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Oxygen uptake and blood lactate in full and fractionated synchronized swimming duet routines in elite swimmers

Rodríguez FA, Chaverri D, Rodríguez-Zamora L, Carrasco M, Irurtia A, Iglesias X

INEFC Institut Nacional d'Educació Física de Catalunya
Generalitat de Catalunya
Universitat de Barcelona

INTRO


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Introduction

- Synchronized swimming imposes great physiological demands by
  - intense muscular exercise
  - body position changes
  - prolonged apneas (Rodríguez-Zamora et al., PloSOne 2012)

SYNCHRO
project

Introduction

- Oxygen uptake ($\dot{V}O_2$) and blood lactate (La_b) have traditionally been used as key indicators to assess the internal load in sports
- Apneic events may have an impact on exercise metabolism
- No studies have examined $\dot{V}O_2$ or energy metabolism during competitive routines

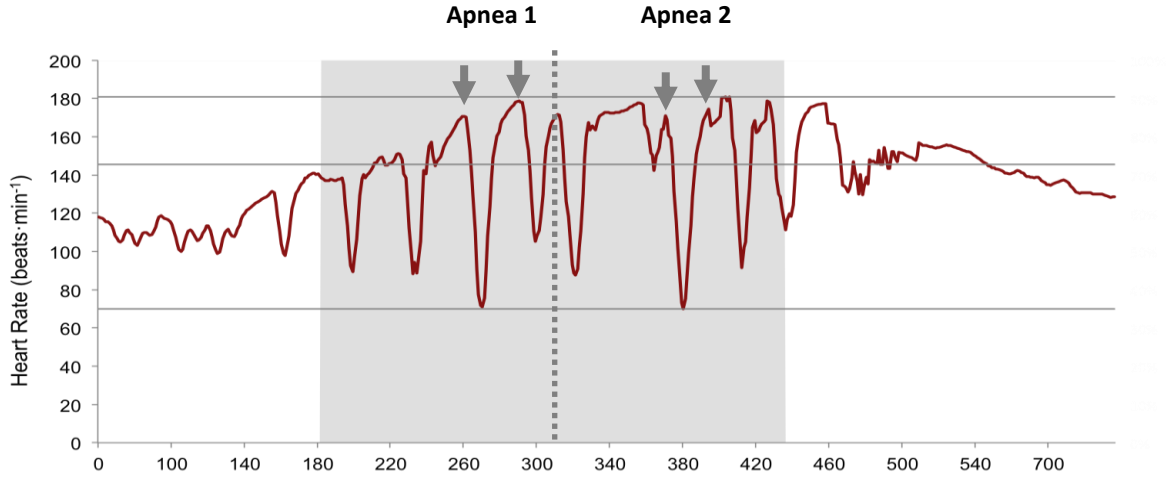

AIMS

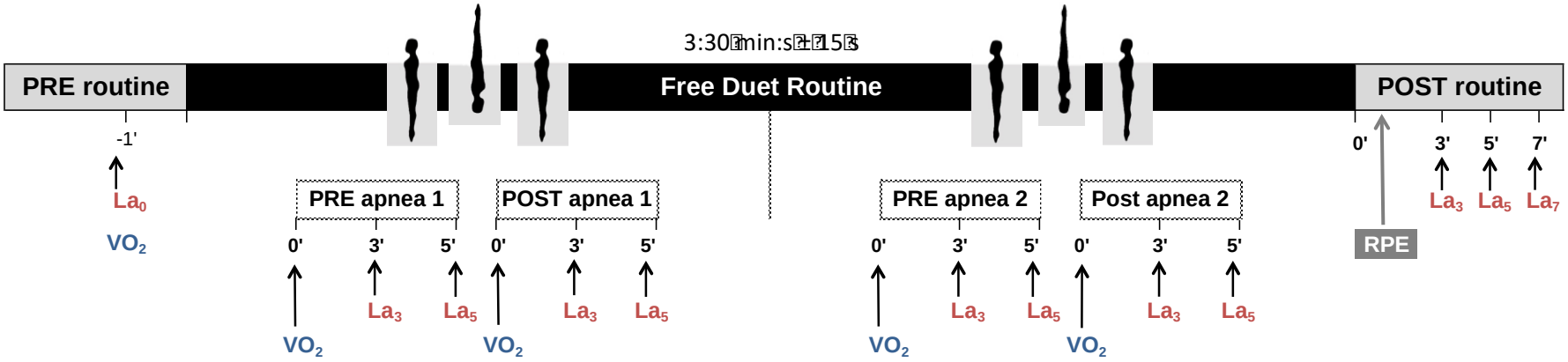
Aim

- To describe the time course of $\dot{V}O_2$ and La_b across full and fractionated competitive routines in elite swimmers
- To ascertain the effect of apneas over these metabolic parameters

METHODS

Design


Apnea 1
Apnea 2
Heart Rate (beats·min-1)
200
180
160
140
120
100
80
60
40
20
0
0
100
140
180
220
260
300
340
380
420
460
500
540
700

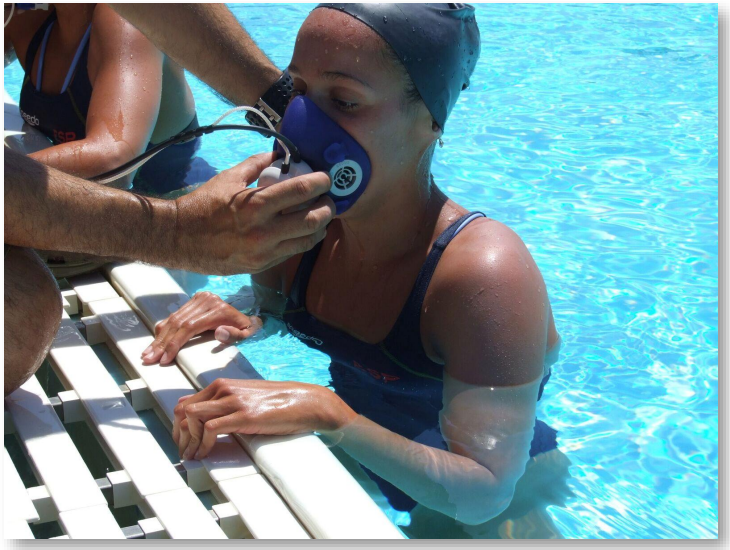

3:30 min:s 15
PRE routine
Free Duet Routine
POST routine
-1'
La0
VO2
PRE apnea 1
POST apnea 1
PRE apnea 2
Post apnea 2
0'
3'
5'
La3
La5
VO2
RPE
7'
La7


FULL
preAP1
postAP1
preAP2
postAP2

Methods

Subjects

- 16 elite senior & junior swimmers
- Age 16.5 ± 2.5 yrs
- Height 165 ± 7 cm
- Body mass 53 ± 8 kg

