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Science & Cycling 2021

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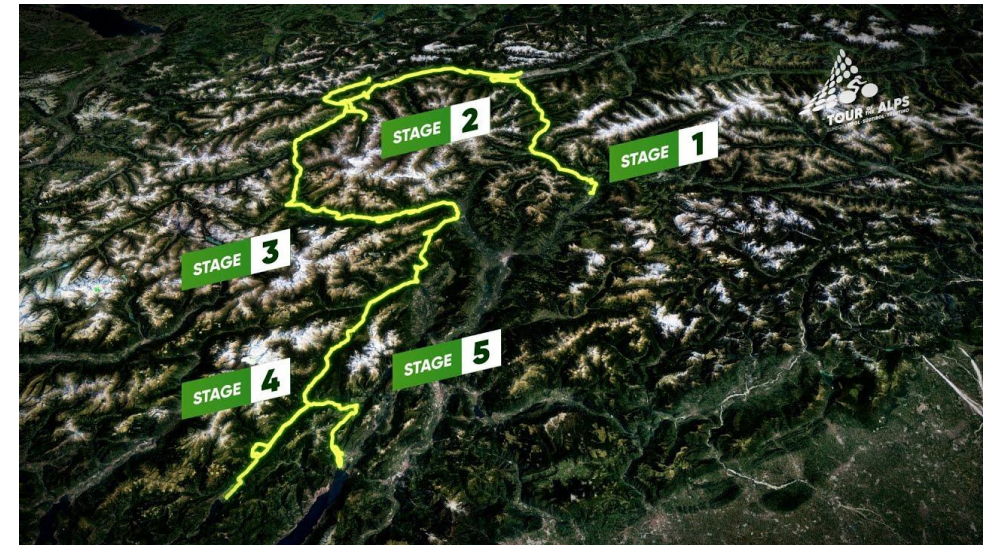
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Workload characteristics and race performance of U23 and professional cyclists during an UCI 2. Pro multistage race



Aims

- performance requirements of professional road cycling depend on varying race characteristics (topography, single day vs. multi-day, race difficulty) (Padilla et al. 1999 & 2008; Van Erp et al. 2019, Sanders et al. 2018)
- performance capacity dictated by internal and external workloads and power profile (Sanders et al. 2019; Mujika and Padilla 2000)
- UCI 2. Pro category direct comparison of “continental” vs. “pro and world tour” level
- participation of U23 and professional cyclists in the same race
- talent identification and maturation - (*“what it takes”*)

