Improving Coronavirus Vaccine Effectiveness

"I am not throwing away my shot"

By Steve Paulus, DO, MS

To do or not to do the coronavirus vaccine? Is that the question? Or put another way, is that the only question we need to be asking during this pivotal time in this terrible pandemic?

I support taking the coronavirus vaccine to begin the process of ending this pandemic, and to begin healing the complicated rift that has divided all of our lives.

I support medications that work and do not support medications that do not work. No vaccine, of any kind, is 100% effective. Rather than asking whether we should or should not take this vaccine—we must. We could be asking, "does the vaccine work?" Or, we might ask how can we as individuals make this vaccine work better?

Let's start with a discussion of the influenza vaccine to provide a context for how vaccines work or do not work. All vaccines teach the body to produce antibodies and specialized white blood cells to fight, and thus prevent a future infection. The average efficacy of the flu vaccine is a paltry 50%. That is the average. In the advanced elderly (those over 75 years old) the efficacy is less than 20%. In young, healthy people the success rate approaches 90%. The differences in efficacy are due to disparity in age range, obesity, or the presence of chronic diseases that lowers immune function. The variability of how well vaccines work holds true for all vaccines, not just for influenza. Inconsistency is found with vaccine efficacy for tetanus, shingles, hepatitis B and A vaccines, and many others.

Real world vaccine effectiveness can be placed in three broad categories: dynamics that you can control (host factors); issues relating to transport, storage and delivery; and the science of vaccine technology. This paper will be focusing on factors that you can change or influence with evidence based behaviors and efforts. It is important that you *not throw away your shot*, and this paper will outline the specifics of how to make the most of your coronavirus vaccine.

What You Can Do to Help Yourself

There are anatomic and physiologic realities that you can influence and others that are fixed. Examples of fixed realities are chronologic age, obesity, genetics, previous key surgeries, many permanent disease conditions that negatively affect the immune system, and drug therapies that depress the immune system, to name only a few. Yes, obesity can be reversed and people can stop their chemotherapies for cancer but not in time for their vaccine, thus they remain fixed. But, there are modifiable factors that you can definitively influence.

This paper will identify four problem areas that create immune disruption. Then I will provide eight solutions that augment the immune system.

Immunosenescence—The Aging Body

Immunosenescence is the study of the aging immune system. Senescence is the medical term for the process of aging. The biology of aging is a young science. There is not enough research on the intricate and diverse process of aging and how it affects the immune system in particular.

The physiology of the immune system begins to decline at about age 50. From a medical point of view, the treatment of the elderly in the specialty of geriatrics, does not formally begin until age 65. Based upon the realities of science, I will begin the timing of immunosenescence at the age of 50 years old. The political and cultural meme of "60 is the new 40" is not based upon the science of aging, but upon a combination of wishful thinking, appearance-based behavior, and only sometimes from a healthy attention to the details of aging.

Immunosenescence functionally begins at about 50 years old and accelerates in earnest by 65 years old. It worsens again at about age 75 years old and advances rapidly thereafter. The progressive decline in immune function with increasing age is a real problem, especially relating to the clinical presentation of Covid-19. Older people get more severe diseases in all categories. This decline in the immune system's functionality, as people age, is also associated with an increase in the incidence of all inflammatory diseases, and the aging body tends to be in a state of chronic low-grade inflammation. This "inflamm-aging" weakens the body at multiple levels and especially with the function of the immune system. Though we cannot change our chronologic age, we can modify our biologic age—or those physiologic actions—that at any age, can make us younger in function by altering key behaviors.

What you can do:

Your goal is to lower your biologic age by modifying unhealthy lifestyles and doing as many of the immune augmentation activities as you are able. Your goal is to help your body to help the vaccine to create a more robust immune response. Your goal is to be younger in function—that will not happen by chance.

Obesity—The Other Epidemic

Obesity decreases the overall function of the immune system at many levels. Influenza virus epidemics have been shown to present differently in an obese host causing higher incidence of flu and more hospitalizations. Influenza vaccines are not as effective and don't last as long in obese individuals.

