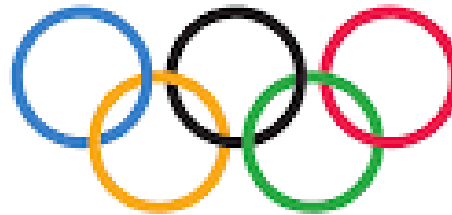




TOKYO 2020



Amândio M. Cupido Santos
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Laeta
laboratório associado



Tokyo, the city where the next Olympic Games will take place in July and August 2020, has a higher risk of heat illness than the three cities where the Games were held before. The values of the Wet Bulb Globe Temperature (WBGT) index, used to assess the risk of thermal stress are typically, at least, for the Games season, 3 °C above the Beijing and Rio de Janeiro values ' (Kakamu T et al 2017)

[Scand J Med Sci Sports](#). 2019 Feb;29(2):189-199. doi: 10.1111/sms.13319. Epub 2018 Oct 30.
Effects of hydration status during heat acclimation on plasma volume and performance.
[Pethick WA](#)¹, [Murray HJ](#)^{1,2}, [McFadyen P](#)¹, [Brodie R](#)¹, [Gaul CA](#)², [Stellingwerff T](#)^{1,2}.

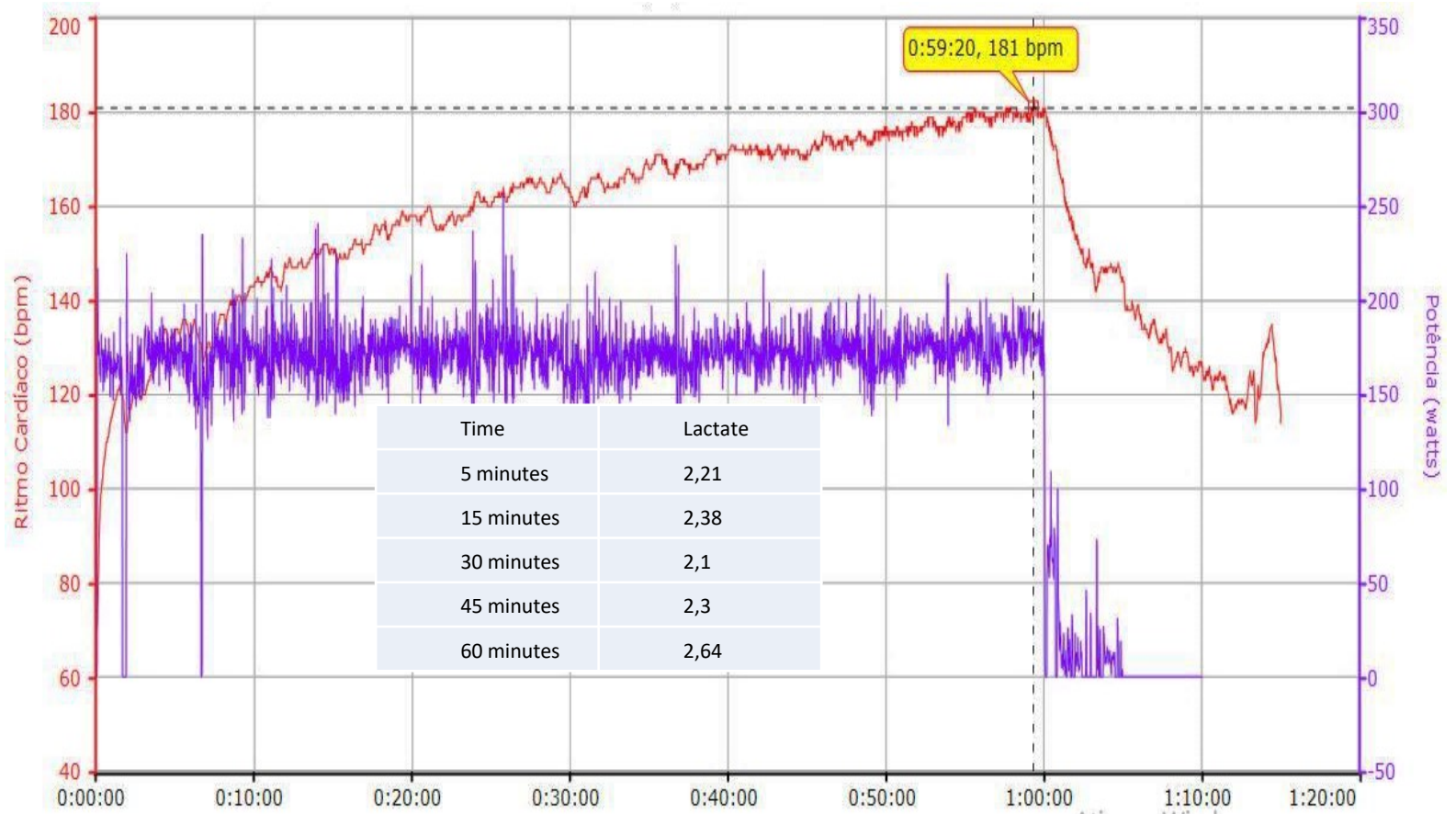
Journal of Applied Physiology. [Volume 109 Issue 4](#) October 2010 Pages 1140-1147
Heat acclimation improves exercise performance
[Santiago Lorenzo](#), [John R. Halliwill](#), [Michael N. Sawka](#), and [Christopher T. Minson](#)

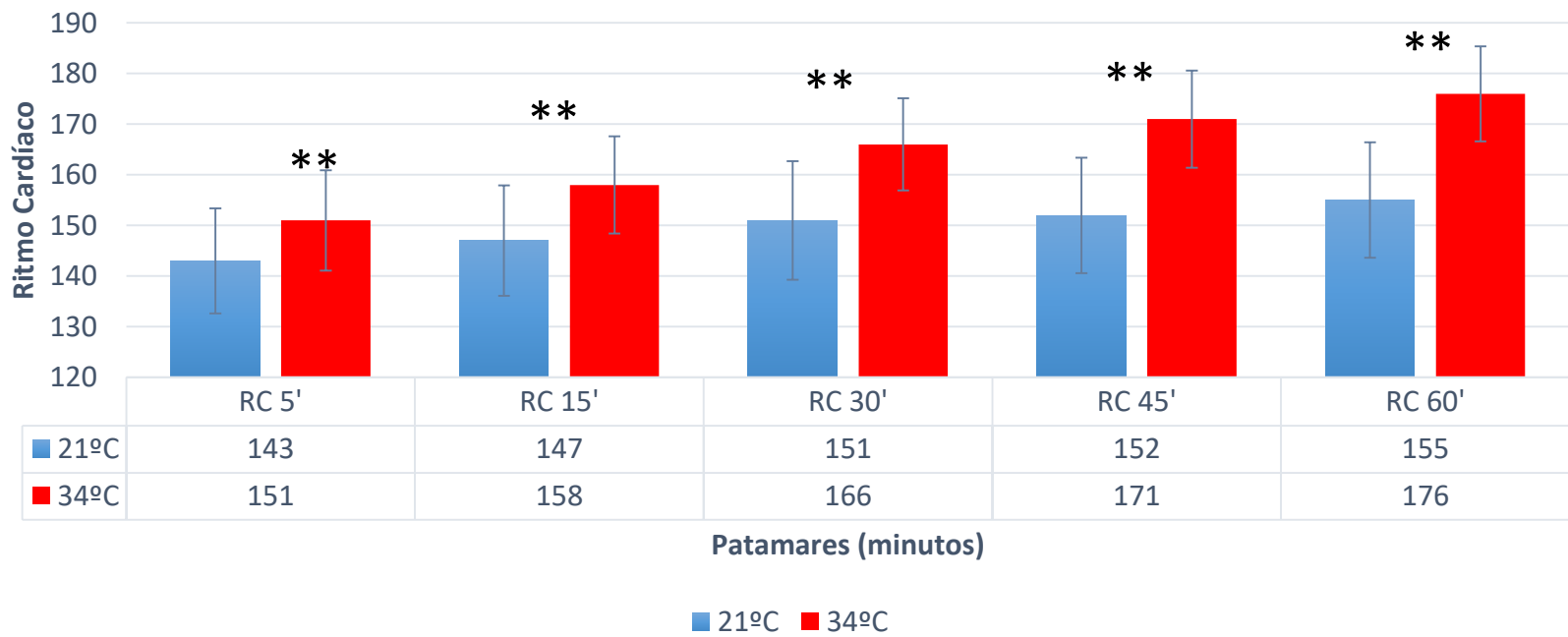
[Sports Med](#). 2017 Aug;47(8):1467-1476. doi: 10.1007/s40279-016-0668-9.
From Lab to Real World: Heat Acclimation Considerations for Elite Athletes.
[Casadio JR](#)^{1,2}, [Kilding AE](#)³, [Cotter JD](#)⁴, [Laursen PB](#)^{3,5}.

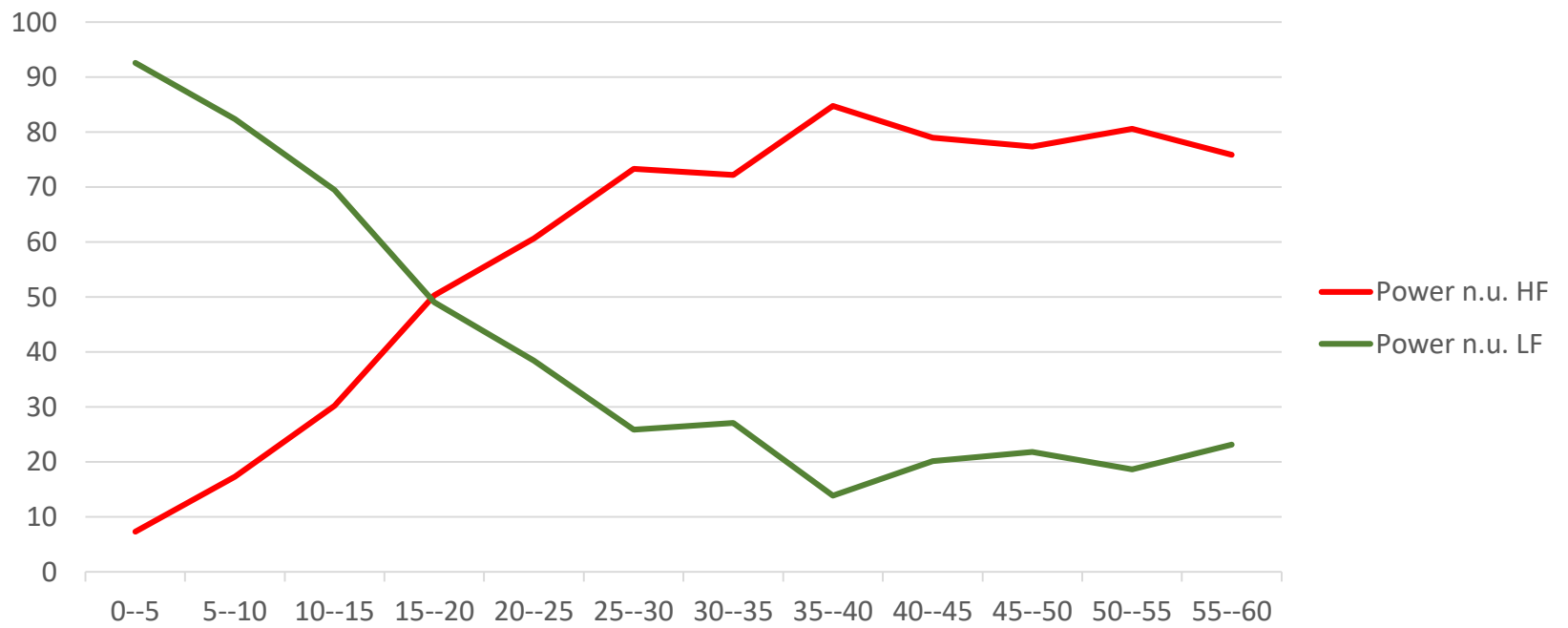
The Effects of Heat Adaptation on Physiology, Perception and Exercise Performance in the Heat: A Meta-Analysis (Tyler, Reeve, Hodges, Cheung, & Tyler, 2016)

