NATURAL PRODUCTS RICH IN VITAMINS AND MINERALS

Vitamins

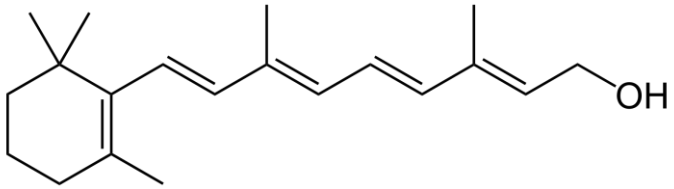
- vital - amine
- Vitamins are the organic substances which are required to maintain basic body functions and prevent diseases.
- Vitamins are essential nutrients which an organism needs in small quantities for the proper functioning of its metabolism.

Vitamins

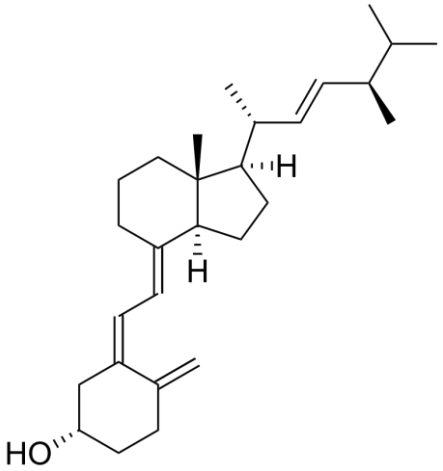
- It is necessary to take vitamins and minerals to maintain a healthy life together with carbohydrates, fats and proteins, which are the main nutrients.
- Dietary deficiency of vitamins leads to deprivation syndrome in metabolism.

Vitamins

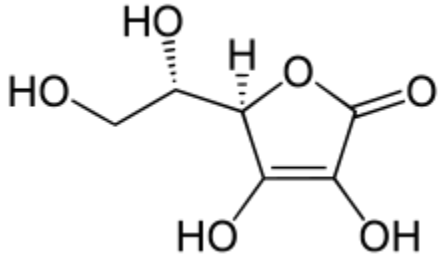
- Not all the vitamins have amine sutructure.



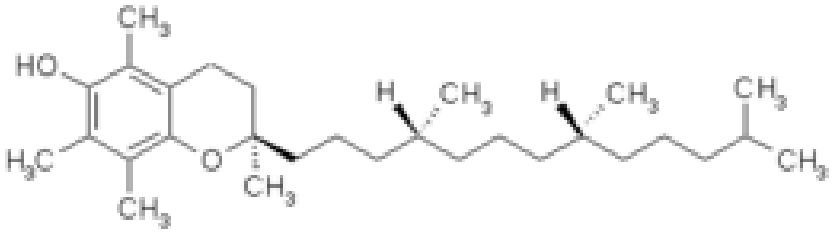
Vitamin A – terpenic compound



Vitamin D_2- sterol



Vitamin C - monosaccharide containing lactone ring



Vitamin E – terpenoid quinone

Vitamins

- Some vitamins have vitamers (structural analogue of vitamins each of which has vitamin activity).
  - Vitamin D (Ergochalciferol, Cholecalciferol)
  - Vitamin E (a- tocopherol, β-tocopherol…)
- In time, the term «vitamin» has lost its importance due to the structural diversity and isomerization and each compound is referred to as its own name (Vitamin A- retinol, vitamin B_3 – niacin, vitamin C – ascorbic acid etc.)

Classification

- Due to the differences in their chemical structure, the solubility of vitamins differs.
- Vitamins are classified in two basic groups:
  - Water-soluble vitamins
  - Fat-soluble vitamins

Classification

- Water-soluble vitamins
  - Vitamin C
  - Vitamin B complex
- Fat-soluble vitamins
  - Vitamin A
  - Vitamin D
  - Vitamin E
  - Vitamin K

Minerals

- Minerals are inorganic molecules that are found naturally but are not produced by living organisms.
- By the erosion of stone and rock fragments, they become dust and sand in the billions of years and they introduce into the soil.
- Humanbeings take minerals directly from plants and water or indirectly from animals.

