ITALIA CONI
SCUOLA DELLO SPORT
MARCHE

La preparazione fisica nel calcio a 5

Ancona, 03 maggio 2019

Gianluca Briotti PhD

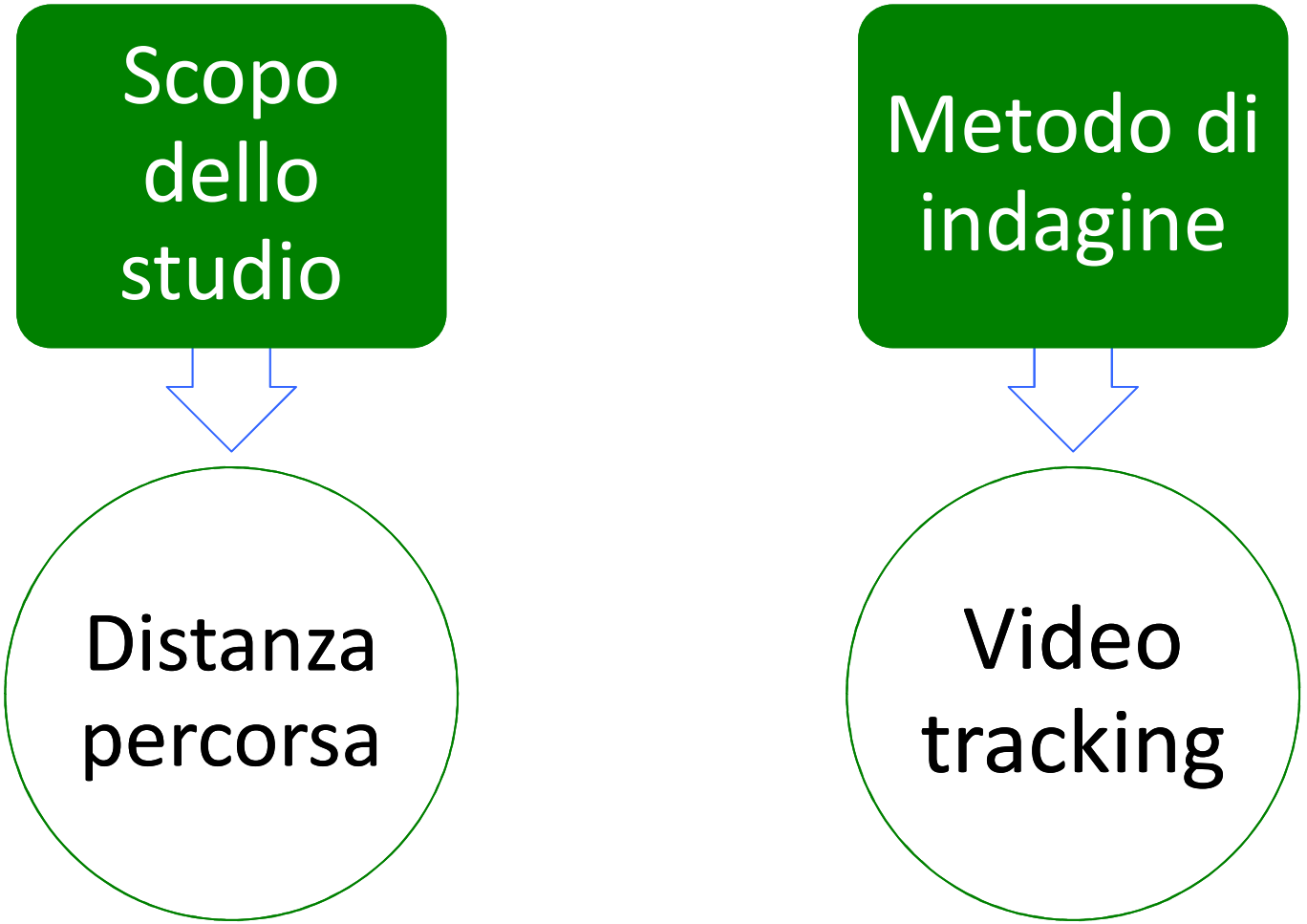
MATCH ANALYSIS

PROFILO DEL GIOCATORE E
TEST DI VALUTAZIONE

AGILITY E
CAPACITA’ DI ANTICIPAZIONE

REPEATED SPRINT ABILITY:
CONSIDERAZIONI METODOLOGICHE

Analysis of the distance covered by Brazilian professional futsal players during official matches



Murilo Jose´ De Oliveira Bueno et al. Analysis of the distance covered by Brazilian professional futsal players during official matches. Sports Biomechanics. Vol. 13, No. 3, 230–240, 2014

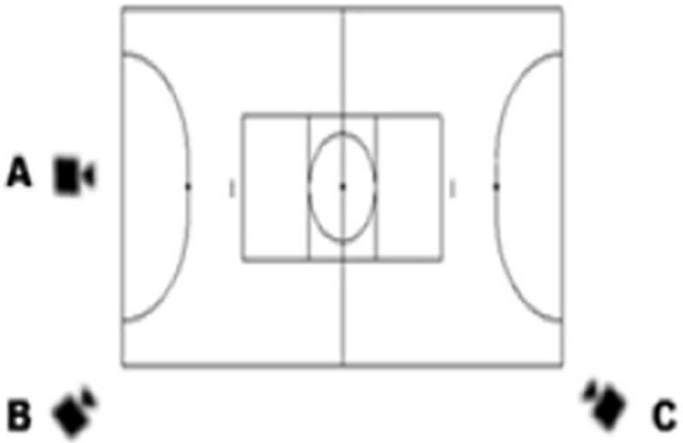


Figure 1. Position of cameras at the highest points in relation to the game court surface for the recording of the events in both games.

Analysis of the distance covered by Brazilian professional futsal players during official matches

Protocollo

5 partite ufficiali ; n=93 giocatori

RANGE DI VELOCITA' (Castagna et al., 2009)
V1 ≤ 6.0 km/h (standing and walking);
6.1 < **V2** ≤ 12.0 km/h (low-intensity running);
12.1 < **V3** ≤ 15.4 km/h (medium-intensity running);
15.5 < **V4** ≤ 18.3 km/h (high-intensity running);
V5 > 18.4 km/h (sprinting)

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DISTANZA PERCORSA:
- 3133, 2 m
- PRIMO TEMPO: 1710,6 m
- SECONDO TEMPO: 1635,9 m

- Distanza **IN PLAY** = 2133,9 m
- Distanza **OUT OF PLAY** = 1028,5 m

Table I. Total distance covered (m/min).

Condition	First half	Second half	*p*
In play	136.6 (17.2)	129.2 (16.7)*	0.01
Out of play	58.8 (10.4)	56.8 (14.8)	0.21
Whole game	97.9 (16.2)	90.3 (12.0)*	<0.01

Note: Values in median (IQR).
*Significantly different from the first-half value ($p < 0.05$).

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Table II. Percentage of the distance covered in velocity ranges (%).

Condition	Velocity ranges	First half	Second half	*p*
In play	Standing and walking	16.2 (5.7)	19.3 (8.3)*	<0.01
	Low-intensity running	41.9 (5.3)	42.1 (5.4)	0.69
	Medium-intensity running	20.1 (4.2)	17.8 (5.1)*	<0.01
	High-intensity running	10.3 (3.5)	9.6 (3.4)*	<0.01
	Sprinting	10.1 (6.1)	9.9 (5.0)	0.49
Out of play	Standing and walking	52.4 (11.9)	55.4 (15.2)	0.72
	Low-intensity running	33.1 (8.0)	32.9 (11.1)	0.44
	Medium-intensity running	8.1 (5.9)	8.7 (5.5)	0.55
	High-intensity running	2.1 (2.4)	3.1 (3.2)*	<0.01
	Sprinting	1.5 (2.8)	1.7 (3.0)	0.29
Whole game	Standing and walking	28.0 (6.1)	30.8 (6.7)*	<0.01
	Low-intensity running	39.0 (5.0)	38.7 (4.0)	0.92
	Medium-intensity running	16.4 (3.4)	15.4 (3.4)*	<0.01
	High-intensity running	8.0 (2.4)	7.5 (2.0)*	<0.01
	Sprinting	7.6 (4.3)	7.2 (2.7)	0.32

Note: Values presented in median (IQR).
*Significantly different from the first half value ($p < 0.05$).

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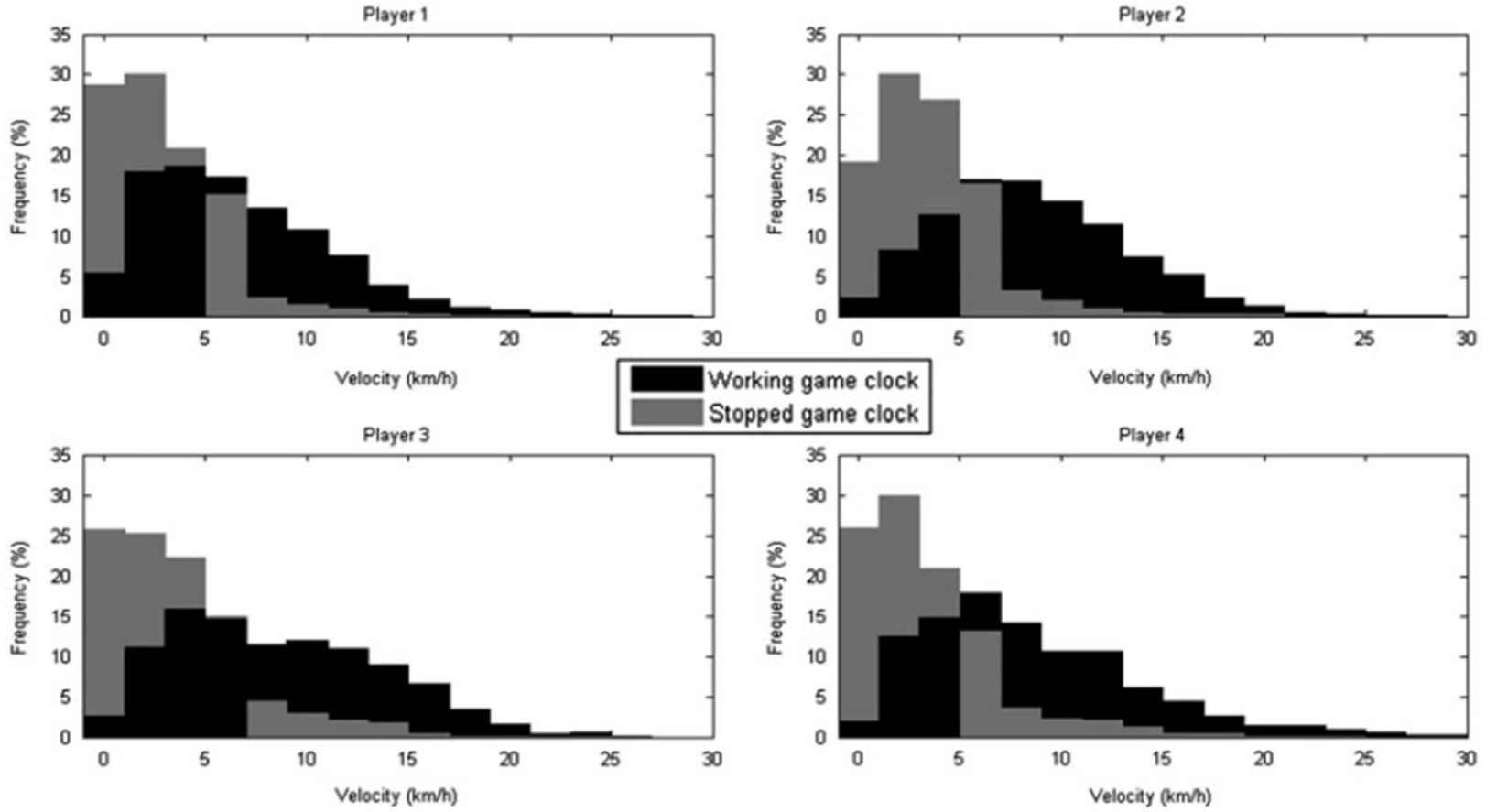

Figure 3. Velocity histogram examples for professional futsal players during the first half of a match distinguished by the in-play and out-of-play periods.

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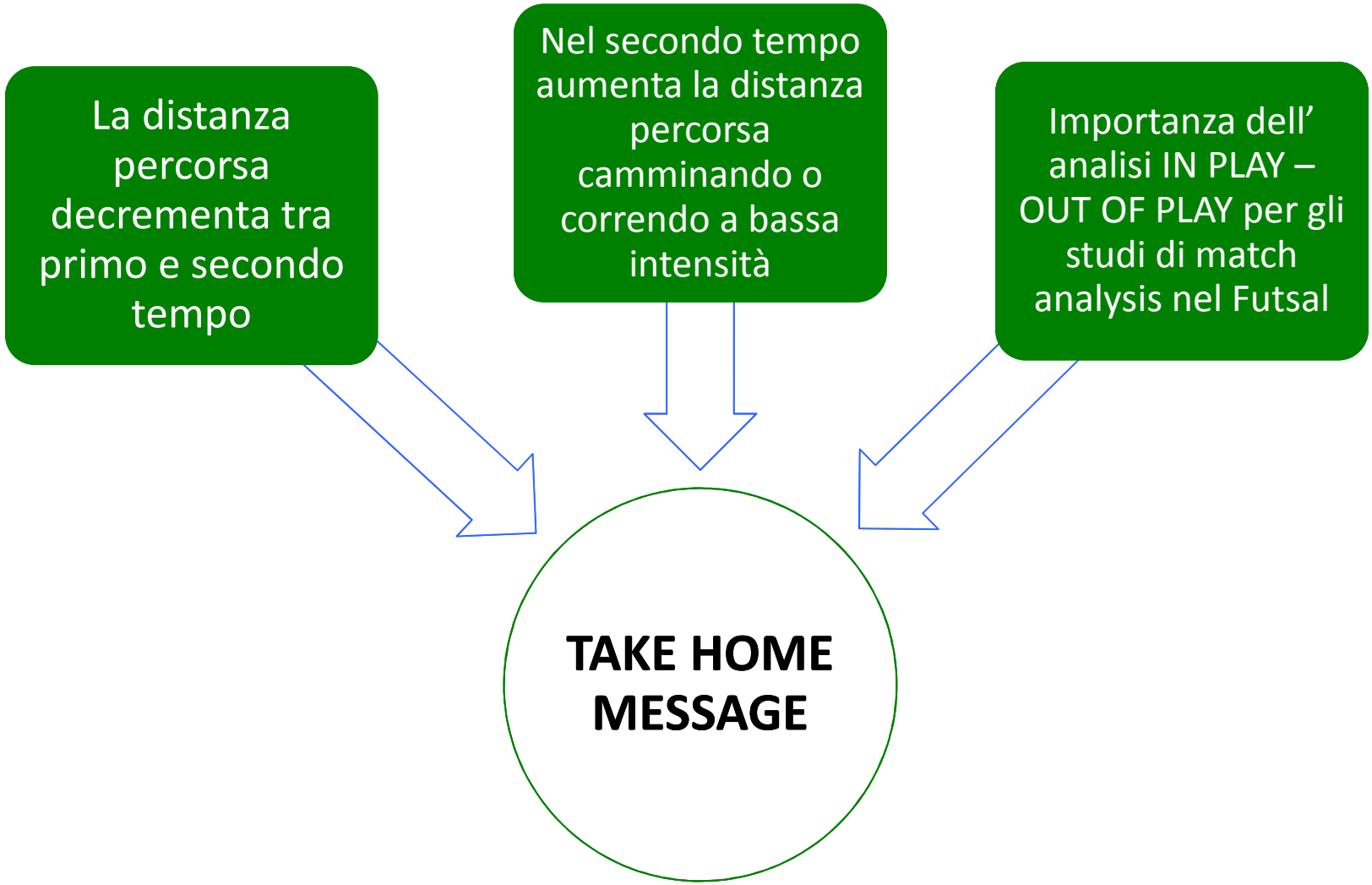

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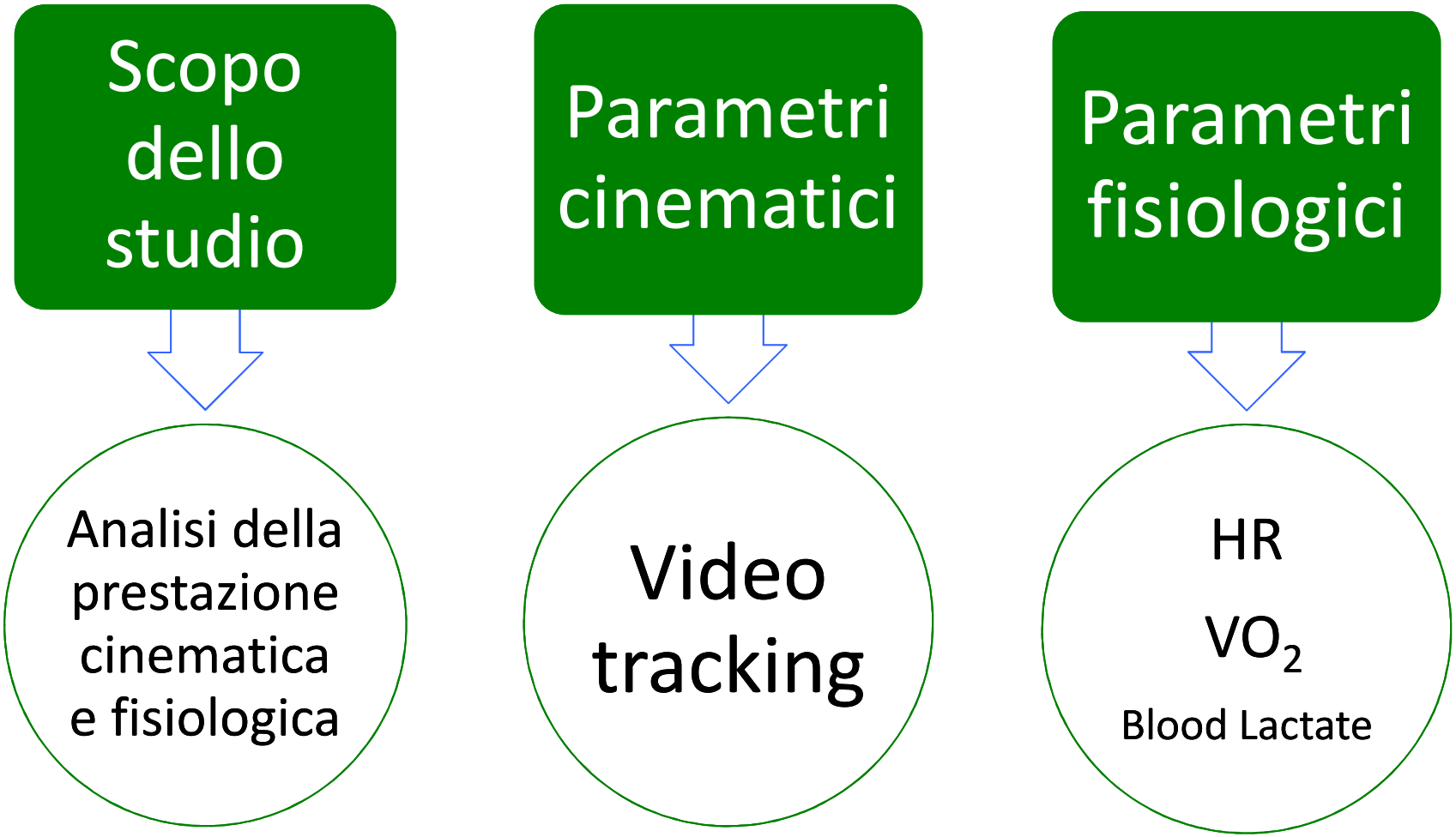
Match demands of professional Futsal: A case study



