THE INSTITUTE FOR FUNCTIONAL MEDICINE®

VERSION 7

Phytonutrient *Spectrum*

Comprehensive Guide

Table of Contents

Why Phytonutrients?	*3*
Touring Through the Phytonutrient Food List—Red	*4*
Touring Through the Phytonutrient Food List—Orange	*6*
Touring Through the Phytonutrient Food List—Yellow	*8*
Touring Through the Phytonutrient Food List—Green	*10*
Touring Through the Phytonutrient Food List—Blue/Purple/Black	*13*
Touring Through the Phytonutrient Food List—White/Tan/Brown	*15*
Frequently Asked Questions	*18*
Summary	*26*
Resources and Tools for Success	*27*

Why Phytonutrients?

Natural compounds called phytonutrients, or phytochemicals, are components of plants that are powerful defenders of health. Studies show that people who eat more plant foods have reduced risk of chronic diseases such as heart disease, type 2 diabetes, and cancer. Studies have also shown that eating more plant foods is associated with better brain health and lower inflammation. Phytonutrients provide many functions in the plant itself, such as providing protection from pests and environmental stressors, along with imparting color and distinctive tastes and smells. In the human body, phytonutrients provide many benefits including supporting the immune system, improving heart and blood vessel health, supporting brain health, and promoting healthy estrogen metabolism.

Fruits and vegetables are rich sources of phytonutrients, along with whole grains, legumes, herbs, spices, nuts, seeds, and teas. Phytonutrients in food come in all different colors—green, yellow-orange, red, blue-purple, white, tan, and brown. To promote good health, it is important to eat fruits and vegetables of varied colors each day. Eating at least one serving of each color per day is an excellent goal to strive for! While darker-colored plants are generally higher in phytonutrients, white and tan plants also have several beneficial components.

Anyone can start with color as a first basic step when developing a healthy way of eating. This is foundational to all food plans within functional medicine, as plants are good medicine for chronic disease prevention and treatment.



Touring Through the Phytonutrient Food List—*Red*









Red

Red foods contain phytonutrients that may help reduce the risk for certain cancers, along with helping to protect the brain, blood vessels, and heart.

The Food List: Red Foods

There is a vast selection of red foods for you to choose from on the food list. The red fruits on the list include apples, blood oranges, cranberries, cherries, goji berries, grapes, plums, pomegranate seeds, raspberries, strawberries, watermelon, and rhubarb. If you buy dried cranberries, cherries, or grapes (red raisins), make sure there is minimal or no added sugar. When it comes to red vegetables, there are red bell peppers, beets, red onions, red potatoes, radicchio, radishes, sweet red peppers, and tomatoes. This category of foods also presents you with options for red-colored legumes to choose from such as adzuki and kidney beans. Eating the skin of red foods, like apples and potatoes, will provide you with more phytonutrients.

Red berries, which are rich in anthocyanins, are particularly beneficial for brain health. One study showed that eating strawberries regularly was associated with a 34% reduced risk of Alzheimer's dementia compared to people who rarely ate strawberries. Another study showed that people with higher berry intake delayed cognitive aging by up to 2.5 years. Strawberries have also been shown to be beneficial in improving inflammation, particularly in people with osteoarthritis.

Red Food Compounds

Anthocyanins
Astaxanthin
Carotenoids
Ellagic Acid
Ellagitannins
Fisetin
Flavones
Flavonols
Flavan-3-ols
Flavanones
Luteolin
Lycopene
Proanthocyanidins
Quercetin

Benefits

Anti-bacterial
Anti-cancer
Anti-inflammatory
Blood vessel health
Brain health
Cell protection
Heart health
Prostate health

Foods

Apples
Beans *(adzuki, kidney, red)*
Beets
Bell pepper
Blood oranges
Cranberries
Cherries
Grapefruit *(pink)*
Goji berries
Grapes
Guava
Onions
Plums
Pomegranate
Potatoes
Prickly pear
Radicchio
Radishes
Raspberries
Strawberries
Sweet red peppers
Rhubarb
Rooibos tea
Tomato
Watermelon

Touring Through the Phytonutrient Food List—*Red*

Featured Red Phytonutrient

Lycopene

Lycopene is a red-colored phytonutrient, and there is some evidence to suggest that eating a diet rich in lycopene is associated with a lower risk of prostate cancer. It is typically found in tomatoes and tomato-based products such as tomato juice, spaghetti sauce, tomato soup, and tomato paste, as well as, watermelon, pink grapefruit, and guava. Cooked tomato products result in the lycopene being more "available" to be absorbed by the body. Lycopene is also fat-soluble, which means fat is required to optimize absorption into the body. Therefore, an ideal combination could be making a cooked tomato sauce with olive oil.

Ways to get more red foods:

- Add fresh tomatoes, goji berries, raspberries, pomegranate seeds, or pink grapefruit sections to your green salads.
- If you eat pasta, use marinara (red) sauce instead of an Alfredo (white) sauce to increase your lycopene and reduce your saturated fat intake. You can also use marinara sauce on vegetables.
- Make a Mediterranean salad with tomatoes, olives, garlic, herbs, and feta cheese.
- Prepare salsa using chopped tomatoes, chopped red onions, and chili peppers.
- If you drink juice, try blood orange, grapefruit, and/or guava juice.
- Make a chili with kidney beans and tomato sauce.
- Great snack ideas include watermelon slices, raspberries, cherries, strawberries, and apple slices.
- Prepare bruschetta using chopped tomatoes and red onion with fresh basil.



