A year in the life of a Brazilian professional female road cycling team Part I: Performance measures

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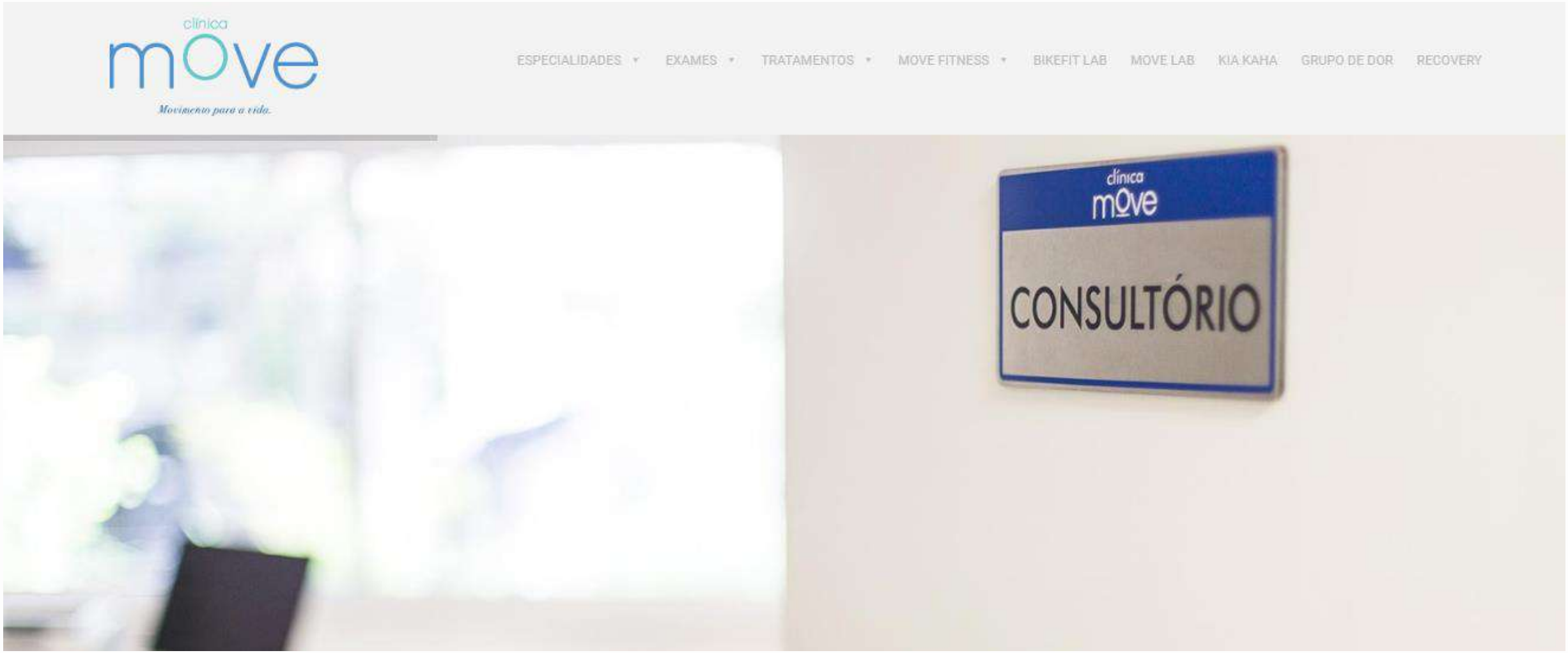
Background


MOUNTAIN BIKE | CICLISMO | BMX | DOWNHILL | CICLOTURISMO
FPC FEDERAÇÃO PAULISTA DE CICLISMO
HOME NOTÍCIAS FILIADOS 2019 CALENDÁRIO RESULTADOS GALERIA FILIAÇÃO CONTATO
CAMPEONATO PAULISTA
ESTRADA - C.R.I.
SÃO CARLOS-SP
VENHA PARTICIPAR!
INSCRIÇÕES ATÉ 20/06

Clinica MOVE



Elite female cycling

- 2016: UCI Women's WorldTour

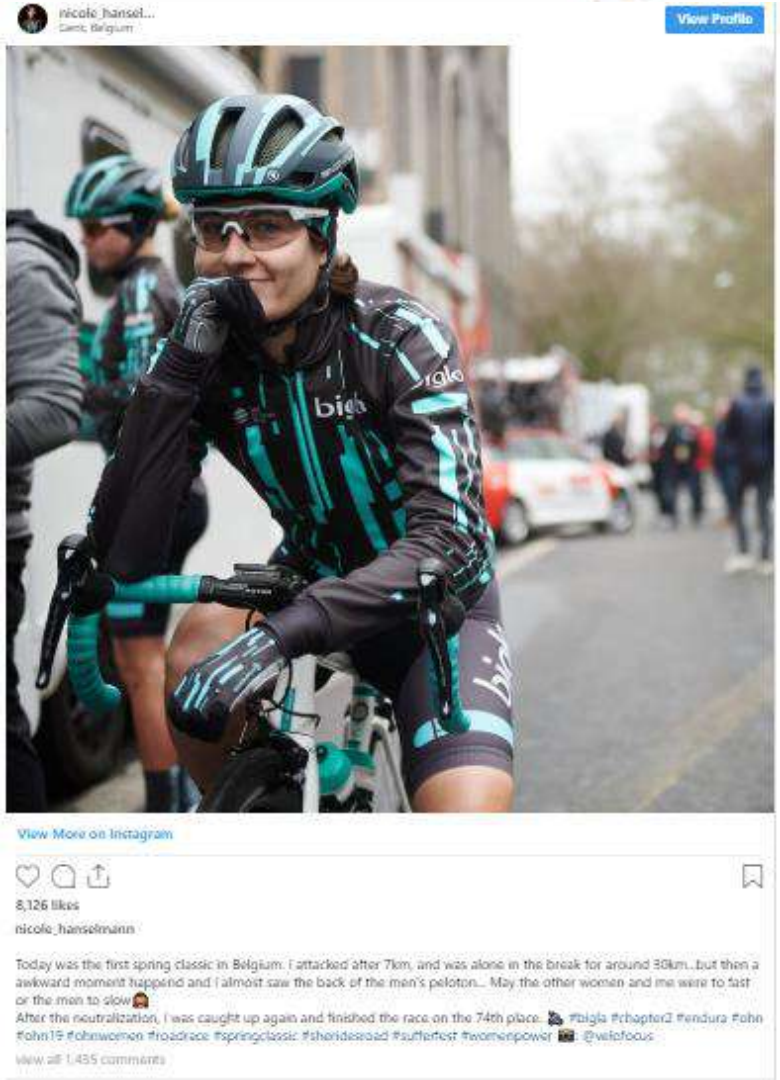
- 2019: 23 events in ten countries across three continents
  - 52 days of racing

Source: www.UCI.org

Still a way to go…

Woman cyclist forced to stop race after catching up with men

Swiss cyclist Nicole Hanselmann said it was an "awkward moment" when she caught up with the men's support vehicles in the race in Belgium.



Elite female cycling

- 2016: UCI Women's WorldTour
- 2019: 23 events in ten countries across three continents
  - 52 days of racing
- Female World Tour cyclists
  - 13000 to 18000 kilometres per
  - Up to 65 competition days
    - Sanders et al. (2019)

Source: www.UCI.org

Female cycling in Brazil

- The Brazilian Cycling Confederation calendar:
  - 2018: 53 elite female events consisting of 76 days of competition
  - 2019: 44 elite female events consisting of 59 days of competition
- Numerous other regional elite competitions
- No UCI events…
- What kind of schedules do professional female Brazilian cyclists have?

Aim

Determine the training and competition demands of a professional Brazilian female cycling team throughout a competitive season

Methods

- Five professional female Brazilian cyclists
- Incremental cycling test to exhaustion (VO_{2max})
- 50 W + 25 W/3 min (Decroix et al., 2015)
- Training and competition data
  - Garmin Connect, Strava, Training Peaks
  - Power data from two athletes (Garmin Vector, Garmin, USA).

