LIPOSOMAL

VITAMIN C

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Vitamin C (L-ascorbic acid) provides highly bioavailable vitamin C as L-ascorbic acid, designed to support the body's antioxidant defenses, immune function, and healthy connective tissue.

Supplement Facts

Serving Size: 5 mL (1 tsp)
Servings Per Container: 24

	Amount Per Serving	% Daily Value
Vitamin C (from Sodium Ascorbate)	1,000mg	1,111%
Sodium	125mg	5%

****Daily Value not established**

Other Ingredients: Water, glycerin, ethanol, highly purified phospholipids, natural mixed tocopherols, natural citrus oils

EDUCATION

VITAMIN C: A CRUCIAL ANTIOXIDANT NUTRIENT

Vitamin C is a powerful water-soluble nutrient with pleiotropic functions; it fortifies the body against oxidative stress, regulates immunity, and serves as a cofactor in the biosynthesis of connective tissue, among many other roles. Unlike many other mammals, the human body cannot manufacture vitamin C endogenously, necessitating its inclusion in the diet. Intestinal absorption of oral vitamin C is limited, falling to less than 50 percent at doses greater than 1 gram; historically, this has made it exceedingly difficult to achieve therapeutic levels of vitamin C in the body. Liposomal delivery methods improve vitamin C bioavailability, enhancing delivery of this critical nutrient to cells.[1]

VITAMIN C REDUCES OXIDATIVE STRESS

Vitamin C is a potent reducing agent, meaning it readily donates electrons to recipient molecules that are electron-deficient (also referred to as free radicals), stabilizing their biochemical structure and inhibiting a chain reaction of oxidative stress. Vitamin C's ability to terminate these harmful chain reactions makes it one of the body's most crucial antioxidants. In fact, vitamin C is the body's primary non-enzymatic, water-soluble antioxidant in blood plasma and tissues.

Vitamin C's antioxidant properties influence numerous physiological processes:

- Protects lipids, proteins, DNA, and RNA from free radical damage
- Recycles the fat-soluble antioxidant vitamin E[2]
- Boosts endogenous levels of glutathione, the body's master detoxifier[3]

Without sufficient vitamin C, excessive free radical damage occurs throughout the body, adversely impacting physiological systems ranging from the brain to the cardiovascular system.

VITAMIN C PROTECTS AND REPAIRS TISSUES

Vitamin C was discovered in the 1930s when scientist Albert Szent-Gyorgyi elucidated its role in the prevention of scurvy, a condition caused by vitamin C deficiency and characterized by weakness, fatigue, and connective tissue breakdown.[4] Thanks

to Szent-Gyorgyi's groundbreaking work, we came to realize vitamin C's pivotal role as a cofactor for enzymes involved in collagen biosynthesis. Today, our understanding of vitamin C and its implications in connective tissue health has expanded further. Vitamin C plays vital roles in the maintenance and repair of collagenous tissues, including skin, bones, cartilage, ligaments, and tendons.[5] It also protects against UV light-induced photodamage by inhibiting aberrant epigenetic alterations in skin tissue.[4]

VITAMIN C FORTIFIES THE IMMUNE SYSTEM

Vitamin C stimulates the production and function of white blood cells, particularly neutrophils, lymphocytes, and phagocytes.[6]

It is a necessary cofactor for neutrophil motility, the process by which neutrophils are deployed to tissues to combat infection.[7] Vitamin C also shortens the duration and severity of the common cold. Importantly, doses of vitamin C greater than 100-200 mg per day are required to quench the inflammation and meet the metabolic demand caused by infection; such levels are difficult to achieve with conventional oral vitamin C.

