### **Immune Nutrients to Calm Cytokine Storm**

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Immune nutrients could not be more important to consider than they are right now. Everyone is talking about COVID-19 also known as the novel coronavirus. We are in the midst of a global pandemic which nobody has experienced in our lifetime before. It seems though, there is a lot of talk about a phenomenon called the cytokine storm related to COVID-19 as well.

Cytokines are an important part of your immune response. Your body releases them as a response to an infection to trigger inflammation for your protection. A cytokine storm, however, is not good news. A cytokine storm happens when the body releases excessive or uncontrolled levels of cytokines, which results in hyperinflammation and may lead to serious complications or even death. It has contributed to complications and death in more serious cases of COVID-19.

Along with discussions popping up about the cytokine storm and COVID-19, I also noticed a lot of misinformation about elderberry causing cytokine storm. These speculations have no known scientific evidence, so I want to create clarity about the potential health benefits of elderberry as an immunomodulator and its potential benefits as an immune nutrient for optimizing your immune system.

In this article, I will discuss how COVID-19 works and how it enters your body. You will understand what a cytokine storm is and why it is a problem. I will share the top immune nutrients that may help to calm a cytokine storm. Finally, I will discuss and create clarity on whether or not elderberry can cause a cytokine storm.

# WHAT IS CORONAVIRUS?

Coronaviruses are a large family of viruses that cause illness ranging from the common cold to more severe diseases like pneumonia, MERS and SARS.

SEVERE SYMPTOMS

High Fever (100.4°F or higher)

Pneumonia

Death

Kidney Failure

### COMMON SYMPTOMS

After 2 to 7 days develop a dry cough

Mild breathing difficulties at the outset

Gastrointestinal issues

<sup>-</sup> Diarrhea

Fever

General body aches

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### TRANSMISSION

Coughs or sneezes from infected person or touching contaminated objects.

\*Source: Centers for Disease Control and Prevention / USA Today

### How COVID-19 Works

COVID-19 (or SARS-CoV-2) is a novel coronavirus. Coronaviruses (CoV) are a large group of enveloped, positive-sense, single-stranded RNA viruses. They have different strains that may cause different illnesses ranging from the common cold to more severe illnesses. In the past two decades, we've seen two coronavirus outbreaks, the Severe Acute Respiratory Syndrome (SARS-CoV or SARS) in 2002 and the Middle East Respiratory Syndrome (MERS-CoV, or MERS) in 2012 that lead to serious illness and in many cases, death.

Coronaviruses are zoonotic viruses, which means that they can be transmitted between humans and animals. SARS was transmitted from civet cats to humans, and MERS originated from camels. While scientists are not clear where COVID-19 originated from, one speculation is that it was passed on from bats to humans.

As I discussed in **this article**, the main symptoms of the virus include cough, fever, and shortness of breath while some people experience other respiratory and even gastrointestinal issues. Up to 80 percent of the population may only develop mild to

moderate symptoms that they can recover from at home and about 20 percent may develop more serious issues, including bronchitis and pneumonia which will require hospitalization.

### COVID-19 COMPARED TO OTHER COMMON CONDITIONS

SYMPTOM	COVID-19	COMMON COLD	FLU	ALLERGIES	
Dry cough	Common	Mild	Common	Sometimes	
Fever	Common	Rare	Common	Sometimes	
Sore throat	Sometimes	Common	Common	No	
Headaches	Sometimes	Rare	Common	Sometimes	
Sneezing	No	Common	No	Common	
Runny Nose	Rare	Common	Sometimes	Common	
Shortness of Breath	Common	No	No	Common	
Fatigue	Sometimes	Sometimes	Common	Sometimes	
Aches and pains	Sometimes	Common	Common	No	
Diarrhea	Rare	No	Sometimes*	No	
*Sometimes for children					

Sources: CDC, WHO, American College of Allergy, Asthma and Immunology

### **COVID-19 And The ACE2 Receptor**

Those over the age of 60 and people with a compromised immune system are at higher risk, however, we have also seen cases of younger and otherwise healthy people needing care at the hospital. While at a ~1-2 percent mortality rate COVID-19 not the most deadly (SARS had a mortality rate of ~15 percent, MERS had a mortality rate of ~35 percent), but it is certainly the most serious coronavirus we have seen that has lead to a global pandemic and national emergency **(1, 2, 3, 4, 5)**.