If we take the extensive data regarding altered immune function with obesity and then add that data that to Covid-19 infections, we can see that being obese is a fixed host factor that may be one possible reason for why the pandemic has been so devastating to this population. We must also be concerned about the potential lower effectiveness of the coronavirus vaccines for individuals who suffer from obesity due to their distinctive immune system dysregulation.

What you can do:

If you are overweight or obese, recognize that your immune system may not be able to utilize the coronavirus vaccine at the highest level. Consider doing as many of the immune augmentation activities listed in this paper as you are able.

Immune Compromised Individuals—Be Careful Out There

Certain medical conditions, such as renal failure, diabetes, alcoholic cirrhosis, surgical loss of a spleen, HIV infection, the long-term taking of high dose corticosteroids, cancer chemotherapy, extensive radiation therapy for cancer, or the taking of anti-immune drugs for autoimmune diseases (such as rheumatoid arthritis, psoriasis, inflammatory bowel disease), to name only a few cause affected people to be immunocompromised and increases the patient's risk for many infectious diseases. The degree of immunocompromise is dependent upon many factors, some of which are known and many of which are unknown.

These diseases and key drugs also will alter the function of the immune system causing lower vaccine efficacy. Unfortunately, science has not pursued the study of vaccines in this complicated population. A lesser immune response to the coronavirus vaccine is better than no response. For these categories of patients, it is very much recommended that you get the vaccine.

What you can do:

- *Get the coronavirus vaccine as soon as you are able.*
- *Recognize that your immune response to the vaccine will be less than ideal.*
- *Continue social distancing, mask wearing, etc. longer than the average person. Only once the pandemic is "over" then you can let your guard down.*

Drug Interactions—Don't' Forget, Vaccines are Also Drugs

There are many potential drug interactions with all vaccines. The scientific community has not performed the well-organized interdisciplinary studies required to better understand how vaccines may not work as well due to interference from over-the-counter and prescription drugs. Listed here are five drug categories that potentially will decrease vaccine immune response.

Polyethylene Glycol (PEG)—A Hidden Danger

The two part Moderna/Pfizer coronavirus vaccines both contain mRNA wrapped in lipid nanoparticles (LNPs) that help transport it to human cells. The LNPs are "PEGylated"—chemically attached to polyethylene glycol (PEG) molecules that cover the outside of the LNP. PEG holds on to water and creates a gel-like coating that increases the stability and "life span" of the vaccine. *The one part Johnson & Johnson or Novavax vaccines DO NOT contain PEG.*

Despite the pharmacologic benefit, PEGylated products (any agent that uses PEG) are not free of risk and immune-mediated adverse events are of concern. PEGs were long thought to be biologically inert, but a growing body of evidence suggests they are not. PEG allergic reactions may very well be the cause of the uncommon anaphylactic reactions that occur with some people after receiving the coronavirus vaccine. In one recent study, as many as 72% of people have measurable antibodies against PEGs. About 7% have a level that may be high enough to predispose them to anaphylactic reactions. Why and how severe allergic reactions occur with PEG is still being sorted out by scientists.

Unfortunately, PEG has become ubiquitous in many common household products that we take for granted. PEG serves as a solvent or softener in toothpaste, shampoos, topical moisturizers, cosmetics, and in a common laxative called Miralax. The overuse of PEGylated is concerning. When we use laxatives internally, we are exposing the body to PEG in high quantities that very well could raise antibody levels increasing the chance of developing an allergic reaction to a PEGylated vaccine.

What you can do:

Because the era of mRNA vaccines delivered in an LNP wrapped in a layer of PEG is here to stay. And, because we need this new technology to fight this pandemic and future iterations of coronavirus, it would be wise to discontinue the use of PEGylated laxatives. If you are taking Miralax for mild to moderate constipation, the switch to a different type of laxative. If you have severe constipation, and Miralax is the only drug that works then you may need to accept the possibility of an allergic reaction to these and future coronavirus vaccines. Finally, PEGylated laxatives must not be utilized in children.

No formal recommendations have been made from the FDA, CDC, or WHO regarding PEGylated products—yet. If you are currently taking Miralax and do not plan to stop it, then I would suggest, at the very least, stopping this laxative the day before, the day of, and the day after receiving your vaccine.