VITAMIN C SUPPORTS COGNITION

Emerging research indicates a link between vitamin C status and cognitive function, with a significant association between plasma vitamin C concentration and performance on tasks involving attention, focus, and working memory.[8]

Vitamin C influences cognitive function by regulating neuronal differentiation and myelin formation, modulating catecholaminergic neurotransmission, and balancing excitatory and inhibitory brain activity. The brain is also highly vulnerable to damage from free radicals due to its dense concentration of polyunsaturated fatty acids and high rates of cellular metabolism; the antioxidant activities of vitamin C play a critical role in protecting delicate brain tissue from such damage, thereby inhibiting harmful brain oxidative stress.[9] The effects of vitamin C on the brain suggest it may have protective effects in a variety of neuropsychiatric and neurodegenerative disorders, including Alzheimer's disease, Parkinson's disease, multiple sclerosis, depression, and anxiety.[10]

VITAMIN C REGULATES EPIGENETICS AND ABERRANT CELL GROWTH

Emerging research indicates that vitamin C is involved in epigenetic regulation, the process by which intrinsic and environmental signals modulate gene expression and activity independent of gene sequence.[11] Vitamin C regulates the epigenome by functioning as a cofactor for dioxygenase enzymes, which catalyze reactions that demethylate DNA and histones.[12] These new findings demonstrate a central role of vitamin C in supporting genome integrity, profoundly expanding our understanding of this nutrient.

The epigenetic effects of vitamin C may be particularly beneficial for modulating cancer development, progression, and response to pharmaceutical treatments. Vitamin C sensitizes cancerous cells to bromodomain and extra-terminal inhibitors (BETi) used in the treatment of triple-negative breast cancer and melanoma and sensitizes colorectal cancer cells to the chemotherapeutic agents 5-fluorouracil, oxaliplatin, and irinotecan.[13,14,15] Vitamin C may thus be a beneficial nutrient while undergoing cancer treatment.

VITAMIN C PROVIDES CARDIOVASCULAR PROTECTION

Vitamin C at doses greater than 500 mg per day has been found to support blood vessel integrity and combat vascular free radical damage, improving endothelial function.[16,17] Vitamin C sufficiency is also associated with reduced cardiovascular disease risk factors, including hypertension, C-reactive protein, IL-6, and fasting blood glucose.[18,19]

Vitamin C may also be beneficial for individuals with pre-existing heart disease or who need to undergo heart surgery. Clinical trials have found that vitamin C reduces biomarkers of oxidative stress and improves microcirculation in angioplasty patients while also attenuating myocardial reperfusion injury in people who have undergone cardiopulmonary bypass surgery.[20,21]

WHY SUPPLEMENT WITH VITAMIN C?

According to data from the U.S. NHANES survey, vitamin C deficiency is the fourth most prevalent nutrient deficiency in the United States.[22] While vitamin C is abundant in fruits and vegetables, it is rapidly degraded in produce upon harvesting.[23] Further nutrient losses occur during storage and cooking, leaving us with foods significantly depleted of their original vitamin C content.[24] This means even the best of eaters may not be consuming enough vitamin C to support optimal health. Supplemental vitamin C beautifully complements a healthy diet, helping your patients realize the full health benefits of this vital nutrient.

THE BENEFITS OF LIPOSOMAL VITAMIN C

According to the clinical research, high levels of vitamin C must be achieved for its optimal antioxidant, immune, and other health benefits to be realized.[25] However, oral vitamin C demonstrates stringent pharmacokinetics, with doses greater than 500 mg per day resulting in fractionally less intestinal absorption of the nutrient and increased excretion in the urine. The term "bowel tolerance" refers to the point at which intestinal vitamin C transporters have become saturated, leaving unutilized vitamin C in the intestine and causing an influx of water that produces diarrhea and abdominal cramps. The problems with vitamin C pharmacokinetics and bowel tolerance limit the utility of conventional oral vitamin C supplements. Liposomal delivery systems bypass absorption constraints in the intestine, significantly enhancing the bioavailability and cellular delivery of vitamin C.[1]

Quicksilver Delivery Systems® improve upon liposomal and emulsification technology with smaller, more stable particles made from the highest-grade ingredients available. In addition to exceptional absorption rates, these tiny liposomal and nanoemulsified particles increase diffusion across mucus membranes, enhance lymphatic circulation of nutrients and support cellular delivery.

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References available at quicksilverscientific.com/vitamincreferences

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