# GOVT. COLLEGE FOR GIRLS, LDH

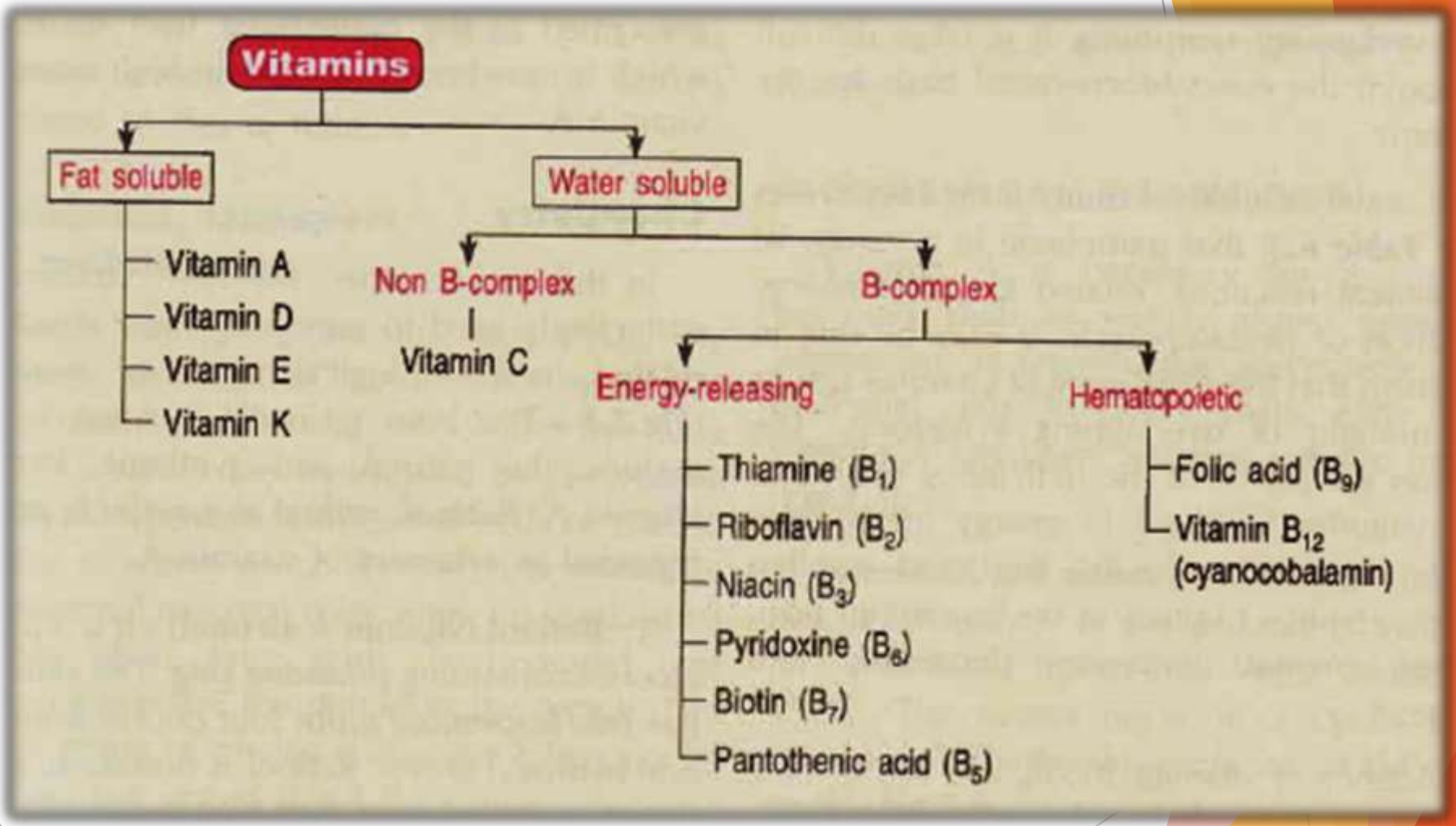
## A PRESENTATION ON



**Presented By:**
**Ramanjit Bhatti**

# INTRODUCTION

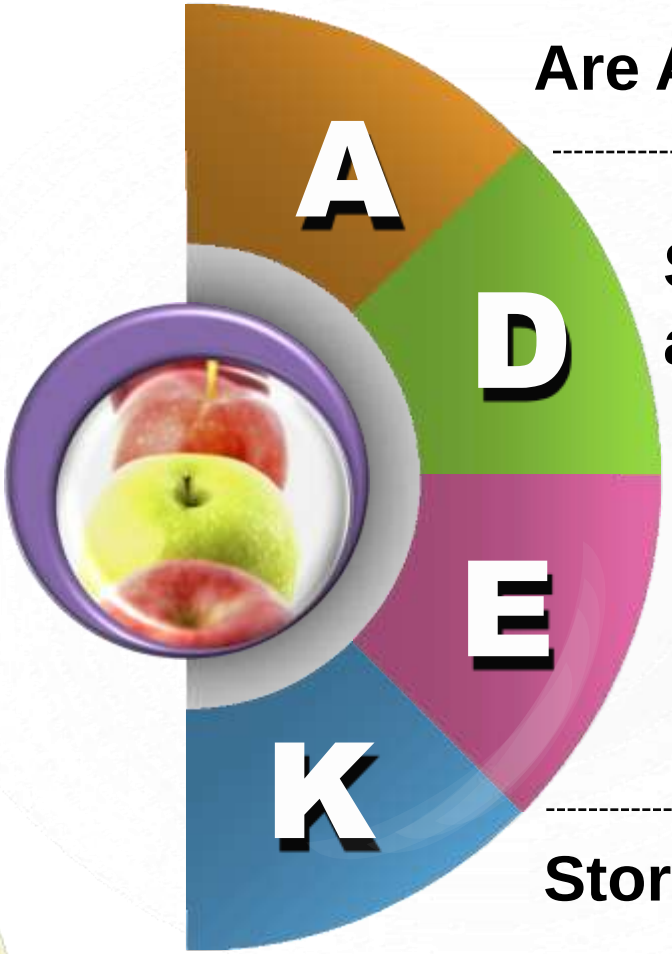
- The word "**vitamin**" comes from the Latin word "**vita**", means "**life**".
- **Vitamins are organic components in food that are needed in very small amounts for growth and for maintaining good health.**
- Everybody must eat a certain amount of vitamins to stay healthy.
- Vitamins are chemicals found in very small amounts in many different foods.


