

COVID-19: WHAT TO DO

The following is a common sense, science based, approach to preventing Corona Virus (Covid-19) infection. The following recommendations, and remember it is the synergy of ALL of the following science based suggestions, I believe will give each of us a very good chance of not being infected by the virus or if we do test positive for Covid-19, of surviving the infection (along with additional treatment modalities used by healthcare professionals). The following approach is designed to optimize our immune system and its response to bacterial and viral threats to our health-span. A significant part of this strategy is to lower inflammatory markers in our body, which will have a positive impact on ALL aspects of our health and longevity. The ultimate goal is to have our health=span equal our lifespan. As our knowledge of Covid-19 infections has grown, the following pre-existing conditions have been shown to raise one's risk for severe illness/death from this viral infection. It has also become evident, that the risk for poor outcomes from Covid-19 disproportionately affects Black Americans.

PRE-EXISTING CONDITIONS THAT ARE ASSOCIATED WITH POOR COVID-19 OUTCOMES

- Type I diabetes
- Pulmonary fibrosis (scarred or damaged lung tissue)
- Smoking (anything in my opinion), although only cigarettes have been implicated to date
- Pregnancy
- High Blood Pressure
- Liver disease
- Dementia and other neurological conditions
- Thalassemia
- Weakened immune system
- Asthma
- Cancer
- Cerebrovascular disease
- Asthma (moderate to severe)
- Chronic kidney disease
- Obesity (BMI of 30 or more)
- Type 2 diabetes
- Sickle cell anemia
- Heart failure or coronary artery disease
- Chronic obstructive lung disease

**source Centers for Disease Control and Prevention

1. Have your health care professional order a 25 (OH) Vitamin D3 test. Aim for a serum level of 50-75 to 80 ng/ml. There is a high prevalence of vitamin D and magnesium insufficiency in westernized populations. Magnesium plays a very important role in the synthesis and metabolism of vitamin D. See discussion of magnesium later in this paper as to how to be sure this does NOT become an issue in your ability to achieve optimum vitamin D status. Depending on your intake of vitamin D3 when you have the first test done, it is relatively easy to recommend a daily dose that will help you achieve the aforementioned serum level. Four months after your first blood test (and 4 months on

the recommended dose to achieve the recommended blood level), repeat the blood test. You may or may not be able to lower your daily “dose”, in fact, you may need to raise it still further. Whatever your total daily amount of supplemental vitamin D3 may be, divide the dose, so 50% is with breakfast and 50% with dinner. Vitamin D is a fat-soluble vitamin (actually “D” is a hormone), and needs fat in the meal to be properly absorbed. Food sources are great, but supplements are almost always necessary. “D” is absolutely necessary for your immune system to function properly. Vitamin D decreases the risk of respiratory tract infections (one of the major causes of Covid-19 death) by at least 3 main mechanisms: killing of some viruses through the stimulation of antiviral mechanisms, the maintenance of tight junctions to prevent the infiltration of immune cells in lungs, and the reduction in synthesis of pro-inflammatory cytokines through the modulation of our immune system. Type 2 diabetes (DM2) is a significant cause of morbidity and mortality, and it is a significant risk factor for the same as a result of Covid-19 infections. Chronic low- grade inflammation is common in most chronic diseases, including DM2, obesity, and cardiovascular disease. A review article by Mousa states: “This meta-analysis provides level 1 evidence that vitamin D supplementation may reduce chronic low-grade inflammation in patients with type 2 diabetes”. As an added incentive, keep in mind that January is the month usually associated with the highest incidence of the “flu” (a viral infection) and is the month where humans have been noted to have their lowest blood levels of vitamin D (NO accident here). At this time, due to the Covid-19 “situation”, it may not be practical or even possible to get a 25 (OH) Vitamin D3 test, so- take 2000 IU Vitamin D3 with breakfast and 2000 IU Vitamin D3 with dinner (D3 supplements are readily available in most markets and pharmacies), and enjoy the sources of D3 listed below (no limits here). Your multi vitamin will also contain some D3. No worries about too much vitamin D3 under the guidelines and foods listed in this section. At some point, you need to get the blood test for D3. As a general rule, it takes about 1000 IU’s of D3 to raise the Vitamin D3 level about 10 ng/ml. A common mistake many of my patients make is once they raise their D3 level to a protective range, they stop taking D3 supplements. Most of us will need to continue taking about the same amount of D3 they were using to raise their vitamin D3 level to a protective range indefinitely- Discuss with your health care professional for further guidance.

Sources of vitamin D.

- | | |
|---|---------|
| 1. Cod liver oil (1 Tbsp) | 1300 IU |
| 2. Wild Alaskan sockeye salmon (3.5 oz) | 670 IU |
| 3. Albacore tuna (3.5 oz) | 540 IU |
| 4. Wild Alaskan silver salmon (3.5 oz) | 425 IU |
| 5. Pink salmon, canned (3 oz) | 360 IU |
| 6. Sardines, canned (3 oz) | 250 IU |
| 7. Milk or soymilk, vitamin D fortified (1 cup) | 100 IU |
2. Optimize your Vitamin C intake. Along with vitamin D, essentially all immune system functions utilize “C & D” in the center of “their wheelhouse”. “D” blood levels change on a multiple days-to weeks basis, while “C” changes on an hourly basis. As a result, it is

important to ingest vitamin C containing foods throughout the day, and to take a “C” supplement in a manner listed below.

Sources of vitamin C

1. Yellow bell pepper (1 large)	341 mg
2. Red bell pepper (1 large)	312 mg
3. Guava (1)	165 mg
4. Green bell pepper (1)	132 mg
5. Orange juice, fresh (1 cup)	124 mg
6. Orange juice, from concentrate (1 cup)	97 mg
7. Brussels sprouts (1 cup)	97 mg
8. Strawberries, (1 cup sliced)	97 mg
9. Papaya, (1/2 medium)	85 mg
10. Orange, navel (1 fruit)	83 mg
11. Broccoli, fresh (1 cup chopped)	79 mg
12. Cantaloupe, (1 cup chopped)	75 mg
13. Kiwi, (1 medium)	57 mg
14. Cherry tomatoes (10)	22 mg * so easy and only 27

calories, grow in pots in the yard and you have an “easy” to use supply

**Throughout the day enjoy a variety of “Vitamin C foods” listed above, and purchase one of the following 4 Vitamin C supplements. Take one supplement on awakening, one mid-morning with a healthy snack, one mid-afternoon with a healthy snack, and one at bedtime-EACH DAY. MEGAFOOD Complex C, GARDEN of Life Vitamin CODE Raw Vitamin C, NEW Chapter fermented Activated C Complex, NUTRIGOLD Vitamin C Gold. Found at Sprouts, Jimbo’s, and Whole Foods (each pill has 240- 250 mg of vitamin C). Other than a possibility of “loose stools” there is no toxicity with multiple grams of vitamin C daily, and the anti-viral properties of vitamin C may increase as the dose/d increases (I still feel the supplemental dose is in the “sweet spot” as listed above). If you cannot find one of the 4 Vitamin C supplements listed above, no worries, just purchase any supplement you can find, and follow the guideline. Aim for about 1000-2400 mg of supplemental vitamin C/24 hours (kidney stones should not be a problem, but if you have experienced this problem, please discuss with your health care professional before beginning my regimen). As for dietary Vitamin C, the more the better!

Biological mechanisms of vitamin C suggesting anti-viral properties of this vitamin:

- immunomodulatory properties
- concentrates in cells which respond to viral infections: leucocytes, lymphocytes, macrophages
- improves chemotaxis (cells moving towards invading pathogens)
- improves “oxidative killing” of pathogens
- supports lymphocyte proliferation and function
- decreases production of pro-inflammatory cytokines (these cytokines play a major role when a “poor outcome” occurs in Covid-19 infections)

*blinded, randomized, placebo controlled studies, with a large number of patients have not been done, and may well, never be done. Until such studies are published,

I am confident my above recommendations for 1000-2400 mg of supplemental vitamin C (from the supplements listed) plus eating foods high in vitamin C, will play a positive role in preventing AND treating (in conjunction with Covid-19 protocols being used) those infected with Covid-19.

