

Name: _____ Date: _____

Modeling the Cell Membrane Lab

Pre-lab Questions

1. List the molecules that make up the structure of the cell membrane.

2. What is the major difference between Active & Passive Transport?

Background:

The cell membrane is made up of a double layer of *phospholipids*, known as the **lipid bilayer**. Part of the phospholipid is *hydrophilic* (water-loving) and part is *hydrophobic* (water-repelling). This causes the phospholipids to be arranged in a very specific way with the hydrophobic tails facing inward (center) and the hydrophilic heads facing outwards. In this activity the Q-tips represent the phospholipids. However, one Q-tip equals **two** phospholipids (see figure 1).

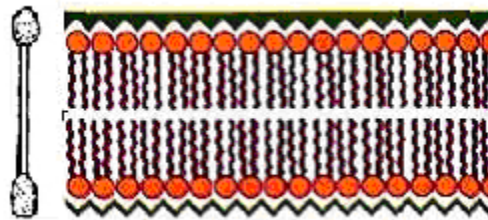


Fig. 1- Q-tip Phospholipid Model

The function of the *cell membrane* is to both separate the cell from what surrounds it and, most importantly, control (regulate) what is able to enter and exit the cell. The cell membrane is **selectively permeable** meaning that only certain things are able to enter and leave the cell easily. Think of the cell membrane as the exterior walls and roof of your home. It's scattered with a number of windows, doors and vents. Just like the cell, these items help to control what enters and exits your home.

Passive transport happens *without* the cell needing to use any energy (ATP) to move things through the membrane.

Active transport requires some energy (ATP) to move things through the membrane.

The membrane also has proteins imbedded within the membrane. Some proteins are simple **channel proteins**, which assist molecules to enter or leave the cell. Other proteins are **receptor proteins**, which simply receive a signal from outside the cell, and relay the information to inside the cell (no a chemical signal is passing through the cell, inside of a molecule).

Procedure Part 1: Modeling the Cell Membrane

Purpose: What does the structure of the Cell Membrane look like?

Materials: 50 Cotton Swabs
1 Drinking Straw

1 Rubber Band
Scissors

2 Pipe Cleaners of different colors

1. Gather all the cotton swabs and place into a bundle. Then place the rubber band around the middle of the Q-tip sticks to keep them in this bundle.
2. Place a **receptor molecule** into the cell membrane.
 - a. Take one of the pipe cleaners and place it through the bundle of cotton swabs. Bend the top end of it into a circular shape. This shape represents how signal molecules bind to specific molecules. Only a circular-shaped molecule can bind with this receptor.
3. Place a **carbohydrate chain** into the cell membrane
 - a. Use a second pipe cleaner as a carbohydrate chain. Place it in the bundle of cotton swabs, just as in step 2, but don't bend this pipe cleaner.
4. Place **protein channels** and **pumps** into the cell membrane.
 - a. First, cut your drinking straw in half. Then, place both halves into different locations in the bundle of cotton swabs.
5. Answer Part 1 Questions. When you are finished answering the questions, then you may break apart your model to re-use the components for another class.