

Vitamins

Introduction:

Vitamins are naturally occurring organic substances.

Their coenzyme forms are essential in metabolic processes.

They serve nearly the same roles in all forms of life.

The daily requirement of any vitamin depends on a number of factors and may increase during growth, pregnancy and lactation.

They are essential nutrients of, and have various roles in the human body, The vitamins are divided into two groups :

1-Fat-soluble vitamins (A, D,

E and K): Foods that contain these vitamins will not lose them when cooked.

2- Water-soluble vitamins:

(B complex) and vitamin C).

Fat-Soluble Vitamins:

The four fat-soluble vitamins—A, D, E, and K—are found in fruits and vegetables, fish, liver, and dairy products.

Although fat-soluble vitamins must be obtained from the diet, they do not have to be ingested every day.

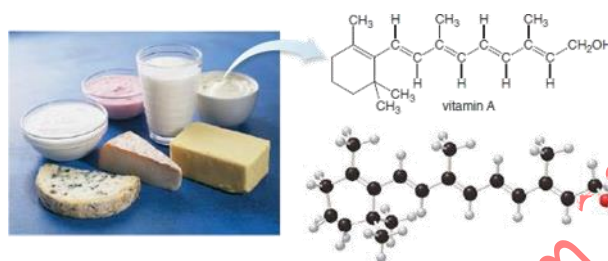
Excess vitamins are stored in adipose cells, and then used when needed. Table below summarizes the dietary sources and recommended daily intake of the fat soluble vitamins.

1-Vitamin A

Chemical name: Retinol.

Source: They can only be found intact in animal sources. They are widely found in liver, whole milk, eggs, cheese & butter.

RDA.Recommended Dietary Allowances):(1-3 mg).



Vitamin A

Functions of Vitamin A :

- 1-Vision.
- 2-Generates pigments for the retina.
- 3-Maintains surface lining of eyes.
- 4-Prevents night blindness.
- 5-Promotes bone growth.
- 6-Helps in cell division and differentiation.
- 7-Anti-oxidant.
- 8-Necessary for healthy Skin.
- 9-Regulate Immune System.
- 10-Keeps mucous membrane healthy.

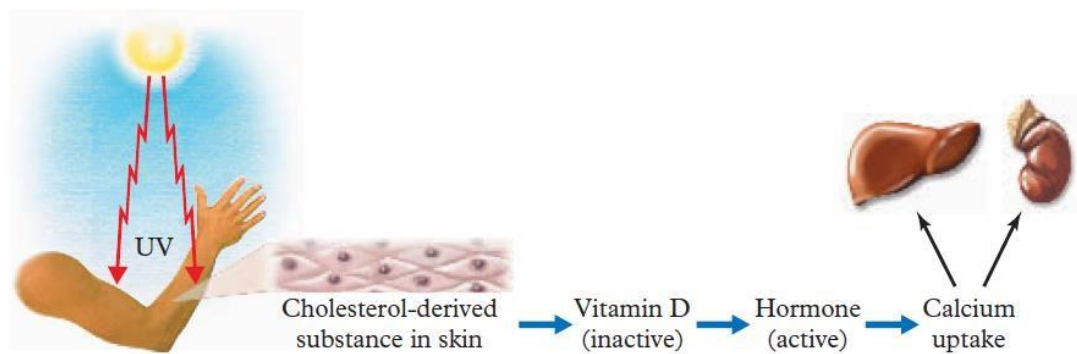
Signs of Deficiency of Vitamin A :

- 1- Night blindness.
- 2- Decreased resistance to infections.
- 3- Extremely dry skin, hair or nails.
- 4- Impaired growth.

2- Vitamin D:

Chemical name: Calciferol

Source: Action of sunlight on the skin - Fish liver oil - Eggs - Tuna - Salmon - Fortified foods like dietary products - Margarine.



Formation and activation of vitamin D in the body.

Vitamin D.