3. SLEEP. Make it a priority to average between 7-8.5 hours of sleep each night. Sleep is essential for proper function of your immune system. < 7 hours sleep/night is associated with immune system dysfunction, and too much sleep can also have a detrimental effect on immune function. You CANNOT "TRAIN" your immune system to function at 100% on < about 7 hours/night.

TIPS FOR A GOOD NIGHTS SLEEP:

- try and go to bed and arise at the same time each day.
- take a warm bath one hour before bedtime.
- try and get your physical activity at least 4 hours prior to your regular bedtime. Studies show that exercise at night delays the release of melatonin that helps you fall asleep.
- minimize evening alcohol consumption. Alcohol may help you fall asleep, but it will not be a deep, restorative sleep. You 'll also be more likely to wake in the middle of the night. The more alcohol you drink, and the closer it is to bedtime, the greater this effect.
- avoid caffeine eight to twelve hours before bedtime. Caffeine stays in your system about twelve hours. So, if you have difficulty sleeping, avoid any caffeinated beverages including soft drinks, after lunchtime.
- don't eat dinner too close to bedtime (3 hours is about the right time between dinner and bedtime).
- if you sleep with animals, limit the number.
- check your medications for any adverse effect on sleep.
- spend some money on a good pillow, my wife and I are sold on "My Pillow" (most of us have seen the ads or TV).
- drink some warm milk before bedtime-it's the tryptophan, a natural sleep enhancer.
- throw out the cigarettes, as nicotine withdrawal has been linked to difficulty falling asleep.
- let the sun shine in. As sunlight is an essential element in helping us to synchronize our body "clock", leave your sunglasses off until after 8 am (this adds some additional "unfiltered sunlight").
- turn off your electronic devices at least one hour prior to your bedtime.
- Cell phones, tablets, computers etc. should be "off your bed" and away from your head when sleeping.
- save your problems for the light of day. For couples, bedtime is not the time to discuss your issues.
- if you take a nap during the day, keep it short and do it early in the day (before 3 P M). A power nap of fifteen to twenty minutes can do wonders.
- sleep meds, discuss with your health care professional.

4. 3 to 5 ounces of Organic 100% Concord Grape Juice 2x daily, best with a healthy snack. Along with your 100% Concord Grape juice (with one of your two servings daily) take one Grape Seed Extract supplement (two supplements which pass my “smell test” are: 1. Vitamin Shoppe Grape Seed Extract- 60 mg of grape seed extract with 300 mg of citrus bioflavonoids) 2. Natural Factors Grape Seed Extract 100 mg. Of course, chewing and swallowing the grape seeds in the grape is a 100% natural way to consume “grape seed extract”. Most seeds have multiple “good nutrients”, other than apple seeds, which contain arsenic. Purple grapes, and their 100% no sugar added juices, have anti-viral properties. A recent review article by Ho on fruit juice states: “In addition to providing fruit servings consistent with current dietary guidance, dark-colored fruits and their corresponding 100% fruit juices contribute a unique array of polyphenols to the human diet that is not delivered by other commonly consumed polyphenol rich sources (eg. Coffee, tea, cocoa). Evidence suggests that blueberries, grapes, pomegranates, tart cherries, and cranberries (as well as their 100% fruit juices) provide health benefits associated with CVD, memory/cognition, obesity/cognition, obesity/diabetes, and exercise performance”,
5. Curcumin is the source of the spice Turmeric. There are numerous studies depicting the anti-inflammatory and antioxidant effect of this spice in humans. Turmeric decreases the reactive oxygen species release from our white blood cells and attenuates the release of pro-inflammatory cytokines (chemicals), helping to control the inflammatory response in a “safe zone”. Although I do not recommend this amount, studies have found Turmeric to be safe in humans up to about 10 grams/day. I recommend 1000-2000 mg Turmeric (Curcumin), twice daily, with food (breakfast and dinner). For the vast majority of the population, this amount is extremely safe. If you are on any medications, especially anticoagulants, I recommend you speak with your prescribing health care professional prior to beginning Turmeric. Look for Turmeric supplements that also contain Black Pepper Fruit extract (may be listed as piperine or BioPerine). The Black Pepper fruit increased the bioavailability (absorption) of the Turmeric up to 2000% in one published report. Turmeric supplements are found at many markets, and certainly at Sprouts, Jimbo’s and Whole Foods. Costco has my favorite brand: youtheory Turmeric, extra strength formula 1000 mg (plus Black Pepper fruit extract). Sprouts 100% Vegetarian Turmeric is another excellent supplement.
6. If you drink alcohol, limit your intake to 3 drinks/week (F), and 6 drinks/week (M). Above these amounts, alcohol can be a definite immune system depressant. Best to “have your drink” with a meal, not on an empty stomach. Also avoid alcohol consumption after about 4 PM, as alcohol in the evening can disrupt sleep, which in turn, could lead to immune system depression. Avoid binge drinking, which has a significant negative effect on immune function. If you are 65+, cut your alcohol amount by 50%, as your ability to metabolize alcohol decreases by about 50%, which means your blood alcohol level will rise about 50%/drink=not an immune system booster.
7. Enjoy a Probiotic supplement with breakfast and dinner. There are many on the market. My two favorite Probiotic supplements are: Nature’s Bounty Ultra Strength Probiotic 10 (1 800 433 2990, NaturesBounty.com)-found at Costco. Another excellent probiotic is

Douglas Laboratories Multi-Probiotic 40 Billion (found on my website listed at the end of this handout). 75-80% of our entire immune system is in our “gut”, and our gut immune system does communicate and “pump up” our immune response throughout the rest of our body (e.g. lungs, nose, sinus, brain, skin, eyes). A 2019 study in Cell Reports is summarized by one of the authors: “We were surprised to discover that the cells lining the lung, rather than immune cells, were responsible for early flu resistance induced by microbiota. Previous studies have focused on immune cells, but we found that the lining cells are more important for the crucial early stages of infection. They are the only place that the virus can multiply, so they are the key battleground in the fight against flu. Gut bacteria send a signal that keeps the cells lining the lung prepared, preventing the virus from multiplying so quickly”. In this mouse study, the mice with healthy gut bacteria were infected with the flu. About 80% of them survived. But, only 1/3 survived if they were given antibiotics before being infected. Take away message: if you must be treated with an antibiotic, be sure and use probiotic supplements 1-1.5 hours after your antibiotic and “load up” on pre-biotic foods. Although the Cell Reports study is in mice, and more studies need to and will be done, there is not a reason to not adopt my just mentioned “Take away message”. Probiotic supplements must be taken twice daily (with meals), and EVERY DAY to be effective. A partial list of foods which stimulate the “growth” of these healthy bacteria, so called pre-biotics, include tea, coffee, dark chocolate, honey (buckwheat has the most anti-oxidants), all berries-cherries-grapes & their juices, raisins, figs, whole grain fiber, and inulin-found in many yogurts. And of course, don’t forget another excellent source of probiotics and other important nutrients-non-fat or low-fat yogurt (organic is best). I recommend 1-2 servings of yogurt (organic if possible) most days.