Minerals

- Minerals found in plants vary geographically depending on the mineral content of soil or fertilizer.
- Minerals are essential for muscle and bone formation, formation of body fluids, persistance of healthy nerve functions and regulation of muscle tone.
- They are also necessary to maintain the metabolic functions of an organism.

Minerals

- Important for energy production, growth and development.
- Different minerals must be in a chemical equilibrium in an organism in terms of types and proportions.
- Absorption of minerals varies according to the needs of our body.
- Mineral deficiency leads to different symptoms and overdose causes side effects or toxic effects as well.

Minerals

- Mineral deficiency may be prevented by a healthy diet and using dietary supplements containing minerals.
- Mineral supplements should be used cautiously because some of the minerals can be toxic even at very low doses.
- Multivitamin preparations contain some minerals at daily doses.

Classification

- Macrominerals: Minerals found in large quantities in the body
  - Ca, Mg, K, P, Na etc.
- Microminerals: Minerals found in trace amount in the body
  - Boron, Br, Cu, Ge, I, Fe, Mn, Mo, Se, Zn, S, Va

Phytochemicals

- Obtained from herbal materials such as fruit, vegetables, legumes, cereals, nuts
- Non-nutritious chemicals which form the basis of a healthy diet
- Specific phytochemicals have important roles in prevention and treatment of diseases but phytochemicals are not essential nutrients.

Sources of Phytochemicals

- Vegetables and fruit
- Plants belonging to Cruciferae family
- Garlic
- Legumes
- Nuts
- Cereals

Some Important Phytochemicals

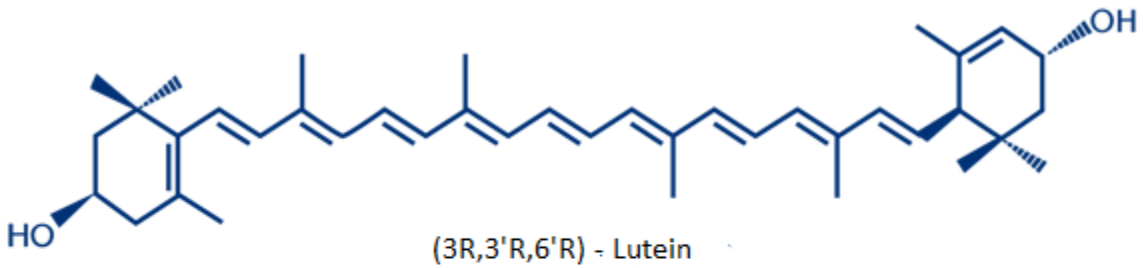
- Carotenoids
- Chlorophyl
- Fiber
- Flavonoids
- Indol-3-carbinol
- Isoflovones
- Isocyanates
- Lignans
- Phytosterols

Phytochemicals - examples

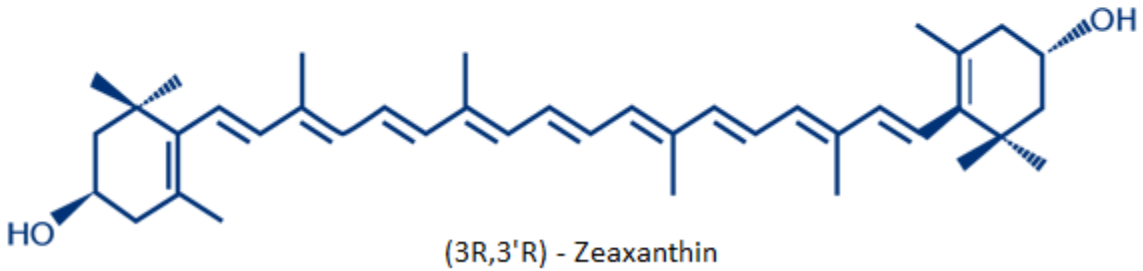
- Lycopene – tomato – antioxidant
- Soy isoflavones – phytoestrogenic
- Carotenoids – carrot – antioxidant
- Polyphenols – tea, grape – antioxidant
- Allyl sulfur – garlic, onion, leek – antibacterial
- Capsaicin – chili pepper- anticarcinogenic
- Saponins – anticarcinogenic
- Indols – cabbage – enzyme stimulation
- Resveratrol – grape - antioxidant

