Information control center of the cell

As a result of the EU General Data Protection Regulation (GDPR). At this time, we do not allow internet traffic on the website of any of the countries of the European Union. No tracking or performance measurement cookies are provided on this page. The nucleus is the center of cell control, that is, it contains genetic information to do and do everything that happens in the cell. The nucleus is surrounded by nuclear dill, which is a double membrane that protects the nucleus by filtering what it can leave and enter (like a cell membrane), and separates the nucleus from the rest of the cell. The nucleus works with everything in the cell because it has all the DNA needed to do everything. Each single protein in each cell was created because of the DNA of the nucleus. A nuclear envelope is a double diaphragm (meaning it has a primary/outer and secondary/internal layer) that surrounds the nucleus itself. It is made of two-layer phospholipids, like the cell membrane, and contains many pores for filtering. The main task of the nuclear envelope is to allow certain molecules inside the nucleus to enter it, while preventing DNA leakage inside the nucleus into the cytoplasm. The nuclear membrane works with three main organelles: cytoplasm, nuclei (and nuclei), and Rough Endoplasmic Reticulum (Rough ER). The rough ER actually interacts with the nuclear envelope, and is covered with many riboomes that make up the proteins (see Need Some Energy details). The nucleus is a granular structure inside the nucleus. This is where RNA is prescribed (DNA copying) and where subunit ribosomes are made. The nuclei itself is very dense and there is no membrane. Its density actually helps protect all the RNA, DNA, and proteins inside the nucleus that are needed to make the cell even alive. As the core of the nucleus, the nucleus is like a means of command. It works with any organelle in some way, whether it's what ribosomes will protein and organelle, or if the RNA inside is copying DNA, the nuclei is the heart of it all. Chromosomes and chromatin are small bundles in the nuclei of a cell that are needed to do everything in a cell. Made from DNA, they contain all the genetic information that may be needed for the development of organelles or organelles. But, although both are made from DNA, chromosomes and chromatin differ in several respects... Chromatin is dispelled DNA, like an unraveled ball of yarn or a loose thread on a shirt. It can easily curl together to make chromosomes. Chromosomes are small bundles of DNA mentioned earlier. Or rather, they are small bundles of chromatin. Chromatin is wrapped around and histone protein inside the nuclei to make the chromosome. But, no matter how different chromosomes and chromatin are, both work to work with other organelles, especially the testicers. The nuclei protect chromosomes and chromatin, while they protein for the ribosome subunit. These subunits leave the nucleus and nucleus through the pores and go to another organelle. Learning goals Describe the structure and function of the nucleus Explain the organization of DNA in the nucleus Describe the structure and function of the main cellular organelles Now that you have learned that the plasma membrane surrounds all cells, you can plunge inside the prototype human cell to learn about its internal components and their functions. Animal cells contain three main regions: plasma membrane, nucleus and cytoplasm. The nucleus is the central organele of the cell that contains the DNA of the cell (Figure 3.6). The cytoplasm consists of two parts, cytosol and organelles. Cytosol, a gelatinous device in the cell, provides the fluid medium necessary for biochemical reactions. Organelle (small organ) is one of several different types of membrane-sealed bodies in a cell, each of which performs a unique function. Just as different organs of the body work together in harmony to perform all human functions, many different cellular organelles work together to keep the cell healthy and perform all its important functions. Fig. 3.6. Prototype human cell Although this image does not indicate a single specific human cell, it is a prototype example of a cell containing primary organelles and internal structures. The nucleus is the largest and most famous organelle cell (Figure 3.7). The nucleus is generally considered a cell control center because it stores all genetic instructions for protein production. Interestingly, some cells in the body, such as muscle cells, contain more than one nucleus, which is known as multi-nucleus. Other cells, such as mammalian red blood cells (RBC), do not contain testicles at all. RBC eject their nuclei as they mature, creating space for a large number of hemoglobin molecules that carry oxygen throughout the body. Without testicles, the life span of RBC is short, so the body must constantly produce new ones. Fig. 3.7. The nucleus of the nucleus is the cell control center. The nucleus of living cells contains genetic material that determines the entire structure and function of this cell. Inside the nucleus lies a plan that dictates everything the cell will do and all the products it will do. This information is stored in DNA. The nucleus sends commands to the cell via molecular messengers that translate information from DNA. Every cell in the body (except reproductive cells) contains a complete set of DNA. When a cell divides, DNA must be duplicated so that each new cell receives complete the DNA. The following section will