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Evaluation of a Commercial Accelerometer (Tritrac-R3 D) to Measure Energy Expenditure During Ambulation

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Abstract

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This study evaluated the ability of a commercially available accelerometer (Tritrac-R3 D) to measure energy expenditure in 16

subjects at rest (pre- and post-exercise) and during three different intensities of steady-state exercise (40-70 % of peak oxygen consumption [VO₂peak]) while ambulating on a treadmill (no grade). Oxygen consumption and the respiratory exchange ratio from indirect calorimetry and the vector magnitude of triaxial accelerations were used to estimate energy expenditure using the manufacturers equations. There was a significant relationship between indirect calorimetry-derived energy expenditure and the energy expenditure derived from the accelerometer ($r = 0.96$). Using analysis of variance, there was no difference in the energy expenditure derived by the two methods at rest before exercise and during the three different intensities of ambulatory exercise. There was a significant difference between energy expenditure derived via indirect calorimetry and with the accelerometer during rest after exercise, probably due to the failure of the accelerometer to accurately estimate the energy expenditure associated with the progressive decline in post-exercise oxygen consumption. Thus, this commercially available accelerometer appears to provide statistically acceptable estimates of energy expenditure at rest and during zero-grade treadmill ambulation up to about 70 % VO₂peak. This may indicate its acceptable utility for large-scale population studies of physical activity involving this mode of movement. The failure of the accelerometer to accurately estimate energy expenditure during recovery from exercise may contribute to an underestimation of energy expenditure in some physically active individuals.



Key words

Physical activity - metabolism - exertion - fitness

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