8. Increase your intake of phytochemical (bioactive, phytonutrient) rich foods, such as berries (includes blueberries, cranberries, raspberries, gogi berries, strawberries, currants, blackberries, boysenberries, salmon berries, buffalo berries, etc), apples (be sure and eat the skin as that is where the phytochemicals are often located), cherries, grapes, plums, citrus (eat the white pith on the inside of citrus skin-loaded with quercetin*(a longevity-immune system booster with anti-viral properties), cherries, prunes (dried plums), dates, raisins, tea (green may be best, but all teas-oolong, white, black, hibiscus, African red tea are all excellent). Although it is not possible to know exactly how much of any one fruit one should eat for maximum health benefits, the referenced review article by Martini et al states the following for berries: “Although it is difficult to estimate clinically efficacious doses of berries, most studies have shown an improvement in vascular function with doses higher than 200 g/d (about 1.75 cups)”. Phytonutrients=phytochemicals (non-vitamin, non-mineral, non-protein nutrients with health benefits). To date, more than 5000 phytochemicals have been identified in food, including polyphenols. Polyphenols are divided into four groups: phenolic acids, stilbenes, flavonoids, and lignans. Flavonoids are the largest group and are further sub-groups: dihydrochalcones (apples), flavonols (kale, leeks, apples, broccoli, onions and others), flavanols-which includes pro-anthocyanidins (grapes, cocoa, tea), flavones (celery, parsley), anthocyanins (black grapes, berries), flavanones (citrus), and

isoflavones (soybeans) and lignans (cereals, linseed). As you can see, this includes a wide variety of foods which hopefully are commonly eaten. High intake of polyphenols is associated with a lower risk of cardiovascular disease and diabetes, two co-morbidities associated with a poor prognosis when diagnosed with Covid-19. Polyphenols demonstrate excellent anti-viral, anti-bacterial, and anti-fungal properties. Polyphenols influence glucose metabolism by increasing insulin secretion from the pancreas, inhibit intestinal glucose absorption, suppress glucose release from the liver, and improve insulin uptake in muscle and fat cells. Additional phytochemical groups include nitrogen containing components, alkaloids, carotenoids, phytosterols, and organosulfur components, all of which have health promoting properties. Tea is the easiest way to keep your blood/body level of polyphenols “high”, so sipping on hot brewed tea, multiple cups/d, is a great preventive step—calorie “free” if no added honey. At least for green tea, the health benefits keep increasing up through at least 5 cups/d. Stevia, if you need a sweetener, is a calorie free product if you don’t like honey or the calories which come with the honey. Hot brewed teas, consumed in the first hour or so after steeping the tea bag in hot water for 3-4 minutes, provides a much higher level of polyphenols than cold, canned or iced tea (in the summer, add ice to hot tea for a “cooling” effect). 100% juices of grapes, cherries, berries. OJ, apples, pomegranate, and prunes is also a way to increase your blood/body level of polyphenols. Dilute with water (50/50 or 1/3 juice/2/3 water, with chipped ice, to reduce the calorie intake. Juices are best consumed with a healthy snack. High intake of polyphenols from food should have no adverse health effect, however, too much supplement intake of polyphenols is not recommended. Polyphenol supplements which meet my “smell test”: Solaray Tart Cherry Fruit Extract (maximum 2/day with food—1 am/1 pm, not two at same time), NOW Citrus Bioflavonoids— (maximum 2/day with food—am/pm, not two at same time), NOW Pycnogenol 30 and 50 mg, (maximum 2/day with food—1am/1pm, not two at same time), Paradise Resveratrol Plant Active Extract 100 mg (maximum 1/day), CocoaVia 450 mgs/capsule or packet 1 877 842 0802 or www.Cocoavia.com (1 capsule breakfast and 1 capsule pre-bed or 1 packet breakfast and 1 packet pre-bed). See Grape Juice for Grape Seed Extract discussion (this is also a polyphenol supplement). Dr. Steve’s Hot chocolate: 6-8 ounces of organic vanilla soymilk in a coffee cup, microwave for 20- 40 seconds, mix in 1 packet of Cocoa Via plus dark honey to taste, stir and enjoy (use a spoon to “retrieve” any Cocoa Via at the bottom of the coffee cup). Dr. Steve’s Green tea: 8-10 ounces of water in a coffee cup, microwave for 2.5-3 minutes, place 2 tea bags in the hot water plus buckwheat honey, steep 3-4 minutes, remove the tea bags and “squeeze them dry” into the coffee cup, add about 2 ounces of vanilla soymilk, stir and enjoy. As for berries, fresh-frozen-freeze dried, all have my endorsement. As summarized in Govers review on berries and their phytochemicals on the digestive and immune systems: “Beneficial health effects were mainly observed for whole berry extracts, not individual berry components. These effects ranged from support of the immune system and beneficial microbiota to reduction in the number and size of premalignant and malignant lesions. These results demonstrate the potency of berries and suggest berries can serve as a strong adjuvant to established treatments or therapies for a variety of

gastrointestinal and immune-related diseases". As for blueberries, a 2019 publication by Curtis found the following: "we show, to our knowledge, the first sustained improvements in vascular function, lipid status, and underlying NO (nitric oxide) bioactivity following 1 cup blueberries/d. With effect sizes predictive of 12-15% reductions in CVD risk, blueberries should be included in dietary strategies to reduce individual and population CVD risk". Rare is the day I do not have one-two cups of these tasty gems.

*Quercetin-rich foods (a common Flavonoid): Tea, Red wine and red/purple grapes, Legumes, Onions, Strawberries, Dark chocolate, Citrus-especially the white pith on the inner layers of the fruit skin, Apples, Berries, Cabbage, Broccoli, Capers.

9. Increase your consumption of garlic, onions, onions, leeks, radishes, and try and have a spinach salad with avocado 5x weekly. First cold-pressed extra-virgin olive oil and balsamic vinegar would be the ideal salad dressing. Add red cabbage plus onions, arugula, pieces of broccoli, and orange bell peppers, mushrooms for an added immune boost. The avocado increases the absorption of the carotenoids in the salad, while providing our body with a wide variety of antioxidants, phytonutrients, and healthy monounsaturated fatty acids.
10. Cold water fish-source of marine omega-3 fatty acids EPA, DHA, DPA, and others: (e.g. Albacore tuna, Wild Alaskan salmon, Arctic Char, Sardines, Alaskan Halibut, Mackerel)- 3-4 ounces 2-4 times weekly plus plant based omega-3's (alpha linolenic acid): 2 tablespoons daily of Ground Flaxseed meal- I like "Bob's" brand, but there are many good choices, organic when possible and found in the cereal section of most markets, Chia seeds, and a handful of walnuts at least 5x weekly. These are the 3 best sources of plant based omega-3 fatty acids. Fish oil supplements are also important. Best brand is Nordic Naturals. In stores look for Nordic Naturals Ultimate Omega, and in healthcare offices or online (www.superhealthyliving.com- this is my website, but I am sure other healthcare professionals offer this as well). Nordic Naturals "sets" the price. Marine Fish Oil dose: 2 Capsules with breakfast and 2 with dinner (Males) and 2 capsules with breakfast and 1 with dinner (Females). In general, as mentioned earlier, omega-3 fatty acids play an important role in promoting health, preventing multiple diseases, and regulating/optimizing immune health. Omega-3 fatty acids help our body "control" our natural immune response, it's a careful balance between too much inflammatory response which can lead to cell destruction/death, and not enough inflammatory response, which can also lead to infection, cell death, and loss of life-it is a very controlled response, and the omega-3 fatty acids (fish oil especially) play an important role in regulating our immune response-not too much, not too little, but "just the right amount".
11. Keep your body in a "De-toxified" state. For optimal function of our immune system, we want our body to rid itself of environmental, man-made, and naturally occurring "toxins" which occur as a result of normal metabolic processes and "infection patrol". We all possess what are called phase 1 and phase 2 detoxification systems. A primary phase 1 activator is chlorophyll, which is found in abundance in green leafy vegetables such as spinach, kale, Swiss chard, mustard greens, turnip greens, and to a lesser extent,

romaine lettuce and other salad greens. The primary phase 2 activators, in order of potency from highest to lowest, are as follows:

1. Sulforaphane, found in broccoli seeds (sprouted) and broccoli florets
2. Pinostrobin, found in buckwheat honey, and to a lesser extent, other honey
3. Broccoli, fresh or frozen
4. Zeaxanthin, found in orange bell peppers, Gogi berries, yellow corn
5. Quercetin, found in red onion, yellow onion, apple skin, cranberries, blueberries, tea, broccoli, buckwheat (the grain), and cilantro
6. Curcumin, found in Turmeric and cumin
7. Beta-carotene, found in sweet potato, pumpkin, carrots & carrot juice, spinach
8. Lutein, found in spinach, kale, Collard greens, Turnip greens, Green peas, Broccoli
9. Lycopene, found in Tomato sauce, R. W. Knudsen Very Veggie, Tomato juice, watermelon, stewed tomatoes, tomato paste, Ketchup, Pink grapefruit
10. Chlorophyll, see above list
11. Vitamin B12, found in clams, mussels, crab, sardines, salmon, beef, multi-vitamins
12. Alpha-carotene, found in pumpkin, carrots & carrot juice, Orange bell peppers, Collard greens