NSAIDs and Tylenol—Don't Trade Comfort for Vaccine Effectiveness

Post vaccine reactions are common especially for those given into the muscle. The most common side effect is a sore arm. But, for many vaccines there can be a widespread normal immunologic reaction that can be disconcerting. Those extra side effects can be headache, joint and muscle pains, fatigue, and even fever. None of these symptoms indicate an active infection. *It is impossible to get Covid-19 from the coronavirus vaccines.* For two-part vaccines, all reactions are worse with the second dose. For the coronavirus vaccines, the second dose side effects affect 50-60% of people and tend to be more significant.

These reactions are signs that the immune system is mounting a vital immune response. There is a good type of inflammation that is initiated by the immune system that "turns on" certain white blood cells that create the antibodies and memory cells that "remember" the virus, so you do not get Covid-19.

If you take a non-steroidal anti-inflammatory drug (NSAID) such as ibuprofen (Advil, Motrin), naproxen (Aleve), or the prescription versions (Celebrex, Mobic, etc.) then you are destroying the beneficial inflammation generated by the immune system and blunting the immune response to the vaccine. A similar, but lesser effect happens with acetaminophen (Tylenol).

What you can do:

- *DO NOT pre-treat a vaccine with ibuprofen, naproxen, or acetaminophen hoping to prevent a local or systemic reaction.*
- *DO NOT take ibuprofen, naproxen, or acetaminophen if you have a sore arm after a vaccine.*
- *DO NOT take ibuprofen, naproxen, or acetaminophen if you develop a mild to moderate headache, fatigue, body aches, or fever after the coronavirus vaccine.*

Aspirin—Should I or Shouldn't I? No and Yes

Aspirin is an NSAID and is an anti-inflammatory drug. If your daily dose of aspirin was prescribed for secondary prevention following a heart attack or stroke, or after bypass surgery or getting a stent, then you should continue this essential drug—even though aspirin may slightly decrease your vaccine immune response. If, however, your daily dose of aspirin was prescribed for primary prevention because you have risk factors for a heart attack or stroke (such as hypertension, elevated cholesterol, or diabetes) but you have never had a stroke or heart attack, then it would be best to temporarily discontinue the aspirin the day before and for 7-14 days after your vaccination.

What you can do:

- *If you have never had a heart attack or stroke then stop your aspirin the day before and for 7-14 days after your vaccine.*
- *If you have had a heart attack, stroke, bypass surgery, or a stent then continue your aspirin during the vaccine process.*

Herbal Anti-Inflammatory Agents—The Hidden Problem

If OTC and Rx NSAID's (such as aspirin, ibuprofen, naproxen, etc.) as well as acetaminophen decrease vaccine effectiveness, what about herbal anti-inflammatory agents? Probably yes. People taking supplements with anti-inflammatory effects should avoid these ingredients the day before and for two weeks after vaccination, as there is some concern these ingredients may reduce response to the vaccine. Anti-inflammatory supplements to avoid include willow, meadowsweet, birch, poplar, goldenrod, and polygala which contain salicylic acid derivatives and have effects similar to aspirin. Other supplements such as devil's claw, echinacea, turmeric/curcumin, cat's claw, Boswellia/frankincense, myrrh, resveratrol, and fish oils have anti-inflammatory effects that theoretically could reduce response to the vaccine. The basic rule: if any supplement is advertised as being anti-inflammatory, then stop it during the two week post-vaccine immunologic window of opportunity.

What you can do:

Stop all anti-inflammatory herbs, supplements, or vitamins the day before and for 14 days after vaccination.

Antibiotics—Too Much of a Good Thing?

There is strong scientific evidence and emerging clinical studies showing that antibiotics prescribed prior to, or during vaccination decreases the immune response and thus impairs the effectiveness of any immunization. Antibiotic killing of good bacteria decreases the function of the immune system. The title of a powerful 2019 study from the journal *Cell*, says it all: "Antibiotics-Driven Gut Microbiome Perturbations Alter Immunity to Vaccines in Humans."

