

the *wale*
→ clinic →
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*A Mask Is Not
Your Only
Defense!*

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MY STORY

Susan Prather, FNP-C

I am certified by the American Academy of Nurse Practitioners. I am the founder and owner of The WAE Clinic, PLLC in Cleveland, Mississippi.

After my own health crisis and an endless search for answers with providers, I found help and healing in the whole-person approach of functional medicine. I experienced amazing symptom relief and became an integrative medicine convert after more than a decade as a nurse practitioner in conventional clinics. I'm on a mission to share what I've learned with my patients to help them break away from traditional sick care and toward wellness and vibrant health.

I am zealous about personalizing care for every person and take time to listen and evaluate so I can treat the root cause of the problem rather than suppressing symptoms.

I earned my bachelor of nursing from Delta State University and a master's of nursing from the University of Mississippi Medical Center School of Nursing. I recently completed a board certification in anti-aging medicine at the American Academy of Anti-Aging Medicine.



WHAT TO EXPECT

- Learn the importance of Digestive Wellness
- Learn how toxins affect your immune system
- Learn what probiotics are essential for immune health and some easy ways to include them in your diet

DIGESTION DEFINED

- Digestion is the process your body follows to breakdown the food you eat into smaller components that can be absorbed into the bloodstream.
- Mechanical digestion occurs in the mouth where food is physically chewed and broken down into smaller pieces
- Chemical digestion occurs in the gastrointestinal tract where the food is broken down by digestive enzymes into smaller molecules that can be absorbed into the bloodstream and utilized by the body!



THE IMPORTANCE OF GUT HEALTH AND GOOD DIGESTION

- The health and vitality of your body, your skin, and your hair depend on the health of your gut.
- The health of your immune system depends on the health of your gut.
- The health of your mind depends on the health of your gut.
- Today, we explore why your gut is the doorway to ultimate health.





FACTORS THAT DISRUPT GUT FLORA

- Antibiotics
- Poor Diet
- Chronic Stress
- Environmental Toxins
- Digestive Distress (low stomach acid, and poor motility)
- Toxic Overload

STRESS, DIGESTION & IMMUNITY

- When the body is stressed, the body cannot properly detox or function.
- Stress raises cortisol and insulin levels, resulting in blood sugar imbalances, hormonal issues, weight gain, and toxicity.
- Stress is the biggest toxin in this world. When you stress, your gut lining gets inflamed and the microbiome is disrupted. (The Oregon Study)
- 80% of your immune system is located in your gut. The intestinal immune system produces more antibodies than the rest of the body put together and gastrointestinal secretions are as rich as breast milk in health-supporting and disease-preventing factors!
- Learning simple tools to reduce and manage stress is essential for fighting off even the common cold.

TYPES OF STRESS

- Cellular (e.g., cancer, disruption of endothelial tight junctions in the gut, immune cells, TH1/TH2 imbalance)
- Environmental toxins (e.g., endocrine-disrupting chemicals, medications, mercury, mold)
- Epigenetic (e.g., acetylation and methylation defects)
- Genetic (e.g., APOE4, MTHFR, PRGN)
- Microbial (e.g., dysbiosis, infections, pathological microbiome)
- Molecular (e.g., CIRS, disrupted neurotransmitter synthesis, oxidative stress)
- Nutritional (both macronutrient imbalances [e.g., inadequate fiber or protein, unhealthy fats] and micronutrient imbalances [e.g., DHA, EPA, selenium, zinc, etc.])
- Psychosocial level (e.g., belief systems, perceived locus of control, role disruption)



STRESS

- Both physical and psychological stressors have been implicated in the development of disease with numerous animal and human studies demonstrating the effect of stressors on immune function.
- Regularly scheduled relaxation modulates an overactive immune system. This can include scheduled downtime or specific steps to invoke the Relaxation Response (RR).
- In healthy individuals subjected to experimental stress, low vagal tone has been correlated with impaired immune response.
- Relationships can be both stress-inducing and stress-relieving.
- Social isolation correlates with increased cortisol and inflammatory cascades, and loneliness correlates with increased expression of pro-inflammatory genes.



Mindful Breathing

"If you want to conquer the anxiety of life, live in the moment, live in the breath." —Amit Ray

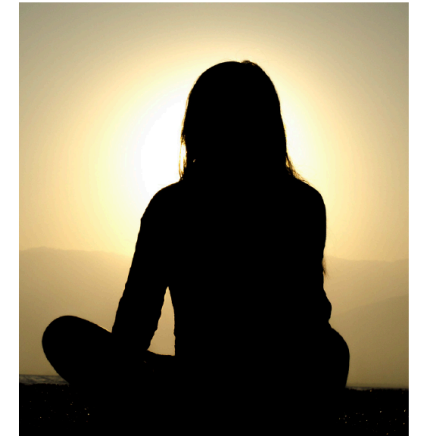
Shallow breathing may lead to tension and fatigue. Breathing with your diaphragm tends to reduce stress and improve energy.

Abdominal breathing, or **diaphragmatic breathing**, is a powerful way to decrease stress by activating relaxation centers in the brain. The abdominal expansion causes negative pressure to pull blood into the chest, improving the venous flow of blood back to the heart.

When you mindfully incorporate abdominal breathing exercises into your daily routine, you may find that focusing your attention on your breath during stressful moments becomes easier to do. This is an important skill that can help you deal with stress, anxiety, and negative emotions in a positive way. Mindful, deep breathing can also help sharpen your ability to concentrate.

