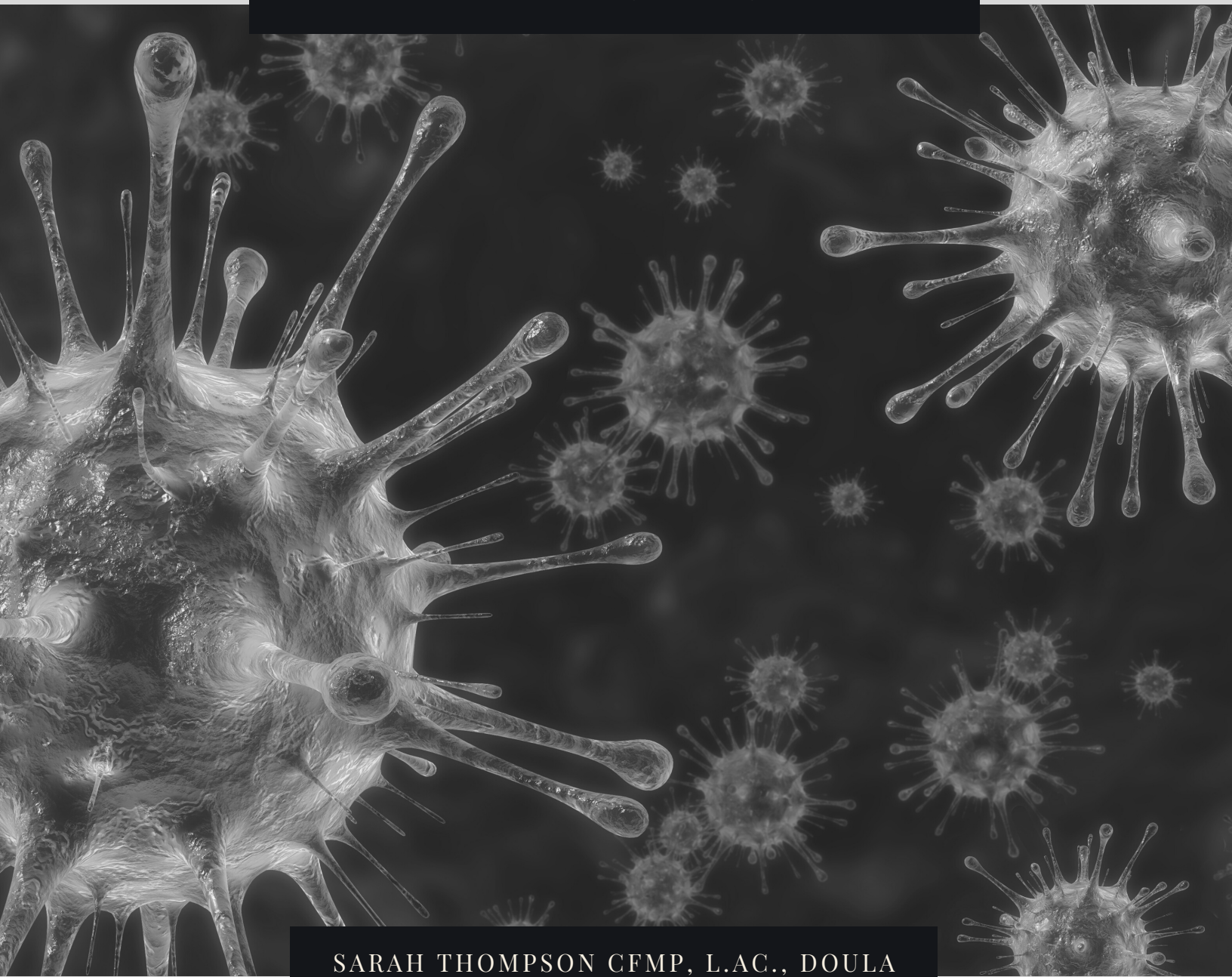


IMMUNE SUPPORT THROUGH PROPER NUTRITION

NUTRITION & YOUR IMMUNE SYSTEM

YOUR JOURNEY STARTS TODAY



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SACRED VESSEL ACUPUNCTURE & FUNCTIONAL MEDICINE

ABOUT ME

I believe that there is a difference between surviving and thriving. Conventional Medicine is wonderful at survival, keeping us alive, but where they fail is often in nutritional prevention and in the elevation of health from just surviving, to thriving. Living life at its healthiest, fullest and most enjoyed. My roots are in Traditional Chinese Medicine and Acupuncture, but we cannot expect modalities that stimulate the natural functions of the body to be successful if the foundation of those functions is cracked. Therefore, I strive to increase overall body function to increase the success of my Acupuncture treatment protocols. My goal in practice is to be transparent in communications. I believe everyone should be advised in their healthcare, not just told what to do. I want my patients to truly understand how their body works and where the systems went wrong, so they can better care for their health. I encourage patients to take charge of their own outcomes by giving them the information they need to make the decisions that are best for them. I believe that the foundation of health is nutrition, and as such I focus on proper and realistic nutrition goals taking into account individual lifestyles and beliefs.

I founded Sacred Vessel Acupuncture & Functional Medicine in 2012 after years of working along side medical doctors. I've dedicated my practice to helping patients with complicated conditions and those seeking to improve their health. I have written several articles and lecture on a variety of subjects. I bring over 16 years of experience to my patient's care.

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NUTRITION & IMMUNE FUNCTION

The current COVID-19 Pandemic has increased awareness and research into the immune system, and medications to treat acute symptoms. Behind the headlines, a small group of researchers have put their focus into nutrition, and more importantly, prevention of serious complications associated with COVID-19 infections.

There are definite connections between getting enough nutrition and immune function. It's well understood that people who are malnourished or who don't get enough nutrients can have a weakened immune system. We see that viruses, in general, prey on the weak. Elderly and those with underlying health conditions tend to be at higher risk for complications from viral infections, and often have multiple underlying nutritional issues.

HOW YOUR IMMUNE SYSTEM WORKS

Your immune system is complex and its response is affected by the pathogen form, the route of infection, and your health status before infection. There are multiple types of cells that defend your body, and different ways in which they work. Your white blood cells account for 1% of your blood, but are your greatest defense against invading pathogens.