What you can do:

If you need antibiotics for a life threatening condition, then the taking of this drug is a medically essential therapy. However, many patients DEMAND an antibiotic from their doctor for any upper respiratory infection (the vast majority are viral infections that do not need antibiotics). Many doctors also initiate giving way too many antibiotics—unnecessarily— for colds and the flu. Try if you can to avoid unnecessary antibiotics, especially near the time of receiving your coronavirus vaccine.

If you are taking antibiotics at the time of your vaccine or have taken antibiotics within two weeks of your vaccine, you are in a higher risk category of potential vaccine failure. In this situation, it would be helpful to follow as many of the "what you can do" parts of this paper.

Corticosteroids—A Double Edged Sword

Oral corticosteroids (prednisone, methylprednisolone, dexamethasone, and hydrocortisone) and their injectable cousins are powerful anti-inflammatory drugs with a double-edged sword. They can be lifesaving if used at the right time or life threatening if used at the wrong time. All corticosteroids depress the function of the immune system at all dosage ranges. Even lung inhaled steroids for asthma and nasal inhaled steroids for allergies all have listed in their package inserts that these drugs increase the risk of viral, bacterial, fungal, and parasitic infections.

The good news is that many studies performed with influenza vaccine do not show any lessening of antibody response to inhaled steroids that are used chronically for asthma and other lung conditions. But, immune action is more than just the production of antibodies. There are complex immune cellular and chemical responses that have not yet been studied regarding corticosteroid interactions with vaccines. We do know that high oral dosing of drugs like prednisone have been definitively shown to decrease antibody response and to lower vaccine efficacy for all immunizations.

If the medical literature is clear that any dose of corticosteroids can increase the risk of many infectious diseases, then it just makes sense that this class of common drugs would also decrease the immune response to any vaccine and decrease effectiveness to varying degrees depending upon dose and where the corticosteroid was delivered. It is likely that anyone who is on any dose of corticosteroids will have a lesser immune response to the coronavirus vaccine, depending upon the dose, potentially rendering you without full protection.

What you can do:

◆ *If you are on long term corticosteroids for a medical condition, it is vital that you get the coronavirus vaccine. Please note, your immune response will not be as great and you may not have full protection. Therefore, extra precautions should be taken until the pandemic has ended.*
◆ *If you "need" corticosteroids for a temporary problem such as a knee injection, spine epidural, oral prednisone for poison oak, etc. Then consider delaying your coronavirus vaccine for at least 4-6 weeks following your dosing. That will allow your immune system to catch up and get back to normal.*

Statins—Good for Your Heart but Maybe Bad for Your Vaccine

Statins can be helpful medications when used to treat elevated cholesterol and have been shown to decrease the risk of getting a heart attack or stroke due to their lipid lowering effects. There is increasing evidence that statins weaken the immune response to many vaccines. Several small studies looking at statins and the influenza vaccine have not been favorable. Statins decrease influenza vaccine efficacy. If confirmed by larger studies, these disturbing findings related to the flu vaccine will have potential implications for clinical guidelines regarding statin use around the time of routine vaccinations. This specific situation is a great example of how science has failed to protect us. I am concerned that these commonly used drugs could render the new coronavirus vaccines less effective.

What you can do:

If you are taking a statin for primary prevention of a heart attack or stroke, it would be reasonable to withhold your statin on the day of your vaccine and for at least one week after receiving the coronavirus vaccine. If you are taking a statin for secondary prevention because you had a past heart attack, stroke, bypass surgery, or stent, then it would be reasonable to withhold your statin on the day of your vaccine and for at least two days after receiving the coronavirus vaccine.

Marijuana and Hemp—The "Other" Drugs

We often look critically at prescription medications and talk about negative side effects and drug interactions. But, what about the "other" drugs. Marijuana and hemp based drugs that include THC and CBD have profound anti-inflammatory and immune suppressive effects. Some of these effects may be desirable and others are detrimental. Cannabis and hemp based products are known to suppress the immune system by silencing key components of the body's defenses, particularly mast cells and certain types of T-cells. Both of these key cellular elements of the immune system are essential to high level vaccine efficacy.

If we are going to be critical of prescription drugs then we must also appraise the potential threat posed by recreational drugs and medicalized cannabis and hemp with their deleterious impact on vaccine efficacy. There is strong theoretical evidence that CBD in particular, and to a lesser extent THC, have the potential to harm the immune response to any vaccine.

