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Dose Response of a Novel Exogenous Ketone Supplement on Physiological, Perceptual and Performance Parameters

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Interest into the health, disease, and performance impact of exogenous ketone bodies has rapidly expanded due to their multifaceted physiological and signaling properties but limiting our understanding is the isolated analyses of individual types and dose/dosing protocols. **PURPOSE:** To explore both the administration and dose response of β HB+MCT on metabolic, physiological, perceptual, physical performance and cognitive performance parameters. **METHODS:** Thirteen recreational male distance runners (24.8 ± 9.6 y, 72.5 ± 8.3 kg, VO_{2max} 60.1 ± 5.4 ml/kg/min) participated in this randomized, double-blind, crossover design study. The first two sessions consisted of a 5-km running time trial (TT) familiarization and a VO_{2max} test. During subsequent trials, subjects were randomly assigned to one (KS1:22.1g) or two (KS2:44.2g) doses of beta-hydroxybutyrate (β HB) and medium chain triglycerides (MCTs) or flavor matched placebo (PLA). Blood *R*- β HB, glucose, and lactate concentrations were measured at baseline (0-min), post-supplement (30 & 60mins), post-exercise (+0min, +15mins). Time, heart rate (HR), rating of perceived exertion (RPE), affect, respiratory exchange ratio (RER), oxygen consumption (VO_2), carbon dioxide production (VCO_2), and ventilation (VE) were measured during exercise. Cognitive performance was evaluated prior to and post-exercise. **RESULTS:** KS significantly increased *R*- β HB, with more potent (60min post-KS; KS1: 0.73 ± 0.2 mM; KS2: 0.60 ± 0.2 mM) and prolonged (+15min post-exercise; KS1: 0.28 ± 0.1 mM; KS2: 0.59 ± 0.3 mM) elevations in KS2. *R*- β HB was significantly decreased in KS1 compared to KS2. Blood lactate significantly increased post-exercise but was augmented by KS administration (PLA: 6.1 ± 2.2 mM; KS1: 7.2 ± 2.5 mM; KS2: 7.1 ± 2.5 mM). Gaseous exchange, respiration, HR, affect, RPE, and exercise performance was unaltered with KS administration. KS2 significantly augmented cognitive function in pre-exercise conditions (Reaction Time; PLA: 728.3 ± 143.3 ms; KS1: 707.9 ± 156.7 ms; KS2: 622.6 ± 98.8 ms). **CONCLUSION:** Novel β HB+MCT formulation had a dosing effect on *R*- β HB and cognitive performance, an administrative response on blood lactate, while not influencing gaseous exchange, respiration, HR, affect, RPE, and exercise performance.

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