Note (Not for keep)

7-dehydrocholesterol, an intermediate of a minor pathway of cholesterol synthesis, is available in the Malpighian layer of epidermis. In the skin, ultraviolet light breaks the bond, to give rise the provitamin, secosterol.

The cis double bond between is then isomerised to a trans bond to form vitamin D₃ or cholecalciferol. So, vitamin D is called the "sun-shine vitamin".

As sunshine is less in winter months, vitamin deficiency is seen in winter.

RDA: 10 Mg.

Functions of Vitamin D:

- 1-Acts as a hormone to increase intestinal absorption of calcium and phosphorus.
- 2-Promote bone and tooth formation.
- 3-Prevents rickets in children and osteomalacia in adults.
- 4-Promotes calcium homeostasis.
- 5-Promotes bone calcium mobilization.

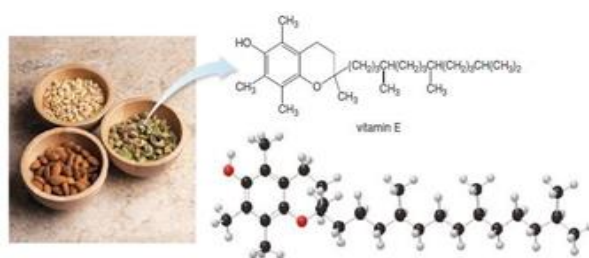
Signs of Deficiency of Vitamin D

- 1-causes rickets, a bone disease characterized by knock-knees.
- 2-spinal curvature, and other skeletal deformities in adults.

Lect.6**3- Vitamin E:****Chemical name: Tocopherol**

Source: Vegetable oils, margarine, green leafy vegetables, egg yolks etc.

RDA: 10 mg for men, 8 mg for women.

**Functions:**

- 1-Antioxidant
- 2-Reduce the energy of the free radical
- 3-Stop the free radical from forming in the first place
- 4-Plays some role in the body's ability to process glucose
- 5-Acts as anti-blood clotting agent
- 6-Promotes normal red blood cell formation

Signs of Deficiency

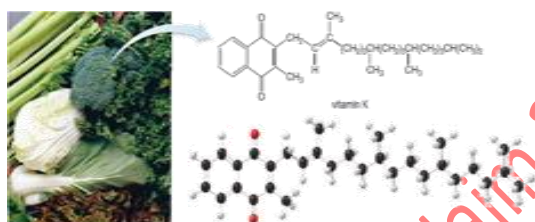
- 1- Disruption of red blood cell membranes
- 2-Anemia -Lack of vitality -Inability to concentrate
- 3-Muscle weakness Deficiencies are extremely rare

Lect.6.**4- Vitamin.k.**

Chemical name: Phylloquinone

Source: Beef, liver, eggs, spinach, tomatoes etc.

RDA: 80 µg for men 65 µg for women.

**Functions:**

- 1-Necessary for normal blood clotting
- 2-Synthesis of proteins found in plasma, bone & kidneys
- 3-Helps to maintain strong bone

Signs of Deficiency

Increased bleeding and hemorrhage Deficiency states are rare, they may occur in some individuals when antibiotic medications kill the intestinal bacteria that produce the vitamin.

Lect.6.**2- Water Soluble Vitamins**

Water-soluble vitamins are required daily in small amounts because they are readily excreted in the urine and the cellular stores of their coenzymes are not stable.

The various members of the vitamin B complex and C vitamin are not related either chemically or physiologically, yet they have many features in common.

- 1- All of them are water-soluble.
- 2- Act as a coenzyme.
- 3-Not stored in the body.

1- Vitamin C.

Chemical name: Ascorbic acid.

Source: Orange Juice, Strawberries, Tomato Juice,etc

RDA: 80 mg.

Functions:

- 1-Helps prevent some forms of cancer.
- 2-Aids in the prevention of heart disease.
- 3-Helps the body to fight infections.
- 4-Helps to keep your gums healthy.
- 5-Aids the body in absorbing iron from plant sources
aids in the healing of wounds.
- 6-A strong antioxidant: Protects our bodies from formation of free radicals.
- 7-Helps to form connective tissue that hold our bones, muscles, and tissues together (collagen).

