



COVID-19 “Survival Guide”

*A Resource Guide for Handling
a Global Pandemic*

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RICHMOND
Integrative & Functional Medicine

A Note From Dr. Hartman

We posted our first video about COVID-19 on January 30, 2020 in response to patients posing questions to me asking my thoughts on this new virus affecting China and if it was going to affect us. That's how this journey began, me answering patients' questions. We have continued to do this over the last few months and have created a robust compendium of information, videos and infographics as resources for you, your family, and friends. However, it's quite a bit of information and in response to continued inquiries and concerns, I have decided to summarize my studies for the first quarter of this year and put the information into a simplified manual or "survival guide". This project falls directly in line with our values of Education for individuals, Encouragement to take charge of their health, and the Empowerment to do so.

This survival guide is meant to do several things:

1. Cover the basic prevention tactics to keep you and your loved one's disease free
2. Instruction on basic lifestyle measures to boost your immune system to combat viral infections and include the current data we have on COVID-19
3. Prepare us for the fall when this virus re enters the seasonal flu cycle

My hope is that this will provide you with the basic tools and resources to maintain your health, keep a balanced perspective in a sea of misinformation, and provide you with a basic action plan for your health and your family's wellbeing. I've gone into some (simplified) detail of "Immunity 101", but know that the tips following that section are your "take away" action steps, so you can also proceed to that section if you would prefer to simply have a resource for what you can do without the full explanation of why those steps are useful. If you find this or other information we have been publishing helpful, you can also find us on Facebook and Instagram for our real time updates. We've also added Vimeo, and YouTube for individuals who would like access to our videos, but prefer not to engage on social media. Our website is our hub for information, and there is a whole host of information there as well, from food plans and diets to book reviews and informational blog posts. I'd like to invite you to enjoy these resources as well.

Yours in Health,

Aaron Hartman MD

2 April 2020

Disclaimer: Nothing contained in these pages is meant as medical advice and is not intended to diagnose or treat any medical condition. Any information in this guide should be cautiously reviewed with your personal healthcare practitioner.

BASIC HISTORICAL OUTLINE OF COVID-19

When I first started following the then unknown novel coronavirus traveling throughout the Wuhan province in China, I didn't quite know what to think. We had already survived the SARS CoV-1 from 2002-2003 that originated in the same country and then several years later MERS. However, I learned in medical school in 1996 that we were "due" for a worldwide pandemic and since medical school I have been following infection trends worldwide, just waiting to see when/if the next worldwide pandemic would come. Maybe that's why I was an early adopter, I don't know. But what I do know is that the primary reason I started to follow this was plain and simple; people were asking me about it and I was compelled to answer their questions. So, I started to follow this new infection.

On January 30th, 2020 we put out our first video on the virus' progression. At that time, it seemed like just another unusual virus that may have originated in the wet markets of China. These are marketplaces unique to Chinese culture where people can buy a whole array of exotic foods. What makes this area so prone to infection production is the close proximity of so many people, a wide array of animals, and on the same spot availability of butchering and consuming these animals. It's a perfect storm for transmission of infections from lower animals (i.e. bats, civets and reptiles) to humans. This initial transmission mostly likely happened sometime in late October to early November 2019*.

News getting out of China was quite spotty until early January but it appears that things were spreading from November through mid-late December. There was active suppression of medical professionals releasing the information but by January too much data was out there in social media and too many local professionals had asked their colleagues about this new strange viral pneumonia. This lag of response time by 6 weeks allowed enough people to travel in and out of the 11-million person city Wuhan that it not only got out of China but spread to other population centers. The Lombardy region of Italy has a large Chinese textile industrial center, Iran has a strong trade with China, and the U.S. is a major trading partner with China. I remember in December hearing of some cases of bizarre bilateral viral pneumonias in our local intensive care units and seeing patients with coughs lasting 4-6 weeks in early/mid January. Mostly likely this novel coronavirus, COVID-19, was already in the U.S., but it wasn't until January 20, 2020 that the first case was reported here.

