RA1911031010021

(ANIMAL CELL)

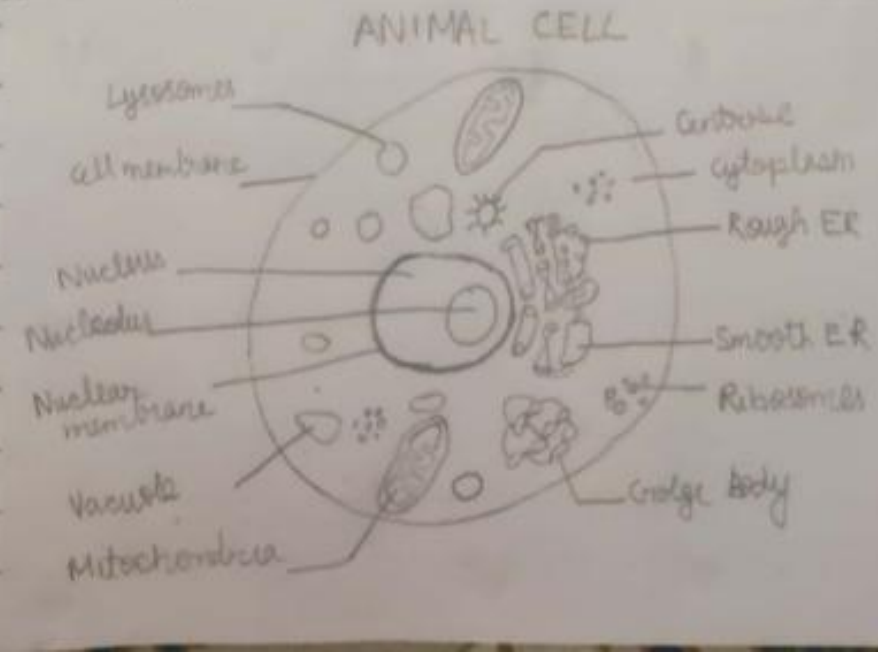
- **What is cell?**

Cell is the basic membrane bound unit that contains the fundamental molecules of life and of which all living things are composed. A single cell is often a complete organism in itself such as yeast. Other cells acquire specialized functions as they mature. These cells cooperate with other specialized cells and become the building blocks of large multicellular organisms, such as humans.

- **What is a cell composed of?**

1. **CELL/PLASMA MEMBRANE:**

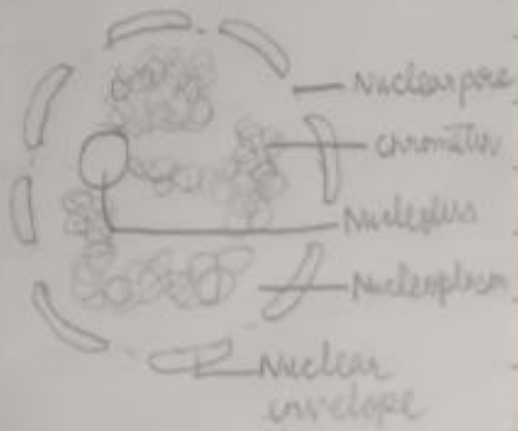
The outermost layer of the living cell that gives structure & shape is the cell membrane. The chief function is to regulate the passage of materials into and out of the cell. Initial structural studies using electron microscope revealed that it consists of inner & outer dense protein layer enclosing a less dense phospolipid layers. The flexibility of the cell membrane also enables the cell to engulf in food.



2. NUCLEUS AND NUCLEOLUS:

The nucleus is a round/oval body lying in the centre of the cell enclosed by a double membrane known as the nuclear membrane / or envelope. The outer membrane of the nuclear envelope is continuous with the endoplasmic reticulum & thus, facilitates the passage of materials from the nucleus directly into the channels of endoplasmic reticulum.

Within the nucleus, one or more nucleoli may be seen. These are dense bodies containing the sub-units for the ribosomes, the cytoplasmic organelles involved in the synthesis of protein. The nucleolus is involved in the assembly & synthesis of ribosomes. The nucleus is the storehouse of the genetic material i.e chromosomes.



3. CYTOSKELETON:

It is a cellular 'skeleton contained within the cytoplasm & is made of protein. It has structures such as flagella, cilia & lamellipodia & plays important roles in both intracellular transport & cell division.

4. CENTRIOLES:

These are present as pair of cylindrical rods. They lies above the nuclear membrane and are in ⊥ form of a cross. They play a role in the formation of the spindle apparatus which is essential for both mitosis and meiosis.

