How to Prevent and Reduce Cytokine Storm Naturally at Home

- May 19, 2022

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.

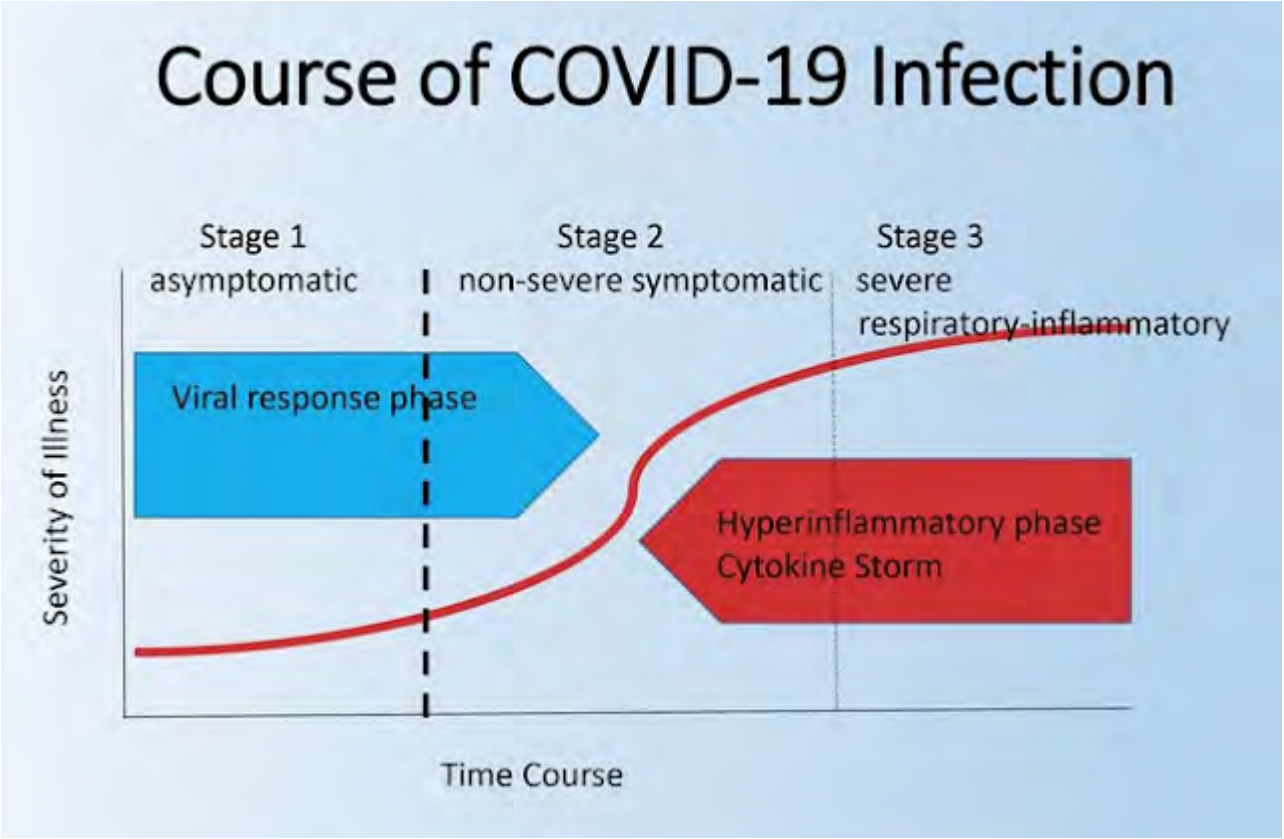


Image credit: ClevelandClinic

10 Best Immune Nutrients to Calm Cytokine Storm

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 (J Biol Regul Homeost Agents, The Lancet, Microbiol Mol Biol Rev).

1. Vitamin D and Cytokine Storm

Vitamin D deficiency affects the body's susceptibility to infection and has been associated with influenza, hepatitis C, human immunodeficiency virus (HIV) and other viral diseases [Source]. Surveys indicate that most people in the United States consume less than recommended amounts of vitamin D. Sun exposure, which increases serum 25(OH)D levels, is one of the reasons serum 25(OH)D levels are usually higher than would be predicted on the basis of dietary vitamin D intakes alone.

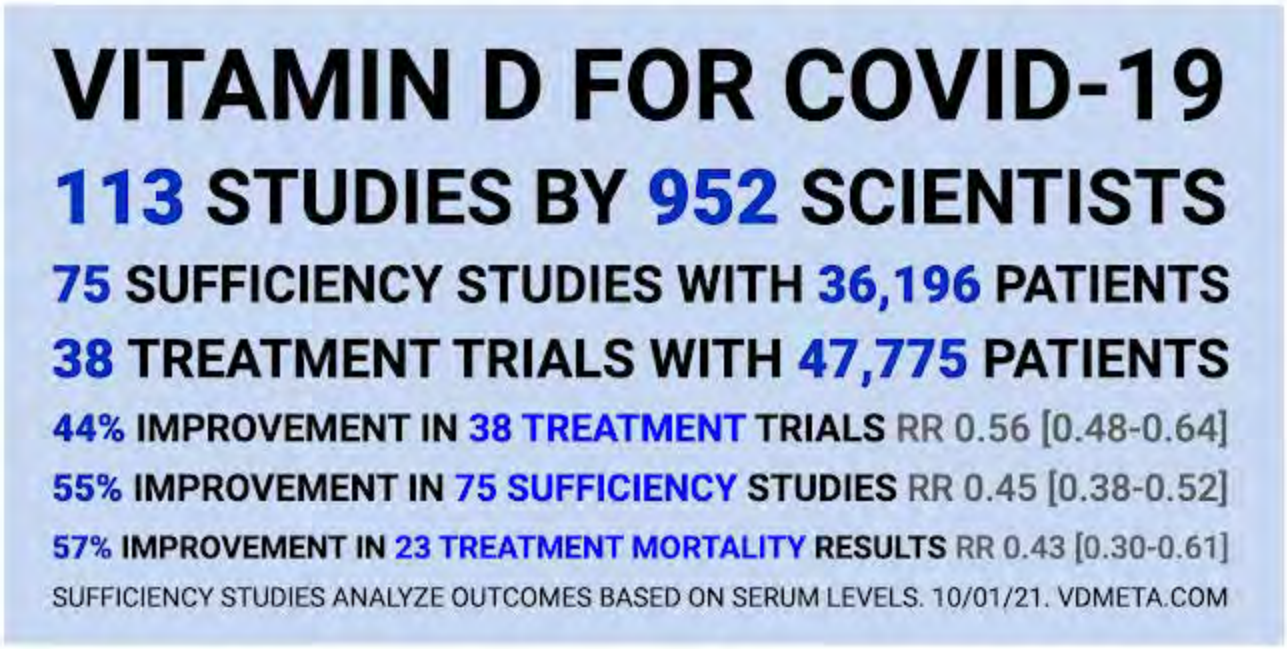
Update: Newest of many Vitamin D3 papers estimates level above 50 associated with "close to zero mortality": COVID-19 Mortality Risk Correlates Inversely with Vitamin D3 Status, and a Mortality Rate Close to Zero Could Theoretically Be Achieved at 50 ng/mL 25(OH)D3: Results of a Systematic Review and Meta-Analysis (Nutrients. 2021 Oct)

