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# CHEMICAL COMPOSITIONS OF DIFFERENT VITAMINS

# LECTURE CONTENTS

- INTRODUCTION TO VITAMINS
- DISCOVERY OF VITAMINS
- CLASSIFICATION OF VITAMINS
- DEFICIENCY DISEASE
- HOW TO OVERCOME DEFICIENCY DISEASE
- SOURCES OF DIFFERENT VITAMINS
- CONCLUSION

# INTRODUCTION TO VITAMINS

- Vitamins are organic molecules that are essential to an organism in small quantities for proper metabolic function.

- Vitamins are vital micronutrients that cannot be synthesized endogenously or in insufficient amounts, and the principal means by which we get vitamins is through our diet.

# Discovery of vitamin

- In 1912, Casimir Funk originally coined the term "vitamine“.
- The term *vitamine* (1911) was changed to *vitamin* when it was realized that not all vitamins are amines (i.e., not all contain nitrogen).
- In 1905, an Englishmen named William Fletcher became the first scientist to determine whether the removal of special factors, known as vitamins, from food would lead to diseases.

# Types of Vitamins

## Fat-Soluble Vitamins

- vitamin A
- vitamin D
- vitamin E
- vitamin K

## Water-Soluble Vitamins

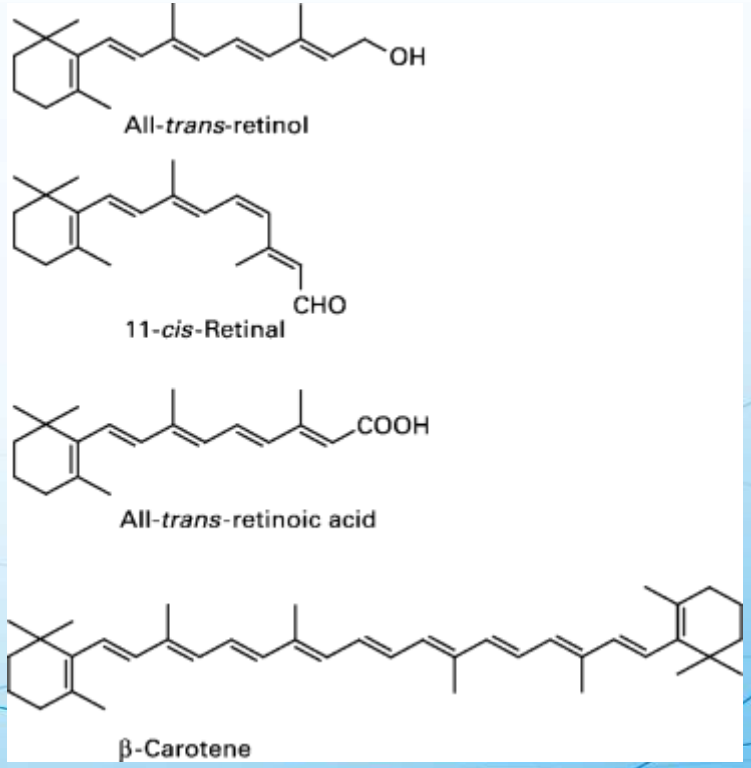
- vitamin B1
- vitamin B2
- vitamin B3
- vitamin B5
- vitamin B6
- vitamin B7
- vitamin B9
- vitamin B12
- Vitamin C

# FAT SOLUBLE VITAMINS

## VITAMIN A

Vitamin A is a pale yellow primary alcohol derived from carotene. It include Retinol (alcoholic form), Retinal (aldehyde form) and Retinoic acid ( acidic form)