** as for vegetables in general, there is no “upper limit” as to servings/day. Raw, cooked, stir-fried (in low heat with first cold pressed extra-virgin olive oil + herbs and spices) is our family favorite way for most veggies

** a review article by Toh states: “Increasing FV (fruit and vegetable) intake to > 3 servings daily improves CVD risk factors, most distinctly triglycerides, especially when complemented with other healthy dietary changes”. I still like unlimited veggie intake and > 5 servings of fruit daily, but for those who can’t achieve this goal, “>3 FV” seems to work when combined with incorporating more wholegrains, nuts, legumes, and healthy oils (e.g. olive) rich in monounsaturated and polyunsaturated fatty acids combined with a reduction in saturated/trans fats and sugar sweetened foods.

12. Physical Activity (PA). Worldwide, approximately 23% of men and 32% of women are at risk for the underlying conditions which increase our risk for acquiring Covid-19 infections, and for stress-related psychological symptoms (which also increases our risk for infection with Covid-19), because they do not meet PA guidelines based on self-reported data. Physical activity is required for the human immune system to function in an optimal manner. Active muscles produce chemicals that improve immune function, which in turn reduces the extent of infection, and decreases inflammation. And, these are the main causes of lung damage from severe acute respiratory Covid-19 infections. PA is a powerful preventive and therapeutic intervention for the most common pre-existing chronic conditions (e.g. cardiovascular disease, obesity, diabetes) that increase risk of severe Covid-19 infections and death. PA enhances the efficacy of vaccines (hopefully coming for Covid-19) and is an effective tool for preventing and treating anxiety and depression (both increasing as a result of the Covid-19 pandemic). How much exercise is enough? Aim for at least 30 minutes of moderate intensity physical activity 5-6 days/week. More is better, so work your way up to 45-60 minutes

5-6 days/week. Moderate intensity is defined as “burning” 4-7 calories/minute or any activity as intense as a brisk walk, gardening (digging, planting, weeding etc.), dancing, swimming, singles tennis, or bicycling on level terrain. Also, aim for two days a week of strength-training activity. Daily physical activity “sessions” can be broken up into 10-15 minute sessions, whatever works for you. When you are in “lock down mode”, use your imagination in your residence, there are always push-ups, sit ups, and planks. My mom, as she got older, would “fast walk” around her home. Free weights are also great. I’m doing wind-sprints up my driveway, yard work, free weights or exercise bands, lifting 120-140 pound bales of horse food, lifting and walking with 50 pound bags of alfalfa pellets, push-ups, and my favorite-tennis. Don’t forget to walk, as those walking 8000 steps/day are about half as likely to die from any cause, especially heart disease, then those who walk about 4000 steps/day.

13. Stress Reduction/Personal Peace. One of the benefits of a good night’s sleep is stress reduction.

Reducing the stress in your life, along with a good night’s sleep, can prevent or reduce headaches, back pain, high blood pressure, upset stomach, heart disease, anxiety, and depression (a real immune system “trouble maker”). And, stress reduction can also help improve your general health, your energy levels, your skin, your weight, your levels of performance, and IMPROVE YOUR IMMUNE SYSTEM FUNCTION. In my books, I have listed “Personal Peace” as your weapon against unrelieved stress. Personal peace allows the ratcheting down of the flight-or-fight response into a state of serenity that actually has positive physiological and psychological benefits. Daily practice and achieving PERSONAL PEACE enables your body to recover from the inevitable daily onslaughts of stress. To achieve optimal health and function of your immune system, a person needs PERSONAL PEACE as much as one needs the nutrients provided by whole foods, hand washing, social distancing, and masks during “lock down” etc.

PERSONAL PEACE INCLUDES:

The relaxation response (find details on the internet and initially promoted by Frederick Benson MD- bensonhenryinstitute.org. The Benson-Henry Institute for Mind Body Medicine located at Massachusetts General Hospital

Meditation

Religious practice-spirituality

The power of prayer

Listen to music & the music of nature (birds, water etc.)

Enjoy the fragrant smells of flowers and the “massage” of the wind on your skin

Practice optimism

Pet power-petting your dog or cat will lower your blood pressure (in our case, hopefully petting our goats, horses & donkeys will do the same as petting our cats & dogs)

Friendships (they are a telephone call, text, Instagram, email away etc.)

Embrace nature

Yoga, Tai Chi, Qi Gong

Reduce anger-forgive & forget

Nature walks-get outside (not in a group, family only or with trusted friends, easy in the

back-country where there.....

are few neighbors, not easy in the city/suburbs where we are on variable degrees of “lock down” and lots of neighbors

So, open your windows, camp out on your balcony, and watch nature on your TV- e.g. National Geographic, Animal Planet. I use a host of these practices, from the relaxation response-prayer-reading the Bible-exercise-out with nature at various times, every single day, to achieve my own PERSONAL PEACE. DEPRESSION, PTSD, ANXIETY, SUICIDE, DRUG USE, and ALCOHOL ABUSE have all increased dramatically as a result of the Covid-19 Pandemic and the resulting “lock downs”, job loss, financial distress, in-ability to meet and be with friends and even family, isolation, etc. At my place of worship this weekend we were blessed to have a guest Pastor, Ben Courson, speak about DEPRESSION-PTSD-ANXIETY AND SUICIDE. Pastor Courson’s 2020 book, Building Hope in the Face of Depression, FLIRITING WITH DARKNESS, is published by Harvest House Publishing, Eugene, Oregon. In my years as a physician, I have never heard a better discussion how to confront and overcome these human conditions as a “Joyful Warrior”. In my opinion, Pastor Courson’s book, along with your healthcare professional, gives all of us some new tools to use in overcoming these “obstacles” to achieving PERSONAL and OPTIMUM HEALTH. Pastor Courson’s October 25, 2020 sermon can be found at www.horizon.org. (Horizon Christian Fellowship, Rancho Santa Fe, Ca)

14. If you smoke ANYTHING, STOP!!

15. Aim for a BMI < 25. Being overweight is a real “drag” on your immune system. If you need to drop some weight, 2-3 pounds/week is ideal. The BMI formula is on the internet. Increased risk for Covid-19 starts at BMI of 30 or more, but I’m sticking with the optimum BMI, which is <25.

16. Take a multivitamin/mineral/phytonutrient dietary supplement daily. This will insure your body has enough of a wide variety of nutrients which are essential for an A+ immune system-vitamins A, B1, B6, C, D, folate, and the minerals copper, zinc, iron and selenium. For post-menopausal women and most men, iron is not “mandatory” in your multi, as long as you do not have iron deficiency anemia (when in doubt, ask your health care professional for advice on iron). Keep in mind that worldwide, iron deficiency is the number one mineral “deficiency”. There are many multi’s on the market. My favorite, and the one I personally use is Douglas Laboratories Ultra Preventive X, 4 capsules with breakfast and 4 capsules with dinner EVERY DAY. We sell this supplement on www.superhealthyliving.com and the price is set by Douglas Laboratories. I’m sure you can find other sources as well.

