SCUOLA REGIONALE MARCHE dello SPORT

Area:
Documentazione, informazione e ricerca

Italia Coni

"L'Acido Lattico negli Sport di Squadra:
Gli studi della SRS delle Marche"

Relatore: **Carlo Castagna**

FIDAL

Comitato Regionale delle Marche

13 Ottobre 2006, Sala CONI Regionale, Ancona

Introduzione

Basket

Calcio

Calcio a 5

Introduzione

Basket

Professionisti Australia

$[La]_b$ =6.8 ± 2.8 mM

McInness e coll 1995

Basket

Basket

Serie C2 Italia

Torneo n=10

$[La]_b$ =6.27 ± 2.44 mM

Castagna 2002

Basket

Basket

Serie C1 Italia

Amichevole n=10

$[La]_b$ =5.8 ± 2.35 mM

Finale Torneo n=10

$[La]_b$ =7.1 ± 3.47 mM

Castagna 2003

Basket

Basket

Basket Giovanile

Coinvolgimento Anaerobico?

Allenamento Basket

Basket

Basket

Basket Giovanile

Sperimentale n=42

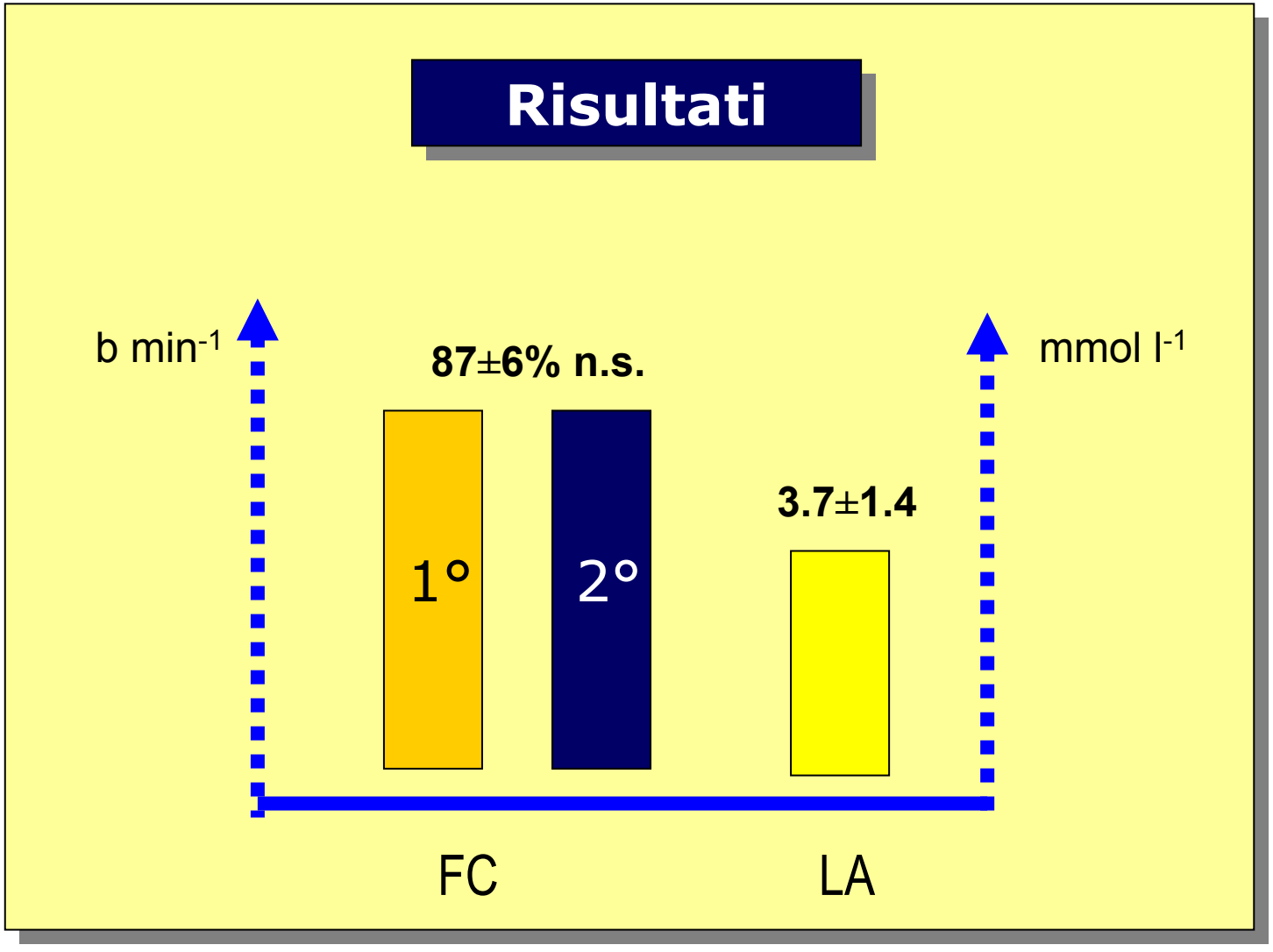
$[La]_b$ =3.7 ± 1.4 mM

Castagna e coll. 2006

Basket

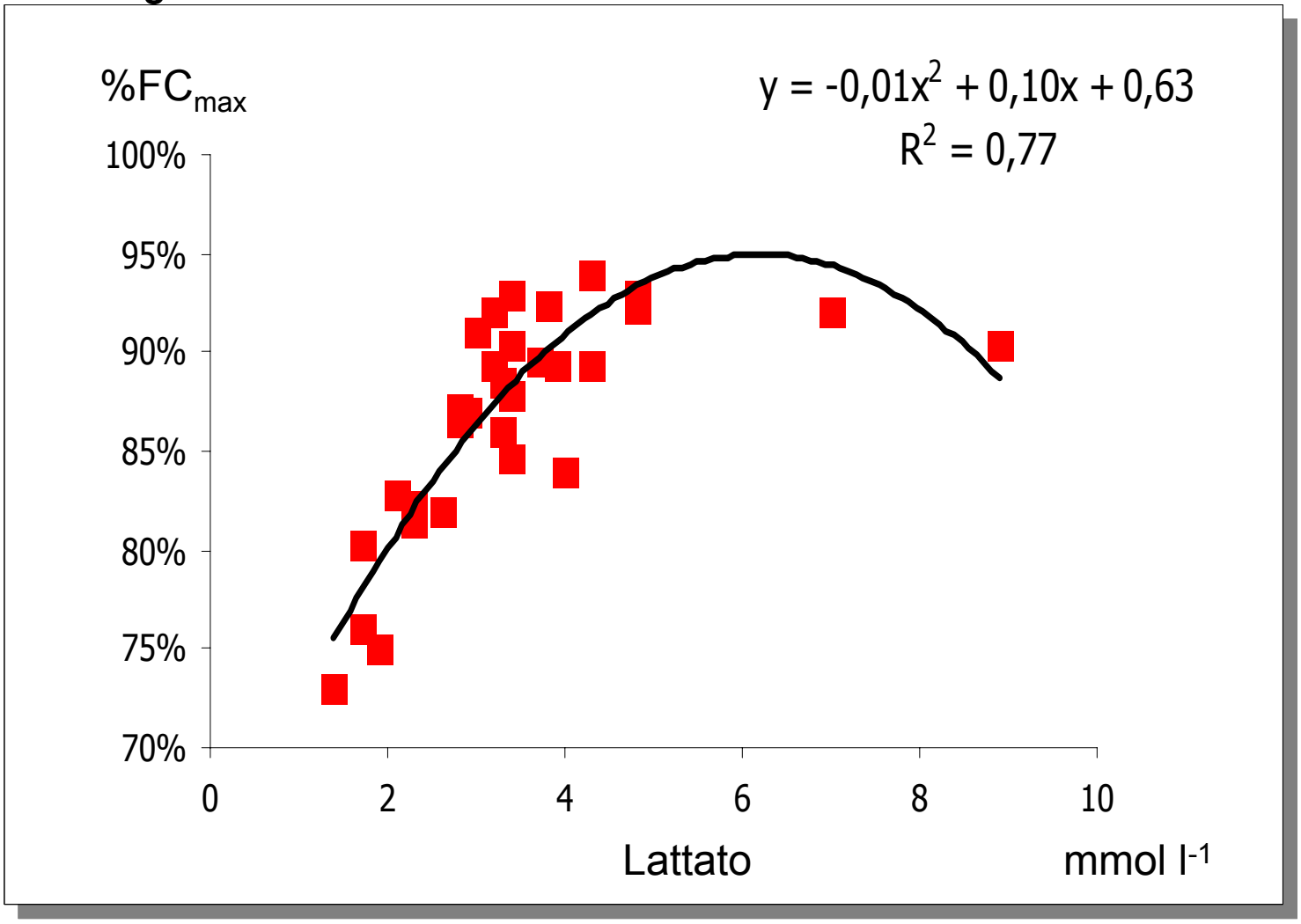
Basket Giovanile

Castagna e coll. 2006



FC *vs* LA

Castagna e coll. 2006



Basket Training

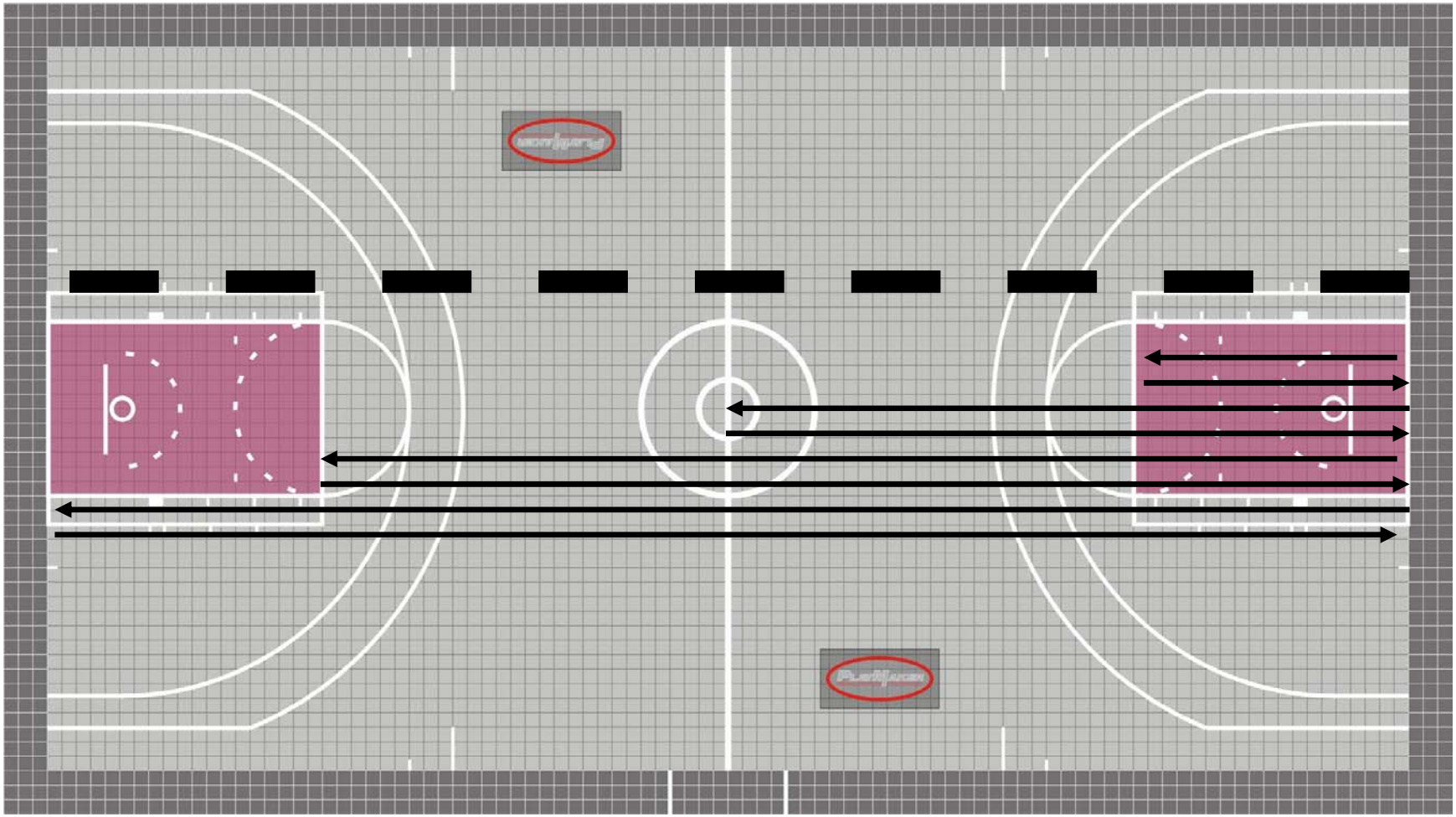
Suicidio n=14

$[La]_b$= 9.6±2.0 mML^{-1}