examine the structure of the kernel and its contents, as well as the DNA replication process. The organization of the nucleus and its DNA Like most other cellular organelles, the nucleus is surrounded by a membrane called a nuclear envelope. This membranous coating consists of two adjacent lipid bialysers with a thin fluid space between them. Covering these two two-layer are nuclear pores. Nuclear season is a small transition to protein flow, RNA and dissolved between the nuclei and cytoplasm. Inside the nuclear envelope there is a gel nucleus with debauchery, which contain nucleic acid building blocks. There may also be a dark coloring mass often visible under a simple light microscope called nuclei (plural = nuclei). The nucleus is a region of the nucleus that is responsible for the production of RNA necessary for the construction of ribo-omans. After synthesization, newly made riboomal subunits leave the nucleus of the cell through the nuclear pores. Genetic instructions that are used to build and maintain the body are arranged in an orderly manner in dna strands. In the nuclei there are chromatin threads consisting of DNA and related proteins (Figure 3.8). Chromatin is a fibrous, fibrous form of DNA that enables effective DNA packaging in the nucleus while preserving the structure that allows for the early stages of protein synthesis. Along the strand of chromatin DNA is wrapped around a set of histone proteins. When a cell is in the process of being split, chromatin condenses into chromosomes so that DNA can be safely transported to the ponajm cells. The chromosome consists of DNA and proteins; it is a condensed form of chromatin. It is estimated that humans have almost 22,000 genes spread over 46 chromosomes. Fig. 3.8. The strands of macrostructure DNA are wrapped around the supporting histones. These proteins are increasingly bonded and condensed into chromatin, which is tightly packed into chromosomes when the cell is ready to split. Organelle endomembrane system A set of three major organelles together form a system in a cell called the endomembrane system. These authorities work together to perform various mobile tasks, including the task of producing, packaging and exporting certain mobile products. Organelle endomembrane system include endoplasmic drug, Golgi apparatus and vesicles. Endoplasmous Endoplasmatic Reticulum Endoplasmatic Reticulum (ER) is a duct system that is continuous with a nuclear membrane (or envelope) covering the nucleus and consisting of the same two-layer lipid material. ER can be thought of as a series of winding arteries similar to the waterways of Venice. ER provides fragments in a large part of the cell that work in transport, storage of materials. The structure of the ER winding causes a large membrane surface that supports its many functions (Figure 3.9). Fig. 3.9. Endoplasmatic Reticulum (ER) a) ER is a winding network of thin membrane bags found in close association with the cell nucleus. Smooth and rough endoplasm reticula are very different in appearance and function (source: mouse tissue). (b) Rough ER is stubed with numerous riboomes, which are places of protein synthesis (source: mouse tissue). EM × 110,000. (c) Smooth ER synthesizes phospholipids, steroid hormones, regulates the concentration of Ca ++ cells, metabolizes certain carbohydrates, and breaks down some toxins (source: mouse tissue). EM × 110 510. (Micrographs provided by the Regents of the University of Michigan Medical School © 2012) Endoplasmatic reticle can exist in two forms: rough ER and smooth ER. These two types of ER perform very different functions and can be found in very different amounts depending on the cell type. Rough ER (RER) is so-called because its membrane is dotted with embedded granules - organelles called riboms, giving the RER a bumpy appearance. Ribosom is an organelle that serves as a place for protein synthesis. It can be found freely floating in the cytoplasm or attached to the ER. It consists of two riboomal RNA subunits that wrap around the mRNA to begin the translation process, the protein synthesis stage. Protein synthesis consists of two stages: transcription and translation. Transcription takes place in the nuclei and is the protein synthesis phase in which mRNA is copied from DNA. MRNA leaves the nucleus through the nuclear pores and goes to the ribosome. Ribos then reads or interprets the instructions in mRNA and uses RNA transfer (tRNA) to combine amino acids in the correct order to produce the protein (Fig. 3.10). Typically, the protein is synthesized within the ribosome and released inside the rough ER channel, where sugars can be added to it (in a process called glycosilation) before being transported in a bubble to the next stage of the packaging and shipping process: the golgi apparatus. Fig. 3.10. From DNA to protein: Transcription through translation transcription in the cell nuclei produces an mRNA molecule that is modified and then sent to the cytoplasm for translation. Transcription is decoded into protein using ribosome and tRNA molecules. Smooth ER (SER) is missing these ribooms. One of the main functions of smooth ER is lipid synthesis. Smooth ER synthesizes phospholipids, the main component of biological membranes, as well as steroid hormones. For this reason, cells that produce large amounts of such hormones, such as the female ovaries and male testicles, contain large amounts of smooth ER. But Synthesis, smooth ER also sequesters (i.e. stores) and regulates the concentration of calcium ions