

Buffered C Powder

High-Potency, Tapioca-Derived Vitamin C*



Available in Fruit Punch

Discussion

Vitamin C (ascorbic acid) is a water-soluble nutrient with numerous physiological functions, and it is essential to human health. While most mammals are able to synthesize vitamin C as needed, humans do not have this capability and must obtain it exogenously. Vitamin C is the primary aqueous phase antioxidant. It is necessary for the development and maintenance of collagen, cartilage, and blood vessels; critical for the absorption of iron; needed for synthesis of carnitine, neurotransmitters, and as a cofactor for metabolic enzymes; and significant for its role in immune system function.*^[1-3]

Antioxidant Activity

Free radical production is known to increase when exposure to physiological, psychological, chemical, or emotional stressors is elevated. Vitamin C works in aqueous environments both inside and outside cells as the first line of cellular antioxidant defense, and it is able to quench free radicals that have the potential to damage DNA, proteins, or membrane structures.^[1,4] Oxidative stress also occurs if antioxidant defenses are impaired, which may be the case when vitamin C levels are insufficient.^[1,5] Vitamin E and carotenes (lipid phase antioxidants) are vitamin C's non-enzymatic antioxidant partners. They work in concert with the antioxidant enzymes glutathione peroxidase, catalase, and superoxide dismutase. Vitamin C is also responsible for regenerating oxidized vitamin E in the body, thus potentiating the antioxidant benefits of vitamin E.*^[3,6]

Immune System Support

Vitamin C's antioxidant role contributes to it being recognized as critical to the health of the immune system. Vitamin C supports epithelial barrier function and promotes oxidant scavenging activity in the skin to help protect against environmental oxidative stress.^[1] In addition, vitamin C is absorbed by immune cells and boosts T-lymphocyte activity, phagocyte function, leukocyte mobility, and possibly antibody and interferon production.*^[3,5,7]

Much debate surrounds the issue of how much vitamin C is required to ensure that immunity is not compromised. It takes only 10 mg of

Clinical Applications

- » Supports Immune Health*
- » Provides Antioxidant Activity*
- » Buffered with Minerals*

*Buffered C Powder features 3,000 mg of vitamin C buffered with minerals and delivered in a fruit punch-flavored powder that rapidly disperses in water. This formula is packed with antioxidant activity and is well-suited for individuals seeking high-potency vitamin C to support immune health.**

daily vitamin C to prevent scurvy, the deficiency disease rarely seen in modern times but which is characterized by weakening collagenous structures—resulting in poor wound healing—and impaired immunity.^[1,8] The current RDA for vitamin C is 75 mg/day for adult women and 90 mg/day for adult men with an additional 35 mg/day recommended for smokers. The tolerable upper intake level (UL) of 2,000 mg/day was established based on the potential risk for gastrointestinal disturbances in some individuals at higher doses; however, doses of up to 10 g/day in adults have not proven to be toxic or detrimental to health.^[3] Because vitamin C is water-soluble, excess levels get excreted once tissues have become saturated. This is why it is often suggested to take vitamin C throughout the day to maintain serum levels. Pharmacokinetic studies have explored various doses to determine where saturation begins to happen. At an intake of 200 mg/day, no vitamin C was excreted in the urine; whereas, when intake was increased to 500 mg/day, excretion did occur. These studies have led some experts to recommend that the RDA be increased to 200 mg/day with no more than 500 mg/day needed. Others advocate that doses of ascorbic acid above 1,000 mg/day are necessary for maintaining tissue saturation. Although there are only a few randomized controlled trials with large daily doses of vitamin C, pharmacokinetic data indicates that daily oral doses up to 2,500 mg/day result in higher plasma ascorbate levels than doses of 200 mg/day, despite increased urinary excretion.*^[9,10]

The work of Linus Pauling, published in 1970, generated great public interest and kicked off decades of studies assessing the link between high-dose vitamin C and immune health.^[11] In early 1972, a randomized, double-blind, placebo-controlled study of subjects (N = 1,000) taking 1,000 mg of vitamin C/day provided support for the use of vitamin C supplementation for common immune challenges. The study results revealed that the supplementation group missed significantly fewer days from work/activities and had fewer days per episode of immune challenge. In addition, significantly more subjects taking vitamin C remained symptom-free throughout the

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study. Although the authors did not make a firm recommendation for large doses, this study set the stage for further research into establishing support for larger doses of ascorbic acid in supporting immune health.*^[12]

A prospective, controlled study with students (N = 463) ranging in age from 18 to 32 years was conducted in a controlled environment to assess the effect of vitamin C megadoses on seasonal immune symptoms. Subjects in the control group who reported symptoms were given pain relievers and decongestants. In the test group, symptomatic subjects were given hourly doses of 1,000 mg of vitamin C for the first six hours followed by three times daily thereafter; non-symptomatic test subjects were given 1,000 mg three times daily. The results suggested that megadoses of vitamin C were beneficial for both easing and warding off seasonal immune symptoms.*^[13]