Castagna Ditroilo 2006

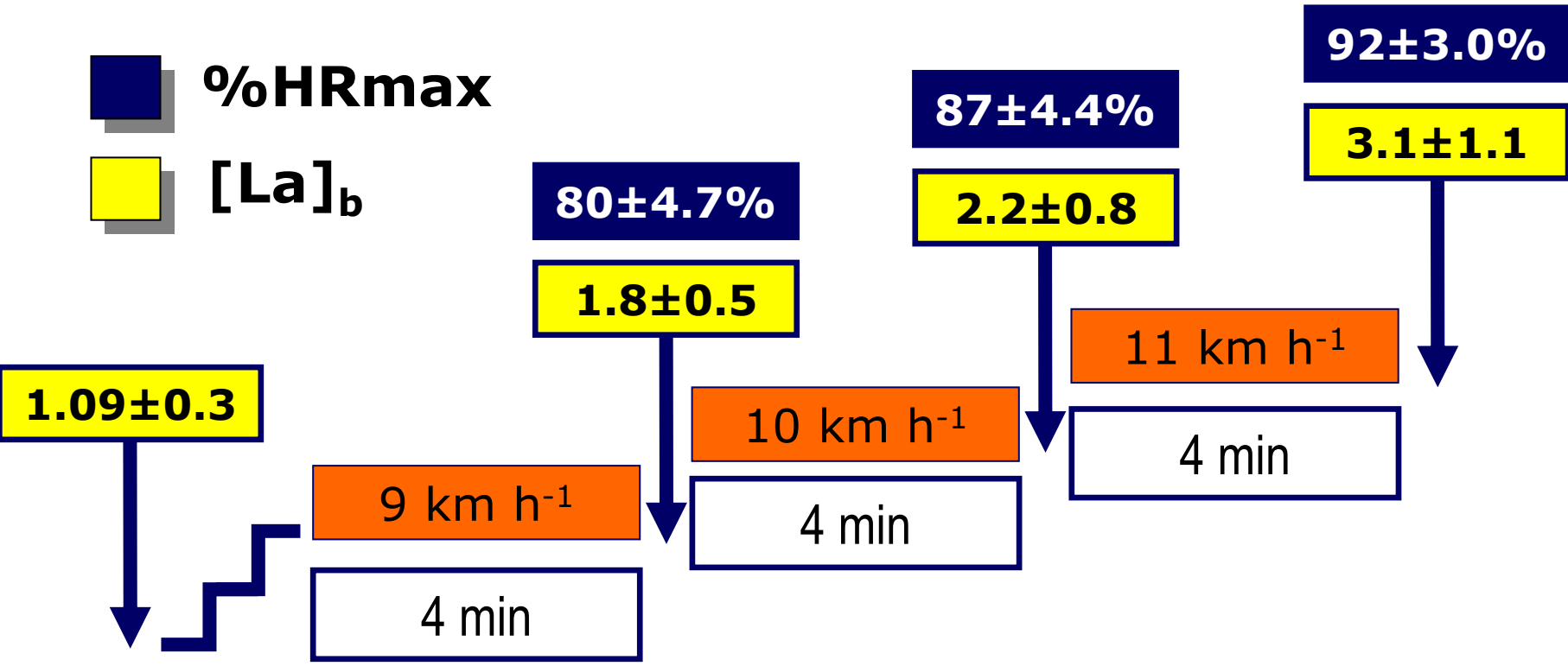
Basket Training

Protocollo- Suicidio



Protocollo- Suicidio

Soglia Anaerobica



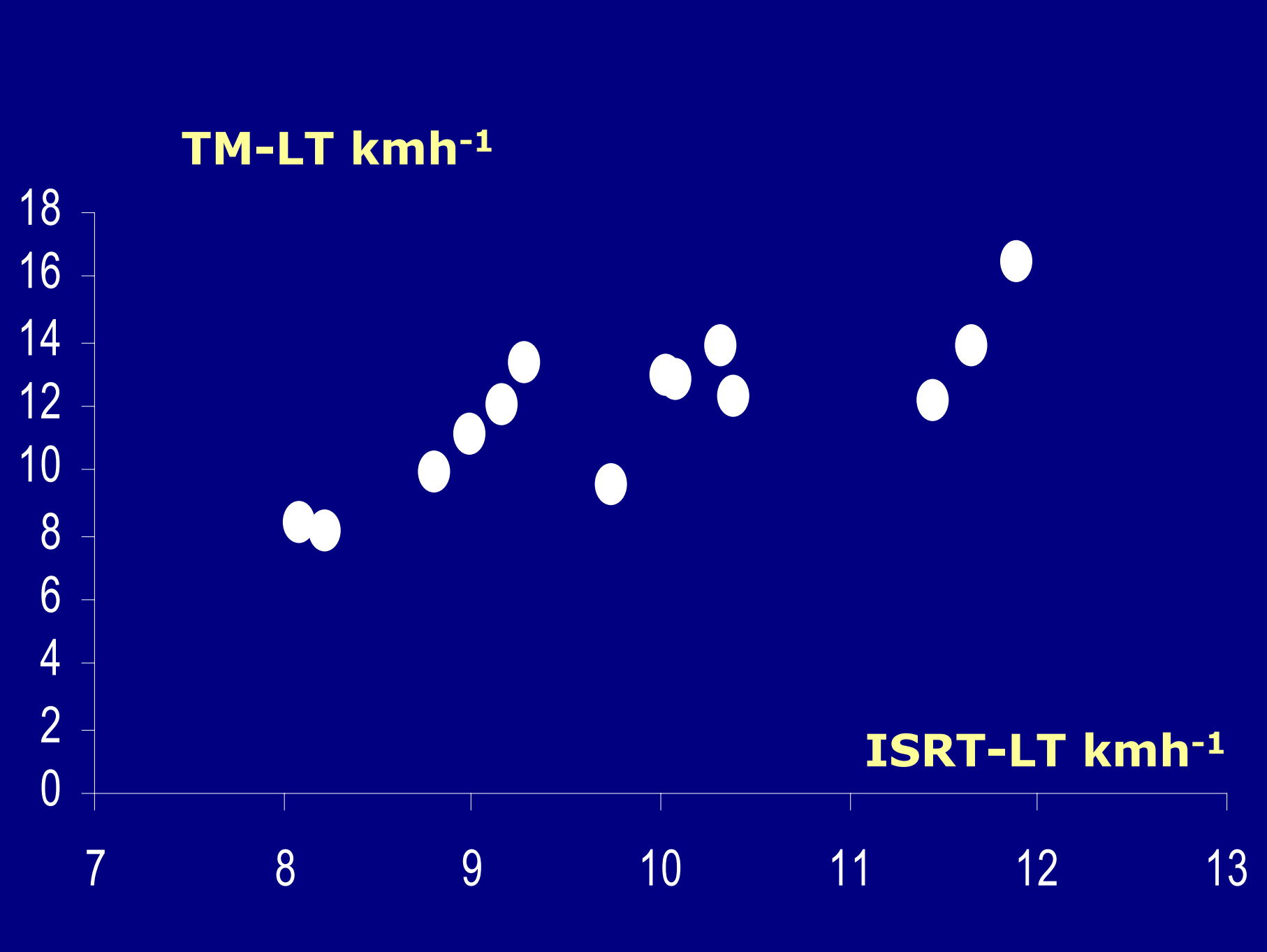
Castagna Ditroilo 2006

Soglia Anaerobica

ISRT-LT *vs* TM-LT

r= 0.82 , p<0.001

Basket Giovanile


TM-LT kmh-1
18
16
14
12
10
8
6
4
2
0
ISRT-LT kmh-1
7
8
9
10
11
12
13

Basket Giovanile

Castagna Ditroilo 2006

11kmh^{-1} $[La]_b$ ~ Game $[La]_b$

	$[La]_b$ mmol L^{-1}
11 kmh^{-1}	3.1±1.1
Game	3.7±1.4
Suicidio	9.6±2.0

Basket Giovanile

Basket Giovanile

$9kmh^{-1}$ $[La]_b$ Warm-up

	$[La]_b$ mmol L^{-1}
9 kmh^{-1}	**1.8±0.5**
Game	**3.7±1.4**
Suicidio	**9.6±2.0**

Castagna Ditroilo 2006

Basket Giovanile

Basket Giovanile

	Speed Km h^{-1}
ISRT-LT	10.1±1.7
TM-LT	12±2.3***

P<0.001***

Basket Giovanile

Basket Giovanile

	%FC$_{max}$
ISRT-LT	87±10.8
TM-LT	85±6.1

P>0.05

Basket Giovanile

Basket Giovanile

Foster et al (1995) E J Appl Physiol

	Perceived Effort
ISRT-LT	3.6±1.6*
TM-LT	4.4±0.7

P<0.05

Basket Giovanile

Borg CR10-Scale

Foster et al (1995) E J Appl Physiol

Rating	Descriptor