Vitamins
Fat soluble
Vitamin A
Vitamin D
Vitamin E
Vitamin K
Water soluble
Non B-complex
Vitamin C
B-complex
Energy-releasing
Thiamine ($B_1$)
Riboflavin ($B_2$)
Niacin ($B_3$)
Pyridoxine ($B_6$)
Biotin ($B_7$)
Pantothenic acid ($B_5$)
Hematopoietic
Folic acid ($B_9$)
Vitamin $B_{12}$ (cyanocobalamin)

**Water-soluble vitamins**

- Soluble in aqueous solutions
- Used as cofactors by many enzymes
- Not stored in the body

# Fat-Soluble Vitamins




Are A, D, E, and K.

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Soluble in lipids, but not in aqueous solutions

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Important in vision, bone formation, antioxidants, and blood clotting

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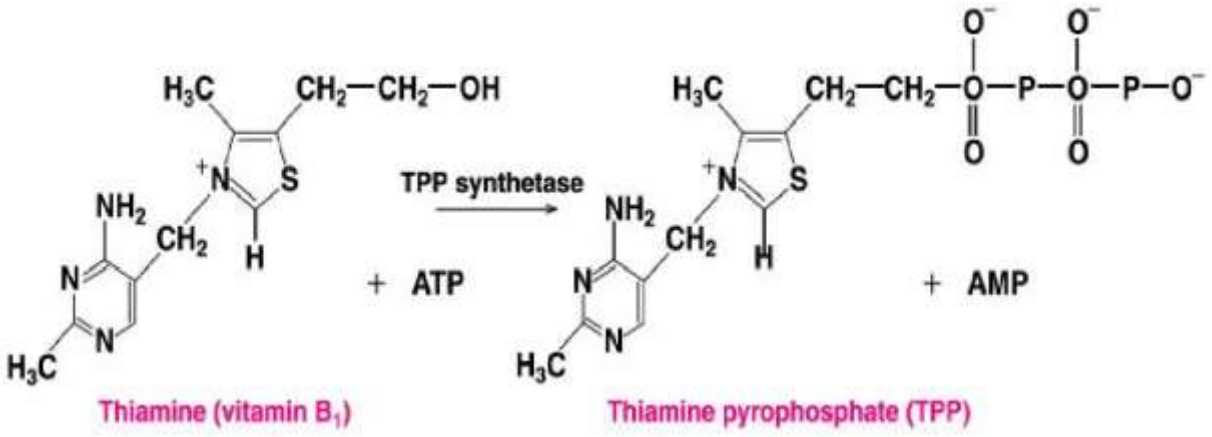
Stored in the body

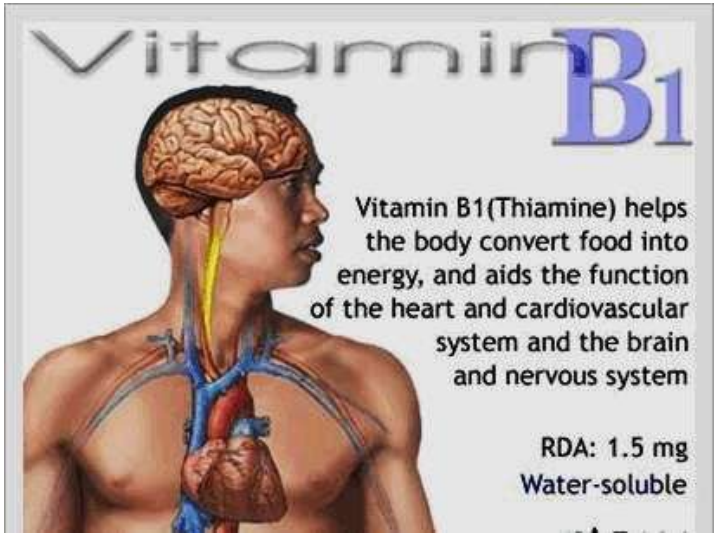
# Thiamine (Vitamin $B_1$)

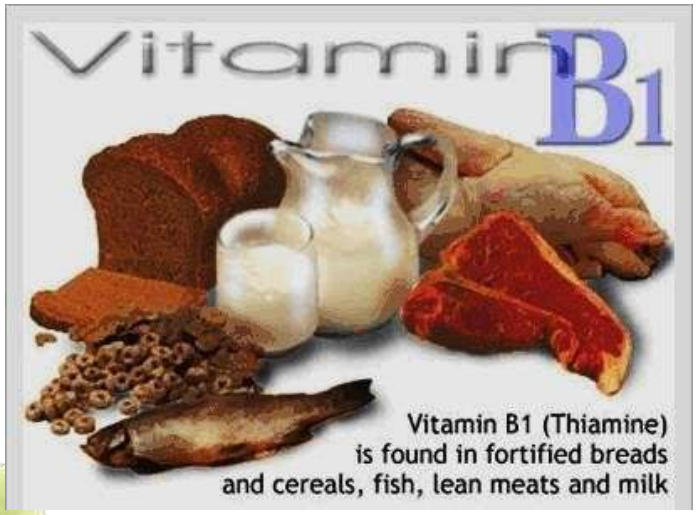
- Was the first B vitamin identified.
- Is part of the coenzyme thiamine  pyrophosphate(TPP).




- TPP coenzyme is required by enzymes in the decarboxylation of $\alpha$-keto carboxylic acids.
- Deficiency results in beriberi (fatigue, weight loss, and nerve degeneration).

# Thiamine

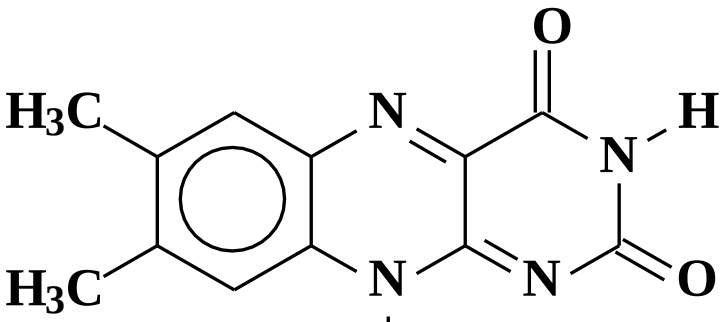


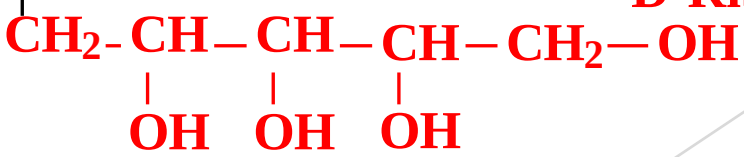




- Influences sacharide metabolism
- Helps against tiredness
- Is destroyed by severe washings of rice and vegetables
- Severe deficiency leads to beri-beri
- Sources: yeasts, cereals,rice, liver, legumes

# Riboflavin (Vitamin $B_2$)

- Made of the sugar alcohol *ribitol* and *flavin*
- Part of the coenzymes flavin adenine dinucleotide (FAD) and flavin mononucleotide (FMN).
- Needed for good vision and healthy skin



