

Publication

Accuracy of ventilatory measurement employing ambulatory inductive plethysmography during tasks of everyday life

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Ambulatory inductive plethysmography (AIP) has recently been introduced to permit monitoring of ventilation outside the clinic and laboratory. It provides a method for noninvasive assessment of both timing (e.g. respiration rate; RR) and volumetric parameters (e.g. tidal volume and minute ventilation volume; $V(T)$ and $V'(E)$, respectively). Although inductive plethysmography has been validated in laboratory investigations, quantitative validation during ambulatory, naturalistic conditions has not yet been assessed. Should AIP yield accurate estimation of ventilatory parameters, real-life monitoring of breathing pattern may provide new insights into respiratory functioning in health and disease. We examined the accuracy of AIP for assessing RR, $V(T)$ and $V'(E)$ during a 90-min protocol simulating activities of everyday life. A mobile backpack metabolic cart with integrated flowmeter was employed as the reference standard. Within- and between-participant minute-by-minute comparisons were made for each ventilatory measure among 9 healthy adults. Average within-participant minute-by-minute correlations between reference method and AIP were 0.96, 0.91 and 0.92 for $V'(E)$, $V(T)$ and RR, respectively. Average correlations across participants yielded r 's of 0.98, 0.98 and 1.0. Analysis of mean task levels across participants revealed, in all cases, very close correspondences between both methods of measurement, with only a significant but minor deviance during a period of supine posture. Additionally, results indicated that within-individual variations in oxygen consumption were highly correlated with AIP-estimated $V'(E)$, suggesting that ambulatory assessment of $V'(E)$ may provide a reliable index of metabolic activity during everyday life.

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