
Secret Getaway


بسم الله الرحمن الرحيم

VITAMIN E

BY

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VITAMIN E

Synonyms:

ANTI-STERILITY FACTOR.

or

TOCOPHEROLS.

Or

Tocotrienols

Vitamin E

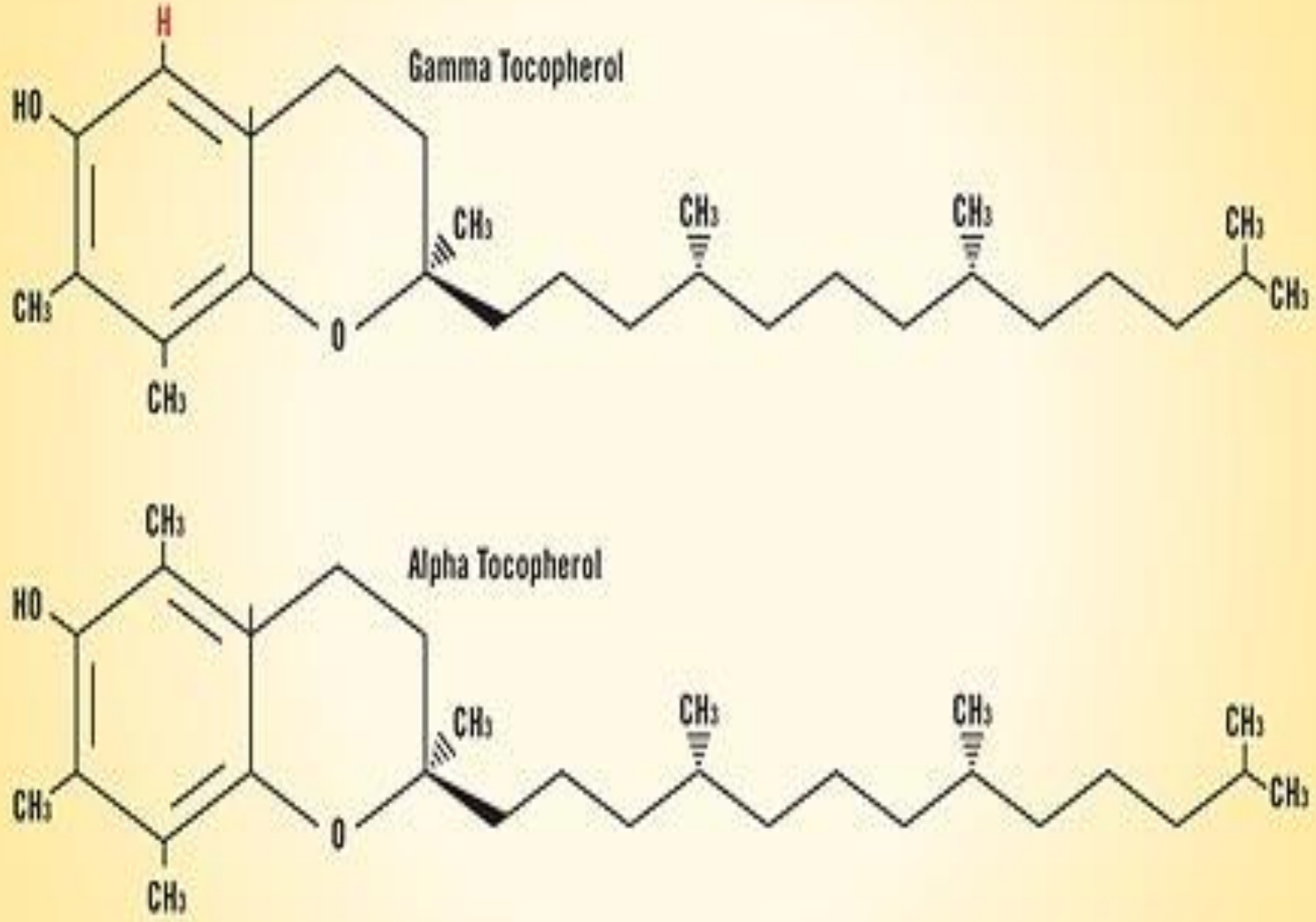
- Vitamin E occure in the diet as a mixture of several related compounds known as **tocopherols**.
- The α-tocopherol molecule is the most potent of the tocopherols and is used as the measure of vitamin E potency.
- (1- **tocopherols**. equiv.= 1mg α-tocopherol)

VITAMIN E

- The E vitamins consist of eight naturally occurring tocopherols, of which α-tocopherol is the most active.
- The primary function of E is as an antioxidant in prevention of the non-enzymic oxidation of cell components (for example, polyunsaturated fatty acids) by molecular oxygen and free radicals.