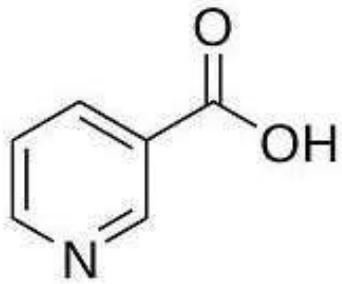

D-Ribitol

# Riboflavin

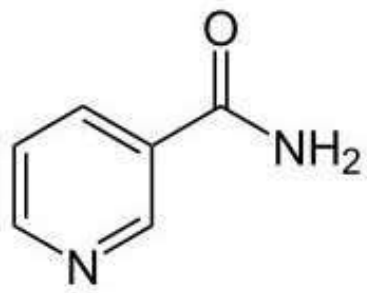
- Sacharide and lipids metabolism
- Curing of skin diseases
- Support of sight function
- Light sensitive
- Sources: cerals, eggs, vegetables, dairy products, yeast, liver


# VITAMIN $B_3$ (NIACIN)

- Vitamin B3 is also known as **niacin** or **nicotinic acid.**
- it is essential for metabolism of carbohydrate, protein & fat.
- It is a colorless, water-soluble solid derivative of pyridine, with a carboxyl group (COOH) at the 3-position.
- It is a pyridine derivative and is a precursor of the coenzyme NAD **(Nicotinamide adenine dinucleotide)**.




Niacin

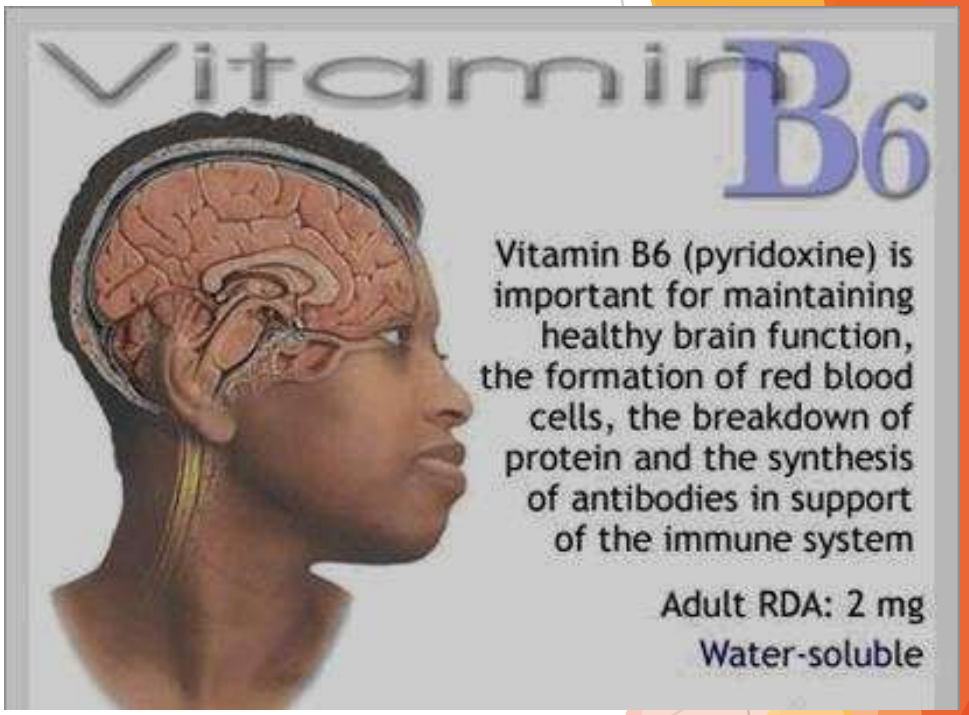



Nicotinamide

# IMPORTANCE OF NIACIN OR VITAMIN B 3

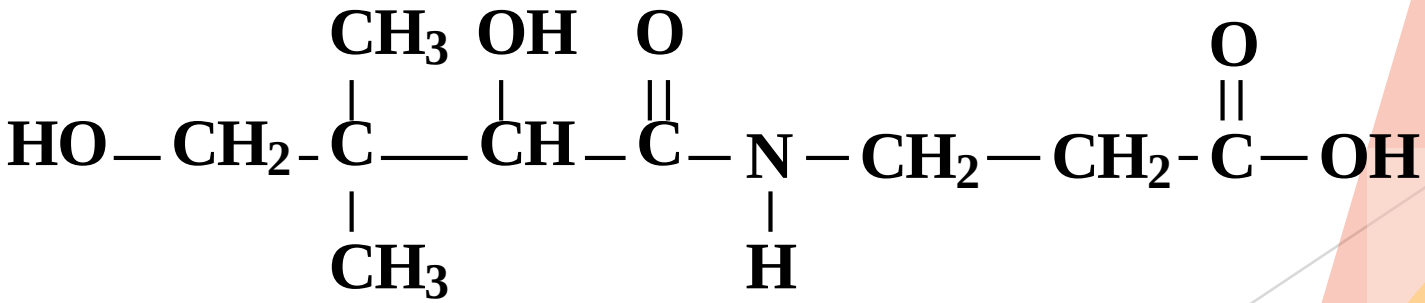

# Pyridoxine

- Aminoacids and protein metabolism
- Cure of anemy
- Formation of red blood cells
- Sources: meat, fish, liver, vegetables, cerals, yolk, legumes



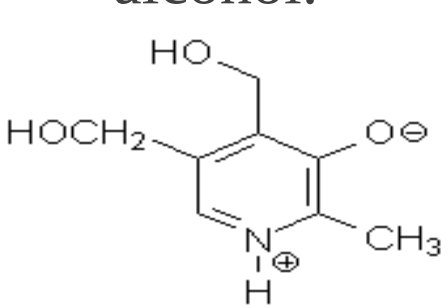

# Pantothenic Acid (Vitamin $B_5$)

- Is part of coenzyme A needed for energy production as well as glucose and cholesterol synthesis.
- Deficiency can result in fatigue, retarded growth and anemia.
- Part of coenzyme A
- Reduces stress, prevents tiredness
- Necessary for formation of glycogen, fatty acids, steroid hormones
- Sources: whole grains, and vegetables ,eggs,liver, heart, yeast

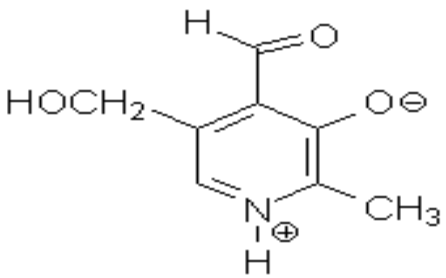



# VITAMIN $B_6$ (PYRIDOXINE $B_6$)

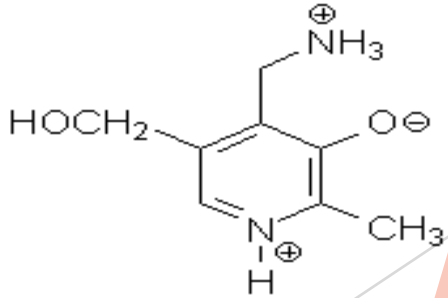
- Vitamin $B_6$ refers to a group of chemically very similar compounds which can be interconverted in biological systems.
- Vitamin $B_6$ is part of the vitamin B complex group, and its active form, Pyridoxal 5'-phosphate (PLP) serves as a cofactor in many enzyme reactions in amino acid, glucose, and lipid metabolism.
- It is white crystalline substance soluble in water and alcohol.