The first COVID-19 outbreak initially started in December 2019 in Wuhan, China only a few months ago and scientists don't yet fully understand this infectious disease. In the midst of the ongoing COVID-19 pandemic, scientists are currently studying the virus to understand how it is similar to and different from the severe acute respiratory syndrome (SARS-CoV or SARS) which led to the outbreak in 2002.

While there are definitely some differences between the two viruses as well as the extent of the outbreaks we are dealing with, the way the two viruses work in your body show some similarities. Both SARS and COVID-19 seem to exploit the angiotensin-converting enzyme 2 (ACE2) receptor in your body in order to gain access inside your cells.



### How COVID-19 Gets Into Our Cells

Understanding how a virus gains entry to the human cells is important for the development of potential vaccines and treatment methods, and may also help us to better understand preventative measures and immune nutrients that may help us. This

is especially important since COVID-19 is a virus, not a bacteria, which means that our current method of treatment is simply supporting your immune system and body and in more serious cases, organ support.

Coronaviruses, and therefore the COVID-19 genome encode four major structural proteins: the spike (S), nucleocapsid (N), membrane (M), and envelope (E) proteins. The S protein is the one that helps the entry of the virus to the target cell in the body. Research has shown that about only about 75 percent of the COVID-19 S protein genome is the same as the SARS S protein genome, however, most of the amino acid residues needed for receptor binding are the same between the two viruses. This also suggests that the entry receptor, ACE-2, used by SARS is the same for COVID-19 as well.

ACE-2 is a type I transmembrane metallocarboxypeptidase with a similar structure to ACE, which is an enzyme that is an essential part of the Renin-Angiotensin system (RAS) and an important target for hypertension treatment. ACE and ACE-2 are both expressed in vascular endothelial cells, the renal tubular epithelium, and in the testes Leydig cells. ACE-2 is also expressed in your lungs, gastrointestinal tract, and kidneys, and plays a protective role in your cardiovascular system and other organs in your body.

SARS and COVID-19 show sequence similarities, and it seems that both viruses use the ACE-2 as a cellular entryway to your body. Researchers believe that COVID-19 can use ACE-2 from humans, civet cats, pigs, and Chinese horseshoe bats to access the body. Research has shown that the affected ACE-2 in neurological tissue may lead to neurological tissue damage which may also contribute to the morbidity and mortality of the disease **(6, 7, 8, 9, 10, 11, 12, 13)** 



### What Is Cytokine Storm

When reading about the symptoms and complications of COVID-19, chances are, you will run into the word cytokine storm. But what is a cytokine storm and why is it a problem? Let's take a look at this phenomenon.

Cytokines got their name from the Greek words cyto (cell) and kinos (movement). They are small proteins that your body's cells may release in different areas. For example, the cells of your immune system may release them as a response to an infection and to trigger inflammation for your protection.

The problem occurs when your body's reaction to an infection goes into overdrive. For example, researchers have observed that when the COVID-19 virus enters the lungs, it triggers an immune response that prompts immune cells to fight the virus and to create localized inflammation. In a small number of patients, however, the body releases excessive or uncontrolled levels of cytokines, which results in hyperinflammation and may lead to serious complications or even death. This hyperinflammation and consequent damage are called the cytokine storm.

Cytokine storms are not a new phenomenon in the medical field. It is not only a

complication that is observed in some COVID-19 patients, but also in patients of seasonal influenza (flu) virus. It has been observed with other coronaviruses, such as SARS and MERS, as well as the bird flu (H5N1 influenza virus) leading to many cases of death. Cytokines storms may also happen in non-infectious diseases, such as pancreatitis and multiple sclerosis.



### **COVID-19 and Cytokine Storm**

We know that while a large percentage of the population only experiences mild to moderate symptoms of COVID-19 and won't require hospitalization, others experience severe symptoms and complications, require hospitalization, or may even die. The cytokine storm may be one possible way to explain the severe reaction of those in our hospitals. This may also explain why younger people and those with a healthy immune system and without preexisting health conditions tend to have an easier time. Their bodies may release lower levels of cytokines creating just enough inflammation for healing.

Research has found that COVID-19 increases (IL)-1 $\beta$  and IL-6, IL-17 pro-inflammatory cytokines, which act as a mediator of lung inflammation, <u>fever</u>, and fibrosis. On the other hand, the suppression of pro-inflammatory cytokines may be beneficial in treatment. Other cytokines, such as Interferon (IFN-alpha and beta), along with IL-37 and IL-38, show the ability to suppress innate and acquired immune responses. While more research is needed, these findings may lead to a new strategy.