White blood cells are divided into two groups; Granulocytes and Agranulocytes. Granulocytes originate in the bone marrow and include Neutrophils, Eosinophils and Basophils. Agranulocyte Monocytes originate in the bone marrow, while agranulocyte Lymphocytes originate primarily in the thymus.

- Neutrophils eat dead cells, and are your primary defense against bacteria and fungi. They are the most abundant of white blood cells and are the first immune cells to respond to infection. Neutrophils don't live very long (only a couple of hours) and need to send messages to other immune cells to engage during infections.
- Eosinophils carry digestive enzymes, and are your primary defense against parasites. They are also involved with allergy immune reactions.
- Basophils carry heparin which prevents clotting in areas of infection and inflammation to increase the nutrients and blood flow to the site. They also contain histamine, and are associated with allergy immune reactions.
- Monocytes eat dead cells, similar to neutrophils, and are your backup defense for bacteria, fungi and viral infections. Monocytes live longer, and are often elevated during infection recovery or chronic infections.
- Lymphocytes are divided into three different groups that each have a different job. Lymphocytes make up almost 40% of all your immune cells, and are the largest part of your defense against bacteria, viruses and cancer. Lymphocytes also create antibodies that can be used to identify and target specific pathogens. These cells are your immune system memory.

- T-cells originate in the Thymus (hence the T-). They contain a special receptor on the outside of their cell. This receptor identifies pathogens. When T-cells are stimulated by a pathogen helper T-cells are created to stimulate the differentiation of B-cells and increase antibody production. Regulatory T-cells keep the production under control.
- Natural Killer Cells are also known as Cytotoxic T-cells. They have the ability to kill other cells. They identify virus or cancer infected cells and destroy them before the virus or cancer can multiple.
- B-cells originate in the bone marrow (hence the B-). They contain a special protein on the outside of their cell that enables them to identify specific pathogens. They then attack and neutralize the pathogen. Antibody production continues from weeks to months. Other B-cells, memory B-cells, are stored with the memory of the pathogen. Together these different cells work together to defend your body against viruses, bacteria, and other pathogens that could cause damage and infection.

VIRAL IMMUNITY

We are exposed to a variety of viruses throughout our lives. How your body responds to these viruses is dependent on the virus itself, it's mechanisms of action, and your underlying health. Depending on the path of infection, your body offers multiple ways to defend you against viral pathogens.

