

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Introduction to Cell and its components

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Aims & Objectives

At the end of the lecture, students of 3rd Year MBBS should be able to

80. Define cell

81. Describe structure of cell membrane

82. Describe cell organelles.

Structure of the Cell

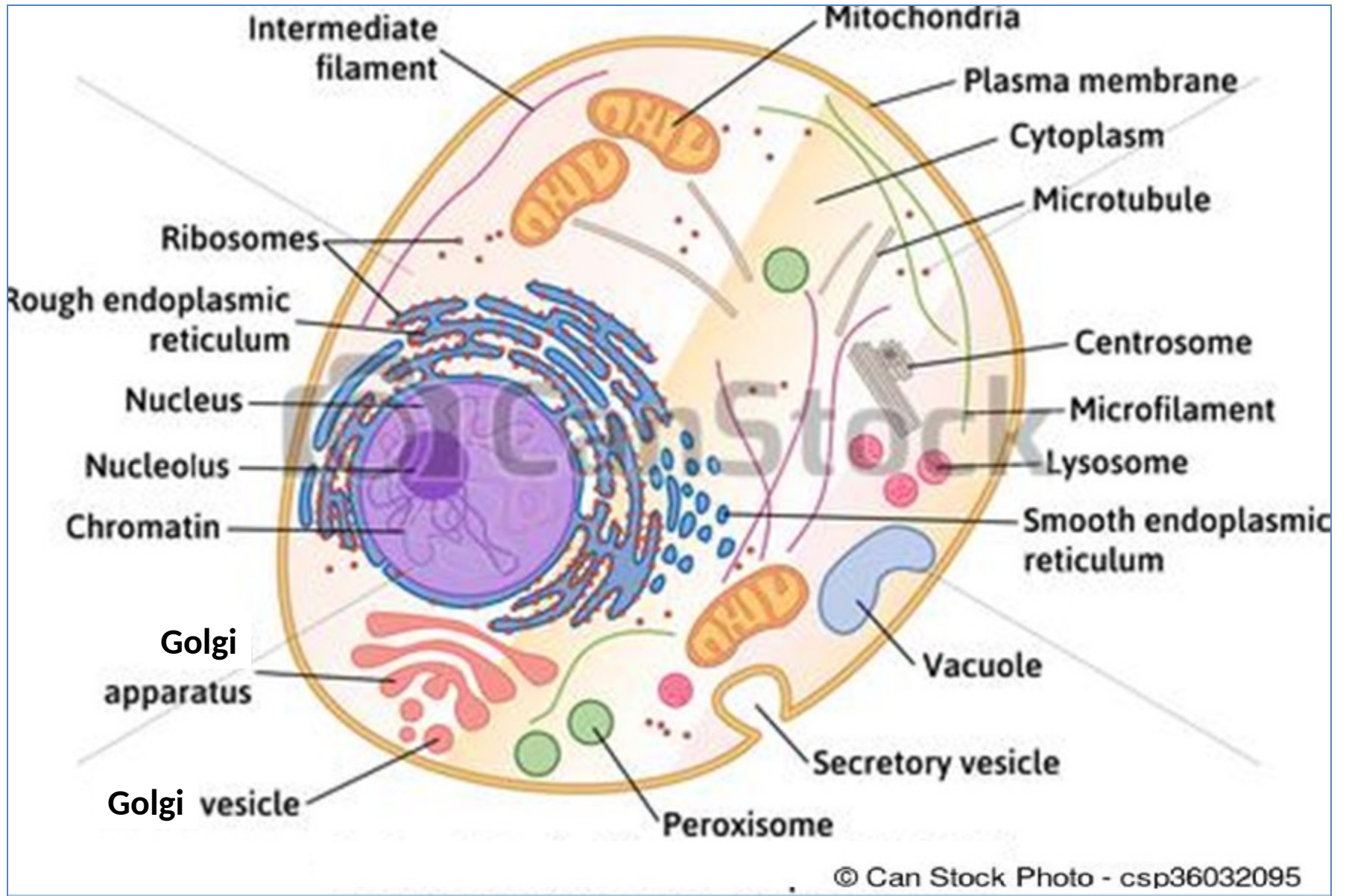
Cell is the structural & functional unit of life.

The cell has three parts.

