# Ratna Sagar

RATNA SAGAR | PRIMUS | BYWORD | E-LIVE

**Education, Our Mission**

As per the latest ICSE syllabus

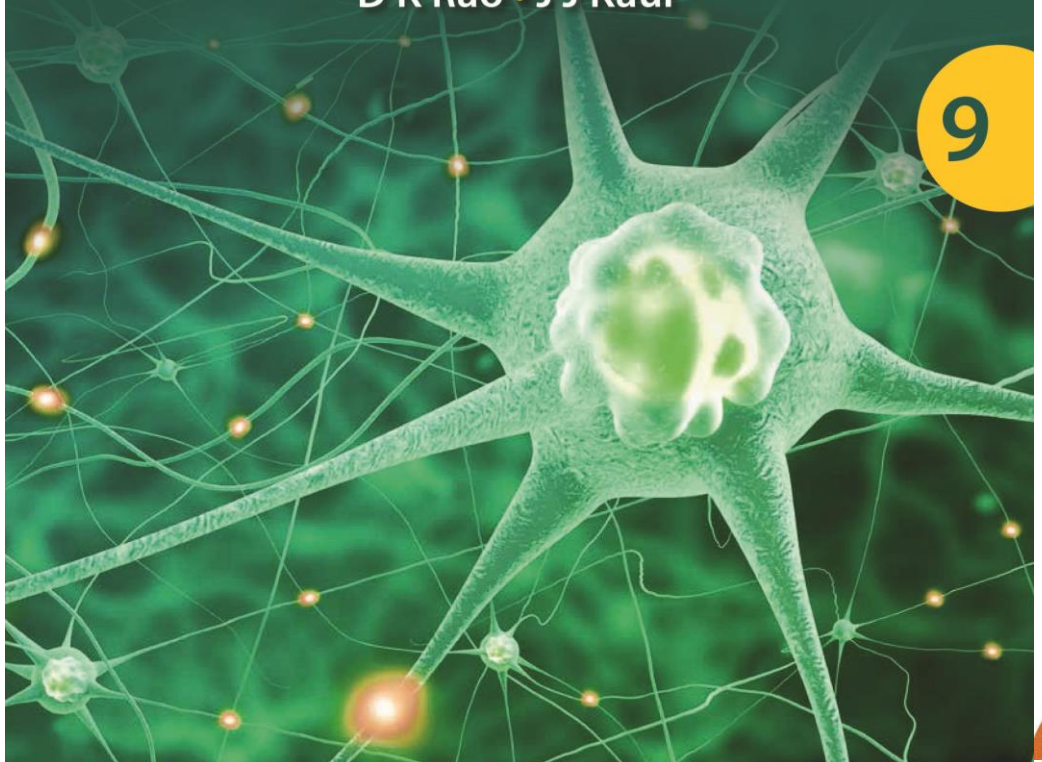
Rama Sagar
Education, Our Mission!

Revised and Updated

# LIVING SCIENCE BIOLOGY

D K Rao • J J Kaur

9



# ICSE
# Living Science
# Biology

## Class 9

## Chapter 9 Nutrition

## LEARNING OBJECTIVES

**Classes of food**

- **Carbohydrates**
- **Fats**
- **Proteins**
- **Minerals**
- **Vitamins**
- **Water**

**Balanced diet**

**Deficiency diseases**

- **Protein-Energy Malnutrition (PEM) or Protein-Calorie Malnutrition (PCM)**

## What is nutrition?

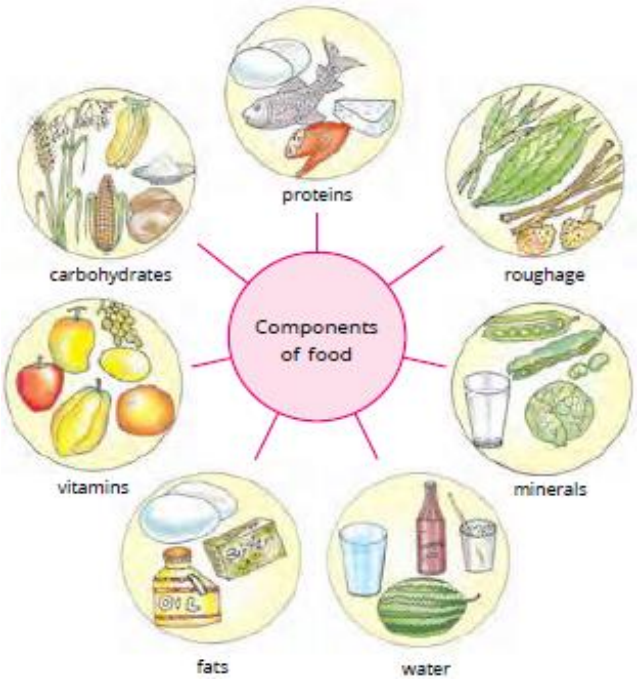
**Nutrition** is the process of providing or obtaining necessary food materials consisting of essential inorganic and organic compounds like proteins, vitamins, etc., for growth, maintenance and survival. A **nutrient** is an organic or inorganic chemical substance which nourishes our body. A nutrient supplies energy to the body, builds and repairs body tissues, and regulates body processes.