The **humoral immune response** is named for the immune cells found in the humor of the body (the body fluids, or plasma). These refer to the reactions of the B- and T-cell lymphocytes. Antibodies are produced by the B-cells (with the help of T-cells) which identify and destroy the invading pathogen and prevents the spread of disease. Antibodies block virus-host cell interactions and label viral antigens on virus-infected cells which increases killer cell activity.

Cell mediated immunity refers to the immune responses that do not require antibodies. This is the recognition of virus infected cells by leukocytes (Eosinophils and Monocytes), and the increased phagocytosis and secretion of cytokines that signal natural killer cell activity.

OXIDATIVE STRESS DURING VIRAL INFECTIONS

Oxidative stress is, essentially, the buildup of free radicals within cells. During a normal day, your produces natural free radicals (or Reactive Oxygen Species, ROS), that are neutralized while you sleep by antioxidants. When you are sick with a virus, the virus invades cells and increases ROS production, increasing your demand for antioxidants.

When the cells are sick, or damaged, they cannot function properly.

Viral cell damage can happen anywhere in the body, but seems to be higher in more functional cells, such as the heart, liver and kidneys.

Oxidative stress has been found in chronic pathologies, such as diabetes, heart disease, cancers, and has been documented in RNA type viruses, such as coronaviruses.

PROTEIN & IMMUNE FUNCTION

Protein is a macronutrient, and is essential for your body to function. Dietary proteins are constructed of amino acids. During digestion, these amino acids are separated and absorbed, and are responsible for the majority of cellular work. Amino acids work as flags on the outsides of cells to signal that the cell is damaged or infected. Cell culture studies show that branch chain amino acids are absolutely essential for lymphocytes to function. T-cells in particular are highly dependent on amino acids, such as arginine.

It is well accepted in research that protein malnutrition reduces the ability of the immune system to function properly. In those with protein malnutrition negative changes to the immune system are seen. There is a reduction in the size and weight of the thymus (remember, it produces a large amount of your immune cells), delayed response to new and recall pathogens, reduces maturity of T-cells, reduction in lymphocyte protein receptors that identify pathogens, decreased antibody production, decreased cytokine production, and decreased phagocytosis...pretty much a complete decrease in immune response and function. These changes are seen in moderate deficiencies.

Supplementation with specific amino acids has been shown to enhance or preserve immune function in high risk patient, as well as improve the capacity to resist infection. Supplementation and dietary changes may take weeks to months to improve immune responses. Arginine supplementation has been used to normalize T-cell production with great success.

MICRONUTRIENTS & IMMUNE FUNCTION

Trace minerals and vitamins play critical roles in the immune system pathways. Many are enzyme cofactors, or are required for processes to occur properly. Changes in the immune system begin to occur in the early stages of deficiency, and may occur before serum testing can detect deficiencies.

It is rare to have a single nutrient deficiency. More often than not, those with nutritional deficiency have multiple nutrients missing from the diet. Micronutrients, such as, Zinc, Selenium, Iron, Copper, Vitamin A, Vitamin C, Vitamin E, Vitamin D, B6 and Folate have all been found to affect and regulate the immune system in some way. Research also shows that deficiencies, even mild to borderline, in any one of these nutrients, can have a big impact on the function of your immune responses.

ZINC & IMMUNE FUNCTION

Zinc is a trace mineral that is crucial for normal development and function of immune cells, proper phagocytosis, and prevents free radical damage as an antioxidant. Zinc is a cofactor for many of the enzymatic functions used in immune responses. In human model studies of zinc restriction, blood levels of zinc remained the same while immune cell zinc concentrations decreased, making plasma zinc testing inaccurate for diagnosing mild deficiencies that could affect immune function. A deficiency in Zinc is associated with an increased risk of pneumonia and respiratory infections.

Food Sources of Zinc

- **Plant Sources: Nuts and Seeds (Pumpkin Seeds, Sunflower Seeds, Cashews), Legumes (Chickpeas, lentils), Quinoa**
- **Animal Sources: Beef, Lamb, Liver, Turkey, Shrimp**

SELENIUM & IMMUNE FUNCTION

Selenium is important for initiating immunity, and is also involved in regulating excessive immune responses and chronic inflammation. Selenium bound proteins are responsible for immune cell communication. A deficiency in selenium in those hospitalized with respiratory illness was correlated with poorer prognosis. Supplementing with additional selenium when not deficient can cause negative impacts on the immune system, so high dose supplementing is never recommended. Dietary intake increases are your best way increasing total selenium.