- Cell membrane
- Cytoplasm and cell organelles
- Nucleus

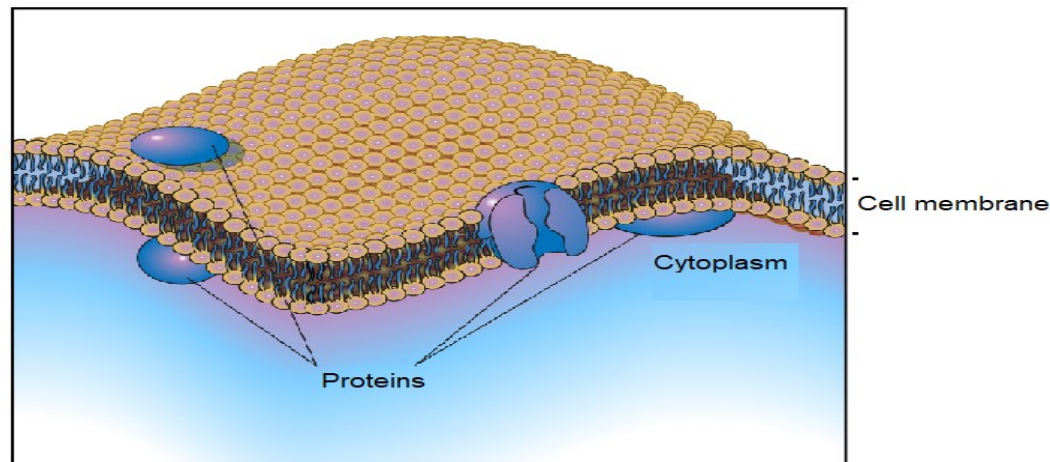
Any damage to these; at any level, can lead to death of cell.

Human cell



Cell membrane

- It is semipermeable lipid bilayer (phospholipids), that separates cell interior from exterior. It regulates the material going in & coming out of cell (passive and active diffusion) through transport proteins.
- Damage to Cell membrane leads to osmotic lysis of cell.



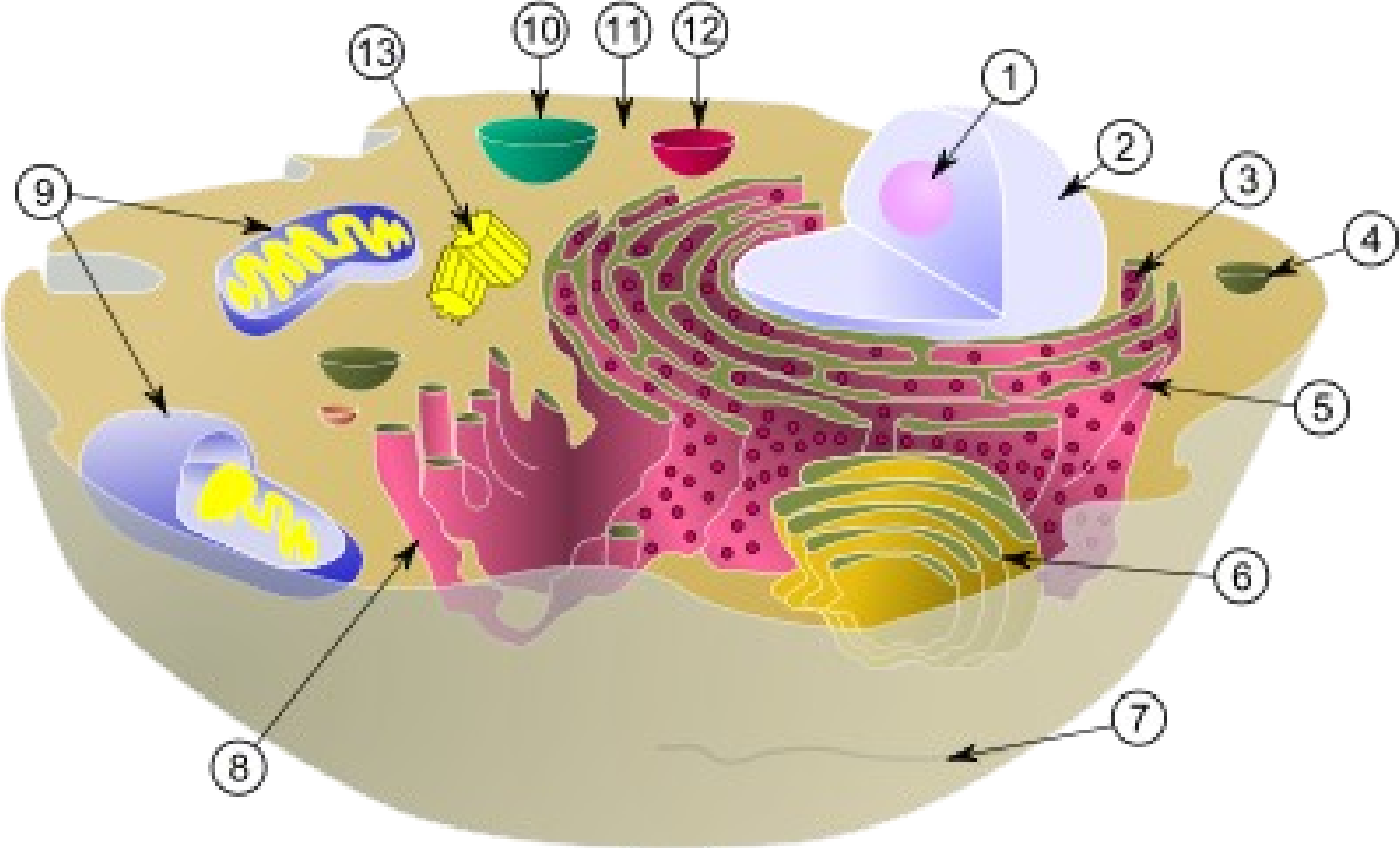
- Transport proteins □ responsible for active transport of ions, nutrients and cell-waste across the plasma membrane □ ***selective permeability***

