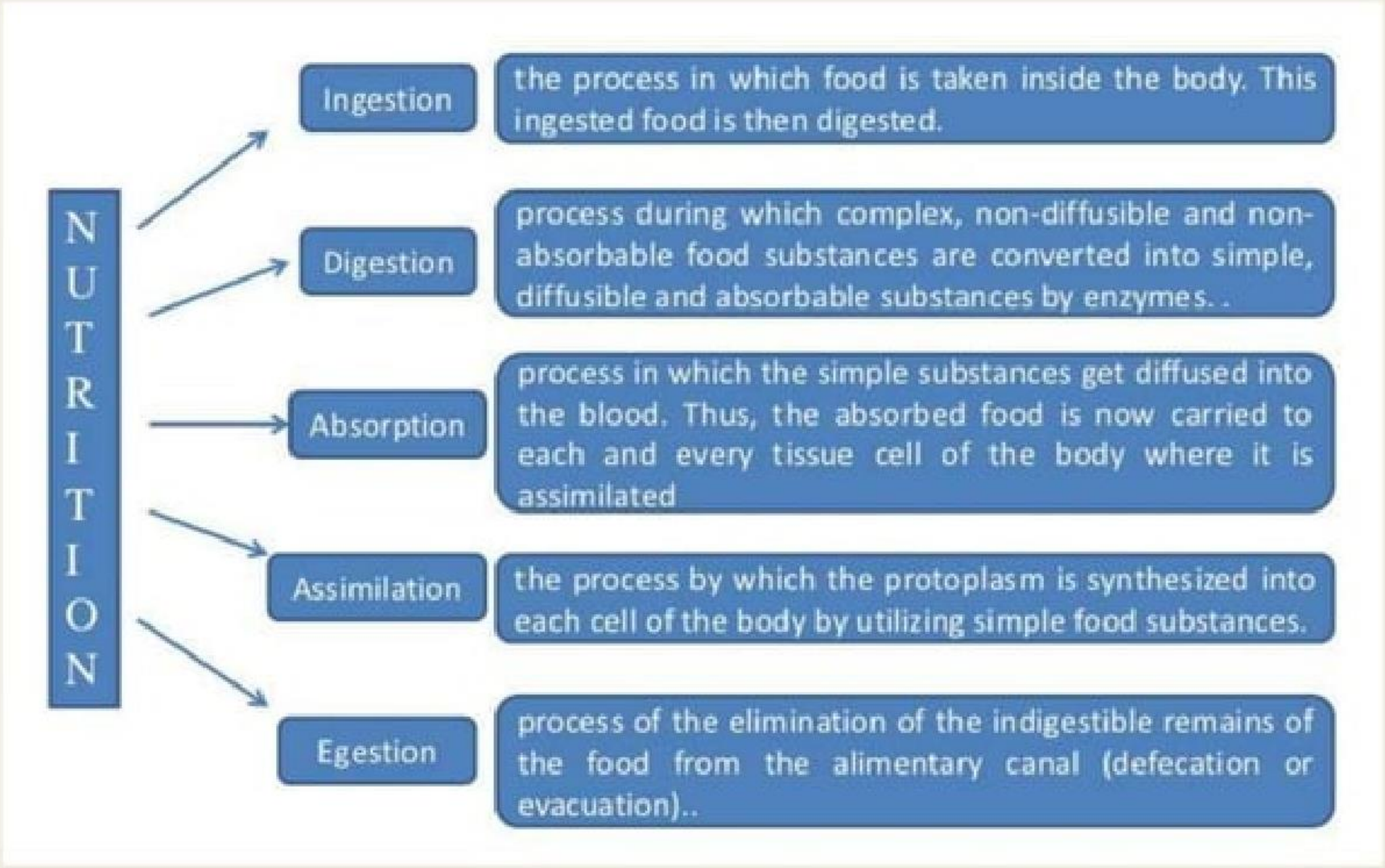
# NUTRITION & HEALTH

**UNIT 2**

# NUTRITION & HEALTH

**Food** can be defined as anything edible that can be solid, semisolid or liquid which when swallowed, digested and assimilated in the body, proves useful to it. These substances not only keep the person alive, but also provide energy used for growth and development, regulate the body processes and protect the body from diseases.

**Nutrition** is defined as the science of foods, nutrients and other substances they contain; and of their actions within the body including ingestion, digestion, absorption, metabolism and excretion.



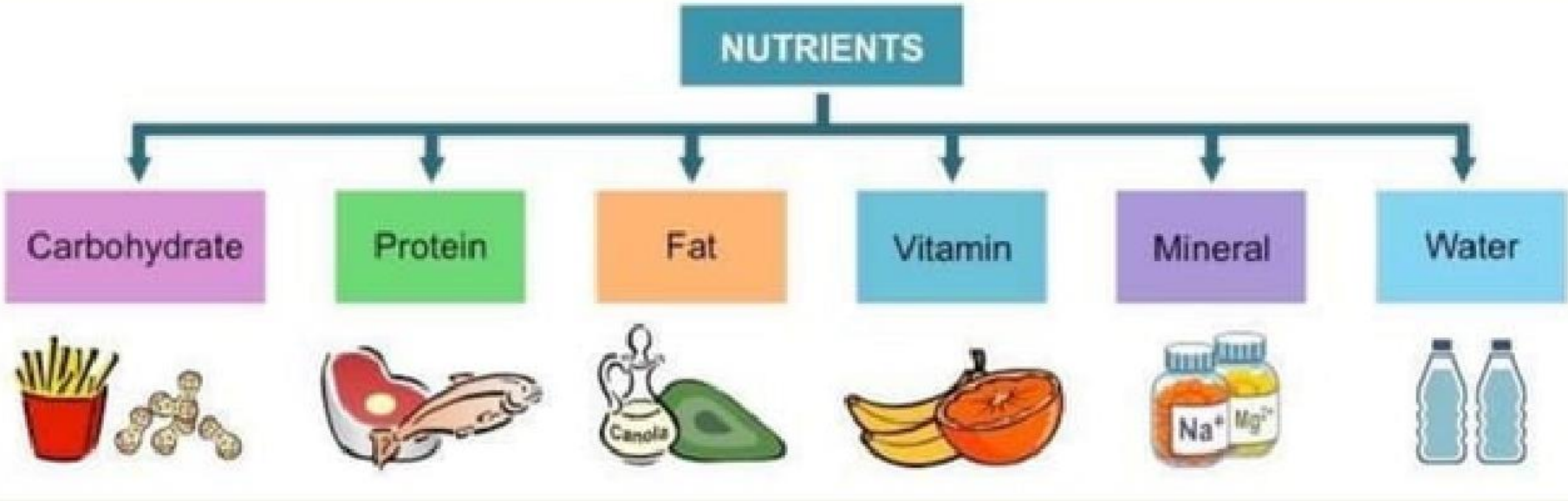
**Nutrients are organic or inorganic substances present or contained in food which is required or necessary for growth and maintenance of function of body." E.g.: Proteins, Vitamins etc.**

**Or**

**Nutrients have been defined as "chemical substances found in food that cannot be synthesized at all or in sufficient amounts in the body, and are necessary for life, growth and tissue repair".**

**Or**

**Nutrient "or "food factor" are organic and inorganic complexes contained in food, which are responsible for the functions of foods and protect the body from disorders.**



**Balanced Diet** A balanced diet is one which includes a variety of foods in adequate amounts and correct proportions to meet the day's requirements of all essential nutrients such as proteins, fats, carbohydrates, vitamins, minerals, water, and fibre.

# THE RELATIONSHIP BETWEEN NUTRITION AND HEALTH

1. Food is a basic and foundational part of our lives. Food plays a vital role for human existence just as the air we breathe and the water we drink. The food we eat is utilized in the body and assimilated substances are used for growth and maintenance of the tissue.
2. People who eat right foods rich in nutrients enjoy their lives more, live longer, and are at a reduced risk of disease.
3. Good nutrition is critical in preventing not only deficiency diseases, but also chronic diseases. Nutrition is vital to our bodies as water is to plants. An unhealthy diet increases the risk of many diet related diseases.

# CLASSIFICATION OF FOOD

- **Food can be classified** in accordance to their chemical property, to their function, to their essentiality, to their concentration and to their nutritive value. A classification based on nutrients present will ensure that all nutrients are made available to the body and offer greater variety within the group.

- There are five basic food groups suggested by the **Indian Council of Medical Research (ICMR).** These include:

✓ Cereals, grains and products
✓ Pulses and legumes
✓ Milk and meat products
✓ Fruits and vegetables
✓ Fats and sugars

✓Cereals, grains and products

✓Pulses and legumes

✓Milk and meat products

Fruits and vegetables

# ✓Fats and sugars

# Classification of Foods

| | |
|---|---|
| By chemical nature | • Carbohydrates, Protien, Fats, vitamins, Minerals, Dietary fiber, Water |
| By functions in the body | • Energy Giving<br>• Body Buidling<br>• Protective |
| By chemical properties | • Organic<br>• Inorganic |
| By mass | Macro Nutrients<br>Micro Nutrients |
| By Origin | Plant Foods<br>Animal Foods |
| By nutiritve value | 12 Categories |

## a) According to the chemical nature

i. Carbohydrates
ii. Vitamins
iii. Proteins
iv. Dietary Fiber
v. Fats
vi. Water Minerals

## b) ACCORDING TO THEIR FUNCTION IN THE BODY

**Energy giving foods:**

- The carbohydrates, fats and the protein are considered as calorie nutrients, so that the body can perform the necessary functions. Rice, chapatti, bread, potato, sugar, oil, butter and ghee are examples of energy giving foods.

