Vitamins and vitamin containing crude drugs

Plan

1. Definition of terms “vitamin”, “provitamin”.
2. Classifications.
3. Characteristic of structure, source, function, vitamin deficiency symptoms according to the chemical classification.
4. Methods of analysis of carotenoids and vit. C.
5. Medicinal plants and crude drugs containing vitamins.

Vitamins are organic substances, that are essential in small amounts for the maintenance of normal metabolic functions.

The lack of vitamins leads to distinctive deficiency states such as *beriberi*, *rickets*, *scurvy*, and *xerophthalmia*, or to conditions without definitive symptoms.

-The term vitamin was derived in 1911 when an amine thought to prevent beriberi was isolated from rice bran; this essential or vital amine was called a vitamin. The term has been retained even though it is technically incongruous. Not all vitamins are amines; vitamins A, C, D, E, K, and inositol lack a nitrogen function of any type.

-The vitamins are diverse chemically, ranging from a simple molecule such as niacin to a complex molecule such as cyanocobalamin.

Vitamins are supplied to organism in insignificant amounts with food, **Or** synthesized in organism by intestinal microorganisms. They play a major role in metabolism. Vitamins combine with specific proteins to form enzyme systems.

-Standardized, partially purified concentrates and isolated vitamins can be obtained for commercial purposes from a variety of animal, microbial, and plant sources; however, chemical synthesis is more feasible for many of the vitamins.

- Vitamins may be used as special dietary supplements or as drugs.

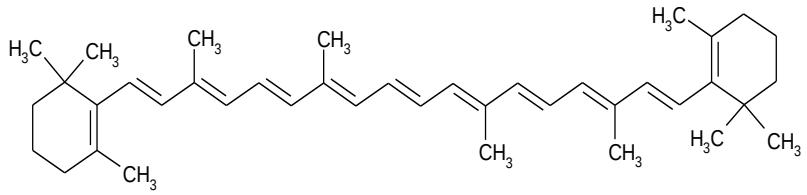
- Vitamin supplements are technically foods for special dietary needs and are unnecessary in most cases in which there is a balanced diet.

- Vitamins are considered drugs if they are taken to treat a condition of vitamin deficiency or to prevent imminent development of a disease.

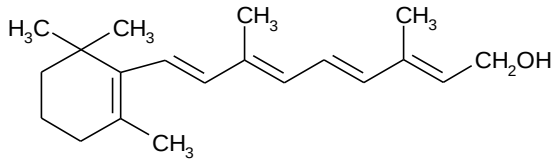
Provitamins

Provitamins are chemically similar to a vitamin. During metabolism, these substances transform into vitamins.

For example, the **carotenoids** from carrot have a structural part of vitamin A , after getting into the organism, the carotenoids are converted into vitamin A. Hence, carotenoids are **provitamin A.**

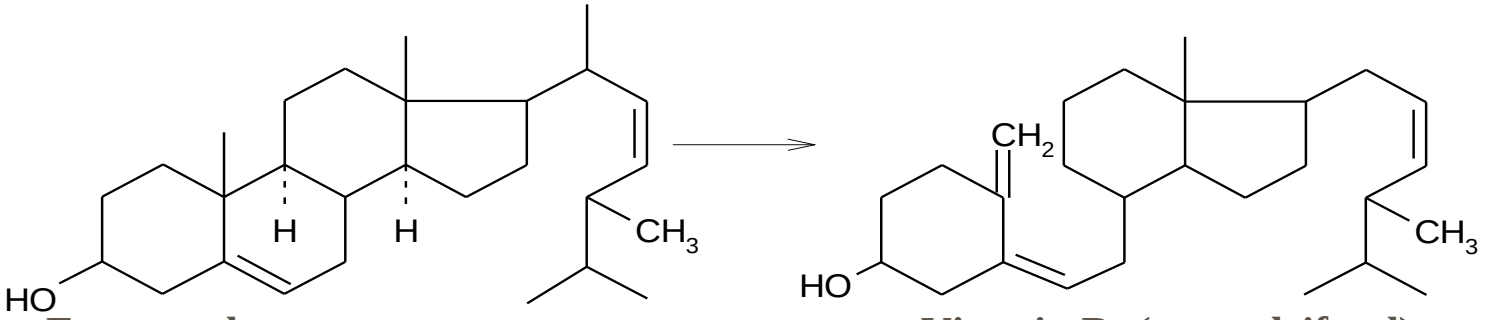


β-carotene



vitamin A

- Another example is **sterol,** which under the influence of ultraviolet, is converted into vitamin D and is thus **provitamin D**.



- **Ergosterol** **Vitamin D2 (ergocalciferol)**

Classifications

I. Literal (vit. A, B, C …)

II. Biological activity

vitamin A - axerophthol (because a lack of this vitamin in an organism causes xerophthalmia - an eye disease)

vitamin E - tocopherol (Gk *tokos* birth, and *pherein* to carry)

III. Solubility

1. **FAT-SOLUBLE VITAMINS (vit. E, D, A, F and K)**
2. **WATER-SOLUBLE VITAMINS (vit. B, PP, C, H, P)**

IV. Chemical structure

1. **ALIPHATIC VITAMINS.**
2. **ALICYCLIC VITAMINS.**
3. **AROMATIC VITAMINS.**
4. **HETEROCYCLIC VITAMINS.**

-Vitamins **A**, **D**, **E**, **F** and **K** are **fat soluble**. Their absorption from the intestinal tract is associated with that of lipids, and a deficiency state may be caused by conditions that impair fat absorption. These conditions include pathologic situations such as cirrhosis, cholecystitis and therapeutic situations such as cholestyramine regimens and excessive use of mineral oil laxatives.

-The **water-soluble** vitamins are dominated by the vitamin **B complex**, but this solubility classification also includes ascorbic acid (vitamin **C**), **biotin**, the **bioflavonoids**, and **inositol**.

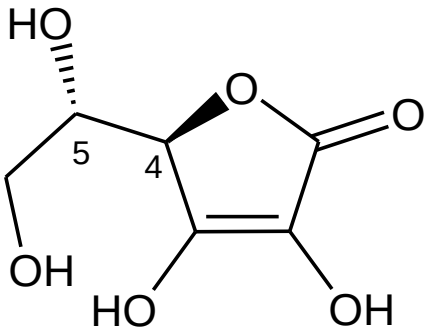
1. ALIPHATIC VITAMINS

1. **Vitamin C (ascorbic acid)**
2. **Vitamin B_5 (pantothenic acid)**

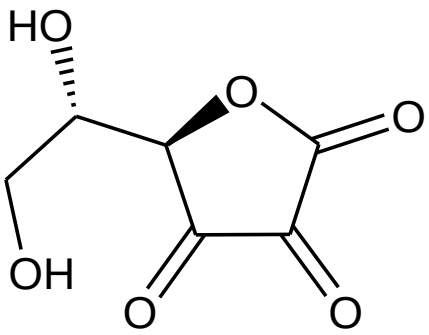
Vitamin C

Vitamin C (L-ascorbic acid) occurs naturally in crude drugs, prevents scurvy and also has antioxidant properties.

It occurs in equal with dehydro-L-ascorbic acid, an oxidized form, which also has antiscorbutic activity.



L-Ascorbic acid



Dehydro-L-Ascorbic acid

Function:

-This vitamin is essential for the proper formation of collagen and other intercellular materials, in tissues, in bones, skin, and teeth.

-It takes part together with hydroxylases for the proper formation of corticosteroids and catecholamines.

- Vitamin C is involved in biologic processes like oxidation-reduction reactions (hydrogen and electron transport).

Deficiency symptoms include fatigue, muscular pain, increased susceptibility to infection and stress, skin lesions, bleeding gums, and other signs of collagen degeneration.

Source:

Most commercial supplies of this vitamin C are obtained by chemical synthesis starting with D-glucose.

Good dietary sources of ascorbic acid include citrus fruits, tomatoes, strawberry, and other fresh fruits and vegetables.

Although the vitamin content is preserved on freezing, up to 50% of the vitamin C content is lost upon cooking.
The maximum intestinal absorption capacity is about 1200 mg per 24 hours.

-A normal healthy adult has an ascorbate body pool in excess of 1500 mg. This pool must drop below 300 mg before clinical signs of scurvy appear.

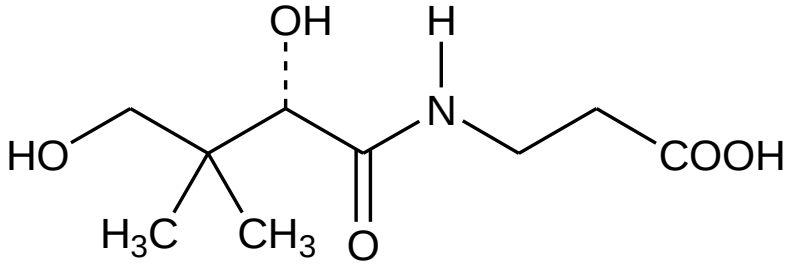
-Patients who smoke or who have gastrointestinal disease, cancer, peptic ulcer, hyperthyroidism, stress, or severe burns also may require increased vitamin C supplementation.

