

# How Zinc Can Boost Your Immune Health

Analysis by [Dr. Joseph Mercola](#) ✓ Fact Checked

## STORY AT-A-GLANCE

- › Zinc is essential for the normal development and function of your immune system as it protects against susceptibility to pathogens, mediates natural killer cells, activates T-lymphocytes, regulates macrophages and is central to DNA replication
- › Evidence shows zinc helps protect the body from COVID-19 by impairing viral replication in the cell, supporting ciliary growth and function in the respiratory system and improving the respiratory epithelial barrier
- › A zinc deficiency is associated with many of the comorbidities linked to COVID-19, including obesity, kidney disease, tobacco smoking, diabetes and autoimmune diseases
- › Using a zinc ionophore helps move zinc into the cells where it can impair viral replication. Zinc ionophores include hydroxychloroquine, quercetin and EGCG found in green tea
- › Zinc supplementation may trigger a zinc/copper imbalance. It is best to consistently get your zinc from food and use supplementation during an acute illness

In this short video by Dr. John Campbell, he reviews some of the science behind the association between zinc and the immune system. He believes it is one biological basis for an “altered resistance to infection.”<sup>1</sup> But, beyond the immune functions I discuss below, it’s important to know that zinc plays other important biological roles.

For example, you have at least 300 enzymes that require zinc to function normally.<sup>2</sup> The Centers for Disease Control and Prevention<sup>3</sup> has identified several common human coronaviruses that are responsible for upper respiratory tract illnesses, like the common

cold. Although a cold is usually a minor condition, it is also responsible for most doctor's office visits every year.<sup>4</sup>

A cold can last as short as a week, but in children and the elderly it can last longer. Cold symptoms include stuffy head, runny nose, sore throat, headache and sometimes a fever.<sup>5</sup> These are some of the same symptoms of influenza, but the symptoms are often worse and include fever and body chills.

It wasn't until the work of Dr. Ananda Prasad in the 1970s that zinc was acknowledged as an essential mineral.<sup>6</sup> A decade earlier, Prasad was studying young men who had grown up in Egypt and never attained their normal height.

After supplementing with zinc, the men grew “significantly taller.” In the 1970s, zinc was acknowledged by the National Academy of Sciences as a mineral fundamental to many aspects of health. Prasad collaborated with a scientist from the University of Michigan to demonstrate that zinc influences immunity.<sup>7</sup>

Research in the last decade has identified the crucial role that zinc plays in curtailing the length and severity of upper respiratory infections. A meta-analysis<sup>8</sup> published in 2017 found those who took a zinc supplement of 80 to 92 milligrams (mg) each day at the beginning of cold symptoms saw a reduction in the length of their cold by 33%.

Although research has demonstrated the significantly positive effect zinc has on the immune system and on shortening upper respiratory infections caused by common cold viruses, further research in 2020 has demonstrated that zinc is crucial to immune system function and deficiency may be linked to individuals who have severe COVID-19 illness.<sup>9</sup>

## **Zinc Is Crucial for Normal Immune System Development**

Since the 1970s, scientists have discovered several facts about zinc and how it plays a central role in the immune system. Your immune system is your body's first line of defense. Whether this is against infectious disease, wound infections or chronic disease, your immune system plays a crucial role.

Researchers have spent decades studying the different ways that you can support your immune system to improve function. Nutrients play a vital role in supporting your immune system, and one of those nutrients is zinc. Swiss Policy Research (SPR), formerly known as Swiss Propaganda Research, describes itself as:<sup>10</sup>

*“... an independent, nonpartisan and nonprofit research group investigating geopolitical propaganda. SPR is composed of independent academics and receives no external funding other than retrospective reader donations.”*

The group has gathered evidence and information throughout the COVID-19 pandemic. The investigators believe that those who are either at high risk of getting COVID or at high risk for exposure to it should receive early or prophylactic treatment.<sup>11</sup> They also propose that prophylaxis and treatment should contain zinc.<sup>12</sup>

Early and outpatient treatment from the Front Line COVID-19 Critical Care Alliance,<sup>13</sup> contains zinc, as does the protocol recommended and prescribed by Dr. Vladimir Zelenko.<sup>14,15</sup> Zelenko created a website to facilitate crowd-source medical data from frontline primary care doctors around the world.<sup>16</sup>

There are academics who also support Zelenko's efforts, including some at the University of Texas, which hosts a download page describing the history and citations behind the Zelenko Protocol.<sup>17</sup> Zelenko and the Front Line critical care doctors used their knowledge of the association between zinc and your immune system to develop their successful protocols. Data have shown:<sup>18</sup>

- People who are deficient in zinc have an increased susceptibility to pathogens, including through the skin barrier.
- Zinc mediates nonspecific immunity, including natural killer cells and neutrophils.
- Zinc deficiency prevents the activation of T-lymphocytes, production of Th1 cytokine, and the ability of B lymphocytes to help. During deficiency, B lymphocyte development is also compromised.
- Deficiency affects the function of macrophage cells, which can trigger cytokine production and dysregulated intracellular death.

