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The three main parts of the brain are the cerebrum, cerebellum, and brainstem, but these portions contain many key sections.The human brain is the epicenter of our nervous system and plays a pivotal role in virtually every aspect of our lives. Its a complex, highly organized organ responsible for thoughts, feelings, actions, and interactions with the world around us. Here is a look at the intricate anatomy of the brain, its functions, and the consequences of damage to different areas.The brain is an organ of soft nervous tissue that is protected within the skull of vertebrates. It functions as the coordinating center of sensation and intellectual and nervous activity. The brain consists of billions of neurons (nerve cells) that communicate through intricate networks. The primary functions of the brain include processing sensory information, regulating bodily functions, forming thoughts and emotions, and storing memories.The brain has the remarkable ability to change and adapta process called neuroplasticity. This allows neurons to form new connections, reorganize pathways, and even compensate for damage. Neuroplasticity is essential for learning, memory, and recovery from injuries like strokes.The three main parts of the brain are the cerebrum, cerebellum, and brainstem.Location: The cerebrum occupies the upper part of the cranial cavity and is the largest part of the human brain.Functions: Its responsible for higher brain functions, including thought, action, emotion, and interpretation of sensory data.Effects of Damage: Depending on the area affected, damage leads to memory loss, impaired cognitive skills, changes in personality, and loss of motor control.Location: The cerebellum is at the back of the brain, below the cerebrum.Functions: It coordinates voluntary movements such as posture, balance, coordination, and speech.Effects of Damage: Damage causes problems with balance, movement, and muscle coordination (ataxia).Location: The brainstem is lower extension of the brain, connecting to the spinal cord. It includes the midbrain, pons, and medulla oblongata.Functions: This part of the brain controls many basic life-sustaining functions, including heart rate, breathing, sleeping, and eating.Effects of Damage: Damage results in life-threatening conditions like breathing difficulties, heart problems, and loss of consciousness.The four lobes of the brain are regions of the cerebrum that serve different functions:Frontal LobeLocation: This is the anterior or front part of the brain.Functions: Decision making, problem solving, control of purposeful behaviors, consciousness, and emotions.Parietal LobeLocation: Sits behind the frontal lobe.Functions: Processes sensory information, including touch, temperature, and pain. It also manages proprioceptionour sense of body position and movement in space, which helps with balance and coordination.Temporal LobeLocation: Below the lateral fissure, on both cerebral hemispheres.Functions: Mainly revolves around auditory perception and is also important for the processing of both speech and vision (reading).Occipital LobeLocation: At the back of the brain.Functions: Main center for visual processing.The cerebrum has two halves, called hemispheres. Each hemisphere controls voluntary movements and sensory processing on the opposite side of the bodya phenomenon known as contralateral control. However, the two hemispheres also specialize in certain cognitive functions:Left Hemisphere: Often called the logical side of the brain, the left hemisphere is dominant in language processing, reading, writing, mathematical reasoning, and sequential problem-solving. It plays a key role in grammar, syntax, and analytical thinking.Right Hemisphere: Known as the intuitive side, the right hemisphere specializes in spatial awareness, creativity, recognizing faces, interpreting emotions, and visualizing patterns. It is more involved in music and artistic abilities.However, it is a myth that people are strictly left-brained or right-brained. Both hemispheres constantly communicate via the corpus callosuma bundle of nerve fibers that integrates information between them. Most tasks require cooperation between both hemispheres. For example, while the left hemisphere is dominant in language, the right hemisphere helps with tone, emotion, and context in speech.While knowing the three key parts of the brain is a good start, the anatomy is quite a bit more complex. In addition to nervous tissues, the brain also contains key glands:Cerebrum: The cerebrum is the largest part of the brain. Divided into lobes, it coordinates thought, movement, memory, senses, speech, and temperature.Corpus Callosum: A broad band of nerve fibers joining the two hemispheres of the brain, facilitating interhemispheric communication.Cerebellum: Coordinates movement and balance and aids in eye movement.Pons: Controls voluntary actions, including swallowing, bladder function, facial expression, posture, and sleep.Medulla oblongata: Regulates involuntary actions, including breathing, heart rhythm, as well as oxygen and carbon dioxide levels.Limbic System: Includes the amygdala, hippocampus, and parts of the thalamus and hypothalamus.Amygdala: Plays a key role in emotional responses, hormonal secretions, and memory formation.Hippocampus: Plays a vital role in memory formation and spatial navigation.Thalamus: Acts as the brains relay station, channeling sensory and motor signals to the cerebral cortex, and regulating consciousness, sleep, and alertness.Basal Ganglia: A group of structures involved in processing information related to movement, emotions, and reward. Key structures include the striatum, globus pallidus, substantia nigra, and subthalamic nucleus.Ventral Tegmental Area (VTA): Plays a role in the reward circuit of the brain, releasing dopamine in response to stimuli indicating a reward.Optic tectum: Also known as the superior colliculus, it directs eye movements.Substantia Nigra: Involved in motor control and contains a large concentration of dopamine-producing neurons.Cingulate Gyrus: Plays a role in processing emotions and behavior regulation. It also helps regulate autonomic motor function.Olfactory Bulb: Involved in the sense of smell and the integration of olfactory information.Mammillary Bodies: Plays a role in recollective memory.Limbic System: The limbic system is a network of structuresincluding the hippocampus, amygdala, thalamus, and hypothalamusthat regulates emotions, memory, motivation, and arousal. It plays a key role in forming memories and controlling emotional responses such as fear, pleasure, and aggression.Download and print the diagram of the parts of the brain, with or without labels:Labeled: PNG | PDFNo Labels: PNG | PDFThe hypothalamus, pineal gland, and pituitary gland are the three endocrine glands within the brain:Hypothalamus: The hypothalamus links the nervous and endocrine systems. It contains many small nuclei. In addition to participating in eating and drinking, sleeping and waking, it regulates the endocrine system via the pituitary gland. It maintains the bodys homeostasis, regulating hunger, thirst, response to pain, levels of pleasure, sexual satisfaction, anger, and aggressive behavior.Pituitary Gland: Known as the master gland, it controls various other hormone glands in the body, such as the thyroid and adrenals, as well as regulating growth, metabolism, and reproductive processes.Pineal Gland: The pineal gland produces and regulates some hormones, including melatonin, which is crucial in regulating sleep patterns and circadian rhythms.The brain and spinal cord consist of gray matter (substantia grisea) and white matter (substantia alba).White Matter: Composed mainly of myelinated axons, which transmit electrical signals between different brain regions and the spinal cord. Its white appearance comes from myelin, which speeds up communication between neurons. White matter is crucial for learning, memory, and coordination.Gray Matter: Consists of neuronal cell bodies, dendrites, and axon terminals. It appears gray due to the lack of myelin, the fatty substance that coats some neurons. Gray matter is responsible for processing information, including muscle control, sensory perception, decision-making, and self-regulation.How many cells are in the human brain?The human brain contains approximately 86 billion neurons. Additionally, it has a similar or slightly higher number of non-neuronal cells (glial cells), making the total number of cells in the brain close to 170 billion.How