Medicinal plant material, (crude drugs) **containing vit. C:**

- rosehip,
- nettle leaves,
- sea-buckthorn fruits,
- mountain ash fruits,
- blackcurrant fruits.

Pantothenic acid (vitamin B_3 or B_5).

Pantothenic acid is a component of the vitamin B complex known as the **antidermatitis factor**.



Pantothenic Acid

It is synthesized by colon bacillus in human organism.

Source:

- Animal organs (heart, kidney, and liver) , cereal grains are rich dietary sources of pantothenic acid.

Function :

- Pantothenic acid is a precursor of coenzyme A, a cofactor that is essential for metabolism of carbohydrates, lipids, and proteins.

-Biosynthetic evidence reveals that pantothenic acid is derived from alanine and α-ketoisovaleric acid.

-Pantothenic acid is a viscous, oily liquid, so it is usually used as the calcium salt. It is readily synthesized. Both the racemic mixture and the dextrorotatory isomer are available commercially, the former having approximately one half the physiologic activity of the latter.

-The most distinctive of the deficiency symptoms are paresthesias of the extremities or "burning foot" syndrome.

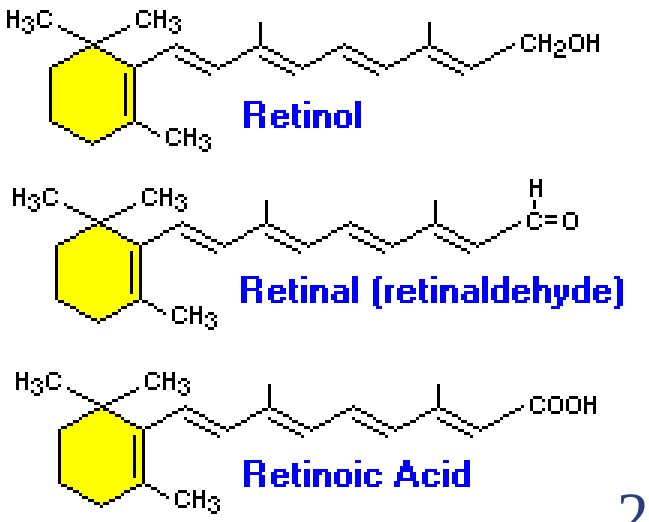
-Tablets of pantothenic acid and calcium pantothenate are available, but this vitamin is more commonly taken for dietary supplementation as a component of multivitamin preparations.

2- ALICYCLIC VITAMINS

1. **Vitamin A**
2. **Vitamin D**

Vitamin A

- **Vitamin A (A_1; A_2).** Vitamin A is found as such only in the animal kingdom and is particularly abundant in fish-liver oils. Vitamin A occurs in three or more forms. Vitamin A_1 (retinol) is an alcohol and (retinal) is its corresponding aldehyde. Vitamin A_2, dehydroretinal, has a second unsaturated bond in the ring system.
- Vitamin A mainly exists in the form of retinol.



-Retinol is readily absorbed (80 to 90%) from the normal intestinal tract and is stored in body tissues, especially in the liver. An estimated one third of the ingested vitamin A is stored in the normal conditions.

Sources of vitamin A

-Fish liver oils are the richest natural sources of the vitamin A.

-Common dietary sources of vitamin A include animal organs (heart, kidney, liver), eggs, dairy products, and fish.

Function:

Vitamin A is essential for the normal functioning of the body epithelial tissue and the retina.

Vitamin A is involved in vision, growth, and tissue differentiation.

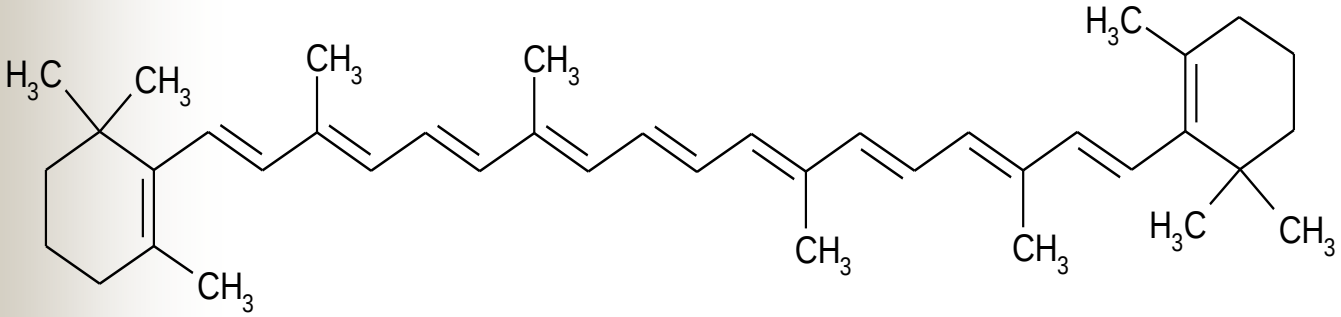
Deficiency:

Night blindness is one of the early signs of vitamin A deficiency. Bacterial invasion and permanent scarring of the cornea of the eye (xerophthalmia) is a symptom of more profound deficiency. A deficiency of this vitamin can result in hyperkeratosis of the skin, growth retardation, decreased resistance to infection.

Vitamin A is indicated specifically for the treatment of a deficiency of this vitamin. The vitamin is used primarily for prophylactic purposes when normal dietary intake is inadequate or when normal absorption is compromised.

-Vitamin A activity is also derived from some plant carotenoids that occur in carrot, pumpkin and green leafy vegetables. Carotenoids are yellow or orange-red pigments. Only carotenoids that possess at least one unhydroxylated β-ionone ring can be converted to vitamin A.

β-carotene and related carotenoids (provitamin A substances) are cleaved by β-carotene oxygenase in mucosal cells of the intestine to yield retinal, most of which is reduced to retinol.



β-carotene

-Acute toxicity, usually manifest as increased intracranial pressure (hydrocephalus) within 8 to 12 hours, has been observed with high doses of vitamin A, and a hypervitaminosis A syndrome has occurred with chronic overuse of the vitamin.

-*Symptoms of this syndrome include fatigue, night sweats, abdominal discomfort, anorexia, and vomiting*.

-Competent medical supervision and caution should be exercised with extended usage of daily adult doses of **25,000** units or more.

-The usual US RDA of vitamin A for adults and children over 4 years of age is **5000** units (sometimes expressed as 1000 retinol equivalents). The US RDAs are **1500** units for infants, **2500** for children under the age of 4, and **8000** units for pregnant and lactating women.

-Vitamin A is usually taken orally, but it may be administered intramuscularly.

-Product formulations may contain suitable antimicrobial agents, dispersants, and antioxidants. Capsule, tablet, cream, gel, oral solution, and injection dosage forms are available.

Medicinal plant material, containing carotenoids:

- **Carrot**
- **Pumpkin**
- **Rosehip**
- **Calendula flowers**
- **Sea-buckthorn fruit**
- **Mountain ash fruit**

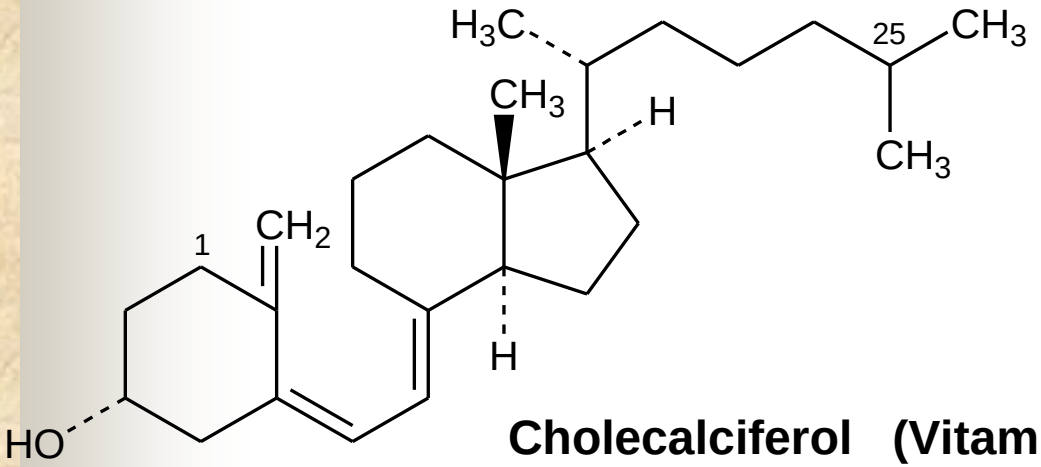
Vitamin D

- Vitamin D includes several related steroids and their metabolites that are essential for the absorption and utilization of calcium.