Touring Through the Phytonutrient Food List—*Orange*









Orange

Orange foods are anti-inflammatory, and they help protect the blood vessels, heart, and brain. Several orange foods are also a source of vitamin A.

The Food List: Orange Foods

When you look at the food list, you will find many orange-colored foods to include into your daily diet. The orange fruits include apricots, cantaloupe, mango, nectarine, oranges, papaya, persimmon, and tangerines. You can have these fruits fresh or dried; however, note that dried fruits purchased from the store will most likely have sugar and/or sulfites added. You will have to read the label carefully to be sure there is no added sugar (or sulfites if you are sensitive to them). Orange vegetables on this list are acorn squash, orange bell pepper, butternut squash, carrots, pumpkin, and sweet potatoes.

Orange foods, along with leafy green vegetables, contain a family of phytonutrients called carotenoids. Some of the richest sources of carotenoids from orange foods include carrots, mango, papaya, and pumpkin. Studies have shown that diets high in carotenoid-rich foods reduce inflammation and support brain health.

In addition to fruits and vegetables, turmeric root is also included in this list. Turmeric is an important food as well as a spice when dried into a powder. Turmeric contains curcuminoids, which are potent anti-inflammatory compounds that have been shown to be beneficial for heart health. There are several ways to incorporate this food into your diet—you can sprinkle or grate turmeric into stir-fries, rice, meats, soups, tea, or even add it to smoothies.

Orange Food Compounds	*Benefits*	*Foods*	
Alpha-carotene	Anti-inflammatory	Apricots	Pumpkin
Beta-carotene	Blood vessel health	Bell pepper	Squash *(acorn, buttercup, butternut, winter)*
Beta-cryptoxanthin	Brain health	Cantaloupe	Sweet potato
Bioflavonoids	Cell protection	Carrots	Tangerines
Carotenoids	Heart health	Mango	Turmeric root
Curcuminoids	Reproductive health	Nectarine	Yams
Naringenin		Orange	
		Papaya	
		Persimmons	

Touring Through the Phytonutrient Food List—*Orange*

Featured Orange Phytonutrient

Beta-Carotene

Beta-carotene is important because it can turn into vitamin A in the body. Vitamin A has many functions such as promoting healthy vision, immune function, cell growth, and reproduction. There are actually several plant compounds that convert to vitamin A in the body (the "carotenoids") and beta-carotene is just one.

Most food sources of vitamin A are of animal origin such as seafood, eggs, fish, and dairy products like yogurt, milk, and cheese. Therefore, if you are a vegan or do not eat select animal products, it will be essential for you to eat plenty of carotenoid-containing foods which are of the red, orange, yellow, and green varieties. Additionally, it may not be enough to have carotenoids be your sole source of vitamin A as there are a number of factors that can limit the conversion of carotenoids into beta-carotene such as genetics, digestive issues, excessive alcohol, environmental toxins, and certain medications.

To absorb the most carotenoids possible from your food, here is another example where cooking foods like carrots will be important. Cooking carotenoid-containing vegetables allows heat to "free" the carotenoids from the food to be absorbed. A little fat is also needed to make the carotenoids become more available to the body. Therefore, having cooked carrots drizzled with olive oil would be an ideal combination to maximize how much beta-carotene your body absorbs.

Ways to get more orange foods:

- Have a baked sweet potato instead of a baked white potato.
- Sprinkle turmeric powder onto tofu and vegetable stir-fry.
- Put orange slices into your water pitcher.
- Drink carrot and/or orange juice instead of soft drinks.
- Have a clementine, tangerine, nectarine, or peach as a mid-morning or afternoon snack.
- Puree carrots, butternut squash, and/or pumpkin and use as a soup base.

  Make a tropical fruit smoothie containing fresh, cubed mango, papaya, or orange in a base of nut milk with your choice of protein powder.

  Make a trail mix containing dried orange fruits like apricots, mango, and papaya.



Touring Through the Phytonutrient Food List—*Yellow*









Yellow

Yellow foods are beneficial because they contain compounds that are anti-inflammatory, and they may protect the eyes and heart. Some studies indicate that yellow foods may also support the immune system as well as healthy digestion.

The Food List: Yellow Foods

Like the other categories, it is recommended that you get a variety of yellow foods. Note that some of the yellow foods like banana, corn, and potatoes are starchy and should be eaten with protein and fat to support blood sugar balance. Yellow fruits to choose from include Golden Delicious apples, Asian pears, gold kiwi, lemons, pineapple, and starfruit. The yellow vegetables include yellow bell peppers, corn, and potatoes.

You'll also find ginger root on this list. Ginger has been widely used around the world for centuries as an herbal medicine. Ginger has anti-inflammatory properties and has been shown to be beneficial for digestive issues, particularly nausea. You can grate fresh ginger into tea or into a stir-fry, or use the powdered ginger spice in oatmeal.

Another yellow food with beneficial effects on digestive health is gold kiwi. Studies have found that gold kiwis improved bowel function and digestive discomfort, and these benefits have been shown to be true for green kiwis as well. Natural plant-based sources of fiber, like kiwi and prunes, have been shown to be better tolerated than isolated fiber supplements, such as psyllium.