many neurons are in the human brain?There are about 86 billion neurons in the human brain. These neurons are connected by trillions of synapses, forming a complex networks.How much does the human brain weigh?The average adult human brain weighs about 1.3 to 1.4 kilograms (about 3 pounds). This weight represents about 2% of the total body weight.What percentage of the brain is water?The brain is about 73% water.How much of our brain do we use?What is the size of the human brain?The average size of the adult human brain is about 15 centimeters (6 inches) in length, 14 centimeters (5.5 inches) in width, and 9 centimeters (3.5 inches) in height.How fast do brain signals travel?Brain signal speeds vary depending on the type of neuron and the nature of the signal. They travel anywhere from 1 meter per second to over 100 meters per second in the fastest neurons.How does the brain change with age?With age, the brains volume and/or weight decrease, synaptic connections reduce, and there can be a decline in cognitive functions. However, the brain to continues adapting and forming new connections throughout life.Can the brain repair itself after being injured?The brain has a limited ability to repair itself. Neuroplasticity aids recovery by allowing other parts of the brain to take over functions of the damaged areas.What is the energy consumption of the brain?The brain consumes about 20% of the bodys total energy, despite only making up about 2% of the bodys total weight. It requires a constant supply of glucose and oxygen.How does sleep affect the brain?Sleep is crucial for brain health. It aids in memory consolidation, learning, brain detoxification, and the regulation of mood and cognitive functions.Do people really have a dominant brain hemisphere?Not really. While some tasks are lateralized, most functions involve both hemispheres.Is brain size related to intelligence?Larger brains do not necessarily mean higher intelligence.Douglas Fields, R. (2008). White Matter Matters. Scientific American. 298 (3): 5461. doi:10.1038/scientificamerican0308-54Kandel, Eric R.; Schwartz, James Harris; Jessell, Thomas M. (2000). Principles of Neural Science (4th ed.). New York: McGraw-Hill. ISBN 978-0-8385-7701-1.Kolb, B.; Whishaw, I.Q. (2003). Fundamentals of Human Neuropsychology (5th ed.). New York: Worth Publishing. ISBN 978-0-7167-5300-1.Rajmohan, V.; Mohandas, E. (2007). The limbic system. Indian Journal of Psychiatry. 49 (2): 132139. doi:10.4103/0019-5545.33264Shepherd, G.M. (1994). Neurobiology. Oxford University Press. ISBN 978-0-19-508843-4.Related Posts Your brain has three main parts:Cerebrum.Your cerebrum interprets your five senses. It regulates conscious actions that require thinking, like your speech, memory, behavior, personality, movement, reasoning and judgment. Its the largest part of your brain, divided into two halves: the left and right hemispheres. The two halves connect by nerve fiber bundles (white matter) called the corpus callosum.Cerebellum.Your cerebellum maintains your balance, posture, coordination and fine motor skills. Its a small, half-circle shape thats located in the back of your brain around your brainstem.Brainstem.Your brainstem regulates many automatic body functions. You dont consciously control these functions, like your heart rate, breathing, sleep and wake cycles, and swallowing. Your brainstem is in the lower part of your brain. It connects the rest of your brain to your spinal cord.A bony structure called your cranium surrounds your brain. Your cranium is part of your skull. Your brain floats in a liquid called cerebrospinal fluid (CSF). All the bones of your skull and CSF protect your brain from injury. Between your brain and skull, you have three layers of tissue called the meninges:Dura mater.The outermost layer lines your cranial vault.Arachnoid membrane.The middle layer has a thin layer of tissue that covers your entire brain.Pia mater.The innermost layer contains blood vessels that run into your brains surface.Your brain has 12 cranial nerves. Nerves carry messages by sending electrical impulses back and forth between your brain, organs and muscles. Information from your body passes through your nerves to your brain and from your brain to the rest of your body.Other important parts of your brain include:Amygdala. Part of your limbic system and located in your temporal lobes, it helps you regulate your emotions, especially fear.Basal ganglia.Deep within your cerebrum, these structures regulate your movement.Hippocampus. This small structure in your temporal lobes is responsible for your memory and learning.Thalamus. Sitting above your brainstem, this is the switchboard to your central nervous system. It relays sensory information to your cerebral cortex from the rest of your body.Hypothalamus.Just below your thalamus, the hypothalamus regulates hormones and autonomic functions like hunger and thirst.Pituitary gland.Below the hypothalamus, the pituitary gland regulates hormone activity.Pineal gland. In the back of your corpus callosum, this gland regulates your sleep and wake cycles.What are the lobes that make up your brain?Your cerebrum is split into hemispheres (sides). On each side, there are four lobes (sections) with different functions:Frontal lobes.Located in the front part of your brain, behind your forehead, this is the largest lobe. It controls voluntary movements, social understanding, thinking and learning, and more.Occipital lobes.Located in the back of your brain, this lobe allows you to process and interpret visual information from your eyes.Parietal lobes.Near the upper back of your brain, this lobe receives and interprets signals from other parts of your brain so you can understand your environment and the state of your body. Temporal lobes.On the side of your head near your ears, this lobe helps you retrieve memories and understand language and emotions.What is the gray and white matter in the brain?There are two tissues in your brain known as gray and white matter. They differ based on their color and function:Gray matter is the darker, outside section (the cerebral cortex) that helps you with your day-to-day functioning., like muscle control, using your senses, remembering something, experiencing emotions and speech.White matter is the lighter section below the gray matter that sends signals to different parts of your central nervous system to help you function.You can compare gray matter to a computer. White matter is the cables for the computer.How many brain cells does a human have?There are close to 86 billion nerve cells (neurons) in the human brain and an equal amount of non-neuronal glial cells:Neuronssend and receive electric and chemical signals.Glial cellshelp maintain your brain, form myelin (a fatty, protective substance found in white matter) and provide nutrition to your brain.How much does the human brain weigh?An adult human brain weighs, on average, about 3 pounds. When youre born, it weighs about 1 pound and grows to about 2 pounds through childhood. The weight of your brain varies based on your sex and body size.Disclaimer: The content on this site is for educational purposes only and is not a substitute for professional medical advice, diagnosis, or treatment.Anatomy.co.ukLearn Human AnatomyOrgan responsible for control and cognitionThe human brain is the main Central Nervous System organ, situated in the head, protected by the cranium. Human brain has the same overall construction and anatomy as other mammalian brains, but it has a more developed cerebral cortex. The human brain is particularly complex and extensive. It embodies 2% of body mass, but it takes approximately 25% of all the blood pumped by the heart. The brain splits in left and right hemispheres. It is a distributed set of billions of cells. Bigger animals, such as elephants and whales, have larger brains, but when they are measured via encephalization coefficient (which compensates the body size), the human brain coefficient is practically twice as large as the common dolphin coefficient and three times bigger than the chimpanzee coefficient. Most of the development is due to the cerebral cortex, specifically the frontal lobes, which are connected to executive functions such as reasoning, scheduling, abstract thinking and self-control. The brain role, as part of the Central Nervous System is to regulate most functions of human body, including vital functions such as heart rate or breathing, basic functions like being hungry, sleeping, or sexual instinct, also complex functions like speaking, thinking, remembering etc. The