



A perspective on chemical and functional properties of bioactive compounds

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DESCRIPTION

Bioactive compounds are extra-nutritional constituents found in small quantities in foods and offer health benefits that go beyond the basic nutritional value of the product. They have been extensively studied to evaluate their effects on health, and bioactive compounds appear to have beneficial physiological, behavioral, and immunological effects. Till date, many bioactive compounds have been discovered. These compounds differ from each other in chemical structure and function and are grouped accordingly. Some examples of bioactive compounds are carotenoids, flavonoids, carnitine, choline, coenzyme Q, dithiothione, phytosterols, phytoestrogens, glucosinolates, polyphenols, and taurine. Vitamins and minerals show pharmacological effects and can be classified as bioactive compounds. Bioactive compounds are naturally found in various foods. Most of the bioactive compounds have antioxidant, anti-carcinogenic, anti-inflammatory, and antibacterial properties. Therefore, many epidemiological studies report that some of them also have a protective effect against cardiovascular disease.

Phenolic compounds, including subcategories of flavonoids, are present in almost all plants and are widely found in grains, legumes, nuts, olive oil, tea, red wine, vegetables and fruits. They are primarily antioxidant in property, and some studies have shown beneficial effects on risk factors for cardiovascular disease. Various phytoestrogens are found not only in soybeans, but also in flaxseed oil, whole grain products, fruits and vegetables. In addition to their antioxidant prop-

erties, their similarity to estrogen at the molecular level allows for mimicry. Carotenoids are one of the most effective antioxidants because they are efficient radical scavengers. They are found in most fruits and vegetables, especially apricots, carrots, mangoes, tomatoes and pumpkins. Glucosinolate is a natural ingredient in many spicy plants such as mustard, cabbage and horseradish. They are being studied to reduce cancer because they induce Phase I and Phase II enzymes and inhibit enzyme activation.

Vitamins are important nutrients that an organism needs in limited amounts. They cannot be synthesized by the human body and must be obtained through the diet. They have many biological functions and effects on health. Besides their regulatory and catalytic activities in the body, some of them, like vitamin E and vitamin C, also function as antioxidants. Although bioactive compounds are naturally present in various foods, they are also used as additives and processing aids. Bioactive compounds are often added to foods or food products to enhance their health-promoting properties. It is a fact that carotenoids, anthocyanins and curcumin are the best known biologically active coloring compounds. They are added to some food products for the purpose of coloring. To prevent oxidation, ascorbic acid is one of the widely used food additives. The most obvious application of cinnamaldehyde and vanillin is as flavoring in sweet foods, chewing gum, and beverages.

Due to their carbonyl functional groups, bioactive carbonyl compounds can also be involved in some reactions during food production. Their potential reactivity should be considered with respect to human health

risks. Naturally Bioactive Compounds (NBCs) are becoming more and more popular in various commercial sectors such as the food, chemical and pharmaceutical industries due to their diverse medicinal properties and enormous development. NBCs extraction begins with proper protocol selection, sample preparation, and extensive literature review. Researchers' primary concern in extracting NBC from biological materials is to minimize interference from unwanted compounds that may co-extract with concentrated compounds. Although numerous extraction methods have been introduced along with existing traditional extraction methods, scientists still seek to develop a single standard method for extracting NBC from biological materials. There are several important parameters that affect the efficiency of conventional and non-conventional extractions, such as understanding the properties of plant matrix and the chemistry of bioactive compounds, and scientific expertise. Urgent advances in selective extraction methods from extraction to fractionation and subsequent purification that accelerate and scale up the separation of purified compounds from biological

materials in order to efficiently extract NBC from biological materials is needed.

Bioactive compounds in plant-based foods can provide many health benefits, especially the prevention and control of pathophysiological events. Phytochemicals such as flavonoids, allicin, and glucosinolates (GSLs) are one of the most important bioactive compounds in foods that have beneficial effects on human health. The qualitative and quantitative composition of phytochemicals in a particular plant or food is dynamic and depends on various conditions during cultivation, post-harvest storage and processing. Processed foods are widely consumed, and preserving naturally bioactive compounds or creating new compounds by processing can also be health promotion strategies. Therefore, understanding the role of influencing factors in the transformation of bioactive compounds is for quality control and preservation of bioactive ingredients while maximizing their physiological use to promote potential health benefits.