## Classes of food

There are six classes of food nutrients as under:

**1.** Carbohydrates **2.** Fats **3.** Proteins **4.** Minerals **5.** Vitamins **6.** Water

According to their requirement in the body, these nutrients can be classified into three main groups:




❖ **Body-building food:** These are **protein-rich food** which help in cell growth and repair, for example, pulses, legumes, nuts, oilseeds, milk, eggs (egg white), fish, poultry, meat and so on.

❖ **Energy-providing food:** These are the food **rich in carbohydrates and fats**, and provide energy on oxidation in the body, for example, fats (ghee and oil), sugar, jaggery, cereals (like rice and wheat), starches (like potato), etc.

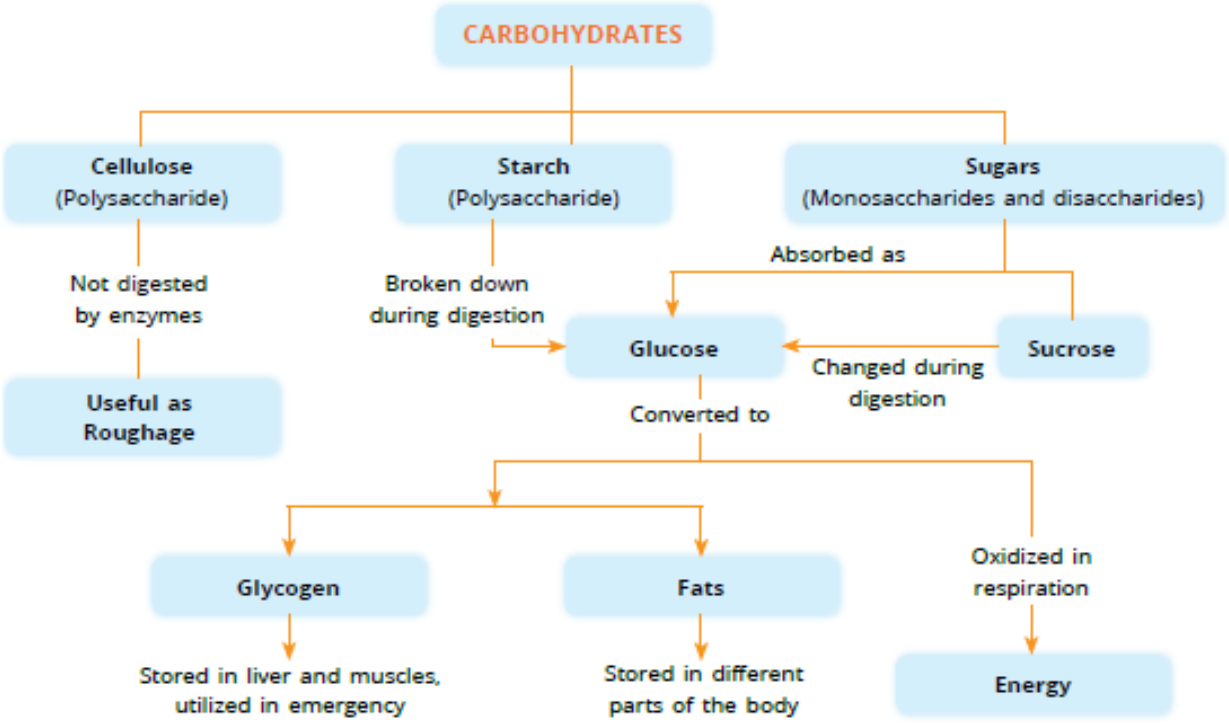

❖ **Protective food:** These are **rich in vitamins and minerals**. They regulate the internal metabolism of the body, for example, *amla*, guava, orange, citrus, tomato, green leafy vegetables and dietary fibres.

## Carbohydrates

Carbohydrates are the chemical compounds made up of carbon, hydrogen and oxygen with hydrogen and oxygen always in the ratio of 2:1. The basic unit of carbohydrates is monosaccharide. Carbohydrates when **oxidized** in the cells, **release energy**. They are the **cheapest source of energy**.

## Types of carbohydrates

There are three types of carbohydrates in our food. These are sugars, starch, and cellulose.