human brain is the most complex of all living constructions, processing sensory information while organizes and preserves the organism's vital functions. One trillion primary cells, i.e. neurons, work together over electrical compulsions in order to organize physical activities and mental processes that differentiate the human being from others animal species. The brain is a gelatinous mass, approximately 1.4 kg in weight, depending on the body weight and sex of each individual. There is no connection between a person's brain weight and his/her intellectual capacity. The human brain and spinal cord are components of the Central Nervous System. The cranium and the three membranes with cerebrospinal fluid, named meninges, allow the brain to stay protected from impacts/ knocking on its four lobes: Picture 1: Parts of the Human Brain The frontal lobe is located behind the forehead, and is responsible for considerable of the complex cognitive function: Reasoning, imagination, planning, values and behavior. The parietal lobe is located in the upper back of the frontal lobe. It covers the sensitive cortex (processing those messages related to touch, palate and body temperature), and the motor cortex (controlling the movement). The temporal lobe is located behind the temple, sheltering the auditory cortex, taking care of the language comprehension, and acting over emotions and memory. The occipital lobe is located behind the head, controlling the visual cortex in charge of handing out what the individual sees.StructureThe anatomy of the human brain it is characterized by the following parts: Picture 2: Structure of Human brain Cerebral cortexCerebral cortex is a tissue layer that forms the brain's outer covering, whose thickness fluctuates from 2 to 6 millimeters. In intellectually superior mammals, such as humans, the cerebral cortex has protuberances and grooves that supply additional space to store relevant information about the organism. The left and right cerebral hemispheres are linked by the rough corps located into the cerebral cortex.CerebellumCerebellum is an area located at the cranium base, below the occipital lobe. Cerebellum is small size (like a walnut), and coordinates significant functions such as movement, coordination equilibrium, and language learning.ThalamusThalamus takes information from the body and several sensory organs. The information received is filtered before transferring it to the cerebral cortex, in order to prevent a brain overload. On the other side, the cortex sends information to the thalamus, so it can be diffused to other brain and spinal cord areas.HypothalamusHypothalamus is the gland that monitors the organism's vital functions, such as thirst, body temperature, sleep, or pain states. Hypothalamus and the pituitary gland connect the nervous and hormonal systems.HippocampusHippocampus is the area located within the temporal lobe. It is central for cognitive processes such as learning and memory.BrainstemBrainstem is located at the human brain radix, connecting to the spinal cord. Brainstem contains three areas: Mesencephalon, protuberance and medulla, which allow the brain to interconnect with the rest of the central and peripheral nervous system. The medulla bulb leads the reflex acts, i.e. those functions that body makes automatically, such as heart rate, breathing, swallowing, blood pressure, or digestion.HypophysisHypophysis (pituitary gland) is responsible for liberating hormones. Together with the hypothalamus, the pituitary gland links the hormone-related organs, i.e. the endocrine organs: ovaries, mammary glands, thyroids, adrenals, and testes).Spinal cordSpinal cord is the central nervous system component that begins in the lower area of the brain, extending along the spine.[7] The spinal cord links the brain with the nerves. The spinal cord's nerve tissues are approximately 45 centimeters long, and nearly 2 centimeters bulk, and they conform the peripheral nervous system.Function of the BrainPhysiological functions of human brain involves in reception of information from the body, understanding it (through cognitive process), and guiding the body's reply. Brain is the maximum responsible of the thinking and motion the body generates. The human brain also mediates in vital actions such as: To breath, to control blood pressure, and to release hormones. The brain allows human being to interact successfully with the environment, by communicating and interacting with others. Extensive of the physiological functions of the brain involve reception of information from the rest of the body, interpreting the information, and supervisory the body's response. The main human brain functions are to keep the organism alive, so that it can interact with the environment. All the human being deliberates, feels and does is connected to specific functions of his/her brain: Sensitive functions, reception and processing of data (information of the different perceived stimuli). [6]The stimuli of external or internal origin are apprehended through different receptors. These relevant receivers transform the stimuli by energy indicators. Motor functions: The brain controls voluntary and involuntary actions. The motor cortex is located in the frontal lobe, ahead the Rolando fissure, a cleft located in the upper brain of the higher mammals. This area is the central sulcus of the brain, and is characterized by separating the parietal lobe from the frontal lobe. Integrative functions are mental activities such as learning, memory, attention, language etc. Most patients who suffer from a kind of brain damage lose some cognitive capability. Cognitive functions are those mental processes that let individual to receive, interpretive, select, lay-up, transform, develop and recover information from the environment. Cognition allow people to understand and link to the world around them. The daily human activities involve millions of connections, also complex mental computations between different brain areas, to get a proper working in the surrounding world. Main cognitive functions: Attention: Individual chooses between stimuli that arrive at the same time into the brain, both external (sound, smells or images) and internal (values, feelings or thoughts). Stimuli are useful and to perform a motor and mental activity. Memory is in charge of information encoding, storing and recovery. People need the attention system to work correctly. If an individual does not pay attention to one given thing, he/she will not be able to cypher, to store and recover that information. Executive are the most complex cognitive functions. It is the control of cognition and opinions and behavior guideline, done by different processes related to each other.[5] Executive functions cover a set of skills, such as scheduling, paying attention, organizing, or validating intentional behavior. They are located in the frontal lobe. Language is the symbolic human communication system, stating through languages. Language is not only significant for communicating with other people. It also structures the innermost thinking. In language processing, several brain areas mediate, acting in a cohesive way through numerous functional systems relating, particularly, the left hemisphere.[8] The visual perception functions allow individual to identify and categorize the stimuli. These functions help humans to interpret, assign and associate what they are watching with known categories, fit in into their knowledge field. The proper working of the visual perception allows, for example, to recognize the faces of relatives, also to identify if an object is a letter, a coat or a plant. The visual spatial functions examine, recognize and manage the space in which human beings. We are talking about processes such as depth perception, logical navigation, or mental construction. [4]The visual spatial functions include different skills, such as orientation through a given place, reading a map, to calculate how far is a car in order to decide whether or not to cross the street, to walk without tripping over the objects that are on our ride etc.Picture 3: Functions of Human Brain The Brain Hemispheres The leading hemisphere in 98% of humans is the left one, responsible for logical reasoning, different skills, and communication. The right hemisphere is in charge for symbolic thinking and imagination. It is related to non-verbal expression, such as: Intuition, recognition of voices, faces or melodies. In the right hemisphere views and memories are manifested through images. In left-handed people roles are inverted. The left hemisphere lean towards dominance because it is located in two specialized zones: the Broca area, the motor cortex that directs the speech, and the Wernicke area, responsible for verbal understanding. [3]The left hemisphere is dominant in most people, related to the verbal section, as well as the ability to analyze, logical reasoning, or mathematical problem resolving. The corpus callosum is located at the bottom of the interhemispheric fissure, in control for the connection between the two cerebral hemispheres. This frame, conformed by nerve fibers (involved in myelin), is responsible for information exchange among the different regions of the cerebral cortex.Clinical SignificanceThe brain, spinal cord and nerves form the Human Nervous System. They control together all the body functions.