Even though we do not yet have scientific studies with definitive proof, it makes sense to limit cannabis and hemp use around the time of your coronavirus vaccine.

What you can do:

If you are using cannabis or hemp products for any reason, it would be reasonable to withhold these drugs for one week prior to immunization and for at least two weeks after receiving the coronavirus vaccine.

What You Can do to Help Your Vaccine—Immune System Augmentation

Immune system augmentation includes the healthy choices that you can make, allowing your body to develop a more robust immune response from your upcoming coronavirus vaccine. Let's look at the research regarding other vaccines and then extrapolate that research to the coronavirus vaccines. It is important that you *not throw away your shot*.

The Power of Sleep—The World's Greatest Immune Stimulator

If I could pick one "drug" or one "supplement" that provides the immune system with the MOST, the BEST, and the HIGHEST level of beneficial immune system stimulation it would be high quality sleep. If I could pick one lifestyle choice or modifiable factor that WEAKENS the immune system the most in the most people, it would be the lack of quality sleep. Sleep plays a vital role in the regulation of the immune system at multiple levels, and the scientific evidence is overwhelming. Our immune system builds up and repairs itself while we sleep. Extensive research has shown that poor sleep can make one more susceptible to all upper and lower respiratory infections such as the common cold, influenza, pneumonia, sinusitis, etc. If sleep is compromised, then once you have any infection, the illness is more severe and lasts longer.

Sleep duration is also directly tied to vaccine immune response. People who slept fewer than six hours on average per night were far less likely to mount an effective antibody response to any vaccine and were far more likely to be unprotected, to some degree, by the immunization than people who slept more than seven hours, on average. If you think that being young will protect yourself from the ravages of poor sleep habits, then think again. Everyone is susceptible to the immune suppressing consequences of the lack of quality and quantity of sleep. If you do not want your coronavirus vaccine to work well, then stay sleep deprived.

What you can do:

The night before your coronavirus vaccine, go to bed early. The day of your vaccine, sleep in. Consider taking a nap before and after your vaccine. Then, try to go to bed early the night of your vaccine. During the two weeks after receiving your vaccine, defend your sleep and do whatever it takes to get a good night's sleep, keeping your immune system primed and ready for action.

Circadian Rhythm—Timing is Everything

Circadian rhythms are the internal body clock that regulate a roughly 24 hour cycle of biological processes in animals and plants. Honoring the wisdom of our circadian rhythms is essential to good health. We know that immune system function varies over the course of a day. The immune system is more active in the morning than in the late afternoon or evening. One very simple study looked at the immune activity of influenza vaccines given in the morning, between 9 AM to 11 AM compared to those given in the afternoon between 3 PM to 5 PM. The results were striking. People who had the morning flu shots had four times more antibodies than those vaccinated in the afternoon.

What you can do:

If you are over the age of 50—especially if you are over the age of 65—it would be best to receive your coronavirus vaccine in the morning. If you are younger and obese, have a weakened immune system for any reason, or take a medication that alters immune function, then take your vaccine in the morning.

Exercise—Move Your Vaccine

It is clear that exercise is good for general health, but what about the effects of exercise on the immune system in particular? The number of studies demonstrating the high level effectiveness of exercise upon building the immune system is vast. Regular exercise decreases the chance of getting a cold or flu, has measurable positive effects on the immune system, and can partially reverse immunosenescence. It also decreases stress and helps promote healthy sleep patterns.

Pre and post influenza vaccine exercise has been studied scientifically. Exercise is considered an input that enhances vaccine effectiveness. If you specifically exercise the arm that received an intramuscular vaccine in the hours before and especially after a flu shot, you will develop a stronger antibody response. Arm exercise speeds blood circulation and pumps the vaccine away from the injection site to other parts of the body. One study took sedentary people who jogged or rode a stationary bike after receiving their flu shot .The subsequent number of antibodies produced were double that of controls who did not exercise.

What you can do:

After you get your vaccine, EXERCISE. Go for a brisk walk for 30-60 minutes, go on a long bike ride, take a Zumba class, cross country ski, go to your gym and do an upper body weight lifting workout, or clean your garage, or garden aggressively, etc. Just do something that involves movement and getting your heart rate up. Preferably do any activity that moves the arm that got the vaccine.