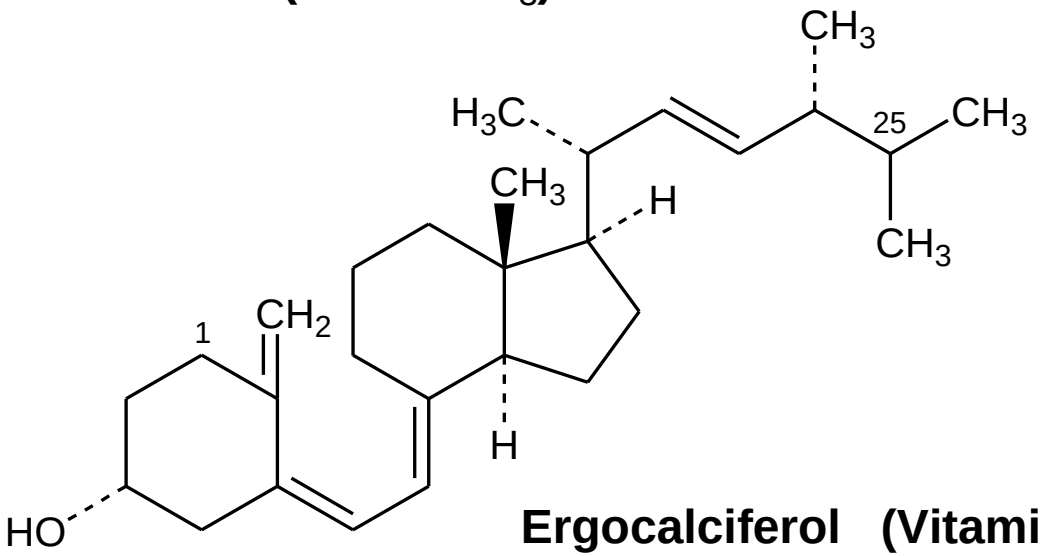
Sources:

-The body's requirements for vitamin D are normally satisfied by dietary sources and by the activating action of sunlight (ultraviolet component) on the skin.

-Butter, cream, and liver are good natural sources of vitamin D, and milk and cereals are usually fortified with this vitamin.



Cholecalciferol (Vitamin D_3)



Ergocalciferol (Vitamin D_2)

- Cholecalciferol (vitamin D_3), is the primary form of the vitamin which founded in zoologic species. Fish liver oils are a rich natural source of this material.
- Ergocalciferol (vitamin D_2), is derived from ergosterol, a plant steroid . It is the form of this vitamin normally used to fortify such foods as milk, bread, and cereals.

- Vitamin D has been called the sunshine vitamin since ultraviolet light is involved in the conversion of provitamin substances to vitamins D_2 and D_3.

- 7-Dehydrocholesterol is converted to Cholecalciferol in the skin upon exposure to the ultraviolet rays in sunlight, and ergosterol is converted to ergocalciferol in vitro by controlled exposure to ultraviolet irradiation.

- *Cholecalciferol and ergocalciferol undergo metabolic hydroxylations in the body to yield molecular forms with greater physiologic activity*.

-The initial activation reaction occurs in the **liver** and involves formation of 25-hydroxyl derivatives (calcifediol and 25-hydroxyergocalciferol).

-The second hydroxylation reaction occurs in the **kidney** and involves the 1-position; the resulting calcitriol and 1,25-dihydroxyergocalciferol are considered to be the most active molecular forms of this vitamin. Vitamin D is absorbed readily from the small intestine of normal individuals, but deficiencies caused by malabsorption are known. Cholecalciferol is absorbed with somewhat greater efficiency than ergocalciferol.

Function:

-Vitamin D helps in the metabolism of calcium and phosphate and is essential to the development and maintenance of strong teeth and bones.

-**Deficiency states** lead to rickets in children and osteomalacia in adults.

-Calcitonin and parathyroid hormone are also involved in calcium homeostasis.

-Vitamin D increases serum calcium and phosphate concentrations by stimulating absorption of these ions from the small intestine and by mobilizing calcium resorption from bone.

-The enhanced serum levels of calcium and phosphate normally promote bone mineralization, and the vitamin effect on bone resorption of calcium becomes significant only in hypocalcemic conditions, in which it helps prevent muscular tetany.

- Vitamin D, the antirachitic vitamin, is indicated specifically for the prevention and treatment of deficiency states.
- Deficiencies are sometimes encountered:

i. In patients with intestinal malabsorption of various etiologies.

ii. In those on strict vegetarian diets (no dairy products), in which cholesterol and vitamin intake is inadequate.

iii. In those with renal impairment, in which activation of the vitamin is precluded.

- Vitamin D is also used to treat familial hypophosphatemia and hypoparathyroidism and to supplement the diet in therapeutic regimens involving long-term use of cholestyramine or anticonvulsant drugs.

- Vitamin D substances are usually taken orally, but ergocalciferol is available for intramuscular injection in cases of intestinal malabsorption.

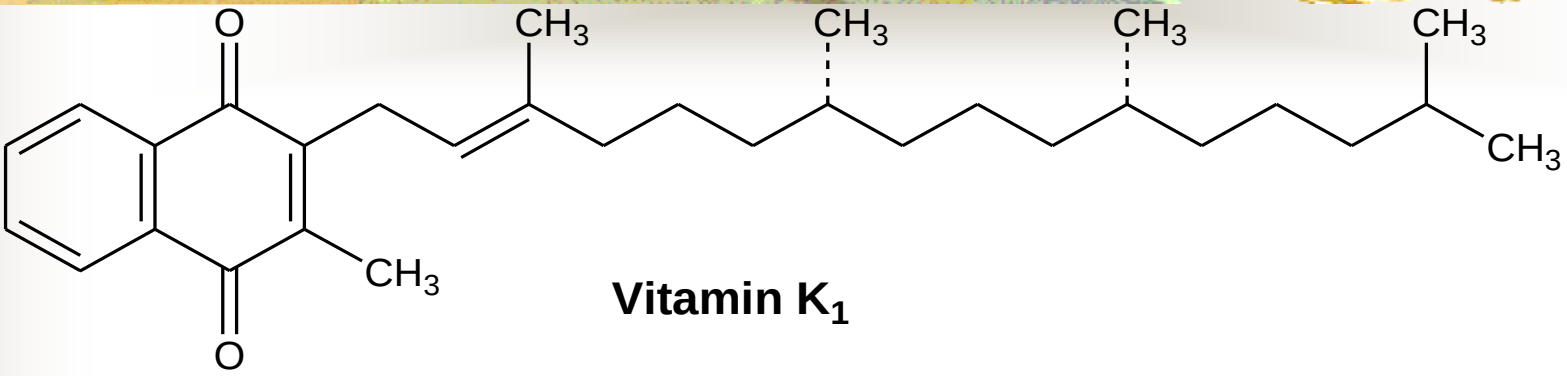
3. AROMATIC VITAMINS.

1. **Vitamin K (antihemorrhagic)**

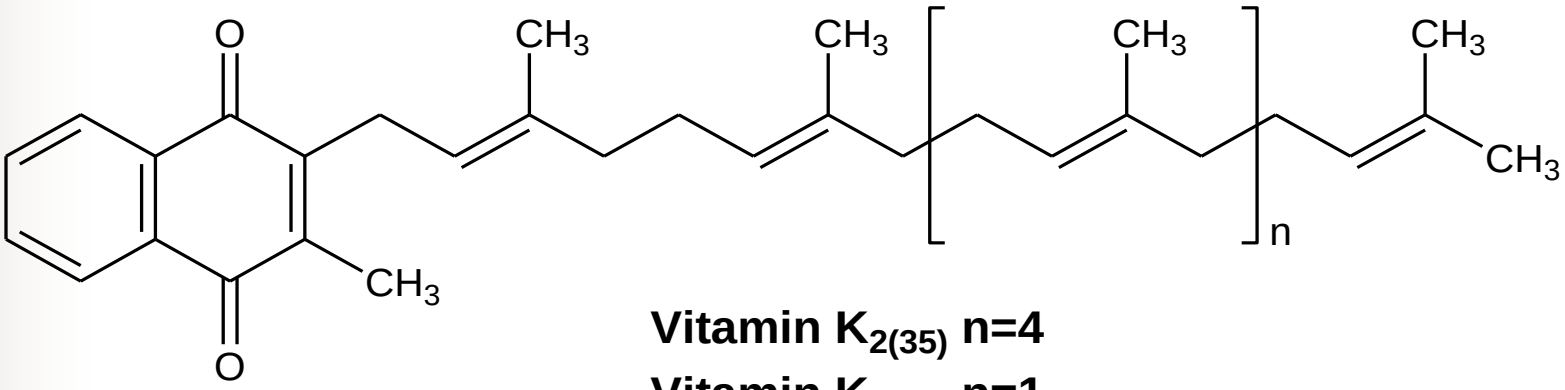
Vitamin K

- **Vitamin K** is a term that refers to 2-methyl-1,4-naphthoquinone and derivatives of this compound that demonstrate an antihemorrhagic activity.