The spread at first seemed slow but that was mainly due to a lack of testing in the U.S. This delayed response created about a 6-week lag in testing, reporting, quarantining, and isolating. This is the standard operating procedure in any epidemic. But due to this lag, the virus was allowed more time to spread to certain population centers. One interesting observation is that as of March 31, 2020, the majority of infected individuals appear to be in population centers, whether Wuhan, China, or the Lombardy region of Italy, or New York in the U.S. At this juncture,

for some reason, the majority of cases are in these population centers. But that leads to another refrain we hear often with this virus. We just don't know. We don't know why it is so lethal in Italy and not apparently in Germany. We don't know why the spread has so adversely affected New York City versus Los Angeles. We don't know why 80% of those infected have minimal symptoms yet 5% will need intensive care in a hospital. This is a pandemic in real time and we are learning on the fly.

By March 11th, things had gotten bad enough for the World Health Organization to declare a worldwide pandemic. Up until that point, COVID-19 was mostly an afterthought. We had just finished going through a historic impeachment trial that had taken our national attention from the world stage and hyper-focused it on this singular historical event. But on that Wednesday everything changed and by March 13th, a national emergency was declared by the President of the United States. The rest is a flurry of news briefs, tweets, infomercials, misinformation and press reports.

As of March 30, 2020, in my home state of Virginia, we are in a shelter in place order and over 30% of businesses are closed. So now what? How do we move forward? What can we do to keep ourselves healthy while we wait for the 1st wave of COVID-19 to settle down? When it does can we do anything to prepare us for "Round 2" in the fall?

*We feel it's very important to note that this information is intended for educational purposes and, while we may occasionally be critical of how different governments of the world handle certain crises, we are in no way blaming the *people* of any country for this, or any other, outbreak. We firmly believe we have the opportunity to unite people right now, not divide them.

IMMUNITY 101 PRIMER: BASICS OF IMMUNE SYSTEM FUNCTION

What I'd like to do now is walk through some basics of our immune system, how it works and how we can improve the efficacy of our immune system related to our knowledge of its inner workings.

But first, let's discuss disease avoidance. Social distancing is the process of removing oneself from the presence of others at risk for carrying a disease. This practice has been used for millennia. We have records from biblical times of those with skin infections being quarantined away from others for a 7-day period to determine their disease status. Even houses with 'blights' (most likely toxic mold) were quarantined. We used this practice for tuberculosis in the 1800s and later for Spanish influenza in 1918-1919. This is the single best preventative measure. If you don't get infected in the first place, you don't have to worry about spreading anything.

Now let's dive into a simplified explanation of immune system function. First, an infectious particle has to make it through all of your body's physical barriers. These include your skin and mucous membranes. Once through these physical barriers, the microbe is officially in your body's cells or tissues and it has to first contend with your innate immune system. This part of your immune system is preprogrammed to fight off the major categories of infected cells, abnormal or cancer cells, parasites, and fungal infections. These cells include macrophages, dendritic cells, and natural killer cells. The main function of these cells (though they have many) is to eat or engulf abnormal/aberrant/infected cells or invading organisms. Once this is done, these cells then "chew up" the invader into little parts and then "present" specific pieces of the processed infectious particles to your acquired immune system. The innate system can fight infections all by itself, but for amplification, it needs the antibodies made by the acquired immune system. Without this amplification, your immune response cannot reach its full potential to fight off infections and it can't convert your body's resources from general attack mode to specific attack mode.

For those of you who are familiar with the new research behind hydroxychloroquine and its immune-boosting effect to fight off COVID-19, the innate immune system is where this drug works. This antimalarial drug acts as an ionophore. These are pore-like structures that embed into a cell wall and allow zinc to enter the cell. This zinc then enables the cell's metabolism to create hydrogen peroxide like molecules to fight off the virus. A significant portion of the elderly population is zinc deficient and has a suppressed innate immune system. Other natural ionophores that act this way are EGCG (found in green tea) and quercetin (from apples and onions), and they tend to do so effectively and with minimal side effects.

