

Cell Transport Notes

Chapter 7 Section 3

pages 208-217

The goal of Cellular Transport is to move substances IN and OUT of the cell.

A little review from last unit (pg204)

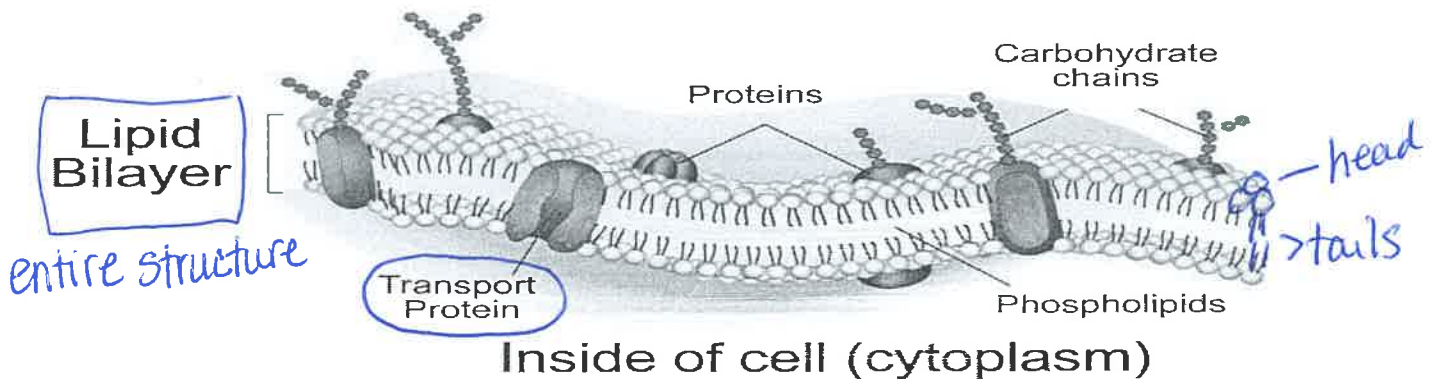
The Plasma Membrane (AKA cell membrane)

- All cells contain a cell membrane this includes (Animal, plants, and prokaryotes cells)
- The cell membrane is made up of a double-layered sheet called the lipid bilayer
- This gives the cell a flexible structure that forms a strong barrier between the cell and its surroundings
- The lipid bilayer is made up of fatty acid chains that are hydrophobic to water and called the tail end
 - These form an oily layer on the inside of the membrane
- The opposite end (called the head end) is hydrophilic to water
 - These form the outside layer of the membrane

The Plasma Membrane

Structure of the Cell Membrane

Outside of cell



Inside of cell (cytoplasm)

Fluid Mosaic – Why do scientists describe the cell membrane/lipid bilayer as a fluid mosaic?

- because it is able to move, flexible
- it is not rigid

Why are some cell membranes' are called Selectively permeable?

allow certain things to enter & exit
- very picky & choosy

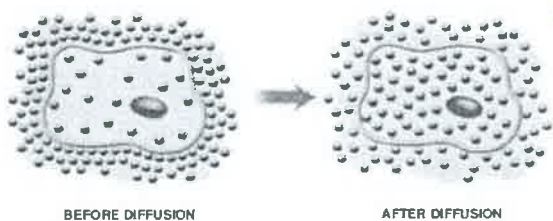
There are 2 types of Cellular Transport (page 208)

PASSIVE TRANSPORT	ACTIVE TRANSPORT
Diffusion	Endocytosis
Facilitated diffusion	Exocytosis
Osmosis	Protein Pumps

~PASSIVE TRANSPORT~

Diffusion: process by which particles move from an high concentration to an area of lower concentration

Diffusion Across Cell Membranes



- Cellular cytoplasm consists of many different substances/solutes dissolved in H₂O
- solute particles move constantly
- Particles tend to move from a high concentration to a low concentration area
- If a substance can cross the cell membrane its particles will move to the less concentrated area until evenly distributed
- No energy needed
- no overall change
- Examples: O₂, CO₂

