Cell membrane prokaryotic or eukaryotic

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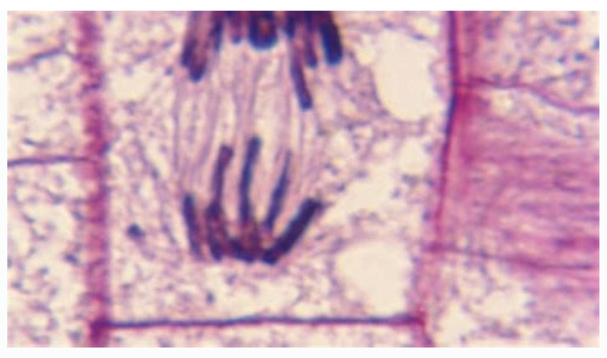

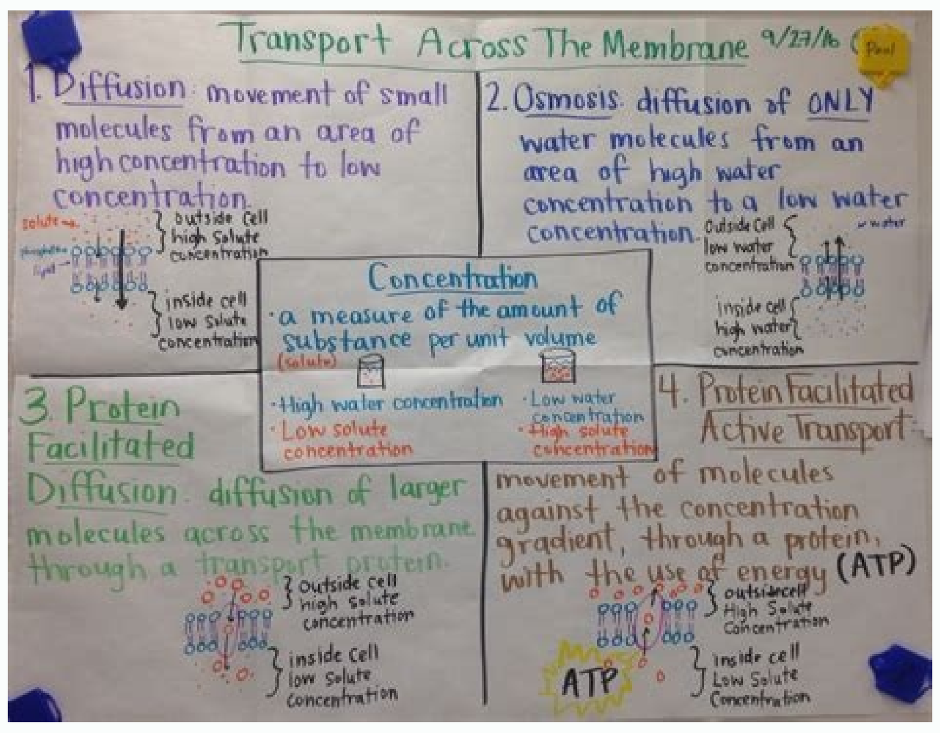

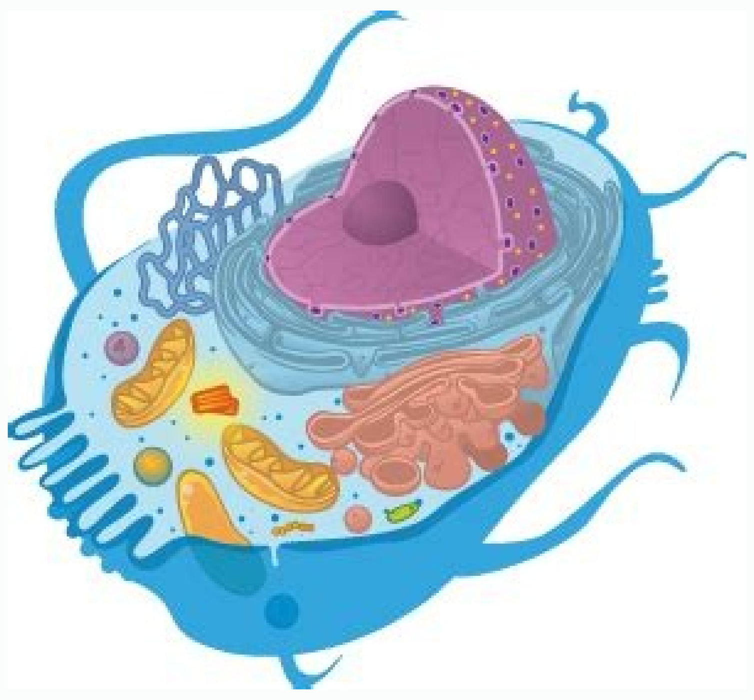

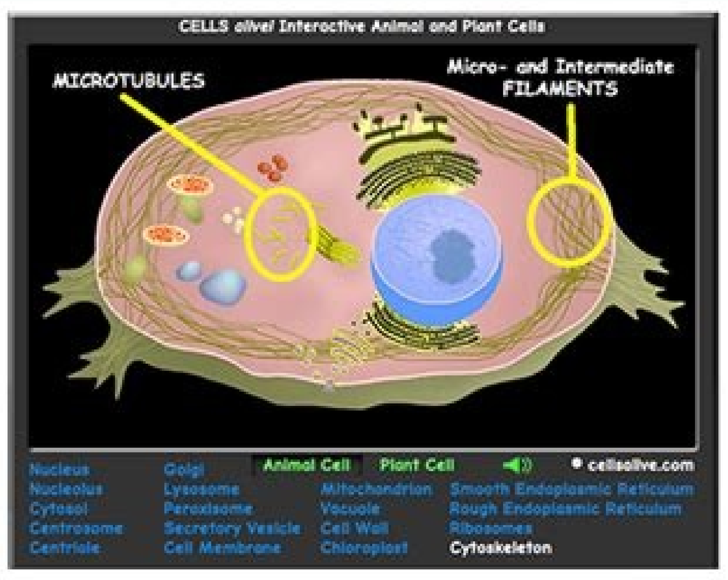

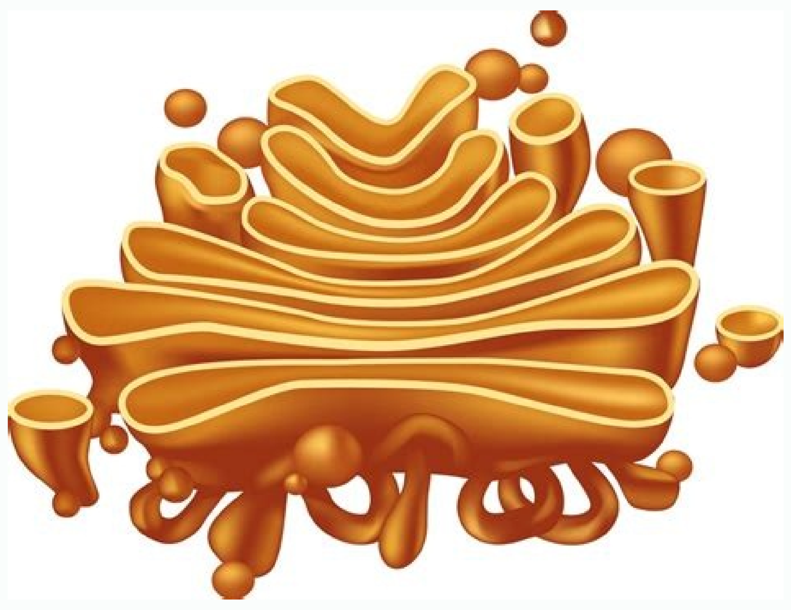

Is nuclear membrane found in prokaryotic or eukaryotic cells. True or false the plasma membrane in prokaryotic and eukaryotic cells is very similar. Cell membrane prokaryotic or eukaryotic or both. Cell membrane prokaryotic or eukaryotic quizlet. Have a cell membrane prokaryotic or eukaryotic. Cell membrane prokaryotic or eukaryotic brainly. Cell surface membrane prokaryotic or eukaryotic. Cell plasma membrane prokaryotic or eukaryotic.

