

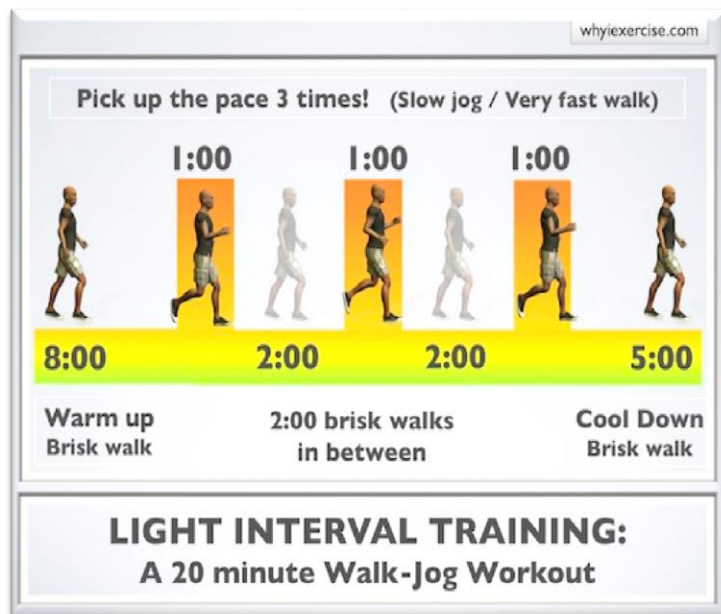


"Emeljük a szintet,, 2. Képzési Nap

Labdarúgók állóképességének
fejlesztése gyakorlati teszteken
keresztül, a továbblépés...

Sáfár Sándor

Állóképesség fejlesztésének módszerei



Szakaszos



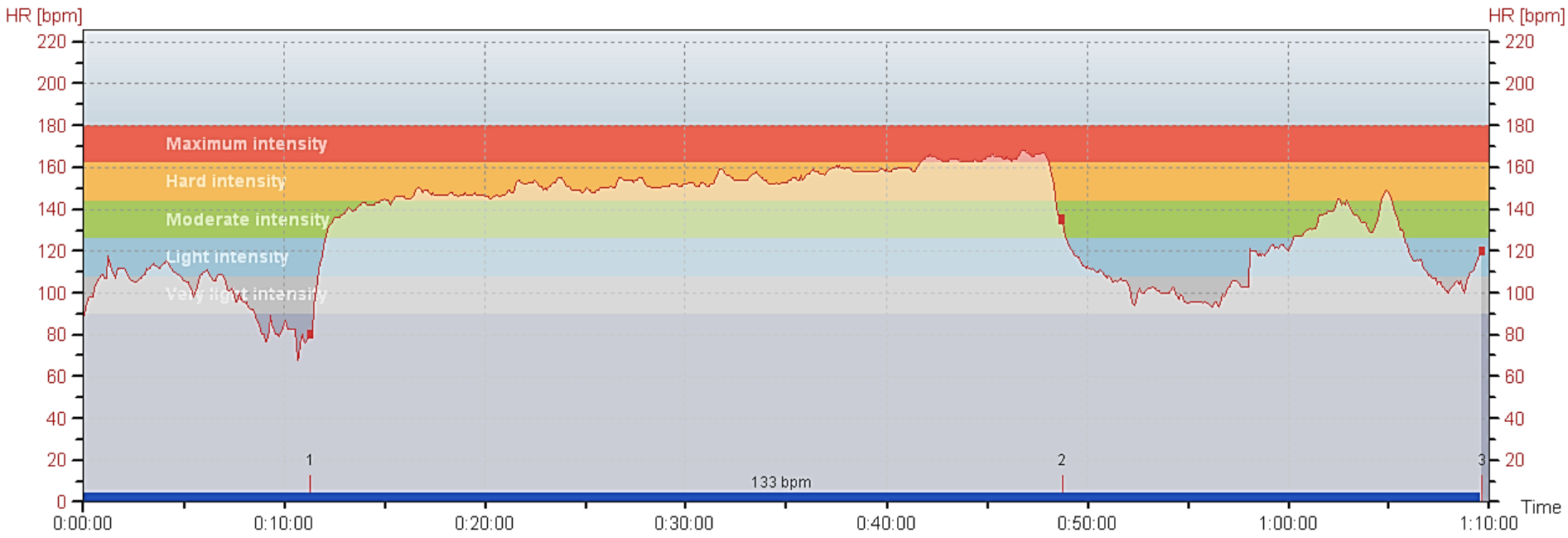
Tartós



Marathoni módszer (VO_2 max 50-80%)



**Ciklikus mozgás.
140-160 ütés/perc munkapulzus.
Állóképességi alkalmazkodás első foka.**



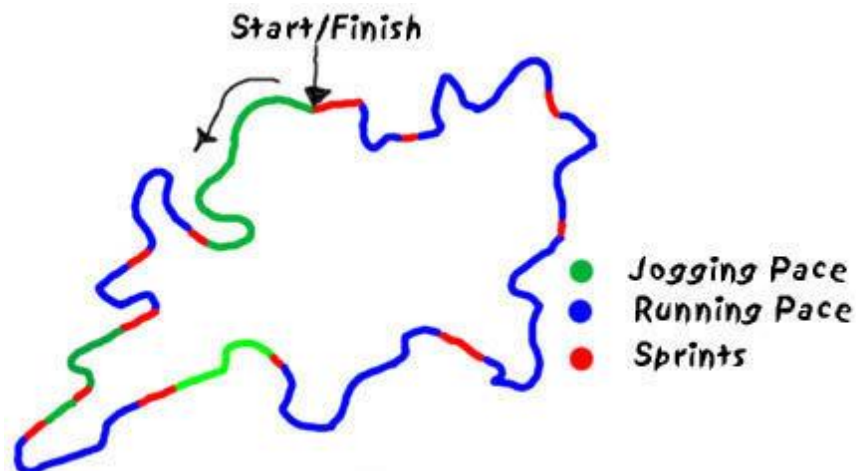


Fartlek módszer



Gösta Holmer (1912-es stockholmi olimpián bronzérmét szerzett tízpróbában.)

Gunder Hagg 10 világcsúcsot állított fel Holmer fartlek módszerével.





4 perc 1 p 4 perc 1 p 4 perc 1 p 4 perc 1 p

4 perc 1 p 4 perc 1 p 4 perc 1 p 4 perc

3 perc 1 p 3 perc 1 p 3 perc 1 p 3 perc 1 p

3 perc 1 p 3 perc

75" 150" 60" 120"

Watson Fartlek: (10 km-es, 5, km-es, 3 km-es és rövidebb terepversenyekre való felkészüléshez).

10 perc bemelegítés után 8X4 perc gyors futás, egy perc pihentetőbb szakasszal, utána 10 perc levezetés.

Saltin Fartlek: (5 km-es, 3 km-es, 1500 m-es felkészüléshez).

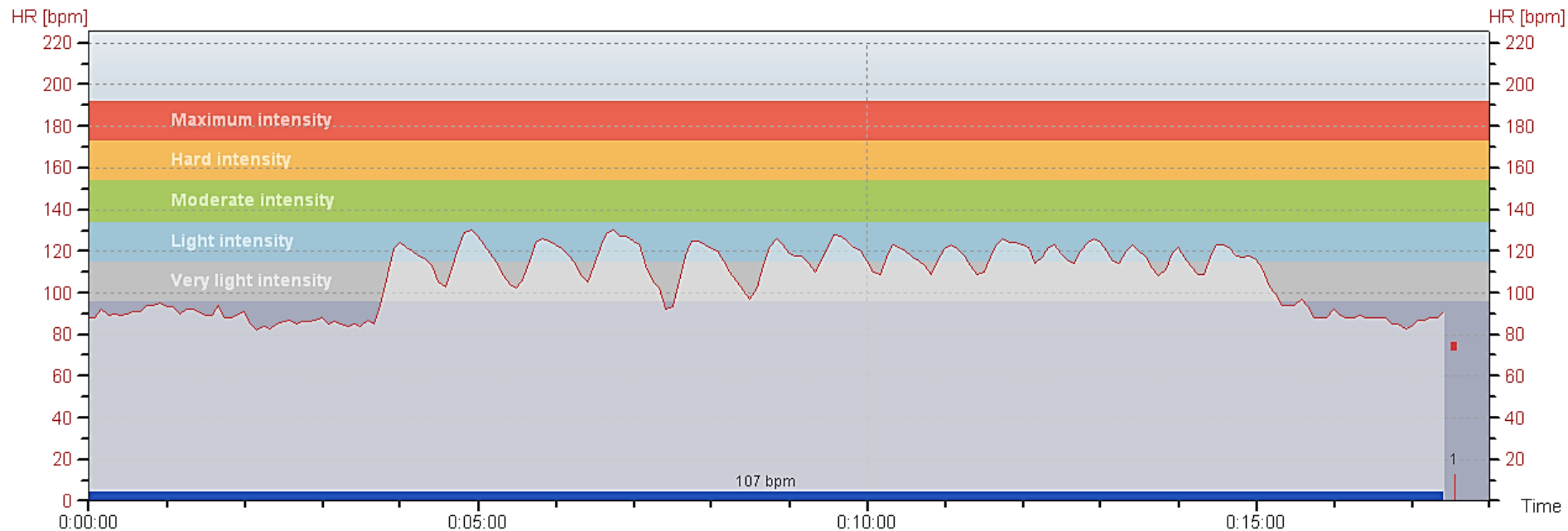
10 perc bemelegítés után 6X3 perc, egy perc pihentetőbb szakasszal, 10 perc levezetés.

Astrand Fartlek: (800 méteres felkészüléshez).

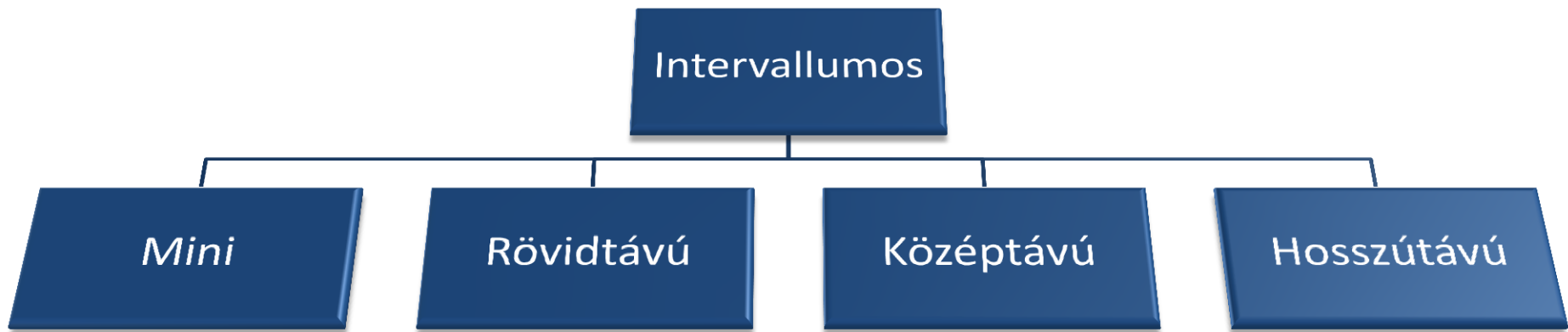
10 perc bemelegítés után 3 sorozat: 75 másodperc „teljes” erőből, utána 150 másodperc joggal vagy kocogással, majd 60 másodperc „teljes” erőből, utána 120 másodperc joggal vagy kocogással.



Fartlek edzés pulzus-idő görbéje



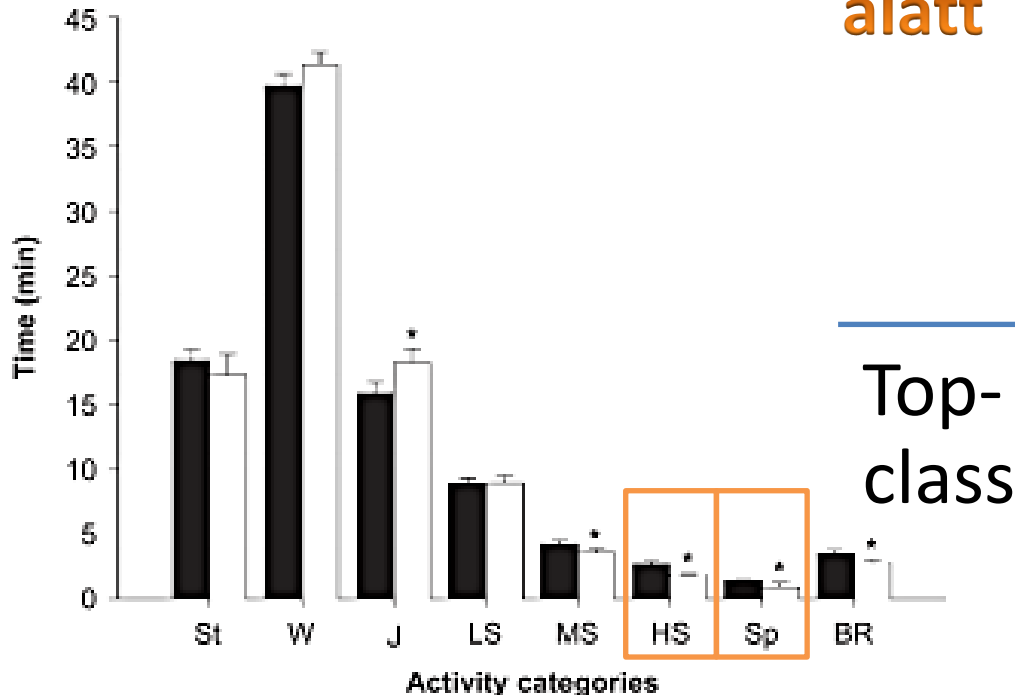
Intervallumos edzésmódszer és hatásai ($VO_2\text{max}$ 90-120%)



Klasszikus intervallumos edzés során a pihenési szakaszban a pulzusszám 120 ütés/perc alá nem mehet!

Éltsportolóknál akár 140 – 160 ütés/perc érték is lehet!

Labdarúgók lokomotorikus mozgásmintái a mérkőzések alatt



Top-class

Válogatott játékosok

BL csapatok

Első osztályú csapatok

Fig. 1. Locomotor categories for top-class players (■) and moderate players (□) during a soccer game expressed as total time (mean ± s_e) *Significant difference (P < 0.05) between groups. St = standing; W = walking; J = jogging; LS, MS and HS = running at a low, moderate and high speed, respectively; Sp = sprinting; BR = backwards running.

HI-futások és sprintek 15 perces periódusokat vizsgálva

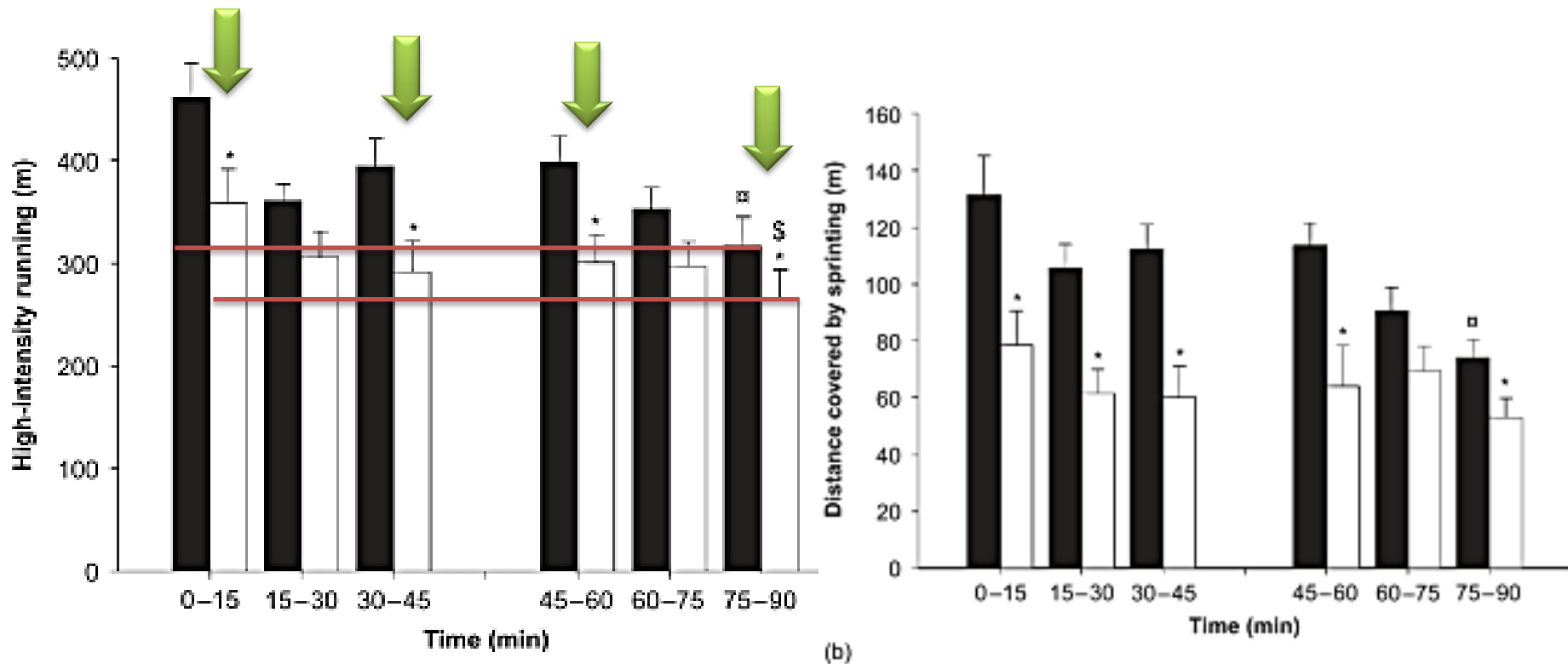


Fig. 3. High-intensity running (a) and sprinting (b) in 15-min intervals for top-class players (■) and moderate players (□) (mean ± SE). *Significant difference ($P < 0.05$) between top-class and moderate players. †Significantly different ($P < 0.05$) from the first four 15-min periods of the game. §Significantly different ($P < 0.05$) from the first 15-min period of the game.