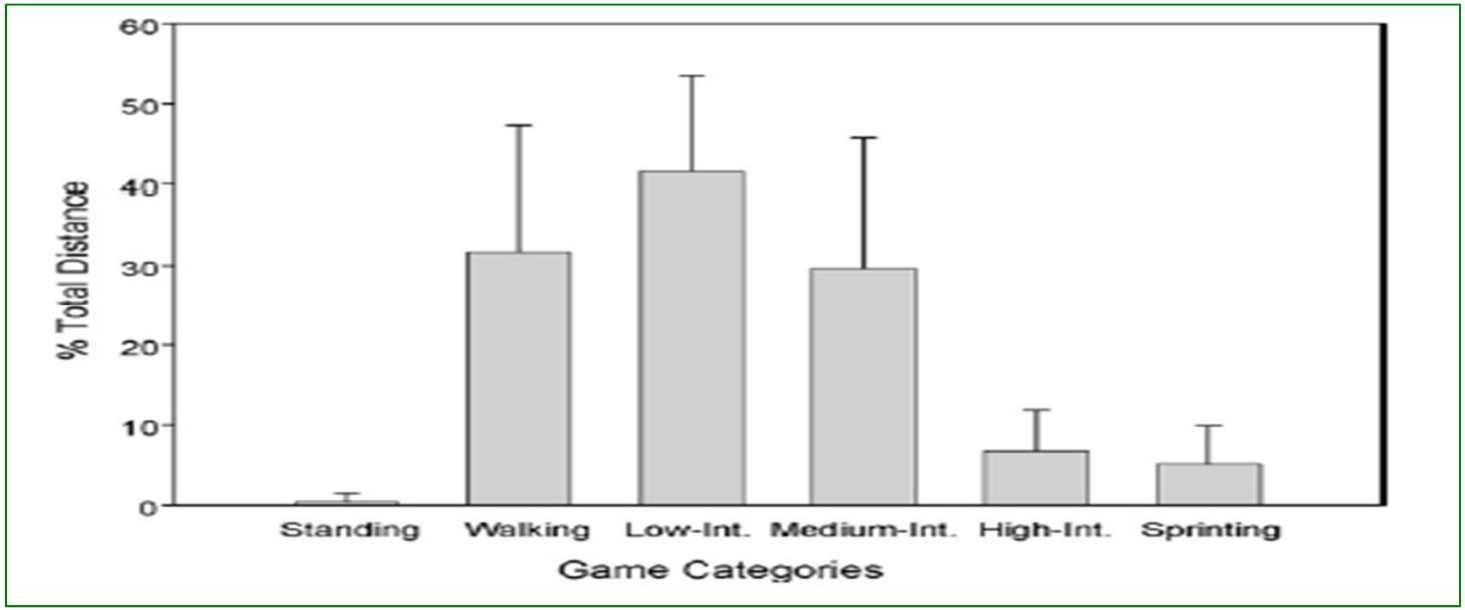
Castagna et al. Match demands of professional Futsal: A case study. Journal of Science and Medicine in Sport,12,490–494, 2009

Match demands of professional Futsal: A case study

Range di velocità:
1. sprinting (speed >18.3 km h−1);
2. high-intensity running (speed >15.5 km h−1);
3. medium-intensity running (12.1–15.4 km h−1);
4. low-intensity running (6.1–12 km h−1);
5. walking (0.5–6 km h−1);
6. standing (0–0.4 km h−1).

DISTANZA PERCORSA
121 m/min

DISTANZA MEDIA SPRINT
10.5m (6.2–14.8)



Frequenza sprint: sequenze di **3-4 sprint** / **20-30s** di recupero

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Match demands of professional Futsal: A case study

VO_2

76% VO_{2Max}

(59–92)

HR

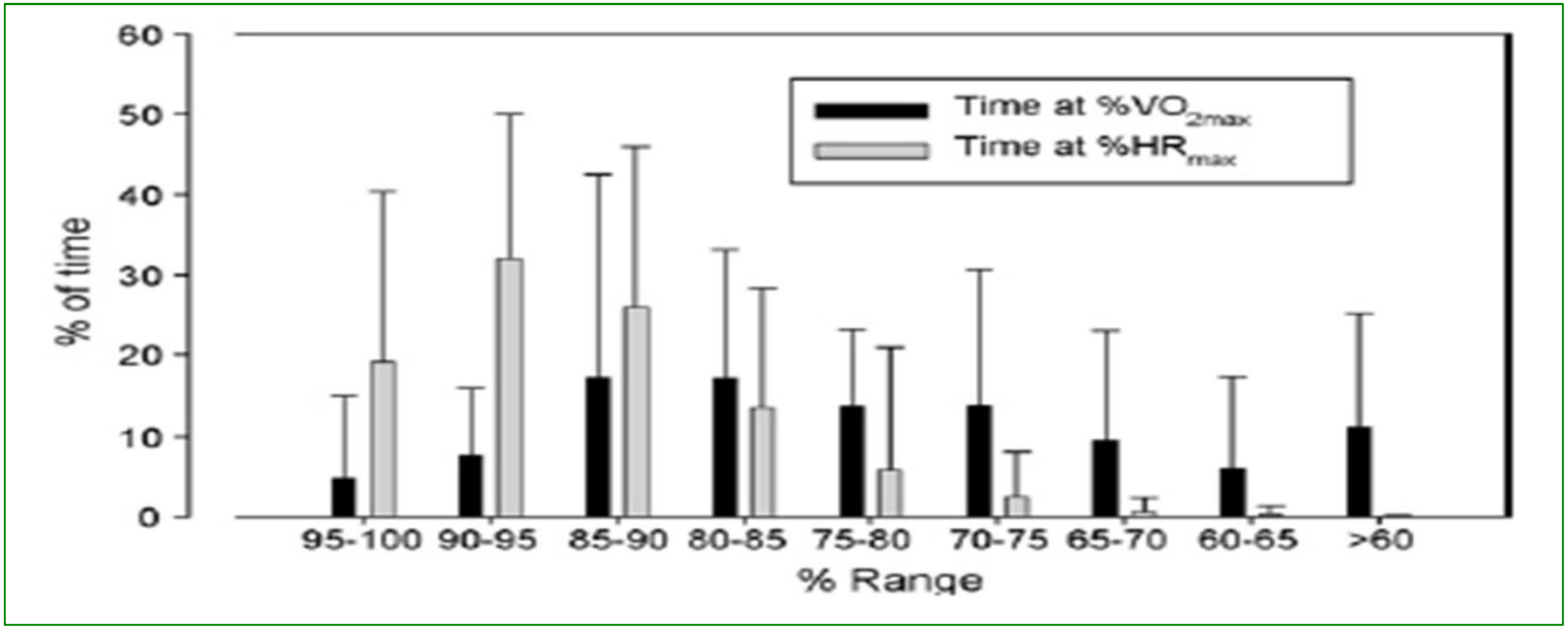
90% HR_{Max}

(84-96)

Blood Lactate

5.3 mmol l^{-1}

(1.1–10.4)



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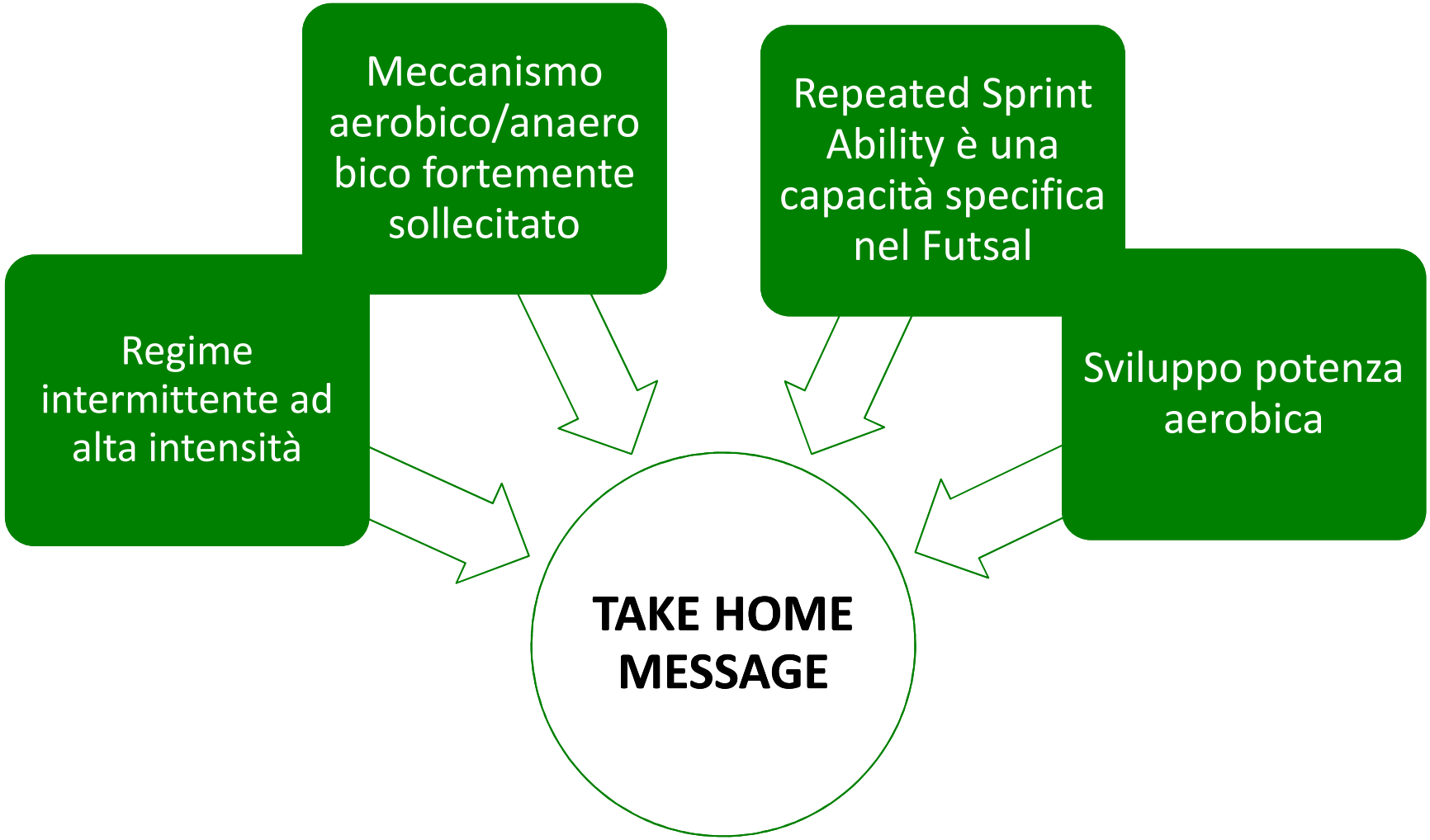

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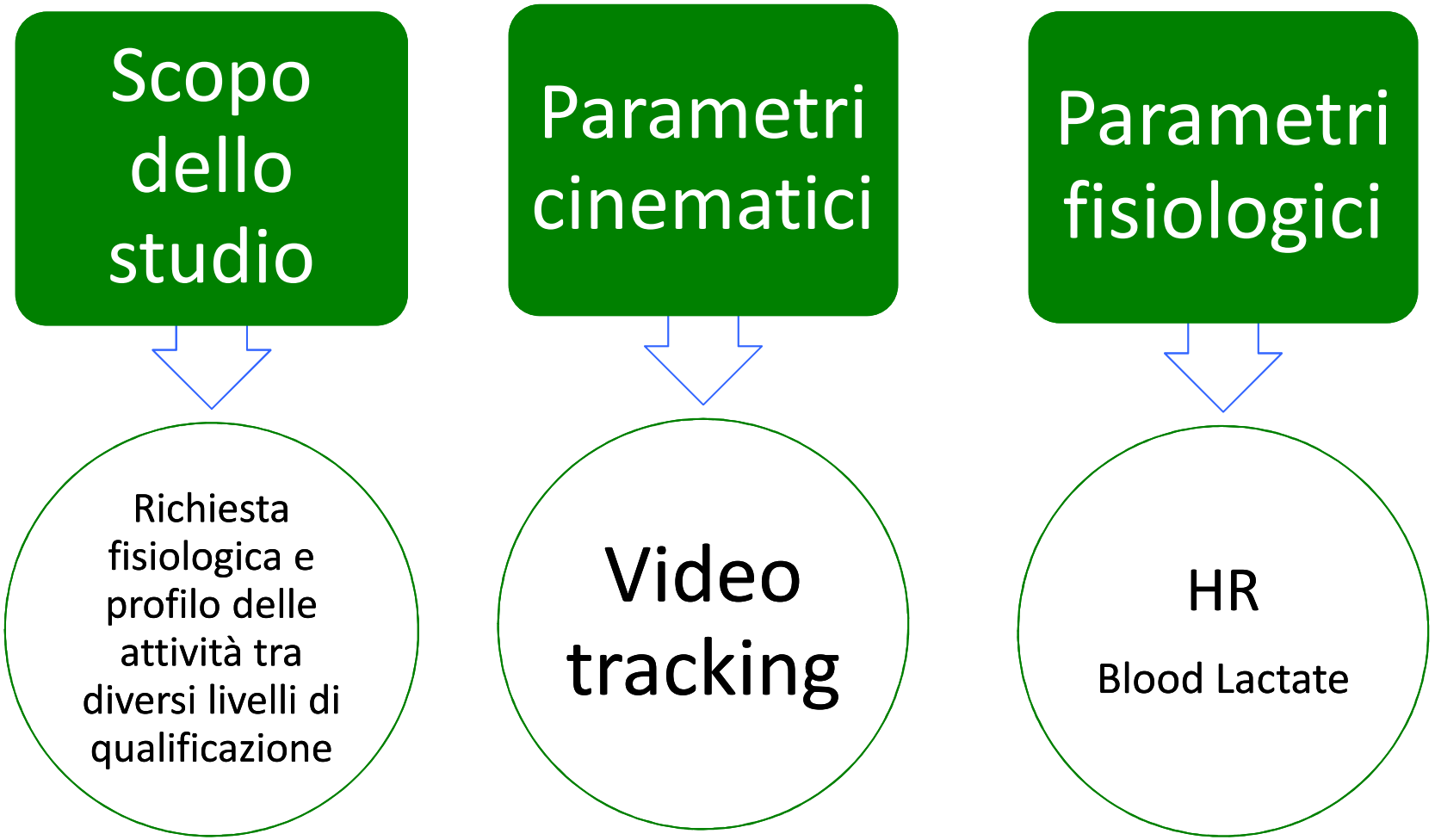
Physiological demands and activity profiles during futsal match play according to competitive level



Makaje N et al. Physiological demands and activity profiles during futsal match play according to competitive level. J Sports Med Phys Fitness, 52, 366-74, 2012

Physiological demands and activity profiles during futsal match play according to competitive level

TEMPO TRASCORSO NEI RANGE DI VELOCITA'

Time spent	Outfield players		Goalkeepers	
	Elite (N.=12)	Amateur (N.=12)	Elite (N.=3)	Amateur (N.=3)
Standing (%)	4.2±1.1	6.9±1.7*	8.2±2.7	12.4±2.3*
Walking (%)	26.1±1.8	27.8±2.2*	51.0±5.2	50.6±4.2
Jogging (%)	18.0±1.6	17.2±1.3*	15.2±4.2	14.1±4.3
Low-speed running (%)	19.4±2.4	18.6±1.7*	10.4±2.2	9.1±2.5
Moderate-speed running (%)	17.1±2.2	16.2±2.6*	8.3±1.5	7.8±1.5
High-speed running (%)	8.7±1.3	7.7±1.6*	4.7±1.3	4.2±1.3
Sprinting (%)	6.5±1.5	5.6±1.8*	2.2±0.7	1.8±0.8

Values are mean±SD. * Significant (P<0.05) difference between groups.

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DISTANZA PERCORSA NEI RANGE DI VELOCITA'

Distance covered	Outfield players		Goalkeepers	
	Elite (N.=12)	Amateur (N.=12)	Elite (N.=3)	Amateur (N.=3)
Walking (m)	514±112	551±127*	993±143	960±126
Jogging (m)	1302±671	1220±664*	352±152	280±184
Low-speed running (m)	1165±526	1019±573*	265±189	189±127
Moderate-speed running (m)	1050±355	896±381*	196±130	159±107
High-speed running (m)	636±248	534±276*	127±85	95±41
Sprinting (m)	422±186	308±203*	110±57	87±46
Total distance covered (m)	5087±1104	4528±1248*	2043±702	1770±854

Values are mean±SD. * Significant (P<0.05) difference between groups.

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Physiological demands and activity profiles during futsal match play according to competitive level

PARAMETRI FISIOLOGICI

Physiological demands	Outfield players		Goalkeepers	
	Elite (N.=12)	Amateur (N.=12)	Elite (N.=3)	Amateur (N.=3)
HR (beat/min)	175±12	170±10*	147±7	145±11
HR_{max} (%)	89.8±5.8	86.2±6.7*	73.7±5.1	72.2±8.6
$\dot{V}O_2$ (mL/kg/min)	43.7±5.8	38.7±7.9*	31.5±4.7	29.7±5.9
$\dot{V}O_{2max}$ (%)	77.9±9.0	73.1±6.2*	63.2±8.9	61.8±11.7
Energy Expenditure (kcal)	595±50	543±67*	422±80	415±65
Blood Lactate (mmol/L)	5.5±1.4	5.1±1.5*	4.2±1.3	4.0±1.9

Values are mean±SD. * Significant P<0.05difference between groups.

