

MOXUS VALIDATIONS

Rosdahl H, Lindberg T, Edin F, Nilsson J. The Moxus Modular metabolic system evaluated with two sensors for ventilation against the Douglas bag method. *Eur J Appl Physiol.* 2013 May;113(5):1353-67. doi: 10.1007/s00421-012-2551-1. Epub 2012 Dec 7. PMID: 23224357.

ABSTRACT

This study evaluated the Moxus metabolic system with the Douglas bag method (DBM) as criterion. Reliability and validity were investigated in a wide range of ventilation and oxygen uptake and two sensors for determining ventilation were included. Thirteen well-trained athletes participated in one pre-test and four tests for data collection, exercising on a cycle ergometer at five submaximal powers (50-263 W) and at VO_2max . Gas exchange variables were measured simultaneously using a serial setup with data collected on different days in an order randomized between Moxus with pneumotachometer (MP) and turbine flowmeter (MT) sensors for ventilation. Reliability with both sensors was comparable to the DBM. Average CV (%) of all exercise intensities were with MP: 3.0 ± 1.3 for VO_2 , 3.8 ± 1.5 for VCO_2 , 3.1 ± 1.2 for the respiratory exchange ratio (RER) and 4.2 ± 0.8 for V E. The corresponding values with MT were: 2.7 ± 0.3 for VO_2 , 4.7 ± 0.4 for VCO_2 , 3.3 ± 0.9 for RER and 4.8 ± 1.4 for V E. Validity was acceptable except for small differences related to the determination of ventilation. The relative differences in relation to DBM at the powers including VO_2max were similar for both sensors with the ranges being: +4 to -2 % for V E, +5 to -3 % for VO_2 and +5 to -4 % for VCO_2 while RER did not differ at any power. The Moxus metabolic system shows high and adequate reliability and reasonable validity over a wide measurement range. At a few exercise levels, V E differed slightly from DBM, resulting in concomitant changes in VO_2 and VCO_2 .

Medbø, Jon & Mamen, Asgeir & Beltrami, Fernando. (2012). Examination of the Moxus Modular Metabolic System by the Douglas-bag technique. *Applied physiology, nutrition, and metabolism = Physiologie appliquée, nutrition et métabolisme.* 37. 860-71. 10.1139/h2012-056.

ABSTRACT

The purpose of this study was to examine the performance of the Moxus Modular Metabolic System from AEI Technologies, Inc. using the Douglas-bag method as reference. To achieve this, eight moderately trained subjects cycled for 5 min at constant powers from 50 to 300 W in increments of 50 W. The O_2 uptake was measured simultaneously by both systems during the last minute of each stage. The O_2 uptake reported by the Moxus system was $83 \pm 78 \text{ mL}\cdot\text{min}^{-1}$ higher (mean \pm SD; $\approx 3\%$, $+62 \mu\text{mol}\cdot\text{s}^{-1}$, $P < 0.001$) than that reported by the Douglas-bag method; the bias varied by $\approx 2\%$ between the subjects. The higher O_2 uptake of the Moxus system was a consequence of $1.4\% \pm 3.0\%$ higher reported ventilation and $2\% \pm 3\%$ higher reported O_2 extraction per volume of air breathed. The respiratory exchange ratio (R value) reported by the Moxus system rose proportionally to that of the Douglas-bag

method and was $1\% \pm 2\%$ higher for the range examined (0.75-1.10). Repeated tests of the maximal O_2 uptake showed a variability (coefficient of variation) of 2.5%. The study concluded that measurements by the Moxus system showed some bias and residual variation and, in addition, some systematic differences between the subjects in the O_2 uptake. The R value was reported quite accurately with moderate random error. Although there were some computer software and hardware instability problems that need to be solved, the Moxus system worked quite well and provided data more reliable than those of most commercial instruments.