5 perces HI-futások összehasonlítása az azt követő 5 perccel, valamint az átlaggal

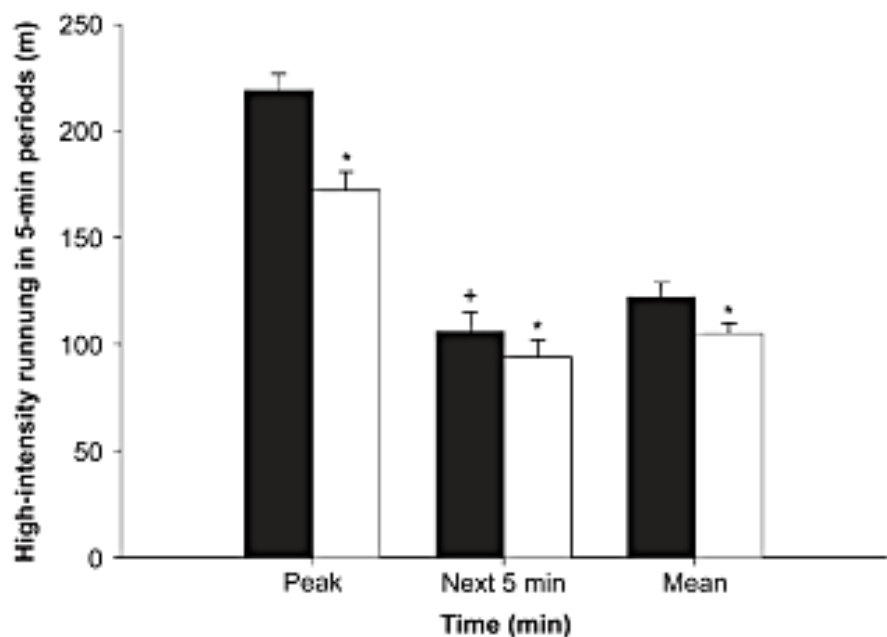


Fig. 4. Peak high-intensity running in a 5-min period, the following 5 min and average values of the remaining 5-min periods for top-class (■) and moderate players (□) (mean \pm $s_{\bar{x}}$). *Significant difference ($P < 0.05$) between top-class and moderate players. †Significantly different ($P < 0.05$) from average 5-min value.

Mohr et al. 2003

Posztok szerinti HI-futások az 1., 2. félidő alatt, valamint az egész mérkőzésen

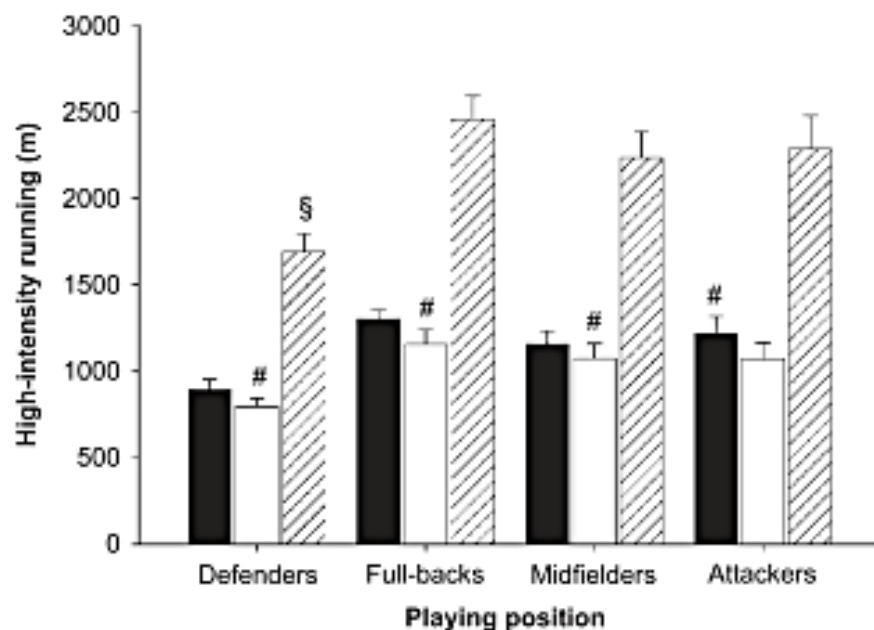


Fig. 6. High-intensity running in the first (■) and second half (□) as well as during the entire game (▨) for defenders ($n = 11$), full-backs ($n = 9$), midfielders ($n = 13$) and attackers ($n = 9$) (mean \pm $s_{\bar{x}}$). #Significant difference ($P < 0.05$) between first and second half. §Significantly different ($P < 0.05$) from full-backs, midfielders and attackers.

Mérkőzés utolsó 15 percében teljesített HI-futások és sprintek távja kezdőjátékosok és cserék tekintetében

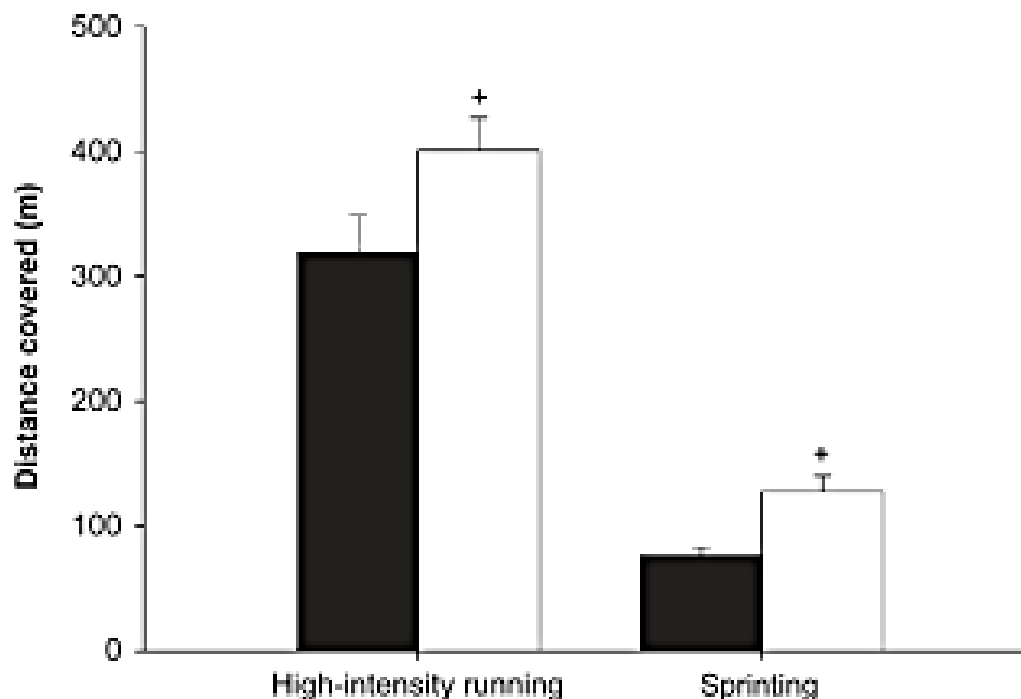


Fig. 5. High-intensity running and sprinting in the last 15 min of the game for elite players playing the entire match (■) and elite substitutes (□) (mean \pm SE). ⁺Significant difference ($P < 0.05$) between substitutes and players playing the entire match.

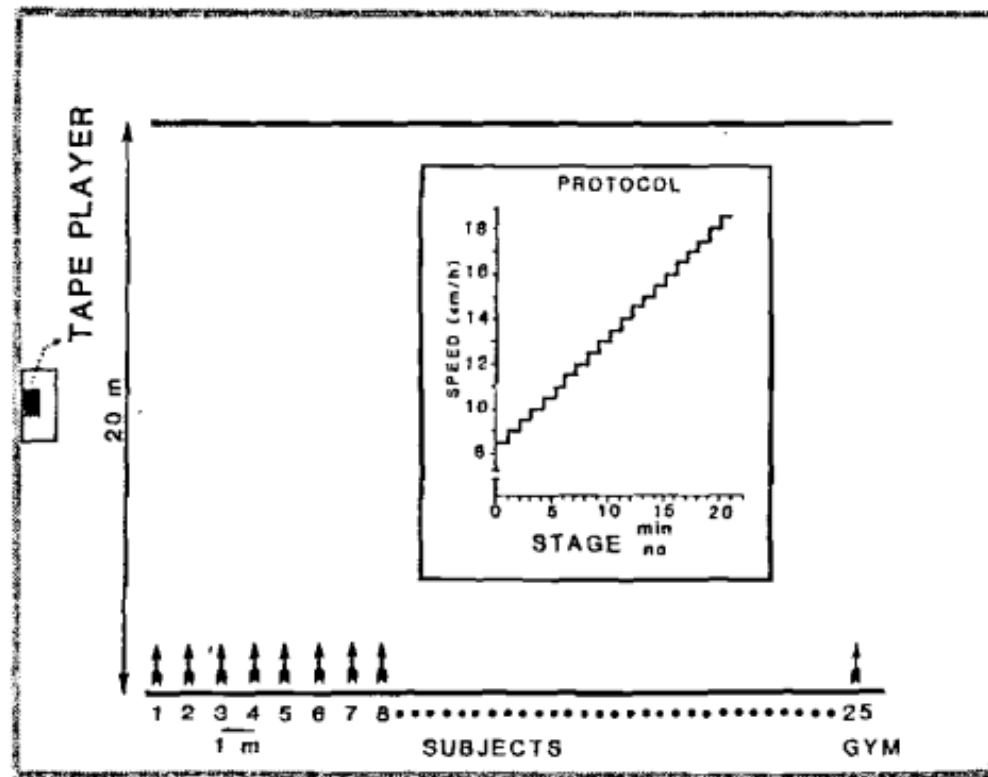
Table I. An in-season weekly programme for a professional soccer team when playing one or two matches a week.

Day	One match a week	Two matches a week
Sunday	Match	Match
Monday	Free	Low-/moderate-intensity aerobic training, 30 min Strength training, 30 min
Tuesday	Warm-up, 15 min Technical/tactical, 30 min High-intensity aerobic training, 23 min Play, 15 min	Warm-up, 15 min Technical/tactical, 30 min High-intensity aerobic training, 10 min Play, 15 min
Wednesday	<i>Morning</i> Strength training, 60 min <i>Afternoon</i> Warm-up, 15 min Technical/tactical, 30 min Speed endurance training, 20 min	Match
Thursday	Warm-up, 15 min Technical/tactical, 30 min Play, 30 min	Low-/moderate-intensity aerobic training, 40 min Strength training, 30 min
Friday	Warm-up/technical, 25 min Speed training (long), 20 min High-intensity aerobic training, 18 min	Warm-up/technical, 25 min Speed training (long), 10 min High-intensity aerobic training, 20 min
Saturday	Warm-up/technical, 25 min Speed training (short), 20 min Play, 30 min	Warm-up/technical, 25 min Speed training (short), 20 min Play, 30 min
Sunday	Match	Match

Note: For a definition of “training”, see Bangsbo (2005).

Yo-Yo tesztek előszobája

„20 metre shuttle run test” Léger ötlete nyomán



Léger et al. 1988

Fig. 1. Protocol and gymnasium set up for the 20 m shuttle run test for aerobic fitness.

8,5 km/h-ról indulva 0,5 km/h sebességnövelés, 1 perces frekvencia növeléssel!



Klasszikus „BÍP” - teszt

10:33

Beep Test - 2 running, 0 finished

Level **06** Target Speed **11.0km/h**

Elapsed Time **05:30**

Shuttle **2 of 10** Distance Covered **860m**

Runners

Barry

Harry

Bleep Test Summary Information

Level	Shuttles	Speed (km/h)	Shuttle Time (seconds)	Cumulative Distance (m)	Cumulative Time (min and seconds)
1	7	8	9	140	01:03
2	8	9	8	300	02:07
3	8	9.5	7.58	460	03:08
4	9	10	7.2	640	04:12
5	9	10.5	6.86	820	05:14
6	10	11	6.55	1,020	06:20
7	10	11.5	6.26	1,220	07:22
8	11	12	6	1,440	08:28
9	11	12.5	5.76	1,660	09:31
10	11	13	5.54	1,880	10:32
11	12	13.5	5.33	2,120	11:36
12	12	14	5.14	2,360	12:38
13	13	14.5	4.97	2,620	13:43
14	13	15	4.8	2,880	14:45
15	13	15.5	4.65	3,140	15:46
16	14	16	4.5	3,420	16:49
17	14	16.5	4.36	3,700	17:50
18	15	17	4.24	4,000	18:54
19	15	17.5	4.11	4,300	19:56
20	16	18	4	4,620	21:00
21	16	18.5	3.89	4,940	22:03



Yo-Yo Intermittent Recovery Teszt

Yo-Yo Intermittent Endurance Teszt

10 mp konstans pihenő

5 mp konstans pihenő

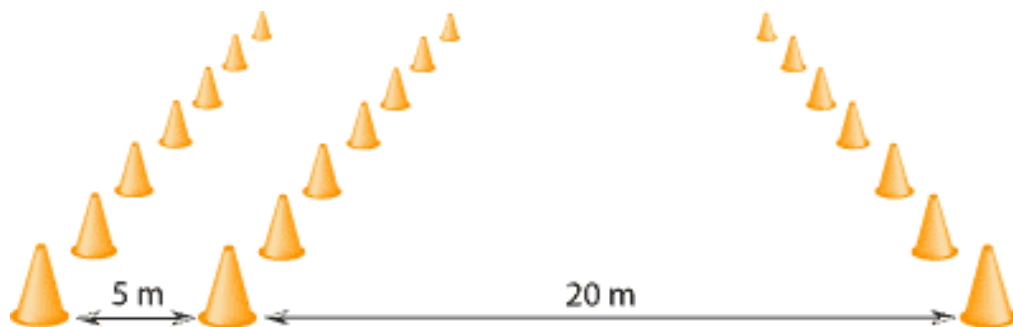
2x20 méter futás 180 fokos fordulással

15 éves kortól

IR1 (10 km/h kezdésnek) aerob közegetől maximális intenzitásig

IR2 (13 km/h kezdésnek), anaerob közegetől maximális intenzitásig

15 éves kortól



Yo-Yo Levels (Running Speed & Pace)

Speed Level	Pace	Speed		Time Limit		No. of Reps		No. of Reps		No. of Reps	
		(km/h)	(m/sec)	(sec/20m) "turn"	(sec/40m) "finish"	no rest, continuous		5" recovery		10" recovery	
						E level 1	E level 2	IE level 1	IE level 2	IR level 1	IR level 2
1	slow jog	8.00	2.22	9.00	18.00	7		2			
2		8.50	2.36	8.47	16.94	8					
3		9.00	2.50	8.00	16.00	8		2			
4		9.50	2.64	7.58	15.16	8					
5	jog	10.00	2.78	7.20	14.40	9		2		1	
6		10.50	2.92	6.86	13.71	9		8			
6.5		10.75	2.99	6.70	13.40			8			
7		11.00	3.06	6.55	13.09	10		8			
7.5		11.25	3.13	6.40	12.80			3			
8		11.50	3.19	6.26	12.52	10	10	3	2		
8.5		11.75	3.26	6.13	12.26			6			
9		fast jog	12.00	3.33	6.00	12.00	11	11	6		1
9.5	12.25		3.40	5.88	11.76			6			
10	12.50		3.47	5.76	11.52	11	11	6	2		
10.5	12.75		3.54	5.65	11.29			6			
11	13.00		3.61	5.54	11.08	11	11	6		2	1
11.5	13.25		3.68	5.43	10.87			6			
12	13.50		3.75	5.33	10.67	12	12	6	2	3	
12.5	13.75		3.82	5.24	10.47			6			
13	tempo	14.00	3.89	5.14	10.29	12	12	6	8	4	
13.5		14.25	3.96	5.05	10.11			6	8		
14		14.50	4.03	4.97	9.93	13	13	6	8	8	
14.5		14.75	4.10	4.88	9.76				3		
15		15.00	4.17	4.80	9.60	13	13		3	8	1
15.5		15.25	4.24	4.72	9.44				6		
16		15.50	4.31	4.65	9.29	13	13		6	8	
16.5		15.75	4.38	4.57	9.14				6		

Yo-Yo Levels (Running Speed & Pace)

Speed Level	Pace	Speed		Time Limit		No. of Reps		No. of Reps		No. of Reps	
		(km/h)	(m/sec)	(sec/20m) "turn"	(sec/40m) "finish"	no rest, continuous		5' recovery		10' recovery	
						E level 1	E level 2	IE level 1	IE level 2	IR level 1	IR level 2
17	fast tempo	16.00	4.44	4.50	9.00	14	14		6	8	2
17.5		16.25	4.51	4.43	8.86				6		
18		16.50	4.58	4.36	8.73	14	14		6	8	3
18.5		16.75	4.65	4.30	8.60				6		
19		17.00	4.72	4.24	8.47	15	15		6	8	4
19.5		17.25	4.79	4.17	8.35				6		
20		17.50	4.86	4.11	8.23	15	15		6	8	8
20.5		17.75	4.93	4.06	8.11				6		
21	run	18.00	5.00	4.00	8.00		16		6	8	8
22		18.50	5.14	3.89	7.78					8	8
23		19.00	5.28	3.79	7.58					8	8
24		19.50	5.42	3.69	7.38						8
25		20.00	5.56	3.60	7.20						8
26		20.50	5.69	3.51	7.02						8

Yo-Yo Intermittent Recovery Test (Level 1) - Time Table

Speed (km/h)	10.0	12.0	13.0		13.5			14.0					
Level	5		9		11			12				13	
Rep	1	1	1	2	1	2	3	1	2	3	4		
Distance (m)	40	80	120	160	200	240	280	320	360	400	440		
Start	00:00	00:24	00:46	01:07	01:29	01:49	02:10	02:31	02:51	03:11	03:31		
Turn	00:07	00:30	00:52	01:13	01:34	01:55	02:15	02:36	02:56	03:16	03:37		
Finish	00:14	00:36	00:57	01:19	01:39	02:00	02:21	02:41	03:01	03:21	03:42		

Speed (km/h)	14.5								15.0							
Level	14								15							
Rep	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Distance (m)	480	520	560	600	640	680	720	760	800	840	880	920	960	1,000	1,040	1,080
Start	03:52	04:12	04:32	04:52	05:11	05:31	05:51	06:11	06:31	06:51	07:10	07:30	07:50	08:09	08:29	08:48
Turn	03:57	04:17	04:37	04:56	05:16	05:36	05:56	06:16	06:36	06:56	07:15	07:35	07:54	08:14	08:34	08:53
Finish	04:02	04:22	04:42	05:01	05:21	05:41	06:01	06:21	06:41	07:00	07:20	07:40	07:59	08:19	08:38	08:58

Speed (km/h)	15.5								16.0							
Level	16								17							
Rep	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Distance (m)	1,120	1,160	1,200	1,240	1,280	1,320	1,360	1,400	1,440	1,480	1,520	1,560	1,600	1,640	1,680	1,720
Start	09:08	09:27	09:47	10:06	10:25	10:44	11:04	11:23	11:42	12:01	12:20	12:39	12:58	13:17	13:36	13:55
Turn	09:13	09:32	09:51	10:10	10:30	10:49	11:08	11:28	11:47	12:06	12:25	12:44	13:03	13:22	13:41	14:00
Finish	09:17	09:37	09:56	10:15	10:34	10:54	11:13	11:32	11:51	12:10	12:29	12:48	13:07	13:26	13:45	14:04

Speed (km/h)	16.5								17.0							
Level	18								19							
Rep	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Distance (m)	1,760	1,800	1,840	1,880	1,920	1,960	2,000	2,040	2,080	2,120	2,160	2,200	2,240	2,280	2,320	2,360
Start	14:14	14:33	14:52	15:10	15:29	15:48	16:07	16:25	16:44	17:03	17:21	17:40	17:58	18:16	18:35	18:53
Turn	14:19	14:37	14:56	15:15	15:34	15:52	16:11	16:30	16:48	17:07	17:25	17:44	18:02	18:21	18:39	18:58
Finish	14:23	14:42	15:00	15:19	15:38	15:57	16:15	16:34	16:53	17:11	17:30	17:48	18:06	18:25	18:43	19:02