## Functions of carbohydrates

**1.** Carbohydrates are a quick and **economical source of energy**. 1g of carbohydrate yields about 4.1 kcal of energy.
**2.** Excess carbohydrates when converted into glycogen serve as a '**reserve source of energy**' and produce energy during emergency.
**3.** Ribose and deoxyribose sugars are important components of nucleic acids (DNA and RNA).
**4.** Cellulose provides bulk of the food which facilitates elimination of waste products.
**5.** Glucose is the only source of energy for the central nervous system.

## Fats

Like carbohydrates, fats also contain carbon, hydrogen and oxygen, but differ from carbohydrates in that fats contain more carbon and hydrogen and less oxygen. Fats are insoluble in water but soluble in solvents like acetone, benzene and chloroform.

## Sources of fats

We obtain fats from food items like butter, ghee, cheese, cooking oils like groundnut oil, coconut oil, mustard oil, milk, egg yolk, meat, nuts and soybean. **The fats which we eat in our diet are called dietary fats**.

## Functions of fats

**1.** Fats are the **richest source of energy** in our body.
**2.** Fats are **essential for absorption of fat-soluble vitamins** A, D, E and K.
**3.** Subcutaneous (fat under skin) fat **acts as an insulator and protects against cold weather and pressure by retaining body heat**.
**4.** Fats **provide padding around the vital organs**.
**5.** Fats can be stored in the body for subsequent uses, when there is a need of energy to the body.
**6.** Fats help in the synthesis of vitamin D, and sex and adrenal hormones (steroid hormones).

## Saturated and unsaturated fats

Saturated and unsaturated fats depend upon the type of fatty acids they are composed of. Saturated fats have melting points higher than room temperature, which makes them solid at room temperature. *Vanaspati* ghee and butter are examples of saturated fats.
The melting point of unsaturated fats is less than the room temperature, which makes them liquid at room temperature. Unsaturated fatty acids occur in vegetable oils like mustard, groundnut, sunflower, etc.

## Proteins

Proteins are the large molecules of amino acids arranged together in complex arrangements. Proteins are the **building material of our body**. **We need proteins for growth and repair of the body.** Like carbohydrates and fats, proteins also contain carbon, hydrogen and oxygen. **However, unlike carbohydrates and fats, proteins contain nitrogen and provide much of the body's nitrogen.**

## Sources of proteins

The plant sources of proteins are beans, groundnuts, whole cereals like wheat and maize, legumes and pulses. The best sources of animal proteins are fish, eggs, lean meat (without fat), milk and milk products. Severe deficiency of protein in the diet of young children causes **kwashiorkor**.

## Functions of proteins

**1.** Proteins **act as a structural component of the body**. Proteins are found in skin, bones, hair, muscles, blood vessels, blood, etc.
**2.** Proteins are used **for building and maintaining body tissues**.
**3. Many proteins act as enzymes.**
**4.** Some proteins **act as hormones** and regulate many body functions.
**5.** Some proteins **act as antibodies**.

**6.** Proteins also **act as transport proteins** which carry different substances from the blood to the various tissues of the body. **Haemoglobin in blood is one such example of transport proteins.**
**7. Protective proteins help fight infection** in our body.

## Minerals

A mineral is an inorganic element occurring in the form of its salt, for example, calcium, potassium, sodium, phosphorus, iron, copper, magnesium, etc. Our body needs many minerals.

❖ **Major minerals or macrominerals:** These minerals are needed in relatively large amounts in our diet – over 100 mg per day. For example, calcium, magnesium, phosphorus, potassium, sodium and sulphur.

❖ **Trace minerals or trace elements:** These minerals are needed in smaller amounts, in our diet. For example, chromium, cobalt, copper, fluorine, iodine, iron, manganese, molybdenum, selenium and zinc.

## Functions of minerals

**1.** Minerals are **structural components** of bones, soft tissues, teeth, muscles and blood.
**2.** They are **needed for proper growth**, normal functioning and good health of our body.

**3.** They are needed for the **formation of red blood corpuscles** and **coagulation of blood**, functioning of muscles, nerves and thyroid gland.
**4.** They help in maintaining the acid-base balance and water balance of the body fluids.

## Vitamins

Vitamins are complex organic chemicals that are needed in our food in small quantities.

❖Most vitamins are obtained through food, however, some are also produced by bacteria in the intestine.

❖ Only two vitamins, vitamins A and D, can be made in our body.

❖ There is no food that contains all vitamins in the right amount, therefore, we should eat a varied and balanced diet.

## Functions of vitamins

**1.** Minerals are Vitamins are essential for growth, good health, proper vision, normal digestion process and synchronized activities of our body.
**2.** Vitamin B12 is important for producing new blood cells.
**3.** Vitamin B1 helps the body to breakdown the carbohydrates.
**4.** Vitamin D helps in absorption of calcium and phosphorus in our body.