The naturally occurring forms of vitamin K possess large aliphatic substituents at position 3.

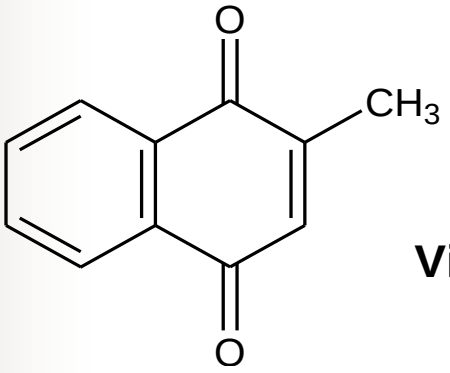


Vitamin K_1



Vitamin $K_{2(35)}$ n=4

Vitamin $K_{2(20)}$ n=1



Vitamin K_3 (Menadione)

Function:

- Vitamin K is a necessary factor in the blood-clotting process; it acts indirectly by activating those substances which are necessary for the conversion of prothrombin to thrombin.
- In healthy individuals the intestinal flora provides an adequate supply of the vitamin. This vitamin is metabolized hepatically and eliminated readily. There is no significant storage of vitamin K in the body tissues
- **Deficiency symptoms**

  prolonged bleeding.

Sources:

Vitamin K is distributed widely in dairy products and many fruits and vegetables, being especially good dietary sources.

- Vitamin K_1 (phylloquinone) is found in many plant sources and has a C_{20} side- chain.
- Vitamin K_2 (menaquinones) has been isolated from putrefied fish meal and other natural sources, but it is not commercially available for medicinal use. It has a C_{35} side- chain
- Vicasol (menadione) (or 2-methyl-1,4-naphthoquinone) - is a synthetic material with vitamin K activity.

Medicinal plant material, containing
Vitamin K_1

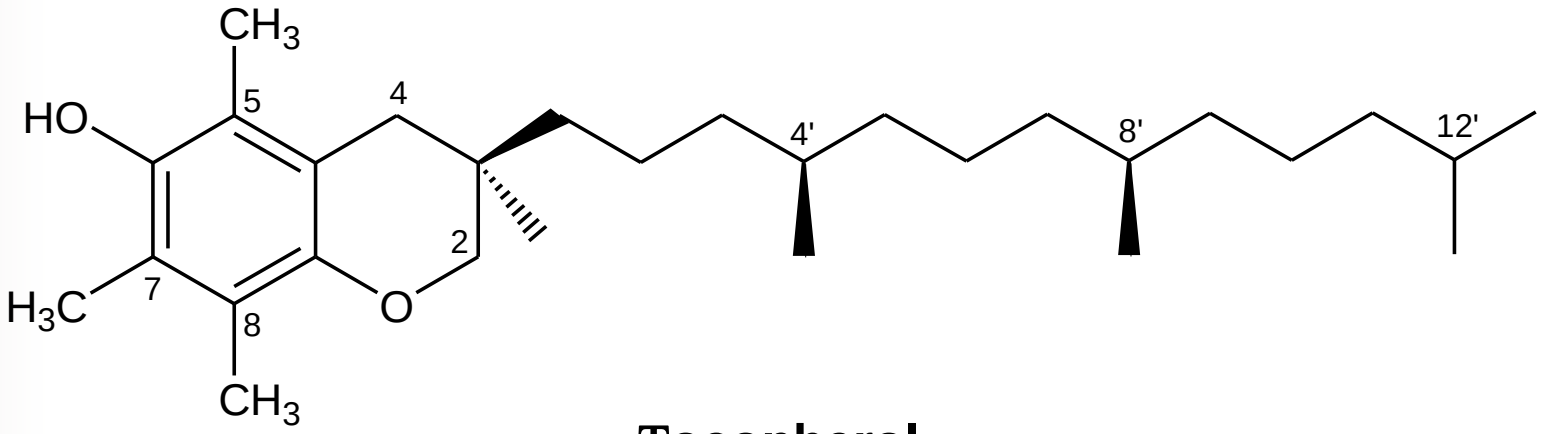
- Nettle leaves
- Shepherd’s purse herb
- Cornsilk
- Snowball bark

4. HETEROCYCLIC VITAMINS.

1. **Vitamin E (tocopherol)**
2. **Vitamin B_1 (thiamine)**
3. **Vitamin B_2 (riboflavin)**
4. **Vitamin B_6 (pyridoxine)**
5. **Vitamin B_7 or PP (niacin, nicotinic acid)**
6. **Vitamin B_9 (folic acid)**
7. **Vitamin B_{12} (cyanocobalamin)**
8. **Vitamin H (biotin)**

Vitamin E

-**Vitamin E** is a term that refers to various forms of α-tocopherol, including the dextrorotatory isomer, the racemic mixture, and their acetate and acid succinate esters



α –Tocopherol

- Several structurally related tocopherol analogs also occur in nature, including β-, γ-, and δ-tocopherols. The vitamin is stored extensively in adipose tissues of the body;
- Vitamin E is widely distributed in nature, and the body's requirements are normally satisfied by dietary sources.

Sources of vitamin E

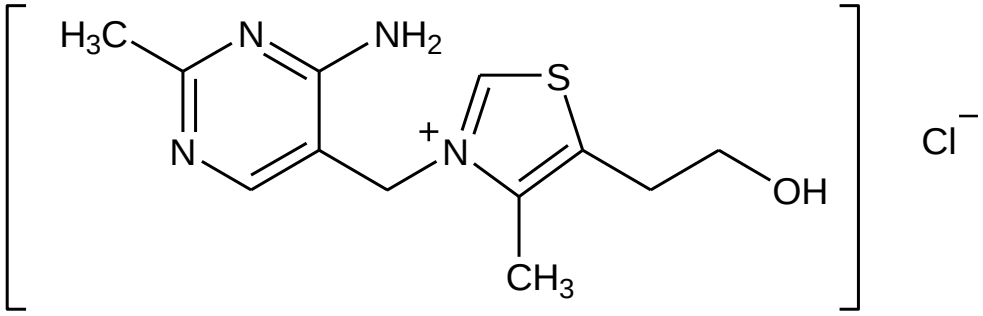
- Plant oils, green vegetables, whole grains, egg yolks, and meats are common dietary sources of this vitamin.

Function:

- *The antioxidant properties of the vitamin have been implicated.*
- Vitamin E is also incorporated into a number of topical emollient products for control of dry or chapped skin or for temporary relief of minor skin disorders.

Vitamin B_1 or Thiamine

-**Thiamine** has substituted pyrimidine and thiazole rings linked by a methylene bridge.



Thiamine

-Commercial supplies of thiamine are prepared by **chemical synthesis**, and it is usually used as the hydrochloride salt.

-*It is estimated that about 50% of the vitamin in foods is destroyed during cooking.*

Function:

- Thiamine is required for carbohydrate metabolism and for some neurologic functions.
- It is phosphorylated in the body to give thiamine diphosphate or cocarboxylase, its active form. Cocarboxylase functions biochemically as a coenzyme.

Deficiency conditions

- **Beriberi** is the classic dietary deficiency state; however, most of the commonly observed deficiency conditions (*symptoms include emotional hypersensitivity, loss of appetite, fatigue, and muscular weakness*) involve malabsorption in alcoholics.

Sources of vitamin B_1

- Whole grains, legumes, and meats are good dietary sources of thiamine. Although the substance is absorbed readily from the small intestine, alcohol inhibits its absorption.

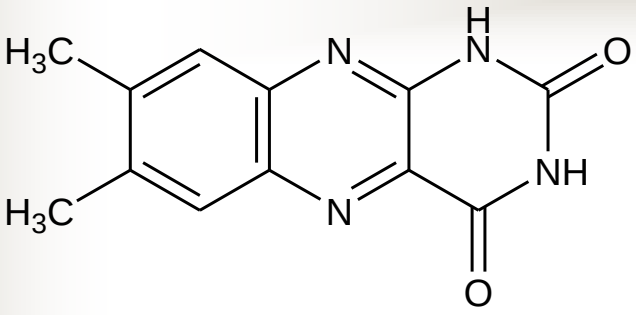
- Thiamine is used to supplement an inadequate diet (rare) and to treat deficiency conditions resulting from intestinal malabsorption of various etiologies, and from certain genetic errors

Vitamin B_2 or riboflavin

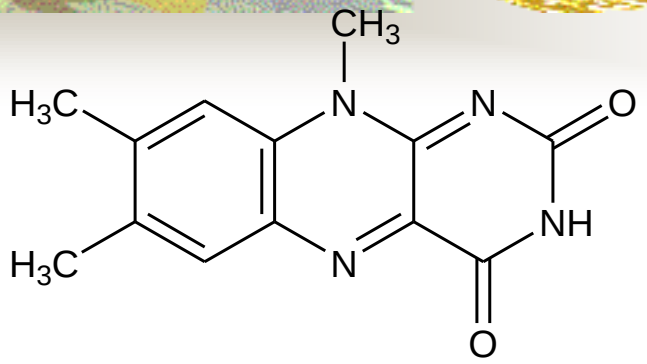
- Riboflavin is built up from a ribose and an isoalloxazine residue.
- Riboflavin can be synthesized chemically, but bacterial synthesis is more convenient and economical for commercial purposes
- **Riboflavin** is a yellow, heat-stable substance. It is sensitive to light and will change into lumichrome or lumiflavin; neither lumichrome nor lumiflavin possesses physiologic activity.

