

# L-Glutamine



*Free form amino acid offered in capsules and powder*

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Designs for Health offers the amino acid glutamine in two delivery options: capsules (850 mg glutamine per capsule) and powder form (3 g per  $\frac{3}{4}$  teaspoon serving). Glutamine is the body's most abundant free amino acid, representing approximately 40-60% of the total amino acid pool in tissues.<sup>1</sup> It is required to perform a variety of essential functions, as it is a necessary substrate for protein synthesis, hepatic ureagenesis, and liver and kidney gluconeogenesis.<sup>2</sup> It is also an anabolic precursor for muscle growth, a buffer for acid-base balance in the kidney, oxidative fuel for intestinal and immune cells, inter-organ nitrogen transport, and a precursor for neurotransmitter, nucleotide, nucleic acid synthesis, and glutathione production.<sup>2</sup>

Often referred to as the "multitasker," glutamine is a nutrient with an impressive range of health benefits. It helps balance blood sugar, build lean muscle, and strengthen the body's defenses. In the gut, it promotes the health and function of the mucosal cells for normal healing and repair. Furthermore, glutamine distributes nitrogen freely to the cells which need it most, such as the immune, gut, and muscle cells.<sup>3</sup> Glutamine is also fuel for brain cells which helps keep mental energy up and stress and mental fatigue down.<sup>4</sup>

## Muscle Maintenance

Nearly 80% of total body glutamine is found in skeletal muscle. For individuals who often skip meals or do not consume enough protein, such as the critically-ill, glutamine supplementation may be beneficial for helping maintain muscle mass (skeletal muscle is the major supplier of glutamine in cases of severe illness).<sup>1</sup> The body requires a steady supply of protein or it will eventually break muscle down for energy, i.e., during the overnight 12-hour fasting period. This catabolic state is halted by protein consumption or by supplementing with glutamine in order for the body to receive the nitrogen it needs to build and maintain muscle.<sup>1</sup>

## Sports Applications

Prolonged exercise lowers glutamine levels in the body, and has been shown to decrease mucosal immunity. Glutamine supplementation has been shown to promote the production of IgA antibodies and maintain pro- and anti-inflammatory cytokine balance in athletes with damaged mucosal immunity caused by strenuous exercise.<sup>5</sup> Glutamine helps the body store more glycogen (the energy reserve in muscles and liver to fuel exercise) and enhances growth hormone secretion, which increases muscle growth and improves overall health.<sup>1</sup> A randomized, double-blind placebo-controlled human crossover study showed glutamine supplementation to diminish muscle soreness and speed up recovery following eccentric exercise.<sup>6</sup> Supplementing before and after exercise may help attain maximum results and replenish lost stores.

## Digestive Health

Intestinal cells utilize approximately 30% of total glutamine in the body, competing with other tissues for utilization.<sup>7</sup> Glutamine promotes proliferation of enterocytes, helps regulate tight junction proteins, suppresses pro-inflammatory cytokine expression and signaling pathways, and protects against cellular stress and apoptosis.<sup>7</sup> It is considered "the intestinal permeability factor" because of its ability to maintain the integrity of the intestinal wall.<sup>7,8</sup> If the intestinal lining becomes permeable or "leaky," large food molecules enter the bloodstream, which can lead to a host of conditions such as disrupted immune function, autoimmune diseases, food allergies, and even mood disorders.<sup>8</sup> Glutamine stores are depleted during severe metabolic stress including inflammatory bowel diseases such as Crohn's disease (CD), and in clinical studies supplementation has been shown to protect the intestinal mucosa and reduce colonic inflammatory cytokine production.<sup>7</sup> Clinical trials determined that 21 g glutamine for 28 days resulted in improved clinical outcomes in patients with CD, and in patients in remission phase of CD, 0.5 g/kg body weight glutamine for 2 months reduced intestinal permeability and morphology.<sup>7</sup> Results from various *in vivo* and *in vitro* studies suggest glutamine a promising therapeutic treatment for intestinal inflammatory disorders via inhibition of NF- $\kappa$ B and STAT pathways, ultimately suppressing IL-6, TNF- $\alpha$ , IL-8, and iNOS.<sup>7</sup> Moreover, a pilot study of obese humans found that 14 days of glutamine (30 g) treatment significantly altered gut microbiota, reducing *Firmicutes* to *Bacteroidetes* ratio.<sup>9</sup>