## STRUCTURE OF VITAMIN A

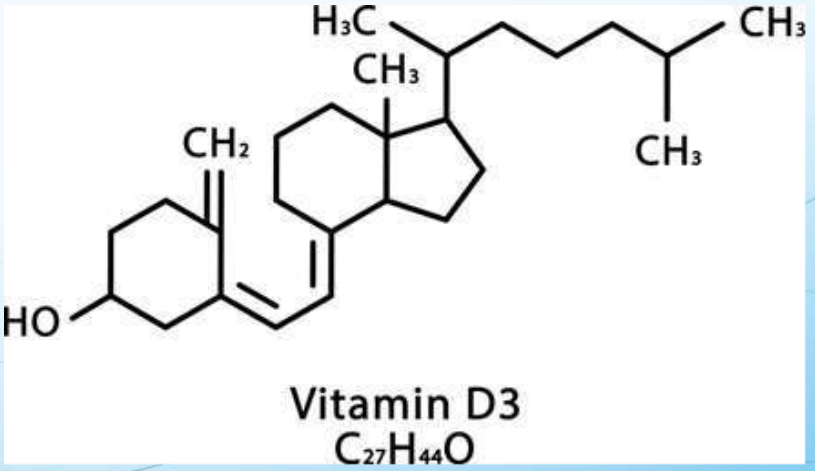


# FAT SOLUBLE VITAMINS

## VITAMIN D

VITAMIN D(Calciferol)
This comprises a group of fat soluble sterol founds naturally in few foods.
The two major physiolgically relevant forms of vitamin D are D2 (ergocalciferol) and D3 (cholecalciferol)

## STRUCTURE OF VITAMIN D

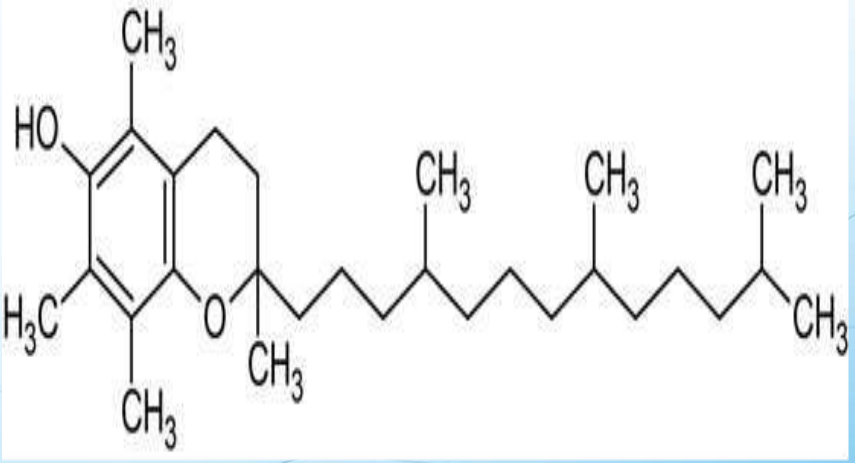


# FAT SOLUBLE VITAMINS

## VITAMIN E

VITAMIN E
also called Tocopherol or fertility hormone
Vitamin E is required in the human diet but its deficiency is rare except in pregnancy and the new born, where it is associated with hemolytic anaemia

## STRUCTURE OF VITAMIN E



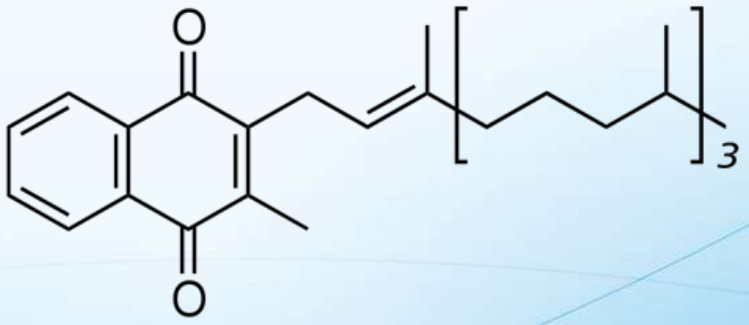
# FAT SOLUBLE VITAMINS

## VITAMIN K

VITAMIN K

Also called phylloquinone or anti-hemorragic vitamin or coagulation vitamin. Vitamin K is a complex unsaturated hydrocarbon found in two forms, vitamin K1(phylloquinone) and vitamin K2(Menaquinone)