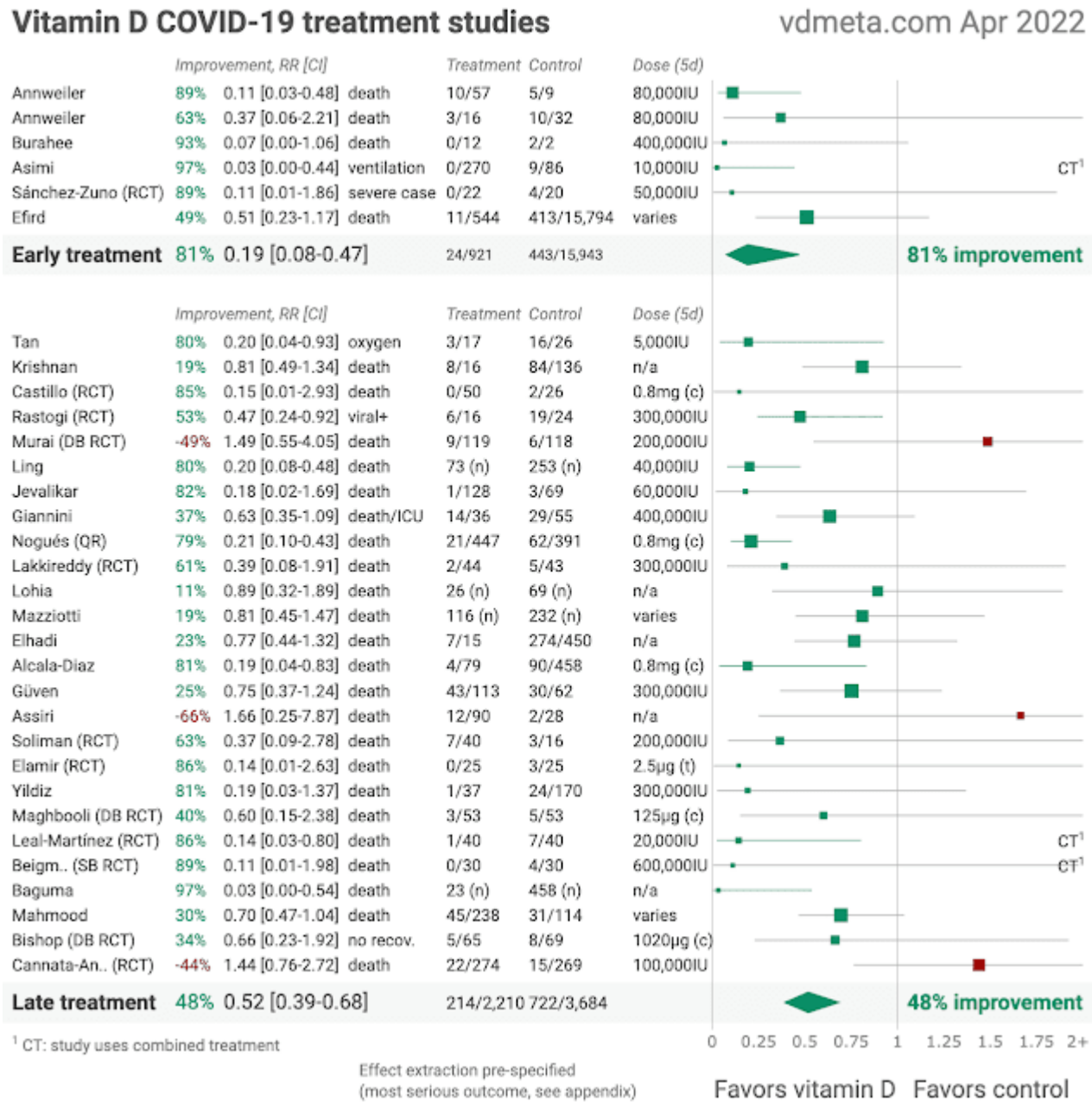
Vitamin D and COVID-19

Based on several publications and studies, vitamin D seems to be the "most promising" natural supplement for COVID-19 protection. Several studies suggest that people with lower levels of vitamin D are more likely to test positive for the coronavirus, have more severe symptoms, and may have a higher risk of dying from COVID-19.

Vitamin D deficiency is also known to enhance a process known as the "cytokine storm" (Marik, Jun 2020, Frontiers in Immunology, Dec 2020).

Check out the evidence tracker on vitamin D and COVID-19 from c19vitamind.com (constantly updated), with more than 100 published studies by more than 900 scientists.


VITAMIN D FOR COVID-19
113 STUDIES BY 952 SCIENTISTS
75 SUFFICIENCY STUDIES WITH 36,196 PATIENTS
38 TREATMENT TRIALS WITH 47,775 PATIENTS
44% IMPROVEMENT IN 38 TREATMENT TRIALS RR 0.56 [0.48-0.64]
55% IMPROVEMENT IN 75 SUFFICIENCY STUDIES RR 0.45 [0.38-0.52]
57% IMPROVEMENT IN 23 TREATMENT MORTALITY RESULTS RR 0.43 [0.30-0.61]
SUFFICIENCY STUDIES ANALYZE OUTCOMES BASED ON SERUM LEVELS. 10/01/21. VDMETA.COM



Results of a systematic review and meta-analysis (Nutrients 2021) suggested that COVID-19 mortality risk correlates inversely with vitamin D3 status, and a mortality rate **close to zero** could theoretically be achieved at 50 ng/ml 25(OH)D3.

Vitamin D has also been shown to have an anticoagulant effect. A decrease in 25-hydroxyvitamin D [25(OH)D] concentration has also been associated with an increased risk of venous thromboembolism (PubMed).

Safety: Daily intakes of up to 25–100 mcg (1,000 IU–4,000 IU) vitamin D in foods and dietary supplements are safe for children (depending on their age) and up to 100 mcg (4,000 IU) are safe for adults. These values, however, do not apply to individuals receiving vitamin D treatment under the care of a physician. Higher intakes (usually from supplements) can lead to nausea, vomiting, muscle weakness, confusion, pain, loss of appetite, dehydration, excessive urination

and thirst, and kidney stones. In extreme cases, vitamin D toxicity causes renal failure, calcification of soft tissues throughout the body (including in coronary vessels and heart valves), cardiac arrhythmias, and even death.

Vitamin D, Omicron and Deltacron

Will Vitamin D Work Against Omicron and Deltacron? Vitamin D is not variant specific because it's primary mode of action is to support the body's immune system which reacts in a variety of ways against viral attack, not just in a specific antibody reaction to a specific spike protein.

Vitamin D, Resveratrol and Cytomegalovirus

Dormant cytomegalovirus (CMV) is carried by 70-90% of the adult population and is reactivated by inflammation. One third of patients in hospital intensive care units reactivate CMV which doubles their mortality rate. There is agreement that Covid-19 co-infection with cytomegalovirus is associated with higher rates of mortality in older people who have an aged (senescent) immune system.

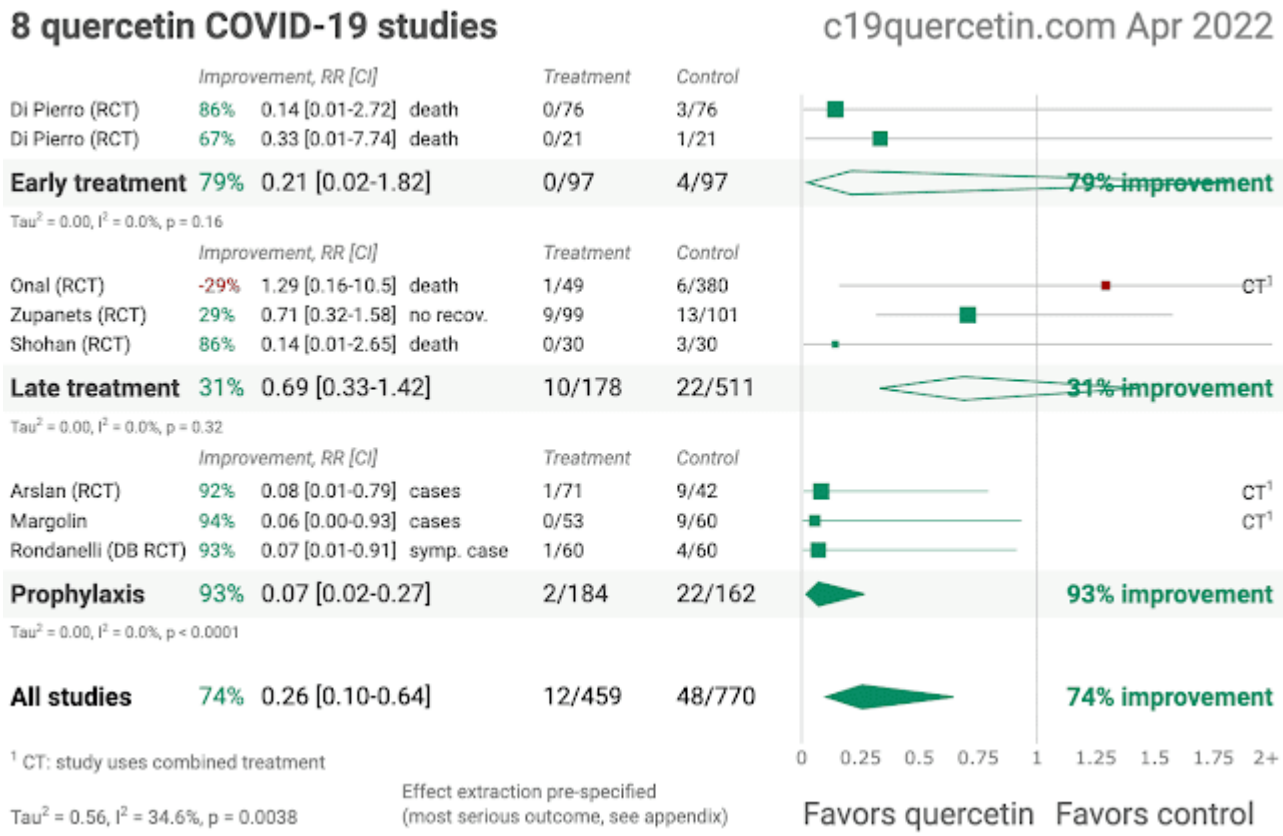
Cytomegalovirus also dulls the vitamin D receptors thus preventing the active form of vitamin D to enter living cells.

Resveratrol inhibits replication of cytomegalovirus in infected lung cells. Resveratrol also binds to and activates the vitamin D receptors, thus allowing cells in the body to respond to vitamin D.

Related: Best Vitamin D Supplement

2. Quercetin

As of May 2022, there have been 9 published studies of quercetin and COVID-19 (c19quercetin.com).



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 inflammatory cytokines, infections, allergies and anti-blood clot property. Research has found that quercetin may be particularly beneficial for viral respiratory infections.

Quercetin was initially found to provide broad-spectrum protection against SARS coronavirus in the aftermath of the SARS epidemic that broke out across 26 countries in 2003.

Quercetin as a Zinc Ionophore

Quercetin was found to act as a zinc ionophore (J Agric Food Chem. 2014). A 2015 study found that that Quercetin shows inhibitory activity in the early stages of a wide range of influenza viruses, including H1N1 and H5N1 (Viruses 2016). Although influenza is not in the same family of viruses as the coronavirus, it's plausible that a similar mechanism could apply here. There is actually some evidence that Quercetin has already proven effective at treating Ebola and Zika viruses.

Quercetin and Vitamin C

Incidentally, ascorbic acid (vitamin C) and the bioflavonoid quercetin (originally labeled vitamin P) were both discovered by the same scientist — Nobel prize winner Albert Szent-Györgyi.

Quercetin and vitamin C also act as an antiviral drug, effectively inactivating viruses.

Quercetin Dosage

The FLCCC I-MASK+ protocol recommends 250 mg daily for prevention and 250 mg twice daily for early treatment.

Quercetin works best when taken with vitamin C and Bromelain, as vitamin C helps activate it and bromelain helps with the absorption.

