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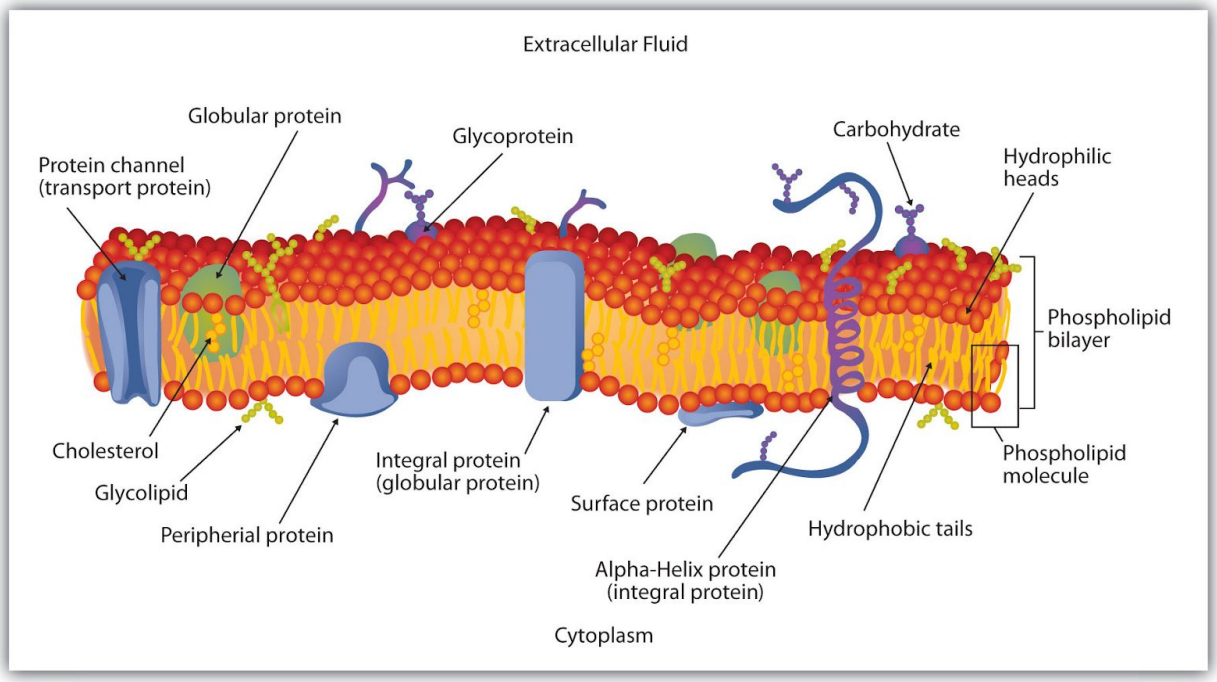
Mrs. McTague
H Bio. per. 3
4 / 6 / 15

Study Guide: Membrane Structure and Transport

1. **Identify the main parts of cell membrane as shown in a diagram.**



2. **Explain the function of each of the parts of the cell membrane.**
    a. phospholipids?
        i. main part of membrane
        ii. allow for fluidity of cell membrane
        iii. (see below for more importance)
    b. cholesterol?
        i. is in between some phospholipids, helps regulate stability
            1. keeps fluid when cold
            2. keeps stable when warm
    c. carbohydrate chains?
        i. antigens to help other cells recognize as domestic (or foreign)
    d. three roles of proteins related to membrane transport?
        i. transport proteins
            1. protein channels
                a. allowing small polar molecules to pass through
                b. facilitated diffusion (passive transport)
            2. protein carriers
                a. allow larger molecules to bind and pass through
                b. facilitated diffusion
            3. protein pumps
                a. active transport
                b. use ATP to move solutes against concentration gradient
        ii. endocytosis

1. receptor proteins
    a. allow for specific recognition of solutes to enter the cell

3. Explain why phospholipids make a good barrier between the cytoplasm and the extracellular fluid.

a. they have hydrophilic heads and hydrophobic tails
b. they automatically form bilayers that prevent water for readily flowing in and out, allowing for two different environments in and out of the cell or bubble

4. Explain why the phospholipids are arranged in their bilayer.

a. the hydrophilic heads point out because they are attracted to the water in the cytoplasm and extracellular fluid
b. the hydrophobic tails stay in because they are repelled by the water — they try to stay far away from the water

5. Explain why the carbohydrate chains are found only on the outside.

a. they are used as surface markers for other cells (not itself) — it has no purpose inside the cell

