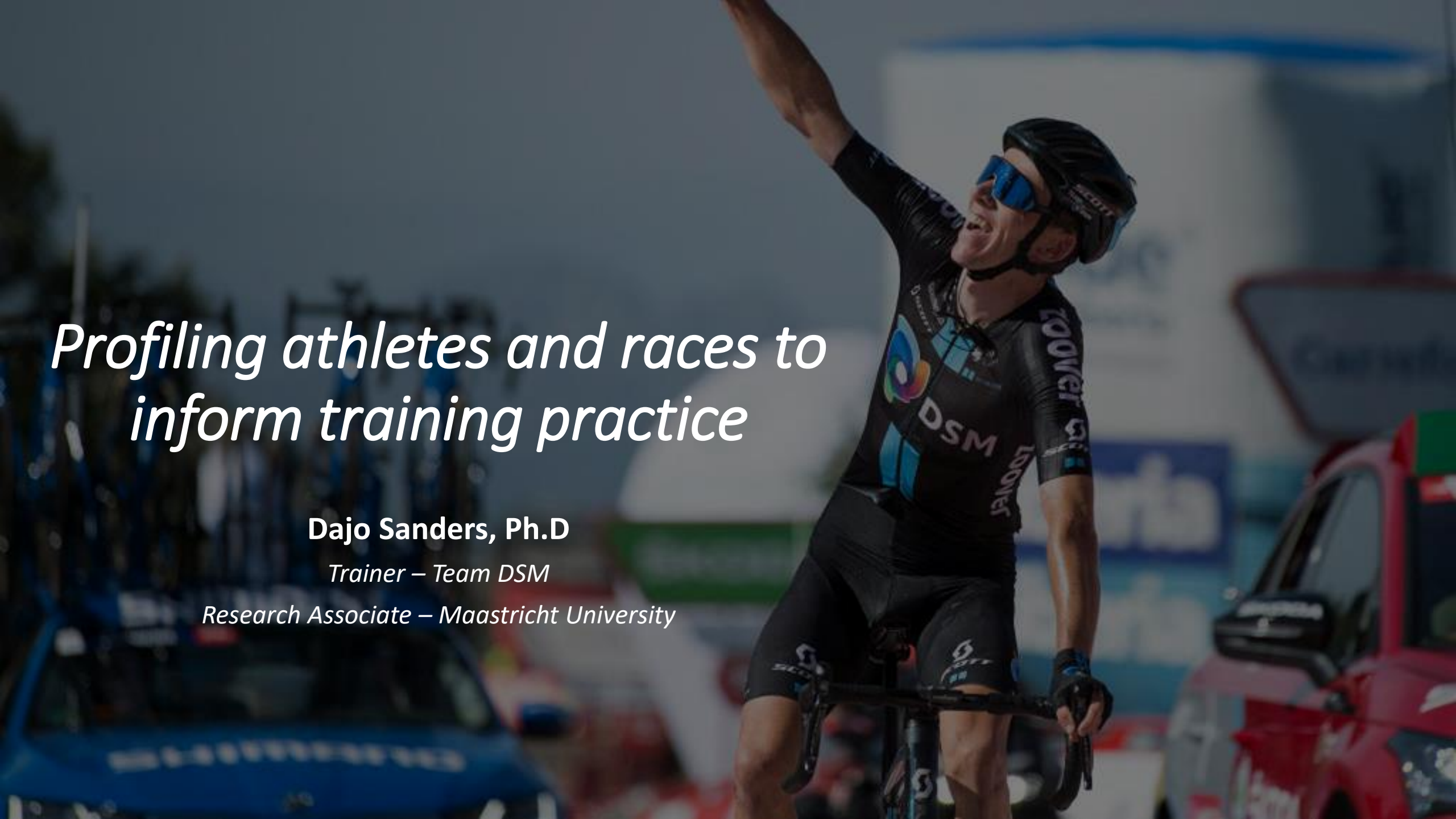


Profiling athletes and races to inform training practice

Dajo Sanders, Ph.D

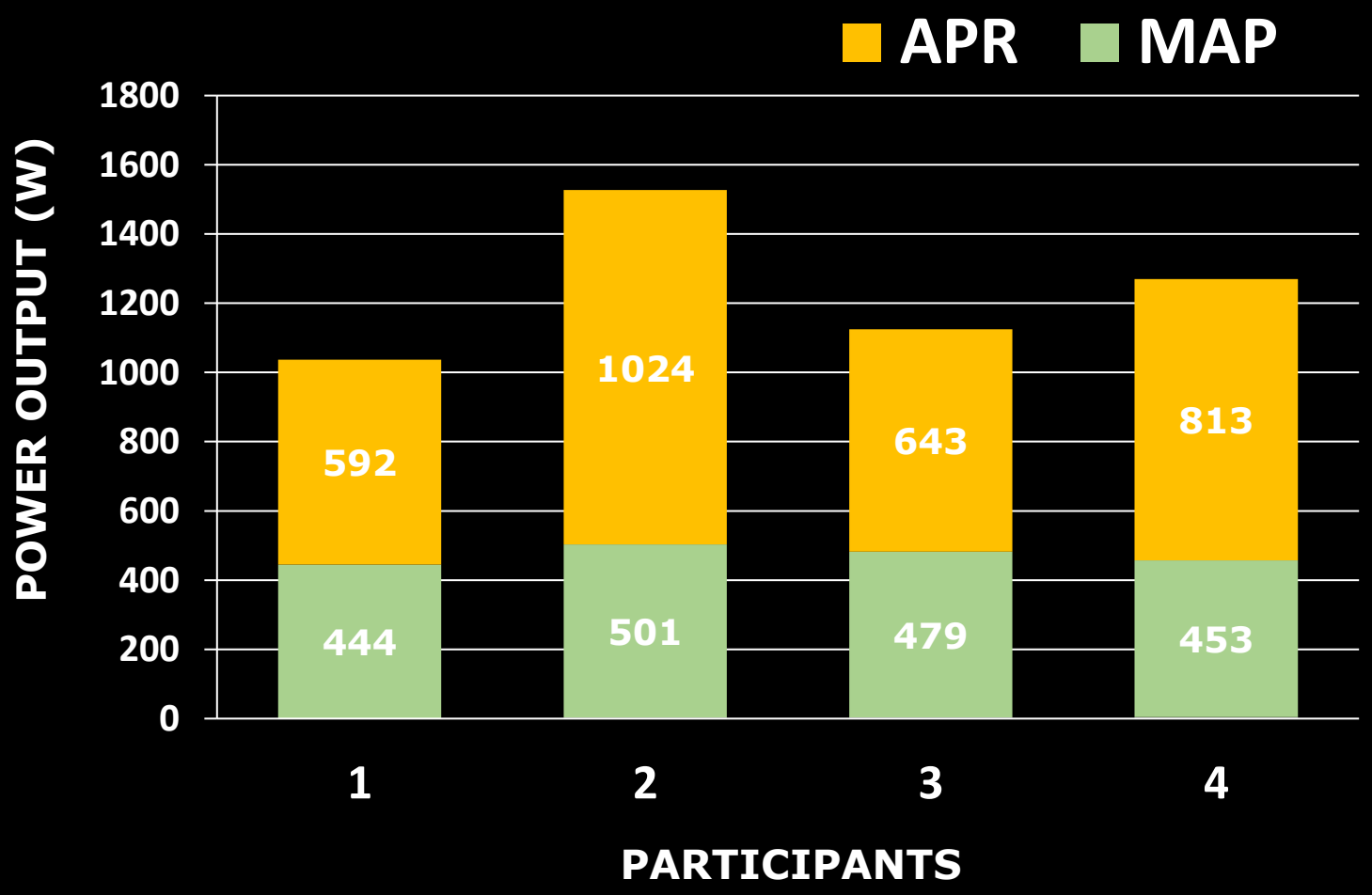
Trainer – Team DSM

Research Associate – Maastricht University

