INTRODUCTION

- Life cannot be sustained without adequate nourishment.
- Man needs adequate food for growth and development and to lead an active and healthy life.
- Food plays an important role in maintaining a person's nutritional and health status.

WHAT IS FOOD ?

- **Food** is what **people and animals eat to survive.**
- Food usually comes from **animals and plants sources.**
- It is eaten by living things to provide **energy and nutrition.**
- Food contains the **nutrition that people and animals need to be healthy.**
- The consumption of food is normally **enjoyable to humans.**
- It contains **protein, fat, carbohydrates, vitamins, water and minerals.**

According to Rajmal P. Devdas

"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".

On the other hand "***any substance intended to be, or reasonably expected to be, ingested by humans, which provides nutrients needed to maintain life considered as food***". It means substances, whether in liquid, concentrated, solid, frozen, dried or dehydrated form, that are sold for ingestion or chewing by humans an are consumed for their taste or nutritional value.

- "*Food:* ***does not include*** *alcoholic* ***beverages, dietary supplements, soft drinks or tobacco".***

NUTRITION

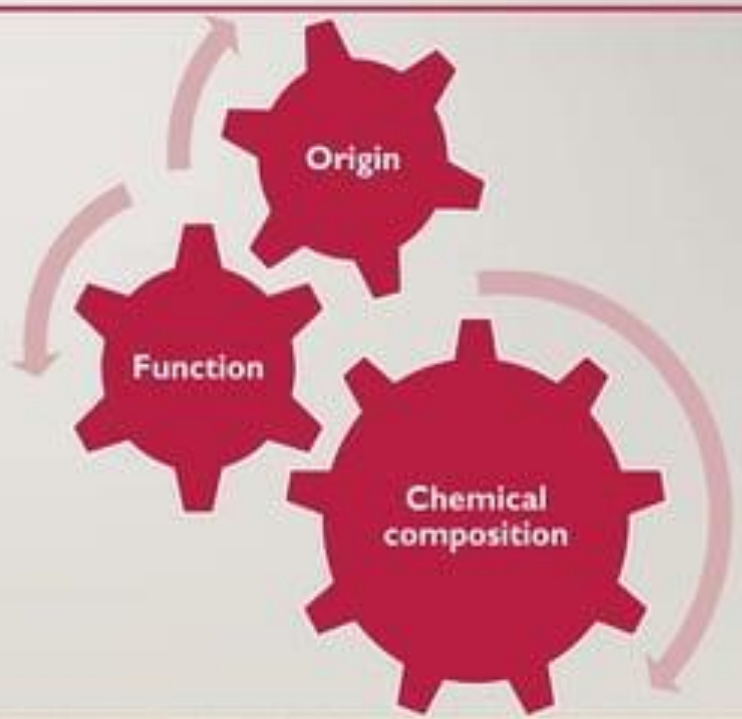
- **Nutrition** is the science that interprets the nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catab olism and excretion.

- Nutrition is a critical part of health and development. Better nutrition is related to improved infant, child and maternal health, stronger immune systems, safer pregnancy and childbirth, lower risk of non-communicable diseases (such as diabetes and cardiovascular disease), and longevity.
- People with adequate nutrition are more productive and can create opportunities to gradually break the cycles of poverty and hunger.

(World Health Organization)

CLASSIFICATION AND FUNCTIONS OF FOOD

- Food is classified on the basis of three dimensions:



CLASSIFICATION OF FOOD

A. CLASSIFICATION BY ORIGIN:

1. FOODS OF ANIMAL ORIGIN e.g meat, fish.
2. FOODS OF VEGETABLE ORIGIN e.g cabbage , carrot etc.

B. CLASSIFICATION BY CHEMICAL COMPOSITION:

1. PROTEIN
2. FAT

} PROXIMATE PRINCIPALS (MACRO-NUTRIENTS)

3. CARBOHYDRATE
4. VITAMINS

} MICRO-NUTRIENTS

5. MINERALS

C. ON THE BASIS OF PREDOMINANT FUNCTION:

1. BODY BUILDING FOOD: Milk, Meat, Egg, fish, Pulses etc. (Protein)
2. ENERGY GIVING FOOD: Sugar, Root, Tubers, Fats & oils (Carb. & fat)
3. PROTECTIVE FOOD: Vegetables, fruits and milk (rich in vit. & minerals)

CLASSIFICATION OF FOOD BY ORIGIN

Depending upon the origin of food it is classified as -

Food of animal origin

Milk, butter, ghee, meat, egg, fish, poultry

Food of plant origin

(Cereals, pulses, fruits vegetables, sugar, jaggery, spices condiments etc.)

