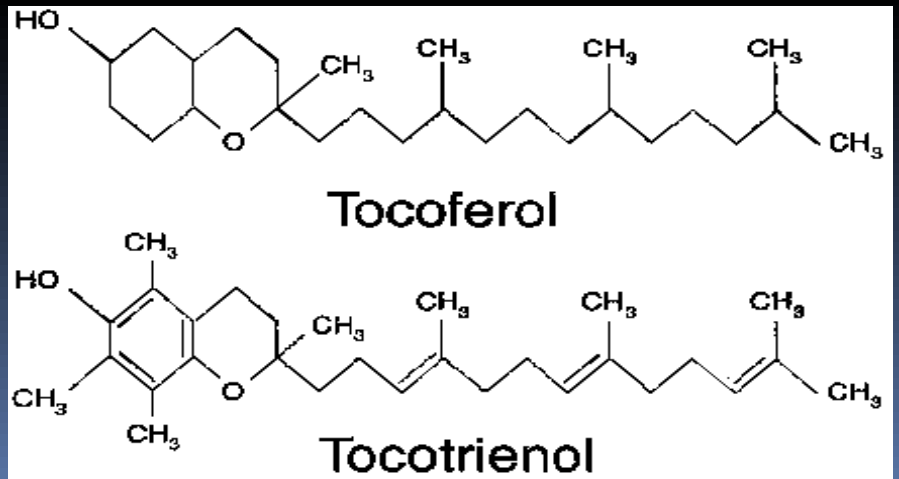
Vitamin E

- A fat-soluble vitamin which plays a role in the cell antioxidant defense system.
- Especially taken in daily diet
- 8 isomers; (synthesized from homogentisic acid by plants)
  - α-, β-, γ-, δ- tocopherol
  - α-, β-, γ-, δ- tocotrienol



Vitamin E

- Among these isomers only α-tocopherol is involved in human plasma and released to the circulation by liver cells.
- Present in phospholipid layer of the cell
- Daily need is generally supplied by diet.
- Main role of vitamin E is to protect the cell components such as polyunsaturated fatty acids, protein, DNA from oxidative damage.

Vitamin E

* Essential for the production of coenzyme Q10 and DNA synthesis
* Extends the life span of red blood cells
* Reduces clotting tendency
* Increases blood flow in the legs
* Shows anti-inflammatory effect by inhibiting the inflammatory activities of prostaglandins.

Main Sources

- Unrefined vegetable oils (wheat germ oil, olive oil, sunflower oil etc.)
- Green leafy vegetables
- Cereals
- Nuts

- Medicinal preparations and dietary supplements generally include vitamin E in the form of α-tocopheryl acetate.

Vitamin E Deficiency

- Abnormalities in dietary fat absorption or metabolism,
- Mutations in the tocopherol transfer protein causing impaired fat metabolism,
- Disrupted fat malabsorption as the small intestine requires fat to absorb vitamin E,
- Low birth-weight,
- Some genetic disorder causing irregularities in lipoprotein production,
- Cystic fibrosis, chronic cholestatic hepatobiliary disease, short-bowel syndrome, Crohn's disease, exocrine pancreatic insufficiency, and liver disease

...can lead to vitamin E deficiency.

* Kemnic, T.R., Coleman, M. Treasure Island (FL): StatPearls Publishing; 2019

Vitamin E Deficiency

- Cellular structure is destroyed.
- Cardiac myopathy, neuropathy, liver necrosis, disorders in the muscles and neurological system
- The initial symptoms;
  - infiltration of enzymes such as creatine kinase and pyruvate kinase into the plasma,
  - infiltration of lipid peroxidation products into the plasma,
  - increased erythrocyte hemolysis.

Use of Vitamin E

- It is reported that intake at the daily dose of 400-800 IU reduced the risk of the development some cancer types such as lung, esophagus and colon cancer.
- It is recommended at a dose of 800-1200 IU to control blood-glucose level in patients with diabetes.
- Its use against Alzheimer disease and dementia due to antioxidant activity and its effect to increase blood circulation in the brain is reported.
- Reduces the risk of cataract and macular degeneration by 55-60% at the dose of 400 IU

Use of Vitamin E

- Symptoms of premenstrual syndrome and fibrocystic breast pain are treated with the dose of 400-1200 IU.
- It is recommended against leg pain due to poor blood circulation at the dose of 600-1200 IU.
- Uses of vitamin E as neuroprotective, anti-HIV, anti-atherogenic are reported due to its antioxidant activity.
- Anticoagulant activity due to inhibition of platelet aggregation and thrombin production.

Vitamin E and Atherosclerosis

- Atherosclerosis is a disease that starts with oxidation of LDL cholesterol and damage in blood vessels.
- Daily 400-800 IU vitamin E intake reduces LDL oxidation.
- Although there is no conclusive evidence, it is thought that the risk of developing atherosclerosis and coronary diseases can be reduced by the use of vitamin E at high doses.
- It is recommended at the dose of 1200 IU/day to reduce the risk of heart attack and atherosclerosis.

Recommended Daily Dose

Age	Dose
0-6 months	3 mg/ 4.5 IU
6-12 months	4 mg/6 IU
1-3	6 mg /9 IU
4-10	7 mg/ 10.5 IU
11 + (male)	10 mg/ 15 IU
11 + (female)	8 mg /12 IU
Pregnancy	10 mg /15 IU
Lactation	12 mg/ 16 IU

Vitamin E: 1 IU
0.67 mg d-alpha-tocopherol
0.9 mg of dl-alpha-tocopherol

Interactions & Cautions

- Oral anticoagulants
- Anticonvulsants

- Vitamin E supplementation should be discontinued 1 month before surgical operations.
- Intake at high doses of vitamin E (1000 IU) can affect vitamin K metabolism and may cause bleeding risk.

Toxicity

- Vitamin E toxicity is rarely seen.
- Vitamin E supplement contain 100-200 mg vitamin E.
- Prooxidant activity as a toxic effect is encountered at the dose of 1000 mg/day.