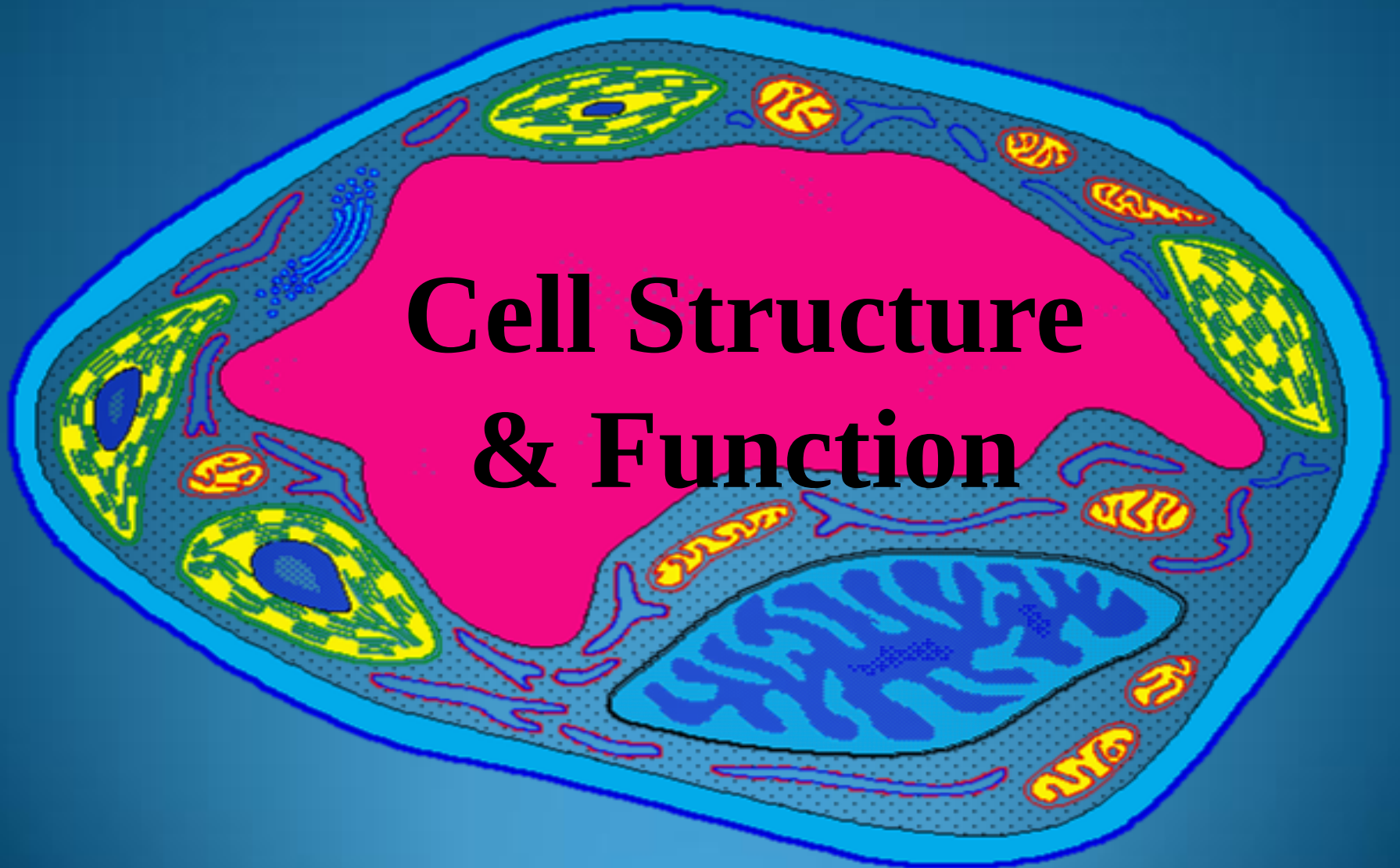


Lec(3)

Cell Structure & Function



Anatomy and Physiology of Animal Cells

All cells have main components:

1. Plasma membrane (Cell Membrane).
2. Cytoplasm.
3. Nucleus.

The Plasma Membrane

- ❖ The semi-permeable double membrane surrounding the cytoplasm of a cell.
- ❖ Membranes that allow certain materials to pass through based on certain properties
 - size
 - hydrophobicity
 - charge

Structures of cell membrane:

1- **phospholipids**: Made up of two layers.