Kakamu T, Wada K, Smith DR, Endo S, Fukushima T. Preventing heat illness in the anticipated hot climate of the

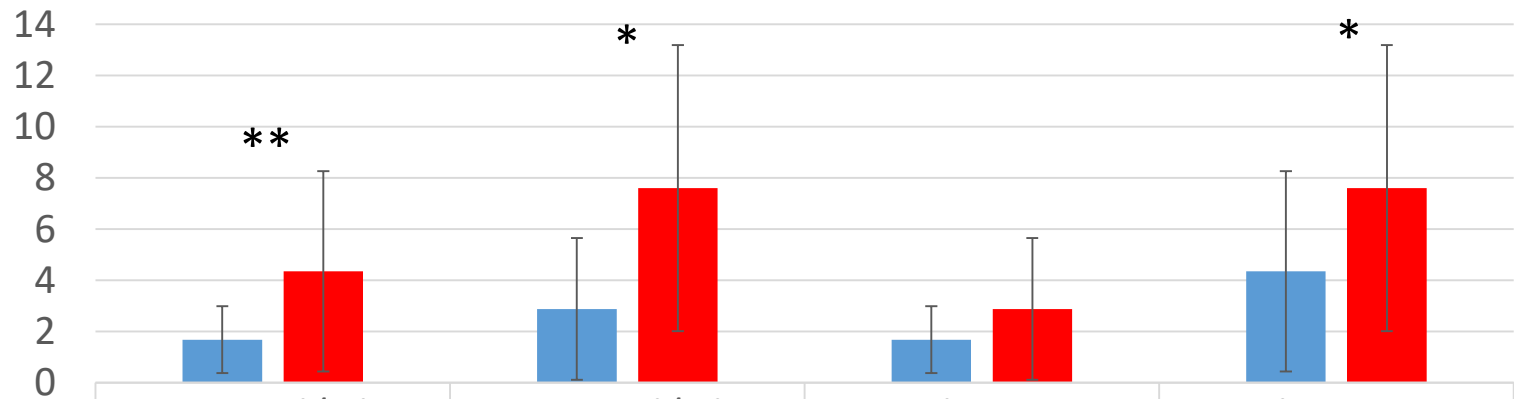
Gráfico FC – 1 hora 180W e 34°C e 55% HR





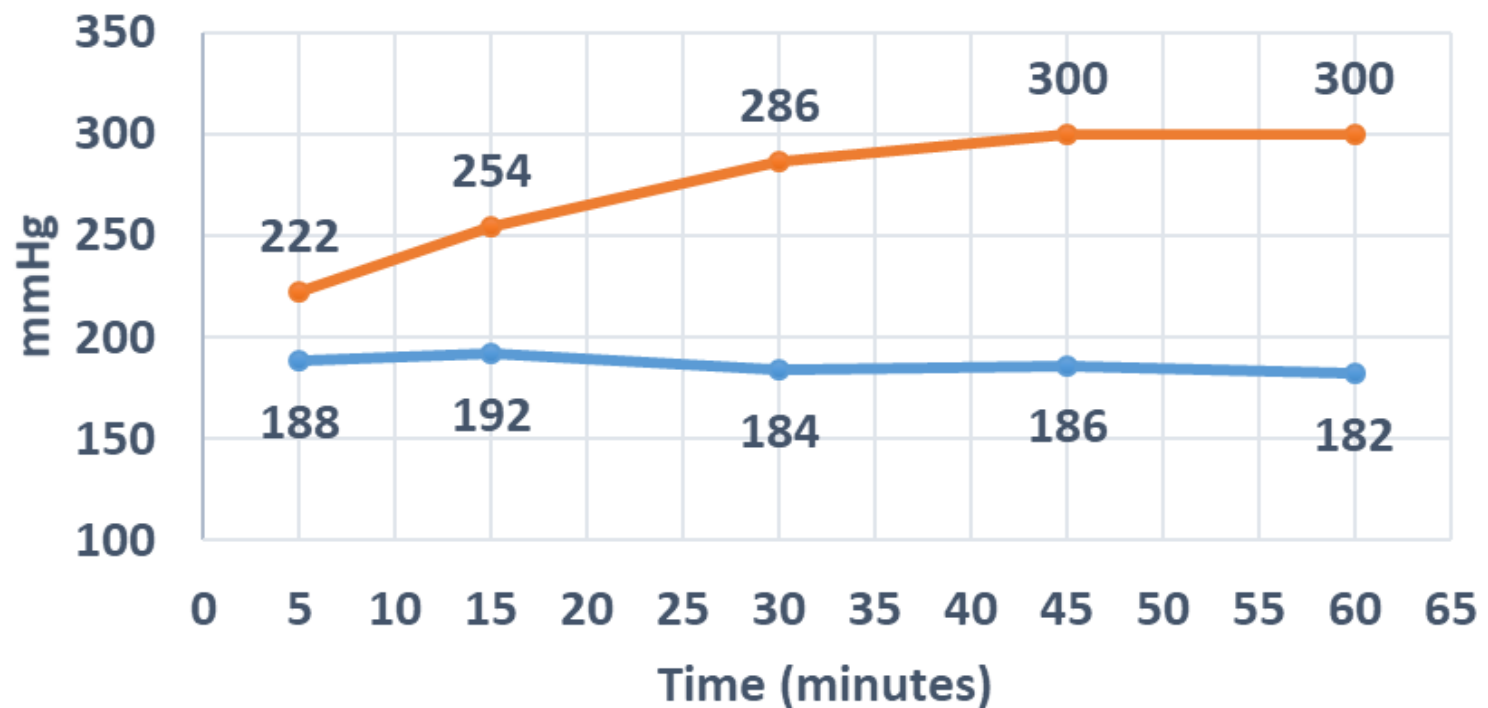


LF:HF



	21°C Pré/Pós	34°C Pré/Pós	Pré testes	Pós Testes
■ Série1	1,68	2,88	1,68	4,35
■ Série2	4,35	7,6	2,88	7,6