Yo-Yo Intermittent Recovery Test (Level 1) - Time Table

Speed (km/h)	17.5								18.0							
Level	20								21							
Rep	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Distance (m)	2,400	2,440	2,480	2,520	2,560	2,600	2,640	2,680	2,720	2,760	2,800	2,840	2,880	2,920	2,960	3,000
Start	19:12	19:30	19:48	20:07	20:25	20:43	21:01	21:20	21:38	21:56	22:14	22:32	22:50	23:08	23:26	23:44
Turn	19:16	19:34	19:52	20:11	20:29	20:47	21:05	21:24	21:42	22:00	22:18	22:36	22:54	23:12	23:30	23:48
Finish	19:20	19:38	19:57	20:15	20:33	20:51	21:10	21:28	21:46	22:04	22:22	22:40	22:58	23:16	23:34	23:52

Speed (km/h)	18.5								19.0							
Level	22								23							
Rep	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Distance (m)	3,040	3,080	3,120	3,160	3,200	3,240	3,280	3,320	3,360	3,400	3,440	3,480	3,520	3,560	3,600	3,640
Start	24:02	24:20	24:37	24:55	25:13	25:31	25:48	26:06	26:24	26:42	26:59	27:17	27:34	27:52	28:09	28:27
Turn	24:06	24:23	24:41	24:59	25:17	25:35	25:52	26:10	26:28	26:45	27:03	27:20	27:38	27:56	28:13	28:31
Finish	24:10	24:27	24:45	25:03	25:21	25:38	25:56	26:14	26:32	26:49	27:07	27:24	27:42	27:59	28:17	28:35



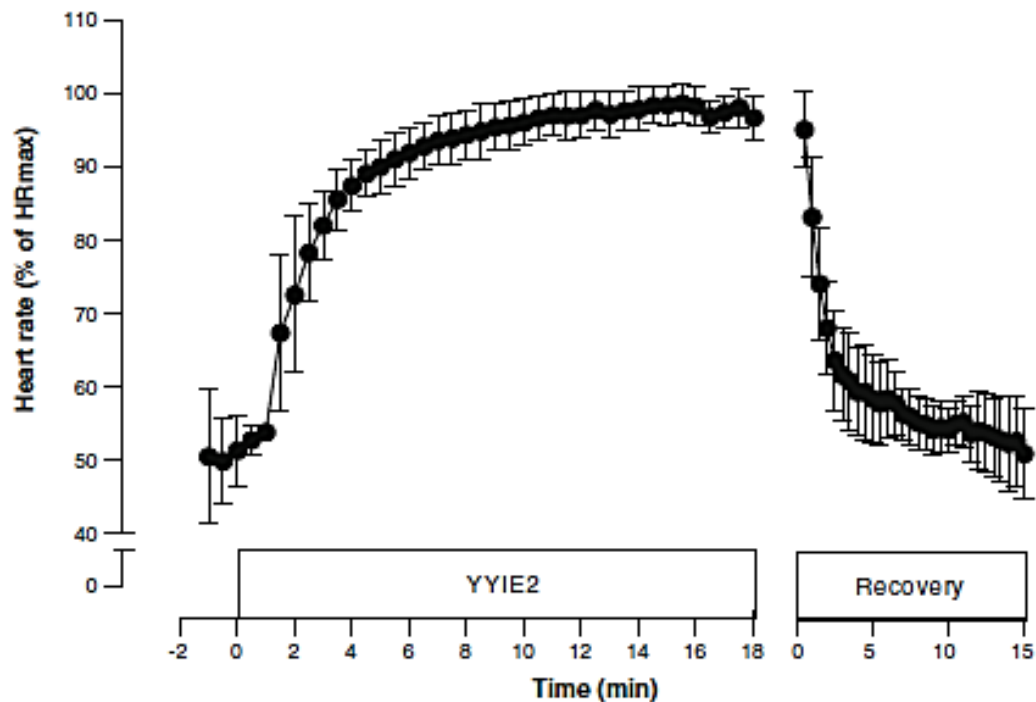
Yo-Yo Intermittent Endurance Teszt Level 2 (YYIET2)

- 20+20 méter futás
- 5 másodperc pihenő
 - gyors tempó
- anaerob közegben

U19 elit angol labdarúgók Yo-Yo IE2 tesztje

Fig. 1 Elite English youth U19 players heart rate responses before, during and after the Yo-Yo IE2 test ($n = 14$). Data are mean; *error bars* are standard deviations

**U19 elit angol labdarúgók (n=14)
Yo-Yo IE2 tesztje
5" pihenő, anaerob közegben**



Férfi elit és „sub-elit” angol labdarúgók Yo-Yo IE2 tesztje

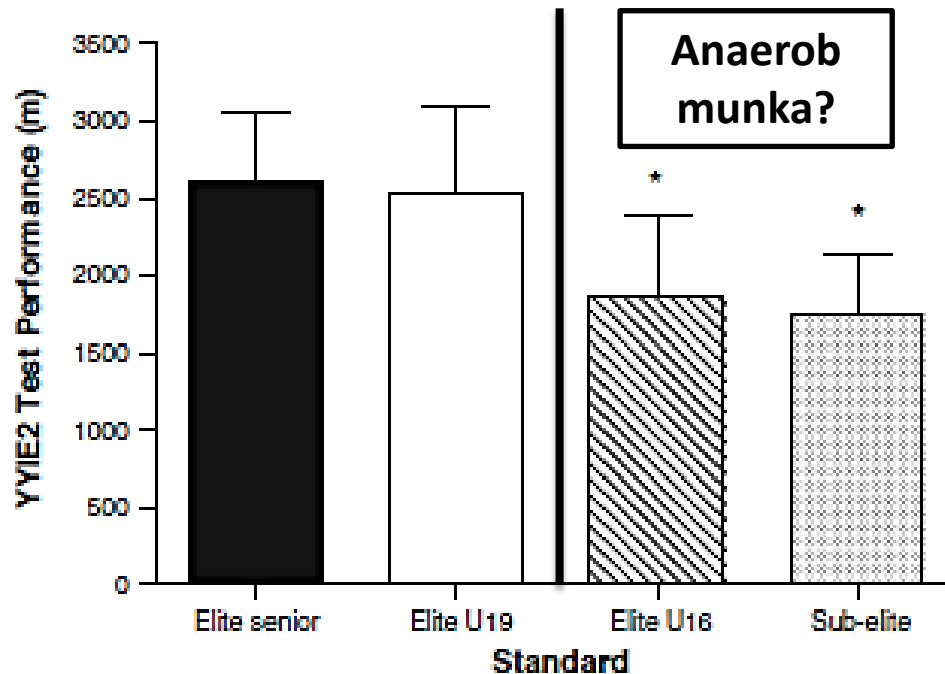
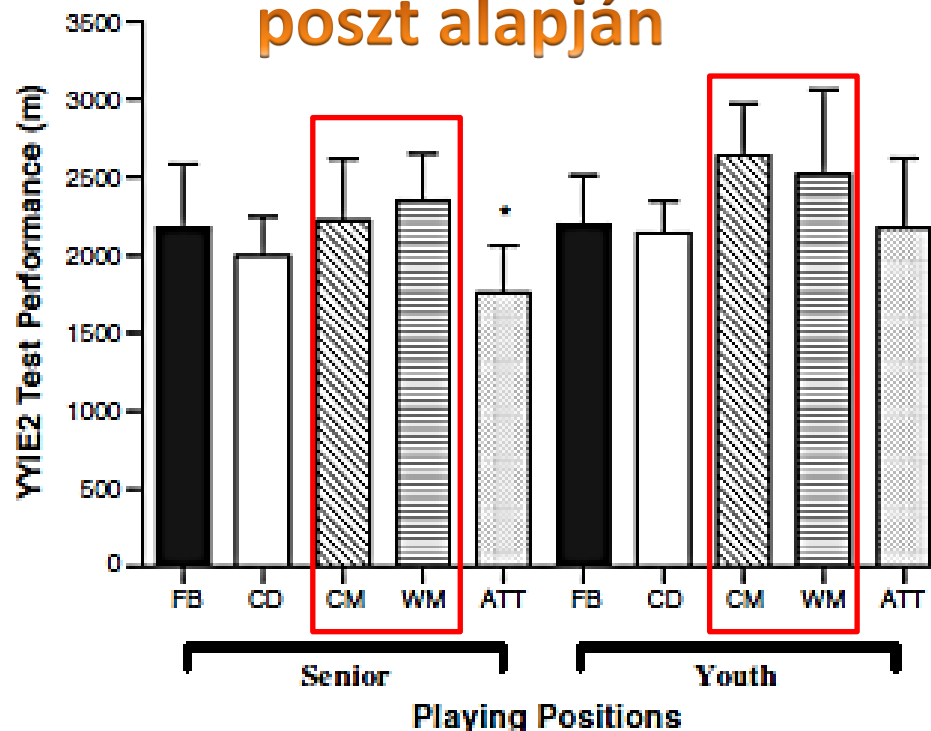


Fig. 2 Yo–Yo IE2 test performance of different types of elite soccer players. Elite male senior ($n = 44$), elite U19 ($n = 32$), elite U16 ($n = 30$) and sub-elite players ($n = 14$). *Different from elite male senior and youth U19 players ($P < 0.01$). Data are mean; error bars are standard deviations

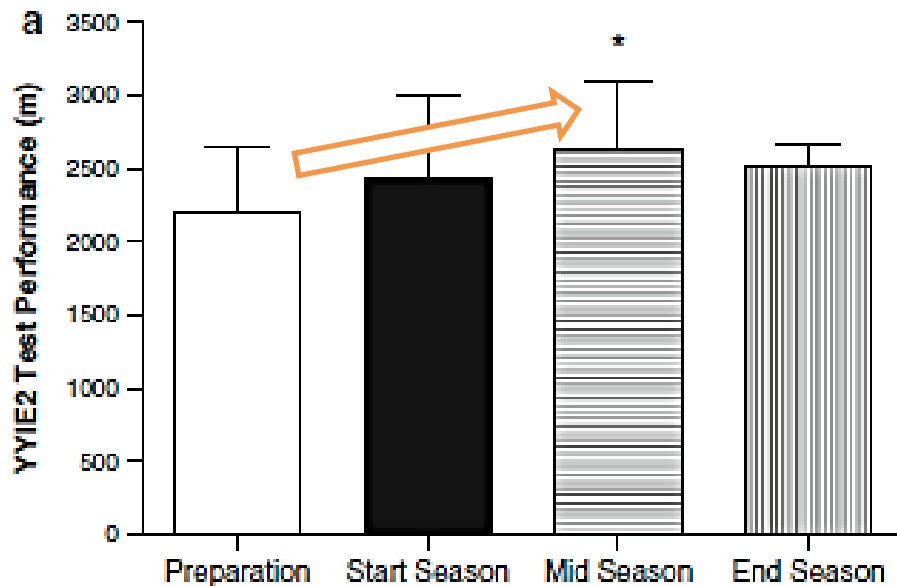
Elit és U19-es angol labdarúgók Yo-Yo IE2 tesztje poszt alapján



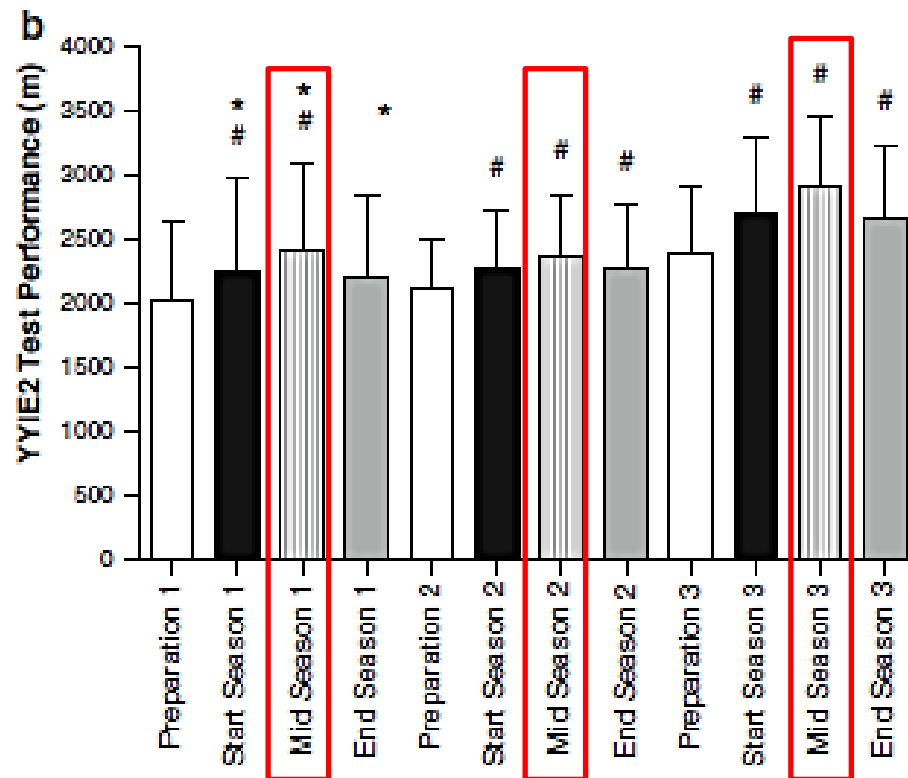
FB – Védő
CD – Középső védő
CM - Középpályás
WM – Szélső középpályás
ATT - Támadó

Fig. 3 Yo–Yo IE2 test performance of elite senior and Youth U19 soccer players in different playing positions. *CD* central defenders (Senior $n = 7$; Youth $n = 6$), *FB* full-backs (Senior $n = 8$; Youth $n = 9$), *CM* central midfielders (Senior $n = 7$; Youth $n = 6$), *WM* wide midfielders (Seniors $n = 7$; Youth $n = 6$) and *ATT* attackers (Senior $n = 7$; Youth $n = 7$). *Senior players: lower Yo–Yo IE2 test performance than all other positions ($P < 0.05$). Data are mean; error bars are standard deviations

Elit és U19-es angol labdarúgók Yo-Yo IE2 tesztjének alakulása szezon közben



Elit és U19-es angol labdarúgók



U16-tól U19-ig angol labdarúgók teljesítménye 3 szezonon keresztül

Fig. 4 Yo-Yo IE2 test performance for elite English youth U19 soccer players at various phases of the season ($n = 15$). *Significantly different from preparation phase of season ($P < 0.01$). b Yo-Yo IE2 test performance over three seasons for elite English youth soccer players at various stages (U16–U19) ($n = 12$). *Different from preparation phase in each season ($P < 0.05$). #Different from equivalent stage in season 3 ($P < 0.05$). Data are mean; error bars are standard deviations

Női angol labdarúgók Yo-Yo IE2 tesztje (n=199)

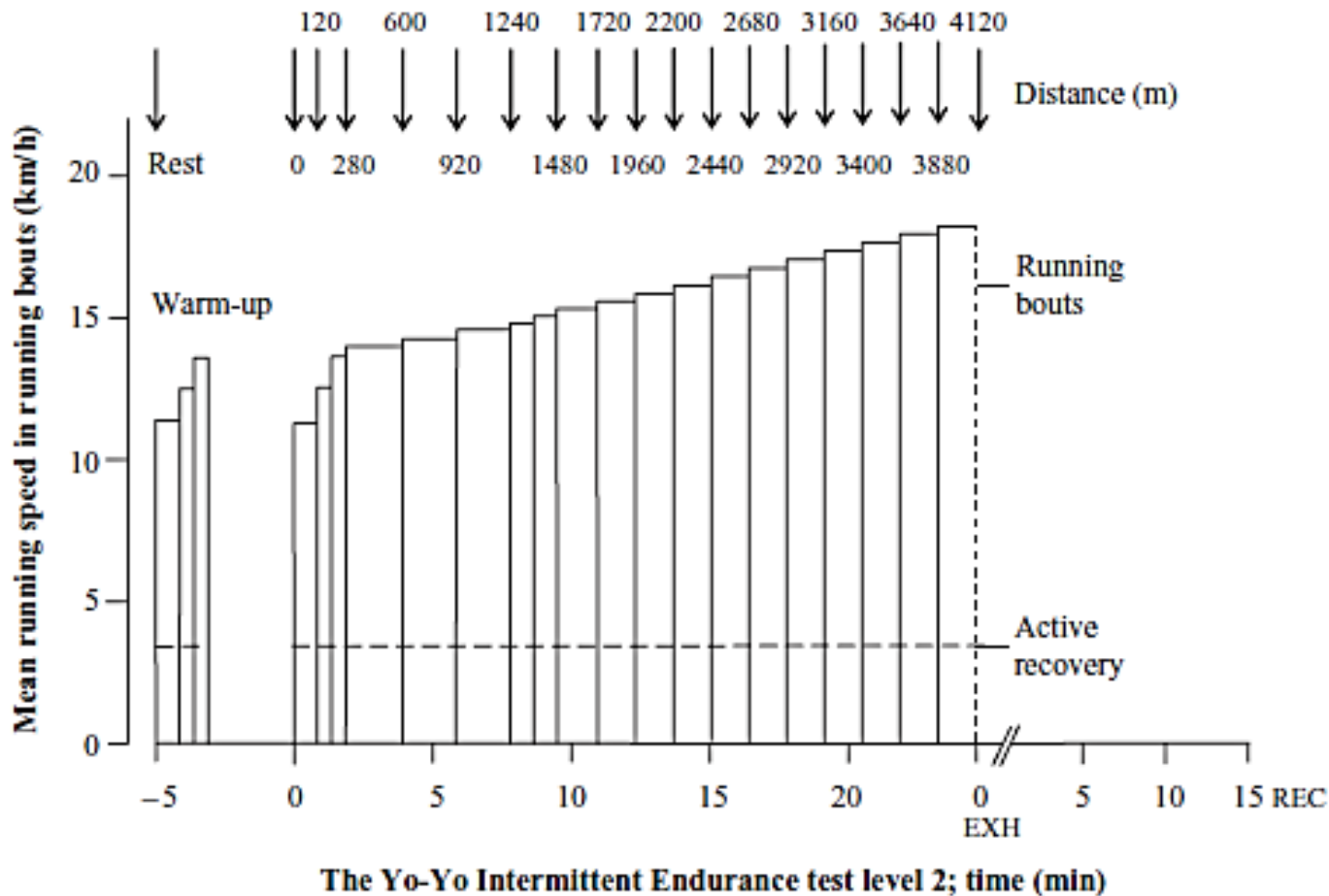


Fig. 1. Schematic representation of the Yo-Yo IE2 test. EXH, exhaustion; REC, recovery.

