



The Invisible Nutrients Silently Guarding Your Health - Phytonutrients

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In my previous articles we looked at how a diet rich in plant foods will reduce your risk of heart disease, cancer, diabetes, stroke, chronic kidney disease, cognitive decline, dementia, and Alzheimer's disease. But how do fruits, vegetables, whole grains, legumes, nuts, and seeds improve our health? I am more motivated to eat healthy foods when I understand how they are working in my body.

Essential Nutrients

Casimir Funk was the first to coin the term "vitamin" in a 1912 research paper. He derived the term vitamin from "vita" meaning life and "amine" referring to a nitrogenous substance essential for life. This began an interest among the scientific community in discovering the "deficiency" diseases, which led to the discovery of 13 vitamins in 35 years. For example, scurvy is caused by too little vitamin C, beriberi – insufficient vitamin B1, pellagra – insufficient vitamin B3, and rickets – insufficient vitamin D. The 13 essential vitamins are A, C, D, E, K, and the B vitamins (B1 – thiamine, B2 – riboflavin, B3 – niacin, B5 – pantothenic acid, B6 – pyridoxine, B7 – biotin, B9 – folate or "folic acid", and B12 – cobalamin).

Phytonutrients

As new nutrients have been discovered that promote health and reduce the risk of many different diseases, they have been termed phytonutrients ("phyto" is the Greek word for plant). Technically they are not "essential" to prevent one particular disease and are therefore not considered vitamins. There is now estimated to be around 100,000 bioactive phytonutrients and a single plant-based meal may have 25,000 different phytonutrients.[1] They occur naturally in herbs, spices, fruits, vegetables, whole grains, legumes, nuts, and seeds.

Common phytonutrients include:

- carotenoids, such as the alpha carotene in pumpkin, beta carotene which provides the orange in carrots, lycopene responsible for the red in tomatoes, lutein found abundantly in kale, collards, and spinach, zeaxanthin in yellow bell peppers, astaxanthin which gives salmon its orange color, and cryptoxanthin found in tangerines and many squashes,
- isoflavones in soy products,
- allium compounds found in garlic and onions,

- anthocyanins found in berries and purple grapes,
- ellagic acid in strawberries and raspberries,
- chlorogenic acid in coffee, and
- glucosinolates in cruciferous vegetables such as broccoli, cauliflower and Brussels sprouts.



BLUE & PURPLE

blackberries
blueberries
black currants
dates
eggplants
grapes
plums
prunes
purple figs
raisins

RED & PINK

beets
cherries
cranberries
pink grapefruit
pomegranates
radicchio
red radishes
red apples
red grapes
red peppers
red potatoes
rhubarb
strawberries
tomatoes
watermelons



EAT MORE COLOR

The best way to get all of the vitamins, minerals and nutrients you need is to eat a variety of colorful fruits and veggies. Add color to your plate each day with the five main color groups.

GREEN

artichokes
asparagus
avocados
bok choy
broccoli
Brussels sprouts
celery
collard greens
cucumbers
green beans
green cabbage
green grapes
green onions
green peppers
kale
kiwis
leeks
limes
mustard greens
okra
pears
peas
romaine lettuce
snow peas
spinach
sugar snap peas
watercress
zucchini

WHITE

bananas
cauliflower
garlic
Jerusalem artichokes
mushrooms
onions
potatoes
parsnips
shallots

ORANGE & YELLOW

acorn squash
butternut squash
apricots
cantaloupes
carrots
corn
grapefruit
lemons
mangoes
nectarines
oranges
orange peppers
papayas
peaches
pineapples
pumpkins
summer squash
sweet potatoes
tangerines
yams
yellow apples
yellow peppers
yellow squash

Phytonutrients provide the color, distinctive tastes, and aromas to plant foods. We need a wide variety of plant foods to keep us healthy, as each plant contains a different mixture of nutrients that protect us in different ways. This is why health organizations such as the World Cancer Research Fund and American Heart Association[2] remind us to eat plant foods from all of the color groups: red, pink, orange, yellow, green, blue, purple, and white. No one color is superior to another. Green foods have chlorophyll, lutein, sulforaphane, or indoles. Red foods have lycopene. Orange foods have beta carotene. Orange/yellow foods have vitamin C. White/green foods have allium compounds. Red/blue/purple foods have anthocyanins. In general, the more deeply pigmented a fruit or vegetable, the more nutrients it has. Often the colorful skins are the richest source of nutrients.

Phytonutrients strengthen a plant's immune system and protect them from threats such as insect attacks, disease and too much sunlight. T. Colin Campbell describes our symbiotic relationship with plants:[3]

But here's the kicker: we do not naturally build shields to protect ourselves against free radicals. As we are not plants, we do not carry out photosynthesis and therefore do not produce any of our own antioxidants. Fortunately the antioxidants in plants work in our bodies the same way they work in plants. It is a wonderful harmony. The plants make the antioxidant shields, and at the same time make them look incredibly appealing with beautiful, appetizing colors. Then we animals, in turn, are attracted to the plants and eat them and borrow their antioxidant shields for our own health. Whether you believe in God, evolution or just coincidence, you must admit that this is a beautiful, almost spiritual, example of nature's wisdom.

Phytonutrients work as a team to help our bodies detoxify, kill dangerous organisms, repair DNA damage, enhance intercellular communication, reduce inflammation, regulate how cells reproduce, help damaged cells self-destruct, activate enzymes that break down carcinogens, improve our immune function, and neutralize free radicals.[4]

At one time we thought the antioxidant properties of phytonutrients were their most important function – preventing damage to cells by neutralizing unstable molecules known as “free radicals”. However, we now understand that many of these other mechanisms are even more important, such as the anti-inflammation effects, increasing blood flow to the brain, and increasing a cancer cell's tendency to self-destruct, a process known as apoptosis.

How many different colors of fruits and vegetables do you routinely eat each week?

References

[1] Nordic Council of Ministers (2014) Nordic Nutrition Recommendations 2012. <https://www.norden.org/en/publication/nordic-nutrition-recommendations-2012>.

[2] <https://www.heart.org/en/healthy-living/healthy-eating/add-color/eat-more-color>

[3] T. Colin Campbell, PhD and Thomas M. Campbell II, The China Study, Startling Implications For Diet, Weight Loss And Long-Term Health (Benbella Books 2006).

[4] Gupta C, Prakash D. Phytonutrients as therapeutic agents. J Complement Integr Med. 2014

