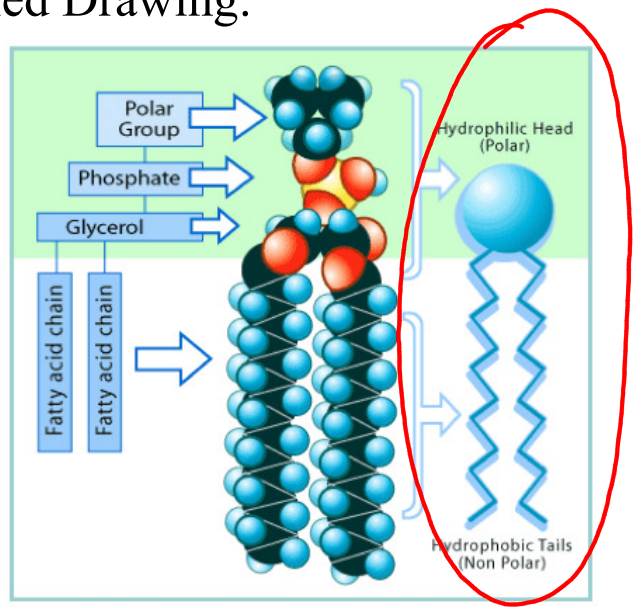
Honors Bellringer:

Name the different molecules that are found in the cell membrane.

enzymes
receptor proteins
transport protein
carbohydrates (cell surface marker)
phospholipids

I) Parts of the cell membrane
   a. Phospholipids
      i. Labeled Drawing:



ii. Polar head

1. Consist of a phosphate group
2. Hydrophilic: literally “water loving” (is attracted to water)

iii. Two nonpolar tails

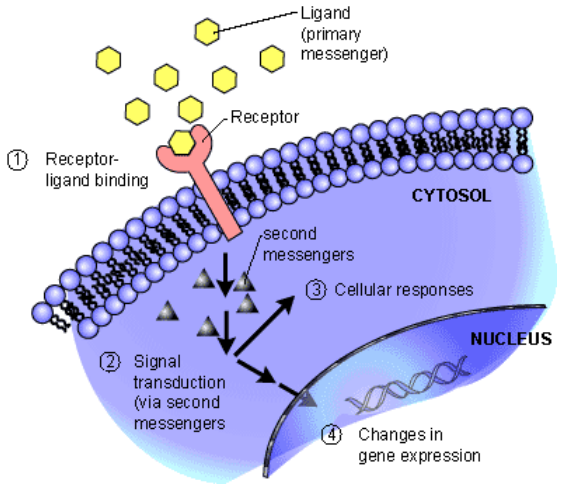
1. Consist of fatty acids (chains of carbon with hydrogen attached)
2. Hydrophobic: literally “water fearing” (repels water and polar molecules)

b. Proteins

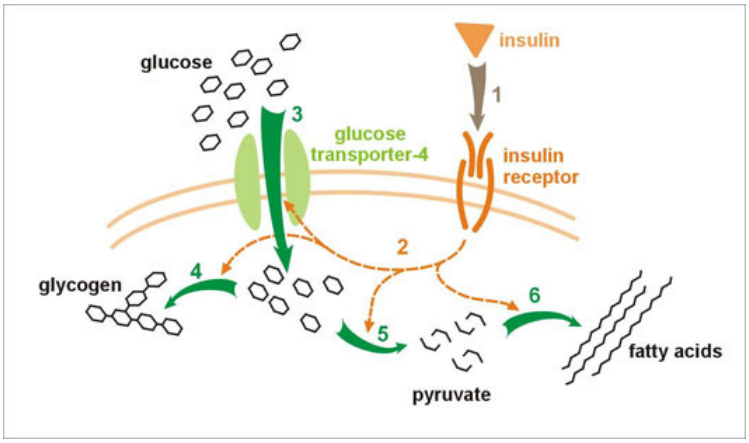
i. Cell Surface Marker
   1. Carbohydrate portion (a) identifies the type of cell, similar to the way flags represent different countries.
   2. Protein portion (b) is embedded in the membrane and serves as the attachment point of the carbohydrate and cell membrane.