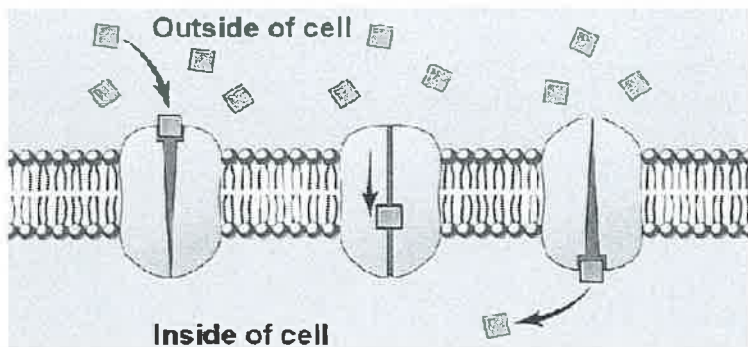
- Some factors that affect diffusion include: temp, concentration, pressure
- How am I going to remember the meaning of DIFFUSION?

high → low No energy

Facilitated Diffusion: The process in which molecules use protein channels to diffuse across the cell

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Facilitated Diffusion



- Proteins stuck in the cell membrane act as Channels
- This makes some molecules cross the membrane easily
- The protein channels that allow sugar across the membrane facilitate or help the diffusion of glucose across the membrane
- No energy needed
- Examples include: sugar
- How am I going to remember the meaning of FACILITATED DIFFUSION?

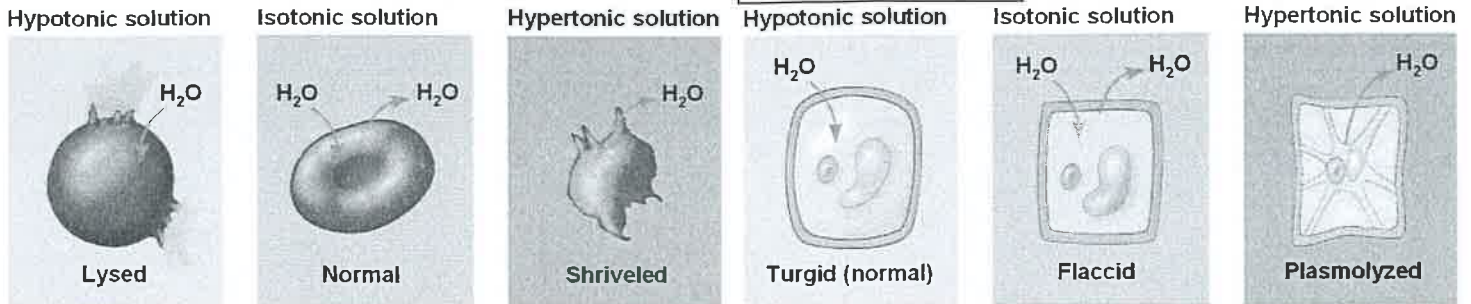
diffusion but use carrier proteins (how sugar crosses)

Osmosis: the diffusion of water thru a selectively permeable membrane

* No energy
* use aquaporins

- Molecules move from an area of high concentration to an area of low concentration
- Name the molecule that moves in osmosis: water
- Water continues to move across the membrane until equilibrium is reached

PLANT OSMOSIS



ISOTONIC SOLUTION

- If the water and sugar molecules are same on both sides of the membrane
- Isotonic means same strength
- "strength" refers to the amount of solute NOT water
- Water will move in & out at the same rate
- The cell will keep its normal shape
- Animal cells: this IS the perfect condition since the cell is at equilibrium
- Plant cells: this is NOT the perfect condition

HYPERTONIC SOLUTION



- Hypertonic means above strength
- The solution has a higher solute concentration than the inside of the cell
- low water amount high solute amount OUTSIDE
- high water amount low solute amount INSIDE
- Results in water moving Out of the cell
- Cell will shrink
- Animal cells: this is NOT good since the cell will shrink (it is dehydrated)
- Plant cells: this is NOT good causing the plant to wilt

HYPOTONIC SOLUTION

- Hypotonic means below strength
- The solution has a lower solute concentration than the inside of the cell
- high water amount low solute amount OUTSIDE
- low water amount high solute amount INSIDE
- Results: water moves IN the cell
- Cell will swell
- Animal cells: this is NOT good since the cell could swell too much causing it to burst or lyse
- Plant cells: this IS ideal because the cell membrane pushes on the cell wall causing the plant to be more upright

HOW AM I GOING TO REMEMBER...???