Food Sources of Selenium

- **Plant Sources: Mushrooms (Crimini, Shitake), Soy (Tofu, Tempeh, Miso), Nuts and Seeds (Sunflower, Sesame), Grains (Brown Rice, Barley), Asparagus**
- **Animal Sources: Fish (Tuna, Sardines, Salmon, Cod), Shellfish (Shrimp, Scallops), Lamb, Beef, Chicken, Pasture Raised Eggs**

IRON & IMMUNE FUNCTION

Iron is necessary for your immune cells to multiple and mature, specifically lymphocytes, as well as the expression of cytokines. Bacterial infections can be negatively impacted when excess iron is consumed as it is used by bacterial cells to increase their ability to multiple.

Food Sources of Iron

- **Plant Sources: Soy (Tofu, Miso, Tempeh), Legumes (Lentils, Chickpeas, Lima Beans), Broad Leaf Greens (Spinach, Swiss Chard), Nuts & Seeds (Sesame Seeds, Pumpkin Seeds), Grains (Quinoa)**
- **Animal Sources: Seafood (Clams, Shrimp, Oysters, Mussels), Liver, Beef, Lamb**

COPPER & IMMUNE FUNCTION

The immune system requires copper to function, but the exact mechanisms of action are still unknown. Neutrophil production is often used as a measure of copper deficiency. Not only is the total count of neutrophils reduced in the presence of copper deficiency, but their ability of phagocytosis is affected as well.

Food Sources of Copper

- Plant Sources: Mushrooms (Cremini, Shitake), Nuts & Seeds (Cashews, Sesame Seeds, Sunflower Seeds, Walnuts), Legumes (Lentils, Chickpeas, Lima Beans), Soy (Tofu, Tempeh, Miso), Grains (Quinoa, Barley, Millet, Rye), Sea Vegetables**
- Animal Sources: Seafood (Shrimp), Fish (Sardines)**

VITAMIN A & IMMUNE FUNCTION

Vitamin A (retinol) is a fat soluble vitamin involved in the development of the immune system and plays regulatory roles in cellular immune responses and bone marrow homeostasis. Vitamin A deficiency leads to a defect in T cell-mediated and antibody-dependent immune responses. Vitamin A deficiency in America is very common, with more than half of the population deficient in dietary Vitamin A.

Vitamin A comes in 2 dietary forms; Provitamin A Carotenoids (Beta-Carotene, Alpha-Carotene, Beta-Cryptoxanthin) and Preformed Vitamin A Retinoids (Retinol, Retinal, and Retinoic Acid).

Carotenoids in the diet are converted to Retinol (the more usable form of Vitamin A). The Liver stores Vitamin A in an alcohol based form called Retinyl Esters. (which is why it is such a nutritional powerhouse for dietary retinol - esters are converted to retinol in the small intestines). There is a negative feedback mechanism in place that "measures" the levels of retinol in the liver. When there are adequate levels of Vitamin A in the body, there is actually an inhibition of both absorption of Carotenoids from the diet and a decrease in conversion to Retinol in the Liver. The ratio varies from 4:1 to 55:1. Conversion is also limited in the presence of other nutritional deficiencies, such as zinc.

On their own, Carotenoids are potent antioxidants that help neutralize toxins in the body. In order to actually function, they must be converted to retinol. Their main dietary function is to serve as a source of Retinol, as Retinol is the true Vitamin A.

Food Sources of Vitamin A

- Vegetable Sources (Carotenoids): Pumpkin (and other orange winter squash), Sweet Potatoes, cooked Leafy Greens (spinach, turnip greens)**
- Animal Sources (Retinols): Liver, pasture raised Eggs, pasture raised Dairy (butter), Salmon**

VITAMIN C & IMMUNE FUNCTION

Vitamin C is an essential antioxidant and cofactor for enzymes. Vitamin C enhances microbial defense, and has been shown to enhance differentiation and proliferation of lymphocytes. Vitamin C deficiency results in impaired immunity and higher susceptibility to infections.