Pyridoxine




Pyridoxal

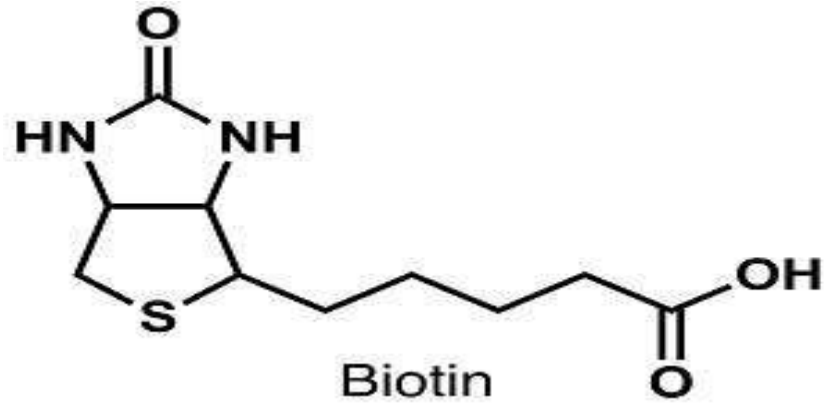



Pyridoxamine

Vitamin $B_6$

# VITAMIN $B_7$ (BIOTIN)

- Vitamin B7 or **Biotin**, also known as **vitamin H** or **coenzyme R**, is a water-soluble B-vitamin.
- Biotin is a coenzyme for carboxylase enzymes, involved in the synthesis of fatty acids, isoleucine, and valine, and in gluconeogenesis



Biotin

# FUNCTIONS OF VITAMIN $B_7$

sufficient intake of vitamin B7 (biotin) is important as it helps the body to-

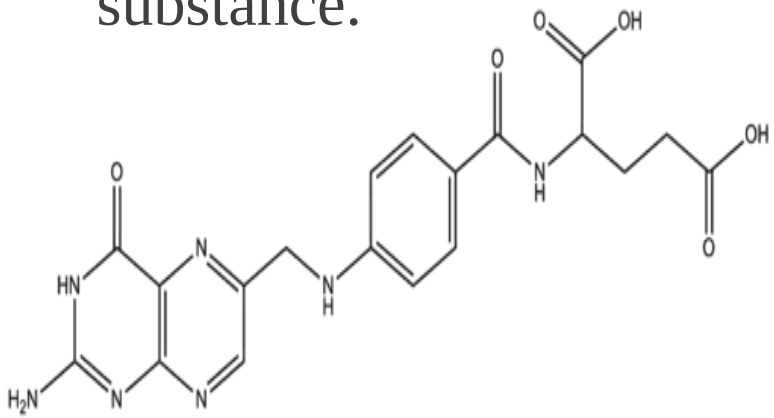
•convert food into glucose, which is used to produce energy
•produce fatty acids and amino acids (the building blocks of protein)
•activate protein/amino acid metabolism in the hair roots and fingernail cells.

The **European Food Safety Authority (EFSA)**, which provides scientific advice to assist policy makers, has confirmed that clear health benefits have been established for the dietary intake of biotin (vitamin B7) in contributing to:

•normal macronutrient metabolism;
•normal energy yielding metabolism;
•the maintenance of normal skin and mucous membranes;
•the normal function of the nervous system;
•the maintenance of normal hair;
•normal psychological functions.

# VITAMIN $B_9$ (FOLIC ACID)

- Vitamin b7 is also known as **folic acid, folacin or folate.**
- It is a water soluble vitamin.
- It is a yellow crystalline substance.




Folic acid

## DIETARY SOURCE

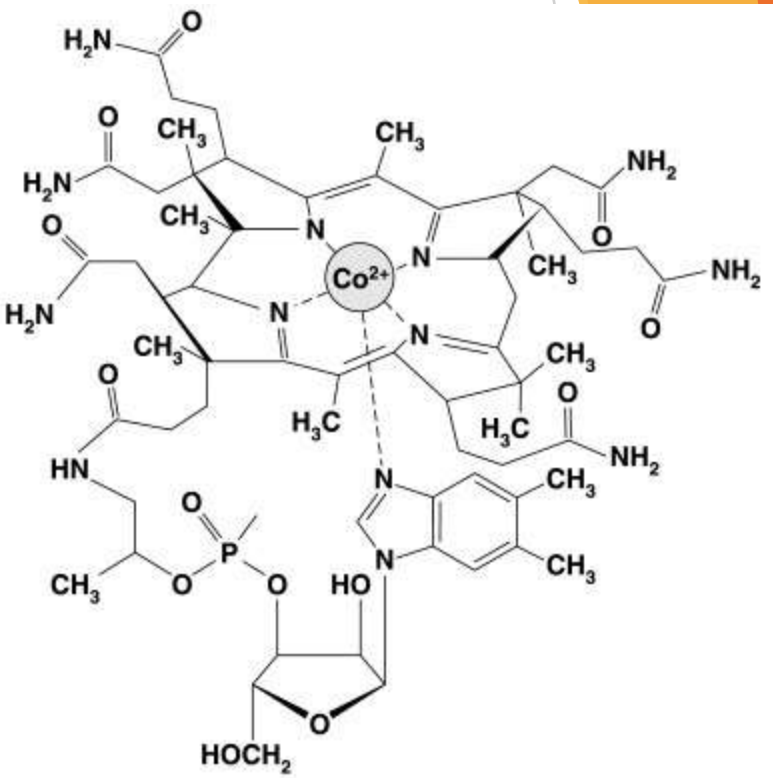
1) Lentil
2) Borlotti Beans
3) Chickpeas
4) Spinach
5) Black Beans
6) White Beans
7) Red Beans
8) Cabbage
9) Turnip Greens
10) Lima beans