High intensity (>85% HRmax)
Elite : 81.4±16.3
Amateur : 73.5±21.4

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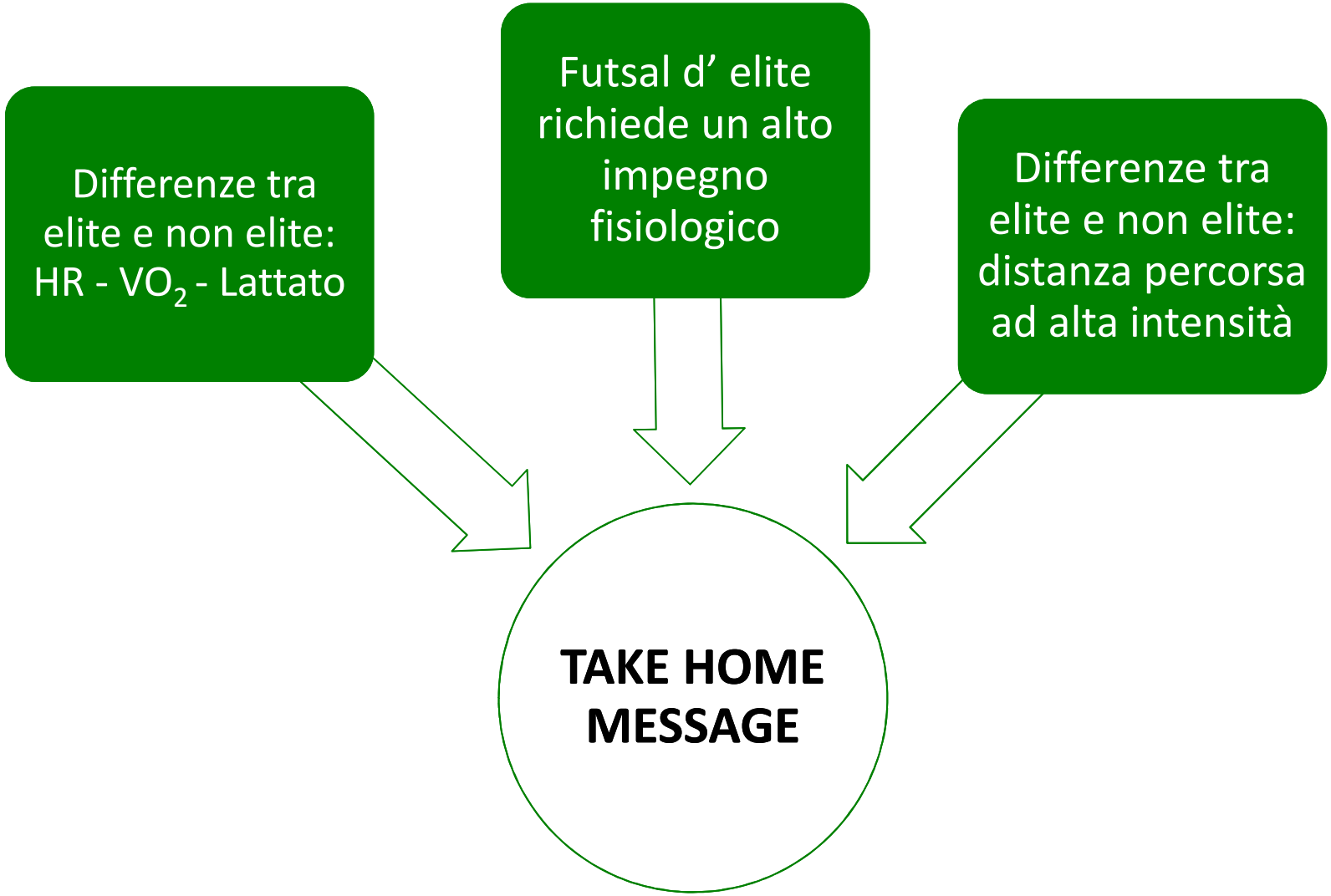

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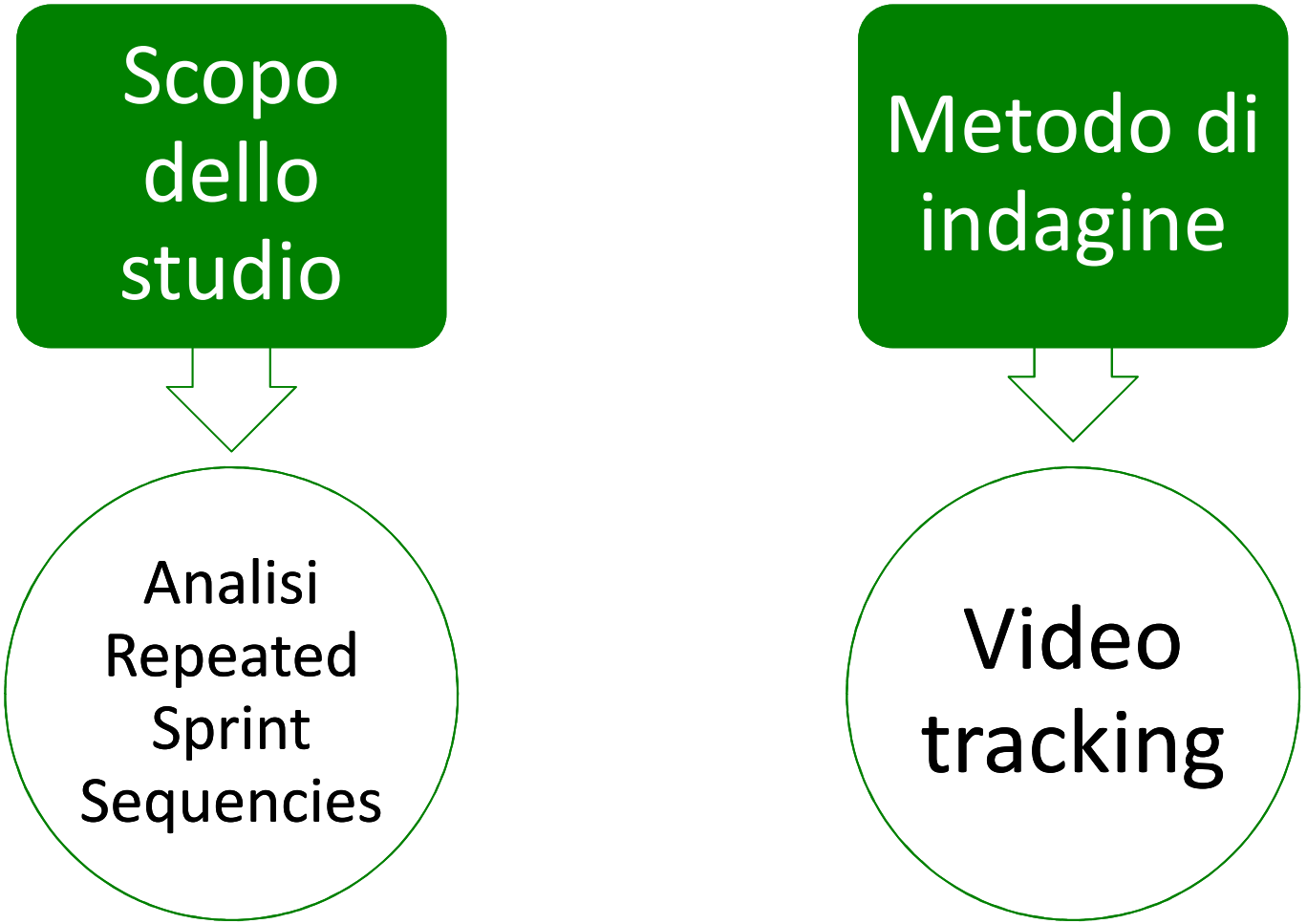
Characterization of the Sprint and Repeated-Sprint Sequences Performed by Professional Futsal Players, According to Playing Position, During Official Matches



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Protocollo

5 partite ufficiali ; n=97 giocatori

Sprint: ≥ 5,08 m s^{-1}

Repeated Sprint Sequencies:
N=2 o più sprint consecutivi con intervallo tra loro:

- 15s (RS15)
- 30s (RS30)
- 45s (RS45)
- 60s (RS60)

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Table 1 Mean (standard deviation) of the variables that represent players' sprints

	Distance Covered per Sprint (m)		Duration (s)		Peak Velocity ($m \cdot s^{-1}$)		Initial Velocity ($m \cdot s^{-1}$)		Recovery Time Between Sprints (s)		Sprint per Minute	
Positions	First	Second	First	Second	First	Second	First	Second	First	Second	First	Second
Defender	13.5 (6.1)	13.6 (6.1)	3.1 (1.2)	3.2 (1.2)	5.9 (0.7)	5.9 (0.7)	1.5 (1.3)	1.4 (1.3)	57.3 (59.0)	62.4 (66.6)	0.9 (0.3)	0.8 (0.3)
Winger	13.3 (5.6)	14.3 (6.6)	3.1 (1.1)	3.3 (1.3)	5.9 (0.7)	6.0 (0.8)	1.4 (1.2)	1.3 (1.2)	55.7 (62.4)	61.2 (68.7)	0.9 (0.4)	0.9 (0.5)
Pivot	13.2 (5.7)	13.9 (6.5)	3.1 (1.2)	3.2 (1.3)	5.9 (0.7)	6.0 (0.8)	1.4 (1.3)	1.4 (1.2)	53.3 (58.0)	68.6 (82.5)	0.8 (0.4)	0.7 (0.2)
Total	13.3 (5.7)	14.0 (6.5)	3.1 (1.2)	3.2* (1.3)	5.9 (0.7)	5.9 (0.7)	1.4 (1.2)	1.4 (1.2)	55.3 (60.5)	63.2 (71.6)	0.9 (0.4)	0.8 (0.4)

* $P < .05$, significant different from the first half.

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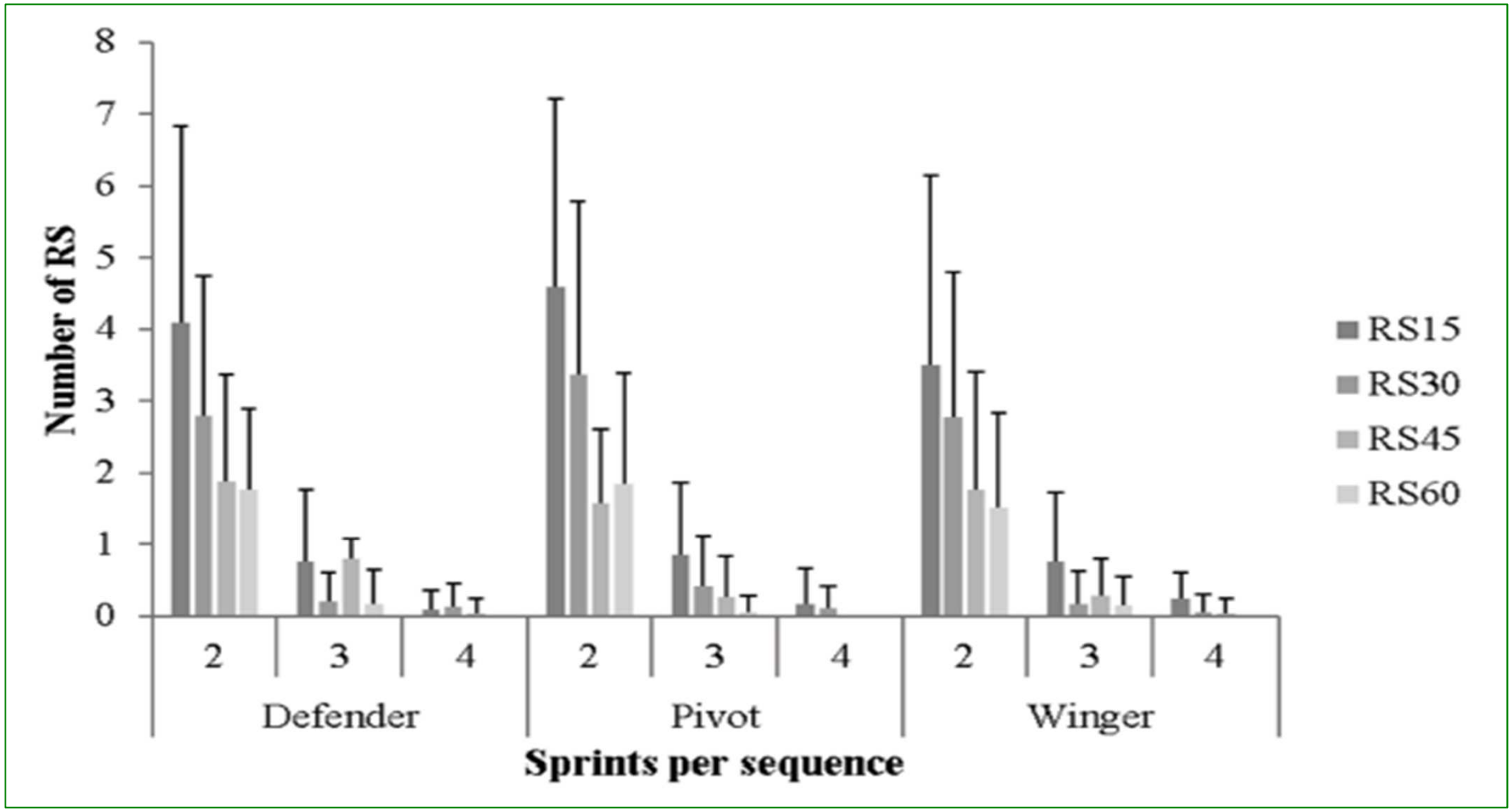

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Table 2 Total and relative frequencies of the sprint sequences

	Sprints per Sequence			
Sequence	2	3	4	Total (%)
RS15	368 (32.7%)	74 (6.6%)	17 (1.5%)	40.8
RS30	276 (24.6%)	22 (2.0%)	8 (0.7%)	27.2
RS45	167 (14.9%)	22 (2.0%)	3 (0.3%)	17.1
RS60	155 (13.8%)	12 (1.1%)	0 (0.0%)	14.9
Total (%)	85.9	11.6	2.5	100.0

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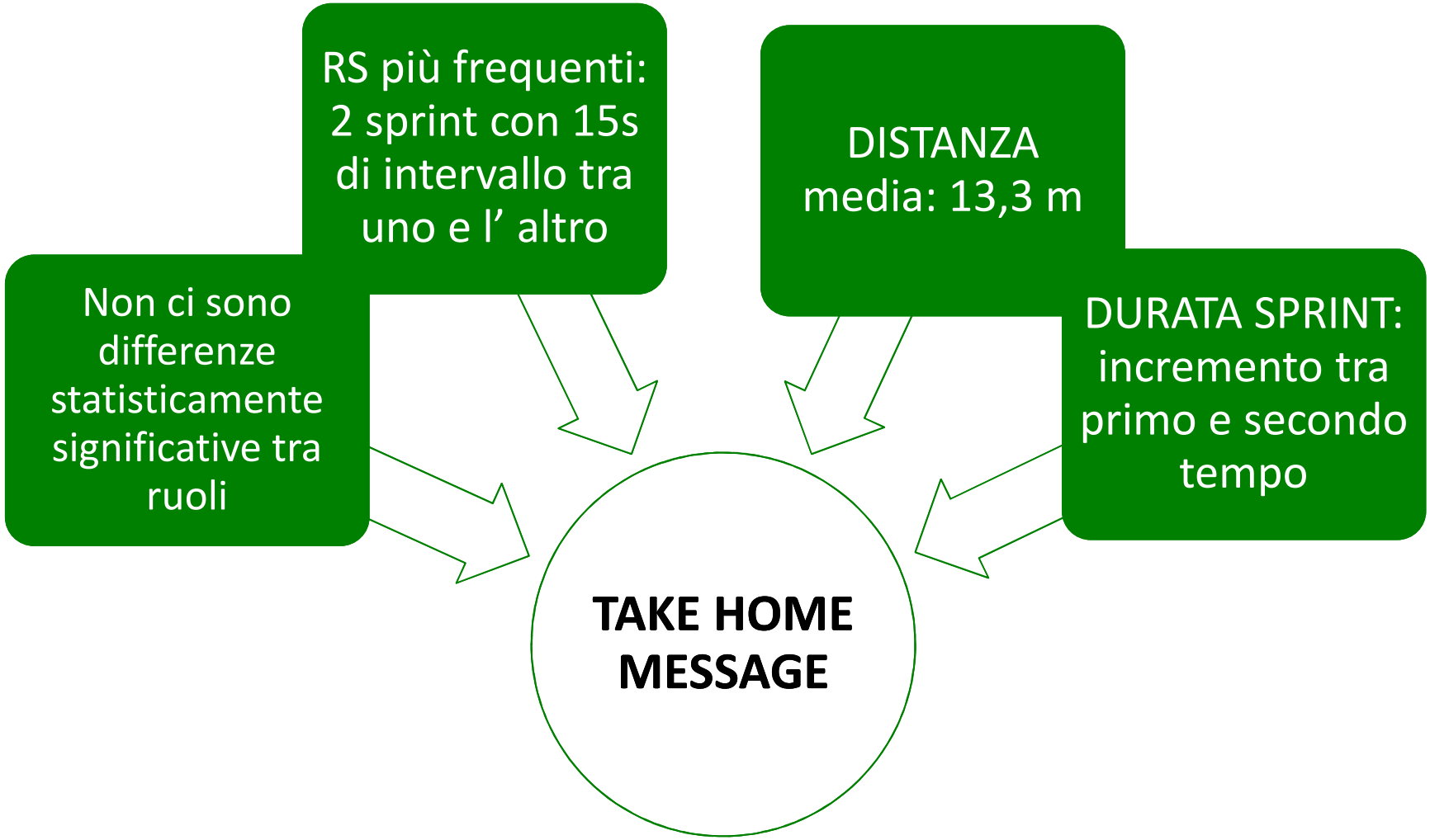

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IL PROFILO DEL GIOCATORE DI FUTSAL

Estudo	Sujeitos	Idade (anos)	Peso (Kg)	Estatura (cm)	% Gordura
Arins, Silva[16]	Nível Regional (Brasil) (n=5)	23,9 ± 3	74,1 ± 8,6	178,6 ± 4,9	10,2 ± 1,5
Avelar et al[28]	Nível Regional (Brasil) (n = 27)	24,7 ± 6,4	73,6 ± 7,6	174,8 ± 6,6	9,4 ± 2,3
Barbero e Álvares[29]	1ª Divisão da Espanha (n = 13)	26,3 ± 2,5	74,7 ± 5,7	174,7 ± 5,6	-
Barbero et al[23]	Nível Internacional (n = 13)	22,8 ± 3,5	74,3 ± 5,8	174,6 ± 5	-
Barbero et al[4]	1ª divisão da Espanha (n = 10)	25,6 ± 2	73,8 ± 5,7	175 ± 6	-
Barbero et al[30]	2ª divisão da Espanha (n = 11) 3ª divisão da Itália (n = 13)	2ª Divisão: 22,8 ± 1,5 3ª Divisão: 24,6 ± 2,7	2ª Divisão: 75,3 ± 6,3 3ª Divisão: 69,8 ± 6,6	2ª Divisão: 178 ± 7,4 3ª Divisão: 175 ± 4,2	-
Baroni et al[25]	1ª divisão do Brasil (n = 22 goleiros) (n = 164 atletas de linha)	Goleiros: 22,7 ± 5,2 Atletas de linha: 23,9 ± 5,4	Goleiros: 85,9 ± 10,2 Atletas de linha: 74,5 ± 8,1	Goleiros: 180 ± 0,05 Atletas de linha: 1,76 ± 0,06	-
Castagna et al[10]	2ª divisão Espanha (n = 8)	22,4 (18,8 – 25,3)	75,4 (59,9 – 91)	177 (159 – 195)	-
Castagna e Barbero[31]	2ª Divisão da Espanha (n =18)	20,6 ± 3,1	71,6 ± 8,5	175 ± 7,9	-
Dittrich et al[32]	1ª Divisão do Brasil (n = 12)	23,3 ± 4,1	75,4 ± 8,6	177,1 ± 6,7	9,9 ± 3,2
Dogramaci et al[9]	Seleção da Austrália (n = 8)	25,5 ± 3,8	74,8 ± 4,7	176 ± 7	-

F. Matzenbacher et al. / Demanda fisiológica no futsal competitivo. Características físicas e fisiológicas de atletas profissionais. Rev Andal Med Deporte.;7(3):122-31, 2014

