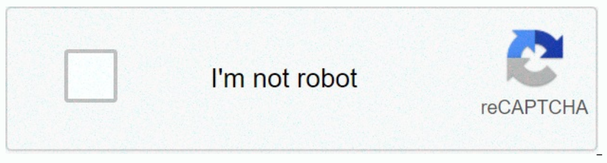


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# 7.3 cell transport ppt

1 Lesson Overview 7.3 Cell transplant 2 THINK ABOUT IT When considering how cells move materials in and out, it can be useful to think of a cell as a nation. The nation's borders are its borders, and almost every country tries to regulate and control goods that cross these borders. Cells have their own borders that separate a cell from their environment and also determine what comes in and what goes out. How can a cell stand out from its surroundings and still let material in and out? 3 Passive traffic What is passive traffic? The movement of materials over the cell membrane without using cellular energy is called passive transport. -difusion osmosis facilitated difusing 4 Difusion Cell cytoplasm is a solution of many substances dissolved in different water. Soluble particles move from a high concentration to an area where they are less concentrated. The process of transferring particles from a high concentration range to a lower concentration area is called difusion. the movement of many substances in the background over the cell membrane. 5 Diffusion Example: Assume that the substance occurs at unequal concentrations on either side of the cell membrane. Diffusion If a substance can cross a cell membrane, its particles tend to move towards an area where it is less concentrated until it is evenly distributed. 7 Diffusion At that stage, the concentration of the substance on both sides of the cell membrane is the same, and balance is achieved. Diffusion Although balance is achieved, particles in the solution still move over the membrane in both directions. Since almost as many particles move in both directions, there is no net change in concentration on either side. 9 Relieved DifusionCell membranes have proteins that act as carriers or channels, making it easy for certain molecules to cross. Molecules that are not able to directly decompose across the membrane pass through special protein channels in a process called facilitated difusion. Hundreds of different proteins have been found that allow certain substances to cross cell membranes. The movement of molecules with relief by diffusion does not require additional use of cell energy. 10 Osmosis: An example of facilitated difusion The inside of the cell lipid bilaer is hydrophobic – or water-hating. Because of this, water molecules find it difficult to pass through the cell membrane. Many cells contain water channel proteins called waterporin, which allow water to pass through them. Without waterporin, the water would break down into the cells very slowly. The movement of water through cell membranes by facilitating difusion is a very important biological process – the osmosis process. 11 Osmosis: An example of relieved difusionosmoosososis is diffusion selectively permeable film. movement of water molecules from a higher concentration range to a smaller area. 12 Osmosis operation In the experimental installation below, the barrier passes through the water, but not the sugar. This means that water molecules can pass through the barrier, but soluble, sugar, can't. 13 Osmosis action There are more sugar molecules to the right of the barrier than on the left side. Therefore, the water content is lower on the right, where more solution is made from sugar. Operation of osmosis The mains movement of water into a compartment containing a solution of consentrate sugar solution. Water tends to move over the barrier until balance is achieved. At that point, the concentrations of water and sugar are the same on both sides. How osmosis works When the concentration is the same on both sides of the membrane, these two strips are isotonic, which means the same strength. Osmosis function A more concentrated sugar solution at the start of the experiment was hypertonic, i.e. above strength, compared to the diluted sugar solution. The diluted sugar solution was hypotonic, i.e. below strength. 17 Osmotic pressure In order to survive organisms, they must have a way of balancing water supply and loss. The net movement of water from or into a cell causes a force known as osmotic pressure. Osmotic pressure Because the cell is full of salts, sugars, proteins and other molecules, it is almost always hypertonic with fresh water. As a result, the water tends to quickly migrate to the cell surrounded by fresh water, causing it to swell. Eventually, the cell could explode. 19 Osmotic pressure In plants, the movement of water into the cell causes the central constant to swell, pushing the contents of the cell against the cell wall. Since most cells of large organisms do not come into contact with fresh water, they are not at risk of bursting. 20 Osmotic pressure Instead, cells bathe in liquids such as blood, which are isotone and have dissolved material concentrations about equal to those of cells. Cells placed in an isotonic solution should not and do not lose water. 21 Osmotic pressure Hypertonic solution, water rushes out of the cell, causing animal cells to shrink and plant cell vasoluls to collapse. 22 Osmotic pressure Some cells, such as fish and frog eggs, must come into contact with fresh water. These types of cells usually lack water channels. As a result, the water moves so slowly into them that osmotic pressure does not become a problem. 