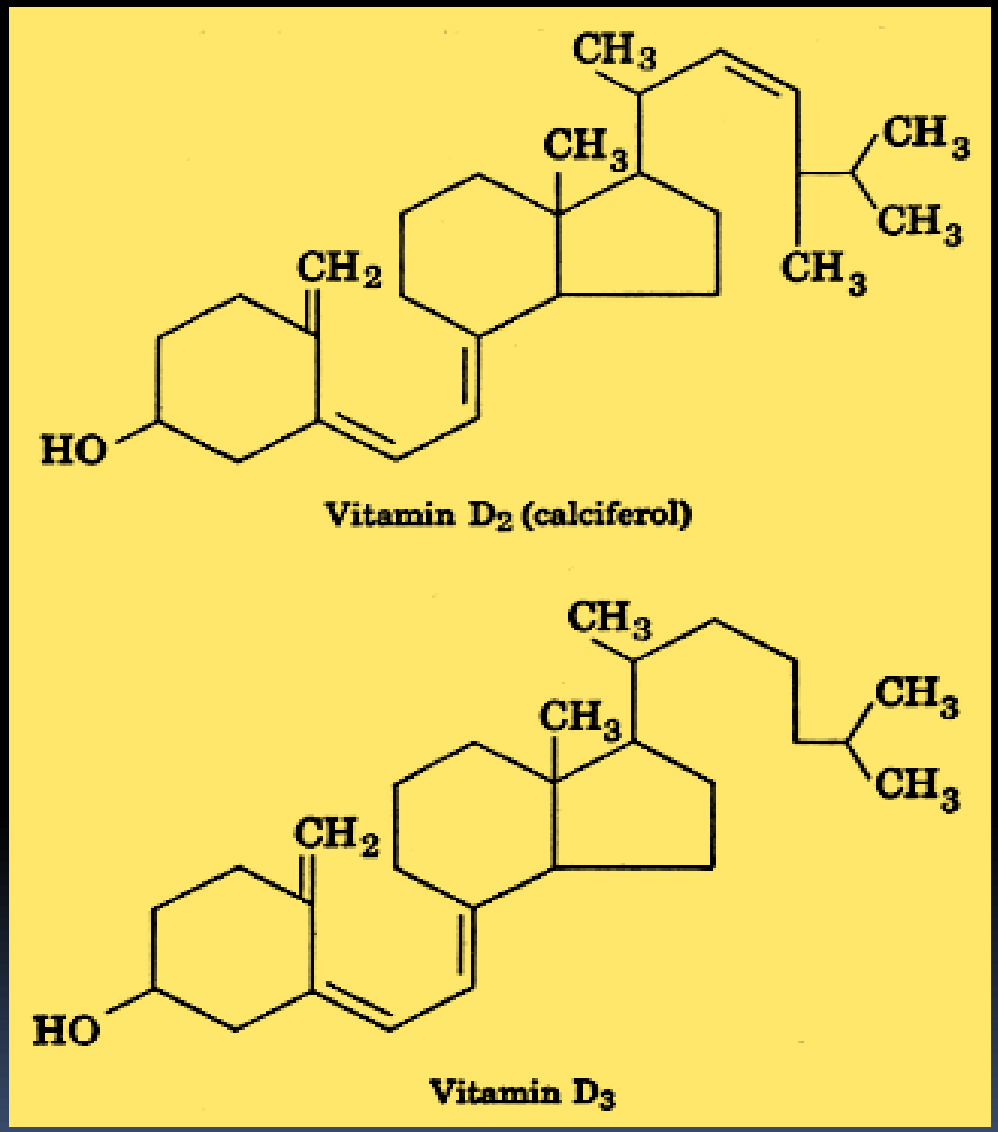
# Vitamin D

- Fat-soluble vitamin
- Not hormone but has hormone-like functions
- Necessary for bone formation and maintanence of bone health.
- Sun, ultraviolet rays are necessary for the construction of vitamin D.

# Vitamin D

- Vitamin D2 is synthesized from ergosterol (phytosterol) in plants in case of exposure to UV light.
- Humans and animals synthesize Vitamin D3 (cholecalciferol) from cholesterol when exposed to UV light.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Vitamin D2 (calciferol)
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Vitamin D3

# Vitamin D

- Exposure to sun light for 10-15 min. 2-3 times a week fulfills the vitamin D requirement of the body.
- However, vitamin D sythesis may be insufficient due to the environmental factors such as pigmentation, cloths, sun protection products, fog, smoke, seasonal and geographical conditions.
- Age is an important factor since capability of vitamin D synthesis reduces with age.

# Vitamin D

- 90% of the requirement is sythesized by the skin with the help of sun light, while 10% is provided by nutrients.
- Daily requirement can not be fulfilled only by nutrients without synthesis of skin by sunlight.
- Vitamin D deficiency is common.
- Vitamin D (cholecalciferol) is synthesized in the skin passes into the blood, stored in muscle and adipose tissue, or passes to the liver and kidneys.
- It is converted into the active form of vitamin D and utilized by the body.