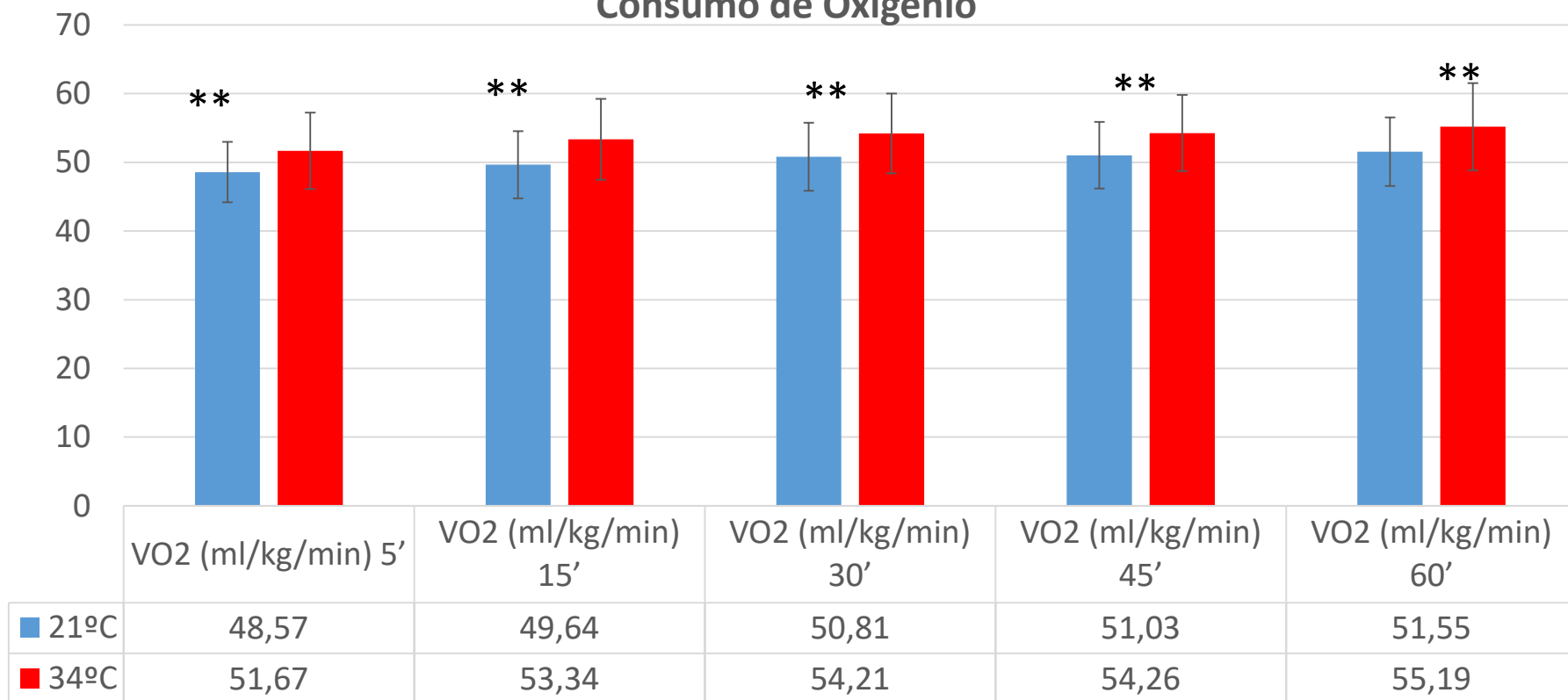
Systolic blood pressure



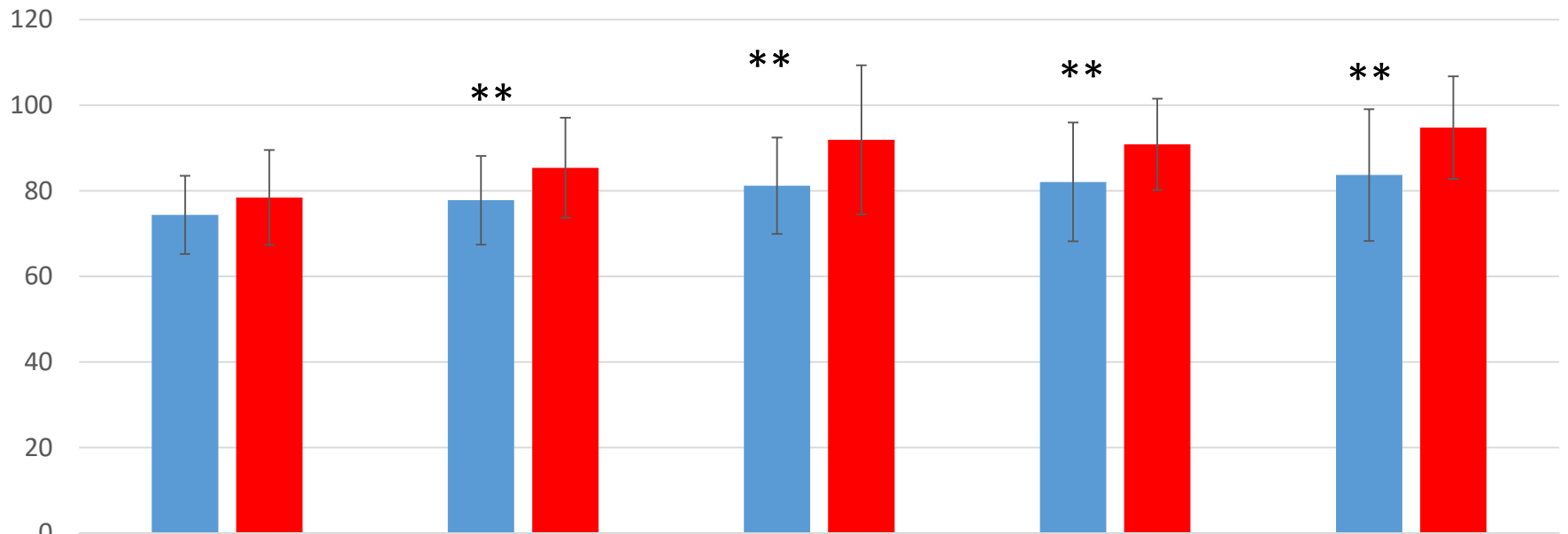
—●— 21°C and 60% HR

—●— 34°C and 55% HR

Consumo de Oxigênio

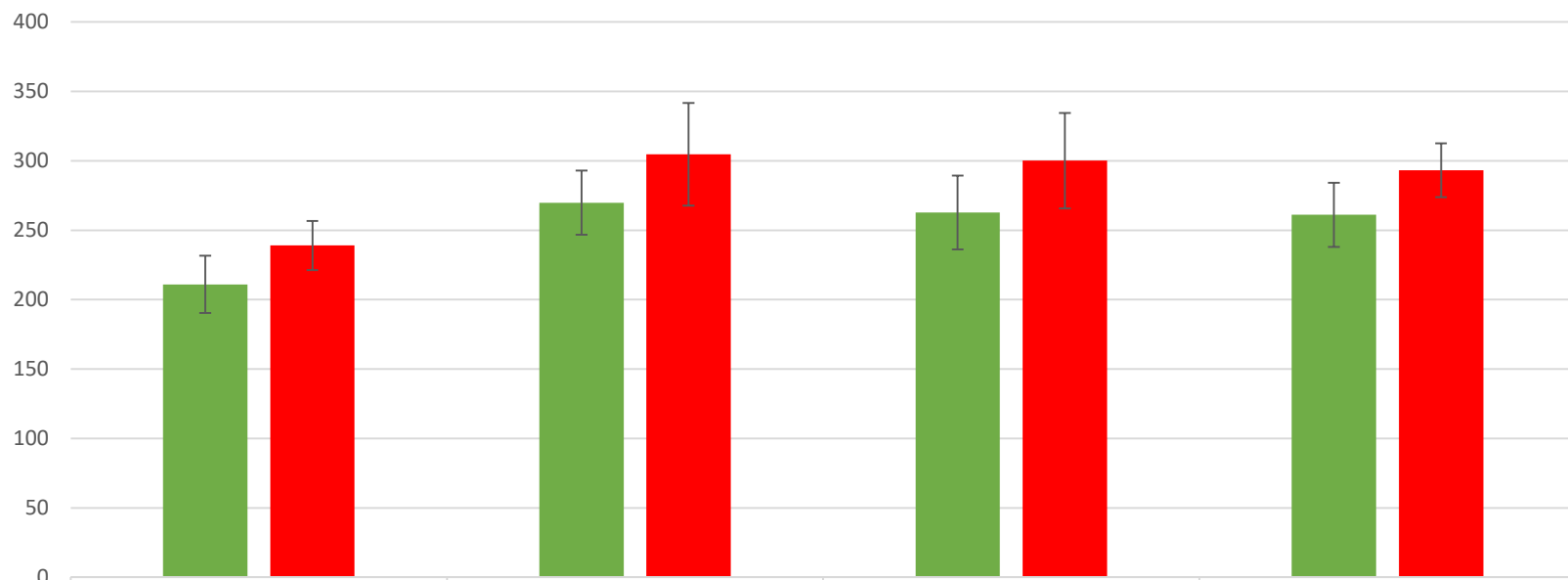


Ventilação



	VE 5'	VE 15'	VE 30'	VE 45'	VE 60'
■ 21°C	74,37	77,79	81,19	82,08	83,69
■ 34°C	78,44	85,39	91,92	90,89	94,78

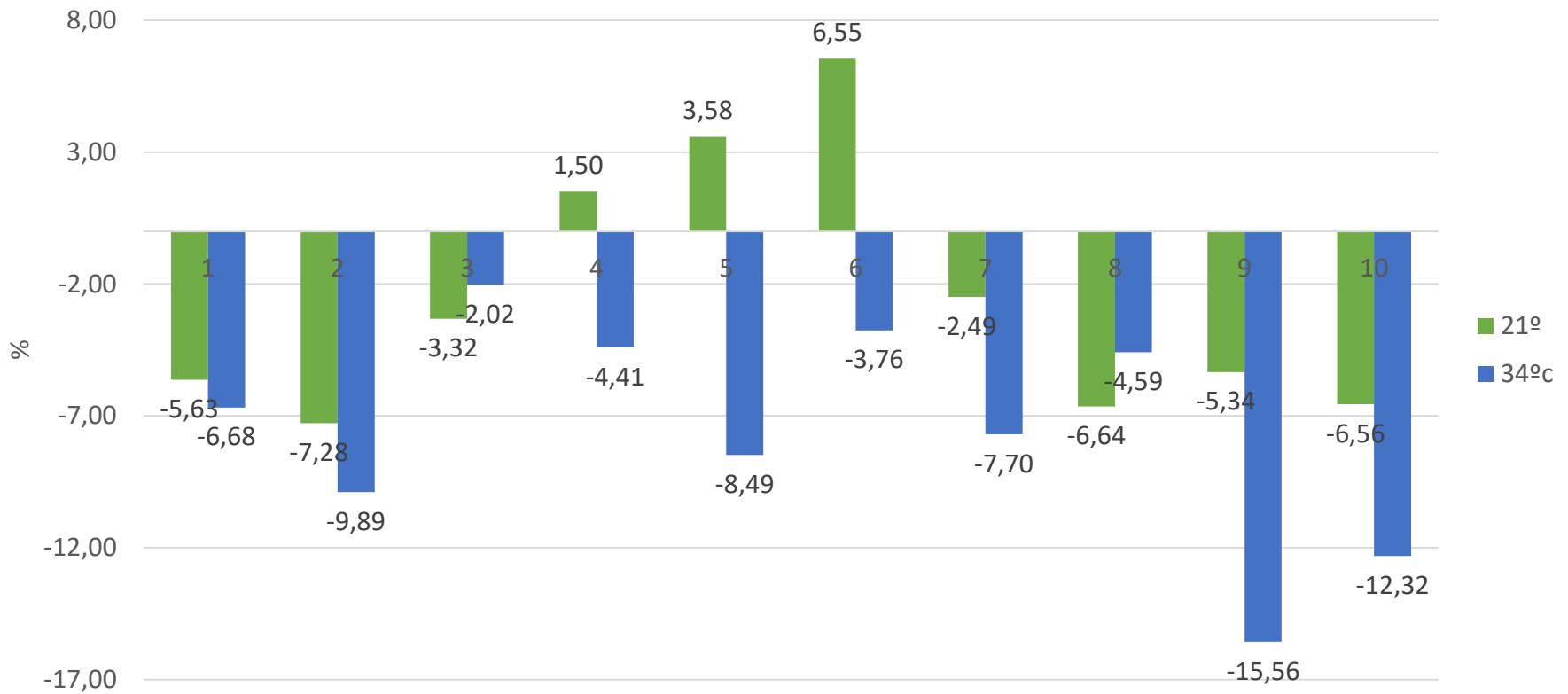
Término do teste – Ácido láctico sanguíneo



	2 mmol/L	4 mmol/L	Lactate Threshold	MDmáx
Terminaram	211	269,8	262,8	261,1
Não Terminaram	239	304,65	300,13	293,17

Comparação entre o teste à temperatura de 21°C e à de 34°C

Variações do volume plasmático

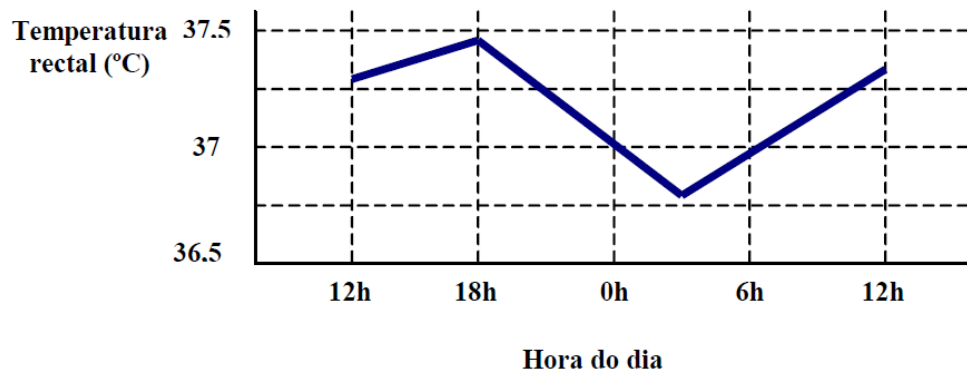


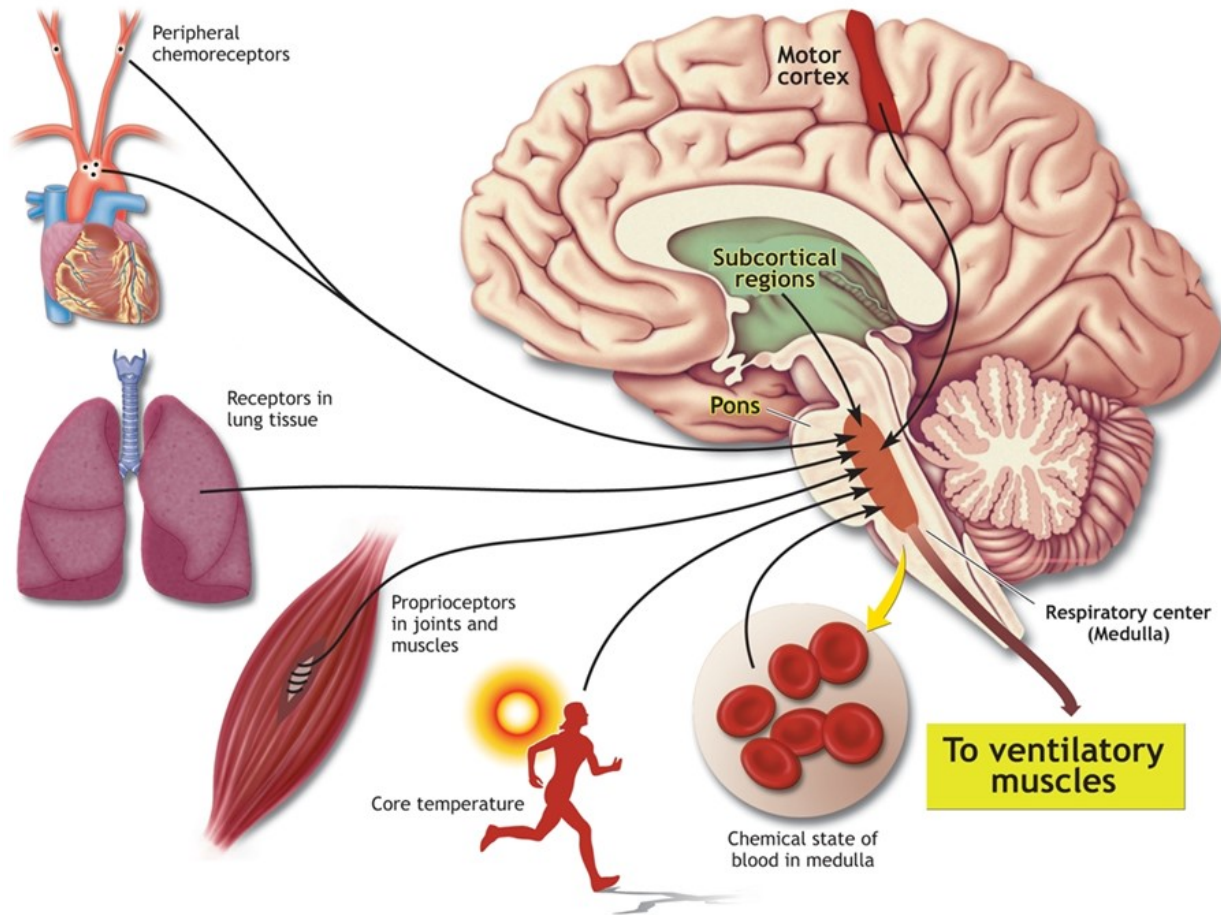
O ser humano é um ser **homeotérmico**, isto é, possui a capacidade de manter a temperatura corporal dentro de um certo intervalo pré-determinado apesar das variações térmicas do meio ambiente (**homeostasia térmica**).

