

Chronic Health, LLC

The Nutrition of Color



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When color-enhancers aren't part of the mix, the colors of food can tell you a lot about what's in the food.

Since the colors we see are wavelengths of light that are reflected, rather than absorbed, by the food we're looking at, different colors tell us that the light is coming into contact with different elements. The more (naturally occurring) colors you consume, the broader the nutrient spectrum is that you're taking in, and this is very good news.

Why does this matter?

Excellent question!

Isn't everything that's good for me labeled as such? *Nope!* Not even close.

The reality is: the job of packaging and labeling is to convince you to buy a product, *not* to help you make a good decision, and when it comes to whole foods... there is almost no info.

This document is a decent cheat sheet for shopping and eating in a way that helps support your wellbeing. What do we need for wellbeing? Variety. This variety includes a broad spectrum of phytochemicals and phytonutrients.

"...eat all of the colors of the rainbow," says Dr. Michelle Hauser, a clinical fellow in medicine at Harvard Medical School and a certified chef and nutrition educator. "These colors signal the presence of diverse phytochemicals and phytonutrients."

Phytochemicals and phytonutrients are beneficial substances produced by plants. People who eat diets rich in phytonutrients have lower rates of heart disease and cancer—the two leading causes of death in the United States.

As an added bonus, plants also provide both soluble and insoluble fiber:

- **Soluble fiber:** dissolves in water, helps the body improve blood glucose control, can reduce inflammation, and provides bulk to stool, making it more solid.
- **Insoluble fiber:** does not dissolve in water, supports insulin sensitivity, and attracts water into the stool, which can soften it, making it easier to pass.

What do colors mean?

In *What Color Is Your Diet?* by David Heber, MD, PhD, and Susan Bowerman, MS, RD, they attempted to group foods according to their predominant phytochemical group, coding plant foods into **seven color categories**:

- **Red**
- **Red / Purple (& Blue)**
- **Orange**
- **Orange / Yellow**
- **Yellow / Green**
- **Green**
- **White / Green**

While research regarding color's effect on health is ongoing, the following is a summary of produce's nutritional relationship with the colors that you see.

One thing to keep in mind: seeds and skins contain one of the few defense mechanisms that most plants have (called **Lectins***), so expect them to be fierce. Remove seeds and skins, whenever feasible, and feel the elevated experience of eating plants without having to fight with them afterward. (Beans are a totally different process, but we'll address that in the notes!)



Red

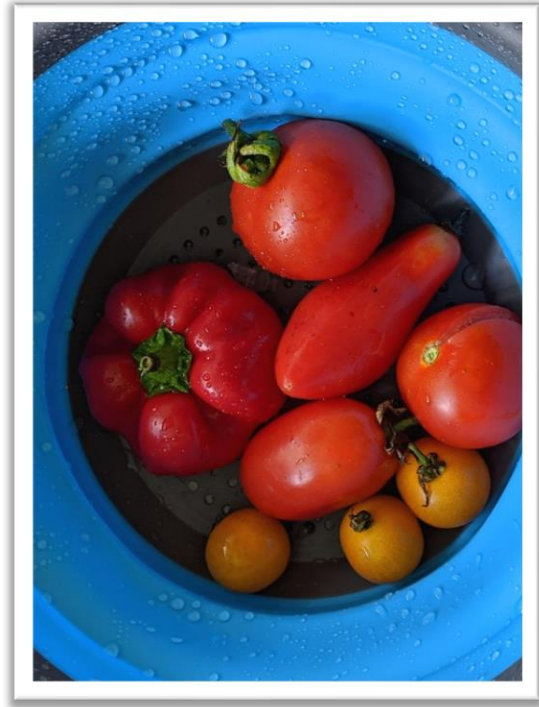
Example - Tomatoes: The chief phytonutrient in tomatoes is lycopene, the pigment found in abundance in red, orange, and yellow fruits and vegetables. The science isn't clear yet whether the health benefits of tomatoes come mostly from lycopene or from their full range of vitamins, minerals, and other nutrients, but what we keep learning is that plants are packaged along with the other materials that work best together, making whole foods much more beneficial than supplements, if you can get them.

Nutritional profile: One cup of cooked tomatoes provides nearly all of your daily vitamin C and 25% of your vitamin A. Tomatoes are also a good source of potassium and iron.

Behind the color: Lycopene is the predominant pigment in reddish fruits and veggies. A carotenoid, lycopene is a powerful antioxidant that has been associated with a reduced risk of some cancers, especially prostate cancer, and protection against heart attacks. Look for tomato-based products for the most concentrated source of this phytochemical.

“In addition to vitamin C and folate, red fruits and vegetables are also sources of flavonoids, which reduce inflammation and have antioxidant properties. Cranberries, another red fruit [whose color is due to anthocyanins, not lycopene], are also a good source of tannins, which prevent bacteria from attaching to cells,” says Kasik-Miller of *More Reasons to Relish Red*.

Other plants in this group include: red beets, red peppers, radishes, radicchio, red onions, red lettuces, cranberries, watermelon, pink grapefruit, and guava.



