Basrah University
College of Nursing
Department of medical sciences
Lecturer: A.L. Wafi Dhahir
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Stage:1st nursing

Part one

Cell structure and function

Definition: Physiology is the science which study function and has many subdisciplaines such as neurophysiology study of nervous system ,Endocrinology the study of hormones and pathophysiology study of disease . the comparative physiology study how different species solved the problems of life.

The cell is the main functional unit in the body

The modern cell theory:

1- Al cells composed of cells and cell products.
2- The cell is the simplest structure and functional units.
3- All cells function due to activities of its cells.
4- Cells come from living cells(preexisting cells).
5- Cells of all species have many fundamental similarities(chemical composition and metabolic mechanisms).

Cell structure:

1- Cell wall (plasma membrane).
2- Nucleus enclosed by nuclear envelope.
3- Smooth endoplasmic reticulum.
4- Rough endoplasmic reticulum.
5- Cytoplasm(the fluid between the nucleus and cell wall.
6- Supportive framework called cytoskeleton

7- The organelles(Mitochondria, Golgi vesicle, ribosome, lysosomes and centriol).
8- Microvillus

The plasma membrane:

The function of cell wall or plasma membrane is control the interaction of the cell with the other cells and control the passage of materials into and out the cell ,and composed of:

1-Membrane lipids;

Consist of double layer of lipids.75%are phospholipids each molecule have head(hydrophilic)faced the water on each side of the cell membrane and tail (hydrophobic)toward the center of membrane and 20% of the lipids was cholesterol which make the membrane stiff the remaining 5% of the lipids are glycolipids form the glycocalyx(fuzzy coat on cell surface (enable the cell to adhere with other cell.

2-**Membrane proteins:**

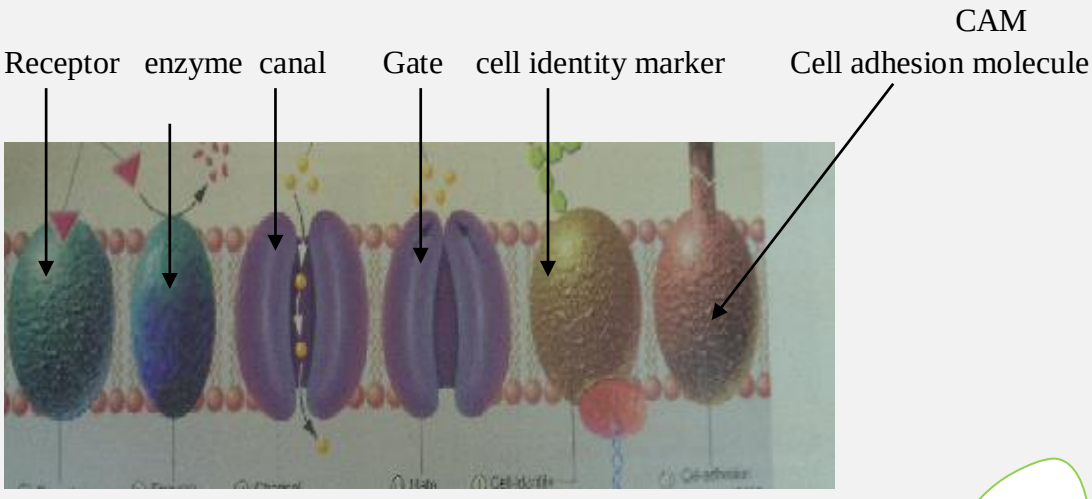
A-Integral proteins: includes

*Receptors, connect with the chemical signals to enter the cell and receptor specific for one messenger

*Enzymes, carry out the final stage of proteins and starch digestion.

*Cannel and gate, these proteins have pores that allow water and hydrophilic solutes to pass through the membrane

*Cell adhesion molecules(CAM).



Membrane proteins

B- **Peripheral proteins** these proteins adhere to the intercellular face of the membrane

Membrane Transport

The plasma membrane is selectively permeable(it allows some things through and prevent others).The movement of substances into or out of the cell classified **into two ways**:

1-Passive or active transport

The passive mechanism required no energy like filtration, simple diffusion and osmosis.

The active mechanism required energy(ATP) include active transport and Vesicular transport.

The passive mechanism

1-Filtration: The process in which particles move through selective membrane by hydrostatic pressure(the force on membrane by water.

2-Simple diffusion: occurs on air and water depend on concentration gradient(from high concentration toward low concentration.

The factors effect diffusion:

1-Temperature.Hight temperature increase diffusion.

2-Molecular weight: the heavy molecules diffuse slowly.

3-Steepness:The concentration gradient(the difference between two point.

4-Membrane surface area: diffusion increased with folded surface.

5-Membrane permeability .diffusion depend on how the membrane permeable it to particles.

3-Osmosis: The diffusion of water through a selectively permeable membrane from the watery to the less watery.

The osmotic pressure is the pressure is the pressure that stop osmosis.

Tonicity: Is the ability of a solution that effect the fluid volume. and pressure of cell.

Hypotonic: Solution has lower concentration.

Hypertonic: Solution has higher concentration.

Isotonic: Solution has concentration equal to the concentration to the ICF(Intracellular fluid).

Normal saline: is isotonic to human blood cell(0.09% solution of Na Cl.

2-Carrier mediated mechanism use membrane protein in transportation and include facilitated and active transport. In Carrier-mediated transport the substance bind to receptor on the carrier. There are three kind of carriers:

1- Uniport, carry one solute.

2- Symport ,carry two solutes.

3- Antiport, carry one or two solutes but in opposite direction.

The mechanisms of carrier mediated transport

1-Fasilitated diffusion: Transport of solute down it concentration gradient.

Facilitated transport

2-active transport: Transport of solute up it concentration gradient using energy provided by ATP.

Active transport