The following abdominal breathing exercise, often called **4-7-8 breathing**, can help you start breathing mindfully:

- Find a comfortable place to sit or lie down, with your feet slightly apart, one hand on your abdomen near the navel, and the other hand on your chest.
- Gently exhale the air in your lungs through your mouth, then inhale slowly through your nose to the count of **four**, pushing out your abdomen slightly and concentrating on your breath. As you breathe in, imagine warm air flowing all over your body. Hold the breath for a count of at least four but not more than **seven**.
- Slowly exhale through your mouth while counting to **eight**. Gently contract your abdominal muscles to completely release the remaining air in the lungs.
- Repeat until you feel deeply relaxed for a total of five cycles. You may be able to do only one or two cycles at first.
- Once you feel comfortable with your ability to breathe into the abdomen, it is not necessary to use your hands on your abdomen and chest.



LIFESTYLE

- Exercise, but don't over-exercise. Strenuous exercise can cause increased intestinal permeability
- Athletes undergoing intense, prolonged training or participating in endurance races suffer an increased risk of infection due to apparent immunosuppression
- Plasma glutamine concentration is lower after prolonged, exhaustive exercise: this may contribute to impairment of the immune system at a time when the athlete may be exposed to opportunistic infections
- Exercise increases endorphins, improves mood, reduces anxiety, and improves sleep
- Exercise and mindful movement are key lifestyle tools for immune modulation.
- Avoid vigorous, high-intensity exercise
- Sleep deprivation, even mild, can cause elevations in inflammatory markers (ie CRP).



THE GUT AND IMMUNE CONNECTION

“In a healthy gut, the trillions of microorganisms that inhabit the small and large intestine make up a symbiotic, harmonious community known as the gut microbiome. Your gut bacteria can impact everything about your health, including how your brain responds to stress, how well your body can digest certain carbohydrates, the health of your immune system, how you store fat, and much, much more. If your gut microbiome is disrupted, it can cause dysbiosis—which leads to CHRONIC ILLNESS” Chris Kressler

- Source: Chris Kressler- <https://chriskresser.com/the-gut-microbiome/>



HOW TO IMPROVE YOUR DIGESTION AND MICROFLORA

Tips for Maintaining a Healthy Microbiome

- Stay hydrated. Every day, drink approximately half your body weight in ounces of water and other non-caffeinated beverages free of added sugars.
- Be sure to include both prebiotic and probiotic foods in your diet
- Eat plenty of high-fiber vegetables, which help maintain a healthy digestive system. Limit or avoid processed foods, foods high in added sugar, artificial sweeteners, and trans fats.
- Limit or avoid any foods to which you are sensitive, intolerant, or allergic. Some common examples are corn, dairy, eggs, fish and shellfish, peanuts, soy, tree nuts, and wheat (gluten).
- Take antibiotics only when medically necessary. During and after completing a course of antibiotics, eat probiotic foods and take a probiotic supplement. This can help rebuild the population of healthy bacteria in your gut.

PROBIOTICS

- Probiotics are allies for daily detox!
- They improve the balance of good bacteria in the gut AND help us have healthy bowel function
- Help balance weight and reduce the risk of metabolic syndrome (overweight people tend to have fewer good bacteria than thinner people)
- Improve immunity and immune response while lowering inflammation and overall risk of disease





PREBIOTICS

Prebiotics are insoluble fiber available in many foods. They act as food for probiotics.

Eat the following regularly to help satisfy the good guys in your gut:

- Onion, leeks and garlic
- Asparagus
- Artichoke
- Jerusalem artichoke
- Chicory root (Dandy Blend coffee substitute is an easy choice)

PROBIOTIC FOODS

Dairy:

- Acidophilus milk
- Buttermilk
- Cheese (aged)
- Cottage cheese
- Kefir
- Sour cream
- Yogurt (plain, no added sugar, active cultures)

Non-Dairy:

- Fermented meats
- Fermented vegetables
- Kimchi
- Kombucha
- Kvass
- Miso
- Natto
- Pickled vegetables (raw)
- Sauerkraut
- Tempeh
- Yogurt (plain, no added sugar, active cultures)

PREBIOTIC FOODS

- Apple
- Asparagus
- Banana
- Burdock
- Chicory
- Cocoa
- Dandelion greens
- Eggplant
- Endive
- Flaxseed
- Garlic
- Honey
- Jerusalem artichoke (sunchoke)
- Jicama
- Konjac
- Leek
- Legumes
- Onion
- Peas
- Radicchio
- Whole grains



SUPPORT A
STRONGER
IMMUNE
SYSTEM

5 SIMPLE STEPS TO SUPPORT YOUR IMMUNE SYSTEM

1. Change your diet.
2. Cut out toxins.
3. Sweat.
4. Breathe more deeply.
5. Journal.

#1 – CHANGE YOUR DIET

Ditch

- processed foods
- added sugar
- gluten
- dairy

Eat

- more organic whole foods
- focus on veggies and greens

Include

- probiotic-rich foods and drinks
- Lemon water

#2 – CUT OUT TOXINS

Ditch

- Plastics
- Personal care products with questionable ingredients
- Artificial fragrances
- Smoking

Switch

- Store in glass
- Use natural products (check EWG database for good choices)
- Essential oils

Limit

- Caffeine
- Alcohol

THE REST...