Red / Purple / Blue



Example - Kale: Kale has dark green leaves, but many varieties have purple ribs (with green leaves), are completely purple, or are just very dark green. "Some of the very dark green varieties have a lot of the phytochemicals that produce purple hues," Dr. Hauser says. "It's just that the green pigments overpower the purple ones."

Nutritional profile: One cup of kale provides all of your daily need for vitamin A, C, and K. Kale is also a good source of calcium and potassium. Calcium helps to preserve bone strength and potassium aids blood pressure control and muscle health.

Behind the color: The red / purple / blue hues in foods are due primarily to their anthocyanin content. Tend toward darker selections, as the darker the

blue hue, the higher the phytochemical concentration. “In our book, we called these foods red / purple because many of the foods that are rich in anthocyanins also have a red or pink hue,” says Bowerman. Gloria Tsang, RD, editor-in-chief of HealthCastle.com, says, “The anthocyanins that give these fruits their distinctive colors may help ward off heart disease by preventing clot formation. They may also help lower risk of cancer” and support healthy blood pressure.

Other plants in this group include: eggplant (especially the skin), cauliflower, turnips, red and purple potatoes, cabbage, asparagus, purple carrots, blueberries, blackberries, prunes / plums, and pomegranates.



Orange & Orange / Yellow

Example - Sweet Potatoes: Orange and yellow fruits and vegetables predominantly get their color from the antioxidants alpha- and beta-carotene.

Nutritional profile: One medium baked sweet potato provides all the vitamin A you need daily. It also provides significant amounts of vitamin C, B vitamins, calcium, iron, and potassium. In fact, sweet potatoes are richer than bananas in potassium, which helps to keep blood pressure under control if you have hypertension.

Behind the color: “We had an orange / yellow group representing beta-cryptoxanthin and vitamin C,” says Bowerman. “Our orange group foods are also rich in beta-carotene, which are particularly good antioxidants.”

Beta-cryptoxanthin, beta-carotene, and alpha-carotene are all orange-friendly carotenoids and can be converted in the body to vitamin A, a nutrient integral for vision and immune function, as well as skin and bone health, according to information from the PBH. (Remember that vitamin A is

also a fat-soluble vitamin, so you can only process it if you're eating a good fatty acid with it.)

“These foods are commonly considered the eyesight foods because they contain vitamin A. Beta-carotene, which can be converted into vitamin A, is a component of these foods as well. In addition, they may have high levels of vitamin C, and some contain omega-3 fatty acids,” says Kasik-Miller.

“Other [phyto]chemicals typically found in yellow/orange fruits and vegetables protect our eyes from cataracts and have anti-inflammatory properties. They also help with blood sugar regulation,” Kasik-Miller adds.

Tsang notes that the beta-carotenes in some orange fruits and vegetables



may also play a part in preventing cancer, particularly of the lung, esophagus, and stomach. “They may also reduce the risk of heart disease and improve immune function,” she says.

Other plants in this group include: carrots, yellow and orange peppers, many varieties of squash and pumpkins, mangos, cantaloupe, and apricots.

Yellow / Green

Example – Spinach: The bright color of spinach and other leafy vegetables is mostly due to chlorophylls – a green-colored phytonutrient – as well as containing a particular richness in lutein.

Nutritional profile: Spinach is also “one of the best sources of dietary potassium and magnesium, two very important electrolytes necessary for maintaining human health. Spinach provides a whopping 839 milligrams of potassium per cup (cooked). As a comparison, one cup of sliced banana has about 539mg of potassium,” said Megan Ware, a registered dietitian nutritionist based in Orlando, Florida.

Ware noted that there are several health benefits to potassium, among them “protection against loss of muscle mass, preservation of bone mineral density, and reduction in the formation of kidney stones.”

Spinach is also an excellent source of vitamin K, vitamin A (in the form of carotenoids), manganese, folate, copper, vitamin B2, vitamin B6, vitamin E, calcium, and vitamin C.

Behind the color: A variation of the green color category, these foods exhibit a richness in lutein. “Lutein is particularly beneficial for eye health,” says Bowerman. “There are lutein receptors in the macula of the eye, and lutein helps protect against age-related macular degeneration.”

For a somewhat surprising source, check out pistachio nuts—there is lutein in the green skin around the nut.

Another reason to grab some yellow / green kiwifruit at the grocery store is its high amount of vitamin C.

Other plants in this group include: Avocado, kiwifruit, other leafy greens, basil, and pistachios.



Green

Example - Swiss chard: Swiss chard is among the many green vegetables rich in the phytochemicals sulforaphane, isocyanate, and indoles. The ribs in chard are usually another bright color—like red, yellow, or even multiple colors—so you get the benefits of the phytonutrients associated with those colors as well.

Nutritional profile: One cup of cooked Swiss chard provides all of your daily needs for vitamin A and K, and half of your daily vitamin C. It is also rich in magnesium and is a good source of iron, potassium, calcium, and fiber.