Dietary Iron

Tofu (4 oz)	6.1 mg
Bran cereal with raisins (1 cup)	5.0 mg
Oysters (6 medium)	5.0 mg
Soybeans (1/2 cup)	4.4 mg
Lean beef tenderloin, grass-fed (4 oz)	4.0 mg
Quinoa (1/4 cup)	3.9 mg
Blackstrap molasses (1 tbsp)	3.5 mg

Lentils (1/2 cup cooked)	3.3 mg
Spinach (1/2 cup cooked)	3.2 mg
Kidney beans (1/2 cup cooked)	2.6 mg
Prune juice (3/4 cup)	2.3 mg
Turkey breast (3 oz)	1.6 mg
RDA males 14-18	11 mg/d
RDA males 19 & older	8 mg
RDA females 14-18	15 mg
RDA females 19 & older	8 mg
RDA females, pregnant, all ages	27 mg

17. Dental health is very important. Scrub your teeth after breakfast and before you go to bed. Floss after breakfast, lunch, and dinner. Healthy gums, and a healthy mouth, are essential for optimum immune function. Gingivitis and periodontitis are chronic inflammatory diseases affecting our gums and tooth supporting structures. They are caused by mouth bacteria and are associated with a chronic inflammatory response, and, this in turn lowers the optimum function of our immune system. Periodontal disease is present in 64% of Americans 65 and above, and has been linked to diet borne systemic inflammation. In the review by O'Connor the authors conclude: "Inverse associations were found between vitamin C, vitamin E, beta-carotene, fiber, calcium, dairy, fruits, and vegetables and risk of periodontal disease".

18. Zinc. The RDA for zinc for males fourteen and older is 11 mg and for females nineteen and older is 8 mg. More than 300 zinc dependent enzymes have been found in our body, hence zinc is a very important mineral. Even a mild dietary deficiency in zinc can have a profound implication for immunity, skin & eye health, and reproductive/fertility capabilities. It appears that the elderly (65 years and up) are especially prone to developing reduced immunity related to poor zinc nutrition. I feel it is important to take a daily "multi" which provides males and females with the aforementioned RDA's. Since zinc is so important to immune function, I recommend that all males fourteen and older and females eighteen and older make a major effort to consume 11-15 mg of zinc from food (in addition to your supplement). The Tolerable Upper Limit for zinc, set by the Institute of Medicine and the National Academy of Sciences, is 40 mg/day.

Best Sources of Zinc

Oysters (6 medium)	43 mg
Beef (grass-fed, 4 oz)	6.3 mg
Crab (Dungeness, 3 oz)	4.6 mg
Turkey (dark meat, 3 oz)	3.6 mg
Pumpkin Seeds, (¼ cup)	2.6 mg
Cashews, (¼ cup)	2.3 mg
Shrimp, (4 oz)	1.9 mg
Tofu, (4 oz)	1.8 mg
Oats, (¼ cup)	1.6 mg
Green Peas, (1 cup)	1.6 mg
Spinach, (1 cup)	1.4 mg

Yogurt, (1 cup) 1.4 mg

19. N-acety-L-Cysteine (NAC). Commonly known as NAC. When taken orally, our body converts NAC to cysteine. Cysteine is an important amino acid which our body uses to produce glutathione, which is the “primary” antioxidant found in our cells. NAC is an antioxidant which has proved useful in the management of COPD, reducing symptoms, exacerbations and accelerated lung function decline. It has been shown to inhibit influenza virus replication and to diminish the release of inflammatory and apoptotic (cell death) mediators during virus infection. I recommend taking 500 mg with breakfast daily and if you are in quarantine for exposure to a person with Covid-19, up your dose to 500 mg two times daily (breakfast and dinner). There are many reputable companies selling NAC. One of my favorites is Jarrow Formulas N-A-C (500 mg, 200 veggie caps/ bottle). I currently take 500 mg NAC with breakfast and 500 mg NAC with dinner.
20. Magnesium. Magnesium is necessary for > 300 chemical reactions in our body. Unfortunately, approximately half of the US population has been shown to consume < the daily requirement of magnesium from food. Since magnesium plays a very important role in vitamin D metabolism, and in cardiac/ inflammatory processes, it is important to consume more magnesium containing foods.

Best sources of magnesium

Pumpkin seeds, (¼ cup)	185 mg
Spinach, (1 cup cooked)	156 mg
Swiss Chard, (1 cup cooked)	150 mg
Soybeans, (1 cup cooked)	147 mg
Green beans, (1 cup cooked)	149 mg
Wild Chinook salmon, (4 oz)	138 mg
Sunflower seeds, (¼ cup)	127 mg
Black beans, (1 cup cooked)	120 mg
Pinto beans, (1 cup cooked)	94 mg
Cashews, (¼ cup)	89 mg
Brown rice, (1 cup cooked)	83 mg
Almonds, (22)	81 mg

**Optional, take 100-200 mg of a magnesium supplement, with breakfast and or dinner, in addition to your “multi”- I do. My favorite supplement for this key mineral is magnesium glycinate, multiple brands

21. Melatonin. Melatonin is found in various food and medicinal plants. Plant flowers, fruits, and especially seeds, have been found to have the highest melatonin concentrations. Dietary melatonin is absorbed by our gastrointestinal tract and transported into the bloodstream. As a result, ingestion of dietary melatonin seems to be a key step in attaining a serum melatonin level, which can in turn enter cells and play a significant role in promoting health and preventing disease, including infectious diseases, e.g. Covid-19. There are now 100’s of published, peer reviewed, studies which clearly show melatonin’s physiological functions to include the following: sleep promotion, influence on circadian rhythms, mood, neuroprotective effects, immunomodulatory

actions, hormonal regulation, bone growth, synergistic effects with other anti-oxidants, defense against oxidative stress, tumor suppression, anti-inflammatory activity (by interfering with pro-inflammatory signaling pathways), efficient modulation of excessive oxidative stress, photo-protective properties (skin and retina), amelioration of pulmonary lesions associated with inflammation, helps regulate blood sugar, up-regulates antioxidant enzymes, helps protect cellular mitochondria (the cells energy factories), neutralization of excessive free radicals (reactive oxygen and reactive nitrogen species), anti-cancer properties, cardio-protective properties, and possession of anti-bacterial, anti-parasite, and anti-viral properties. Melatonin is a so called amphiphilic antioxidant molecule, able to penetrate all compartments of a cell due to good solubility in both lipids and water, and because of its small size. Melatonin receptors are widely distributed in the body, including brain, skin, GI tract, cardiovascular-immune-endocrine systems, reproductive organs, and brain. Melatonin synthesis in humans proceeds 24 h/day (about 30 micrograms/24 hours), and the maximum concentration in the blood is reached at the mid-dark period. There is no storage of melatonin in the pineal gland. In humans, melatonin is produced by the pineal gland (brain) GI tract, skin, lymphocytes, retina, bone marrow, and possibly in every organ. Melatonin production in humans decreases with age, and data suggests synthesis is depressed in women during menopause, and in those afflicted by Alzheimer Disease, some malignancies, and cardiovascular disease. In older patients, reduced melatonin output has been linked to a higher prevalence of cancer and insomnia. Smoking, alcohol, excessive coffee consumption and some medications reportedly decrease melatonin production in humans.

EXCELLENT SOURCES OF MELATONIN IN FOOD: sour cherries and Tart Cherry Juice, walnuts, corn, rice, ginger root, peanuts, barley, radish, asparagus, sunflower seeds, tomatoes, black tea, orange bell peppers, gogi berries, garbanzo beans cashews, bananas, almonds, pineapple, coffee beans, and oranges. "Foodstuff" melatonin is bioavailable to humans. Coffee, tea, beer, and wine also contain melatonin.

WAYS TO INCREASE MELATONIN "NATURALLY"

- DECREASE artificial light at night, which decreases night-time melatonin production. If you go to the bathroom during the night while in sleep mode, do NOT turn on the lights, as your melatonin production dramatically decreases until you are back in bed, attempting to resume sleep. A small, RED light near the floor will keep you from falling, and has no adverse effect on melatonin production.

- DECREASE LED light at night, which decreases melatonin production

- Consider a Blue Tech lens for indoor "screen time"

- HOT BATH in the evening lowers serum cortisol levels which in turn may play a role in raising serum melatonin levels

- GET SOME SUN, best before 10 am or after 3pm

- ATTEMPT TO decrease or eliminate Wi-Fi and EMF (electromagnetic fields) exposure while sleeping or in bed. EMF's are produced by most, if not all, electrical devices.