Magness, 2014

Athlete characteristics

Different athletes – different characteristics



4 World Tour cyclists

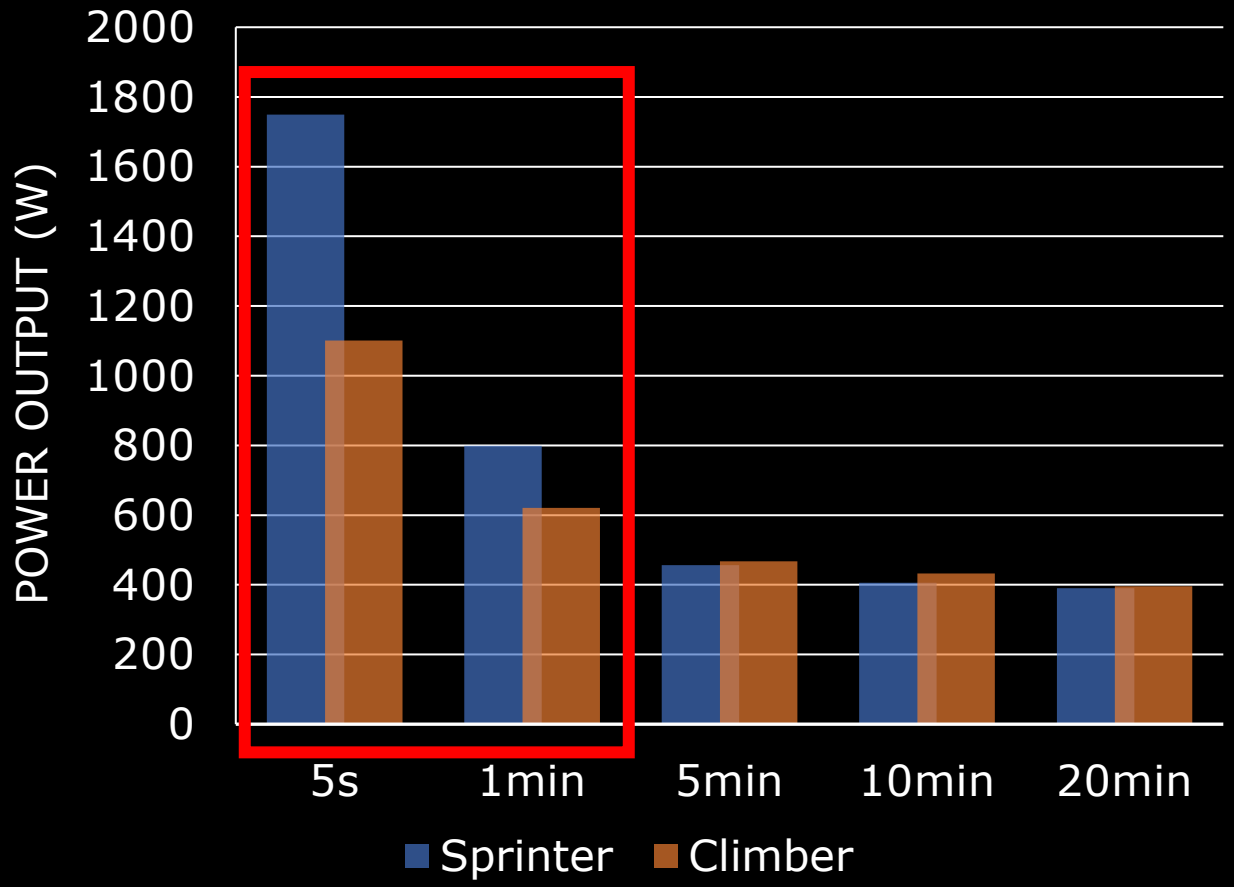
- Different Maximal Aerobic Power outputs
- Different sprint peak power outputs