IL PROFILO DEL GIOCATORE DI FUTSAL

Fereira et al[27]	Nível Regional (Brasil) (n = 15)	27,1 ± 3,6	72,7 ± 12,6	175,2 ± 6,7	13,1 ± 5,6
Freitas et al[33]	1ª Divisão do Brasil (n = 12)	24,9 ± 5,2	73,4 ± 5,7	175,8 ± 5	11,2 ± 3,7
Gorostiaga et al[34]	1ª Divisão da Espanha (n = 15)	26,2 ± 4,1	76,9 ± 10	176,7 ± 7,6	9,7 (2,5)
Heineck et al[35]	Nível Regional (Brasil) (n = 12)	21,7 ± 3,8	-	175,7 ± 4,8	10,2 ± 1,4
Jiménez et al[22]	1ª Divisão da Espanha – Nível Internacional – (n = 3 goleiros) (n = 9 atletas de linha)	Goleiros: 27,6 ± 5 Atletas de linha: 24,5 ± 3	Goleiros: 78,6 ± 6,5 Atletas de linha: 76,5 ± 6,8	Goleiros: 184 ± 2 Atletas de linha: 180 ± 12,3	-
Leal et al[36]	Nível Regional (Brasil) (n = 12)	20,9 ± 2,7	69,9 ± 5,9	176 ± 6	-
Lima et al[24]	Nível Regional (Brasil) (n = 13)	18,6 ± 1,9	68,5 ± 9,5	177,1 ± 3,5	-
Milanez et al[37]	Nível Regional (Brasil) (n = 9)	22,8 ± 2,2	70,6 ± 6,4	174,3 ± 6	-
Moreira et al[38]	1ª Divisão do Brasil (n = 10)	24 ± 3	73 ± 9	174 ± 5	
Nunes et al[39]	1ª Divisão do Brasil (n = 11)	24,1 ± 2,4	78,6 ± 10,3	178 ± 0,03	12,3 ± 4
Rodrigues et al[15]	1ª Divisão do Brasil (n = 14)	22,5 ± 3,1	Pré: 70 ± 6,3 Pós: 69,7 ± 5,6	172,8 ± 5,5	Pré: 10,0 ± 2,4 Pós: 9,6 ± 2,4
Silva et al[40]	1ª Divisão do Brasil (n = 14)	18 – 20	76,9 ± 8,7	177,5 ± 6,6	
Soares et al[26]	Nível Regional (Brasil) (n = 11)	24,3 ± 4,5	72,7 ± 3,8	177,8 ± 3,8	8,5 ± 2,66

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IL PROFILO DEL GIOCATORE DI FUTSAL

Estudo	Sujeitos	VO_{2max}
Arins et al.[16]	Nível Regional (Brasil) (n = 5)	52,6 ± 3,1
Barbero et al.[30]	2ª divisão da Espanha (n = 11)	2ª divisão: 62,8 ± 5,3
Baroni et al.[25]	3ª divisão da Itália (n = 13) 1ª divisão do Brasil (n = 22 goleiros) (n = 164 atletas de linha)	3ª divisão: 55,2 ± 5,7 Goleiros: 50,6 ± 5,24 Atletas de linha: 59 ± 5,8
Castagna et al.[10]	2ª divisão da Espanha (n = 8)	64,8 (53,8 – 75,8)
Castagna e Barbero[31]	2ª Divisão da Espanha (n = 18)	65,1 ± 6,2
Dittrich et al.[32]	1ª Divisão do Brasil (n = 12)	59,9 ± 5,2
Leal et al.[46]	Nível Regional (Brasil) (n = 12)	55,7 ± 3,7
Lima et al.[24]	Nível Regional (Brasil) (n = 13)	62,8 ± 10,1
Milanez et al.[37]	Nível Regional (Brasil) (n = 9)	59,6 ± 2,5
Nunes et al.[39]	1ª Divisão do Brasil (n = 11)	62,5 ± 4,3
Rodrigues et al.[15]	1ª divisão do Brasil (n = 14)	Pré: 71,5 ± 5,9 Pós: 67,6 ± 3,5

F. Matzenbacher et al. / Demanda fisiológica no futsal competitivo. Características físicas e fisiológicas de atletas profissionais. Rev Andal Med Deporte.;7(3):122-31, 2014

Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status

Scopo dello studio

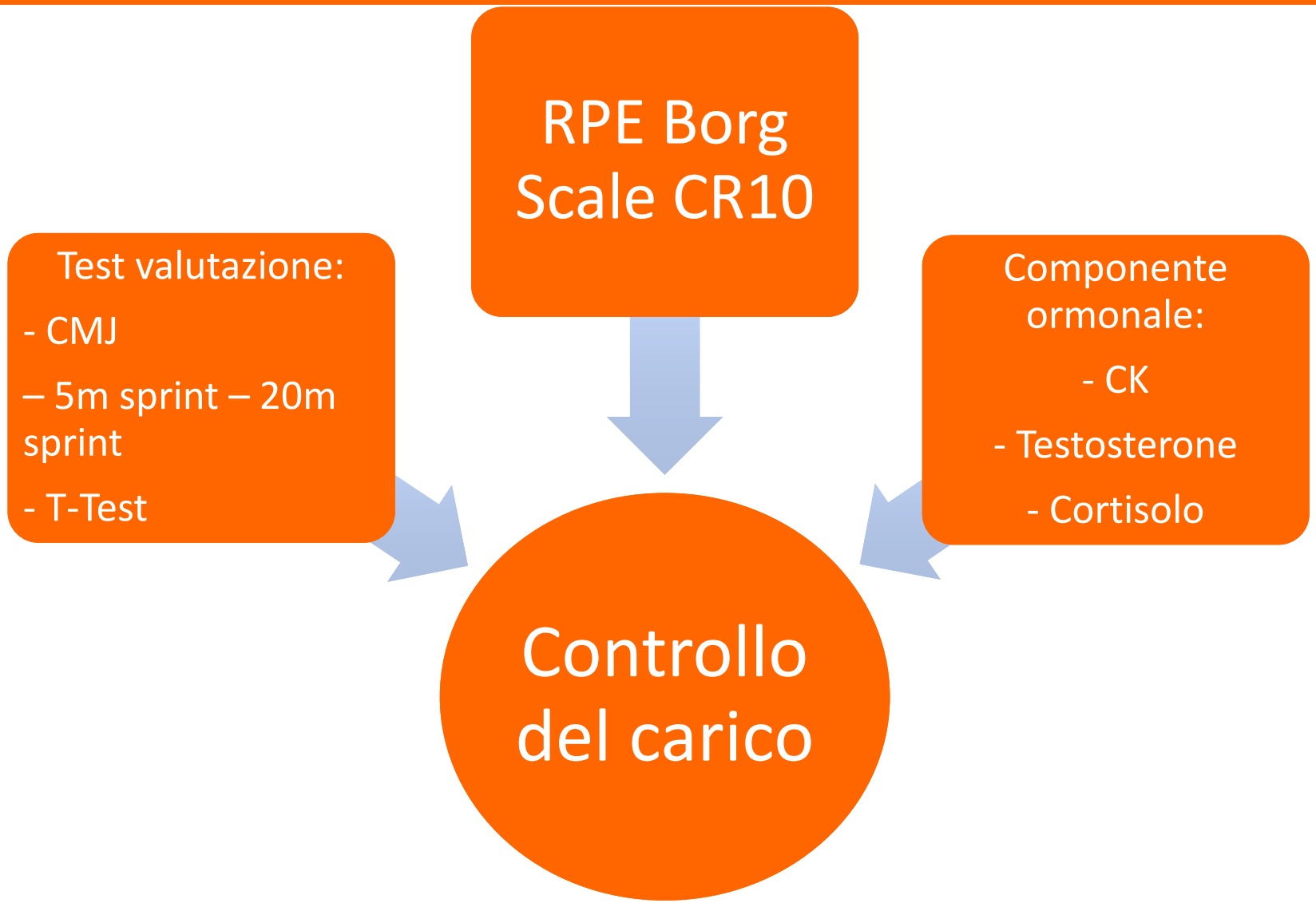
Descrizione della distribuzione del carico di lavoro durante una stagione nel Futsal brasiliano

Metodo di indagine

Studio comparativo longitudinale

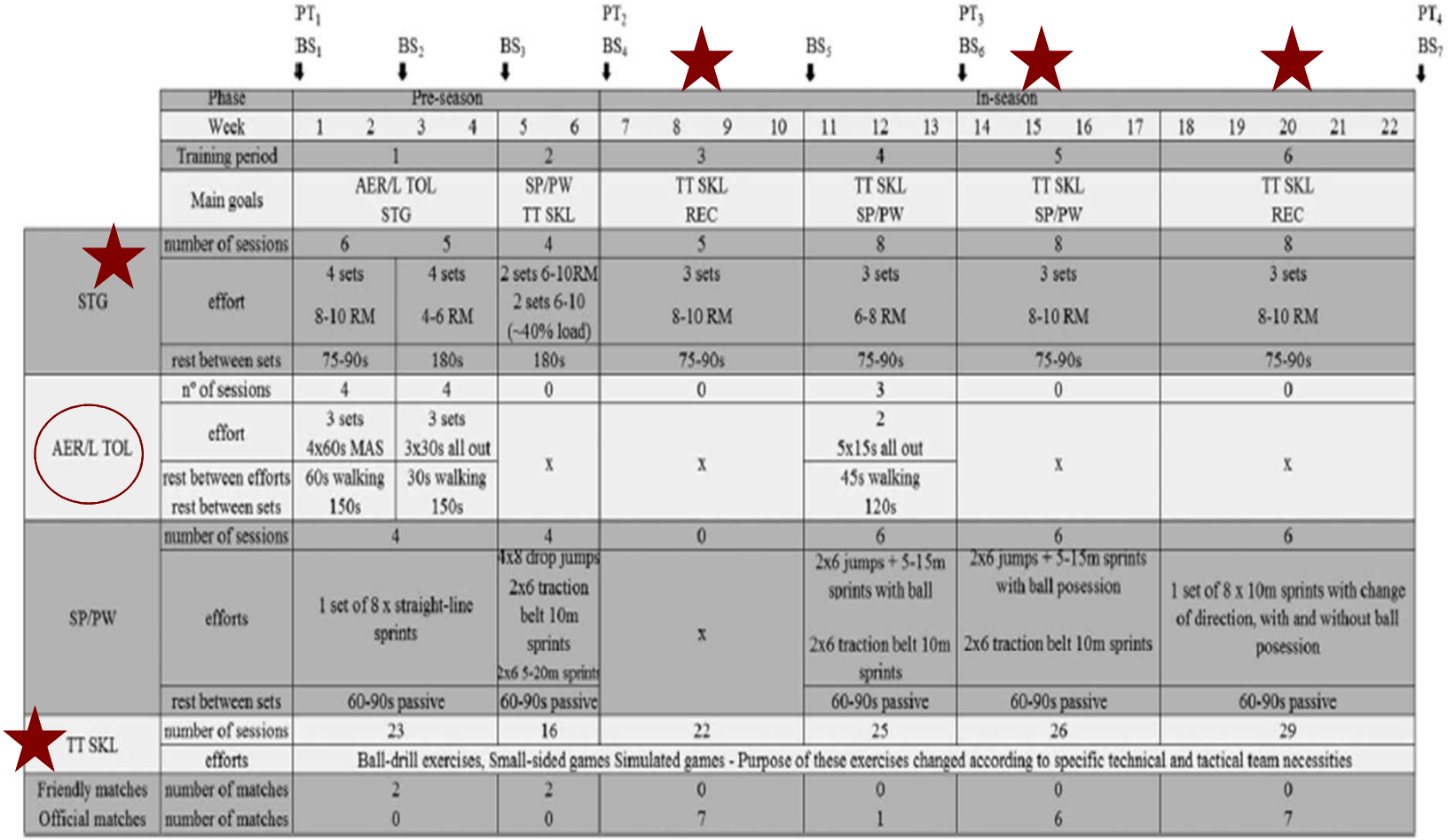
Miloski B et al. Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status. J Strenght Cond Res 30, 6, 1525-1533, 2015

Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status



Miloski B et al. Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status. J Strenght Cond Res 30, 6, 1525-1533, 2015

Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status



		PT1 BS1		BS2		BS3	PT2 BS4			BS5			PT3 BS6				PT4 BS7				
	Phase	Pre-season					In-season														
	Week	1	2	3	4	5 6	7	8	9 10	11	12	13	14	15	16	17	18	19	20	21	22
	Training period	1				2	3			4			5				6				
	Main goals	AER/L TOL STG				SP/PW TT SKL	TT SKL REC			TT SKL SP/PW			TT SKL SP/PW				TT SKL REC				
STG	number of sessions	6		5		4	5			8			8				8				
	effort	4 sets 8-10 RM		4 sets 4-6 RM		2 sets 6-10RM 2 sets 6-10 (~40% load)	3 sets 8-10 RM			3 sets 6-8 RM			3 sets 8-10 RM				3 sets 8-10 RM				
	rest between sets	75-90s		180s		180s	75-90s			75-90s			75-90s				75-90s				
AER/L TOL	n° of sessions	4		4		0	0			3			0				0				
	effort	3 sets 4x60s MAS		3 sets 3x30s all out		x	x			2 5x15s all out			x				x				
	rest between efforts	60s walking		30s walking						45s walking											
	rest between sets	150s		150s						120s											
SP/PW	number of sessions	4				4	0			6			6				6				
	efforts	1 set of 8 x straight-line sprints				4x8 drop jumps 2x6 traction belt 10m sprints 2x6 5-20m sprints	x			2x6 jumps + 5-15m sprints with ball 2x6 traction belt 10m sprints			2x6 jumps + 5-15m sprints with ball posession 2x6 traction belt 10m sprints				1 set of 8 x 10m sprints with change of direction, with and without ball posession				
	rest between sets	60-90s passive				60-90s passive				60-90s passive			60-90s passive				60-90s passive				
TT SKL	number of sessions	23				16	22			25			26				29				
	efforts	Ball-drill exercises, Small-sided games Simulated games - Purpose of these exercises changed according to specific technical and tactical team necessities																			
Friendly matches	number of matches	2				2	0			0			0				0				
Official matches	number of matches	0				0	7			1			6				7				

Figure 1. Training program overview. PT = physical tests; BS = blood sample collection; TS = training sessions; STG = strength; AER/L TOL = aerobic/lactate tolerance fitness; SP/PW = speed/power; TT SKL = technical and tactical skills.

Miloski B et al. Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status. J Strenght Cond Res 30, 6, 1525-1533, 2015

Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status

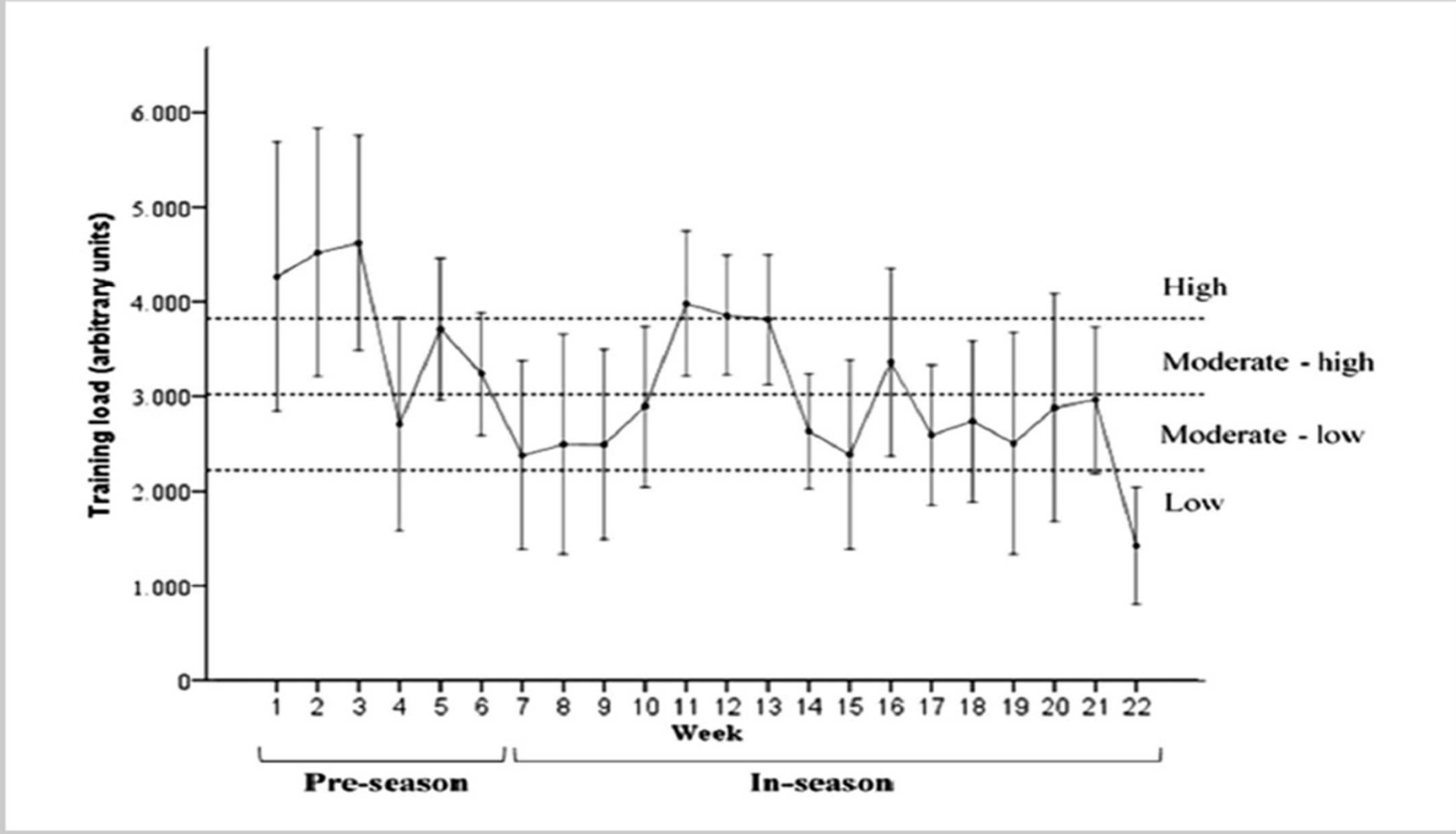


Figure 2. Weekly TL distribution throughout a season in elite futsal players.

Miloski B et al. Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status. J Strenght Cond Res 30, 6, 1525-1533, 2015

Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status

Table 1. Magnitude-based inference analysis of physical performance throughout a season of high-level futsal players.*†

	PT_1	PT_2	PT_3	PT_4
CMJ	47.5 ± 5.5	47.8 ± 6.1	49.1 ± 6.2‡	49.8 ± 6.2‡
5-m sprint	1.10 ± 0.08	1.08 ± 0.05§	1.04 ± 0.07‖	1.00 ± 0.04¶
20-m sprint	3.14 ± 0.11	3.09 ± 0.11‡	3.03 ± 0.13‖	3.00 ± 0.07¶
T-test	9.24 ± 0.31	8.75 ± 0.30¶	8.71 ± 0.22¶	8.56 ± 0.22¶
$\dot{V}o_2max$	49.5 ± 3.5	52.3 ± 3.7¶	53.4 ± 2.8¶	53.3 ± 2.9¶

*PT = physical tests; CMJ = countermovement jump; $\dot{V}o_2max$ = Maximal oxygen uptake.
†Differences for PT_1.
‡75–95%, likely.
§25–75%, possible.
‖95–99%, very likely.
¶>99%, almost certain.

