Introduction: Technological advances have contributed to the development of portable metabolic systems (1). As a new online metabolic analysis system becomes available, information on its performance, particularly of its validity and reliability is essential (2). However, limited knowledge is available about the validity and reliability of the measurements produced by a number of these commercially available systems (3). A recently-introduced online metabolic measuring system (Innocor, Innovision, Denmark) has only limited data available on the reliability and validity of metabolic measurements. The purpose of this study was to assess the reliability (consistency and agreement) between gas exchange variables measured by the Innocor and an alternative online metabolic system (CardiO2, Medical Graphics Corp., St Paul, MN, USA) during an incremental exercise test. Methods: After obtaining local ethical approval and informed consent, 15 healthy subjects (34 ± 11 years) performed an incremental exercise test to volitional fatigue using the Bruce protocol. In order to make direct comparison, the Innocor mouthpiece was attached into the flow meter of the CardiO2 using a five centimetre long flexible tube. Metabolic data were analysed during the last 30 seconds of each stage and at peak exercise. Results: There was a non-significant difference (p>0.05) between the two systems in estimation of oxygen consumption (VO2) and in measured minute ventilation (Ve). Mean Cronbach's alpha for VO2 and Ve was 0.94 and 0.92. The Bland-Altman analysis revealed that limits of agreement were 7.18 to -7.17 ml.kg⁻¹.min⁻¹ and 0.55 to -52 l.min⁻¹ for VO2, and 13.09 to -12.60 l.min⁻¹ for Ve. Carbon dioxide production (VCO2) and consequently respiratory exchange ratio (RER) measured by the Innocor were significantly lower (p<0.05) through all stages. At peak exercise the difference of 7.5% was not statistically different (p>0.05), while the RER value remained significantly different (p<0.05). The CardiO2 measured fraction of expired carbon dioxide (FeCO2) significantly higher (p<0.05) through all exercise stages. Conclusion: The differences in estimated VCO2 are due to a systematic overestimation in FeCO2. Although there were non significant differences in estimated VO2 and measured Ve between the Innocor and the CardiO2, the limits of agreement appear to be wide and unacceptable in exercise testing. Therefore, the Innocor can not be replaced by the CardiO2 system without affecting the diagnosis of an individual patient.

References:

Keywords: Testing, Breath-by-Breath, Technology