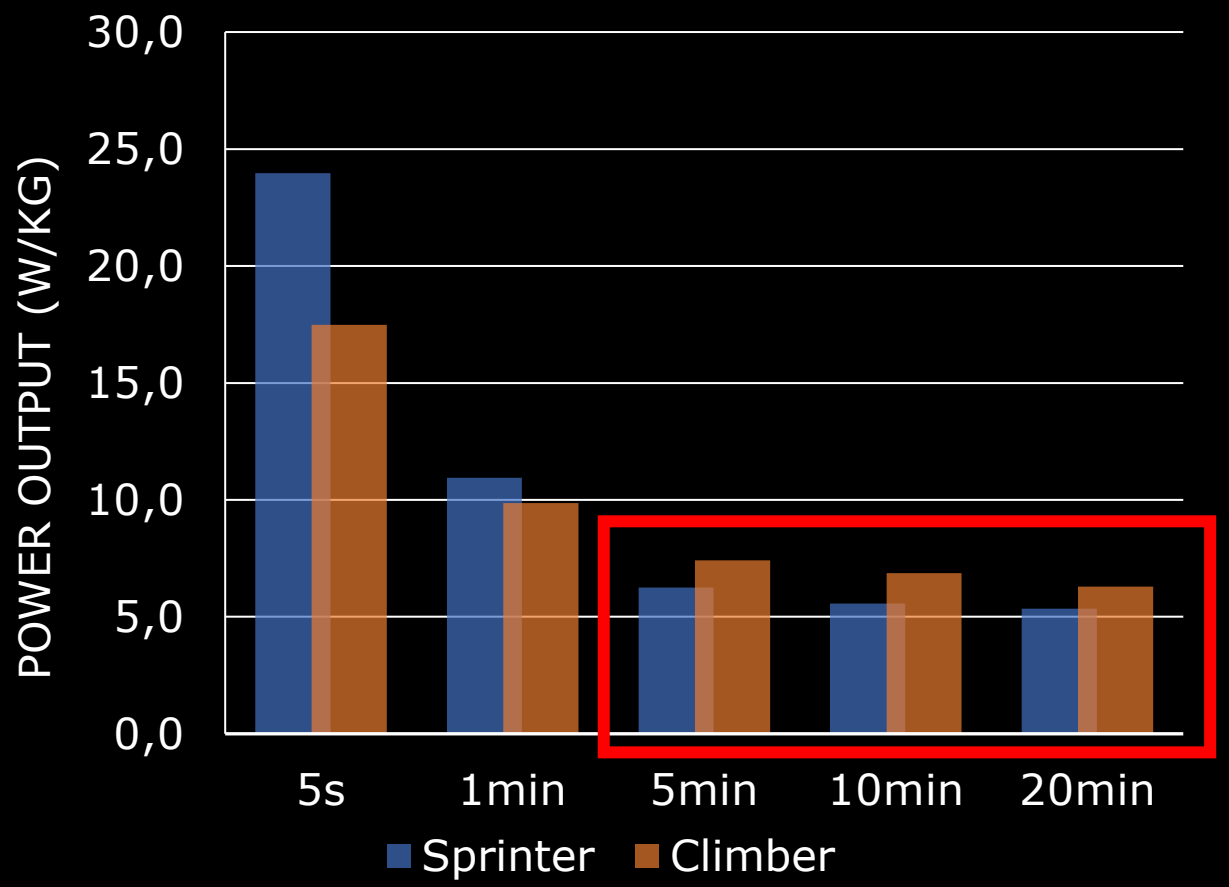
Sanders et al. 2017

Physiological vs *Functional testing*

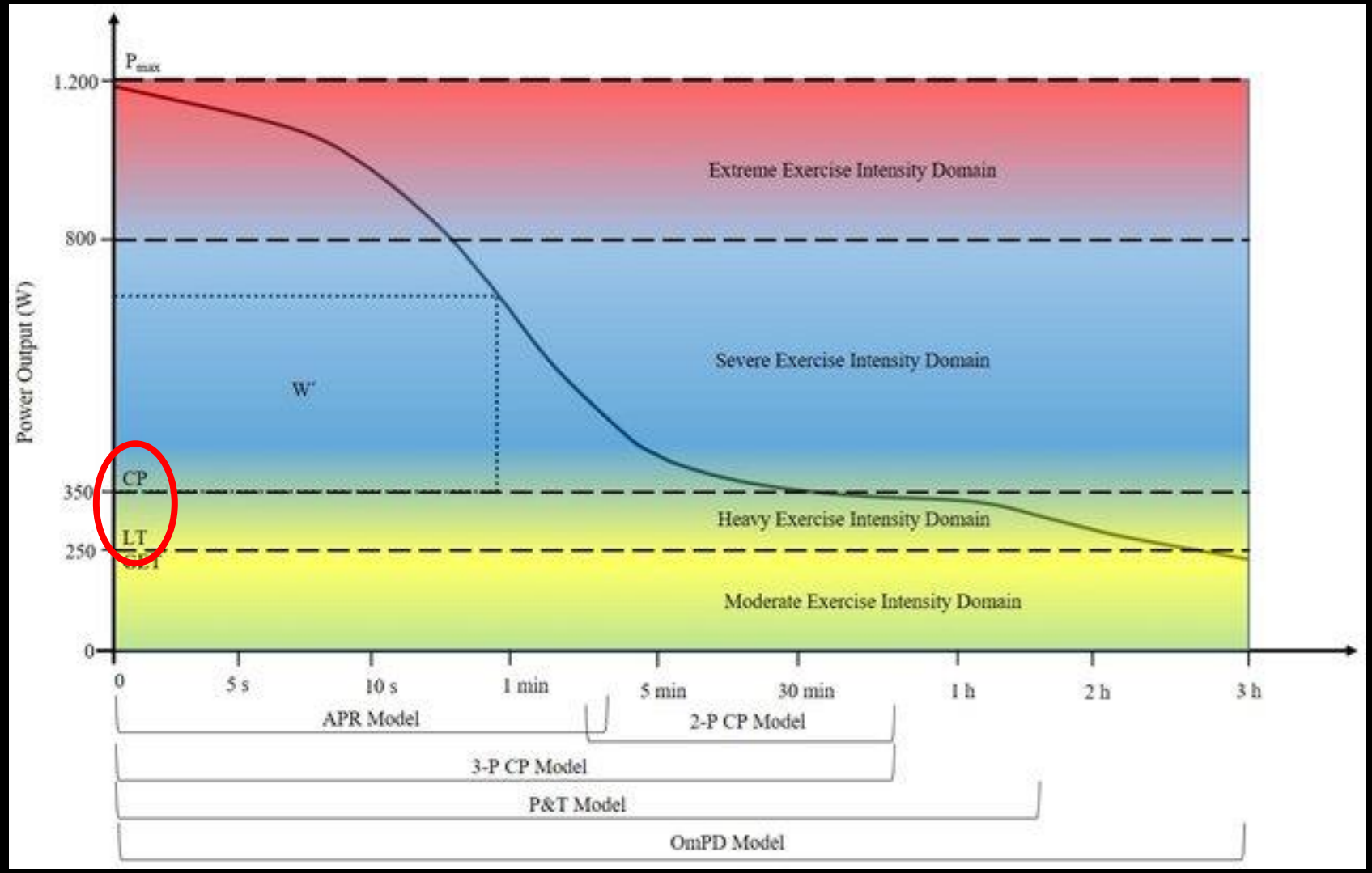
Athlete characteristics – *Physiological Profiling*

Athlete characteristics – *Functional profiling*





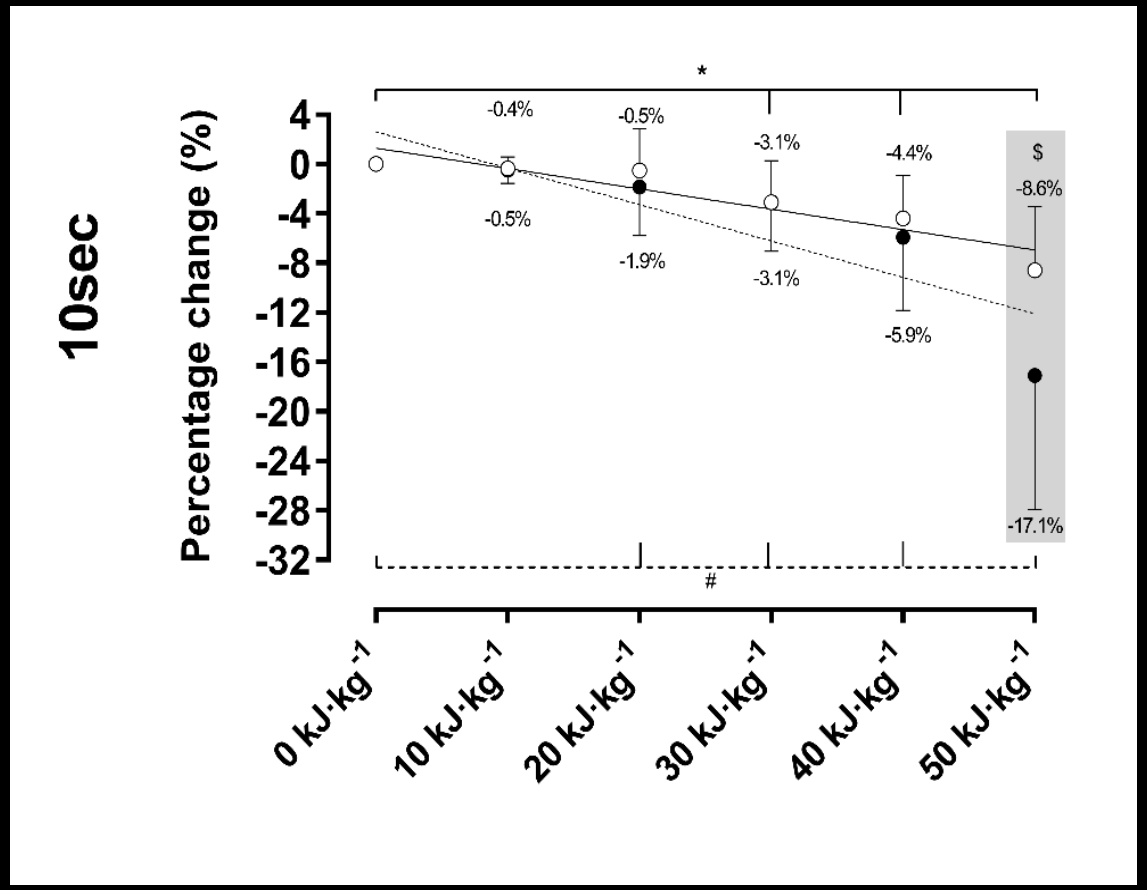
Athlete characteristics – *Functional profiling*