Yellow Food Compounds	*Benefits*	*Foods*	
Lutein	Anti-inflammatory	Apple	Lemon
Rutin	Cell protection	Asian pears	Millet
Zeaxanthin	Digestive health	Banana	Passionfruit
	Eye health	Bell peppers	Pineapple
	Heart health	Corn	Plantains
	Immune health	Corn-on-the-cob	Potatoes
		Ginger root	Starfruit
		Gold kiwi	Succotash
		Jackfruit	Summer squash

Touring Through the Phytonutrient Food List—*Yellow*

Featured Yellow Phytonutrient

Lutein & Zeaxanthin

Similar to lycopene and beta-carotene, lutein and zeaxanthin are both carotenoids. These two carotenoids are not just found in yellow foods. Some green foods like kale and spinach also contain these important carotenoids. A good yellow food source of lutein is corn. Since corn is in many foods as a processed ingredient, it is preferable to get your corn as corn-on-the-cob or the whole kernel form of corn. Keep in mind that corn tends to be starchy and can increase your blood sugar, so you will want to have it in a meal containing other foods that are higher in fiber, protein, and even fat. Like the other carotenoids, lutein and zeaxanthin are fat-soluble so they need fat to be absorbed by your body. A drizzle of olive oil or a few slices of avocado would be a great way to add healthy fat.

Ways to get more yellow foods:

- Slice a banana into your warm oatmeal cereal.
- Keep frozen corn kernels on hand and add them to stir-fries, rice and bean dishes, and, when warmed up slightly, even sprinkled on a Southwestern-style chicken salad.
- Have slices of a Golden Delicious apple or an Asian pear as a mid-morning or afternoon snack together with a thin layer of nut butter (e.g., almond butter or cashew nut butter).
- Add diced yellow bell pepper to a vegetable stir-fry.
- Have Yukon Gold and French fingerling potatoes rather than a starchy, white Russet potato.
- Grate ginger into a stir-fry of vegetables like snap peas, cabbage, and carrots.
- Make a ginger tea with freshly squeezed lemon juice.
- Have pineapple slices as a dessert.



Touring Through the Phytonutrient Food List—*Green*

Green

Green foods are healthy because they contain compounds that are anti-cancer, anti-inflammatory, and may protect the brain, heart, blood vessels, and bones. One of the unique attributes of some green foods is that they can assist with keeping hormones in balance.

The Food List: Green Foods

There are many green fruits and vegetables available to maximize your phytonutrient intake, and there is a long list of phytonutrients that can be found inside these green foods. Even though yellow foods contain lutein, the carotenoid that is helpful for eye health—it is also present in green vegetables (especially kale, parsley, and spinach). Other phytonutrients include the indoles, chlorophyll (what gives green vegetables their color), and folate (an important B vitamin). In general, the deeper the green color of the plant, the more nutritious it will be.

The green fruits listed here are apples (Granny Smith), avocado, limes, kiwi, olives, and pears. Avocado and olives are considered fruits, as they contain a pit. These two foods are the "super foods" of the Mediterranean diet and an excellent addition to daily meals. Avocados are truly a remarkable food—one whole avocado has a substantial amount of fiber (about 9 grams) and even more potassium than a banana (about 700 mg). One study showed that eating a hamburger by itself led to an increase in inflammation in the body within hours after it was eaten. However, when just half of an avocado was eaten with the hamburger, there were no increases in inflammation.

Olives and olive oil are also great choices. Extra-virgin olive oil should be used unheated or in low-heat cooking. Studies show that extra-virgin olive oil is associated with a variety of health benefits, including reduced risk of type 2 diabetes and heart disease. There is also research to suggest that extra-virgin olive oil may help liver and blood vessel health.

The green vegetables on this list are numerous: artichoke, bamboo sprouts, bean sprouts, bitter melon, bok choy, broccoli, broccolini, Brussels sprouts, cabbage, celery, cucumber, edamame/soy beans, green beans, green peas, greens of all types (beet, chard, collards, dandelion, kale, lettuce, spinach, and turnip), okra, snow peas, and watercress. The cruciferous vegetables, like Brussels sprouts, broccoli, and watercress, are considered to be anti-cancer because they contain compounds called glucosinolates.

Touring Through the Phytonutrient Food List—*Green*

There are many other benefits of green vegetables beyond their heart health and anti-cancer benefits, including blood vessel and brain health. As an example, one study showed that postmenopausal women who ate two leafy green salads a day improved their blood vessel health in only 10 days. Another study showed that eating 1-2 servings per day of green leafy vegetables was the equivalent of being 11 years younger compared to those to rarely or never ate them. Rather than a single nutrient being responsible for these powerful benefits, it is thought that the many nutrients in these vegetables work synergistically together to improve health. This is one reason why eating whole, unprocessed plant foods are so important for health.

