VITAMINS(I)



Chapter Objectives:

- **INTRODUCTION TO VITAMINS**
- **COMPOSITION OF VITAMINS**
- **CLASSIFICATION OF VITAMINS**
- **FAT SOLUBLE VITAMINS: STRUCTURE AND FUNCTIONS**

INTRODUCTION TO VITAMINS

- Vitamins are organic compounds required by the body in small amounts for metabolism, for protection, for maintenance of health and proper growth
- They cannot be synthesized by the body. Must be obtained by outside sources like diet, bacteria & sun.
- Vitamins also assist in the formation of hormones, blood vessels, nervous system chemicals and genetic materials
- They generally act as catalysts, combining with proteins to create metabolically active enzymes that are essential for life reactions
- Without enzymes, many of the reactions essential to life would slow down or cease

COMPOSITION OF VITAMINS

- *Vitamins are of different chemical nature. These are alcohols, aldehydes, organic acids, their derivatives and nucleotide derivatives*

CLASSIFICATION OF VITAMINS

- Vitamins are classified according to their ability to be absorbed in fat or water

- 1. Fat Soluble Vitamins: these are oily and hydrophobic compounds, they are stored in the liver and not excreted out of the body. Bile salts and fats are needed for their absorption. Vitamins A,D,E and K are fat soluble

- 2. Water Soluble Vitamins: Vitamin B complex and Vitamin C are water soluble. They are not stored in the body, therefore are required daily in small amounts

CLASSIFICATION OF VITAMINS

Soluble **Water Vitamins:**

not stored in tissues, must have constant supply

Examples

B, B1, B2, B6 & B12

Niacin

Folic Acid C

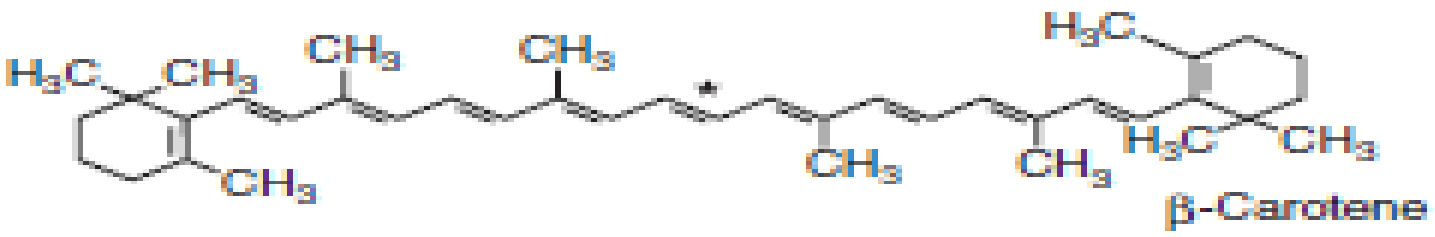
Fat Soluble Vitamins:

stored in tissues

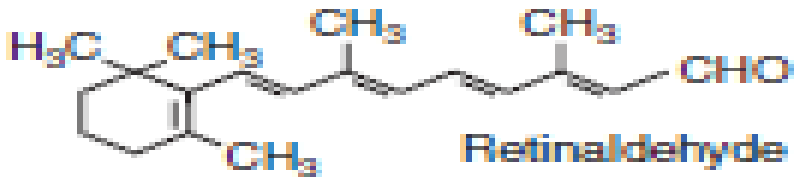
Examples A D E K

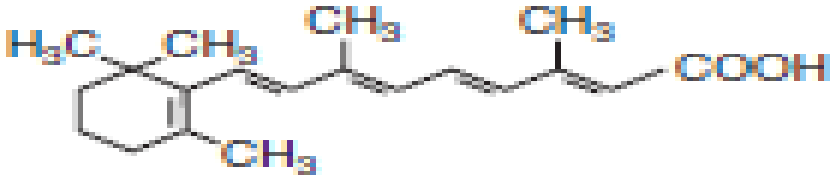
FAT SOLUBLE VITAMINS

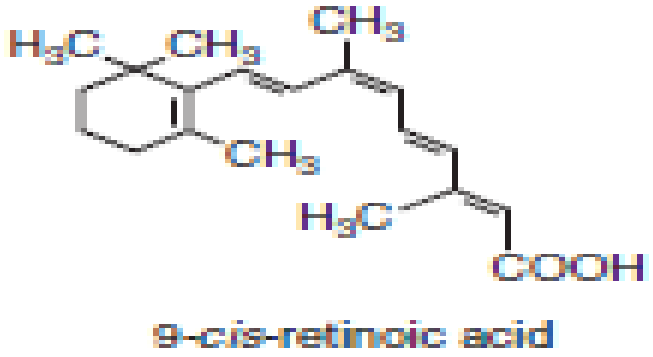
STRUCTURE OF VITAMIN A (*Retinol*)











- Function: Retinol is a precursor for retinal that is used in the visual cycle and for retinoic acid that is required for maintenance of epithelial cells..
- Effect of Deficiency: Night blindness and keratinization of epithelial cells.
- Oral manifestations: Hyperplasia of the gingiva, gingivitis.