## STRUCTURE OF VITAMIN K



# WATER SOLUBLE VITAMINS

## VITAMIN B1

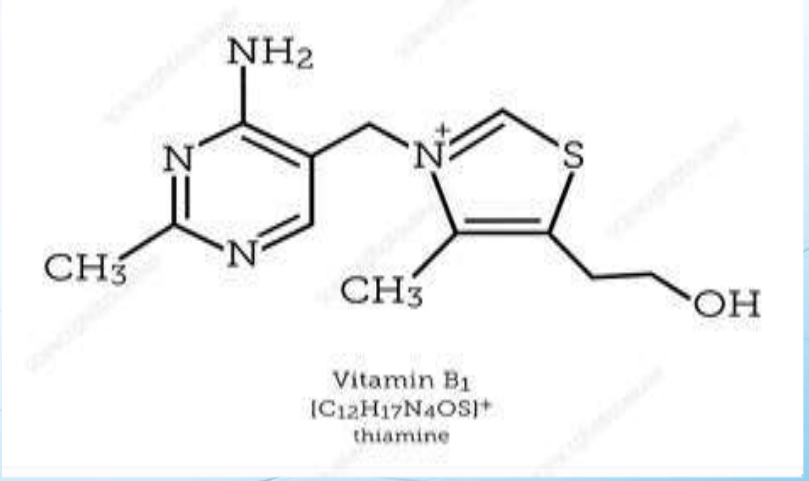
VITAMIN B1(Thiamine)

It is a colourless and crystalline substance

It is readily soluble in water and slightly in ethyl Alcohol

Thiaminis involved in carbohydrate, fat, amino acid, glucose, and alcohol metabolism.

## STRUCTURE OF VITAMIN B1



# WATER SOLUBLE VITAMINS

## VITAMIN B2

Also known as (Riboflavin)

It is a component of the flavin coenzymes, FAD and FMN.

- it is composed of an isoalloxazane ring system linked to ribitol

## STRUCURE OF VITAMIN B2

# WATER SOLUBLE VITAMINS

## VITAMIN B3

- VITAMIN B3 also known as(NIACIN OR NICOTINIC ACID)
- Niacin can be synthesized from tryptophan
- Niacin contains a substituted pyridine ring and when NAD+ activated forms NAD+ and its phosphorylated derivative NADP+, which are coenzymes of many dehydrogenases

## STRUCTURE OF VITAMIN B3

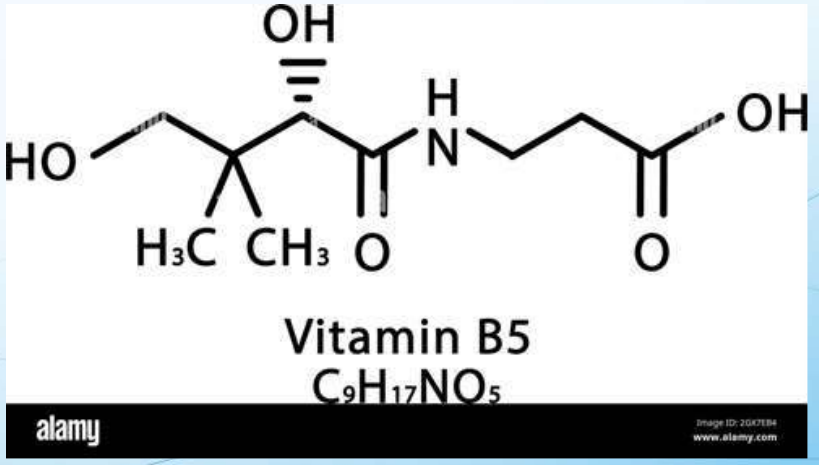
# WATER SOLUBLE VITAMINS

vitamin B5

PANTOTHENIC ACID (VIT.B5)

 Also called coenzyme, pantothenic acid is a vitamin that forms an essential part of acyl groups in general, including the acetyl group derived from pyruvate

STRUCTURE OF VIT .B5



# WATER SOLUBLE VITAMINS

VITAMIN B6

VITAMIN B6(PYRIDOXINE)

Vit.B6 exists in three forms:

Pyridoxine, Pyridoxal and Pyridoxamine and their corresponding phosphates

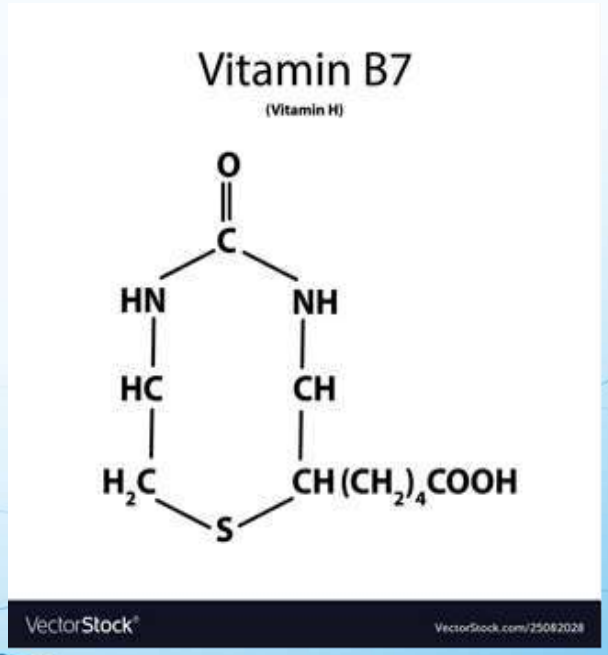
STRUCTURE OF VIT.B6

# WATER SOLUBLE VITAMINS

## VITAMIN B7

VITAMIN B7 is also known as BIOTIN) Biotin is a vitamin and a coenzyme commonly associated with enzyme performing carboxylation reactions Biotin is also known as “anti-egg white injury factor” or as H-factor

## STRUCTURE OF B7



# WATER SOLUBLE VITAMINS

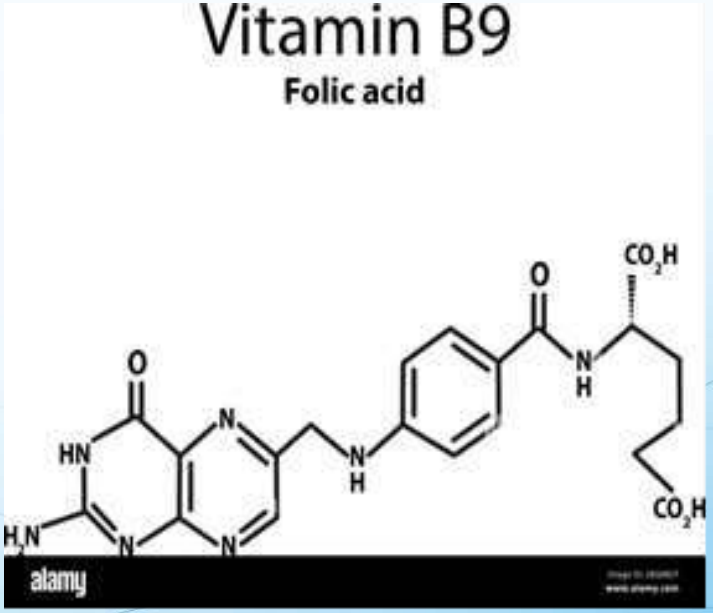
## VITAMIN B9

VITAMIN B9 is also known as (folic acid)

The active form acid is tetrahydrofolate (THF)

Coenzymes derived from the vitamin folic acid participates in the generation and utilization of single – carbon functional groups, methyl, methylene and formyl