# FUNCTIONS OF VIT $B_9$

- **Formation of RBC** – folic acid in combination with vitamin B12 is essential for formation, maturation.
- **Nerve** – it is necessary for growth & division of all body cells,
- **Hair & Skin** – it is essential for the health of skin & hair
- **Pregnancy –** it is an important nutrient for the pregnant women & her developing fetus.& folic acid improves the lactation.
- **DNA synthesis**
  - Transfer of single carbon units
  - Synthesis of adenine and guanine
  - Anticancer drug methotrexate
- Homocysteine metabolism
- Neurotransmitter formation

# Cobalamin (Vitamin $B_{12}$)

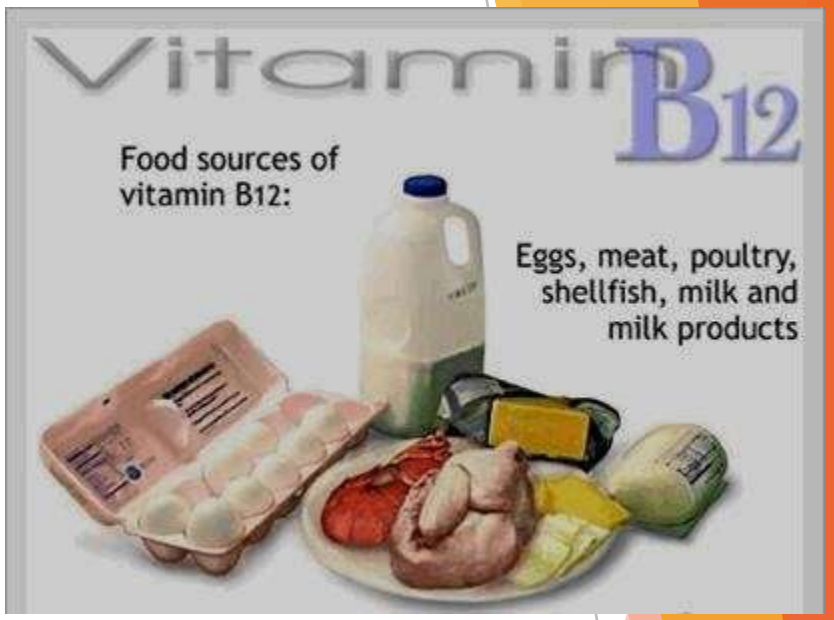
- Consists of four pyrrole rings with a $Co^{2+}$.
- Is a coenzyme for enzymes that transfer methyl groups and produce red blood cells.
- Deficiency can lead to pernicious anemia and nerve damage.

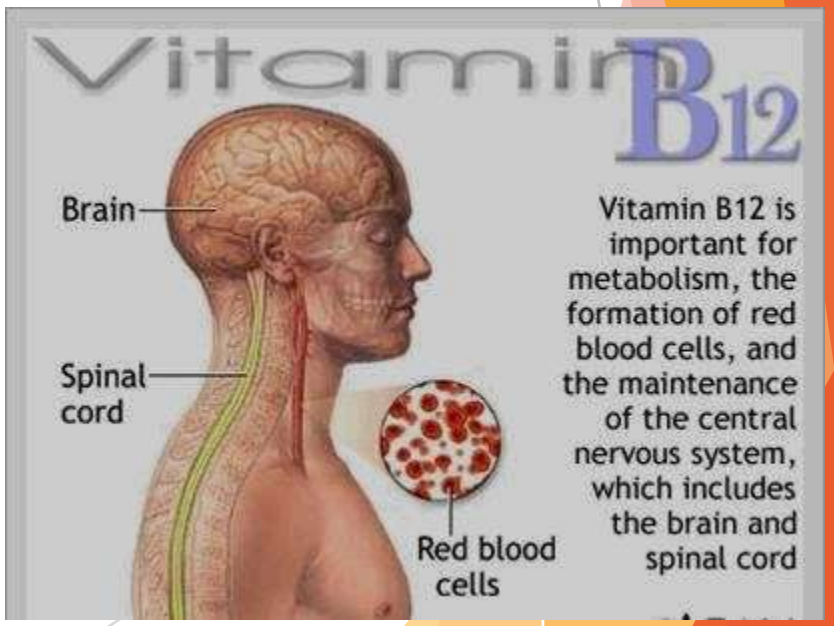


Vitamin $B_{12}$ (cobalamin)

# Cyanocobalamin

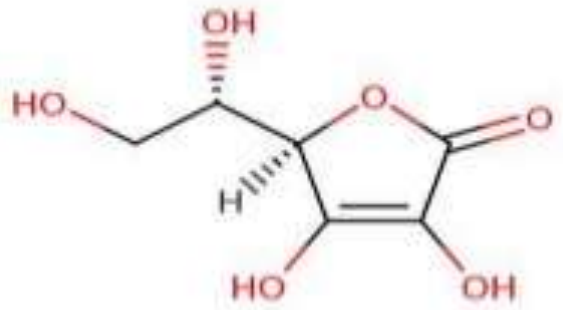
- Formation of red blood cells
- Maintenance of neuro tissue
- Cure of neuro diseases, anemia
- Sources: dairy products, meat, poultry, sea  products