[2] When it is healthy, it works quickly and mechanically. However, when some problem happens, the results can be devastating. When something is wrong in a region of the nervous system, people may have difficulty to talk, move, breath, swallow, read, remember, feel etc. Over six hundred neurological diseases are threat for human. The most known categories include: Diseases caused by malfunctioning genes, such as Huntington's disease, and muscular dystrophy Degenerative illnesses, in which nerve cells are serious damaged (or die), such as Parkinson and Alzheimer Difficulties with the nervous system development, such as spina bifida Diseases in blood vessels that provide the brain, such as strokes Infections, such as meningitis Convulsive disorders, such as epilepsy disease Cancer, such as brain tumors Damages to the spinal cord and brainPreventionCaring for the nervous system sometimes is not easy, as the brain functions are so complex, and there are many factors involved, making it complicated, but not impossible. The brain controls human body; Therefore, caring for it should be a priority in people's life. Nobody likes to get sick, but many times people act irresponsibly, putting their health at risk. The consequence can be critical diseases in the long term. However, as the health effects are not seen immediately, but generally when the problem is already much more severe, people do not start caring their health until it is too late.[1] Regarding main factors that protect the nervous system: Self-esteem: self-confidence, to value life, and to strive to meet goals. Having high self-esteem favors facing and solving daily problems. The development of personal values such as respect, tolerance, solidarity, and love, in order to maintain a high level of mental health. Stay productive and healthy, through recommended behaviors and life habits. Eating well, doing physical exercises, resting enough, and taking care of personal hygiene. Establish healthy relationships with others is the basis of a quiet life in society. Envy, violence and resentment, or jealousy threaten mental health. Avoid smoking, alcohol and other drugs that disturb the proper working of the nervous system, and can lead to critical mental illness, even death from brain damage.Published on June 8, 2017Last updated on May 17, 2025HomeExploreDiscussFlashcardsQuiz The human brainis not only one of the most important organs in the human body; it is also the most complex. The brain is made up of billions of neurons and it also has a number of specialized parts that are each involved in important functions. While there is still a great deal that researchers do not yet know about the brain, they have learned a great deal about the anatomy and function of the brain. Understanding these parts can help give people a better idea of how disease and damage may affect the brain and its ability to function. MedicalRF.com/Getty Images The cerebral cortex is the part of the brain that makes human beings unique. Functions that originate in the cerebral cortex include: The cerebral cortex is what we see when we look at the brain. It is the outermost portion that can be divided into four lobes. Each bump on the surface of the brain is known as a gyrus, while each groove is known as a sulcus (gyri and sulci are the plural form). The cerebral cortex is the largest part of the brain and is responsible for a number of complex functions, including conscious thought, information processing, language, memory, behavior, and personality. PIXOLOGICSTUDIO/SCIENCE PHOTO LIBRARY / Getty Images The cerebral cortex can be divided into four sections, known as lobes. The frontal lobe, parietal lobe, occipital lobe, and temporal lobe have been associated with different functions ranging from reasoning and memory to auditory and visual perception. This lobe is located at the front of the brain and is associated with reasoning, motor skills, higher-level cognition, and expressive language.At the front of the frontal lobe is the prefrontal cortex, which is responsible for most executive functions, like thinking, paying attention, and self-control. Damage to the frontal lobe can lead to changes in sexual habits, socialization, and attention, as well as increased risk-taking.The motor cortex, also known as the motorhomunculus(meaning 'little person'), lies at the back of the frontal lobe, near the central sulcus. It receives information from various lobes of the brain and uses it to carry out body movements like playing the piano, blowing a kiss, and skipping. The parietal lobe is located in the middle section of the brain, just behind the frontal lobe. It is associated with processing tactile sensory information such as pressure, touch, and pain. A portion of the parietal lobe known as the somatosensory cortex is located just behind the central sulcus and is essential to the processing of the body's senses.It is also known as the somatosensory homunculus.The homunculus is known as the "little person' in the brain because it has a topographical map of the whole human body in a small area of the cerebral cortex. There is one for the motor cortex in the frontal lobe and one for the somatosensory cortex in the parietal lobe. The temporal lobe is located on the bottom section of the brain next to the temples and ears.This lobe is also the location of the primary auditory cortex, which is important for interpreting sounds, tones, and frequencies. This cortex has a topographical map of the cochlea, a tiny organ in the inner ear.The secondary auditory cortex contains Wernicke's area, which is responsible for understanding spoken or written human language.The hippocampus is also located in the temporal lobe, which is why this portion of the brain is also heavily associated with the formation of memories. Damage to the temporal lobe can lead to problems with memory, sound discrimination, and speech comprehension. The occipital lobe is located at the back portion of the brain and is associated with interpreting visual stimuli and information. The primary visual cortex, which receives and interprets information from the retinas of the eyes, is located in the occipital lobe. Damage to this lobe can cause visual problems such as difficulty recognizing objects, an inability to identify colors, and trouble recognizing words.The brain comprises four lobes, each associated with different functions. The frontal lobe is found at the front of the brain; the parietal lobe is behind the frontal lobe; the temporal lobe is located at the sides of the head; and the occipital lobe is found at the back of the head. PIXOLOGICSTUDIO/SCIENCE PHOTO LIBRARY / Getty Images The brainstem is an area located at the base of the brain that contains structures vital for involuntary functions such as heartbeat and breathing. It is comprised of themidbrain, pons, and medulla. The midbrain is often considered the smallest region of the brain. It acts as a relay station for auditory and visual information and controls many important functions, such as the visual and auditory systems, as well as eye movement. Portions of the midbrain called thered nucleusand thesubstantia nigraare involved in the control of body movement. The darkly pigmented substantia nigra contains a large number of dopamine-producing neurons. The degeneration of neurons in the substantia nigra is associated with Parkinsons disease. The medulla is located directly above the spinal cordin the lower part of the brain stem and controls many vital autonomic functions such as heart rate, breathing, and blood pressure. The pons, meaning "bridge," connects the cerebral cortex to the medulla and to the cerebellum and serves a number of essential functions. It plays a role in several autonomic processes, such as