

VITAMIN C FOR COVID-19

Landmark publication on vitamin C for COVID-19

Story at-a-glance

While health authorities and mainstream media have ignored, if not outright opposed, the use of vitamin C and other supplements in the treatment of COVID-19, citing lack of clinical evidence, a landmark review recommends the use of vitamin C as an adjunctive therapy for respiratory infections, sepsis and COVID-19

According to the authors, “Vitamin C’s antioxidant, anti-inflammatory and immunomodulating effects make it a potential therapeutic candidate, both for the prevention and amelioration of COVID-19 infection, and as an adjunctive therapy in the critical care of COVID-19”

Oral vitamin C at doses of 2 to 8 grams a day have been shown to reduce the incidence and duration of respiratory infections

Intravenous vitamin C at 6 to 24 grams a day has been shown to reduce mortality, ICU admission rates, hospital stays and time on mechanical ventilation in patients with severe respiratory infections

An international vitamin C campaign has been launched in response to the landmark review

Regardless of what the mainstream media want you to think,

many are starting to realize the truth, which is that both vitamin C (ascorbic acid) and vitamin D have an enormous amount of research showing they provide important immune function enhancements, and that your immune function is your frontline defense against all illness, including COVID-19.

As reported in the paper "Optimal Nutritional Status for a Well-Functioning Immune System Is an Important Factor to Protect Against Viral Infections," published April 23, 2020:1

"The role nutrition plays in supporting the immune system is well-established. A wealth of mechanistic and clinical data show that vitamins, including vitamins A, B6, B12, C, D, E, and folate; trace elements, including zinc, iron, selenium, magnesium, and copper; and the omega-3 fatty acids eicosapentaenoic acid and docosahexaenoic acid play important and complementary roles in supporting the immune system.

Inadequate intake and status of these nutrients are widespread, leading to a decrease in resistance to infections and as a consequence an increase in disease burden."

High-Dose Vitamin C Acts as an Antiviral Drug

As explained in the video above by Dr. Andrew Saul, editor-in-chief of the Orthomolecular Medicine News Service, at extremely high doses, vitamin C actually acts as an antiviral drug, effectively inactivating viruses.

His Tokyo presentation, "Orthomolecular Medicine and Coronavirus Disease: Historical Basis for Nutritional Treatment," highlights the fact that when used as a treatment,

high doses of vitamin C — often 1,000 times more than the U.S. Recommended Dietary Allowance (RDA) — are needed.

It's a cornerstone of medical science that dose affects treatment outcome, but this premise isn't accepted when it comes to vitamin therapy the way it is with drug therapy. Most vitamin C research has used inadequate, low doses, which don't lead to clinical results.

"The medical literature has ignored over 80 years of laboratory and clinical studies on high-dose ascorbate therapy," Saul notes, adding that while it's widely accepted that vitamin C is beneficial in fighting illness, controversy exists over to what extent. "Moderate quantities provide effective prevention," he says, while "large quantities are therapeutic."

Landmark Paper Puts Vitamin C on the COVID-19 Treatment Map

While health authorities and mainstream media have ignored, if not outright opposed, the use of vitamin C and other supplements in the treatment of COVID-19, citing lack of clinical evidence, we now have a landmark review² recommending the use of vitamin C as an adjunctive therapy for respiratory infections, sepsis and COVID-19.

Vitamin C's antioxidant, anti-inflammatory and immunomodulating effects make it a potential therapeutic candidate, both for the prevention and amelioration of COVID-19 infection, and as an adjunctive therapy in the critical care of COVID-19. ~ Nutrients December 7, 2020

The review,³ published December 7, 2020, in the journal

Nutrients, was co-written by Dr. Paul Marik who, in 2017, developed a groundbreaking vitamin C-based treatment for sepsis. Marik is now heading up the Front Line COVID-19 Critical Care Alliance,⁴ which has developed a highly successful treatment for COVID-19.