- Function:

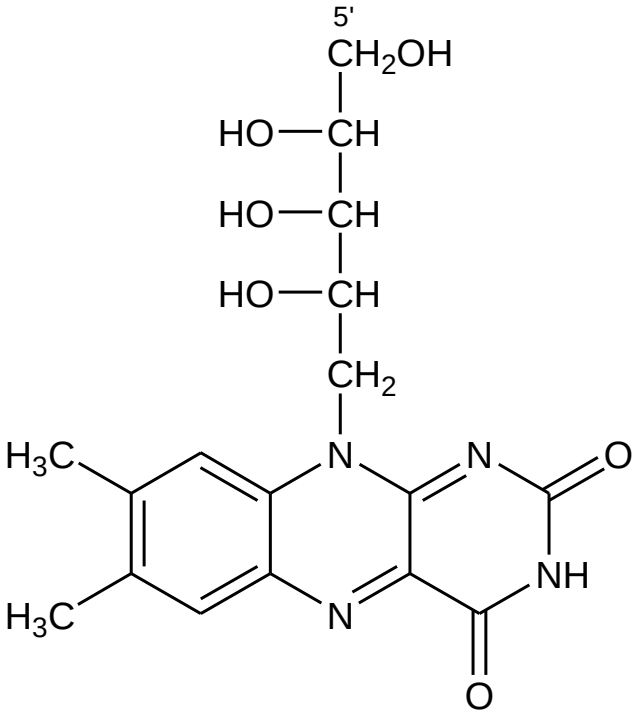
- It is a component of the flavin coenzyme systems. As the catalytically operating moiety, riboflavin participates in oxidation-reduction reactions in numerous metabolic pathways and in energy production via the respiratory chain.



Lumichrome



Lumiflavine



Riboflavin or Vitamin B_2

Deficiency symptoms

- Riboflavin deficiency is rarely encountered in healthy persons receiving a balanced diet, but symptoms of deficiency may occur in cases of inadequate nutrition, intestinal malabsorption. Deficiency symptoms are usually dermatologic in nature, including cracking of the corners of the mouth, dermatitis, and conjunctivitis.
- Alcohol inhibits intestinal absorption of riboflavin.

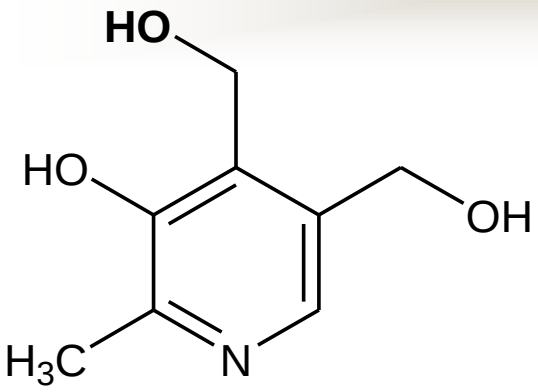
Source

Yeast is the richest natural source of riboflavin. Dairy products, eggs, legumes, and meats are the main dietary sources of this vitamin. Small amounts are provided by cereal grains, fruits, and green vegetables.

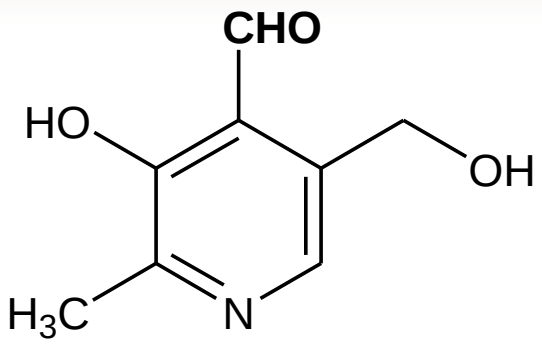
Riboflavin is stable during cooking in the absence of light.

Vitamin B_6

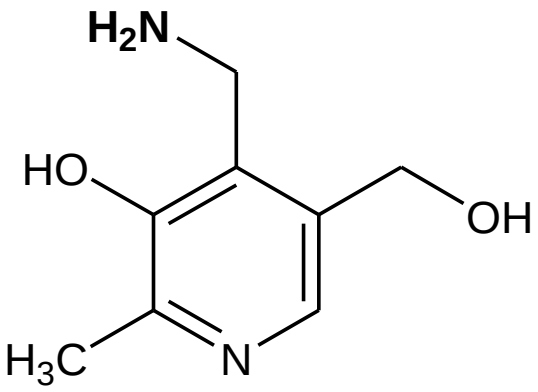
- **Vitamin B_6 or piridoxin** is a term that is applied to pyridoxol, pyridoxal, and pyridoxamine, three closely related, naturally occurring pyridine derivatives.
- **Pyridoxine** is the term that is usually used for pyridoxol in pharmacy and medicine. *This alcohol is the predominant form of the vitamin in plant materials*.
- In man vitamin B_6 is synthesized by microorganism of the large gut, but how much of this is utilized appears uncertain.



Pyridoxol (Pyridoxine)



Pyridoxal



Pyridoxamine

Function

- Pyridoxine is involved as a cofactor in many reactions of carbohydrate, lipid, and protein metabolism.

Sources

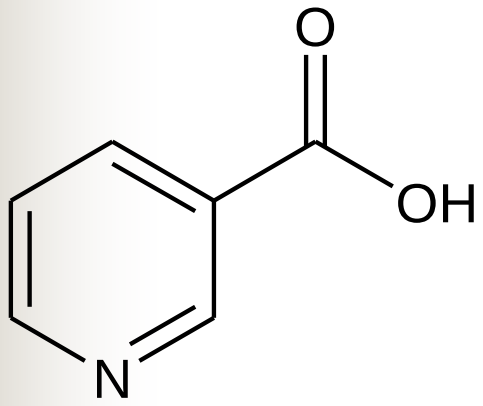
- Meats, bananas, whole cereal grains, nuts, and potatoes are good dietary sources of vitamin B_6.
- Up to 40% of its activity may be lost during cooking.

Symptoms of deficiency

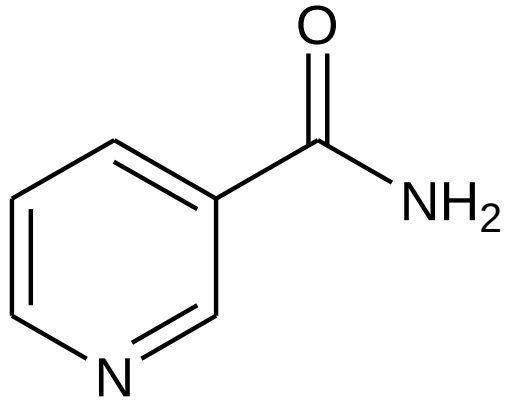
- They include neurologic abnormalities (*confusion, irritability, and convulsions*), and skin lesions (*seborrheic dermatitis, and stomatitis*).
- Deficiency conditions occur in persons receiving a balanced diet only in such special situations as intestinal malabsorption, and inborn errors of metabolism.
- **A number of drugs, including chloramphenicol, cycloserine, hydralazine, isoniazid, and oral contraceptives, act as pyridoxine antagonists or increase its renal excretion. When they are used, intake of this vitamin must be increased**.

Vitamin PP (or B_7)

Niacin (nicotinic acid) and niacinamide (nicotinamide) or vitamin PP are a simple, naturally occurring pyridine derivatives that prevents pellagra.



Niacin



Niacinamide

These compounds can be prepared easily by **chemical synthesis.**

Sources

- Lean meats, fish, and dairy products are good dietary sources of niacin; *the vitamin is stable during cooking*. Cereal grains and a number of other foods contain appreciable quantities of niacin that is present in a bound form and thus is not readily bioavailable.
- The roasting of coffee beans results in the release of a significant quantity of niacin as well as in the development of a characteristic flavor.

Function

- These coenzymes are involved in electron transport in a large number of essential enzyme systems associated with glycogenolysis, lipid metabolism, and tissue respiration.