The team

Athlete 1
Time-triallist

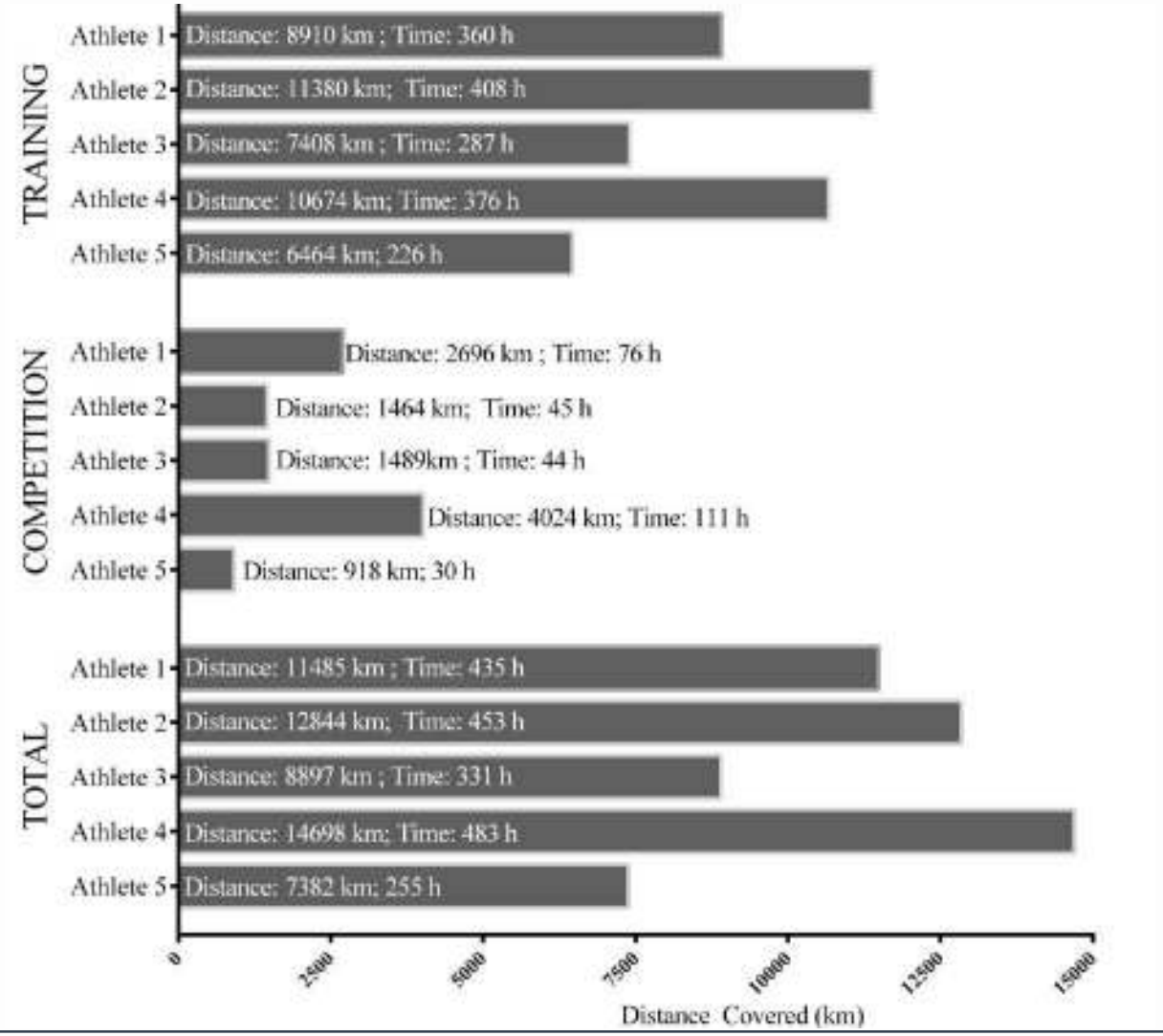
Athlete 2
Sprinter

Athlete 5
Domestique

Athlete 3
Domestique

Athlete 4
Sprinter

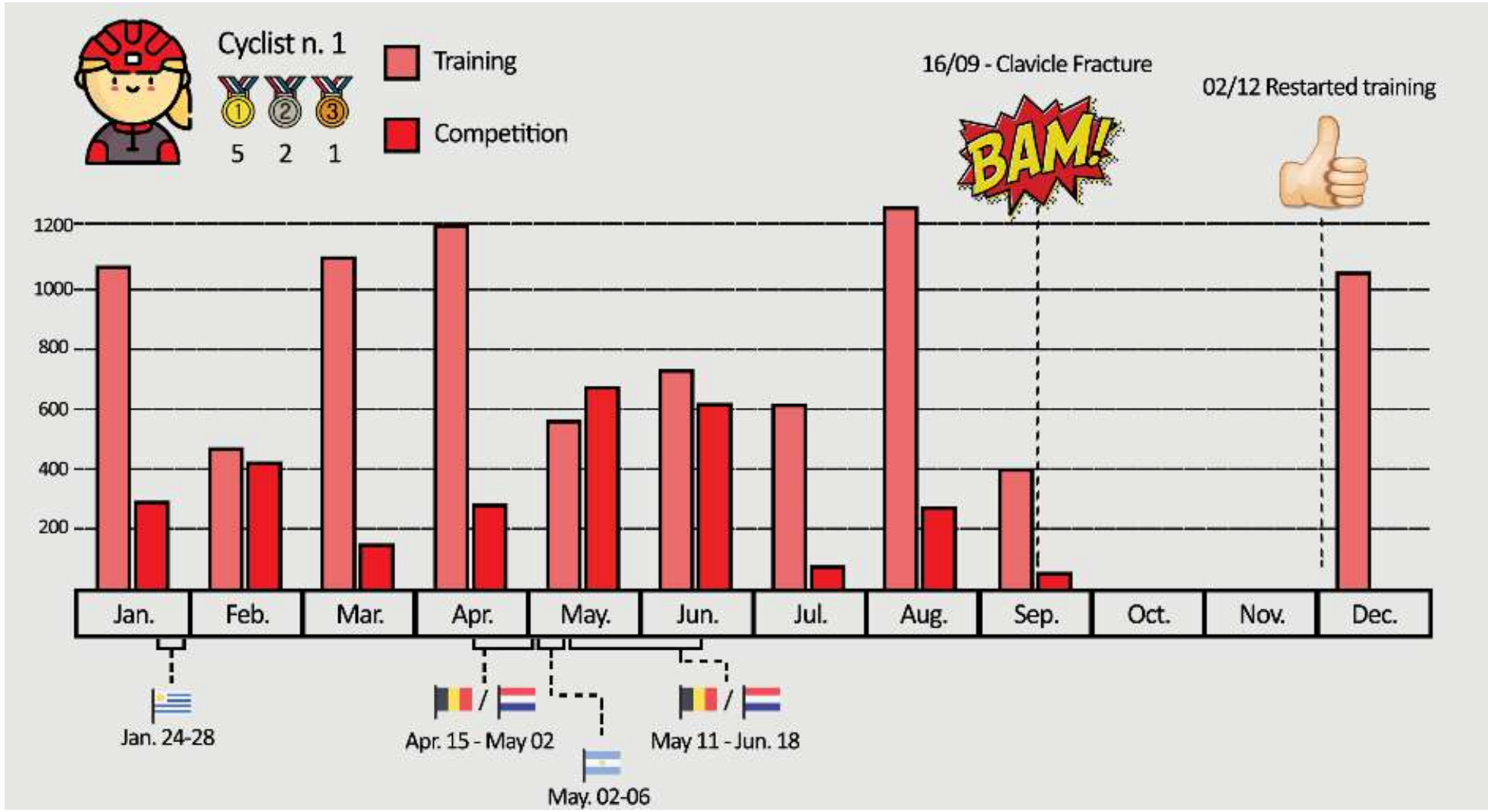
Cycling numbers



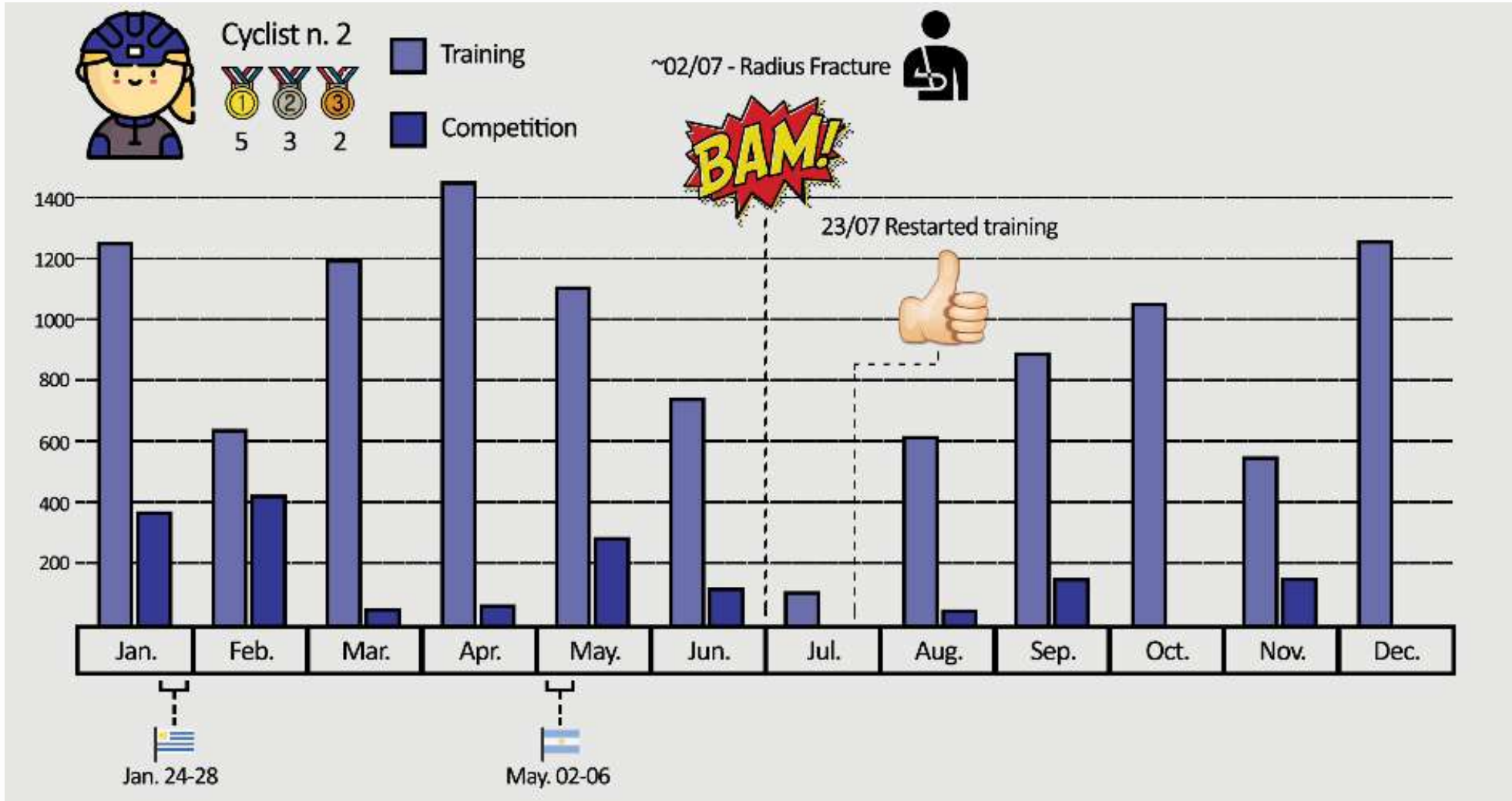
- 193 ± 56 days on the bike
  (range: 104 – 234 days)
- 164 ± 45 days training
  (range: 89 – 206 days)
- 30 ± 16 days competing
