شرح النقل الخلوي – الوحدة الثانية الدرس الثالث





تم تحميل هذا الملف من موقع المناهج الإماراتية	
موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف العاشر ⇦ أحياء ⇦ الفصل الأول ⇦ ملفات متنوعة ⇦ الملف	
تاريخ إضافة الملف على موقع المناهج: 2026-11-09 20:14:08	
ملفات ا كتب للمعلم ا كتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي ا للمدرس	المزيد من مادة أحياء:
إعداد: Gilgil Omar	

التواصل الاجتماعي بحسب الصف العاشر					
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المزيد من الملفات بحسب الصف العاشر والمادة أحياء في الفصل الأول	
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Unit 2 - Lesson 3

Cellular Transport

Types of Cellular Transport

- Cellular transport can occur through one of two basic processes:
  - passive transport.
  - active transport.
- There are three main types of passive transport:
  - Diffusion or simple diffusion - the movement of small or nonpolar molecules, such as O2 and CO2, across the plasma membrane.
  - facilitated diffusion - the movement of large or charged molecules, such as proteins and ions, through water-filled transport proteins.
  - osmosis - the movement of water molecules across the plasma membrane.
- All of these three types of passive transport move substance from high concentration to low concentration (down concentration gradient) and without need energy.

Diffusion

- Particles in solids, liquids, and gasses are in constant random motion.
- substances dissolved in water move constantly in random motion called Brownian motion.
- Concentration: The amount of a substance in a particular area.
- The difference in concentration of materials across a space is called the concentration gradient.
- The physical and chemical properties of the material determine which process it uses to pass through the membrane.
- Diffusion is the net movement of particles from an area of high concentration to an area of lower concentration or down their concentration gradient
- Additional energy is not required.

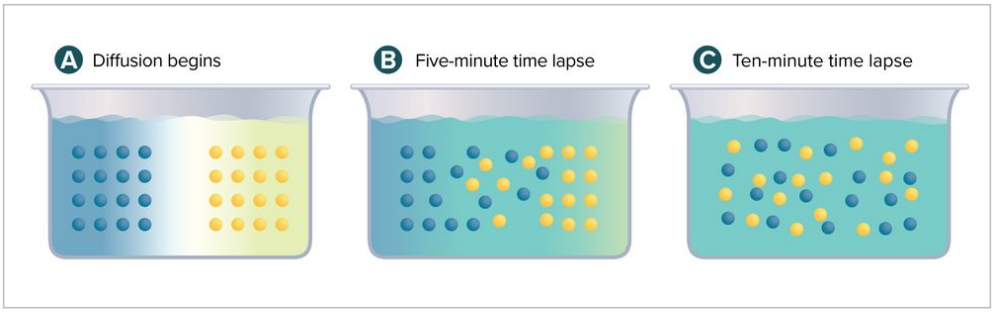
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Unit 2 - Lesson 3

Cellular Transport

Diffusion

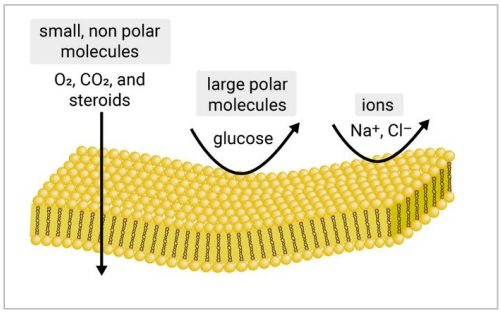
- When diffusion occurs over a long enough time, concentrations will become uniform, and the solution will reach dynamic equilibrium.
- In dynamic equilibrium, molecules continue to move, but the concentration remains the same.



1-Diffusion= Simple Diffusion

- Three main factors affect the rate of diffusion: 1-concentration, 2-temperature, and 3- pressure.
- 4-The size and 5- charge of a substance also affects the rate of diffusion.