Temperatura de equilíbrio: **37°C** (98.6°F)

[Limites normais: 36.1° - 37.2°C (97° - 99°F)]

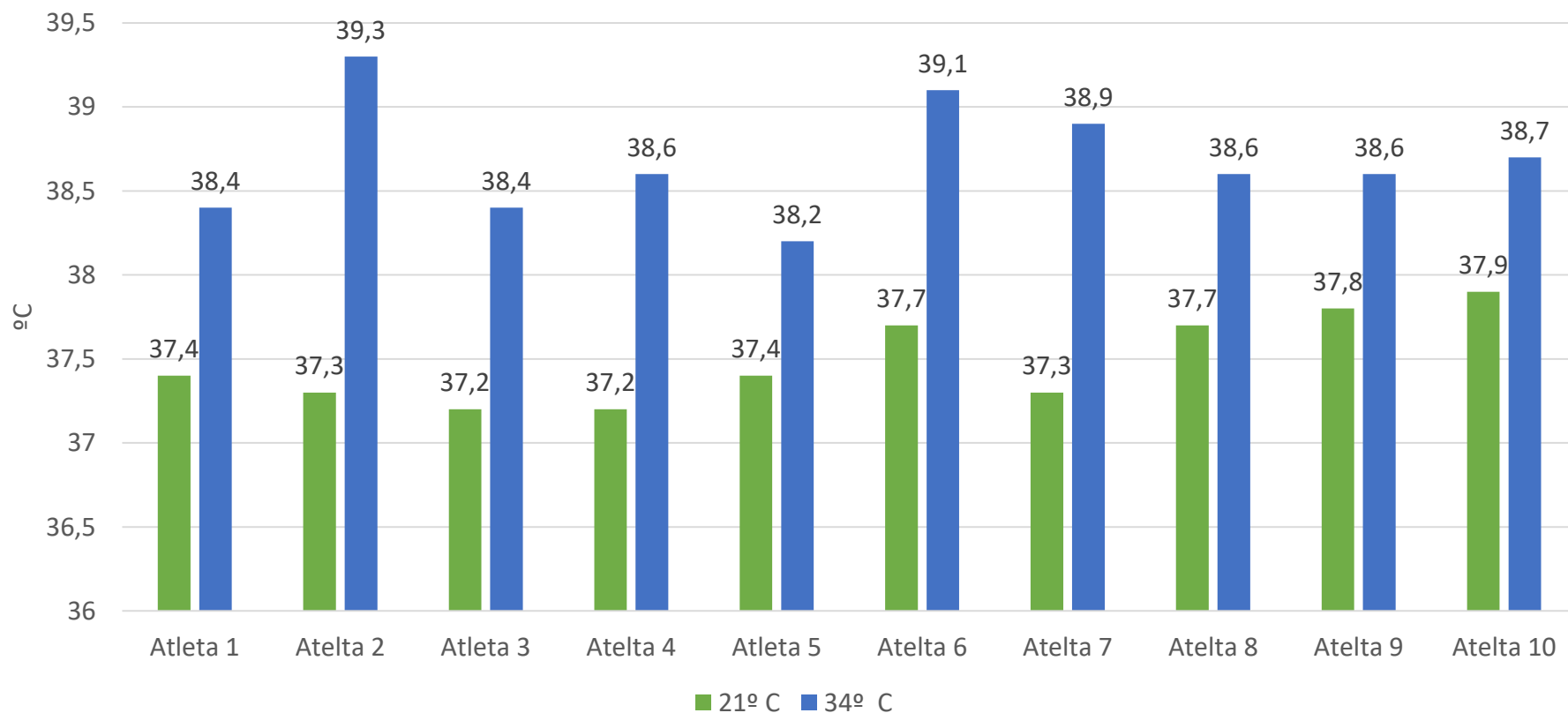
A variação térmica circadiana é um fenômeno natural e geralmente não ultrapassa os 0.6°C (1°F). A temperatura corporal é menor pela manhã, aumenta ao longo do dia e é máxima pelo início da noite.





Comparação entre o teste à temperatura de 21°C e à de 34°C

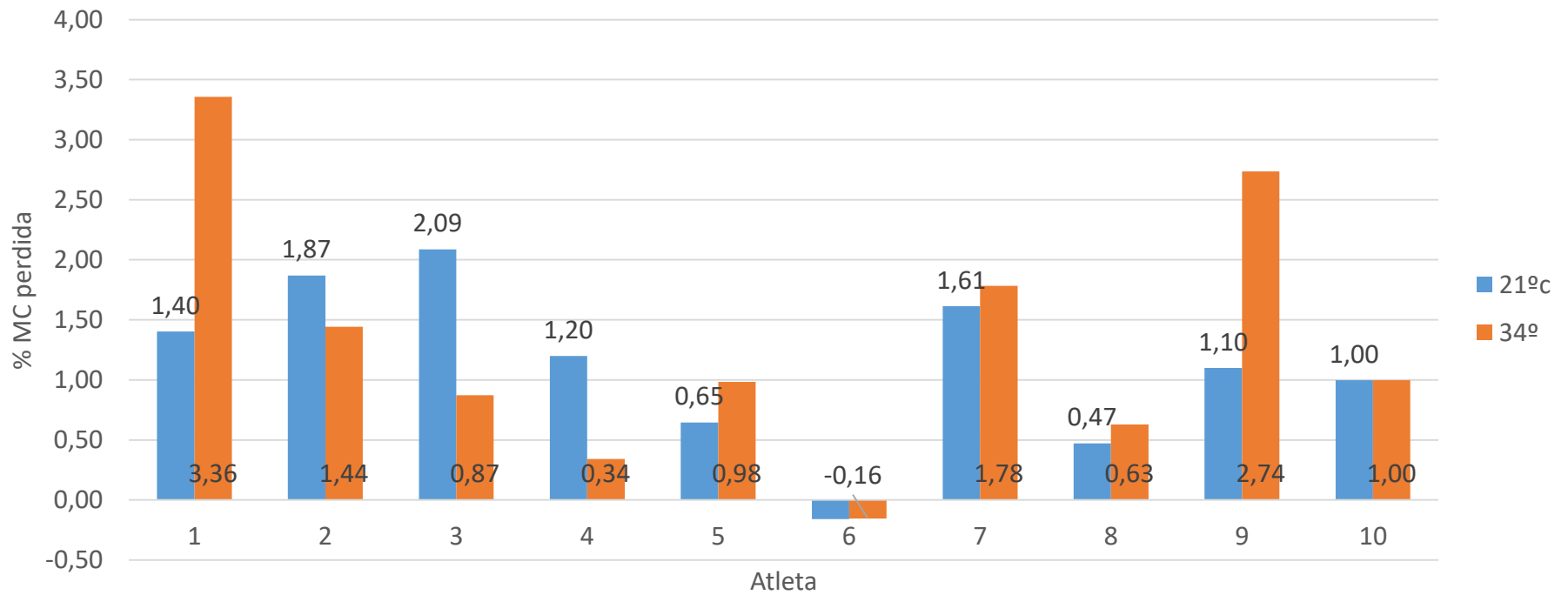
Temperatura da urina



REDUÇÃO DE DESEMPENHO

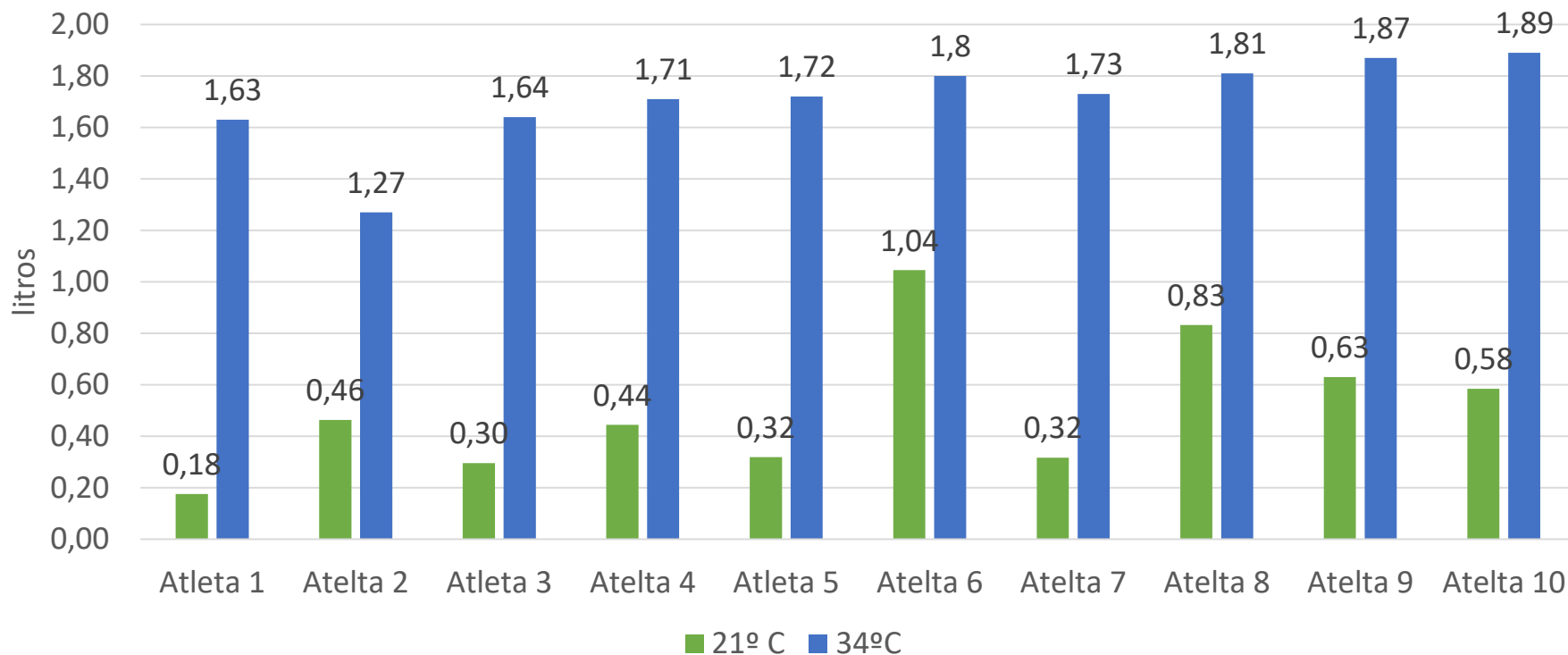
- perdas de 1% do peso corporal
 - ↑ temperatura retal
 - 4 a 5 % de perda pode causar distúrbios:
 - ↓ volume sanguíneo circulante
 - ↓ VS e ↑ FC
 - ↓ capacidade circulatória
- desidratado (4.5%):
 - ↓ de 48 % na performance
 - ↓ de 22% do VO_2 max