- ❖ Phosphate groups called hydrophilic

- ❖ Lipid groups called hydrophobic

2- proteins: there are two types of protein

1- **Integral protein** that span the membrane and serve as membrane transporter.

form channels for passage of materials, act as receptor sites, function as carrier molecules, and provide identification markers.

2- **Peripheral protein** that loosely attach to the outer side or surface of the cell membrane, acting as enzymes to facilitate interaction with the cell's environment.

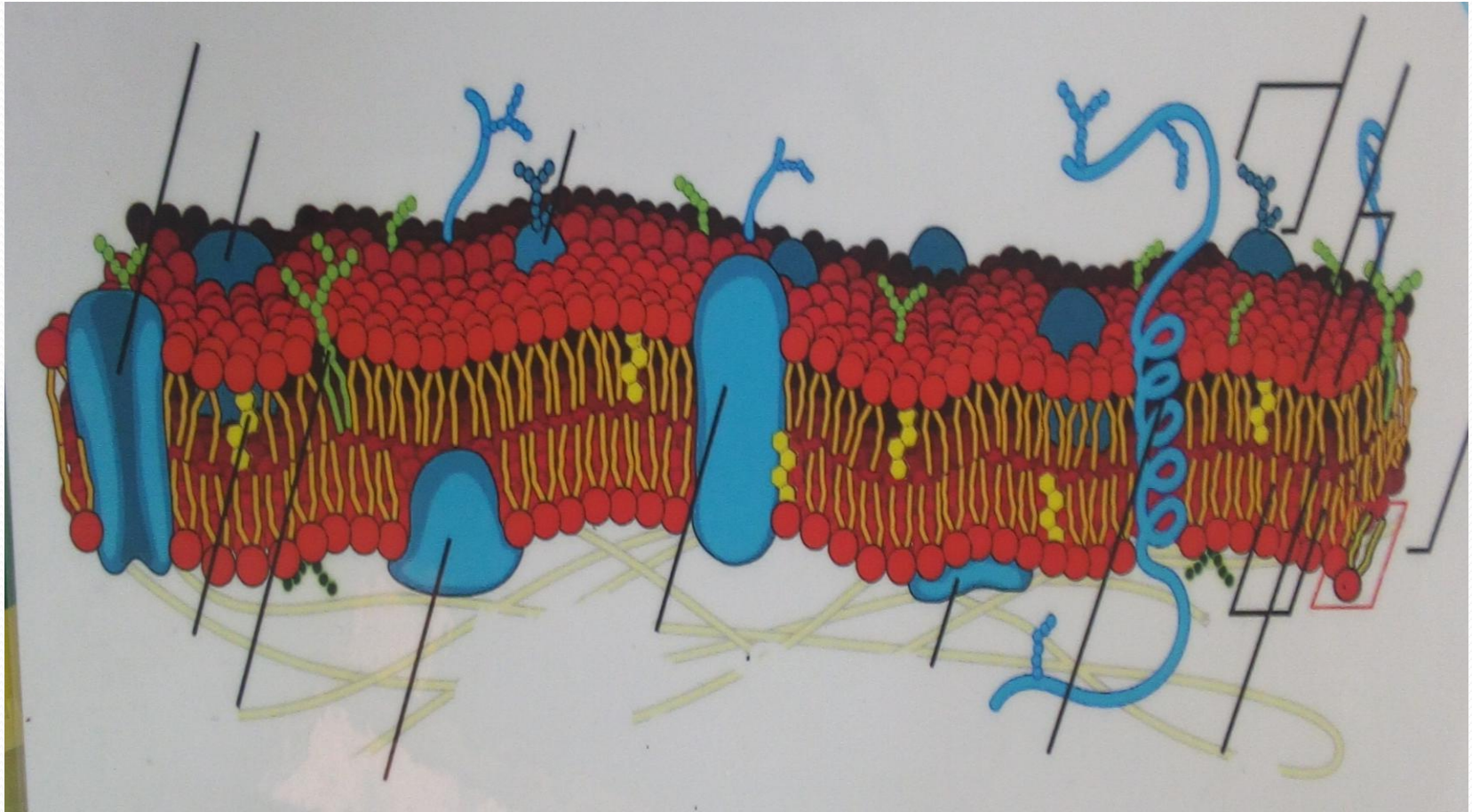
3- **Cholesterols** (a lipid component) interspersed between them, maintaining appropriate membrane fluidity at various temperatures.