### Nutrients to Block COVID-19 Molecular Docking

As you know, COVID-19 is a new virus. Treatment includes supportive care and supporting organ functions when necessary. While research is on-going looking at the potential benefits of certain existing drugs, including remdisivir and chloroquine, and the search for new medications and a vaccine is on-going, looking at alternative options is critical. In recent decades, research has shown that certain edible herbs and vegetables have various health benefits with little to no side effects.

The hope with this research is that dietary molecules in these plants may also be developed as herbal medicines or therapeutic agents to be used in the treatment or prevention of COVID-19. Past research has shown the potential benefits of curcumin, savanin, and betulinic acid for SARS.

To understand the benefits of certain herbs and plants further, one recent molecular docking study looked into 18 dietary molecules, including epigallocatechin gallate (EGCG), curcumin, beta-glucan, piperine, apigenin, gingerol-[6], resveratrol, myricetin, quercetin, genistein, daidzein, alliin, allicin, sulforaphane, phycocyanobilin, ferulic acid, and alpha-lipoic acid, to explore their potential benefits for COVID-19. **(43)**.



### **Top 3 Immune Nutrients to Block COVID-19 Cell Entry**

Researchers used a molecular docking analysis using a computer cluster system to understand the molecular interactions of these dietary molecules with the binding pockets of different types of proteins of COVID–19. Researchers wanted to understand which proteins are responsible for the high virulence and replication of COVID-19, and what may prevent the infection or destroy the virus.

Based on past research, main protein targets included "main protease COVID–19 (6lu7), the structure of the 2019-nCoV HR2 Domain (6lvn), the structure of post-fusion core of 2019-nCoV S2 subunit (6lxt), prefusion 2019-nCoV spike glycoprotein (6vsb), the structure of 2019-nCoV chimeric receptor-binding domain complexed with its receptor

human ACE2 (6vw1), the crystal structure of NSP15 endoribonuclease from SARS CoV–2 (6vww) and crystal structure of the free enzyme of the SARS-CoV–2 (2019-nCoV) main protease (6y2e)".

To get some answers for their second question regarding prevention and treatment they selected the 18 dietary molecules I just mentioned based on their anti-viral or anti-SARS potential indicated by earlier studies. Their findings indicate that curcumin, EGCG, and beta-glucan are some of the strongest options and people may benefit from using them as a dietary supplement for immune nutrient support **(43)**.



If you want to optimize your immune health and reduce your risk of a cytokine storm, there are various immune nutrients that may help you. It is important to note that since COVID-19 is a new virus, there is no research suggesting that these immune nutrients would specifically benefit COVID-19 prevention or recovery.

However, there are scientific studies that show their immune benefits for other viral infections, including the flu, other coronavirus infections, and other respiratory infections. As with other infections, I recommend protecting your body and optimizing your immune health with the best immune nutrients.

While at this point, research is on-going and scientists are working hard to understand COVID-19 and find treatment options, these are some promising developments. The good news is that you don't have to wait to take steps to protect your health. There are a number of things that you can do to improve your immune system, including using immune nutrients that may help to calm a cytokine storm **(14, 15, 16, 17, 18, 19, 20)**.



### Vitamin D

Vitamin D is an essential immune nutrient. It supports your immune system, brain, nervous system, lung function, cardiovascular health, bones, and teeth. The best way to meet your vitamin D needs is through the sun. Unfortunately, during the winter months and times of gloomy weather, it is impossible to meet all your needs.

Research suggests that low vitamin D levels may contribute to viral epidemics in the winter, while optimal vitamin D levels may help to reduce the risk of viral epidemics and pandemics. Observational and supplement trials suggest that higher 25(OH)D concentrations of vitamin D immune nutrient supplementation may reduce the risk of various viral infections, including influenza, dengue, hepatitis B and C, pneumonia, and respiratory viral infections.

Research suggests that vitamin D supplementation may reduce the production of proinflammatory cytokines by the innate immune system and as a result may also lower the risk of a cytokine storm and pneumonia **(21, 22, 23)**.

### 10 Signs That You May Need More Vitamin D



Greater Pain Sensitivity Insufficient levels of vitamin D have been linked to chronic pain.



