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Publications/Proceeding

Mauger, A.R., Smith, S.A., Fennell, C.R.J., Doy, H., Bowd, J., Thomas, T. (2026). Tapentadol but not dihydrocodeine exerts a performance enhancing effect in time trial cycling. *European College of Sports Science Conference*, Lausanne, Switzerland.

INTRODUCTION: Tramadol, an opioid analgesic, can enhance performance of time trial (TT) cycling by a mean of 1.3%. Consequently, the World Anti-Doping Agency (WADA) specified tramadol as a Prohibited Substance in January 2024. There is now concern that other opioid analgesics, not currently on the Prohibited List, may be used as performance enhancing drugs as a replacement for tramadol. Tapentadol (TP) and dihydrocodeine (DHC) are two such drugs that have been added to the 2024 Monitoring Program. This abstract presents the preliminary data from a pre-registered, randomised controlled trial following a counter-balanced, double-blinded, crossover study design (funded by WADA, grant reference 241C18AM), assessing whether TP and DHC enhance cycling TT performance in highly trained cyclists. **METHODS:** Eighteen highly trained and experienced cyclists and triathletes (16 males age = 41 ± 10 y, stature = 179 ± 9 cm, mass = 78.0 ± 11.1 kg, VO_{2max} = 57 ± 8 mL/kg/min, power output at gas exchange threshold = 220 ± 39 W; 2 females age 40 ± 1 y, stature = 165 ± 5 cm, mass 60.6 ± 2.2 kg, VO_{2max} = 54 ± 7 mL/kg/min, power output at gas exchange threshold = 155 ± 3 W) completed five exercise tests across separate visits. In Visit 1, participants completed a ramp VO_{2max} test and experimental trial familiarisation, and in Visit 2 completed a full experimental trial familiarisation. Visits 3-5 were experimental trials, where participants completed a 30-min 'cycling control pre-load' test on cycling rollers fixed at a heavy intensity, immediately followed by a 25-mile (40.2-km) cycling performance TT on a Cyclus2 cycle ergometer. One hour prior to warm up and experimental testing, participants ingested either 50-mg tapentadol, 60-mg dihydrocodeine, or a placebo in a double-blind, randomised and counterbalanced design. During the cycling control pre-load test, rating of perceived exertion and pain scales were used to assess changes in effort (RPE) and pain. **RESULTS:** Compared to placebo, time trial completion time improved by a mean of 1.73% (-71.3 (-138 to -4.67) s, $p=0.043$; ES: 0.5, 'medium') following the ingestion of TP (4111 ± 427 s vs. 4040 ± 385 s). However, there was no difference in completion time (-17.8 (-84.5 to -48.8) s, $p=0.6$; ES: 0.12, 'small') between the placebo condition and the DHC condition (4111 ± 427 s vs. 4093 ± 393 s). There was no difference in mean pain or mean RPE between the PLA and TP, or PLA and DHC trial experienced during the cycling control pre-load test. No significant side-effects from TP or DHC were experienced by any of the participants. **CONCLUSION:** This preliminary data set provides strong evidence that TP, but not DHC, can exert a statistically significant and competitively meaningful performance enhancing effect (mean 1.73% improvement in TT completion time), and that this is potentially greater than the banned substance tramadol. This performance enhancing effect occurred despite no measurable change to pain perception or perception of effort.