CLASSIFICATION OF FOOD BY FUNCTION

Foods are classified according to their functions in the body.

1. Energy yielding food: Carbohydrates, fats and proteins
2. Body building food: Proteins, minerals
3. Protective food: Vitamins, minerals
4. Regulatory food: Water, roughage

1. ENERGY YIELDING FOOD

- This group includes foods rich in carbohydrate, fat and protein. They may be broadly divided into **two groups.**

1. **Cereals, pulses, roots and tubers:** Cereals provide in addition to energy large amounts of proteins, minerals and vitamins in the diet. Pulses also give protein and B vitamins besides giving energy to the body.
2. **Fats, Oils and pure carbohydrates like sugars and jaggery:** Sugars provide only energy and fats provide concentrated source of energy.

2. BODY BUILDING FOOD

- Foods rich in protein are called **body building foods**. They are classified into **two groups**.

1. **Milk, egg, meat & fish:** They are rich in proteins of high biological value. These proteins have all the essential amino acids in correct proportion for the synthesis of body tissues.
2. **Pulses, nuts and oilseeds:** They are rich in protein but may not contain all the essential amino acids required by the human body.

3. PROTECTIVE FOOD

Foods rich in **protein, vitamins and minerals** have regulatory functions in the body like maintaining the heartbeat, water balance, temperature, etc. Protective foods are broadly **classified into two groups**.

- Foods rich in **certain vitamins and minerals** only (eg) green leafy vegetables and fruits.
- **Foods rich in vitamins, minerals and proteins** of high biological value (eg) milk, egg, and fish, leggumes and pulses.

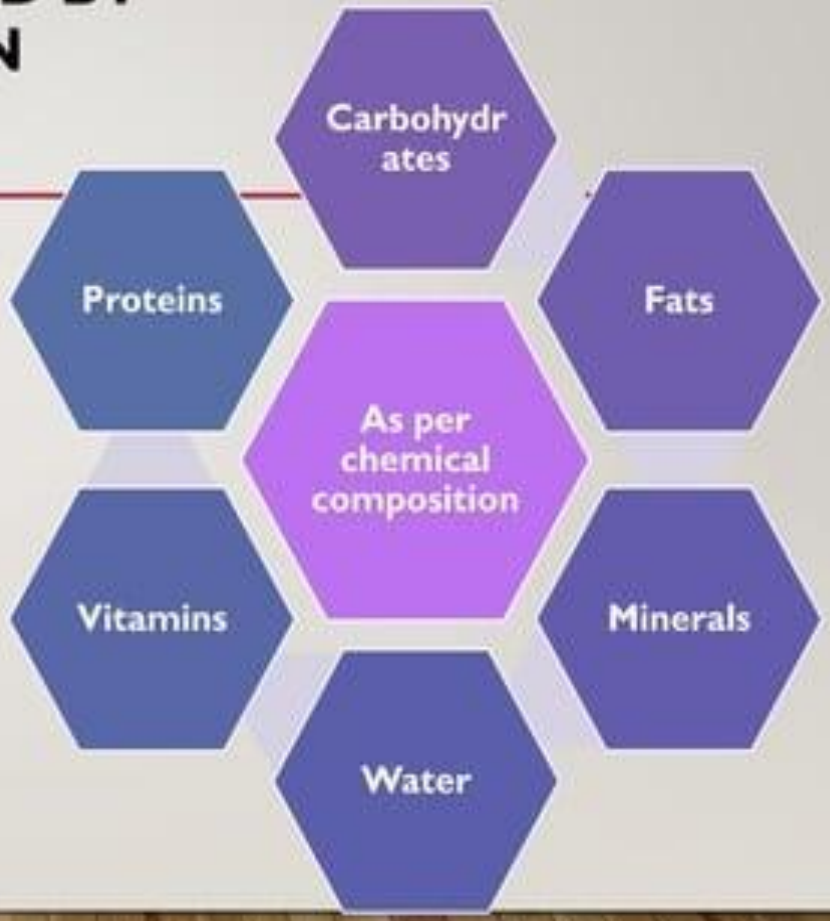
4. REGULATORY FOOD

Regulatory food includes **water and roughage** which helps to maintain regulatory body function.