When in bed, have your cell phone, computer, and other electrical devices as far from your body as possible. My rule, nothing, not even my alarm clock, within 3 feet of my

body, and cell phones-computers-tablets 15 feet or more from the bed. There is little published research on EMF/Wi-Fi and melatonin levels, but there is plenty of research suggesting there is adverse physiological consequences to “excessive” exposure, especially while you sleep. While driving, I always have my cell no closer than “a seat away”, and while at work, I leave my cell on my desk, NOT in my pocket, and while talking, I try and use “speaker mode” which keeps the cell away from my ear and brain.

-EAT MELATONIN RICH FOODS (see above)

-TAKE TIME TO PRAY AND MEDITATE

-SEEK OUT TRYPTOPHAN RICH FOODS. Tryptophan is an amino acid and one of the precursors to melatonin production, so consuming this amino acid will help your body increase melatonin synthesis. Tryptophan-rich foods include: garbanzo beans, yogurt, almonds, peanuts, tofu, chicken, watermelon seeds (loaded with many nutrients), pumpkin seeds and soy nuts

-SEEK OUT MAGNESIUM RICH FOODS (see above). This important mineral is essential for melatonin production in humans

-As stated by Zhang’s 2020 article: “The possible beneficial effects of melatonin in Covid-19 in anti-inflammation, anti-oxidation, immune response regulation has been repeatedly demonstrated in respiratory disorder models induced by infections and associated complications. Melatonin has a high safety profile. Although the direct evidence of melatonin application in Covid-19 is unclear, both its use in experimental animal models and in studies on humans has continuously documented its efficacy and safety and its use by Covid-19 patients predictably would be highly beneficial”. I agree. I am not yet recommending use of Melatonin supplements in prevention, but highly recommend consuming plants and seeds high in melatonin (plus see How to Raise Your Melatonin Naturally) as part of everyone’s “Prevent Covid-19 infection” protocol. Finally, there is a synergistic relationship between vitamin D and melatonin, as summed up by the Gimenez article: “The combined supplementation of vitamin D with melatonin could offer an attractive synergistic alternative for the prevention and treatment of pulmonary infection by Covid-19. These molecules modulate the same signaling pathways that relate to anti-inflammatory, immunomodulatory, antioxidant, anti-fibrotic, as well as anti-apoptotic effects, in many tissues with special focus at the lung level. They have many shared underlying mechanisms that allow them to exert potentiating actions aimed at strengthening the immune system and preparing the body to overcome the severe pathological consequences of Covid-19 infection, and if there is infection, reduce its high mortality rate”.

22. Activate your Natural Killer Cells (NKC’s). NKC’s are a unique type of lymphocyte (a type White Blood Cell-WBC) that is capable of killing cancer cells and virus-infected cells without a prior immunization (vaccine). Physical activity and resistance exercise (weights) are two activities which have been shown to be NKC activators. Natural compounds (vitamins, phytochemicals, foods) have also been shown to activate NKC’s, including: vitamin A and beta-carotene, niacin (B3), B6, B12, vitamin C, alpha-Tocopherol (the most prevalent form of vitamin E), Curcumin (Turmeric), the soy Isoflavone genestein, Resveratrol (grapes, blueberries, raspberries, cranberries,

peanuts), kumquats, brown rice bran, and garlic, including Aged garlic extract.

23. If you feel like you might be “coming down with Covid-19”, do NOT take any NSAIDS, as this class of medicines has been shown to have a negative effect on your chance of surviving a Covid-19 infection. Seek medical care immediately, as there have been valid reports of patients going from “breathing ok, to death with 12 hours”, due to hypoxia (lack of oxygen to your cells).
24. Increase your daily intake of high fiber, healthy foods. Remember, inflammation is an immune function used by our body in response to infection, trauma, or injury. Dysregulation of anti-inflammatory pathways often leads to chronic low-level inflammation, which sets us up for infection and a hyper-immune response, such as can be seen with Covid-19. A high fiber diet (from a variety of healthy superfoods) is beneficial in reducing, eliminating, or preventing low grade, chronic inflammation. This, in turn, can lead to improvements in many chronic diseases, all of which put us at increased risk for a poor outcome from Covid-19 infections. High levels of inflammation are typically found in Type 2 diabetes, cardiovascular disease, depression, metabolic syndrome, obesity, chronic obstructive lung disease, and cancer. In addition, fiber is loaded with phytonutrients and is an excellent prebiotic, providing “food” that help stimulate the growth of immune system boosting probiotic bacteria. Aim for 10 grams of whole grain fiber as part of your daily total fiber intake. I recommend that men aim for 35-45 grams a day, and women 30-35 grams daily. Take 2-4 weeks to work your way up to my fiber recommendations.

SUPERFOOD FIBER CHOICES

WHOLE GRAIN FIBER

-Barley (0.33 cup)	11 g
-Kashi GOLEAN (1 cup)	10 g
-Whole wheat (1 cup)	8 g
-Nature’s Path Organic Heritage Flakes (1 cup)	7 g
-Bob’s Red Mill Museli (1/4 cup)	4 g
-Oats (1/4 cup)	4 g
-ARROWHEAD MILLS Organic Oat Bran Flakes (1 cup)	4 g
-Bob’s Red Mill Organic Whole Ground Flaxseed Meal (2Tbsp)	3 g
-Food for Life Ezekiel 4:9 Flax (1 slice)	3 g

FRUITS

-Raspberries (1 cup)	8.4 g
-Blackberries (1 cup)	7.6 g
-Apple, with skin (1large)	5.7 g
-Kirkland Three Berry Blend-Raspberries, Blueberries, Blackberries (1 cup)	5 g
-Avocado (1/2 cup)	4.2 g
-Pear, Bartlett (1 medium)	4 g
-Dates, Neglet Noor, pitted (5 or 6)	3 g

-R.W Knudsen Organic Prune Juice (1 cup) 3 g

LEGUMES

--Whole Foods 365 Organic Black Beans, dry (1/4 cup cooked) 12 g
-Eden Organic Kidney Beans, no salt added (1/2 cup) 10 g
-Green peas (1 cup cooked) 8.8 g
-Health Valley Organic No Salt Added Lentil Soup (1 cup) 8 g
-Pinto beans (1/2 cup cooked) 7.4 g
-Eden Organic Black Beans, no salt added (1.4 cup cooked) 6 g

NUTS

-Pistachios (49) 3 g
-Hazelnuts (20) 3 g
-Almonds (24) 3 g
-Maranatha Almond Butter (2 Tbsp) 3 g
-Pecans (20 halves) 3 g
-Walnuts (14 halves) 2 g

VEGETABLES

-Collard greens (1 cup cooked and chopped) 5.3 g
-Libby's 100% Canned Pumpkin (1/2 cup cooked) 5.3 g
-Sweet potato (3/4 cup cubed and cooked) 5 g
-Broccoli (1 cup cooked and chopped) 4.7 g
-Butternut squash (1/2 cup cubed and cooked) 3.5 g

25. Spice it up. Spices and the herb garden can provide your body with a wide variety of anti-inflammatory, anti-viral, and anti-bacterial phytonutrients. No limits other than your taste buds. KIRKLAND Organic No-Salt Seasoning and Mrs. Dash are easy to find no salt substitutes and full of a wide array of health promoting spices. My individual favorites include cinnamon, turmeric, rosemary, oregano, ginger, black pepper and licorice.

26. Potential "Side Effects". If you take a blood thinner, discuss fish oil, turmeric, green leafy veggies, and tea with your health care professional. In general, the only "side effects" which you might experience include: more toilette paper, weight loss, your health-span "heading towards" your lifespan, younger looking skin, your "biological appearance less than your birthday number appearance", less illness, more energy, and a decreased risk for Covid-19.