The COVID-19 protocol was initially dubbed MATH+ (an acronym based on the key components of the treatment), but after several tweaks and updates, the prophylaxis and early outpatient treatment protocol is now known as I-MASK+⁵ while the hospital treatment has been renamed I-MATH+,⁶ due to the addition of the drug Ivermectin. Vitamin C remains a central component of this treatment, though.

(The two protocols^{7,8} are available for download on the FLCCC Alliance website in multiple languages. The clinical and scientific rationale for the I-MATH+ hospital protocol has also been peer-reviewed and was published in the Journal of Intensive Care Medicine⁹ in mid-December 2020.) As explained in the Nutrients review abstract:¹⁰

"There are limited proven therapies for COVID-19. Vitamin C's antioxidant, anti-inflammatory and immunomodulating effects make it a potential therapeutic candidate, both for the prevention and amelioration of COVID-19 infection, and as an adjunctive therapy in the critical care of COVID-19.

This literature review focuses on vitamin C deficiency in respiratory infections, including COVID-19, and the mechanisms of action in infectious disease, including support of the stress response, its role in preventing and treating colds

and pneumonia, and its role in treating sepsis and COVID-19. The evidence to date indicates that oral vitamin C (2–8 g/day) may reduce the incidence and duration of respiratory infections and intravenous vitamin C (6–24 g/day) has been shown to reduce mortality, intensive care unit (ICU) and hospital stays, and time on mechanical ventilation for severe respiratory infections ...

Given the favorable safety profile and low cost of vitamin C, and the frequency of vitamin C deficiency in respiratory infections, it may be worthwhile testing patients' vitamin C status and treating them accordingly with intravenous administration within ICUs and oral administration in hospitalized persons with COVID-19."

International Vitamin C Campaign Launched

In a December 16, 2020, action alert,¹¹ Rob Verkerk, Ph.D., founder and scientific director of the Alliance for Natural Health, announced the launch of an international vitamin C campaign¹² in response to the landmark review, which "puts all the arguments and science in one, neat place."

As noted by Verkerk, there are several reasons to take supplemental vitamin C. First, your body cannot make it. Second, most people do not get sufficient amounts from their diet and, third, your body's requirement for vitamin C can increase 10-fold whenever your immune system is challenged by an infection, disease or physical trauma.

In fact, the Nutrients review¹³ points out that it's common for hospitalized patients to have overt vitamin C deficiency,

defined as a blood level at or below 11 $\mu\text{mol/L}$. This is particularly true for older patients and those hospitalized for respiratory infections.

According to the authors, "Vitamin C concentrations are three to 10 times higher in the adrenal glands than in any other organ. It is released from the adrenal cortex under conditions of physiological stress (ACTH stimulation), including viral exposure, raising plasma levels fivefold." In his action alert, Verkerk notes:¹⁴

"Taking vitamin C as a preventative and then, upping your intake if you're infected, is a no brainer. So is using vitamin C intravenously for those with acute respiratory infections, or sepsis, in critical care.

So much so, that we argue — given the now available evidence — that doctors and other health professionals who avoid recommendations on vitamin C in relation to COVID disease prevention and treatment, should be considered medically negligent ...

There is ample evidence to show that supplements like zinc, vitamin C, and vitamin D can help prevent and treat COVID–19, but we're prevented from learning about these benefits by the federal government.

Because supplements are not, and can never become, FDA–approved, they cannot claim to have an impact on disease, even when we know they can. This nonsense has to stop."

How Vitamin C Works

As mentioned, the Nutrients review¹⁵ details vitamin C's

mechanisms of action and how it helps in cases of infectious disease, including the common cold, pneumonia, sepsis and COVID-19. For starters, vitamin C has the following basic properties:

Anti-inflammatory

Immunomodulatory

Antioxidant

Antithrombotic

Antiviral

Beneficial antiviral effects apply to both the innate and adaptive immune systems. When you have an infection, vitamin C improves your immune function in part by promoting the development and maturation of T-lymphocytes, a type of white blood cell that is an essential part of your immune system. Phagocytes, immune cells that kill pathogenic microbes, are also able to take in oxidized vitamin C and regenerate it to ascorbic acid. With regard to COVID-19 specifically, vitamin C:¹⁶