- Sources: Vegetables, fish liver oil.

- Note: beta-carotene is a precursor of retinol.

- RDA: 1000 retinol equivalents (corresponds to 1000 µg retinol or 6000 µg beta-carotene).
- Excess vitamin A is toxic.

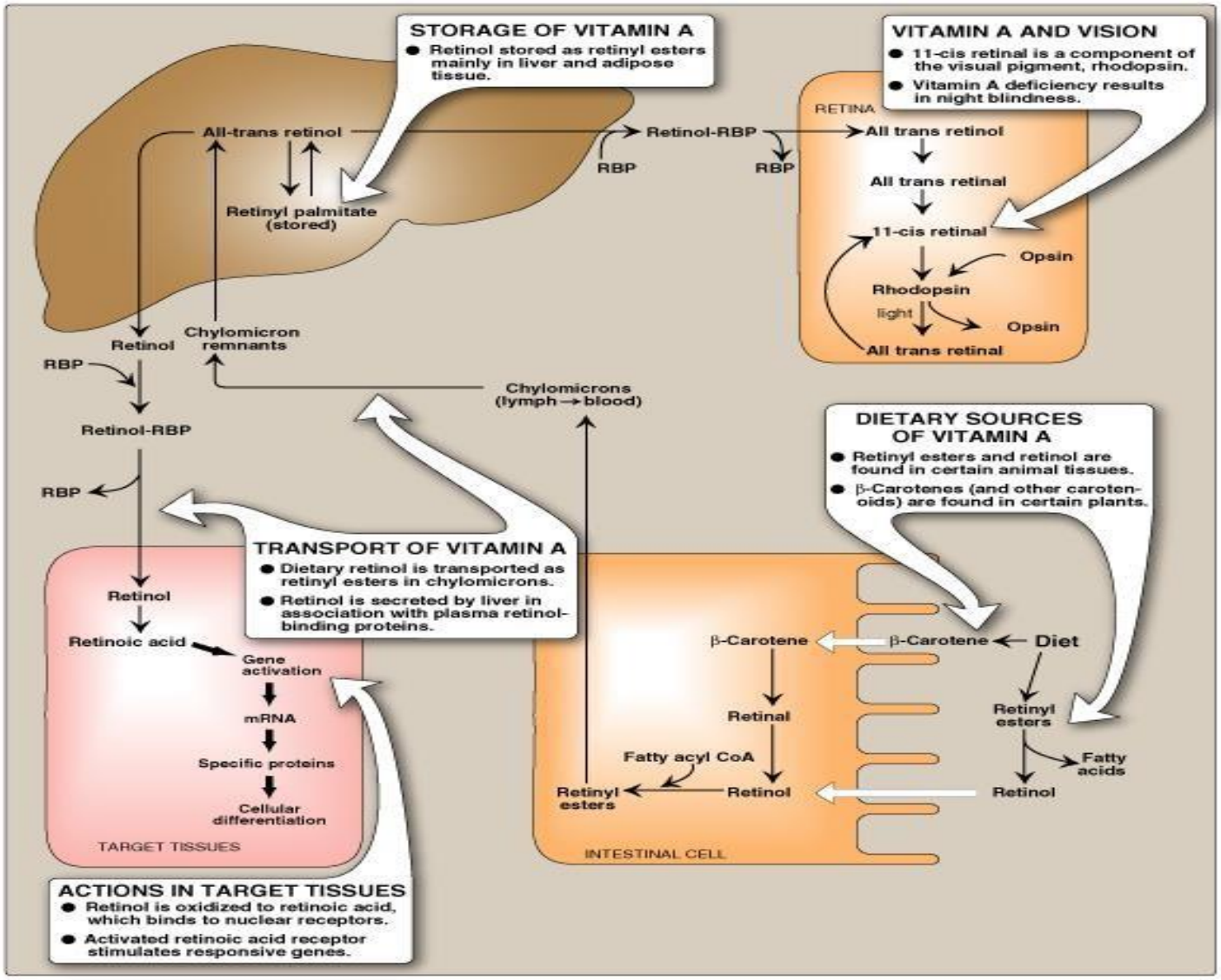
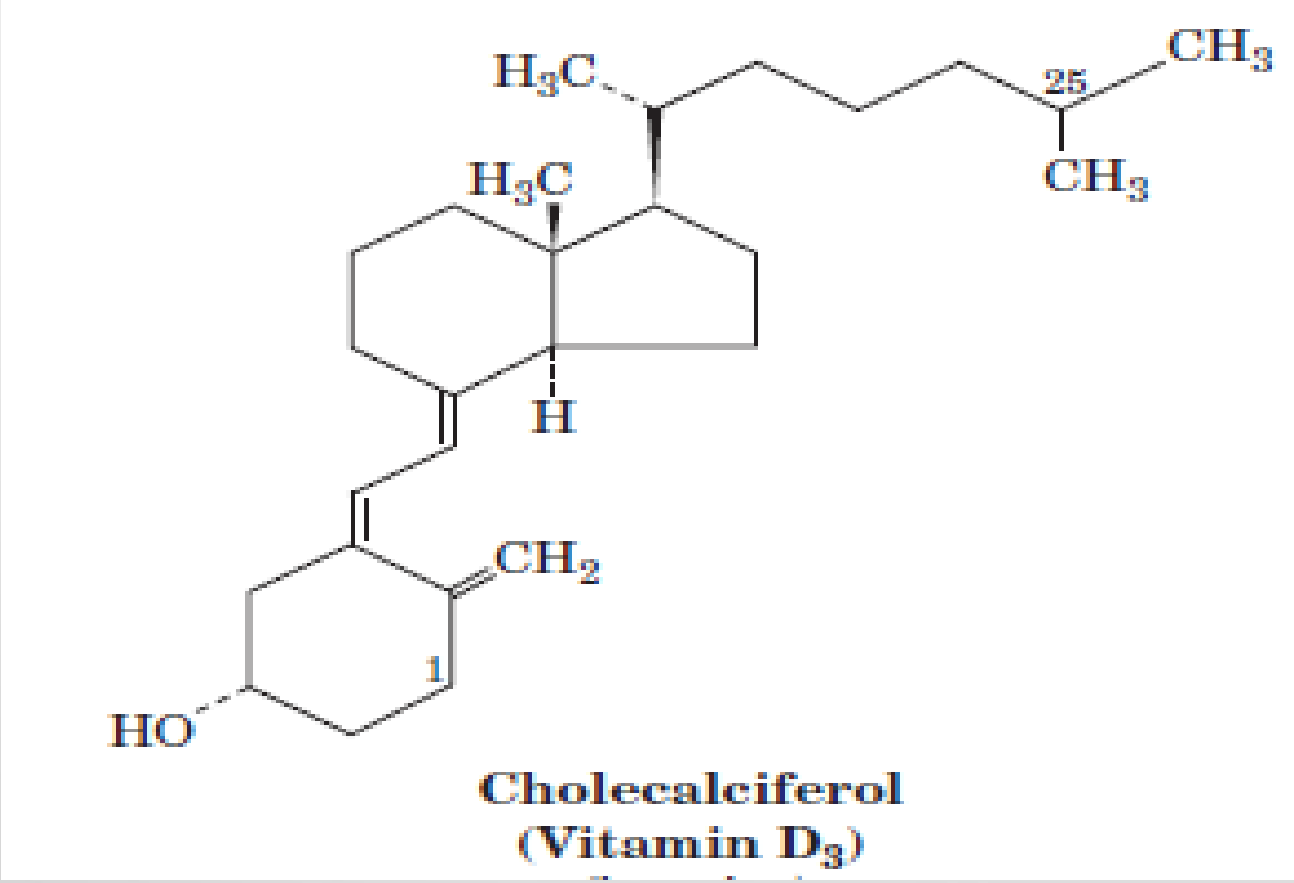


Figure 28.19
Absorption, transport, and storage of vitamin A and its derivatives. RBP = retinol-binding protein.

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FAT SOLUBLE VITAMINS

STRUCTURE OF VITAMIN D



Cholecalciferol
(Vitamin D_3)

Function: Regulation of calcium levels through actions on intestine, kidney and bone.

- Effect of Deficiency: Rickets, osteomalacia.