1. α-tocopherol 5,7,8 trimethyl tocol
2. ß-tocopherol 5,8 dimethyl tocol
3. ɣ-tocopherol 7, 8 dimethyl tocol
4. ɗ-tocopherol 8 methyl tocol

- There are 7 naturally occuring tocopherol differeing from one another in the number or position or both of the methyl group on the chromane ring of the tocol nuclus.
- All tocopherol contains a side chain formed from 12 carbon attached to carbon number 2.
- All tocopherol contain a hydroxyl group at carbon 6.


Gamma Tocopherol
H
HO
CH3
CH3
CH3
O
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CH3
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Alpha Tocopherol
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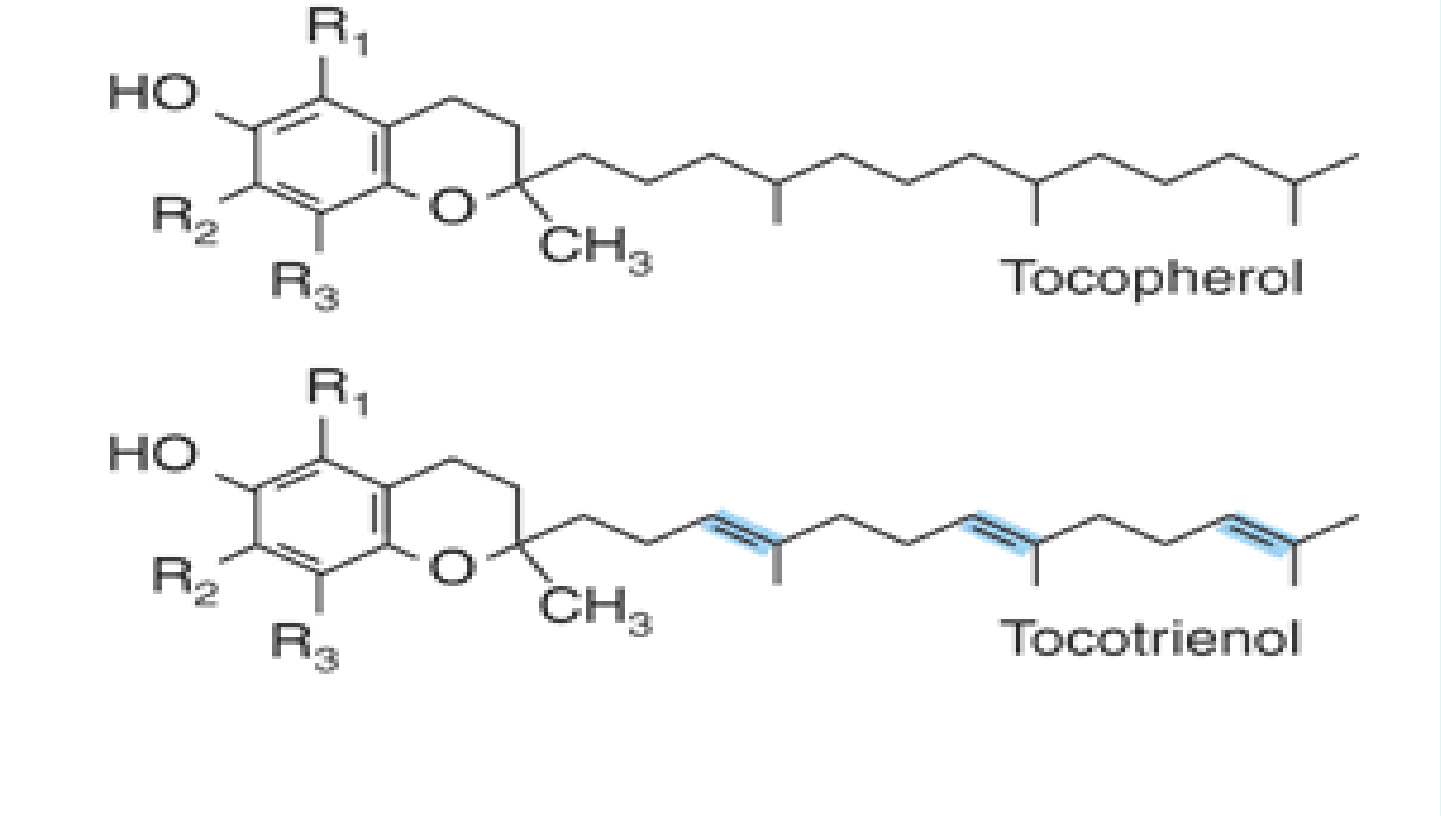
Tocopherol and tocotrienol