Mood Issues Before you blame your grouchiness on PMS, know that D affects the levels of serotonin in your brain — which also impacts your mood.



Depression Women with low levels of D are twice as likely to combat depression.



Sleepiness Lower levels of vitamin D were linked to higher levels of daytime sleepiness.



Muscle Weakness Decreased muscular size can be the result of not enough vitamin D in muscle and nerve tissue.



High Blood Pressure Vitamin D plays a role in heart health, helping to regulate blood pressure. So when you don't get enough, your blood pressure can creep up.



Decreased Endurance Some studies have shown reduced aerobic capacity and overall endurance in athletes with low vitamin D levels.



Stress Fractures When you're low in the nutrient, your bones become weakened, meaning your risk for stress fractures increases.



Frequent Illness Vitamin D is very important for healthy immune response. People with vitamin D deficiency get colds and flu's more often.



#### Learning Disorders

Vitamin D plays an important role in childhood brain development. Individuals with learning disorders have a higher revalence of vitamin D deficiency.

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### Resveratrol

Resveratrol is a powerful plant compound found in grapes, berries and red wine. This immune nutrient acts as an antioxidant and helps to optimize your immune system. Resveratrol may also help to calm a cytokine storm. In one animal experiment mice were given superantigen staphylococcal enterotoxin B (SEB), in order to induce lung inflammation. SEB can lead to respiratory failure and treatment options are limited to supportive care.

The study has found that the administration of resveratrol had anti-inflammatory benefits on pulmonary inflammation. The study has shown that resveratrol may be effective in suppressing the potent immune responses induced by a superantigen and may help to reduce the risk of acute lung inflammation. These findings are incredibly exciting when it comes to the prevention and treatment of respiratory infections (24, 25).





### Quercetin

Quercetin is a pigment that is found in plants, vegetables, and fruits, and serves as an immune nutrient offering many health benefits. Elderberry, red onions, white onions and cranberries are the richest sources of quercetin. It is a flavonoid and antioxidant that may help to reduce inflammation, infections, and allergies. Research has found that quercetin may be particularly beneficial for viral respiratory infections.

One study has found that quercetin may have the ability to inhibit influenza infection. It may be beneficial for various strains of the influenza virus, including H1N1, H3N2, and H5N1. It also shows promise for blocking the COVID-19 from entering into the cells. Results suggest that quercetin may be a safe natural method for preventing and aiding recovery from viral infections **(26, 27)**.



### Curcumin

Curcumin is the active compound of one of the most rigorously studied herbs. It has been used in Asia for its medicinal properties and countless studies have shown its antiinflammatory, anti-viral, anti-biotic, and anti-fungal benefits. It has been used for joint pain, digestive issues, and many other chronic health conditions. Curcumin is a powerful immune nutrient with countless benefits, and current research on COVID-19 treatment options has shown its potential benefits **(42)**.

The molecular docking study found that curcumin, EGCG, and beta-glucan, as well as quercetin, myricetin, genistein, myricetin, and daidzein may show benefits as a potential treatment for COVID-19. Curcumin ranked number two in most categories. It ranked number two against 6lu7, 6lvn, 6vw1, 6vww, 6yte number four against 6vsb, number five against 6vsb and 6lxt of COVID-19. The study recommends 500 mg of curcumin.

Taken in the form of turmeric, they suggest 15.625 gm per day. Take it 3 times a day every 6.5 hours. If you are using turmeric, mix it with lukewarm milk or plant milk. You can also look for a good quality curcumin supplement **(43)**.

### **INCREDIBLE HEALTH** BENEFITS OF CURCUMIN

Curcumin, the primary component of the spice Turmeric, is not only an important culinary ingredient but a medical one as well.

BOOSTS DETOXIFICATION	SUPPORTS CARDIOVASCULAR FUNCTION	PROMOTES HEALTHY MOOD BALANCE	SUPPORTS NATURAL WEIGHT LOSS		
Curcumin optimizes function of the liver, the body's primary organ of detoxification.	Curcumin supports heart health by promoting a healthy inflammatory response.	Curcumin has been shown to be an extremely effective natural mood enhancer.	Curcumin can enhance weight loss when combined with healthy diet and exercise.		
SUPPORTS JOINT & MUSCLE HEALTH	FIGHTS BODY-WIDE INFLAMMATION	PROMOTES YOUTHFUL RADIANT SKIN	BOOSTS COGNITIVE FUNCTION		
Curcumin promotes a healthy inflammatory response and eases aches and pains.	Curcumin has been proven to significantly lower levels of inflammatory markers.	Curcumin promotes soft, smooth, glowing skin and fights fine lines and wrinkles.	Curcumin protects brain cells by binding to and dissolving abnormal proteins.		
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### EGCG