Design

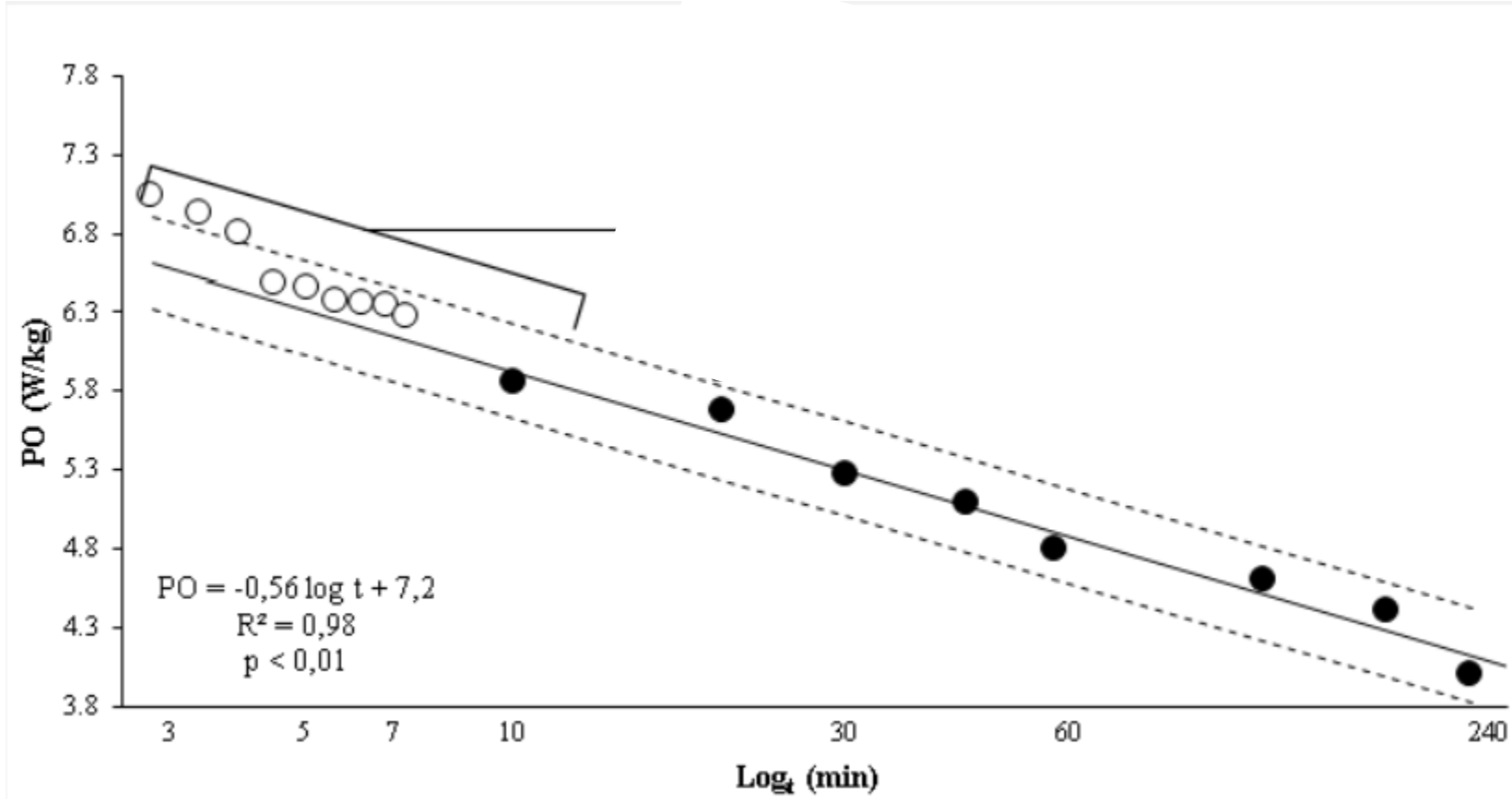
- 14 U23 cyclists and 11 professional cyclists
- 2018 and 2019 race edition
- 5-day stage race (UCI 2. Pro) ~700km and ~13.000m elevation gain
- power output, heart rate and GPS data