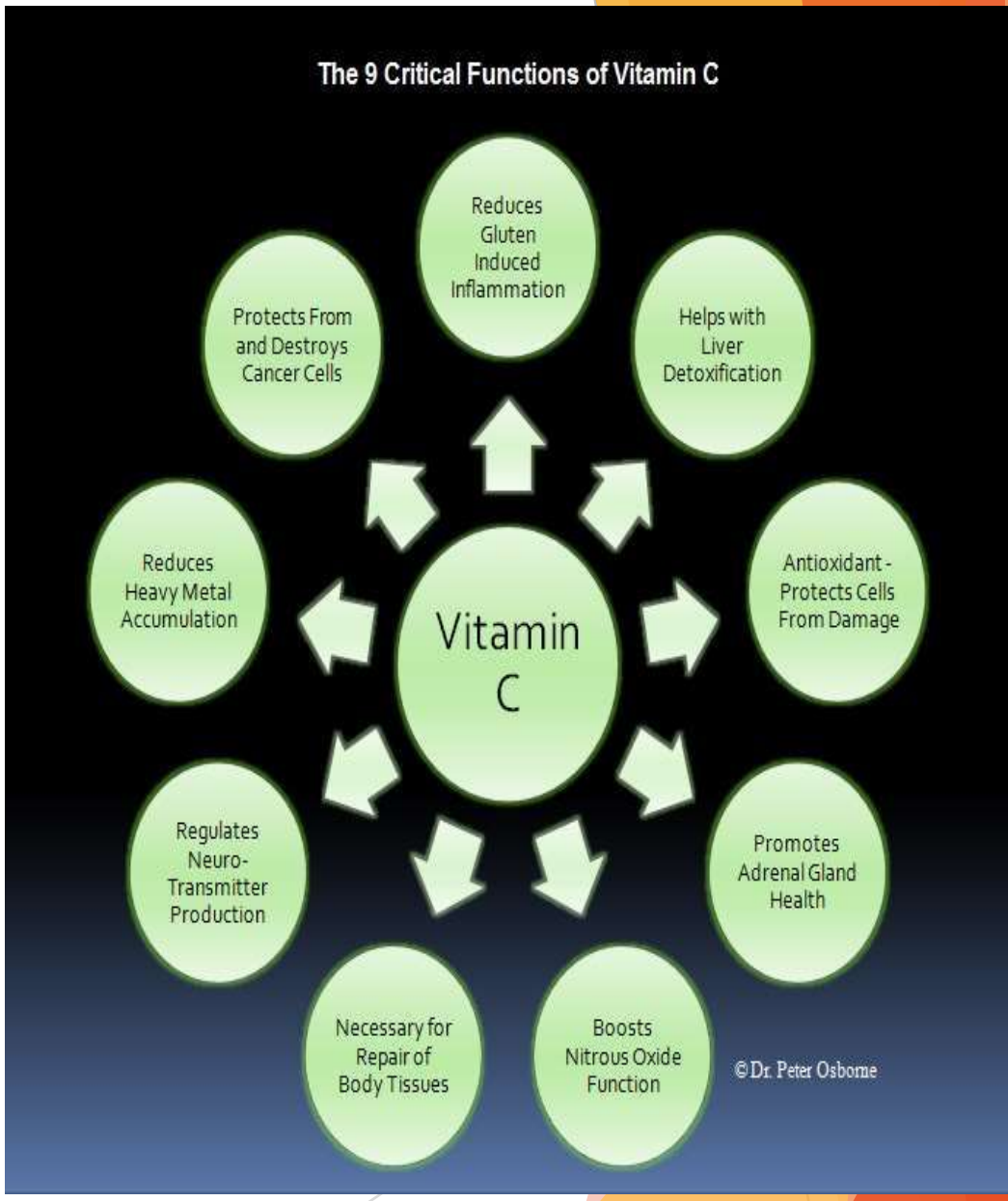

# Vitamin C: Ascorbic Acid

- Has antioxidant properties and protects food from oxidation
- Role in formation of collagen and absorption of nonheme iron
- Prevents scurvy
- May be involved with formation or functioning of norepinephrine, some amino acids, folate, leukocytes, the immune system, and allergic reactions



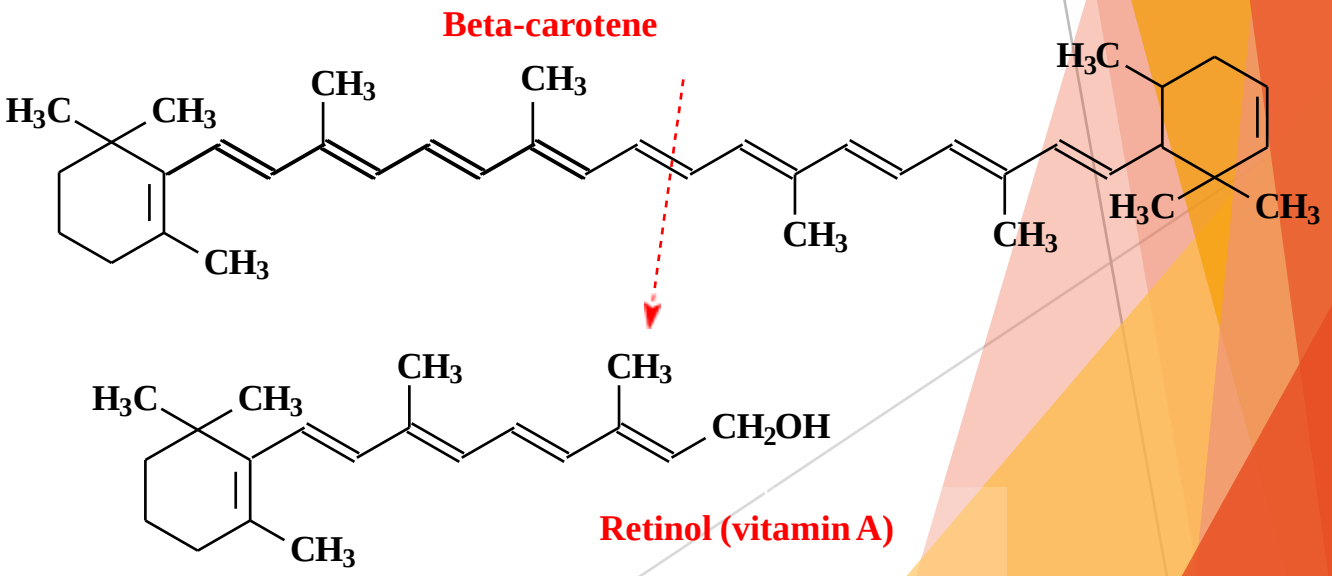
# FUNCTIONS OF VITAMIN C

- Synthesis of collagen.
- Maintenance – necessary for maintenance of bones & proper functioning of the adrenal & thyroid gland .
- Antioxidant
- It stimulates immune function, combats bacterial infection, reduces effects of allergy-producing substances and protects vitamins, A, E and some B complex vitamins from oxidation.



# Vitamin A

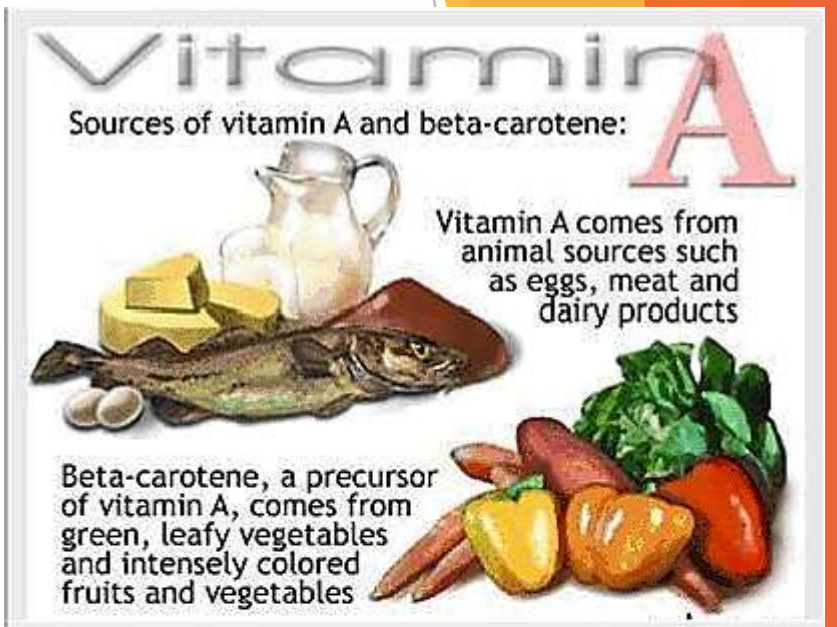
- **Vitamin A** is obtained from meats and beta-carotenes in plants.
- Beta-carotenes are converted by liver enzymes to vitamin A (retinol).

