

Athlete Perceptions of Flavored, Menthol-enhanced Energy Gels Ingested Prior to Running in the Heat

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ABSTRACT

Thermal perception during exercise is known to influence endurance performance and the onset of fatigue. L-menthol, an organic compound derived from peppermint, evokes a cooling sensation through its action on TRPM8 channels which also respond to cold stimuli. Recent work identified that the internal application of menthol-enhanced fluids can be ergogenic during exercise in the heat. Hence, the addition of menthol to energy gels may be practical and beneficial for athletes. **PURPOSE:** To determine athlete acceptability and preferences for flavored energy gels with different menthol concentrations. **METHODS:** With a randomized, crossover, and double-blind placebo-controlled design, 27 endurance athletes (34.8±6.7 y, BMI: 21.7±1.6 kg m⁻², 9 female) ingested an energy gel with a menthol additive at relative concentrations: low (0.1%), medium-low (0.3%), medium-high (0.5%), high (0.7%), or a non-menthol, flavor-matched placebo (CON), on separate days before outdoor running sessions. Athletes rated the gels for cooling sensation, irritation (tingling/burning), flavor, and overall experience on 100-point sensory and hedonic labeled magnitude scales. The duration of any cooling sensation was also reported. Repeated measures ANOVAs with a Bonferroni adjustment for pairwise comparisons were used to determine differences. **RESULTS:** All menthol gels successfully delivered a greater cooling sensation compared to CON (7.4±8.1 AU) with a significantly greater response for 0.7% (59.9±20.5 AU) and 0.5% (57.7±21.8 AU), compared to all others, which were both rated “moderate-strong” for intensity. Irritation intensity was higher for all menthol gels compared to CON (3.4±7.2 AU), and for 0.7% compared to 0.1% (31.1±31.0 vs 16.3±21.0 AU, p=0.041), with none reported higher than a “mild-moderate” intensity. The menthol gels delivered a significantly longer cooling duration (range: 12.3-19.6 min) compared to CON (2.2±4.8 min) with no significant difference between menthol gels. Ratings of overall experience and flavor were not different between gels (p>.05). **CONCLUSION:** A flavored energy gel with the addition of menthol at 0.1-0.7% provides a cooling sensation for athletes when ingested before exercise. The 0.5% concentration is recommended to maximize the cooling sensation of the gel whilst minimizing irritation.