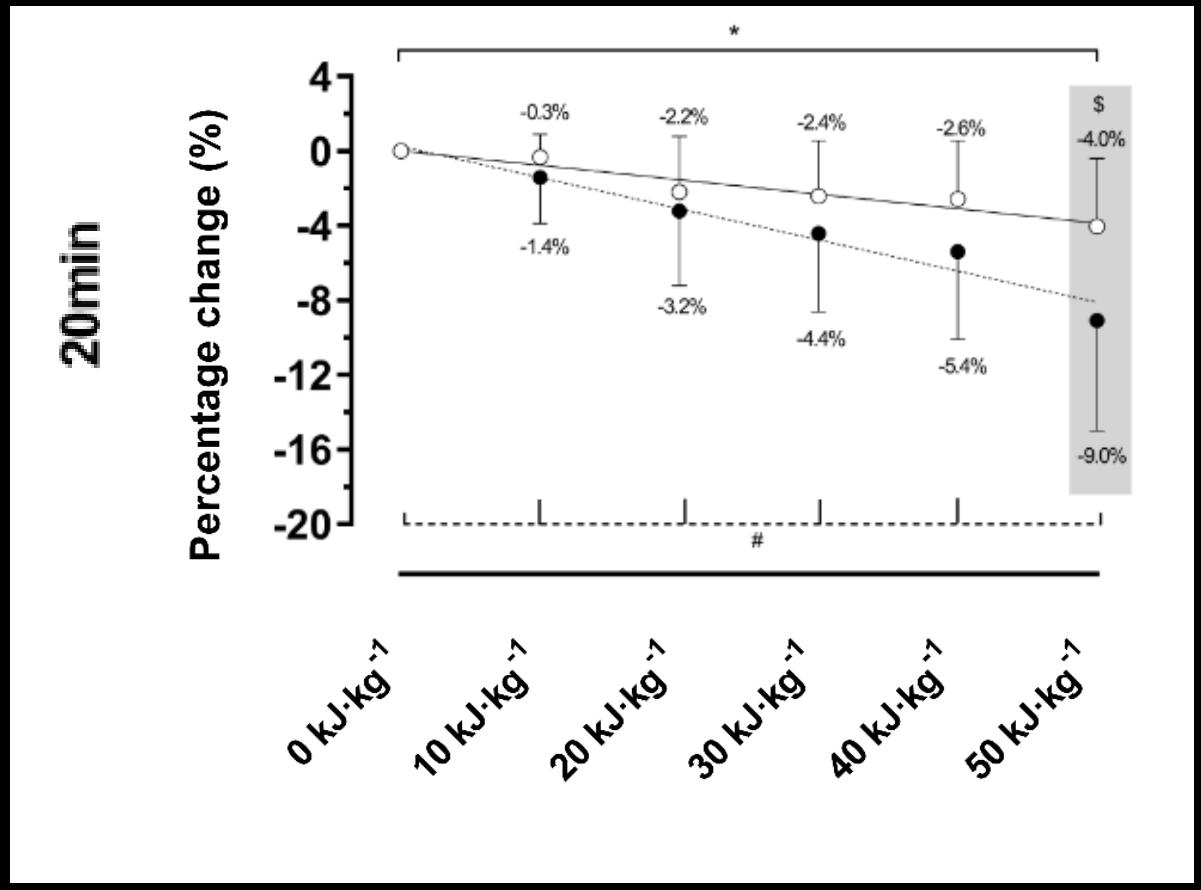
Leo et al. 2020

Athlete characteristics – *Fatigue Resistance*

Sprinters

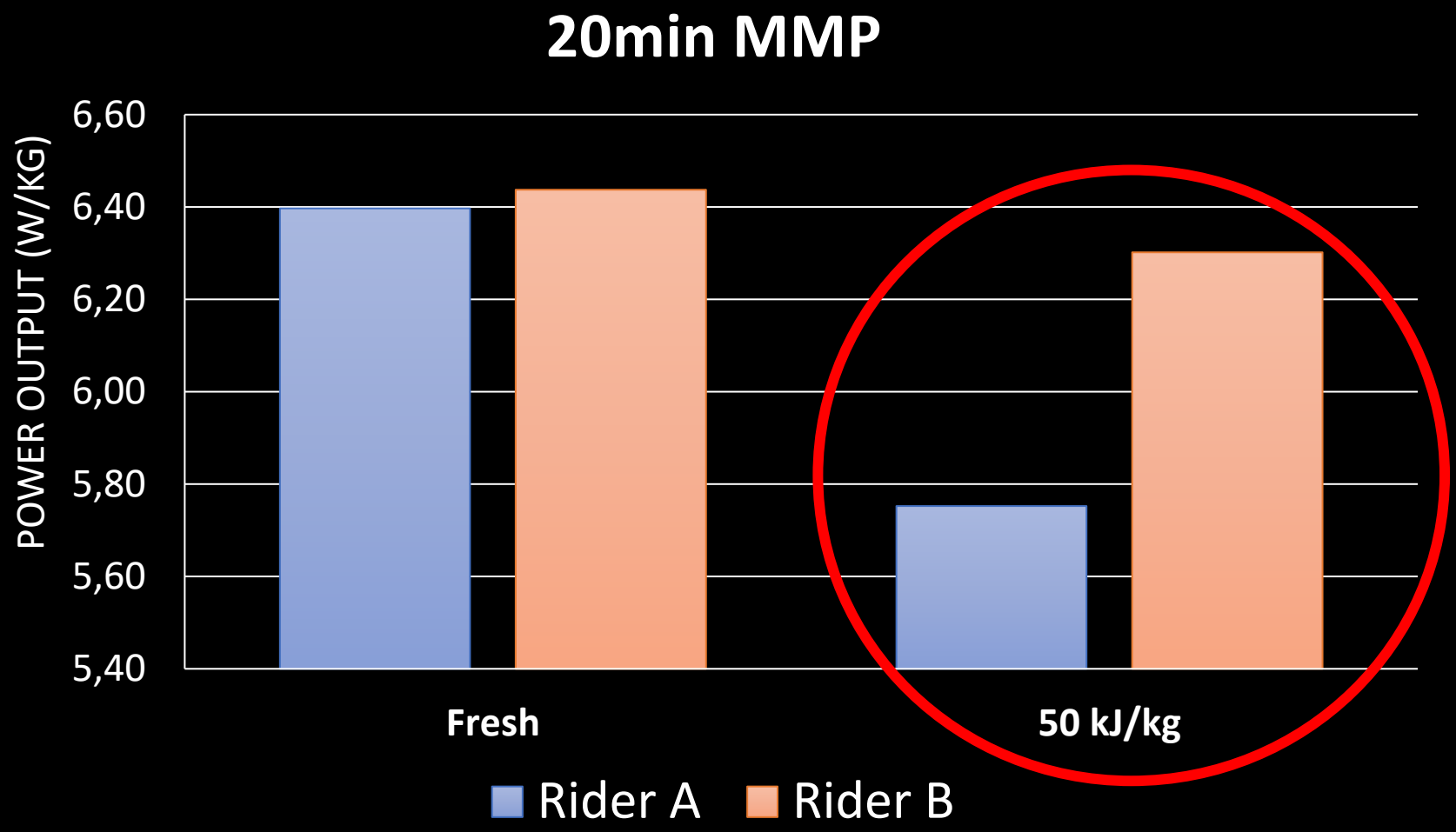


Climbers



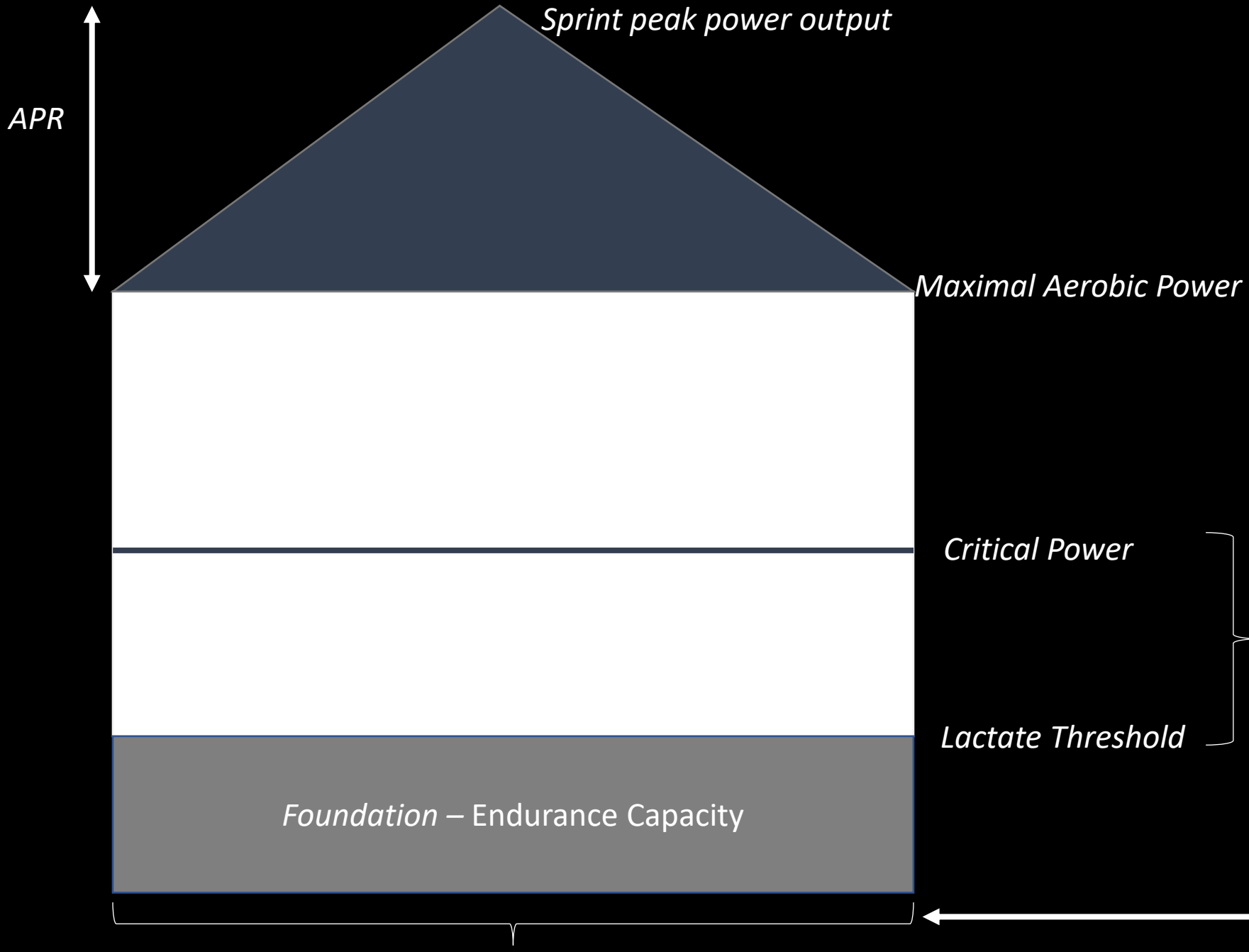
Van Erp, Sanders, Lamberts 2021

Athlete characteristics – *Fatigue Resistance*



Putting it all together

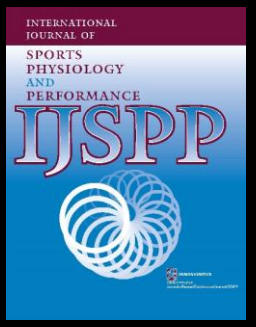
‘Building the house’



Skiba, 2022

Race Demands

The Physical Demands and Power Profile of Professional Men's Cycling Races: An Updated Review

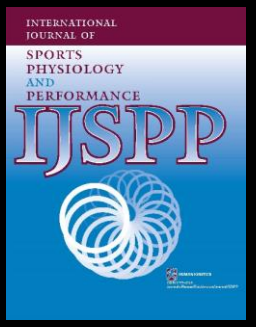


- ✓Races with more elevation gain typically result in a higher intensity and load and longer-duration power outputs (ie, >10 min).
- ✓Flat and 'semi-mountainous' stages are characterized by higher maximal mean power outputs over shorter durations (ie, <2 min).
- ✓Single-day races tend to have a higher (daily) intensity and load compared to stages within multi-day races.

But.. limited amount of research is available describing the "race-winning efforts" or the profile of riders achieving a result