  (range: 15 – 55 days)

- Total distance covered:
  11124 ± 2895 km
  (7382 – 14698 km)

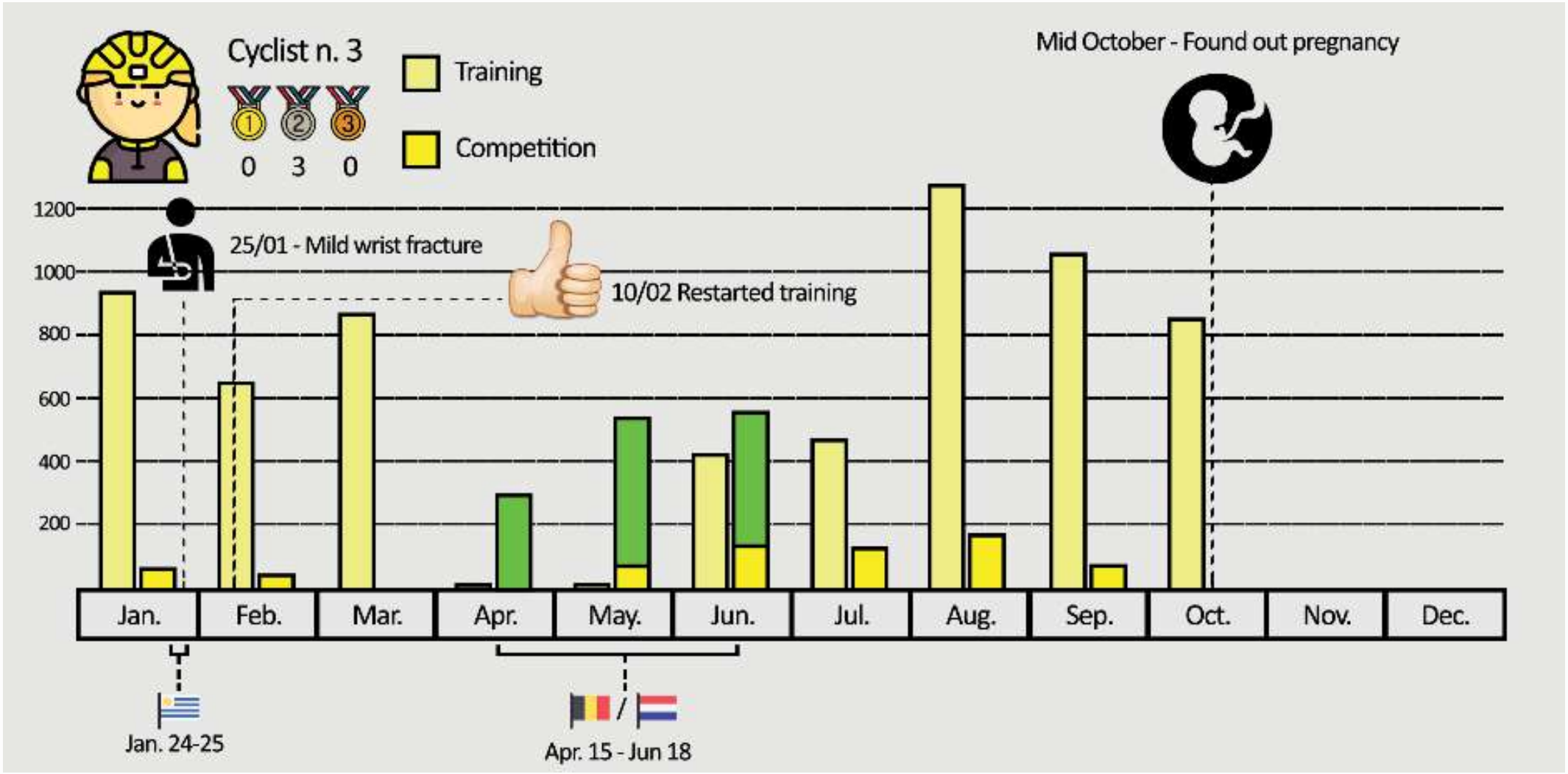
Athlete 1


Cyclist n. 1
5 2 1
Training
Competition
16/09 - Clavicle Fracture
BAM!
02/12 Restarted training
1200
1000
800
600
400
200
Jan.
Feb.
Mar.
Apr.
May.
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Jan. 24-28
Apr. 15 - May 02
May. 02-06
May 11 - Jun. 18