Your immune system's response to invaders is like a war within your own body. Someone or something has invaded your native country and your defense system is on constant alert for this

potential attack. The Innate Immune system is like the Marines, the first to fight in any major conflict. Once deployed and on the ground, they set up key sites for surveillance that then allows the Air Force (Acquired Immune System) to drop tactical smart bombs (antibodies). There are myriad nutrients, vitamins and plant-based chemicals that can boost your innate immune system. The most important of these are listed in the Protocols and Research sections below.

Your acquired immune system is the part of your bodies defense system most people are familiar with. The two major arms of this system are the T cell-mediated and the B cell-mediated immune system. T cells respond to activation by the innate immune system and make cytokines. Cytokines are molecules that regulate all the intricacies of the communication between all the different parts of your immune system. When you have a fever and feel achy, tired and sleepy; all these symptoms are modulated by cytokines. When someone has an autoimmune disease, it is usually described as a Th1 or Th2 process, typically dysregulation of this part of your body's defenses results in these diseases.

Once the T cell response is activated and spreads the word to your bodies defense systems that something is wrong, it wants to bring in the masses of your bodies army. This is the B cell-mediated immune response. It's like D-day when the allies stormed Normandy. Swarms of B cells start creating an innumerable number of exact antibodies to fight the specific infection in which the innate immune system first processed then the T cell system presented to the entire body, putting it on high alert. Then and only then are hordes of specific killer antibodies released to destroy the invaders.

Each step of this process requires immune modulation, regulations, specificity, reactivity but at the same time, these responses need to be controlled in order not to destroy the surrounding healthy tissue. In war we want to leave the civilian population alone and intact. Acute Respiratory Distress Syndrome is an example of dysregulation of the interconnectedness of these different arms of your bodies defense system. Sometimes referred to as Cytokine Storm, this hyper-reactivity results in the shedding of the skin in your lungs, their filling full of fluid and ultimately the death of the patient. Instead of dropping a smart bomb (antibody response) your body carpet bombs the entire area (cytokine storm).

At each handoff and interface of your immune system nutrients, vitamins, minerals, antioxidants, oxidants, fatty acids, etc. are checking and rechecking your bodies response to the invaders' attack. So, for example, if your vitamin D level is low your innate immune system tends not to see enemy invaders quite as well. If your vitamin C levels are low, you can't recycle your intracellular firefighters (glutathione) as quickly or efficiently. Without zinc and other trace minerals, the enzymes that clean up damaged cells and the passageways between cells don't function properly. This is how nutrition can either boost your immune system, impede it or cause it to respond erratically.

STEPS TO PROTECT YOURSELF AND YOUR FAMILY

SOCIAL AVOIDANCE and ISOLATION

THESE ARE THE KEYS FOR PREVENTING INFECTION SPREAD OR BREAKING A PANDEMIC INFECTION SEEDING CYCLE

The first part of our immune system to discuss is our primary barrier, the skin. This primary barrier includes the specialized exterior skin of our arms and hands as well as that in our lungs and GI tract. All of these skin interfaces are covered with healthy bacteria that boost the immune function of the localized white blood cells as well as prevent colonization of these barriers with invading organisms. The aggregate of healthy protective bacteria are referred to as the Human Microbiome. This health barrier is built and maintained by a proper diet of real food, healthy fats and adequate proteins and micronutrients.

ALWAYS USE A MASK

N95 MASKS OR SURGICAL MASKS OR A FACIAL COVERING OF SOME SORT TO MINIMIZE EXPOSURE TO AEROSOLIZED VIRAL PARTICLES

Aerosolized viral particles have been shown to stay in the air column for up to 3 hours. This means that other people may not even be around, but the virus they aerosolized with a cough or sneeze one hour prior is still in the air you are walking through. Though initially controversial, several countries have adopted mandatory mask-wearing when in public and California has floated the idea as well. When this was written the idea was still considered controversial but my expectation is that once the shortages are ameliorated, the recommendation to wear a mask will become commonplace.

Wearing a mask not only helps prevent your exposure but it prevents someone who is infected from spreading the infection, so it helps to minimize spread as well as minimize exposure. Anything is better than nothing but the ideal would be an N95 mask, which many people have discovered in their household painting supplies or other household “project” bins. If you happen to discover that you have a large supply of these, consider sharing with friends or family members who will come into contact with, or are caring for, individuals who are at extreme risk of complications from COVID-19.