0	Rest
1	Very, very Easy
2	Easy
3	Moderate
4	Somewhat Hard
5	Hard
6	
7	Very Hard
9	
10	Maximal

Training Tips

- 11kmh^{-1} Resistenza Generale
- SD Capacità Potenza Anaerobica
- 9 kmh^{-1} warm-up
- 10-11 kmh^{-1} Sviluppo Aerobico

Training Tips

Calcio a 5

Calcio a 5

Professionisti Spagna

$[La]_b$ =5.3 ± 2.6 mM

Barbero e Castagna 2006

Calcio a 5

Calcio

REVIEW ARTICLE

Sports Med 2005; 35 (6): 501-536
0112-1642/05/0006-0501/$34.95/0

Physiology of Soccer
An Update

Tomas Stølen,[1] *Karim Chamari,*[2] *Carlo Castagna*[3] and *Ulrik Wisløff*[4,5]

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2 Unité de Recherche 'Évaluation, Sport, Santé' – National Center of Medicine and Science in Sport (CNMSS), El Menzah, Tunis, Tunisia
3 School of Sport and Exercise Sciences, Faculty of Medicine and Surgery, University of Rome Tor Vergata, Rome, Italy
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5 Department of Cardiology, St. Olavs Hospital, Trondheim, Norway

Contents

Table IV. Blood lactate in male and female soccer players (numbers in parentheses indicate range)