in muscles and nerve tissues. Smooth ER further metabolizes some carbohydrates and acts as a detoxification in the liver, breaking down some toxins. Unlike smooth ER, the primary task of rough ER is to synthesize and modify proteins intended for cell membrane or export from a cell. For this protein synthesis, many riboomes attach to the ER (giving it the stumless appearance of a rough ER). Golgi Camera Golgi camera is responsible for sorting, modifying and shipping products that come from ER raw material, just like mail. Golgi's camera looks like stacked flattened discs, almost like piles of strangely shaped pancakes. Like ER, these disks are membranous. Golgi's camera has two distinct sides, each with a different role. One side of the camera picks up products in bubbles. These products are sorted by the apparatus and then released from the opposite side after repackaging into new bubbles. If the product is to be exported from the cell, the follicle migrates to the cell surface and connects to the cell membrane and the charge is secreted (Figure 3.11). Fig. 3.11. Golgi camera (a) Golgi camera manipulates raw ER products and also produces new organelles called lysooms. Proteins and other ER products are sent to the Golgi camera, which organizes, modifies, packs and marks them. Some of these products are transported to other areas of the cell, and some are exported from the cell by exocytosis. Enzymatic proteins are packaged as new lysosomes (or packaged and sent for fusion with existing lysosomes). (b) the electron micrograph of the Golgi apparatus. Lysosomes Some of the protein products packaged by Golgi include digestive enzymes that are supposed to remain inside the cell for use in breaking down certain materials. Bubbles containing enzymes released by Golga can form new lysosomes or merge with existing lysosomes. Lysosom is an organelle that contains enzymes that break down and digest unnecessary cellular components such as damaged organelles. (Lysosom is similar to the wreckage crew that destroys old and unhealthy buildings in the area.) Autophagy (self-eating) is the process of digesting one's own structures by a cell. Lysosomes are also important for the decomposition of foreign materials. For example, when certain immune defense cells (white blood cells) phagocytize bacteria, the bacterial cell is transported to the lysosome and digested by the enzymes inside. As you can imagine, such phagotic defense cells contain a large number of lysooms. In certain circumstances, lysosomes perform a more great and tragic function. In case of damaged or unhealthy Lysosomes can be induced to open up and release their digestive enzymes into the cytoplasm cells, killing the cells. This mechanism of self-destruction is called autolysis and makes the process of cell death controlled (a mechanism called apoptosis). Watch this video to learn more about the endomembrane system, which includes rough and smooth ER and Golgi's body, as well as lysosomes and bubbles. What is the primary role of the endomembrane system? Organelles for energy production and detoxification In addition to the tasks performed by the endomembrane system, the cell has many other important functions. Just as you need to consume nutrients to provide yourself with energy, so must each cell take in nutrients, some of which convert into chemical energy that can be used to power biochemical reactions. Another important function of the cell is detoxification. People take in all sorts of toxins from the environment and also produce harmful chemicals as by-products of cellular processes. Cells called hepatocytes in the liver detoxify many of these toxins. Mitochondria Mitochondion (plural = mitochondria) is a bean-shaped organelle membrane that is the energy transformer of a cell. Mitochondria consist of the outer lipid double layer membrane, as well as an additional internal lipid double layer membrane (Figure 3.12). The inner membrane is very complex in a large-area winding structure called cristae. It is along this inner membrane that a number of proteins, enzymes, and other molecules perform biochemical reactions of cellular respiration. These reactions convert the energy stored in molecules of nutrients (such as glucose) into adenosine triphosphate (ATP), which delivers useful cellular energy to the cell. Cells use ATP constantly, so mitochondria are constantly at work. Oxygen molecules are required during cellular breathing, so you need to constantly inhale. One of the organ systems in the body that uses huge amounts of ATP is the muscular system because ATP is required to maintain muscle contraction. As a result, muscle cells are full of mitochondria. Nerve cells also need large amounts of ATP to run their sodium-potassium pumps. Therefore, a single neuron will be loaded with more than a thousand mitochondria. On the other hand, a bone cell that is not so metabolically active can only have several hundred mitochondria. Fig. 3.12. Mitochondria Mitochondria are factories for converting cell energy. a) Mitochondrytion consists of two separate lipid double-layer membranes. Along the inner membrane there are various molecules that work together to produce ATP, the cell's main energy currency. (b) mitochondrial electron micrograph. EM × 236,000. (Micrograph provided by Regents of University Michigan Medical School © 2012) 2012) Like lysosomes, peroxisome is a membrane-related cell organelle that contains mainly enzymes (Figure 3.13). Peroxisoms perform several different functions, including lipid