#3 SWEAT

- Skin is a detox organ
- Sauna
- Rebounding
- Exercise stimulates lymph flow

#4 BREATHE

- Deeper breathing helps relax the body and reduce stress
- Less stress = better immune response & lower inflammation

#5 JOURNAL

- Release negativity and record gratitude
- Reduces stress
- ← Less stress = better immune response & lower inflammation!



YOUR
NUTRITION

GLYCEMIC LOAD

- Glycemic load also plays a role in the effects of diet. For example, middleaged women who consume a single high glycemic index meal show increased C-reactive protein. Dietary changes make a difference.
- In obese and overweight individuals consuming identical macronutrient density but with one group eating a high-glycemic diet, the other low-glycemic, C-reactive protein decreased (weight loss did not result).
- For ALL individuals, high-sugar and high-glycemic meals trigger low-grade inflammation.
- The resultant increased levels of destructive and immune triggering advanced glycation end-products promote inflammation and chronic disease, including autoimmune disease.





Hidden Foods

Hidden Food Sources of 5 Common Allergens

The following list will help you identify hidden sources of refined simple sugars, egg, dairy, soy, and wheat that may be added to many common foods. Always read labels carefully and don't hesitate to make inquiries of the food manufacturer if you have any doubts as to a food's contents.

SUGAR	EGG	MILK	SOYBEANS	WHEAT (Gluten)
Baby Foods	Bavarian Cream	Au Gratin Foods	Baby Foods	Beer, Alcohol
Biscuits, Breads	Breads	Bavarian Cream	Breads, Biscuits	Biscuits, Rolls
Cakes	Breaded Foods	Breads, Biscuits	Butter Substitute	Breads: <i>Wheat, Rye, Oat, Spelt, Pumpernickel</i>
Candies	Cakes	Butter, Hard Sauces	Cakes	Breaded Fish
Cereals	Egg Noodles	Buttermilk, Cream	Crackers	Breaded Meats
Chocolate	Flour Mixes	Cakes, Cookies	Cereal	Bouillon Cubes
Cocoa Drinks	French Toast	Candies	Crisco Spray	Cakes, Muffins
Cookies	Fritters	Crackers	Candies	Candy, Chocolates
Crackers	Frostings	Cheeses, Sour Cream	Ice Cream	Cereals
Creamed Foods	Frying Batters	Chocolate	Infant Formulas	Crackers
Custards, Puddings	Glazed Roll	Doughnuts	Lecithin	Cocoa Drinks
Doughnuts	Hamburger Mix	Chowders	Lunch Meats	Cookies, Pretzels
Frostings	Hollandaise Sauce	Cocoa Drinks	Margarine	Cooked Meat Dishes
Hard Candies	Ice Cream	Creamed Foods	Milk Substitutes	Corn Bread, Muffins
Ice Cream, Sherbets	Macaroons	Custard, Pudding	Oil	Crackers
Lunch Meats	Marshmallows	Flour Mixes	Oriental Sauces	Doughnuts, Popovers
Marshmallows	Mayonnaise	Gravies	Pastries	Dumplings
Macaroons	Meat Loaf	Meat Loaf	Prepared Meats	Flour: <i>White, Wheat</i>
Mayonnaise	Meringues	Hot Dogs	Salad Dressings	Gravies
Meringues	Pancakes, Waffles	Ice Cream, Sherbet	Soups	Matzos
Pancakes, Waffles	Puddings	Mashed Potatoes	Soy Flour	Packaged Mixes
Processed Foods	Salad Dressings	Omelets, Soufflés	Soy Noodles	Pancakes, Waffles
Salad Dressings	Sauces	Ovaltine, Malted Milk	Soy Sauce	Pasta, Noodles
Sauces	Sausages	Pancakes, Waffles	Tamari	Pie Crust
Soft Drinks	Sherbets	Salad Dressing	Tempeh	Postum, Ovaltine
Soups	Soufflés	Scalloped Dishes	Tempura	Soufflés
Yogurt		Soups (creamed)	Tofu	Soy Sauce
		Whey	Tuna	Tamari
		Yogurt		Wheat Germ, Bran

FASTING

- Calorie restriction, fasting, and induced ketosis have all been suggested for immune regulation and for reducing autoimmune response.
- For those at risk of chronic conditions, safe and supervised intermittent fasting decreases inflammatory markers.
- While not appropriate for all patients, supervised fasting, intermittent fasting, or induced ketosis may lead to improvement in symptoms from autoimmune conditions.



PROTEIN

- Adequacy of protein is essential for the maintenance of immune-tissue integrity.
- Protein intake, digestion, absorption, transport, biotransformation, assimilation, and elimination are essential functions.
- If there is an imbalance (or inadequacy) of any of these functions, it alters the immune system and increases the likelihood of an aberrant immune response.
- Malnourishment has long been known to correlate with impaired gastrointestinal-immune integrity, and the lack of adequate protein increases gut permeability and changes the immune response.



ESSENTIAL FATS

- Correct Omega-6/Omega-3 ratio
- Optimal ratio may vary with the disease, but overall ratio of 4-5/1 is reasonable goal
- Choose grass fed over grain fed meats for more beneficial ratio of O6/O3
- Both the adequacy and appropriate ratio of essential fats are necessary for normal immune system integrity and function.
- The balance of the omega-3 and omega-6 long-chain fatty acids (LCFA) plays a pivotal role in inflammation and immune system communication, including the regulation of anti-inflammatory or pro-inflammatory prostaglandin cascades.
- Low/No Trans Fatty Acids
- TFA have been shown to raise markers of systemic inflammation



Food Sources: Essential Fatty Acids

Essential Fatty Acids (EFAs) cannot be created by the body; they are called "essential" because they must be obtained through the diet. There are two primary families of essential fatty acids: Omega-6 and Omega-3.