dy	Level/country (sex)	n	Lactate 1st half (mmol/L)		Lactate 2nd half (mmol/L)	
			during	end	during	end
nevik[12]	Division 1/Sweden (M)	10				10.0 (–15.5)
ngsbo et al.[7]	Division 1 and 2/Denmark (M)	14	4.9 (2.1–10.3)		3.7 (1.8–5.2)	4.4 (2.1–6.9)
ngsbo[1]	League/Denmark (M)		4.1 (2.9–6.0)	2.6 (2.0–3.6)	2.4 (1.6–3.9)	2.7 (1.6–4.6)
	League/Denmark (M)		6.6 (4.3–9.3)	3.9 (2.8–5.4)	4.0 (2.5–6.2)	3.9 (2.3–6.4)
wer and Davis[13]	Elite/Sweden (F)			5.1 ± 2.1		4.6 ± 2.1
pranica et al.[49]	Young/Italy (M)	6		3.1–8.1 (during match)		
olom[3]	Division 1/Sweden (M)			9.5 (6.9–14.3)		7.2 (4.5–10.8)
	Division 2/Sweden (M)			8.0 (5.1–11.5)		6.6 (3.1–11.0)
	Division 3/Sweden (M)			5.5 (3.0–12.6)		4.2 (3.2–8.0)
	Division 4/Sweden (M)			4.0 (1.9–6.3)		3.9 (1.0–8.5)
rish et al.[50]	Top amateurs/Germany (M)	59		5.6 ± 2.0[a]		4.7 ± 2.2[a]
	University/Germany (M)		6.8 ± 1.0	5.9 ± 2.0	5.1 ± 1.6	4.9 ± 1.7
hde and Esperson[51]	Division 1 and 2/Denmark (M)	22		5.1 ± 1.6		3.9 ± 1.6
aros[17]	Division 2/Finland (M)	7		4.9 ± 1.9		4.1 ± 1.3
ith et al.[52]	College/England (M)	6		5.2 ± 1.2 (during match)		

Median.

