

Randomized Controlled Trial *Med Sci Sports Exerc.* 2016 Feb;48(2):277-86. doi: 10.1249/MSS.0000000000000757.

Tyrosine Ingestion and Its Effects on Cognitive and Physical Performance in the Heat

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PMID: 26285023 DOI: [10.1249/MSS.0000000000000757](https://doi.org/10.1249/MSS.0000000000000757)

Abstract

Purpose: Ingestion of tyrosine (TYR), a catecholamine precursor, has previously improved aspects of cognitive function and mood during acute stress, although there is limited research exploring the optimal dose relative to blood values. The serum responses of two doses of TYR were investigated (study 1), with the identified "optimal" dose assessed relative to cognitive and physical performance during a military-based protocol in the heat (study 2).

Methods: For study 1, 21 participants were assigned to one of the following three groups: HIGH (two doses of 150 mg · kg⁻¹ body mass TYR), LOW (two doses of 75 mg · kg⁻¹ body mass TYR), and CON (sugar-free drink). Participants ingested TYR in two separate doses (0900 and 1300 h) and remained in the laboratory from 0800 to 1700 h, having blood drawn every hour. For study 2, eight participants completed a military-based load carriage protocol composed of a 60-min walk (6.5 km · h⁻¹) followed by a 2.4-km time trial carrying a 25-kg backpack (40°C; relative humidity, 30%) on two occasions (TYR/placebo) in a double-blind counterbalanced crossover design. Cognitive function was assessed before, during, and after exercise.

Results: Study 1 demonstrated that ingestion of a single dose of 150 mg · kg⁻¹ body mass TYR was equally efficient at elevating serum TYR concentration relative to a double dose. In study 2, exercise heat stress impaired some aspects of cognitive function; however, TYR did not alleviate these decrements ($P > 0.05$). Furthermore, no difference was observed in any physiological variable between conditions ($P > 0.05$) or time trial completion time ($P = 0.74$) between TYR (19.78 ± 3.44 min) and placebo (20.29 ± 3.55 min).

Conclusions: Despite marked elevations in serum TYR concentration, ingestion of TYR did not influence cognitive function or physical performance during exercise heat stress.