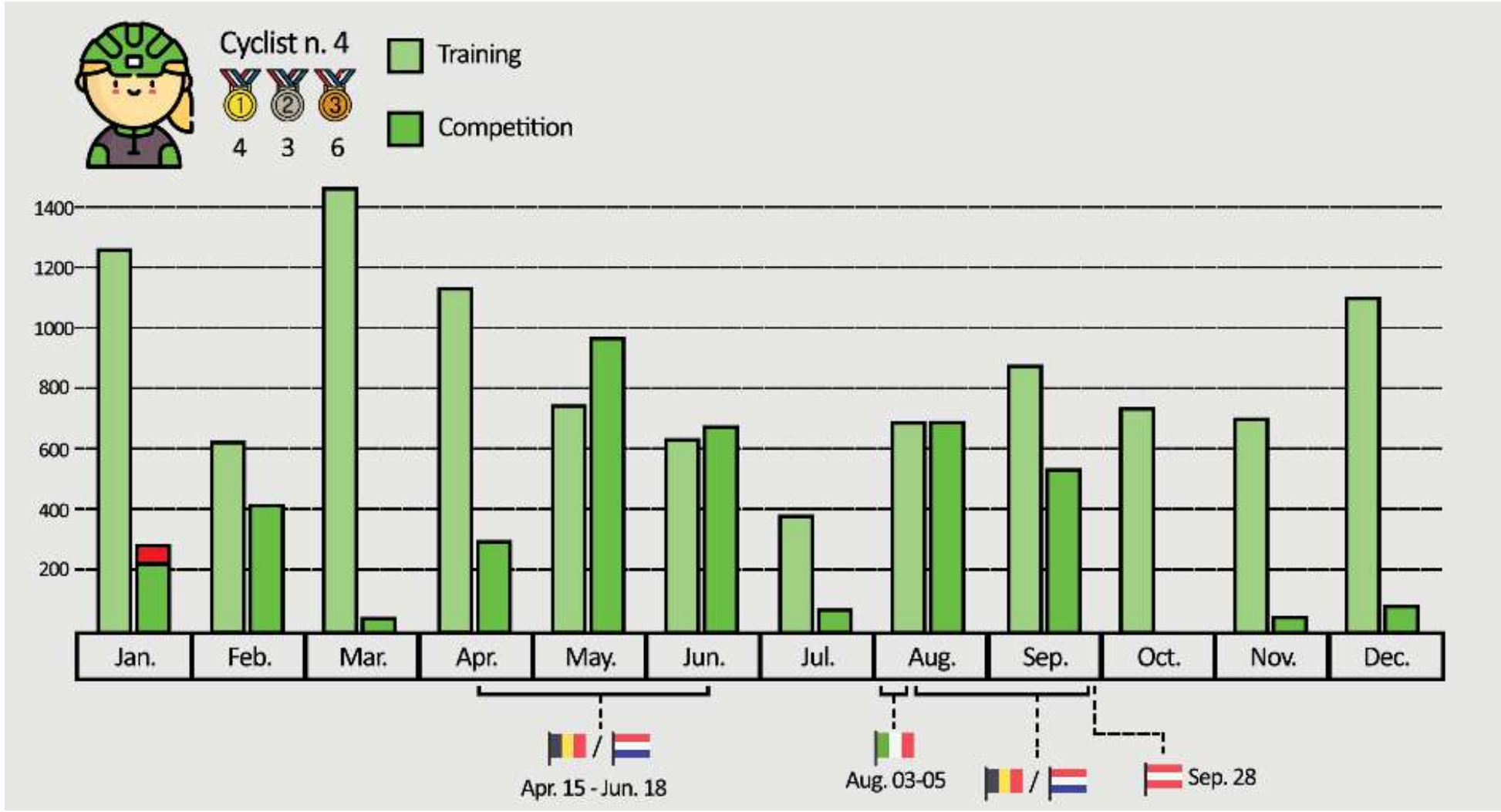
Athlete 2


Cyclist n. 2
Training
Competition
5 3 2
~02/07 - Radius Fracture
BAM!
23/07 Restarted training
1400
1200
1000
800
600
400
200
Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec.
Jan. 24-28
May. 02-06

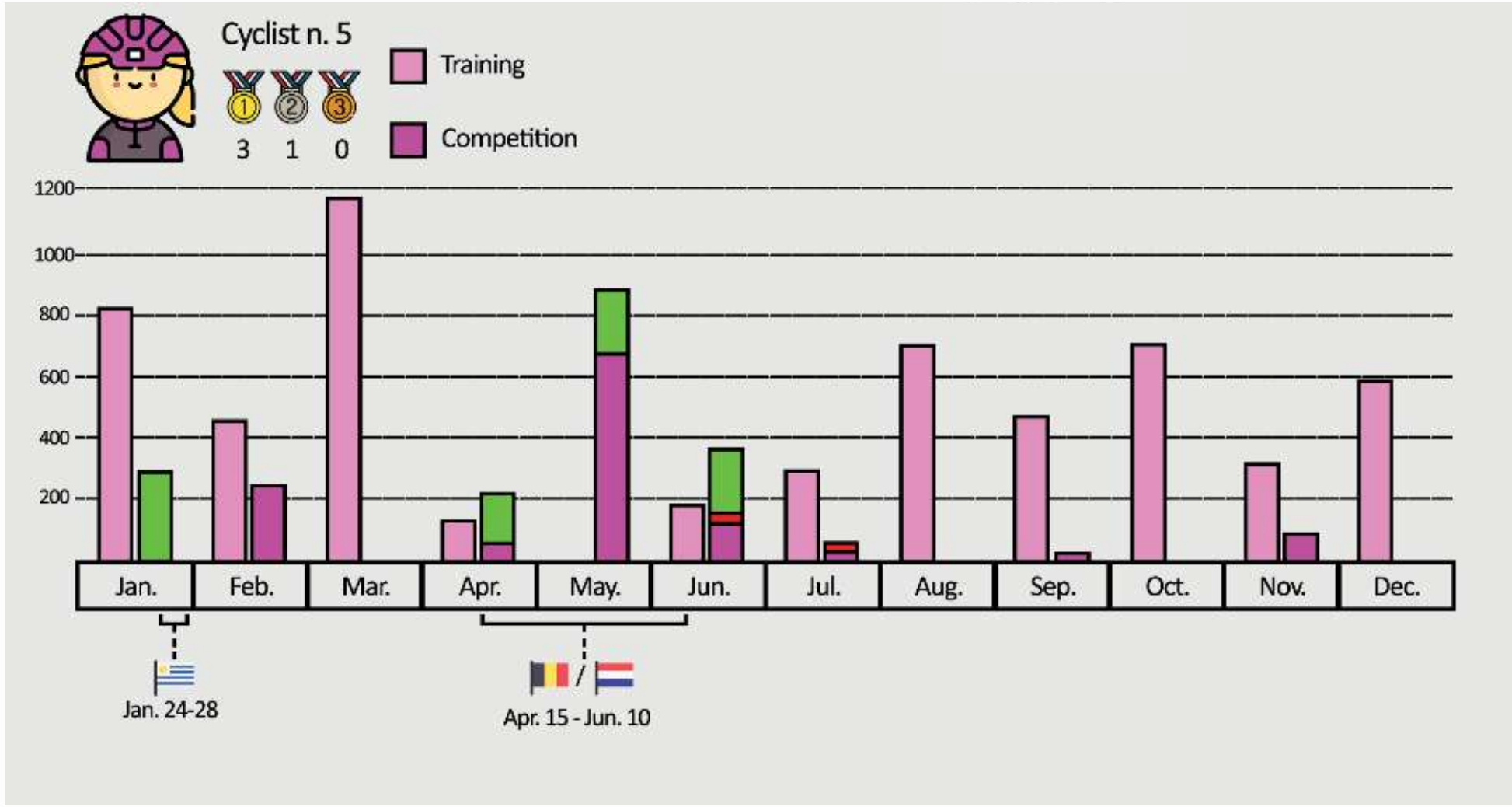
Athlete 3


Cyclist n. 3
Training
Competition
0 3 0
Mid October - Found out pregnancy
1200
1000
800
600
400
200
25/01 - Mild wrist fracture
10/02 Restarted training
Jan.
Feb.
Mar.
Apr.
May.
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Jan. 24-25
Apr. 15 - Jun 18

