

**BMD 330 and 334: Human Physiology**  
**Chapter 4 Objectives**

**Cell Membrane Transport**

1. Describe the various factors that affect the direction of transport across membranes.
  - a. Compare energy changes in active and passive transport
  - b. Explain the role of chemical, electrical, and electrochemical forces in the passive transport of substances across cell membranes.
  - c. Describe the membrane potential and the role of the equilibrium potential in determining the direction of passive transport of ions across cell membranes.
    1. Describe the properties of electricity and how they apply to the cell
    2. Understand the relationship between voltage, current and resistance (Ohm's Law)
2. Identify the three general factors that influence the rate at which a substance can be passively transported across a membrane, and identify the two general factors that influence the rate of active transport.
3. Explain the role of proteins in the mediated transport of molecules across membranes.
  - a. Compare the movement of molecules across cell membranes by carriers and ion channels.
  - b. Compare the affinities of mediated transport proteins for facilitated diffusion and active transport.
4. Explain the distinction between primary and secondary active transport.
  - a. Describe the actions of the Na/K-ATPase
  - b. Describe the function of calcium pumps.
  - c. Explain the role of sodium in secondary active transport
    1. Define co-transport with sodium
    2. Define counter-transport with sodium
5. Explain how a difference in solute concentration across a membrane can cause the movement of water.
  - a. Describe the distribution of water and solutes across cell membranes
  - b. Compare osmolarity and tonicity.
  - c. Describe the effects of tonicity on cell volume
  - d. Define osmotic pressure and describe how it relates to water movement.
6. Describe vesicular transport across membranes
  - a. Compare the three mechanisms of bringing substances into cells.
  - b. Describe the process of exocytosis.
7. Describe movement across epithelia.
  - a. Describe the polarity of epithelial cells.
  - b. Describe the relationship between solute and water transport.