2- Facilitated Diffusion



- The ability of materials to diffuse across the phospholipid bilayer depends upon their 1-size and 2-type, and 3-the chemical nature of the plasma membrane.
- Facilitated diffusion uses transport proteins to move ions and small molecules across the plasma membrane from higher concentration to lower concentration.
- Facilitated diffusion don't require energy.
- Two types of transport proteins are involved in facilitated diffusion

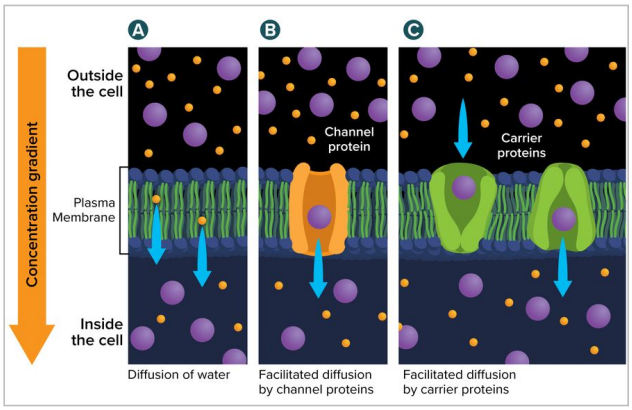
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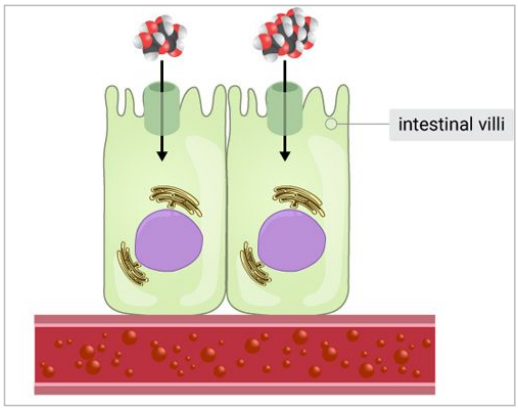
Cellular Transport

2- Facilitated Diffusion

- **channel proteins** are like pores that open and close and allow ions to diffuse across the plasma membrane.
- **carrier proteins:** carry large molecules, such as glucose, across the plasma membrane by changing their shape after binding to the molecule.

- Water moves freely through the plasma membrane (aquaporins) (A), but other substances cannot pass through on their own. Channel proteins (B) and carrier proteins (C) help ions and small molecules move across the membrane.





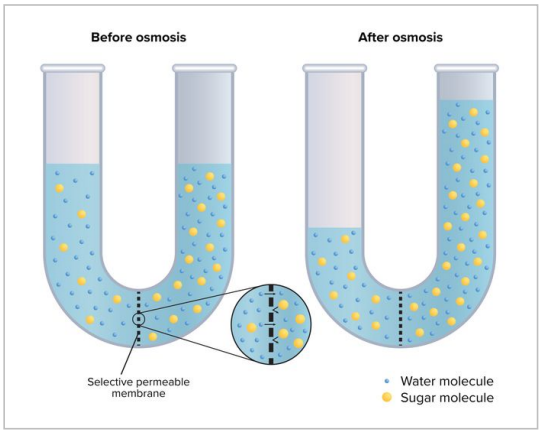
3- Osmosis: Diffusion of Water

- **Osmosis** is the movement of water molecules down their concentration gradient (high to low) across a selectively permeable membrane.
- **Aquaporins** are channel proteins embedded in the plasma membrane composed of tiny holes that selectively allow small uncharged molecules, such as water, to pass through.
- The concentration of a solution decreases when the amount of solvent increases.
- Water will move across a membrane until the concentration of solute is the same on both sides.

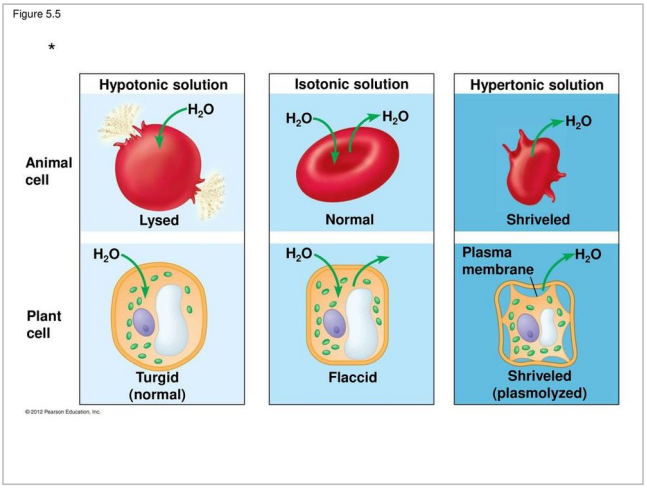
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Cellular Transport