Comparação da % de MC perdida pelos atletas



Comparação entre o teste à temperatura de 21°C e à de 34°C

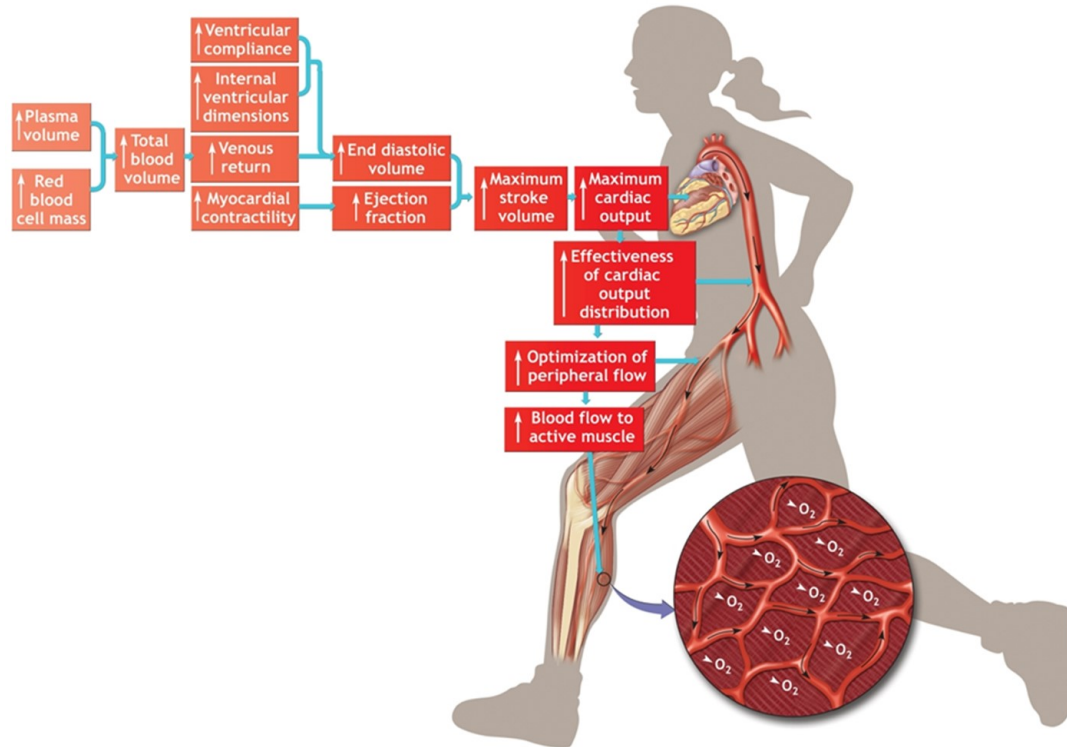
Líquidos ingeridos



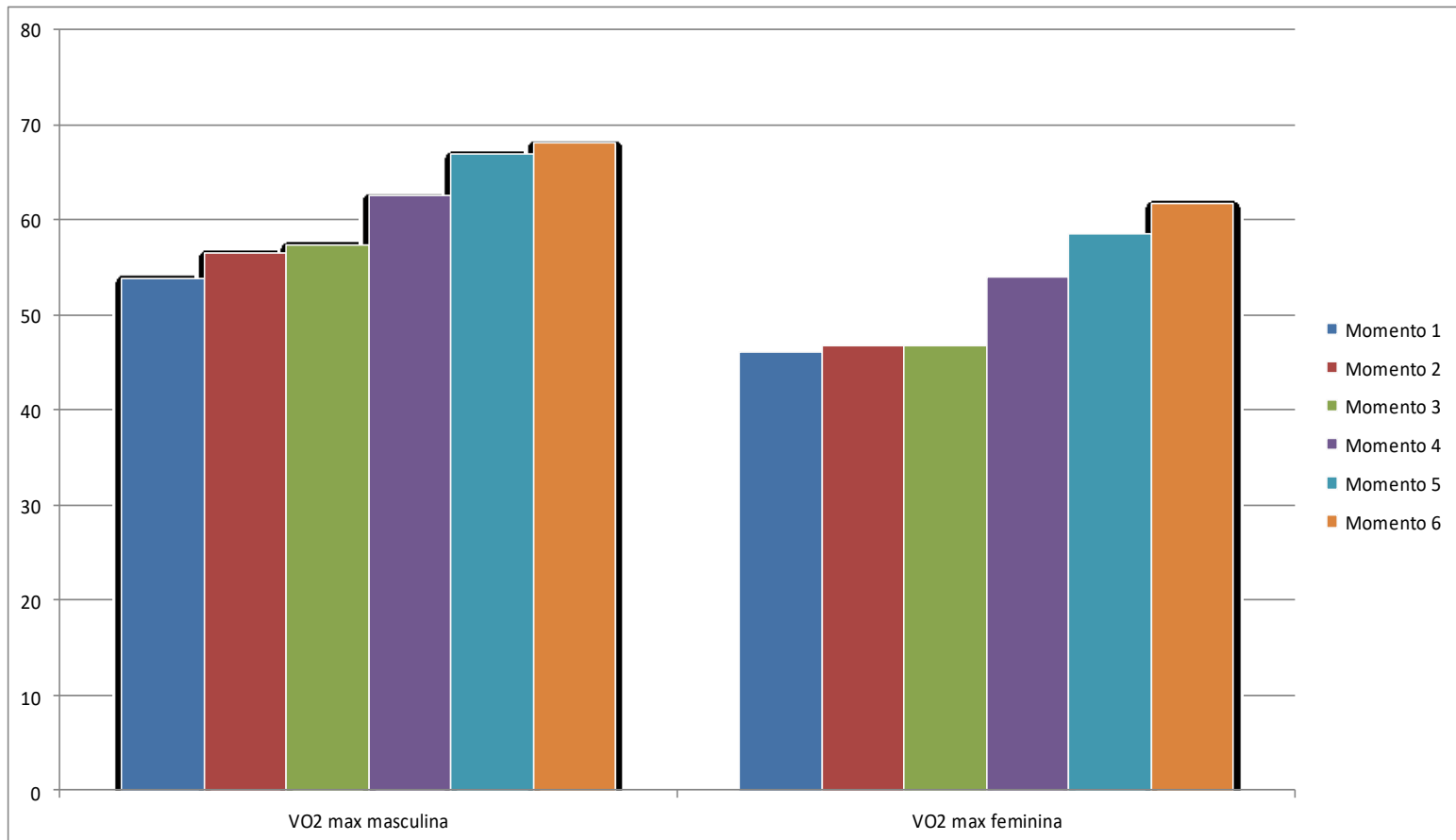
Two informational posters are pinned to the left wall. The left poster is titled "Protocolo de Actuación en caso de emergencia" and the right poster is titled "Protocolo de Actuación en caso de incendio". Both posters contain text and small images.

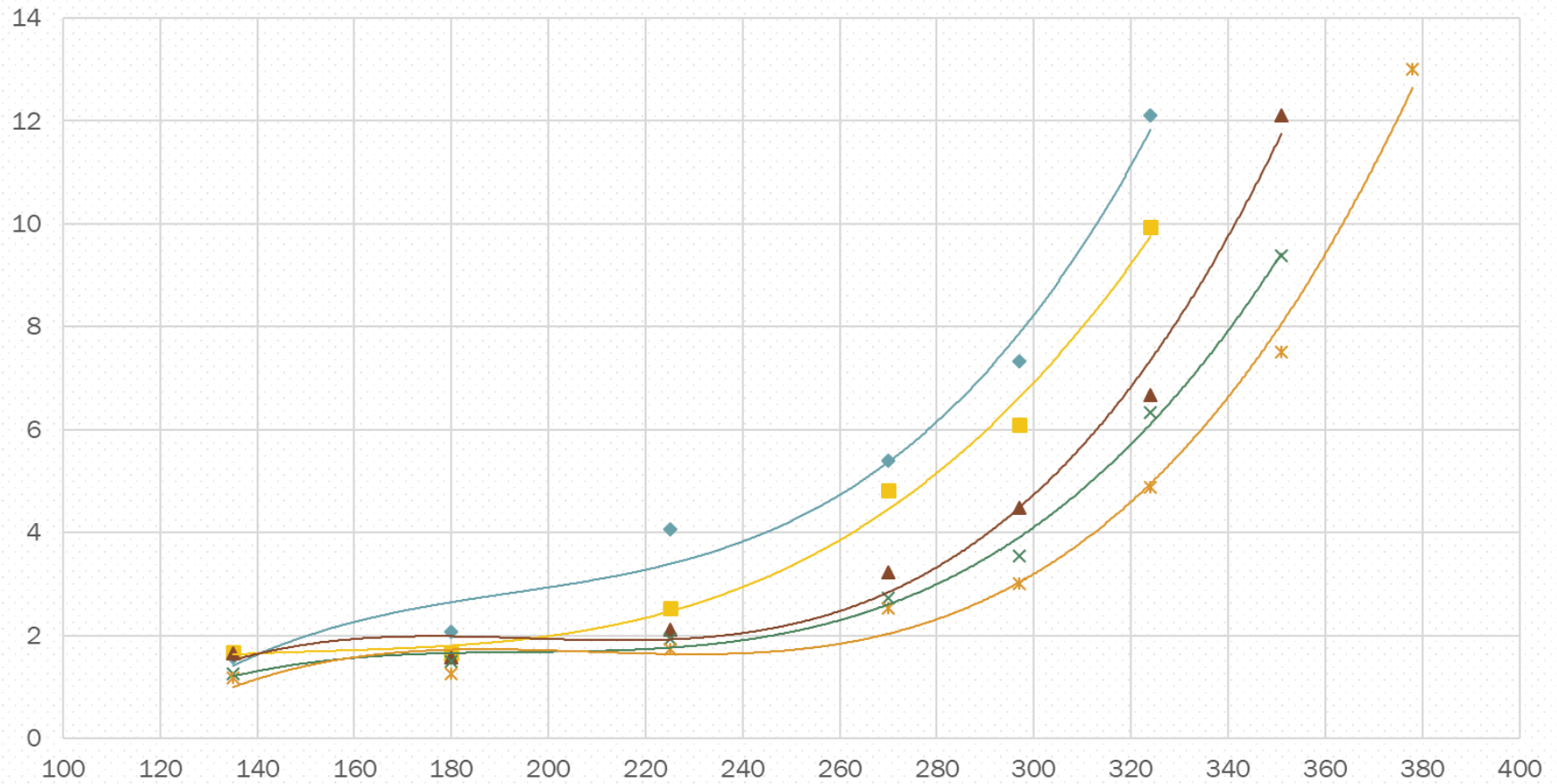




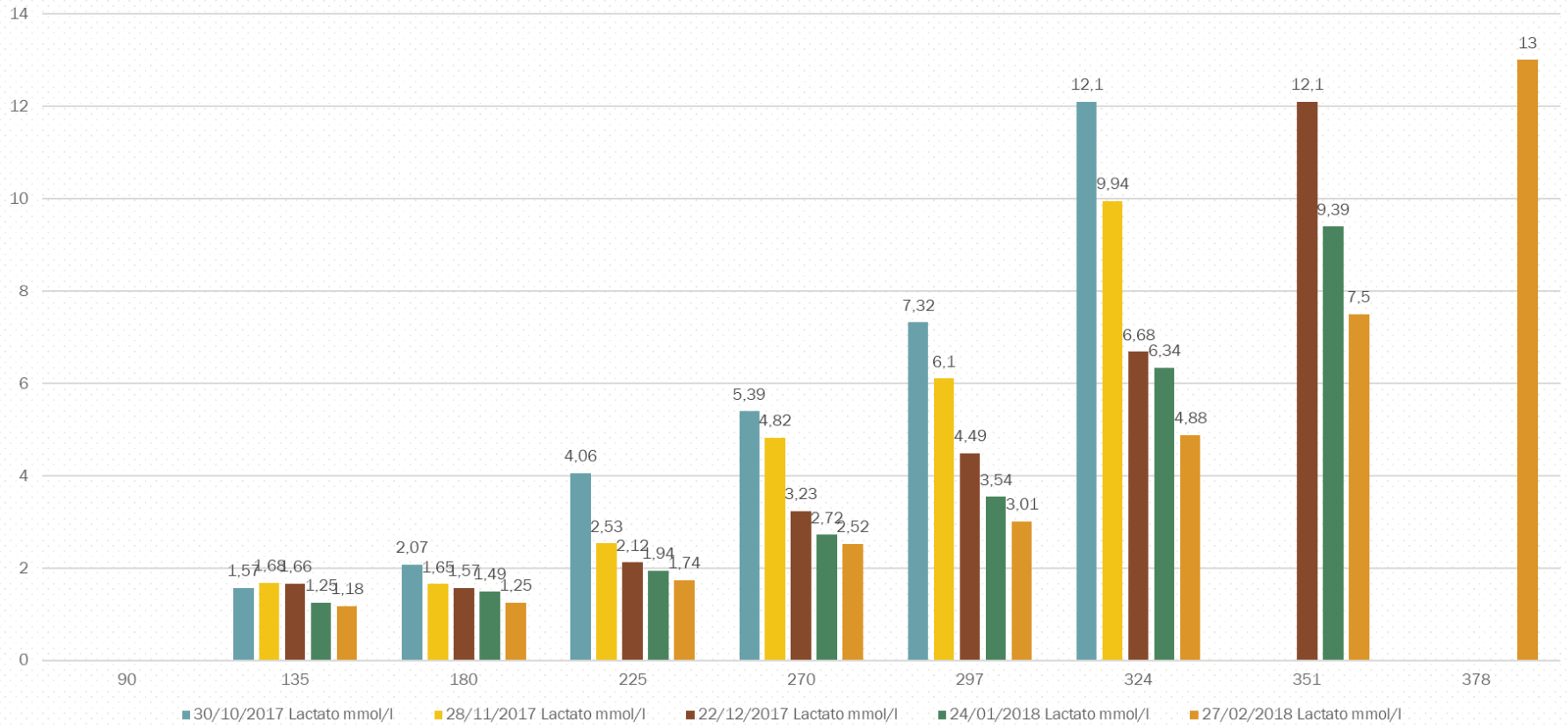


Peak VO2 Men and Women.