Precaution: Quercetin should be used with caution in patients with hypothyroidism (low thyroid hormone) and relevant thyroid hormone levels should be monitored.
Quercetin and ivermectin interactions? According to Drugs.com: "No interactions were found between ivermectin and Quercetin. This does not necessarily mean no interactions exist. Always consult your healthcare provider."

Quercetin and COVID-19

For an updated list of studies, check out c19quercetin.com.

A word about quercetin: Some physicians are recommending this supplement to reduce viral illnesses because quercetin acts as a zinc ionophore to improve zinc uptake into cells. It is much less potent than HCQ (hydroxychloroquine) as a zinc transporter, and it does not reach high concentrations in lung cells that HCQ does. Quercetin may help reduce risk of viral illness if you are basically healthy. But it is not potent enough to replace HCQ for treatment of COVID once you have symptoms, and it does not adequately get into lung tissue unless you take massive doses (3-5 grams a day), which cause significant GI (gastrointestinal) side effects such as diarrhea.

Related:

- *List of Doctors that will prescribe Ivermectin*
- *Best Quercetin Zinc Supplement*
- *Best Pulse Oximeter*

3. Zinc and Cytokine Storm

Zinc deficiency can significantly impact your immune system, but it can also result in a hyper inflammatory response from pro-inflammatory cytokines (Nutrients. 2017).

As early as 2010, zinc has been shown in a lab study to inhibit regular coronavirus (not the current SARS-CoV-2) in a 2010 publication.

Yet another study from Belgium (Nutrients 2021) has demonstrated the significance and importance of adequate levels of zinc and selenium in patients who have COVID-19, and especially in those who have underlined comorbidities identified to increase the severity of disease.

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 age-related diseases. This trace element is essential to to cell function and involved in over 100 enzymes. Research on atherosclerosis and diabetes mellitus suggests that zinc deficiency may contribute to low-grade systemic inflammation.

Aging is associated with compromised immunity, that just means that your immune response to pathogens and infections starts to slow and is less robust, including a reduced vaccine immune response/efficacy.

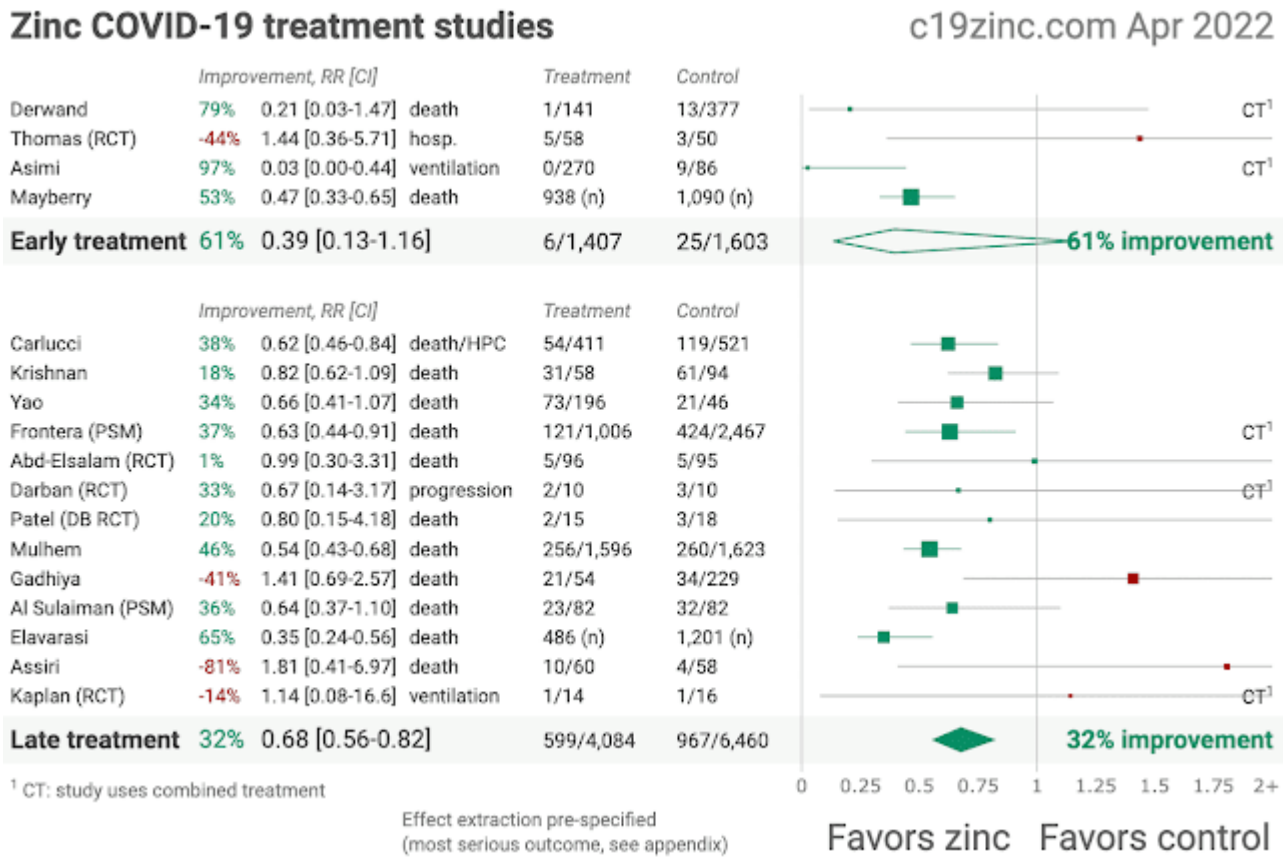
Improving zinc intake/zinc status improves/modulates/enhances immune function. The flip side is, while some aspects of immunity slow, others increase. Uncontrolled immune responses drive excess inflammation. Zinc helps to balance all of this.

The National Institutes of Health (NIH) states:

“Zinc is involved in numerous aspects of cellular metabolism. It is required for the catalytic activity of approximately 100 enzymes and it plays a role in immune function, protein synthesis, wound healing, DNA synthesis, and cell division. Zinc also supports normal growth and development during pregnancy, childhood, and adolescence and is required for proper sense of taste and smell.”

Zinc and COVID-19

Check out the evidence tracker on zinc and COVID-19 from c19zinc.com (constantly updated).



Foods that are high in zinc include oysters, crab, lobster, mussels, red meat, and poultry. Cereals are often fortified with zinc. Most multivitamin and nutritional supplements contain zinc.

Zinc has been shown in a lab study to inhibit regular coronavirus (not the current SARS-CoV-2) since 2010, in a 2010 publication.

Safety: Taking zinc long term is typically safe for healthy adults, as long as the daily dose is under the set upper limit of 40 mg of elemental zinc (PubMed). Be aware that typical daily doses of zinc provided by zinc lozenges generally exceed tolerable upper limits for zinc, and for this reason, they **should not be used for longer than about a week**.

Excessive doses may interfere with copper absorption, which could negatively affect your immune system as it can cause copper deficiencies, blood disorders and potentially permanent nerve damage. Zinc can also impair the absorption of antibiotics, and use of zinc nasal gels or swabs has been linked to temporary or permanent loss of smell.

Zinc Form and Dosage

There are several types of zinc supplements. Supplements contain several forms of zinc, including zinc gluconate, zinc citrate and zinc picolinate. The percentage of elemental zinc varies

by form. To find out the percentage of elemental zinc in each form, check out elemental zinc percentage.

Chelated zinc is a general form of supplementary zinc in which the zinc is chelated — or bound — to a compound to make it easier for the body to absorb. Zinc picolinate or zinc gluconate are formed when zinc is chelated to picolinic acid or gluconic acid, so the main difference between zinc gluconate and picolinate is what compound it is bound to.

To find out which zinc supplement to consider, check out best zinc supplement.

Most people do not lack an intake of zinc, but in disease state, there might be an increase in demand by the body. The FLCCC I-MASK+ protocol recommends 30 mg a day for prevention and 100 mg a day for early treatment of COVID-19. This should not be taken long term without evaluation of your zinc/copper ratios.

The ideal dose for prevention while the COVID-19 risk is high is 40-100 mg/d, a portion of which comes from zinc lozenges to spread the zinc through the tissues of the nose, mouth and throat. It should be accompanied by at least 1 mg copper from food and supplements for every 15 mg zinc.

Do take note that you should keep the dosage back to within 40 mg/d once the exposure risk is back to normal.

Related: Is Zinc Picolinate Elemental Zinc?