## Water

Water is an inorganic substance made of hydrogen and oxygen. It is an essential nutrient for our survival. One can live without food for a longer time than one can without water. Our body contains about 70% water.

## Functions of water

**1.** It is a medium through which other nutrients and essential elements are distributed to various cells of the body.
**2.** It serves as a lubricant (the presence of water in and around body tissues defends the body from shock).
**3.** It participates in the body's biochemical processes, especially metabolism of proteins and carbohydrates to absorbable forms.
**4.** It helps in smooth movement of food through the digestive tract.
**5.** It helps in the removal of body wastes.
**6.** It regulates the body temperature by sweating and evaporation, i.e. thermoregulation.

## Balanced diet

A diet which contains all the nutrients like carbohydrates, fats, proteins, minerals and vitamins, water and roughage in adequate amounts for energy, growth, repair and regulation of various body processes is called a balanced diet.

## Deficiency diseases

Deficiency of any of the essential nutrients in our diet may cause a disease. Since the disease arises due to the deficiency of a nutrient, it is called a **deficiency disease**. The deficiency disease may be:

- ❖ Protein deficiency disease or protein-energy malnutrition (PEM)
- ❖ Vitamin deficiency disease
- ❖ Mineral deficiency disease

## Protein-Energy Malnutrition (PEM) or Protein-Calorie Malnutrition (PCM)

The children between the age group of 1 to 3 years are mostly affected by this. Protein-Energy Malnutrition occurs due to two reasons:

- ❖ Lack of proteins or carbohydrates and fats or all.
- ❖ Less intake of proteins than carbohydrates.

Protein-Energy Malnutrition causes two diseases– marasmus and kwashiorkor.

## Marasmus

The marasmus disease affects infants (under 1 year of age). Children who do not take sufficient food suffer from this disease. Marasmus develops when a diet is poor in energy giving foods like carbohydrates, fats and proteins.

*Symptoms*

- ❖ Body becomes lean and weak.

❖ Skin becomes dry, thin, wrinkled and shows loose folds as the layer of fat below the skin disappears.
❖ Ribs become very prominent. Thin face and limbs.

*Prevention and cure*

❖ Marasmus can be cured by giving the child adequate quantities of protein, carbohydrate and fat in the diet.
❖ In absence of mother's milk, even cow's milk can be given. This will provide a child appropriate food materials.

a. child affected with kwashiorkor  b. healthy child  c. child affected with marasmus

## Kwashiorkor

If the diet is deficient in proteins, then the child will suffer from kwashiorkor.

*Symptoms*

❖ Stunted growth and loss of appetite,  Protruding belly and bulging eyes.
❖ Oedema occurs due to retention of water.
❖ Skin becomes dry and scaly and hair become reddish.
❖ Disease resistance is lower and the child may suffer from anaemia.
❖ The liver becomes enlarged; vomiting and diarrhea are very common.
❖ Prolonged disease causes mental retardation.

*Prevention and cure*

❖ A protein-rich diet should be given to children.  Animal protein is found to be more effective than plant protein in the cure of kwashiorkor.

## SUMMARY...

❖ Food is a nutritive substance consumed by an organism for growth, doing work, building new body substances, repair of worn-out tissues and maintaining the life processes.

❖ The major components of our food are carbohydrates, fats, proteins, minerals, vitamins, water and roughage.

❖ Carbohydrates and fats supply energy. Proteins are the functional and structural materials of the body. Vitamins, minerals and water help to regulate the different body processes. Roughage helps in elimination of solid waste from our body.

❖ Carbohydrates are the chemical compounds of carbon, hydrogen and oxygen. They are the cheapest source of energy.

❖ Proteins are the large molecules of amino acids. They are building material of our body, and help in growth and repair.

❖ Fats are the richest source of energy.

❖ A mineral is an important inorganic element, occurring in the form of its salt. Deficiency of minerals causes many diseases in our body.

❖ Vitamins are organic compounds essential for growth, good health, proper vision, normal digestion process, etc.

❖ Water is an inorganic substance made of hydrogen and oxygen.

❖ Roughage is the fibrous material present in some food items and consists mainly of the indigestible plant carbohydrates called cellulose.

❖ A diet which contains all nutrients in adequate amounts for energy, growth, repair and regulation of various body processes is called a balanced diet.

❖ A balanced diet is related to the state of one's age, health and occupation. It is high for growing children, pregnant women and lactating mothers.

❖ The diseases that arise due to the deficiency of a nutrient is called a deficiency disease.


RATNA SAGAR
PRIMUS
BYWORD
E-LIVE
THANK
YOU