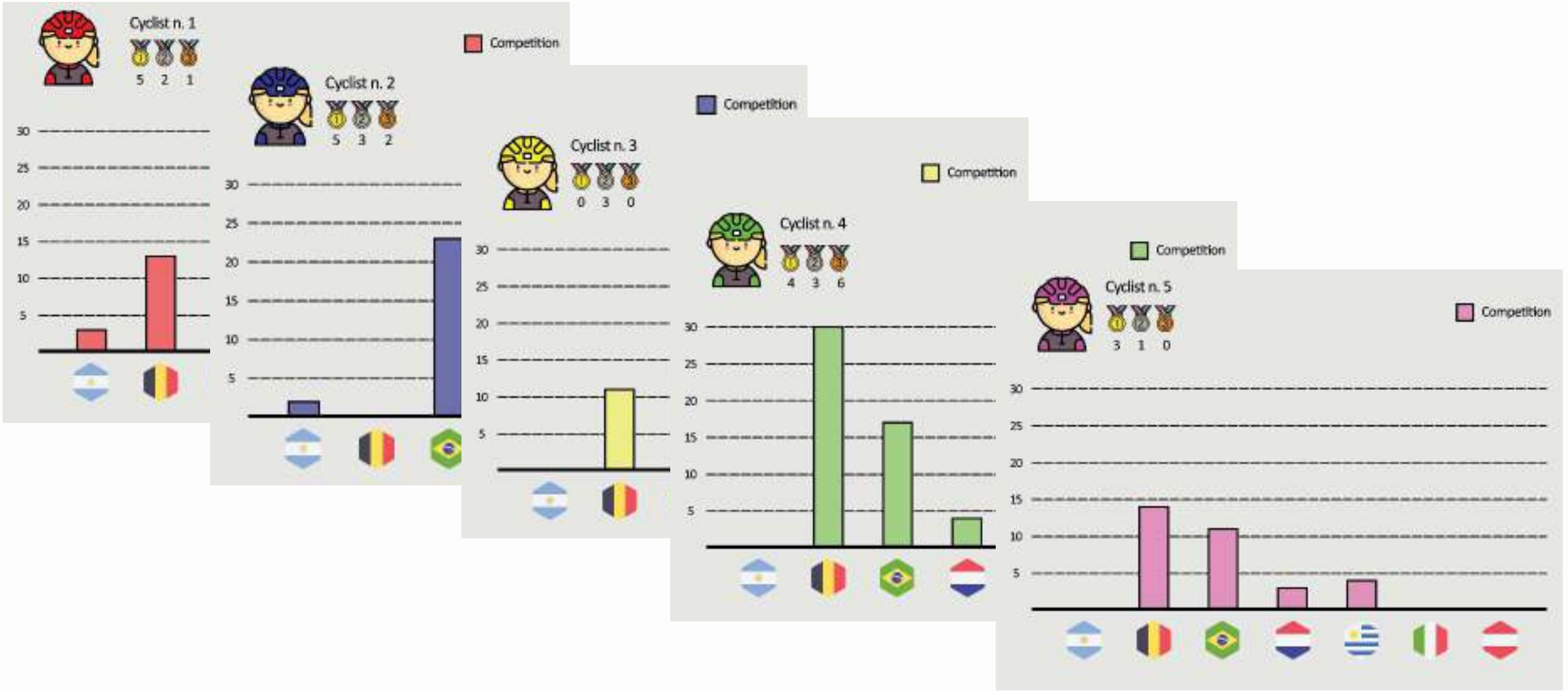
Athlete 4


Cyclist n. 4
4 3 6
Training
Competition
1400
1200
1000
800
600
400
200
Jan.
Feb.
Mar.
Apr.
May.
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Apr. 15 - Jun. 18
Aug. 03-05
Sep. 28

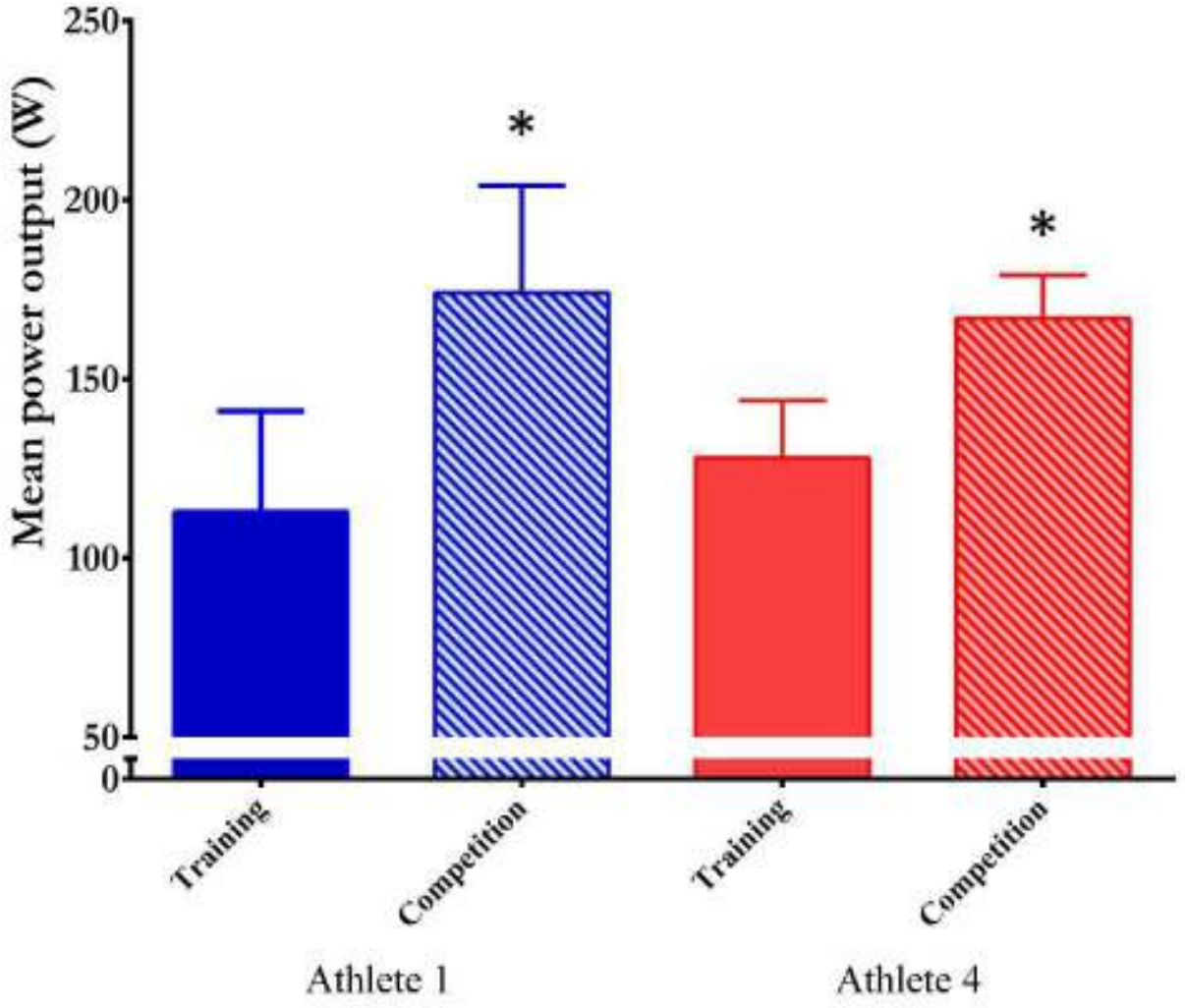
Athlete 5


Cyclist n. 5
1
2
3
3 1 0
Training
Competition
1200
1000
800
600
400
200
Jan.
Feb.
Mar.
Apr.
May.
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Jan. 24-28
Apr. 15 - Jun. 10