1. ***Water*** is required to regulate body processes such as digestion, excretion, maintenance of the body temperature and the electrolyte balance.
2. ***Roughage*** is also called as fiber. It helps normal bowl movements. **The diet which is rich in fiber can prevent coronary heart diseases, bowel cancer, and diabetes.**

CLASSIFICATION OF FOOD BY CHEMICAL COMPOSITION

- According to their chemical nature food is classified in to **seven categories**



I. CARBOHYDRATES

- It is one of the three macronutrients in our diet with their main function being to provide energy to the body or ***they fuel the brain and muscles***.
- Digestive system **changes carbohydrates into glucose known as blood sugar** which is used as an energy for cells, tissues and organs. It **stores any extra sugar in your liver and muscles** in the form of **glycogen** for when it is needed.
- They also contain **the fiber the gut or intestine needs** to properly function.
- It is also called as **saccharides.**
- Consumption of **1 gram** or carbohydrate gives **4 calories**.

It is basically divided into two types:

1. **Simple carbohydrates** contain one or two sugars that includes **glucose, galactose and fructose.**

2. Complex carbohydrates are made of three or more linked sugars (**sucrose maltose, lactose, and polysaccharides**) and **takes longer time to digest** than simple carbohydrates and promote satiety.

- **Plant-based foods** and **whole grains** are **good sources of complex carbohydrates.**
- Simple carbohydrates abound in **fruits, table sugar, honey and sweetened processed foods**.

Five main functions of the carbohydrate are:

1. **Energy production:** It produces and supply energy to all cells in the body.
2. **Energy storage:** If the body already has enough energy to support its functions, the excess glucose is stored as glycogen (in the muscles and liver).
3. **Building macromolecules:** Some glucose is converted to ribose and deoxyribose, which are essential building blocks of important macromolecules, such as RNA, DNA, and ATP.
4. **Sparing action:** The presence of adequate glucose basically spares the breakdown of proteins from being used to make glucose needed by the body.
5. **Lipid Metabolism:** As blood-glucose levels rise, the use of lipids as an energy source is inhibited. Thus, glucose additionally has a "fat-sparing" effect.

2. PROTEIN

- **Proteins** are a class of macromolecules that perform a diverse range of **functions** for the cell. They help in metabolism by providing structural support and by acting as enzymes, carriers, or hormones. The building blocks of **proteins** (monomers) are amino acids.
- Proteins give structure to all cells.
- They also help repair tissues and fight infection.
- When consumption exceeds the body's needs, protein can serve as an energy source, delivering 4 calories per gram.
- **Twenty amino acids** constitute the building blocks of proteins. Of these, **nine are essential amino acids**, which must come from the diet. In contrast, the body can make the remaining non-essential amino acids if the need arises.
- **Animal products and legumes** are good protein sources.

Protein performs basically nine important functions:

1. **Growth and maintenance:** helps to develop body cells and enforces growth.
2. **Causes biochemical reactions** like digestion, blood clotting, muscle contraction and energy production.
3. **Act as a messenger:** Some proteins are hormones, that aid communication between cells, tissues and organs.
4. **Provide structure:** Some are fibrous & provide cells/tissues with stiffness & rigidity (keratin, collagen & elastin).
5. **Maintain proper pH.**
6. **Balances Fluids:** Proteins regulate body processes to maintain fluid balance.
7. **Bolsters Immune Health:** Proteins help form immunoglobulins, or antibodies, to fight infection.
8. **Transports and Stores Nutrients** throughout your bloodstream — into cells, out of cells or within cells.
9. **Provides Energy:** Proteins can supply your body with energy. Protein contains **four calories per gram.**

3. FATS

- Like carbohydrates and proteins, fats **supply energy to fuel the processes** that keep your body alive.
- In contrast, however, they pack **9 calories per gram**.
- They generally fall in one of four categories, based on their chemical structure: **monounsaturated, polyunsaturated, saturated and trans fats**.
- Trans fats are man-made and considered the unhealthiest because they **raise bad LDL cholesterol and lower good HDL cholesterol**.
- **Saturated fats** usually come from **animal fats and tend to raise bad cholesterol**, while fish oil and vegetable fats are typically unsaturated and help lower bad cholesterol.

Three main functions of the fat are as follows:

1. **Source of Energy:** While carbohydrates are the main source of fuel in body, system turns to fat as **a backup energy source** when carbohydrates are not available. Fat is a concentrated source of energy. One gram of fat has **9 calories, which is more than double the amount of calories from carbohydrates and protein**.
2. **Vitamin Absorption:** Some types of vitamins rely on fat for absorption and storage. Vitamins A, D, E and K, called fat-soluble vitamins, cannot function without adequate daily fat intake. These vitamins are essential parts of our daily diet.
3. **Insulation and Temperature Regulation:** Fat cells, stored in adipose tissue, insulate body and help sustain a normal core body temperature.