Női angol labdarúgók Yo-Yo IE2 tesztje (n=199) életkor szerint és szezon közben U20 korosztálynál

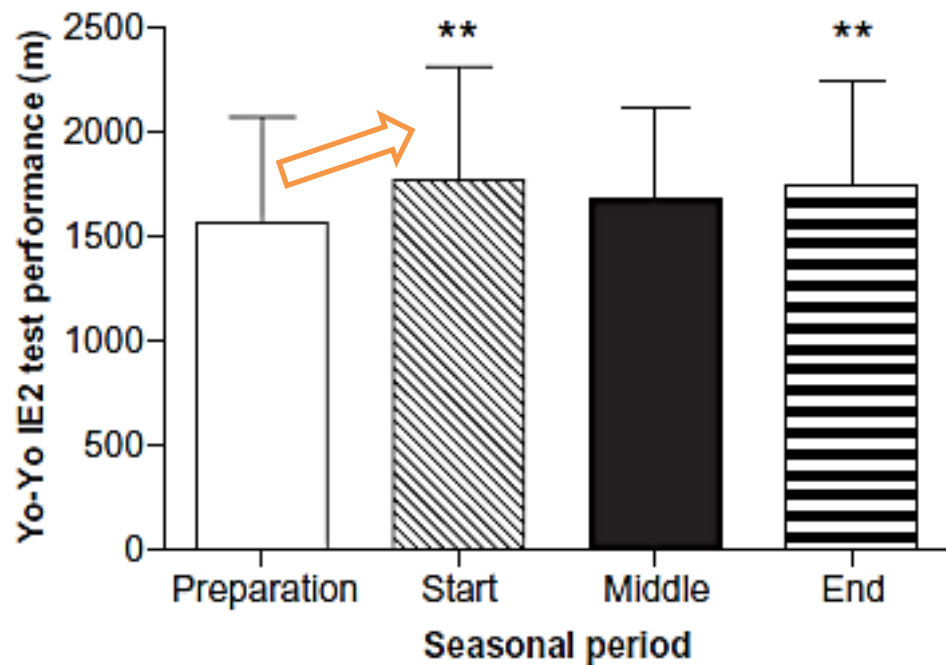
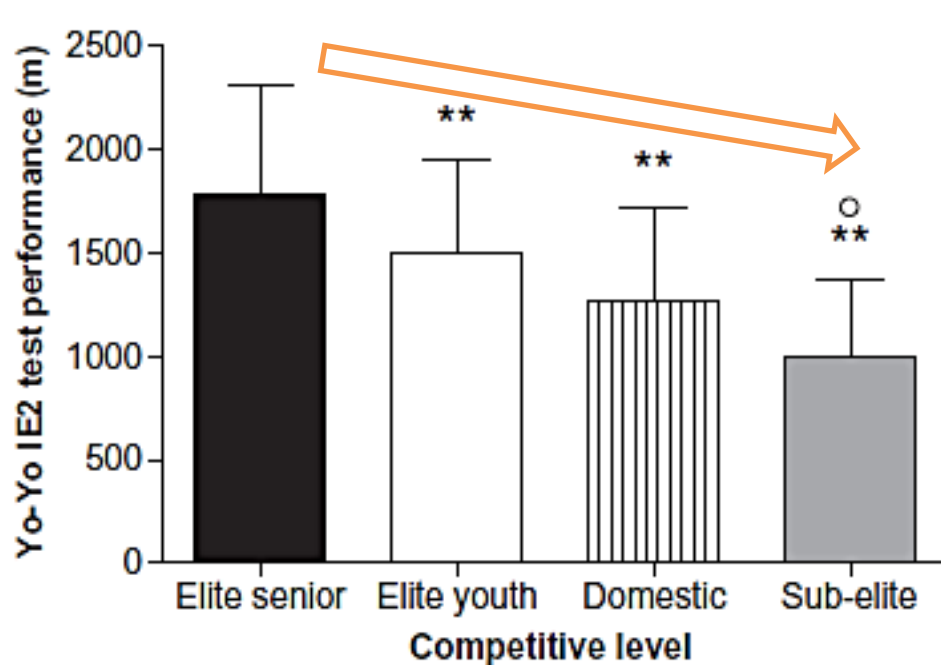
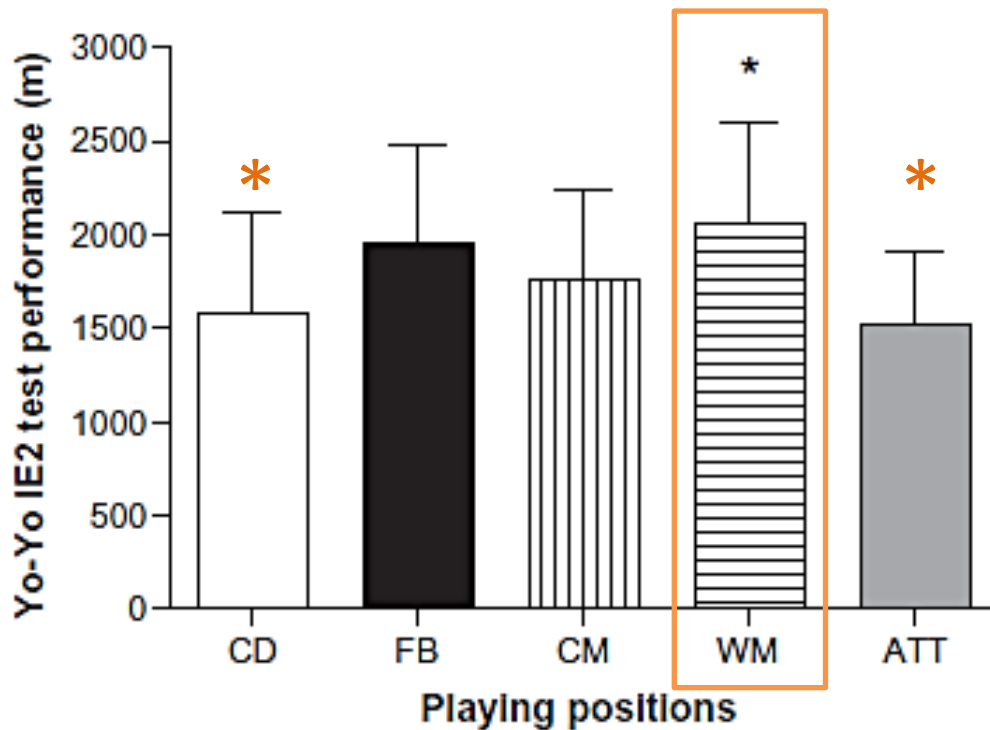


Fig. 3. Differences in Yo-Yo IE2 test performance in various female soccer populations. Data includes elite senior players ($n = 92$), elite youth players ($n = 42$), domestic players ($n = 46$) and sub-elite players ($n = 19$). **Significantly lower Yo-Yo IE2 test performance than elite senior players ($P < 0.01$). °Significantly lower Yo-Yo IE2 test performance than elite youth players ($P < 0.01$).

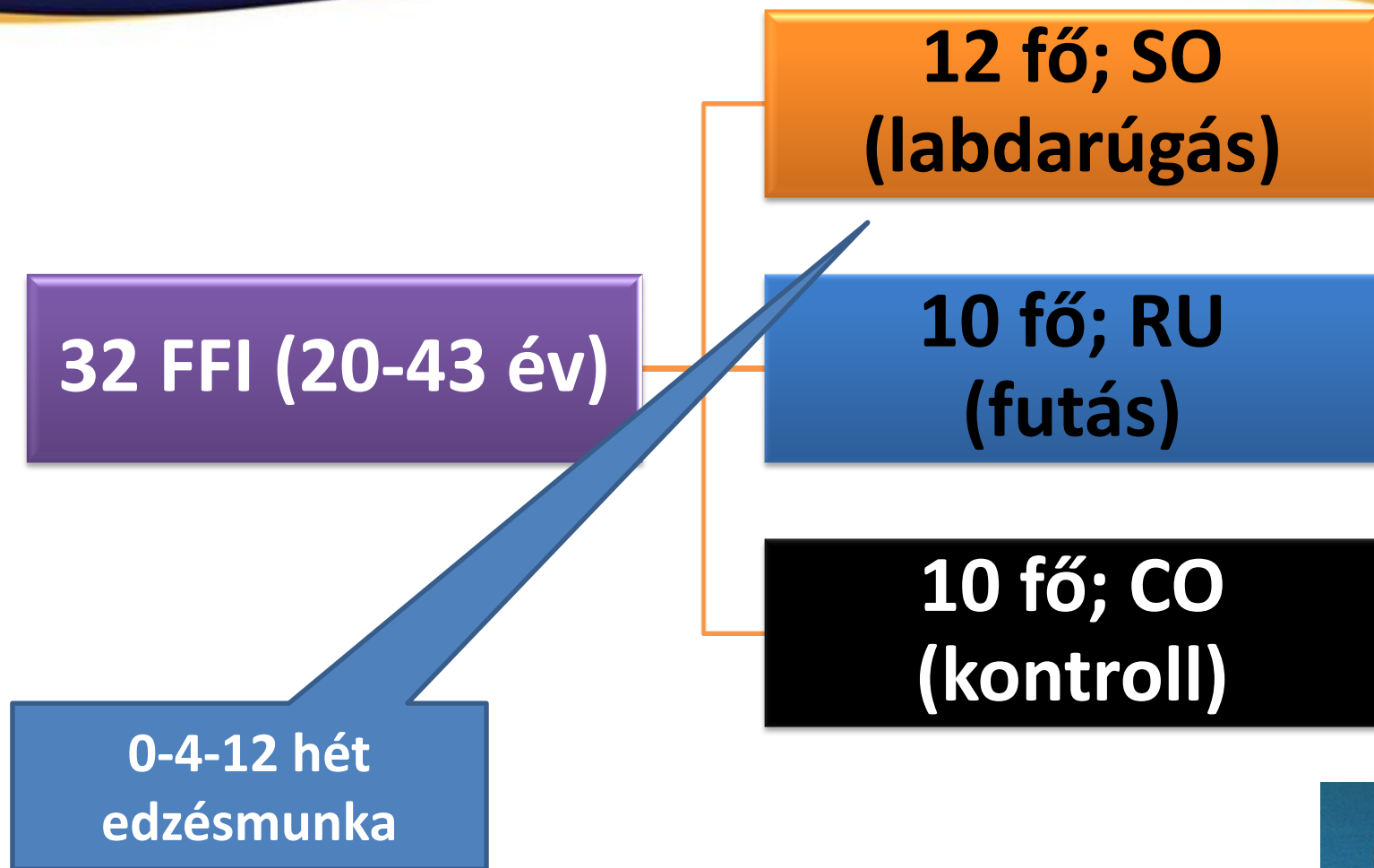
Fig. 5. Longitudinal intra-seasonal trends in Yo-Yo IE2 test performance in elite youth female players ($n = 11$). Preparation training camp (September) vs training camps in the first (March), middle (May) and just prior to the U-20 International Federation of Association Football World Cup finals (June). **Significantly higher Yo-Yo IE2 test performances than preparation training camp ($P < 0.01$).

Női angol labdarúgók Yo-Yo IE2 tesztje (n=92) életkor szerint és szezon közben



CD – Középső védő
 FB – Védő
 CM - Középpályás
 WM – Szélső középpályás
 ATT - Támadó

Fig. 4. Positional differences in Yo-Yo IE2 test performances in elite senior female players (n=92). Data includes central defenders (CD) (n= 21), full-backs (FB) (n= 15), central midfielders (CM) (n= 21), wide midfielders (WM) (n= 19), attackers (ATT) (n= 16). *Significantly higher Yo-Yo IE2 test performance than CD and ATT (P < 0.05).



Testtömeg: $84,4 \pm 2,4$ kg,

Zsír%: $24,5 \pm 1,1\%$

VO_2 max: $39,4 \pm 0,9$ ml/min/kg.



Edzés (SO - labdarúgók csoportjának):

5:5 és 7:7

30-40 méter széles és 40-60 méter hosszú területen (fű)

Edzés ideje: 60 perc

Edzésszám átlaga: 27,8 edzés (2,3 / hét)

Edzés (RU - futók csoportjának):

Tartós módszerrel közepes intenzitású edzés (egyéni HR maximum 82%-ra)

Edzés ideje: 60 perc

Edzésszám átlaga: 30,4 edzés (2,5 / hét)

1 órás labdarúgó edzés (SO) fizikai aktivitásainak alakulása

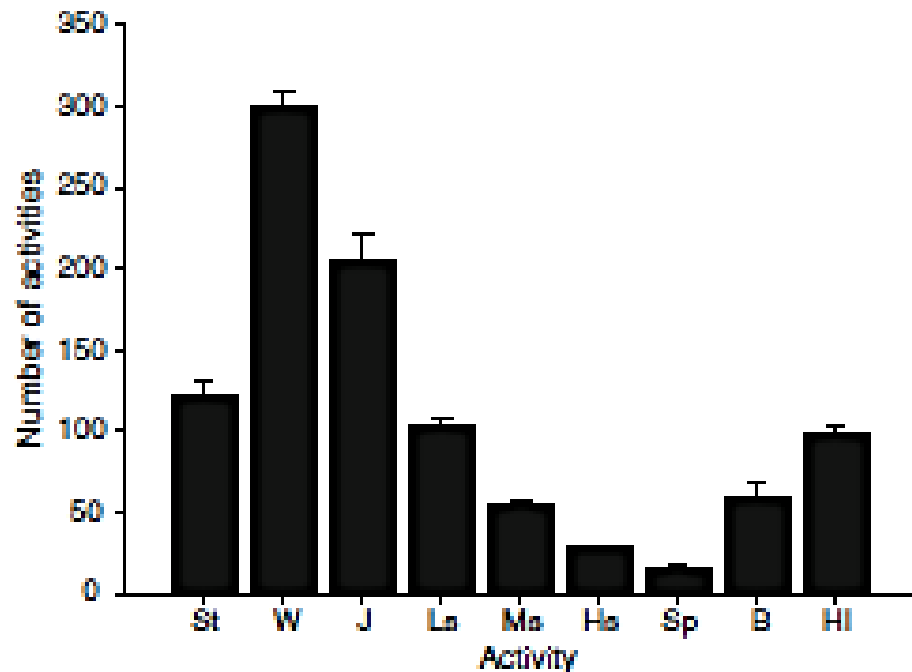


Fig. 1. Activity profile during a 1-h soccer training session, expressed as the number of occurrences of various locomotor modes including standing (*St*), walking (*W*), jogging (*J*), low speed running (*La*), moderate speed running (*Ma*), high speed running (*Ha*), sprinting (*Sp*), sideways/backward running (*B*), as well as the total amount of high intensity running (*HI*, sum of *Ma*, *Ha* and *Sp*). Mean \pm SEM ($n=9$) are presented

Table 1 Muscle metabolites (mmol kg^{-1} d.w.) and after a soccer training session (SO, $n = 11$) and a running training session (RU, $n = 8$) performed 4 weeks into the 12-week training period

	SO		RU	
	Before	After	Before	After
Lactate	11.6 \pm 2.7	30.1 \pm 4.1* [#]	9.7 \pm 2.1	15.6 \pm 3.3
CP	80.5 \pm 8.0	50.3 \pm 5.0*	85.2 \pm 7.9	59.4 \pm 10.4*
Glycogen	422 \pm 28	304 \pm 31*	402 \pm 19	303 \pm 26*

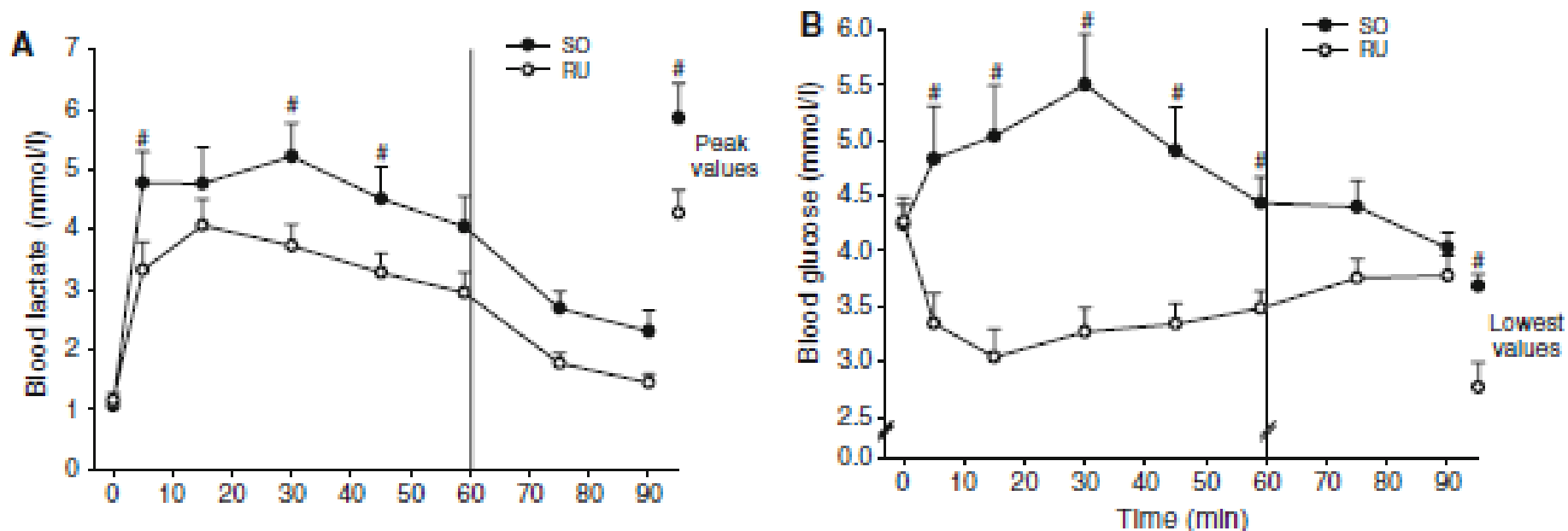
Mean \pm SEM are presented

* Significant difference from before training

[#] Significant difference from RU

SO és RU csoport izommetabolikus mutatóinak alakulása 12. hét során.