Lect.6.**Signs of Deficiency:**

Weight loss -Fatigue and joint pain -Scurvy (bruising easily, bleeding gums, and (tendency for bones to fracture).

Reduced resistance to colds and infections -Slow healing of wounds and fractured bones -Gingivitis: swelling, tenderness, redness and ulceration of gums.

2-Vitamin B1

Vitamin B Complex: Chemical name: Thiamine

Source: Whole grains, nuts, meat, white and brown flour ... etc

RDA: 1.5 mg for men ; 1.1mg for women

Functions: Vitamin B1 is important for:

Producing energy from carbohydrates -Proper nerve function -Stabilizing the appetite.

Promoting growth and good muscle tone -ATP production.

Signs of Deficiency:

Beri-Beri (symptoms: weight loss, emotional disturbances, weakness and pain in the limbs, irregular heart rate...) A disorder of the nervous system.

Loss of appetite -Weakness & Feeling tired -Insomnia -Loss of weight Depression -Heart & Gastrointestinal problems.

3-Vitamin B2

Chemical name: Riboflavin.

Source: Large amounts in eggs, meats, green vegetables ...etc.

RDA: 1.7 mg for men 1.3 mg for women.

Lect.6.**Functions: It is important in:**

- 1-Energy production
- 2-Carbohydrate, fat, and protein metabolism
- 3-Formation of antibodies and red blood cells -Cell respiration
- 4-Maintenance of good vision, skin, nails, and hair alleviating eye fatigue.
- 5- transport and metabolism of iron in the body.

Signs of Deficiency

Cracks and sores in mouth and lips -Bloodshot eyes.

Itching and burning eyes

4-Vitamin B3

Chemical name: Niacin

Source: Niacin is found in most foods, although meat is the major source. It can also be made by the body from the amino acid tryptophan.

RDA: 19 mg for men, 15 mg for women.

Functions: It is important in:

Energy production

Maintenance of skin and tongue

Lect.6.

Maintenance of nervous system

Health of
the digestive track.

Signs of Deficiency

Pellegra: A disease caused by B3 deficiency (symptoms: high sensitivity (to sunlight, aggression, dermatitis, red skin lesions, insomnia).

Gastrointestinal disturbance, loss of appetite

Headache, insomnia, mental depression

Fatigue, aches, and pains

Nervousness, irritability

5-Vitamin B5

Chemical name: Pantothenic acid

Source: Mushrooms, avocado, sweet potato, lentils, dried peas, chicken, broccoli, yogurt etc.

RDA: 6 mg.

Functions:

It is important for

Energy to be released from carbohydrate & fat

Maintaining a healthy digestive tract

Synthesis of cholesterol

Lect.6.**Signs of Deficiency**

Burning sensation in the hands and feet

Muscle cramps

Diarrhea, vomiting and water retention.

6-Vitamin B6

Chemical name: Pyridoxine

Source: It is found in a variety of foods. Beef, fish and poultry are rich sources...etc.

RDA: 2 mg for men 1.6 mg for women

Functions: It is important in :

Production of red blood cells

Conversion of tryptophan to niacin (B-3)

Immunity.

Nervous system functions.

Reducing muscle spasms, cramps, and numbness.

Maintaining proper balance of sodium and phosphorous in the body.

Lect.6.**7- Vitamin B12:**

Chemical name: Cyanocobalamin

Source: It is found exclusively from animal sources, e.g. milk, meat and eggs. Fortified breakfast cereals can be a useful source of this vitamin

RDA: 1.5 - 2 μg .

Functions: It is Important in:-Proper nerve function -Production of red blood cells -Metabolizing fats and proteins -Prevention of anemia -DNA reproduction -Energy production.

Signs of Deficiency

Peripheral neuropathy & cognitive deficits resulting from neurological damage

Anemia -Hypersensitive skin

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