3- Osmosis: Diffusion of Water



- Before osmosis, the sugar concentration is greater on the right side. After osmosis, the concentrations are the same on both sides (dynamic equilibrium). Water molecules continue to move across the membrane.
- In osmosis, water always moves from an area of higher water concentration to one of lower water concentration until it reaches a state of dynamic equilibrium.
- Pressure generated as water flows through the plasma membrane is called osmotic pressure.
- Based on the solute concentration, solutions can be categorized as isotonic, hypotonic, and hypertonic solutions.



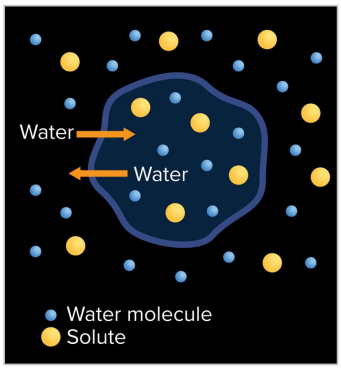
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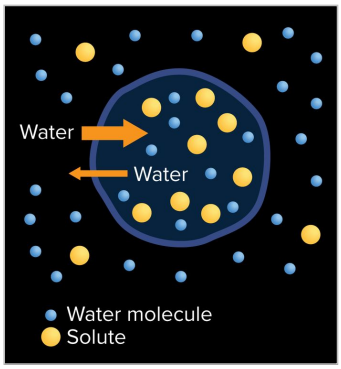
3- Osmosis: Diffusion of Water

Isotonic solution

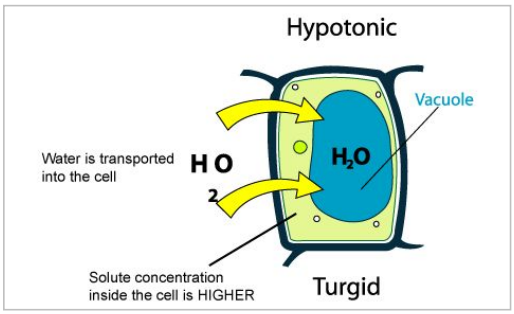


- An isotonic solution has the same concentration of water and solutes as the cytoplasm of the cell.
- Water still moves through the membrane, but it enters and leaves at the same rate.
- Most cells in organisms are in isotonic solutions, such as blood.

Hypotonic solution



- A hypotonic solution has a lower concentration of solutes than the cytoplasm of the cell.
- The net movement of water is into the cell.
- As water moves into the cell, pressure increases.
- Animal cells can swells or burst when placed in extremely hypotonic solutions.
- plant cells do not burst when they are placed in a hypotonic solution, Because they have a rigid cell wall that supports them.



- As the pressure inside a cell increases, the plant's central vacuole fills with water, pushing the plasma membrane against the cell wall.
- Instead of bursting, the plant cell becomes firmer. Grocers use this process to keep produce looking fresh by misting fruits and vegetables with water.

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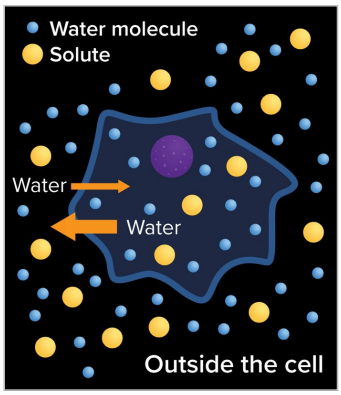
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Cellular Transport

3- Osmosis: Diffusion of Water

Hypertonic solution

- An hypertonic solution has a higher concentration of solutes than the cytoplasm of the cell.
- The net movement of water is out the cell.
- As water moves out of the cell, pressure decreases.
- Animal cells in a hypertonic solution shrivel because of decreased pressure in the cells.
- Hypertonic solutions cause wilting in plants.