Table 2. Creatine kinase activity and hormonal status throughout a season of high-level futsal players.*

	BS_1	BS_2	BS_3	BS_4	BS_5	BS_6	BS_7
Creatine kinase ($U \cdot L^{-1}$)	156.8 ± 57.1	266.3 ± 184.7†	246.9 ± 115.2	179.3 ± 71.1	200.4 ± 67.1	201.1 ± 97.4	215.6 ± 97.4
Testosterone ($pg \cdot ml^{-1}$)	21.6 ± 2.3	23.7 ± 3.9	23.1 ± 3.0	23.1 ± 3.5	22.5 ± 3.9	24.0 ± 3.7	21.9 ± 3.7
Cortisol ($\mu g \cdot dl^{-1}$)	14.2 ± 2.0	12.3 ± 2.2	14.5 ± 3.5	12.9 ± 2.9	16.8 ± 4.0‡	14.9 ± 4.0	15.8 ± 2.8
T:C ratio	1.5 ± 0.2	2.0 ± 0.4†	1.7 ± 0.4	1.9 ± 0.6	1.4 ± 0.3‡	1.7 ± 0.5	1.4 ± 0.3

*BS = blood sample collection; T:C = testosterone to cortisol ratio.
†Different to BS_1.
‡Different to previous measurement ($p \leq 0.05$).

Miloski B et al. Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status. J Strenght Cond Res 30, 6, 1525-1533, 2015

Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status

Post periodo di preparazione precampionato valori di VO_{2max} migliorati (5,7%) → adattamento ad un carico di allenamento elevato con obiettivo specifico

TAKE HOME MESSAGE

Durante la fase di preparazione CMJ, 5m sprint e 20m sprint non hanno avuto un miglioramento significativo (che poi avviene durante la stagione)

Miloski B et al. Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status. J Strenght Cond Res 30, 6, 1525-1533, 2015

Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status

CK, dopo un incremento iniziale post preparazione pre-campionato, ha un andamento costante durante la stagione → i giocatori hanno la capacità di sostenere il carico di lavoro/partite

TAKE HOME MESSAGE

Rapporto T:C rimane costante durante l' anno → il giocatore di futsal ha grandi capacità di sostenere lunghi periodi di stress agonistico

Miloski B et al. Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status. J Strenght Cond Res 30, 6, 1525-1533, 2015

Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status

Programmazione: Endurance e Forza in pre-season e Velocità e Potenza durante la stagione

?

TAKE HOME MESSAGE

Importanza del controllo e della valutazione dell' allenamento →

somministarzione di squadra /risposta individuale

Miloski B et al. Seasonal training load distribution of professional futsal players: effects on physical fitness, muscle damage and hormonal status. J Strenght Cond Res 30, 6, 1525-1533, 2015

AGILITY

Classificazioni, considerazioni metodologiche e test di valutazione

Agility

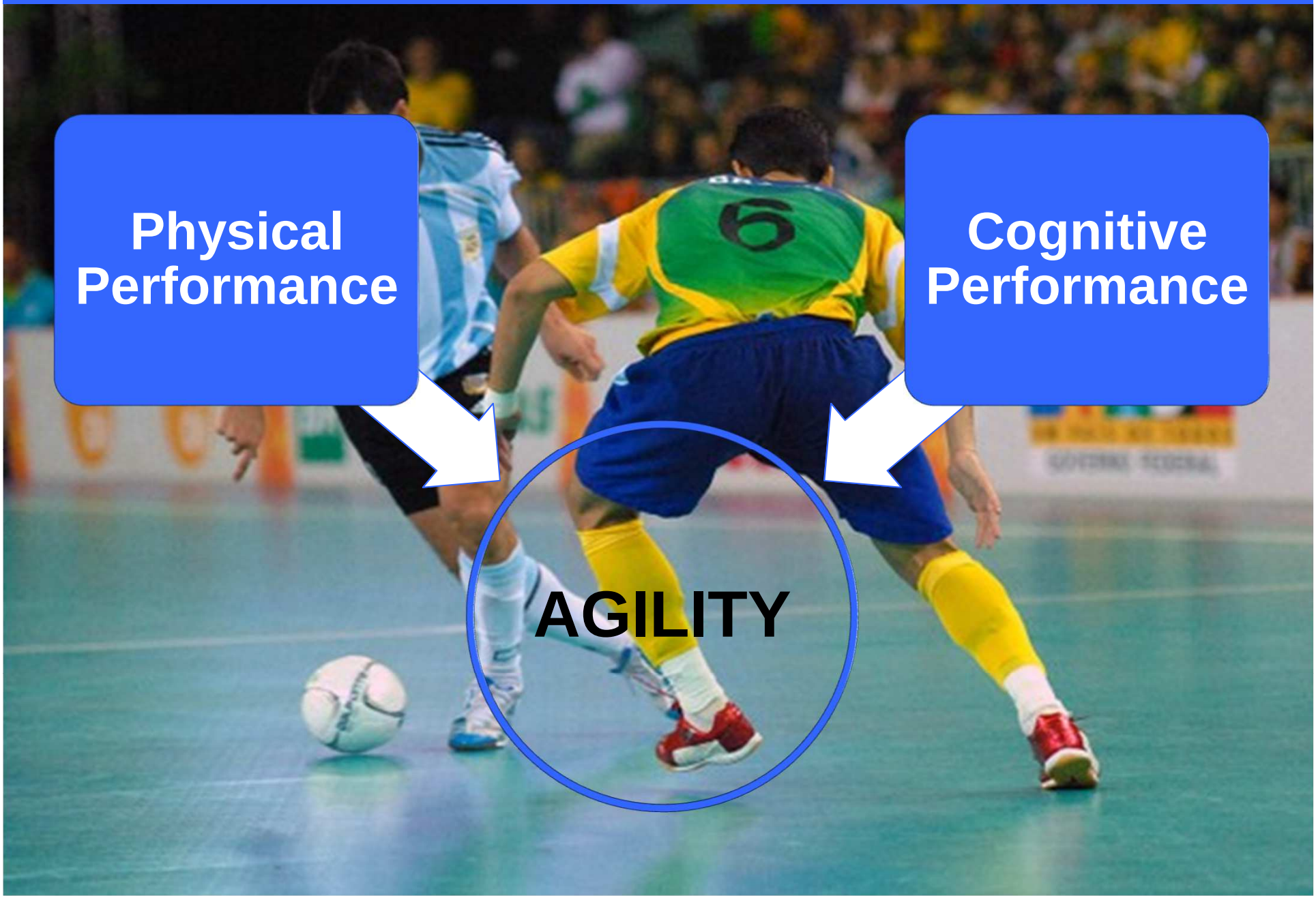
L'agilità è costituita da due fattori fondamentali, la velocità nel cambio di direzione e l'aspetto cognitivo"

(Young et al., 2002)

"Rapido movimento del corpo con cambio di velocità e direzione in risposta ad uno stimolo"

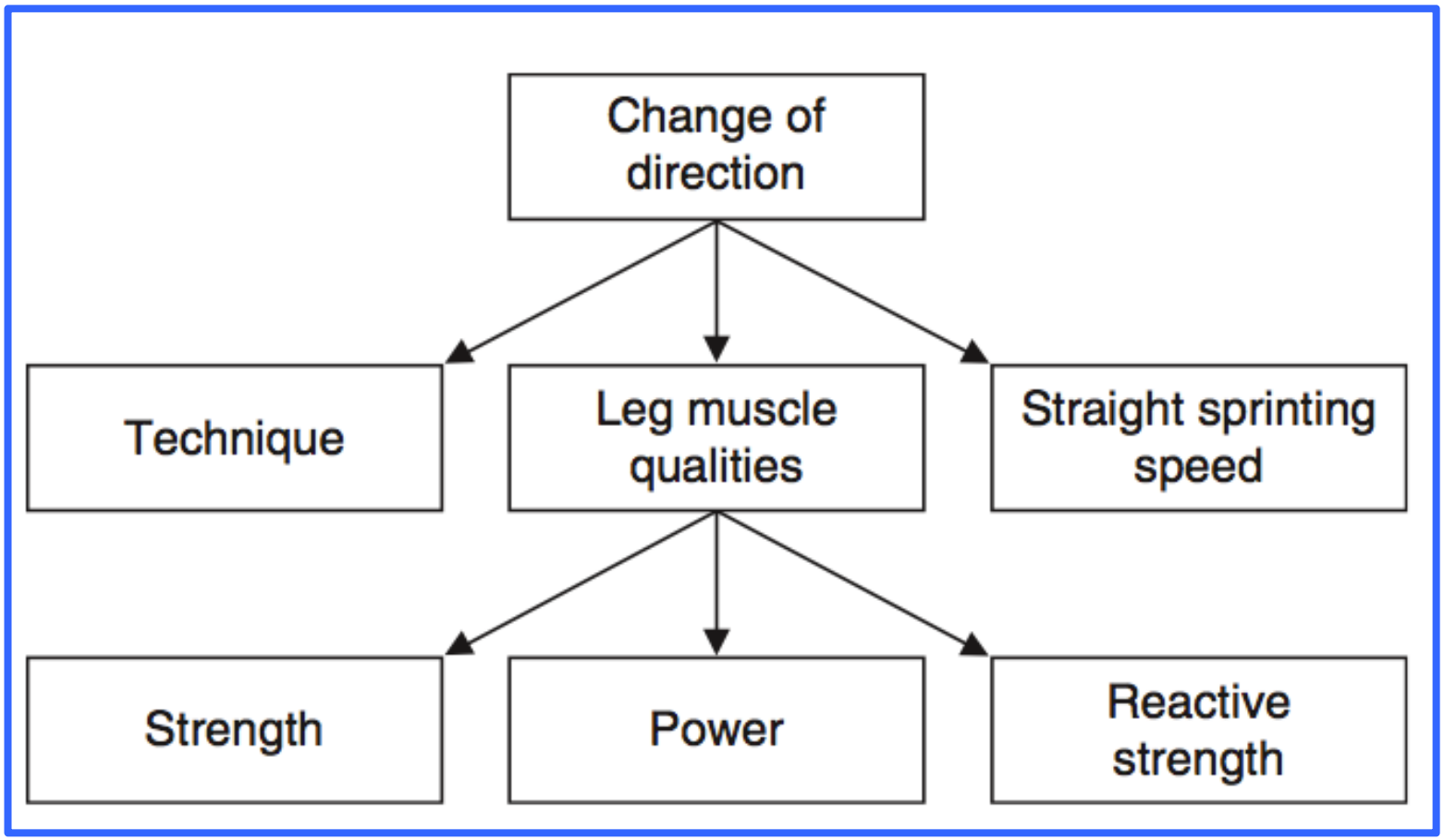
(Sheppard et al., 2006)

Agility



Agility

Physical Performance

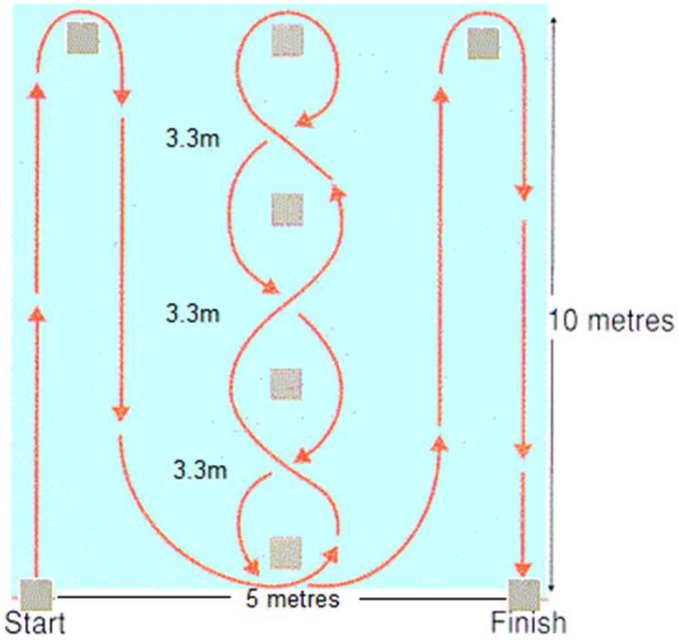


(Brughelli et al., 2008)

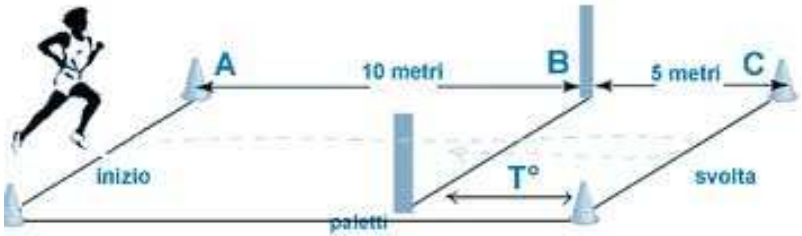
Agility

Test di Valutazione

Illinois Agility Test
(Miller M. et al. 2006)



505 Test
(Draper J.A., and M.G. Lancaster, 1985)



T-Test
(Pauole K. et al. 2000)

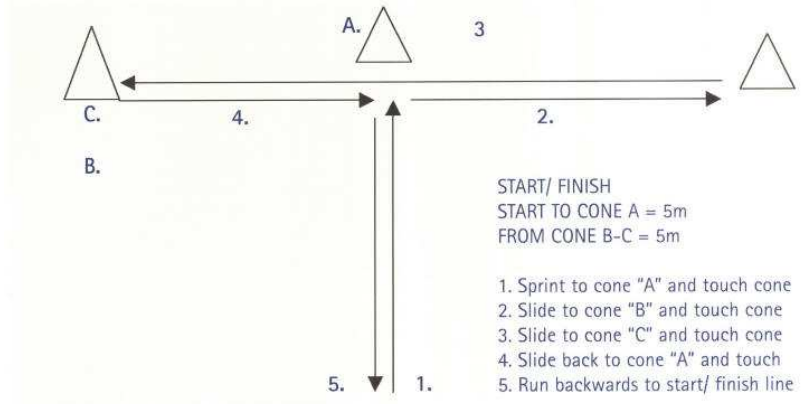


Figure 1: The T-drill

Agility

Test di Valutazione

15-m Agility Run

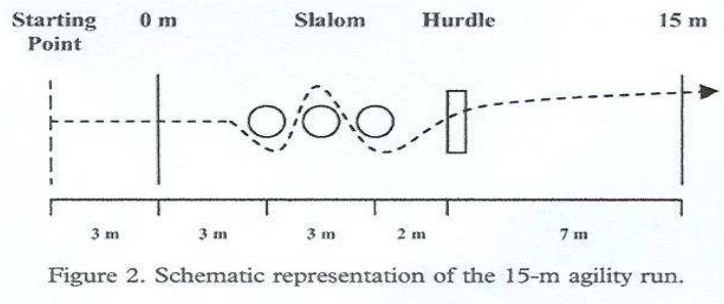
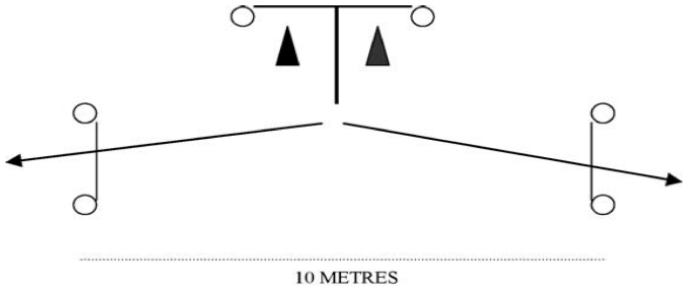


Figure 2. Schematic representation of the 15-m agility run.

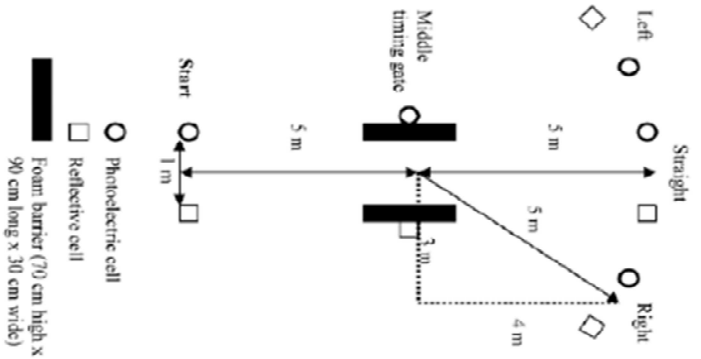
Change of Direction Speed Test

(Sheppard J.M. et al., 2006)



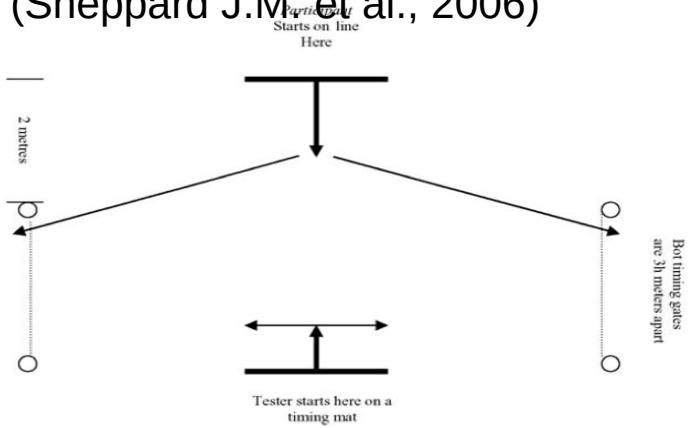
Reactivity Agility Sprint Speed

(Oliver J. L. & Meyers R. W., 2009)



Reactive Agility Test (RAT)

(Sheppard J.M. et al., 2006)



Agility

Correlational Research

Maximal Leg Strength

Non ci sono correlazioni statisticamente significative tra squat isoinerziale (1RM eseguita al Multipower) e COD

(Markovic. 2007)

Non ci sono correlazioni statisticamente significative tra squat (1RM eseguito con bilanciere) COD (valutata con T-TEST)

(Peterson et al. 2006)

Leg Power

Gli studi riportati in letteratura indicano che vi è una correlazione moderata ($r \approx 0,4$; valore medio) tra altezza di salto misurata attraverso il salto verticale e COD

(Brughelli et al. 2008)

Straight Sprinting Speed

Vi è una bassa correlazione tra la velocità lineare e la velocità di eseguire COD

(Sheppard & Young. 2006; Young et al. 1996)

Agility

Training studies

J Strength Cond Res. 2005 Feb;19(1):76-8.

Specificity of acceleration, maximum speed, and agility in professional soccer players.

Little T, Williams AG.

