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The Influence of CYP1A2 and ADORA2A Polymorphisms and Caffeine Consumption under Anaerobic Conditions

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Caffeine (CAF) is the most commonly used psychoactive drug in the world, having implications for athletics and medicine. The metabolism, clearance, and reception of CAF varies significantly among individuals, primarily dictated by the liver enzyme CYP1A2 and the adenosine neuroreceptor ADORA2A. **PURPOSE:** The purpose was to determine the effect of CAF and potential genetic influences in anaerobic exercise. **METHODS:** 11 female college athletes completed two maximal 30-s Wingate anaerobic bike tests on a Velotron cycle ergometer after ingesting a capsule of CAF monohydrate ($5\text{mg}\cdot\text{kg}^{-1}$ BW) or a placebo (maltodextrin). Anaerobic Power ($\text{W}\cdot\text{kg}^{-1}$) (AP) and anaerobic capacity ($\text{W}\cdot\text{kg}^{-1}$) (AC) were recorded during each trial. DNA from buccal cells were obtained via a 0.9% NaCl mouth rinse, isolated through cell lysis using proteinase k, and extracted using DNA spin columns. The allelic determinations of CYP1A2 (rs762551) and ADORA2A (rs5751876) were determined using TaqMan® SNP Assay, 40 thermocycles for amplification, and allele analysis with a One-Step qPCR. The data was analyzed using a 2 (condition) x 2 (CYP) x 2(ADORA) ANOVA with repeated measures, $p < 0.05$. **RESULTS:** The main effect of CAF showed no significant difference between the CAF or placebo trials for AP, 9.4 ± 1.2 to 9.5 ± 1.1 , $\text{W}\cdot\text{kg}^{-1}$ or for AC, 7.5 ± 0.8 to 7.4 ± 0.01 , $\text{W}\cdot\text{kg}^{-1}$. The interaction of CAF x CYP showed no significant difference across the AA and AC/CC genotypes for PP, 9.5 ± 1.5 and 9.4 ± 1.0 $\text{W}\cdot\text{kg}^{-1}$, respectively. The interaction effect of CAF x ADORA2A produced no significant difference between the TT and TC/CC genotype, 10.0 ± 1.2 and 9.4 ± 1.3 $\text{W}\cdot\text{kg}^{-1}$, respectively. Additionally, the main effects and interaction effects for AC produced no significant differences at any level of analysis. The interaction effect of CAF x CYP x ADORA did not produce significant changes in PP; however the allelic combinations of CYP:ADORA did show a reduction in PP for AA:TT (-3.4%), AA:CC/TC (-2.1%) and AC:TT (-6.5%) whereas the AC/CC:TC/CC produced a 4.6% increase. **CONCLUSION:** CAF did not produce any significant changes in power nor did a specific or combination of genotypes. However, future study should continue to focus on the percent changes in power for different genotypes.