27. Review all Federal Government, State Government, CDC, and local government recommendations. There are many websites, but a trusted source should be www.coronavirus.gov, and www.health.harvard.edu/disease-and-conditions/coronavirus-resource-center. Beware of "fake news" AND political bias. A discussion of the different medical treatments, masks etc. for Covid-19 is beyond the scope of this update. May God Bless you and your family and WE SHOULD ALL PRAY for a vaccine to be "operational" in the near future that will make herd immunity a hastened reality. I

strongly recommend that everyone read THE GREAT BARRINGTON DECLARATION. The 3 co-authors of this declaration are well known health care professionals from Harvard, Stanford, and Oxford. Their collective areas of expertise are infectious disease epidemiology and public health. The declaration has a number of co-authors. As a physician and healthcare professional, I have reviewed the declaration and “signed on” as supporting what the declaration calls FORWARD PROTECTION. The declaration can be found at www.info@gbdeclaration.org.

28. Immune-System Booster Package, available at www.superhealthyliving.com

Nordic Naturals Pro Omega 2000

Ultra Preventive X “Multi”

youththeoryTurmeic 1000 mg with Black Pepper extract

Multi-Probiotic 40 Billion, Douglas Labs

Mega Food Complex C

USANA Vitamin D3 plus Vitamin K as MK4 & MK7

(*there are many D3 supplements on the market, what I like about USANA’s product is the vitamin K, which has some cardio-protective properties)

Steven G. Pratt MD, FACS. ABIHM

First revision March 17, 2020

Second revision April 12, 2020

Third revision October 1, 2020

Fourth revision October 21, 2020

Fifth revision October 25, 2020

Copyright 2020

REFERENCES

SuperFoods Rx: Fourteen Foods That Will Change Your Life, Steven Pratt & Kathy Mathews, Harper Collins, 2004

SuperFoods HealthStyle: Proven Strategies for Lifelong Health, Steven Pratt & Kathy Mathews, Harper Collins, 2006

SuperHealth, Steven Pratt, Dutton, 2009

SuperFoods Rx For Pregnancy: The Right Choices For A Healthy, Smart, Super Baby, Steven Pratt, Wiley, 2011

Ahu-Jarus JH et al. Dietary Flavonoids for Immunoregulation and Cancer: Food Design for Targeting Disease. Antioxidants 2019 Jul;8 (7): 202

Aune D et al. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer, and all-cause mortality- a systematic review and dose-response meta-analysis of prospective studies. *Int J Epidemiol.* 2017;46: 1029-1056

Aune D et al. Dietary intake and blood concentrations of antioxidants and the risk of cardiovascular disease, total cancer, and all-cause mortality: a systematic review and dose-response meta-analysis of prospective studies. *Am J Clin Nutr* 2018;108: 1069-1091

Barrett B et al. Meditation or Exercise for Preventing Acute Respiratory Infection: A Randomized Controlled Trial. *Ann F Med.* 2012 Jul; 10(4): 337-346

Besedovsky L et al. Sleep and immune function. *Pflugers Arch, Jan; 463 (1): 121-137, 2012*

Biancatelli RMLC et al. The antiviral properties of vitamin C. *Journal Expert Review of Anti-infective Therapy.* Vol 18, 2020- Issue 2

Bradley KC et al. Microbiota-Driven Tonic Interferon Signals in Lung Stromal Cells Protect from Influenza Virus Infection. *Cell Reports,* 2019;28 (1):245 DOL:10.1016/j.celrep.2019.05.105

Calder PC. Polyunsaturated fatty acids, inflammation, and immunity. *Lipids.* 2001;36:1007-1024

Calder PC. Omega-3 fatty acids and inflammatory processes from molecules to man. *Biochem Soc Trans.* 2017;45: 1105-1115

Curtis PJ et al. Blueberries improve biomarkers of cardiometabolic function in participants with metabolic syndrome-results from a 6-month, double-blind, randomized controlled trial. *Am J Clin Nutr* 2019; 109: 1535-1545

Dai Q et al. Magnesium status and supplementation influence vitamin D status and metabolism: results from a randomized trial. *Am J Clin Nutr* 2018;108: 1249-1258

Deer RR et al. Protein intake and muscle function in older adults. *Current Opinion.* Vol 18, #3, May 2015

Ding S et al. Regulation of Immune Function by Polyphenols. *Journal of Immunology Research,* volume 2018, Article ID 1264074, 8 pages

Drosos I et al. New Aspects on the Metabolic role of Intestinal Microbiota in the Development of Atherosclerosis. *Metabolism Clinical and Experimental* 64 (2015) 476-481

Edel AL et al. Dietary Flaxseed Independently Lowers Circulating Cholesterol and Lowers It beyond the Effects of Cholesterol-Lowering Medications Alone in Patients with Peripheral Artery Disease. *J Nutr* 2015;145:749-57

Cadiz-Gurrea ML et al. Cocoa and Grape Seed Byproducts as a Source of Antioxidant and Anti-Inflammatory Proanthocyanidins. *Int J Mol Sci* 2017 Feb 10;18(2). pii: E376. Doi: 10.3390/ijms18020376

Caliskan UK et al. Melatonin in Edible and Non-Edible Plants. *Turk J Pharm Sci* 2017 Apr ;14(1) :75-83

Fink RC et al. HIV type -1 Entry inhibitors with a New Mode of Action. *Antivir Chem Chemother.* 2004,19(6), 243-55

Costello R et al. Magnesium. *Adv Nutr.* 2016 Jan; 7(1): 199-201

Fekete AA et al. Whey protein lowers blood pressure and improves endothelial function and lipid biomarkers in adults with prehypertension and mild hypertension: results from chronic Whey/2Go randomized controlled trial. *Am J Clin Nutr* 2016;104:1534-44

Gimenez VMM et al. Lungs as target of Covid-19 infection. Protective common molecular mechanisms of vitamin D and melatonin as a new potential synergistic treatment. *Life Sci* 2020 Aug 1;254:117808

Gombart AF et al. A Review of Micronutrients and Immune System-Working in Harmony to Reduce the Risk of Infection. *Nutrients* 2020, Jan 16;12(1)

Govers C et al. Review of the health effects of berries and their phytochemicals on the digestive and immune systems. *Nutrition Reviews* 2018, Vol 76 76(1):29-46

Greiller CL et al. Modulation of the immune response to respiratory viruses by vitamin D. *Nutrients*. 2015;7:4240-4270. Doi: 10.3390/nu7064240

Grant WB et al. Evidence the Vitamin D Supplementation Could Reduce Risk of Influenza and Covid-19 Infections and Deaths. *Nutrients* 2020 Apr; 12(4): 988

Grudzien M et al. Effect of Natural Compounds on NK Cell Activation. *J Immunol Res* 2018;2018:4868417

Guthold R et al. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis fo358 population-based surveys with 1.9 million participants. *Lancet Glob Health* 2018;6:1077-e1086. Doi:10.1016/S2214-109X(18)30357-7

Gutierrez S et al. Effects of Omega-3 Fatty Acids on Immune Cells. *Int J Mol Sci*, Oct 20 (20), 5028, 2019

Ho KKH et al. Potential health benefits of (poly)phenols derived from fruit and 100% fruit juice. *Nutrition Reviews* Vol. 78(2):145-174 February 2020

Hsu S et al. Compounds derived from EGCG as a novel approach to the prevention of viral infections. *Inflamm. Allergy Drug Targets*, vol. 14, 13-18, 2015

Huang H et al. Effect of quercetin supplementation on plasma lipid profiles, blood pressure, and glucose levels: a systematic review and meta-analysis. *Nutrition R*

Hui DS et al. The role of adjuvant immunomodulatory agents for treatment of severe influenza. *Antiviral Res* 2018 Feb;150: 202-216

Imanishi N et al. Additional inhibitory effect of tea extract on the growth of Influenza A and B viruses in MDCK cells. *Microbiol. Immunol.*, 46, 491-494, 2002

Jo S et. Inhibition of SARS-CoV 3CL protease by flavonoids. *Journal of Enzyme Inhibition and Medicinal Chemistry*. Volume 25, 2020 –Issue 1

Kaczmarek JL et al. Complex interactions of circadian rhythms, eating behaviors, and the gastrointestinal microbiota and their potential impact on health. *Nutrition Reviews* Vol. 75(9):673-682 September 2017