### Glutamine may help\*:

- Optimize muscle growth
- Promote wound healing
- Improve stress
- Promote healthy immune response
- Help regulate blood sugar levels
- Reduce sugar and alcohol cravings
- Improve symptoms associated with leaky gut & food allergies/sensitivities/intolerances
- Promote a healthy acid-alkaline balance
- Reduce symptoms associated with chemotherapy

## Immune Support

As mentioned previously, glutamine is a preferred energy source for the immune system and its varied cells.<sup>4</sup> Viral infections such as the common cold and influenza dramatically lower glutamine levels, making supplementation essential in the midst of and after infection. *In vivo* animal studies showed that oral glutamine supplementation reduced herpes simplex virus 1 and 2 reactivation and upregulation of IFN- $\gamma$ -associated immune response.<sup>10</sup> A deficiency of glutamine has been shown to impair immune function by reducing protective T-lymphocyte proliferation (which requires increased glucose and glutamine) and dampening the expression of surface activation proteins on cytokines,<sup>4</sup> as well as reducing the ability of macrophages to kill viruses and bacteria.<sup>10</sup> For these reasons, this vital amino acid may help combat colds, the flu, and other immune weaknesses, especially if patients are unable to eat well.\*

## Wound Healing

Production of glutamine is decreased during periods of physical stress, trauma, or injury. Glutamine supplementation may be beneficial in these situations, as it has been shown to help speed wound healing and recovery in burn and trauma victims.<sup>11,12</sup> Glutamine has also been shown in research to improve hospital outcomes and shorten hospital stay in post-surgical patients.<sup>13</sup> In patients recovering from abdominal surgery, those supplemented with glutamine showed a decrease in serum proinflammatory markers associated with trauma, as well as restoration of intestinal mucosal barrier function.<sup>11</sup>

## Support During Cancer Treatment

Cancer patients may benefit from glutamine supplementation as it enhances immune function and protects the body from the side effects caused by radiation, chemotherapy, and chemotherapeutic drugs.<sup>1,5,14</sup> Glutamine was shown to significantly reduce the severity of drug-induced oral and gut mucositis, as well as to attenuate weight loss in cancer patients.<sup>5,15</sup>

### Recommended Use:

- **Capsules:** As a dietary supplement, take one capsule per day, or as directed by your health care practitioner.
- **Powder:** As a dietary supplement, take 3 grams (approx.  $\frac{3}{4}$  teaspoon) per day, or as directed by your health care practitioner.
  - » Glutamine powder can be taken in water, juice, or mixed into shakes.

### Additional Considerations:

- For enhanced benefits, consider supplementing with vitamin B6 to help the body use glutamine more effectively.
- Use caution in cases of liver or kidney disease or failure.

## Supplement Facts

Serving Size 1 capsule

Amount Per Serving	% Daily Value
L-Glutamine	850 mg *

\*Daily Value not established.

**Other Ingredients:** Cellulose (capsule), vegetable stearate.

**Available in 250 g and 500 g**

## Supplement Facts

Serving Size 3 grams (approx.  $\frac{3}{4}$  teaspoon)

Amount Per Serving	% Daily Value
L-Glutamine	3 g *

\* Daily Value not established.

*For a list of references cited in this document, please visit:*

<https://www.designsforhealth.com/techsheet-references/l-glutamine-references.pdf>

Dosing recommendations are given for typical use based on an average 150 pound healthy adult. Healthcare practitioners are encouraged to use clinical judgement with case-specific dosing based on intended goals, subject body weight, medical history, and concomitant medication and supplement usage. Any product containing botanical substances has the potential for causing individual sensitivities. Individual monitoring, including liver function tests, may be appropriate.

\*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

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