Cell Notes

1. The Plasma (cell) membrane
   1. Plasma membranes consist of a lipid bilayer containing different proteins
   2. The membrane is a continuous boundary layer that selectively controls the flow of substances across it.
2. Fluid Mosaic Model
   1. Every cell membrane has a mixed composition of phospholipids, carbohydrates, sterols (a type of lipid aides in membrane permeability) and proteins.
      1. Phospholipids consist of two parts a phosphate head and a lipid tail.
         1. The phosphate head is hydrophilic meaning it likes water.
         2. The lipid tail is hydrophobic meaning it hates water.
         3. The reason it is called a bilayer is because it is arranged in two parts.
         4. The heads are oriented towards the inside and outside areas of the cell while the lipid tails are oriented away from the water.
         5. Because of this orientation the membrane is selectively permeable.
      2. Why is it fluid
         1. The components of the membrane are free to move throughout the surface of the membrane.
      3. Function of other membrane parts
         1. Proteins
            1. Proteins that span the membrane (integral) are responsible for transport of materials through the membrane.
            2. Proteins that are on the surface (peripheral) have different jobs depending on whether they are on the inside or outside surface.

Inside proteins aide in maintaining the cells shape.

Outside proteins can act as receptors where hormones or chemicals can bind.

* + - * 1. Carbohydrates can be attached to a protein (glycoprotein) or a lipid (glycolipid) and are involved in cell protection and cell recognition.

1. Movement of materials into and out of cells
   1. Because the plasma membrane is selectively permeable materials must have a way of either entering or leaving the cell.
      1. The five methods are
         1. Lipid diffusion
         2. Osmosis
         3. Passive transport
         4. Active transport
         5. Vesicles
      2. Lipid diffusion is the movement of substances (lipid soluble, H2O, O2 and CO2) across the membrane down the concentration gradient.
         1. How that works
            1. The materials that are inside the cell and the materials that are outside of a cell have different concentrations relative to each other.
            2. For example there could be a higher concentration of water outside a cell than inside. Like when you water a plant. There is more water outside the root cell then inside. That is how water moves from the soil into the plant.
2. Tonicity is the relative solute concentration of two fluids.
   1. Isotonic solutions have the same concentration of solutes as the cell.
   2. Hypertonic solutions have more solutes than a cell.
   3. Hypotonic solutions have fewer solutes than a cell.
3. Osmosis is movement of water from high concentration to low concentration or movement of water down a concentration gradient.
4. Key concept: water and substances move across the plasma membrane with the concentration gradient.
   1. In the absence of other forces, a substance moves from a region where it is more concentrated to one where it is less concentrated –“down” the gradient
5. Passive transport is the movement of materials across the membrane without using energy.
   1. Two types of passive transport
      1. Osmosis
      2. Diffusion
6. Osmosis
   1. Diffusion of water across a selectively permeable membrane
   2. Which way the water moves is dependent on the concentration of solutes on either side of the membrane.
   3. The side with the most solute molecules has the lowest water concentration
      1. More solutes less water
7. Diffusion is the net movement of like molecules or ions down a concentration gradient.
8. Facilitated diffusion
   1. Flow of solutes through the interior of passive transport proteins down their concentration gradients
   2. Transport proteins allow solutes to move both ways
   3. Does not require any energy input
9. Transport proteins
   1. Span the lipid bilayer
   2. Interior is able to open to both sides
   3. They change shape when they interact with solute
   4. Play role in active and passive transport
10. Active transport
    1. Diffusion of solute is against concentration gradient
    2. Transport protein must be activated
    3. ATP gives up phosphate to activate protein
    4. Binding of ATP changes protein shape and affinity for solute
11. Types of active transport
    1. Exocytosis uses a cytoplasmic vesicle fuses with the plasma membrane and contents are released outside the cell.
    2. Endocytosis is a process where a small section of the plasma membrane sinks inward and seals back on itself, forming a vesicle inside the cytoplasm.
       1. Types of endocytosis
          1. Pinocytosis-cell drinking
          2. Phagocytosis- cell eating