Vitamin C has a synergistic relationship with Vitamin E. Both are antioxidants that to protect cells from oxidation and toxic damage.

Food Sources of Vitamin C

•**Plant Sources: Fruit (Papaya, Strawberries, Pineapple, Oranges, Kiwi, Cantaloupe, Tomato, Lemon, Limes), Cruciferous (Broccoli, Cauliflower, Brussels, Bok Choy), Bell Pepper, Broad Leaf Greens (Collard Greens, Kale, Turnip Greens, Beet Greens), Parsley, Fennel**

•**Animal Sources: Liver**

VITAMIN E & IMMUNE FUNCTION

Vitamin E is a well known fat soluble antioxidant. Vitamin E plays an important role in the differentiation of immature T cells in the thymus.

Vitamin E deficiency is extremely common in the US with over 90% of the US population not consuming adequate dietary Vitamin E. Respiratory illnesses affect elderly more aggressively, and vitamin E deficiency is more common as you age. Vitamin E supplementation has been shown to improve immune responses in the elderly.

Vitamin E specifically prevents oxidation of fats. It is found in nuts and seeds, and commercial oil products. More commonly Vitamin E deficiency is associated with decreased dietary intake, but it can also be caused by increased ingestions of rancid oils, and fried foods.

Food Sources of Vitamin E

•**Plant Sources: Nuts & Seeds (Sunflower Seeds, Almonds,), Avocado, Broad Leaf Greens (Spinach, Swiss Chard, Turnip Greens, Beets Greens), Asparagus, Peanuts, Olives/Olive Oil**

•**Animal Sources: Seafood (Shrimp, Scallops, Abalone), Fish (Salmon, Trout), Pasture Raised Eggs, Grass Fed Butter, Liver**

VITAMIN D & IMMUNE FUNCTION

Of all the nutrients I am touching on, Vitamin D has been the most researched and connected to increased severity of viral infections, including COVID-19. The research is mixed, and controversial with many doctors (specifically those in European countries) saying there is a connection with Vitamin D deficiency and severity of symptoms, while many doctors (mainly those in the US) say the research is slim and only correlates with those with severe Vitamin D deficiency.

Vitamin D3 is a fat soluble, steroid hormone produced by the body and consumed in the diet. It is converted to calcidiol in the liver and part of the calcidiol is converted to calcitriol, the biologically active form. Vitamin D3 is also formed through UV rays. UV rays convert cholesterol found in the skin into D3, this enzymatic reaction requires zinc. A zinc deficiency will reduce your ability to convert cholesterol into vitamin D using UV rays.

Receptors for Vitamin D have been found throughout the body, including lymphocytes. Vitamin D is capable of inhibiting pulmonary inflammatory responses while enhancing defense mechanisms against respiratory pathogens.

A deficiency in vitamin D is associated with increased susceptibility to upper respiratory tract infections and decreased forced air volume. Over 90% of Americans are not getting enough Vitamin D. A simple blood test could help you determine the right supplemental dose of Vitamin D for you.

If you are curious about your Vitamin D status, blood testing can give you quick and accurate measurements of your Vitamin D levels. In Colorado, due to high altitude, we see Vitamin D borderline and deficiency status more commonly, even with all our wonderful sunshine.

Food Sources of Vitamin D

•**Plant Sources: Mushrooms (Shiitake)**

•**Animal Sources: Fish (Salmon, Sardines, Tuna), Pasture Raised Eggs, Grass Fed Dairy, Liver**

VITAMIN B6 & IMMUNE FUNCTION

Vitamin B6, pyridoxine, is required for the formation of white blood cells. It also helps produce a protein that signals immune cell actions. Lymphocyte differentiation and maturation are altered by deficiency, immune responses are reduced, and antibody production may be indirectly impaired.

Food Sources of Vitamin B6

- Plant Sources: Sweet Potato, Potato, Cruciferous (Cabbage, Brussels, Collards, Kale), Spinach, Winter Squash, Banana**
- Animal Sources: Fish (Tuna, Salmon), Turkey, Chicken, Beef**

FOLATE & IMMUNE FUNCTION

Folate is another B vitamin that is required for a healthy immune system. Folate is required for DNA and protein synthesis, so every cell is affected by folate deficiency. Deficiency is associated with decreased thymus function and lower response of T-cells. Studies show a correlation with decreased serum folate levels and increased homocysteine in pneumonia cases among elderly. Supplementation with folate may reduce the risk of pneumonia in respiratory illness.