A biological membrane that separates the inside of a cell from the outside. illustration of a eukaryotic cell membrane. Comparison of eukaryotic and prokaryotic cell membranes.) is a biological membrane that separates and protects the inside of all cells from the outside environment (extracellular space).[1][2] The cell membrane consists of a lipid bilayer consisting of two layers of phospholipids interspersed with cholesterol (a lipid component) and maintains sufficient membrane fluidity at different temperatures. The membrane also contains membrane proteins, including integral proteins that span the membrane and serve as membrane transporters, and peripheral proteins that attach loosely to the outer (peripheral) side of the cell membrane and act as enzymes that facilitate interactions with the cellular environment.] Similar glycolipids stored in the outer lipid layer serve this purpose. The cell membrane controls the movement of substances into and out of cells and organelles, and is selectively permeable to ions and organic molecules.[4] In addition, cell membranes are involved in several cellular processes, such as cell adhesion, ion conduction, and cell signaling, and serve as attachment surfaces for several extracellular structures, including the cell wall and a carbohydrate layer called the glycocalyx. as well as an intracellular network of protein fibers called the cytoskeleton. In the field of synthetic biology, cell membranes can be assembled artificially.[5][6][7][8] History Main article: History of the cell membrane theory While Robert Hooke's discovery of cells in 1665 led to the proposal of the cell theory, Hooke misrepresented the cell membrane theory that all cells have a solid cell wall because only plant cells can observe these areas. time.[9] Microscopes focused well on the cell wallBiological membrane that separates the inside of the cell from the outside environment Diagram of the Eukaryotic Cell Membrane Comparison of the Eukaryotic Cell Membrane with the Cell Membrane (also known as the plasma membrane (PM) or cytoplasmic membrane and historically called the plasma lemma) the biological membrane that separates and protects the inside of all cells from the external environment (extracellular space).[1][2] The cell membrane consists of a lipid bilayer consisting of two layers of phospholipids interspersed with cholesterol (a lipid component) that ensures adequate fluidity of the membrane at different temperatures. 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However, some microscopists at the time correctly concluded that, although invisible, due to the intracellular movement of components inwards rather than outwards, it could be inferred that cell membranes existed in animal cells and that these membranes were not the cell wall equivalent of a plant cell. . It has also been found that cell membranes are non-essential components of all cells. In the late 19th century, many disproved the existence of the cell membrane. In 1890 an update of cell theory stated that cell membranes exist but are merely secondary structures. Only with more recent studies on osmosis and permeability have cell membranes gained greater recognition. In 1895, Ernest Overton proposed that cell membranes are made of lipids.[10] The lipid bilayer hypothesis proposed by Gorter and Grendel [11] in 1925 led to the assumptions in describing the structure of the cell membrane bilayer based on crystallographic studies and observations of soap bubbles. To accept or reject the hypothesis, the researchers measured the thickness of the membrane. These researchers extracted lipids from human red blood cells and measured the surface area that the lipids would cover if spread across the water surface. Because mature mammalian erythrocytes lack both a nucleus and cytoplasmic organelles, the cell membrane is the only lipid-containing structure in the cell. Therefore, it can be assumed that all the lipids extracted from the cells were in the plasma of the cells.The ratio of the water surface area covered by the extracted lipid to the calculated surface area of the red blood cells from which the lipid came was (approximately) 2:1, and they concluded that the plasma membrane contains a lipid bilayer. 12] In 1925, Fricke found that the thickness of the cell membranes of erythrocytes and yeast varies from 3.3 to 4 nm, which corresponds to the thickness of the lipid monolayer. The choice of dielectric constant used in these studies has been questioned, but future testing failed to disprove the results of the first experiment. Independently of this, the leptoscope was invented to measure very thin membranes by comparing the intensity of light reflected from the sample with that of a membrane standard of known thickness. The instrument was able to determine thicknesses as a function of pH measurements and the presence of membrane proteins ranging from 8.6 to 23.2 nm, with lower measurements supporting the lipid bilayer hypothesis. Later, in the 1930s, the membrane structure model developed into general agreement and became the molecular model of Davson and Daniella (1935). This model was based on surface tension studies between oils and echinoderm eggs. Since the surface tension values at the oil-water interface turned out to be much lower than expected, it was assumed that some substance was responsible for the reduction of the interfacial tension at the cell surface. It has been proposed that the lipid bilayer is sandwiched between two thin layers of protein. The small molecule model became immediately popular and dominated the study of cell membranes for the next 30 years until it became a competitor to the liquid mosaic model of Singer and Nicolson (1972). Despite the numerous cell membrane models that were proposed before the fluid mosaic model, it remains the main cell membrane archetype long after its introduction in the 1970s [9]. Although the seamless mosaic pattern has been modernized with contemporary detailsthe basic principles remain unchanged: the membrane is a lipid bilayer consisting of hydrophilic outer heads and a hydrophobic inner part, where proteins can interact with hydrophilic heads through polar interactions, but proteins that completely or partially surround the bilayer have hydrophobic amino acids interacting with non-essential ones. -polar lipid interior The fluid mosaic model not only provided a thorough understanding of membrane mechanics, but also extended the possibilities of studying hydrophobic forces, which later became an important descriptive limitation for the description of biological macromolecules.