



An overview of bioactive compounds and their role in human health

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ABOUT THE STUDY

Bioactive compounds are defined as nutrients and non-nutrients present in food matrix (vegetable and animal sources) and can produce physiological effects that go beyond their classical nutritional properties. Bioactive compounds have emerged as important food ingredients related to health and disease prevention. Non-communicable diseases are increasing as the population ages are getting older and physical activities are decreasing. Bioactive compounds can be seen as really interesting alternatives for the prevention and treatment of diseases. This is being increasingly reinforced by growing consumer needs for natural products that require sustainable solutions to focus on personalized nutrition and improve quality of life. Knowledge of the chemistry of natural products and their mechanical approach are key factors in developing new solutions for this market.

Bioactive compounds are phytochemicals found in foods that can regulate metabolic processes and contribute to a better health. They exhibit beneficial effects such as antioxidant activity, inhibition or induction of enzymes, inhibition of receptor activity, and induction and inhibition of gene expression. The bioavailability of each bioactive compound is very different, and the most abundant compound in the ingested fruit does not necessarily result in the highest concentration of active metabolites in the target tissue. In fact, bioavailability is not always well understood when studying the role of bioactive compounds in human health.

Bioactive compounds are found in fruits, vegetables

and whole grains. They have different chemical structures (hydrophilic or lipophilic), natural distribution (plant species or ubiquity), potential sites of action in foods and in the human body, efficacy against oxidized species, and specificity. Some factors that impede the bioavailability of antioxidants, such as dietary sources and chemical interactions with other phytochemicals and biomolecules present in the diet, are some that impede the bioavailability of bioactive compounds. For example, fruit antioxidants are usually mixed with various macromolecules such as carbohydrates, lipids and proteins to form a food matrix. In plant tissues, carbohydrates are the main compounds found primarily in the free and conjugated forms.

Bioactive compounds such as polyphenols, carotenoids, vitamins, omega-3 fatty acids, organic acids, nucleosides, nucleotides and phytosterols have received a great deal of attention as they play a role in the prevention of some chronic diseases. Therefore, the method used to analyze these compounds is interesting. Many attempts have been made to provide sensitive and selective analytical methods for the measurement and characterization of bioactive compounds. Bioactive compounds (BACs) with antibacterial activity have been used as antibacterial agents (AMA) in the form of pure substances, plant extracts, or BACs for many years. Volatile, insoluble, strong aromas or flavors, and sensitivity to a variety of environmental and processing conditions make it difficult to use as an alternative bio-preservative for food systems. Encapsulation is then proposed to protect their function, cover or mask their unwanted characteristics, and enhance their bioavailability. Micro/nano-encapsu-

lation technology can enhance the antibacterial effect of BAC in food systems, despite of the nature of the BAC or the nature of the food.

Bioactive compounds are found in small amounts in foods such as fruits, vegetables and whole grains, providing health benefits that go beyond basic nutritional value. Bioactive compounds are molecules that have the potential for treatments that affect energy intake while reducing pro-inflammatory conditions, oxidative stress, and metabolic disorders. According to epidemiological studies, eating large amounts of foods rich in antioxidant bioactive compounds, such as vitamins, phytochemicals, and mainly phenolic compounds such as flavonoids and carotenoids, can have beneficial effects on human health. They reduce the risk of many diseases such as cancer, heart disease, stroke, Alz-

heimer's disease, diabetes, cataracts and age-related functional decadence.

Bioactive compounds can regulate metabolic processes and exhibit positive properties such as antioxidant activity, inhibition of receptor activity, inhibition or induction of enzymes, induction and inhibition of gene expression. The diversity of the chemical structure of bioactive compounds affects their bioavailability and properties, while anti-nutrient factors reduce the bioavailability of certain compounds or cause digestive enzymes. The potential health effects of bioactive compounds and nutrients depend on the digestive process. This is because it affects bioactive compounds and their stability, and as a result, their bioavailability and potential beneficial health effects.