Food Sources of Folate

- Plant Sources: Legumes (Lentils, Pinto Beans, Garbanzo Beans, Black Beans, Navy Beans, Kidney Beans), Broad Leaf Greens (Spinach, Collards, Turnip Greens, Beet Greens) Cruciferous (Cabbage, Bok Choy, Broccoli, Cauliflower, Brussels), Parsley, Asparagus, Fruit (Avocado, Orange, Cantaloupe)**

COULD YOU REALLY BE NUTRITIONALLY DEFICIENT?

Nutrition is a critical determinant of immune responses and malnutrition is the most common cause of immunodeficiency worldwide. Your body requires both macronutrients and micronutrients to do its job of keeping you safe from invading pathogens.

Deficiency in protein, and micronutrients zinc, selenium, iron, copper, vitamins A, C, D, E, and B-6, and folate, even mild deficiency, is associated with immune dysfunction and increased infection complications.

But, this is America, nutritional deficiencies are rare, right?

I am sure you have read or heard this before. Here in America, with the food fortification system, we've wiped out nutritional deficiencies. I hate to be the one to drop the pot here, but this is a myth.

According to the CDC the majority of American are eating a nutrient poor diet.

- 80% are deficient in vegetable intake
- 70% are deficient in fruit intake
- 60% are deficient in healthy fat intake
- 60% consume excess sugar
- 60% consume excess saturated fats
- 80% consume excess sodium

Based on the data collected by the CDC, the Health and Nutrition Examination Survey showed that Americans aren't doing so well...

- 95+% of adults are not meeting the RDA for **Vitamin D**
- 94+% of adults are not meeting the RDA for **Vitamin E**
- 60+% of adults are not meeting the RDA for **Magnesium**
- 50+% of adults are not meeting the RDA for **Vitamin A**
- 45+% of adults are not meeting the RDA for **Vitamin C**
- 45+% of adults are not meeting the RDA for **Calcium**
- 20+% of adults are not meeting the RDA for **Zinc**
- 15+% of adults are not meeting the RDA for **Vitamin B6**

...the list goes on

RDA stands for Recommended Daily Allowance, which was developed in that 1940's. It represents the minimum amount of the individual nutrient a person needs to maintain health and function. This values is variable based on age, gender, genetics and underlying health conditions.

INCREASE YOUR IMMUNE HEALTH W/A NUTRIENT DENSE DIET

Nutrition interventions, aka changing your diet and including nutrient dense foods in addition to supplementation, has been shown to be beneficial in the prevention of infectious disease. In America, we are not immune to nutritional deficiencies. The standard American diet is riddled with nutritional deficits. Not all calories are created equal. Your body needs micronutrients, and often the American caloric intake is devoid of micronutrients.

If you want your body function optimally, you need to give it nutrient dense food. This is your best defense against viral infections, cancers, and other degenerative diseases such as Type 2 diabetes and hypertension.

Start by increasing your intake of fruits and vegetables. The standard American diet has left over 80% of you deficient in your fruit and vegetable intake. Your diet should be primarily based on vegetables, fruits, nuts and seeds, legumes, whole grains, and quality fats and proteins.

What does this look like?

- Eat foods in their whole state - fresh produce, quality meats, whole grains
- Choose wild caught fish multiple times per week
- Eat pasture raised meats, dairy, and eggs
- Eat full fat and nutrient dense
- Make fruits and vegetables, legumes, nuts and seeds 75% of your daily intake
- Eat the rainbow by choosing vegetables and fruits in a variety of colors and types
- Choose unrefined grains (quinoa, amaranth, oats, barley, buckwheat) in their whole state
- Choose bone in skin on meats
- Learn proper meal preparation skills to increase nutrient density in cooking

You may also need to incorporate nutritional supplements. If you are starting off deficient, consuming enough nutrient dense food to correct that deficiency may not be possible without nutritional supplement support.

For a complete list of foods rich in these immune boosting vitamins and minerals, shoot me an email.

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