Active Transport

- Sometimes substances must move from an area of lower concentration to an area of higher concentration.
- active transport: Movement of particles across the cell membrane, against the concentration gradient (low to high), requires energy.
- Active transport occurs with the aid of carrier proteins, which are often called pumps.
- Examples of active Transport:
  - First: Na+/K+ ATPase Pumps
  - Second: Coupled Transport
  - Third: Vesicle-Mediated Transport

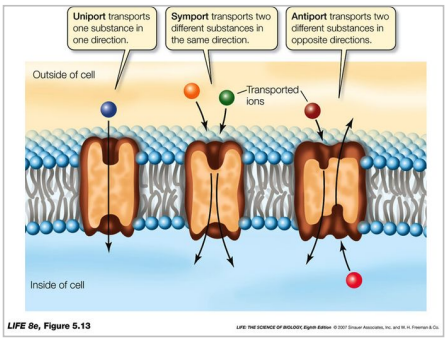
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Cellular Transport

Active Transport

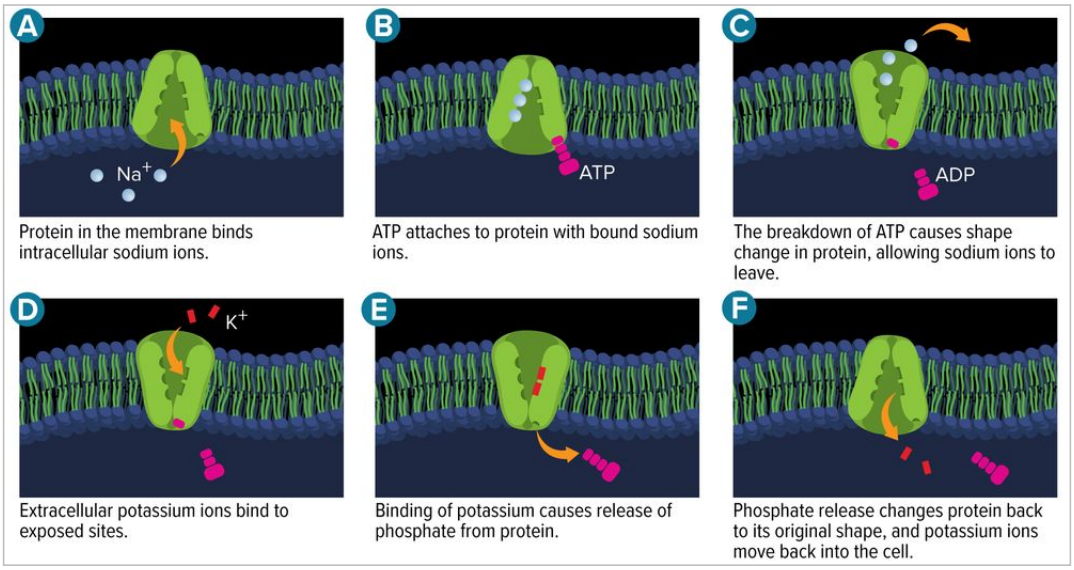
Types of pumps=Types of carrier protein

- 1- Move one type of substance in only one direction (uniport).
- 2- Move two substances either across the membrane in the same direction (symport) or in opposite directions (antiport).



First: Na+/K+ ATPase Pumps

- Na+/K+ ATPase Pumps = It is a protein pump = it is an enzyme
- It is an enzyme that catalyze the breakdown of energy storing molecule ATP.
- These pumps are found in the plasma membrane of animal cells.
- They maintain levels of sodium (Na+) high outside the cell and potassium (K+) high inside the cell.
- The pump uses the energy to transport three sodium ions out of the cell while moving two potassium ions into the cell.