female, M = male

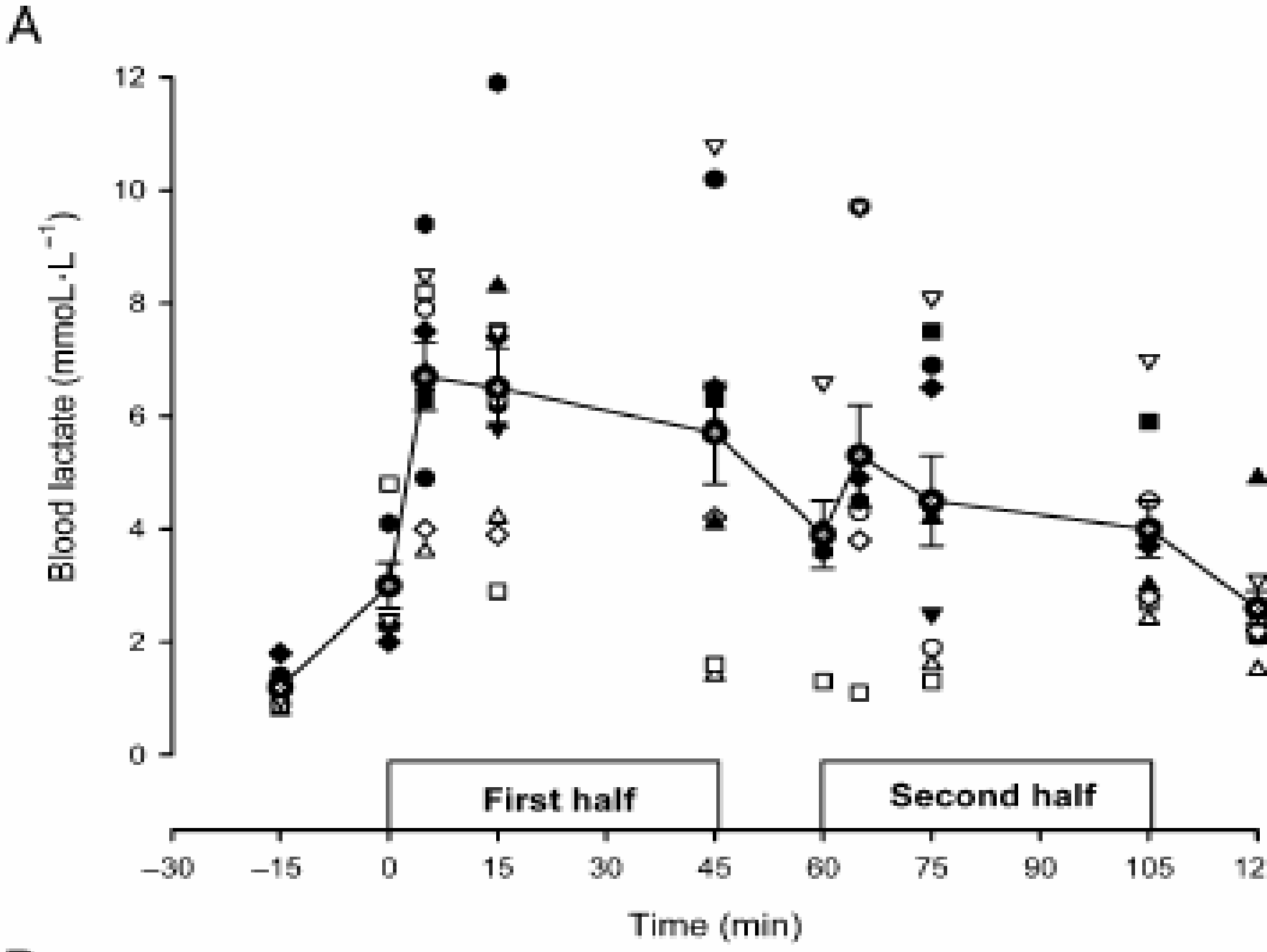
Muscle and Blood Metabolites during a Soccer Game: Implications for Sprint Performance

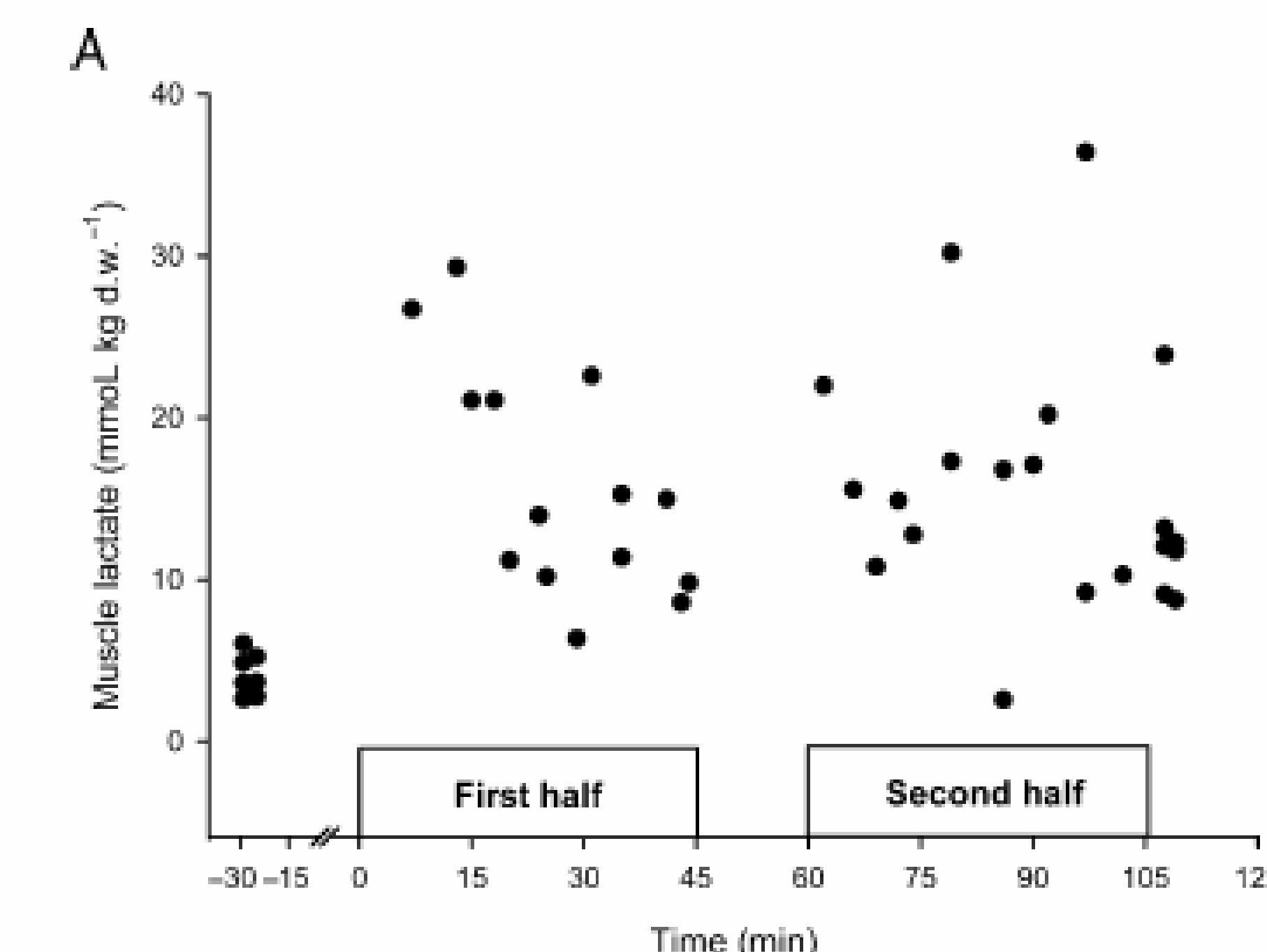
PETER KRUSTRUP[1], MAGNI MOHR[1], ADAM STEENSBERG[2], JESPER BENCKE[3], MICHAEL KJÆR[4], and JENS BANGSBO[1]