**Body building foods:**

- Foods such as proteins, fats and carbohydrates are also called as body-building food. They are the nutrients that form body tissues. Fish, meat, chicken, eggs, pulses, nuts and milk are some body building foods.

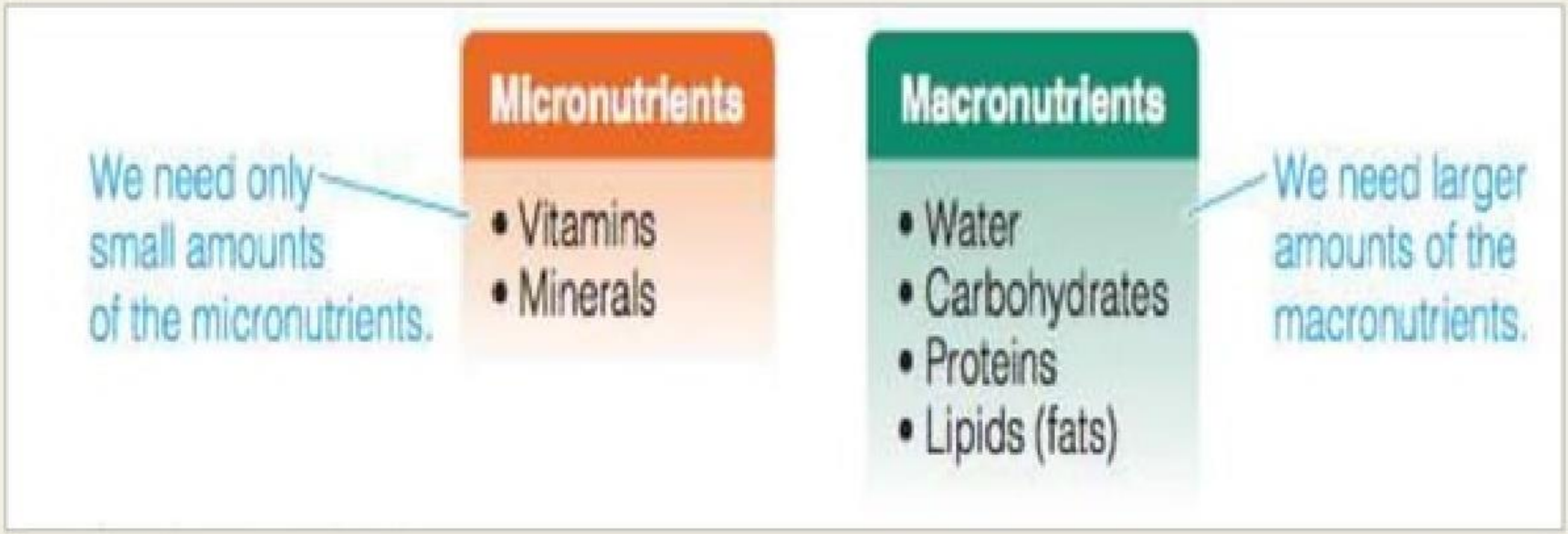
**Protective foods:**

- Vitamins and minerals are the nutrients that function to regulate body processes. They protect us from various diseases. Fruits and vegetables are some examples. Therefore we must eat these regularly.


starchy carbs
Give us energy
fruit & veg
Contain vitamins and minerals to keep us healthy
dairy
Contains calcium for healthy teeth and strong bones
protein
Helps muscles to grow and repair
fats
Fat helps keep our organs safe. Too much of it can be bad for your health

## c) According to its mass depending on the quantity necessary for cells and organisms are classified as:

1. **Macronutrients:** Macronutrients are required in large quantities daily. Proteins, carbohydrates and fats are macronutrients. They are the basis of any diet.
2. **Micronutrients:** Micronutrients are needed in small quantities (usually in amounts less than milligrams). These nutrients are involved in regulating metabolism and energy processes. They are vitamins and minerals.



## Macronutrients

Carbs

Proteins

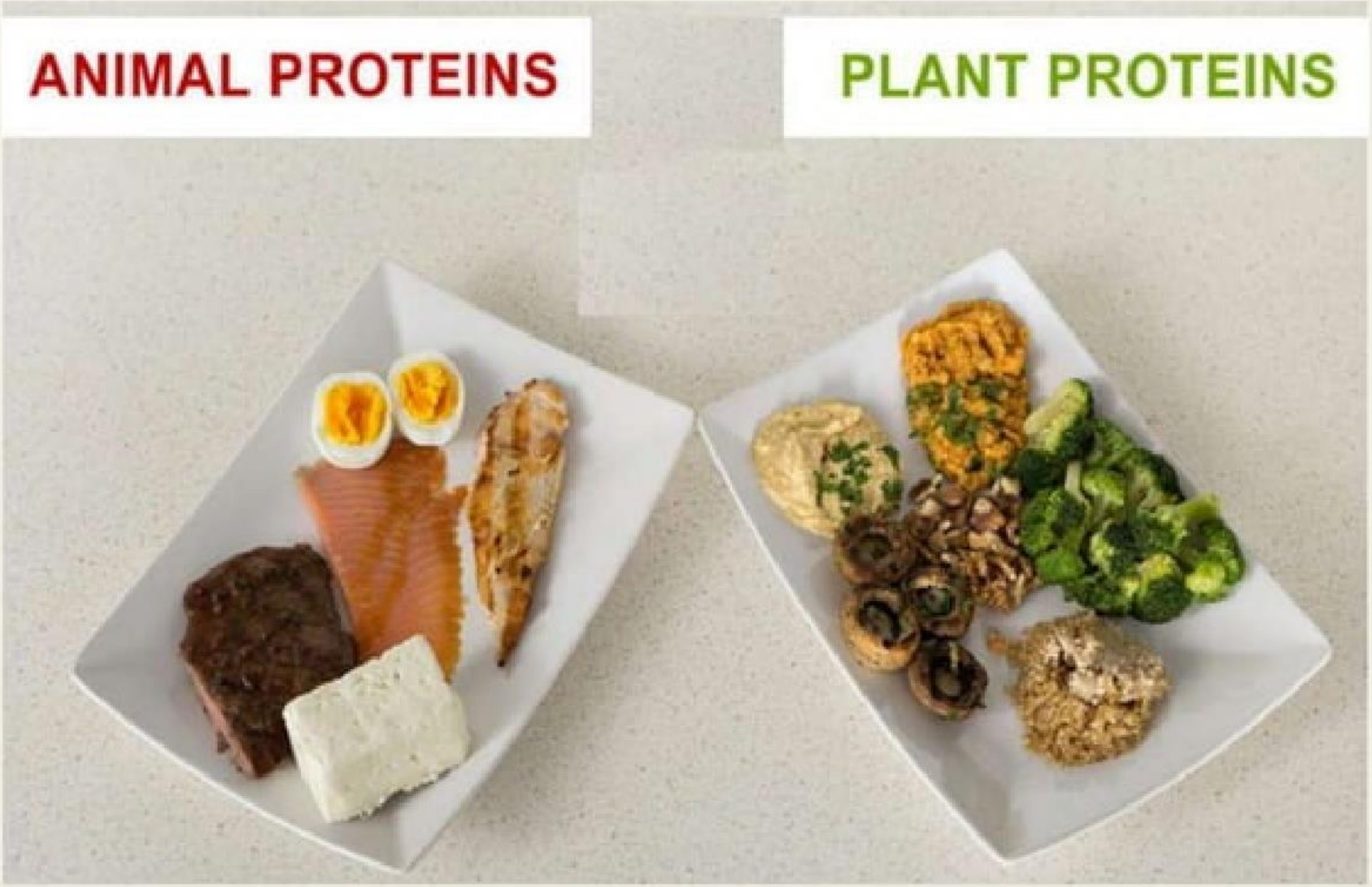
Fats

Water

## Micronutrients

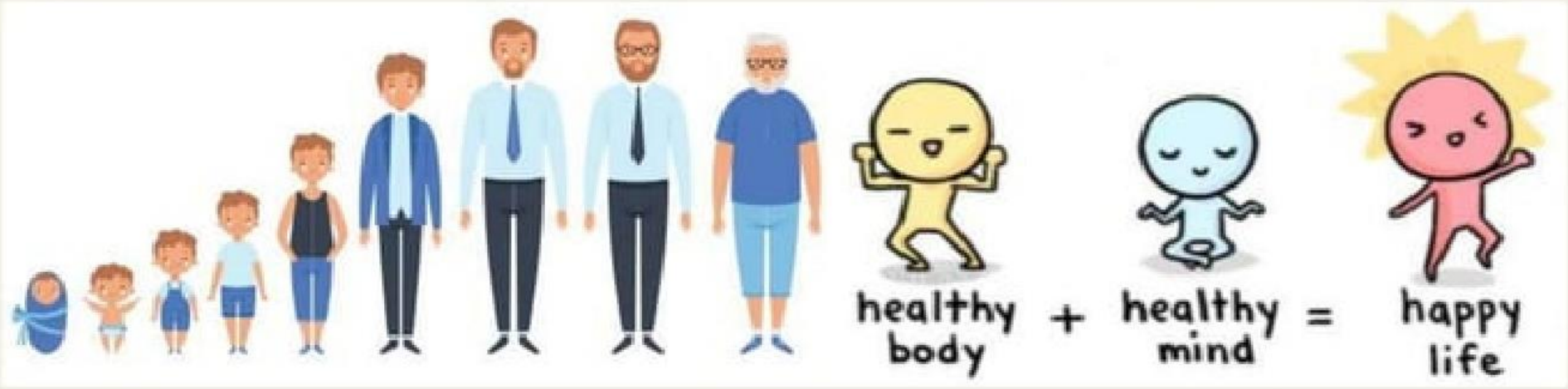
## d) According to its origin

- Depending upon the origin of food it has been classified as animal food sources and plant food sources.