Competitions by country



Power output



*P<0.01 from Training

Laboratory parameters

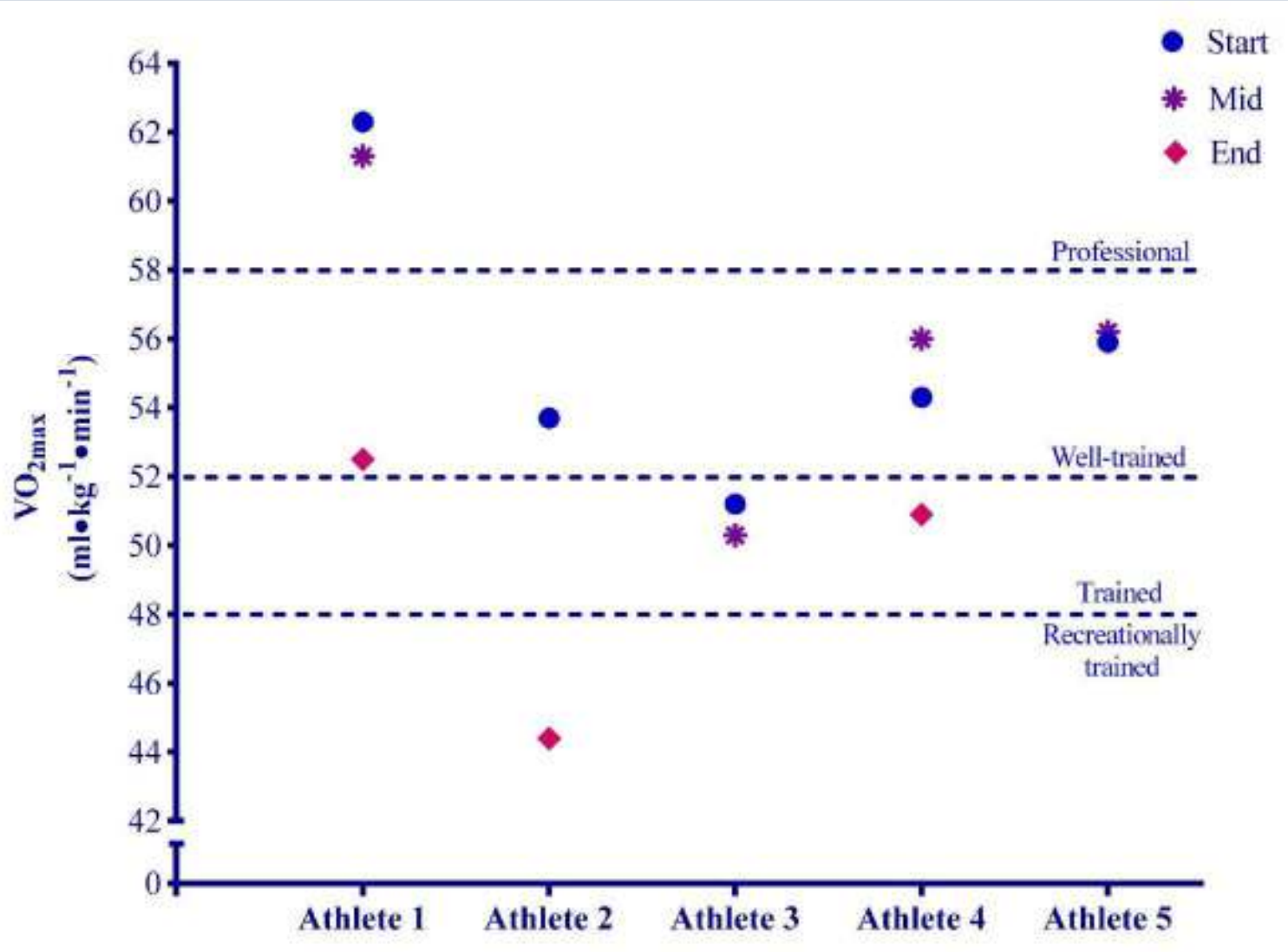
Table 2 Recommendations for Criteria per Performance Level (PL)

Performance indicator	PL1	PL2	PL3	PL4	PL5
Physiological					
1° relative maximal oxygen consumption (mL · kg^{-1} · min^{-1})	<37	37–48	48–52	52–58	>58
2° relative peak power output (W/kg)	<3	3–3.8	3.8–4.3	4.3–5	>5
absolute maximal oxygen consumption (L/min)	<2.2	2.2–3.0	3–3.2	3.2–3.5	>3.5
absolute peak power output (W)	<170	170–235	235–260	260–290	>290
Training					
h/wk	0	1–7	5–8	8–15	>17
sessions/wk	0	>1	>2	>3	>5
history (y)	0	0–6	>2	>3	>6

- **Professional:** Athlete 1 (62.3 ml·kg^{-1}·min^{-1})
- **Well-trained:** Athlete 2 (53.7 ml·kg^{-1}·min^{-1}), 4 (54.3 ml·kg^{-1}·min^{-1}) & 5 (55.9 ml·kg^{-1}·min^{-1})
- **Trained:** Athlete 3 (51.2 ml·kg^{-1}·min^{-1})

Decroix et al. (2016). Int J Sports Physiol Perf, 11: 204 -213.

Incremental cycling capacity



Effect of time (all P<0.01) – End of season < Start and Mid

Conclusions Part I

- These professional Brazilian female cyclists had training and competition schedules similar to female World Tour cyclists, competing in numerous national and international competitions.

- Athletes showed a reduced exercise capacity, as measured by laboratorial tests, at the end of the season. This is perhaps indicative of a gruelling year-long schedule although injuries may play a substantial part

- Further research is warranted to assess the various demands on professional female cyclists throughout the season.

A year in the life of a Brazilian professional female road cycling team
Part II: Nutritional and clinical outcomes

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Elite female cycling

- Female World Tour cyclists
  - 13000 to 18000 kilometres per year
  - Up to 65 competition days
    - Sanders et al. (2019)

- Current female cyclists
  - 7000 to 15000 kilometres
  - Up to 55 competition days
  - Up to 206 training days
  - As much as 234 days riding