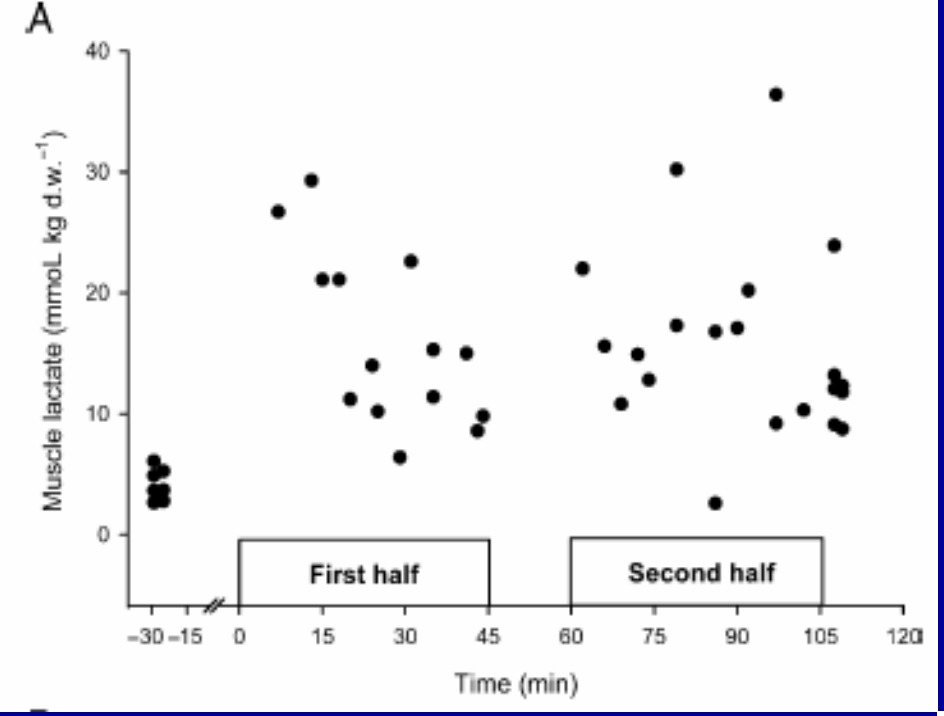
[1]*Institute of Exercise and Sport Sciences, Department of Human Physiology, University of Copenhagen, Copenhagen, DENMARK;* [2]*Copenhagen Muscle Research Centre, Rigshospitalet, Department of Infectious Diseases, Copenhagen, DENMARK;* [3]*Department of Orthopedic Surgery, Hvidovre University Hospital, Copenhagen, DENMARK; and* [4]*Sports Medicine Research Unit, Copenhagen University Hospital, Copenhagen, DENMARK*

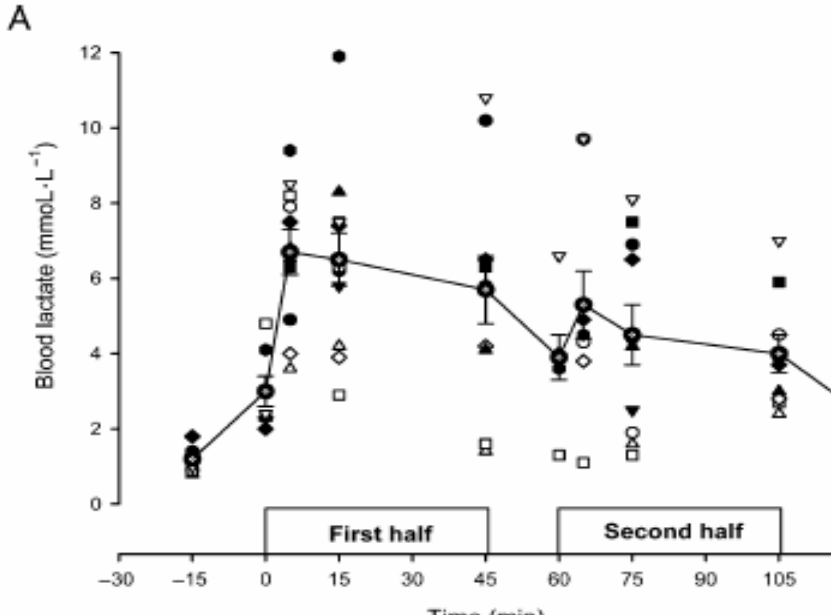
ABSTRACT

KRUSTRUP, P., M. MOHR, A. STEENSBERG, J. BENCKE, M. KJÆR, and J. BANGSBO. Muscle and Blood Metabolites during a Soccer Game: Implications for Sprint Performance. *Med. Sci. Sports Exerc.*, Vol. 38, No. 6, pp. 1165–1174, 2006. **Purpose:** To examine muscle and blood metabolites during soccer match play and relate it to possible changes in sprint performance. **Methods:** Thirty-one Danish fourth division players took part in three friendly games. Blood samples were collected frequently during the game, and muscle biopsies were taken before and after the game as well as immediately after an intense period in each half. The players performed five 30-m sprints interspersed by 25-s recovery periods before the game and immediately after each half (N = 11) or after an intense exercise period in each half (N = 20). **Results:** Muscle lactate was 15.9 ± 1.9 and 16.9 ± 2.3 mmol·kg^{-1} d.w. during the first and second halves, respectively, with blood lactate being 6.0 ± 0.4 and 5.0 ± 0.4 mM, respectively. Muscle lactate was not correlated with blood lactate (r^2 = 0.06 – 0.25, $P > 0.05$). Muscle glycogen decreased ($P < 0.05$) from 449 ± 23 to 255 ± 22 mmol·kg^{-1} d.w. during the game, with 47 ± 7% of the muscle fibers being completely or almost empty of glycogen after the game. Blood glucose remained elevated during the game, whereas plasma FFA increased ($P < 0.05$) from 0.45 ± 0.05 to 1.37 ± 0.23 mM. Mean sprint time was unaltered after the first half, but longer ($P < 0.05$) after the game (2.8 ± 0.7%) as well as after intense periods in the first (1.6 ± 0.6%) and second halves (3.6 ± 0.5%). The decline in sprint performance during the game was not correlated with muscle lactate, muscle pH,


A
Blood lactate (mmol·L⁻¹)
12
10
8
6
4
2
0
First half
Second half
−30
−15
0
15
30
45
60
75
90
105
12
Time (min)


A
Muscle lactate (mmoL kg d.w.-1)
40
30
20
10
0
First half
Second half
-30
-15
0
15
30
45
60
75
90
105
12
Time (min)