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FOOD IS MEDICINE

A NUTRIENT RICH DIET IN THE CORNERSTONE FOR ANY HEALTHY LIVING PLAN

The primary way we keep our exterior skin clean is through vigorous hand washing to remove bacterial and viral particles. Soap dissolves the cell walls and covering of these organisms, inactivating the virus, and this function makes soap and water a more important infection preventative than antimicrobial soaps and gels.

VIGOROUS HAND WASHING

FOR 30 SECONDS IS A MAJOR PREVENTATIVE FOR INFECTIOUS DISEASES

Most respiratory tract infections occur through exposure to infected water droplets. Once exposed, the infected particles have to evade immunoglobulins (antimicrobial proteins made by mucous membranes to keep them clean and functioning) and penetrate this line of defense.

CLEAN AIR

HELPS MAXIMIZE LUNG FUNCTION AND KEEP YOUR SINUSES CLEAN OF INHALED DEBRIS

Dirty air, smoke, combusted petroleum nanoparticles, and general poor air quality can all inflame this protective barrier in the lungs and nasal passageways. Doing one's best to always breathe clean air is a great start to maintaining these barriers. A simple HEPA filter will remove 99.9% of all air particles/debris as well as the infectious agents attached to these particles. This is the concept behind a clean room.

SLEEP

THE SINGLE BEST WAY TO BOOST YOUR BODIES INNATE IMMUNE SYSTEM

Getting a full 8 hours of sleep per night, compared to 6 hours, maximizes your natural killer cell counts and makes you four times less likely to experience complications from a respiratory tract infection.

MANY NUTRIENTS CAN BOOST YOUR IMMUNE SYSTEM

AND HELP TO ENSURE YOUR BODIES RESPONDS APPROPRIATELY TO INFECTIOUS INVADERS

The most well-studied and researched of these in response to respiratory tract viral infections are vitamins D and C, N-acetylcysteine, and zinc.

SPECIFIC NUTRIENTS TO BOOST YOUR IMMUNE SYSTEM

Any textbook of nutritional medicine will give you pages of resources on foods, nutrients, minerals, plant extracts, soil bacteria—you name it—that will boost your immune system and improve your general health. There is even a substance called shilajit that is used in Ayurvedic Medicine to boost the human immune system. It is literally a gooey substance that extrudes out of the Himalayan mountains. While I'm not recommending this, the point is that there is an innumerable host of things you will find on Google that are recommended to boost your immune system. The following is not an exhaustive list of immune boosting nutrients. It is, however, a list of some of the most well-researched, studied, and clinically used nutraceuticals (medicinal nutrients) for immune system function.

The second thing I want to say prior to the nutrient listing is this: Food is Medicine. This list is not an exhaustive collection of immune boosting nutrients, but the intent is to show that the quality of what you eat matters, and the content of what you eat matters. According to research from the University of Florida, up to 50% of all chronic disease in our country can be directly attributed to processed food consumption. Data from the National Institutes of Health (NIH) shows us that chronic diseases account for 70% of all deaths annually in the U.S (about 1.7 million annually). That is 850,000 deaths annually from processed food consumption. Research from the Harvard School of Public Health shows that up to 80% of heart disease (the #1 killer in the U.S.) and 70% of cancer (the #3 killer in the U.S.) can be prevented by diet and lifestyle alone.

What we put in our mouths can have a radical effect on our overall health and survival. We can change the trajectory of our health through basic dietary and lifestyle choices. So, let's review a few basic nutrients and how they affect our health.