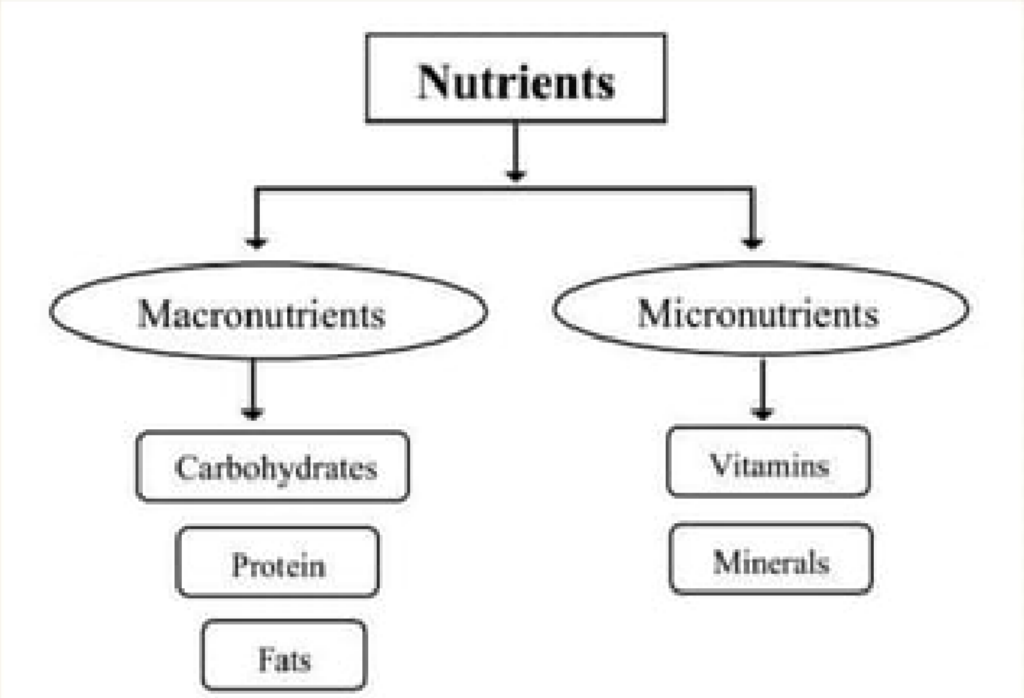
# FUNCTIONS OF FOOD

- 1. Physiological functions
  - a. Energy yielding foods (Carbohydrate, fat)
  - b. Body building foods (Protein)
  - c. Protective and regulatory foods (Vitamins and minerals)
- 2. Social functions
- 3. Psychological functions



# NUTRIENTS

- The substances which are present in the food and consumed in our body for its vital functions are called nutrients. According to the World Health Organization (WHO), these nutrients must come from food, and they are vital for disease prevention, growth, and good health. There are several constituents such as:




**Classification of nutrients**

# Carbohydrates

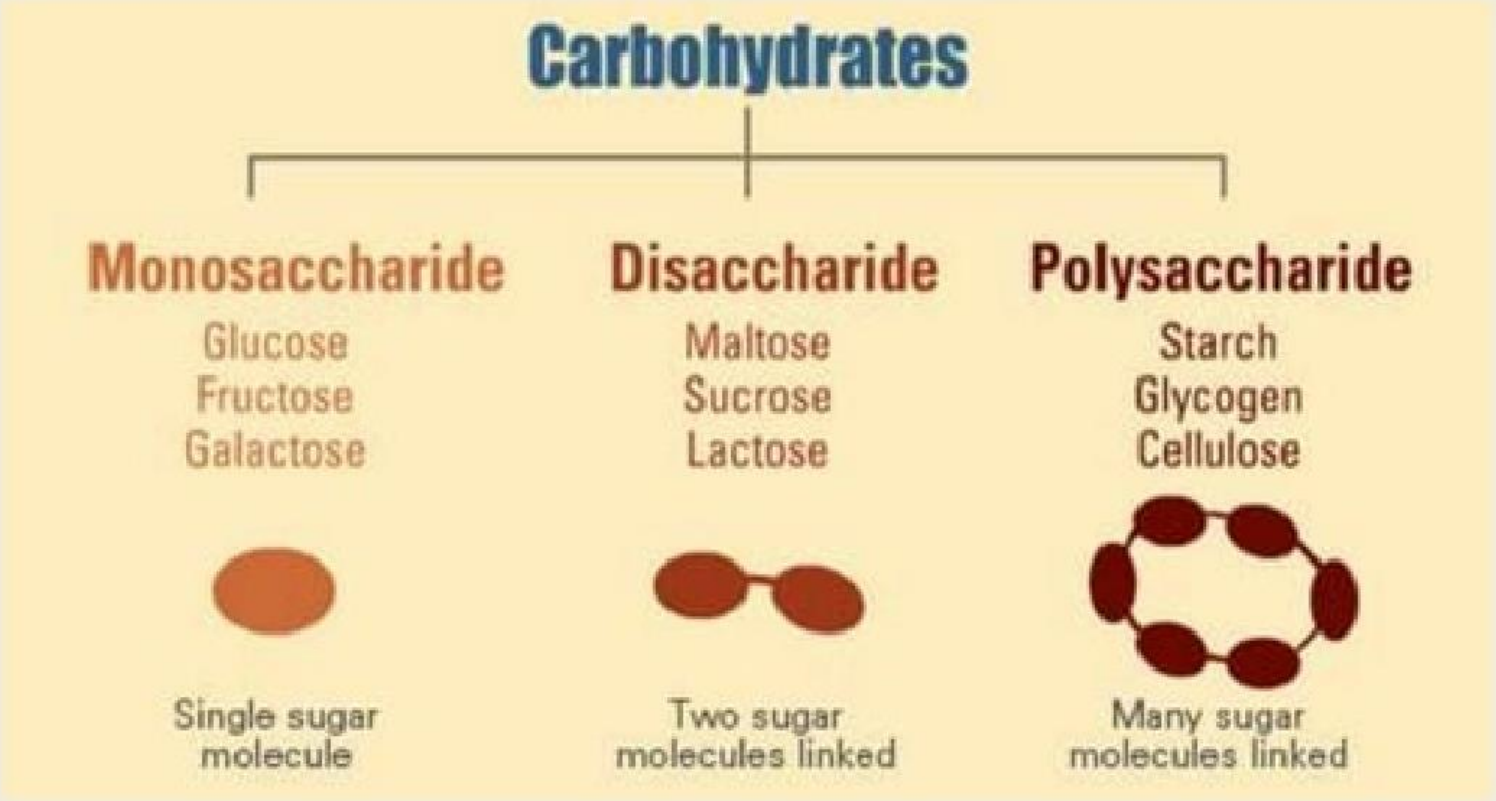
- Carbohydrates are the chief sources of energy (Providing 4 Kcals/gm).
- Carbohydrates consist of carbon, hydrogen, and oxygen.
- The general empirical structure for carbohydrates is $(CH_2O)_n$. (1:2:1)
- The building blocks of all carbohydrates are simple sugars called monosaccharide.

## Classification of Carbohydrates

- **Monosaccharide:** these are the simplest form of carbohydrates containing simple sugar molecule. **Example:** Glucose, Fructose and Galactose.

- **Disaccharide:** These carbohydrates composed of two units of **Monosaccharide's. Example:** Sucrose, Lactose and Maltose.

- **Polysaccharide:** These are the complex sugars containing numerous units of monosaccharide molecules. **Example:** Glycogen, Cellulose and Pectins.




## Daily requirements

Carbohydrate intake should be in the range of 300-500gm (50%- 70%) out of the total energy intake for adults and 40-60% for children.