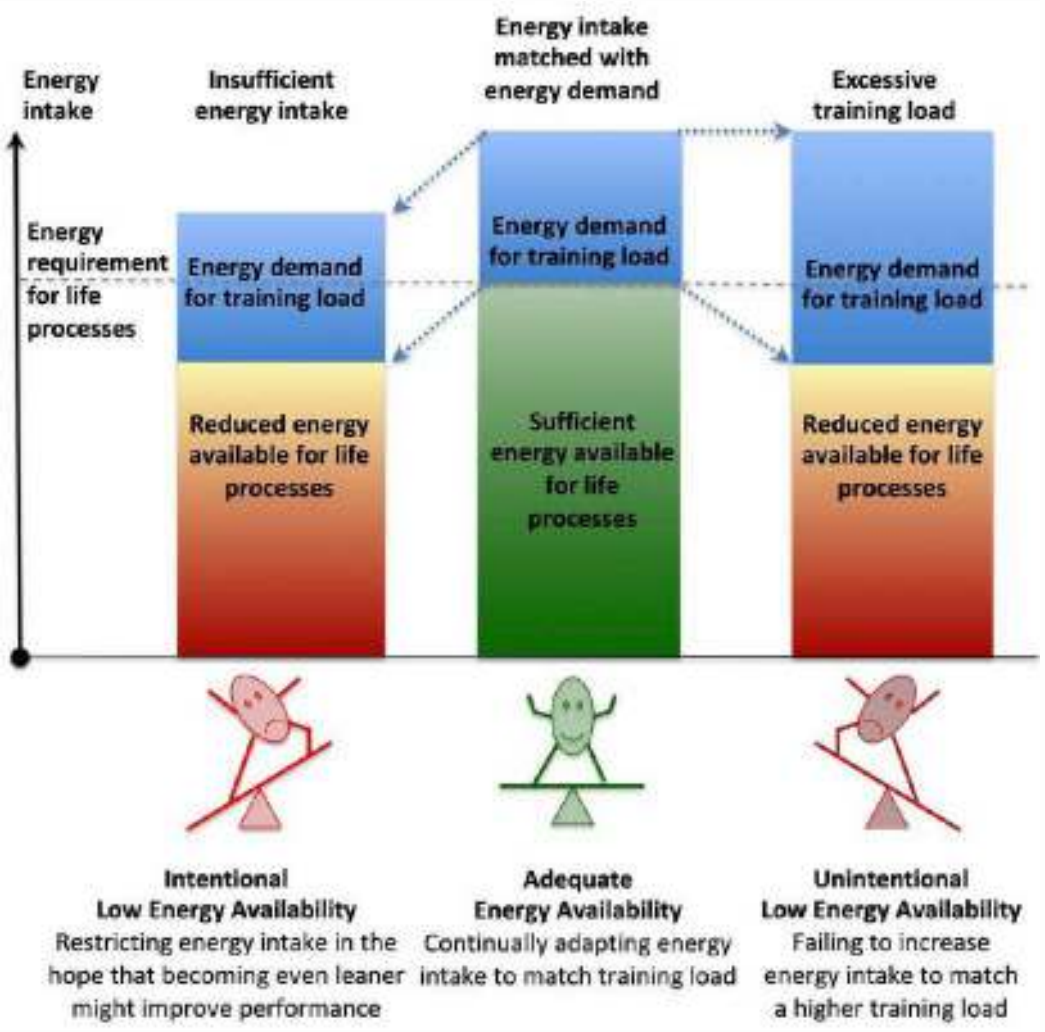
Energy availability

- Energy Availability (EA)
  = [EI – EEE]/FFM

>45 kcal/kg FFM/day

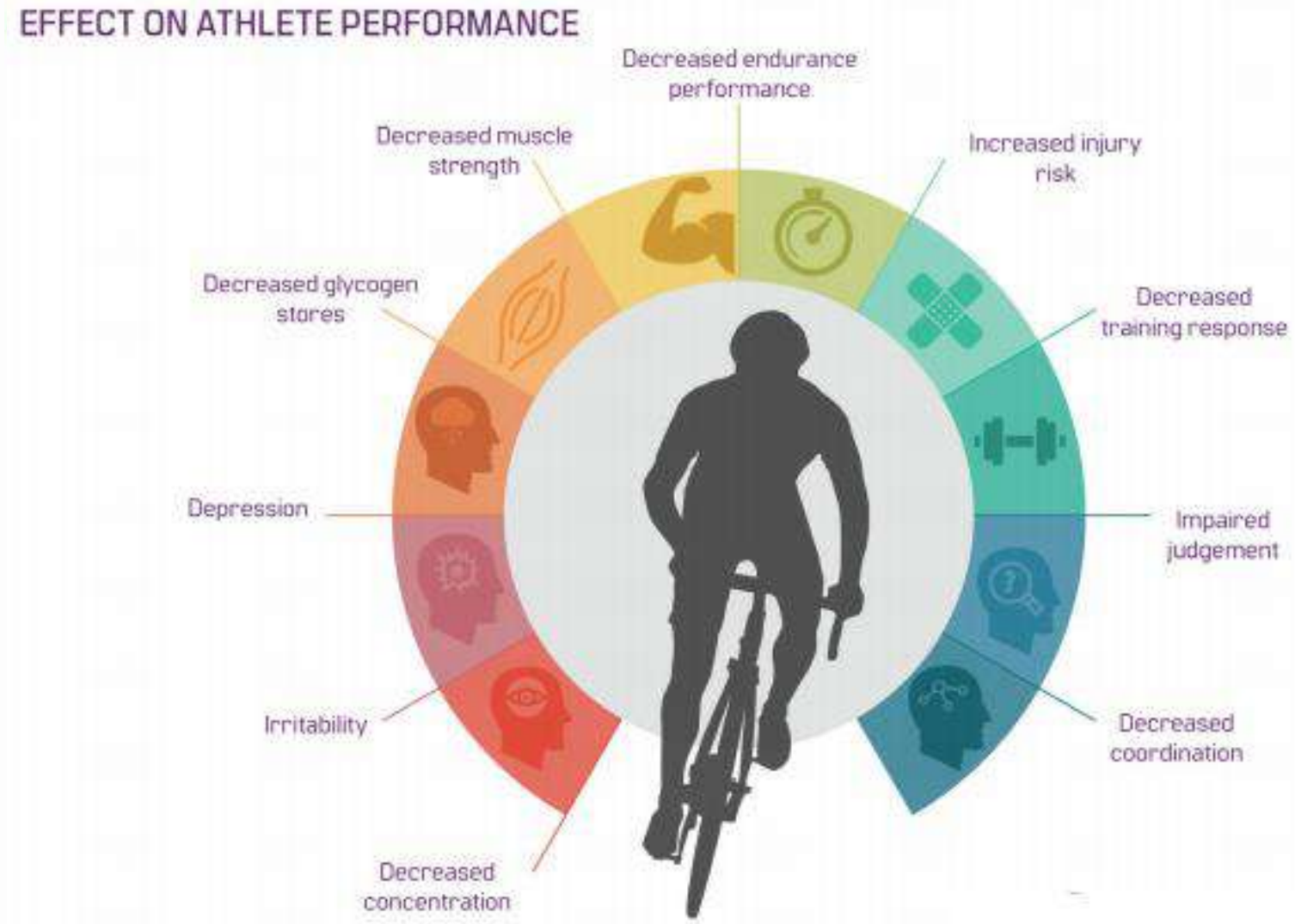
30-45 kcal/kg FFM/day

<30 kcal/kg FFM/day



Keay & Francis, (2019). Infographic. *Brit J Sports Med*. doi: 10.1136/bjsports-2018-100354

Relative Energy Deficiency in Sport (RED-S)



Keay & Francis, (2019). Infographic. *Brit J Sports Med*. doi: 10.1136/bjsports-2018-100354

Aim

Assess the nutritional habits of a professional Brazilian female cycling team throughout a competitive season and measure outcomes related to REDs.

Methods

- Five professional female Brazilian cyclists

- Nutritional assessment was performed by a trained sport nutritionist
  - Start and End of season (AVANUTRI, Brazil).
- Menstrual cycle health was assessed via a questionnaire and self-report.
- Clinical analyses (Clinical Hospital of São Paulo)
  - Immunological and haematological parameters (haemoglobin, haematocrit, leukocytes), nutritional status (vitamin B12, vitamin B, folic acid, total protein, albumin and ferritin) and stress markers (uric acid, creatine kinase, free and total testosterone, cortisol, thyroid-stimulating hormone).
- Bone mineral density (BMD) was determined at the end of the season using an X-ray source dual-emission apparatus
  - (DXA; Discovery A; Hologic Inc., Bedford, USA).