Abstract

High-speed actions are known to impact soccer performance and can be categorized into actions requiring maximal speed, acceleration, or agility. Contradictory findings have been reported as to the extent of the relationship between the different speed components. This study comprised 106 professional soccer players who were assessed for 10-m sprint (acceleration), flying 20-m sprint (maximum speed), and zigzag agility performance. Although performances in the three tests were all significantly correlated ($p < 0.0005$), coefficients of determination ($r(2)$) between the tests were just 39, 12, and 21% for acceleration and maximum speed, acceleration and agility, and maximum speed and agility, respectively. **Based on the low coefficients of determination, it was concluded that acceleration, maximum speed, and agility are specific qualities and relatively unrelated to one another. The findings suggest that specific testing and training procedures for each speed component should be utilized when working with elite players.**

Agility

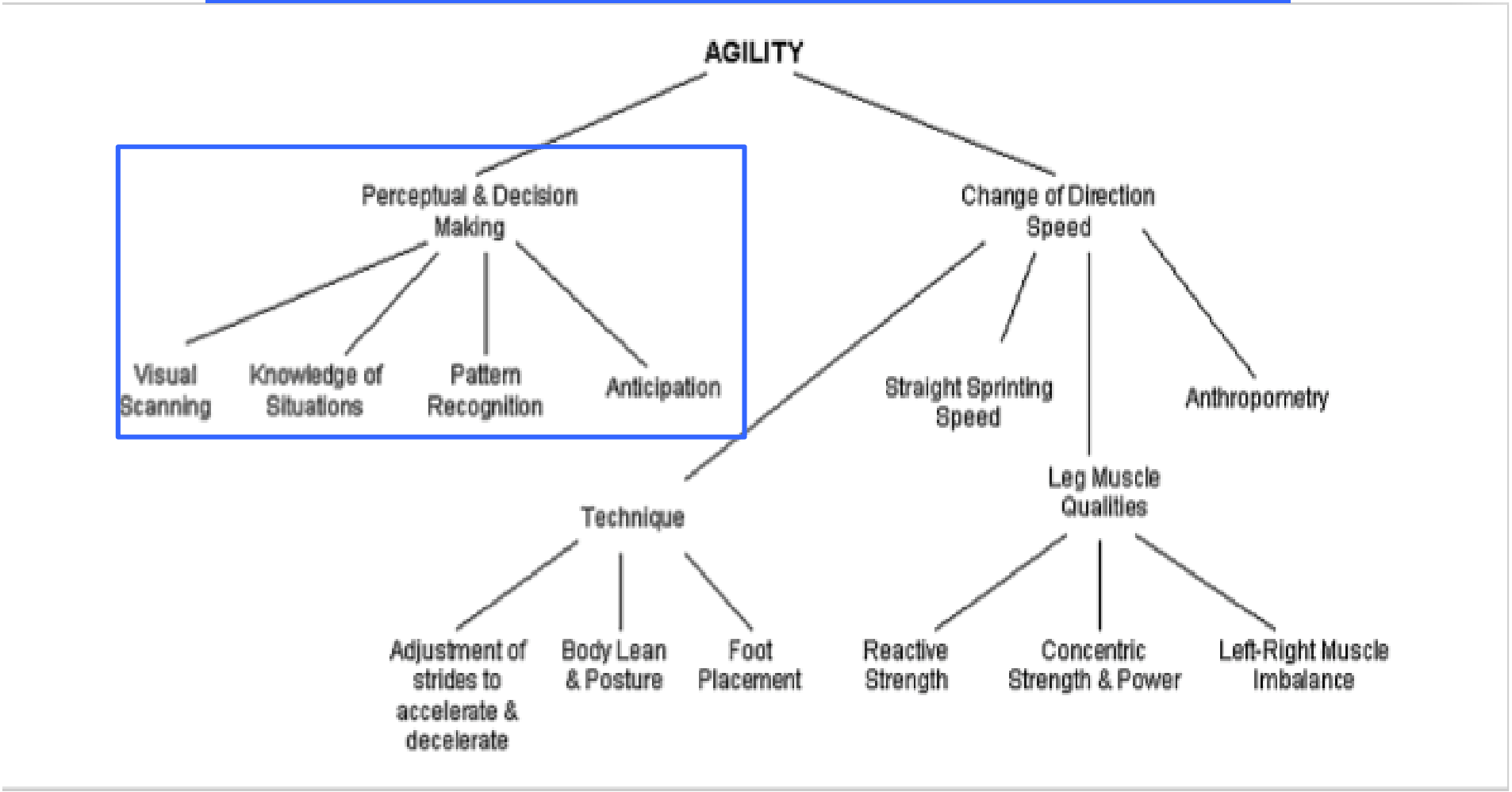
Cognitive Performance

*"**La prestazione calcistica** è caratterizzata da una serie di fattori che la rendono un fenomeno complesso e multifattoriale. Infatti, come sport di situazione, il calcio prevede abilità tecniche che presentano una natura "**open**" piuttosto che "closed" e in esso la prestazione si configura mediante una serie di operazioni sia mentali sia motorie e l'**anticipazione** e la **percezione** dei dettagli dell'ambiente sono fondamentali per i **processi decisionali** ed **esecutivi**, così come quelli **interpretativi**."*

(D'Ottavio, 2011)

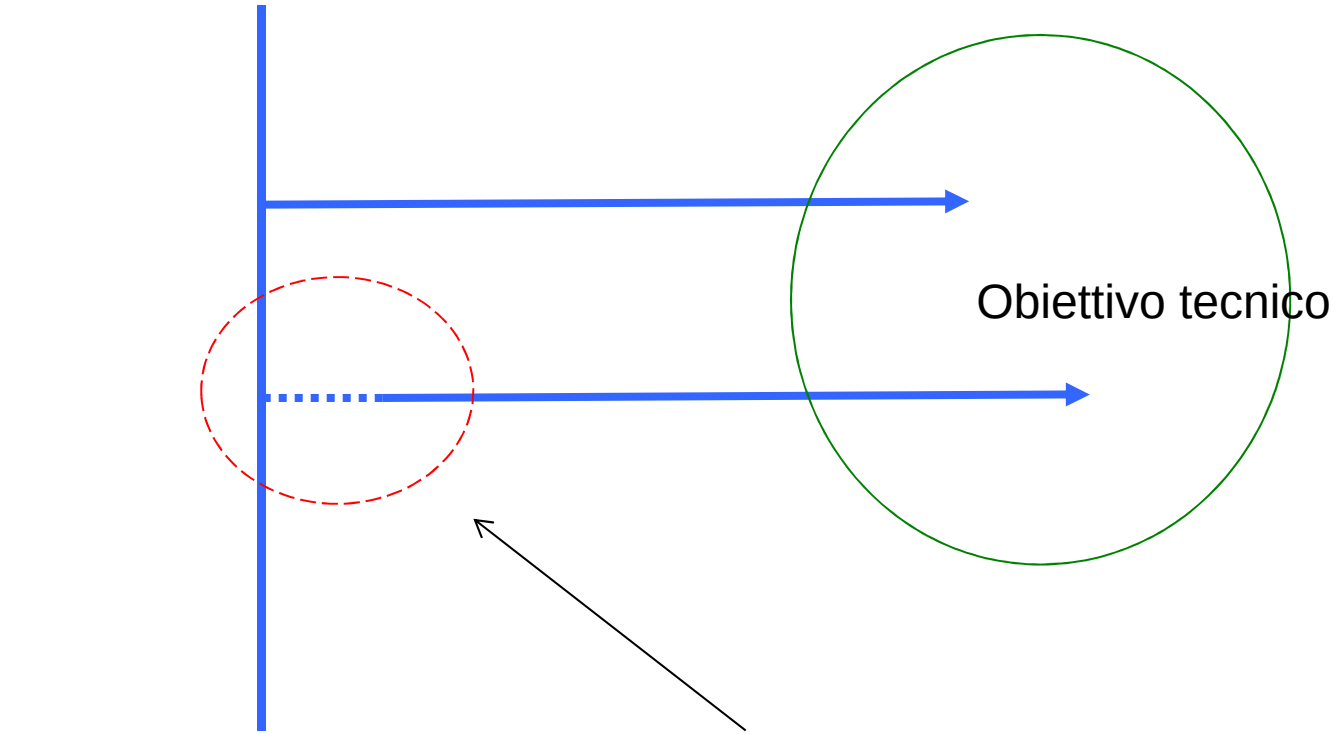
Agility

Cognitive Performance



(Modificato da Young 2002, in: Serpell et al. 2011)

Occorre partire prima!!!!



...Ricercare la “falsa partenza”

(da D’Ottavio S.)

Agility

FOCUS: l’ anticipazione

L’ anticipazione è il piano di organizzazione mentale e motoria elaborato in termini di probabilità.

L’ anticipazione è la capacità di vedere e conoscere in anticipo il senso dell’ azione, di un comportamento tecnico, generalmente fondata sull’ analisi dei “segni” e “specificità” del gioco, delle situazioni, degli esercizi, dei compagni di squadra, degli avversari, della posizione della palla…

(D’Ottavio, 2011)

Agility

FOCUS: l’ anticipazione

FATTORE TEMPO

In allenamento:

AVERE MENO TEMPO PER ANALIZZARE LA SITUAZIONE

VELOCITA’ MENTALE SIA PRIMA CHE DURANTE L’ ESECUZIONE

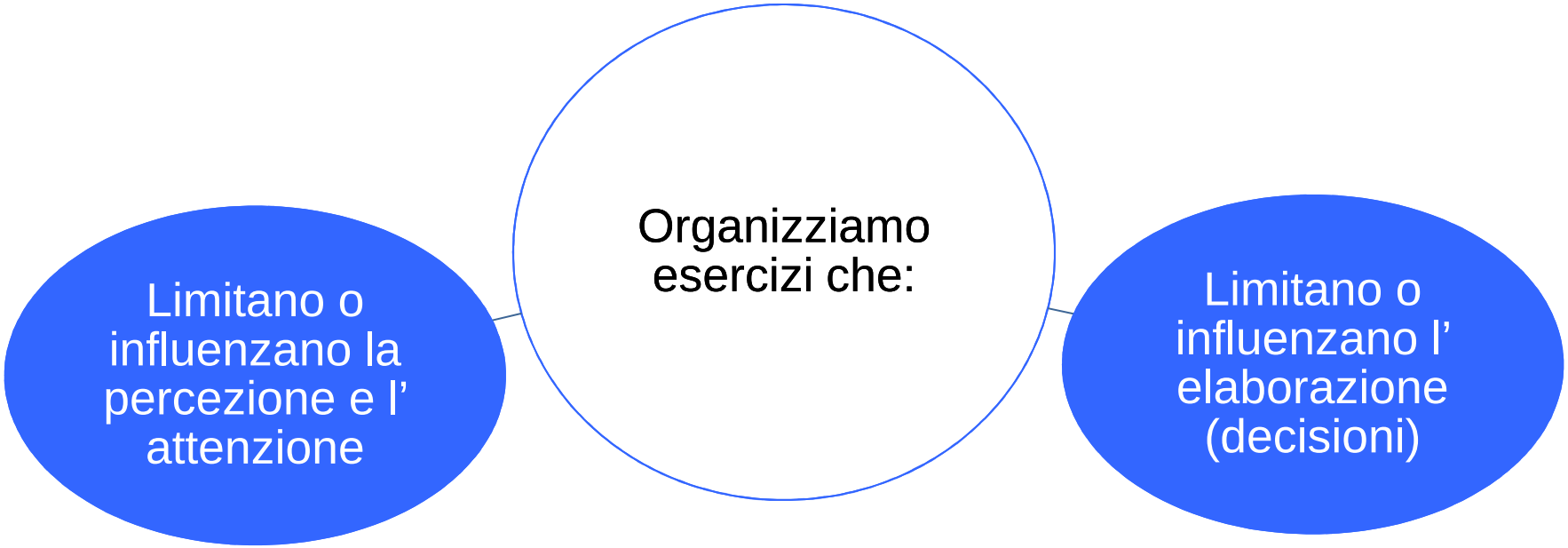
Nella gara ciò è determinato dalla pressione e dalla presenza dell’ avversario

(da D’Ottavio, 2011, modificato)

Agility

FOCUS: l’ anticipazione

Come alleniamo l’ anticipazione?



(da D’Ottavio, 2011, modificato)

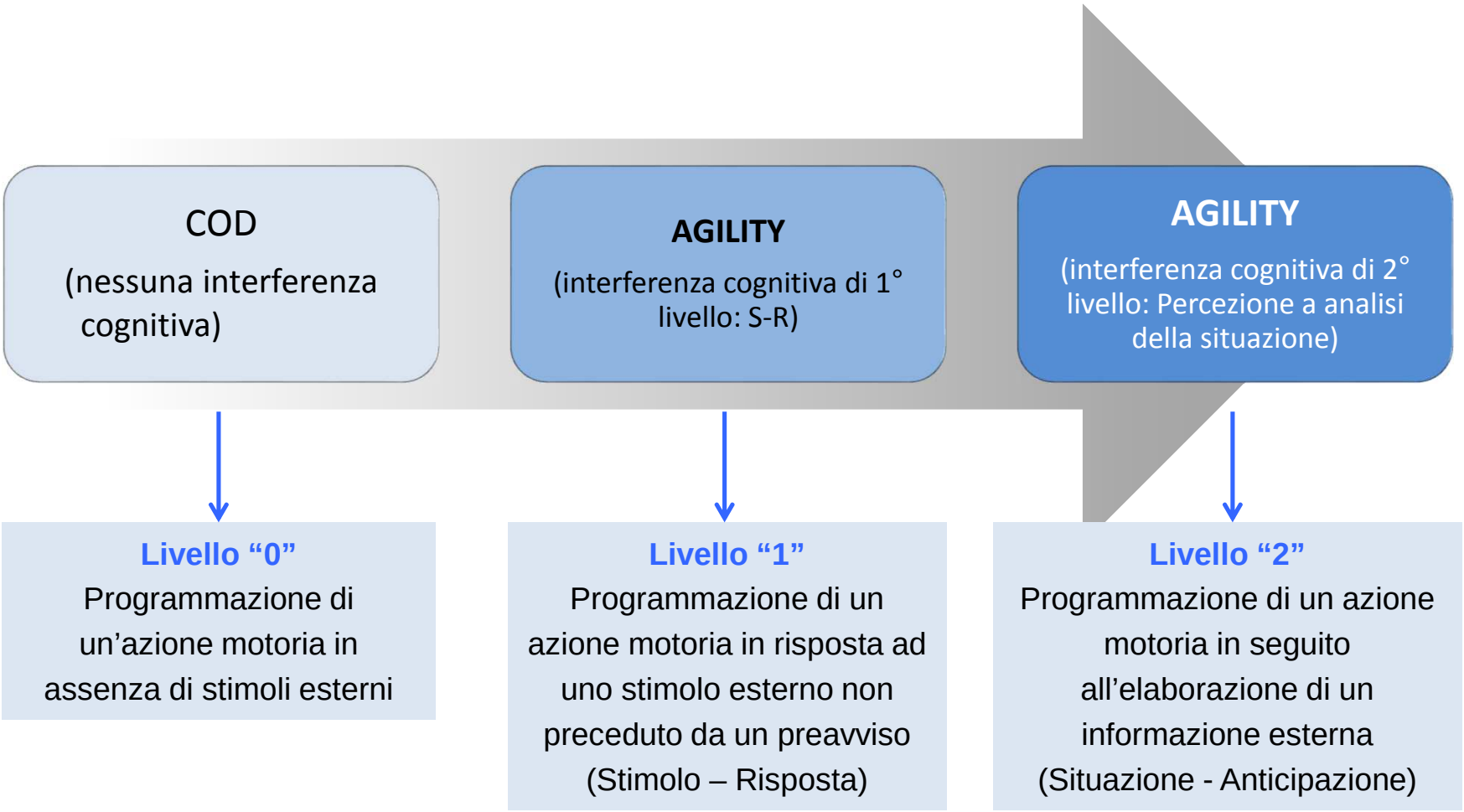
Agility

FOCUS: l’ anticipazione

(da D’Ottavio, 2011, modificato)

Agility

Applicazione pratica



(D’Ottavio, 2011)

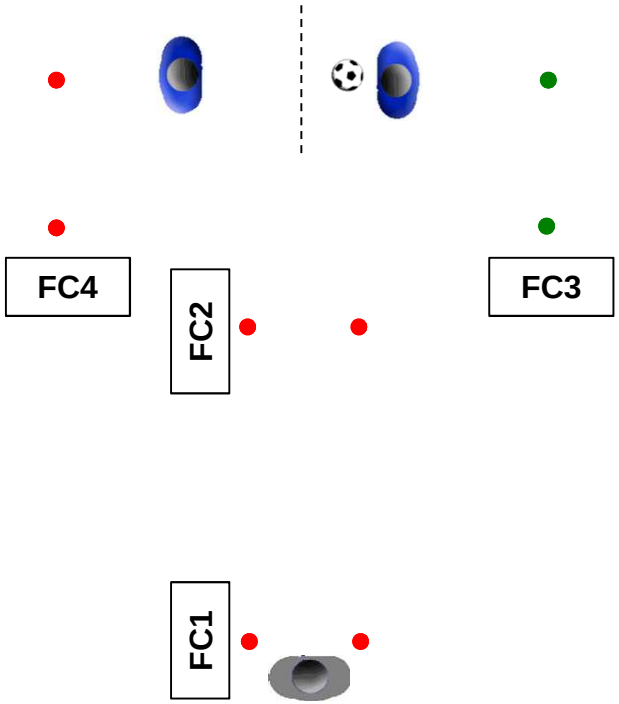
Agility

DISEGNO SPERIMENTALE

COD “Read & React” (Passaggio)

Interferenza Cognitiva:

Livello “2”



(D’Ottavio, 2011)