The goal of exercise is to increase blood flow to the injection site so that the vaccine can be better recognized by your immune system.

Diet—Only You Can Control Your Diet Destiny

Many different factors impact vaccine effectiveness and it would make sense that a healthy diet will increase immune system function and an unhealthy diet will depress the immune system. There is a scarcity of research on dietary effects upon the immune system and no research on diet and vaccine efficacy. On one level, this lack of research is a scientific crime.

How do we define a healthy diet? This is a problem. Who gets to decide what is or is not a healthy diet? Science has chosen to not wade into this messy swamp. I won't tell you specifically (by diet brand name) what a healthy diet is; but I will reveal, based upon over 30 years of clinical experience, what I know to be supportive, health-giving, and beneficial with respect to diet. Only you can control your diet destiny. Before and after your vaccine, I propose nine simple and healthy interventions.

What you can do:

1. Dramatically decrease added sugar in your diet. That includes but is not restricted to sodas, fruit juices, candy, cookies, cake, ice cream, frozen yogurt, added sugar in your coffee or tea, honey, maple syrup, and alcohol. The body treats alcohol like sugar, and in addition alcohol is toxic to the immune system.
2. No junk food. Everyone knows what I mean by this simple healthy recommendation.
3. Dramatically increase your intake of vegetables. If you can eat 4-6 cups, yes cups not servings, of vegetables every day, your immune system will be happy and primed.
4. Eat fermented foods: kefir, cultured buttermilk, yogurt, kimchee, and sauerkraut.
5. Do not skip meals and do not fast. Especially the type of weight loss fasting where no meals are eaten for 1-3 days at a time.
6. Do not overeat. Gluttonous eating overtaxes the entire body. Those who eat all of their calories in one large meal have negative health affects in many body systems.
7. No processed foods such as TV dinners, frozen burritos, canned soups, boxed mac & cheese, etc. Nearly all prepared foods contain additives and chemicals that depress the immune system.
8. Eat in, don't eat out. Fast foods found in many restaurants are not healthy. Don't choose convenience over eating high quality foods at home. Assist your body to help itself by preparing your own high quality meals.
9. Do not get dehydrated. Water is the best hydration agent. If you are dehydrated, you have less fluid circulation. If you have less fluid circulation, your immune system cannot get to, recognize, and process a vaccine.

Stress is an Immune Destroyer and Positive Mood is an Immune Restorer

High levels of stress can cause extensive hormonal and immune dysregulation, including a decrease in vaccine response to any vaccine. Stressed vaccine recipients develop a considerably weaker immune response than vaccine recipients who were not under stress.

Positive mood has been shown in multiple studies to have a significantly helpful influence on the efficacy of the immune response to influenza vaccination. Positive mood, especially on the day of vaccination, was a substantial predictor of increased antibody protection when studied 16 weeks post-vaccination for a diverse group of elderly patients over the age of 65. I am convinced that these interesting findings regarding stress can be extrapolated to *any* vaccine.

What you can do:

On the day of your vaccine and for 3-5 days thereafter, try to decrease your stress in any way that you can. Protect yourself from the harmful effects of stress. See the next section on laughter.

Whatever it takes, in any way possible, on the day of your vaccine endeavor to be upbeat, positive, happy, relaxed, and joyful. I would recommend structuring your vaccine day carefully by including a news fast, spending time with loved ones, being with friends, exercising, taking the day off from work, etc.

Laughter—Is Still the Best Medicine

Laughter decreases stress. The studies on the positive effects of laughter on health are extensive. The key word used in the laughter literature is "mirthful laughter." Mirthful is defined as full of gladness and merriment. Synonyms include cheerful, high-spirited, jocular, hilarious, gleeful, buoyant, and carefree. There has not—yet—been a study correlating the use of laughter on helping the immune response from vaccines; but there should be.

What you can do:

On the day of your vaccine, laugh as much as possible. Watch a funny movie, be with funny friends (while following the guidelines of social distancing). Adopt a mirthful attitude. Consider devoting the day of your vaccine to doing something fun.