## STRUCTURE OF VIT.B9



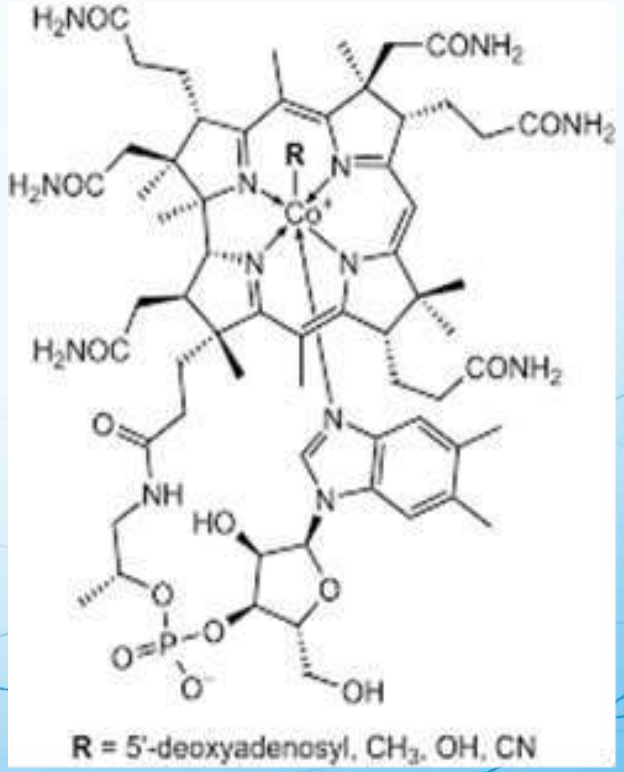
# WATER SOLUBLE VITAMINS

## VITAMIN B12

Vitamin B12 is also known as (Cyanocobalamin)

The metal cobalt in vitamin B12 is coordinated with a tetrapyrole ring system, called a corin ring, which is similar to the porphyrin ringof heme compounds

## STRUCTURE OF B12

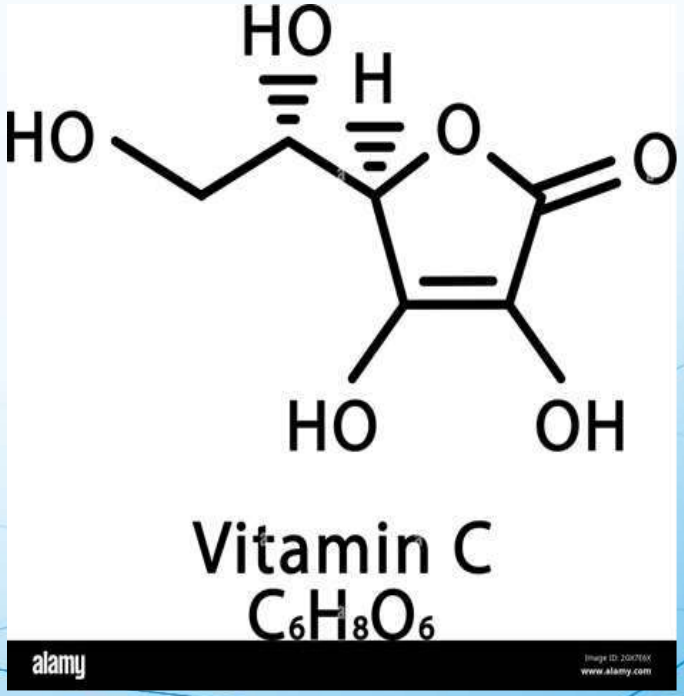


# WATER SOLUBLE VITAMINS

VITAMIN C

Vitamin is also known as ascorbic acid . It is essential for the hydroxylation of proline and lysine in the formation of collagen Collagen is a fibrous protein with myriad connective and

