



Mid Atlantic Regional Chapter of the American College of Sports Medicine

Annual Scientific Meeting, November 2nd - 3rd, 2018
Conference Proceedings
International Journal of Exercise Science, Issue 9, Volume 7



The Effects of Caffeine Ingestion and the -163A>C CYP1A2 Polymorphism on Long Anaerobic Exercise Performance

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Caffeine is a stimulant commonly used in athletics and recent research suggests that variants of the CYP1A2 genotype, AA (responder) and AC/CC (non-responder), may influence the ergogenic effects of caffeine on exercise performance.

PURPOSE: To examine the ergogenic effects of caffeine and CYP1A2 polymorphisms on long-anaerobic exercise.

METHODS: 34 subjects (19 male, 15 female) provided buccal cells via a saline mouth rinse and practiced all-out cycling during an initial familiarization session. During two subsequent visits, subjects ingested a gelatin capsule containing maltodextrin (placebo, PLC) or 6 mg•kg⁻¹ caffeine anhydrous (CAF), administered in a double-blinded, randomized and counterbalanced manner. One-hour post-ingestion, subjects completed an all-out 90-sec Wingate test on a Velotron Cycle Ergometer (resistance = 0.055•kg⁻¹). Peak power (PP) and total work (TW) were analyzed by the Velotron software. Genomic DNA was extracted from cheek cells and a region of the CYP1A2 gene containing the -163 A>C polymorphism was amplified via PCR and genotyped by digestion with with *Apa*I. A 2 (condition) x 2 (genotype) x 3 (time) repeated measures ANOVA with Fisher LSD post-hoc ($p < 0.05$) was used to compare PP and TW.

RESULTS: The main effects of condition (PLC vs CAF) showed no difference in PP, 510.3 ± 119.1 W vs 510.9 ± 119.4 W, respectively. The main effect of genotype showed a non-significant decrease in PP for AA (516.6 ± 117.3 W) compared to AC/CC, (495.4 ± 130.4 W). The main effect of time showed significant decrease in PP in each 30-sec segment; however, there were no interaction effects of time for condition ($p=0.60$) or genotype ($p=0.40$). Total work yielded similar results. There was no difference in TW over the 90-sec, 2.92x10⁵ J for PLC and 3.00x10⁵ J for CAF, and no significant difference in total power for genotype, 3.00x10⁵ for AA and 2.9910⁵ for AC/CC. TW significantly decreased over each 30-sec phase; however, there were no interaction effects for condition ($p=0.63$) or genotype ($p=0.87$).

CONCLUSION: The results indicate that CAF did not impact PP or TW during long-anaerobic testing. In addition, neither the AA nor the AC/CC genotype influenced PP or TW following the ingestion of CAF.