EGCG is a powerful plant compound and immune nutrient primarily found in green tea. It is known for its many health benefits. This immune nutrient is rich in polyphenols and antioxidants. It may help to lower oxidative stress, decrease inflammation, improve heart health, support brain health, and aid weight loss. Research on COVID-19 treatment and prevention found it to be potentially beneficial **(44)**.

The study we've discussed under the curcumin section found that EGCG among other herbs may show benefits as a potential treatment for COVID-19. The study also indicated that EGCG may also act as a COVID-19 inhibitor, and recommends it for further treatment and drug treatment research.

EGCG ranked number one against all proteins, including 6lu7, 6lvn, 6vw1, 6vsb, 6vww, 6lxt, and 6yte of COVID-19. The study suggests taking 800 mg of EGCG or 16.67 gm of green tea a day. Brew it for 3 minutes in boiling water. Let it cool a bit then drink it 3 to 4 times a day every 4.5 hours.

## THE ANTI-MICROBIAL MECHANISMS OF EGCG



### **Beta-Glucan**

Beta-glucans are beta-D-glucose polysaccharides that are naturally found in the cell walls of cereals, bacteria, and fungi. They have been used for a number of issues, including the flu, swine flu, digestive issues, ear infections, allergies, Lyme disease, chronic fatigue syndrome, and more. It is not surprising that research on COVID-19 prevention looked into beta-glucans for its potential benefits **(45)**.

The study we've discussed under the curcumin section found that beta-glucan among other herbs may show benefits as a potential treatment for COVID-19. Beta-glucan ranked number three against 6lu7, number four against 6vww, and number five against 6y2e. You can get beta glucans in medicinal mushrooms such as Cordyceps, Reishi, Maitake and Shiitake or as stand alone supplements **(43)**.



### Melatonin

You may know about melatonin as a supplement that can support your healthy sleep cycle. Assisting sleep and rest is already an immune system-supporting benefit, but melatonin has more to offer. It is a powerful antioxidant that supports your immune health, brain, eyes, digestion, and more. It may even be helpful when it comes to COVID-19.

One recent paper discussed that melatonin is a powerful anti-inflammatory and antioxidative molecule that may be protective against acute lung injury (ALI) and acute respiratory distress syndrome (ARDS). This is important because most serious complications of COVID-19 happen because of a cytokine storm that can lead to ALI, ARDS, and even death.

The paper notes that melatonin is a safe supplement that has already shown benefits for other viral infections and may be helpful for cases of COVID-19 by calming the cytokine storm **(28, 29)**.





### **Probiotics**

Probiotics are incredibly important for your digestion and gut health. Since your gut is connected to all areas of your body, healthy gut flora is important for your immune system as well. It's not surprising that probiotics may help as immune nutrients.

Researchers have found that probiotics may have immunomodulatory effects. According to a scientific review some probiotics, including certain species of *Lactobacillus* and *Bifidobacterium* can play an important role in innate immunity. They may help your body by increasing the cytotoxicity of natural killer cells and support adaptive immunity.

Probiotics may help to stimulate anti-inflammatory cytokines and improve your body's defense system against invasion by bacterial, fungal, viral, and other infections **(30, 31)**.

# Benefits of Using Probiotics

- Immunomodulation
- Protection Against Infections
- Improve Gastrointestinal Diseases
- Increase Nutrient Absorption
- Metabolic By Product Formation
- Aid in Weight Loss
- Improve Brain Health

### Vitamin C

Vitamin C may be one of the most well-known immune nutrients that protect against immune deficiencies and which supports the prevention and recovery from the common cold and upper-respiratory issues, and also protects your cardiovascular system, eyes, skin, and other parts of your body. Research has found that vitamin C may help to optimize the innate and adaptive immune system.

On the other hand, vitamin C deficiency may lead to impaired immunity and higher susceptibility to infections. Vitamin C may help to improve your body's immune response and to prevent and treat respiratory and systemic infections, including respiratory issues **(32, 33)**.