4. Vitamin C and Cytokine Storm

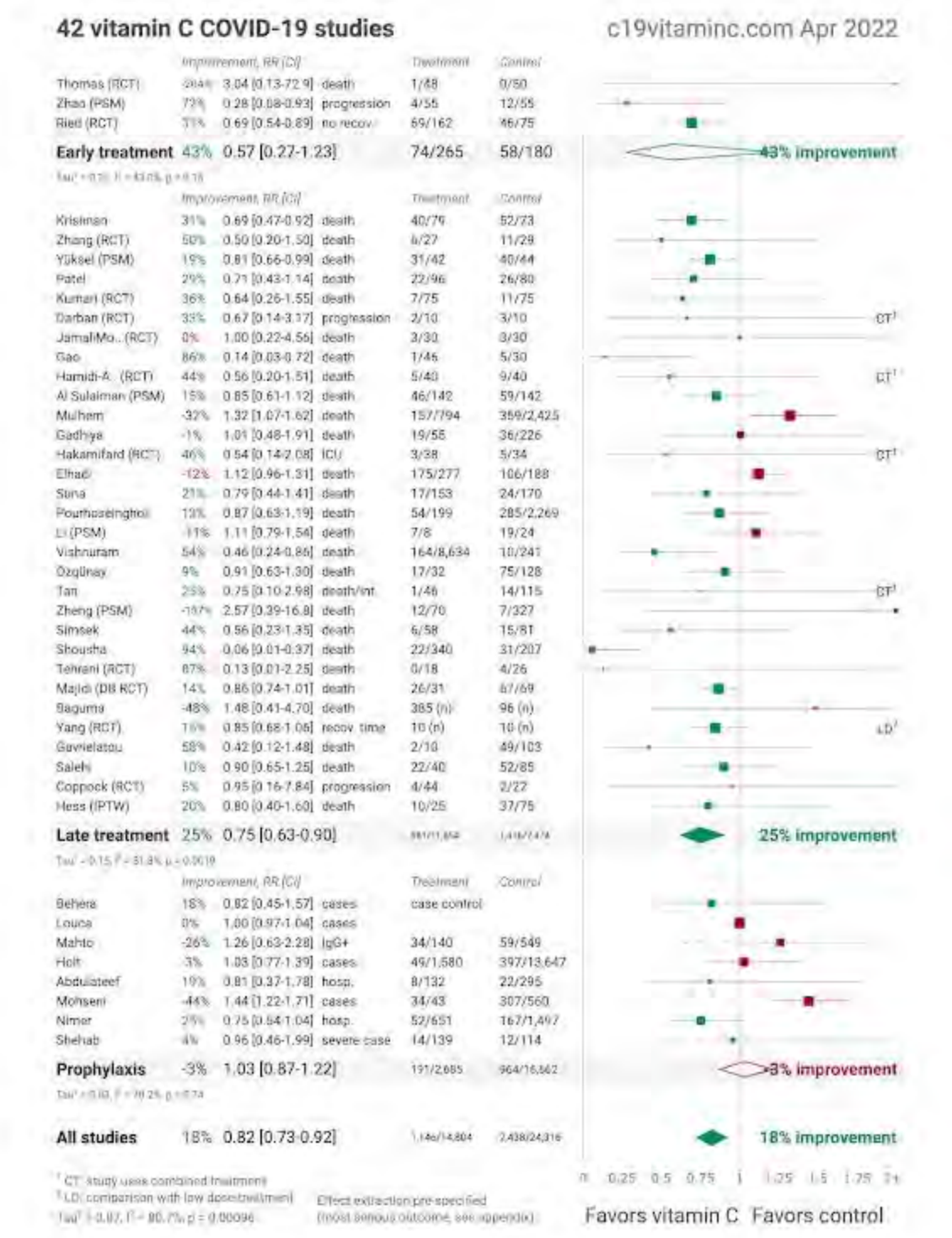
Vitamin C may be one of the most well-known immune nutrients that protect against immune deficiencies and which supports the prevention and recovery from the common cold and upper-respiratory issues, and also protects your cardiovascular system, eyes, skin, and other parts of your body. Research has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

Vitamin C might help prevent COVID-19 and also lessen the inflammatory reactions behind some severe COVID-19 cases, according to a review of research on the topic published in the latest issue of the journal Nutrition.

Do take note that the vitamin C dosages given in the hospitals intravenously are different from those over the counter vitamin C supplements. Therefore, when you come across studies on vitamin C, you need to differentiate those that are given intravenously vs oral vitamin C.

Vitamin C and COVID-19

Check out the evidence tracker on vitamin C and COVID-19 from c19vitaminc.com (constantly updated).



Safety: The U.S. Recommended Dietary Allowance (RDA) for vitamin C is 75 to 120 milligrams per day. Taking large doses of vitamin C (ascorbic acid) on a regular basis lowers your level of

copper, so if you are already deficient in copper and take high doses of vitamin C, you can compromise your immune system.

While generally considered safe even in high doses, way too much vitamin C — anything above 2,000 milligrams daily—can cause headaches, insomnia, diarrhea, heartburn, and other issues.

Temporarily taking megadoses of vitamin C supplements to combat a case of the cold or flu is likely not going to cause a problem.

Many vitamin C supplements that are above the US RDA are sold in the market. It's important to seek a physician's advice if you intend to take high dose vitamin C on a long term basis. To be on the safe side, you may also request for your kidney functions to be monitored.

For long-term, daily use, your best bet is to eat a diet that is full of high quality organic vegetables and fruits that are minimally processed. Not only will you get vitamin C, but you will get all the other accessory nutrients and micronutrients that are needed to optimize it.

Vitamin C, Omicron and Deltacron

Will Vitamin C Work Against Omicron or Deltracron? Vitamin C is not variant specific because it's primary mode of action is to support the body's immune system which reacts in a variety of ways against viral attack, not just in a specific antibody reaction to a specific spike protein.

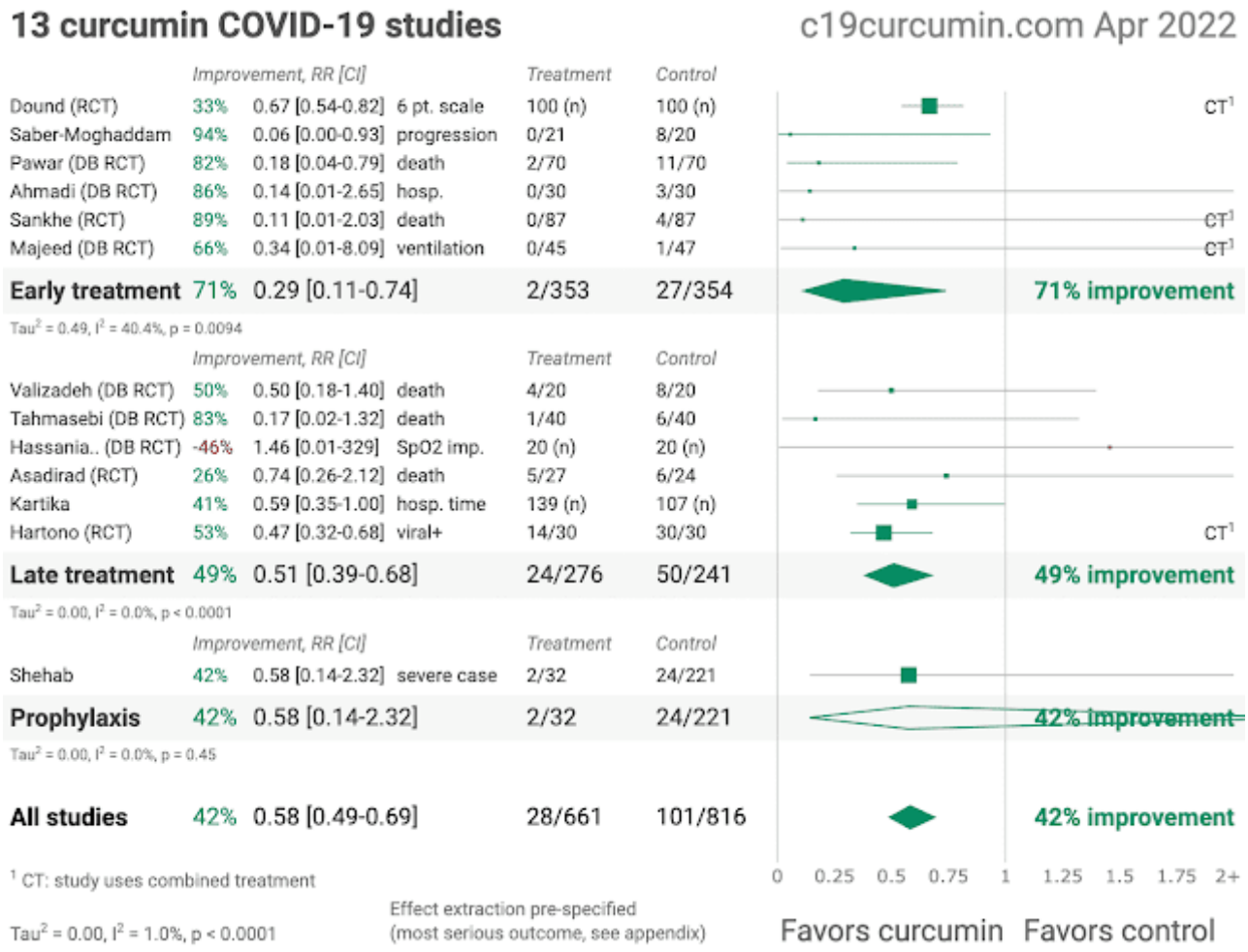
Related: Best Vitamin C Supplement

5. Curcumin and Turmeric

Can Turmeric Supplements Reduce Cytokine Storm? Curcumin, a yellow carotenoid from turmeric, is well known for its anti-inflammatory and free radical-scavenging effects.

Curcumin and COVID-19

There are more than 10 studies of curcumin in COVID-19 published. And the results are promising.



Curcumin also acts as natural zinc ionophores and can promote the cellular uptake of zinc and can be used with zinc to increase the effectiveness of these compounds in the inhibition of the virus (Ref).

It has also demonstrated antiviral effects against a range of respiratory viruses, including influenza A virus and others (Ref). Computer models suggest curcumin may interfere with viral entry into cells as well as viral replication inside cells (Ref).

Numerous preclinical studies indicate curcumin may activate antiviral immunity; at the same time, curcumin appears to inhibit infection-induced inflammatory signaling and promote anti-inflammatory processes, reducing the potential for a cytokine storm and ARDS and protecting other organ systems (Ref). By suppressing inflammation, curcumin has the potential to help mitigate complications and sequelae of severe acute viral respiratory infections (Ref).

Curcumin has been demonstrated (Ref) to suppress several inflammatory cytokines and mediators of their release such as tumor necrosis factor-alpha (TNF-alpha), IL-1, IL-8 and nitric oxide synthase.

Turmeric-derived curcumin is also one of the **natural blood thinners** as it is known to have powerful anti-coagulant properties. This is due to its ability to inhibit platelet aggregation and the formation of fibrinogen.

