Title – Caffeine consumption antagonizes the cardiovascular response during underwater diving
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Abstract: The dive response much like postprandial hyperemia is a cardiovascular event that promotes splanchnic blood flow and a concurrent peripheral vasoconstriction initiated by the activation of facial thermoreceptors (via the trigeminal nerve) by cold water. This redistributes blood to vital organs in humans and sea mammals for sustained metabolic function and longer diving time. Previous study shows increased HRV with diving, but with widespread consumption of caffeine, the cardiovascular consequence (if any) of caffeine consumption prior to diving is uncertain. We hypothesized that caffeine would increase heart rate variability (HRV) during underwater diving. We used AD Instruments Software, the PowerLab 26T equipment and a sample size of 67 (41 females and 26 males). Each participant’s HRV (the standard deviation of normal RR intervals - SDRR), which evaluates the balance between the PSNS (the root mean square of RR intervals - RMSSD, and high-frequency -HF) and SNS (low-frequency - LF) was measured during tidal breathing, breath holding, and submersion in 14°C water before and 30 mins after the consumption of 200mg of caffeine. A two-way repeated ANOVA was run and the mean SDRR 84.54(F(1.171,77.318)=14.102, p<0.0005) and RMSSD 75.61 (F(1.395,90.651)=7.782, p=0.003) were statistically significant over time in the control trail, while LF 2236.96 (F(1.010,65.662)=3.520, p=0.065) and HF 27079.47 (F(1.020, 67.336) = 2.536, p=0.115) was not. The mean SDRR 73.03(F(2,132) =11.895, p<0.0005), RMSSD 61.20 (2, 132) =1.600, p=0.004), and LF 1249.10 (F (2,132) =3.238, p=0.042) were statistically significant over time in the experimental trail, HF 7773.616 (F(1.816, 119.848) = 0.901, p=0.401) was not. Caffeine alone did not significantly increase HRV - SDRR (z(66)=0.360, p=0.720). We conclude that while the dive response increases HRV, prior
consumption of 200mg of caffeine will attenuate this increase and can diminish the cardioprotective machinery of the dive response by increasing baseline cardiovascular sympathetic tone of the diver.