

[Harvard Health Letter](#)

## Fill up on phytochemicals

***Eating a varied diet of colorful plant foods may have benefits that go beyond the power of vitamins and minerals.***

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Whenever you bite into a juicy red apple or crunch a mouthful of dark, leafy greens, you consume more than just vitamins, minerals, and fiber. You also get a power-packed bite of plant substances called phytochemicals. They're not known to be essential for health, like vitamins and minerals, but they may go a long way toward keeping us healthy.

"We're still just learning about them. The science is ongoing. But they may help fight cancer and heart disease," says Debbie Krivitsky, director of clinical nutrition at the Cardiovascular Disease Prevention Center at Harvard-affiliated Massachusetts General Hospital.

### What are they?

Phytochemicals are literally plant (phyto) chemicals: compounds in plants (fruits, vegetables, whole grains, nuts, seeds, and legumes) that contribute to their color, taste, and smell. They give carrots their vibrant orange hue, Brussels sprouts their bitter taste, and hot peppers their searing bite. Phytochemicals are found in all edible parts of a plant, especially the skin or peel.

### Superpowers

Scientists estimate there are more than 5,000 phytochemicals, and we're only beginning to understand what the compounds may do for human health. "The most studied are probably the carotenoids, from beta carotene to lycopene in tomatoes. Also, flavonoids have been studied much more in the last 10 years," says Eric Rimm, professor of epidemiology and nutrition at the Harvard T.H. Chan School of Public Health.

So far, the evidence indicates that phytochemicals have promising benefits. For example:

- Carotenoids in red, orange, yellow, and green plants (cooked tomatoes, carrots, squash, and broccoli) may inhibit cancer growth and cardiovascular disease, and boost immunity.
- Flavonoids in berries, apples, citrus, onions, soybeans, and coffee may fight inflammation and tumor growth.
- Anthocyanins in berries and red wine are associated with lower blood pressure.

- Resveratrol in red wine, grapes, dark chocolate, and peanuts is associated with longevity in some animals.
- Proanthocyanidins and flavanols in grapes, apples, cocoa, and red wine are linked to better function of the lining of the arteries and reduced blood pressure.
- Sulfides and thiols in onions, garlic, leeks, olives, and scallions may help decrease "bad" LDL cholesterol.
- Isothiocyanates (sulforaphane) in cruciferous vegetables such as broccoli, cabbage, and kale may help protect us against cancer and cardiovascular disease.
- Quercetin in apples, onions, and citrus fruits may help decrease inflammation and blood pressure.
- Terpenes in cherries and citrus fruits may help slow cancer cell growth and fight viruses.
- Lutein and zeaxanthin in dark, leafy greens are linked to eye health.

The benefits aren't yet conclusive. They have been derived from associations between people's diets and health outcomes (which does not show a direct cause and effect), and from laboratory studies of human cells or lab animals (resveratrol, for example, has been shown to help prevent cancer and heart disease in lab mice, but at levels of consumption much higher than found in a human diet).

One thing we do know about phytochemicals: "Almost always, benefits are found only when the phytochemical is consumed in food and not pill form," Rimm points out.

## What you should do


With so many phytochemicals, it could be overwhelming to select specific compounds to try to protect your health. But you don't have to. Most plant foods each contain dozens of phytochemicals (for example, a carrot has more than 100).

You should, however, try to eat a varied diet. Krivitsky recommends "eating a rainbow" — many kinds of colorful fruits, vegetables, legumes, nuts, and seeds — in order to scoop up as many different phytochemicals as possible. "They all do different things and they complement each other. So one might block a carcinogen [something that causes cancer], and another might interfere with cancer cell replication."

At a minimum, she advises that you aim for five to nine servings of fruits and vegetables each day.

What if you don't like red apples or berries? "Choose another red food, like watermelon or red peppers," Krivitsky suggests. "If you're not a lover of kale or broccoli, try lettuce or artichokes. Find foods in each color category and include something from each. The more kinds you eat, the more you'll increase the potential benefits."

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