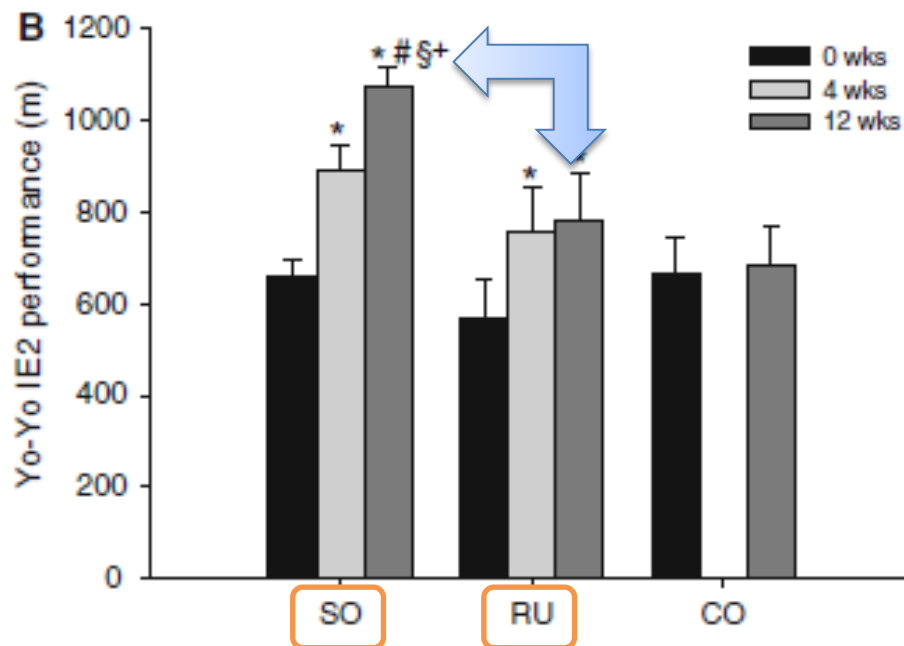
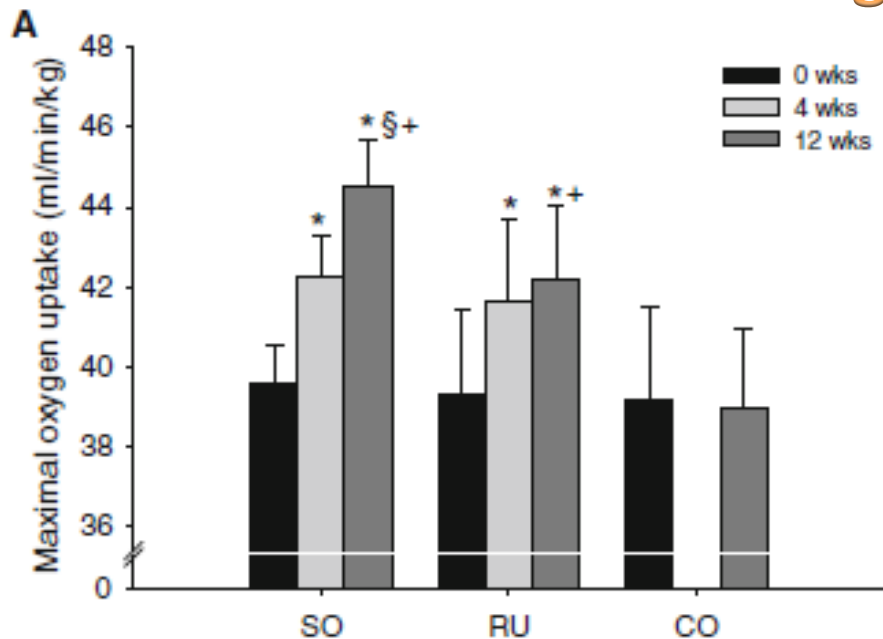
1 órás edzés (SO és RU) izom metabolikus mutatóinak alakulása



SO magasabb LA értéket mutatott, mint RU, a vérglikogén RU csoportnál csökkent szignifikánsan.

Fig. 2 Blood lactate (a) and blood glucose (b) before, during and after a soccer (SO, $n = 11$) and a running training session (RU, $n = 8$) performed 4 weeks into the 12-week training period. Mean \pm SEM are presented. *Significant difference from RU

SO és RU max. oxigén felvevő kapacitása és YYIR2 teljesítménye



A Yo-Yo Intermittent Endurance Teszt Level 2 eredményéből kiindulva 4. és 12. hét után is jobb eredményt érnek el, akik labdarúgással edzettek, mint akik csak futottak!

Fig. 4 Maximal oxygen uptake (a) and Yo-Yo Intermittent Endurance level 2 test performance (b; Yo-Yo IE2) before as well as after 4 and 12 weeks of soccer practice (SO, n = 12) and running (RU, n = 10) for untrained men, or continuation of an inactive life-style (CO = 10). Mean ± SEM are presented. * Significant difference from 0 weeks. §Significant difference from 4 weeks. #Significant difference from RU. +Significant difference from CO



SO, RU és CO csoport laktát (vér) szintjének alakulása futópadon progresszív növekvő teszt alatt

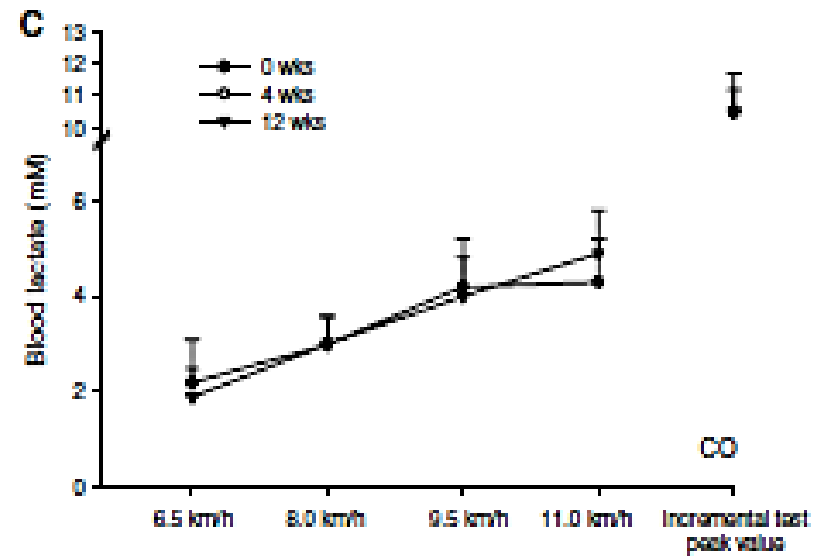
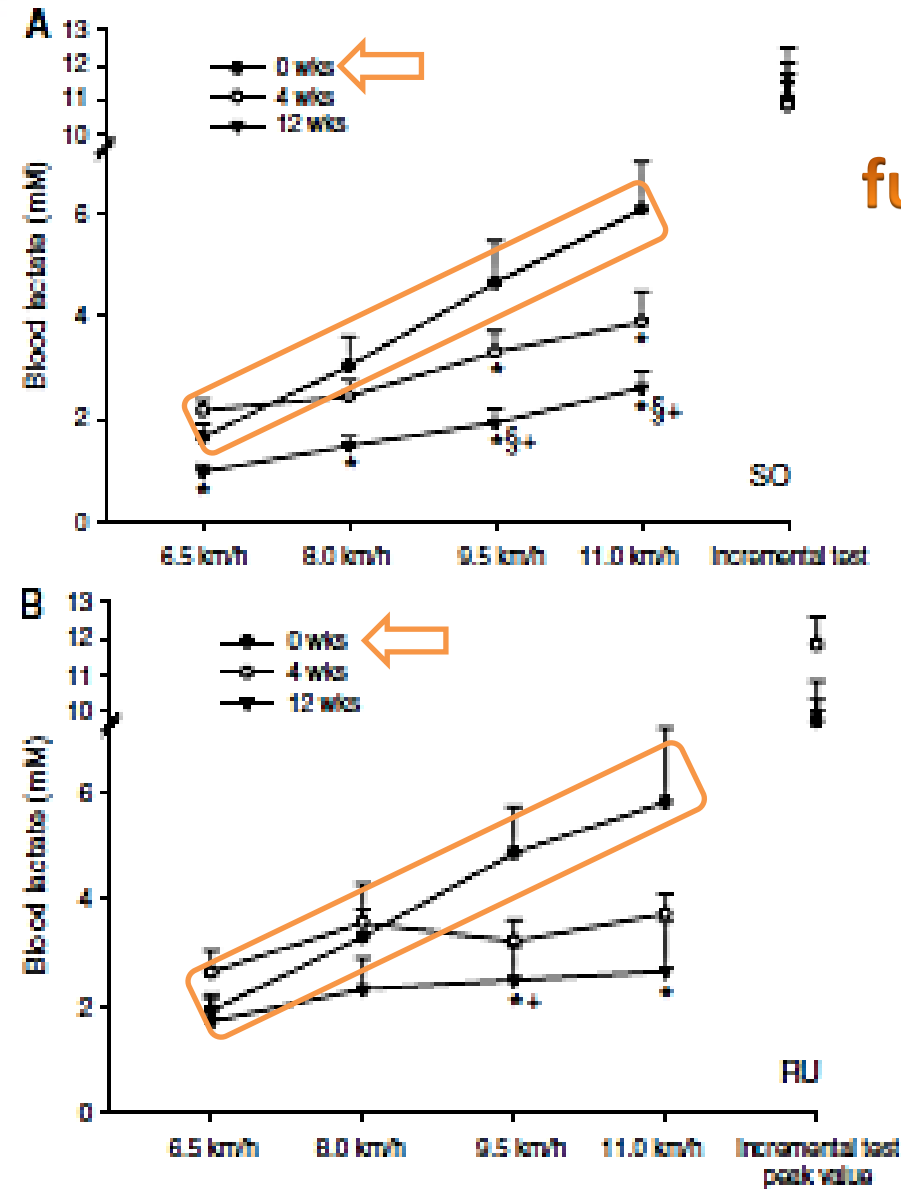


Fig. 5 Blood lactate during treadmill walking at 6.5 km/h and treadmill running at 8.0, 9.5 and 11 km/h performed before as well as after 4 and 12 weeks of soccer practice (a; SO, n = 12) and running (b; RU, n = 10) for untrained men, or continuation of an inactive lifestyle (c; CO = 10). Mean ± SEM are presented. * Significant difference from 0 weeks. [§]Significant difference from 4 weeks. [†]Significant difference from CO

YYIET2 teszt LA és pH változása nyugalomban, a teszt alatt, valamint 3 perc pihenőt követően 0. és 12. héten

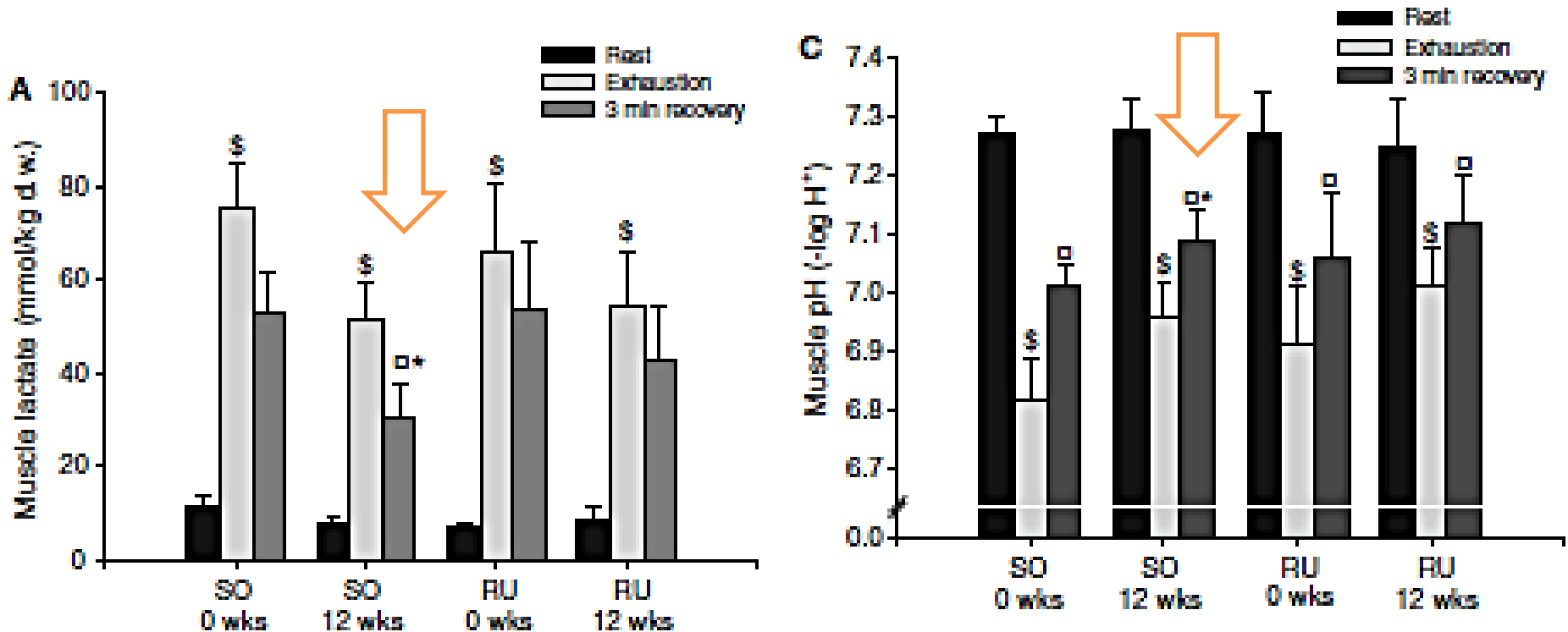


Fig. 6 Muscle lactate (a), CP (b) and pH (c) before and immediately after the Yo-Yo intermittent endurance level 2 test (Yo-Yo IE2) and 3 min into the recovery period before and after 12 weeks of soccer practice (SO, $n = 12$) and running (RU, $n = 10$) for untrained men. Mean \pm SEM are presented. [§]Significant difference from before the test. [□]Significant difference from exhaustion. ⁺Significant difference from before the training period



Yo-Yo Intermittent Recovery Teszt Level 1-2 (YYIRT1-2)

- 20+20 méter futás
- 10 másodperc pihenő
- YYIRT1: lassú tempó, aerob közegtől
- YYIRT2: gyorsabb tempó, anaerob közegben



Yo-Yo Intermittent Recovery Test - Level 1 Average Results

Standard of Soccer Player	Men		Women	
	Distance	Level	Distance	Level
Top Elite Players	2420m	20.1	1600m	17.5
Moderate-Elite Players	2190m	19.3	1360m	16.7
Sub-Elite Players	2030m	18.7	1160m	16.2
Moderately Trained Players	1810m	18.2		
Recreational Players	1200-1300m	16.3 - 16.5	600-700m	14.4 - 14.6

Source: Bangsbo et al (2008)



Yo-Yo Intermittent Recovery Teszt Level 1-2 protokoll

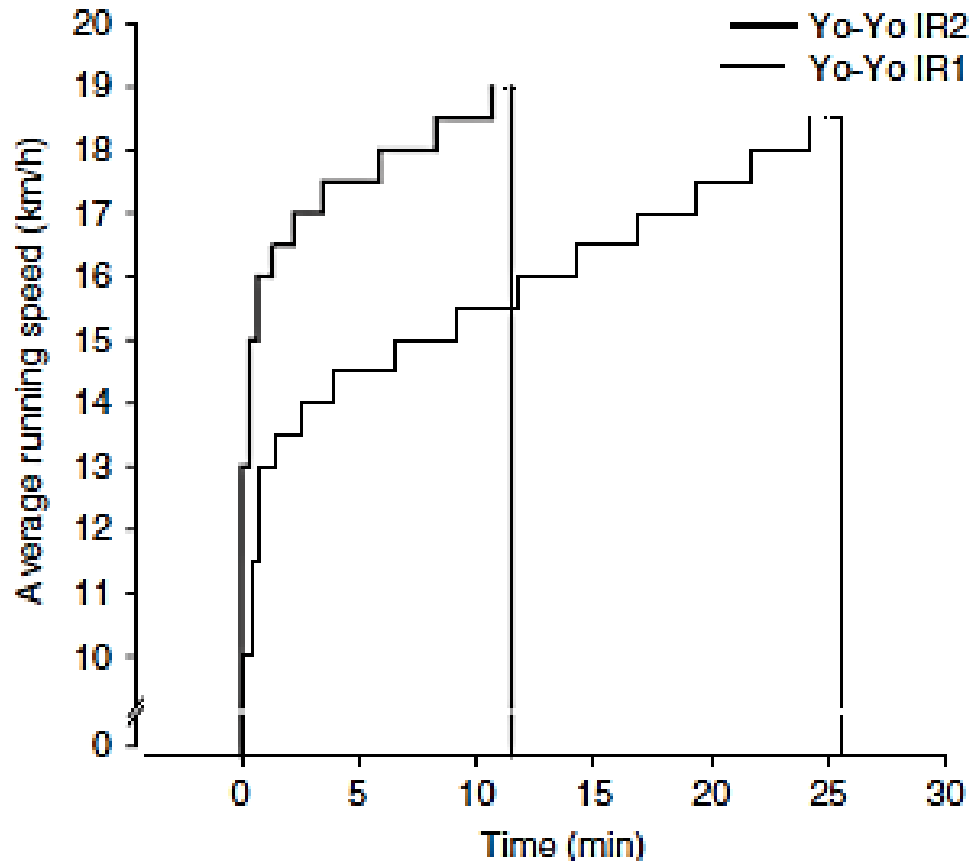


Fig. 1. Schematic representation of the Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) and level 2 (Yo-Yo IR2) tests (reproduced from Krustup et al.,^[15,17] with permission).

Yo-Yo Intermittent Recovery Teszt Level 1-2 labdarúgóknál

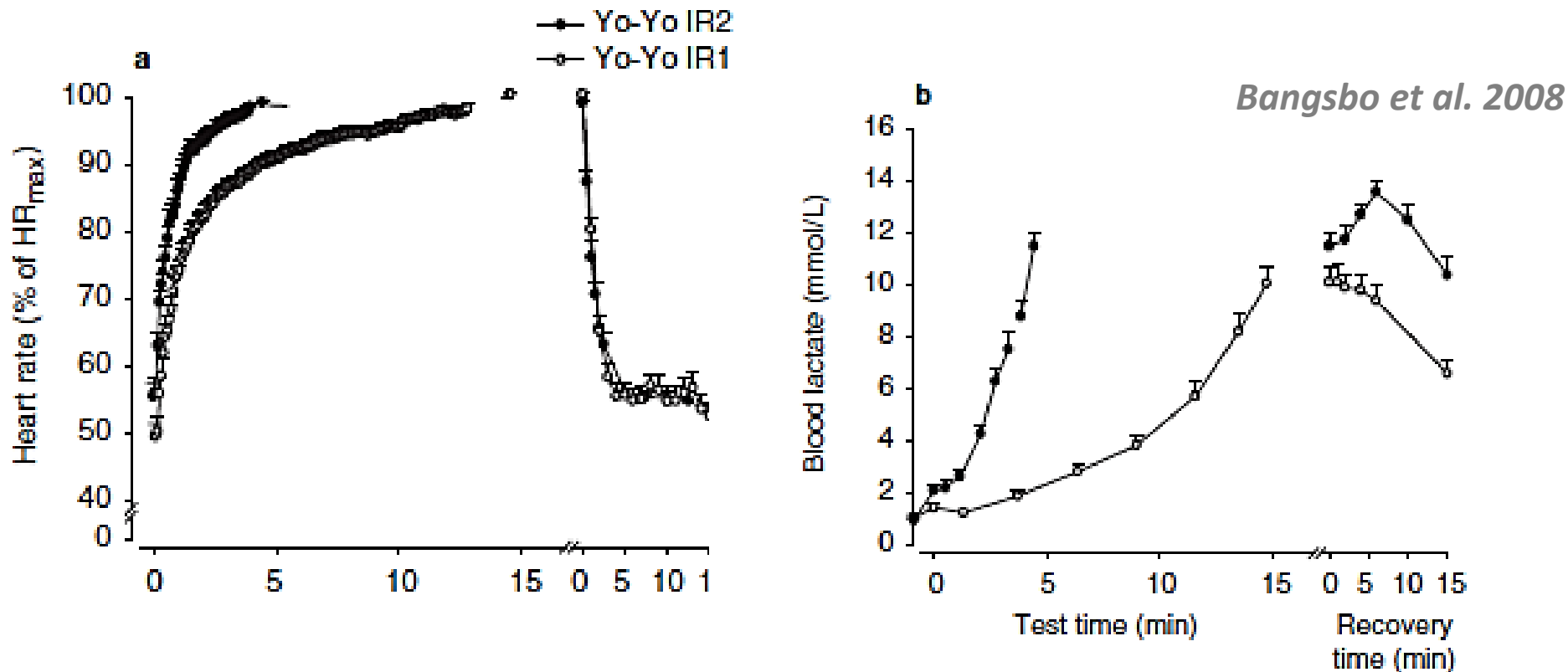


Fig. 2. Heart rate expressed as a percentage of (a) maximal heart rate (HR_{max}) and (b) blood lactate before, during and after the Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) and level 2 (Yo-Yo IR2) tests. Values are mean ± standard error of the mean (reproduced from Krstrup et al.,^[15,17] with permission).