Meditation—Another Way to Relieve Stress

High stress situations have been proven to decrease immune system function and increase the frequency of all types of upper respiratory infections. Meditation has also been shown to decrease the negative physiologic effects of stress. Good studies have shown that having a regular meditation practice decreases the incidence of colds and flu. To date there has not been a study linking meditation and increasing vaccine efficacy. Since we know that meditation decreases stress, it makes sense that using meditation skills on the day of your vaccine and for several day thereafter likely will help improve your vaccine response.

What you can do:

On the day of your vaccine, meditate several times a day to decrease background stress allowing for the vaccine to potentially work better. Or better yet, rededicate yourself to the good habit of a daily meditation practice.

Immune Enhancers—Herbs, Supplements, and Vitamins

There is strong evidence-based medicine showing that certain supplements herbs, and vitamins potentiate the action of vaccines in a beneficial way. There is no current research on vaccine potentiation for the coronavirus vaccine, but we can use the science generated from other vaccines, especially the influenza vaccine to create healthy practices, based upon reason. I will offer three supplements as examples of immunopotentiators: Vitamin D3, probiotics, and medicinal mushrooms. There are other herbs and supplements that will most likely potentiate the action of vaccines. I encourage you to be open minded, and search for natural substances that will help your body to help itself better.

Vitamin D—Sunshine in a Capsule

We now know that anyone who is deficient in Vitamin D has a greater chance of getting Covid-19 and has a more severe disease with a higher probability of hospitalization. Low vitamin D status historically has been shown to dramatically increase the risk of both getting influenza and having a more severe infection.

A recent study of the hepatitis B vaccine showed insufficiency in vitamin D was associated with poorer vaccine response. Though vitamin D deficiency has not been shown to affect antibody production associated with the flu shot, it does however significantly alter the number of key cytokines that signal to the immune system to turn on in the presence of this vaccine. It makes sense that being deficient in Vitamin D will decrease coronavirus vaccine efficacy, even though we do not *yet* have scientific proof.

What you can do:

If you are already taking Vitamin D3 as a supplement then you do not need to add more Vitamin D3. The goal of Vitamin D3 supplementation is to prevent insufficiency and deficiency. More is not better.

If you are NOT taking a Vitamin D3 supplement at all, then I recommend taking 10,000 IU of Vitamin D3 the day before and for three days after your vaccine.

Probiotics—The Gut Microbiome is a Part of the Immune System

Probiotics consisting either of beneficial bacteria in capsule form or in whole foods (kefir, yogurt, cultured buttermilk, kimchee, and sauerkraut) have been shown to have positive immune enhancing effects decreasing the incidence of upper respiratory infections in adults and children. A recent review of probiotics shows them being protective against all viral respiratory infections, and we could make the leap that this class of foods and supplements very well have protective effects against this coronavirus infection by enhancing host immune responses. It makes sense that adding in probiotics will increase coronavirus vaccine efficacy, even though we do not *yet* have scientific proof.

What you can do:

Take a high quality probiotic such as PB-8 the day before and for two weeks after your vaccine dosage. Take 2 capsules twice a day. Or, take one ounce of unsweetened kefir plus one ounce of active culture yogurt twice a day for two weeks and try to begin the day before your vaccine. Eat sauerkraut every day.

Medicinal Mushrooms—The Power of Herbs

Medicinal mushrooms have powerful immune stimulatory effects. There is strong scientific evidence demonstrating anti-viral and anti-inflammatory effects against common viruses such as influenza and the coronaviruses that cause the common cold. Mushrooms such as maitake, shitake, cordyceps, reishi, turkey tail, etc. are available in formulations that mix multiple mushrooms in a helpful blend. It makes sense that adding in medicinal mushrooms will increase coronavirus vaccine efficacy, even though we do not *yet* have scientific proof.

What you can do:

There are many proprietary products containing mixed mushrooms. I have found that "Ten Mushroom Formula" made by EcoNugenics is of high quality and low cost. Take 2-3 caps of Ten Mushroom (or the equivalent) three times a day for 7-14 days, depending upon your age and medical issues. For older individuals and those with other medical risk factors, it may be helpful to take this herb for a longer duration.