Lutein and Zeaxanthin

- Carotenoid structure
- Stereoisomers
- Found in plants, algae and photosynthetic bacteria.
- Lutein is one of the most common carotenoids in serum and is found abundantly in ocular tissue such as lens and yellow zone.



(3R,3'R,6'R) - Lutein



(3R,3'R) - Zeaxanthin

Lutein and Zeaxanthin

- Lutein and zeaxanthin are responsible for the formation of yellow pigment in the retina. Yellow pigments play an active role in protecting the eye from light and may prevent retinal damage
- They have a protective role against macular degeneration and cataract development induced by aging.
- Provide filtration of phototoxic blue light and near-ultraviolet radiation
- More resistant against decomposition by prooxidants than other antioxidants

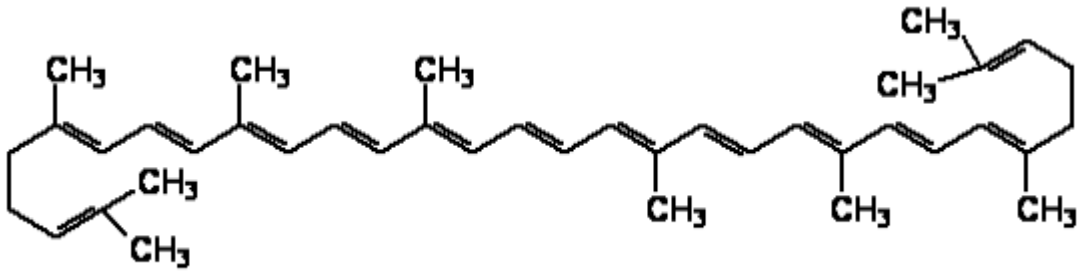
Foods Containing Lutein and Zeaxanthin

- Corn
- Egg yolk
- Green vegetables and fruits (peas, zucchini, cabbage, spinach,lettuce, kiwi, nettle etc.)
- Seaweeds
- Petals of yellow flowering plants

Lutein and Zeaxanthin

- Each egg yolk contains 290 µg lutein, 210 µg zeaxanthin.
- Reduce the risk of macular degeneration at 6.9-11.7 mg daily dose

Lycopene



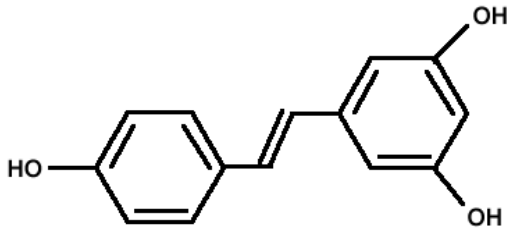
- Lycopene is the most common carotenoid in tomato and forms 80-90% of the pigments found in tomato.
- *Lycopersicum esculentum*
- Lycopene content varies according to the variety and maturity of tomato.
- Watermelon, rosehip, pink guava, papaya, pink grapefruit, carrot and pumpkin are other sources of lycopene.

Lycopene

- Protects the organisms from the toxic effects of light and oxygen
- Protective against cancer, especially prostate cancer and coronary heart disease
- Antioxidant
- Decreases LDL level of blood
- The highest antioxidant effect among all carotenoids.

Resveratrol

- It is a phytochemical that is included in the group of «phytoalexins» which some plants produce in order to protect themselves from pathogen infections such as fungal or bacterial infections.
- Grape – *Vitis vinifera*



Resveratrol

Resveratrol

- Cardioprotective
- Protective against cancer
- Antioxidant
- Phytoestrogenic