Kurtys E et al. Anti-inflammatory effects of rice bran components. *Nutrition Reviews* Vol. 76(5):372-379 May 2018

Claycombe-Larson KJ et al. Nutrients and Immunometabolism: Role of Macrophage NLRP3. *J Nutr* 2020;150:1693-1704

Li A et al. Resources and biological activities of natural polyphenols. *Nutrients*, 6, 6020-6047, 2014

Liu S and Liu Q. Personalized magnesium intervention to improve vitamin D metabolism: applying a systems approach for precision nutrition in large randomized trials of diverse populations. *Am J Clin Nutr* 2018;108:1159-1161

Marco ML et al. Health benefits of fermented foods: microbiota and beyond. *Curr Opin Biotechnol* 2017;44:94-102

Liu S et al. Enzymatic Modification of Rice Bran Polysaccharides by Enzymes from *Grifola Frondosa*: Natural Killer Cell Cytotoxicity and Antioxidant Activity. *J Food Sci* 2018 Jul;83(7):1948-1955

Marsh CE et al. Brachial and Cerebrovascular Functions Are Enhanced in Postmenopausal Women after Ingestion of Chocolate with High Concentration of Cocoa. *J Nutr* 2017;147:1686-92

Martini D et al. Role of berries in vascular function: a systematic review of human intervention studies. *Nutrition Reviews* Vol. 78(3):189-206

Mata M et al. N-acetyl-L-cysteine (NAC) inhibit mucin synthesis and pro-inflammatory mediators in alveolar type II epithelial cells infected with influenza virus A and B and with respiratory syncytial virus (RSV). *Biochem Pharmacol.* 2011 Sept 1;82(5):548-55.

Mathew D et al. Antiviral potential of Curcumin. *Journal of Functional Foods*, 40 (1), 692-699, 2018

McCullough ML et al. Flavonoid intake and cardiovascular disease mortality in a prospective cohort of US adults. *Am J Clin Nutr* 2012;95:454-64

Mitchel F. Vitamin-and COVID-19: do deficient risk a poorer outcome? *Lancet Diabetes Endocrinol.* Published Online May 20,2020. [https://doi.org/10.1016/s2213-8587\(20\)30183-2](https://doi.org/10.1016/s2213-8587(20)30183-2)

[Mocking RJT et al. Meta-analysis and meta-regression of omega-3 polyunsaturated fatty acid supplementation for major depressive disorder. *Transl Psychiatry.* 2016;6:e756. DOI:10.1038/tp.2016.29](#)

[Mousa A et al. Vitamin D supplementation for improvement of chronic low-grade inflammation in patients with type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials. *Nutrition Reviews* Vol. 76\(5\):380-394 May 2018](#)

[Nantz MP et al. Consumption of cranberry polyphenols enhances human T-cell proliferation and reduces the number of symptoms associated with colds and influenza: a randomized, placebo controlled intervention study. *Nutr J* 2013;12:161. Doi:10.1186/1475-2891-12-161](#)

[O'Connor JLP et. al. Poor dietary intake of nutrients and food groups are associated with increased risk of periodontal disease among community-dwelling older adults: a systematic literature review. *Nutrition Reviews* Vol. 78\(2\): 175-188 February 2020](#)

[Oh ES et al. Spices in a High-Saturated-Fat, High-Carbohydrate Meal Reduce Postprandial Proinflammatory Cytokine Secretion in Men with Overweight or Obesity: A 3-Period, Crossover, Randomized Controlled Trial. *J Nutr* 2020;150:1600-1609](#)

[Peterson KS et al. The association between carotid artery intima media thickness and individual dietary components. *Nutrition, Metabolism & Cardiovascular Diseases.* \(2013\), <http://dx.doi.org/10.1016/j.numecd.2013.10.024>](#)

Poe FL et al. N-Acetylcysteine: A Potential Therapeutic Agent for Sars-CoV-2. *Med Hypothesis.* 2020 May 30;143:109862. Doi: 10.1016/j.mehy.2020.109862

Pascoe AR et al. The effects of exercise on vaccination responses: a review of chronic and acute exercise interventions in humans. *Brain Behav Immun* 2014;39:33-41

Praditya D et al. Anti-infective Properties of the Golden Spice Curcumin. *Front. Microbiol*, 10, 912, 2019

Sandoval-Ramirez BA et al. Cyanidin-3-glucoside as a possible biomarker of anthocyanin-rich berry intake in body fluids of healthy humans: a systematic review of clinical trials. *Nutrition Reviews* Vol. 78(7):597-610

Rodriguez-Perez C et al. Grape Seeds Proanthocyanidins: An Overview of In Vivo Bioactivity in Animal Models. *Nutrients* 2019 Oct 12;11(10). pii: E2435. Doi: 10.3390/nu11102435

Rowe CA et al. Regular consumption of Concord grape juice benefits human immunity. *J Med Food* . 2011;14:69-78

Salehi B et al. Melatonin in Medicinal and Food Plants: Occurrence, Bioavailability, and Health Potential for Humans. *Cell* 2019 Jul 8(7). 681

Salis JF et al. An international physical activity and public health research agenda to inform coronavirus disease-2019 policies and practices. *J Sport Health Sci.* 2020 Jul, 9(4): 328334

-Samavat H et al. Effects of green tea catechin extract on serum lipids in postmenopausal women: a randomized, placebo-controlled clinical trial. *Am J Clin Nutr* 2016;104:1671-82

-Mohammadi-Sartang M et al. Flaxseed supplementation on glucose control and insulin sensitivity: a systematic review and meta-analysis of 25 randomized, placebo-controlled trials. *Nutrition Reviews* Vol .76(2):125-139 February 2018

Shoba C et al. Influence of piperine on the pharmacokinetics of curcumin in animals and humans volunteers. *Planta Med.* 1998;64:353-6

Silva MC et al. Intestinal absorption of vitamin D: a systematic review. *Nutrition Reviews* Vol. 76(1):60-76 January 2018

Singer P et al. Anti-inflammatory properties of omega-3 fatty acids in critical illness: novel mechanisms and integrative perspective. *Intensive Care Med* 2008;34:1580-1592

Skrajnowska D et al. Role of Zinc in Immune System and Anti-Cancer Defense Mechanisms. *Nutrients* 2019 Sept 22;11(10). pii: E2273. Doi: 10.3390/nu11102273

Smyth et al. Alcohol consumption and cardiovascular disease, cancer, injury, admission to hospital, and mortality: a prospective cohort study. *Lancet* 2015;386:1945-54

Swann IG et al. Dietary fiber and its associations with depression and inflammation. *Nutrition Reviews* Vol. 78(5):394-411, May 2020

Vidal K et al. Immunomodulatory effects of dietary supplementation with a milk-based wolfberry formulation in healthy elderly: a randomized, double-blind, placebo-controlled trial. *Rejuvenation Res.* 2012;15:89-97

Wang J et al. Connection between systemic inflammation and neuro-inflammation underlies neuroprotective mechanism of several phytochemicals in neuro-degenerative diseases. *Oxid. Med Cell Longev* 2018, 297, 1972714

Wessels I et al. Zinc as a Gatekeeper of Immune Function. *Nutrients* 2017 Nov 25;9(12). pii: E1286. Doi: 10.3390/nu9121286

Wu D et al. Nutritional modulation of immune function: analysis of evidence, mechanisms, and clinical relevance. *Front Immunol* 2018;9:3160

Yaomingli Li et al. Antiviral and virucidal effects of curcumin on trans

Yokoyama Y et al. Association between plant-based diets and plasma lipids: a systematic review and meta-analysis. *Nutrition Reviews* Vol. 75(9):683-698 September 2017

Zhang RH et al. N-acetyl-L-cystine (NAC) protects against H9N2 swine influenza virus-induced acute lung injury. *Int Immunopharmacol* 2014 Sep;22(1):1-8

Zhang R et al. Covid-19: Melatonin as a potential adjuvant treatment. *Life Sci.* 2020 Jun 1; 250: 117583.