determine the differences between swimmers.
DISCUSSION & CONCLUSION However, the records show a clear behavioral similarity compared the result with a general pattern of the butterfly technique. Conclusion: As we can see that the potential quality of this instrument is evident by the patterns obtained from a temporal sequence.
KEY WORDS Technical Analysis, Patterns, Butterfly, Chronology

Kinematical constrictions during breaststroke swimming with a portable gas analyzer snorkel

V. Reis [3], A.J. Silva [3], T. Barbosa [1], J. Brito [2], A. Reis [3], H. Louro [2] and A. Conceição [2]
[1] Polytechnic Institute of Bragança, Bragança, Portugal, [2] Polytechnic Institute of Santarém, Santarém, Portugal, [3] University of Trás-os-Montes and Alto Douro, Vila Real, Portugal

OBJECTIVE To determine the kinematical constrictions in maximal breaststroke swimming bouts with the AquaTrainer® snorkel (Cosmed, Rome, Italy).
METHODS Seven national level breaststrokers performed two maximal bouts of 100-m swims (separated by 48 hours): (i) one bout connected to the AquaTrainer® snorkel (constricted swim); (ii) one bout without the snorkel (free swim). The swims were videotaped in sagittal plane with a pair of cameras providing a dual projection from both above and underwater. The study comprised kinematical analysis of stroke cycles using APAS and a VCR (f = 50 Hz). To create a single dual projection image, the independent digitalization from both cameras was reconstructed with the help of a calibration volume and a 0.01). The±2D-DLT algorithm. Digitalization reliability was high (ICC=0.97 following measures were assessed: (i) swimming performance (T100); (ii) stroke parameters (stroke cycle period, stroke rate, stroke length and mean swimming velocity); (iii) estimated swimming efficiency by the swimming index; (iv) speed fluctuation (dv) and the mathematical characterization of dv. Mean dv curves normalized to time were computed with MATLAB. The polynomial regression (7th power) between dv and normalized duration of the full stroke cycle was calculated. Wilcoxon tests were performed to compare significant differences in the dependent variables (performance, stroke mechanics and efficiency variables) according to the independent variable (free versus constricted swim) ($P \leq 0.05$).
RESULTS T100 was significantly higher for constricted swimming than in free condition (6.26%; Z=-2.366; P=0.02). The remaining variables showed no significant differences between the two swimming conditions. In both exercise conditions, dv was characterized by a bi-modal profile. The determination coefficients for the dv mathematical model were significant ($P<0.01$) and 0.47.
DISCUSSION & CONCLUSION None of the stroke mechanics and efficiency variables evaluated presented significant differences between both swimming conditions. The AquaTrainer® constrictions might be related mainly to the start and turn phases. *(Supported by FCT grant: POCI/DES/58362/2004)*
KEYWORDS Kinematical constrictions, swimming performance, stroke parameters, AquaTrainer snorkel, breakstroke

Relation between energy expenditure and time spent in physical activity and fitness in middle age adults

Marjeta Misigoj-Durakovic [1], Zijad Durakovic [2] and Maroje Soric [1]
[1] Faculty of Kinesiology University of Zagreb/1Dept. of Kinesiological Anthropology, Zagreb, Croatia, [2] Institute for Anthropological Research/Dept. of Medical Anthropology, Zagreb, Croatia

OBJECTIVE Physical fitness is often considered as a good measure of individual physical activity. The aim of the study was to assess the relations between energy expenditure and time spent in physical activity of different intensities and aerobic fitness indicators in adults.
METHODS In the sample consisted of employed urban living adults (31 men and 20 women aged 40±3.7 years). Relation between energy expenditure and time spent in physical activity (PA) and fitness were analyzed. Energy expenditure (EE)-total relative EE (TEErel) and relative EE during PA (AEErel), and the time spent sedentary and in low (1.5-3MET) moderate (3-6MET) and high (> 6MET) intensity PA was measured by combined system Sense Wear Armband™ (Body Media, Pittsburgh, PA) during seven consecutive days. Aerobic fitness indicators – maximal oxygen uptake (VO_2maxrel), aerobic threshold ($V0_2$AT) and anaerobic threshold (VO_2AnT) were determined during direct treadmill spiroergometric testing using K4 Cosmed equipment.
RESULTS To reveal the relations between EE and aerobic fitness indicators Pearson's partial correlations controlled for gender were calculated. The results showed significant positive correlations between the EE indicators (total and EE