Linoleic acid (LA) and Arachidonic acid (AA) are two common omega-6 fatty acids. LA is found in most plant oils, and AA is present in meat, poultry, and eggs. Alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA) are the most common omega-3 fatty acids. ALA is found in some plant foods, and EPA/DHA in fatty fish.

Every cell in the body needs EFAs for proper structure and function. EFAs promote healthy nerve activity, help produce hormones, and play a role in inflammation. The established AIs below suggest a higher ratio of omega-6s to omega-3s, however, some research suggests that ratios 4:1 and lower may reduce inflammation and lower the risk of chronic disease. Emphasis should be placed on increasing EPA and DHA omega-3 consumption.

The Adequate Intake (AI) for omega-6 fatty acids is as follows:

- **Females, ages 19-50:** 12 grams per day
- **Females, ages 51+:** 11 grams per day
- **Females (pregnant, lactating):** 13 grams per day
- **Males, ages 19-50:** 17 grams per day
- **Males, ages 51+:** 14 grams per day

Food, Standard Serving Size	Amount of LA Omega-6s (g)
Safflower oil, 1 Tbsp	10.1
Sunflower seeds (oil roasted), 1 ounce/~¼ cup	9.7
Pine nuts, 1 ounce/~¼ cup	9.4
Sunflower oil, 1 Tbsp	8.9
Corn oil, 1 Tbsp	7.3
Soybean oil, 1 Tbsp	6.9
Pecans (oil roasted), 1 ounce/~19 halves	6.4
Brazil nuts, 1 ounce/~6 nuts	5.8

The Adequate Intake (AI) for omega-3 fatty acids is as follows:

- **Females, ages 19+:** 1.1 grams per day
- **Females (pregnant), ages 19-50:** 1.4 grams per day
- **Males, ages 19-50:** 1.3 grams per day
- **Males, ages 51+:** 1.6 grams per day

Food, Standard Serving Size	Amount of Omega-3s (g)
Flaxseed oil, 1 Tbsp	7.3 (ALA)
Chia seeds, 1 ounce/~2 Tbsp	5.1 (ALA)
Walnuts, 1 ounce/~14 halves	2.6 (ALA)
Flaxseed (whole), 1 Tbsp	2.4 (ALA)
Atlantic salmon (cooked), 3 ounces	1.8 (EPA/DHA)
Atlantic herring (cooked), 3 ounces	1.7 (EPA/DHA)
Sardines (canned), 3 ounces	1.2 (EPA/DHA)
Atlantic mackerel (cooked), 3 ounces	1.0 (EPA/DHA)

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1. U.S. Department of Health and Human Services, National Institutes of Health, Office of Dietary Supplements. Omega-3 fatty acids. <https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/>. Updated November 21, 2018. Accessed January 22, 2019.
2. U.S. Department of Health and Human Services, National Institutes of Health, Office of Dietary Supplements. Standard Reference. <https://ods.od.nih.gov/factsheets/StandardReference-HealthProfessional/>. Updated November 21, 2018. Accessed January 22, 2019.
3. Oregon State University. Omega-3 fatty acids. <https://www.oregonstate.edu/news/omega-3-fatty-acids>. Accessed January 22, 2019.

Version 2

Medicine

PHYTONUTRIENTS

- High phytonutrient content—A dietary pattern with high vegetables and vegetable oils, leading to high intakes of antioxidant micronutrients and essential fatty acids, was significantly and negatively associated with risk of elevated CRP. Strong inverse correlation with BOTH fruit and vegetable intakes with plasma CRP and metabolic syndrome
- A high-phytonutrient diet not only correlates with decreased risk for frailty in the elderly, it supports overall health.
- Polyphenols have garnered increasing interest from researchers and clinicians as safe, effective immunomodulators.
- Specific compounds, like curcumin, have strong evidence for immune effects—e.g., affecting interleukin-10 secretion.
- Flavonoids
- Resveratrol
- Green Tea



MICRONUTRIENTS

- Micronutrient needs vary significantly across individuals and across specific disease states, and the manner in which these individual needs have been addressed has been with a one-size-fits-all population-based approach as defined by the Daily Reference Intake (DRI).
- The DRI is an extension of the previous Recommended Daily Allowance (RDA) that determined the minimum levels necessary to prevent diseases of deficiency across a population.
- Some argue that the current DRIs are only slightly better than avoiding deficiency states.
- What is apparent is that we do not have clear standards to determine optimal micronutrient status for individuals.
- Personalization of micronutrient recommendations is often determined through “functional testing”—a process in which the functional need for a nutrient is assessed.



FOUNDATIONAL IMMUNE SUPPORT SUPPLEMENTS

- Essential fatty acids: 1–2 grams/day of DHA/EPA supplementation (not including flaxseed oil, which is minimally assimilated)
- Magnesium: 400–600 mg/day, preferably as magnesium glycinate
- Vitamin D: 2,000–5,000 IU/day, depending on latitude and season
- Further supplement recommendations must be personalized



COVID-19: Botanical and Nutraceutical Recommendations for Patients

At this time, there are no specific vaccines or uniformly successful treatments for COVID-19. However, emerging research on several specific botanical and nutraceutical agents is promising, as such agents can improve the body's ability to fight off and recover from the illness. Beneficial botanical and nutraceutical agents are listed below, along with dosing recommendations from your Functional Medicine practitioner. For more information on these recommendations, please consult your practitioner directly.

