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Metabolic Profile in Badminton Match Play

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INTRODUCTION:
The intermittent nature of badminton suggests high involvement of anaerobic energy supply [2]. However, recent research showed that energy supply of match play might be predominantly aerobic [1]. To clarify the physiological requirements in badminton the present study aimed to analyse the metabolic profile using two different calculation models based on PCr-La-O2 method.
METHODS:
7 internationally ranked badminton players (5 males: age 21.2 ± 2.3 y, height 184 ± 7 cm, body mass 77.4 ± 9.8 kg; 2 females: age 18.5 ± 0.7 y, height 172 ± 11 cm, body mass 67.5 ± 9.1 kg) performed two sets of 15 min match play under training conditions. Rally and rest times, oxygen uptake (VO2), RER, and blood lactate concentrations (La) were obtained. Net metabolic cost (Etot) and percentage contribution to aerobic (Eaer), anaerobic alactic (Epcr), and lactic (Ela) energy supply were calculated by indirect calorimetry from VO2 and RER during exercise, fast component of postexercise oxygen kinetics (EPOC) and net La. The continuous model (con) considered replenishment of anaerobic energy stores only at the end of exercise. The intermittent model (int) accounted for replenishment of creatine phosphate (PCr) during the match by applying the EPOC model to each resting phase. Repeated measures ANOVA was used to compare the models.
RESULTS:
On average 91 ± 11 rallies with mean duration of 7.1 ± 0.7 s and 12.3 ± 1.9 s rest in between were observed. Mean VO2, RER and La were 36.0 ± 5.3 ml·min-1·kg-1, 0.89 ± 0.05, and 2.2 ± 1.1 mmol·l-1. Etot was 675 ± 98 J·kg-1·min-1. Comparison between models revealed significant differences for Eaer and Epcr (con: Eaer 97% ± 1%, Epcr 3 ± 1%; int: Eaer 56% ± 9%, Epcr 43 ± 9%). Ela remained below 1% for both models. No differences could be observed between the sets or male and female players.
CONCLUSION:
The study showed that selection of the underlying calculation model is crucial for the results. Consistent with a previous study, continuous model suggests that badminton is predominantly aerobic [1]. In contrast, the intermittent model revealed a considerably higher proportion of anaerobic alactic energy supply, while aerobic capacity is needed to replenish PCr stores during rest. This would be in line with general findings for metabolic profile in intermittent exercises [2]. However, since La dynamics cannot be reflected seamlessly by punctual measurements, the lactic content might be underestimated in both models.
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