ii. Receptor Protein

1. Receives signals from surrounding cells; important because this allows cells to respond to their environment

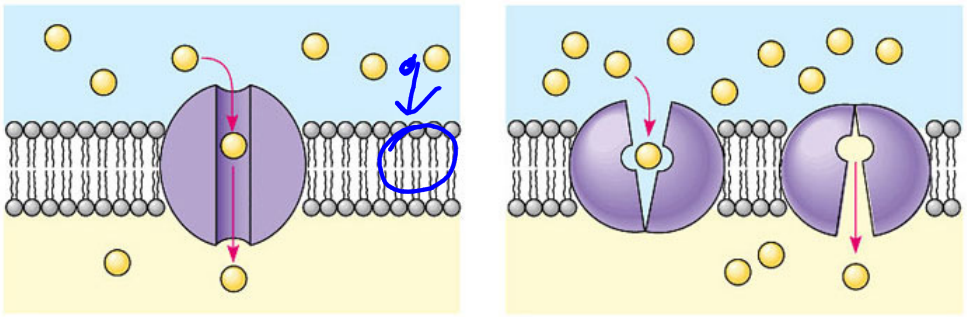


2. Example: insulin receptor proteins change shape when they attach to insulin molecules, causing the cell to increase its absorption of glucose and maintain homeostasis

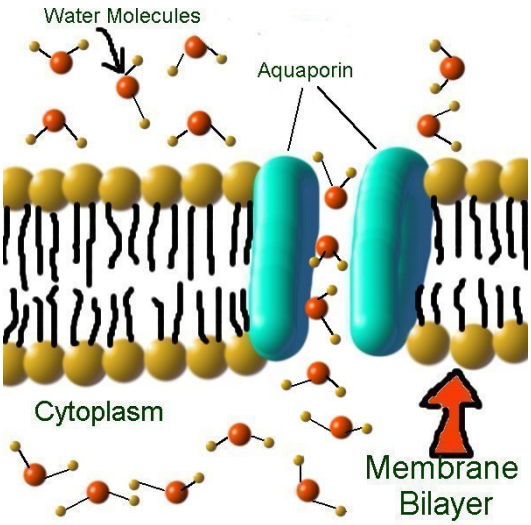


iii. Transport Protein

1. Allows materials to cross the cell membrane that ordinarily wouldn't (macromolecules, polar molecules, or charged molecules—***ions***)

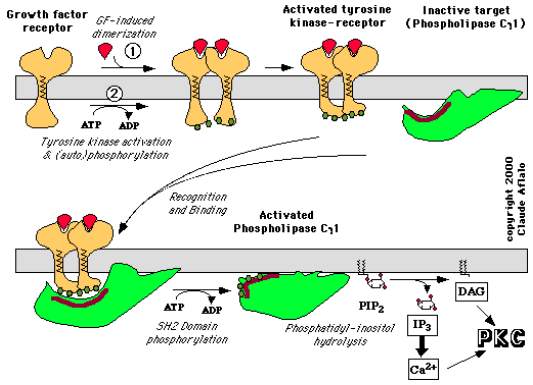


2. Example: Aquaporins are transport proteins that provide a small channel for water molecules to pass through



iv. Enzyme

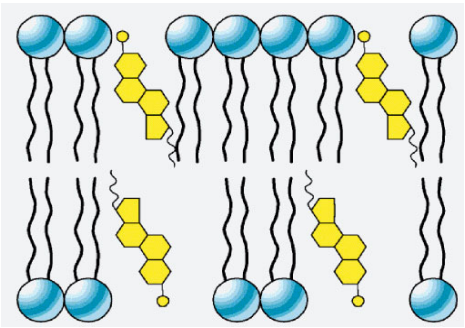
1. Catalyze chemical reactions
2. Example: Phospholipase is a membrane enzyme that catalyzes the breakdown of phospholipids (important component of membranes)