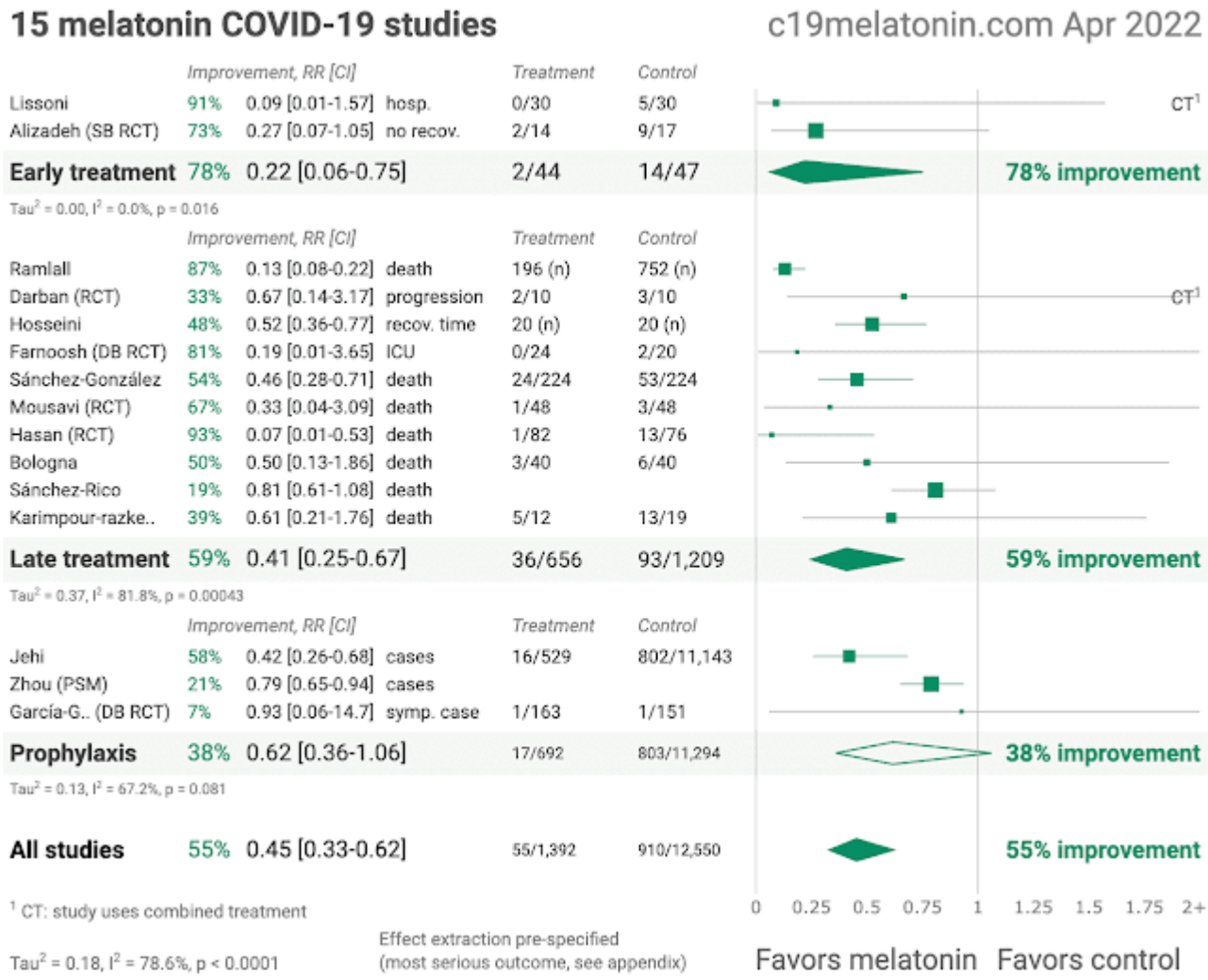
6. Melatonin and COVID-19

Melatonin is a hormone produced by the pineal gland in the brain, mainly during the night, that helps regulate circadian rhythms [Source]. Its levels decrease with aging. Most melatonin supplementation studies have evaluated its ability to control sleep and wake cycles, promote sleep, and reduce jet lag.

The potential utility of melatonin in treating COVID patients has not gone unnoticed, with a PubMed search combining melatonin and COVID producing more than 50 citations.

Check out the evidence tracker on melatonin and COVID-19 from c19melatonin.com (constantly updated).

As of April 2022, there are more than 10 published clinical studies of melatonin for treatment and prevention in COVID-19 and the results are promising even when it's given as a late treatment.



Melatonin and COVID-19

Melatonin is a hormone synthesized in your pineal gland and many other organs. While it is most well-known as a natural sleep regulator, it also has many other important functions. For example, melatonin is a potent antioxidant (Antioxidants, 2020) with the rare ability to enter your mitochondria, where it helps “prevent mitochondrial impairment, energy failure and apoptosis of mitochondria damaged by oxidation.” It also helps recharge glutathione and glutathione deficiency has been linked to COVID-19 severity.

Production of melatonin diminishes with age, contributing to immune dysfunction and increasing oxidative stress, inflammation, and infection susceptibility (Ref). In addition, infectious viruses can suppress melatonin production, disrupting circadian controls and impairing immune function (Ref).

According to a review (Cardinali et al. 2020), melatonin might counteract the consequences of COVID-19 via salutary effects on the sleep/wake cycle and more generally on chronobiology, as well as through its antioxidant and anti-inflammatory effects.

Based on melatonin's therapeutic potential and well-established safety profile, it has been suggested those at higher risk for severe illness and complications from viral respiratory infection, including the elderly and those with chronic medical conditions, may benefit most from regular use of 3–10 mg melatonin at bedtime (Ref).

Fluvoxamine (Selective Serotonin Reuptake Inhibitor) might also exert beneficial effects in COVID patients through its well-characterized ability to substantially increase (~ 2–3-fold) night-time plasma levels of melatonin. This increase appears to result from fluvoxamine's inhibition of the melatonin-metabolizing liver enzymes (von Bahr et al. 2000).

An Iranian randomised controlled trial (Arch Med Res 2021), studied 74 mild to moderate hospitalized patients. The study showed that adjuvant use of melatonin has a potential to improve clinical symptoms of COVID-19 patients and contribute to a faster return of patients to baseline health.

Some researchers have suggested high doses of melatonin, ranging from 50 to 200 mg twice daily, might help treat patients hospitalized for severe acute respiratory illness (Ref).

In a small Philippine case series study of 10 hospitalised COVID-19 patients, high dose melatonin (hdM) was given in addition (adjuvant) to standard therapy. According to the authors:

"High dose melatonin may have a beneficial role in patients treated for COVID19 pneumonia, in terms of shorter time to clinical improvement, less need for MV, shorter hospital stay, and possibly lower mortality."

Safety: If you take a melatonin supplement, be careful: ***Too much can cause daytime sleepiness***. There is no federal RDA nor any formal advice on supplement dose ranges. Based on an on-going Spanish study, a 2 mg daily dose protocol is being investigated for prevention of COVID-19. Do take note that the dosage for 'prevention' and 'treatment' is different, For prevention or maintenance, a lower dosage is normally recommended whereas a 'treatment' or 'therapeutic' dosage is normally higher.

Typical doses of 1–10 mg/day melatonin appear to be safe for short-term use (Source). Reported side effects, which are usually minor, include dizziness, headache, nausea, upset stomach, rash, and sleepiness. However, some reports have linked high blood levels of melatonin with delayed puberty and hypogonadism.

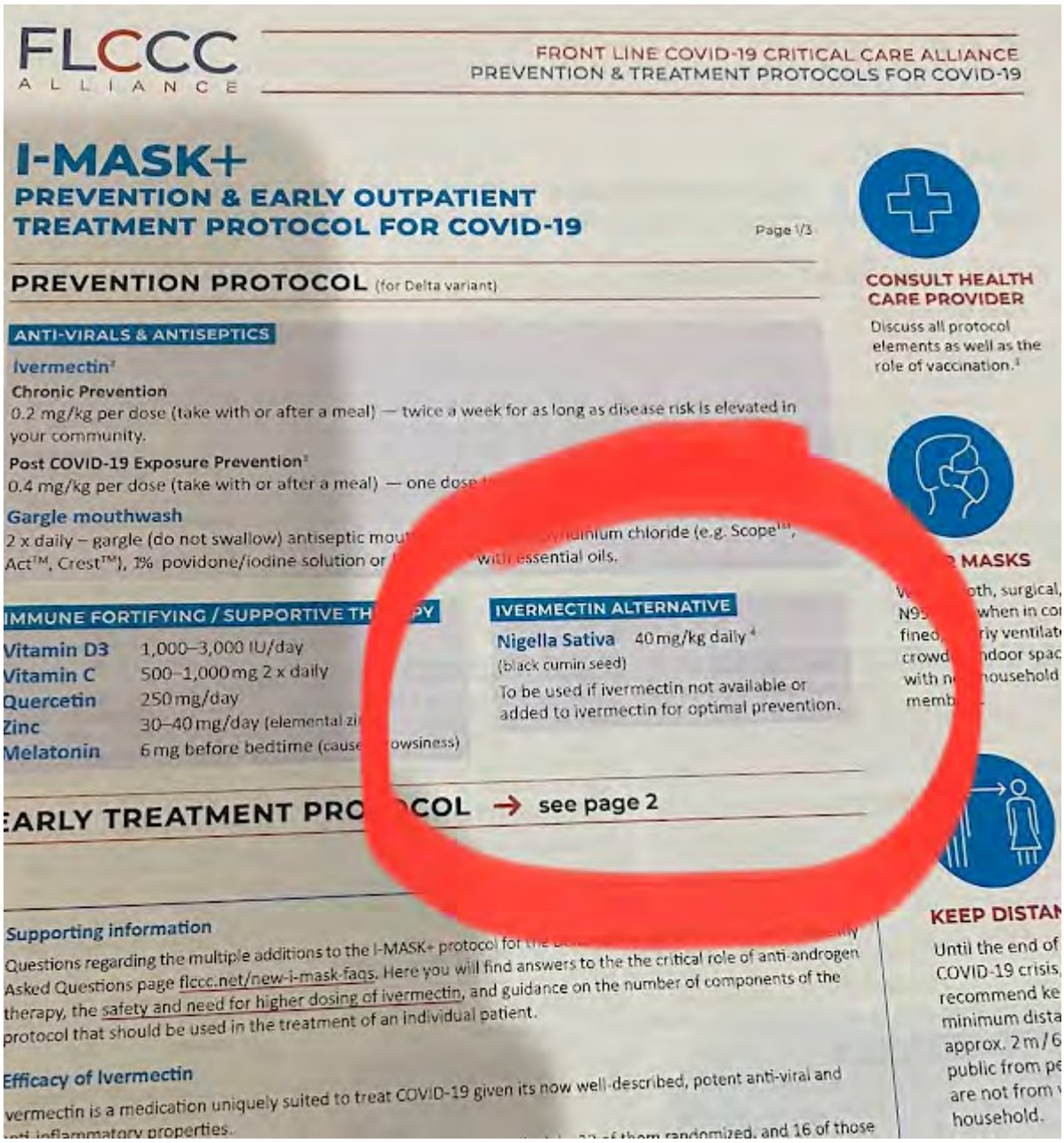
Studies have not evaluated melatonin supplementation during pregnancy and breastfeeding, but some research suggests that these supplements might inhibit ovarian function