Green Food Compounds	*Benefits*	*Foods*	
Catechins	Anti-cancer	Apples	Greens *(arugula, beet, chard, collard, dandelion, kale, lettuce, mustard, spinach, turnip)*
Chlorogenic acid	Anti-inflammatory	Artichoke	
Chlorophyll	Blood vessel health	Asparagus	
Epigallocatechin gallate	Bone health	Avocado	
Folates	Brain health	Bamboo sprouts	Kiwi
Glucosinolates	Cell protection	Bean sprouts	Limes
Hydroxytyrosol	Heart health	Bell peppers	Nopales
Indole-3-carbinol	Hormone health	Bitter melon	Okra
Isoflavones	Metabolic health	Bok choy	Olives
Isothiocyanate		Broccoli	Pears
Oleocanthal		Broccolini	Snow peas
Oleuropein		Brussels sprouts	Tomatillos
Phenolic diterpenes		Cabbage	Watercress
Phytosterols		Celery	Zucchini
Phenols		Chayote	
Phenylethylisothiocyanate		Cucumbers	
Sulforaphane		Edamame/Soybeans	
Tannins		Feijoa	
Tyrosol		Green beans	
		Green peas	
		Green tea	






Touring Through the Phytonutrient Food List—*Green*

Featured Green Phytonutrient

Glucosinolates

Cruciferous vegetables have been associated with reduced risk of cancer. The class of phytonutrients which make the cruciferous vegetables (also known as Brassica vegetables) so beneficial for health is called glucosinolates. Glucosinolates are responsible for these vegetables' sulfur aroma. When cruciferous vegetables are chopped or chewed, the glucosinolates turn into active compounds called isothiocyanates (examples of these include indole-3-carbinol and sulforaphane). It is theorized that these activated compounds help enhance the body's natural detoxification systems, which reduces the risk of developing cancer.

Eating these vegetables either raw, lightly sautéed, or steamed is best to retain the full array of nutrients. Cruciferous vegetables are also important sources of fiber, vitamins, and minerals. The following green vegetables are included in the cruciferous family: arugula, bok choy, broccoli, broccolini, Brussels sprouts, cabbage, Chinese cabbage (napa), collard greens, kale, kohlrabi, mustard greens, and watercress.

Ways to get more green foods:

- Have an avocado in your salad or on top of a hamburger or grilled chicken breast.
- Make a stir-fry with bok choy, broccolini, carrots, and edamame.
- Have a cup of green tea instead of coffee.
- Use extra virgin olive oil instead of refined vegetable oils like corn and soybean oils.
- To meat and vegetable dishes, add more green-colored herbs and spices like rosemary, oregano, dill, and thyme.
- Make guacamole with fresh cilantro, green pepper (such as serrano), and avocado.
- Toss some greens into your morning smoothie.
- Make grilled Brussels sprouts and drizzle with olive oil.
- Add green olives, green peas, cucumber, and celery into a salad.
- Have diced asparagus and spinach in your morning omelet.
- Squeeze fresh lime into your water.
- Make soup with bitter melon, celery, and beet greens.



Touring Through the Phytonutrient Food List—*Blue/Purple/Black*









Blue/Purple/Black

Blue/purple/black foods from nature are healthy because they contain compounds that are anti-inflammatory, and they may protect the heart, bone, liver, and blood vessels. It is interesting to note that out of all the colors, this is the category that many people eat the least often. Eating more foods from this color is important, as they are particularly beneficial for protecting the brain from damage and promoting healthy cognition.

The Food List: Blue/Purple/Black Foods

One of the reasons why people eat too few of these foods is because there are not as many options as the green and orange food categories. Therefore, it requires a conscious effort to eat these foods regularly.

The blue/purple/black fruits include a wide variety of berries: blueberries, blackberries, boysenberries, huckleberries, and marionberries. Similar to strawberries, these berries are helpful for brain health and protecting cells from damage. Berries have also been shown to be beneficial for the heart and blood vessels.

Other blue/purple fruits include figs, grapes, prunes, and raisins. When buying prunes, dried figs, and raisins at the grocery store, read the label to be sure that no added preservatives (e.g., sulfites, BHT, BHA) or added sweeteners have been included. You are probably already aware that prunes can help with constipation, however prunes may also be a good choice for bone health. Similar to berries, purple grapes have been shown to have cognitive benefits, including improvements to mood.

The blue/purple/black vegetables listed are purple cabbage, eggplant, purple kale, black olives, black rice, and purple rice. There are also purple varieties of certain vegetables like bell pepper, carrots, potatoes, and cauliflower. These selections are more phytonutrient-dense compared with their most commonly found forms. In research studies, purple sweet potatoes have been shown to be beneficial for liver health. Purple rice has been shown to have anti-inflammatory effects.

Blue/Purple/Black Compounds	*Benefits*	*Foods*	
Anthocyanidins	Anti-inflammatory	Bell pepper	Grapes
Hydroxystilbenes	Blood vessel health	Berries *(blueberries, blackberries, boysenberries, huckleberries, marionberries)*	Kale
Procyanidins	Bone health		Olives
Pterostilbene	Brain health		Plums
Resveratrol	Cell protection	Cabbage	Potatoes
	Digestive health	Carrots	Prunes
	Heart health	Cauliflower	Raisins
	Liver health	Eggplant	Rice *(black, purple)*
		Figs	

Touring Through the Phytonutrient Food List—*Blue/Purple/Black*

Featured Blue/Purple/Black Phytonutrient

Anthocyanins

Anthocyanins are phytonutrients that provide the blue/purple/black color to plants, such as blackberries and blueberries. They are also present in red plants, such as strawberries and red onion. There are a number of health benefits associated with eating foods rich in anthocyanins, such as reduced risk of heart attack, improved blood vessel health, and improved cognition. Studies have looked at the anti-inflammatory effects of these foods as well. One study showed that eating blueberries daily led to reduced pain and stiffness in people with knee osteoarthritis.