Agility

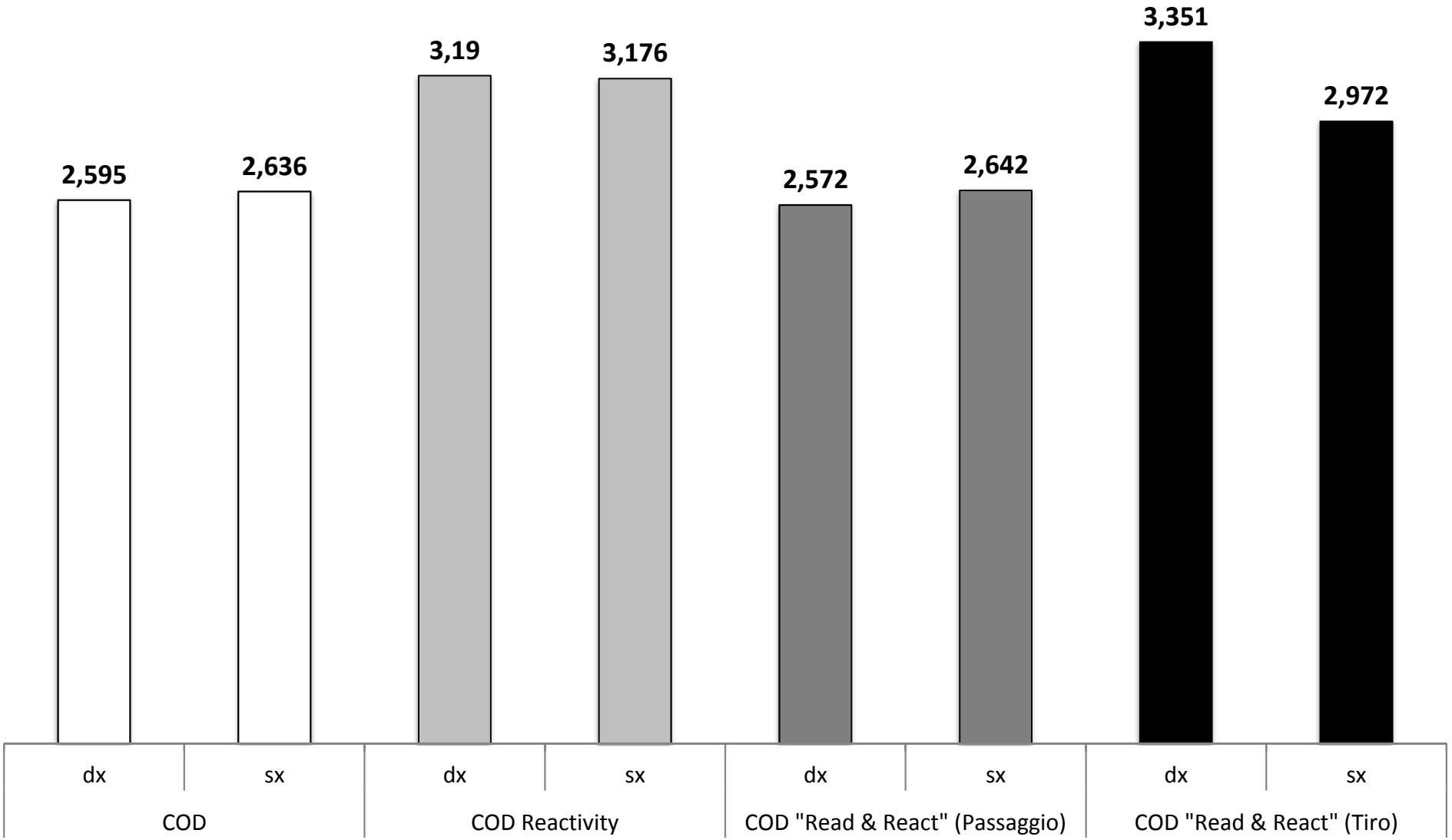
RISULTATI

Tabella 1. *Risultati ottenuti nelle diverse prove*

	COD		COD Reactivity		COD "Read & React" (Passaggio)	
	dx	sx	dx	sx	dx	sx
N° prove	3	3	2	2	5	2
Best	2,595	2,636	3,19	3,176	2,572	2,642
Media	2,659	2,738	3,223	3,634	2,843	2,765
DS	0,06	0,09	0,05	0,65	0,30	0,17

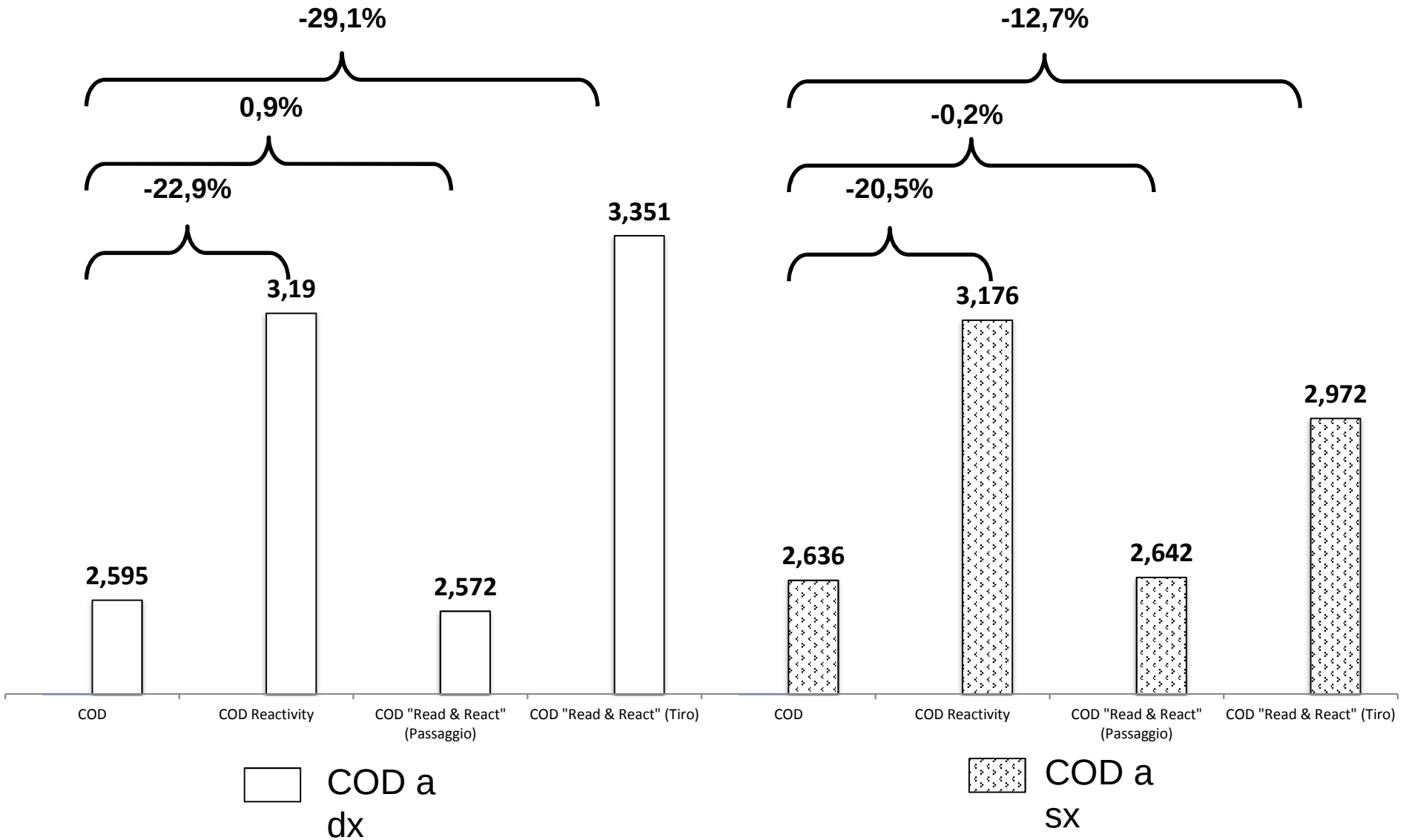
Agility

Miglior tempo registrato nelle diverse tipologie di prove (s)



Agility

Differenza % nelle diverse tipologie di prove



Agility

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RSA
(REPEATED SPRINT ABILITY)

Classificazioni, considerazioni metodologiche e test di valutazione

Repeated sprint ability (RSA)

Definizioni di RSA

- L'abilità di produrre la miglior prestazione media su una serie di sprint (≤ 10 secondi), separati da brevi (≤ 60 secondi) periodi di recupero (Bishop)
- È l'abilità di ripetere brevi periodi di sprint con un breve recupero tra essi (Thébault)
- RSA (Repeated Sprint Ability) si intende l'abilità di reiterare sprint con ridotto decremento della prestazione: può essere definita come la capacità di sprintare, accelerare e svolgere movimenti brevi ad alta intensità, quindi recuperare e sprintare ancora (D'Ottavio)
- È l'abilità di fornire prestazioni di sprint con un minor decremento della prestazione massima (Bishop)

Repeated sprint ability (RSA)

Focus: età

- In uno studio di Mujika et al. (2009), che ha indagato la RSA in differenti fasce di età in 134 giovani giocatori di calcio (U-11: n=22; U-12:n=17; U-13: n=15; U-14 n=16; U-15: n=19; U-16: n=17; U-17: n=17; U-18: n=11)
- Test di RSA 6x30 m con recupero attivo di 30".
- Tempo totale (TT), percentuale di decremento Dec%)
- I **risultati** suggeriscono che le prestazioni di RSA, nel TT, migliorano durante la maturazione e marcatamente dagli U-11 a U-15 ($p<0.05$), e in maniera più lentamente in seguito ($p<0.05$)

- In uno studio di Wierike SC. et al. (2013), si sono testati 48 giocatori di basket d'elitè di età compresa tra 14-19 anni. Gli atleti sono stati testati in 6 occasioni durante le stagioni 2008-09 e 2009-10.

- Si è riscontrato come l'abilità di RSA migliora con l'età, maggiormente tra i 14-17 anni ($p<0.05$) raggiungendo un plateau tra i 17-19 anni.

Repeated sprint ability (RSA)

Focus: livello di qualificazione

In uno studio effettuato da Aziz et al. (2008), che ha indagato la differenza tra giocatori professionisti, semiprofessionisti e amatori è stato constatato che la performance di RSA è correlata al livello di competizione con differenze statisticamente significative

In uno studio effettuato da Rampinini et al. (2009), con l'obiettivo di esaminare le differenze tra giocatori professionistici vs amatori, sono state constatate differenze statisticamente significative tra i due livelli di competizione (con differenti indici di affaticamento).

In uno studio effettuato da Gabbet TJ (2010), che ha indagato la differenza tra giocatrici elitè di livello nazionale e di club, di sesso femminile (n=19; età, 18,1 ± 2,9 anni), i risultati dimostrano che le prova di sprint ripetuti discriminano le giocatrici di livello nazionale da quelle di club.

Repeated sprint ability (RSA)

TEST DI VALUTAZIONE

RSA (Repeated Sprint Ability) TEST

- 8 x 35m “corsa-sprint” con 30” di recupero (Rushall et al., 1991)
- 12 x 20m “corsa-sprint” con 20” di recupero (Wadley et al., 1998)
- 6 x 15” su cicloergometro con 90” di recupero (McMahon et al., 1998)
- 7 x 30m “corsa-sprint” con 20” di recupero (Reilly et al., 2000)
- 6 x 4” “corsa-sprint” con 25” di recupero (Spencer et al., 2002)

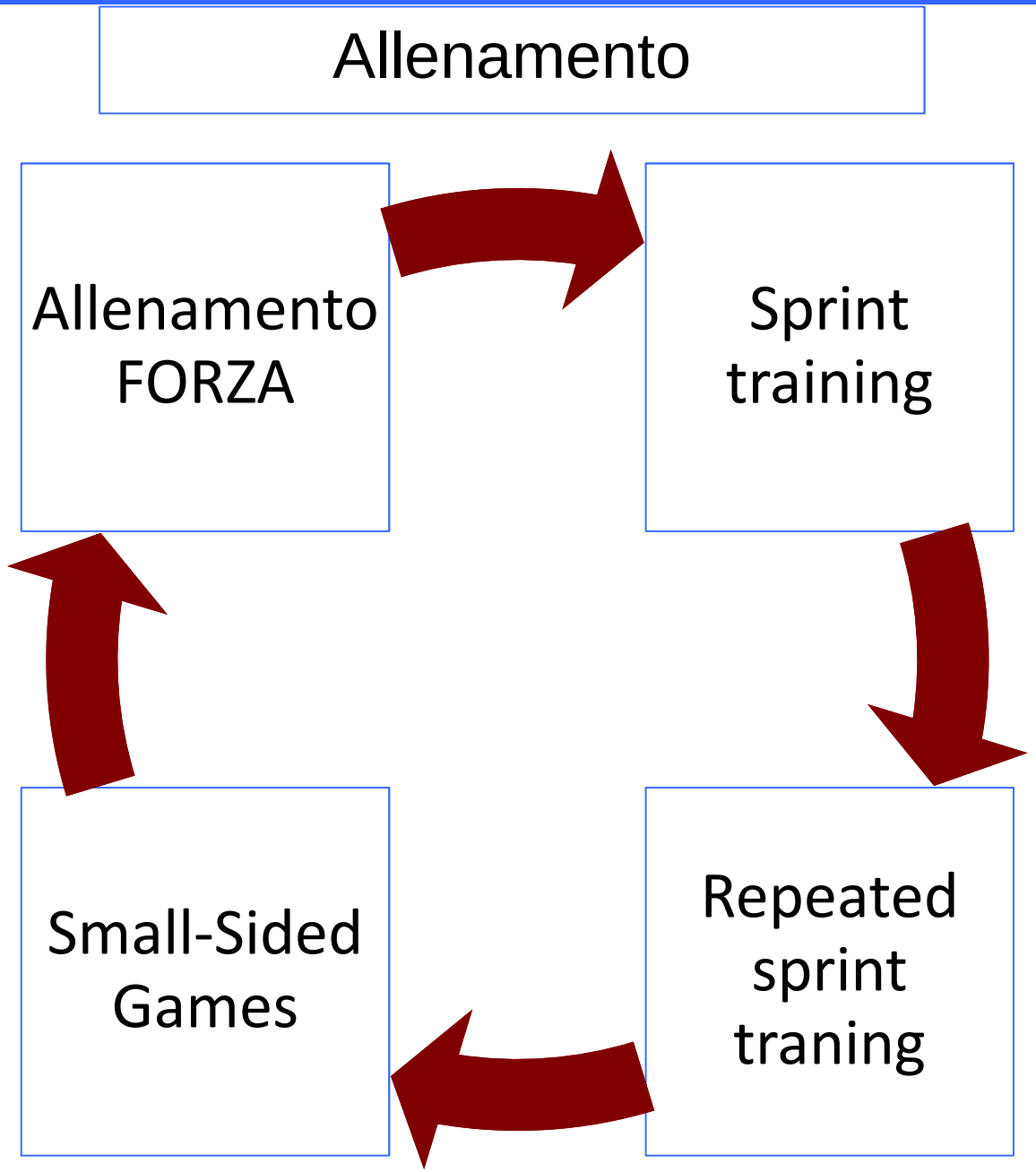
RSA (Repeated Shuttle Sprint Ability) TEST

•10 x 15m shuttle run con 30” di recupero (Castagna et al. 2005)
•6 x 20m shuttle run con 20” di recupero (Impellizzeri et al., 2008)
•6 x 40 m shuttle run con 20” di recupero (Rampinini et al. 2009)
•7 x 15m schttle run con recupero 1:5 (Ruscello, D’Ottavio et al. 2013)

COD Sprinting Test

•7x (6x5m); 1:5 esercizio/recupero) (Ruscello et al. 2013)

Repeated sprint ability (RSA)



Repeated sprint ability (RSA)

Allenamento

Durata

- Nei test di valutazione proposti in letteratura i valori di durata degli sprint si aggirano tra i 2.5 e 10 secondi
- < 6 secondi (Spencer et al. 2005)

N° ripetizioni

- 8-12 ripetizioni → rapporto lavoro:recupero
- 6-7 ripetizioni (Spencer et al. 2005)

Tempo di recupero

- Rapporto lavoro:recupero in letteratura è indicato a 1:5

N.B.: risultati mostrano che durante RSA, il recupero passivo produce una migliore prestazione riducendo la fatica.

Repeated sprint ability (RSA)

Allenamento: modalità di esecuzione

Fitzsimons et al. (1993) consiglia che la modalità di esecuzione da utilizzare deve essere sport specifico, visti i differenti affaticamenti

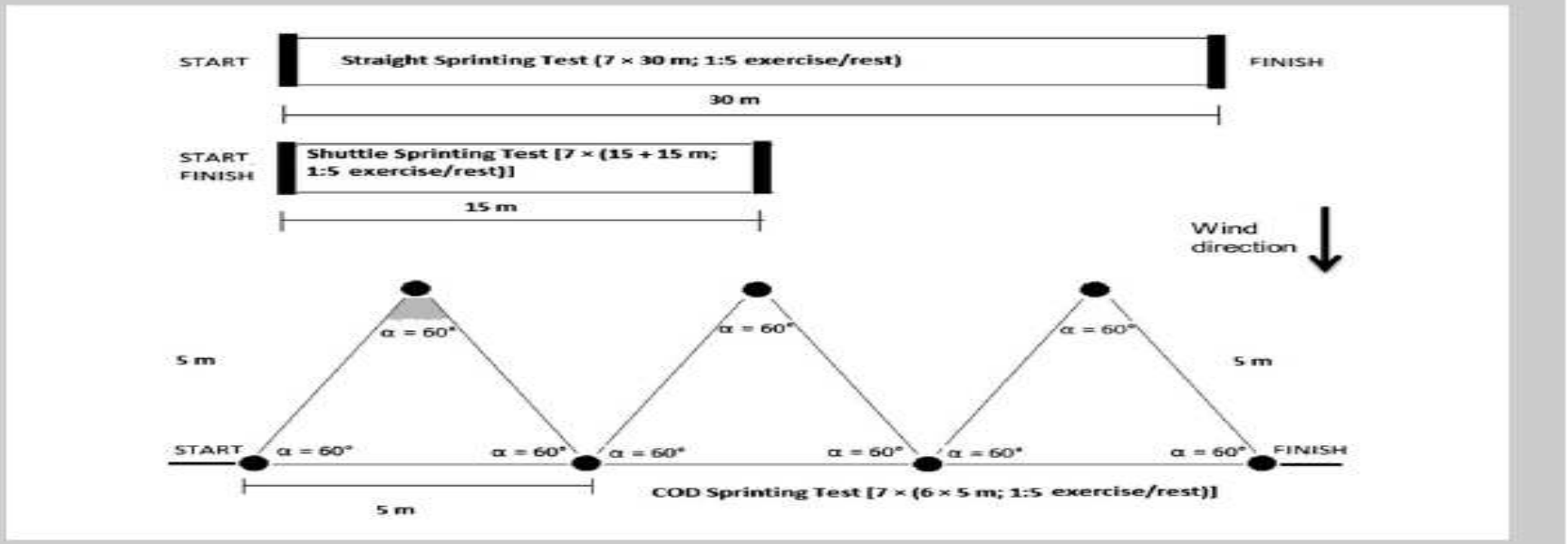


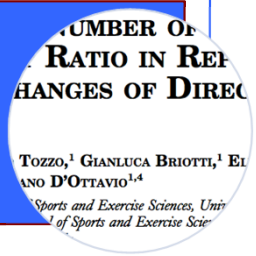
Figure 1. Sprinting modes adopted in this study: straight, shuttle, and COD sprinting. COD = change of direction.

È stato visto come la differente modalità di esecuzione induce differenti modalità di affaticamento (Ruscello, D'Ottavio et al. 2013)

Influence Of The Number Of Trials And The Exercise Ratio To Rest In Repeated Sprint Ability, With Changes Of Direction And Orientation

- **Ipotesi:** nell'allenamento RSA, il numero di ripetizioni e / o il rapporto tra lavoro:recupero non è equivalente se applicato a **diverse modalità di sprint (scala, navetta, COD).**
- **Research Questions**: numero di ripetizioni e rapporto lavoro:recupero ottimali in **diverse modalità di sprint**

Fase 1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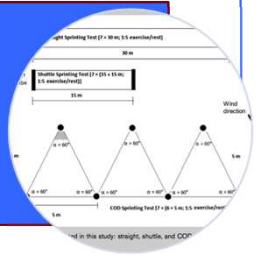
TOZZO,[1] GIANLUCA BRIOTTI,[1] EL
ANO D'OTTAVIO[1,4]
Sports and Exercise Sciences, Univ
of Sports and Exercise Scie

- **Procedure**
- Raccolta dei dati sul test RSA eseguiti in 3 diverse modalità
- N=17; Latin Square Protocol (abc; bca;cab)
- Test eseguiti in tre giorni diversi
- Rapporto lavoro:recupero 1:5 : Linea (7 x 30 m.); Shuttle [(7 x (15+15 m.)]; COD [7 x (6 x 5 m.)]

