Membrane Functions

Directions:
Insert and install your Interactions: Foundations CD.
   a. Click the "Contents" button.
   b. Open the Cellular Level of Organization file.
   c. Click on Animations.
   d. Work through Membrane Functions.

Introduction
1. What are some general functions of the cell membrane?

   Responds to changes in internal & external conditions. Its functions include transport, communication, enzymatic reactions, cell identification, and formation of cell junctions.

2. Define selective permeability. It is the ability to allow the transport of some chemicals but not others.

Transport
3. Describe membrane permeability for oxygen, water, and carbon dioxide.

   Water, oxygen and carbon dioxide moves across the membrane without mishap. In other words, the membrane is permeable to these molecules.

4. Describe membrane permeability for ions and glucose.

   Ions such as $K^+$, $Cl^-$, $Na^+$, & $Ca^{2+}$ as well as, glucose cannot move through the membrane without the aid of membrane proteins.

5. a. What is the function of the membrane transport proteins? They allow the movement of charged or polar molecules across the plasma membrane.

   b. Contrast each type.

      open – pores which are always, open for specific ions. These ions diffuse down a concentration gradient (moving from an area of high concentration to a low one.)

      Open channels allow passive transport through it.

      gated - like an open channel, gated ones are also molecule specific & is another passive transport process. However, it has a structure that limits access through it. These gates open when it binds to specific chemicals or have a change in its shape due a change in its voltage.

      pump – unlike the previous entryways, a pump moves molecules against its concentration gradient with the energy released from hydrolysis of ATP. Pumps can also transport more than one type of molecule.

   c. Why is ATP needed for pumps? Energy is needed to do work when moving molecules against it concentration gradient.

   d. Describe transporter protein functions. These aid molecules like glucose to move across the membrane.

      These alter its shape after binding with the molecule.

6. a. How are large molecules transported within cells?

      vesicle transport – These small sacs bud off the Golgi complex while encasing its large molecular load.
They are the means by which large molecules are moved within cells.

b. What is achieved by exocytosis? Exocytosis is the means by which the vesicle sacs meld with the plasma membrane and deposit its load to the outside of the cell.

c. What is achieved by endocytosis? It is the process by which a cell engulfs large molecules.

d. What is phagocytosis? Is an example of endocytosis in which the cell swallows particles like bacteria whole.

7. How can membrane proteins perform the following functions?

   communication – Some membrane proteins act as receptors to molecules released or secreted by other cells within the body, which precipitate changes within the cell. An example of this communication is seen in the protein receptors that receive & binds to neurotransmitters which then promotes the flow of specific ions through the membrane setting off other reactions within the cell.

   enzymatic functions – Other membrane proteins are enzymes that act as catalysts for chemical reaction. This is seen during digestion when a membrane-bound protein – lactase binds to the carbohydrate – lactose and promotes its division to its components of glucose & galactose.

   cell identification – Some other membrane proteins are specific to cell types allowing the cell to react to other cells as well as be a lookout for foreign cellular invaders. These allow to the body to have an immune reaction against harmful bacteria.

   cell junction formations – These are membrane proteins that anchor cells to one another. They also form seals to prevent leakage into the surrounding tissue, as well as, promote cellular communication.

   desmosomes - These proteins provide spot-weld-like junctions that bind cells tightly together.

   tight junctions – Membrane proteins that fuse the outer surfaces of adjacent plasma membranes which creates a seal that prevents the movement of substances between the cells.

   gap junctions – These are proteins that provide a channel through which chemical substances (ie. ions, nutrients, waste, neurotransmitters, etc. are passed between adjacent cells.