Ways to get more blue/purple/black foods:

- Have berries in a smoothie.
- Add blueberries or blackberries to yogurt, oatmeal, breakfast cereal, and pancakes/waffles.
- Try purple kale instead of the usual green kale.
- Make a stir-fry with purple vegetables like eggplant, purple potatoes, and complement with purple rice.
- Substitute purple or black rice for white rice.
- Try shredding some purple cabbage into salads for additional color and purple phytonutrients.
- Make purple carrot puree and use as a base for soups or sauces.
- Snack on figs, plums, raisins, and berries.



Touring Through the Phytonutrient Food List—*White/Tan/Brown*









White/Tan/Brown

When thinking of the white/tan/brown category, processed foods may come to mind, such as bagels, cereals, breads, pastas, cakes, cookies, and crackers. Although these processed foods are widely available, they are not a rich source of phytonutrients. This category includes nuts, fruits, vegetables, legumes, spices, seeds, and whole grains which are rich in phytonutrients and beneficial to health. In fact, healthy white/tan/brown foods have been shown to have anti-cancer and anti-inflammatory activity.

The Food List: White/Tan/Brown Foods

What is different about this category compared with the earlier food categories is that this one contains more options that go beyond fruits and vegetables. There is also a wide array of legumes, nuts, seeds, and grains in this category.

White/tan/brown fruits include apples (the non-skin part of the apple) and applesauce, coconut, dates, lychees, and pears. There are several types of coconut products which could be included into one's diet such as shredded, unsweetened coconut, coconut milk, coconut butter, and coconut oil. Dates can be used as a natural sweetener to replace table sugar. Lychees and pears are refreshing choices that make for a convenient snack.

White/tan/brown vegetables include cauliflower, garlic, mushrooms, onion, sauerkraut, and shallots. Garlic, onion, and shallots are part of a family of plants called Allium. This group has many health-promoting effects such as protecting against cardiovascular disease and cancer. Allium foods are also sources of prebiotics, which means they provide fuel for the healthy bacteria of the gut.

Unsalted nuts are heart healthy. Nut butters are wonderful complements to fruits, such as a layer of almond butter on an apple slice or cashew nut butter on a sliver of pear. Similarly, seeds have many phytonutrients. They are found as seed oils (e.g., sesame seed oil, flaxseed oil), whole seeds, and seed butters (e.g., tahini is the paste made from sesame seeds). Nuts and seeds have not just beneficial phytonutrients, but also a good mixture of healthy fats and oils, fiber, minerals, and vitamins.

There are several whole grains on this list. Some people may not be able to eat gluten-containing grains (the common ones are barley, rye, wheat, and spelt), in which case, alternate whole grains like brown rice, wild rice, millet, and quinoa are good substitutes.

Beverages, like coffee and tea, are included on this list. Both coffee and black tea have been shown to have cognitive benefits. There are mixed reviews about the benefits of drinking coffee related to heart disease and blood pressure.

Touring Through the Phytonutrient Food List—*White/Tan/Brown*



Some claim that caffeine can make arteries more stiff, however other studies have shown coffee has a positive effect on blood vessel health. There is also research to suggest that coffee intake is associated with reduced risk of diabetes. There may be individual factors, like genetic variants which can influence the metabolism of caffeinated beverages like coffee. Caffeinated drinks may not be suitable, or preferred for everyone, in which case, decaf varieties are available.

You will see dark chocolate on this list. The phytonutrients in cocoa have been shown to be helpful for heart and blood vessel health. Check the ingredients of chocolate products to make sure they are not high in processed sugar or unnecessary preservatives.

Several types of mushrooms are considered to have significant medicinal benefit because of their ability to help the immune system. Examples of mushrooms to try include Shiitake, button, portobello, crimini, and chanterelle.

Within this category, here are some specific options to consider: legumes of all types (hummus, bean dips, dried beans or peas, lentils, chickpeas, peanuts, low-fat refried beans), nuts (Brazil, cashew, almond, hazelnut, pine nut, walnut) and nut butters, seeds (sesame, pumpkin, sunflower, flaxseed, and flaxseed meal) and seed butters (tahini, sunflower seed, and others), and whole grains (wheat, rye, oats, spelt, barley, triticale).

White/Tan/Brown Compounds	*Benefits*	*Foods*	
Allicin	Anti-cancer	Apples	Mushrooms
Allyl sulfides	Anti-inflammatory	Applesauce	Nuts *(almonds, cashews, pecans, walnuts)*
Cellulose *(fiber)*	Blood vessel health	Bean dips	Onions
Lignans	Bone health	Cassava (yuca root)	Pears
Lignins	Brain health	Cauliflower	Pitaya (dragon fruit)
Sesamin	Cell protection	Cherimoya	Sauerkraut
Sesamol	Digestive health	Cocoa	Seeds *(flax, hemp, pumpkin, sesame, sunflower)*
Tannins	Heart health	Coconut	Shallots
Terpenoids	Immune health	Coffee	Soy
Theobromine	Metabolic health	Dates	Tahini
		Garlic	Taro root
		Ginger	Tea *(black, white)*
		Jerusalem artichokes	Turnips
		Jicama	Whole grains *(amaranth, barley, brown rice, oat, quinoa, rye, spelt, teff, wheat)*
		Legumes *(chickpeas, dried beans or peas, hummus, lentils, peanuts, refried beans/low-fat)*	
		Lychee	

Touring Through the Phytonutrient Food List—*White/Tan/Brown*

Featured White/Tan/Brown Phytonutrient

Lignans

Several plant foods contain the phytonutrient, lignans. Lignans are not to be confused with another phytonutrient class called lignins, which are related to fiber. The top food sources of lignans are flaxseeds and sesame seeds. Other food sources of lignans include cashew nuts, peanuts, and sunflower seeds. Studies have shown that lignan-rich flaxseeds support digestive health and heart health.