(Source). Therefore, some experts recommend that women who are pregnant or breastfeeding avoid taking melatonin.

Related: Nature's Bounty Melatonin 5 mg > One tablet before bedtime (Amazon)

7. Nigella Sativa (Black Seed Oil) and Cytokine Storm

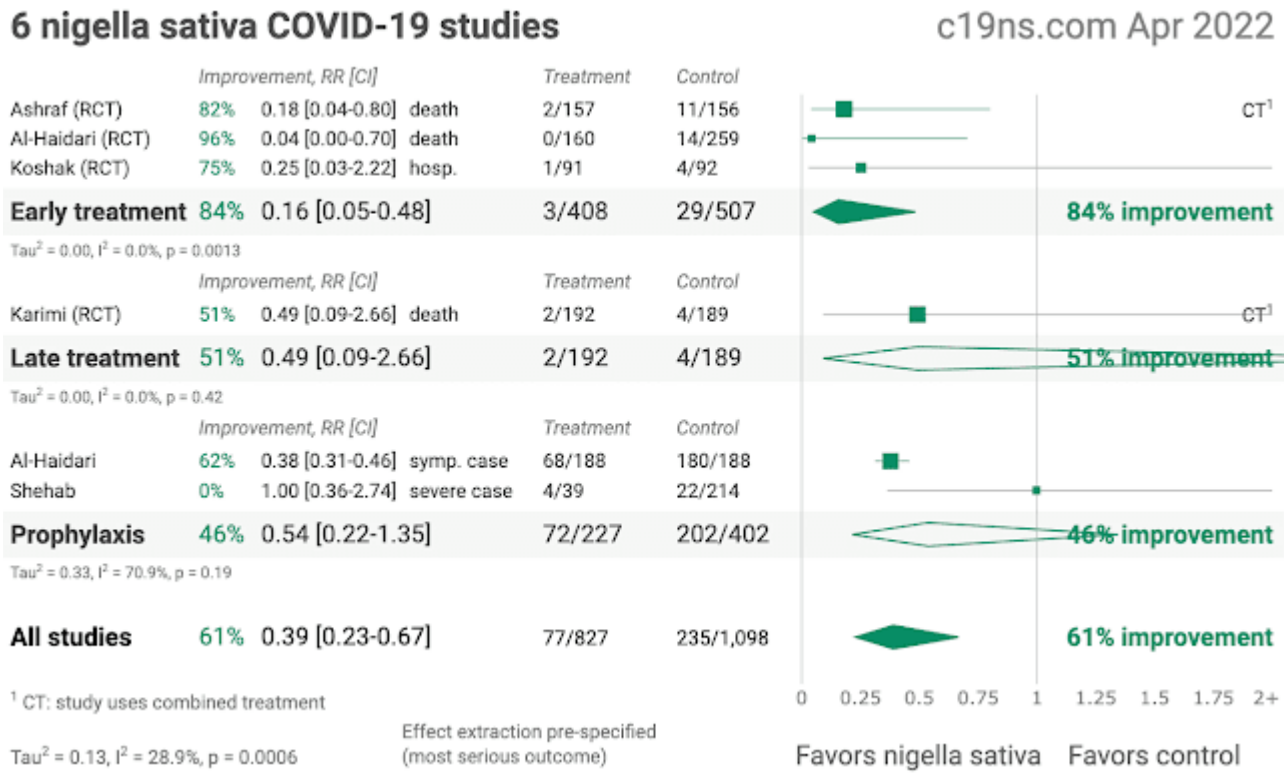
Nigella sativa (N. sativa) is a small flowering plant that grows in Southwest Asia, the Middle East, and Southern Europe (Source). This shrub produces fruit with tiny black seeds. Commonly referred to as black seed, N. sativa seeds go by many other names, such as black cumin, black caraway, nigella, fennel flower, and Roman coriander (Source).



Black seed oil is extracted from N. sativa seeds and has been used in traditional medicine for over 2,000 years due to its many therapeutic benefits.

Thymoquinone which is the active ingredient in N. sativa seeds has demonstrated effects in significantly reducing the cytokine storm chances and consequent mortalities (Source).

Summary results of 6 published clinical studies are available on this dedicated webpage: c19ns.com. The 4 RCTs (Randomized Controlled Trials) provide evidence that Nigella Sativa was associated with an average improvement of 84% in decreasing the likelihood of death and hospitalization.



8. Glutathione, NAC and COVID-19

Does NAC prevent cytokine storm in COVID? According to this paper (2021), SARS-CoV2 infection impairs the metabolism and redox function of cellular glutathione. According to the authors, NAC can prevent this damage and the role of NAC in COVID-19 therapy is worth investigating.

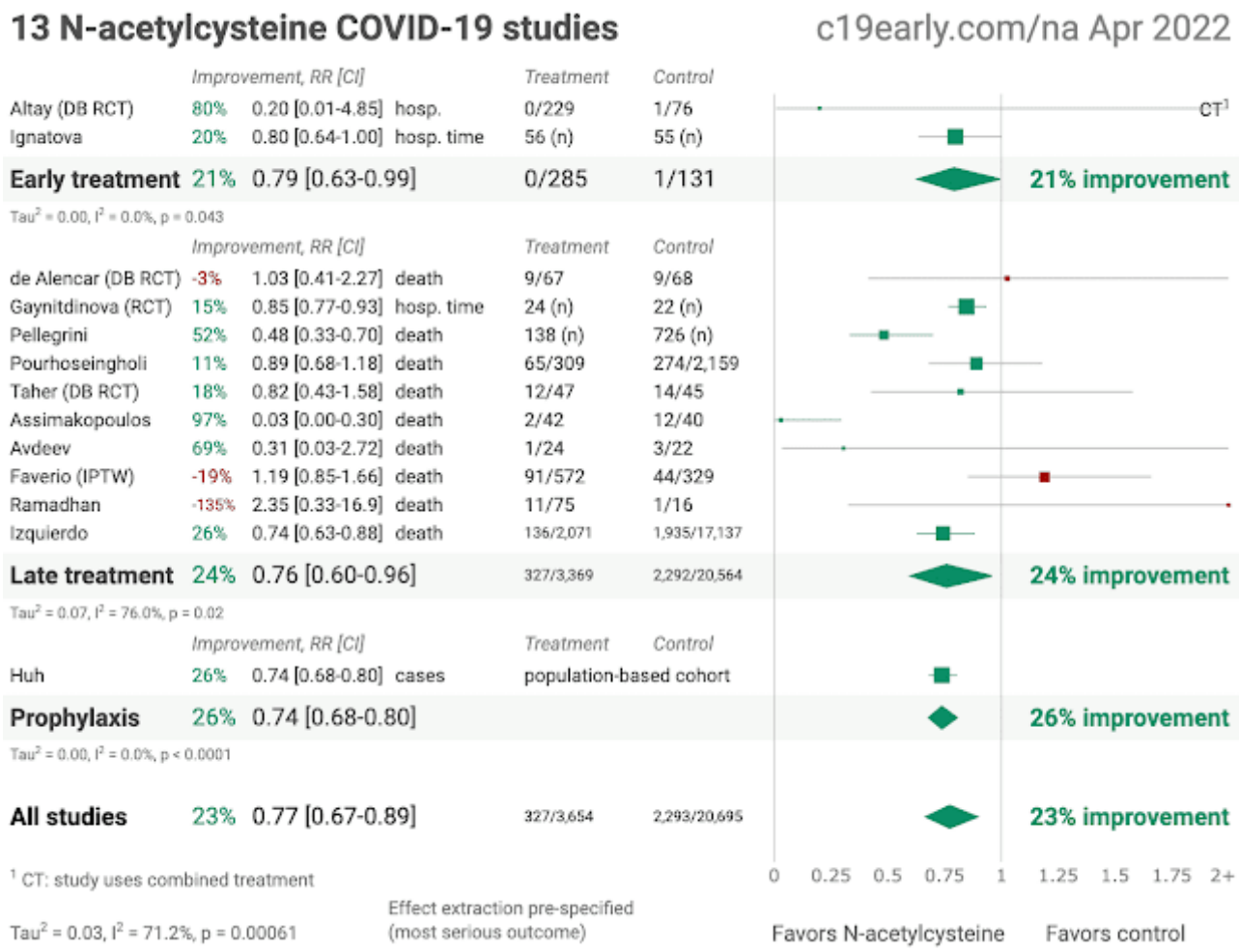
NAC inhibits cellular entry and replication of some respiratory viruses, assists in clearing thickened mucous from the airways, suppresses inflammatory signaling, and may help mitigate viral infection-induced cytokine storm (Ref).