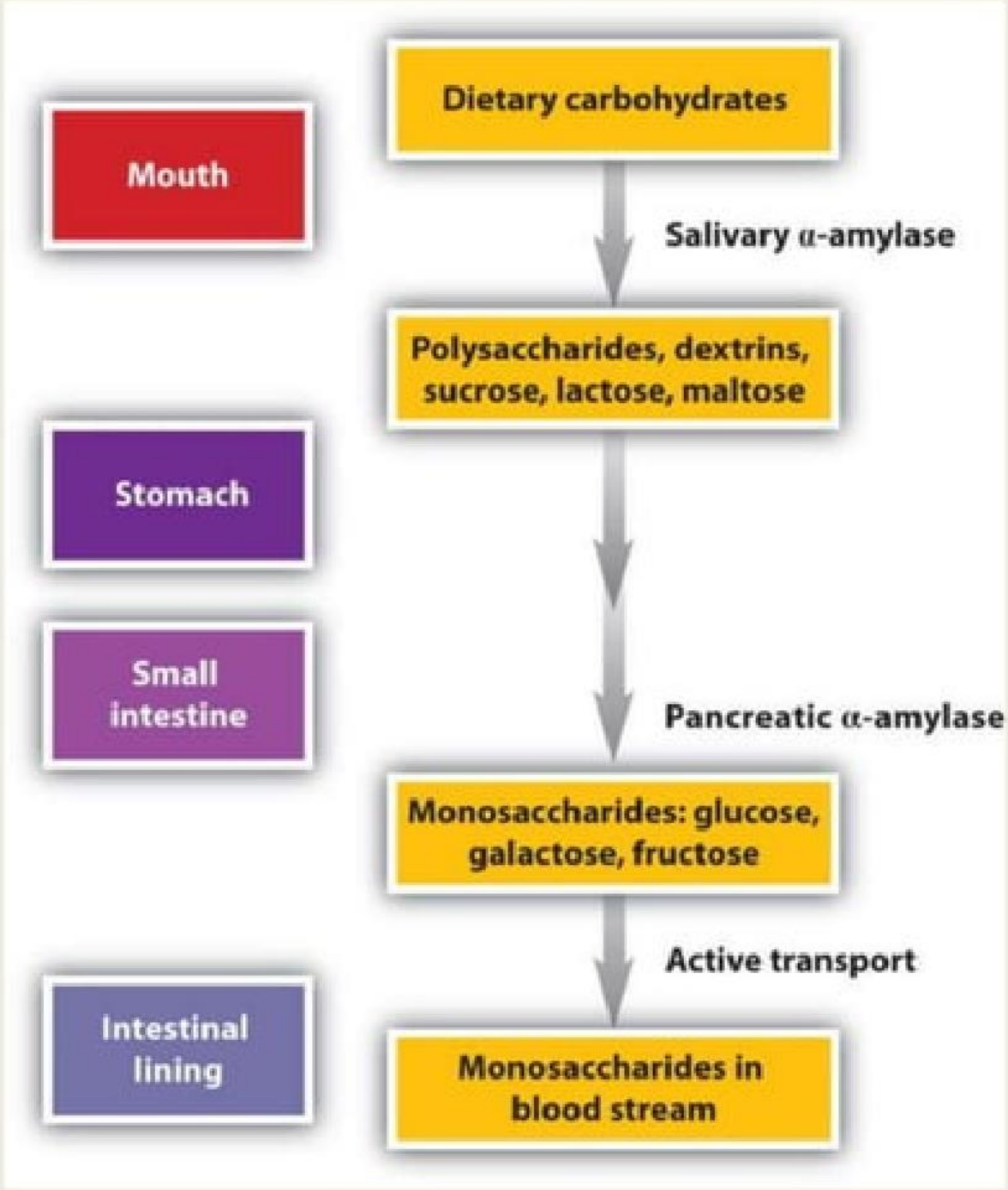
## Sources

All sugars, Jaggery, Honey, Pulses, Whole Grains, Cereals, grains, rice, fruits, milk, yogurt, beans, roots and tubers such as potatoes, beet root etc.

## Functions of Carbohydrates

a) Living organisms use carbohydrates as accessible energy to fuel cellular reactions.
b) They are the most abundant dietary source of energy (4kcal/gram) for all living beings.
c) Stored carbohydrates act as an energy source instead of proteins.
d) Carbohydrates are intermediates in the biosynthesis of fats and proteins.
e) Carbohydrates aid in the regulation of nerve tissue and is the energy source for the brain.
f) Formation of the structural framework of RNA and DNA (ribonucleic acid and deoxyribonucleic acid).
g) They help in the modulation of the immune system.

## Digestion And Absorption of Carbohydrate



# Overeating of Carbohydrate

# II. Proteins

- Proteins are the essential constituents of the diet. Proteins are made up of amino acids. Amino acids are needed for replacement and growth of the body parts.
- Amino acids are classified as essential and non essential amino acids. Essential amino acids cannot be synthesized by the body and must be taken through foods whereas non essential amino acids can be synthesized by the body.

## DAILY REQUIREMENTS

- The ICMR recommends 1gm of protein/ Kg of body weight for adults.
- The amount of protein should be increased for children, pregnant and lactating mothers by 1.5- 2.0 g/kg body weight.

**Sources of Protein**

# Essential & Non-Essential Amino Acids

**Essential Amino Acids:**

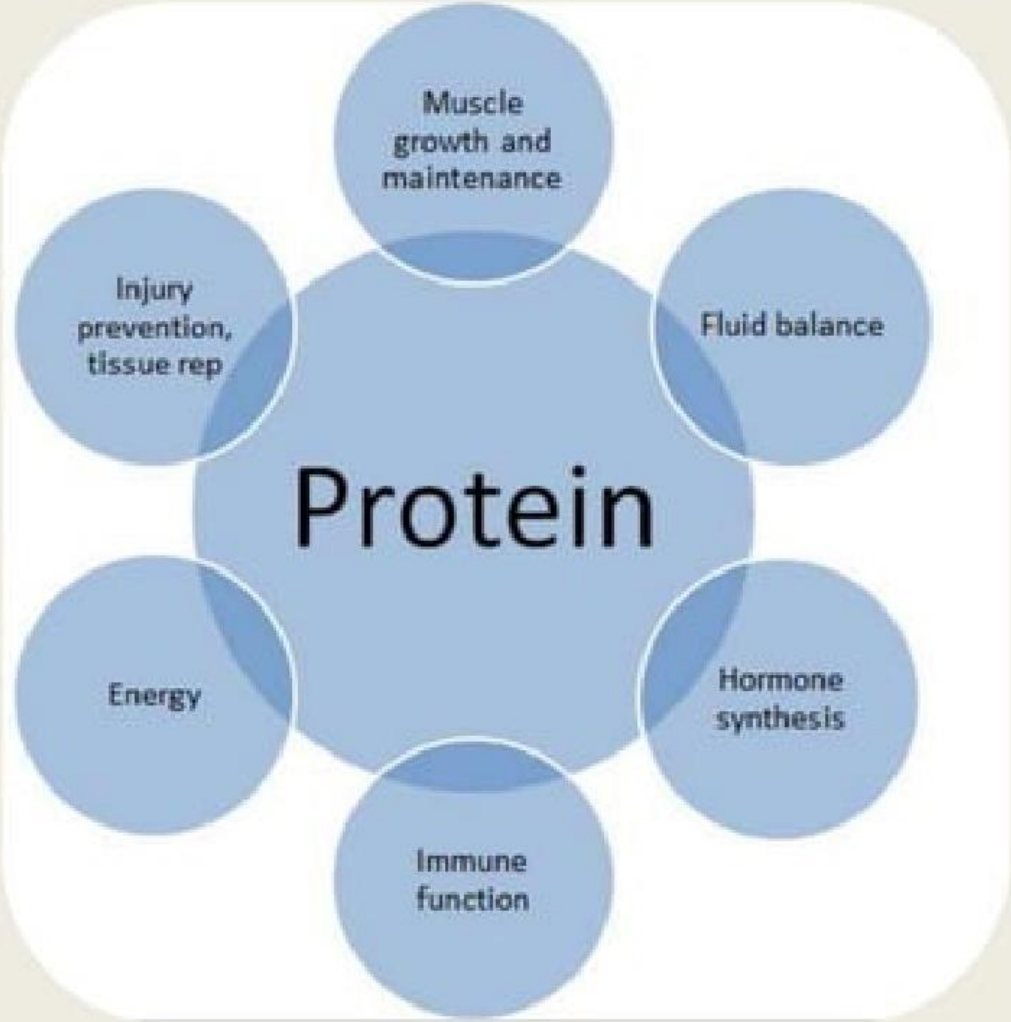
- Arginine
- Isoleucine
- Histidine
- Leucine
- Methionine
- Lysine
- Phenylalanine
- Tryptophan
- Threonine
- Valine

**Non-Essential Amino Acids:**

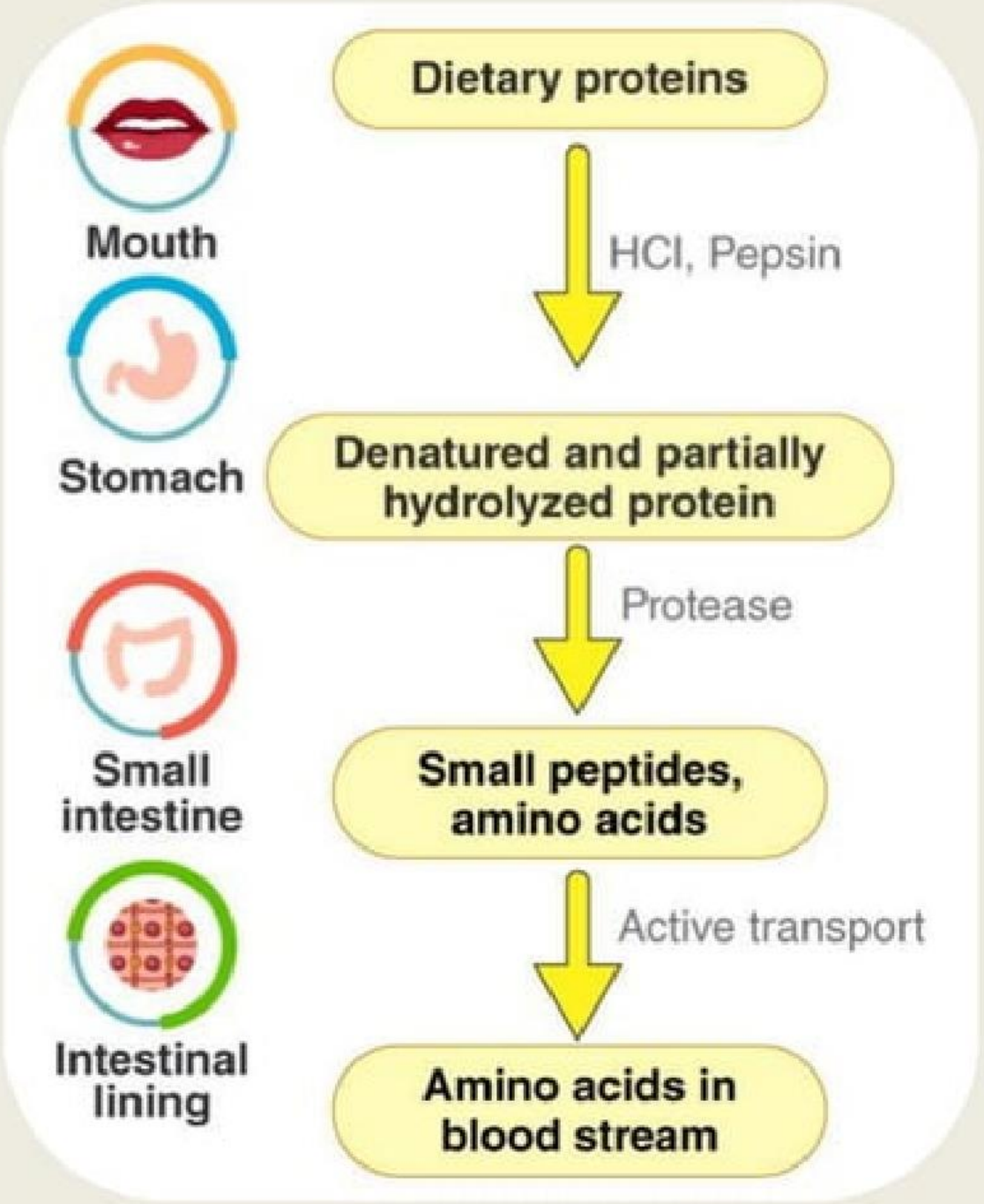
- Alanine
- Arginine
- Asparagine
- Aspartic Acid
- Cysteine
- Glutamic Acid
- Glutamine
- Glycine
- Proline
- Serine
- Tyrosine

