Chapter 7

class notes

I. Overview- Life at the Edge

• The plasma membrane separates the living cell from the nonliving surroundings.

II. Fluid Mosaic Model
(Singer and Nicolson, 1972)

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III. Cell membranes are fluid mosaics of lipids and proteins

- Phospholipids in the Bilayer

Question 7.1

- Proteins in the bilayer
IV. Overview of Six Major Functions of Membrane Proteins
   a) Transport
   b) Enzymes
   c) Signal Transduction
   d) Cell-cell recognition
   e) Intercellular joining
   f) Attachment to the cytoskeleton and ECM.

V. Role of Carbohydrates
   .
   .
   .

VI. Permeability of the Lipid Bilayer
   • A cell must exchange materials with its surroundings, a process controlled by the plasma membrane.
VI. Permeability of the Lipid Bilayer (without transport proteins)

- Nonpolar molecules
- Polar molecules
  - Slow transport
  - No transport

VI. Permeability of the Lipid Bilayer

- Transport proteins allow rapid passage of hydrophilic substances across the membrane.

Question 7.2
Question 7.3

• Two molecules that can cross the lipid bilayer without the help of a transport protein are \( \text{O}_2 \) and \( \text{CO}_2 \). What properties allow this to occur? (Campbell, page 130)

NOTE: You don’t need your clicker to answer this question.

VII. Passive Transport is Diffusion

• **Diffusion**
  – The tendency for molecules of any substance to spread out evenly into the available space

VII. Passive Transport is Diffusion

• **Substances diffuse down** their concentration gradient.

• **Diffusion across a membrane**
Questions 7.4

- The “cell” membrane is permeable to glucose, fructose, and sucrose.

VIII. Osmosis

- Osmosis is the diffusion of water across a semi-permeable membrane.

VIII. Osmosis

Is affected by the concentration gradient of dissolved substances.
VIII. Osmosis

• If a solution is hypotonic
  
  

VIII. Osmosis

• If a solution is isotonic
  
  

VIII. Osmosis

• If a solution is hypertonic
  
  


VIII. Osmosis

• Organisms without cell walls.
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• Organisms without cell walls living in isotonic or hypotonic environments
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• Organisms with rigid cell walls
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Question 7.5

IX. Facilitated Diffusion

• Facilitated diffusion =

IX. Facilitated Diffusion

• Facilitated diffusion-two types
X. Active Transport

• Active Transport =

X. Active Transport

• Active Transport Example

Question 7.6
XI. Review

- Passive transport
- 
- Active transport

XII. Endocytosis and Exocytosis

- Movement of macromolecules (DNA, proteins, LDL, etc…)
- Movement of solutes and water in bulk

XII. Endocytosis and Exocytosis
XIII. Types of Endocytotic Mechanisms

• Phagocytosis = (cellular eating) endocytosis of solid particles.

• Pinocytosis = (cellular drinking) endocytosis of fluid droplets.

• Receptor-mediated endocytosis = The process of importing specific macromolecules into the cell through receptors on the cell’s surface.

Question 7.7