Sanders & Van Erp, 2021

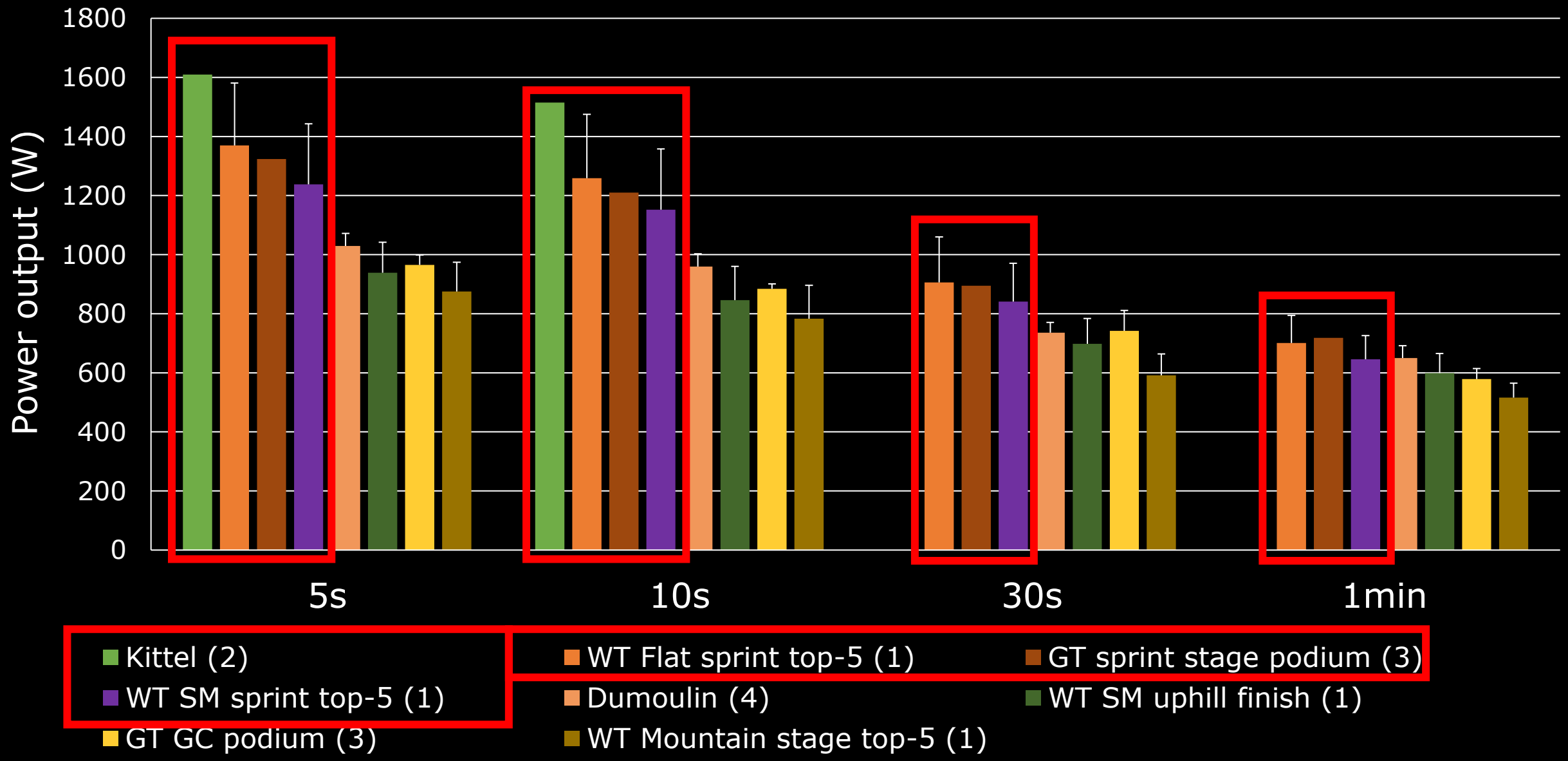
Power Profile of Top-5 results in WT races



- Data from 33 professional cyclists between 2012 – 2019
- WT races categorised in to: 1) flat sprint finish; 2) semi-mountainous sprint finish; 3) semi-mountainous uphill finish; 4) mountain stage
- 177 WT races with a Top-5 result being analyzed
- 'Average requirements' to achieve a WT top-5 in varying stage types

Van Erp, Lamberts, Sanders, 2021

1) Van Erp, Lamberts, Sanders, 2021
2) Van Erp, Kittel, Lamberts, 2021
3) Own observations
4) Van Erp et al. 2020



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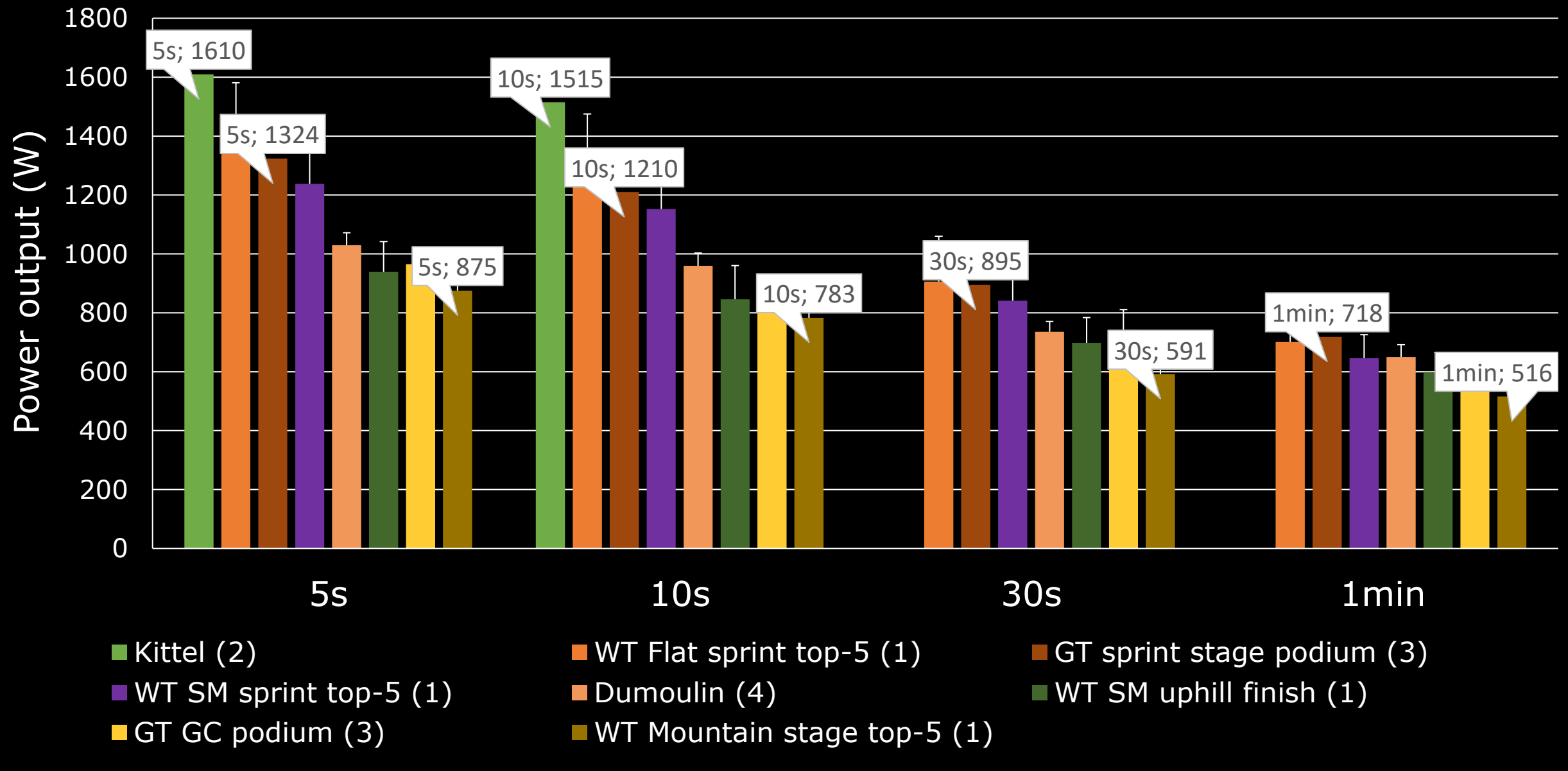