[9] The scientists cited disagreed for many centuries about the importance of what they believed to be the cell membrane. For nearly two centuries, membranes have been considered an important structure with cellular function, but largely ignored. It was not until the 20th century that the importance of the cell membrane was recognized. Finally, the two scientists Gorter and Grendel (1925) discovered that the membrane is "lipid-based". From this, they came up with the idea that this structure should have a layer-mimicking shape. Upon further investigation, it was found that the 2:1 ratio was estimated by comparing the sum of cell area and lipid area; thus providing the first basis for the two-layer structure known today. This discovery initiated many new studies that have appeared around the world in various fields of scientific research and confirm that the structure and function of the cell membrane is widely known. This structure is referred to by various authors as ectoplast (de Vries, 1885), [14] Plasmahaut (plasma skin, Pfeffer, 1877, 1891), [15] Hautschicht (skin layer, Pfeffer, 1886; used in various senses by Hofmeister, 1867), plasma membrane (Pfeffer, 1900), [16] cell membrane, cytoplasmic membrane, cell wall and cell membrane. Some authors who did not believe in the existence of the functionalthe cell surface boundary preferred to use the term plasmalemma (proposed by Mast, 1924) to refer to the outer region of the cell. Composition Cell membranes contain various biological molecules, especially lipids and proteins. The composition is not constant, but is constantly changing to ensure fluidity and changes in the environment, even fluctuating at different stages of cell development. In particular, the amount of cholesterol in the cell membrane of human primary neurons changes, and these changes in composition affect fluidity at all stages of development. Material is incorporated into or removed from the membrane by a variety of mechanisms: fusion of intracellular vesicles with the membrane (exocytosis) not only removes the contents of the vesicles, but also incorporates the membrane components of the vesicles into the plasma membrane. Vesicles may form in the membrane around the extracellular material and collapse and become vesicles (endocytosis). If the membrane is continuous with a tubular structure made of membrane material, then material may be continuously drawn from the tubing into the membrane. Although the concentration of membrane components in the aqueous phase is low (stable membrane components are poorly soluble in water), there is an exchange of molecules between the lipid phase and the aqueous phase. Lipids Examples of major membrane phospholipids and glycolipids: phosphatidylcholine (PtdCho), phosphatidylethanolamine (PtdEtn), phosphatidylinositol (PtdIns), phosphatidylserine (PtdSer). The amount of each depends on the type of cell, but in most cases phospholipids are the most abundant, often accounting for more than 50% of all lipids in plasma membranes. Glycolipids account for only a small amount, about 2%, the rest are sterols. In RBC studies, 30% of the cell membrane is lipid. However, for mostcells, the composition of cell membranes is half lipids and half proteins. The fatty chains in phospholipids and glycolipids usually contain an even number of carbon atoms, usually between 16 and 20. The most common are fatty acids with 16 and 18 carbon atoms. Fatty acids can be saturated or unsaturated, and the configuration of the double bonds is almost always "cis". [23 [24] The ability of some organisms to regulate the fluidity of cell membranes by changing the lipid composition is known as a homeistic adaptation. The entire membrane is held together by the non-covalent interactions of the hydrophobic tails, yet the structure is quite fluid and not rigidly fixed. Under physiological conditions, phospholipid molecules in the cell membrane are in a liquid crystalline state. This means that lipid molecules can diffuse freely and exhibit rapid lateral diffusion along the layer in which they are located.[23] However, the exchange of phospholipid molecules between the intracellular and extracellular sheets of the bilayer is a very slow process. Lipid rafts and caveolae are examples of cholesterol-enriched microdomains in the cell membrane. Also, the lipid fraction that is in direct contact with membrane integral proteins that is tightly bound to the protein surface is called the annular lipid envelope; it behaves as part of a protein complex. In animal cells, cholesterol is normally distributed to varying degrees in cell membranes, in the irregular spaces between the hydrophobic tails of membrane lipids, where it provides membrane rigidity and reinforcement.[4] In addition, the amount of cholesterol in biological membranes variescell types and even within individual cells. Cholesterol, the main component of animal plasma membranes, regulates the fluidity of the entire membrane, which means that cholesterol controls the movement of various components of the cell membrane depending on its concentration.[4] At high temperatures, cholesterol inhibits the movement of phospholipid and fatty acid chains, which leads to a decrease in permeability to small molecules and a decrease in membrane fluidity. The opposite is true for the role of cholesterol at lower temperatures. Cholesterol production, and therefore its concentration, is activated (increased) in response to low temperatures. At low temperatures, cholesterol prevents the interaction of fatty acid chains. Cholesterol acts as an antifreeze and keeps the membrane in the liquid. Animals living in cold conditions have more cholesterol than animals living in warm conditions. In plants that lack cholesterol, related compounds called sterols perform the same function as cholesterol.