

NANOFORMULATED



IMMUNE CHARGE+®

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Immune Charge+® is a comprehensive, high-dose blend of vitamins C, A, D, E, K1, K2 and elderberry (*Sambucus nigra*) formulated to powerfully support healthy immune function.* Our nanoformulation supports enhanced absorption of ingredients and is packaged in a 12 mL single serving shot for convenient dosing.*

SUGGESTED USE

Regular use: Take 1 shot daily for up to 10 days. Thereafter, take up to 4 shots per week, or as directed by your healthcare professional.

Intensive use: Take 2 shots daily for up to 5 days. Thereafter, take up to 4 shots per week, or as directed by your healthcare professional.



Supplement Facts

Serving Size: 12 mL
Servings Per Container: 1

Amount % Daily
Per Serving Value

Vitamin A (as Palmitate) 7500mcg 833%

Vitamin C (as Sodium ascorbate) 2000mg 2222%

Vitamin D (as Cholecalciferol) (D3) 250mcg (10000 IU) 1250%

Vitamin K (as K2 (MK7), K1 (phytonadione)) 1050mcg 875%

Sodium (as Sodium ascorbate) 250mg 11%

ElderCraft® European Black Elderberry Extract (*Sambucus nigra* L.) (contains 6.4 grams of black elderberry herb equivalent) 200mg **

DeltaGOLD® Tocotrienols 40mg **

**Daily Value not established

Other Ingredients: Water, glycerin, ethanol, phospholipids (from purified sunflower seed lecithin), vitamin E (as tocopherol), citric acid, natural citrus oils

EDUCATION

POTENT NUTRIENTS & NUTRACEUTICALS SUPPORT ROBUST IMMUNE FUNCTION

An array of nutrients and nutraceuticals have been found to support elements of healthy immune function, including vitamin C, fat-soluble vitamins A, D, E, and K, and the time-honored botanical, elderberry.

VITAMIN C

Vitamin C (ascorbic acid) offers multifaceted support to the immune system, supporting cellular integrity, antioxidant status, and respiratory function during viral infection.

VITAMIN C SUPPORTS BARRIER INTEGRITY

The epithelial cells of the skin, lungs, and gastrointestinal tract serve as a first-line defense against microbial invaders, including viruses responsible for respiratory infections such as colds and the flu. Vitamin C supports epithelial barrier integrity, enhancing the function of these fundamental defense systems.¹

VITAMIN C BOASTS POWERFUL ANTIOXIDANT PROPERTIES

Vitamin C is a potent reducing agent, meaning it readily donates electrons to electron-deficient recipient molecules (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. The potent antioxidant properties of vitamin C make it a valuable ally for optimal immune function.

Bacterial and viral infections trigger the production of free radicals by immune cells. While these free radicals have an essential purpose – to activate the innate immune response and directly destroy invading pathogens such as RNA viruses – they have the unintended consequence of damaging our own cells and organs, such as the lungs.^{2,3,4} Vitamin C attenuates pathogen-induced free radical damage, protecting cells from harm while the immune system is hard at work eradicating infection.

Vitamin C also boosts the activity of other antioxidants vital to the immune system. It recycles the fat-soluble antioxidant vitamin E and increases endogenous levels of glutathione, the body's premier antioxidant that also fine-tunes the innate immune response to viral infections.^{5,6,7}

VITAMIN C SUPPORTS RESPIRATORY HEALTH

Vitamin C also protects the lungs during severe respiratory infections. Vitamin C increases the resistance of chicken tracheal cells to infection with the avian coronavirus.^{8,9} It also shortens the duration of convalescence from bacterial pneumonia, a common consequence of severe viral respiratory infections.¹⁰

VITAMIN C INHIBITS VIRUS-INDUCED INFLAMMATION

Viruses activate the NLRP3 inflammasome, a multiprotein complex that plays a crucial role in innate immunity and the production of pro-inflammatory cytokines.¹¹ Excessive NLRP3 activation contributes to a phenomenon called a "cytokine storm," an overproduction of immune cells and their activating products, cytokines. Cytokine storms occur in the end stages of severe infections, causing symptoms such as acute lung inflammation and fluid buildup in the lungs. The cytokine storm can thus severely sicken, and sometimes kill, patients.¹² Attenuation of NLRP3 inflammasome activity may inhibit excessive inflammation in viral infections. Vitamin C inhibits the NLRP3 inflammasome¹³ and may thus help inhibit virus-induced inflammation.

Emerging research suggests that intravenous vitamin C is useful for the treatment of severe viral infections. Unfortunately, vitamin C IVs may not be accessible to many infected patients. Liposomal vitamin C has been found to offer a greater degree of bioavailability in a more convenient and less invasive delivery system.¹⁴

VITAMIN C SUPPORTS THE ANTIVIRAL IMMUNE RESPONSE

Finally, vitamin C is an essential factor in the antiviral immune response to viral respiratory infections, such as influenza H3N1, through increased production of interferon- α/β .¹⁵ It also stimulates phagocytosis, neutrophil chemotaxis, and T cell development and maturation, crucial processes for fighting pathogenic bacteria and viruses.¹⁶

