

MODULE.01

Biomolecules and their Applications.

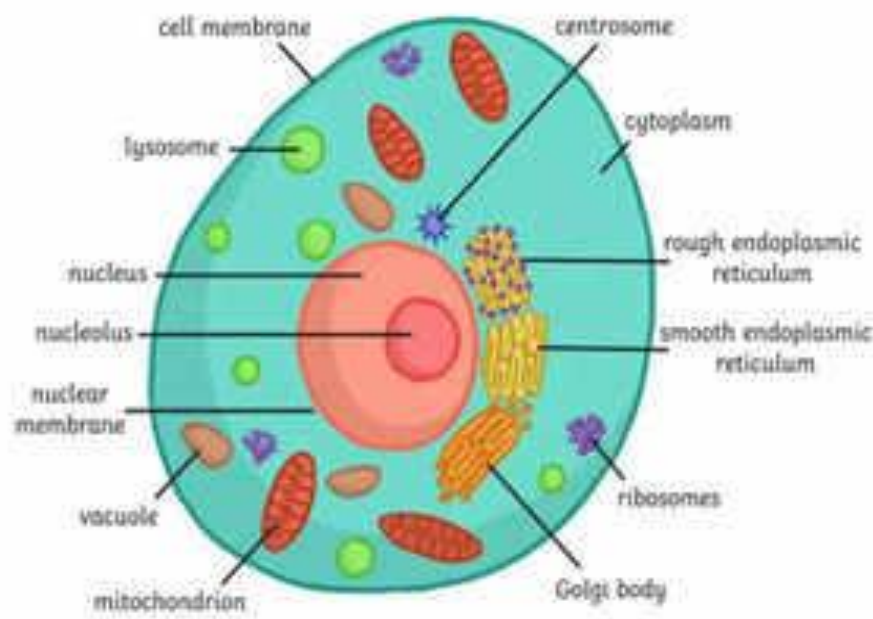
1. Explain in brief about structure and function of a cell.

The cells are the structural and functional units of life in the biological system. Robert Hooke discovered the cell in 1665. All organisms are made up of a single cell or many cells called unicellular or multicellular respectively.

Cells are of two types:

1. Prokaryotic cells: Prokaryotic nucleus is not well defined, and not covered by nuclear membrane.

2. Eukaryotic cells: The eukaryotic nucleus is well-defined and enveloped by nuclear membrane.



The cell structure comprises many components with a specific function. The components are the Cell wall, Cell membrane, Cytoplasm, nucleus, and cell organelles....

Cell membrane: it supports and protects the cell. It is composed of lipids, proteins, and

Carbohydrates: It controls the movement of substances in and out of the cell and separates the cell from the external environment.

Cytoplasm: It is a thick, clear, and jelly-like structure present inside the cell membrane. Most of the chemical reaction takes place in the cytoplasm. Cell organelles are suspended in the cytoplasm

Nucleus: It contains hereditary material like DNA called chromosomal it is enveloped by a nuclear membrane

Endoplasmic Reticulum: It is a tubular structure scattered in the cytoplasm. It transports substances throughout the cell. They are smooth Endoplasmic reticulum without ribosomes and similarly, rough endoplasmic reticulum attached by ribosomes. They are involved in the metabolism of carbohydrates, and the synthesis of lipids, and steroids.

Nucleolus: It is the site of ribosome synthesis is controls cellular activities and cellular production.

Golgi Bodies: They are flat disc-shaped sacs that pack the materials and deliver them within the cell or secreted out of the cell. They are sites of the formation of glycoproteins and glycolipids.

Lysosomes: They are called cell suicide bags. They are membranes bounded by vesicular structure. They are hydrolytic enzymes. carbohydrase, lipases, proteases, and hydrolases digest carbohydrates, lipids, proteins, and nucleic acids respectively.

Ribosomes: They are not bounded by membranes prokaryotic ribosomes are 70S Eukaryotic ribosomes are 80S. It is made of two subunit 80S subunits 60S and 40S.

70S subunits are 50S and 30S. They are the protein synthesis of cells.

Mitochondria: They are called powerhouses of the cell and produce ATP

Chloroplast: They are the organelles for photosynthesis.

Vacuoles: They are membranes bounded space in the cytoplasm and store good water and excretory products.

Functions of cell: They provide structure and support

- Facilitate growth by mitosis.
- Allows transport of substances.
- Energy production.
- Aids in reproduction.

2. What are Stem cells and mention its applications?

They are biological cells found in all multi-cellular organisms they can multiply themselves by mitosis. They are classified into two types

Embryonic stem cells: They are found in blastosis as inner cell mass.

Adult stem cells: Found in various tissues. Stem cells are also called Toti Potential cells.

Applications:

- They are helpful in wound healing.
- They are helpful in drug delivery.
- They are helpful in 3D bioprinting.
- They are helpful in muscular degeneration.
- They help treat disabilities.

3. What are biomolecules? Explain in brief about different types of Biomolecules.

Biomolecules are essential organic molecules. They are the building blocks of living organisms and play an important role in many biological processes.

