PharmacognosyII

Lec. 10 **3rd stage 1st semester** **Year 23-24**

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Vitamins

Vitamins formerly known as (accessory food factors), are present in many animal and vegetable foods. Their absence from the diet causes deficiency diseases such as scurvy, rickets and night-blindness diseases.

However, people on a strict vegetarian diet who eat no eggs or dairy produce need a supplement of vitamin B12, and alcoholic need vitamin B1, which is required for the complete metabolism of ethanol as well as other groups, such as narcotic drug users, whose diet is generally inadequate are also prone to vitamins deficiency.

Chemically, vitamins vary from very simple compounds to very complex one.

Vitamins differ from one another in physical properties such as solubility. They have been traditionally classified according to their water-solubility and fat-solubility properties and this division is still useful. The water-soluble vitamins are non-toxic and can be consumed in large doses without harm, they also remain in the body for a relatively short time.

Conversely, the fat-soluble vitamins are more toxic in large doses and are stored in fatty reserves of organs of the body for long period of time.

Fat-soluble vitamins

Vitamin A (A1, A2)

Vit A is found as such only in the animal kingdom and is particularly abundant in fish-liver oils. Vit A occurs in three or more forms termed vitamers. Vitamin A1, retinol is an alcohol and retinal is its corresponding aldehyde. Vitamin A2, dehydroretinal, has a second unsaturated bond in the ring system and also occurs

as the aldehyde dehydroretinol. The carotenes are C40 compounds found in the plant kingdom and are converted to vitamin A in the small intestine and other organs.

Vit A decomposes by exposure to light and may be assayed in fish liver oil and other preparations by ultraviolet absorption and spectrophotometry.

Vit A is essential for the normal functioning of the body epithelia and retina. Deficiency is indicated by night blindness and by drying and crusting of the mucous membranes.

Vitamin D

The compounds compromising this group have antirachitic activity and are individually designated D2-D6, they are formed by the opening of ring B of a steroidal provitamin. Vitamin D3 (cholecalciferol) is the only member to occur naturally in higher animals and is formed photochemically from 7-dehydro-cholesterol by the sun irradiation of the skin.

Vit D2 (calciferol, ergocalciferol) differs from D3 in having an unsaturated side-chain.

D4, D5 and D6 are produced artificially by the irradiation of 22-dihydroergosterol, 7-dehydrositosterol and 2-dehydrostigmasterol respectively.

These vitamins are relatively stable and preparations containing them are assayed by liquid chromatography, using a standard preparation of crystalline vitamin D3.

Vitamin D regulates the calcium and phosphorous balance in the body by direct action on phosphorous metabolism. It promotes calcium absorption and is an essential factor in bone formation (a deficiency causes rickets). Excessive doses of the vitamin should be avoided.

Vitamin E

Contains in this group are a number of tocopherols, prefixes β, γ , which are of wide occurrence in plants, being particularly abundant in the germ oil of cereals. Tocopherols are among those found in the germ of wheat, barley and rye, whereas others are found in soya beans, nuts, maize and oats.

Vitamin E is a powerful antioxidant and has an important role in the preservation of the well-being of cells, in slowing their ageing effects and in counteracting the harmful aspects of toxins in the blood and lungs. It may assist the protection of the cardiovascular system by preventing blood-lipid peroxidation, traditionally the vitamin has been associated with the improvement of fertility.

A normal diet supplies adequate amounts of the vitamin, but deficiency leads to the destruction of red blood cells with resultant anaemia, it may be added to cod-liver oil.

Vitamin K

Vitamin K is a necessary factor in the blood–clotting process, it acts indirectly by activating those substances that are necessary for the conversion of the prothrombin to thrombin in healthy.

Individuals it is possible that the intestinal flora provides an adequate supply of the vitamin. Deficiency symptoms are prolonged bleeding and excessive bruising.

Water-soluble vitamins

Vitamin B1 (thiamine, aneurine)

In plants, it is biosynthesized in the leaves and transported to the roots where it acts as a growth factor.

Vit B1 in food is destroyed by boiling and its preparation should be protected from light. In the body, carbohydrate metabolism and the normal functioning of

the nervous system are dependent on adequate supplies of the vitamins, initially, deficiency includes loss of appetite, muscular atrophy and mental disturbances.

Vitamin B2 (riboflavin, lactoflavin)

The name riboflavin is derived from the sugar component and the intense yellow fluorescence of its aqueous solution. Synthesized by microorganisms of the intestinal flora of the human can result in a higher excretion in the faeces of vitamin B2 than is actually present in the diet. Deficiency symptoms include cracking of the corner of the mouth, dermatitis and conjunctivitis.

Vitamin B12 (cyanocobalamin)

This vitamin is not found in plants and yeast but occurs in meat, it is also produced by a number of microorganisms (Bacillus), and these are used for the commercial production of the vitamin. Inside the body, this vitamin is involved in the metabolism of amino acids particularly the methylation of homocysteine to give methionine and the breakdown of other amino acids.

Vitamin C (Ascorbic acid)

Ascorbic acid is prepared synthetically or by extraction from plant materials such as rose hips and the juice of citrus fruits.

Vit c is essential for the normal functioning of living cells and is involved in many enzymic reactions. It is required for the development of cartilage, teeth and bones, for wound healing and for aiding the absorption of iron from the intestine.