Evaluation of the Energy Expenditure in Competitive Swimming Strokes.

Barbosa, T.M.¹ email: barbosa@ipb.pt; Fernandes, R.²; Keskinen, K.L.³; Colaco, P.⁴; Cardoso, C.⁵; Silva, J.⁶; Vilas-Boas, J.P.⁷

Source:

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Abstract:
The purpose of this study was to measure and compare the total energy expenditure of the four competitive swimming strokes. Twenty-six swimmers of international level were submitted to an incremental set of 200-m swims (5 swimmers at Breaststroke, 5 swimmers at Backstroke, 4 swimmers at Butterfly and 12 swimmers at Freestyle). The starting velocity was approximately 0.3 m.s⁻¹ less than a swimmer's best performance and thereafter increased by 0.05 m.s⁻¹ after each swim until exhaustion. Cardio-pulmonary and gas exchange parameters were measured breath-by-breath (BxB) for each swim to analyze oxygen consumption (VO₂) and other energetic parameters by portable metabolic cart (K4b2, Cosmed, Rome, Italy). 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 analyze blood lactate concentration (YSI 1500 L, Yellow Springs, Ohio, USA). Total energy expenditure (Etot), was calculated for each 200-m stage. Etot differed significantly between the strokes at all selected velocities. At the velocity of 1.0 m.s⁻¹ and of 1.2 m.s⁻¹ the Etot was significantly higher in Breaststroke than in Backstroke, in Breaststroke than in Freestyle and in Butterfly than in Freestyle. At the velocity of 1.4 m.s⁻¹, the Etot was significantly higher in Breaststroke than in Backstroke, in Breaststroke than in Freestyle and in Butterfly than in Freestyle. At the velocity of 1.6 m.s⁻¹, the Etot was significantly higher in Breaststroke and in Butterfly than in Freestyle. As a conclusion, Etot of well-trained competitive swimmers was measured over a large range of velocities utilizing a new BxB technique. Freestyle was shown to be the most economic among the competitive swimming strokes, followed by the Backstroke, the Butterfly and the Breaststroke.

[ABSTRACT FROM AUTHOR]

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**Author Affiliations:**
1 Department of Sports Sciences, Polytechnic Institute of Braganca, Braganca, Portugal; 2 Faculty of Sports Sciences, University of Porto, Porto, Portugal; 3 Finnish Society for Research in Sport and Physical Education, Helsinki, Finland; Department of Biology of Physical Activity, University of Jyvaskyla, Jyvaskyla, Finland; 4 Faculty of Sports Sciences, University of Porto, Porto, Portugal; 5 Faculty of Sports Sciences, University of Porto, Porto, Portugal; 6 Faculty of Sports Sciences, University of Porto, Porto, Portugal; 7 Faculty of Sports Sciences, University of Porto, Porto, Portugal

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