YYIR1-2 teszt alatt LA és CP alakulás labdarúgóknál

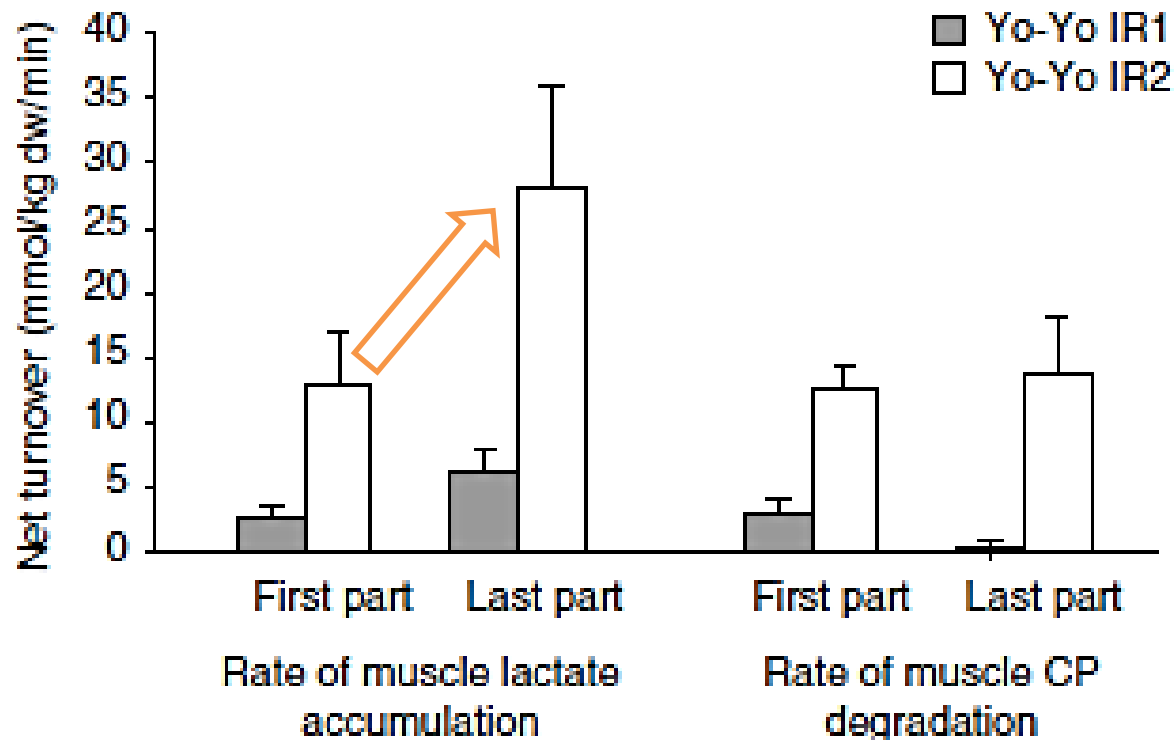
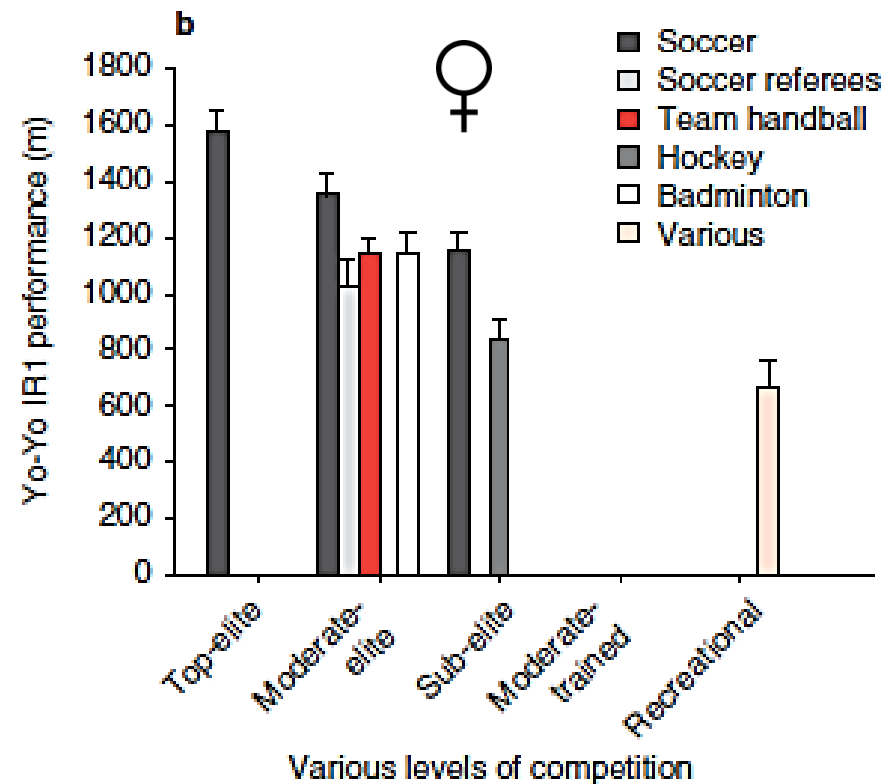
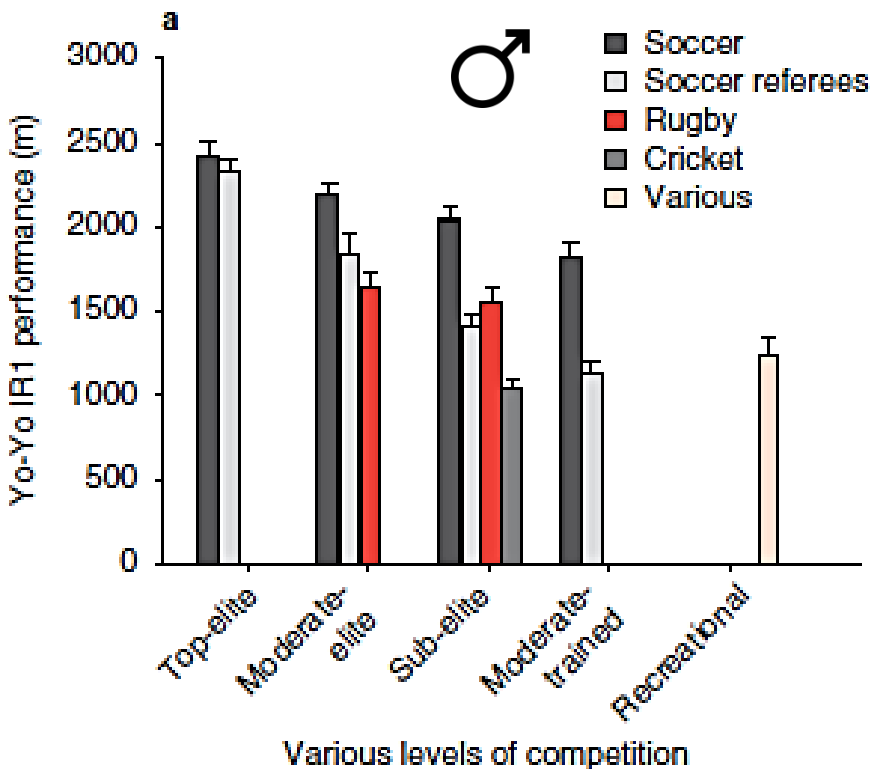
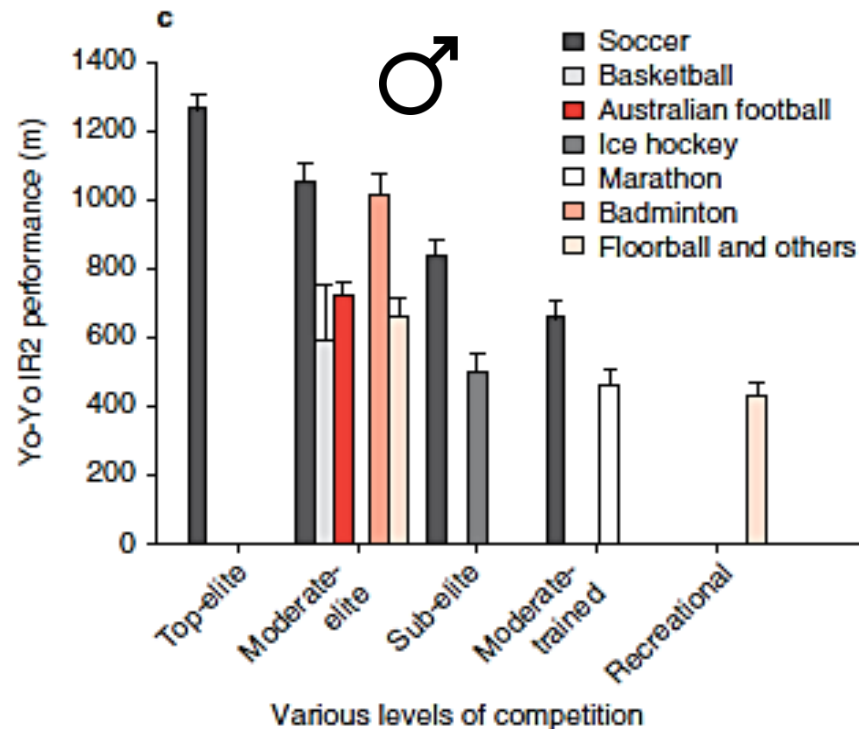


Fig. 3. Rate of muscle lactate accumulation and creatine phosphate (CP) degradation during the first and the last part of the Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) and level 2 (Yo-Yo IR2) tests. Values are mean \pm standard error of the mean.^[15,17] dw = dry weight.

YYIR1 teszt teljesítménye a különböző szinten edzett sportolóknál



YYIR2 teszt teljesítménye a különböző szinten edzett sportolóknál



Bangsbo et al. 2008

Fig. 5. Yo-Yo intermittent recovery test level 1 (Yo-Yo IR1) performance for (a) male and (b) female athletes and Yo-Yo IR2 test performance for (c) male athletes in relation to their competitive level and to the type of sport practiced. Values are mean \pm standard error of the mean. (a) Top-elite (n = 12), moderate-elite (n = 31), sub-elite (n = 46) and moderate-trained (n = 83) soccer referees^[13,14,38] (unpublished observation). (b) Elite badminton players (n = 17; Meibom J, personal communication). Elite soccer referees (n = 10; unpublished observation). Elite team handball players (n = 96; Bencke J, personal communication). Under-21 state-level hockey players (n = 15).^[31] Various recreationally active subjects (n = 26; unpublished observation). (c) Sub-elite ice-hockey players (n = 13; unpublished observation). Moderate-trained marathon runners (n = 16; unpublished observation).

YYIR1-2 teszt teljesítménye posztok szerint

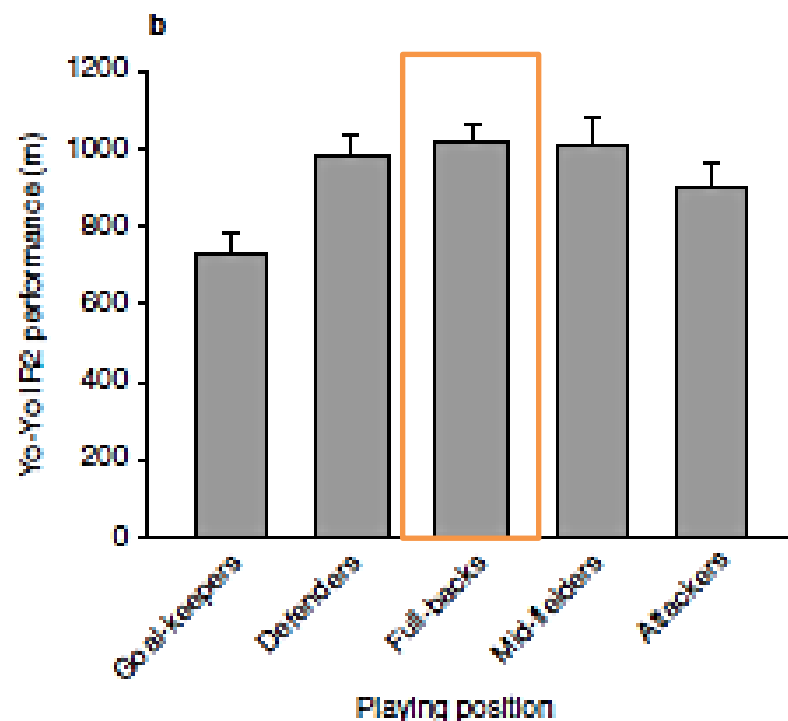
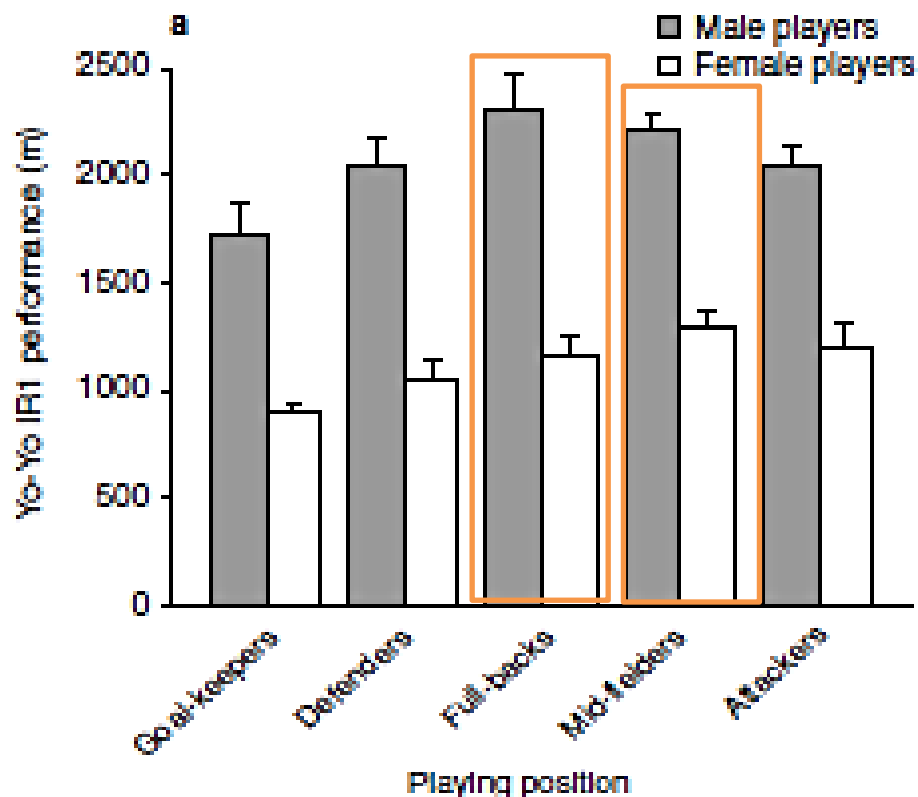


Fig. 6. Yo-Yo Intermittent recovery level 1 (Yo-Yo IR1) test of male and female soccer players (a) and Yo-Yo IR2 performance of male soccer players (b) at different playing positions. (a) Male players: goalkeepers (n = 5), defenders (n = 58), fullbacks (n = 39), midfielders (n = 75) and attackers (n = 49). Female players: goalkeepers (n = 3), defenders (n = 11), fullbacks (n = 9), midfielders (n = 19) and attackers (n = 12)^[4,15] [unpublished observation, Rossi H, Tschopp M and Tunstall H, personal communication]. (b) Goalkeepers (n = 18), defenders (n = 44), fullbacks (n = 38), Midfielders (n = 92) and attackers (n = 46)^[17,21,27] [unpublished observation, Rossi H and Rostgaard T, personal communication]. Values are mean \pm standard error of the mean.