4. VITAMINS

- Vitamins are **complex organic substances** that team up with proteins called **enzymes**, to help chemical reactions take place in the body.
- From reactions required for food **absorption to bone building and reproduction**, they are involved.
- The Linus Pauling Institute describes **13 vitamins** that the body requires for health and proper development.
- They vary in their specific roles and are either **water-soluble, such as vitamin C and the B-complex vitamins, or fat-soluble, such as vitamins A, D, E or K.**
- Fruits and vegetables are among the **richest sources of most vitamins**.

FUNCTION OF VITAMINS

Nutrient	Function	Food sources
Vitamin A	Strengthens our immunity which helps us fight off infections Improves vision in dim light Keeps the skin and the linings of some parts of the body, such as the nose, healthy	Dark green leafy vegetables such as spinach, broccoli and carrots. But also: pumpkin, liver, fish, kidney and dairy produce such as yoghurt, eggs, fortified margarine
Vitamin D	Helps the body absorb calcium Keeps bones and teeth healthy	Sun light, fish liver oils, milk, fortified margarine, eggs, liver
Vitamin E	Helps maintain cell structure by protecting cell membranes	Soya, groundnuts, fortified margarine or oil, wholegrain cereals, eggs, peanut butter, tomatoes
Vitamin K	Helps with blood clotting	Vegetables such as spinach, lettuce, cauliflower, and cabbage, broccoli, fish, liver, meat, eggs
B-group Vitamins	Help the body release energy from food Keep the skin, eyes and the nervous system healthy	Millet, sorghum, beans, peas, eggs, liver, meat, milk, fresh fruit, green leafy vegetables, wholegrain cereals
Vitamin C	Helps with wound healing Strengthens our immunity which helps us fight off infections	Citrus fruits such as oranges, lemons and tangerines, red and green peppers, tomatoes, broccoli, potatoes

5. MINERALS

- Minerals give **structure to your bones, teeth and nails**. Like vitamins, they assist enzymes in many body processes.
- Unlike vitamins, however, they are **inorganic substances** that come from the **soil, rocks and water and are absorbed by plants.**
- Major minerals often have recommended daily values above **250 milligrams, according to the American Dietetic Association.** Examples include **calcium, phosphorus and magnesium**.
- In contrast, the body needs **smaller amounts of trace minerals**, usually less than 20 milligrams. Examples of trace minerals include **fluoride, chromium, iodine, iron, chromium and zinc.**
- Good mineral sources include **milk, leafy vegetables and meat**.