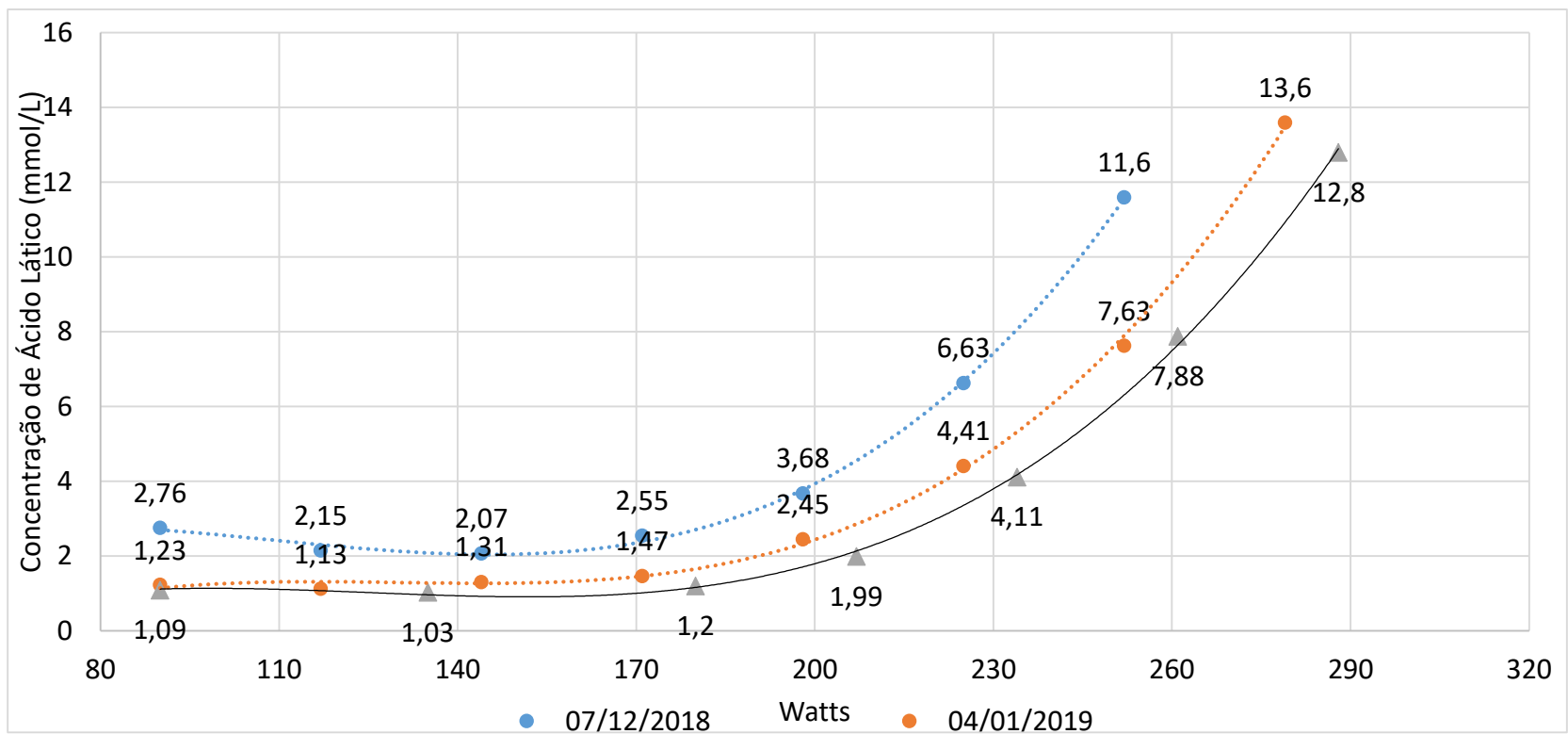




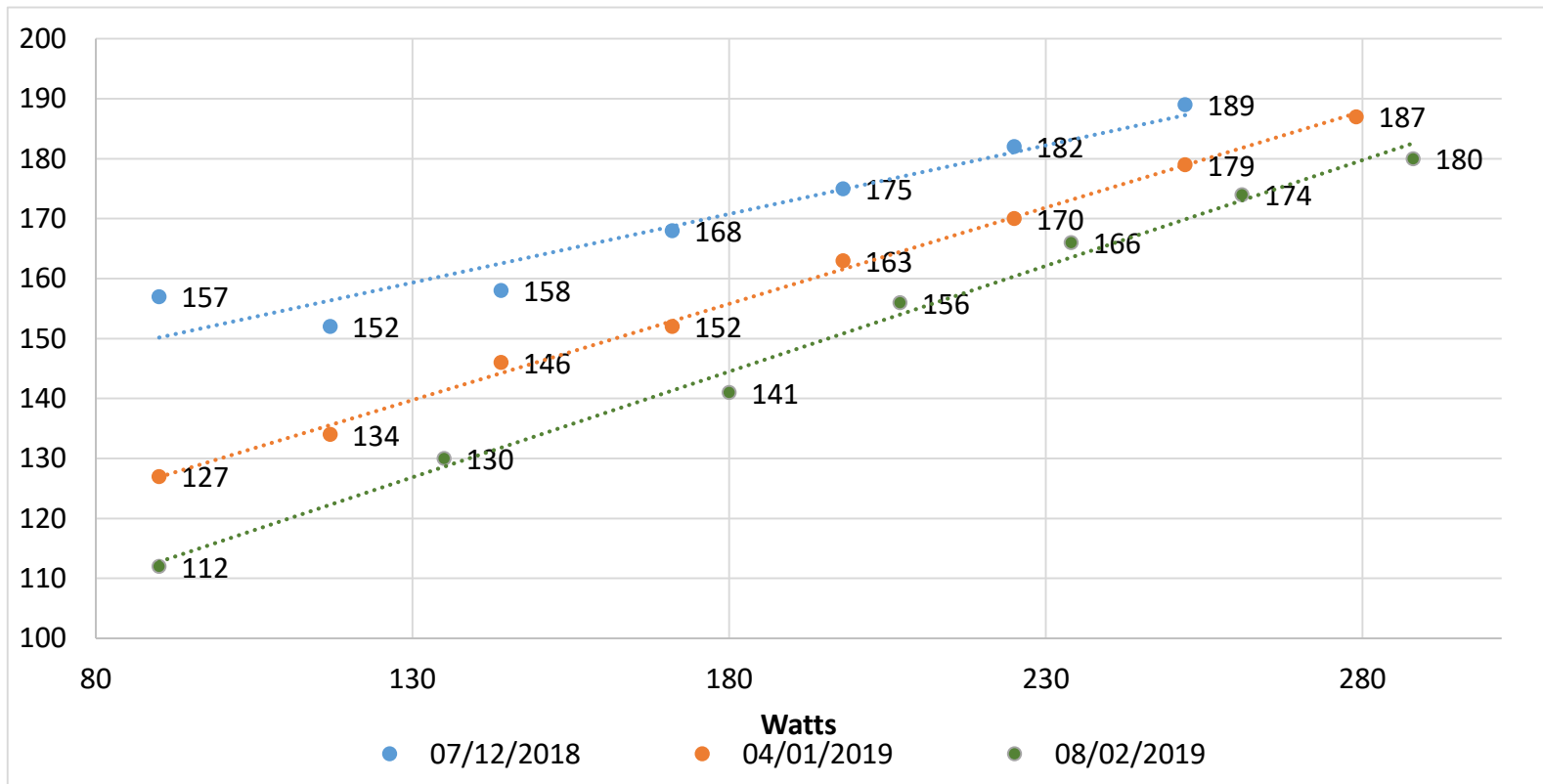
Concentração de ácido láctico

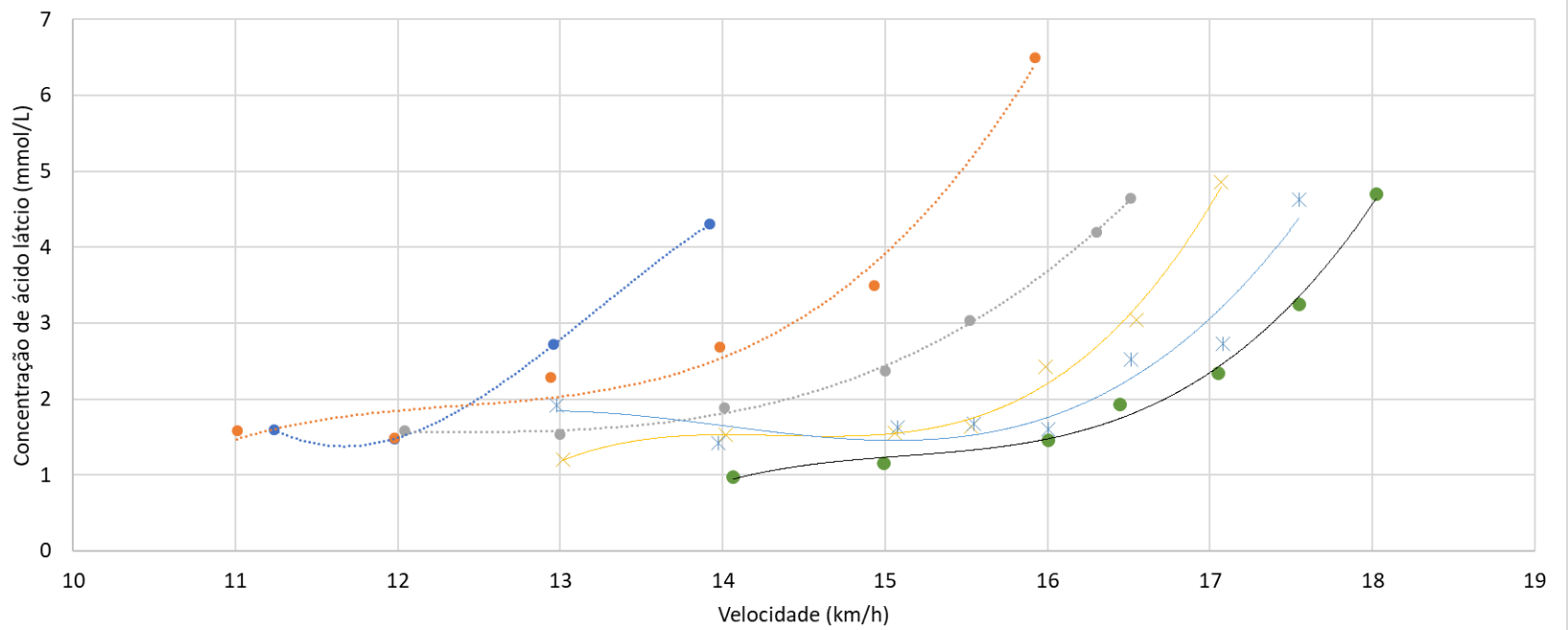


Ciclismo



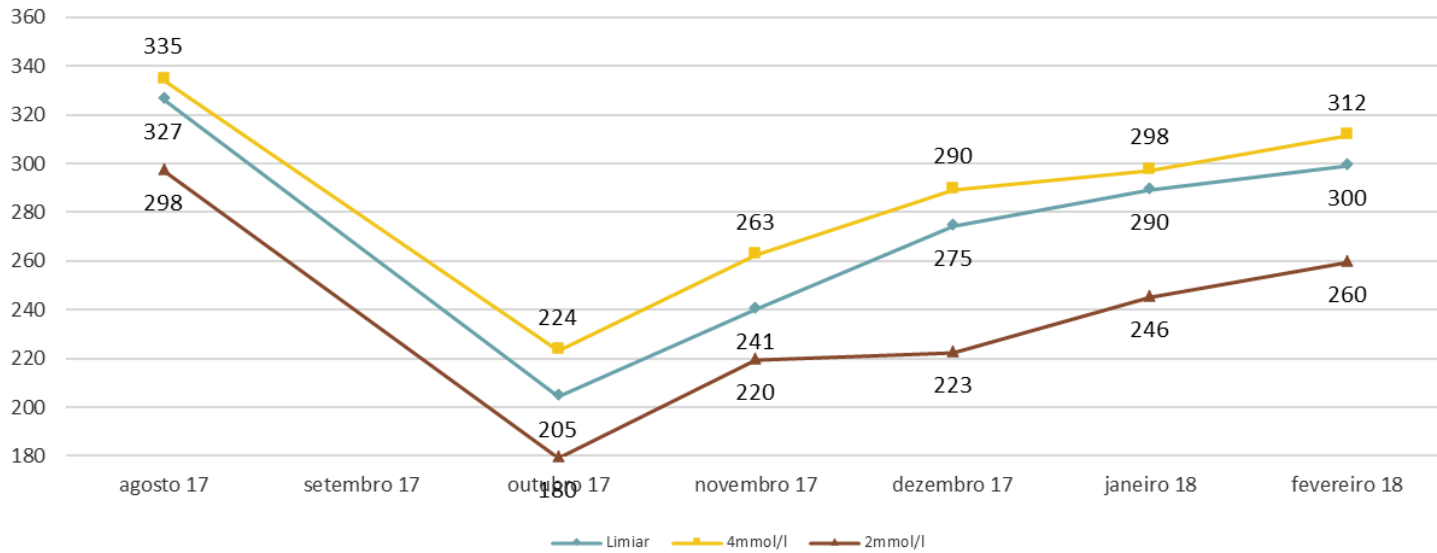
Ciclismo



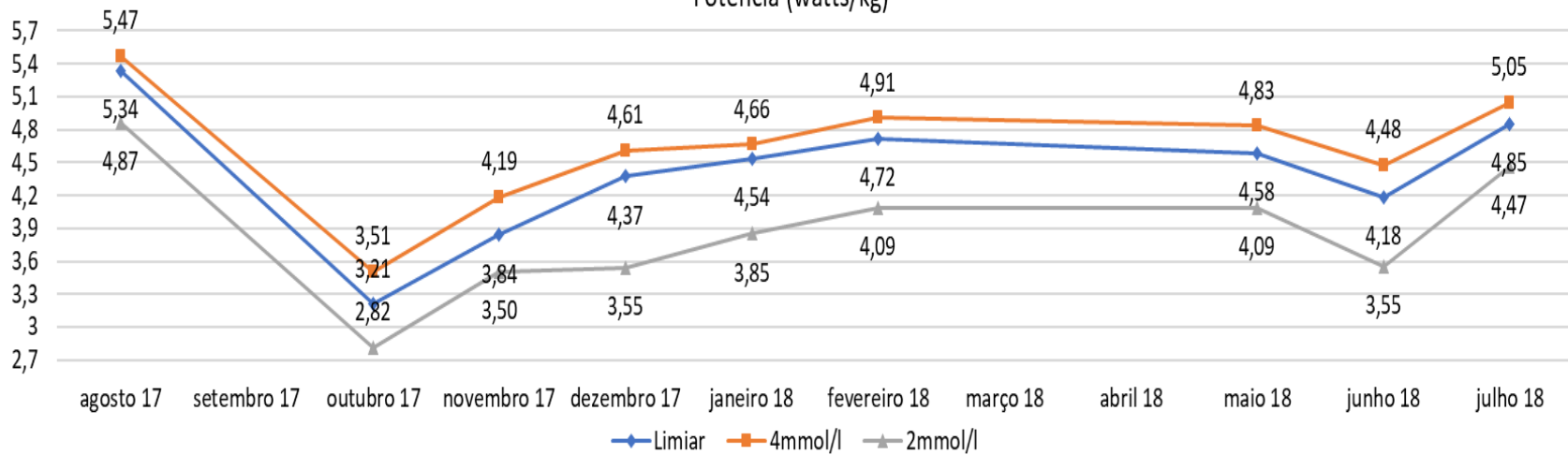


Distance	Rank	Rank M/W	Rank Cat.	Time	RealTime	Delta	min/Km	
5K	5000	29	2	2	00:17:11	00:17:09		3.26
10K	10000	30	2	2	00:34:08	00:34:06	00:16:57	3.24
15K	15000				00:51:19	00:51:17	00:17:10	3.25
20K	20000				01:08:28	01:08:26	00:17:09	3.25
Half Marathon	21097				01:12:15	01:12:13	00:03:46	3.25
25K	25000				01:25:40	01:25:38	00:13:24	3.25