5. MITOCHONDRIA:

It is referred to as the Powerhouse of the cell. These are rounded or long shaped organelles that are particularly prominent in cells with high metabolic activity. They have a double wall: an outer smooth membrane which forms the outer boundary and inner membrane which is extensively folded. Their folds have a variety of enzymes embedded in them. They are responsible for the breakdown of sugar molecules to release ATP. The mitochondria contains its own DNA & ribosomes.

6. ENDOPLASMIC RETICULUM (ER):

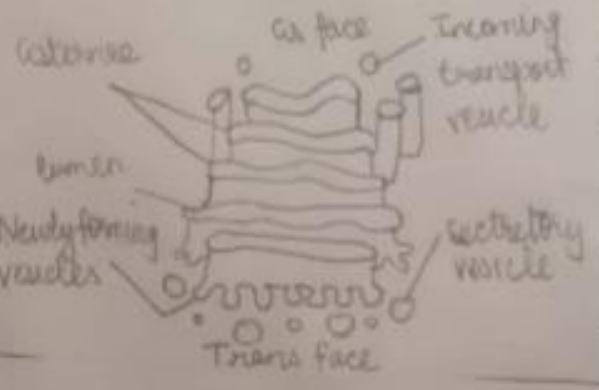
The endoplasmic reticulum is a large network of membrane-bound tubes and sheets. It looks like long tubules or round or oblong bags. The ER membrane is similar in structure to the plasma membrane. There are two-types of ER - Rough ER (RER) and Smooth ER (SER).
RER looks rough under a microscope because it has particles called ribosomes attached to its surface. The ribosomes, which are present in all active cells are the sites of protein manufacture. The manufactured proteins are then sent various places in the cell depending on need, using the ER. The SER helps in the manufacture of fat molecules, or lipids, important for cell function. Some of these proteins and lipids help in building the cell membrane. This process is known as membrane biogenesis. Some other proteins and lipids function as enzymes & hormones. Although ER varies greatly in appearance in different cells. It always forms a network system. The ER also functions as a cytoplasmic framework providing a surface for some of the biochemical activities of the cell. The SER plays a crucial role in detoxifying many poisons & drugs in the liver cells of animals.

7. RIBOSOMES:

They are the component of cell that make proteins from the amino acids. These are work horses of protein biosynthesis, the process of translating messenger RNA (mRNA) into protein. The Ribosomes are made up from complexes of RNAs and proteins. Ribosomes are divided into 2 subunits, one larger & another smaller subunit. The transfer RNA (tRNA) binds with the larger subunit while the smaller subunit binds to mRNA. Ribosomes are classified as ribozymes. Since the ribosomal RNA seems to be most important for the peptidyl tranferase activity that links amino acids together.

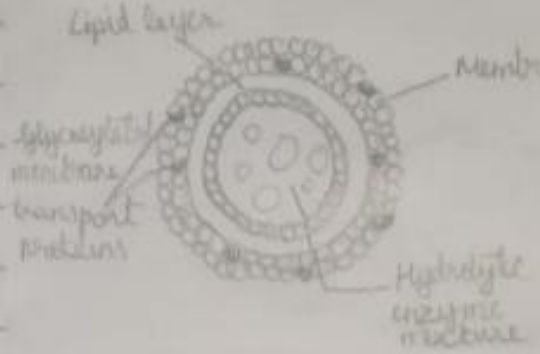
8. GOLGI BODIES / APPARATUS:

They exist as stacks of flattened sacs of vesicles that are continuous with the channels of the smooth endoplasmic reticulum. Their major function is the storage, modification, and packing of materials for release outside the cell membrane. The outer portion of the Golgi apparatus releases its secretory material within membrane-enclosed globules that migrate to the surface of the cell. These may actually be a part of a dynamic system of membranous channels with the cell in which all elements such as the nuclear envelope, the endoplasmic reticulum, the Golgi apparatus, and the cell membrane are connected to each other without sharp boundaries. This interconnected network facilitates transport of materials across the cell.



9. LYSOSOMES:

These are similar to mitochondria but are smaller and consist of a single membrane covering the structure. They contain powerful enzymes that would digest the cellular contents if they were not contained within the impermeable lysosomal membrane. Rupture of this membrane releases these enzymes. The lysosome plays a role in intracellular digestion and may also be important in the destruction of certain structures during the process of development



10. VACUOLES:

These are discrete, clear regions within the cell that contain water & dissolved materials. The vacuole may act as a reservoir of fluids & salts that might otherwise interfere with metabolic processes occuring in the cytoplasm. The membrane enclosing the vacuole is called tonoplase. Many protozoans have a contractile vacuole, which periodically contracts & forces fluids & salts out of the cell. Vacuoles containing digestive enzymes may also be formed around in a variety of cells.