stimulating breathing and controlling sleep cycles.The brainstem, which includes the midbrain, medulla, and pons, is responsible for involuntary processes, including breathing, heartbeat, and blood pressure. Image by Ministry of Education, Culture, Sports, and Technology(MEXT) Integrated Database Project Sometimes referred to as the "little brain," the cerebellum lies on top of the pons behind the brain stem. The cerebellum makes up approximately 10% of the brain's total size, but it accounts for more than 50% of the total number of neurons located in the entire brain. The cerebellum is comprised of small lobes and serves several functions. It receives information from the inner ear's balance system, sensory nerves, and auditory and visual systems. It is involved in coordinating movements and motor learning.It helps control posture, balance, and the coordination of voluntary movements. This allows different muscle groups to act together and produce coordinated fluid movement.It is also important in certain cognitive functions, including speech. The cerebellum is associated with motor movement and control, but this is not because the motor commands originate here. Instead, the cerebellum modifies these signals and makes motor movements accurate and useful. The cerebellum is densley packed with neurons and is responsible for managing posture, balance, and the coordination of movement. Image by Ministry of Education, Culture, Sports, and Technology(MEXT) Integrated Database Project Although there is no totally agreed-upon list of the structures that make up the limbic system, four of the main regions include: The hypothalamus is a grouping of nuclei that lie along the base of the brain near the pituitary gland. It connects with many other regions of the brain and is responsible for controlling hunger, thirst, emotions, body temperature regulation, and circadian rhythms. The hypothalamus also controls the pituitary gland by secreting hormones. This gives the hypothalamus a great deal of control over many body functions. The amygdala is a cluster of nuclei located close to the base of the brain. It is primarily involved in functions including memory, emotion, and the body's fight-or-flight response. The structure processes external stimuli and then relays that information to the hippocampus, which can then prompt a response to deal with outside threats. Located above the brainstem, the thalamus processes and transmits movement and sensory information. It is essentially a relay station, taking in sensory information and then passing it on to the cerebral cortex. The cerebral cortex also sends information to the thalamus, which then sends this information to other systems. The hippocampus is a structure located in the temporal lobe. It is important in memory and learning and is considered to be part of the limbic system because it plays an important part in emotional regulation or the control of emotional responses. It plays a role in the body's fight-or-flight response and in the recall of emotional memories. The limbic system controls behaviors essential for well-being and survival, including emotional regulation, the fight-or-flight response, feeding behavior, and reproduction. Other important structures play an essential role in supporting the structure and function of the brain. Some of these parts of the brain include: The meninges are the layers that surround the brain and spinal cord and provide protection. There are three layers of meninges: The dura mater: This is the thick, outmost layer located directly under the skull and vertebral column.The arachnoid mater: This is a thin layer of web-like connective tissue. Under this layer is cerebrospinal fluid that helps cushion the brain and spinal cord.The pia mater: This layer contains veins and arteries and is found directly atop the brain and spinal cord. The brain also contains 12 cranial nerves. Each nerve plays a vital role in relaying essential information to the brain. These nerves include: The olfactory nerve: Essential for the sense of smellThe optic nerve: Controls eyesightThe oculomotor nerve: Controls the motions of the eye and the response of the pupilThe trochlea nerve: Controls the muscles of the eyeThe trigeminal nerve: Carries sensory and motor information to and from the face, jaw, teeth, and scalpAbducens nerve: Associated with specific movements of the eyeFacial nerve: Responsible for sensory and motor functions controlling the face, tongue, tear glands, and parts of the earThe vestibulocochlear nerve, which regulates hearing and balanceThe glossopharyngeal nerve: Important for sensory information from parts of the tongue and stimulating specific throat musclesThe vagus nerve: Plays many important roles, including carrying sensory information from the ear, heart, intestinesThe accessory nerve: Controls the muscles of the neckThe hypoglossal nerve: Responsible for the muscle movements of the tongueIn addition to the main parts of the brain, there are also other important structures that are important for normal functioning. This includes the protective meninges and the cranial nerves that transmit signals to and from the brain. The brain can also be affected by a number of conditions and damage. According to the National Institute of Neurological Disorders and Stroke, there are more than 600 types of neurological diseases. Some conditions that can affect the brain and its function include: Brain tumorsCerebrovascular diseases such as stroke and vascular dementiaConvulsive disorders such as epilepsyDegenerative diseases such as Alzheimer's disease and Parkinson's diseaseDevelopmental disorders such as cerebral palsyInfectious diseases such as AIDS dementiaMetabolic diseases such as Gaucher's diseaseNeurogenetic diseases, including Huntington's disease and muscular dystrophyTrauma such as head injury and spinal cord injury By studying the brain and learning more about its anatomy and function, researchers are able to develop new treatments and preventative strategies for conditions that affect the brain.Disease and damage can affect the brain's ability to function. Tumors, strokes, degenerative conditions, trauma, and infectious diseases are just a few of the conditions that can damage the brain. You can't change your genetics or some other risk factors. But it's important to take steps to help protect the health of your brain. Research suggests that regular physical activity is essential for brain health. Exercise can help delay brain aging and degenerative diseases such as Alzheimer's, diabetes, and multiple sclerosis. It is also associated with improvements in cognitive abilities and memory. Similarly, a nutritious, balanced diet that includes omega-3 fatty acids, vitamins, and antioxidants is important for brain function (as well as overall health). It's also essential to protect your brain from injury by, for example, wearing a helmet when participating in physical activities that pose a risk for collision or falls, and always wearing a seatbelt when driving or riding in a car. Sleep can also play a pivotal role in brain health and mental well-being. Studies have found that sleep can actually play a role in the development and maintenance of some psychiatric conditions, including anxiety, depression, and bipolar disorder. Evidence also suggests that staying mentally engaged can also play an important role in protecting your brain from some degenerative conditions. Activities that may help include learning new things and staying socially active. The human brain is remarkably complex and researchers are still discovering many of the mysteries of how the mind works. By better understanding how different parts of the brain function, you can also better appreciate how disease or injury may impact it. If you think that you are experiencing symptoms of a brain condition, talk to your doctor for further evaluation. The Human Brain is a complex organ and is also known as the central processing unit of the body. It is enclosed inside the bony covering called the cranium (or skull). The brain consists of the cerebrum, responsible for higher cognitive functions; the cerebellum, involved in coordination and balance; and the brainstem, which regulates basic life functions such as breathing and heart rate. The human brain regulates thoughts, emotions, movements, and controls thoughts, memory, and speech, arm and leg movements.What is Human Brain?Human Brain along with the spinal cord forms Central Nervous System. It is the site of information processing and control. Brain is protected inside the