Carotenoids and Vitamin A

Some carotenoids like alpha and beta carotene are converted into active Vitamin A (retinol) while others are not (astaxanthin, zeaxanthin, lycopene). Vitamin A is a pro-hormone immune modulator. What this means is that it's not officially a hormone but acts a whole lot like one. Low levels of vitamin A are associated with the following:

- Diarrheal illness
- Increased susceptibility to infections
- Higher rate of complications from measles, TB and other infectious diseases

Vitamin A supports the immune cells in our body known as phagocytes (neutrophils and macrophages). Supplementing vitamin A boosts our immune system to have better response to vaccines, decreases in mortality from infectious diseases and, in combination with zinc, lowers the risk of death in children by infectious disease. Age-related immune suppression is associated with low levels of the non-vitamin A carotenoids. ^{1 2 3 4}

STANDARD DOSING: Adults 5000-10,000 IU DAILY, Children based on age, weight and nutritional status

Vitamin E

Vitamin E is an antioxidant whose main function is to prevent oxidative stress (a rust-like phenomenon) of the fatty cell walls. High intake of vitamin E has been shown to increase the cell-mediated (Th1) response as well as improve the cell-eating response of macrophages. This response is particularly found in the lungs, one of the major interior/exterior interfaces of the body. Vitamin E is particularly important in the elderly whose immune systems are depressed. Animal studies have shown vitamin E supplementation to improve lung clearance of the influenza virus, prevent brain damage from the herpes simplex virus, and have a protective effect on the brain against infections. Combined with vitamin C, there was an additional immune-boosting effect that was seen especially in the elderly. ^{5 6 7}

STANDARD DOSING: Adults 200-400 IU DAILY, Children based on age, weight and nutritional status

¹ <https://academic.oup.com/jn/article/139/2/377/4750929>

² <https://pubag.nal.usda.gov/download/35803/PDF>

³ <https://asbmr.onlinelibrary.wiley.com/doi/full/10.1002/jbmr.498>

⁴ <https://www.ncbi.nlm.nih.gov/pubmed/14704330>

⁵ <https://www.ncbi.nlm.nih.gov/pubmed/15882360>

⁶ <https://jamanetwork.com/journals/jama/fullarticle/199271>

⁷ <https://www.ncbi.nlm.nih.gov/pubmed/9795745>



Vitamin C

Many studies have shown the immune-boosting and antimicrobial activity of vitamin C. Concentrations of this vitamin in the body's white blood cells (the major antimicrobial cell type of the body) become rapidly depleted during infections and supplementation of vitamin C has been shown to boost the T cell (type of white blood cell) function and in combination with the B cell, increase antibody production. A case report by Thomas E. Levy MD, JD showed an example of a patient with terminal H1N1 influenza who reversed their disease course with high dose vitamin C therapy. Studies have shown up to an 80% response rate to a vitamin C combination (vitamin C 1000mg, vitamin E 1000 IU, selenium 200mcg) in patients with severe pneumonia. One word of caution, vitamin C can increase iron absorption and in susceptible individuals could result in iron overload.^{8 9 10 11 12}

STANDARD DOSING: 1000mg twice daily, Children 200-500mg daily based on weight

⁸ <https://www.ncbi.nlm.nih.gov/pubmed/16373990>

⁹ <https://www.ncbi.nlm.nih.gov/pubmed/15271375>

¹⁰ <https://www.ncbi.nlm.nih.gov/pubmed/20149369>

¹¹ <https://www.ncbi.nlm.nih.gov/pubmed/23925826>

¹² <https://www.ncbi.nlm.nih.gov/pubmed/21430251>

Vitamin B6, B12, and Folate

Many nutrient deficiencies can cause immune dysfunction. I've chosen this grouping due to their unique cooperation in the immune system and their ability to work synergistically together. Vitamin B6 deficiency slows white blood cell maturation, growth and antibody production. Even slight insufficiencies can have a profound immune effect. Vitamin B6 deficiency also causes a shift from a Th1 immune and cytokine response to a Th2 cytokine response. This may account for some instances of "cytokine storm". Folate deficiency affects DNA expression directly limiting the activity of cytotoxic CD8+ lymphocytes. Natural Killer cell function, one of the most important cells in the innate immune system, is dependent on adequate vitamin B12 levels. Low blood B12 levels directly correlate to lower levels of lymphocytes and a lower antibody response to infection. ^{13 14 15 16}

STANDARD DOSING: B complex vitamin with 500-1000mcg OF B12,
400-800mcg of folate and 50mg of B6, Children use a children's B complex