	BOTANICAL OR NUTRACEUTICAL AGENT	BENEFITS	ENHANCES IMMUNE SYSTEM	DECREASES VIRAL GROWTH	REDUCES SYMPTOMS
<input type="checkbox"/>	Curcumin 500-1,000 mg, 2x daily	Curcumin has been shown to reduce inflammation and decrease viral activity for COVID-19.	■	■	■
<input type="checkbox"/>	Quercetin Regular: 1,000 mg orally, 2x daily Phytosome: 500 mg, 2x daily	Quercetin is found in fruits and vegetables and has a wide range of benefits, including decreasing viral growth.	■	■	■
<input type="checkbox"/>	Zinc (gluconate preferred) 30-60 mg orally, daily	A large body of research shows that zinc has strong anti-viral properties against many viruses.	■	■	■
<input type="checkbox"/>	N-Acetylcysteine (NAC) 600-900 mg orally, daily	N-acetylcysteine promotes the production of glutathione, a potent antioxidant that supports immune function. It also reduces the severity of the flu.	■		■
<input type="checkbox"/>	Vitamin D 5,000 IU orally, daily	Vitamin D enhances immune system function, reduces viral growth, and can reduce upper respiratory infections.	■	■	■
<input type="checkbox"/>	Vitamin A 10,000-25,000 IU, daily	Vitamin A is anti-inflammatory, enhances immune function, and supports the lining of the respiratory tract.	■		■
<input type="checkbox"/>	Vitamin C 1-3 g orally, daily	Vitamin C contributes to immune defense by supporting various cellular functions of the immune system. Vitamin C has been used in hospital ICUs to treat COVID-19 infection.	■	■	■
<input type="checkbox"/>	Melatonin 5-20 mg, taken at bedtime	In addition to promoting restful sleep, melatonin has been shown to reduce inflammation.	■	■	

	BOTANICAL OR NUTRACEUTICAL AGENT	BENEFITS	ENHANCES IMMUNE SYSTEM	DECREASES VIRAL GROWTH	REDUCES SYMPTOMS
<input type="checkbox"/>	Elderberry (Sambucus nigra) 500 mg orally, daily	Elderberry is packed with vitamin C, dietary fiber, and antioxidants. It has been used extensively in the prevention of influenza.	■	■	
<input type="checkbox"/>	Palmitoylethanolamide (PEA) 300 mg orally, 2x daily (prevention); 600 mg orally, 3x daily (treatment)	PEA is a naturally occurring anti-inflammatory agent that has been shown to improve outcomes in acute respiratory disease and influenza.	■	■	■
<input type="checkbox"/>	Green tea or epigallocatechin gallate (EGCG) 4 cups daily (green tea) 225 mg orally, daily (EGCG)	In addition to reducing inflammation, green tea enhances the immune system and targets one of the processes involved in COVID-19 replication.	■	■	■
<input type="checkbox"/>	Resveratrol 100-150 mg orally, 2x daily	Resveratrol, a natural compound found in red grapes, has many beneficial health effects and has been shown in the lab to attack a relative of the COVID-19 virus.	■	■	

<https://www.ifm.org/news-insights/the-functional-medicine-approach-to-covid-19-virus-specific-nutraceutical-and-botanical-agents/>

<https://www.ifm.org/news-insights/lifestyle-practices-for-strengthening-host-defense/>

TURMERIC (CURCUMINOIDS) (CURCUMA LONGA)

- Anti-inflammatory Mechanisms
 - Increases Treg cell proliferation and B reg cell function; increases antioxidants and anti-inflammatory genes
 - Decreases TH 1 cell proliferation
 - Downregulation of $\text{NF}\kappa\text{B}$, COX, LOX
 - Inhibition of iNOS, matrix metalloproteinases, pro-inflammatory cytokines: TNF α Interleukins 1, 2, 6, 8, 12, and chemokines
 - Upregulation of Nrf2 (anti-inflammatory signaling pathway)
- Typical oral dose: 750 to 1500 mg/day
 - Product should be standardized to curcuminoids (90–95%)
- When to use:
 - Most inflammatory-related conditions; as a spice in food and as a supplement
 - Liberally as a food in inflammatory conditions
 - Autoimmune disease: RA, IBD, Lupus, Osteoarthritis



QUERCETIN

- Anti-inflammatory and anti-allergic mechanisms
 - Inhibits phospholipase A2 activity, LOX and COX pathways, TGF Alpha-induced COX-2 activity
 - Inhibits histamine release by mast cells and basophils
- Quercetin is one of the six subclasses of flavonoid compounds and can be found in many forms of food including apples, berries, brassica vegetables, onions, shallots, tea, and tomatoes. Approximate daily intake is 15 mg.
- Typical oral dose: 500–1000 mg TID
- When to Use
 - Allergies
 - Asthma
 - Atopic Disease



ZINC

A large body of research shows that zinc has strong anti-viral properties against many viruses.

- **Immune System:** Helps regulate a wide variety of immune system activities, including T-lymphocytes, CD4, natural killer cells, and interleukin II. A meta-analysis of 15 clinical trials found that zinc administered within 24 hours of onset of symptoms reduces the duration and severity of the common cold in healthy people (Singh et al, 2011). Another meta-analysis found zinc effective in decreasing the incidence of acute upper respiratory tract infections in children (Roth et al, 2010).