23 Osmotic pressure Other cells, including cells of plants and bacteria that come into contact with fresh water, are surrounded by hard cell walls that prevent cells from expanding, even under enormous osmotic pressure. 24 Osmotic pressure Note how the plant cell holds in the form of a hypotonic solution, while the red blood cell of the animal does not. However, increased osmotic pressure makes such cells highly susceptible to injuries to cell walls. 25 Active traffic What is active transportation? The movement of materials against the concentration difference is called active transport. Active traffic requires energy. Transport of molecules Small molecules and ions are transported over membranes using membrane proteins that act like pumps. E.g. proteins to move calcium, potassium and sodium ions over cell membranes. Changes in protein shape appear to play an important role in the pumping process. 27 Bulk transport Larger molecules and even fixed rope spacing of material can travel through the movements of a cell membrane known as mass transport. Bulk transports can be multiple shapes, based on the size and shape of materials transferred to or from a cell. Endosytosis is a process in which material is introduced into the cell using cell membrane intels or pockets. The resulting pocket detaches from the outer part of the cell membrane and forms a vesicle or vakuol in the cytoplasm. Endocytosis In phagocytosis, cytoplasm extensions surround the particle and pack it into food whales. Then the cell swallows it. Amoebas uses this method to take food. In this way, the swallowing material requires a significant amount of energy. In pinocytosis, cells take fluid from the surrounding environment by forming small pockets along the cell membrane. Pockets filled with liquid and pinched away to form vakuoles in the cell. Exosytosis Many cells also release large amounts of material known as exosytosis from the cell. During exosytosis, the membrane of the vakuol surrounding the material merges with the cell membrane, forcing the contents out of the cell. 1 Lesson Overview 7.3 Cell transport 2 Passive transport The movement of materials over the cell membrane without using cellular energy is called passive transport. 3 Diffusion The process of transferring particles from a high concentration range to a lower concentration area is known as difusion. - passive transport form - particles move concentration gradient 4 Diffusion High Conc. Low Conc. 5 Difusion 6 Difusion 7 Facilitated difususIf molecules that cannot directly break down through the membrane pass through special protein channels in a process called facilitated difusion. - protein channels are molecular-specific - a form of passive transport - particles move downwards concentration gradient 8 Osmosis: An example of facilitated difusionosmosmosis is the diffusion of water through a selectively permeable membrane. - water moves down the concentration gradient - passive 9 osmosis: Example of facilitated difusionhyperthonous - higher solubility content; low solvent (water) content - lower solubility content; high isotonic concentration of solvent - equal solubility concentrations 10 How osmosis affects Hypertonic hypotonic 11 How osmosis acts 12 Osmotic pressure The net movement of water in or out of the cell causes a force called osmotic pressure. Osmotic pressure Because the cell is full of salts, sugars, proteins and other molecules, it is almost always hypertonic with fresh water. So if the cell is in fresh water, the water tends to quickly migrate to the cell, causing it to swell or even burst. 14 Osmotic pressure In plants, the movement of water into the cell causes the central vein to swell, pushing the contents of the cell against the cell wall. Osmotic pressure cells in isotone solution do not receive a net gain or loss. 16 Osmotic pressure Hypertonic solution, water rushes out of the cell, causing animal cells to shrink and plant cell vasoluls to collapse. 17 Active transport The movement of materials against or up to the concentration difference is called active transport. - requires energy (ATP). Active transport of small molecules or ions is carried out through transport proteins, i.e. protein pumps, in the membrane. calcium, potassium and sodium ions use this transport. - example: changes in the shape of the sodium potassium pump protein are important in the process. 19 Active transport: Bulk TransportBulk Transport moves larger molecules and material ropes over cell membranes. - requires energy (ATP) forms: 1. endocytosis a. pinocytosis b. phagocytosis 2. exocytosis 20 Endocytosis process to introduce material into the cell by vesicles or waxes 21 Endocytose Endocytosis types:1. extensions of phagocytosis cytoplasm surround the particle and pack it into food vats. Then the cell swallows it. Amoebas eats like this. means eating cells 2. pinocytosis - cells form small pockets along the cell membrane. Pockets filled with liquid and pinched away to form vakuoles in the cell. means cell drinking 22 Vakuol's exosytosis membrane merges with the cell membrane, forcing the contents of the vakuol out of the cell. Cell.

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