<p>Isotonic Solutions? equal cell inside = outside enviro</p>	<p>Hypertonic Solutions? "dehydrate" water out water high inside solute high outside</p>	<p>Hypotonic Solutions? Watered plant water in water high outside solute high inside</p>
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~ACTIVE TRANSPORT~ Pg 212

Active Transport: movement of materials against a concentration gradient

- Requires energy
- Most also use carrier proteins/pumps

MOLECULAR TRANSPORT

- Small molecules and ions are carried across membranes by proteins in the membrane that act like pumps
- Examples includes: Ca, K⁺, Na⁺

BULK TRANSPORT

- large molecules and even solid clumps of material can be transported by movement of the membrane
- This depends on the size and shape of the material

ENDOCYTOSIS: cell process of taking material into the cell by means of infoldings or pockets of cell membrane (a way)

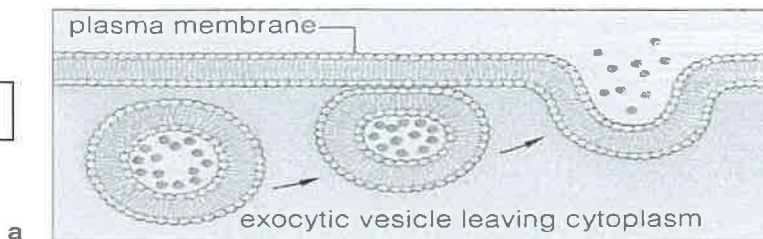
- The pocket will break loose from the outer portion of the membrane and form vesicles/vacuoles
- Examples: food clumps, cell
- Bringing large molecules into the cell using vesicles/vacuoles and energy
- PHAGOCYTOSIS: a type of endocytosis where cytoplasm surrounds a particle & making a vesicle
 - amoebas use this to bring in food
 - white blood cells use this to "eat" damaged cells
- PINOCYTOSIS: process of taking up liquid from environment into cell

EXOCYTOSIS: cells release large amounts of material

- Contents of the cell are forced out
- Must use energy + vesicle
- Example: water from contractile vacuole, other waste

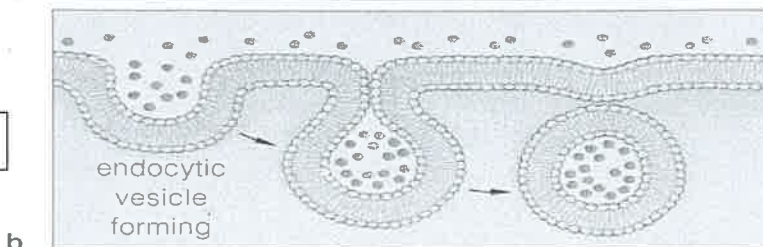
EXOCYTOSIS

OUT



ENDOCYTOSIS

IN



HOMEOSTASIS: constant internal physical & chemical conditions

Ways to maintain homeostasis

Unicellular organisms will:

- 1) grow
- 2) respond to environment
- 3) transform energy
reproduce

Ex: yeast
prokaryotes
protists

Multicellular organisms will:

- 1) specialized for particular tasks
- 2) communicate

Levels of Organization

CELL: the basic unit of life

TISSUE: group of similar cells that perform a particular function "Muscle tissue"

ORGAN: many tissues working together to perform a particular function "heart organ"

ORGAN SYSTEM: a group of organs that work together to perform specific function

This division of labor allows organisms to maintain homeostasis Because of

specialization and interdependence

Cellular Communication

- Cells in large organisms communicate by means of chemical signals
- These signals speed up activities or can slow down activities
- **RECEPTORS:** a signaling molecule binds so that a signal can be responded to
- Examples: heart to contract nerve impulse
reactions