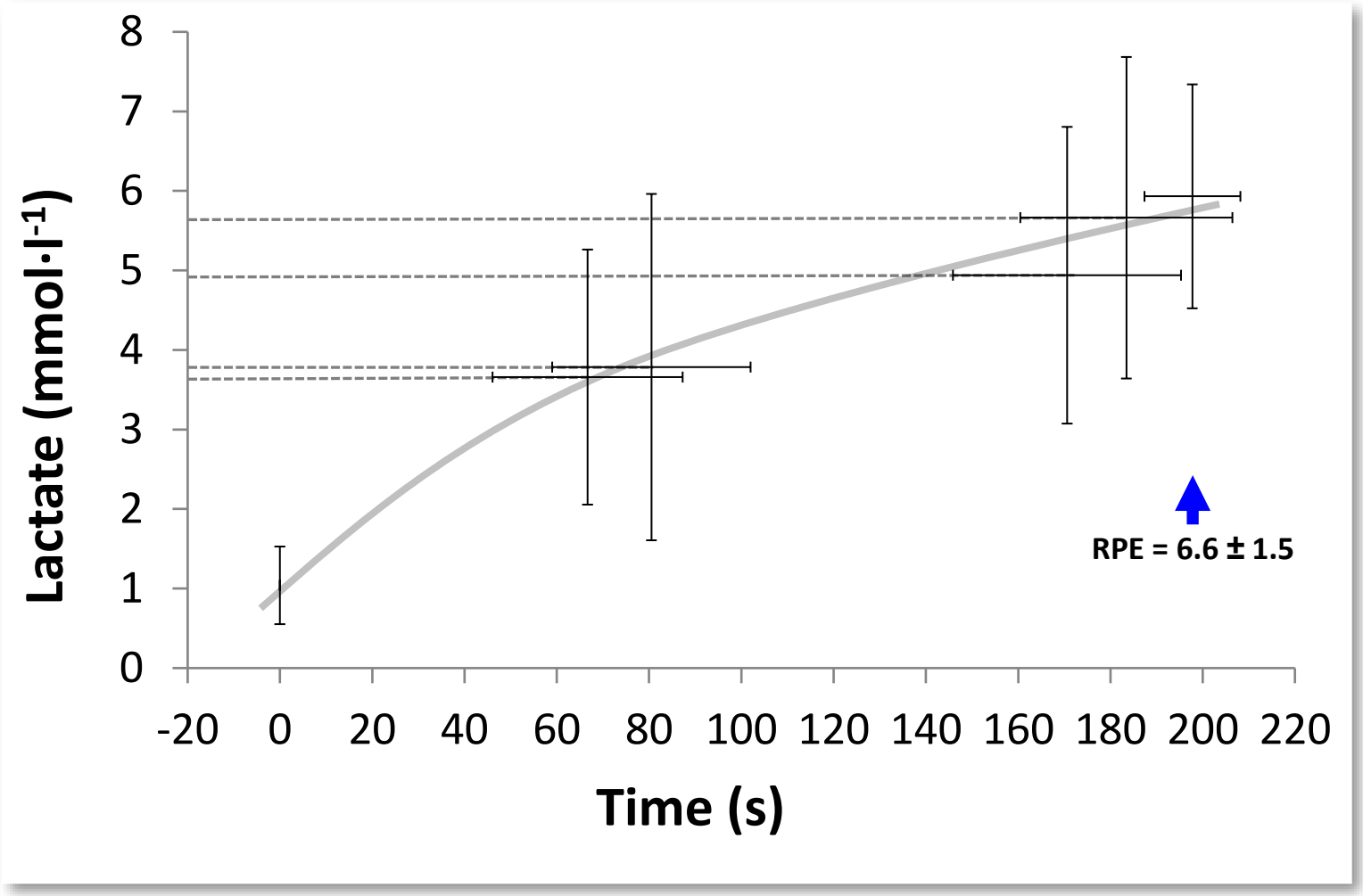


Testing

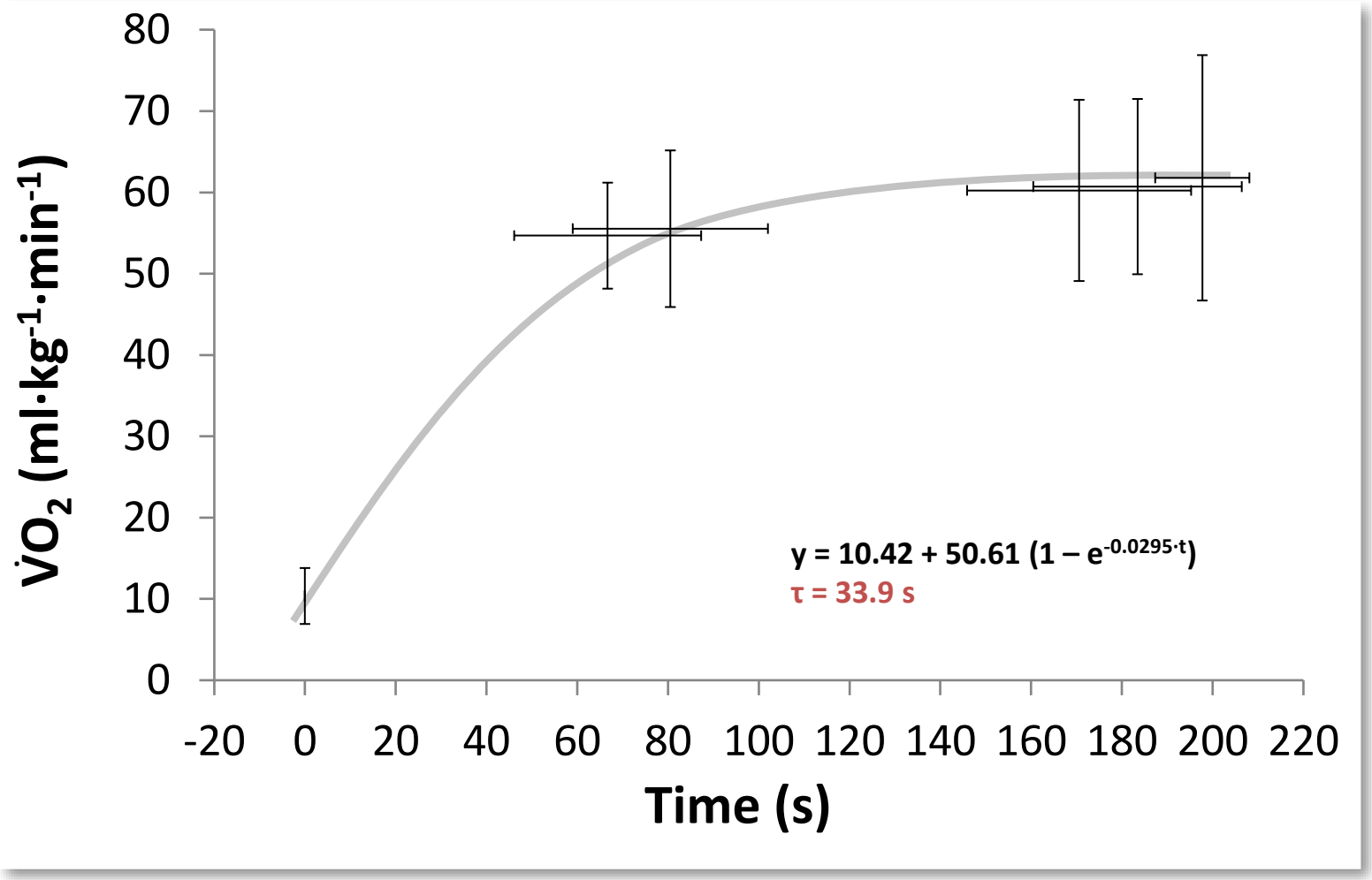
- Peak VO_2 by backward extrapolation of first 30 s postexercise (Cosmed K4 b^2)
- Serial (min 3, 5, 7) capillary blood samples for La_b (DiaglobalDP100)
- RPE (Borg CR-10 scale)


RESULT
S

Blood lactate, RPE



Oxygen uptake




DISCUSSION

Discussion

- Continuous measurement of $\dot{V}O_2$ and La_b during SS routines is not possible due to immersion phases
- The fractionation strategy allowed us to study the time course of these parameters across competitive duet routines
- $\dot{V}O_2$ showed a moderately fast rate of increase during exercise (τ = 33.9 s, e.g. ~90% $\dot{V}O_{2peak}$ after 1 min)

Discussion

- No differences noted in $\dot{V}O_2$ or La_b before and after prolonged apneas

- The rate of $\dot{V}O_2$ increase and La_b accumulation seem to be caused
  - essentially by the high energy demands of exercise
  - not by prolonged apneas despite the dramatic effect on HR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