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Programme: M.Sc., Biochemistry

Course Title: Chemistry of Biomolecules

Course Code:BC101CR

Unit V

Fat soluble Vitamins

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Vitamins

- Definition:

Vitamins are the naturally occuring organic compounds required in minute amounts for the maintenance and normal growth of the life.

2 Main Groups

- **MACRO NUTRIENTS.**
- **MICRONUTRIENTS.**

Macro nutrients

- Proteins, Fats and Carbohydrates
- The Proportion of energy supplied is
- Protein 7-15%
- Fats 10-30%
- Carbohydrate 65-80%

- ✓ Includes Vitamins and Minerals
- ✓ They are required in very small quantities, vary from a fraction of a mg to several grams.
- ✓ Required for the proper metabolism and functioning of the cells and tissues of the body.

Classification of Vitamins

- Vitamins are generally classified as water-soluble vitamins and fat-soluble vitamins.
- I. Fat-Soluble Vitamins
- Vitamin A, D, E and K are fat-soluble vitamins.
- II. Water-Soluble Vitamins
- Vitamins in B-group and vitamin C are water-soluble vitamins.

DAILY HUMAN REQUIREMENTS OF VITAMINS

- ✓Younger one requires higher quantities
- ✓Performance of exercises
- ✓During ailments
- ✓Specific conditions of metabolic disorders (no proper utilization of vitamins)

DAILY HUMAN REQUIREMENTS OF VITAMINS

- ✓ Growing children requires high quantities of Vitamin D
- ✓ During Pregnancy and lactation (Vitamin D)
- ✓ Under conditions of greater utilization of carbohydrates B complex requirement
- ✓ Generally Vitamin requirement is not fixed, it depends on the metabolic activity (heavy muscular work, pregnancy and lactation, growing Children).

DEFICIENCIES OF VITAMINS

- PRIMARY: Due to inadequate intake
- SECONDARY: Due to Malabsorption, increased excretion, allergies, anorexia, gastrointestinal disorders etc.

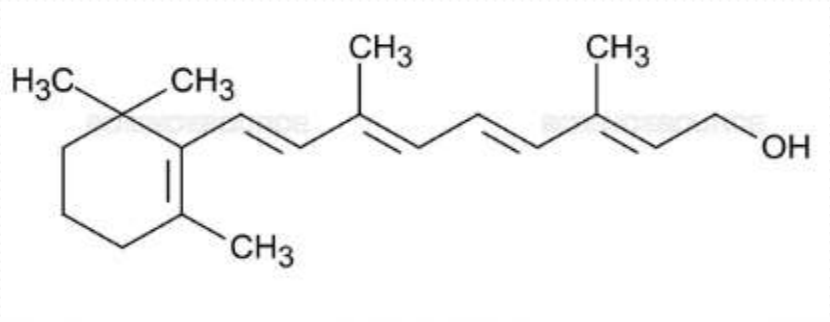
Vitamin A

Bright eye Vitamin

- **Source:**

- ✓ Liver oils of various Fishes, butter, milk, eggs, all pigmented (particularly yellow) vegetables and fruits (carrots, pumpkins, turnips, pappayas, tomatos, plums, cherries, mangoes) contain provitamin form of Vitamin A.
- ✓ Vitamin A is absent from vegetable fats and oils.
- ✓ Vitamin A originates in marine algae, then passes up the food chain to reach the large carnivorous animals.

Vitamin A



- Requirement
- 5000IU/day

DEFICIENCY

- ✓ leads to the onset of many diseases.
- ✓ Keratomalacia (softening of the cornea)
- ✓ Phrynoderma or toad skin (hard and horny skin) and stunted growth.

DEFICIENCY

- ✓ Nyctalopia or Night blindness.
- ✓ Xerophthalmia (scaly condition of the delicate membrane covering the eyes)

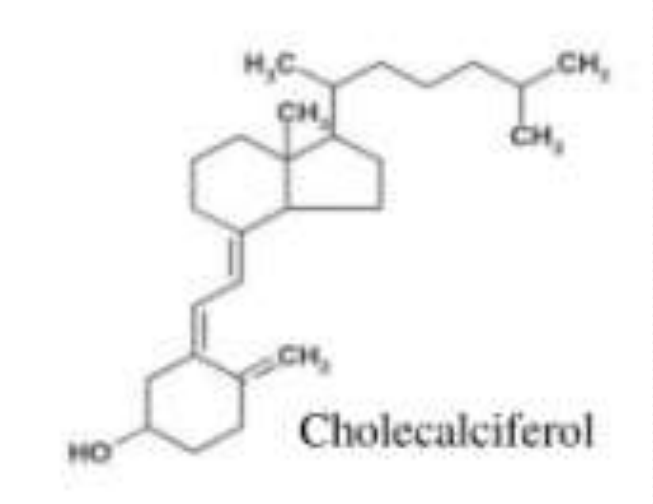
VITAMIN - D SUNSHINE VITAMIN

Source:

- ✓ Liver oils of many fishes, egg yolks. Provitamin form is present in human skin and converted to active form by irradiating with UV light.

- ✓It is required for the calcification of bones and teeth.
- ✓It encourages the absorption of calcium and phosphates in to the blood.

