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**Physiological and electromyographic responses during 40-km cycling time trial: Relationship to muscle coordination and performance.**

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The purpose of this study was to compare the oxygen uptake ( $\text{VO}(2)$ ), respiratory exchange ratio (RER), cadence and muscle activity during cycling a 40-km time trial (TT), and to analyse the relationship between muscle activity and power output (PO). Eight triathletes cycled a 40-km TT on their own bicycles, which were mounted on a stationary cycle simulator. The  $\text{VO}(2)$ , RER and muscle activity (electromyography, EMG) from tibialis anterior (TA), gastrocnemius medialis (GA), biceps femoris (BF), rectus femoris (RF) and vastus lateralis (VL) of the lower limb were collected. The PO was recorded from the cycle simulator. The data were collected at the 3rd, 10th, 20th, 30th and 38thkm. The root mean square envelope (RMS) of EMG was calculated. The  $\text{VO}(2)$  and PO presented a significant increase at the 38thkm ( $45.23 \pm 8.35 \text{ mlkgmin}^{-1}$ ) and  $107 \pm 7.11\%$  of mean PO of 40-km, respectively) compared to the 3rdkm ( $38.12 \pm 5.98 \text{ mlkgmin}^{-1}$ ) and  $92 \pm 8.30\%$  of mean PO of 40-km, respectively). There were no significant changes in cadence and RER throughout the TT. The VL was the only muscle that presented significant increases in the RMS at the 10thkm ( $22.56 \pm 3.05\%$  max), 20thkm ( $23.64 \pm 2.52\%$  max), 30thkm ( $25.27 \pm 3.00\%$  max), and 38thkm ( $26.28 \pm 3.57\%$  max) when compared to the 3rdkm ( $21.03 \pm 1.88\%$  max). The RMS of VL and RF presented a strong relationship to PO ( $r=0.89$  and  $0.86$ , respectively,  $p<0.05$ ). The muscular steady state reported for cycling a 30-min TT seems to occur in the 40-km TT, for almost all assessed muscles, probably in attempt to avoid premature muscle fatigue.