6. Compare and contrast the modes of transport.

a. passive transport:
    i. sometimes a protein
    ii. facilitated or simple diffusion
        1. facilitated: through proteins, for larger or charged particles
            a. protein channels
                i. allow small charged molecules (ions) to pass through freely
                ii. osmosis through aquaporins
            b. protein carriers
                i. when certain solutes bind to it it morphs and allows the solute in
        2. simple: for small, nonpolar molecules
    iii. happens by diffusion
    iv. with only kinetic energy of the molecules and none from the cell
    v. with solutes traveling down their concentration gradient
b. active transport
    i. requires a protein (protein pump)
    ii. uses energy from the cell (ATP)
    iii. to move solutes against their concentration gradient
c. bulk transport
    i. endocytosis
        1. bulk transport into the cell
        2. vesicle forms around item, comes into cell
        3. phagocytosis: cellular eating
        4. pinocytosis: cellular drinking
        5. receptor-mediated endocytosis: specific endocytosis of certain molecules that bind to surface receptor proteins
    ii. exocytosis
        1. bulk transport out of the cell
        2. secretory vesicle binds with cell membrane, opens up and releases items out

7. State examples of transport different substances use to enter and leave cells.

a. oxygen, carbon dioxide: simple diffusion
b. glucose: facilitated diffusion (protein carriers)
c. sodium, chlorine, potassium ions: facilitated diffusion (protein channels)
d. water: facilitated diffusion (protein channels (aquaporins)), simple diffusion (occasionally)
e. food: phagocytosis
f. cholesterol: receptor-mediated endocytosis
g. liquids and dissolved solutes: pinocytosis

8. Tonicity:

a. isotonic
    i. when concentration of solutes inside and outside a cell are equal
    ii. in plant cells, this causes the cells to go limp— is not preferred
    iii. is preferred in animal cells
b. hypotonic
    i. when concentration of solutes outside cell is less than inside cell
    ii. is preferred in plant cells — makes them turgid
    iii. may make animal cells expand or lyse
c. hypertonic
    i. when concentration of solutes outside cell is higher than inside cell
    ii. causes plant cells to
d. solute
    i. a substance that is dissolved in a another substance
e. solvent
    i. the liquid in which a solute is dissolved
f. solution
    i. a liquid with a solute dissolved evenly throughout a solvent
g. equilibrium
    i. a balance

9. Explain lysing.

a. the bursting of a cell
b. usually happens in cells that don't have cell walls
    i. (mostly in animal and protist cells — plant, fungi, bacteria, amoeba all have them)
c. usually when a cell is placed in a hypotonic solution, or when virus invades
d. opposite is cell shrinkage or plasmolysis in cells that have a cell wall

10. Explain plasmolysis.

a. the peeling away of a cell membrane from a cell wall (only in cells with cell walls)
b. usually happens when cell is placed in a hypertonic solution
    i. cell wall is rigid, doesn't shrink, but the membrane does
c. usually leads to cell death
d. opposite is lysing

11. Explain applications of membrane transport:

a. alveoli and bloodstream (simple diffusion)
b. villi and bloodstream (facilitated diffusion)
c. kidneys and bloodstream (osmosis)
d. bloodstream and all cells

e. engulfment of germs by white blood cells (endocytosis and phagocytosis)
f. secretion of neurotransmitters from neutrons (exocytosis)
g. solute pumping and ion channels in neurons and muscle cells (facilitated diffusion and solute pumping)

12. Explain different blood types.

a. antigens on blood cells
b. genetic
c. body recognizes and attacks any foreign antigens (but not missing ones)
d. ABO
    i. carbohydrate chains (genetic because created by protein enzymes)
    ii. A and B antigens on cells
    iii. can have A, B, and o (no antigen) genes
        1. o is recessive
        2. A, B are equally dominant (can have both genes and both antigens)
    iv. not too important during pregnancy
e. RhD factor
    i. protein chain
    ii. can have Rh protein or not (+ or -)
    iii. more important important during pregnancy

13. Explain problems with blood types.

a. if foreign antigen is given to somebody, their body will reject it
    i. during blood infusions, if the A, B, and/or RhD antigen is given to somebody who doesn't have that/those antigen(s), then they will fight it off, causing anemia and/or death
    ii. during pregnancy, if Rh+ father and Rh- mother have a child, there is possibility that child can be Rh+. When mother gives birth, blood may mix, and the mother could make antigens for the RhD protein. In later pregnancies, as antibodies go into baby the antibodies would mark future RhD+ babies