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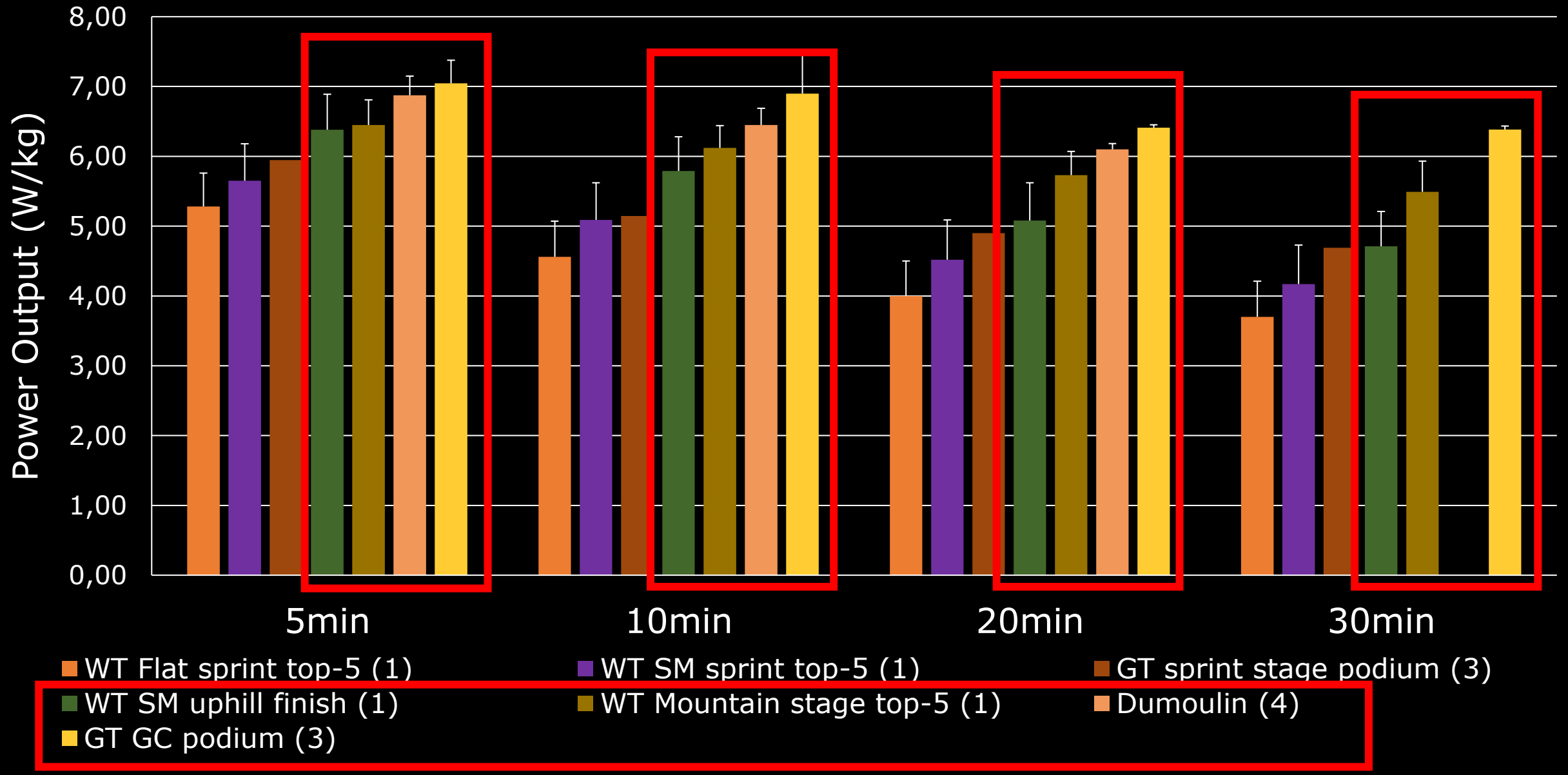

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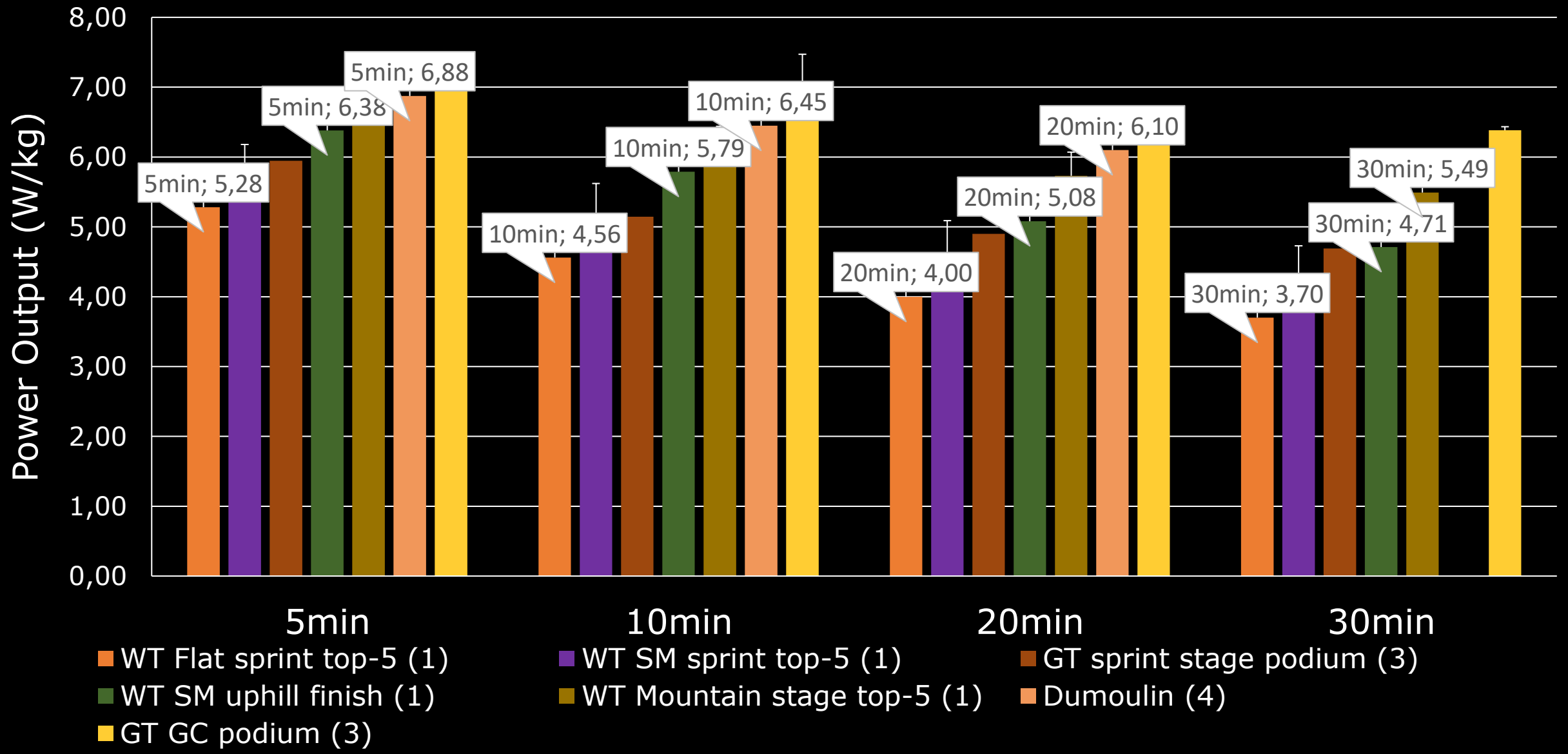