Helps downregulate inflammatory cytokines, thereby reducing the risk of a cytokine storm. It also reduces inflammation through the activation of NF- κ B and by increasing superoxide dismutase, catalase and glutathione. Epigenetically, vitamin C regulates genes involved in the upregulation of antioxidant proteins and downregulation of proinflammatory cytokines

Protects your endothelium from oxidant injury

Helps repair damaged tissues

Upregulates expression of Type-1 interferons, your primary antiviral defense mechanism, which SARS-CoV-2 downregulates

Eliminates ACE2 upregulation induced by IL-7. This is particularly noteworthy, as the ACE2 receptor is the entry point for SARS-CoV-2 (the virus' spike protein binds to ACE2)

Appears to be a powerful inhibitor of Mpro, a key protease (enzyme) in SARS-CoV-2 that activates viral nonstructural proteins

Regulates neutrophil extracellular trap formation (NETosis), a maladaptive response that results in tissue damage and organ failure

Enhances lung epithelial barrier function in an animal model of sepsis by promoting epigenetic and transcriptional expression of protein-channels at the alveolar capillary membrane that regulate alveolar fluid clearance

Mediates the adrenocortical stress response, particularly in sepsis

The graph below, from the Nutrients review, illustrates the key ways in which vitamin C ameliorates the pathology seen in COVID-19.

Nebulized Peroxide May Be Even Better

The beautiful graphic above makes it really clear that one of the primary ways that vitamin C works is through the generation of reactive oxygen species. Guess what the primary one is? If you guessed hydrogen peroxide give yourself a high five!

It is highly likely that the peroxide forms a very powerful signaling function that stimulates the immune system to defeat whatever viral threat it is exposed to. This is one of the reasons why nebulized peroxide is my absolute favorite intervention for acute viral illnesses. It is highly effective, inexpensive and has no side effects when used at the very low doses recommended (0.1%, which is 30 times less concentrated than regular drugstore 3% peroxide).

My video below discusses the details of how you can use this therapy. The key is to have your nebulizer already purchased and ready to go so that it is locked and loaded and you don't have to go out and purchase anything if you or a loved one gets sick. You can still use vitamin C with the peroxide, as they likely have a powerful synergy and use different complimentary mechanisms.

Since you are not using full strength 3% peroxide and diluting it by 30 to 50 times, it is unlikely the stabilizers will present a problem, but to be safe, it is best to use FOOD-GRADE peroxide. Also, do not dilute it with plain water as the lack of electrolytes in the water can damage your lungs if you nebulize it. Instead, use saline or add a small amount of salt to the water to eliminate this risk.

Clinical Evidence

The Nutrients review¹⁷ also includes clinical evidence for the role of vitamin C in COVID-19, noting that early oral supplementation might help prevent a mild case from developing into something more serious. In patients with

critical symptoms, intravenous administration of vitamin C has been shown to speed up recovery, reducing both ICU stays and mortality.

Interestingly, vitamin C deficiency and COVID-19 share many of the same risk factors, including male gender, darker skin, older age and comorbidities such as diabetes, high blood pressure and COPD. All of these subgroups are at increased risk for severe COVID-19 and, according to the authors, all “have also been shown to have lower serum vitamin C levels.”

Commenting on the clinical evidence supporting the use of vitamin C in the treatment of COVID-19, the authors write:¹⁸ “There are currently 45 trials registered on Clinicaltrials.gov investigating vitamin C with or without other treatments for COVID-19. In the first RCT to test the value of vitamin C in critically ill COVID-19 patients, 54 ventilated patients in Wuhan, China, were treated with a placebo (sterile water) or intravenous vitamin C at a dose of 24 g/day for 7 days ... The more severely ill patients with SOFA [sequential organ failure assessment] scores ≥ 3 in the vitamin C group exhibited a reduction in 28-day mortality: 18% versus 50% in univariate survival analysis (Figure 2). No study-related adverse events were reported.”