Ways to get more white/tan/brown foods:

- Add some cocoa powder to your smoothie.
- Add brown spices (cinnamon, clove, allspice) to your cooking and baking.
- Use dates instead of refined sweeteners to sweeten dishes.
- Add diced onion to a stir-fry.
- Drizzle warm tahini over vegetables (e.g., broccoli, cauliflower, carrots).
- Dip vegetables into hummus (ground chickpea dip) or bean dip.
- Add mushrooms to broths and soups for more flavor and medicinal impact.
- Sprinkle sesame seeds on a vegetable stir-fry.



Frequently Asked Questions

Phytonutrients: What are they and why should you eat them?

Phytonutrients (phyto = plant) refers to thousands of different, healthful, non-nutritive compounds in plants. These compounds are referred to as "non-nutritive" because they do not supply calories like proteins, carbohydrates, and fats. There are many reasons why it is important to eat a variety of phytonutrient-dense fruits and vegetables. In research studies, people who eat more of these plants tend to have lower rates of cancer, heart disease, diabetes, dementia, and other chronic health conditions.

Eating fruits and vegetables may also improve immune function, as well as have psychological benefits. In one study, the strongest psychological benefits occurred when eating 7-8 servings of fruits or vegetables per day. Another study showed that fruit and vegetable intake is even associated with enhanced creativity.

How can I get more phytonutrients in my diet?

Start by observing your meals and colors eaten each day. Gradually shift to eating a broader spectrum and more color variety whenever possible. It is common to get stuck in a rut of eating the same foods over and over again. Aiming to eat the full seven colors every day is an excellent goal.

Here are some simple ways to jump start getting more phytonutrients in your everyday eating:

- Make it your goal to try one new plant food (fruit, vegetable, nut, seed, legume, whole grain) per week. Try different cuisines from around the world for greater variety.
- Stock up on frozen vegetables for easy cooking. Frozen berries tend to retain their phytonutrients. Cruciferous vegetables like broccoli are least desirable for freezing.
- Use fruits and vegetables that go bad quickly first. Save hardier varieties for later in the week.



Frequently Asked Questions

- Keep a bowl or container of fresh cut vegetables on the top shelf of refrigerator, within easy reach.
- Keep fruit bowl on the kitchen counter, table, and desk at work.
- Bring fruit and vegetables with you to work to eat as a snack.
- Choose fruit for dessert (fruit kabobs, berry compotes, fruit salads, etc.).
- Have dishes with lots of vegetable variety (e.g. soup, stir-fry).
- Use vegetable and mushroom-based sauces.
- Dip vegetables into herb-packed sauces such as pesto, chimichurri, gremolata, or Chermoula.
- Try mashed cauliflower as a substitute for mashed white potatoes.
- Make a switch from corn to squash.
- Toss red peppers, tomatoes, garlic, onions or broccoli into omelets.
- Add rinds of oranges or lemons to water, chicken, and fish.
- Try a little bit of every color at a salad bar.
- Be generous with your use of spices!

Where can I find phytonutrients? Can I just take a supplement?

Sources of phytonutrients include all plant foods, including fruits, vegetables, whole grains, legumes, nuts, seeds, and spices. Although you can purchase supplements that contain phytonutrients, it is better to get the majority of these beneficial health compounds from a wide variety of whole, or minimally processed foods. Eating fruits, vegetables, legumes and other phytonutrient rich foods in their whole food form provides many other health promoting compounds including fiber, vitamins, minerals, and amino acids.

Are some foods higher in phytonutrients than others?

The short answer is: yes.

Some plant foods clearly provide more phytonutrients than others. For example, mashed purple potatoes or sweet potatoes contain more phytonutrients than mashed white potatoes. Substituting white rice with purple, brown, or black rice provides a wider array of phytonutrients than just eating white rice on a daily basis. One way to get more plant foods would be to think of foods that are commonly eaten that may not be as nutrient dense, and replace those with more nutrient-dense options.



Frequently Asked Questions

How many servings of phytonutrient-rich foods should I be eating every day?

Most people eat too few servings of plant foods every day. It has been estimated that the average American gets somewhere between 2-4 servings of fruits and vegetables per day. However, much more—at least 9 servings per day—are recommended to prevent chronic disease.

A typical serving is a half a cup of cooked vegetables, one cup of raw leafy vegetables, or a medium-sized piece of fruit. Fresh, cooked, and processed fruits and vegetables including frozen and canned, 100% fruit juices, 100% vegetable juices, and dried fruits are all considered servings of fruits and vegetables. It would be best to aim for 3 servings at every meal (not including snacks), to achieve the recommended amount of servings on a daily basis.

Is variety that important?

There are thousands of phytonutrients in nature. If we eat the same foods over and over again, even if they are colorful, we may be missing the plethora of other phytonutrients across the spectrum. Rather than getting all of your blue-purple phytonutrients from blueberries, you may want to try other blue-purple foods like purple potatoes, purple rice, and even purple cabbage—all of which will give you very different phytonutrients within the blue-purple color. One helpful tip is to try a new food every week to ensure getting as many phytonutrients as possible.