[4] Phospholipids composing lipid vesicles Lipid vesicles or liposomes are roughly spherical pockets surrounded by a lipid bilayer. These structures are used in laboratories to study the effects of chemicals on cells by delivering those chemicals directly into the cell, as well as to gain more information about cell membrane permeability. Lipid vesicles and liposomes are formed by first suspending lipids in an aqueous solution and then mixing the mixture with ultrasound, resulting in the formation of vesicles. By measuring the flow rate from the inside of the bubble into the surrounding solution, the researcher can better understand the permeability of the membrane. Bubbles can be created with molecules and ions within the bubble, creating a bubble with the desired molecule or ion present in the solution. Proteins can also be incorporated into the membrane by solubilizing the desired proteins in the presence of detergents and attaching them to phospholipids to form a liposome. they providewith a tool to study different functions of membrane proteins. Carbohydrates Plasma membranes also contain carbohydrates, mainly glycoproteins but also some glycolipids (cerebrosides and gangliosides). Carbohydrates play an important role in intercellular recognition in eukaryotes; on the cell surface where they recognize host cells and exchange information, viruses that bind to cells through these receptors cause infection [26]. For the most part, glycosylation does not occur at membranes in the cell; Glycosylation occurs most commonly on the extracellular surface of the plasma membrane. The glycocalyx is an important feature of all cells, especially epithelia with microvilli. Recent data suggest that the glycocalyx is involved in cell adhesion, lymphocyte homing [26] and many other processes. The penultimate sugar is galactose and the last sugar is sialic acid, since the sugar backbone is modified in the Golgi apparatus. Sialic acid carries a negative charge and forms an outer barrier for charged particles. Proteins Type Description Examples Integral proteins or transmembrane proteins span the membrane and have a hydrophilic cytosolic domain that interacts with internal molecules, a hydrophobic membrane-spanning domain that anchors them to the cell membrane, and a hydrophilic extracellular domain that interacts with external molecules interacts. The hydrophobic domain consists of one, more, or a combination of α-helices and β2-sheet protein motifs. ion channels, proton pumps, G protein-coupled receptor lipid-anchored proteins covalently linked to one or more lipid molecules; incorporated hydrophobically into the cell membrane and fix the protein. The protein itself is not in contact with the membrane. G proteins Peripheral proteins bind to integral membrane proteins or are associated with peripheral regions of the lipid bilayer. These proteins usually only interact with biological membranes transiently and after reacting with the moleculecontinue to work in the cytoplasm. Some Enzymes, Some Hormones The cell membrane has a high protein content, typically around 50% of the membrane volume.[27] These proteins are important for the cell as they are responsible for various biological activities. About a third of yeast genes encode them specifically for them, and the number is even higher in multicellular organisms.[25] Membrane proteins fall into three main types: integral proteins, peripheral proteins, and lipid-anchored proteins.[4] As indicated in the adjacent table, integral proteins are amphipathic transmembrane proteins. Examples of integral proteins include ion channels, proton pumps, and g protein-coupled receptors. Ion channels allow inorganic ions such as sodium, potassium, calcium, or chlorine to diffuse across the membrane through hydrophilic pores along their electrochemical gradient in the lipid bilayer. The electrical behavior of cells (i.e. nerve cells) is controlled by ion channels.[4] Proton pumps are protein pumps embedded in the lipid bilayer that allow protons to cross the membrane by transferring from one amino acid side chain to another. Proton pumps are used in processes such as electron transport and ATP production.[4] The G protein-coupled receptor is a single polypeptide chain that crosses the lipid bilayer seven times and responds to signaling molecules (i.e. hormones and neurotransmitters). G protein-coupled receptors are used in processes such as signaling between cells, regulating cAMP production, and regulating ion channels.[4] The cell membrane, which is exposed to the external environment, is an important site for cellular communication. Accordingly, there are a large number of protein receptors and identification proteins such as antigens on the surface of the membrane. The function of membrane proteins may also include cell contact, surface recognition, cytoskeletal contact, signal transduction, enzymatic activity, or transportthrough the membrane. Most membrane proteins must be integrated into the membrane in some way.