30K	30000				01:42:53	01:42:52	00:17:13	3.25
35K	35000				01:59:57	01:59:56	00:17:03	3.25
40K	40000				02:17:09	02:17:08	00:17:11	3.25
Finish	42195				02:24:49	02:24:47	00:07:39	3.25

Potência (watts)

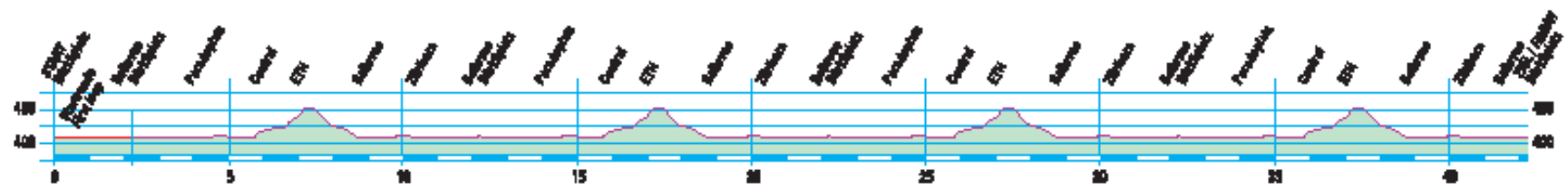


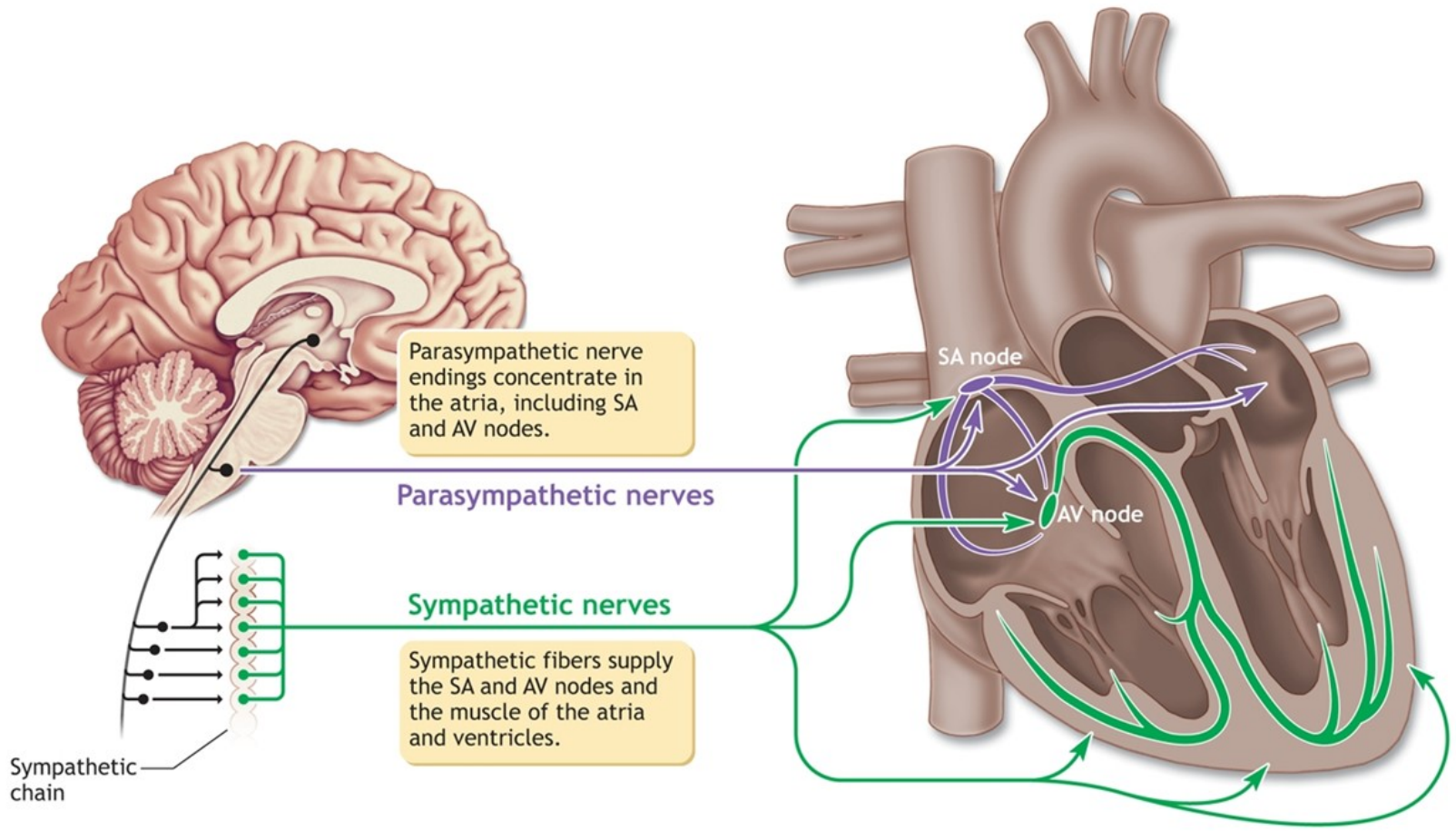
Potência (watts/kg)





Höhenprofil Marathon / Altitude profile Marathon





Parasympathetic nerve endings concentrate in the atria, including SA and AV nodes.

Parasympathetic nerves

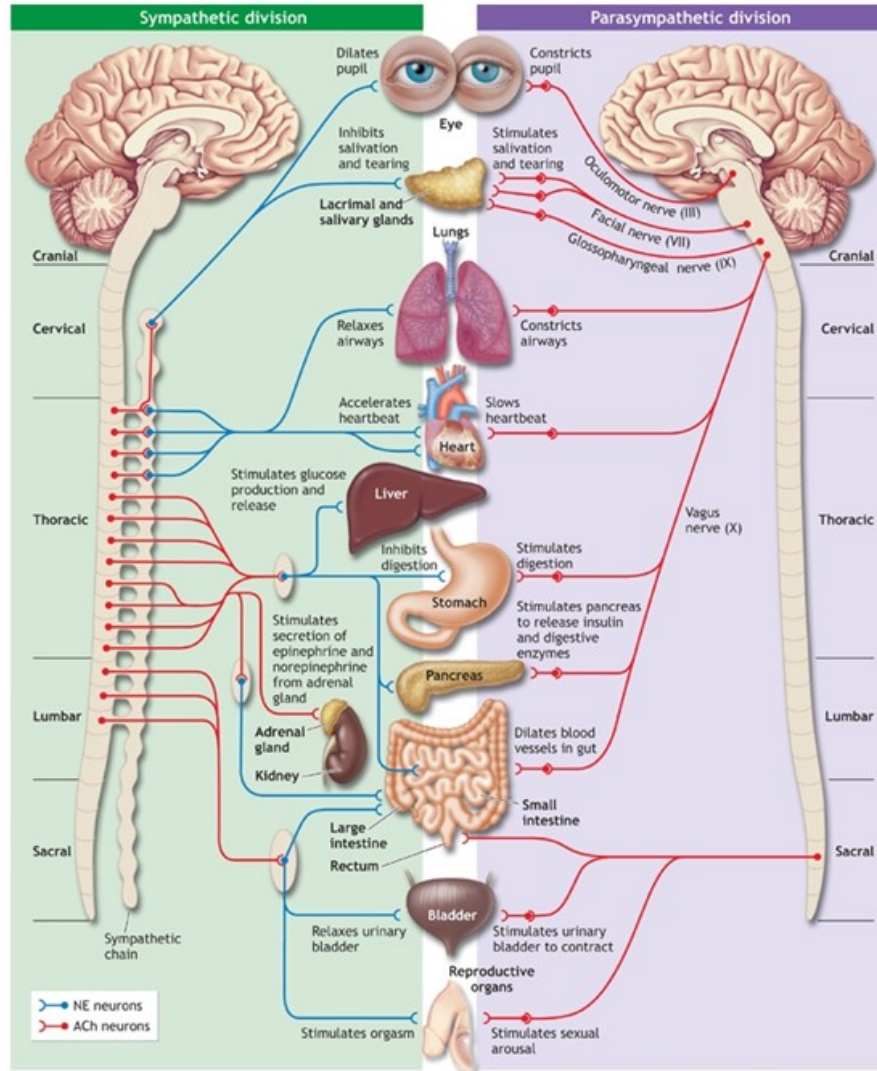
Sympathetic nerves

Sympathetic fibers supply the SA and AV nodes and the muscle of the atria and ventricles.

