TACSM Abstract

Comparisons of Portable Metabolic Sensors During Outdoor Cycling

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ABSTRACT

Wearable technology has increased in prevalence and in the ability to monitor health related data. Additionally, the ability to record training data through various sensors has become essential in developing highly personalized training programs. Metabolic measurements have typically been confined to laboratory settings, but portable metabolic carts make the collection of these metrics in real world conditions possible. **PURPOSE**: The purpose of this study was to compare measurements of VO_2 from two different portable metabolic carts, a new consumer focused cart (A) and a research grade cart (B), in outdoor cycling under steady state conditions. **METHODS**: A total of 10 participants were included in the study. All participants were recreationally trained cyclists who had track racing experience. Participants completed a ramped VO_2max test with lactate sampling from capillary blood at one minute intervals. Lactate threshold (LT) was estimated as the first stage prior to an increase of >1 mmol in lactate concentration. Participants later completed six 10-minute intervals in a pairwise manner at 50, 70, and 85% of their power at LT on an outdoor velodrome. Expired gasses during these intervals were analyzed by two different portable metabolic carts (A&B). Data from approximately 6-9 min of each interval were averaged. Comparisons between the two devices were made using paired t-tests. **RESULTS**: Average age of participants was 44.3 ± 3.01 years and VO_2max was 51.56 ± 2.74 ml/kg/min. Cart A was unable to capture enough data when cycling at 50% of LT and therefore no comparisons were possible. There were significant differences ($p<0.001$) in absolute VO_2 (1890.0 ± 245.1 mL/min vs. 2627.3 ± 262.0 mL/min) between carts A&B respectively when cycling at 70% of LT. Additionally, there were significant differences ($p<0.001$) in absolute VO_2 (2269.9 mL/min ± 362.3 vs. 3069.3 ± 317.5 mL/min) between carts A&B respectively when cycling at 85% of power at LT. **CONCLUSION**: Measurements of VO_2 while cycling in an outdoor environment may not be consistent across devices.