[28] To do this, an N-terminal "signal sequence" of amino acids directs the protein to the endoplasmic reticulum, which inserts the protein into the lipid bilayer. Once activated, proteins are transported to their destination in vesicles, where the vesicles fuse with the target membrane. Function Cell Membrane Detailed Diagram Cell Diffusion Illustration The cell membrane surrounds the cytoplasm of living cells, physically separating intracellular components from the extracellular environment. The cell membrane also plays a role in anchoring the cytoskeleton to give the cell its shape and attaching to the extracellular matrix and other cells to hold them together to form tissues. Fungi, bacteria, most archaea, and plants also have a cell wall that provides mechanical support to the cell and prevents larger molecules from entering. The cell membrane is selectively permeable and able to regulate what enters and leaves the cell, thereby facilitating the transport of materials necessary for survival. The movement of substances across the membrane can occur either by passive transport, which occurs without the use of cellular energy, or by active transport, which requires energy from the cell to transport it. The membrane also maintains cell potential. In this way, the cell membrane acts as a selective filter that allows only certain substances in or out of the cell. A cell uses several transport mechanisms involving biological membranes: 1. Passive osmosis and diffusion: Some substances (small molecules, ions) such as carbon dioxide (CO_2) and oxygen (O_2) can move across the cell membrane by diffusion. which is a passive transport process. Because the membrane acts as a barrier to certain molecules and ions, they can be found in different concentrations on either side of the membrane. Diffusion takes placesmall molecules and ions move freely from high to low concentration to balance the membrane. It is considered a passive transport process because it does not require energy and is driven by the concentration gradient created on each side of the membrane.[29] Such a concentration gradient across a semipermeable membrane creates an osmotic flow of water. In osmosis in biological systems, a solute moves across a semipermeable membrane similar to passive diffusion because the solute still moves with a concentration gradient and does not require energy. Although water is the most common solvent in cells, other fluids may be present, including supercritical fluids and gases.[30] 2. Transmembrane protein channels and transporters: Transmembrane proteins cross the lipid bilayer of membranes; they act on both sides of the membrane and transport molecules across.[31] Nutrients such as sugar or amino acids must enter the cell and certain metabolites must leave the cell. Such molecules can passively diffuse through protein channels such as aquaporins in facilitated diffusion or are pumped across the membrane by transmembrane transporters. Protein channel proteins, also called permeases, are usually quite specific and recognize and transport only a limited range of different chemicals, often just one. Another example of a transmembrane protein is a cell surface receptor that allows cell signaling molecules to communicate between cells.[31] 3. Endocytosis: Endocytosis is the process by which cells take up molecules by engulfing them. The plasma membrane creates a small internal deformation, the so-called invagination, during which the transported substance is trapped. This intussusception is caused by proteins on the outside of the cell membrane that act as receptors and accumulate in depressions that ultimately promote the accumulation of more proteins and lipids on the cytosolic side.membrane.[32] The strain then detaches from the membrane inside the cell and forms a vesicle containing the trapped substance. Endocytosis is a pathway for the internalization of solid particles ("cell ingestion" or phagocytosis), small molecules and ions ("cell ingestion" or pinocytosis), and macromolecules. Endocytosis requires energy and is therefore a form of active transport. 4. Exocytosis. Just as material can be introduced into a cell by invasion and formation of a vesicle, the membrane of a vesicle can fuse with the plasma membrane and expel its contents into the environment. This is the process of exocytosis. Exocytosis occurs in a variety of cells to remove undigested residues of substances introduced by endocytosis, to secrete substances such as hormones and enzymes, and to completely transport substances across the cell barrier. In the process of exocytosis, an undigested food vacuole containing waste products or secretory vesicles budding from the Golgi apparatus first moves along the cytoskeleton from the interior of the cell to the surface. The alveolar membrane is in contact with the plasma membrane. The lipid molecules of the two bilayers change and thus the two membranes come together. A passage is formed in the fused membrane and the vesicles expel their contents outside the cell. Prokaryotes Prokaryotes are divided into two different groups: archaea and bacteria, and bacteria are further divided into gram-positive and gram-negative. Gram-negative bacteria have both a plasma membrane and an outer membrane separated by periplasm, but other prokaryotes have only a plasma membrane. The two membranes differ in many ways. The outer membrane of Gram-negative bacteria differs from other prokaryotes in the phospholipids that form the outer layer of the bilayer, and the lipoproteins and phospholipids that form the inner layer. The outer membrane usually has a porous structure due to the presence of membrane proteins such asPorins, which are pore-forming proteins. The inner plasma membrane is also usually symmetrical, while the outer membrane is asymmetrical due to the aforementioned proteins. Even with prokaryotic membranes, there are many things that can affect fluidity. One of the main factors affecting fluidity is the fatty acid composition. For example, when Staphylococcus aureus bacteria were cultured at 37 °C for 24 h, the membrane showed a more fluid state than a gel state. This supports the concept that the membrane is more fluid at higher temperatures than at lower temperatures. As the membrane becomes more fluid and requires more stabilization, longer fatty acid chains or saturated fatty acid chains are formed to stabilize the membrane. [34] Bacteria are also surrounded by a cell wall made of peptidoglycan (amino acids and sugars). Some eukaryotic cells also have cell walls, but none are made of peptidoglycan. The outer membrane of Gram-negative bacteria is rich in lipopolysaccharides, a combination of poly- or oligosaccharides and carbohydrate-lipid regions that stimulate the cell's innate immunity.