Labdarúgók YYIR1 teszt teljesítménye életkor szerint U12 és >18 között

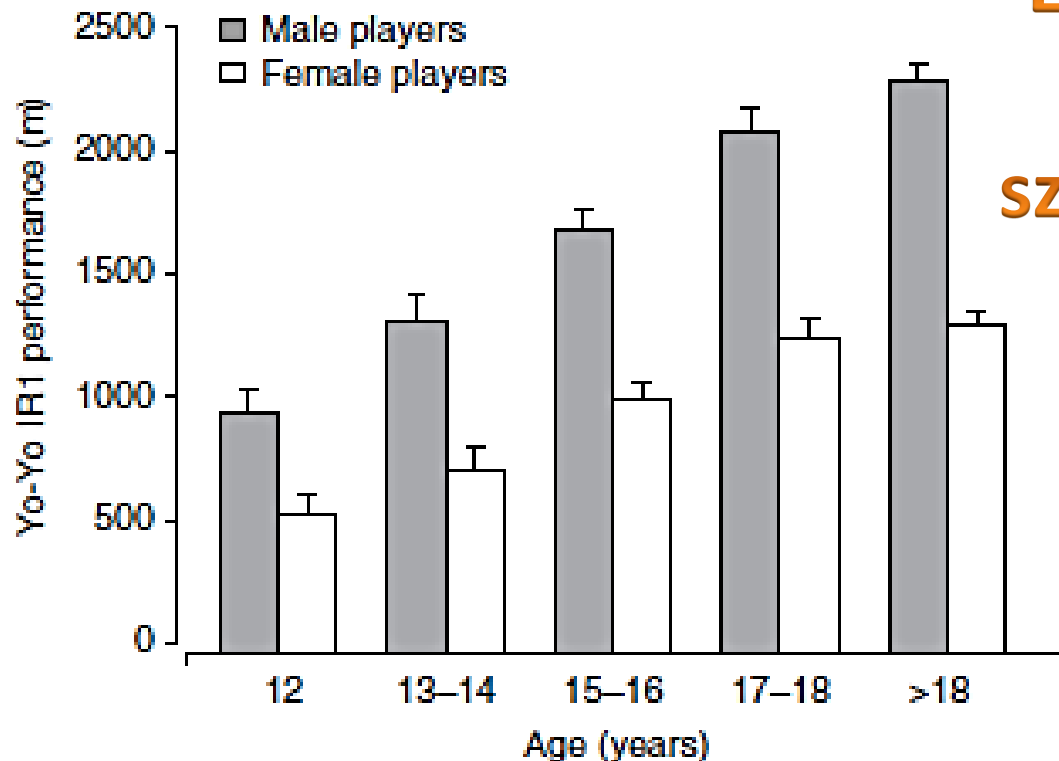
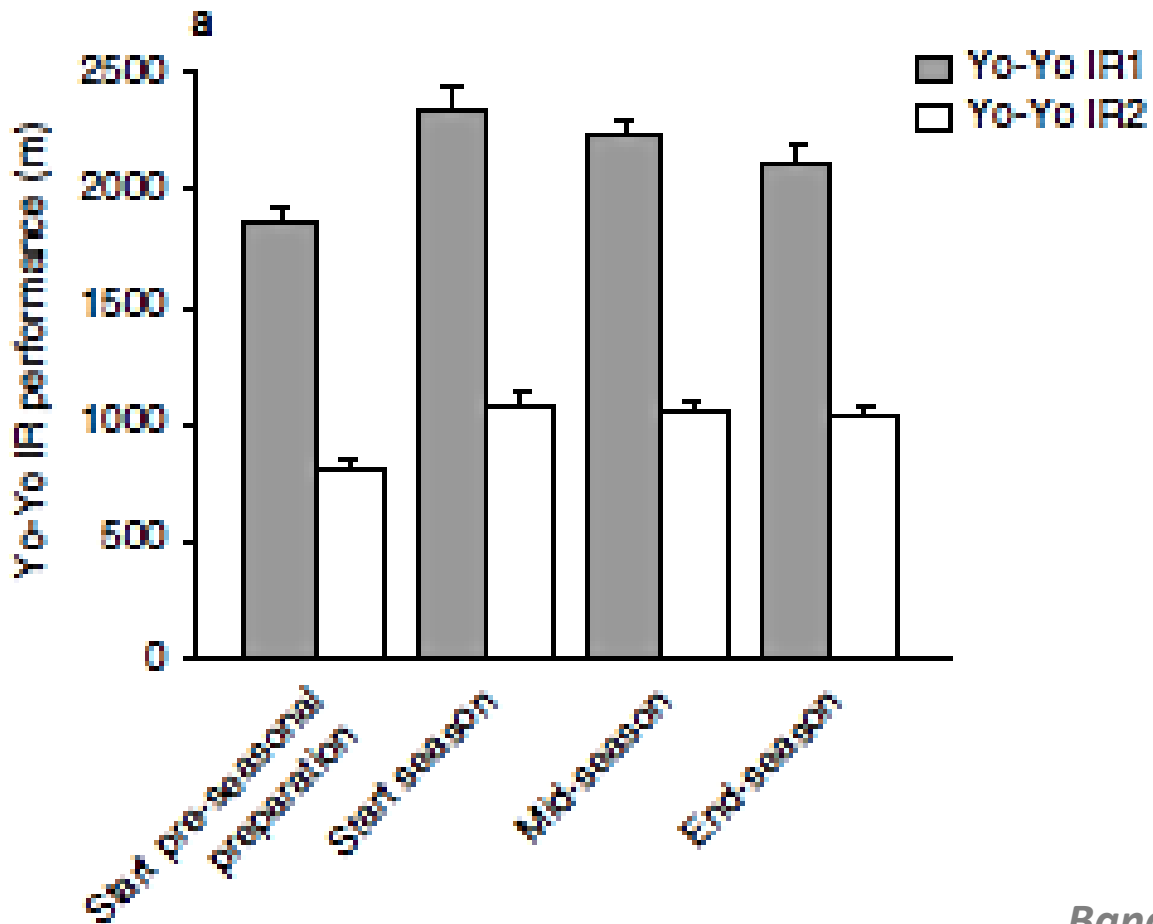
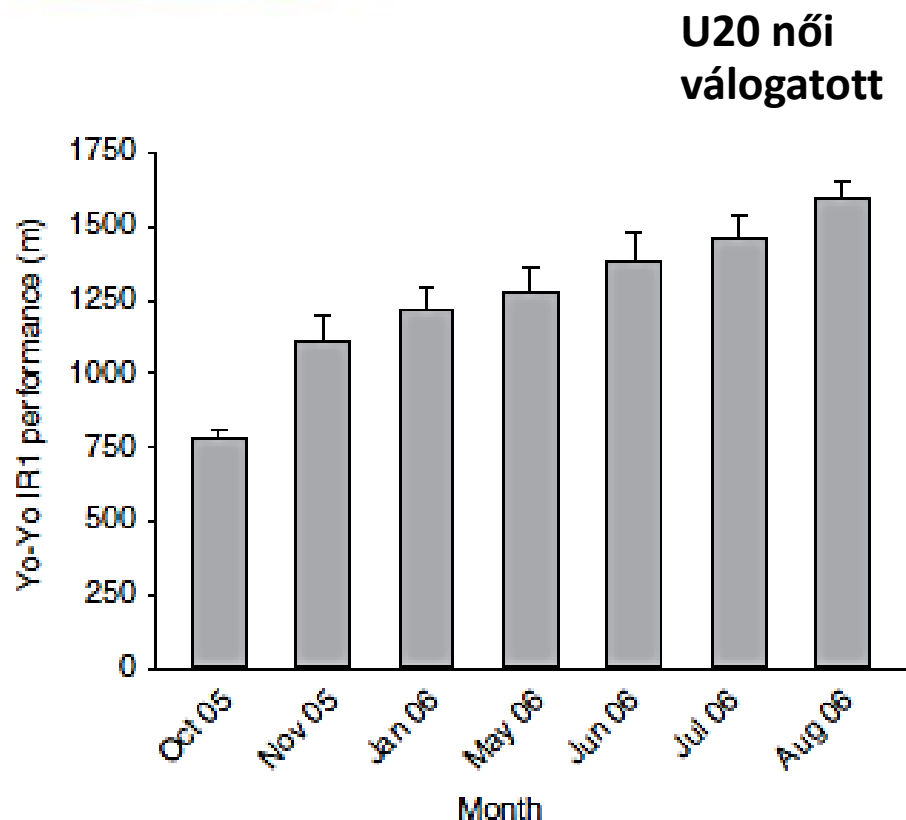


Fig. 7. Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) test performance in relation to age (12, 13–14, 15–16, 17–18, >18 years) for male ($n = 58$, $n = 60$, $n = 94$, $n = 58$, $n = 72$, respectively)^[8,15,20,25] [Tschopp M and Tunstall H, personal communication] and female players ($n = 30$, $n = 58$, $n = 47$, $n = 84$, $n = 114$, respectively)^[4,25] [unpublished observation, Tschopp M and Tunstall H, personal communication]. Values are mean \pm standard error of the mean.



Labdarúgók YYIR1-2 teszt teljesítménye szezon alatt





2005. Okt.: Világbajnokságra felkészülés kezdete

2005. Nov.: 1. Makrociklus vége

2006. Jan.: 2. Makrociklus vége

2006. Máj.: VB. Felkészülés kezdete

2006. Jún.: Felmérő

2006. Júl.: Felkészülés vége

2006. Aug.: Utolsó felmérő VB előtt

Fig. 11. Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) test performance of under 20 years (U20) national female soccer players (n = 17–20) throughout a 1-year period. Start of World Cup (WC) squad selection process (Oct 2005); end of phase 1 development (Nov 2005); end of phase 2 development (Jan 2006); post-qualification – start of WC preparation (May 2006); mid-WC preparation (Jun 2006); late WC preparation (Jul 2006); final squad for U20 WC (Aug 2006) [Tunstall H, personal communication]. Values are mean \pm standard error of the mean.



Yo-Yo IR1 teszt változatos alkalmazása és elért eredményei

Table 1. Change in Yo-Yo Intermittent recovery level 1 (Yo-Yo IR1) and level 2 (Yo-Yo IR2) test performance as an effect of training/de-training in different sports

Study	n	Sport/level/gender	Training type/protocol/period	Frequency (no. sessions per week)	Duration (no. of weeks)	Yo-Yo IR test		$\dot{V}O_{2max}$ (mL/min/kg)	Change (%)
						distance (m)	performance change (%)		
Yo-Yo IR1									
Barbero Alvarez and Barbero Alvarez ^[29]	9	Professional male soccer players	Soccer training Pre-season preparation			1875 ± 95	+28*	55.3 ± 1.3*	+6.0
Krustrup et al. ^[14]	10	Elite male soccer players	Soccer training Pre-season preparation	5–7	6	1760 ± 59	+25 ± 6*	51.3 ± 1.1	+7 ± 1*
Unpublished observation	14	Elite male soccer players	Soccer training During competitive season	6	7–8	1883 ± 56	+14.4*		
Tunstall ³	21	U20 elite male soccer players	Soccer and interval training Tour preparation	3–5	7	2125 ± 52	+12.7*		
	17	U20 elite female soccer players	Soccer and interval training Final World Cup preparation	4	8	1278 ± 80	+24.9*		
Ferrari Bravo et al. ^{[34][35]}	13	Sub-elite male soccer players	Interval training (4 × 4 min 90–95% HR _{max} – 3-min rest) ^a	2	7	1846 ± 91	+12.5*	52.8 ± 0.9	+6.6*
	13	Sub-elite male soccer players	Repeated sprint: 3 × (6 × 20 + 20m sprints – 20-sec rest)/3-min rest ^a	2	7	1917 ± 121	+28.1*	55.7 ± 0.6	+5.0*
Krustrup and Bangsbo ^[36]	10	Elite male soccer referees	Intermittent training (run >90% HR _{max})	3–4	12	1345 ± 62	+31.1*	46.5 ± 1.7	+3.4
Weston et al. ^[38]	12	Top-class male soccer referees	Intermittent high-intensity training (85–95% HR _{max})	3	68–70	1720 ± 80	+35.5*		
	7	Elite male soccer referees	Intermittent high-intensity training (85–95% HR _{max})	3	68–70	1290 ± 154	+53.9*		



Intermittent Recovery Teszt L1 alkalmazása során magasabb teljesítményt ér el a sportoló, ha:

- legalább 6 hétig tart az adott makrociklus,
- felkészülés kezdeti szakaszában építjük ki az alap állóképesség megszerzését követően, még a bajnokság és felkészülési mérkőzések előtt,
- inkább 20+20 méteres mini intervall munka preferált, mint 4x4 percig tartó 90-95%-os maximális intenzitású intervall futás.



Study	n	Sport/level/gender	Training type/protocol/period	Frequency (no. sessions per week)	Duration (no. of weeks)	Yo-Yo IR test	
						distance (m)	performance change (%)
Yo-Yo IR2							
Hasegawa ²⁴	16	Professional male football players	Daily football practice		10	717 ± 33	+52.3*
Krustrup et al. ²³	20	Sub-elite male soccer players	End of season/de-training after summer holidays	0-1	4	873 ± 43	-11 ± 5*
	15	Elite male soccer players	Soccer training Pre-season preparation	5-7	8	730 ± 41	+42 ± 8*
Unpublished observation	10	Elite male soccer players	Soccer training Pre-season preparation	6-7	6	1116 ± 62	+19.5*
McHughes et al. ²⁴	16	Professional male soccer players	Soccer training Pre-season preparation			911 ± 58	+18.4*



Study	n	Sport/level/gender	Training type/protocol/period	Frequency (no. sessions per week)	Duration (no. of weeks)	Yo-Yo IR test		$\dot{V}O_{2max}$ (mL/min/kg)	Change (%)
						distance (m)	performance change (%)		
Rostgaard ⁸	14	Elite male soccer players	Soccer training Mid-season rebuilding	6	5	840 ± 33	+31.7*		
	12	Elite male soccer players	Soccer training Pre-season preparation	5-7	5	880 ± 45	+26.1*		
Tala et al. ^{9,10}	8	Trained male endurance runners	Speed endurance: 8-12 x 30-sec run ~95% v _{max} , 3-min rest	3	4	440 ± 58	+19.0*	55.3 ± 1.8	-2.2
Mohr et al. ¹¹	6	Healthy active males	Sprint training: 15 x 6-sec runs at 95% v _{max} , 1-min rest	3-5	8	520 ± 54	+9.9*	51.9 ± 2.7	+0.9
	7	Healthy active males	Speed endurance: 8 x 30-sec runs 130% $\dot{V}O_{2max}$ - 90 sec rest	3-5	8	483 ± 61	+28.7*	49.0 ± 1.6	+2.4



Intermittent Recovery Teszt L2 alkalmazása során magasabb teljesítményt ér el a sportoló, ha:

- **legalább 4-5 hétig tart az adott makrociklus,**
- **felkészülés kezdeti szakaszában építjük ki az alap állóképesség megszerzését követően, a felkészülés középső szakaszában még a bajnokság és felkészülési mérkőzések előtt,**
- **kb. 30 mp-es 95-100%-os mini intervall munkát végez.**

YYIR1-2 review

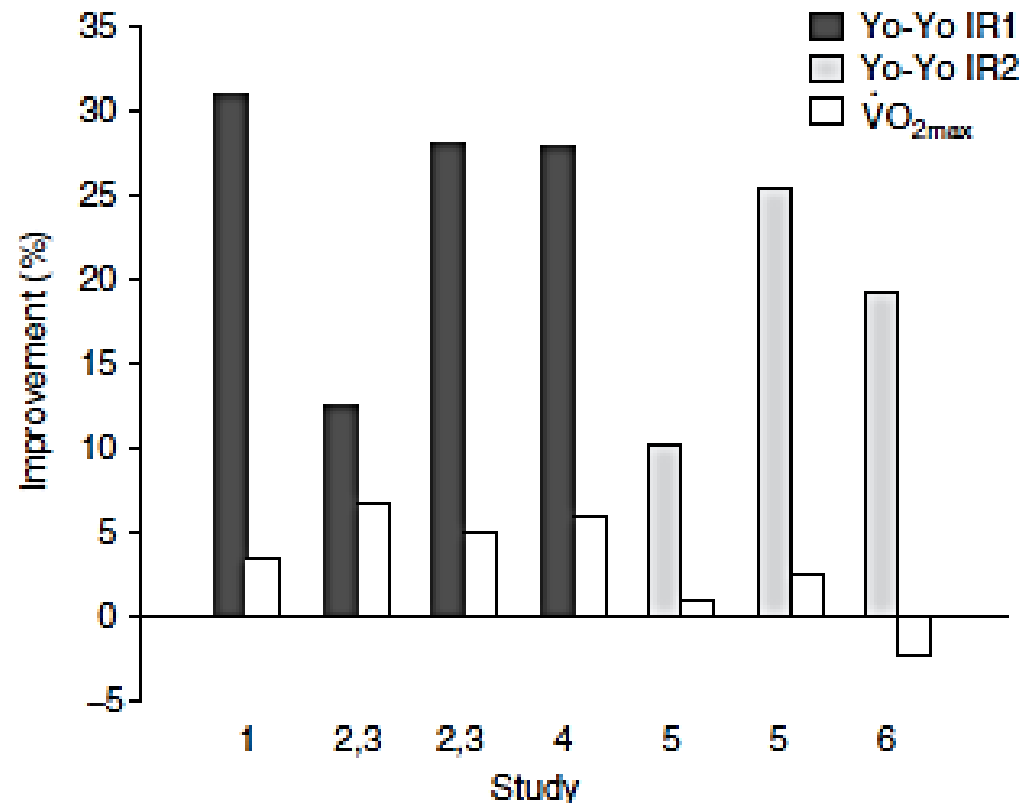


Fig. 14. The effect of different types of training on the Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) and Yo-Yo IR2 test performance as well as maximal oxygen uptake ($\dot{V}O_{2max}$). Data from Krustup et al.^[14] (study 1); Ferrari Bravo et al.^[23,30] (studies 2 and 3); Barbero Alvarez and Barbero Alvarez^[20] (study 4); Mohr et al.^[43] (study 5); Iaia et al.^[32] (study 6).

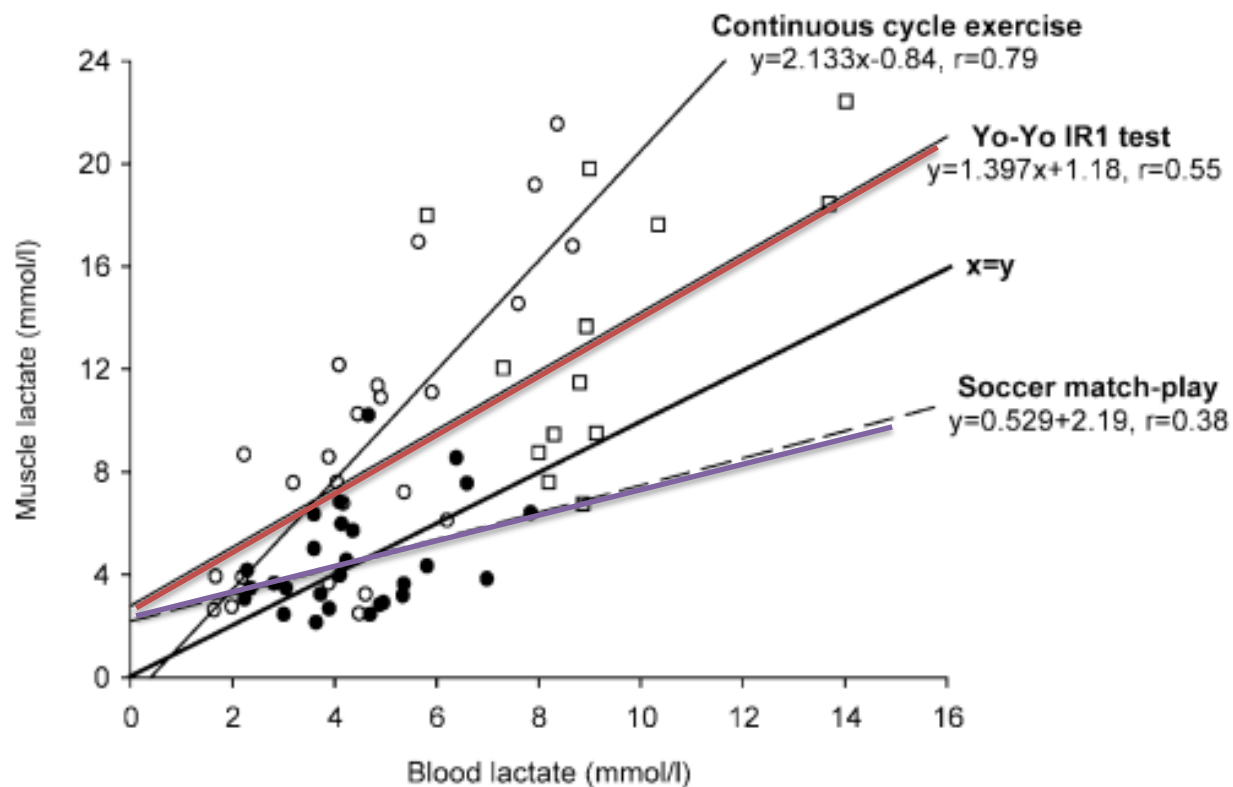


Figure 1. Individual relationships between muscle lactate (expressed in mmol per litre of cell water) and blood lactate during a soccer match (solid circles; data from the present study), at exhaustion in the Yo-Yo intermittent level 1 recovery test (solid squares; data from Krstrup *et al.*, 2003), and after 20 min of continuous cycle exercise at 80% $\dot{V}O_{2max}$ (open circles; data from Krstrup *et al.*, 2004b).