skull, suspended in cerebrospinal fluid, and isolated from the bloodstream by the bloodbrain barrier. The adult human brain weighs on average about 1.21.4 kg. The human brain is primarily composed of neurons, glial cells, neural stem cells, and blood vessels. Within the skull, the brain is covered by cranial meninges. Meninges are divided into three layers , the outer layer called the dura mater, very thin middle layer called arachnoid and an inner layer called pia mater. It consists of cerebrum, the brainstem and the cerebellum. Brain Diagram The diagram below showing the different parts of the Human brain:Where is the Brain located?Brain is located inside the cranial cavity, that is within the skull. Skull provides protection to the brain from dorsal, lateral and frontal sides. Inside the cranial cavity the brain is suspended in cerebrospinal fluid. Cerebrospinal fluid is a clear and colorless fluid that surrounds the brain and spinal cord. Around 500 ml of the CSF is produced daily by the ependymal cells. It helps to support the weight of the brain, preventing it from pressing against the base of the skull. CSF carries essential nutrients to brain cells and removes waste products from the brain. It contains immune cells that help protect the central nervous system from infections. Also Read: Difference Between Brain and Spinal CordBrain Structure The parts of the brain are as follows:Cerebrum: is the largest part of the brain and forms 80% of the brain. Cerebrum is responsible for higher cognitive functions. It regulates emotions, learning and interprets different senses.Cerebellum: It coordinates motor functions and balance. It is located at the back of the brain.Brainstem: Includes the midbrain, pons, and medulla oblongata, controlling vital functions like breathing and heart rate. It is located is in the lower part of brain. It connects the brain to the spinal cord.Also Read: Difference Between Cerebellum And Cerebrum Lobes of BrainEach side of the brain is divided into different lobes. Various lobes are explained as follows:Frontal LobeLocated at the front of the brain and is the largest lobe.It controls voluntary movement, speech and intellect and is responsible for higher cognitive functions, such as reasoning, and problem-solving.Contains the motor cortex, which controls voluntary muscle movements.Parietal LobeLocated at the top and back of the brain, behind the frontal lobe.Processes sensory information from the body, including touch, temperature, and spatial awareness.Contains the somatosensory cortex, which interprets tactile sensations.Temporal LobeLocated near the ears on the either sides of the brain, near the temples.Involved in auditory processing, language comprehension, and memory.It help recognize people, understand language and interpret other peoples emotions.Occipital LobeLocated at the back of the brain.Primarily responsible for visual processing, including the interpretation of visual stimuli and object recognition. It control how to process shapes, colors and movement.Contains the primary visual cortex.Parts of the Brain The human brain and its part are as follows:ForebrainIt forms the largest part of the brain and consists of cerebrum, thalamus and hypothalamus. The forebrain plays a crucial role in the processing of information related to complex cognitive activities, voluntary motor activities and sensory and associative functions. The function of the forebrain includes controlling the body temperature, eating and drinking, regulation of sexual behaviour, expression of emotional reaction, and motivation. The various parts of the forebrain are explained as follows:CerebrumIt forms the largest and most important part of the brain. The cerebrum handles conscious thoughts and actions. It is longitudinally divided into two halves that are connected by the corpus callosum. Cerebral hemisphere is covered by a layer of cells called cerebral cortex, which is present in folds. The cerebral cortex is referred to as the grey matter due to its greyish appearance. The cerebral cortex is divided into different areas as follows:Motor Area: Located in the frontal lobe and is responsible for voluntary muscle movements.Sensory Area: It receives and processes sensory information related to touch, pressure, temperature, and pain.Association Area: They integrate and process information from various sensory and motor areas to support complex functions such as perception, language, memory, and problem-solving.Cerebral hemisphere consists of fibres that are covered with myelin sheath. They give an opaque white appearance to the layer and, hence, is called the white matter.ThalamusThe thalamus is located deep within the forebrain, situated above the brainstem. The thalamus is a gray matter structure of the diencephalon. It acts as a relay station for sensory information entering the brain. It receives sensory input from various parts of the body, including the ears, skin, eyes, etc. and then transfers this information to the specific regions of the cerebral cortex for further processing. The main function of thalamus is keeping you awake and alert. Hypothalamus Hypothalamus location in brain at the base of the thalamus. It is a major coordinating centre for sensory and motor signaling. It contains neurosecretory cells, which secrete hormones called hypothalamic hormones. The hypothalamus control body temperature, urge for eating and drinking.Midbrain The midbrain is the smallest portion of the brainstem. It is also known as the mesencephalon. Hypothalamus is located between the thalamus/hypothalamus of the forebrain and pons of the brain. Four round swelling or lobes are present in the dorsal portion of the midbrain called corpora quadrigemina. The mid brain consists of tectum and tegmentum. TectumTectum consists of two main structures: the superior colliculus, which primarily processes visual information, and the inferior colliculus, which is primarily involved in auditory processing. These structures play essential roles in coordinating reflexive responses to sensory stimuli.Tegmentum The tegmentum is situated beneath the tectum. It processes and modulates pain signals. The reticular formation in the tegmentum regulates sleep-wake cycles and overall alertness. The tegmentum helps control autonomic functions like heart rate, blood pressure, and respiration. It also contributes to sensory processing and integration.The various functions performed by midbrain are:The midbrain contains the superior colliculus, which processes visual information and helps direct eye movements.The inferior colliculus is involved in auditory processing and helps coordinate reflex in respons to auditory stimuli.The midbrain helps control body temperature, and regulates sleep - wake cycle.HindbrainThe hindbrain is the posterior portion of the brainstem, located just above the spinal cord. It consists of pons, cerebellum and medulla (also called the medulla oblongata). Collectively, the three regions of the hindbrain coordinates all the functions like breathing, sleep and wake up cycle, heartbeat, motor learning necessary for sustaining life. The three regions of the brain are explained below in detail as follows:PonsPons is located above the medulla oblongata and below the midbrain. It consists of fibre tracts that interconnect different regions of the brain. It serves as a relay station, transmitting signals between the cerebrum in the forebrain and the cerebellum in the hindbrain. The functions performed by the pons are as follows:Regulates the body temperature and breathing.It helps control muscles involved in facial expressions, chewing, and even the sensation of taste.Takes part in the synthesis of various hormones.Regulates the sense of taste and smell.Controls the mood and emotions.Participates in pain perception and modulation.Medulla OblongataIt is lowermost part of the brain stem which is located above the spinal cord and is connected to the pons. Medulla oblongata is the connection between brainstem and the spinal cord. The medulla oblongata control respiration, cardiovascular reflexes and gastric secretions. The various functions of the medulla oblongata are :Regulates heart rate and blood pressure.Controls breathing rhythm and depth.Coordinates reflexes like swallowing and vomiting.Manages vital autonomic functions.Facilitates the crossover of motor nerve fibers.Cerebellum Cerebellum is located at the back of the brain, behind the brainstem. It has very convoluted surface, that is, its cortical surface displays closely spaced parallel grooves provide the additional