Data Analysis

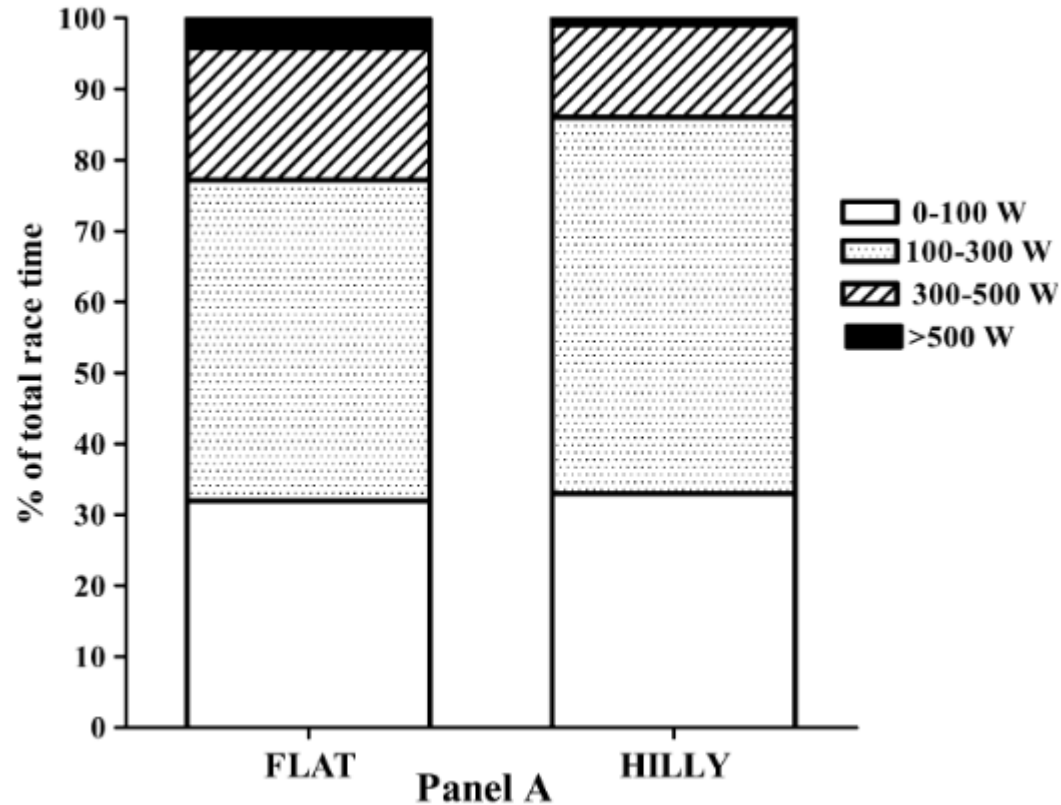
- anthropometrics (weight, height, body mass index, body surface area)
- performance data (average power output, normalized power, 20min MMP, 20min MMP after 2.000 kJ, maximum aerobic power)
- workloads (total work [kJ], Edward's TRIMP, TSS)
- intensity ratios (power output bands, $TSS.km^{-1}$, $TRIMP.km^{-1}$, $KJ.km^{-1}$)
- Race performance (% time difference GC, UCI points scored)

Maximum Aerobic Power (MAP)



Pinot and Grappe (2014)

Power Output Distribution



The Making of a Pro Tour Rider

BY NATE WILSON

Follow coach Nate Wilson and rider Will Barta through four seasons—and see what it takes to climb from the U23 ranks to the world tour.



<https://www.trainingpeaks.com/blog/the-making-of-a-pro-tour-rider/>

Results

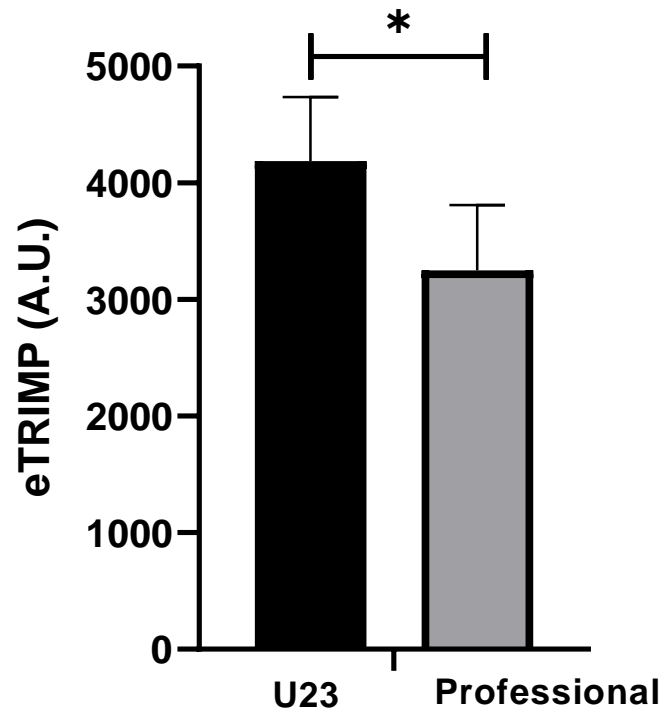
Table 1: U23 and professional groups' anthropometrics (Mean \pm SD)

