



## Background

Glutamine is an amino acid that is essential for maintaining intestinal function, immune response, and amino acid homeostasis (stable equilibrium) during times of severe stress. Glutamine functions as a precursor for other amino acids, purines and pyrimidines, glutathione, and glutamate (all of these being essential chemical components of the body). It also transports nitrogen and carbon throughout the body. Muscle, lung, and adipose (fat) tissue are major sources of glutamine in circulation, and these tissues increase glutamine production during catabolic states (i.e., during metabolic breakdown, such as occurs during intense exercise). However, during physical stress, the body actually can consume more glutamine than the skeletal muscle can produce. Oral glutamine supplements are purported to boost athletic performance, promote muscle gain, and/or repair and improve immune function after physical stress. During exercise, glutamine concentrations in the body may change depending on the type, duration, and intensity of exercise. However, there is no evidence that glutamine supplementation can affect glutamine levels in the muscles, and preliminary research suggests that glutamine does not affect the muscle precursor cells that are thought to cause muscle enlargement.<sup>1</sup> There is little published evidence to show which immune functions glutamine might enhance during the temporary reduced immunity that occurs in healthy, well-nourished individuals after prolonged, exhaustive exercise.<sup>2</sup>

## Dose Range and Upper Limit

### *Food and Nutrition Board DRI:*

*RDA/AI:* Not relevant for this substance.

*Upper Limit:* Not relevant for this substance. However, taken orally or intravenously, glutamine is well tolerated. A safe upper level of 14 g/d has been proposed.<sup>3</sup>

*Doses Used In Randomized Clinical Trials:* Doses up to 45 g/d for six weeks have been utilized in clinical studies of healthy adults.<sup>3</sup> In healthy adult males, the longest duration trial was 10 weeks at a dose of 5 g/d.<sup>3</sup> Doses as high as 28 g/d for two weeks have been used without ill effects.<sup>4</sup> Doses of 5–9 g/d have been used in clinical studies.<sup>5</sup>

*Toxicology Data:* Acute oral ingestion in the range 0.1 to 0.3 g glutamine per kg body weight per day (e.g., 7–21 g glutamine for a 70 kg individual) is absorbed safely and shows no evidence of clinical toxicity after several weeks. Larger doses in the range 0.3 to 0.6 g glutamine per kg body weight per day show no harmful effects after five days of administration in normal subjects.

## Evaluation of Potential Benefits

Insufficient evidence found.

## Potential Detrimental Effects on...

*Military Performance:* No data found.

*Military Survivability:* No data found.

## Other Health Risks

Glutamine is partially metabolized to ammonia. In higher doses, it can increase serum ammonia levels, as well as serum glutamate levels.<sup>6</sup> Exceedingly high levels could be neurotoxic (damaging to nerves),<sup>7</sup> but these effects would most likely be due to parenteral (i.e., usually by injection) administration.

## Interactions with Medications or Other Bioactive Substances

Glutamine may decrease the effectiveness of anticonvulsants.<sup>6</sup> Some caution should also be used when taking glutamine with lactulose and during chemotherapy.<sup>6</sup>

For details of these and other potential interactions, visit the Natural Medicines Comprehensive Database.<sup>6</sup>

## Withdrawal Effects

No data found.

## Concern and Benefit Estimate (see Dietary Supplement Risk Matrix)

*Benefit potential:* Low

*Risk (safety concern):* Minimal

*Classification score:* **5**

Evidence does not support that oral glutamine supplements boost athletic performance, promote muscle gain and/or repair, or improve immune function after physical stress.

## References

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4. Gleeson M. Dosing and Efficacy of Glutamine Supplementation in Human Exercise and Sport Training. *The Journal of Nutrition*. 2008;138(10):2045S-9S.
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