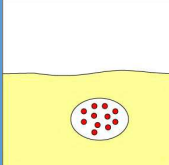
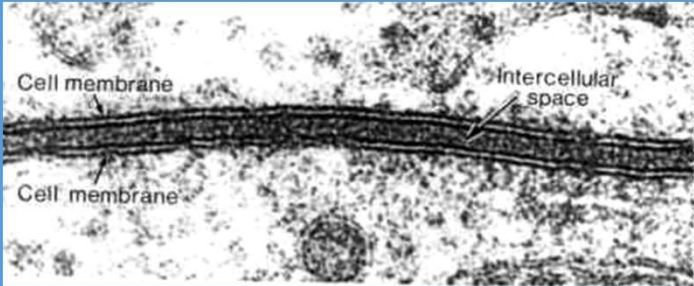


Cellular Transport Notes

Chapter 3.3-3.5

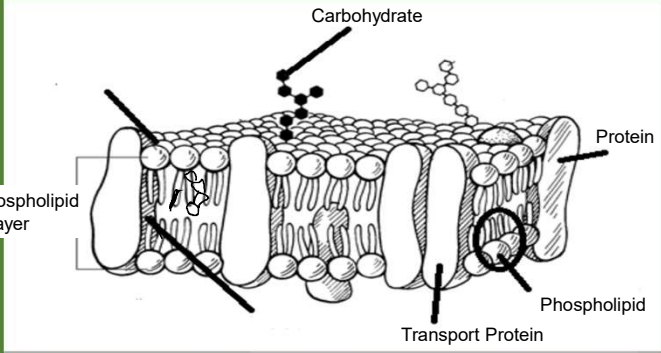


Membrane movement animation



Cell membrane
Intercellular space
Cell membrane

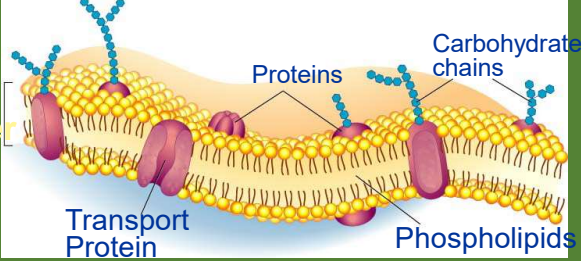
Label the Fluid Mosaic Model Below



Carbohydrate
Protein
Phospholipid Bilayer
Phospholipid
Transport Protein

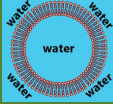
Structure of the Cell Membrane

Outside of cell



Lipid Bilayer
Proteins
Carbohydrate chains
Transport Protein
Phospholipids

Inside of cell (cytoplasm)

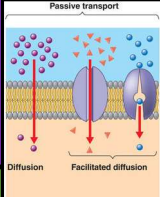


water

About Cell Membranes

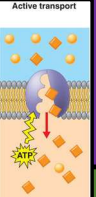
1. All cells have a cell membrane
2. Functions:
 - a. Controls what enters and exits the cell
 - b. Maintain internal balance called **homeostasis**
 - c. Provides protection and support for the cell

Passive transport

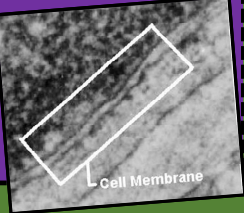


Diffusion
Facilitated diffusion

Active transport



ATP



Cell Membrane

About Cell Membranes

3. Structure of cell membrane

- **Lipid Bilayer** - 2 layers of phospholipids

Phospholipid

Lipid Bilayer

About Cell Membranes

- 4. Cell membrane is picky.
 - **Selectively permeable**: Allows some molecules in and keeps other molecules out.
 - Pores are found in protein and between phospholipids.

Try this out...