In Addition, Add in Osteopathic Manipulative Medicine

Receiving an Osteopathic Treatment the day of your vaccine or the day after will decrease arm soreness at the site of the vaccine, enhance your immune response, and generally allow the vaccine to work better.

Other Helpful Herbs and Supplements and One Ultimate Message

There are many other herbs, supplements, and vitamins that can be helpful as potentiators of the immune system and have evidence-based research. They include green tea, selenium, NAC, zinc, melatonin, and many more.

Remember, supplements, herbs, and vitamins ARE NOT more powerful than DEFENDING YOUR SLEEP, EXERCISING, DECREASING STRESS, and EATING A HIGH QUALITY DIET.

Other Vaccines and Interference with the Coronavirus Vaccine

First, none of the *current* coronavirus vaccines have been tested in conjunction with other common vaccines such as influenza, tetanus, hepatitis A and B, or shingles vaccines, to name a few. Until further safety and efficacy research emerges, it is recommended by the drug companies, the FDA, and the CDC that we do not receive any non-coronavirus vaccine two weeks before or two weeks after receiving the coronavirus vaccine.

Second, there is a small body of interesting scientific studies showing that flu shots may very likely increase the risk of non-influenza upper and lower respiratory, including coronavirus. There are four types of ordinary coronaviruses that preceded Covid-19, and they cause about 20% of common cold infections. There are over 200 different types and strains of viruses that are a part of what we call the common cold, they include rhinovirus, adenovirus, parainfluenza virus, RSV, and of course the coronaviruses.

Here is the dilemma, if the influenza vaccine potentially increases the incidence of the common cold versions of coronaviruses, could the flu vaccine possibly be contributing to the increase in SARS-CoV-2 type of novel coronavirus causing the pandemic? Some scientists believe that this is a possibility based upon past research. We desperately need to investigate this potential risk now! Influenza vaccines have become sacred cows in the American medical system, but maybe they shouldn't be in this situation. I am in favor of the influenza vaccine, and know it to be generally helpful. It is not a great vaccine. We could make it better by attending to the simple vaccine augmentation measures outlined in this paper. Until we know more, perhaps we should hold off on giving the influenza vaccine for the remainder of the pandemic?

What you can do:

- *If you are scheduled to have a routine immunization for tetanus, shingles, etc. consider delaying these vaccines until after you have completed the two shots of coronavirus vaccine. If you can, wait at least two months, or longer, after receiving your second dose of vaccine.*
- *If you have a medical urgency and need for example, a tetanus shot, then you should get the immunization under close direction of your physician. And, you must accept that the other immunization MAY distort the coronavirus vaccine in some way not yet known.*
- *If you have not received your flu shot for this season, I would recommend holding off for now and not getting this common vaccine this year, or waiting until two weeks after your second coronavirus vaccine.*
- *If you have received a flu shot this year, then you may be at increased risk of Covid-19 and you MUST get the coronavirus vaccine as soon as you can.*

In Conclusion—Do it

How do we answer the "do to or not do" question? We DO the vaccine. It is the right thing to do. I strongly support that every adult gets the coronavirus vaccine. And, we should start immunizing children once the vaccine supply has adequately increased and when studies have been completed demonstrating basic safety of the coronavirus vaccines for different age groups.

As a physician and a front-line health care worker I have continued to see patients in-person during this entire pandemic. I never closed my medical office. I have meticulously maintained the highest standards of air quality and hygiene in my office. *I have been vaccinated as a showing of solidarity and as a public health necessity.*

There are additional details that we must consider. The science of vaccine medicine is incomplete. We need to know how a vaccine works and just as important, we need to better understand why they frequently do not work. If we use the power of science to discover the weak points of vaccine technology as well as inconsistencies in host factors, then we can create remedies that can change the world for the better. A novel virus demands novel solutions.

The moral of this story is, get your coronavirus vaccine and make the most of it by augmenting your immune system. You can make conscious healthy choices that will increase the efficacy of this vaccine. During this unprecedented crisis, it is our civic responsibility to stay healthy in order to end this pandemic sooner.

The current group of coronavirus vaccines are not perfect. But, as the saying goes, "perfect is the enemy of the good."

Do not throw away your shot.

SFP 5-25-21