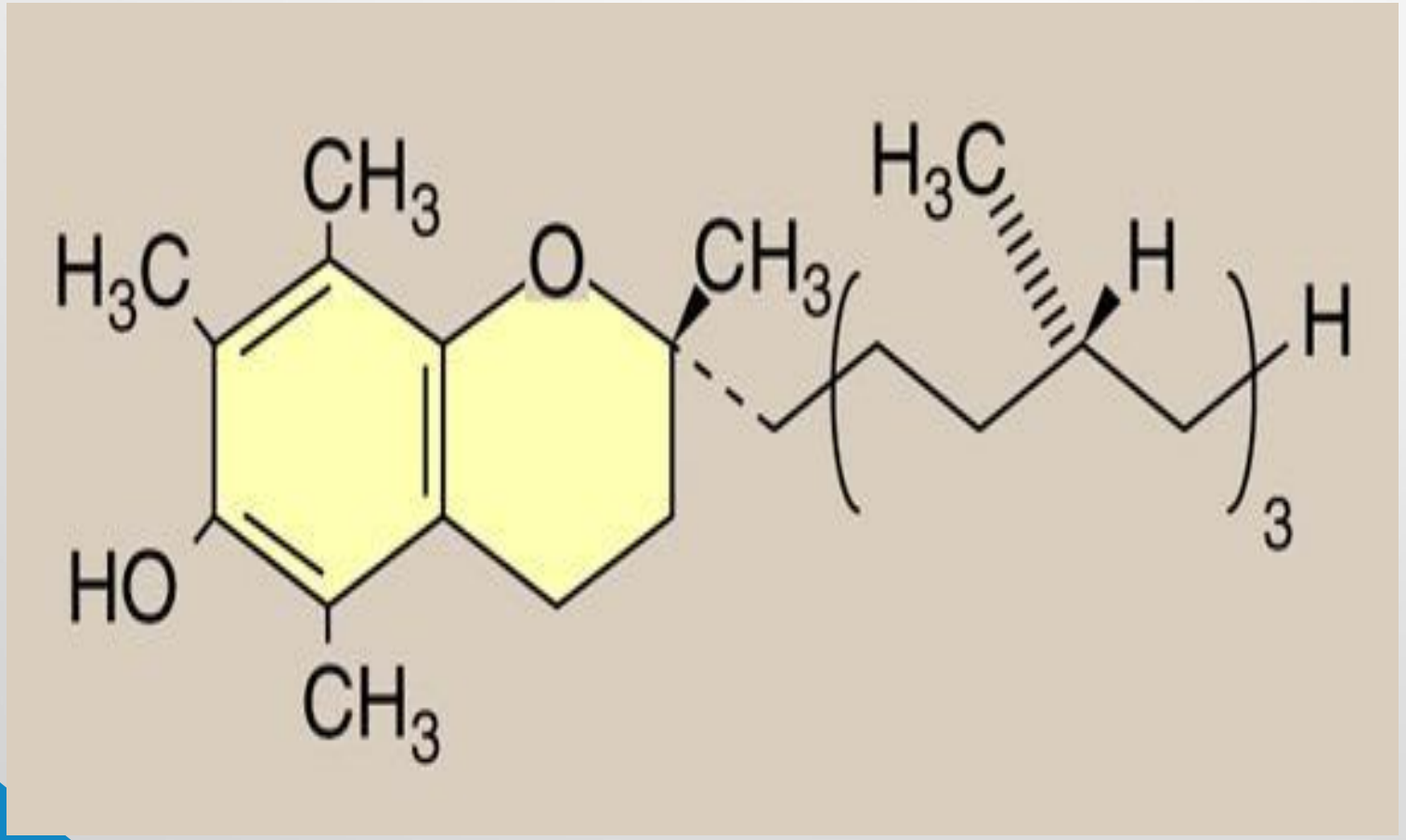
  - Oral manifestations: Deficiency associated with incomplete mineralization of teeth.

- Sources: UV irradiation of 7-dehydrocholesterol in the skin, fish liver oils and supplemented milk.

- RDA: 600 international units (15 µg cholecalciferol) - IOM recommendation 2010 - and not more than 4000 Ius.

