 20.4% (AnAl) whereas for each lap they were 44.6, 73.2, 83.3 and 66.6% (Aer), 14.1, 5.0, 4.4 and 28.1% (AnL) and 41.3, 21.8, 12.3 and 5.2% (AnAl) for the four laps, respectively. For the 200 m as a whole C was 1.60 kJ m⁻¹ whereas C = 1.71, 1.56, 1.44 and 1.70 kJ m⁻¹ for each consecutive lap, respectively. Arm stroke efficiency ranged from 0.40 to 0.43 and was significantly lower in the last lap as compared to the first ($P = 0.002$), suggesting the occurrence of fatigue. The decrease in arm stroke efficiency was mirrored by an increase in C as can be expected on theoretical grounds.

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Publication Types, MeSH Terms

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