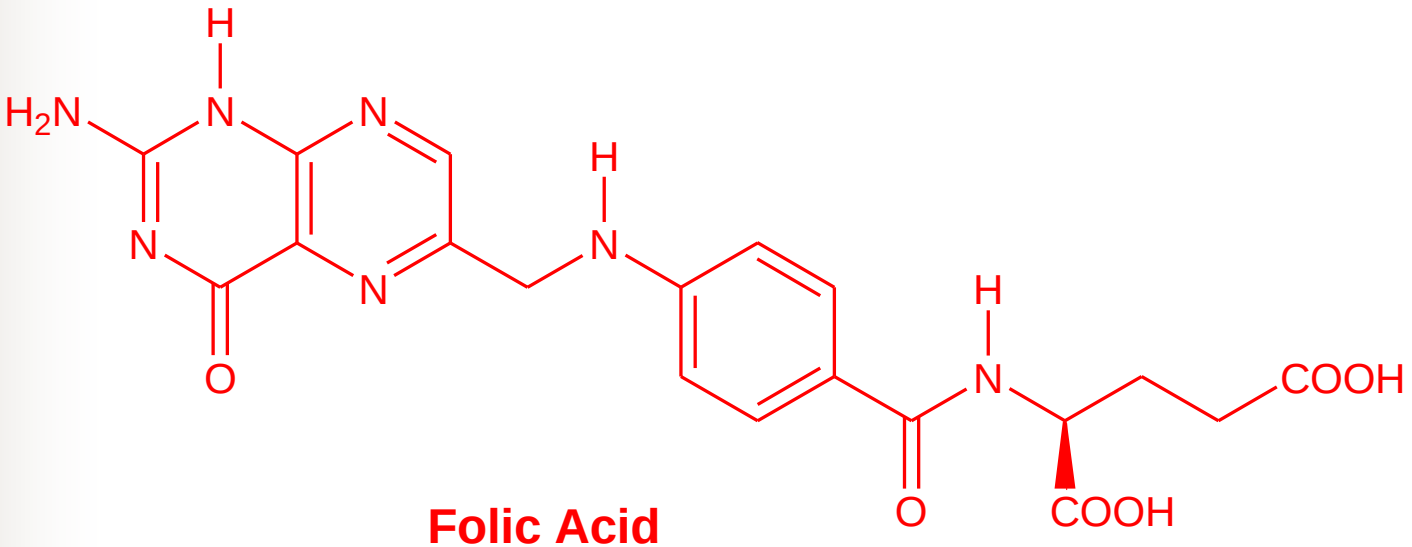
Deficiency condition

- **Pellagra** is the classic niacin-deficiency condition. Symptoms of the deficiency involve the nervous system, the skin, and the gastrointestinal tract and are sometimes summarized as the 3D's—dementia, dermatitis, and diarrhea. Oral lesions, especially angular stomatitis, are more distinctive than the other symptoms.

Vitamin Bc Folic acid

- **Folic acid, folacin, and** occasionally **vitamin Bc** are terms that refer to a material with antianemia properties.

It is a conjugate of a *pteridine* derivative, *p-aminobenzoic acid*, and *glutamic acid*. Pteroilmonoglutamic acid.



Folic Acid

Sources

- Leafy vegetables (origin of the term "folic") and liver are good dietary sources of pteroylpolyglutamates (folates), the primary dietary forms of this vitamin.
- Up to 90% of dietary folates are lost during the cooking process; raw liver has been recommended in deficiency conditions, and a raw spinach salad is superior to cooked spinach as a dietary source.
- Human tissue storage of folates is estimated to be 5 to 10 mg. About one half of this amount is normally stored in the liver.

Function:

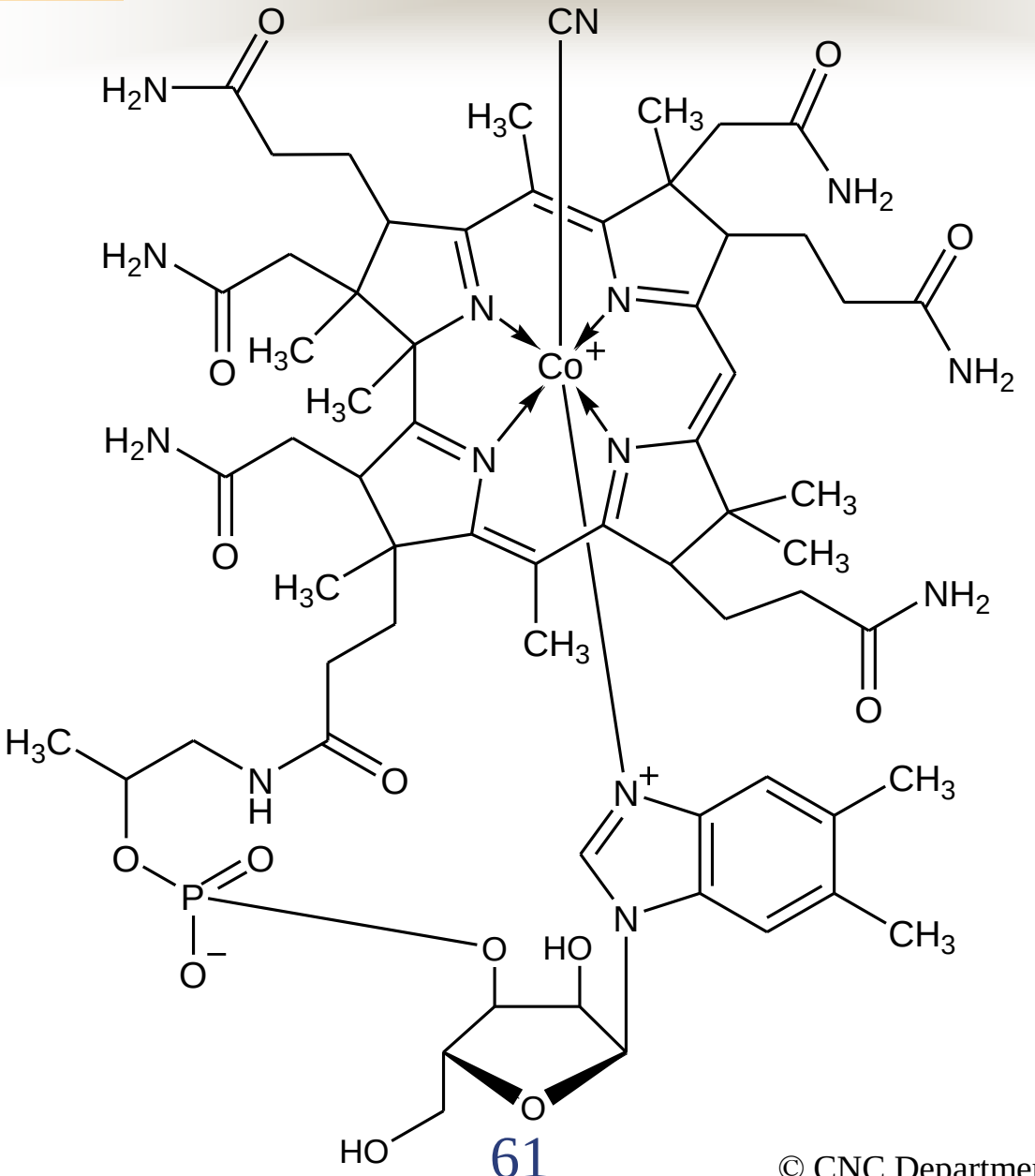
- In the body, folic acid is necessary for cell division and for production of red blood cells.

Deficiency

- Deficiency of folic acid is rarely encountered in the absence of intestinal malabsorption or impaired hepatic function (including alcoholism).
- Lack of vitamin produces diarrhea, loss of weight and anaemia.

Vitamin B_{12}

- The molecule is a porphyrin derivative complexed with cobalt and linked to a nucleotide. As a natural complexed porphyrin derivative may be compared with chlorophyll (Mg2+) and haemoglobin (Fe2+).
- Commercial supplies of the vitamin are obtained **semisynthetically** using microorganisms, especially *Streptomyces griseus*. The total cobalamin fraction obtained by fermentation is readily converted to cyano-cobalamin by controlled treatment with cyanide.
- Vitamin B_{12} is stored in the liver.



Sources

- Meat, seafood, eggs, dairy products, and fermented foods, such as soy sauce, are good dietary sources of the vitamin.
- Vitamin B_{12} is absorbed in the lower half of the ileum.

Function

- The cobalamins are essential to cell reproduction, growth, hematopoiesis, and synthesis of myelin and nucleoprotein.

