Journal of Science & Cycling
Breakthroughs in Cycling & Triathlon Sciences

OPEN ACCESS

Article

Muscle Typology of World-Class Cyclists across Various Disciplines and Events

Eline Lievens[1], Phil Bellinger[2,3], Kim Van Vossel[1], Jan Vancompernolle[4], Tine Bex[1], Clare Minahan[2] and Wim Derave[1,*]

[1] Department of Movement and Sports Sciences, Ghent University, Ghent, BELGIUM; wim.derave@ugent.be, elilieve.lievens@ugent.be , kim.vanvossel@ugent.be
[2] Griffith Sports Physiology and Performance, School of Allied Health Sciences, Griffith University, Gold Coast, Queensland, AUSTRALIA
[3] Queensland Academy of Sport, Queensland, AUSTRALIA
[4] Cycling Vlaanderen, Ghent, BELGIUM

* Correspondence: WD, wim.derave@ugent.be

Received: June 2020; Accepted: September 2020 (Medicine & Science in Sports & Exercise)

Abstract:

Purpose: Classic track-and-field studies demonstrated that elite endurance athletes exhibit a slow muscle typology, whereas elite sprint athletes have a predominant fast muscle typology. In elite cycling, conclusive data on muscle typology are scarce, which may be due to the invasive nature of muscle biopsies. The noninvasive estimation of muscle typology through the measurement of muscle carnosine enabled to explore the muscle typology of 80 world-class cyclists of different disciplines.

Methods: The muscle carnosine content of 80 cyclists (4 bicycle motor cross racing [BMX], 33 track, 8 cyclo-cross, 24 road, and 11 mountain bike) was measured in the soleus and gastrocnemius by proton magnetic resonance spectroscopy and expressed as a z-score relative to a reference population. Track cyclists were divided into track sprint and endurance cyclists based on their Union Cycliste Internationale ranking. Moreover, road cyclists were further characterized based on the percentage of UCI points earned during either single- and multistage races.

Results: BMX cyclists (carnosine aggregate z-score of 1.33) are characterized by a faster muscle typology than track, cyclo-cross, road, and mountain bike cyclists (carnosine aggregate z-score of −0.08, −0.76, −0.96, and −1.02, respectively; $P < 0.05$). Track cyclists also possess a faster muscle typology compared with mountain bikers ($P = 0.033$) and road cyclists ($P = 0.005$). Moreover, track sprinters show a significant faster muscle typology (carnosine aggregate z-score of 0.87) compared with track endurance cyclists (carnosine aggregate z-score of −0.44) ($P < 0.001$). In road cyclists, the higher the carnosine aggregate z-score, the higher the percentage of UCI points gained during single-stage races ($r = 0.517$, $P = 0.010$).

Conclusions: Prominent differences in the noninvasively determined muscle typology exist between elite cyclists of various disciplines, which opens opportunities for application in talent orientation and transfer.

Keywords: CYCLING, MUSCLE FIBER–TYPE COMPOSITION, ELITE, CARNOSINE, SPECTROSCOPY