Food Sources: Zinc

Zinc is an essential trace mineral; it must be obtained through the diet and is required by the body in small amounts. Zinc is found in shellfish, beef and other red meats, as well as nuts, legumes and fortified breakfast cereals. The bioavailability of zinc, or the amount retained and used by the body, may be lower in grains and plant proteins because these foods also contain phytates, which bind to zinc and inhibit its absorption.

Zinc plays an important role in several body systems – over 100 enzymes in the body require zinc to function. Zinc is necessary for normal growth and development, immune and neurological function, proper sense of taste and smell, and maintaining the structure of cell membranes, as well as protecting them from oxidative damage.

The Recommended Dietary Allowances (RDA) for zinc is as follows:

- **Females, ages 19+:** 8 mg per day
- **Females (pregnant), ages 19+:** 11 mg per day
- **Females (lactating), ages 19+:** 12 mg per day
- **Males, ages 19+:** 11 mg per day

Food, Standard Serving Size	Average Zinc Content (mg)
Eastern oysters (breaded, fried), 3 ounces/6 medium	74
Eastern oysters (raw), 3 ounces/6 medium	33
Game meat, bison/deer (braised), 3 ounces	7.3
Beef chuck roast (braised), 3 ounces	7.0
Alaska king crab (cooked), 3 ounces	6.5
Ground beef (cooked), 3 ounces	5.3
Lamb shoulder (braised), 3 ounces	5.2
Pork shoulder (braised), 3 ounces	4.1
Breakfast cereal (fortified), ¾ cup	3.8
Lobster (cooked), 3 ounces	3.4
Baked beans (canned), ½ cup	2.9
Pork loin (braised), 3 ounces	2.9
Chicken, dark meat (roasted), 3 ounces	2.4
Pumpkin seeds (dried), 1 ounce/~¼ cup	2.2
Cashews (dry roasted), 1 ounce/~17 nuts	1.6

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1. U.S. Department of Health and Human Services, National Institutes of Health, Office of Dietary Supplements. Zinc. <https://ods.od.nih.gov/factsheets/Zinc-HealthProfessional/#h3>. Updated March 13, 2019. March 29, 2019.
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Version 2



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N-ACETYL CYSTEINE

N-acetylcysteine promotes the production of glutathione, a potent antioxidant that supports immune function. It also reduces the severity of the flu.

Several animal and human studies have explored NAC's effectiveness as a therapeutic agent for various types of respiratory illness. While results varied, NAC administration resulted in decreased expectoration difficulty, cough severity, and diaphragm fatigue.

A small study was conducted with 18 patients diagnosed with fibrosing alveolitis; a condition characterized by severe oxidative stress and decreased glutathione levels. NAC was administered at a dose of 600 mg three times daily for 12 weeks and improvement in both pulmonary function and glutathione levels was noted. In contrast, studies of patients with chronic bronchitis, severe airway obstruction, and cystic fibrosis showed a slight, although not statistically significant, decrease in the exacerbation rate.

VITAMIN D

- Stimulates immature/naïve immune cells; enhances host defense against infection; upregulates antimicrobial peptides, while dampening inflammatory cytokine production
- Downregulates activity of mature immune cell; dampens autoimmune responses
- VDR binding induces toleragenic properties in dendritic cells: tips balance towards T-reg cells instead of T-effector cells (especially Th17)
- Dosage: 4000 IU or correct to serum level of 60- 80 ng/mL
- Folic acid, B12, C, E



Food Sources: Vitamin D

Vitamin D is naturally found in very few foods, including fish liver oils, some fatty fish, beef liver and egg yolks. This fat-soluble vitamin can also be obtained from fortified foods such as orange juice, milk, and ready-to-eat breakfast cereals or dietary supplements.

At least some vitamin D needs are met through skin exposure to sunlight. How much vitamin D is made depends on the time of day, age, how much skin is uncovered, and skin tone. Without sunblock and with arms and legs exposed, the skin will make an average of 10,000 to 15,000 units of vitamin D in one pinkish sun exposure. Sunblock with an SPF of more than 15 blocks 100% of vitamin D production in the skin.

Vitamin D helps the body absorb calcium and regulates both calcium and phosphorous levels in the blood. It plays an important role in bone growth and maintenance, influences cell growth and development, and is required for proper immune function.

Research indicates that the current RDAs may be too low for supporting optimal, non-skeletal health. Much higher intake may be required to maintain adequate blood levels. In some instances, optimal vitamin D levels can only be achieved with supplementation. Your functional medicine practitioner may suggest supplementing above the RDA based upon laboratory values, your individual health concerns, and other factors.

The Recommended Dietary Allowances (RDA) for vitamin D is as follows:

- **Females, ages 19-70:** 600 IUs per day
- **Females, ages 70+:** 800 IUs per day
- **Males, ages 19-70:** 600 IUs per day
- **Males, ages 70+:** 800 IUs per day

Food, Standard Serving Size	Average Vitamin D Content (IUs)
Cod liver oil, 1 Tbsp	1360
Salmon (pink, canned), 3 ounces	465
Salmon (sockeye, cooked), 3 ounces	447
Sardines (canned), 3 ounces	164
Tuna fish (canned in water, drained), 3 ounces	154
Milk (whole, 3.25% milkfat, fortified), 1 cup	124
Orange juice (fortified), 8 ounces	100
Beef liver (cooked), 3 ounces	42
Egg (cooked), 1 large	41
Cereal (fortified), 1 cup	40

References

1. U.S. Department of Health and Human Services, National Institutes of Health, Office of Dietary Supplements. Vitamin D. <https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional>. Updated November 09, 2018. Accessed January 28, 2019.
2. U.S. Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory. USDA National Nutrient Database for Standard Reference.
3. Oregon State University. Vitamin D Review.