VITAMIN A

Vitamin A maintains epithelial barriers in the human body, including the epithelial lining of the lungs and the gut mucosa, where a significant portion of the immune system resides. Vitamin A deficiency compromises immunity in the lungs, rendering them more susceptible to respiratory infections.^{17,18} Vitamin A deficiency also impairs the immune response to intranasal vaccination for respiratory syncytial virus (RSV), a human virus that causes respiratory infections, thus suggesting that this nutrient is crucial for the development of the host immune response to envelope viruses.¹⁹ Altered vitamin A metabolism is also suspected to play a role in the pathogenesis of influenza.²⁰

Conversely, vitamin A sufficiency, and supplementation reduce susceptibility and mortality in numerous preclinical and clinical models of viral infection. In preclinical research, animals fed vitamin A-deficient diets suffer from more severe coronavirus infections than those fed vitamin A-sufficient diets.²¹ High-dose supplemental vitamin A also enhances the immunoglobulin response to influenza A virus.²²

Finally, vitamin A supports immune homeostasis by activating immune cells when they are needed to combat infectious threats while attenuating excessive inflammation.²³

VITAMIN D

Vitamin D has pleiotropic benefits for immunity. Vitamin D receptors (VDR) are present on most immune cells, indicating their indispensability as components of the immune system.²⁴ Vitamin D deficiency has repeatedly been independently associated with an increased risk of viral infections.²⁵

Vitamin D modulates both the innate and adaptive immune responses to respiratory viruses.²⁵ In the presence of viral infection, lung epithelial cells convert inactive vitamin D into the active form, increasing the expression of a peptide called cathelicidin, which has antiviral effects. Vitamin D also modulates the immune response to respiratory viruses and protects the lungs from damage caused by pro-inflammatory LPS.^{26,27}

VITAMIN E

Vitamin E is a fat-soluble antioxidant that protects the polyunsaturated fatty acids in cell membranes from oxidative damage, which can be triggered by microbial infections. It increases white blood cell proliferation, immunoglobulin levels, natural killer cell activity, and antibody activity, thus supporting broad-spectrum immune function.^{28,29}

VITAMINS K1 AND K2

Vitamins K1 and K2 are fat-soluble vitamins that work in synergy with vitamins A, D, and E to support healthy immune function. Vitamin K1 (phylloquinone) has anti-inflammatory properties through inhibition of the NF-κB pathway.³¹ Vitamin K2 modulates the immune system, decreasing immune reactivity and helping to manage the inflammatory response.³²

ELDERBERRY

Elderberry is a small dark purple berry that has been used for centuries in traditional herbalism as an aid to the immune system. In this formula, we use Haschberg variety European black elderberry, known for its high potency in anthocyanin flavonoids.

ELDERBERRY SUPPORTS ANTIVIRAL AND ANTIBACTERIAL ACTIVITY

Elderberry has direct antiviral activities, demonstrating mild inhibitory effect at the early stage of viral infection and a considerably stronger response in the later stages of infection.³³ Elderberry exerts antiviral effects by blocking the function of hemagglutinin (HA) glycoproteins present on the surface of viruses, such as the influenza virus and coronaviruses. When the binding of these spikes to host cells is inhibited, viruses can't enter the host cell to replicate and cause infection. Elderberry also binds to neuraminidase (NA), an enzyme necessary for viral replication, as indicated by mass spectrometry and molecular docking studies.³³ The ability of elderberry to target viruses through multiple pathways may make it unlikely to trigger antiviral resistance, a common problem with antiviral pharmaceutical drugs.³⁴ Given these findings, it is no surprise that a meta-analysis of RCTs found elderberry supplementation effective for the treatment of upper respiratory symptoms, which are frequently caused by viruses.³⁵ In fact, one study found that overseas travelers using elderberry for 10 days before traveling and up to 5 days after arriving experienced a 2-day shorter duration of the cold (on average), along with noticing a reduction in symptom severity.³⁶

Elderberry's antimicrobial activity is not limited to its effects on viruses. It also inhibits the growth of clinically-relevant bacteria that can cause infections such as pneumonia secondary to infection with a respiratory virus.³⁷

ELDERBERRY OFFERS IMMUNOMODULATORY PROPERTIES

Elderberry is an immune modulator, enabling a robust immune response while inhibiting excessive inflammation. Elderberry also coordinates a more efficient immune response by mobilizing antiviral innate immune defenses, including the release of the cytokines IL-6 and IL-8.³³ The antioxidant anthocyanins found in elderberry may quench excessive inflammation triggered by a viral infection and promote the growth of beneficial gut bacteria, many of which have immune-enhancing properties.^{38,39,40}

ELDERBERRY BENEFICIALLY ALTERS CELLULAR REDOX STATE

Finally, elderberry also fine-tunes the cellular redox state, or the balance between reactive oxygen species (ROS), reactive nitrogen species (RNS), and their scavenging by antioxidant compounds. The cellular redox state plays a critical role in the immune defense against viral invaders.⁴¹ When ROS and RNS accumulate in viral infections and antioxidant systems are depleted, a severe inflammatory response called a "cytokine storm" can occur. The cytokine storm incites a massive release of inflammatory mediators called cytokines that damage vital tissues such as the heart and lungs. Elderberry phytochemicals called anthocyanins boost the cellular redox potential, enhancing cellular resilience against pathogens.⁴²

Quicksilver Delivery Systems® improves 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 mucous membranes, enhance lymphatic circulation of nutrients, and support cellular delivery.*



References available at quicksilverscientific.com/immunechargereferences

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