- Zinc is central to DNA replication, RNA transcription and cell activation and division.

## **Evidence Zinc Helps Protect Against COVID-19**

Campbell describes several functions by which zinc helps protect the body from COVID-19, including helping to stop viruses from entering the cells.<sup>19</sup> Another function that zinc performs is in supporting the growth and function of ciliary hairs in the respiratory system.

One study published in the American Journal of Rhinology and Allergy<sup>20</sup> showed that zinc helps to stimulate the ciliary beat frequency and may help improve mucociliary clearance, which is essential for clearing the lungs of mucus. Another group of scientists found that supplementing animals deficient in zinc affected the length of the cilia and number of epithelial cells in the bronchus.<sup>21</sup>

Zinc also functions to improve the respiratory epithelial barrier,<sup>22</sup> which past research also demonstrated.<sup>23</sup> Evidence has shown that zinc influences interferon-gamma (IFN- $\gamma$ ), which plays a significant role in defending against intracellular pathogens.<sup>24</sup> When there is a reduction in this cytokine it results in immunological impairment.

While the jury is still out on whether IFN- $\gamma$  plays a role as an antitumor mechanism, some studies have shown that it does have a positive effect on patients' survival of certain cancers.<sup>25</sup>

As you've likely heard throughout 2020, zinc also has a direct effect on viral replication inside the cells. Campbell describes some of the effects that zinc has inside the cells,<sup>26</sup> including decreasing the effects of RNA-dependent RNA polymerase, often called replicase since it helps replicate the virus inside the cells.

## **Zinc Deficiency Linked to Multiple Health Conditions**

As Campbell points out, a zinc deficiency can significantly impact your immune system, but it can also result in a hyper inflammatory response from proinflammatory

cytokines.<sup>27</sup> Thus, with a deficiency in zinc, you not only get more viral infections, but these trigger an increase in the hyper inflammatory response.

At approximately minute 14 in the video above, Campbell shows a Venn diagram of the overlapping health conditions in which a zinc deficiency is commonly associated, and which are known comorbidities for COVID-19. These conditions include:

Arteriosclerosis	Autoimmune diseases	Bronchial asthma
Cancer	Chronic obstructive pulmonary disease (COPD)	Diabetes
Diuretics	Elderly	Immunosuppression
Kidney disease and liver cirrhosis/damage	Tobacco smoking	Obesity

Interestingly, a study published in the journal Mayo Clinic Proceedings<sup>28</sup> found that celiac disease, or a gluten sensitive enteropathy, is highly associated with a zinc deficiency. One in 141 people in the U.S. reportedly suffers from celiac disease<sup>29</sup> and the prevalence has increased in the last 60 years.<sup>30</sup>

In the study, 59.4% of those diagnosed with celiac disease were zinc deficient.<sup>31</sup> Dr. Adam Bledsoe, a gastroenterology fellow at Mayo Clinic's Rochester campus and lead author of the study, noted in a Mayo Clinic news release:<sup>32</sup>

*"It was somewhat surprising to see the frequency of micronutrient deficiencies in this group of newly diagnosed patients, given that they were presenting fewer symptoms of malabsorption ...*

*Our study suggests that the presentation of celiac disease has changed from the classic weight loss, anemia and diarrhea, with increasing numbers of patients diagnosed with nonclassical symptoms."*

Zinc deficiency has also been associated with depression.<sup>33</sup> Studies show that low serum levels of zinc in individuals who are depressed could trigger a chronically poor mood. Researchers have also found that zinc plays a role in maintaining normal levels of thyroid stimulating hormone and T3.<sup>34</sup>

## **Zinc Ionophores Improve Effectiveness**

In this short MedCram video, Dr. Roger Seheult reviews the compelling evidence that suggests how zinc ionophores improve zinc uptake into the cell. This is a crucial component of stopping viral replication. As Seheult explains, the zinc cannot easily penetrate the fatty walls of the cell but needs to be inside the cell to stop viral replication.