A
Muscle lactate (mmoL kg d.w.$^{-1}$)
40
30
20
10
0
First half
Second half
–30 –15 0 15 30 45 60 75 90 105 120
Time (min)


A
Blood lactate (mmoL·L^{-1})
12
10
8
6
4
2
0
First half
Second half
–30 –15 0 15 30 45 60 75 90 105

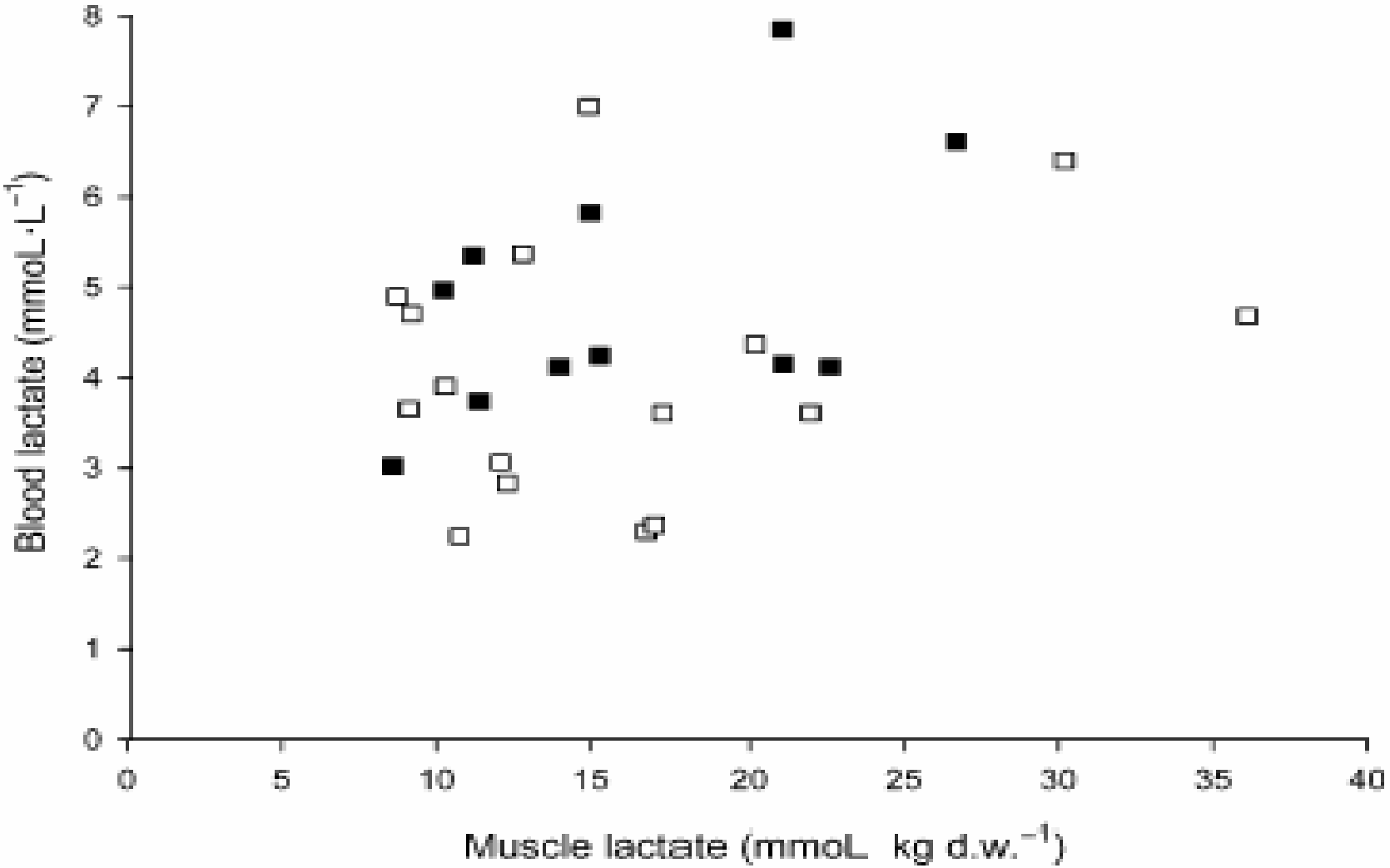
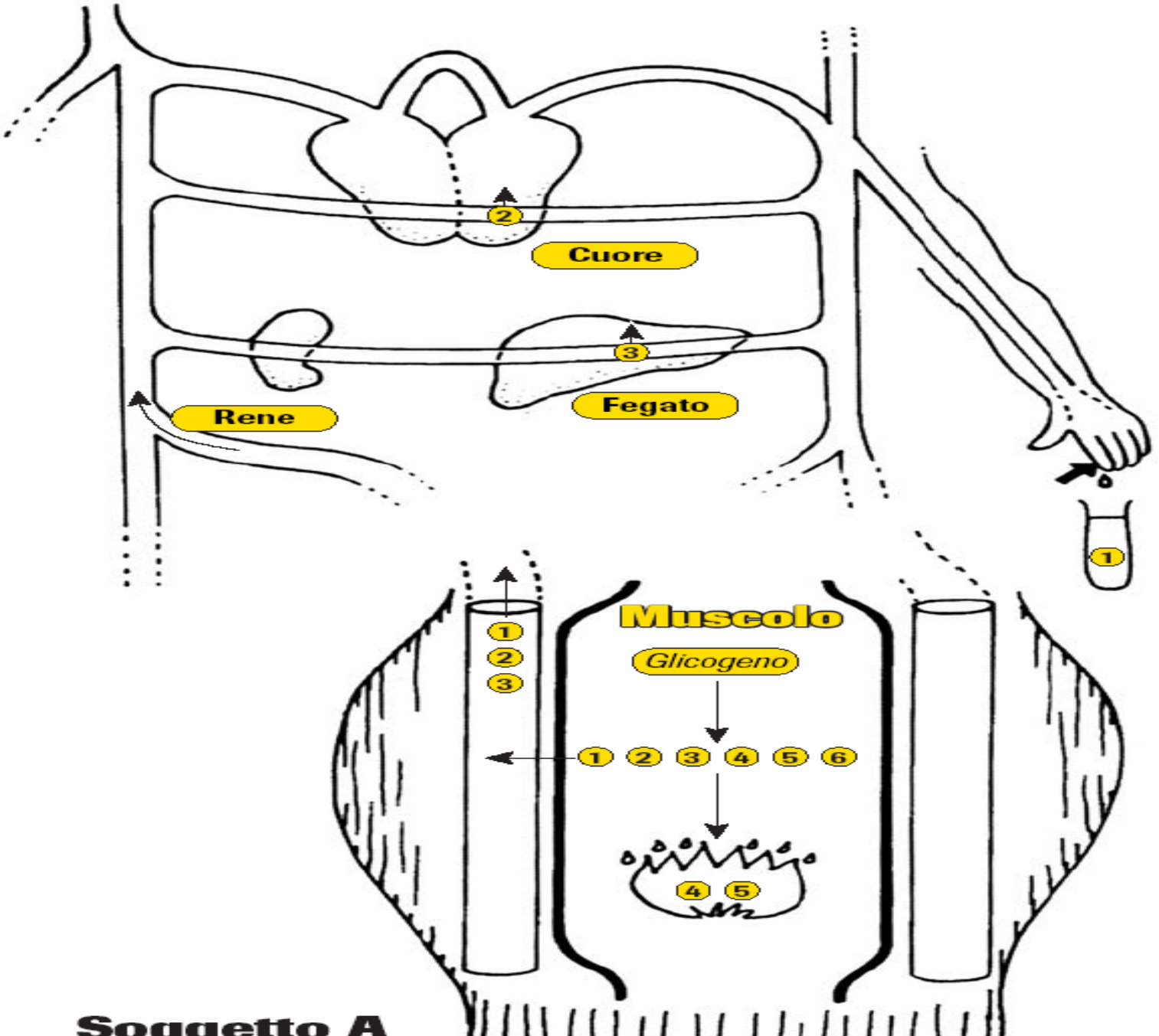