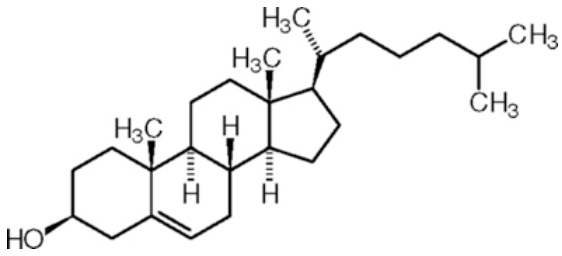
c. Cholesterol

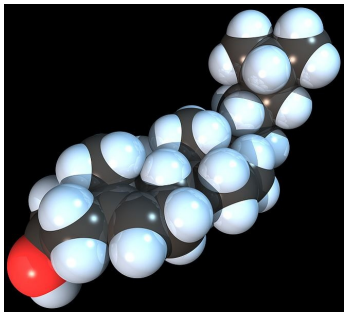
i. Type of lipid in the cell membrane that helps maintain membrane fluidity in two ways:

1. Holds together neighboring fatty acid tails to keep membrane from falling apart
2. Prevents fatty acid tails from crystallizing with each other and making the membrane too rigid



ii. Drawing of cholesterol:

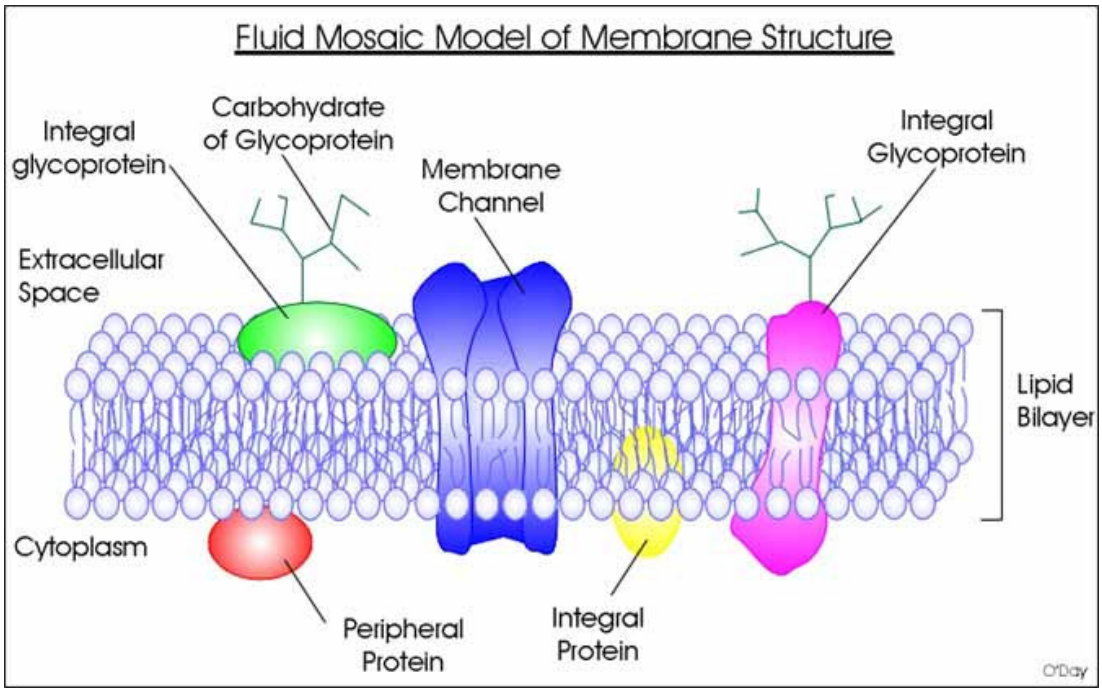




II) Fluid Mosaic Model

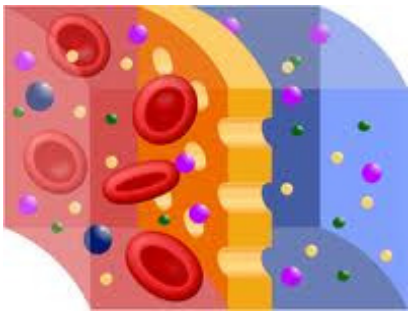
a. The cell membrane is ***fluid***, which means that it is flexible enough for the different membrane components to be able to move around within it.