There are several zinc ionophores that can do the job. In this video, Seheult describes the role that hydroxychloroquine and chloroquine play. Hydroxychloroquine is the ionophore that Zelenko uses in his protocol to move zinc into the cells. In his peer-reviewed study the researchers compared 141 treated patients against 377 untreated patients from the same community.<sup>35</sup>

The data collection showed only four of the 141 treated patients were hospitalized and 58 of the untreated patients were hospitalized. One patient in the treatment group died and 13 patients in the untreated group died. However, there are also other natural compounds that may work, except for perhaps in the most serious cases. Two that have been studied include quercetin and epigallocatechin gallate (EGCG), which is found in green tea.<sup>36</sup>

In a comparative study, researchers evaluated quercetin and EGCG as zinc ionophores. They demonstrated ionophore action on a lipid membrane system and concluded that these polyphenols may raise zinc levels in the cells and have a significant impact on the biological action of zinc.

Interestingly, quercetin is also a potent antiviral and quercetin and EGCG have the added advantage of inhibiting the 3CL protease.<sup>37</sup> According to a 2020 study in the Journal of Enzyme Inhibition and Medicinal Chemistry,<sup>38</sup> the ability to inhibit SARS coronaviruses

“is presumed to be directly linked to suppress the activity of SARS-CoV 3CLpro in some cases.”

## Zinc Supplementation May Trigger a Copper Imbalance

Zinc deficiency is not uncommon. Experts believe that about 17.3% of the global population are deficient<sup>39</sup> and it is estimated most people over 65 consume just 50% of the recommended amount zinc.<sup>40</sup>

The deficit may in part be the result of soil depletion of zinc due to conventional farming methods and may also simply be that not enough zinc-rich foods are included in the diet. There are four common signs that your body may need more zinc:<sup>41</sup>

- Lack of appetite
- Mental lethargy
- Impaired sense of taste or smell
- Frequent colds, flu or infections
- Hair loss<sup>42</sup>

Although more attention is being paid to zinc recently, Emily Ho, Ph.D., principal investigator with the Linus Pauling Institute at Oregon State University, has said,<sup>43</sup> "Zinc deficiencies have been somewhat under the radar because we just don't know that much about mechanisms that control its absorption, role or even how to test for it in people with any accuracy."

While some tests used to identify deficiency include hair analysis,<sup>44</sup> urine samples<sup>45</sup> or an oral taste test,<sup>46</sup> blood plasma tests are the most common.<sup>47</sup> The oral taste test can be done at home through mail-order labs. It involves holding 10 milliliters of liquid zinc in your mouth for 10 seconds. Because the liquid zinc has an intense taste, if your zinc levels are normal, you likely will not be able to tolerate the strong taste for long.

In fact, you may want to immediately spit it out. If you're deficient, you'll likely be able to hold it in your mouth without any difficulty because it will taste like water. The absence

of sufficient zinc in your body will somewhat disable your sense of taste and smell, which means you're not affected by the intense taste.

However, the test is not specific to zinc.<sup>48</sup> In other words, impaired taste for another reason will net the same result – you will not taste the zinc. Campbell list several groups of individuals who are at risk for zinc deficiency, including:<sup>49</sup>

- Those with malnutrition
- The elderly
- People with inflammatory or autoimmune diseases
- Vegetarians and vegans

Early zinc deficiency is largely subclinical – meaning you do not have clinical symptoms – yet it does impact the immune system. Zinc levels are impacted by copper. An imbalance in your zinc and copper levels can lead to other health conditions. For example, researchers postulate that the zinc deficiency associated with anxiety and depression may be the result of a zinc copper imbalance.<sup>50</sup>

Although you may be tempted to begin supplementing with zinc, it's important to realize that your body has an intricate method of maintaining balance of trace minerals such as copper, iron, chromium and zinc. The best way to readily achieve proper balance is to get your minerals from real food.

Although it may be necessary to supplement during illness when your body needs more zinc, I recommend trying to meet your daily requirement from foods. These are some of the best food sources of zinc:<sup>51,52,53</sup>

Alaskan King crab	Oysters	Almonds
Cashews	Kidney beans	Pastured chicken
Lamb	Chickpeas	Oatmeal
Grass fed beef	Cheddar or Swiss cheese	Yogurt



Mushrooms	Spinach	Pork chops
Pumpkin seeds		

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