Bioactive compounds in plants and human health

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Where are we from?

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Where are we now?
Content

- Bioactive compounds
- Flavonoids
- Carotenoids
- Vitamins
- Summary
Bioactive compounds

- are extranutritional constituents that typically occur in small quantities in foods

- the plant-based diets have protective effects of on cardiovascular disease (CVD) and cancer

- vary widely in chemical structure and function and are grouped accordingly

Source:
Flavonoids

• belong to secondary metabolites

• flavonoids are polyphenolic compounds that are ubiquitous in nature

• organic compounds

• 8000 different flavonoids are known and 500 among them are known better
Groups of flavonoids

According to chemical structure, they are categorized for few groups:

- flavonols: quercetin, kaempferol, myricetin
- flavons: luteolin, apigenin
- flavanones: hesperidin, naringenin
- flavanonols
- isoflavones: daidzein, genistein, glycine
- catechines: epicatechin, theaflavin
- anthocyanins: resveratrol, cyanidin, delphinidin, malvidin, pelargonidin, peonidin, petunidin
Sources of flavonoids

- Citrus fruits
- Berries
- Ginko biloba
- Vegetables
- Tea
- Red wine
- Dark chocolate
- Cereals
- Legumes
- Nuts
- Olive oil
Impact for plants

• play important roles in the biology of plants by affecting several developmental processes

• most important plant pigments for flower coloration producing yellow or red/blue pigmentation in petals designed to attract pollinator animals

• flavonoids secreted by the root of their host plant help *Rhizobia* in the infection stage of their symbiotic relationship with legumes

• some flavonoids have inhibitory activity against organisms that cause plant disease e.g. *Fusarium oxysporum*

• are called natural insecticides

• play role as fungicides

• decrease harmful radiation impact
Impact for human health

- the most common group of polyphenolic compounds in the human diet are catechins

- help provide protection against these diseases by contributing, along with antioxidant vitamins and enzymes, to the total antioxidant defence system of the human body

- beneficial effects: antiviral, anti-allergic, antiplatelet, anti-inflammatory, antitumor and antioxidant activities, antithrombotic properties

- inhibit carcinogenesis
Carotenoids

- over 600 known carotenoids
- tetraterpenoids
- carotens and xanthophylls

- are organic pigments that are found in the chloroplasts and chromoplasts of plants and some other photosynthetic organisms like algae, some bacteria, and some fungi

- can be produced from fats and other basic organic metabolic building blocks by all these organisms
Sources of carotenoids
Role in the plants

• they absorb light energy for use in photosynthesis
• they protect chlorophyll from photodamage
Impact for human health

- can act as antioxidants
- four carotenoids (β-carotene, α-carotene, γ-carotene and β-cryptoxanthin) have vitamin A activity
- β-carotene protects human body against some kinds of skin cancer
- lutein, astaxanthin and zeaxanthin act directly to absorb damaging blue and near-ultraviolet light, in order to protect the macula of the retina
- lycopene is thought to protect against prostate and other cancers, and inhibits tumor cell growth in animals
- they decrease level of cholesterol in blood and protect from coronary attack
- they have anti-cancer properties
Vitamins

- The term vitamin was derived from "vitamine," a compound word coined in 1912 by the Polish biochemist Kazimierz Funk when he was working at the Lister Institute of Preventive Medicine.

- Vitamins were discovered between 1913 and 1941.

fat-soluble:
- Vitamin A (Retinol)
- Vitamin D (Calciferol)
- Vitamin E (Tocopherol)
- Vitamin K

water-soluble:
- Group of Vitamin B
- Vitamin C (Ascorbic acid)
Sources of vitamins
# Impact of Vitamin C

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- For human health: Necessary to form collagen, for healthy bones, teeth, blood vessels, helps the body absorb iron, aids in wound healing, contributes to brain function.
- For plants: Appears to increase a plant's smog tolerance, improve the process of photosynthesis, make the fruit more nutritious, a protection against the ozone, decreasing brown spots, avoiding stunted growth, raising crop yields.
Summary

• Numerous bioactive compounds appear to have beneficial health effects.

• There is sufficient evidence to recommend consuming food sources rich in bioactive compounds.

• From a practical perspective, this translates to recommending a diet rich in a variety of fruits, vegetables, whole grains, legumes, oils, and nuts.
THANK YOU FOR ATTENTION!