STRUCTURE OF VIT.C



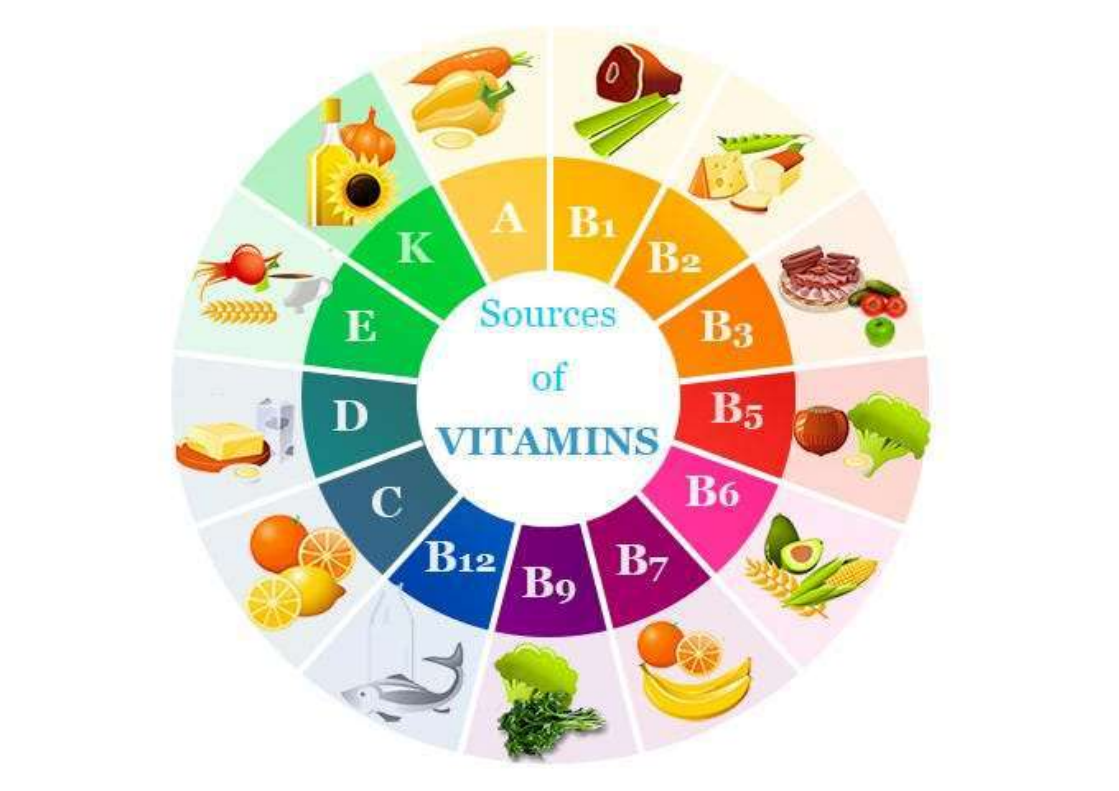
# Deficiency disease due to different vitamins

| Vitamin | Deficiency disease |
|---|---|
| **Vitamin A** | Night blindness |
| **Vitamin B1** | Beriberi |
| **Vitamin B2** | Retarded growth and bad skin |
| **Vitamin B3** | Pellagra |
| **Vitamin B5** | Paresthesia |
| **Vitamin B6** | Anemia |
| **Vitamin B7** | Dermatitis, enteritis |
| **Vitamin B9 & Vitamin B12** | Anemia |
| **Vitamin C** | Scurvy, Swelling of Gums, compromised immunity |
| **Vitamin D** | Rickets & Osteomalacia |
| **Vitamin E** | Less fertility, muscle and nerve weakness |
| **Vitamin K** | Decreased coagulation of Blood |

# How to overcome these deficiencies

- Food- The best method available to overcome these deficiency is by proper diet which includes proper amounts of vegetables, fruits and some amount of meat.
- Medicine- To avoid the deficiency of any Vitamin B we can use B complex. Vitamin B complex is a group of 12 related water-soluble substances. The eight water-soluble vitamins including thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), biotin (B7), pyridoxine (B6), folic acid (B9), and cyanocobalamin (Vitamin B12).

# SOURCES OF DIFFERENTS VITMINS



# Conclusion

- Vitamins are in every aspect essential to our life. First of all, vitamin is that component of a balanced diet which the human body generally cannot manufacture on its own So you must consume vitamin directly in the form of food or through supplements as tonic or pills.

- The whole process of assimilation of vitamins depends on ingestion of food. Once you have it as a part of your meal, say for tomatoes, lemon, spinach and other stuffs, it is more helpful. To maintain a healthy life, we must use regular proper balanced diet.

- The diet must contain vegetables, fruits, meat The body's metabolism is also dependent on vitamins as on carbohydrates, fats, minerals and other basic components of a complete diet. Always remember that vitamins are not food but should be a part of your food..

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# Thank You