Különböző intenzitású edzések hatása a YYIR2 tesztre

2 hét

- 3 edzés/hét

3 hét

- 4 edzés/hét

2 hét

- 5 edzés/hét

1 hét

- 6 edzés/hét



**Gyorsaság-
fejlesztés**

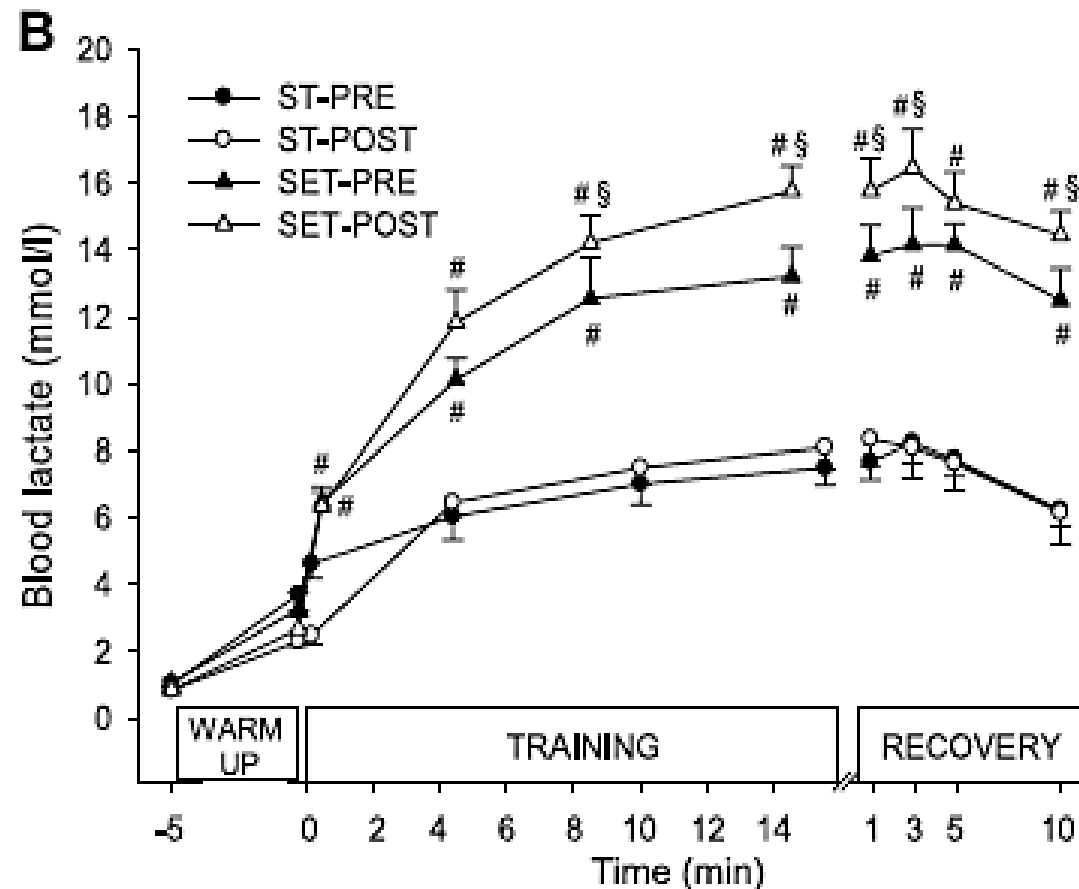
**6 mp sprintek
SPMax95-
100%**



**Gyorsasági
állóképesség**

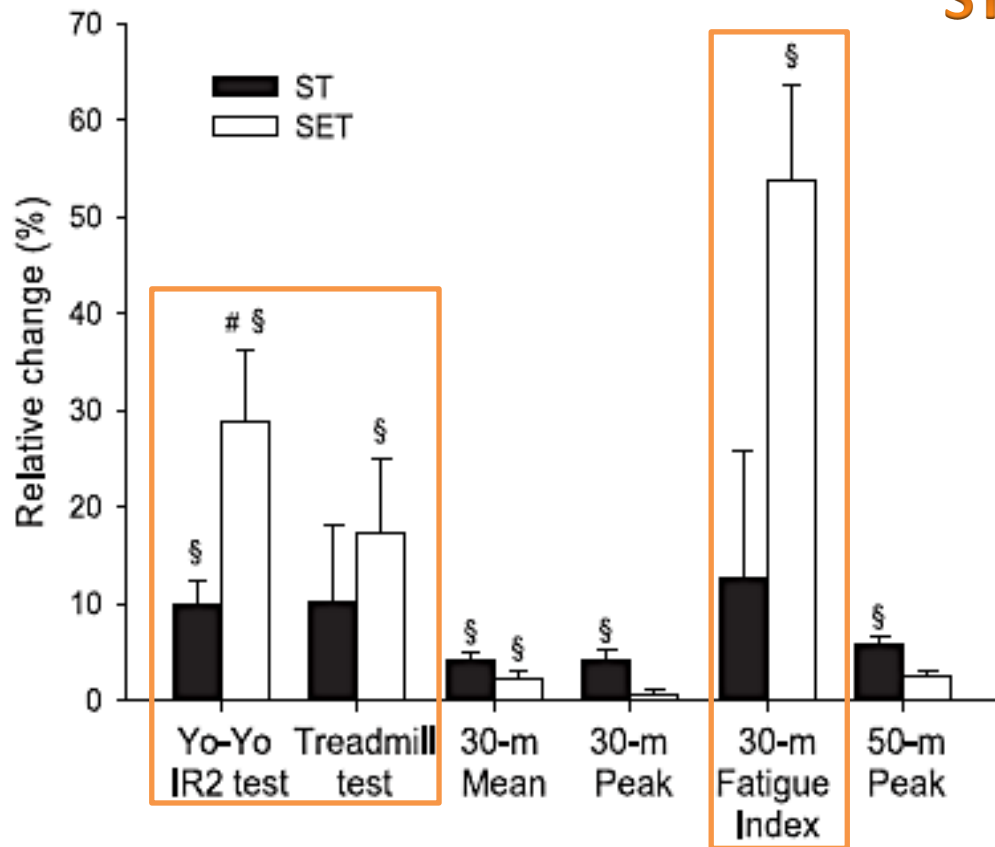
**30 mp
SPMax90%**

ST és SET csoport La-változása felkészülés elején és végén



**Magasabb laktát érték SET csoportban a makrociklus után (jobb laktát tolerancia).
ST edzés során az érték nem változott!**

ST (Sprint Training) – Gyorsasági Munka
SET (Speed Endurance Training) – Gyorsasági Állóképesség



ST és SET csoport teljesítménye gyorsasági és állóképességi feladatok során

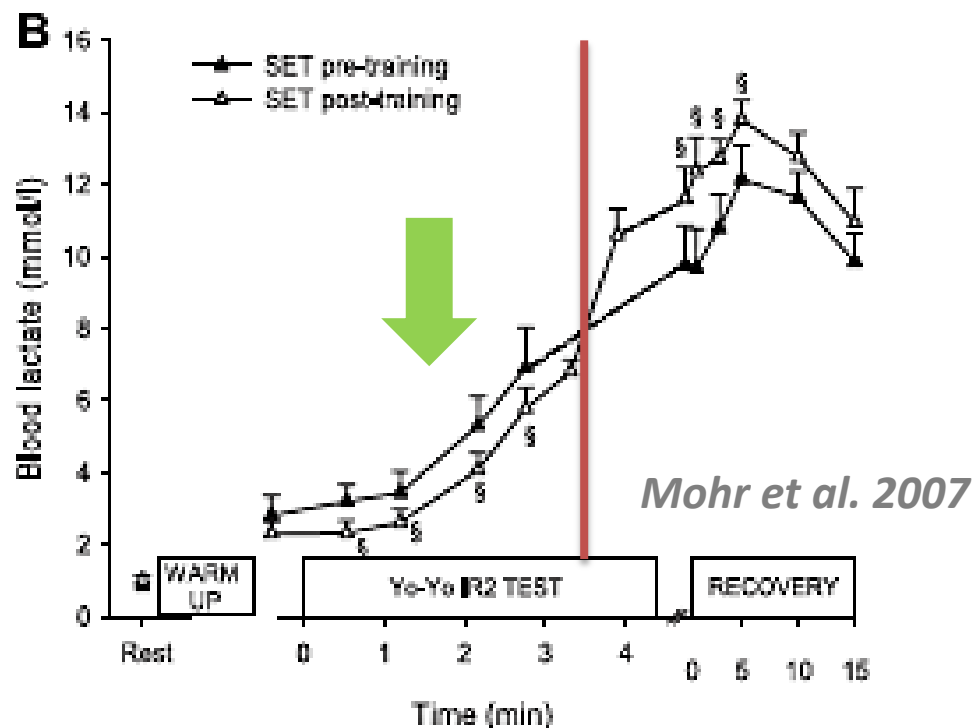
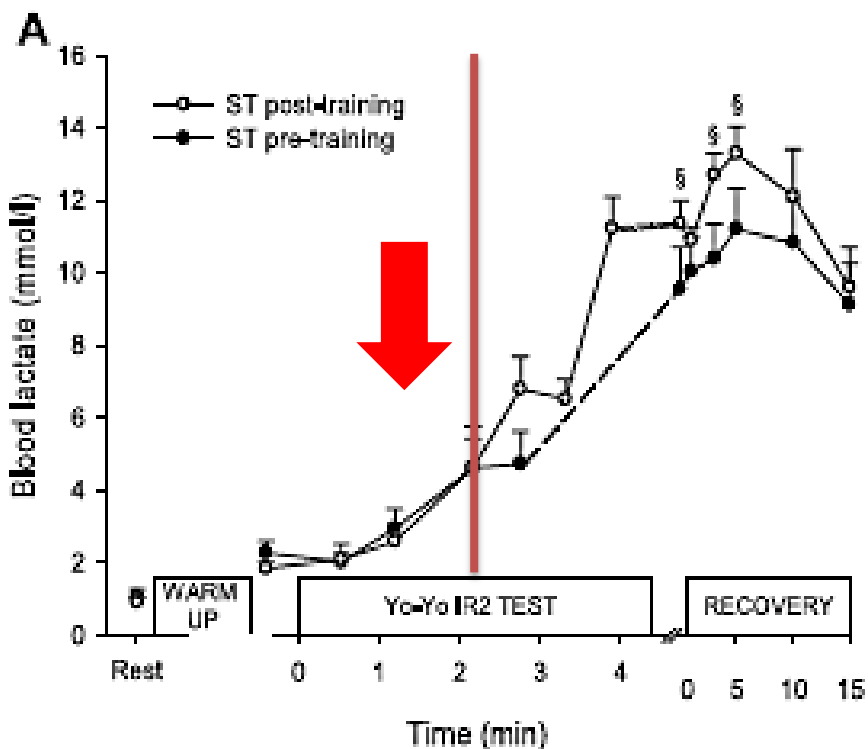
Magasabb relatív teljesítményt értek el a labdarúgók SET csoportban a makrociklusok után (jobb laktát tolerancia).

Fig. 3. Relative training-induced change in performance in the Yo-Yo intermittent recovery level 2 (IR-2) test, incremental treadmill test, a 50-m ST and 30-m repeated ST. #Significant difference between ST and SET ($P < 0.05$); §significant ($P < 0.05$) difference between before and after the training period.

ST (Sprint Training) – Gyorsasági Munka

SET (Speed Endurance Training) – Gyorsasági Állóképesség

ST és SET csoport LA - változása felkészülés elején és végén YYIR2 teszt során



ST – Gyorsasági Munka
SET – Gyorsasági Áll.

Fig. 5. Blood lactate before, during and after the Yo-Yo IR-2 test before and after the training period in ST (A) and SET (B). §Significant ($P < 0.05$) difference between before and after the training period.



Andersen teszt gyerekeknek:

20 m futás, a bólyát meg kell érinteni, majd futás vissza
15 mp futás folyamatosan, majd 15 mp pihenő (max. 2
lépés és megállás)

Legalább 10 perc hosszú a teszt!

Megtett táv hossza számít!

YYIR1C

Gyerekeknek

2x16 méter futás és 2x4 méter séta a pihenő

6-7 és 8-9 évesek YYIR1C és Andersen-teszt eredménye, valamint a $\dot{V}O_2$ max alakulása

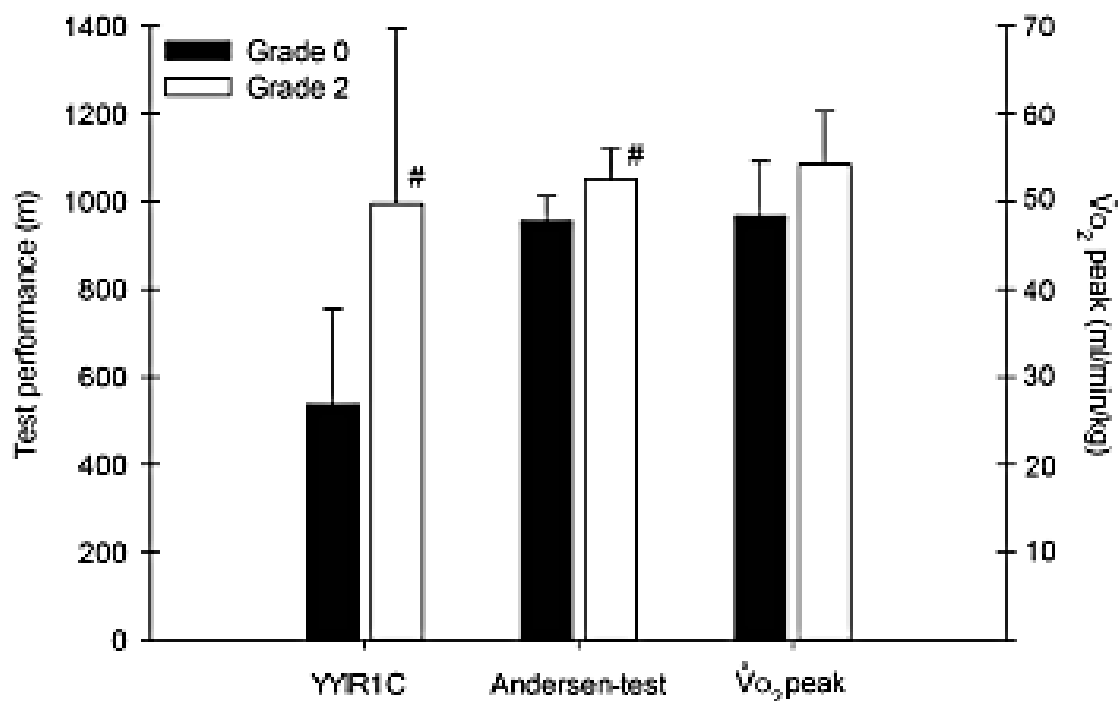


Figure 1. Intermittent exercise capacity, expressed as performance in the modified YYIR1C and Andersen tests and maximal oxygen uptake for grade 0 school children (6–7 years, $n = 17$, open bars) and grade 2 school children (8–9 years, $n = 16$, filled bars). Data are presented as mean \pm SD. #Significantly different from grade 0 pupils. YYIR1C = Yo-Yo intermittent recovery level 1 children's test.



Mario Gomez egyéni edzése (2013, Doha)

- **4 mp SPRINT, az első 5 lépés alatt a frekvenciára koncentrálv**
 - **20 mp kocogás, joggolás**
- **5 mp SPRINT a kezdőkör körívének fele mentén**
 - **20 mp kocogás, joggolás**
- **6 mp SPRINT irányváltás letűzött jelek között (zikk-zakk)**
 - **25 mp kocogás**
 - **5 mp SPRINT előre-hátra irányváltással**
 - **PIHENŐ**

CH bevitel?

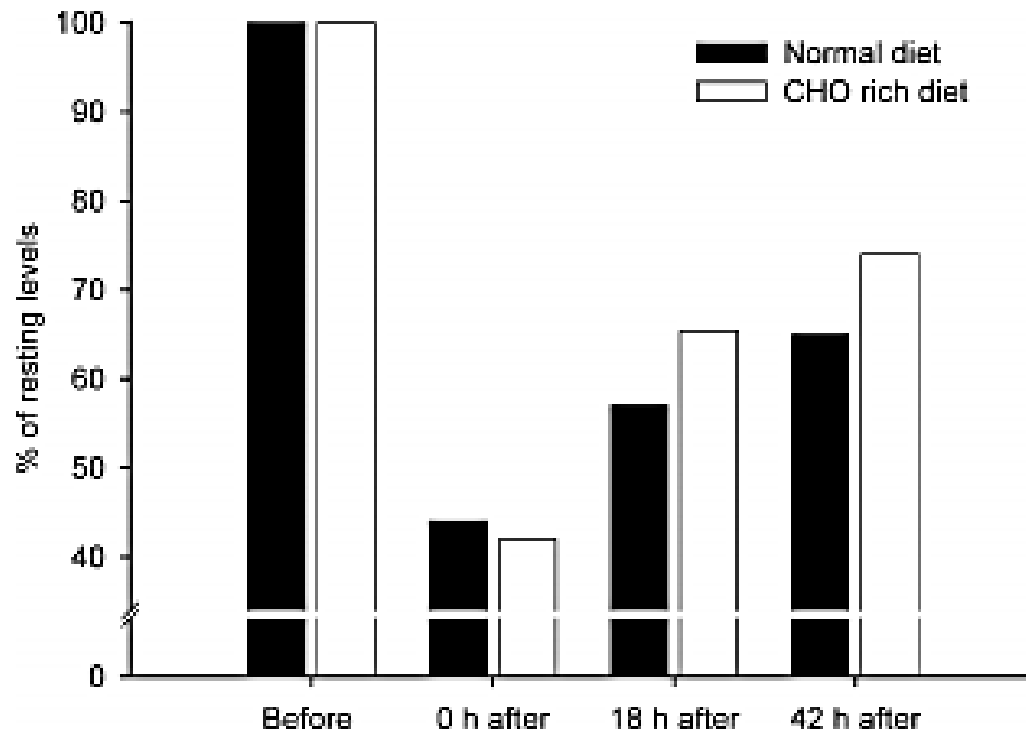


Figure 4. Muscle glycogen concentration (expressed as a percentage of resting values) after a competitive soccer match. Biopsies were obtained from the vastus lateralis muscle 0, 18, and 42 h after a game on two occasions, with a normal diet (solid bars) and a diet high in carbohydrates (open bars).



**Köszönöm megtisztelő
figyelmüket!**

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