b. The cell membrane is also like a ***mosaic*** because it consists of many different small pieces (molecules) that all work together to perform the function of regulating what can enter/leave the cell



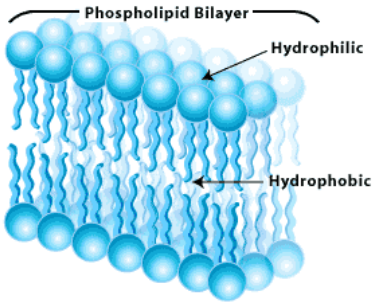
III) Permeability

a. **Semipermeable membrane**: a membrane that allows some molecules to pass through but not others, also called ***selectively permeable***

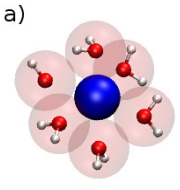


b. How the membrane is semipermeable:

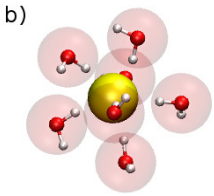
i. Since a cell is typically surrounded by water (or fluids rich in water) and also has water *inside*, the phospholipids naturally arrange themselves in a double layer called a **lipid bilayer** with the fatty acid tails facing each other.



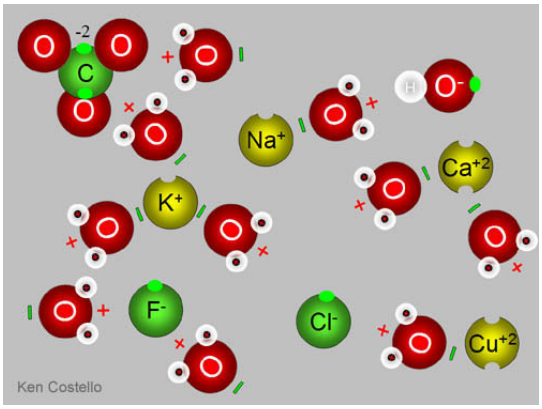
ii. The interior of the lipid bilayer is nonpolar, or hydrophobic, and therefore *repels* water and other polar molecules, as well as **ions** (charged particles).



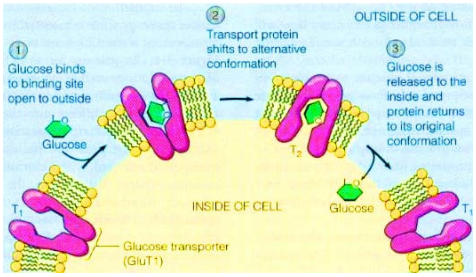
Na^+



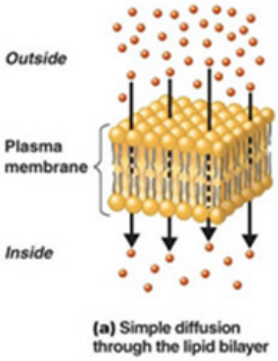
F^-



1. Polar molecules, ions, and large molecules (like macromolecules) require transport proteins to get through the membrane.



2. Small, nonpolar molecules (such as oxygen molecules, carbon dioxide) are able to move directly through the cell membrane.



c. This is critical for the cell to maintain homeostasis!

The kidneys help maintain homeostasis by filtering wastes from your blood. People with kidney disease use *dialysis* to clean their blood. A piece of dialysis tubing is semipermeable; it will allow wastes to flow out while keeping the larger blood cells in the blood.