VITAMIN A

Vitamin A (retinol): 12,500 IU

- Essential for maintaining integrity and function of all mucosal surfaces, required for innate and adaptive immunity
- Retinoic Acid promotes sIgA production and balanced differentiation between Th1/Th2 and Th17 cells
- Essential for maintaining integrity & function of all mucosal surfaces
- Required for innate and adaptive immunity
- Vitamin A deficiency leads to food intolerance; can be corrected with dietary supplements (12,500 IU/d)
- RDA: 700-900 mcg RAE/ 2,330-3000 IU
- B-carotene is converted to vitamin A, an enzymatic process which is highly variable between well-nourished healthy individuals
- Dosage: 12,500 IU



Food Sources: Vitamin A

Vitamin A is the term used to describe a group of fat-soluble compounds which are available in the diet in two different forms: **preformed vitamin A** (retinol) and **provitamin A carotenoids**, such as beta-carotene. The richest sources of preformed vitamin A include organ meats and fish oils, with smaller amounts found in dairy products and fortified cereals. Provitamin A carotenoids are found predominantly in orange, yellow, and green colored fruits and vegetables.

Vitamin A is essential to support cell growth, immune function, and healthy vision. Deficiency of vitamin A is a major, preventable cause of blindness, chronic infection, low thyroid function, and disorders of the skin. Overconsumption of preformed vitamin A is highly toxic, especially during pregnancy. Excess consumption of carotenoids, however, is not associated with toxic side effects.

Preformed vitamin A is more easily absorbed and used by the body. Provitamin A carotenoids must be converted to retinol. Food sources are ranked by micrograms of retinol activity equivalents (mcg RAE) to reflect this difference in bioavailability.

The Recommended Dietary Allowances (RDAs) for Vitamin A are as follows:

- **Females, ages 19+:** 700 mcg RAE per day
- **Females (pregnant), ages 19+:** 770 mcg RAE per day
- **Females (lactating), ages 19+:** 1300 mcg RAE per day
- **Males, ages 19+:** 900 mcg RAE per day

Highest Sources of Preformed Vitamin A

Food, Standard Serving Size	Vitamin A (mcg RAE)
Organ meats (liver, giblets, etc.), 3 ounces	1490-9126
Cod liver oil, 1 teaspoon	1350
Herring (pickled), 3 ounces	219
Oats (fortified, cooked), ½ cup	152
Whole milk, 1 cup	112
Egg (cooked), 1 large	98
Butter, 1 Tbsp	97

Highest Sources of Provitamin A Carotenoids

Food, Standard Serving Size	Vitamin A (mcg RAE)
Pumpkin (canned), ½ cup	953
Spinach (frozen, cooked), ½ cup	573
Butternut squash (cooked), ½ cup	572
Sweet potato (baked), ½ medium	548
Carrot (raw), ½ cup	509
Collards (frozen, cooked), ½ cup	489
Turnip greens (frozen, cooked), ½ cup	441
Winter squash (cooked), ½ cup	268

References

1. U.S. Department of Health and Human Services, National Institutes of Health, Office of Dietary Supplements. Vitamin A. <https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional>. Updated July 9, 2019. Accessed July 17, 2019.
2. U.S. Department of Health and Human Services, National Institutes of Health, Office of Dietary Supplements. Vitamin A. <https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional>. Updated July 9, 2019. Accessed July 17, 2019.
3. Oregon State University. <http://lpi.oregonstate.edu>. Version 2

VITAMIN C

Vitamin C contributes to immune defense by supporting various cellular functions of the immune system. Vitamin C has been used in hospital ICUs to treat COVID-19 infection

- **Immunity:** Regular supplementation with Vitamin C is reported to decrease the duration of colds (Hemila et al, 2013) and decrease the incidence of infection (Ochoa-Brust et al, 2007). Vitamin C supplementation is reported to:
 - a) Increase production of white blood cells (neutrophils, lymphocytes, and natural killer cells)
 - b) Increase levels of antibodies IgA, IgG, and IgM
 - c) Increase production of interferon
 - d) Modulate prostaglandin synthesis and decrease inflammation

Food Sources:

- The best sources of vitamin C are fresh fruits, especially citrus fruits, strawberries, cantaloupe and currants, and fresh vegetables, especially Brussels sprouts, collard greens, lettuce, cabbage, peas, and asparagus.

GREEN TEA (CAMELLIA SINENSIS)

- Anti-inflammatory mechanisms
 - Major active constituents are catechins with EGCG being the most potent anti-inflammatory
 - Inhibits IL-8 production in airway epithelial cells
 - Reduces I κ B phosphorylation to block NF κ B activation
 - Blocks P2X4 receptor mediated pro-inflammatory gene expression of IFN-gamma in vascular endothelial cells
 - Inhibits IL-1 β induced iNOS and COX-2 expression in cartilage
 - Down-regulates IL-6, IL-8 and TNF-alpha by inhibiting NF κ B
- Typical oral dosing:
 - EGCG effects are dose dependent - 200 mg TID
 - Standardized against EGCG content
 - High, frequent doses may make one prone to nausea
 - Quercetin and Fish Oil can increase bioavailability or consuming with a meal that contains these
 - Pair EGCG supplement with cup of green tea to get all four catechins
 - Green tea varies widely in amount of EGCG per serving from 20 mg to 85 mg per cup
 - Steep three to five minutes to extract the EGCG
- When to Use
 - Most inflammatory-related conditions; drink as a beverage in green tea and/or as a supplement (green tea extract)
 - Drink green teas in most inflammatory conditions and as a cancer prevention