# Vitamin D

- The vitamin D precursors are converted to vitamin D by exposure to ultraviolet light.
- Vitamin D is metabolized in the liver to 25-hydroxyvitamin D and then to 1, 25-dihydroxyvitamin D in the kidney.
- 1,25-Dihydroxyvitamin D is considered to be the biologically active form of vitamin D.

# Sources of Vitamin D

- Vitamin D is found in small amounts in nutrients.
- Vitamin D-rich foods include liver, egg yolk and fatty fishes (fishes fed with blue-green algae, plankton)
- Vitamin D containing products, specially prepared from milk, margarine and wheat products

# Functions of Vitamin D

- Vitamin D is necessary for the absorption of calcium and other minerals in the bones and teeth.
- It is necessary for strong bone and tooth construction in children and for the maintenance of bone and teeth strength in adults.
- Adequate absorption of dietary calcium and phosphorus can not be provided in case of vitamin D deficiency. Calcium is excreted in feces and phosphate is excreted in urine.

# Functions of Vitamin D

- Approximately 10-15% of calcium, 60% of phosphorus can be absorbed.
- When vitamin D receptors are activated, calcium absorption increases by 30-40% and phosphorus absorption increases by 80%.

# Functions of Vitamin D

- It has been found that vitamin D has a protective effect against prostate, colon and breast cancer.
- It is suggested that vitamin D may show this effect due to its hormonal functions.
- Vitamin D deficiency leads to reduced immunity to infections and disease development.

# Vitamin D and Immunity

- In a study; 208 postmenopausal female patients were given 800 IU of vitamin D, 2000 IU of vitamin D and placebo.
- Incidence of cold and influenza symptoms were evaluated in patients under control for 1 year. None of the symptoms were observed in the group taking 2000 IU/day vitamin D.

# Use of Vitamin D

- Rickets disease is encountered in case of vitamin D deficiency. It is a rare disorder in developed countries. The disease is prevented by the use of vitamin D.
- Osteomalacia is softening and embrittling of the bones with excessive calcium and phosphorus loss as a result of vitamin D deficiency. Minimum 200 IU/day vitamin D is recommended for prevention.

# Use of Vitamin D

- Tetany is known for the signs of contraction, cramp and convulsion caused by calcium deficiency. Vitamin D is used for the treatment.
- Osteoporosis occurs with the loss of calcium and other minerals in the bones with age. It is a common disease. Daily 400-800 IU vitamin D and 1200-1500 mg calcium treatment are recommended.

# Vitamin D and Osteoporosis

- Vitamin D reduces the risk of fractures in people with osteoporosis.
- An optimal dose of vitamin D 800 IU / day is recommended for the prevention from hip fracture risk.
- 1000 IU of vitamin D is considered sufficient to support general bone health and maintain blood concentrations of calcium and phosphorus against the risk of osteoporosis.

# Use of Vitamin D

- Activated form of vitamin D is used for the treatment of psoriasis. It decelerates the proliferation of skin cells.
- It has been found to decelerate the progression of osteoarthritis in the knees of the patients.

# Vitamin D and Otoimmune Diseases

- It is reported that there is an increased risk of autoimmune diseases such as Type I Diabetes, Multiple Sclerosis (MS), Crohn's Disease in case of vitamin D deficiency.
- Vitamin D possesses immunomodulator activity.
- Vitamin D deficiency was found to increase insulin resistance and decrease insulin production.

# Use of Vitamin D

- In order to achieve calcium and phosphorus homeostasis in the blood and to regulate bone mineral density, serum vitamin D level should be kept above 40 ng / ml.
- The risk of osteoporosis, infection and autoimmune diseases is significantly reduced by keeping vitamin D level at normal range.

# Toxicity

- Use of 1000 IU or higher for 6 months or more leads to a very high concentration of calcium in the blood.
- Hypercalcemia causes calcium accumulation, especially in soft tissues, heart, kidneys, lungs and blood vessels, which can be fatal.
- Intake at high doses during pregnancy can cause delayed mental development, stenosis of the aortic vessels and some other abnormalities in the infant.

# Cautions

- The drop or powder form is very sensitive to light, acid and oxidation. It should be stored in opaque bottles.
- More stable in tablet form
- The form found in or added to foods is stable and does not decompose by cooking.

# Recommended Daily Dose

| Age | µg/day |
|---|---|
| 0-6 months | 5 |
| 7-12 months | 5 |
| 1-3 | 5 |
| 4-6 | 5 |
| 7-9 | 5 |
| 10-18 | 5 |
| 19-50 | 5 |
| 51-65 | 10 |
| 65 + | 10 |
| Pregnancy | 5 |
| Lactation | 5 |

1 IU = 25 ng
40 IU = 1 µg
200 IU = 5 µg