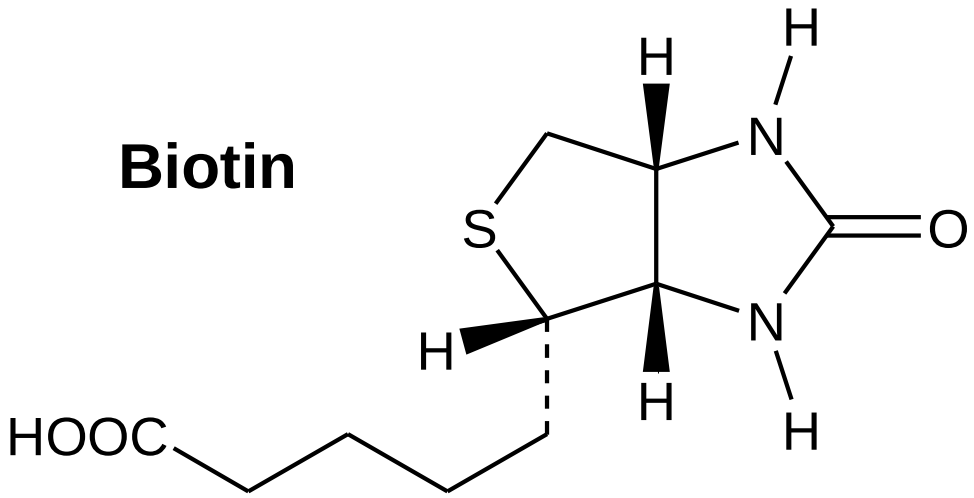
Symptoms of deficiency

- Deficiency of vitamin B_{12} is usually associated with intestinal malabsorption in some pathologic states.
- Because vegetables are a poor dietary source of vitamin B_{12}, deficiency conditions have been associated with some strict vegetarian diets.
- Symptoms of vitamin B_{12} deficiency include irritability, weakness, memory loss, mood swings, and a sensation of tingling or numbness of the arms and legs

- A number of drugs, including the **aminoglycoside antibiotics**, ***p*-aminosalicylic acid**, **many anticonvulsants**, **interfere** with intestinal absorption of the cobalamins. These medications may require dietary supplementation with the vitamin.

Vitamin H

- **Biotin, D-biotin,** or **vitamin H is a** physiologically active substance that consists of fused imidazolidone and tetrahydrothiophene rings and a valeric acid side chain.



Function

- This vitamin functions as a carboxyl-carrying cofactor in several carboxylase and decarboxylase enzyme systems.
- Biotin plays an important role in fat, amino acid and carbohydrate metabolism

Symptoms of deficiency

- Symptoms of biotin deficiency include alopecia, and seborrheic dermatitis.

Sources

- Egg yolk, liver, cereal grains, and milk are good dietary sources of biotin, but commercial supplies are prepared by chemical synthesis.
- Biotin is produced by the intestinal microflora.

Dried yeast

Dried yeast consist of the cells of a suitable strain of *Saccharomyces cerevisiae* dried so as to preserve the vitamins present.

Yeast is produced by growing parent cells in a liquid containing sugars and nitrogenous compounds. Compressed yeast contain 70% of moisture, and is converted into dried yeast by heating at a temperature not exceeding 30˚C until the moisture content is reduced to below 9%.

- **Act.const.**

Vitamin of **B** group (B_1, B2, B6, Bc, B12),

Protein 46%

Carbohydrates 36%

Fats

Sterols

Enzymes

- **Usage.**

To treat furunculosis, as source of vitamins

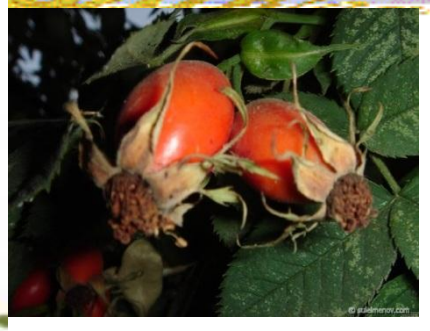
Rose hip and seed – Fructus Rosae
Cinnamon rose – Rosa cinnamomea Hermm.
Dog rose – Rosa canina L.
Fam. – Rosaceae

R.canina is native to Europe, western and central Asia and northern Africa

R. cinnamomea is native to mountains of southern and central Europe.

The material of commerce is imported from China, Russia, and the Balkan States.





Description (USSR Ph.11ed, DAC, Ph. Eur)

The drug consist of the fragments of the hypanthia and numerous yellowish brown nutlets. The outer surface of hypanthia is shiny, strongly wrinkled, bearing on its inner surface abundant hairs.

The Ph. Eur. only allows the drug with the nutlets ("seeds") removed,

Act.const.

Fruit:

- Ascorbic acid (rose cinnamon – 4-14%, dog rose 0,2-1,2%);
- Pectin 15%
- Carotenoids: lycopene, β-carotene;
- Sugar;
- Fruit acids: malic, citric acids;
- Flavonoids, anthocyanins;
- Tannins 2% (gallic acid derivatives);
- Volatile oil 0,3%.

“Seeds”:

up to 10% fatty oil, traces of essential oil, tannins, proteins and phospholipids

Usage

- Prevention and treatment of cold, fever, vitamin C deficiency, gastric acid deficiency, for gall stones, biliary complaints, disorders of the lower urinary tract, as diuretic, mild laxative (pectin and fruit acid) for arthritis, gout.
- Component of herbal tea mixtures, "***Cholosas***" – cholagogue.
- ***Oleum Rose*** – wound healing

Rose Hip Syrup

Black currant fruit– Fructus Ribis nigri
Black currant – Ribes nigrum L.
Fam. Grossulariaceae

Grows wild in central and western Europe, but mostly cultivated in temperate zones.

- **Act.const.**
- vitamines: vit.C (till 500 mg%), vit. E, K,
- sugars – till 17%, pectins
- Fruit acids (till 4%): citric and malic acid.;
- flavonoids (kaempferol and quercetin derivatives) 0,8%;
- essential oil (0,75%),
- tannins;.

- **Usage:**

Diuretic, antiinflammatory, diaphoretic, prevention vitamin C deficiency. The juice black currant is said to be diuretic and diaphoretic. They may be made into a jelly, a jam.

Black currant leaf – Folia Ribis nigri
Black currant – Ribes nigrum L.
Fam. Grossulariaceae

DAC

- **Act.const:**

about 0,5% flavonoids (kaempferol and quercetin derivatives), proantocianidins, phenolic carboxilic acid, traces of essential oil .

- **Usage:**

Used mainly in folk medicine as diuretic, antiinflammatory in case of reumatism, gout;

radical scavenging properties and antioxidant activity by inhibiting COX-2 activity(proantocianidins).

USSR Ph.11ed, Ph. Eur

Marigold flower – Flores Calendulae
Marigold – *Calendula officinalis L.*
Fam. Asteraceae

Indigenous to central, eastern and southern Europe
Cultivated commercially in North America, the Balkans, Eastern Europe and Germany

- **Description:**

Marigold consist of dried ligulate and tubular florets of *Calendula officinalis L.*

Ligulate florets consist of a yellow, orange ligule, 3-5 mm wide in the middle part , with 3-toothed apex.

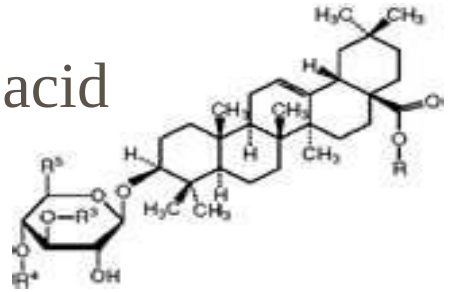
Tubular florets about 5mm long, consist of yellow,

orange-red corolla and yellowish-brown tube, hairy in its lower part.

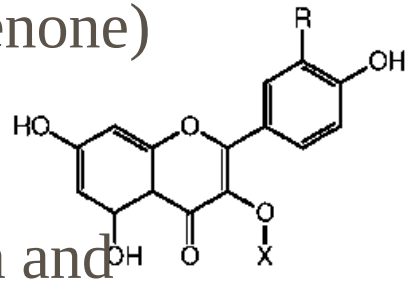
Odor faint and pleasantly aromatic. Taste rather bitter

Act.const.

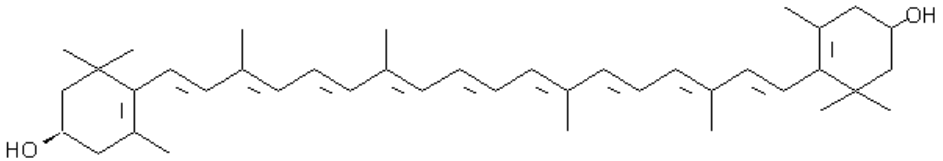
- Volatilae oil - 0,3% (mostly sesquiterpenes),
- Triterpene saponins - 2-10% (based on oleanolic acid (calendulosides))



- Triterpenes (e.g. a- and p-amyrins, lupeol and lupenone)
- Polysaccharides – 15% (water soluble)



- Flavonoids 0,4 % (3-O-glycosides of isorhamnetin and quercetin)
- Carotenoids – 0,2-4,7%
- polyacetylenes
- phenolic acids



Zeaxanthin

Usage:

Preparation of drug inhibit inflammation and promote the formation of granulation tissue.

Internal and topical use: inflammatory changes of the oral and pharyngeal mucosa.

External use: Wounds, burns.

Antibacterial, moderate fungicidal effects have been shown for essential oil and flavonoids.

The saponins have been found non toxic and to have a blood pressure reducing effect in rats.

Lipophilic extract showed antiviral and anti-inflammatory anti-edematous effects.

In folk medicine, the drug is used as a diaphoretic, antispasmodic, and for hepatic problems.