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### **HEALTH BENEFITS OF**

- Antioxidant Support
- Adrenal Function
- Healthy Connective Tissue and Blood Vessel Synthesis

Vitamin

- Support of Normal Immune System Function
- Synthesis of Carnitine, Neurotransmitters, and Collagen
- Protects Against Heart Disease and Cancer

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### Zinc

Zinc is another powerful immune nutrient known for its benefits for providing immune health support and inflammation reduction as well as for improving cold and respiratory symptoms, wound healing, acne reduction, and lowering the risk of agerelated diseases. Research on atherosclerosis and diabetes mellitus suggests that zinc deficiency may contribute to low-grade systemic inflammation.

Zinc deficiency may also lead to increased inflammatory cytokines. However, zinc supplementation may have anti-inflammatory benefits, increase the expression of anti-inflammatory cytokines, lower oxidative stress, and help to achieve homeostasis. Findings suggest that zinc may help to prevent or calm a cytokine storm **(34, 35)**.

Zinc is a mineral required by the body to support immune function and assist in various cellular activities.

### ZINC DEFICIENCY SYMPTOMS

- Spots on Fingernails Loss of Libido
- Low Energy
- Loss of Libido
   Enservent Calde
- Low Energy
  Insomnia
- Frequent Colds or FlusAbnormal Hair Loss

Slow Thinking Process

- somnia
- Infertility
- Loss of Taste or Smell
- Skin Rashes / Eczema
- Loss of Appetite
- Lowered Immunity
- Poor Memory
- Sinus Problems and Allergies
- Breast and Prostate Cancer

### **FUNCTIONS**

- Decreases inflammation
- · Suppresses abnormal tissue growth
- · Boosts healthy Immune function
- Supports progesterone production, essential for balancing estrogen
- Reduces risk and development of any cancers including esophageal, bladder, breast, skin, prostate and head and neck cancers
- Supports the p53 Gene, which protects against breast and prostate cancer
- Inhibits angiogenesis
- Stimulates apoptosis

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### **Does Elderberry Cause a Cytokine Storm**

Elderberry syrup and tea has been one of the favorite natural remedies on the market for immune support. Over the past few months, however, I've noticed an emerging new concern that people are discussing. Even though there is no research indicating this, people are worried that elderberry can cause a cytokine storm and that it is not a safe immune nutrient choice when it comes to COVID-19. Is this true? Does elderberry cause a cytokine storm? Let's find out.

As I said earlier, there is currently no research that indicates that elderberry can cause a cytokine storm and that it is unsafe for COVID-19. It is unclear how this misconception came about. Recent studies circulating on the internet about cytokine storm and COVID-10 do not mention elderberry at all.

To be clear, COVID-19 is a new virus, and there is also no research linking elderberry to COVID-19 in any way. However, elderberry is a long-known immune nutrient remedy that may boost your body's ability to prevent and recover from upper-respiratory infections and illness.

One double-blind, placebo-controlled, randomized study on Sambucol (Sambucus nigra L.) standardized black elderberry extract against various strains of the influenza virus has found that elderberry has anti-viral properties and that it reduced the duration of flu symptoms by 3 to 4 days. While the study did find that elderberry may support the healthy immune system by increasing inflammatory cytokine production, there is no indication that it would lead to a cytokine storm.

Remember, a cytokine storm happens when your body creates excessive or uncontrolled levels of cytokines leading to hyperinflammation. Normal levels of cytokines, on the other hand, are essential for recovery. **(36)**.



### Elderberry is an Immune System Modulator

Elderberry is nature's richest source of quercetin and this compound helps it act as an immunomodulator to help balance the immune system. One study examining the structures and the immunomodulating properties of the pectic polymers from elderberries has found that Sambucus elderberries contained immunomodulating polysaccharides and may benefit respiratory illness. Another study examined the immune-modulating effects of astragalus root and elderberry fruit extracts in bone marrow-derived murine dendritic cells by measuring IFN- $\beta$  and other cytokines with ELISA and RT-PCR tests.

Results suggest that both elderberry and astragalus increased *L. acidophilus*-induced IFN- $\beta$  production while decreasing pro-inflammatory reaction to *E. coli*. These findings suggest that both elderberry and astragalus offer antiviral and immune-enhancing benefits.

Furthermore, a meta-analysis of randomized controlled trials of 180 participants on the effectiveness of black elderberry for respiratory issues has found that elderberry supplementation may substantially reduce upper respiratory symptoms and may be

beneficial for cold and flu recovery (37, 38, 39).