1. Name the 3 major macromolecules that make up the cell membrane.
 - 1. Lipid (phospholipids)
 - 2. Proteins
 - 3. Carbohydrates
2. Because the cell membrane only allows certain items to go in and out of the cell it is Selectively Permeable.
3. What process is being managed but will be negatively affected if the cell membrane stops working? Homeostasis

Types of Cellular Transport

Passive transport

Active transport

Types of Cellular Transport

Passive Transport: • • • **No Energy Required**

- Molecules move until it reach equilibrium
- Molecules spread out **from a high concentration to a low concentration.**

Passive Transport

1. Diffusion: Ex: O₂ and CO₂

- Random movement of solutes
- Move through pores in membrane

Passive Transport

2. Facilitated diffusion:

- Requires a transport protein
- Transports larger or charged molecules

Passive Transport

Facilitated Diffusion

Passive Transport

3. Osmosis

- Diffusion of *water* through a membrane
- Water moves freely through pores.
- *Water moves not the solute.*

Osmosis animation

• Solute (red) is large to move across.

Osmosis in Different Environment

Types of Environments:

1. Hypotonic
2. Hypertonic
3. Isotonic

A. Isotonic solution (equal concentration of ions in solution and cell)
 B. Hypertonic solution (higher concentration of ions in solution than in cell)
 C. Hypotonic solution (lower concentration of ions in solution than in cell)

Salt Sucks

Osmosis in Different Environment

1. Hypotonic Solution

Hypo=below

Info: The solution has (**Low solute; High water**)

Solution is **Hypotonic**

Water moves into the cell

Distilled water

Animal cell

Turgid

Result: Water moves from the solution to inside the cell); Cell Swells (*turgid*) and bursts open (*cytolysis*)!

Osmosis in Different Environment

2. Hypertonic Solution

Hyper=above

Info: The solution has (**High solute; Low water**)

Solution is **Hypertonic**

Water moves out of the cell

Plasmolyzed

shrinks

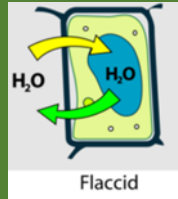
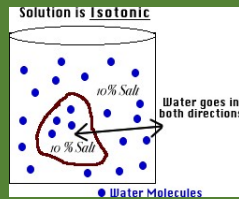
Result: Water moves from inside the cell into the solution: Cell shrinks (*Plasmolysis*)!

Osmosis in Different Environment

3. Isotonic Solution

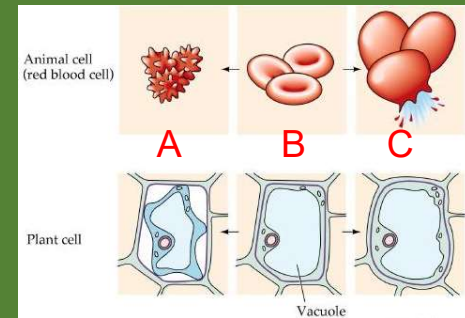
Info: Solution has (Equal solute; Equal water)

- Balanced in both inside and outside the cell



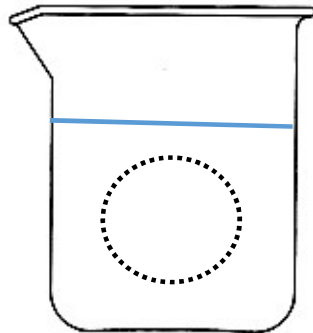
Result: Water moves equally in both directions and the cell remains same size! (Equilibrium) (Flaccid)

What type of solution are these cells in, explain what's happening to the shape of cell, and which direction is the water going?



Hypertonic Isotonic Hypotonic

Solution Practice



- Solution outside of Cell?
- What happens to the cell?
- Movement of water?

How Organisms Deal with Osmotic Pressure

• Paramecium limited in moving excess water out


- Bacteria and plants have cell walls that prevent them from over-expanding. In plants the pressure exerted on the cell wall is called turgor pressure.
- A protist like paramecium has contractile vacuoles that collect water flowing in and pump it out to prevent them from over-expanding.
- Salt water fish pump salt out of their specialized gills so they do not dehydrate.
- Animal cells are bathed in blood. Kidneys keep the blood isotonic by remove excess salt and water.