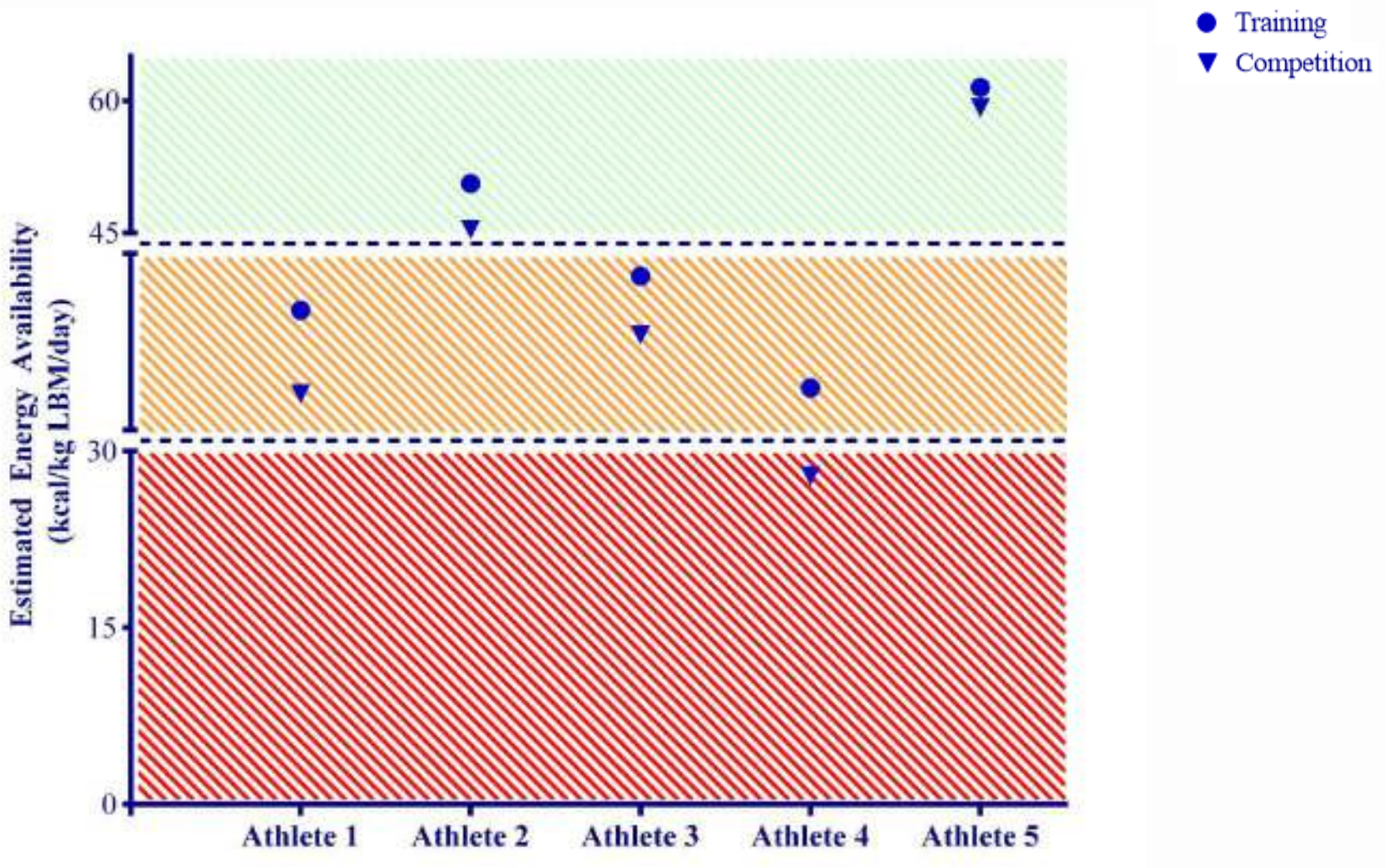
Energy availability calculation

- Harris–Benedict equation for resting metabolic rate
  - (Harris and Benedict, 1918)
- Average metabolic equivalent
  - 7.1 METs for training
  - 9.8 METs for competition
    - (Jette et al., 1990)
- Energy intake from two moments of assessment and accounting for each individual athlete's average time spent cycling in each category

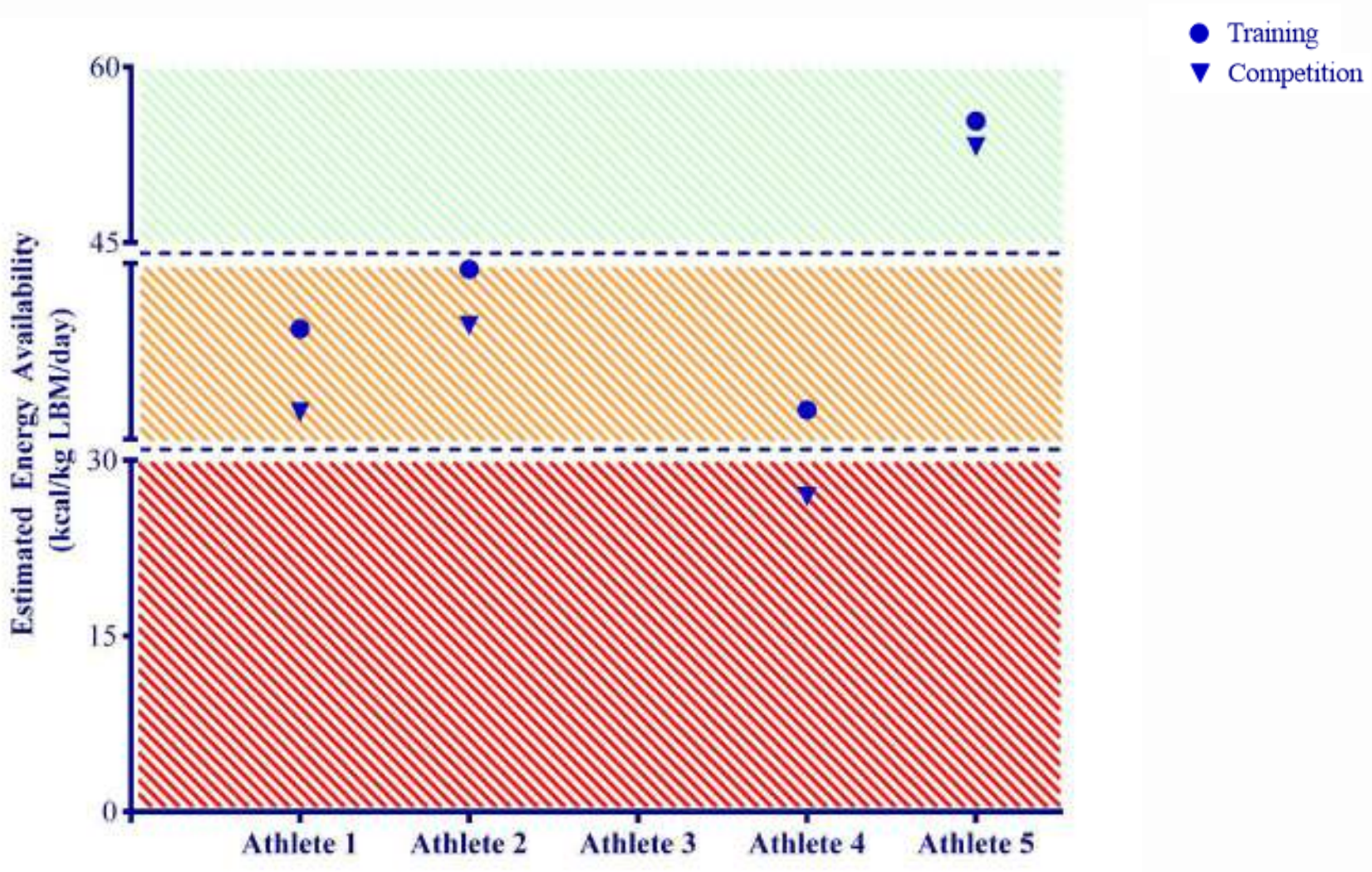
Nutritional evaluation

- Nutritionist (Start and End season)
  - Generally OK
  - Fear of gaining weight
  - Poor understanding of portion sizes
  - Reported a lot of myths about carbohydrate ingestion
    - Fattening/Don't eat after 6 pm
  - Fibre intake was low in several athletes
  - One reported no use of CHO gels during competition or training
    - Also no whey protein
- Provided orientation on how to eat properly (particularly abroad)
- Supplementation program
  - CHO during training; recovery drinks and whey protein after training; creatine and beta-alanine throughout the season

Estimated Energy Availability - Start



Estimated Energy Availability - End



Clinical analyses

- Clinical analyses revealed all cyclists were healthy at the start of the season
- Regular menstrual cycles between 21 and 35 days; three of the five athletes were taking oral contraceptives.
- Immunological and haematological parameters were maintained throughout the season and there were no cases of any kind of infection.
- Nutritional and stress markers remained largely unchanged throughout the season for those who repeated the exams, although testosterone levels were low for some individuals at various moments

Testosterone

- Cyclists with extremely low EA on race days (<10 kcal·kgFFM·d^{-1}; n=2) experienced a trend towards decreased testosterone (-14%)
  - (Heikura et al., 2019)
- Regular use of the contraceptive pill can also lead to low levels of testosterone
  - (Zimmerman et al., 2014).
- Low levels of free testosterone may have a mechanistic role in the development of low BMD
  - (Almeida et al., 2017).

DEXA

	BMD (g/cm^2)	Z-score
Athlete 1	0.831	-0.6
Athlete 2	0.870	0.0
Athlete 3	-	-
Athlete 4	0.944	0.2
Athlete 5	0.926	0.5

Low BMD defined as a Z score ≤-1 (Mountjoy et al., 2014).

Conclusions Part II

- Several members of this professional female cyclists may have been exposed to sub-optimal energy availability during training and competition.
  - Caution should be taken when interpreting these data since there are several issues associated with the calculation of energy availability in an applied setting (Burke et al., 2018)
- This may have resulted in low testosterone levels in several athletes, although no further alterations in the hormonal profile, menstrual cycle or incidences of infection were shown.
- BMD was normal for all athletes.
- Further longitudinal studies on top-level (Brazilian) female cyclists are warranted.

Specific considerations (for Brazil?)

- Brazilian cycling is in dire need of investment if they want to become a cycling power
  - Women and men's!
  - This team are taking great strides (but still have to crowd fund)
  - Don't have training coaches…
  - Recently spent several weeks in Belgium again (UCI ranking!)

- Female athletes need to carefully monitor their EA and BMD
  - Interviews reveal complexity of dealing with athletes
  - Avoid bad science
  - Translate science to practice
  - Employing a nutritionist may improve this ($$$)

Acknowledgements



Acknowledgements

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