4- **Carbohydrates**: side chains are found only on the outer surface of plasma membrane.

- **Glycolipids** are lipids with a Carbohydrates attached by covalent bond . Function to maintain the stability of the cell membrane and to facilitate cellular recognition.
- **Glycoprotein** are proteins and carbohydrates chains. function in the structure, reproduction, immune system, hormones, and protection of cells and organisms. also help cells attach to and bind other cells, which is called cell adhesion.

Functions of cell membrane

- 1- The cell boundary which separates cellular materials from external environment.
- 2- Regulates which materials can enter and exit the cell.
- 3- Maintains homeostasis in cell.



Cytoplasm

❖ **Cytoplasm:** The gel-like fluid substance of a cell that is external to the nuclear membrane and internal to the cellular membrane.

The main components of cytoplasm:

1- The cytosol the gel-like fluid.

2- Organelles (mitochondria, lysosomes ,).

3- Inclusions (non living material).

❖ In human cells the cytosol takes up about 70% of the total cell volume.

❖ Chemically it contain 90% water and 10% include organic and inorganic compound.

Functions of cytoplasm

- 1- The medium for chemical reactions within cells.
- 2- Responsible for giving the cell its shape.
- 3- Most of the cellular metabolism take place in cytoplasm.
- 4- protects the components from damage.

Nucleus

- ❖ Nucleus it contains most of the cell's genetic material.
- ❖ The nucleus is a spherical-shaped organelle that is present in every eukaryotic cell.
- ❖ The nucleus is the control centre of eukaryotic cells.

Structures of nucleus:

- 1- **Nuclear membrane or envelope:** is a double-layered membrane that encloses the components (DNA particularly) of the nucleus from cytoplasm.
 - ❖ The double membranes are fused together to give nuclear pore.
 - ❖ Nuclear pore: facilitate and regulate the exchange of materials (communications) between the nucleus and the cytoplasm

2- **Nucleolus:** spherical-shaped structure found inside the nucleus.

- ❖ The synthesis of rRNA.
- ❖ The site of synthesis for ribosomes.
- ❖ Synthesis of tRNA.
- ❖ Plays an important role in the cell division.

3- **Nuclear Sap (Matrix):** is a semi-fluid which contains a number of enzymes which help in the synthesis and functioning of DNA and RNA (genetic material).

4-**Chromatin** is a genetic material or a macromolecule comprising DNA, RNA, and associated proteins (histones), which constitute chromosomes in the nucleus of a eukaryotic cell.

❖ There are two phases of chromatin:

1- **Euchromatin (active or light)** is less condensed and can be transcribed.

2- **Heterochromatin (inactive or dark)** is highly condensed and is typically not transcribed.

❖ when the cell prepares to divide, the chromatin fibers coil up to be seen as separate structures, chromosomes

Functions of nucleus

- ❖ control of the genetical information of the cell and the heredity characteristics of an organism,
- ❖ control of the protein and enzyme synthesis.
- ❖ control of cell division and cell growth.
- ❖ storage of DNA, RNA and ribosome.
- ❖ regulation of the transcription of the mRNA to protein.