Variables	U23
Height (cm)*	184.3 \pm 4.9
Body Mass (kg)*	71.2 \pm 6.3
BMI (kg.m ⁻²)*	20.9 \pm 1.4
BSA (m ²)*	1.9 \pm 0.1

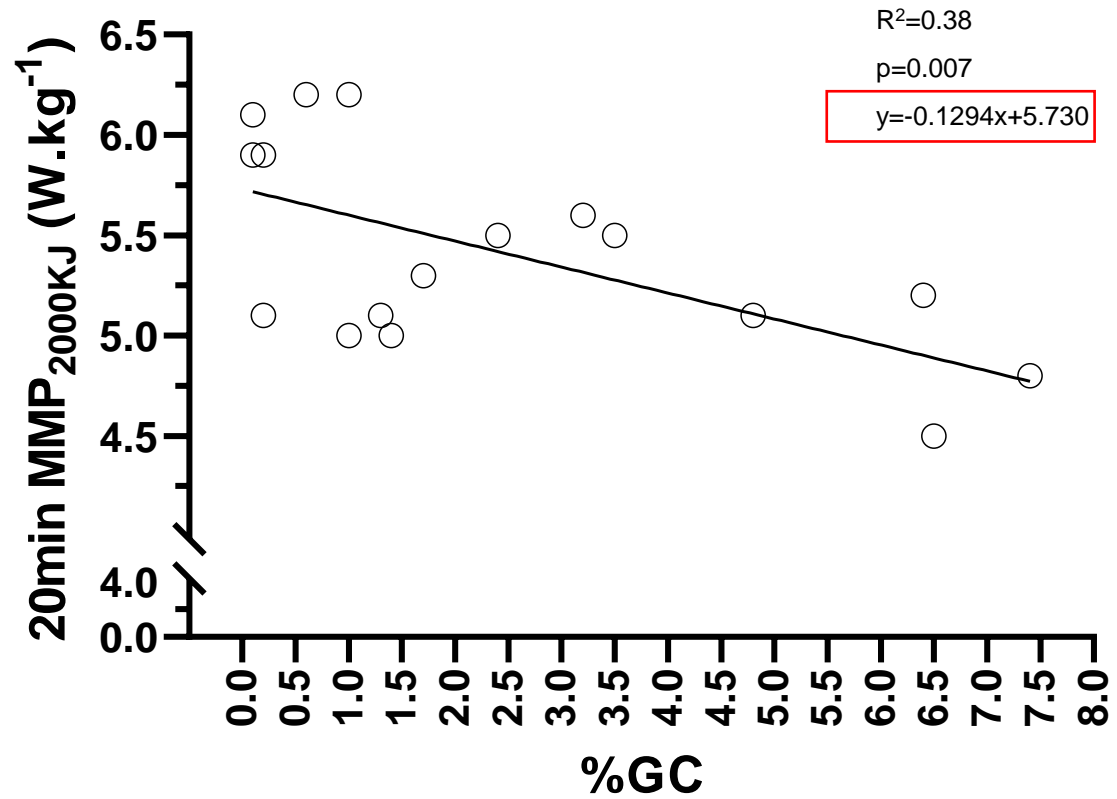
Results



Results



Results



Conclusions

- lower anthropometric values and internal workload measures in professionals
- higher power output and less decline after 2.000 kJ in professionals
- 20MMP, AP, %Time between 5.0-7.9 W·kg⁻¹ and 20MMP_{2000kJ} were the best predictors of race performance
- U23 cyclists fatigue earlier in a race than professionals
- U23 cyclists need to improve their body composition and physical conditioning during their maturation towards the professional level

Thank You!



James Spragg



Iñigo Mujika



Andrea Giorgi



Dan Lorang



Dieter Simon



Justin Lawley