TASK CARD: Simulation

Sodium/Potassium Pump (Active Transport)

*Click on the Link for the Simulation on Mrs. Meyer's webpage.

Introduction

In this simulation, you will learn about how the sodium/potassium pump works and what factors can influence its action.

Procedure

1. Click on the **Skip Intro** button, located in the lower right-hand corner, to start the Exploration.

2. On the screen you see a cutaway of a cell membrane: large globular proteins are embedded in a double layer of two-tailed phospholipid molecules. The top and bottom of the screen are the external and internal environments, respectively. The floating balls represent different kinds of molecules.

   BLUE = sodium ions YELLOW = potassium ions GREEN = amino acids

3. Now suppose this cell requires a supply of amino acids so that it can construct proteins. It must obtain them from the outside, concentrating them within the cell. This requires energy for active transport, or ATP.

4. Using the mouse, click and drag the sliding indicator in the "initial amino acids levels" box in the lower left corner to the right as far as desired to increase amino acids levels outside the cell, relative to those inside.

5. Click on "start." Now that you have provided an abundance of amino acids outside, two things are going to happen that will get them into the cell: **Describe these in your notebook**.

6. Click and drag the sliding indicator in the "ATP expenditures" box to the right and click on "start." This powers your project by supplying ATP.

7. The meters in the upper left corner of the screen monitor the rate of amino acid transport and the relative concentrations of amino acids inside and outside the cell.

8. Design experiments to test the following questions:

   - How is this system affected by the concentration of amino acids available? Test low, medium, and high amounts of amino acids. Record the amounts and results in your notebook.
   - How is the system affected by the amount of ATP used? Test low, medium, and high values of ATP. Record the amounts and results in your notebook.

Summary

How is the sodium/potassium pump important in real life? What kinds of phenomena influence its behavior? What would happen if the sodium/potassium pump was damaged or inoperable?