A meta-analysis of 63 trials evaluating the effect of vitamin C (250 mg to 2,000 mg daily) suggested that regular supplementation reduces the duration of cold symptoms and reduces the incidence of colds in participants undergoing heavy physical stress.^[5,14] Despite the large number of studies evaluated, the effect of high doses of vitamin C on immune health remains somewhat controversial with reviews of the research pointing to poorly controlled trials and the inclusion of outdated data from a time when mechanisms and biological relevance of vitamin C were not as well understood as they are today.*^[9]

The proposed criteria for determining optimal vitamin C requirements are said to depend on availability in the food supply, dose-function relations, steady-state concentrations in plasma and tissues achieved with different doses of vitamin C, urinary excretion, bioavailability, toxicity, and epidemiologic observations.^[10] It could be surmised from the decades of research and the discussion above that although it is difficult to pinpoint an optimal dose based on the proposed criteria, individual needs vary greatly and high vitamin C dosages are warranted in certain individuals.*

Vitamin C Sources

Foods naturally rich in vitamin C include kiwifruit, bell peppers, dark leafy greens, broccoli, strawberries, citrus fruits, and tomatoes. Fruits not typical to the American diet—acerola, amla, camu camu, and rose hips, for example—are also concentrated sources of vitamin C and can be found in supplement form. Supplemental ascorbic acid is typically made from glucose derived from corn; however, vitamin C derived from other starch sources, such as tapioca, is ideal for those individuals with extreme food sensitivities or for whom a non-corn derived source is preferred. Dietary supplements typically contain vitamin C in the form of ascorbic acid, which has equivalent bioavailability to that naturally occurring in food. When ascorbic acid is combined with a mineral buffer, the result is equivalent antioxidant activity with less gastric acidity, suggesting suitability for individuals with sensitivities to high intakes.*^[2-4]

Buffered C Powder offers 3,000 mg of vitamin C derived from tapioca and buffered with the minerals calcium, magnesium, and potassium. This formula is ideal for individuals seeking supplemental vitamin C in a hypoallergenic, powdered form, and it is suitable for those with sensitivity to high dosages of vitamin C.

Buffered C Powder Supplement Facts

Serving Size: 1 Stick Pack (about 7 g)

	Amount Per Serving	%Daily Value
Vitamin C (ascorbic acid)	3,000 mg	3333%
Calcium (as calcium carbonate)	80 mg	6%
Magnesium (as magnesium carbonate)	160 mg	38%
Potassium (as potassium carbonate)	200 mg	4%

Other Ingredients: Malic acid, natural flavors, sodium bicarbonate, and stevia leaf extract.

DIRECTIONS: Mix the contents of one stick pack (7 g) with 6-8 oz of cold water and consume daily, or use as directed by your healthcare professional.

Consult your healthcare professional prior to use. Individuals taking medication should discuss potential interactions with their healthcare professional. Do not use if stick pack is damaged.

STORAGE: Keep closed in a cool, dry place out of reach of children.

FORMULATED TO EXCLUDE: Wheat, gluten, yeast, soy, corn, animal and dairy products, fish, shellfish, peanuts, tree nuts, egg, ingredients derived from genetically modified organisms (GMOs), artificial colors, artificial sweeteners, and artificial preservatives.

References

- Carr AC, Maggini S. *Nutrients*. 2017;9(11):1211. doi:10.3390/nu9111211.
- Lee JK, Jung SH, Lee SE, et al. *Korean J Physiol Pharmacol*. 2018;22(1):35-42. doi:10.4196/kjpp.2018.22.1.35.
- Linus Pauling Institute. Vitamin C. <http://lpi.oregonstate.edu/infocenter/vitamins/vitaminC/>. Updated July 2018. Accessed January 13, 2021.
- Gruenewald J, Graubaum HJ, Busch R, et al. *Adv Ther*. 2006;23:171-178. doi:10.1007/BF02850358.
- Bucher A, White N. *Am J Lifestyle Med*. 2016;10(3):181-183. doi:10.1177/1559827616629092.
- Bendich A, Machlin L, Scandurra O, et al. *Free Radical Biol Med*. 1986;2:419-444. doi:10.1016/S8755-9668(86)80021-7.
- Liugan M, Carr AC. *Nutrients*. 2019;11(9):2102. doi:10.3390/nu11092102.
- Lykkesfeldt J, Poulsen HE. *Br J Nutr*. 2010;103(9):1251-1259. doi:10.1017/S0007114509993229.
- Michels AJ, Frei B. *Nutrients*. 2013;5(12):5161-5192. doi:10.3390/nu5125161.
- Levine M, Conry-Cantilena C, Wang Y, et al. *Proc Natl Acad Sci U S A*. 1996;93(8):3704-3709. doi:10.1073/pnas.93.8.3704.
- Pauling L. *Proc Natl Acad Sci USA*. 1970;67(4):1643-8. doi:10.1073/pnas.67.4.1643.
- Anderson TW, Reid DB, Beaton GH. *Can Med Assoc J*. 1972;107(6):503-508.
- Gorton HC, Jarvis K. *J Manipulative Physiol Ther*. 1999;22(8):530-533. doi:10.1016/s0161-4754(99)70005-9.
- Hemilä H, Chalker E. *Cochrane Database Syst Rev*. 2013;(1):CD000980. doi:10.1002/14651858.CD000980.pub4.

Additional references available upon request

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