Instructions:

1. Label the solution as hypertonic, hypotonic, or isotonic.
2. State the direction the water will move. (Into the cell, out of the cell, into and out of the cell equally)
 - Draw which way the water will flow using arrows in the box provided.
3. Describe what will happen to the cell. (Swells, shrinks, or stays the same)

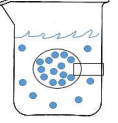
Solution A

1. _____
2. _____
3. The cell will _____



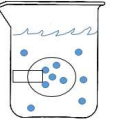
Solution B

1. _____
2. _____
3. The cell will _____



Solution C

1. _____
2. _____
3. The cell will _____



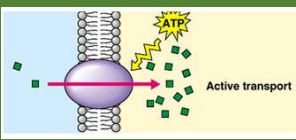
Tells try this

Answer the questions on the sheet provide to you.

Types of Cellular Transport

Active Transport:
Energy Required (ATP)

• Movement against the concentration gradient from an area of low concentration to an area of high concentration



High ←

→ Low

Active Transport

1. Protein Pumps

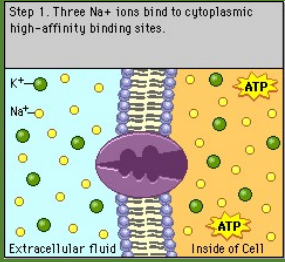
- Transport proteins that require energy to do work

Example:

- Sodium / Potassium Pumps are important in nerve responses.

Sodium Potassium Pumps (Active Transport using proteins)

Step 1. Three Na⁺ ions bind to cytoplasmic high-affinity binding sites.



Extracellular fluid Inside of Cell

Protein changes shape to move molecules: this requires energy!

Active Transport

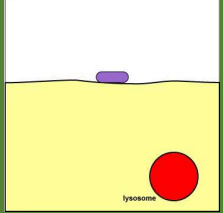
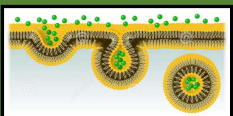
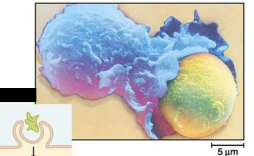
2. Endocytosis

- “Cell eating” of bigger material
- Cell membrane in-folds around food particle

2 Types

- Phagocytosis: large particles (glucose)
- Pinocytosis: Fluid is moved

- This is how white blood cells eat bacteria!

5 μm

lysosome

Types of Endocytosis

Endocytosis

Phagocytosis	Pinocytosis
<p style="text-align: center;">solid particle Phagosome (food vacuole)</p>	<p style="text-align: center;">Extracellular fluid cytoplasm Vesicle</p>

Active Transport

Endocytosis & Exocytosis animations

3. Exocytosis

- Material is forced out of cell
- Membrane surrounding the material fuses with cell membrane
- Cell changes shape – requires energy
- EX: Hormones or wastes released from cell

Exocytosis

Wastes and exported molecules

Endocytosis and Exocytosis

Binding to receptor and movement to clathrin coated pit
Release of nutrients
Digestion
pH drop
Lysosome

Extracellular fluid
Cell membrane
Cytoplasm
Vesicle

Phagocytosis

EXTRACELLULAR FLUID
CYTOPLASM
Pseudopodium
"Food" or other particle
Food vacuole

Pinocytosis

Plasma membrane
Vesicle

Types of Cellular Transport

Video

• **Passive Transport**
Cell doesn't use energy

1. Diffusion
2. Facilitated Diffusion
3. Osmosis

high
low

• **Active Transport**
Cell does use energy

1. Protein Pumps
2. Endocytosis
3. Exocytosis

high
low

Word Bank

diffusion 10
passive 5
Concentration gradient 1
Active 9
osmosis 5
facilitated diffusion 3
Endocytosis 6
Energy 4
phagocytosis 8
pinocytosis 7
exocytosis 2

1. Active transport can move substances against their ____.
2. Materials are released from a cell in a process called ____.
3. A type of passive transport which uses special proteins to aid the movement of materials is called ____.
4. The difference between active and passive transport is that active transport requires _____, while passive transport does not.
5. _____ is the movement of water to try to balance concentrations. This is a type of _____ transport.
6. Materials are taken in by a cell in a process called ____.
7. _____ is the movement of solutes or fluids into a cell.
8. _____ is the movement of large food particles into a cell.
9. Phagocytosis and pinocytosis are types of _____ transport.
10. _____ is the movement of particles from high to low concentrations until they are evenly mixed.