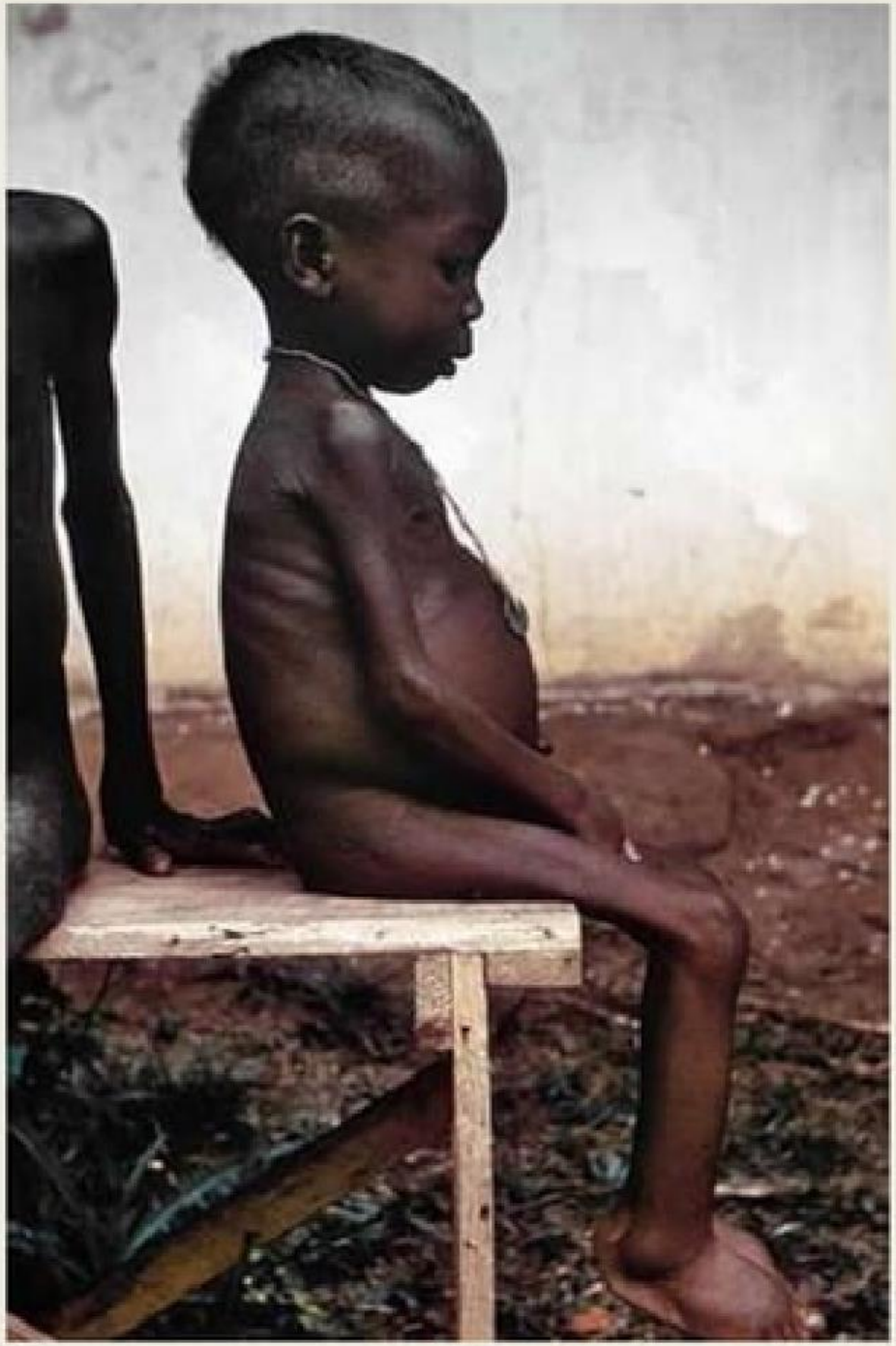
# FUNCTIONS OF PROTEINS

1) Protein helps in synthesis of enzymes, immunoglobulin, plasma proteins and hormones in the body.
2) Protein helps in growth and repair of body tissues
3) Proteins are secondary sources of energy during deficiency of carbohydrates and fats. (Provides 4 Kcals/gm).
4) Proteins help in forming haemoglobin.
5) Proteins help in antibody formation.

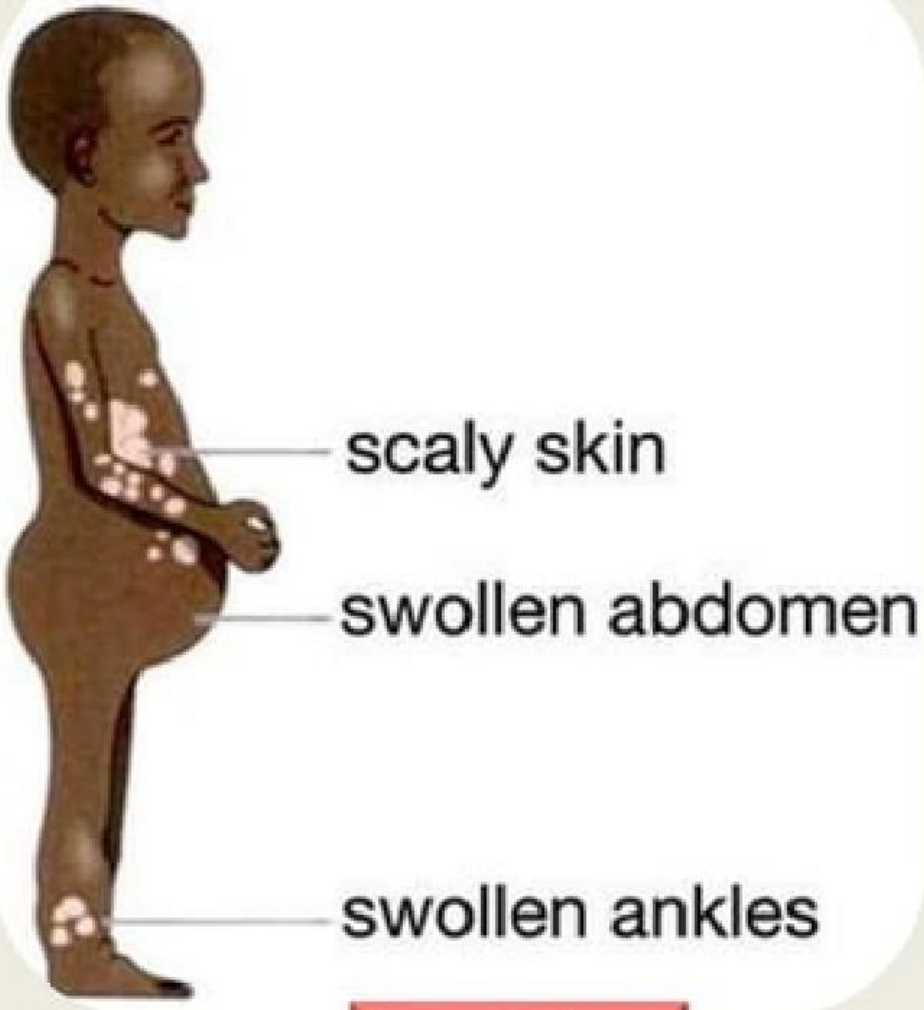


**Digestion And Absorption of Protein**





## Deficiency of Protein




Kwashiorkor


hair loss
old person like face
wrinkled skin
severe muscle loss
MARASMUS

# 3- Fats

- Fat are concentrated sources of energy containing Carbon, hydrogen & oxygen.
- Fat are solid up to $20^0$C and if they are liquid at that temperature they are called Oils.
- Fat are insoluble in water and soluble in Chloroform, petrol and Ether.
- Fat is deposited as adipose tissue in the body and perform essential functions in the body.
- Fats are composed of fatty acids and contain oxygen, carbon and hydrogen.

# CLASSIFICATION

❖ **Fats are classified in to:-**

1) Simple Lipids (Ex. Triglycerides)
2) Compound lipids (Ex. Phospholipids)
3) Derived lipids (Ex. Cholesterol)

❖ Fats are classified in to two types: **Saturated fat and unsaturated fat.**

❖ **Saturated Fat:** These have full number of hydrogen atoms. These are from animal sources. **Example:** Butter, Ghee and vegetable oil.

