

Stationary roller versus velodrome for maximal cycling test: a comparison

João Brito, Luis Lopes, Ana Conceição, Aldo M. Costa, Hugo Louro

Abstract

The present study aimed to compare the acute cardiorespiratory responses of elite cyclists to a maximal progressive exercise carried out in two different conditions: in a laboratory (using a braked roller) and in an uncovered velodrome. In both testing conditions, ten elite male cyclists (age, 22.3 ± 3.9 years) performed a maximal discontinuous progressive test of 6 minutes per level with 150 W of initial load and increasing 50 W at each level until exhaustion. The heart rate and the ventilation parameters were measured breathbybreath using a portable metabolic cart gas analysis system with telemetry data transmission.

In the first 4 levels of effort, no significant differences were found between the two test conditions regarding VO_2 , ($p=0.193$), heart rate ($p=0.973$) and pedaling cadence ($p=0.116$). Comparing the maximum values achieved by each athlete in both exercise conditions, significant differences were found for heart rate ($p=0.008$) and pedaling cadence ($p=0.005$) but not for VO_{2max} and peak power. Each variable showed a strong correlation between both assessments (VO_2 , $r=0.984$, $p=0,000$; heart rate, $r=0.944$, $p=0.005$; pedaling cadence, $r=0.900$, $p=0.014$).

The amount of variability explained by the linear regression model for both cardiorespiratory parameters also showed a good fit value close to one (VO_{2max} , $r^2=0.968$; heart rate, $r^2=0.892$). Our results suggest that identical cycling protocols conducted in different testing conditions with the same bike leads to equivalent performance but significantly different pedaling cadence and heart rate responses.