

**The validity of combining activity record and accelerometry to measure free-living total energy expenditure in female endurance runners**

Asumi Yoshida<sup>1,2</sup>, Kazuko Ishikawa-Takata<sup>2</sup>, Naoto Suzuki<sup>3</sup>, Motoko Taguchi<sup>4</sup>,  
Shigeho Tanaka<sup>4,5</sup>, Mitsuru Higuchi<sup>4</sup>

<sup>1</sup>Graduate School of Sport Sciences, Waseda University

<sup>2</sup>Department of Nutritional Education, National Institute of Health and Nutrition

<sup>3</sup>Faculty of Contemporary Policy Studies, Josai University

<sup>4</sup>Faculty of Sport Sciences, Waseda University

<sup>5</sup>Department of Nutritional Science, National Institute of Health and Nutrition

We tried to prove the validity of new approach combining activity recording and accelerometry to assess total energy expenditure (TEE) in athletes. Eight female endurance runners participated in this study. TEE over 8 days in regular training season was measured by the doubly labeled water (DLW) method. As the combined method, activity record based on the rating of perceived exertion (RPE) was used to estimate energy expenditure (EE) during training period, and tri-axial accelerometer was used to evaluate EE during non-training time over the TEE measurement period by the DLW method. Training EE was calculated from subjects' individual RPE-VO<sub>2</sub> relations provided by exercise tolerance test. Resting metabolic rate (RMR) was measured using indirect calorimetry. There were no

significant differences in TEE, activity-induced EE (AEE) and physical activity level (PAL; TEE / RMR) between the DLW method and the combined method (TEE, 3032 ± 344 kcal/day vs. 2995 ± 498 kcal/day; AEE, 1585 ± 303 kcal/day vs. 1552 ± 439 kcal/day; PAL, 2.68 ± 0.37 vs. 2.64 ± 0.46; respectively). Significant positive correlations and no systematic errors were observed in AEE and PAL. Intra-class correlation coefficients were high (TEE, 0.829 (p = 0.003); AEE, 0.822 (p = 0.003); PAL, 0.864 (p = 0.001); respectively). These findings suggest that the combined method has high validity against the DLW method. Thus, the combined method would be available to estimate free-living TEE in regular training season for female endurance runners.