[35] Upon contact with the target host cell, the outer membrane can bulge into periplasmic ridges under conditions of stress or virulence, and such vesicles can therefore function as virulence organelles. Bacterial cells provide many examples of how prokaryotic cell membranes adapt in various ways to structures that fit into an organism's niche. For example, proteins on the surface of some bacterial cells help them slide.[37] Many Gram-negative bacteria have cell membranes that contain ATP-powered protein export systems.[37] Structures The Fluid Mosaic Model According to SJ Singer and GL Nicolson's (1972) fluid mosaic model, which replaced the earlier Dawson and Daniell model, biological membranes can be viewed as two-dimensional.in which lipid and protein molecules diffuse more or less easily.[38] Although the lipid bilayers that underlie the membrane are themselves two-dimensional fluids, the plasma membrane also contains a large number of proteins that provide structure. Examples of such structures are protein-protein complexes, columns and caps formed by the actin-based cytoskeleton, and possibly lipid rafts. Lipid bilayer The arrangement of amphipathic lipid molecules to form a lipid bilayer. The yellow polar head groups separate the gray hydrophobic tails from the aqueous cytosolic and extracellular environments. Lipid bilayers are formed in a self-assembly process. The cell membrane consists mainly of a thin layer of amphipathic phospholipids, which spontaneously arrange themselves in such a way that the hydrophobic "tail" regions are isolated from the surrounding water and the hydrophilic "head" regions are connected to the intracellular (cytosolic) and extracellular surfaces of the resulting bilayer interaction. This creates a continuous spherical lipid bilayer. Hydrophobic interactions (also known as the hydrophobic effect) are the main driving forces in the formation of lipid bilayers. An increase in the interaction between hydrophobic molecules (causing the accumulation of hydrophobic regions) allows water molecules to bind to each other more freely, thus increasing the entropy of the system. This complex interaction may include non-covalent interactions such as van der Waals, electrostatic and hydrogen bonds. Lipid bilayers are usually impermeable to ions and polar molecules. The arrangement of the hydrophilic heads and hydrophobic tails of the lipid bilayer prevents the diffusion of polar solutes (eg, amino acids, nucleic acids, carbohydrates, proteins, and ions) across the membrane, but usually allows the passive diffusion of hydrophobic molecules. This gives the cell the ability to monitor the movement of these substances through transmembrane protein complexes such ascanals and gates. Flipases and scramblases concentrate the negatively charged phosphatidylserine on the inner membrane. Together with NANA it forms an additional barrier for charged entities moving through the membrane. Membranes perform different functions in eukaryotic and prokaryotic cells. An important role is to regulate the movement of materials in and out of cells. The structure of the phospholipid bilayer (liquid mosaic model) with specific membrane proteins is responsible for the selective membrane permeability and the passive and active transport mechanisms. In addition, membranes in prokaryotes and eukaryotic mitochondria and chloroplasts facilitate ATP synthesis through chemiosmosis.[39] Membrane polarity See also: epithelial polarity Alpha embedded cell The apical membrane of a polarized cell is the surface of the plasma membrane facing inward into the lumen. This is particularly evident in epithelial and endothelial cells, but also describes other polarized cells such as neurons. The basolateral membrane of a polarized cell is the surface of the plasma membrane that forms its basal and lateral surfaces. It is directed outward, towards the interstitium and away from the lumen. Basolateral membrane is a compound term referring to the terms "basal (basal) membrane" and "lateral (lateral) membrane", which, particularly in epithelial cells, are identical in composition and activity. Proteins (such as ion channels and pumps) are free to move from the base of the cell to the lateral surface or vice versa according to the fluid mosaic model. Tight junctions connect epithelial cells near their apical surface to prevent the migration of proteins from the basolateral membrane to the apical membrane. Thus, the basal and lateral surfaces remain roughly equivalent to each other [clarification needed], but deviate from the apical surface. Membrane Structures Diagram of cell membrane structures. Cell membranes can take different formsStructures such as caveolae, postsynaptic density, podosomes, invadopodia, focal adhesions and various types of cell junctions. These structures are generally responsible for cell adhesion, communication, endocytosis, and exocytosis. They can be visualized by electron microscopy or fluorescence microscopy. They consist of specific proteins such as integrins and cadherins. Cytoskeleton The cytoskeleton is located under the cell membrane in the cytoplasm and provides a scaffold for the anchoring of membrane proteins and forms organelles that extend from the cell. In fact, cytoskeletal elements interact intensively and closely with the cell membrane.