Figure 2 below, from version 1 of the study,¹⁹ “High-Dose Vitamin C Infusion for the Treatment of Critically Ill COVID-19,” posted on the preprint server Research Square August 10, 2020 (updated September 23, at which point it was renamed²⁰), shows the 28-day mortality rates between

critically ill COVID–19 patients given high–dose IV vitamin C (HDIVC) compared to those given a placebo.

The Nutrient review also summarizes findings from other COVID–19 trials using vitamin C, as well as a few case reports:²¹

"In the UK, the Chelsea and Westminster hospital ICU, where adult ICU patients were administered 1 g of intravenous vitamin C every 12 h together with anticoagulants, has reported 29% mortality, compared to the average 41% reported by the Intensive Care National Audit and Research Centre (ICNARC) for all UK ICUs ...

The Frontline COVID–19 Critical Care Expert Group (FLCCC), a group of emergency medicine experts, have reported that, with the combined use of 6 g/day intravenous vitamin C (1.5 g every 6 h), plus steroids and anticoagulants, mortality was 5% in two ICUs in the US (United Memorial Hospital in Houston, Texas, and Norfolk General Hospital in Norfolk, Virginia), the lowest mortality rates in their respective counties.

A case report of 17 COVID–19 patients who were given 1 g of intravenous vitamin C every 8 h for 3 days reported a mortality rate of 12% with 18% rates of intubation and mechanical ventilation and a significant decrease in inflammatory markers, including ferritin and D–dimer, and a trend towards decreasing FiO₂ requirements.

Another case of unexpected recovery following high–dose intravenous vitamin C has also been reported. While these case reports are subject to confounding and are not *prima facie*

evidence of effects, they do illustrate the feasibility of using vitamin C for COVID-19 with no adverse effects reported."

How Much Vitamin C Do You Need?

As detailed in the introduction of the Nutrients review,²² primates and humans are dependent on an adequate supply of vitamin C from fruits and vegetables. Gorillas need 4.5 grams a day, while smaller primates weighing around 7.5 kilos need about 600 mg per day. This gives us a clue as to what the human requirement might be, and it's quite a bit higher than the daily recommended intake. According to the authors:²³ "The EU Average Requirement of 90 mg/day for men and 80 mg/day for women is to maintain a normal plasma level of 50 $\mu\text{mol/L}$, which is the mean plasma level in UK adults. This is sufficient to prevent scurvy but may be inadequate when a person is under viral exposure and physiological stress.

An expert panel in cooperation with the Swiss Society of Nutrition recommended that everyone supplement with 200 mg 'to fill the nutrient gap for the general population and especially for the adults age 65 and older. This supplement is targeted to strengthen the immune system.' The Linus Pauling Institute recommends 400 mg for older adults (>50 years old). Pharmacokinetic studies in healthy volunteers support a 200–mg daily dose to produce a plasma level of circa 70 to 90 $\mu\text{mol/L}$. Complete plasma saturation occurs between 1 g daily and 3 g every four hours, being the highest tolerated oral dose, giving a predicted peak plasma concentration of circa 220 $\mu\text{mol/L}$.

The same dose given intravenously raises plasma vitamin C levels approximately tenfold. Higher intakes of vitamin C are likely to be needed during viral infections with 2–3 g/day required to maintain normal plasma levels between 60 and 80 $\mu\text{mol/L}$. Whether higher plasma levels have additional benefit is yet to be determined, but would be consistent with the results of the clinical trials discussed in this review."

While high-dose vitamin C regimens typically call for intravenous administration, if treating a viral infection at home (be it COVID-19 or something else), you could use oral liposomal vitamin C, as this allows you to take far higher doses without causing loose stools.

You can take up to 100 grams of liposomal vitamin C without problems and get really high blood levels, equivalent to or higher than intravenous vitamin C. I view that as an acute treatment, however. I discourage people from taking mega doses of vitamin C on a regular basis if they're not actually sick, because it is essentially a drug — or at least it works like one.

Saul, who has worked with and recommended vitamin C for most of his professional life suggests taking "enough vitamin C to be symptom-free," whatever dosage that might be. When you're well, you typically don't need more than the 200 mg to 400 mg recommended in the quote above