Frequently Asked Questions

When do I eat plant foods raw and when do I cook them?

For the most part, a combination of raw and cooked foods is recommended. Raw foods are typically eaten in the summer months and cooked foods are best in the winter when it is cold outside. People with compromised digestion (bloating, constipation, IBD/IBS, gas, and pain) will often do better with more cooked plant foods. Aside from seasonal and symptomatic concerns, preparation of plant foods to enhance absorption depends on the phytonutrient.

Here are some general guidelines:

- Carotenoids, found in red, orange, yellow, and green foods, typically do better with heat preparation and when eaten with some fat/oil.
- Steaming or waterless cooking of vegetables preserves nutrients better than boiling or other heating methods.
- Cook to the point of making the vegetables tender and not mushy.
- Using heat, mechanical processing, soaking, fermentation, and germination/malting when it comes to foods like seeds, nuts, and legumes can increase the availability of phytonutrients and decrease the content of plant nutrients that are not beneficial, like phytate, goitrogens, and thiaminases.
- Eating cruciferous vegetables raw, or very lightly cooked is best to preserve the enzyme that produces anti-cancer compounds.
- The antioxidant content increases in the following foods when they are cooked: carrots, spinach, mushrooms, asparagus, broccoli, cabbage, red cabbage, green and red peppers, potatoes, and tomatoes.
- Overall, steaming is the preferred method of cooking since it results in the biggest increase in antioxidant content.
- Peeling skins of apples and cucumbers reduces their antioxidant content significantly.
- It is not advisable to pre-soak vegetables before cooking as nutrients are lost in the water.





Frequently Asked Questions

Should I be using more spices and herbs?

The answer is definitely YES! One of the many reasons the Mediterranean diet is so healthy is because of the liberal use of spices and herbs. As a point of distinction, a spice is edible, aromatic, and dried. It comes from a plant's root, stem, bark, bud, leaves, flower, fruit, or seed. In comparison, herbs are usually the leaves of a plant. When the leaves are dried, they become a spice. Spices provide phytonutrients that protect cells, reduce inflammation, and provide may other health benefits. When it comes to purchasing spices, avoid fillers (e.g., sugar, maltodextrin, gluten, artificial colors, preservatives, synthetic anti-caking agents).

Here are some other tips on buying herbs and spices:

- If you buy spices in bulk, store them in air-tight glass or tin containers. Don't buy large quantities—only what you will use within 6-12 months.
- You can buy herbs and spices in their fresh, dried, whole, cracked, coarsely ground, and finely ground forms.
- Store in a cool, dark place. Heat, light, and moisture will accelerate loss of flavor. High temperatures can cause spices to cake or harden and change or lose color.
- Don't let them sit around the stove. Close container well after using.
- Under ideal conditions, ground spices will keep for about a year and whole spices for 2-3 years.
- To test, rub between fingers to detect presence of aroma.
- Roast slowly before grinding for maximum impact.





Frequently Asked Questions

Ways to get more herbs and spices in your eating:

- Add to smoothies.
- Make tea and add to smoothies.
- Combine finely chopped garlic and basil to extra virgin olive oil and lemon juice as a salad dressing.
- Add fresh herbs such as cilantro, chives, basil or mint to salads or sandwiches.
- Sprinkle cumin or fennel seeds in soups or salads.
- Marinate lean meats in curry powder or curry pastes.
- Sprinkle cinnamon and nutmeg over oatmeal or wholegrain toast for breakfast, steamed soymilk, and even on vegetables.
- Add fresh parsley or chives to scrambled eggs.
- Stew fruits with cinnamon stick and a vanilla pod.
- Steep lemongrass, ginger or mint in hot water.
- Add freshly grated garlic to mayonnaise.
- Add fresh or dried herbs to your favorite pasta dish.

What about frozen fruits and vegetables?

It is more important to eat fruits and vegetables in any form (e.g., frozen, dried, canned) than to not eat them at all. Freezing foods can reduce flavor, and the final nutrient content will depend on the initial quality of the food before it was frozen. If the food was initially considered to be of high-quality (e.g., organic and fairly fresh at the time of freezing), then the final nutrient content may be retained to a large degree. For instance, studies have shown that frozen blueberries retain their phytonutrient content during freezing. That said, not all frozen foods are 100% comparable to fresh foods. There are some concerns with freezing as the blanching process that occurs before freezing can result in a loss of vitamin C and B vitamins. In general, freezing foods properly for no longer than six months will help to maintain the nutrient content of frozen foods. For guidance on freezing foods at home, visit the website for the National Center for Home Food Preservation.

Frequently Asked Questions

Should I be eating dried fruits rather than fresh fruits?

In general, fresh fruits are higher in phytonutrients in comparison to dried fruits. Dried fruits lose both water and nutrients in the drying process. Flavonoids in berries are susceptible to damage from heat, light, oxygen, and time-since-harvest. Another point to consider is that losing water in the drying process concentrates calories and sugar content. Eating dried fruit will result in consuming more calories than if you ate the same amount of fruit fresh. For example, 1 cup of fresh apricots contains 74 calories, whereas, 1 cup of dried apricots contains 313 calories. All that being said, eating dried fruit can be a healthy and convenient option.

Another thing to keep in mind is that sweeteners are often added to dried fruit, especially cranberries which are extremely tart. While it may make sense to add some sweetness to cranberries, try to purchase dried berries and other fruits without added sugar. In the case of cranberries, it would be better to have a natural sweetener like apple juice concentrate rather than corn syrup or high fructose corn syrup.