USSR Ph.11ed

Mountain ash berries – Fructus Sorbi
Mountain ash – Sorbus aucuparia L.
Fam. – Rosaceae

- **Act.const.**
  - Carotenoids (up to 27 mg%),
  - ascorbic acid (up to 100 mg%),
  - sugar (up to 5%),
  - Pectins;
  - Organic acids (till 4%): malic, citric acids,
  - Flavonoids : anthocyanidins, glycosides of quercetin).

- **Usage**

Diuretic, expectorant agent. Strengthening of respiratory tract.

The juice of mountain ash berries is recommended to treat edema.

Syrup «Flaminar».

Sea-buckthorn fruits – Fructus Hippophaës recentes

Sea-buckthorn – Hippophaë rhamnoides L.

Fam. – Elaeagnaceae

Act.const:

- Vit. C, E, K_1;
- Carotenoids;
- Oil (in fruit pulp – up to 8%, in seeds – up to 13%);
- Sugar, Pectins;
- Organic acids (till 3%);
- Flavonoids : quercetin, rutin;
- Triterpenes;
- Choline, betaine;

Usage

Internal :laxative.

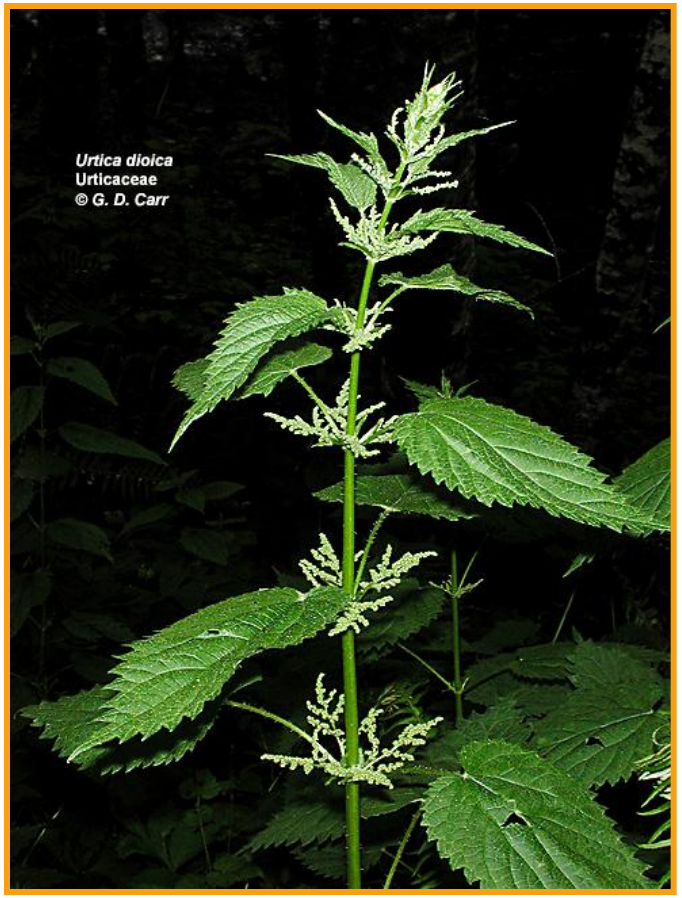
External: astrindent

Emollient. Ingredient in cosmetics.

Antiinflammatory, wound healing activity.

DAC, Ph Helv., USSR Ph.11ed

Nettle leaf – Folia Urticae
Nettle – Urtica dioïca L.
Fam. – Urticaceae



- Occurs almost worldwide growing in waste places. The material of commerce is wide collected in central and eastern Europe .
- Leaves ovate with an acute apex, cordate base and coarsely serrate margin; dark green on the upper surface; lower surface paler with numerous prominent hairs particularly over the mid-rib and prominent nervatives. Faint odor, bitter taste.

Act.const:

- Vit. C, K_1;
- Acetylcholin, serotonin formic acid in stinging hair;
- chlorophyll (up to 5%);
- Flavonoids 1-2%: glucosides quercetin, kaempferol, isorhamnetin;
- Scopoletin
- Silicates 1-4%
- sitosterol

Uses

Hemostatic, antiinflammatory (inhibition of leukotriene synthesis, confirmed *in vitro*), mild diuretic,

"Blood building ", tonic, increasing enzyme production of the pancreas, to promout wound healing, for biliary disorders (**"Allochol"**); externally to treat seborrhea

Treatment of rheumatic complains. (An extract dose – dependently reduced the secretion of proinflamatory cytokines.)

A treatment period of 14 days brought about an increase in urine volume, a reduction of body weights as well as an insignificant lowering of systolic blood pressure.

Shepherd's purse herb– Herba Bursae pastoris
Shepherd's purse – Capsella bursa-pastoris (L.) Medik
Fam. - Brassicaceae

- Cosmopolitan, the material of commerce is collected in the wild in Europe. The material used in Tibetan medicine is collected in Tibet, Nepal.

Description.

- Typical for the cut drug are the green to light yellow entire margined triangular pods; brownish to red seed, whitish green inflorescences are also present. The drug includes roundish or angular pieces of stem and fragments of leaves. Faint and unpleasant odour, bitter taste.

- **Act.const:**

- vitamin K and C;
- Amino acids, prolin,
- Flavonoids (rutin, luteolin 7-glycoside, diosmin);
- tanins;
- Calcium and especially potassium salts
- Aliphatic and phenolic acids: fumaric, citric, malic;
- Peptides with hemostyptic action (has shown oxytocin like activity *in vitro)*

- **Usage**

Infuse and liquid extract have hemostipic and antimicrobic action. It is used to treat menorragia, dismenorrhea .

In Tibetan medicine it is used to stop vomiting, to treat kidney, lungs.

Cornsilk – Styli cum stigmatis Zeae Maydis
Corn – Zea mays L.
Fam. – Poaceae

- Native to central America now cultivated world wide.

Description

- The drug consist of the dried styles and stigmas which have been collected from the female flowers during the flowering period, but before pollination, and rapidly dried in the shade. They are about 0,1-0,2 mm thick and up to 20 cm in length with light yellow to brownish color. Faint characteristic odor, sweetish taste.

- **Act.const:**
  - Vit : K_1, C, Carotenoids;
  - Bitter substances;
  - Flavonoids;
  - saponins (up to 3%);
  - Fatty oil (2%);
  - Sterines;
  - Volatile oil 0,1%;

- **Usage**

As a diuretic (on the basis of its high potassium content), cholagogue, anthi inflammatory.

In popular medicine it is used as a slimming remedy, for cystitis, rheumatism and gout.

High cranberry bark - Cortex Viburni

High cranberry - Viburnum opulus L.
Fam. – Caprifoliaceae

- **Act.const:**
  - Vit. C, K_1 group B, carotenoids;
  - iridoids;
  - triterpenoids;
  - tannins;
  - resines;
  - Organic acids
- **Usage**

Infuse and liquid extract have hemostyptic, astringent, uterotonic, antiinflammatory action.

Quality and quantity determination of vitamins in crude drugs.

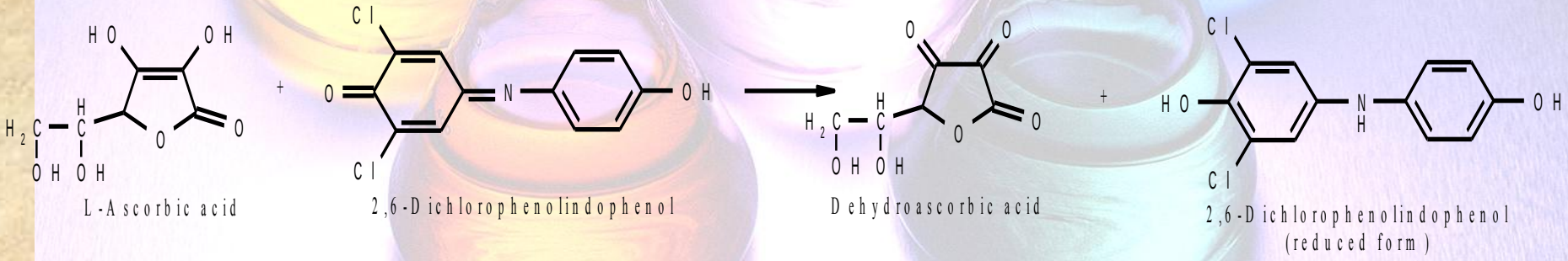
For **quality** determination of vitamins in medicinal plant material chromatographic methods are used.

Methods used for **quantity** determination of vitamins in medicinal plant material:

- To determine ascorbic acid - titration
- To determine carotenoid - colorimetric method
- Vitamin P - spectrophotometric method

Method of quantity determination of vitamin C in Rosehips (USSR Ph.11ed.)

1. Extraction vit. C by cold water;
2. Add 2% hydrochloric acid;
3. Titrate by sodium 2,6-dichlorphenolindophenolate solution (0.001 mole/l) to appearance the rose coloring, not vanishing during 30 seconds.



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