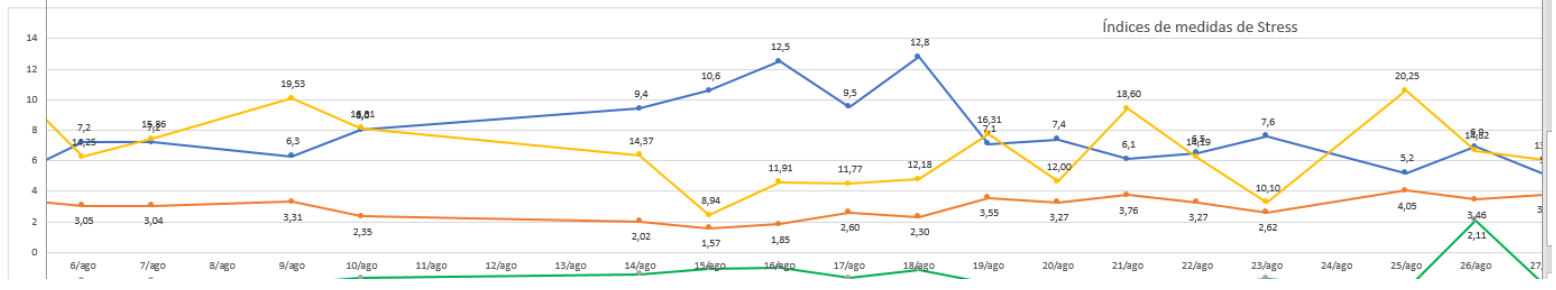
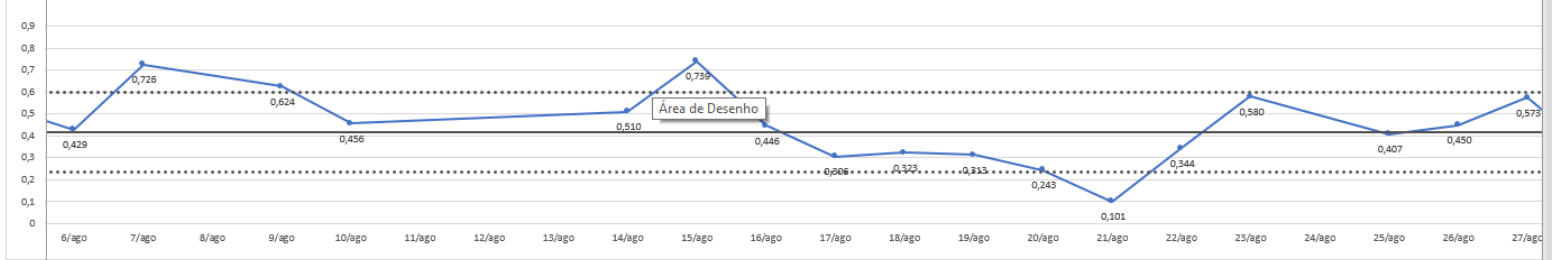
Sympathetic chain

SA node

AV node



	A	B	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1	Jessica Augusto		seg	ter	qua	qui	sex	sab	dom	seg	ter	qua	qui	sex	sab	dom	seg	ter	qua	qui	sex	sab	dom	seg
2	Data:		6/ago	7/ago	8/ago	9/ago	10/ago	11/ago	12/ago	13/ago	14/ago	15/ago	16/ago	17/ago	18/ago	19/ago	20/ago	21/ago	22/ago	23/ago	24/ago	25/ago	26/ago	27/ago
3	Dados Pessoais		Treino:																	Avaliação				



TÚNEL AERODINÂMICO – Laboratório de Aerodinâmica Industrial (LAI)



Túnel tipo Gottingen de circuito fechado e câmara de ensaios aberta, com uma secção transversal de $2 \times 2 \text{ m}^2$ e um comprimento de 5 m. Acionado por um motor elétrico de 230 kW, com regulação de velocidade desde 0 a 18 m/s.



06/12/2016

DEM-FCTUC

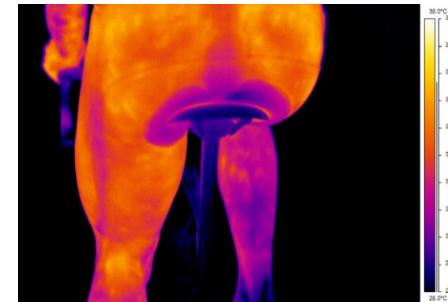
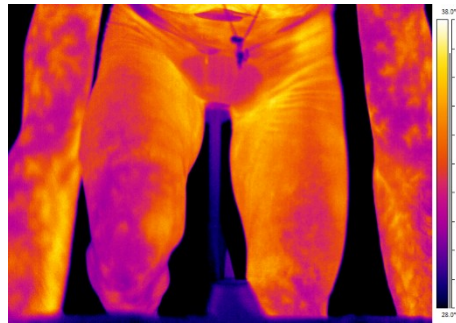
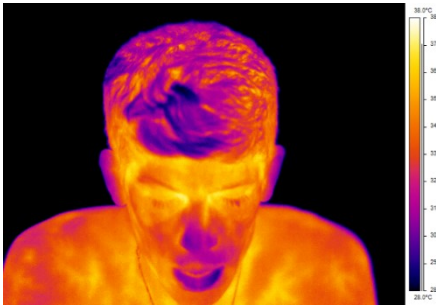
CÂMARA CLIMÁTICA - Laboratório de Aerodinâmica Industrial (LAI)



06/12/2016

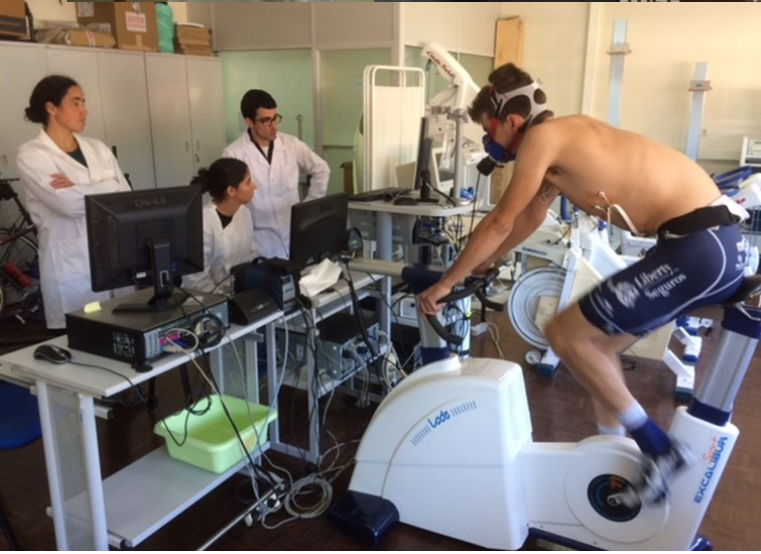
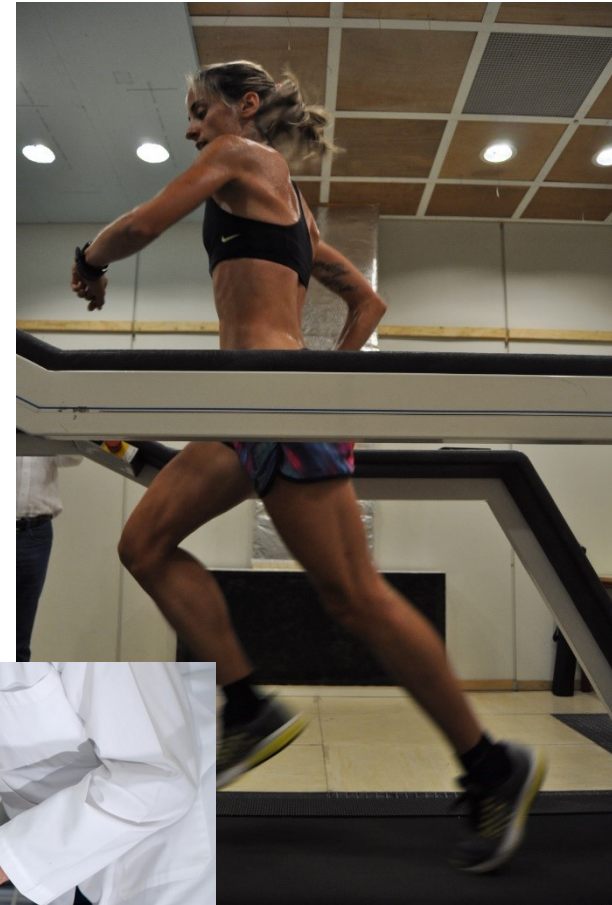
DEM-FCTUC

CÂMARA CLIMÁTICA - Laboratório de Aerodinâmica Industrial (LAI)



06/12/2016

DEM-FCTUC





Jessica Augusto

1° Place: 2:23:07 - Gold Medal (Etiopie Tiki Gelena)

0:02:03

7° Place: 2:25:11 – Olimpico diplom (Portuguese Jessica)

**Fernando Pimenta e Emanuel Silva – Silver medal K2 1.000 m
Jogos Olímpicos Londres2012**

1° Place: 3.09,646 Hungary - Rudolf Dombi e Roland Kokeny

0.00,053

2° Place: 3.09,699 Portugal - Fernando Pimenta e Emanuel Silva

0.01,582

3° Place: 3.10,117 Germany - Martin Holstein e Andreas Ihle

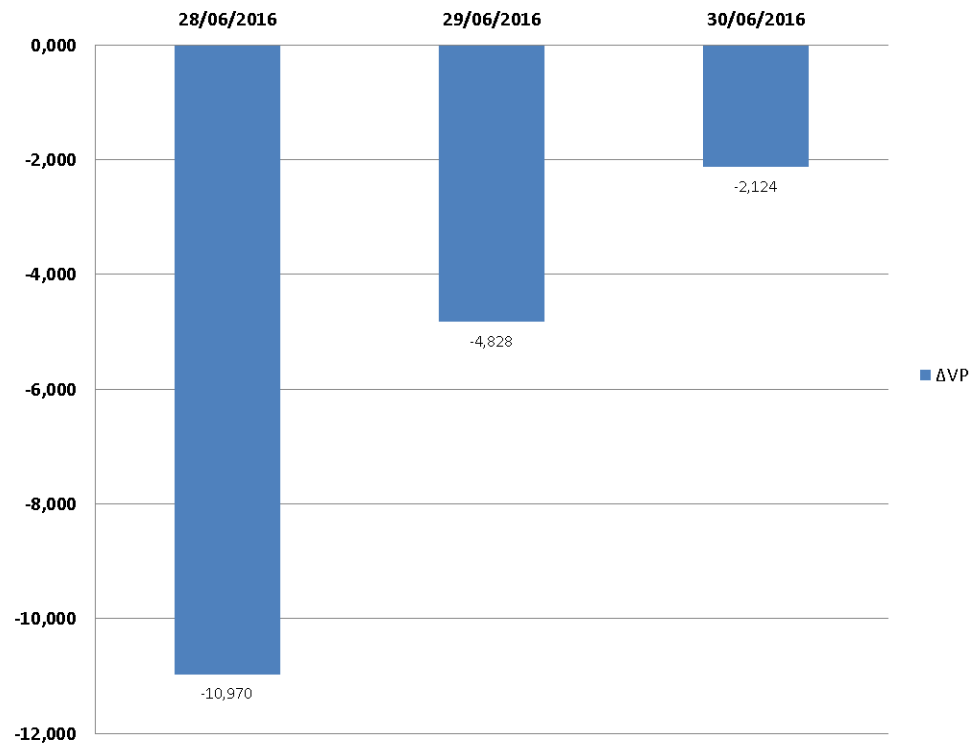




Rio 2016

16º Lugar no Sambódromo







6º Lugar nos Jogos Olímpicos – Diploma Olímpico 20 k Marcha



Obrigado pela vossa atenção