Cell organelles

- Organelle is a subcellular structure that has a specific function in a cell (like an organ).
 1. **Plasma nucleoli** store genetic informations
 2. **Ribosome** contains rRNA and specific proteins that assemble proteins.
 3. **Mitochondria** has DNA surrounded by membrane bilayer. It is the power house of cell and generates ATPs.

- **Endoplasmic reticulum:** This is the interconnected network of sacs, enclosed in a membrane.
 - **Smooth endoplasmic reticulum** is involved in the synthesis of phospholipids & carbohydrates to build the cell membrane. It is also involved in production of enzymes in liver and synthesis of hormones in brain cells.
 - **Rough endoplasmic reticulum:** Ribosomes are attached on it. It is associated with synthesis of various proteins. It is also involved in production of antibodies and insulin.

centrioles within
Centrosome (13)



5. **Lysosomes**: these are the sacs filled with enzymes.

6. **Golgi Apparatus**: The primary function of the Golgi apparatus is to process and package the macromolecules such as proteins and lipids that are synthesized by the cell. It is particularly important in the processing of proteins for secretion.

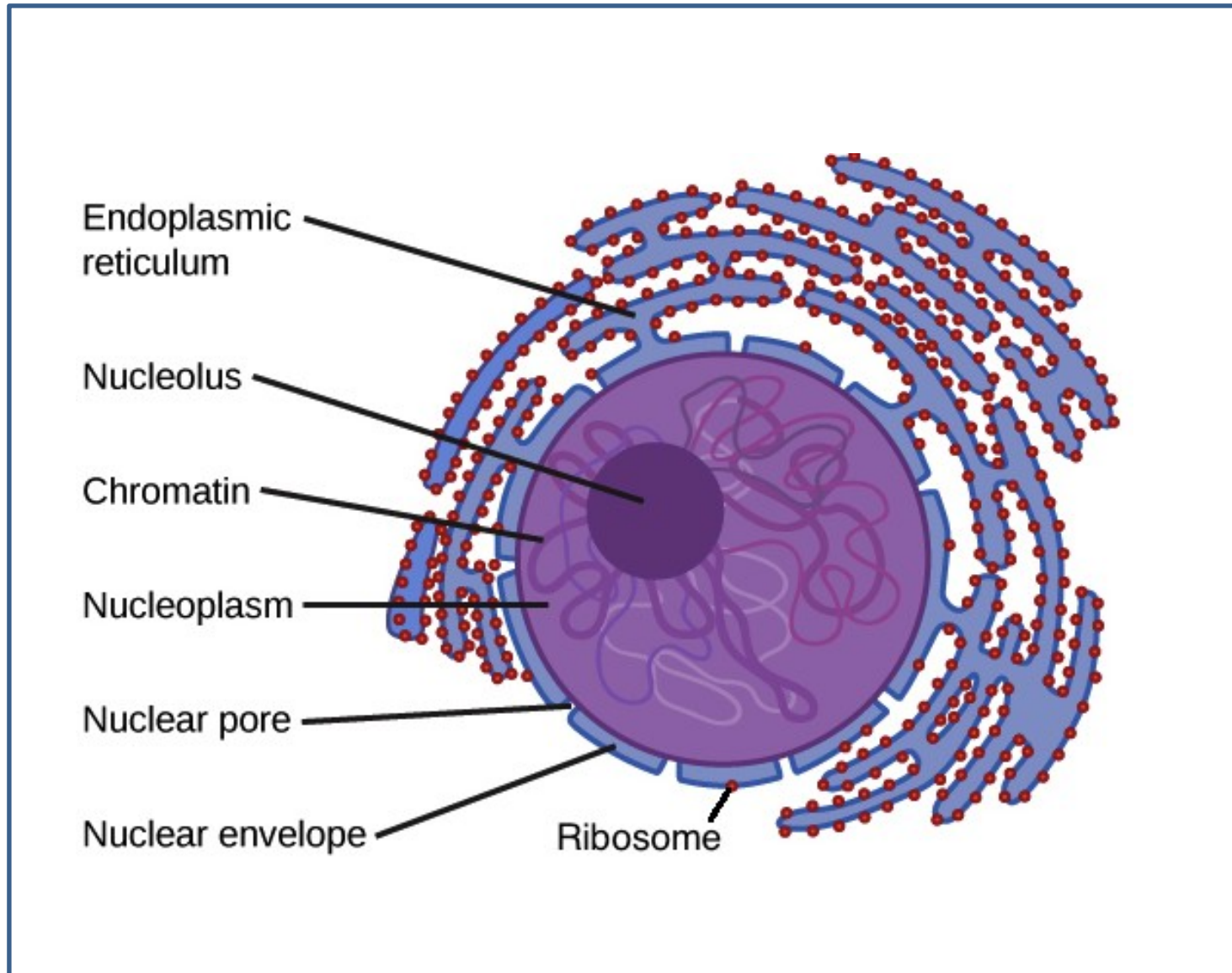
7. **Vacuoles**: Membrane bound spaces filled with fluid, enzymes, cellular waste, food material or water.
8. **Cytoskeleton**: These are microtubules and microfilaments. They spread throughout the cell, and help maintain the shape of cell and its elasticity. It also anchor the nucleus and cell contents.
9. **Centriole**: It contains microtubules that help separate chromosomes during cell division.