FIGURE 4—Individual relationship between muscle and blood lactate concentration after intense exercise periods in the first half and during a soccer match. The *filled squares* and *open squares* represent measurements performed in the first ($r^2 = 0.25$, $P > 0.05$) and second halves ($r^2 = 0.06$, $P > 0.05$), respectively.



Soggetto A

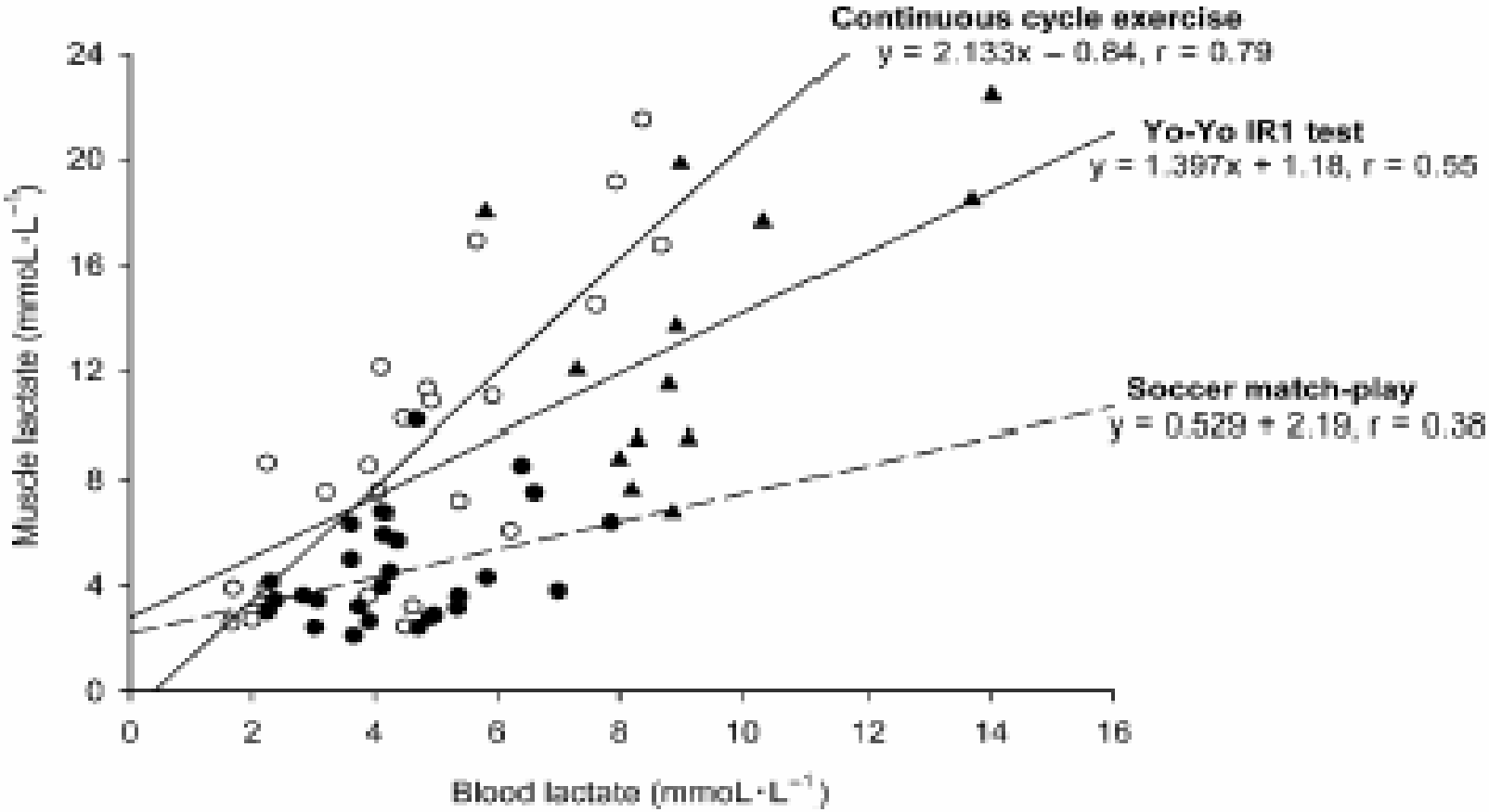


FIGURE 7—Individual relationship between muscle lactate, expressed in millimoles per litter of fluid, and blood lactate, during a soccer match (*filled circles*; data from the present study), at exhaustion in the yo-yo intermittent level 1 recovery test (*filled triangles*; data from (15)) as well as after 20 min of continuous cycle exercise at 80% of maximal oxygen uptake (*open circles*; data from (16)).

Training

Metodi

10x15m navetta 30” recupero

Attivi

Passivi

Recupero Passivo → Stazionamento

Recupero Attivo → Corsa 50% MVA

—Dupont e coll. 2003—

Metodi

Risultati

	Passivo	Attivo
IF%	3.4±2.3	5.1±2.4
		P<0.0001
BLac (mM l^{-1})	14.2±3.5	13.2±2.9
		P=0.37

Risultati

L'Acido Lattico negli Sport di Squadra"
Gli studi della SRS delle Marche"

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13 ottobre 2006, sala CONI Regionale, Ancona