

The Cell Membrane & Transport

I. Membrane structure & Early discoveries

A. Developing the Cell theory- Took nearly 200 years

1. Robert Hooke 1665 examined cork and oak bark and saw little cubicles he called cells
2. Matthias Schleiden 1838 discovered all plants are made of cells
3. Thodor Schwann 1839 concluded the same about animals
4. Rudolf Virchow 1858 stated that all cells come from pre-existing cells
5. These ideas along with the work of Louis Pasteur's work brought together to form the Cell Theory
 - a. All organisms are composed of cells
 - b. Cells are the basic unit of structure and function in all living things
 - c. All cells are produced from other cells

B. Properties of the plasma membrane

1. Cells live in a fluid environment whether in land or water
2. The plasma membrane is the boundary between the cell and its environment
3. It encloses the cell's contents
4. It controls what is passed between the cell and its environment.
5. Plasma membrane has selective permeability
 - a. Only allow certain things are allowed to pass

II. The model of the plasma membrane

A. Lipid Bilayer - two layers of lipids called phospholipid (click on picture for demonstration)

1. Phosphates, water soluble heads point toward the outside and inside of the cell
2. The lipid layer is toward the middle of the cell membrane

B. These properties allow the cell membrane to be maintained with the least amount of energy used

1. The lipids allow the membrane to act as a thin layer of oil around the cell
2. Cholesterol are embedded in the lipids to give some rigidity to the cell (overhead 4-6)

3. Phosphates

4. The lipid layer is toward the middle of the cell membrane

C. Membrane proteins -

1. bumps seen with the electron microscope are proteins embedded in the plasma membrane
2. The proteins can migrate sideways within the bilayer but not as rapidly as the phospholipids
3. Because the components of the membrane are constantly moving like a fluid the current membrane model is called the "Fluid Mosaic Model" (overhead 4-8)

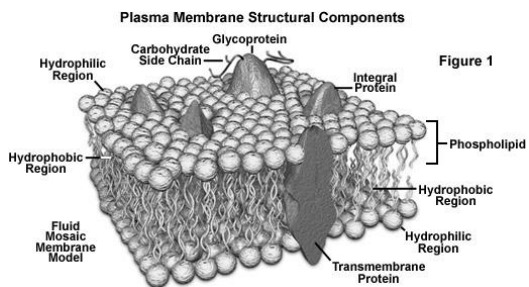
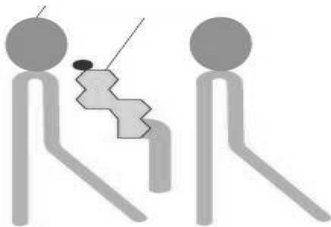


Figure 1

4. Plasma membrane serves mainly as cell outer boundary of cells, but it also is around organelles
5. The proteins play a major role in regulation, recognition and communication
6. The proteins help the cell to be selectively permeable
7. Each membrane has its own distinct permeability characteristics

D. Roles of membrane

E. Membrane Function

1. Diffusion Diffusion is the random movement of particles from areas of high concentration to areas of low concentration.
2. When there is a continuous movement but no overall change this is dynamic equilibrium
3. The same concentration inside as outside or same amount leaving as coming in
4. Particles that dissolve and move quickly across the membrane are salts, liquids oxygen, carbon dioxide etc. . . .
5. Osmosis is diffusion of water across a membrane
6. Osmotic balance results from the same amount of water leaving as coming in
7. Diffusion and osmosis - substances are either able to dissolve in the lipid bilayer or are small enough to squeeze between phospholipids.
8. Passive Transport is like osmosis and diffusion that requires no energy of the cell.
9. Facilitated diffusion
 - a. Transport proteins are the proteins embedded in the bilipid layer
 - b. Channel proteins are proteins with pores in them to allow certain ions to go through
 - c. Channel proteins many times are polar
 - d. Carrier proteins are proteins that change shape and move things from side of the cell membrane to the other
 - e. Gate proteins are proteins in the cell membrane that open and allow certain things through

F. Active transport

1. requires the cell to use some of its own energy to move particles
2. Pumps - Transport proteins embedded in the plasma membrane can bind to a particle then chemical energy is used to alter the shape of pump and move particles
3. Active transport may occur in either direction when moving from low to high

G. Endocytosis and Exocytosis