Behind the color: The natural plant pigment chlorophyll colors green fruits and vegetables. “In our system, the green foods represented those foods rich in isothiocyanates, which induce enzymes in the liver that assist the body in removing potentially carcinogenic compounds,” says Bowerman. According to information from the PBH, cruciferous veggies such as broccoli and cabbage contain the phytochemicals indoles and isothiocyanates, which may have anticancer properties.

“Green vegetables are excellent sources of vitamin K, folic acid, potassium, as well as carotenoids and omega-3 fatty acids,” adds Kasik-Miller. Folic acid is needed to process and use iron in our diets and prevents neural tube defects during pregnancy, and vitamin K is essential in blood clot formation.

Diets high in potassium are associated with lowering blood pressure, and there is an inverse relationship between cruciferous vegetables and cancer, especially colon and bladder cancers.

“In addition, sulforaphane, a phytochemical present in cruciferous vegetables, was found to detoxify cancer-causing chemicals before they do damage to the body,” says Tsang.



Other plants in this group include: broccoli, Brussels sprouts, cabbage, bok choy, broccoli rabe (also known as rappini), salad greens, sprouts, chives, and collard or turnip greens.

White / Green

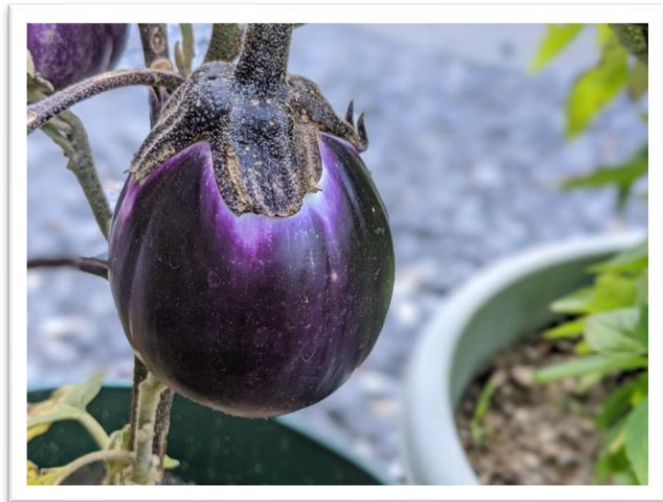
Example - Parsnip: Parsnip, a root vegetable, is widely available and has a richer complement of nutrients than onions. White fruits and vegetables contain compounds called flavonoids, such as quercetin, kaempferol, and anthoxanthins, which have a range of healthful properties.

Nutritional profile: One cup of parsnips provides about a quarter of your daily fiber, vitamin C, and vitamin K. They also deliver potassium, magnesium, vitamins E and B, as well as calcium and other minerals.

Behind the color: While some phytochemicals are pigments that give color, others are colorless. “The largest class of phytochemicals are the flavonoids, which for the most part are colorless,” explains Bowerman. “Flavonoids are powerful antioxidants, and these help the body to counteract free-radical formation. When free-radical damage goes unchecked, it can cause significant damage to body cells and tissues.”

There are more than 4,000 different flavonoids, and they are generally classified into five categories: flavonols, flavones, flavanones, flavan-3-ols, and anthocyanidins. These categories of flavonoids show up in a wide variety of plants, not just the white ones, so when choosing foods of all types of colors, know that you are also getting a good dose of flavonoids.

Other plants in this group include: garlic, onions, leeks, celery, asparagus, kohlrabi, radishes, Napa cabbage, squash, fennel, eggplant, and turnips.



***Lectins** – So, here’s a place where efficiency (laziness) has taken over and we’ve veered far away from the good sense our ancestors had. Lectins are a plant’s natural defense mechanism that makes the skins and seeds unpalatable and / or indigestible.

Food preparation used to be a slower process – seeds and stems were removed from grapes prior to making wine out of them, seeds (and sometimes skins) were removed from tomatoes prior to making sauce out

of them, beans were soaked overnight in several rounds of fresh water prior to being cooked – but with the speeding up of these processes, we’ve also taken a few shortcuts: leaving the lectins in the food.

Lectins lead to GI tract irritation – swelling, gas, reduction in nutrient absorption, and changes in bowel movements. If you’re experiencing any digestive issues, try removing lectins from your diet – it may simply be general inflammation, which is exactly what lectins are *supposed to* cause.

Plants with the highest levels of lectins: nightshades (tomatoes, potatoes, goji berries, peppers, eggplant), legumes (lentils, beans, soybeans, peanuts, chickpeas), wheat and other grains.

The easiest ways to reduce lectins in the diet are to remove seeds and skins when eating produce, cut down on grains, and either avoid legumes or prepare them properly.



For more info or to schedule a chat:

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More sources & further reading:

[A Few Notes on Foods](#), Andrea J Burns, Chronic Health, LLC

[Bookshop.org](#), Evolving book list curated by Chronic Health, LLC

<https://www.health.harvard.edu/>

<https://www.mayoclinic.org/>

<https://healthyeating.sfgate.com/>

<https://foodinsight.org/>

<https://www.healthcastle.com/>