N-acetylcysteine (NAC) is a precursor to glutathione. It is an antioxidant and increases glutathione levels in the body (Source). NAC has mucolytic activity, so it helps reduce respiratory mucus levels. Laboratory research suggests that NAC might boost immune system function and suppress viral replication. NAC also decreases levels of interleukin-6 and has other anti-inflammatory effects.

Much of the research on NAC has used an inhaled, liquid form of this compound. This form—which is classified as a drug, not a dietary supplement—is approved by the U.S. Food and Drug Administration (FDA) as a mucolytic agent and for decreasing respiratory secretion viscosity (Source). Products containing NAC are also sold as dietary supplements.

NAC and COVID-19

For a compilation of more than 10 studies of NAC and COVID-19, check out the list of studies here (constantly updated).



However, in terms of early treatment, the improvement rate is not as impressive as the other alternatives i.e. quercetin, black seed oil and vitamin A.

That said, NAC is a **natural alternative for aspirin** and an over-the-counter supplement that both prevents blood clots and breaks up existing ones i.e. anticoagulant effects. NAC also has other benefits that makes it useful against COVID-19.

Studies published in ACS Infectious Disease (ACS Infect Dis. 2020) and Antioxidants proposed that glutathione plays a crucial role in the body's fight against the severe inflammatory response triggered by the SARS-CoV-2 virus. The research group in the ACS Infectious Disease study called it the “most likely cause of serious manifestations and deaths in COVID-19 patients.”

Foods that have a positive impact on glutathione production include cruciferous vegetables such as broccoli, green tea, curcumin, rosemary and milk thistle. Getting quality sleep may also help.

Different types of exercise can influence your levels as well. In one study, researchers enrolled 80 healthy but sedentary volunteers to measure the type of exercise that may have the greatest effect. They found that aerobic training in combination with circuit weight training showed the greatest benefit.

Consider taking around 500 milligrams/day of NAC, as it helps prevent blood clots and is a precursor for your body to produce the important antioxidant glutathione.

Why are some retailers and Amazon no longer selling NAC? The US FDA made it clear in 2020 that it considers NAC to be a drug and not a dietary supplement, so, for legal reasons, some companies have stopped selling it in United States.

What Is the Primary Cause of Severe COVID-19 Illness: Glutathione or Vitamin D Deficiency?

The hypothesis that vitamin D (VD) deficiency is responsible for severe manifestations and death in COVID-19 patients has been proposed and is actively being discussed by the scientific community.

Several studies reported that glutathione levels positively correlate with active vitamin D. (PubMed, PubMed)

Interestingly, a recent experimental study (PubMed) showed that Glutathione deficiency and the associated increased oxidative stress epigenetically alters vitamin D regulatory genes and, as a result, the suppressed gene expression decreases Vitamin D production, ultimately leading to a secondary deficiency of vitamin D. This study provides important information that glutathione is essential for the control of endogenous vitamin D production and demonstrates potential benefits of Glutathione treatment in reducing the deficiency of vitamin D. Taken together, these findings suggest that glutathione deficiency rather than vitamin D deficiency is a primary cause underlying biochemical abnormalities, including the decreased biosynthesis of vitamin D, and is responsible for serious manifestations and death in COVID-19 patients.

NAC (N-Acetyl Cysteine) vs Glutathione

N-acetyl L-cysteine (NAC), as a precursor of glutathione, helps to replenish intracellular glutathione, a vital cellular antioxidant. NAC has a low molecular weight and is well absorbed via oral administration as compared to glutathione.

NAC may also protect against coagulation problems associated with COVID-19, as it counteracts hypercoagulation and breaks down blood clots.

Glutathione and Zinc

To improve your glutathione, you need zinc, and zinc in combination with hydroxychloroquine (a zinc ionophore or zinc transporter) has been shown effective in the treatment of COVID-19.

Glutathione and Molecular Hydrogen

One of the best ways to increase glutathione, though, is molecular hydrogen. Molecular hydrogen does so selectively and will not increase glutathione unnecessarily if you don't need it. You can view Tyler LeBaron's lecture on the details of how it does this in "How Molecular Hydrogen Can Help Your Immune System."

Glutathione and Selenium

Selenium is also important, as some of the enzymes involved in glutathione production are selenium-dependent.

Glutathione and Blood Clot

Glutathione is also one of the **natural blood thinners** as it is known to reverse the build-up of plaque and lessen the tendency of abnormal blood clots.

Safety: As an FDA-approved drug, the safety profile of NAC has been evaluated (Source). Reported side effects of oral NAC include nausea, vomiting, abdominal pain, diarrhea, indigestion, and epigastric discomfort. No safety concerns have been reported for products labeled as dietary supplements that contain NAC. (Source)

For NAC contra-indications, check out here.

NB: NAC supplements are not available on Amazon US. You can buy NAC Supplements from iHerb.

9. Green Tea (EGCG)

Quercetin and EGCG act as zinc ionophores (J. Agric. Food Chem. 2014), the same mechanism of action that hydroxychloroquine has via helping zinc pass the cell wall where it might halt viral replication.

Epigallocatechin-gallate (EGCG) 200mg (prevention) or 400 mg (early treatment) 1 time a day (J. Agric. Food Chem. 2014) is part of the Zelenko protocol for prevention and early treatment of COVID-19. EGCG acts as a zinc ionophore and therefore needs to be combined with zinc.

The strong oxidative stress-reducing and anti-inflammatory effects of green tea catechins, including epigallocatechin gallate (EGCG), have been well established. A solution of green tea catechins was found to inactivate COVID-19 virus in the laboratory (Ref).

Other laboratory and computer models suggest tea catechins may inhibit viral infectivity and growth (Ref). It has been proposed that EGCG, due to its immune-modulating effect, could have a role in suppressing hyper-inflammation and preventing lung fibrosis in patients with severe acute viral respiratory illness (Ref).

However, an underpowered observational study from Japan suggests that only a large consumption of green tea might be preventative against Covid, pointing to the bioavailability issue. Unfortunately, high green tea consumption is not recommended for your kidneys.

10. Fish Oil (Omega-3 Fatty Acids) and Omega-6

Omega-3 Fatty Acids are part of the I-Recover treatment protocol for Long Haul or Post-COVID syndrome, launched on June 16, 2021 by the FLCCC (Front Line COVID-19 Critical Care Alliance).

A pilot study (Jan 2021) suggests that patients with the most omega-3s in their system were 75% less likely to die from COVID-19. The pilot study was conducted using blood drawn from 100 patients treated for COVID-19 at the Cedars Sinai Medical Center in Los Angeles. The postulated mechanism of action is the well known anti inflammatory role of higher omega-3 levels, which may helped quell the so-called 'cytokine storm' observed in some severe and/or fatal COVID-19 cases.

This protection may have come from the effect EPA and DHA have on the body. An opinion paper published in June 2020 in the journal Frontiers in Physiology expounded on how "EPA and DHA supplementation can alter many biological pathways which may have a direct influence in

the outcome of COVID-19."(Front. Physiol., 19 June 2020) The writers listed the many nutrients that play a key role in managing a cytokine storm and continued:

"Among these micronutrients, LC-PUFAs (long-chain polyunsaturated fatty acids) such as EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) are noteworthy because of their direct influence in the immunological response to viral infections.

Among these complex immunomodulatory effects, interleukin-6 (IL-6) and interleukin-1ß (IL-1β) —because of the suspected central regulatory role in the "cytokine storm"—should be highlighted."

The omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) modulate inflammatory processes in the body through a variety of mechanisms (Ref, Ref). Severe acute viral respiratory infections can sometimes trigger cytokine storm, in which excessive production of inflammatory cytokines leads to uncontrolled systemic inflammation and life-threatening tissue and organ damage. Another phenomenon, called eicosanoid storm, has also been proposed to contribute to widespread inflammation, tissue damage, and organ failure. Eicosanoid storm is characterized by excessive production of pro-inflammatory and procoagulant eicosanoids made from arachidonic acid, an omega-6 fatty acid synthesized in the body and obtained from dietary animal fat (Ref, Ref). By competing with arachidonic acid for metabolic enzymes, EPA and DHA decrease the production of pro-inflammatory and procoagulant eicosanoids and increase production of specialized inflammation-resolving compounds (Ref, Ref).

Accumulating evidence shows omega-3 fatty acids, administered orally or intravenously, may help control inflammation and improve outcomes in critically ill patients, including those with ARDS.489 A meta-analysis of 12 randomized controlled trials with a total of 1,280 critically ill patients with ARDS found supplementation with omega-3 fatty acids, in combination with gamma-linolenic acid (a less-inflammatory omega-6 fatty acid) and antioxidants, improved markers of lung function; however, only hourly administration, rather than large bolus intravenous dosing, was associated with reduced mortality. Although reductions in mechanical ventilation and length of stay in intensive care were seen, these effects did not reach statistical significance (Ref).

An observational study in 100 patients hospitalized with a severe acute viral respiratory illness found higher levels of EPA plus DHA were associated with lower mortality, though the effect was not statistically significant, possibly due to the small number of participants (Ref). During an outbreak of a severe viral respiratory infection, another study found countries with the highest intake of omega-3 fatty acids from marine sources had lower mortality rates than other regions of

the world (Ref). The same research group used computer modeling to show how omega-3 fatty acids might bind to the highly infectious virus and interfere with its ability to enter cells (Ref).