Again, cytokines are an essential immune response to fight off any kind of infection. None of the research indicates that elderberry would lead to excessive or uncontrolled levels of cytokines and hyperinflammation from a cytokine storm, instead, they show that elderberry may help to balance the immune system and offer the right amount of benefits.

# **BEST WAYS TO USE ELDERBERRY**



Take it for **7-10 days** on and then take **5 days off** so you are cycling it. This tends to improve the immunological impact of the active ingredients.

- Helps Prevent Colds, Fever & Flu
- Improves Immune Response
- Stimulates Anti-Cancer Immune Activity



I like to combine it with other immune support herbs such as astragalus and medicinal mushrooms for a synergistic immune support effect that these provide.

**CAUTION:** Caution for anyone with severe autoimmune disease, food or drug allergies as these individuals tend to have a greater degree of sensitivity to herbs. If you don't respond well, you may notice an increase in inflammation and worsening symptoms.

**BEST DOSAGE:** Start with 100-200 mg and slowly increase dosage by 100 mg daily until you get to around 500-600 mg if your body is tolerating it well.

### **Cytokines and AutoImmune Conditions**

It is also important to note, however, that there have been some experimental models of human autoimmune diseases and observations in patients that showed that proinflammatory cytokines may increase autoimmune inflammation and antiinflammatory cytokines may help to reduce autoimmune inflammation and aid recovery from an acute phase of an autoimmune disease.

While the evidence regarding the relationship between cytokines and autoimmunity is still lacking, it may be possible that taking elderberry may not be the right choice in some cases of serious autoimmune diseases. Elderberry may also negatively interact

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with certain medications that decrease the immune system, including azathioprine, basiliximab, cyclosporine, daclizumab, muromonab-CD3, mycophenolate, tacrolimus, sirolimus, prednisone, corticosteroids, and others **(40, 41)**.

Everything considered, there is no research evidence that suggests that elderberry would cause a cytokine storm in COVID-19, and current studies suggest that elderberry may be beneficial for your immune system. However, as with every supplement, it is important that you talk to your healthcare practitioner before taking elderberry supplements, especially if you have an autoimmune condition, take any medication, or have COVID-19. Always watch your body's reactions when taking any supplements, and back off if you experience serious side effects.



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### **Final Thoughts on Immune Nutrients**

Cytokines are an important part of your immune response. However, when your body releases excessive or uncontrolled levels of cytokines it results in hyperinflammation called a cytokine storm. A cytokine storm may lead to serious complications and even death in serious COVID-19 cases and in other infections.

Optimizing your immune system is critical to improve your health and to decrease your risk of a cytokine storm. I recommend that you take my recommended immune nutrients along with a nutrient-dense diet and a healthy lifestyle in order to optimize

your immune system and overall health.



In these last months, our lives have been upended in some tough ways: health, finances, peace of mind... But every day we have the chance to be better... **Tap here for a sneak peek at The Immune Resiliency Summit** (another stellar free event from the Human Longevity team).

Wherever we are, whatever we've gone through - we can <u>use</u> this opportunity - to redefine "normal" and elevate our health and our lives to be better - to go beyond the status quo.

So much of our time is spent without us being <u>fully</u> present.

Miles Davis says that time isn't the main thing, it's the ONLY thing.

What if that were true, completely?

Then your life becomes a <u>thread of moments</u> that you cannot afford to waste.

Time becomes a rushing river, and your job is to drink as much of it, via awareness – and goodness, moment by moment, as possible.

### But to do that, you must be in a place of resilience.

**<u>Resilience</u>** is the process of being able to adapt well and bounce back quickly during or after times of stress. (We have enough of THAT, right?)

This is perhaps more important now than ever before... as we create "new" normal. You

#### can register for this for FREE HERE.

This unique event offers you the most important key points on ...

- Supporting Immunity
- Addressing Stress and Fear
- And redefining how we create resiliency (physically, emotionally and spiritually) by creating the building blocks for a new BETTER normal.



![](_page_29_Picture_0.jpeg)

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Was this article helpful? YesNo Dr. Jockers

Dr. David Jockers is a doctor of natural medicine, functional nutritionist and corrective care chiropractor. He currently owns and operates Exodus Health Center in Kennesaw, Georgia. He has developed 6 revolutionary online programs with thousands of participants.

![](_page_31_Picture_10.jpeg)

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