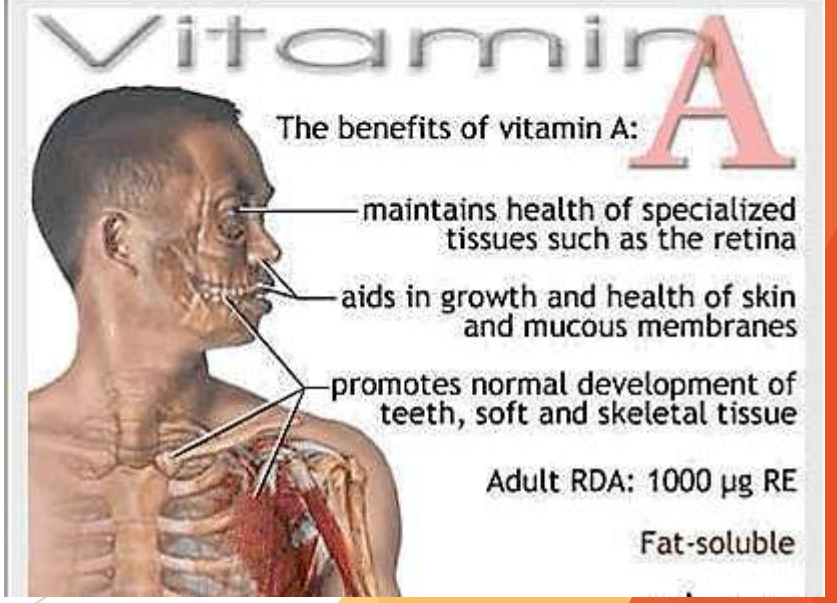


# Vitamin A and provitamin A

- **Retinol**
- Cancer cure and prevention
- Skin, eyes, genital glands
- Provitamin changes to A vitamin in liver
- Sources: liver, egg yolks, dairy products
- provitamin: carrots, pepper, spinach, yellow fruits


A cataract is an opacity of the normally clear lens which may develop as a result of aging, metabolic disorders, trauma or heredity




## Beneficial effects of β-carotene

Increased consumption of β-carotene is associated with decreased incidence of heart attacks, skin and lung cancers. This is attributed to the antioxidant role of β-carotene which is independent of its role as a precursor of vitamin A. Ingestion of high doses of β-carotene for long periods are not toxic like vitamin A.

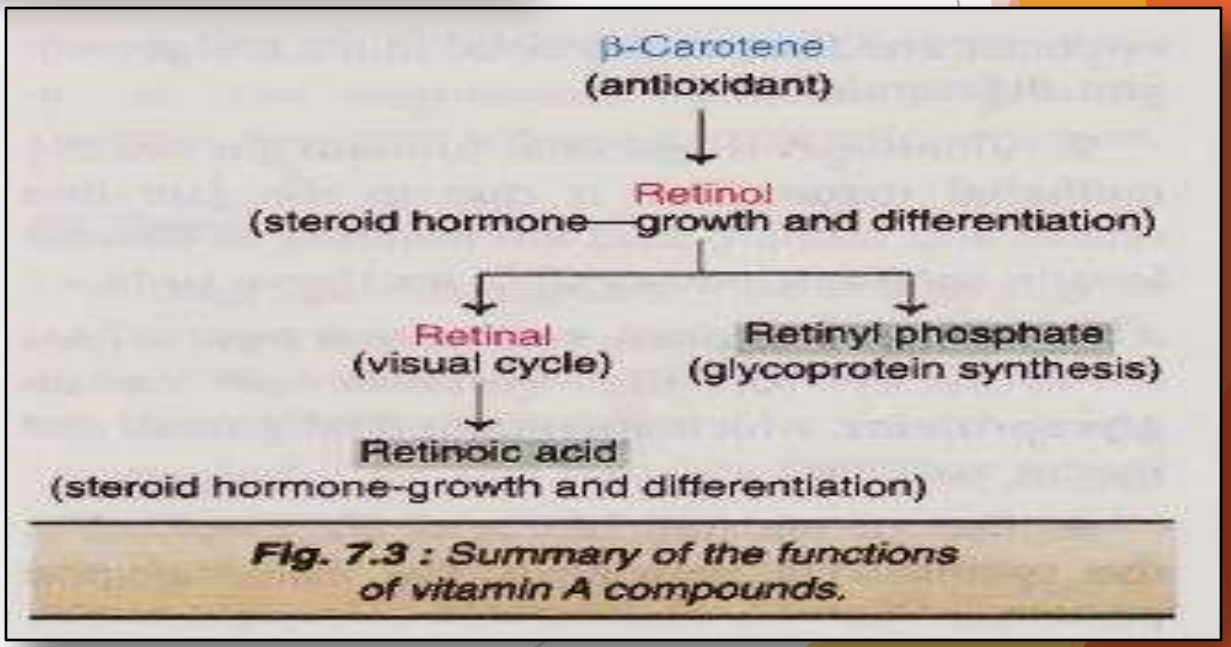
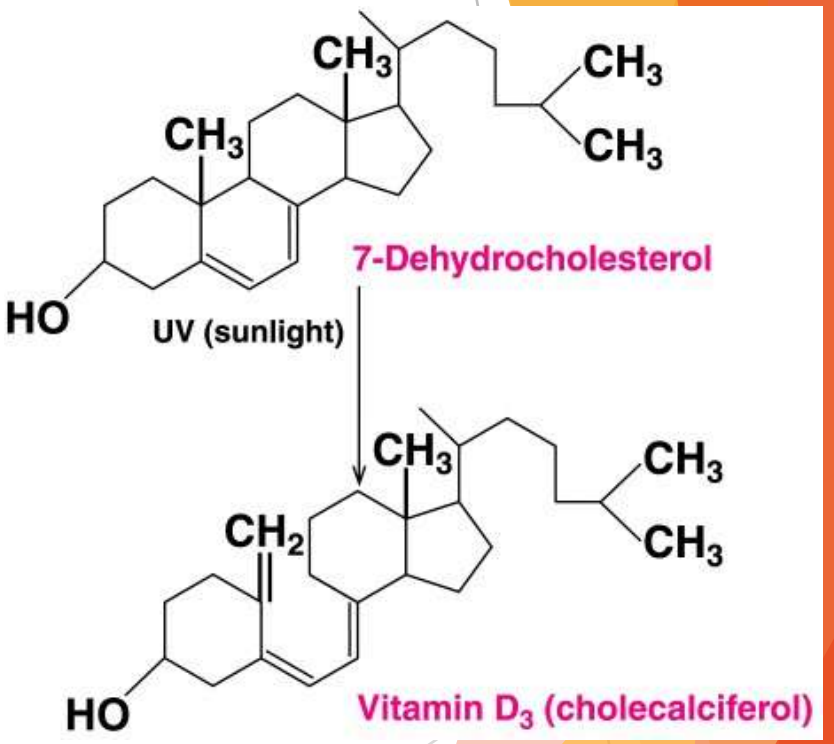