❖ **Unsaturated Fat:** These contain one, two or more double bonds of fatty acids. These are extracted from vegetable sources. **Example:** Groundnut oil, soyabean oil, sunflower oil.

## DAILY REQUIREMENTS

❑ 15-20% of total calorie requirements should be from fat. That is about 44 gm to 77 gm. of **fat per day** if you eat 2,000 calories **a day**.

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## DAILY REQUIREMENTS

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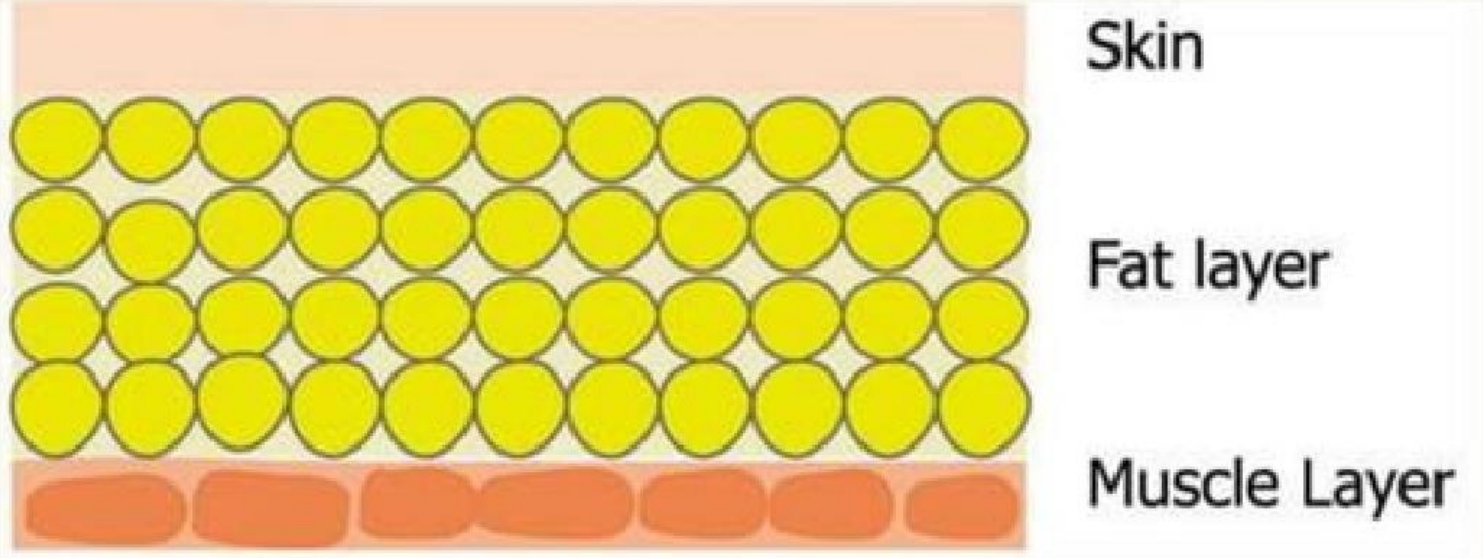
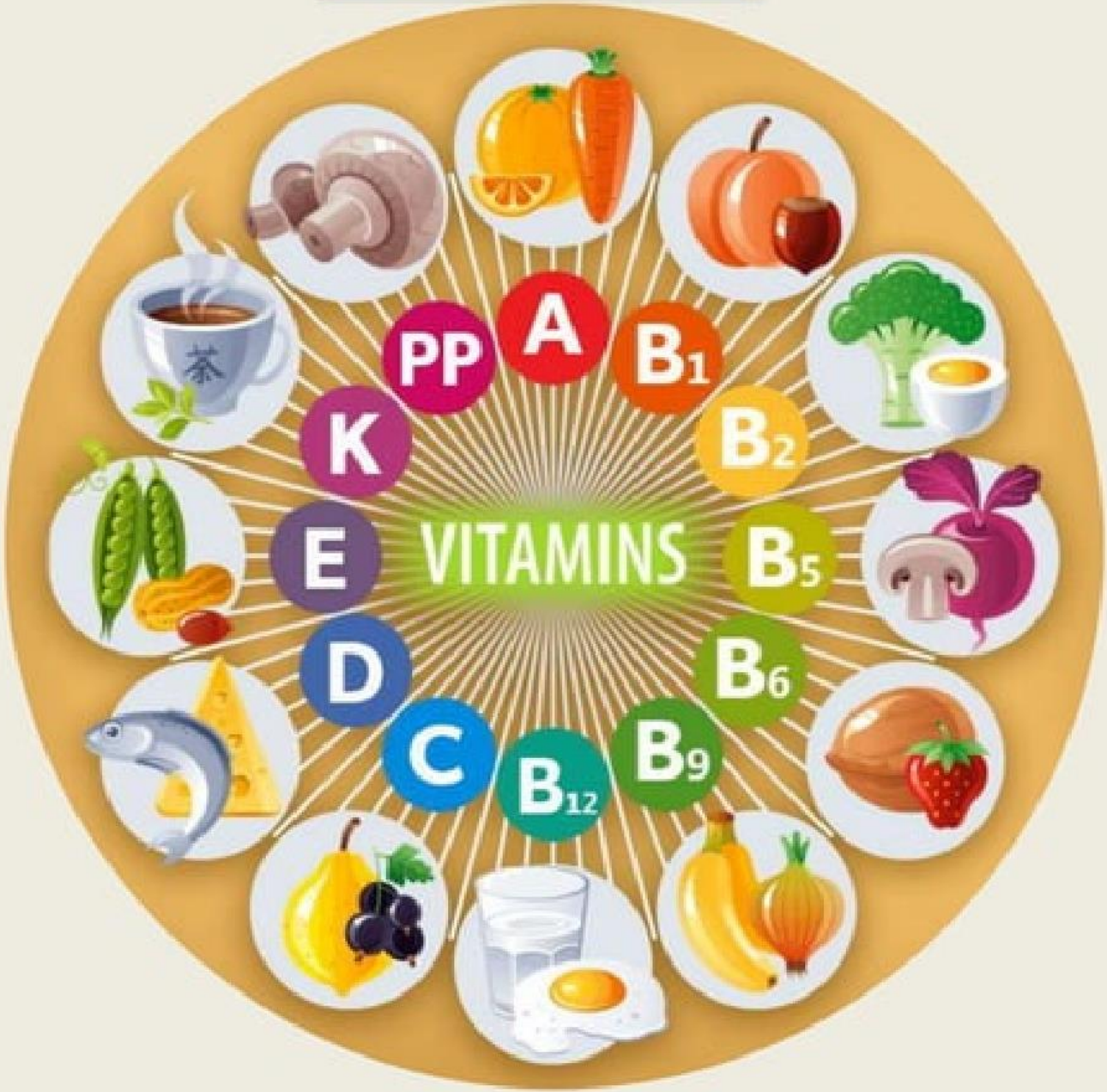
# FUNCTIONS

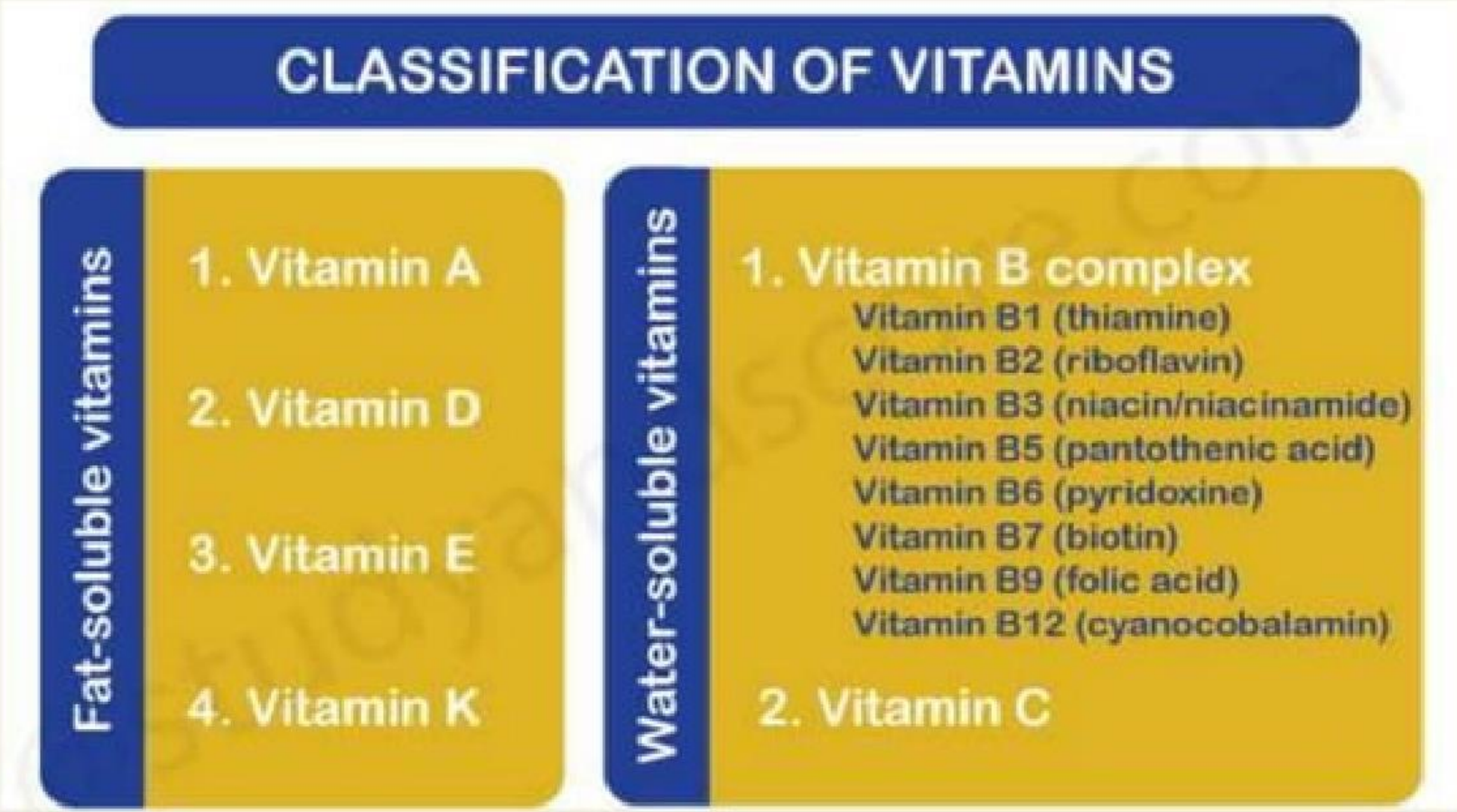
- Supplies energy (9 kcals/ gm).
- Improve the palatability of food (flavor and taste)
- Supports body organs like liver and kidneys
- Provides insulation and thermoregulation against cold
- Provides essential fatty acids which helps in growth, promotion and maintenance of skin integrity.
- Helps in formation of hormones in the body.
- Helps in transportation of fat soluble vitamins.