10. Cell Nucleus: In eukaryotes, it is enclosed by fibrous filaments (nuclear membrane). It contains nucleoplasm and genetic material organized as DNA along with variety of proteins to form chromosomes. It contains nucleolus.

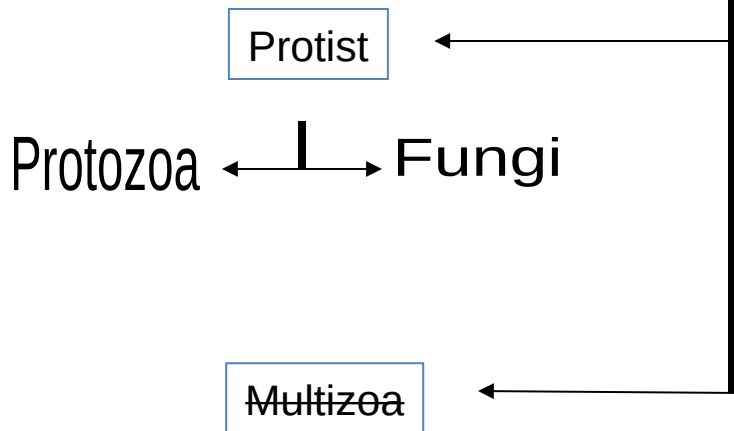
- **Functions:**

- Site for genetic transcription.
- Controls gene expression and mediates replication of DNA during cell cycle.
- nucleolus produces and assemble ribosomes and transcribe genes of rRNA.

Cell Nucleus



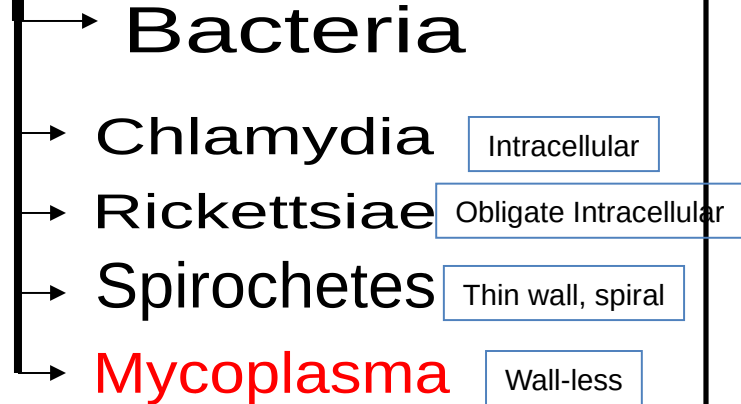
Eukaryotes



Prokaryotes

Archae

Eubacteria



Viruses