*Fig. 7.3 : Summary of the functions of vitamin A compounds.*

# Vitamin D

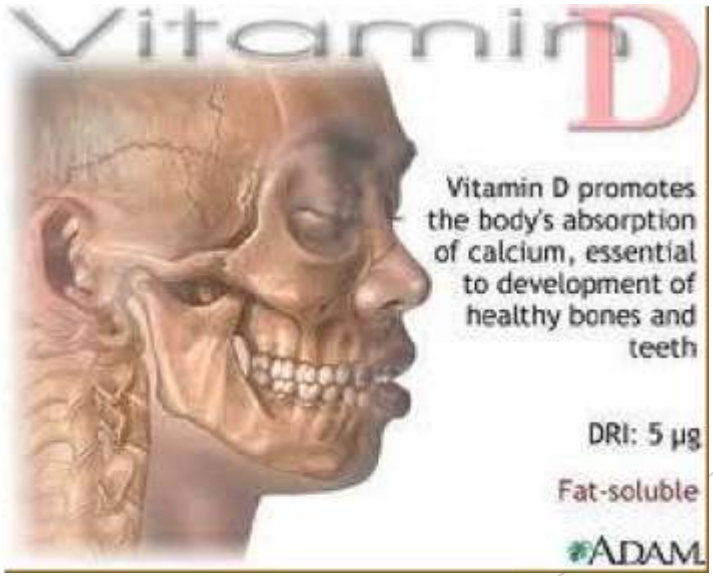
## Vitamin D ($D_3$):

- Is synthesized in skin exposed to sunlight.
- Regulates the absorption of phosphorus and calcium during bone growth.
- Deficiency can result in weakened bones.
- Sources include cod liver oil, egg yolk, and enriched milk.



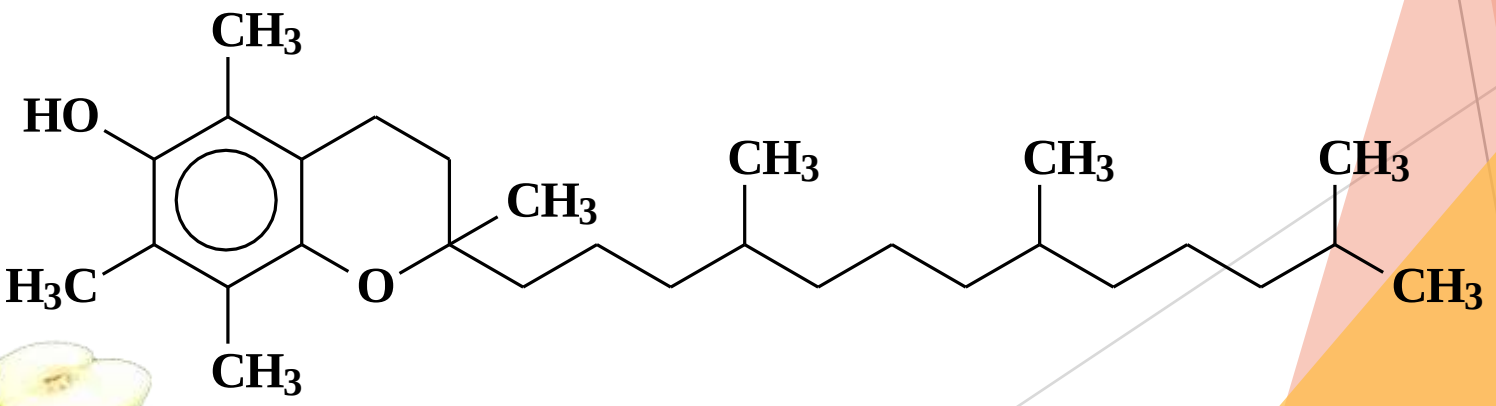

# Vitamin D

- **Calciferols**
- the sun vitamin  (UV rays)
- regulation of calcium metabolism
- sources: yeasts, fish, yolks, dairy products



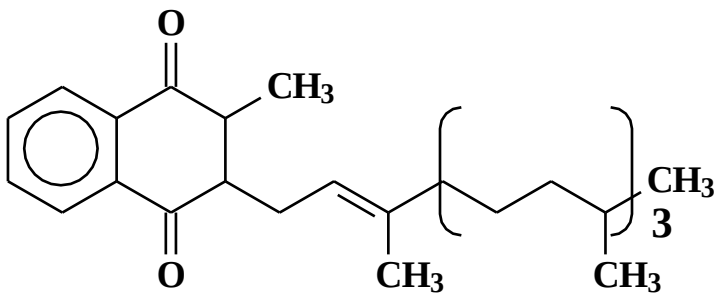

# Vitamin E

- Is an antioxidant in cells.
- May prevent the oxidation of unsaturated fatty acids.
- Is found in vegetable oils, whole grains, and vegetables.

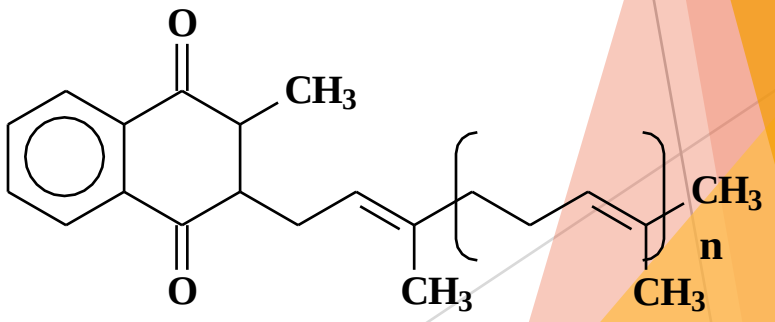


# Vitamin K

- Vitamin $K_1$ in plants has a saturated side chain.
- Vitamin $K_2$ in animals has a long unsaturated side chain.
- Vitamin $K_2$ is needed for the synthesis of zymogens for blood clotting.




Vitamin $K_1$ (phylloquinone)




Vitamin $K_2$ (menaquinone)

# Thank You!