Structure of vitamin E

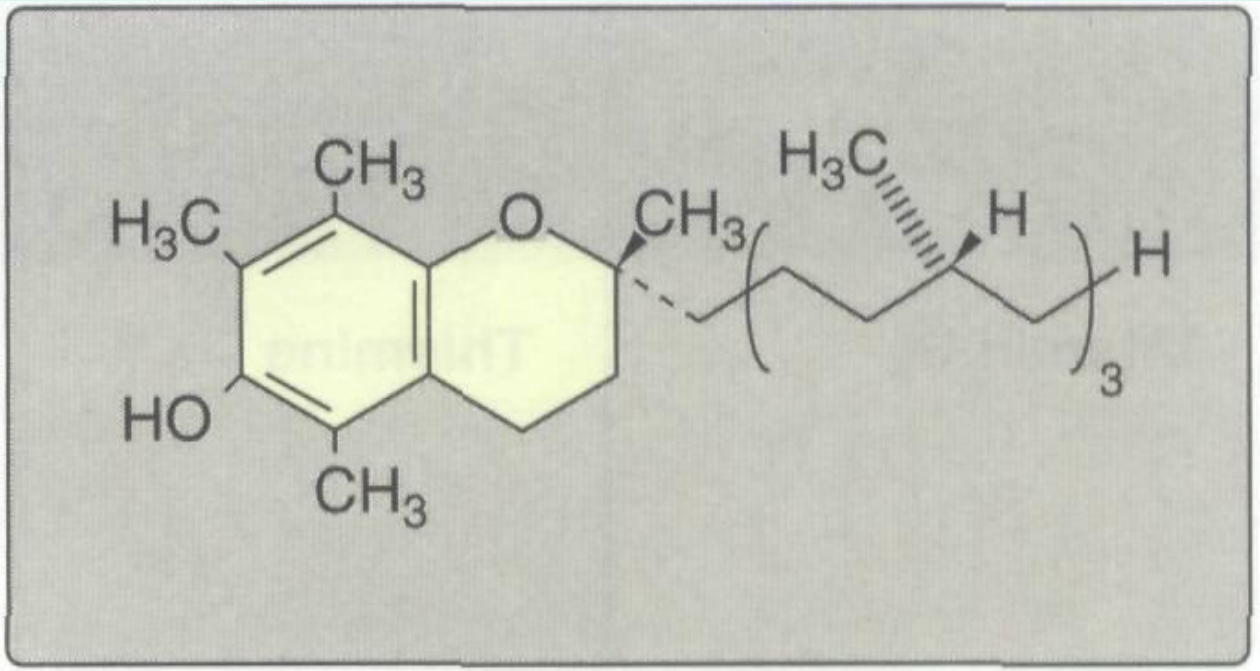
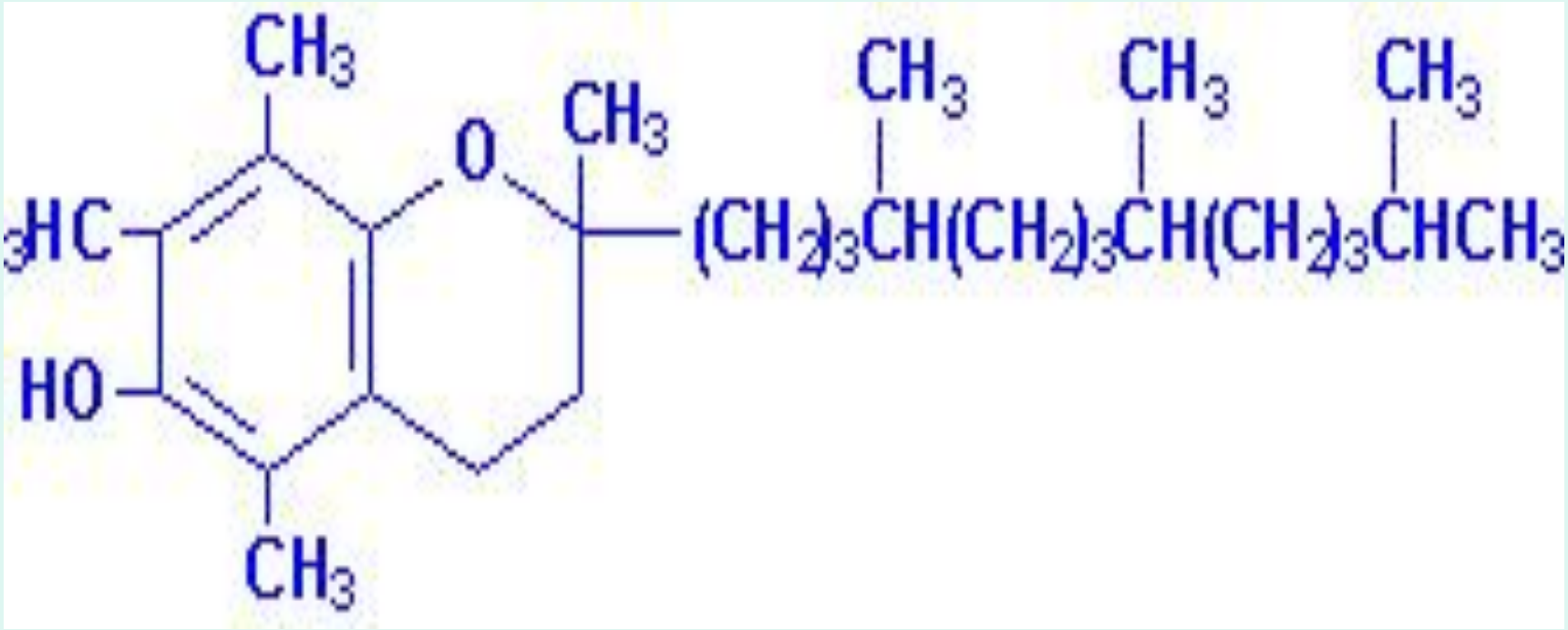