Vitamin D3

Vitamin D is a hormone, not a true vitamin, and is responsible for modulating the peripheral immune system as well as the innate immune system in the central nervous system. One of the ways that vitamin D controls inflammation and modulates the immune system is through the production of antimicrobial peptides. When blood levels of vitamin D are less than 20, a particular one of these peptides cathelicidin is not produced adequately, suppressing the body's response to certain microorganisms. Vitamin D levels over 38 significantly reduce the incidence of acute respiratory tract infections through a similar mechanism. During the Spanish Flu of 1918-1919, there was a direct correlation between fatalities and lack of exposure to UVB light, the main source of vitamin D. Finally, the cytokine storm associated with Acute Respiratory Distress Syndrome (one of the major causes of death in H1N1 and SARS CoV-2) is modulated through the activity of vitamin D on monocytes. In conjunction with vitamins C and E, vitamin D greatly reduces the risk of the immune dysregulation from cytokine storm. ^{17 18 19}

STANDARD DOSING: Adults 2000 IU-5000 IU Daily, Children based on age 800
IU to 2000 IU Daily based on nutritional status

¹³ <https://nyaspubs.onlinelibrary.wiley.com/doi/abs/10.1111/j.1749-6632.1990.tb28073.x>

¹⁴ <https://www.sciencedirect.com/science/article/pii/S0271531705800582>

¹⁵ <https://www.ncbi.nlm.nih.gov/pubmed/10093956>

¹⁶ <https://www.ncbi.nlm.nih.gov/pubmed/1887065>

¹⁷ <https://www.ncbi.nlm.nih.gov/pubmed/17911026>

¹⁸ <https://www.ncbi.nlm.nih.gov/pubmed/20559424>

¹⁹ <https://www.ncbi.nlm.nih.gov/pubmed/21133662>



Zinc

Zinc is an essential nutrient for rapidly dividing cells, especially during infections. Zinc given during vaccination improves the bodies response and immunity to the vaccine. Zinc deficiency during blood infections (i.e. sepsis) is associated with increased whole-body inflammation and increased risk of death during sepsis. Even mild insufficiencies impair the immune T helper cells response to Th2 type cytokines, this shift in immune function is critical for maintaining balance in an immune system fighting off infections. Low levels of zinc are associated with increased inflammatory responses and increased susceptibility to infections such as E. coli. ^{20 21 22 23}

STANDARD DOSING: Adults 30-50mg daily, Children 10-20mg daily based on nutritional status

Selenium

This essential nutrient is important for both the innate and adaptive immunity without which, both arms of your immune system cannot function properly. Deficiencies of selenium increase the disease-causing effects (i.e. pathogenicity) of microorganisms. This dysregulated immune response also results in more inflammation and activation of immune system cells (macrophages) in infected cells. In animal models, mice infected with Listeria, had more severe illness from this infection when they had inadequate selenium levels. ^{24 25 26 27}

STANDARD DOSING: 200-400mcg daily, children based on nutritional status

²⁰ <https://onlinelibrary.wiley.com/doi/abs/10.1002/%28SICI%291520-670X%282000%2913%3A1%3C1%3A%3AAID-JTRA3%3E3.O.CO%3B2-2>

²¹ <https://www.ncbi.nlm.nih.gov/pubmed/12730441>

²² <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2886607/>

²³ <https://www.ncbi.nlm.nih.gov/pubmed/21245267>

²⁴ <https://www.ncbi.nlm.nih.gov/pubmed/21245271>

²⁵ <https://www.ncbi.nlm.nih.gov/pubmed/17449602>

²⁶ <https://www.ncbi.nlm.nih.gov/pubmed/20576203>

²⁷ <https://bmcimmunol.biomedcentral.com/articles/10.1186/1471-2172-10-55>

CYTOKINE STORM

What it is and how to prevent it

Cytokine storm is an extreme upregulation of your immune system to the extent that it looks like you either have a severe infection (i.e., sepsis) or that your body is attacking itself. It's like the fire in your fireplace at home leaping out of its preassigned place in your living room and then spreading through your whole house. This dysregulation is being recognized more and more as a cause of death in infections, not the organism itself, and controlling this overreaction can result in an increased chance of survival. Specific examples of this are the Acute Respiratory Distress Syndrome (ARDS) seen in COVID-19, H1N1 and the Spanish Flu of 1918. Reducing this excessive immune response has been shown to improve outcomes, lower the risk of death and improve survivability from infections. Intravenous high dose vitamin C has been shown to control the cytokine storm in influenza. Vitamins D, E, magnesium, and flavonoids have all been shown to have a role in controlling this complication. Specific flavonoids like curcumin and resveratrol have been shown to down-regulate T cells, T regs, dendritic cells and other cells related to an over-response of the immune system.^{28 29 30}

