An evaluation of a handheld indirect calorimeter against a standard calorimeter in obese and nonobese adults.

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Abstract
BACKGROUND:
Handheld indirect calorimetry has the potential to allow simple and inexpensive measurement of resting metabolic rate in spontaneously breathing people. However, validation work on these devices is contradictory. The purpose of the current study was to determine the bias and level of agreement of oxygen consumption and resting metabolic rate as measured by a handheld indirect calorimeter against a standard open-circuit indirect calorimetry cart.

MATERIALS AND METHODS:
One hundred community-living, spontaneously breathing, ambulatory nonobese and obese adults were studied in single sessions by a single investigator. Sequential measurements were undertaken using the handheld indirect calorimeter and the standard metabolic cart. Measurement sequence was varied randomly.

RESULTS:
The mean value for oxygen consumption and metabolic rate of the 2 devices was not significantly different. However, agreement between the 2 devices was only 43% in nonobese and obese participants, and there was proportional and fixed bias, with the handheld calorimeter tending to produce a higher value for oxygen consumption and resting metabolic rate. Limits of agreement for resting metabolic rate between the 2 calorimeters were -240 to +300 kcal/d.

CONCLUSIONS:
Measurements of resting metabolic rate by the handheld indirect calorimeter tested in this study are not equivalent to measurements by standard indirect calorimetry.

KEYWORDS:
calorimetry, indirect, energy metabolism, validation studies