GINGER (ZINGIBER OFFICINALIS)

- Anti-inflammatory Mechanisms
 - Inhibition of $\text{NF}\kappa\beta$, COX (prostaglandin PG-E₂), LOX (leukotriene LTB₄)
 - Activation of PPAR
 - Potent inhibitor of reactive oxygen species (ROS)-generating enzymes
- Typical oral dose: 500–1000 mg TID
 - Consensus is limited on formal standardization, but ginger products are increasingly being standardized to gingerol content.
- When to Use
 - Liberally as a food/spice in inflammatory conditions
 - Osteoarthritis



SPECIFIC MEDICINAL MUSHROOMS

- Therapeutic Ingredients (higher Basidiomycetes and Ascomycetes)
 - Polysaccharides +/- peptides
 - Beta glucans
 - Heteropolysaccharides and glycoproteins (KS-2, LEM, PSP, PSK)
- Fiber (from fungal cell walls)
 - Chitin (contrasted to cellulose in plants)
 - Chitosan (poly-glucosamine)
- Lectins (proteins and glycoproteins)
- Terpenoids (primarily from Ganoderma)
- Ergosterol (provitamin D) Reishi (Ganoderma lucidum)
 - Allergies/ asthma (anti-histamine); may help prevent anaphylaxis
 - Mediated by ganoderic acids; (structure is similar to steroid hormone)
 - Autoimmune diseases
 - Myasthenia gravis
 - Cancer
 - Hepatitis
 - Chronic infections
 - Arthritis
- Turkey Tail (*Coriolus versicolor*)
- Maitake (*Grifola frondosa*)
- Shiitake (*Lentinula edodes*)
- Caterpillar fungus (*Cordyceps sinensis*)
- Agaricus (*Agaricus subrufescens*)



AMINO ACIDS

- L-arginine
- L-glycine
- L-glutamine
 - Glutamine is an important fuel for some cells of the immune system and may have specific immunostimulatory effects
 - Oral glutamine dosage: 5000 mg

<https://drjockers.com/best-food-sources-glutamine/>



BOTANICALS



- Aloe vera (*A. barbadensis*): mucopolysaccharides
- Andrographis (*A. paniculata*): andrographolides
 - Anti-inflammatory (lowers PGE₂, inhibits iNOS)
 - Antibacterial, antiviral, and antiparasitic effects
 - Enhances innate and cellular (acquired) immune response to pathogens
 - Increases intracellular glutathione
 - Acute dose = 1000-5000 mg/day
- Astragalus (*A. membranaceus*): astragalosides
 - Enhances immunoglobulin production and activation of NK cells and T-cells
 - Enhances phagocytosis
 - Antibacterial effects: *Shigella*, *Streptococcus hemolyticus*, *Staph aureus*
 - Enhances resistance to herpesvirus, HPV and coxsackie viruses
 - Dose: 500 mg to 3000 mg/day

- Ashwagandha (*Withania somnifera*): withanolides
 - Mobilizes macrophages, phagocytosis, lysosomal enzyme release
 - Dose (whole herb): 1-6 g/day
- Chinese Thoroughwax (*Bupleurum falcatum*): bupleurans
- Echinacea (*E. angustifolia*, *purpurea*): arabinogalactans
 - Wide- spectrum immunomodulator of both innate and adaptive immune responses.
 - Promotes cellular immunity (nonspecific)
- Eleuthero (*Eleutherococcus senticosus*): eleutherosides
 - Used for prevention and treatment of colds and flus (especially with Andrographis)
 - Enhances overall resistance to infection
 - Dose: 250-1500 mg/day
- Ginseng (*P. ginseng*; *P. quinquefolium*): ginsenosides
- Isatis (*I. tinctoria* ; *I. indigotica*): IIP (*Isatis indigotica* polysaccharide)

UPPER RESPIRATORY INFECTION

Prevention:

- Vitamin D: 2000-8000 IU qd
- Vitamin A: 5000 IU qd
- Vitamin C with flavonoids: 500-5000 mg qd
- Vitamin E (mixed tocopherols): 400-800 IU qd
- Probiotics(L acidophilus, L plantarum, L paracasei, B lactis)
- Yeast beta glucan: 250-500 mg qd
- N-acetylcysteine: 500-1500 mg qd
- Larch arabinogalactan: 1000-5000 mg qd
- Astragalus: 1000-2000 mg qd

Treating Infection:

- Vitamin D: 50,000—100,000 qdx 3 days (experimental)
- Vitamin C with flavonoids: 5000-10,000 mg
- N-acetylcysteine: 1500-3000 mg qd
- Andrographis: 300-1000 mg qd
- Licorice root: 500-2000 mg qd
 - Caution: pseudoaldosteronism can occur with high doses or prolonged use: can raise BP, lower serum potassium –DGL is ineffective as an antiviral or immune modulator
- Umckaloabo: 1-2 droppers 4 x daily
- Olive leaf extract: 500 mg qid
- Elderberry (liquid): 1-2 tablespoons qd
- Garlic (freeze-dried): 500 mg qid

the *wale*
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*A Mask Is Not
Your Only
Defense!*

Susan Prather

FNP-C, ABAAHP, FAAMM