space for many more neurons like Purkinje cells and granule cells. It plays an important role in various motor and non-motor functions. Following are the cerebellum functions: The cerebellum helps coordinate voluntary muscle movements, ensuring they are smooth and precise.It plays an important role in balance control and motor movement regulation.It helps detect and correct errors in movement to improve accuracy.It assists in the precise timing of muscle contractions needed for coordinated movementsIt coordinates and regulates eye movement.Conclusion - Brain Anatomy In conclusion, understanding the anatomy of the brain, including its structure, parts, and functions, is essential for grasping how human brain controls thoughts, emotions, and behaviors. The parts of the human brain are: cerebrum, cerebellum and brainstem and contains four lobes - frontal, temporal, parietal, and occipital - each with specific functions. By exploring the structure of brain and its functions, we gain valuable insights into its role in shaping our experiences and guiding our actions, paving the way for further advancements in neuroscience and cognitive research. The brain is a central focus of neuroscience, responsible for controlling bodily functions, interpreting sensory input, and shaping individual identity. Studying its neuroanatomythe structure of the nervous systemreveals how each region contributes to cognition and behavior. It receives information through our senses: sight, touch, taste, smell, and hearing. This information is processed in the brain, allowing us to give meaning to the input it receives. The brain is part of the central nervous system (CNS) along with the spinal cord. It receives information from sensory receptors and sends messages to muscles and glands. It is the center of all conscious awareness and is divided into different lobes with different functions. It contains the cerebrum, about 85% of the total mass. The brain is composed of the cerebrum, cerebellum, and brainstem (Fig. 1).Figure 1. The brain has three main parts: the cerebrum, cerebellum, and brainstem. The cerebrum is the largest and most recognizable part of the brain. It consists of grey matter (the cerebral cortex) and white matter at the center. The cerebrum is divided into two hemispheres, the left and right, and contains the lobes of the brain (frontal, temporal, parietal, and occipital lobes). The cerebrum produces higher functioning roles such as thinking, learning, memory, language, emotion, movement, and perception. The cerebellum is located under the cerebrum and monitors and regulates motor behaviors, especially automatic movements. The cerebellum helps regulate posture and balance, and has recently been suggested for being involved in learning and attention. Although the cerebellum only accounts for roughly 10% of the brains total weight, this area is thought to contain more neurons (nerve cells) than the rest of the brain combined. The brainstem is located at the base of the brain. This area connects the cerebrum and the cerebellum to the spinal cord, acting as a relay station for these areas. The brainstem regulates automatic functions such as sleep cycles, breathing, body temperature, digestion, coughing, and sneezing. What are the three main parts of the brain, and what is one function of each? How does the cerebellum support movement and coordination? Which brain region connects to the spinal cord and regulates automatic functions like breathing? The cerebrum is divided into two halves: the right and left hemispheres (Fig. 2). The left hemisphere controls the right half of the body, and the right hemisphere controls the left half. The two hemispheres are connected by a thick band of neural fibers known as the corpus callosum, consisting of about 200 million axons. The corpus callosum allows the two hemispheres to communicate and allows information being processed on one side of the brain to be shared with the other. Figure 2. The cerebrum is divided into left and right hemispheres. The nerve fibers corpus callosum connects the two sides. Hemispheric lateralization is the idea that each hemisphere is responsible for different functions. Each of these functions is localized to either the right or left side. The left hemisphere is associated with language functions, such as formulating grammar and vocabulary and containing different language centers (Brocas and Wernickes area). The right hemisphere is associated with more visuospatial functions such as visualization, depth perception, and spatial navigation. These left and right functions are the case in most people, especially those who are right-handed. Each cerebral hemisphere can be subdivided into four lobes, each associated with different functions. The four lobes of the brain are the frontal, parietal, temporal, and occipital lobes (Figure 3).Figure 3. The cerebrum is divided into four lobes: frontal, parietal, occipital, and temporal. The frontal lobes are located at the front of the brain, behind the forehead (Figure 4). Their main functions are associated with higher cognitive functions, including problem-solving, decision-making, attention, intelligence, and voluntary behaviors. The frontal lobes contain the motor cortexresponsible for planning and coordinating movements. It also contains the prefrontal cortex, which is responsible for initiating higher-level cognitive functioning, and Brocas Area, which is essential for language production. Figure 4. Frontal lobe structure. The temporal lobes are located on both sides of the brain, near the temples of the head, hence the name temporal lobes (Figure 5). The main functions of these lobes include understanding, language, memory acquisition, face recognition, object recognition, perception, and auditory information processing. There is a temporal lobe in both the left and right hemispheres. The left temporal lobe, which is usually the most dominant in people, is associated with language, learning, memorizing, forming words, and remembering verbal information. The left lobe also contains a vital language center known as Wernickes area, which is essential for language development. The right temporal lobe is usually associated with learning and memorizing non-verbal information and determining facial expressions. Figure 5. Temporal lobe structure. The parietal lobe is located at the top of the brain, between the frontal and occipital lobes, and above the temporal lobes (Figure 6). The parietal lobe is essential for integrating information from the bodys senses to allow us to build a coherent picture of the world around us. These lobes allow us to perceive our bodies through somatosensory information (e.g., through touch, pressure, and temperature). It can also help with visuospatial processing, reading, and number representations (mathematics). The parietal lobes also contain the somatosensory cortex, which receives and processes sensory information, integrating this into a representational map of the body. This means it can pinpoint the exact area of the body where a sensation is felt, as well as perceive the weight of objects, shape, and

texture. Figure 6. Parietal lobe structure. The occipital lobes are located at the back of the brain behind the temporal and parietal lobes and below the occipital bone of the skull (Figure 7). The occipital lobes receive sensory information from the eyes retinas, which is then encoded into different visual data. Some of the functions of the occipital lobes include being able to assess the size, depth, and distance, determine color information, object and facial recognition, and mapping the visual world. The occipital lobes also contain the primary visual cortex, which receives sensory information from the retinas, transmitting this information relating to location, spatial data, motion, and the colors of objects in the field of vision. Figure 7. Occipital lobe structure.Which lobe is responsible for decision-making and voluntary movement? What is the primary function of the occipital lobe? How does the parietal lobe help us perceive touch and spatial awareness? The surface of the cerebrum is called the cerebral cortexand has a wrinkled appearance, consisting of bulges, also known as gyri, and deep furrows, known as sulci (Figure 8). A gyrus (plural: gyri) is the name given to the bumps and ridges on the cerebral cortex (the outermost layer of the brain). A sulcus (plural: sulci) is another name for a groove in the cerebral cortex. Figure 8. The cortex contains neurons (grey matter) interconnected to other brain areas by axons (white