Unit 2: Plasma Membrane and Transport of molecules
How do things get in and out of the cell?
PowerPoint Questions

I. The Plasma Membrane

A. The fluid mosaic model

B. In this model the membrane is seen as a bilayer of phospholipids.

C. Structure of the plasma membrane

1. The plasma membrane is a _____ (fat molecules) _____ structure. Each layer is _____ of lipid molecules with _____ molecules _____ in the _____.

2. Membrane lipids are _____ with polar, _____ heads and long, _____, insoluble tails.

- Phospholipids have two _____ attached to _____ instead of three. Because of their polarity, these molecules are attached to H_2O molecules.
- Phospholipids align with the _____ soluble phosphate ends _____ the outside of each layer and the _____ tails inside the _____.

Sketch Below:

II. Cellular Transport

A. Diffusion

1. Brownian motion is the _____ of molecules.

2. Most _____ in and around any cell are in _____ solution. _____ is the movement of particles from areas of _____ concentration to areas of _____ concentration. It is the result of _____ motion.

3. Brownian Motion is continuous motion. When materials are evenly distributed in H_2O and no further changes in concentration occur, dynamic equilibrium exists.

- _____= random movement continues but there is no change in concentration. (dynamic = change; equilibrium = balance) Dynamic equilibrium is a characteristic of homeostasis in the cell.

4. Diffusion depends on concentration gradients.

- _____ = difference in concentration between two areas (ex: Inside of a cell and outside of a cell).
- _____ and _____ automatically diffuse (move through a membrane) from an area of high concentration to an area of low concentration. This means they move _____ the gradient.

- _____ across a membrane _____ until there is no _____ gradient. Dynamic equilibrium then exists because the concentration is the same on both sides of the membrane.

5. Selectivity of membrane- only H2O, oxygen, nitrogen, carbon dioxide molecules, and a few other non-polar molecules can diffuse directly across the plasma membrane.
  - _____ ions of _____ molecules _____ automatically diffuse across the plasma membrane.

B. Osmosis- Diffusion of water

_____=diffusion of water only through a _____ permeable _____ from an area of _____ concentration to an area of _____ concentration.

1. No osmosis in an isotonic solution because the concentration of H_2O is the same on either side of the plasma membrane (dynamic equilibrium). However, movement continues (Brownian motion).

Sketch Below:

2. Osmosis in a hypotonic solution- particulate concentration is lower outside the cell so H_2O concentration is higher outside the cell, therefore, H_2O diffuses into the cell.

- _____ is the internal pressure of a plant cell. It aids in maintaining _____ (fluid presses against the cell wall).
- _____ is loss of water from plant cells causes plant to wilt b/c of the _____ of turgor pressure.
- Most animal cells burst if too _____ H_2O enters the cell. _____ have contractile _____ to remove excess H_2O.

Sketch Below:

3. Osmosis in a hypertonic solution- _____ concentration is _____ outside the cell so H_2O concentrations _____ inside the cell, therefore, H2O diffuses out of the cell.

- This causes animal cells to shrivel up. In plant cells, it results in plasmolysis which is water loss from the central vacuole leading to loss of turgor pressure (wilting).

Sketch Below:

C. Passive Transport (Diffusion and Osmosis)

- _____ transport is the movement of _____ across the plasma membrane by diffusion requiring _____ expenditure of _____ by the cell.

- _____ diffusion- transport _____ embedded in the _____ membrane transport _____ and _____ (that can't get thru the membrane on their own) into and out of the cell as needed.

Sketch Below:

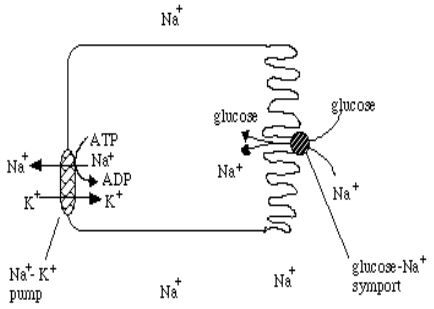
D. Active Transport

_____ transport- diffusion goes against the concentration gradient meaning movement from an area of low concentration to an area of high concentration. The cell _____ energy doing this.

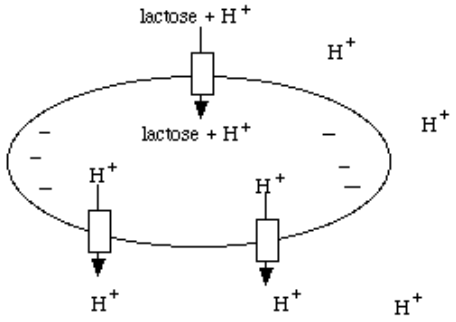
1. How active transport occurs- the cell uses _____ energy to change the shape of _____ proteins so that the _____ to be moved is released on the other side of the membrane. The protein's original shape in then restored.

Sketch Below:

- Here is an example of two ways that cells can use ATP and manipulate concentration gradients to transport molecules inside.



Cotransport: Glucose-Na+ Pump



Cotransport: Lactose-H^+ Pump

- Here, lactose enters the cell along hydrogen's concentration gradient.
- Hydrogen is then pumped out using ATP, and the gradient is maintained.

E. Transport of large particles

_____- a cell _____ material and takes it in from its environment by _____ it in a newly formed _____.

Sketch Below:

_____- vacuole containing what the cell needs to dump, _____ with the plasma membrane _____ the material _____ the cell.

Sketch Below:

III. Endomembrane System

Q: How do things get around inside of the cell?

A: The endomembrane system is a collection of membranous structures involved in transport within the cell.

List Organelles involved in the Endomembrane System:

***Non-Endomembrane Organelles:

The _____ and _____ are surrounded by _____ membranes; The _____ space and the matrix have _____ environments due to the _____ membranes, and we will later see how this allows certain processes to occur in these organelles

IV. Cell Connections and Communication

- _____ attach cells together.
- Tight junctions _____ the cell.
- Gap junctions and plasmodesmata allow communications between cells.

V. Diseases Associated with Difficulties in Transport across membranes.

Diseases resulting from lack of functional channels/pumps

- Motor neuron problems -Na^+ channel
- Cystic fibrosis - Cl^- channel
- Bipolar disorder -Na^+, K^+, ATPase
- Heart problems -Na^+, K^+, ATPase, Na^+ channels
- Resistance to chemotherapy - peptide transporter, p-Glycoprotein, (Multi-Drug Resistance)
- Color Blindness, H^+ gradient as pump (rhodopsin)
- Some Food Poisoning - Ca^+ channel