# Vitamins



- Vitamins are organic compounds that people need in small quantities. Most vitamins need to come from food because the body either does not produce them or produces very little.
- Different vitamins play different roles in the body, and a person requires a different amount of each vitamin to stay healthy.



# FAT SOLUBLE VITAMINS

## Vitamin-A

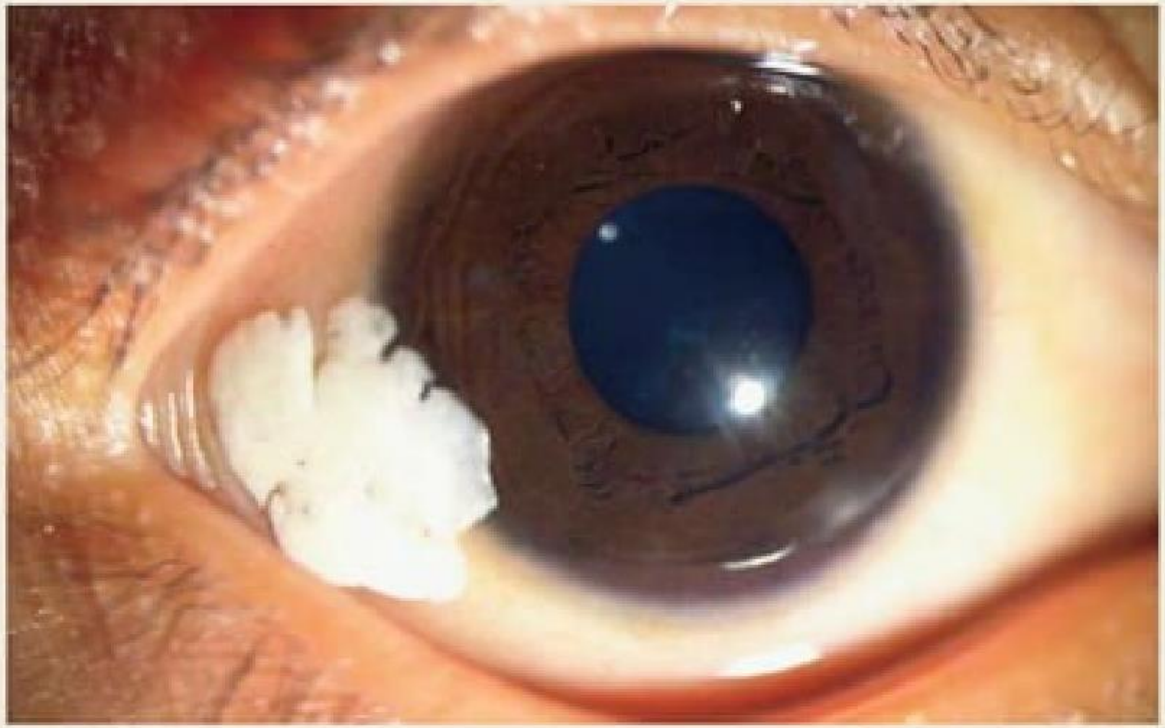
- The chemical name is Retinol.
- Found in foods of both plant and animal origin.
- **Function:** It is essential for eye health.


## Deficiency

**Deficiency Syndrome**

- ✓ Decreased resistance to infection
- ✓ Dry scaly skin
- ✓ Night blindness (Inability to see in dim light)
- ✓ Bitot's spots- Greyish, rough and raised patches on conjunctiva
- ✓ Keratomalacia- Softening of the cornea.

- **Daily requirements:** 0.4-1 mg Sources. Green leafy vegetables and yellow orange fruits and vegetables like mango, papaya, pumpkins and carrots are good sources of β-carotene.



Bitot's spots

Keratomalacia

# Vitamin-D


- Vitamin D is synthesized by sunlight.
- Vitamin D is essential for bone growth.

**Daily requirements: 400 IU Sources**

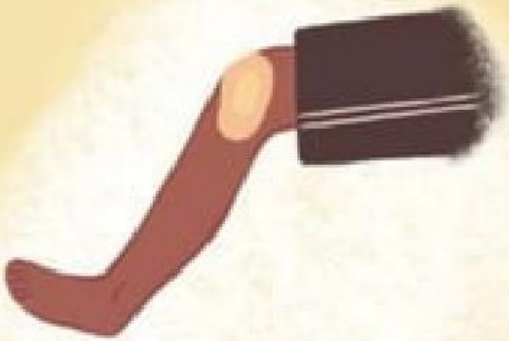
- Generated in the skin by action of ultra violet rays of sunlight
- Food sources are milk, butter, cheese, egg, fish and fish liver oils, and foods which have been fortified by addition of vitamin D.

## Functions

- Increases intestinal absorption of calcium and phosphates.
- Mineralization of bones.
- Vitamin D is also essential for the dental health. It prevents tooth decay and loss, strengthen the gums and reduces risk of any oral infection.

# All About Vitamin D

Promotes cell growth



Reduces inflammation

Can be found in foods, supplements, and exposure to sun

Supports neuromuscular function

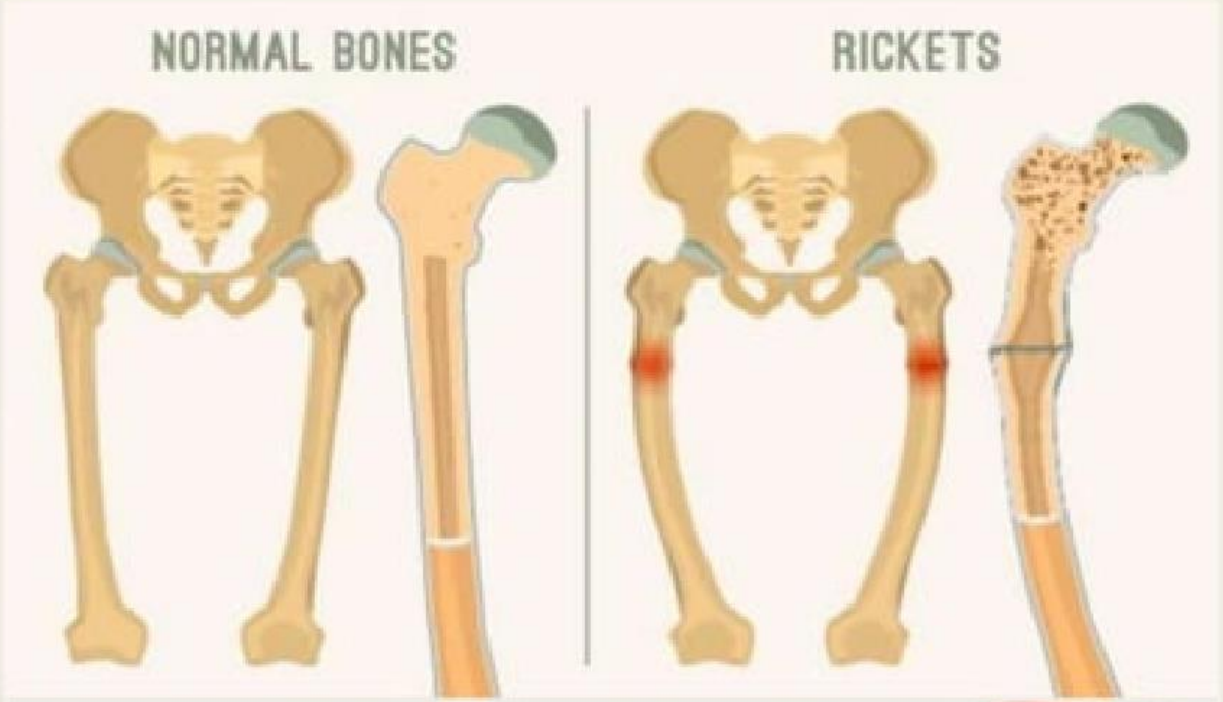
Studies have shown Vitamin D can help prevent upper respiratory infections