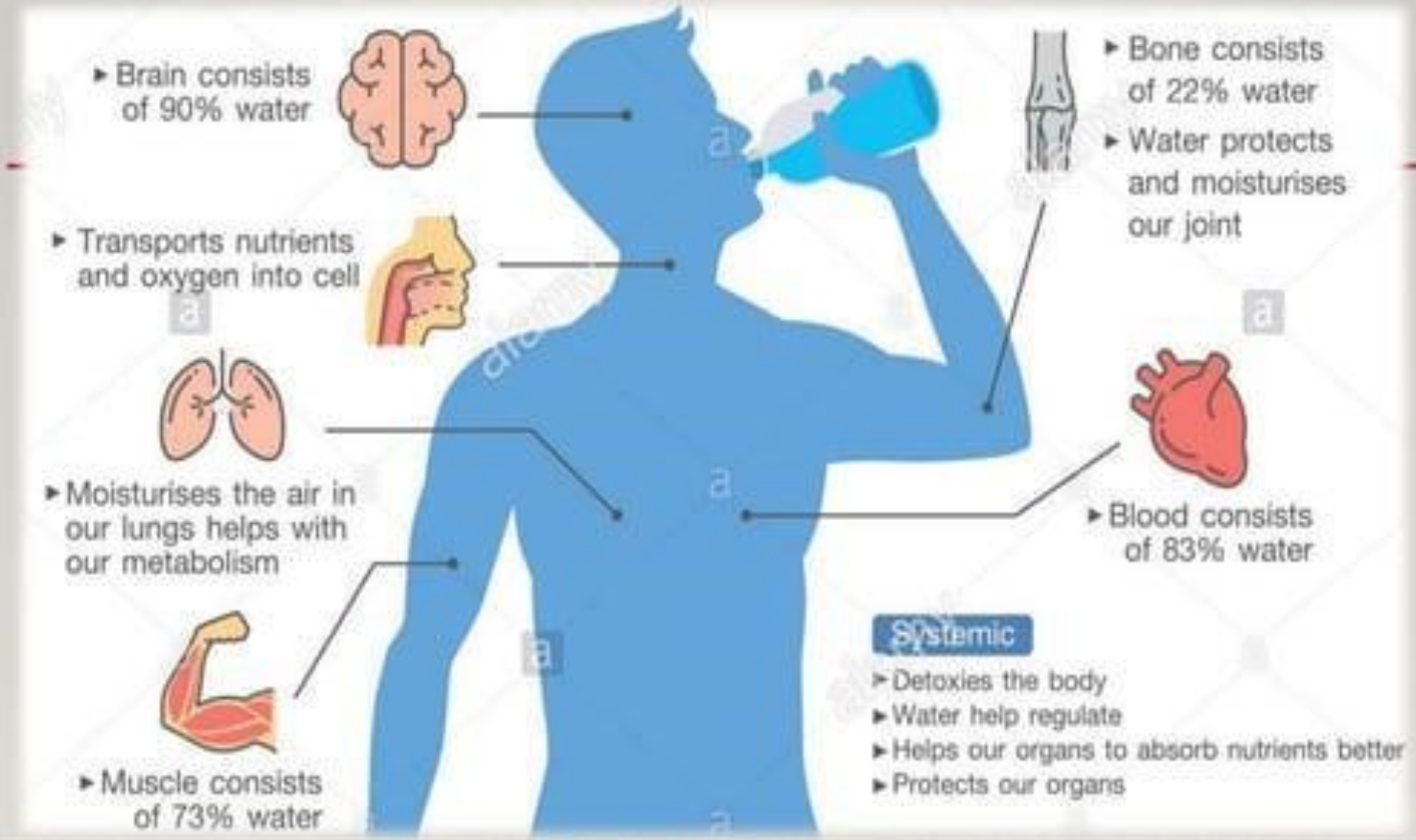
FUNCTION OF MINERALS

MINERALS	FUNCTIONS / BENEFITS	FOOD SOURCES
Calcium	Builds bones, teeth, helps blood clot, assists nerves, muscles & heart to function	Milk, cheese, yogurt, buttermilk, tofu
Phosphorous	Builds teeth and bones, helps body get energy from foods	Milk, milk products, meat, fish, poultry, eggs, nuts, dried peas & beans
Iron	Forms part of red blood cells, helps body get energy from foods	Liver, organ meats, egg yolk, meat, poultry, oysters, whole-grain & enriched breads & cereals, dried peas & beans
Sodium	Controls water balance, regulates nerve impulses & muscle contractions	Salt, meat, fish, poultry, milk, and milk products
Potassium	Helps control water balance, regulates nerve impulses, muscle contractions & heart rhythm	Fruits, vegetables, meat, fish, poultry, milk and milk products
Iodine	Regulates energy	Seafood, iodized salt
Magnesium	Part of teeth & bones, helps body use carbohydrates, helps to regulate nerve & muscle contractions	Whole-grain cereal, nuts, dried peas & beans, milk, meat, leafy greens
Copper	Builds body cells, aids digestion & absorption, lubricates joints & organs, regulates body temperature	All liquids- water, coffee, tea, soft drinks, fruit & vegetable juices, milk, ice

6. WATER

- Every cell and nearly all life-sustaining body processes require water to function.
- The American Dietetic Association estimates that it accounts for **45 to 75 percent of body weight.**
- The average adult loses 2.5 quarts or more of water daily through perspiration, urination, bowel movements and breathing. For optimal hydration, the Institute of Medicine recommends an average intake of 3.7 liters for adult males and 2.7 liters for women, which should come from food and beverages.
- A person should takes **6-8 glasses of water per day**.

SOME FACTS ABOUT WATER



Functions of Water in Human Body

- Hydrates Brain Cells
- Lubricate skin and tissues
- Helps Digestion and Metabolic functions
- Eliminates Toxins
- Provides elasticity to Muscles and Joints
- Reduces Water Retention
- Generates Energy
- Oxigenates Blood and Lungs
- Fluidifies Blood and reduce Arterial Pressure
- Regulates Body Temperature
- Prevents Loss of Calcium

CONCLUSION

- ✓ Proteins, carbohydrates and fats are called "Proximate Principles". They are oxidised (i.e. burnt) in the body to provide energy to the body to carryout all activities of life.

- ✓ In addition to water, which is also a necessary dietary element, proximate principles form the main bulk of the diet. Vitamins and mineral salts do not supply energy, but they play an important role in the regulation of several essential metabolic processes in the body.


Thank you!