metabolism and chemical detoxification. Unlike digestive enzymes found in lysooms, enzymes within peroxisoms are used to transfer hydrogen atoms from different molecules to oxygen, producing hydrogen peroxide (H_2O_2). In this way, peroxisoms neutralize poisons such as alcohol. To appreciate the importance of peroxisoms, it is necessary to understand the concept of reactive oxygen species. Fig.3.13. Peroxysomysoms are membrane-related organelles that contain a plethora of enzymes for detoxification of harmful substances and lipid metabolism. Reactive oxygen species (ROS), such as peroxides and free radicals, are highly reactive products of many normal cellular processes, including mitochondrial reactions that produce ATP and oxygen metabolism. Examples of ROS include hydroxyl radical OH, H_2O_2 and peroxide (O_2^-). Some ROS's are important for certain cellular functions, such as cellular signaling processes and immune response against foreign substances. Free radicals are reactive because they contain free unpared electrons; they can easily oxidize other molecules throughout the cell, causing cell damage and even cell death. Free radicals are believed to play a role in many destructive processes in the body, from cancer to coronary artery disease. Peroxysoms, on the other hand, oversee reactions that neutralize free radicals. Peroxisoms produce large amounts of toxic H_2O_2 in the process, but peroxisoms contain enzymes that convert H_2O_2 into water and oxygen. These by-products are safely released into the cytoplasm. Like miniature wastewater treatment plants, peroxisoms neutralize harmful toxins so as not to wreak havoc on cells. The liver is primarily responsible for detoxifying blood before it travels all over the body, and liver cells contain an exceptionally large number of peroxisoms. Defense mechanisms such as detoxification in peroxysoms and certain cellular antioxidants are used to neutralize many of these molecules. Some vitamins and other substances, found mainly in fruits and vegetables, have antioxidant properties. Antioxidants act by oxidation, stopping the destructive cascades of reactions initiated by free radicals. Sometimes, however, ROS accumulates beyond the capabilities of such defense mechanisms. Oxidative stress is a term used to describe damage to cellular components caused by ROS. Due to their characteristic non-separated electrons, ROS can trigger chain reactions in which they remove electrons from other molecules, which then become oxidized and reactive, and do the same with other molecules, causing a reaction ROS may cause permanent damage to the carbohydrates and nucleic acids. Damaged DNA can lead to genetic mutations and even cancer. A mutation is a change in the nucleotide sequence in a gene in a cell's DNA, potentially altering a protein encoded by that gene. Other diseases believed to be caused or exacerbated by ROS include Alzheimer's disease, cardiovascular disease, diabetes, Parkinson's disease, arthritis, Huntington's disease and schizophrenia. It is worth noting that these diseases are largely age-related. Many scientists believe that oxidative stress is the main factor contributing to the aging process. Cytoskeleton Just as the bony skeleton structurally supports the human body, the cytoskeleton helps cells maintain their structural integrity. The cytoskeleton is a group of fibrous proteins that provide structural support for cells, but this is only one of the functions of the cytoskeleton. Cytoskeleton components are also critical for cell motility, cell reproduction and substance transport in the cell. The cytoskeleton forms a complex threaded network throughout the cell consisting of three different types of protein-based fibres: microfilaments, intermediate fibres and microtubules (Figure 3.14). The thickest of the three is microtubule, a structural filament consisting of a protein subunit called tubulin. Microtubules maintain the shape and structure of cells, help resist cell pressure and play a role in the positioning of organelles in the cell. Microtubules also form two types of cellular appendages important for movement: cilia and wici. Cilia are found on many cells of the body, including epithelium, which line the respiratory tract of the respiratory system. Cilia move rhythmically; they beat constantly, moving waste such as dust, mucus and bacteria up through the airways, away from the lungs and towards the mouth. Beating cilia on cells in female fallopian tubes move egg cells from the ovary towards the uterus. Wici (plural = wici) is a useful feature larger than cilia and specializes in cell movement. The only cell in humans is a sperm cell, which must propel in the direction of female ova. Fig. 3.14. The three components of the Cytoskeleton cytoskeleton consist of (a) microtubules, b) microfilaments and (c) intermediate fibres. The cytoskeleton plays an important role in maintaining the shape and structure of cells, promoting cellular movement, and supporting cell division. A very important function of microtubules is to set paths (a bit like railway tracks) along which genetic material can be drawn (a process requiring ATP) during cell division, so that each new daughter cell receives the right set of chromosomes. Near the nucleus Centriole can serve as a point of cellular origin for microtubules extending outwards as cilia or flailes, or it can help separate DNA during cell division by forming a mitotic spindle (spindle fiber). fibres).

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