Vitamin D



- Requirements
- Adult Man – 100 IU
- Pregnant,lactating Mother, infants-

  220 IU

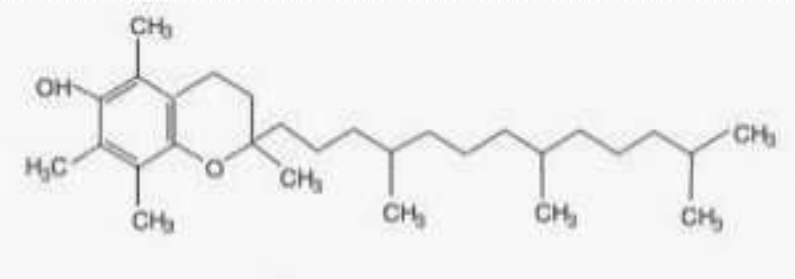
DEFICIENCY

- ✓ Rickets (childhood)
- ✓ Osteomalacia (adult, high among women)- bones become softer, loss of calcium is greater than phosphorous.
- ✓ Bone deformities, deposition of inorganic materials on the matrix of bones fail to occur.

VITAMIN - E
ANTISTERILITY FACTOR

- ✓ Source: Many plant oils such as wheat germ, rice, corn, cotton seed, soybean and peanut. Small amount in meat, milk, eggs, leafy plants and some fruits.
- ✓ It serves as an antioxidant and prevent the oxidation of various vitamins present in food.

Vitamin E



- Requirements

- Children : 10 – 15 IU
- Adults : 20 – 25 IU

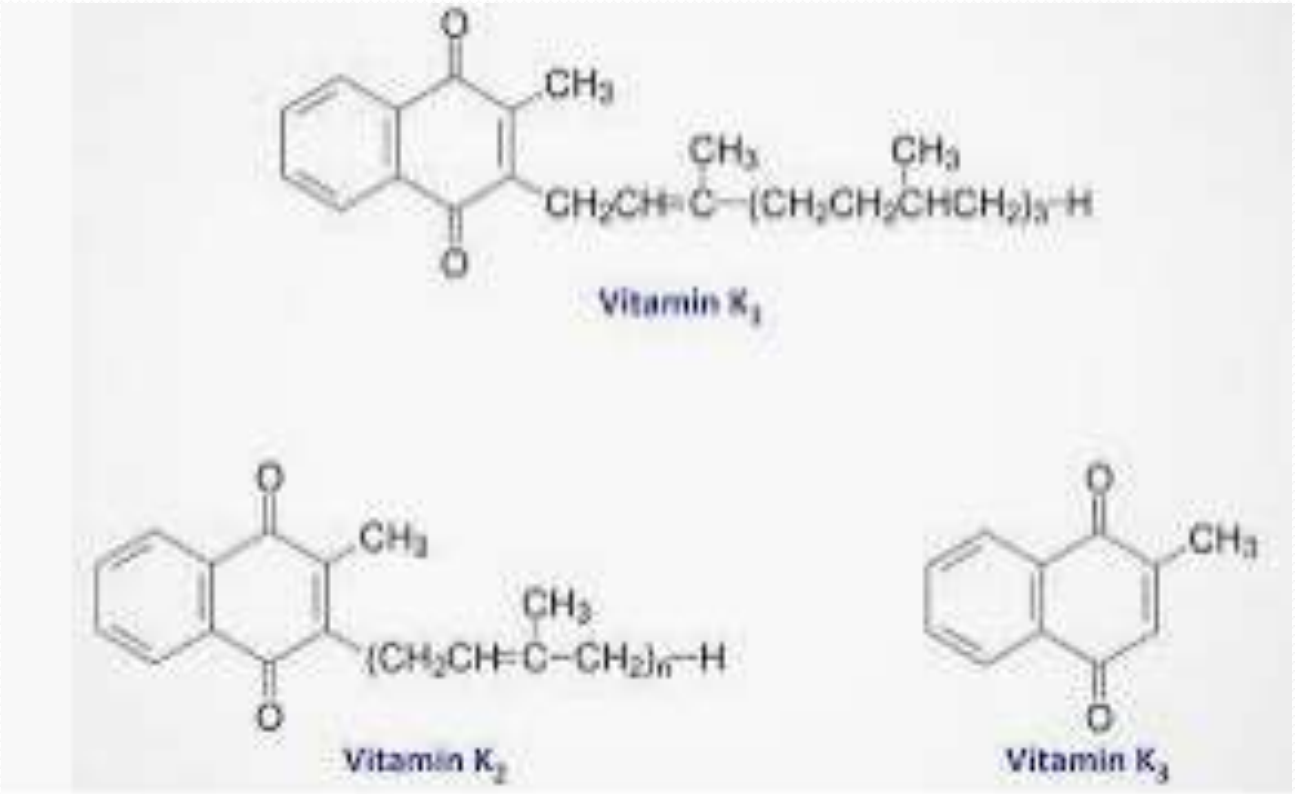
DEFICIENCY

- ✓ Sterility develops in animals.
- ✓ Vitamin E deficiency prevents normal growth.

VITAMIN - K
COAGULATION VITAMIN

- ✓ It is called as antihemorrhagic factor.
- ✓ Source: Green vegetables like Spinach, cauliflower, cabbage and some intestinal bacteria.

Vitamin K


CH3
CH3
CH3
CH2CH=C–(CH2CH2CHCH2)3–H
Vitamin K1
CH3
CH3
(CH2CH=C–CH2)n–H
Vitamin K2
CH3
Vitamin K3

DEFICIENCY

- Deficiency causes loss of blood clotting power.
- The infants develop hemorrhage.
- In Man vitamin K deficiency results in steatorrhea with diminished intestinal absorption of lipids.