

Phytochemicals: Phytochemicals Role in Food

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Abstract

Phytochemicals are compounds that occur naturally in plants as a secondary metabolites. Many of them have therapeutic effects, such as Paclitaxel, an important anticancer drug, anti-inflammatory and blood-sugar-lowering drug. Phytochemicals concentrations in native plants are very low and the field cultivation of their intact plants is time-consuming and geographically specific as well. A large amount of plant material is required for the isolation of a given substance in substantial amount.

Keywords: Phytochemicals; Sterols; Dietary

Introduction

Phytochemicals are chemical compounds produced by plants, generally to help them resist fungi, bacteria and plant virus infections, and also consumption by insects and other animals. The name comes from Greek word 'plant'. Some phytochemicals have been used as poisons and others as traditional medicine.

Classification of Phytochemicals

1-Alkaloids: Alkaloids are smaller molecules and secondary metabolites, containing nitrogen usually in a ring. 20% of plants contain alkaloids. They act as a defense mechanism for pathogens.

They are sub divided in 3 groups

- Camphothecin
- Theobromine
- Barbering

2-Phytosterols: Phytosterols are esters that are similar to cholesterol and found in plants. Phytosterols are found in all plant foods, but the highest concentrations are found in unrefined plant oils, including vegetable, nut, and olive oils. Nuts, seeds, whole grains, and legumes are also good dietary sources of phytosterols [1].

3-Polyphenols: Polyphenols are plant non-nutrient products or the so-called plant secondary metabolites found in fruits, vegetables and seeds that we consume daily. Polyphenols are a large family of compounds derived from secondary metabolism in plant kingdom. Polyphenols can be further categorized into the following groups:

- flavonoids
- phenolic acids
- stableness
- lignans

4- Terpenoids : The terpenoids, also known as isoprenoids, they are a large and diverse class of naturally occurring organic chemicals derived from the 5-carbon compound isoprene, and the isoprene polymers called terpenes [2].

List of phytochemicals in food:

Its an evidence to indicate the health benefits of diets rich in fruits, vegetables, legumes, whole grains and nuts, no specific food has been acknowledged by scientists and government regulatory authorities

as providing a health benefit. Current medical research is focused on whether health effects could be due to specific essential nutrients or to phytochemicals which are not defined as essential [3].

1-Terpenoids

Orange pigments:

α- Abstract

Carotene: vitamin A carrots, pumpkins, maize, tangerine, orange.

B-Carotene: vitamin A dark, leafy greens, red, orange and yellow fruits and vegetables.

Γ-Carotene: vitamin A, Lycopene Vietnam Gac, tomatoes, grapefruit, watermelon, guava, apricots, carrots, autumn olive.

Phytoene in sweet potato, orange.

2-Xanthophylls

Yellow pigments

Canthaxanthin found in paprika, mushrooms, crustaceans, fish and eggs.

Cryptoxanthin found in vitamin A mango, tangerine, orange, papaya, peaches, avocado, pea, grapefruit, kiwi.

Zeaxanthin found in wolfberry, spinach, kale, turnip greens, maize, eggs, red pepper, pumpkin, orange.

Astaxanthin found in microalgae, yeast, krill, shrimp, salmon, lobsters, and some crabs.

Rubixanthin found in rose hip.

Phytosterols found in almonds, cashews, peanuts, sesame seeds, sunflower seeds, whole wheat, maize, soybeans, many vegetable oils.

Campesterol found in buckwheat.

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beta Sitosterol found in avocado, rice bran, wheat germ, corn oils, fennel, peanuts, soybeans, hawthorn, basil, buckwheat.

Gamma found in sitosterol

Stigmasterol found in buckwheat. Polyphenols

Flavonoids

Red, blue, purple pigments

Flavonols

Quercetin red and yellow onions, tea, wine, apples, cranberries, buckwheat, beans, lavages.

Kaempferol tea, strawberries, gooseberries, cranberries, grapefruit, apples, peas, brecciates (broccoli, kale, brussels sprouts, cabbage), chives, spinach, endive, leek, tomatoes.

Myricetin grapes, red wine, berries, walnuts.

Fisetin strawberries, cucumbers.

Rutin citrus fruits, oranges, lemons, limes, grapefruit, berries, peaches, apples, pagoda tree fruits, asparagus, buckwheat, parsley, tomatoes, apricots, rhubarb, tea.

Flavan-3-ols (flavones)

Catechins white tea, green tea, black tea, grapes, wine, apple juice, cocoa, lentils, and black-eyed peas.

-Catching

-Gallocatechin

-Epicatechin

-Epigallocatechin

Proanthocyanidins

Effects of food processing

Phytochemicals in freshly harvested plant foods may be degraded by processing techniques, including cooking. The main cause of phytochemical loss from cooking is thermal decomposition converse exists in the case of carotenoids, such as lycopene present in tomatoes,

which may remain stable or increase in content from cooking due to liberation from cellular membranes in the cooked food. Food processing techniques like mechanical processing can also free carotenoids and other phytochemicals from the food matrix, increasing dietary intake. In some cases, processing of food is necessary to remove phytotoxins or ant nutrients; for example societies that use cassava as a staple have traditional practices that involve some processing (soaking, cooking, fermentation, etc.), which are necessary to avoid getting sick from cacogenic glycosides present in unprocessed cassava [4].

Functions

The phytochemical category includes compounds recognized as essential nutrients, which are naturally contained in plants and are required for normal physiological functions, so must be obtained from the diet in humans. Some phytochemicals are known phytotoxins that are toxic to humans for example aristolochic acid is carcinogenic at low doses. Some phytochemicals are ant nutrients that interfere with the absorption of nutrients. Others, such as some polyphenols and flavonoids, may be pro-oxidants in high ingested amounts. On-digestible dietary fibers from plant foods, often considered as a phytochemical are now generally regarded as a nutrient group having approved health claims for reducing the risk of some types of cancer and coronary heart disease. Eating a diet high in fruits, vegetables, grains, legumes and plant-based beverages has long-term health benefits but there is no evidence that taking dietary supplements of non-nutrient phytochemicals extracted from plants similarly benefits health. Phytochemical supplements are neither recommended by health authorities for improving health nor approved by regulatory agencies for health claims on product labels.

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