Fase 2



Ruscello B, D' Ottavio S et al. Influence of the number of trials and the exercise to rest ratio in repeated sprint ability, with changes of direction and orientation. J Strength Cond Res. 27(7):1904-19, 2013

Influence Of The Number Of Trials And The Exercise Ratio To Rest In Repeated Sprint Ability, With Changes Of Direction And Orientation

- **Analisi statistica e modello matematico**
- Repeated Measure Anova; Factorial Anova; Regression analysis.
- Variabile dipendente: IF% (index of Fatigue as percentage of Personal Best).
- Variabili indipendenti: modalità di sprint (Linea; Shuttle; COD).
- Modello matematico:numero di ripetizioni e rapporto lavoro:recupero ottimali

Phase 3

- **Studio pilota applicando il rapporto lavoro:recupero derivante dal modello matematico**
- Raccolta dei dati sul test RSA eseguiti in 3 diverse modalità
- 3 testing days; 48 hrs. resting between each testing day
- Rapporto lavoro:recupero : Linea(1:5); Shuttle (1: 3); COD (1:2)

Phase 4

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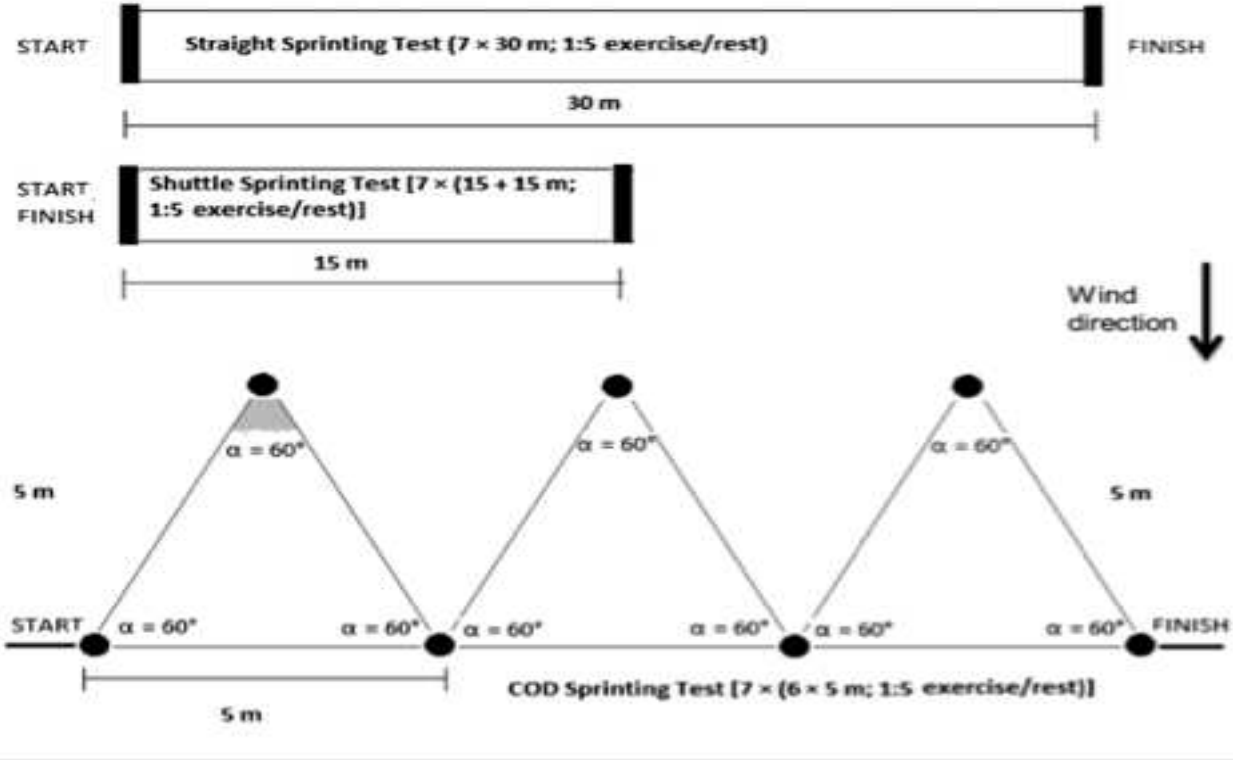
Influence Of The Number Of Trials And The Exercise Ratio To Rest In Repeated Sprint Ability, With Changes Of Direction And Orientation

RSA SPRINTING MODES



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Influence Of The Number Of Trials And The Exercise Ratio To Rest In Repeated Sprint Ability, With Changes Of Direction And Orientation

	Straight	Shuttle	COD
Trial 1	0.28	1.18	1.03
Trial 2	2.30	1.70	1.38
Trial 3	3.61	1.87	1.38
Trial 4	4.88	2.87	1.73
Trial 5	5.71	4.50	2.66
Trial 6	5.91	6.85	5.00
Trial 7	8.69	7.46	5.76
Mean	4.48	3.78	2.71
SD	0.03	0.03	0.02

*IF% = percent index of fatigue; COD = change of direction.

PATTERNS DI AFFATICAMENTO (IF%)

Test	Cutoff (no. of repetitions per set)	*p*
Straight sprinting	2/7	0.014
Shuttle sprinting	4/7	0.004
COD sprinting	5/7	0.020

*IF% = percent index of fatigue; COD = change of direction.

†Post hoc repeated measures ANOVA with Bonferroni's correction.

CUTOFF POINTS OSSERVATI DURANTE I TEST

$$IF\% = (1-[personal\ best] / [trial]) \times 100$$

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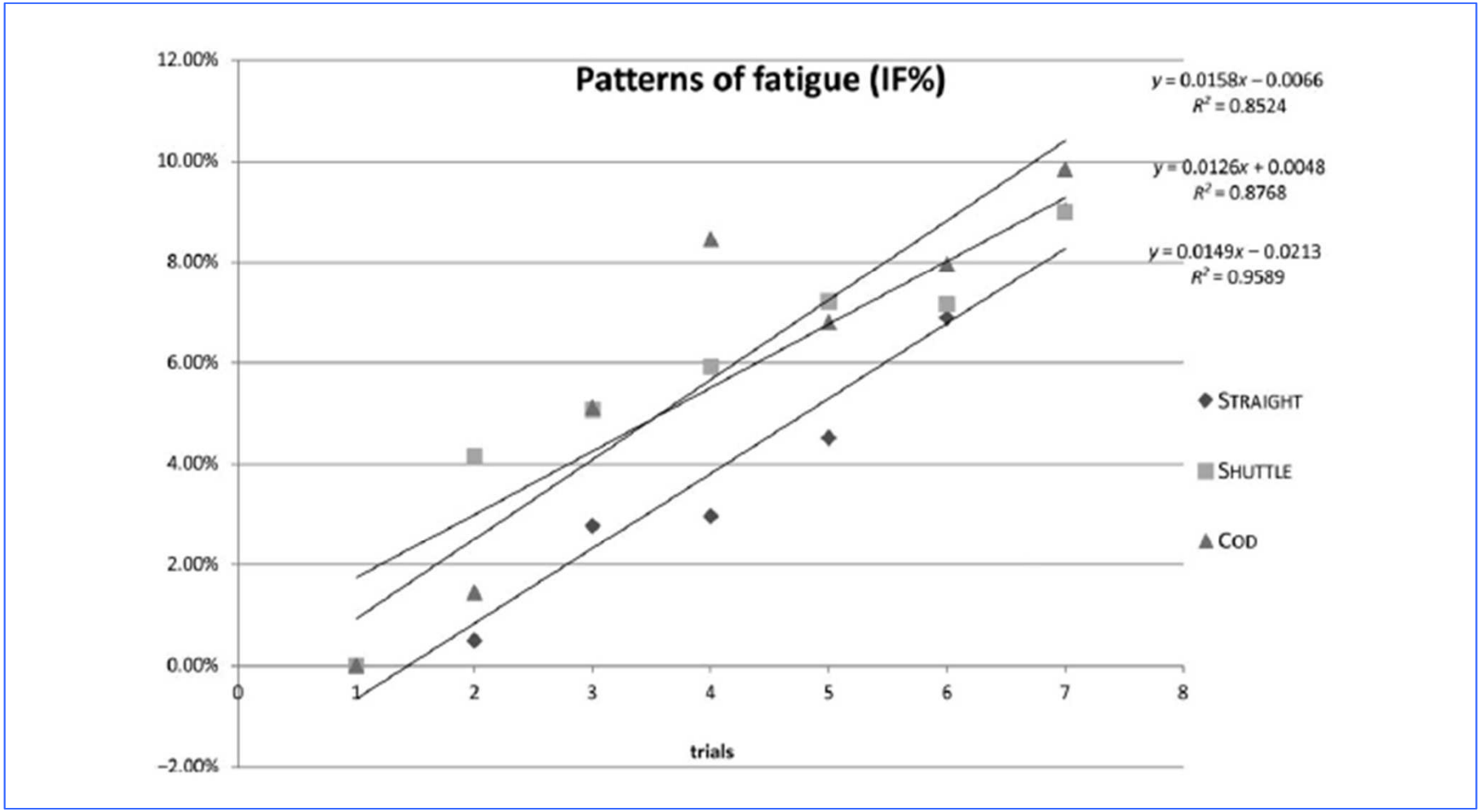

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Qual' è il numero ideale di ripetizioni quando alleno la RSA in modalità non lineare?

	Trial 8: estimated IF% ± standard error of prediction	Trial 9: estimated IF% ± standard error of prediction	Trial 10: estimated IF% ± standard error of prediction
Test 30 m straight ($y = 0.0123x - 0.0045$)	≈9.5 ± 0.6	≈10.7 ± 0.6	≈12 ± 0.6
Test 30 m shuttle ($y = 0.0118x - 0.0076$)	≈8.5 ± 0.7	≈9.8 ± 0.7	≈11 ± 0.7
Test 30 m COD ($y = 0.0081x - 0.0054$)	≈6% ± 0.8	≈6.7 ± 0.8	≈7.5 ± 0.8

*IF% = percent index of fatigue; COD = change of direction.
†With log transformation of *y*.

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ALLENAMENTO RSA: se rapporto lavoro:recupero = 1:5 nella modalità COD dobbiamo eseguire 10-12 ripetizioni

RAPPORTO LAVORO:RECUPERO OTTIMALE :

- Linea: 1:5
- Shuttle Run: 1:3
- COD: 1:2

TAKE HOME MESSAGE

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Acute effect of two different initial hert rates on testing the repeated sprint ability in young soccer players

Scopo dello studio

Analisi degli effetti acuti di due diverse % FC iniziali sulla performance durante test RSA in giovani giocatori

Protocollo

- N= 2 protocolli di riscaldamento: **60% Fc_{max} – 90% Fc_{max} ;**
- n=2 serie da **n=10** ripetizioni di sprint **15m + 15m** “shuttle run”
- Rapporto lavoro:recupero = **1:3**

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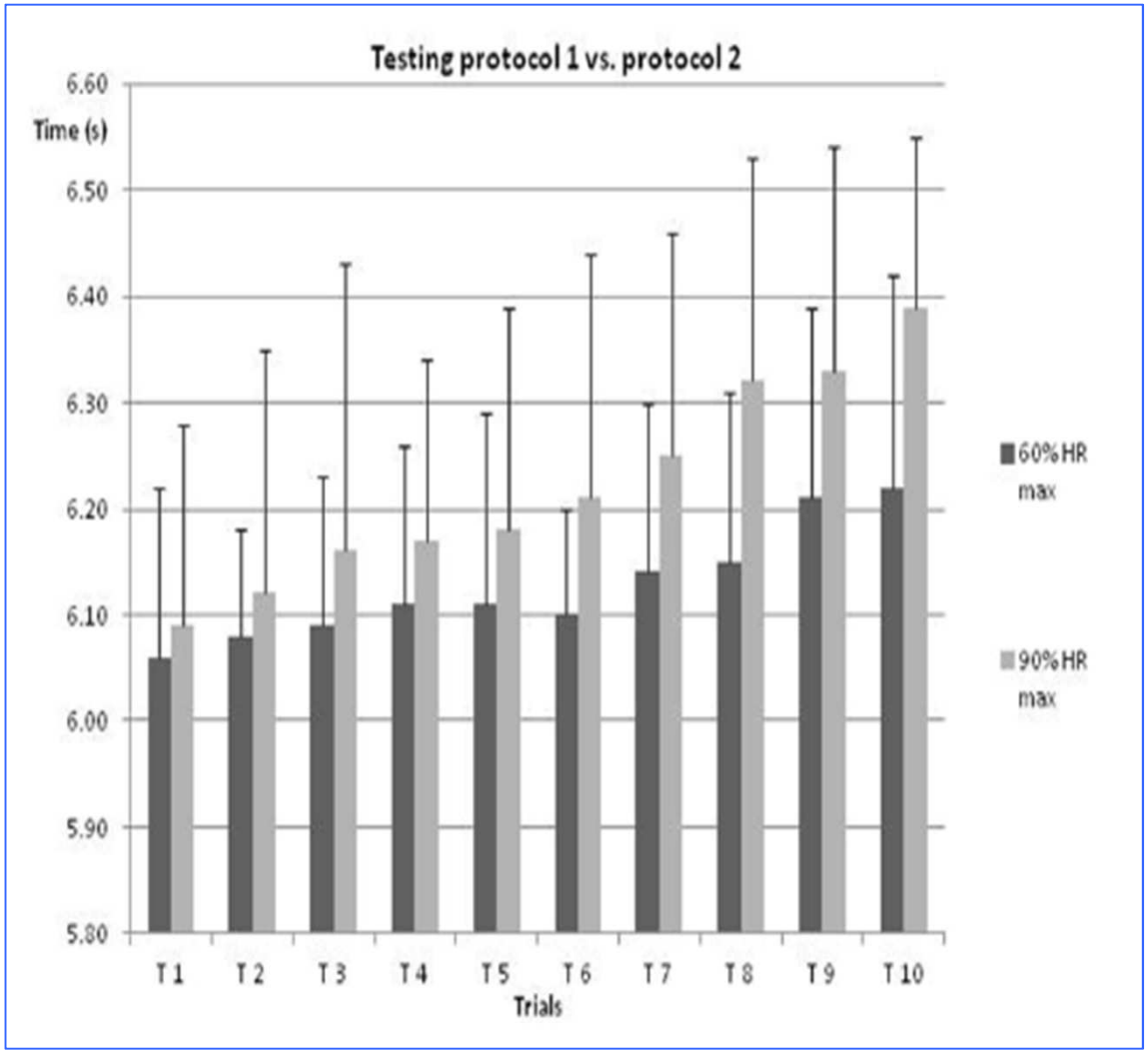
Table V – Fatigue Index (FI%) recorded in different initial heart rates conditions

Trials	FI% (60% HR_{max})	FI% (90% HR_{max})
T 1	0.00%	0.00%
T 2	0.33%	0.49%
T 3	0.50%	1.15%
T 4	0.83%	1.31%
T 5	0.83%	1.48%
T 6	0.66%	1.97%
T 7	1.32%	2.63%
T 8	1.49%	3.78%
T 9	2.48%	3.94%
T 10	2.64%	4.93%



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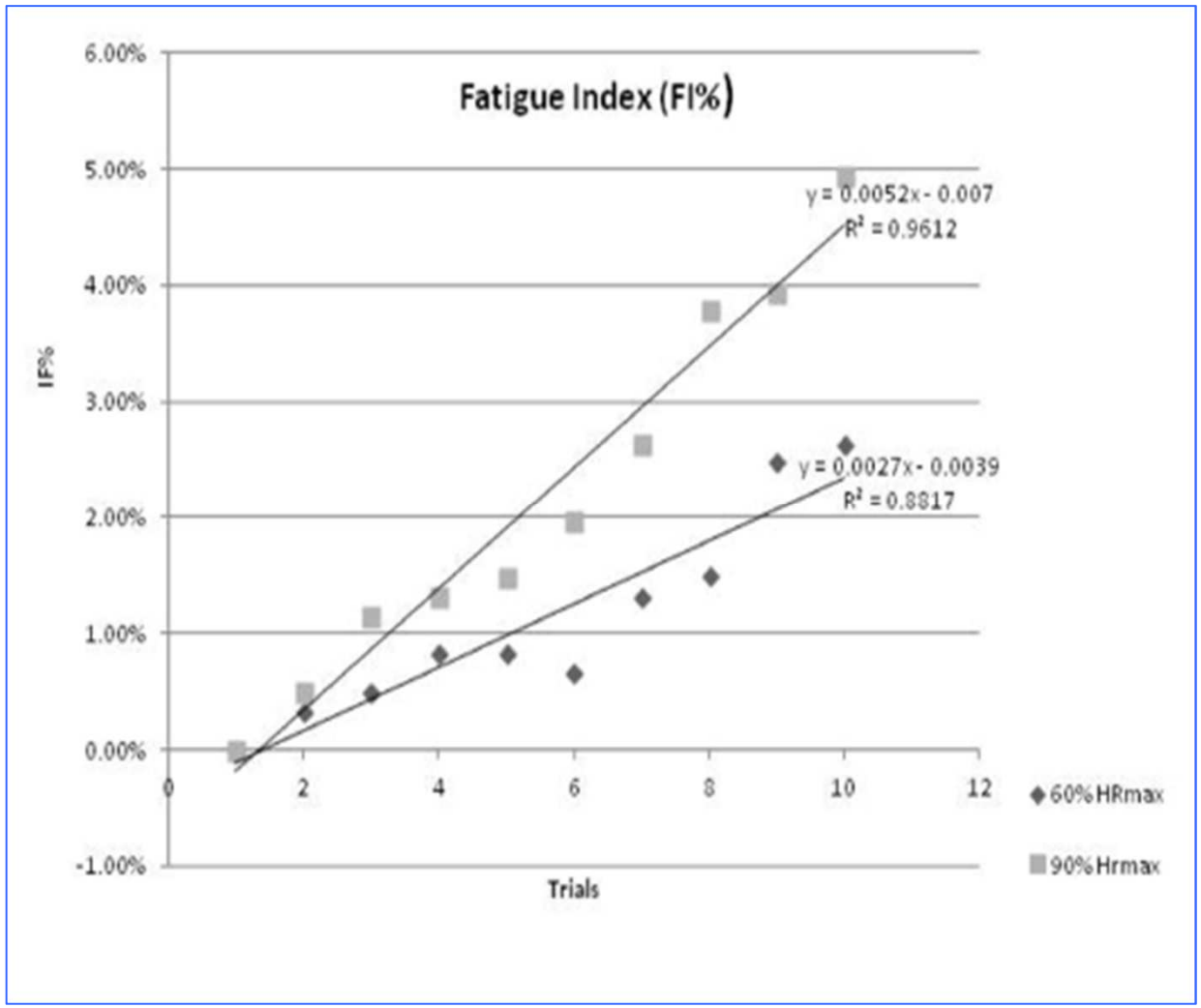

Lattato ematico **pre test**:

- 60% Fc_{max} : 2,52 mmol/L
- 90% Fc_{max} : 4,12 mmol/L

Lattato **ematico post test** (3'):

- 60% Fc_{max} : 14,05 mmol/L
- 90% Fc_{max} : 15,02 mmol/L

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