[40] Anchoring proteins confine them to a specific cell surface, such as the apical surface of the epithelial cells lining the vertebrate gut, and limit how far they can diffuse across the bilayer. The cytoskeleton is capable of forming appendage-like organelles such as cilia, which are cell membrane-covered microtubule-based extensions, and filopodia, which are actin-based. These extensions are enveloped by a membrane and protrude from the cell surface to sense the external environment and/or to contact the substrate or other cells. The apical surfaces of epithelial cells are dense with actin-based finger-like projections known as microvilli, which increase the cell's surface area and thereby increase the rate of nutrient absorption. The localized separation of the cytoskeleton and cell membrane leads to vesicle formation. Intracellular Membranes Cell Content The cell membrane consists of many membrane-bound organelles that contribute to the overall function of the cell. The origin, structure, and function of each organelle result in wide variation in cellular composition due to the individual uniqueness of each organelle. Mitochondria and chloroplasts are thought to have evolved from bacteria known astheory. This theory arose from the idea that the bacterial genera Paracoccus and Rhodopseudomonas have similar functions to mitochondria and that cyanobacteria or cyanobacteria have similar functions to chloroplasts. The theory of endosymbiosis suggests that during evolution, the eukaryotic cell ingested these 2 types of bacteria, leading to the formation of mitochondria and chloroplasts in eukaryotic cells. This absorption resulted in both membrane systems of these organelles, where the outer membrane was derived from the host cell membrane and the inner membrane was the plasma membrane of the endosymbiont. Since both mitochondria and chloroplasts contain their own DNA, this further supports that both organelles evolved from engulfed bacteria that flourished in the eukaryotic cell.[41] In eukaryotic cells, the nuclear membrane separates the contents of the nucleus from the cytoplasm of the cell.[42] The nuclear membrane consists of an inner and an outer membrane, ensuring strict regulation of materials entering and leaving the nucleus. Materials move between the cytosol and the nucleus through the nuclear pores of the nuclear membrane. If a cell's nucleus is more transcriptionally active, its membrane will have more pores. The protein composition of the nucleus can differ significantly from that of the cytosol because many proteins cannot pass through the pores by diffusion. In the nuclear membrane, the inner and outer membranes differ in protein composition, and only the outer membrane is continuous with the endoplasmic reticulum (ER) membrane. Like the ER, the outer membrane also contains ribosomes, which are responsible for protein synthesis and transport into the space between the two membranes. The nuclear membrane breaks down in the early stages of mitosis and reassembles in the later stages of mitosis. The ER, which is part of the intimal system, constitutes a very large part of the total content of the cell membrane. The emergency room is closedtubules and vesicles, and its main functions include protein synthesis and lipid metabolism. There are 2 types of ER, smooth and rough. The rough ER has attached ribosomes used for protein synthesis, while the smooth ER is used more for processing toxins and regulating calcium in the cell. The Golgi apparatus has two interconnected circular Golgi cisternae. The chambers of the device form multiple networks of tubular lattices responsible for the organization, stacking, and transport of cargo, containing a continuous grape array of vesicles 50 to 60 nm in length. The device consists of three main compartments, a flat disc flush with tube networks and bubbles. Variation The cell membrane has a different composition of lipids and proteins in different cell types, which is why some cell types may have specific names. Sarcolemma in muscle cells: Sarcolemma is the name of the muscle cell membrane.[46] Although the sarcolemma is similar to other cell membranes, it has other functions that distinguish it. For example, the sarcolemma transmits synaptic signals, helps generate action potentials, and is highly involved in muscle contraction. Unlike other cell membranes, the sarcolemma forms tiny channels called T-tubules that run throughout the muscle cells. The average sarcolemma was also found to be 10 nm thick, in contrast to the 4 nm thickness of the general cell membrane. The oolemma is the oocyte cell membrane: the oolemma of oocytes (immature oocytes) is incompatible with a lipid bilayer because they lack a bilayer and are not composed of lipids. Rather, the structure has an inner layer, the fertilization coat, and the outer layer is the vitelline layer, which is composed of glycoproteins; however, channels and proteins are still present due to their functions in the membrane. Axolemma: A specialized plasma membrane on the axons of nerve cellsto generate an action potential. It consists of a granular, densely packed lipid bilayer that closely interacts with the components of the cytoskeleton, spectrin and actin. These components of the cytoskeleton can bind and interact with transmembrane proteins in the axolem. Permeability See also: Intestinal permeability Membrane permeability is the rate of passive diffusion of molecules through a membrane. These molecules are known as permeable molecules. The permeability depends primarily on the electric charge and polarity of the molecule, and to a lesser extent on the molar mass of the molecule. Due to the hydrophobic nature of the cell membrane, small electrically neutral molecules pass through the membrane more easily than large charged molecules. The inability of charged molecules to pass through the cell membrane causes the pH of the substance to break down in the body fluid compartments. See also Annular lipid envelope Artificial cell Bacterial cell structure Bangstad syndrome Cell cortex Cell damage including cell membrane damage Cell theory Cytonema Cell membrane flexibility Gram-positive bacteria Membrane models Membrane nanotubes History of cell membrane theory Lipid raft Trogocytosis Notes and references ^ Kimball Biology pages archived 2009 01.25. in Wayback Machine, Cell Membranes ^ Singleton P (1999). Bacteria in Biology, Biotechnology and Medicine (5th ed.). New York: Wiley. ISBN 978-0-471-98880-9. Sandeep Sharma Bibliography2. (March 2, 2019). "Physiology, Membrane". StatPearls. 1 SIU Medical School. 2 Regional Baptist Medical Center. PMID 30855799. {{Journal Citation}}: CS1 maint: localization (link) CS1 maint: uses author's parameters (link) ^ a b c d e f g h Albert B, Johnson A, Lewis J et al. (2002). Cell Molecular Biology (4th ed.). New York: Garland Science. ISBN 978-0-8153-3218-3. 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