Types of Biomolecules: 1. Carbohydrates. 2. Lipids 3. Proteins 4. Nucleic Acids.

Carbohydrates: These are the Organic molecules of Carbon, Hydrogen, and Oxygen. Carbohydrates are the main source of energy for the body. They are found in grains, fruits, and vegetables.

Lipids: These are Organic molecules that are insoluble in water. They Include fats, oils, waxes, and steroids. Lipids reserve energy, provide insulation, and are important components in cell membranes.

Proteins: These are Organic molecules made up of Amino acids. Proteins perform a variety of functions in the body. Proteins provide structures to the cells, transporting to the molecules and catalyzing Chemical reactions. Proteins are found in meat, Dairy products, and beans.

Nucleic acids: These are the organic molecules that store genetic information. They include DNA (deoxyribonucleic acids) and RNA (ribonucleic acid). DNA is the genetic material that is passed from one generation to the next, while RNA is involved in the synthesis of proteins. All of these biomolecules are essential for life and are found in all living organisms. They interact with each other in complex ways to carry out the functions that are necessary for life.

4. What are enzymes mention the functions and properties of enzymes.

Enzymes are proteins that speed up chemical reactions in living organisms which convert substrate to product. Enzymes play an important role in metabolism.

Functions of Enzymes: (a) Enzymes are proteins that help to speed up chemical reactions in our body.

- (b) Enzymes are essential for digestion, liver function, and much more.
- (c) Too much or too little of certain enzymes can cause health problems
- (d) Enzymes in our blood can also help healthcare providers check for injuries and diseases.

Properties of Enzymes:

- (a) Enzymes are complex macromolecules with high molecular weight.
- (b) Enzymes actively decrease with an increase in temperature.
- (c) They are highly specific in their action.
- (d) They are inhibited by inhibitors.
- (e) Enzymes are affected by Ph
- (f) An enzyme contains a highly precise area(active site) with which the substrate interacts to produce the desired products.

Applications of Enzymes: (1) Enzymes are used to produce food products and beverages.

- (2) Used to produce biofuels.
- (3) Used to produce biopharmaceuticals and other products.
- (4) Used in diagnostic tests and as therapeutic agents for treating disease.
- (5) Enzymes are used in industries such as baking, brewing, detergents, and fermented products.
- (6) Used in industries to produce textiles and leather products.

5. What are Vitamins mention the functions , properties and applications of Vitamins.

Vitamins are a group of substances/nutrients that are needed for normal cell function, growth, and development of the cell.

Functions of Vitamins: (a)Vitamins help to maintain healthy teeth and bones. soft tissues, mucous membranes, and skin

- (b) Vitamins play a key role in metabolism
- (c) Vitamins are helpful in wound healing.
- (d) Vitamins boost the immune system
- (e) Vitamins Catalyze important chemical reactions in our cells.

Properties of Vitamins:

- (1) Vitamins are the Organic low molecular weight substances that have key role in metabolism.
- (2)Vitamins have diverse biochemical functions.
- (3)Vitamins are soluble in fats and fat solvents.
- (4)Vitamins are insoluble in water

(4) Vitamins destroy when exposed to sunlight.

(5) Loss of Vitamins in cooking, canning and freezing of food stuffs is small.

Applications of vitamins: (1) Vitamin A supports normal vision and skin health, and plays a role in normal immune system.

(2) Vitamins are important for energy production, metabolism of proteins, Carbohydrates. And Red blood cell formation

(3) Promotes healthy aging

(4) Vitamins reduce Anxiety and stress

(5) Vitamins boost cardiovascular system.

(6) Vitamins cover nutritional bases in the body.

(7) Vitamins keep the body in good working condition

(8) Vitamins improve the eye sight.

(9) Vitamins are very important to maintain normal nervous system function.

6. What are hormones? mention the functions, properties and applications of hormones.

Hormones : These are the chemical substances that act like messenger molecules in the body.

Functions of Hormones:

(a) These play a vital role in metabolic activities in the body.

(b) It helps in growth and development of the body.

(c) Hormones are the key factors in cognitive function and mood of living system

(d) In maintaining body temperature

(e) It maintains sleep-wake cycle

(f) Play a main role in Reproduction and sexual functions

Properties of Hormones: (1) They have a low molecular weight, thus they can easily pass through capillaries.

(2) Hormones always act in low concentration.

(3) They are soluble in water so that they can be transported via blood.

(4) Hormones are non-antigenic.

(5) Hormones regulate the behaviour of target cells.

Uses of Hormones: (1) Hormones carry messages through blood to organs, skin, muscles, and other tissues.

(2) Used to treat certain symptoms of menopause.

(3) Hormone Insulin is necessary for the cells in the body to properly use the glucose in blood stream.

(4) Hormones play a very important role in plant's body and facilitate processes like vernalisation, phototropism, seed germination.

(5) Surges in hormones like Oxytocin and Dopamine can drive feelings of happiness and contentment.