Influences immune function

verywell

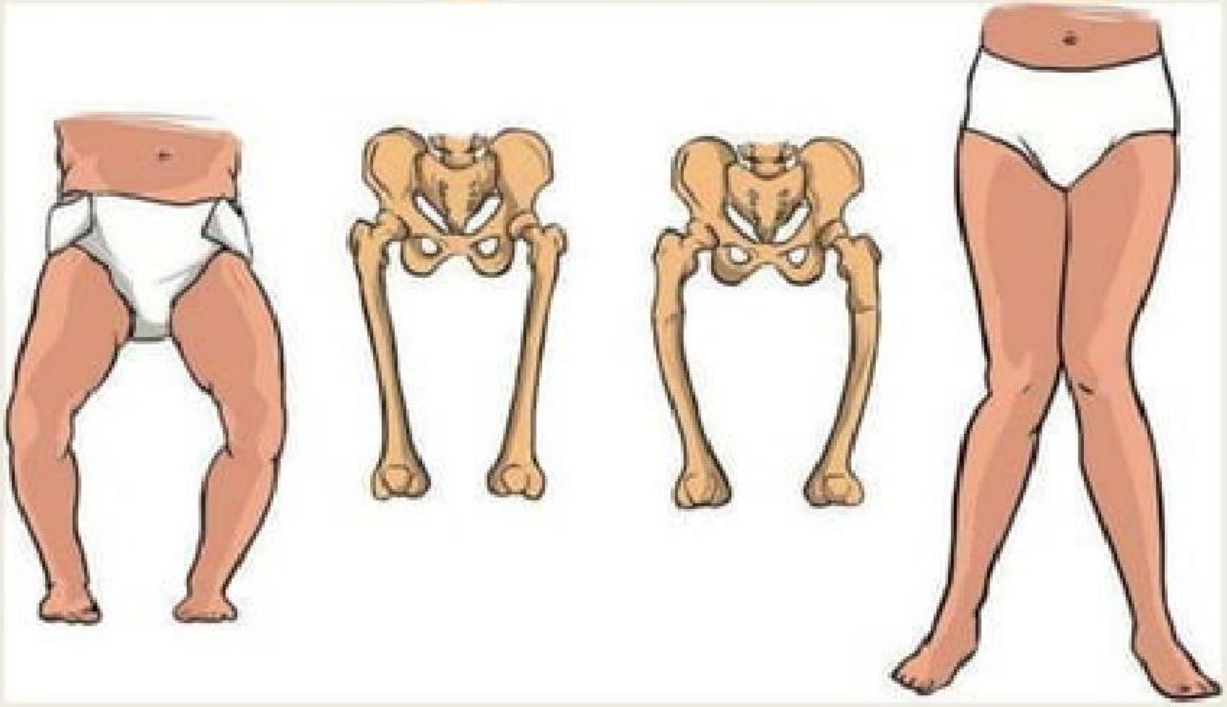
## Rickets:

Rickets characterized by reduced growth and softening of bones. This disease is generally seen in children due to lack of vitamin D. Children develop very thin, deformed bones



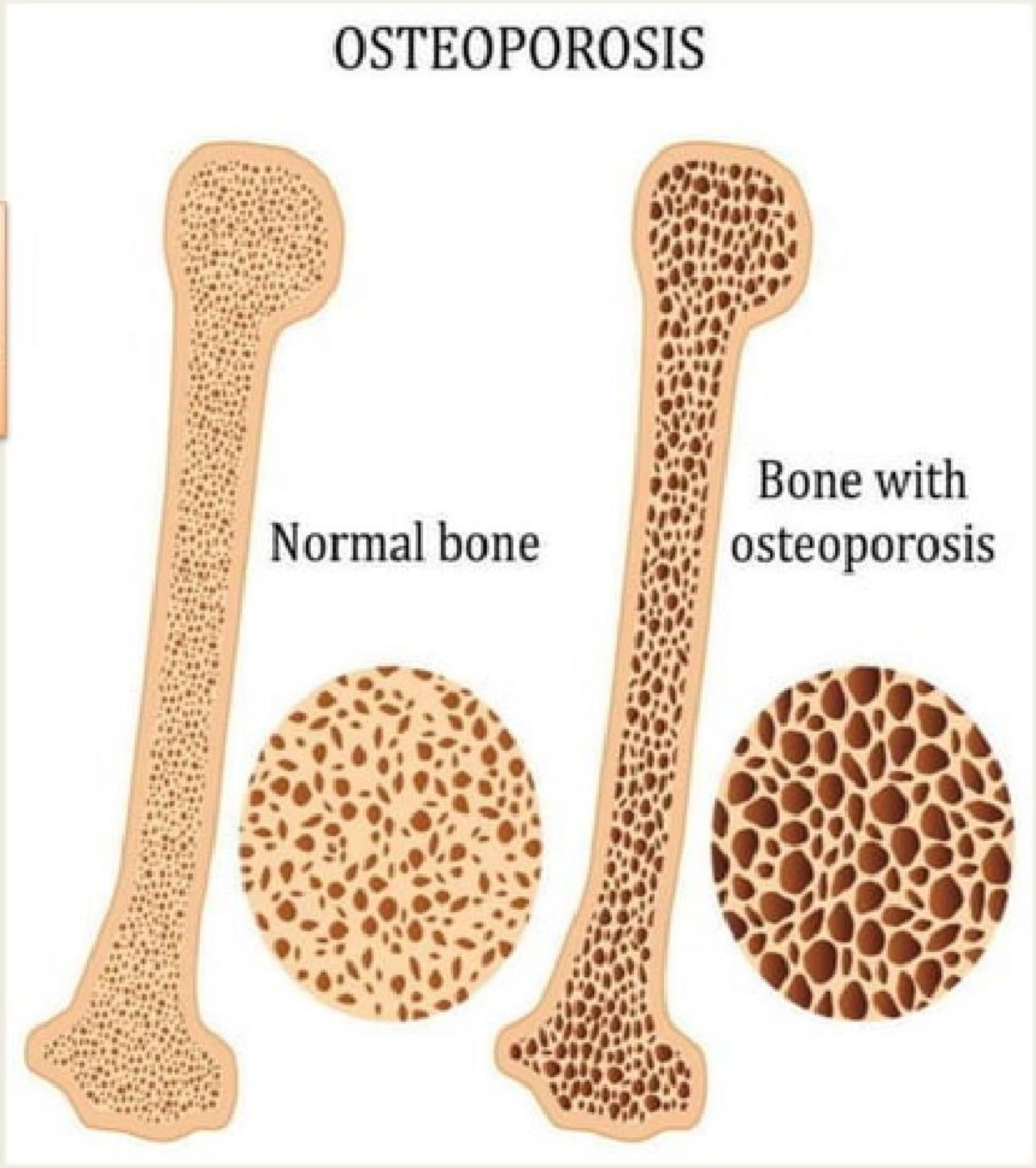

## Osteomalacia

Osteomalacia, similar to rickets but is usually seen in elderly people suffering from vitamin D deficiency.
This disease reduces the absorption of calcium in the body leading to soft and deformed bone structure, bending of the spinal cord and legs and increased risk of fractures.



## Osteoporosis

Osteoporosis, being most common in elderly where the bone density reduces, making it more porous in nature and causing increased risk of broken bone and fractures.



# Vitamin E

- Vitamin E is an antioxidant and formed up of chemical substance called Tocopherols.


## Daily requirements:

- 15UI per day.

## Sources

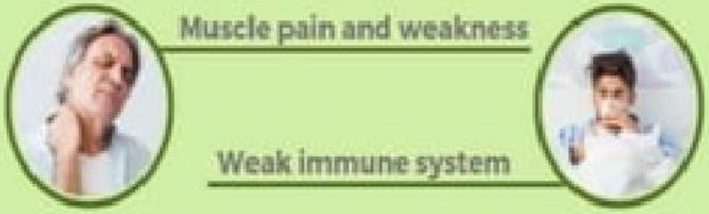
- Milk, oils, eggs, leafy vegetables, papaya, grains, nuts.

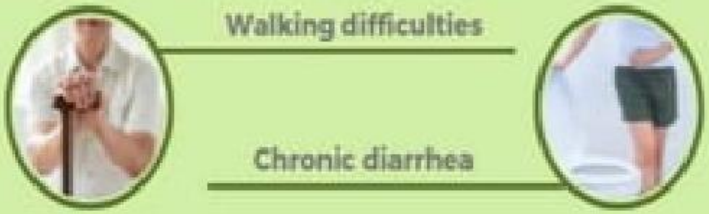
## Functions

- Antioxidant (Prevents the formation of oxidative free radical)
- Co factor in electron transport
- Prevents or delays the ageing.

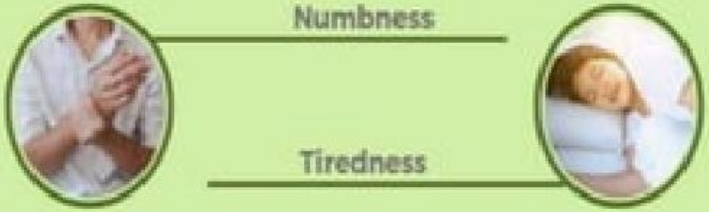
## Vitamin E Deficiency

### SIGNS AND SYMPTOMS








# VITAMIN E DEFICIENCY ICONS

ANAEMIA

HAIR LOSS

MUSCLE WEAKNESS

DRY SKIN

LEG CRAMPS

CANCER

BLINDNESS

IMMUNE IMPAIRMENT

FERTILITY PROBLEMS

# Vitamin K

- It is called as Antihemorrhagic vitamin. It is required for the fromation of Prothrombin in the liver the 2nd factor of coagulation.
- Due to deficiency of Vit. K the prothrombin content in blood may lead to bleeding disorder.

**Daily requirements**

- WHO suggested RDA of 55 μg per day for adults.

**Sources**

- Green leafy vegetables, cereals, fruits.