²⁸ <https://www.ncbi.nlm.nih.gov/pubmed/17911026>

²⁹ <https://www.ncbi.nlm.nih.gov/pubmed/10768926>

³⁰ <https://www.ncbi.nlm.nih.gov/pubmed/21070208>



PROTOCOLS

The following are the specific protocols for immune system boosting that I have put together based on my research of the scientific literature and its review. This is not meant to be a definite list, but to solely focus on the top nutrients that anyone should be able to take with minimal risk for side effects. As always, any diet, lifestyle change, nutrient, medication or any other change in your current lifestyle habits should be reviewed with your personal health care professional.

Nutrient purity is paramount. I have previously written on supplement purity and potency. That information can be found on our website at the following link:

<https://richmondfunctionalmedicine.com/nutrition/supplements/>

VIRAL RESPIRATORY TRACT PREVENTATIVE

Take prior to developing symptoms

- Vitamin D: 5000 units daily for adults and 2000 for pediatrics (Ortho Molecular)
- Vitamin C: 500mg twice daily (Liposomal C from Mercola)
- NAC: 600mg twice daily (Pure Encapsulations)
- Drink green tea 2-4 cups daily
- Bone broth 8 oz daily as tolerated

VIRAL RESPIRATORY TRACT TREATMENT

Take this at the onset of symptoms

- Vitamin D: 25,000 units daily for 5 days in adults and 10,000 daily for 5 days in kids (Ortho Molecular)
- Vitamin C: 2500mg twice daily (Liposomal C from Mercola) for 10 days then back to maintenance dose
-For kids there are liquid liposomal forms from Quick Silver/Redisorb-
- NAC: 600mg 2 caps three times daily for 7 days then back to 600mg twice daily
- Drink green tea 4-6 cups daily
- Bone broth 8 oz daily as tolerated

FOR PEOPLE OVER 65 YEARS OLD

Add the following supplements

- Zinc picolinate 50mg daily (Douglas Labs)
- Quercetin 250mg four times daily (Pure Encapsulations)

All of the above nutritional supports are available at a 25% discount at Fullscript through <https://us.fullscript.com/welcome/RValIntegrative> and after signing in can be found under the RESPIRATORY TRACT SUPPORT tab or searching individually.

They can also be purchased through Wellevate (Emerson) for 25% off at <https://wellevate.me/aaron-hartman#/>

ADDITIONAL RESOURCES

The main hub for our educational materials is on the Richmond Integrative and Functional Medicine website at www.richmondfunctionalmedicine.com. Here we have a full compendium of food guides, meal plans, a reading list, our podcasts, and other educational materials. These resources are provided free of charge. This includes access to our online pharmaceutical grade nutrients (links above) that are offered at a 25% discount. Feel free to review this information as well as share it. If you want to keep up to date with us as we launch new resources, please follow up on Facebook or Instagram, Twitter, and LinkedIn as well as sign up for our newsletter on the website. The newsletter keeps our followers up to date with new information as we create it and make it available.

BIBLIOGRAPHY

The following is not meant to be a comprehensive reference to all the previous information, as this is not a scientific publication but is meant as a resource for anyone desiring to dive deeper into some of the sources I have used in this survival guide (many articles were referenced above in the Nutrients portion of this guide as well). These are a representation of the resources I've student on this topic this year and as such should not be considered a definite guide to information found in this manual.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5996765/>

<http://www.koreabiomed.com/news/articleView.html?idxno=7428>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4728566/pdf/viruses-08-00006.pdf>

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