One day races - *Monuments*

European Journal of Sport Science

	Monuments ($n = 39$)	1.WT ($n = 89$)	1.HC ($n = 64$)	1.1 ($n = 130$)
Distance (km)	268 (19.5)	219 (25.5)[1]	195 (33.1)[1,2]	187 (36.0)[1,2]
Duration (min)	406 (28.3)	332 (40.1)[1]	291 (19.6)[1,2]	285 (34.8)[1,2]
Mean PO (W)	236 (26.4)	223 (29.9)	226 (27.5)	240 (27.9)[2]
Mean PO ($W \cdot kg^{-1}$)	3.32 (0.32)	3.10 (0.44)[1]	3.13 (0.41)	3.22 (0.39)[2,3]
Intensity Factor™	0.77 (0.06)	0.76 (0.07)	0.77 (0.07)	0.79 (0.07)
Mean HR ($beats \cdot min^{-1}$)	144 (10)	139 (12)	143 (9)	144 (8)[2]
Mean HR (%HR_{max})	75.0 (4.5)	71.5 (5.2)	74.0 (4.0)	74.6 (4.1)[2]
Peak HR	181 (9)	184 (24)	183 (21)	185 (18)
Mean RPE (AU)	18.2 (1.5)	16.9 (1.8)[1]	16.3 (1.5)[1]	16.1 (1.7)[1,2]
Total Elevation Gain	2381 (1300)	2098 (788)	1233 (653)[1,2]	1239 (821)[1,2]
Total work (kJ)	5756 (625)	4490 (739)[1]	4004 (574)[1,2]	4134 (589)[1,2]
TSS (AU)	402 (51.4)	324 (68.6)[1]	291 (54.1)[1,2]	298 (57.8)[1,2]
TRIMP (AU)	1284 (135)	949 (212)[1]	919 (135)[1]	891 (146)[1]
sRPE (AU)	7480 (688)	5646 (861)[1]	4833 (568)[1,2]	4633 (817)[1,2]
kJ $spent \cdot km^{-1}$ (AU)	21.5 (2.7)	20.5 (2.8)	19.9 (2.9)[1]	21.3 (2.9)[2,3]
TSS·km^{-1} (AU)	1.51 (0.23)	1.48 (0.28)	1.44 (0.26)	1.53 (0.27)[3]
TRIMP·km^{-1} (AU)	4.79 (0.78)	4.32 (0.83)	4.54 (0.60)	4.58 (0.69)
sRPE·km^{-1} (AU)	27.8 (2.67)	25.8 (3.21)[1]	24.0 (2.56)[1]	24.3 (3.39)[1,2]

Van Erp & Sanders, 2021

Race Demands

- Understanding of the race demands helps to identify (and theorise about) main parameters of importance
- What does a race-winning effort look like?
- What are the minimum requirements?
- What physiological parameters contribute to success in the different stage types?

Athlete characteristic vs Race demand

- Athlete characteristics are evaluated with the race demands in mind
- The goal/specialisation determines the ‘lens’ you evaluate the athlete characteristics with
- What is the limiting factor?
  - *Higher maximal sprint power?*
  - *Higher CP?*
  - *Higher lactate threshold?*
  - *Improved fatigue resistance?*

Summary

Minimum requirements?

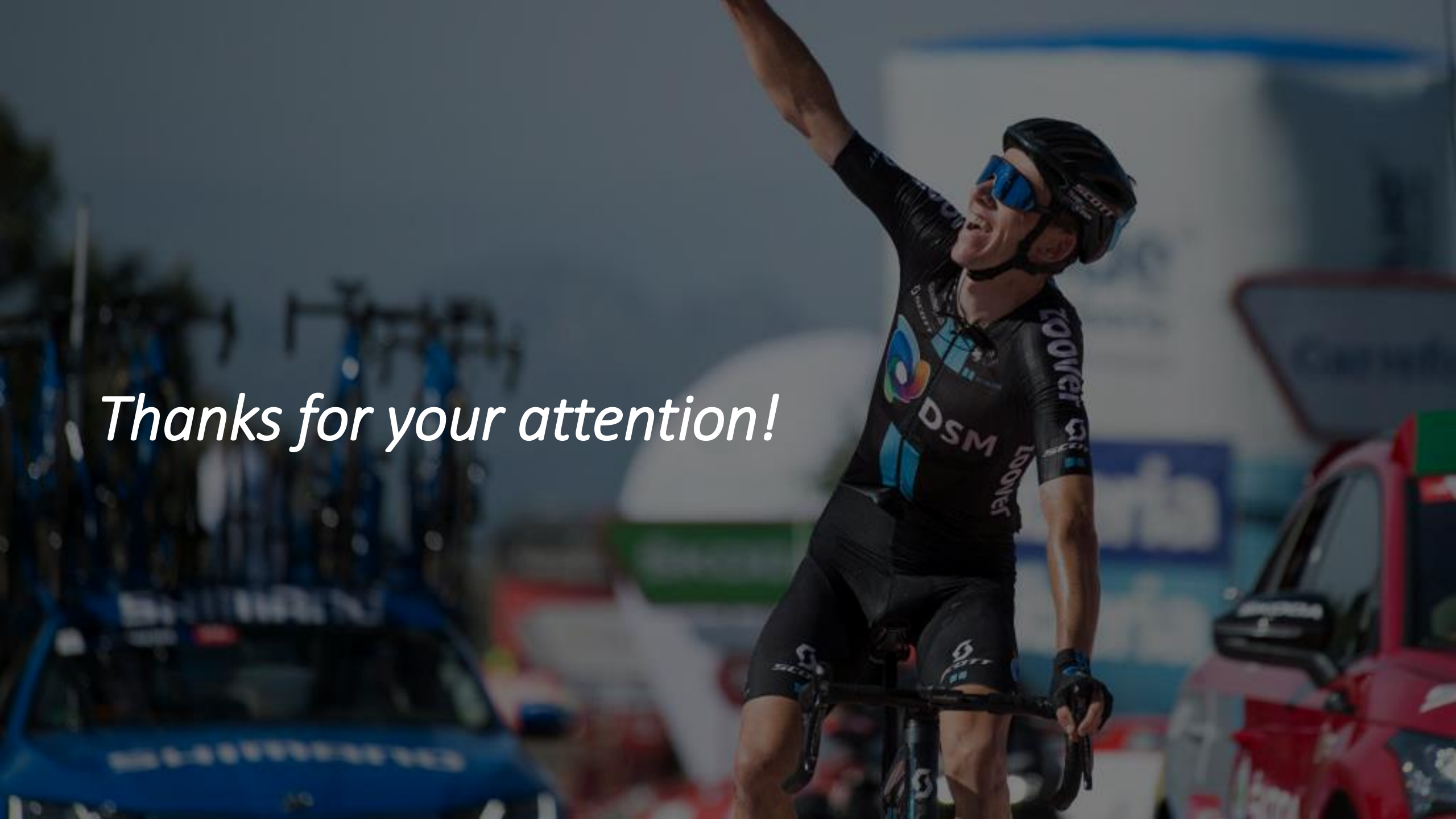
What are the main variables of importance for success in these events?

What does a 'race-winning effort' look like?

What's the limiting factor?

What are the short vs long term goals for this individual athlete?

Magness, 2014



Thanks for your attention!