FAT SOLUBLE VITAMINS

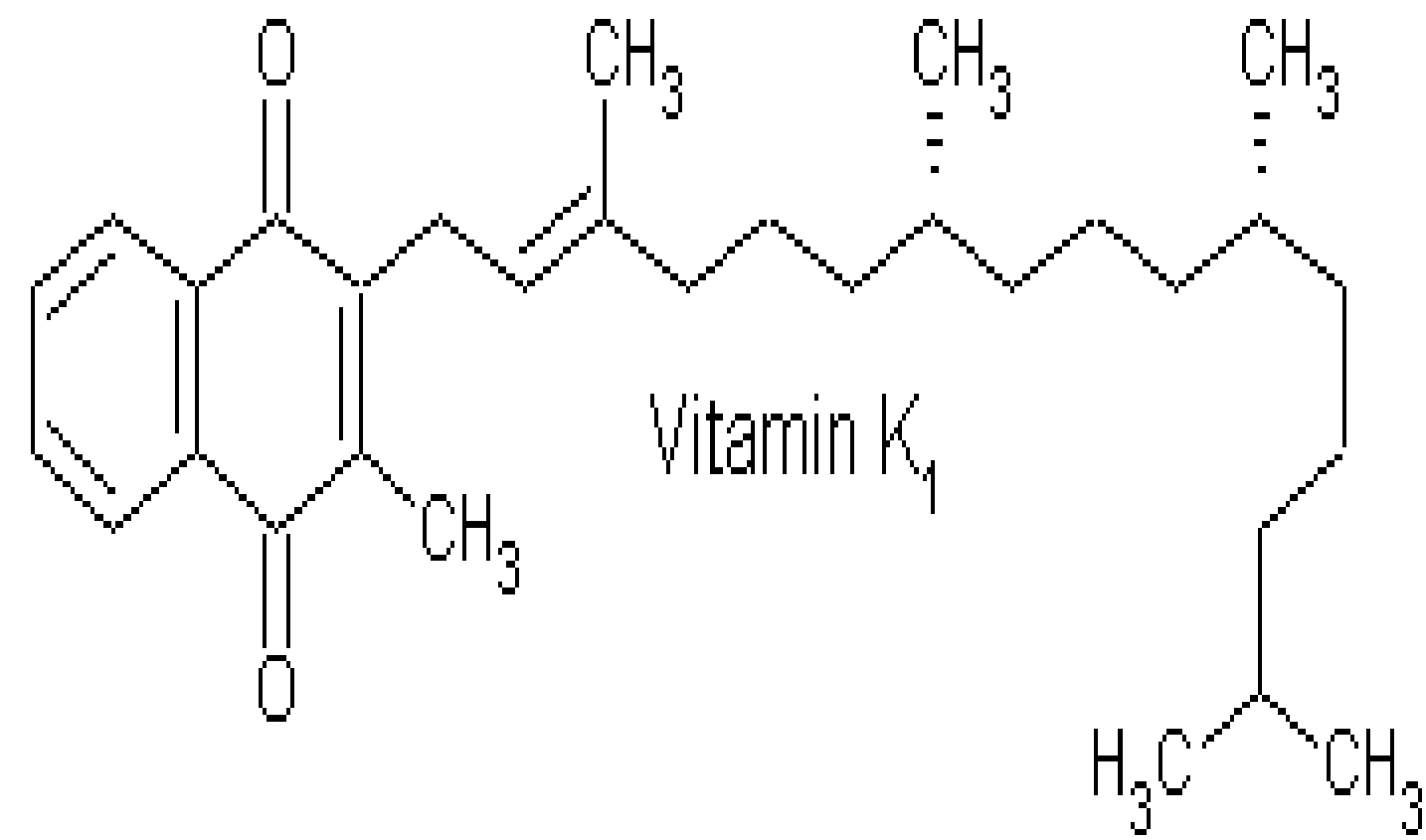
STRUCTURE OF VITAMIN E



- Function: Vitamin E (Tocopherol)is a lipid-soluble antioxidant and helps to prevent lipid damage.
- Effect of Deficiency: In humans, deficiency is associated with lysis of erythrocytes.
- Sources: Vegetables and wheat germ oil
- RDA: 15 international unit. Larger amounts (100-400 units) have been suggested but are probably not advisable.

FAT SOLUBLE VITAMINS

STRUCTURE OF VITAMIN K



- Function: Vitamin K is a coenzyme for the carboxylation of glutamic acid side chains of some blood clotting factors (prothrombin)

- Effect of Deficiency: A deficiency of vitamin K is rare but can be associated with prolonged blood clotting times.

  - Oral manifestation: gingival bleeding

- Sources: Vitamin K is produced by intestinal bacteria.

- RDA: No RDA has been established but 70-140 µg may be appropriate.