matter). The cortex has a folded appearance. A fold is called a gyrus, and the valley between is a sulcus. The cerebral cortex is primarily constructed of grey matter (neural tissue made up of neurons), with between 14 and 16 billion neurons found here. The many folds and wrinkles of the cerebral cortex allow a wider surface area for an increased number of neurons to live there, permitting large amounts of information to be processed. Beneath the cerebral cortex lie several key subcortical brain regions that play essential roles in emotion, memory, sensory processing, and motor control. These include the following: The limbic system is a network of interconnected structures deep within the brain that supports emotional regulation, memory, and motivation. Key components include the amygdala, which processes emotional responses like fear; the hippocampus, involved in memory formation; and the hypothalamus, which helps regulate basic drives such as hunger and stress. By linking emotional experience to memory and bodily responses, the limbic system plays a vital role in how we perceive and react to the world. The amygdala is a brain region deep in the brain that is involved in the processing of emotions and fear learning. The amygdala is a part of the limbic system, a neural network that mediates emotion and memory (Figure 9). The amygdala also ties emotional meaning to memories, processes rewards, and helps us make decisions. This brain region has also been linked with the fight-or-flight response. Figure 9. The amygdala in the limbic system plays a key role in how animals assess and respond to environmental threats and challenges by evaluating the emotional importance of sensory information and prompting an appropriate response. The thalamus relays information between the cerebral cortex, brain stem, and other brain regions (Figure 10). Because of its interactive role in relaying sensory and motor information, the thalamus contributes to many processes, including attention, perception, timing, and movement. The hypothalamus modulates a range of behavioral and physiological functions. It controls autonomic functions such as hunger, thirst, body temperature, and sexual activity. To do this, the hypothalamus integrates information from different brain parts and responds to various stimuli such as light, odor, and stress. Figure 10. The thalamus is often described as the brains relay station as a great deal of information that reaches the cerebral cortex first stops in the thalamus before being sent to its destination. The hippocampus is a curved-shaped structure in the limbic system associated with learning and memory (Figure 11). The hippocampus plays a key role in forming memories. It serves as an early storage system for long-term memory and helps convert them into permanent memory. Figure 11. Hippocampus location in the brain The basal ganglia are a group of structures that regulate the coordination of fine motor movements, balance, and posture alongside the cerebellum. The basal ganglia are connected to other motor areas and link the thalamus with the motor cortex. The basal ganglia are also involved in cognitive and emotional behaviors, as well as playing a role in reward and addiction. Figure 12. The Basal Ganglia IllustrationWhat role does the hippocampus play in memory? How does the hypothalamus help regulate body functions? Which structure helps process fear and emotional responses? Within the brain, there are fluid-filled interconnected cavities called ventricles, which are extensions of the spinal cord. These are filled with a substance called cerebrospinal fluid, which is a clear and colorless liquid. The ventricles produce cerebrospinal fluid and transport and remove this fluid. The ventricles do not have a unique function, but they provide cushioning to the brain and are useful for determining the locations of other brain regions. Cerebrospinal fluid circulates through the brain and spinal cord and functions to cushion the brain within the skull. If damage occurs to the skull, the cerebrospinal fluid will act as a shock absorber to help protect the brain from injury. As well as providing cushioning, the cerebrospinal fluid circulates nutrients and chemicals filtered from the blood and removes waste products from the brain. Cerebrospinal fluid is constantly absorbed and replenished by the ventricles. If there were a disruption or blockage, this can cause a build-up of cerebrospinal fluid and can cause enlarged ventricles. Neurons are the nerve cells of the central nervous system that transmit information through electrochemical signals throughout the body. Neurons contain a soma, a cell body from which the axon extends. Axons are nerve fibers that are the longest part of the neuron, which conduct electrical impulses away from the soma. There are dendrites at the end of the neuron, which are branch-like structures that send and receive information from other neurons. A myelin sheath, a fatty insulating layer, forms around the axon, allowing nerve impulses to travel down the axon quickly. There are different types of neurons. Sensory neurons transmit sensory information, motor neurons transmit motor information, and relay neurons allow sensory and motor neurons to communicate. The communication between neurons is called synapses. Neurons communicate with each other via synaptic clefts, which are gaps between the endings of neurons. During synaptic transmission, chemicals, such as neurotransmitters, are released from the endings of the previous neuron (also known as the presynaptic neuron). These chemicals enter the synaptic cleft to then be transported to receptors on the next neuron (also known as the postsynaptic neuron). Once transported to the next neuron, the chemical messengers continue traveling down neurons to influence many functions, such as behavior and movement. Glial cells are non-neuronal cells in the central nervous system which work to provide the neurons with nourishment, support, and protection. These are star-shaped cells that function to maintain the environment for neuronal signaling by controlling the levels of neurotransmitters surrounding the synapses. They also work to clean up what is left behind after synaptic transmission, either recycling any leftover neurotransmitters or cleaning up when a neuron dies. These types of glial have the appearance of balls with spikes all around them. They function by wrapping around the axons of neurons to form a protective layer called the myelin sheath. This is a substance that is rich in fat and provides insulation to the neurons to aid neuronal signaling. Microglial cells have oval bodies and many branches projecting out of them. The primary function of these cells is to respond to injuries or diseases in the central nervous system. They respond by clearing away any dead cells or removing any harmful toxins or pathogens that may be present, so they are, therefore, important to the brains health. These cells are column-shaped and usually line up together to form a membrane called the ependyma. The ependyma is a thin membrane lining the spinal cord and ventricles of the brain. In the ventricles, these cells have small hairlike structures called cilia, which help encourage the flow of cerebrospinal fluid. What are the three main parts of a neuron, and what does each do? What is the function of the myelin sheath? Name two types of glial cells and explain their roles.There are 12 types of cranial nerves which are linked directly to the brain without having to pass through the spinal cord. These allow sensory information to pass from the organs of the face to the brain: S ome S ay M arry M oney B ut M y B rother S ays B ig B rains M atter M ore Cranial I: Sensory Cranial II: Sensory Cranial III: Motor Cranial IV: Motor Cranial V: Both (sensory & motor) Cranial VI: Motor Cranial VII: Both (sensory & motor) Cranial VIII: Sensory Cranial IX: Both (sensory & motor) Cranial X: Both (sensory & motor) Cranial XI: Motor Cranial XII: Motor Purves, D., Augustine, G., Fitzpatrick, D., Katz, L., LaMantia, A., McNamara, J., & Williams, S. (2001). Neuroscience 2nd edition. sunderland (ma) sinauer associates. Types of Eye Movements and Their Functions. Mayfield Brain and Spine (n.d.). Anatomy of the Brain. Retrieved July 28, 2021, from: Robertson, S. (2018, August 23). What is Grey Matter? News Medical Life Sciences. Guy-Evans, O. (2021, April 13). Temporal lobe: definition, functions, and location. Simply Psychology. Guy-Evans, O. (2021, April 15). 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