That are more than a dozen studies on-going that examine the effect of EPA and/or DHA on the prevention of or lessening of symptoms of COVID-19.

Evidence suggests the omega-3 fats EPA and DHA affect biological pathways that may have direct influence in the outcome of COVID-19.

EPA and DHA have a direct influence in the immunological response to viral infections and can modulate immune response and function.

Animal-based omega-3 fats, especially DHA, also help prevent thrombosis (a blood clot within a blood vessel) by decreasing platelet aggregation. Hypercoagulation is another complication of severe COVID-19 infection that can have lethal consequences.

Omega-3 also lowers your risk of lung dysfunction, protects against lung damage and secondary bacterial infections, and improves mitochondrial function.

Research shows that by lowering triglycerides, the risk of developing a cytokine storm is diminished. Omega-3 supplementation is known to lower triglycerides, but krill oil does so more effectively than fish oil.

The British Rhinological Society's Guidelines for the Management of New Onset Loss of Sense of Smell During the COVID-19 Pandemic advises that that fish oil supplementation (2,000 mg of omega-3 fatty acids/day) may be beneficial when used in addition to standard treatment (olfactory training, oral steroids and steroid rinses) (Hopkins, Clin Otolaryngol 2020). This position is not based on a clinical trial of fish oil in COVID-19 patients but on limited animal and human research suggesting that omega-3 fatty acids may be beneficial for loss of smell due to olfactory nerve damage.

An interesting development published in Science, Nov 2020 revealed that linoleic acid (omega-6) binds with the 'spike protein' of the COVID-19 virus and interferes with the entrance of the virus into a human cell via the ACE-2 receptors. The study also revealed that in human cells, Linoleic Acid supplementation synergizes with the COVID-19 drug remdesivir in suppressing SARS-CoV-2 replication.

Related: Best Fish Oil Supplements

10 BEST FOODS TO PREVENT CYTOKINE STORM

1. Anti-Inflammatory Diet

One diet synonymous with anti-inflammatory properties is the Mediterranean diet, which is characterized by a relatively high dietary intake of minimally processed fruit, vegetables, legumes, olive oil, whole grains, nuts, and monounsaturated fats, followed by low-to-moderate consumptions of fermented dairy products, fish, poultry, wine, and, lastly, low consumptions of processed and red meats[PubMed, PubMed]. A balanced diet rich in these foods is associated with anti-inflammatory and immunomodulatory compounds, including essential vitamins (C, D, and E) and minerals (zinc, copper, calcium, etc.), that affect a person's nutritional status [PMC free article].

Several foods associated with the Mediterranean diet and other healthy dietary patterns contain bioactive compounds that go beyond just vitamins and minerals, including bioactive phenolic compounds; polar lipids; and peptides with potent anti-inflammatory, antithrombotic, and antioxidant properties. These molecules can synergistically act to prevent and protect against inflammatory manifestations and associated thrombotic and ROS-related complications (Nutrients 2020).

2. Fish and Omega-3 fatty acids

Certain types of fish are rich in inflammation-fighting omega-3 fatty acids, which reduce C-reactive protein (CRP) and interleukin-6, two inflammatory proteins in your body.

Best sources: Salmon, tuna, sardines, anchovies and other cold-water fish.

3. Fruits and Veggies

Fruits and vegetables are packed with antioxidants, which support the immune system – the body's natural defense system – and may help fight inflammation.

How much: At least 1½ to 2 cups of fruit and 2 to 3 cups of veggies per meal
Best sources: Colorful foods such as blueberries, blackberries, cherries, strawberries, spinach, kale and broccoli

4. Nuts and Seeds

Walnuts, almonds, pistachios, and many other nuts and seeds reduce inflammation and supply healthy fats to the body. Raw nuts without added oil or salt are best. Seeds, such as chia and flaxseed, are proven inflammation fighters and can be easily added to many foods to add an anti-inflammatory boost.

Nuts are full of inflammation-fighting monounsaturated fat, protein and filling fiber, too – a bonus if you're trying to lose a few pounds.

How much: Eat 1.5 ounces of nuts daily (about a handful)

5. Spinach

Spinach is a powerhouse of nutrients loaded with vitamin K, vitamin A, vitamin E, carotenoids, fiber, and other phytochemicals. The anti-inflammatory superfood is best when eaten raw, juiced, or lightly cooked. Natural antioxidants in spinach — and many other leafy green vegetables — have been shown to reduce inflammation in the body.
Berries

Blueberries, boysenberries, cranberries, pomegranates, cherries, raspberries, and other berries provide a sweet taste without adding too much sugar to a diet. Sugar is known to promote inflammation, which can make the body more susceptible to illness and disease. Many berries contain a blue-purple pigment called anthocyanins, which reduces existing inflammation as well. Blueberries also have potent antioxidants called pterostilbene, which reduce inflammation.

6. Turmeric

Turmeric contains polyphenol curcumin, which has powerful anti-inflammatory, antibacterial and antioxidant properties. The golden-yellow-colored seasoning has been shown to reduce tumor reproduction and induce tumor cell death.

7. Avocados

Avocados are filled with antioxidants that reduce the body’s inflammatory response and have also been shown to reduce inflammation in young skin cells. Avocados in their whole, unprocessed state are more likely to be anti-inflammatory, and they can alleviate pain and illness caused by inflammation.

8. Beans

Beans have several antioxidant and anti-inflammatory compounds. They’re a low-cost source of fiber, protein, folic acid and minerals such as magnesium, iron, zinc and potassium.

Best sources: Try pinto, black, red kidney and garbanzo beans

9. Olive Oil

Olive oil contains heart-healthy monounsaturated fat, antioxidants and oleocanthal, a compound

that can lower inflammation and pain.

How much: Two to three tablespoons per day for cooking or in salad dressings or other dishes

Best sources: Extra virgin olive oil is less refined and processed. It retains more nutrients than standard varieties. For optimal freshness and quality, opt for oils packaged in dark bottles with a certification or seal (COOC, North American Olive Oil Seal, DOP) and harvest date close to the purchase date.

10. Onions

Onions are packed with beneficial antioxidants. They may also reduce inflammation, heart disease risk and LDL, or “bad” cholesterol. Try them sautéed, grilled or raw in salads, stir-fries, whole-wheat pasta dishes or sandwiches.

Frequently Asked Questions

Elderberry and Cytokine Storm - Frequently Asked Question

There have been several warnings circulating about the potential catastrophic effects of taking elderberry extracts with COVID-19. The concern is that elderberry extracts may cause a fatal “cytokine storm” or "increase cytokine response" in patients affected by COVID-19.

Elderberry is considered generally safe and in influenza B (cause of common cold), use of elderberry shortens the duration of symptoms. However, as a part of its immune supportive actions, elderberry increases immune cell release of tiny chemicals called cytokines. Specifically, elderberry increases the release of a cytokine called IL-1B which is a part of the inflammatory reaction to COVID-19 that can result in acute respiratory distress. For this reason, to minimize the possibility that elderberry could aggravate the inflammatory “cytokine storm” associated with the more severe COVID-19 infections, it is recommended to stop elderberry at the first signs of infection (fever, cough, sore throat) and/or if you test positive for the virus.

There do not appear to be studies on the effects of elderberry extract on cytokine levels in people with severe respiratory infections, and there are no published reports of elderberry extract being associated with, or suspected of causing or worsening, a cytokine storm in people. Furthermore, the link between "cytokine storm" and COVID-19 severity has been disputed by some research (Kox, JAMA, Sep 2020).

Does Hydroxychloroquine Calm the Cytokine Storm? - Frequently Asked Question

So far, there is not enough evidence that hydroxychloroquine alone is effective in calming the cytokine storm. The MATH+ hospital treatment protocol by the FLCCC Alliance does not include hydroxychloroquine in their combination treatment protocol.

UK's Recovery Trial (University of Oxford) concluded that "there is no beneficial effect of hydroxychloroquine in patients hospitalised with Covid-19" and the drug has been pulled from the trial.

WHO trial (Solidarity) interim trial results (NEJM, Dec 2020) reported that remdesivir, hydroxychloroquine, lopinavir/ritonavir and interferon regimens appeared to have little or no beneficial effect among hospitalized COVID-19 patients.

Conclusion

Macronutrients and micronutrients are essential to a human body, there are no ifs and buts about it. Optimizing your immune system is critical to improve your health whether there is a pandemic or not.

Cytokines are an important part of your immune response. However, when your body releases excessive or uncontrolled levels of cytokines it results in hyper-inflammation 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.

Read more: coronavirus

Supplements you can purchase from Amazon for COVID-19 prevention based on the FLCCC prevention protocol >

- Vitamin D3 - 1,000 - 3,000 IU daily (Amazon)
- Vitamin C - 1,000 mg twice daily (Amazon)
- Quercetin - 250 mg daily (Amazon)
- Melatonin: 6 mg before bedtime (causes drowsiness) (Amazon)
- Zinc: 50 mg/day (elemental zinc). Zinc lozenges are preferred. (Amazon)

Be aware that most of the dosages are above the recommended daily value and therefore should not be taken on a long term basis.

Related item: Fingertip Pulse Oximeter (Amazon)

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Xlear Nasal Spray COVID-19: Studies Conclude Xlear Kills SARS-CoV-2 and Effective Against New Variants

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An in-vitro study done collaboratively by Utah State University and Northwestern University finds Xlear components (grapefruit seed extract and xylitol) significantly eliminates SARS-CoV-2, the virus that causes

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Quercetin vs Hydroxychloroquine: What's the Difference?

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Hydroxychloroquine is among the handful of COVID-19 treatments that are being studied as potential candidates that might influence the outcome in the management of COVID-19. According to a real time meta-analysis of more