Why should I eat organically-grown food?

Adopting an organic lifestyle helps to enhance the health of people and the planet. It is generally agreed upon by many that growing and eating organic food is better for the environment. Growing foods organically excludes, when possible, the use of synthetic fertilizers, pesticides, growth regulators, and additives to livestock feed. Organic farmers usually rely on crop rotation and animal manures to maintain soil productivity, to supply plant nutrients, and to control weeds, insects, and other pests.

As a result, in addition to reducing your exposure to harmful pesticides, eating organically may also reduce your exposure to hormones, antibiotics, and potentially harmful irradiated food. Less antibiotic use may help to avoid the development of antibiotic resistance. According to the Environmental Working Group, (a non-profit organization that focuses on protecting public health and the environment regarding public policy), scientists have begun to agree that even small doses of pesticides and other chemicals can have long-term health consequences that begin during fetal development and early childhood.

The Organic Seal of Approval guarantees the consumer that there has been no usage of genetically modified crops or sewage sludge as fertilizer, helping to reduce toxic runoff into rivers and lakes and the subsequent contamination of watersheds and drinking water.

If you are unable to purchase organic produce, it is wise to be aware of foods that are the most contaminated with pesticides. The Environmental Working Group publishes the Dirty Dozen™ and Clean 15™ lists, which are updated annually. Foods are listed in order of importance. Their lists may be downloaded on the Environmental Working Group website.

Frequently Asked Questions

Easy Ways to Reduce Your Pesticide Intake:

1. Buy organically-grown produce.
2. Don't over-consume foods that concentrate toxins (animal fat, meat, eggs, cheese, milk).
3. Try to buy local produce, in season.
4. Peel off the skin or remove outer layer of leaves of some produce like lettuce or onions.
5. Remove surface pesticide residues, waxes, fungicides, and fertilizers by washing fruits and vegetables in a mild solution of additive-free soap (pure castile soap, biodegradable cleanser). Use a scrub brush.
6. Wash your hands for 20 seconds with warm water and soap before and after preparing fresh produce.
7. Cut away any damaged or bruised areas before preparing or eating.
8. Wash produce before you peel it, so dirt and bacteria aren't transferred from the knife onto the fruit or vegetable.
9. Dry produce with a clean cloth or paper towel to further reduce bacteria that may be present.



Summary

6 Steps to Getting More Phytonutrients

Food is more than calories. It is essential for optimal health to eat plenty of phytonutrients and to be nourished through the enjoyment of eating and cooking in a way that fosters creativity, community, and connection.

1 *Aim for 9 Servings of Plant Foods Everyday*

We should aim for at least 9 servings per day of whole plant foods for the prevention of chronic disease. A typical serving is a half a cup of cooked vegetables, one cup of raw leafy vegetable, or a medium-sized piece of fruit. It would be best to have 3 servings of plant foods at three general meals per day (not including snacks) in order to achieve the recommended number of servings on a regular basis.

2 *Know Your Phytonutrient Sources*

The options for phytonutrient-rich meals are limitless. It can be fun to experiment with new varieties and colors even within one category of food. Here are some sources of phytonutrients to get you started: any and all plant foods, including fruits, vegetables, whole grains, legumes, nuts, seeds, and even herbs and spices.

3 *Eat the Rainbow of Colors*

Instead of eating the full rainbow of color, many people eat a limited array of food colors of brown, yellow, and white. For example, think of the typical breakfast menu—waffles, pancakes, ready-to-eat cereal, sausage, and eggs—which typically does not provide much color early in the day. However, if you had a fruit smoothie with blueberries, peaches, and raspberries, you'd have three of the seven colors of the rainbow first thing in the morning! Make it your goal to get the full seven colors every day with a variety of foods.

4 *Vary Your Choices*

There are thousands of phytonutrients in nature. If we eat the same foods over and over again, even if they are colorful, we may be missing the plethora of important phytonutrients in foods. One helpful hint is to try a new food every week to ensure that you are getting a wider variety of foods.

5 *Maximize Combinations*

When we combine certain foods, we may achieve a better effect than eating each food separately. Sometimes, there can be a "synergistic" result from combining specific foods. For example, putting turmeric, black pepper, and olive oil together in a meal may enhance the phytonutrient effects of all three foods on your health. Adding lemon juice to spinach helps iron become more absorbed by your body. Experiment with combining plant foods together and observe how you feel.

6 *Be Creative with Substitutions*

One way to get more phytonutrients is to replace less nutrient dense foods with more nutrient-dense options. Some foods clearly give us more phytonutrients than others! For example, you could substitute mashed potatoes with mashed purple potatoes or sweet potatoes. You could substitute white rice with purple, brown, or black rice. Lastly, you can use spiralized vegetable noodles made from zucchini or squash in place of pasta.

Resources and Tools for Success

The Phytonutrient Spectrum is intended to be a nutrient-dense and anti-inflammatory approach to eating that is suitable for everyone. The following resources are available from your functional medicine practitioner to assist you in implementing the IFM Phytonutrient Spectrum:

- **Phytonutrient Spectrum – Bibliography**
- **Phytonutrient Spectrum Foods**
- **Phytonutrient Spectrum Checklist**
- **Phytonutrient Spectrum Rainbow Recipes**

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