CHAPTER 7 LECTURE NOTES

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- biol. 1ab

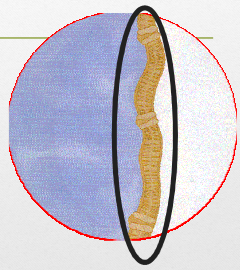
Section Objectives

- Explain how a cell's plasma membrane functions.
- Relate the function of the plasma membrane to the fluid mosaic model.

All living cells must maintain a balance regardless of internal and external conditions. Survival depends on the cell's ability to maintain the proper conditions within itself.

Why cells must control materials

The **plasma membrane** is the boundary between the cell and its environment.

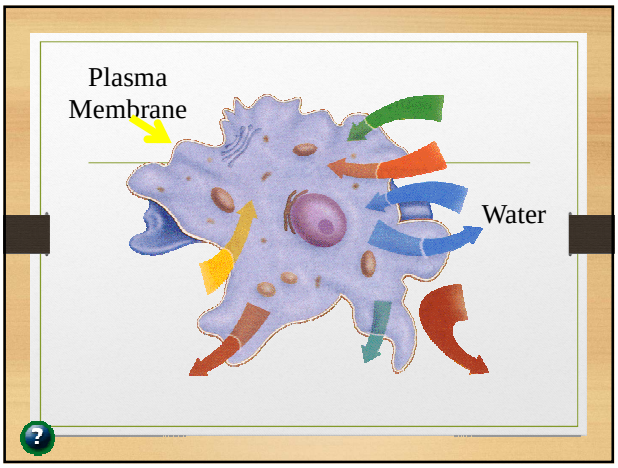


It is the plasma membrane's job to:

- allow a steady supply of glucose, amino acids, and lipids to come into the cell no matter what the external conditions are.
- remove excess amounts of these nutrients when levels get so high that they are harmful.
- allow waste and other products to leave the cell.

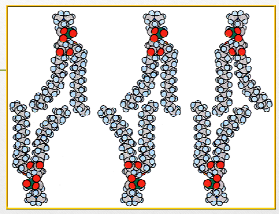
This process of maintaining the cell's environment is called homeostasis.

Selective permeability is a process used to maintain homeostasis in which the plasma membrane allows some molecules into the cell while keeping others out.



Structure of the Plasma Membrane

The plasma membrane is composed of two layers of phospholipids back-to-back.

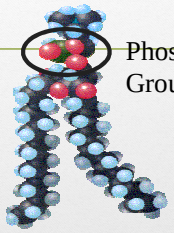


Phospholipids are lipids with a phosphate attached to them.

The lipids in a plasma membrane have a glycerol backbone, two fatty acid chains, and a phosphate group.

Makeup of the phospholipid bilayer

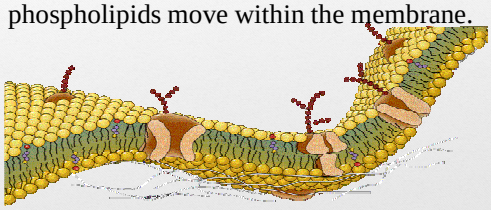
The phosphate group is critical for the formation and function of the plasma membrane.



Phosphate Group

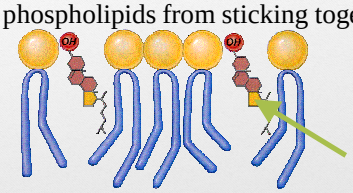
Makeup of the phospholipid bilayer

The **fluid mosaic model** describes the plasma membrane as a flexible boundary of a cell. The phospholipids move within the membrane.



Other components of the plasma membrane:

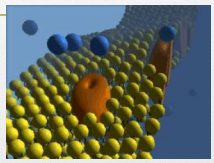
Cholesterol plays the important role of preventing the fatty acid chains of the phospholipids from sticking together.



Cholesterol Molecule

Other components of the plasma membrane:

Transport proteins allow needed substances or waste materials to move through the plasma membrane.



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HOMEOSTASIS AND CELL TRANSPORT

- Diffusion
- Osmosis
- Passive Transport
- Active Transport
- Facilitated Transport
- Endo and Exocytosis

I. Diffusion and Osmosis

- Passive transport of molecules into and out of the cell

1. diffusion

- The movement of molecules from an area of higher concentration to an area of lower concentration
- molecules can diffuse through air and liquids
- kinetic energy of the molecules drive diffusion

2. equilibrium

- Point at which there is an equal concentration of molecules on either side of a membrane or throughout the air or liquid.
- Molecules continue to move, but maintain equal concentrations

a. concentration gradient

- A gradient develops when you have an unequal distribution of molecules on either side of a semi-permeable membrane
- the gradient can be used to generate energy and do work

3. diffusion across membranes

- In order for molecules to move across a membrane, the membrane must be permeable

a. permeability

- permeable = allows molecules to pass through it
- selectively permeable = allows certain molecules to pass through it

4. osmosis

- The net movement of water molecules from an area of high concentration to an area of low concentration

a. hypotonic

- A hypotonic solution has a lower concentration of dissolved substances, or solutes, than a solution to which it is being compared or a cell.
- Cells in this type of solution will swell and burst as the water moves into the cell

b. hypertonic

- A hypertonic solution has a higher concentration of dissolved substances, or solutes, than a solution to which it is being compared or a cell.
- Cells in this type of solution will shrink as the water leaves the cell.

c. isotonic

- An isotonic solution has an equal concentration of dissolved substances, or solutes, than a solution to which it is being compared or a cell.
- Cells in this type of solution will do nothing

5. Roles of osmosis

- Osmosis is very important to both plants and animals
- Plasmolysis
- Cytolysis

a. plasmolysis

- Plasmolysis = the loss of turgor pressure in plants, results in wilting.
- Plant cell will not burst in a hypotonic solution due to the support of the cell wall

b. cytolysis

- Cytolysis = too much water pressure in animal cell causing them to burst.
- No cell wall for support
- if water leaves the cell they will crenate

II. Other Kinds of Transport

- 1. Carrier transport
- 2. facilitated transport
- 3. active transport
- 4. endocytosis
- 5. exocytosis

1. Carrier transport

- Transport of molecules across the cell membrane using protein molecules to carry the molecules across.
- Can involve the use of energy, but not required
- may also go against the gradient

a. facilitated transport

- Movement of molecule across the cell membrane using carrier molecules
- does not require energy
- goes with the gradient

b. active transport

- Movement of molecules across the cell membrane using carrier molecules
- does require energy
- often goes against the gradient

2. endocytosis

- The process of transporting materials into the cell with a vesicle
- phagocytosis = cell eating
- pinocytosis = cell drinking

3. exocytosis

- The process of transporting materials out of the cell with a vesicle