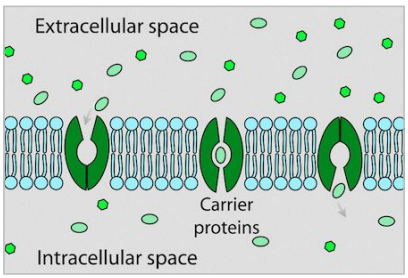
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Cellular Transport

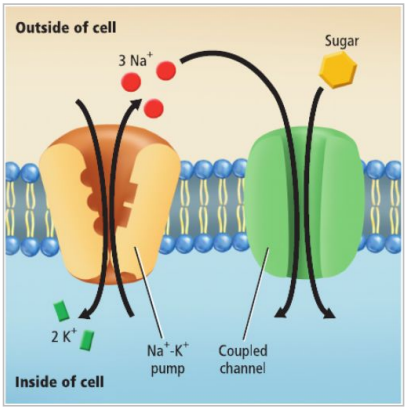
Active Transport

- **Remember:** Glucose moves across the cell membrane using the concentration gradient with the help of a carrier protein, traveling from the extracellular space (higher glucose concentration) to the cytoplasm (lower glucose concentration) by Facilitated diffusion.



Second: Coupled Transport

- Secondary active transport is also called **coupled transport** or cotransport.
- Coupled transport is defined as the simultaneous transport of two substances across a biological membrane.
- It may be a symport or antiport depending on the direction of movement of the two substances
- In a process called coupled transport, sugars can pair with Na+ ions and enter the cell through a membrane protein called a coupled channel.
- Coupled transport allows sugars to enter through facilitated diffusion, which saves energy.



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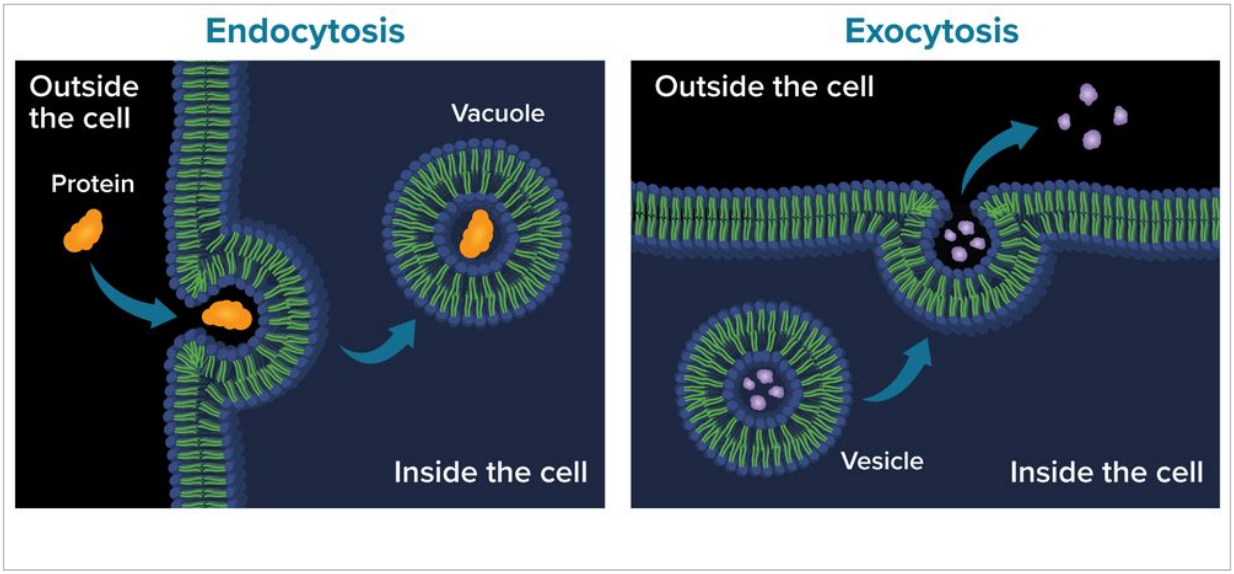
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Cellular Transport

Active Transport

Third: Vesicle-Mediated Transport

- **Transport of Large Particles**
- **Endocytosis** is the process by which a cell surrounds an object in the outside environment in a portion of the plasma membrane.
- **Exocytosis** is the excretion of materials at the plasma membrane.
- Both endocytosis and exocytosis require the input of energy.



Review Vocabulary

- **homeostasis:** the regulation of the internal environment of a cell or organism to maintain conditions suitable for life