Figure 28.28
Structure of vitamin E.

Vitamin E

α-Tocopherol



Distribution and requirements of vitamin E

- Vegetable oils are rich sources of vitamin E.
- Liver and eggs contain moderate amounts.
- The RDA for α-tocopherol is 10 mg for men and 8 mg for women.
- Vitamin E requirement increases as the intake of polyunsaturated fatty acid increases.

Recommended Daily Allowance

- ✓ **Males- 10 Tocopherol Equivalents (TE)**
- ✓ **Females - 8 TE**
- ✓ **Pregnancy- 10TE**
- ✓ **Lactation - 12 TE**

- **1 TE = 1 mg of α tocopherol**

Absorption and transport of vit.E

- Vitamin E is absorbed from the intestines packaged in chylomicrons.
- It is delivered to the tissues via chylomicron transport and then to the liver through chylomicron remnant uptake.
- The liver can export vitamin E in VLDLs.
- Due to its lipophilic nature, vitamin E accumulates in cellular membranes, fat deposits and other circulating lipoproteins.
- The major site of vitamin E storage is in adipose tissue.

Function of vitamin E

1. Play an important role as a naturally occuring antioxidant due to its lipophilic structure it tends to accumulate in circulating lipoproteins, cellular membrane and fat deposits where it reacts with molecular oxygen and free radicals. It acts as a scavenger for these compounds, protecting polyunsaturated membrane fatty acids from peroxidation reaction.

2- Vitamin E appear to play an important role in cellular respiration, either by:

- Stabilizing coenzyme Q
- Helping transfer electons to coenzyme Q.

3- It also appears to enhance heme synthesis by:

- Increasing the level of ɗ-aminolevulinic acid synthetase and ALA dehydratase.

4- **In animals, vitamin E is required for reproduction**

Deficiency of vitamin E

- Vitamin E deficiency is limited to premature infants.
- In adults, associated with defective lipid absorption or transport.
- The signs of human vitamin E deficiency include:

➢ Sensitivity of erythrocytes to peroxide.

➢ Appearance of abnormal cellular membranes.

Clinical significances of Vitamin E Deficiency

- In humans:
- The major symptom of vitamin E deficiency is an increase in red blood cell membrane fragility. Due to peroxidation of membrane components.
- Neurological disorders have been associated with vitamin E deficiencies associated with fat malabsorptive disorders.

- In animals:
- Symptoms of vit. E def. vary from animal species to another. In various animals vit E def. can be associated with:

➢Sterility.

➢Muscular dystrophy.

➢CNS changes.

➢Megaloblastic anemia.

- Premature infants:

➢Infants fed low vit. E develop a form of hemolytic anemia that can be corrected by vitamin E supplementation.

Clinical indications

- Vitamin E appears to protect against the development of heart disease.
- The vitamin, functioning as antioxidant, may prevent oxidation of LDL.
- Oxidized LDL is thought to promote heart disease.
- Vitamin E works together with vitamin C and ß-carotene to delay the onset of cataracts.

Toxicity of vitamin E

- Vitamin E is the least toxic of the fat-soluble vitamins.
- No toxicity has been observed at doses of 300 mg per day.

Vitamin E
Tocopherols, tocotrienols

- Functions:
- Antioxidant, especially in cell membranes; roles in cell signaling
- Deficiency disease :
- Extremely rare—serious neurologic dysfunction

References:

1. Lippincott's review of biochemistry, 3rd edition.
1. Biochemistry Stryer 5th edition.
2. Harper,s illustrated Biochemistry 28 edition.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