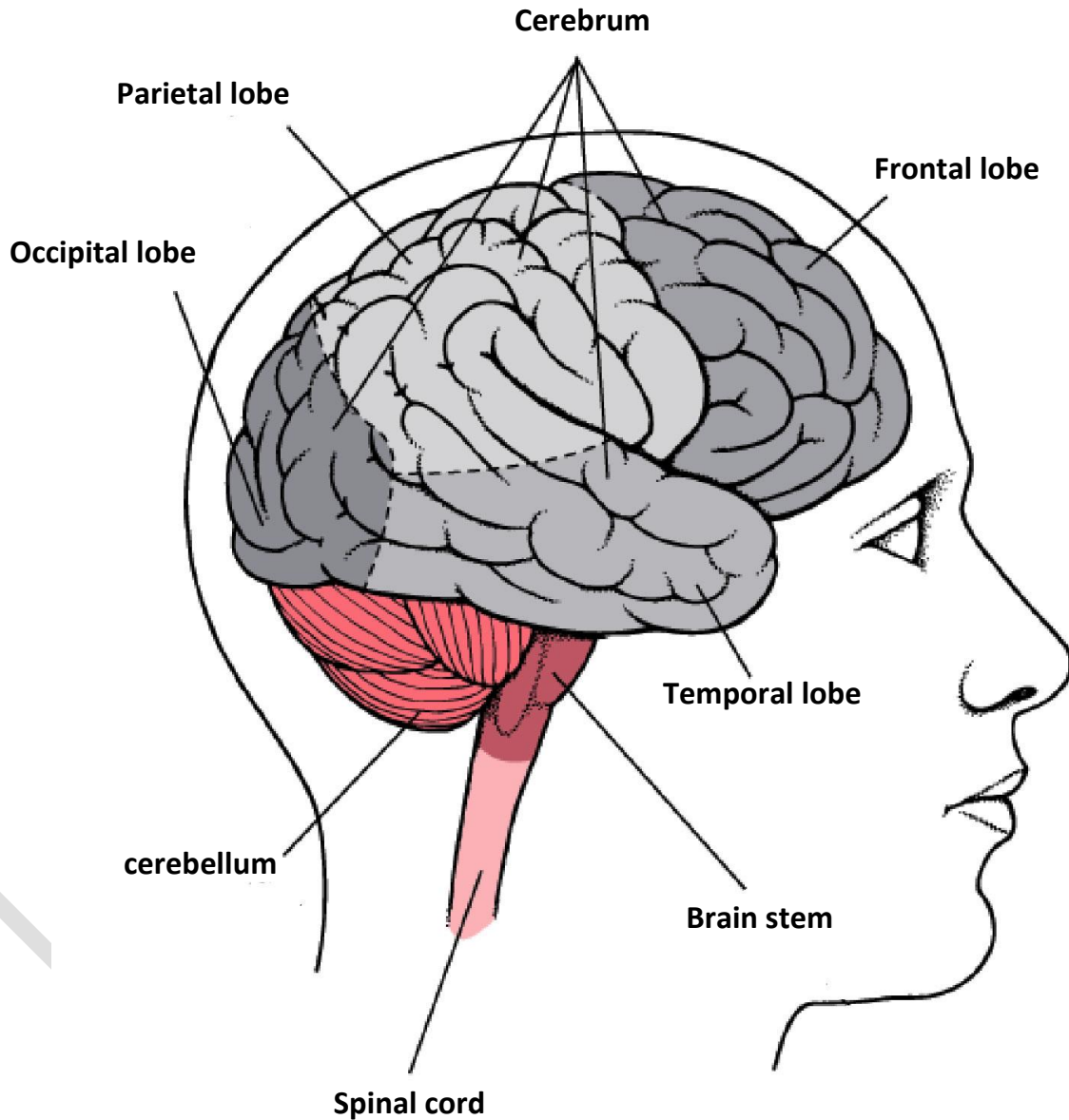


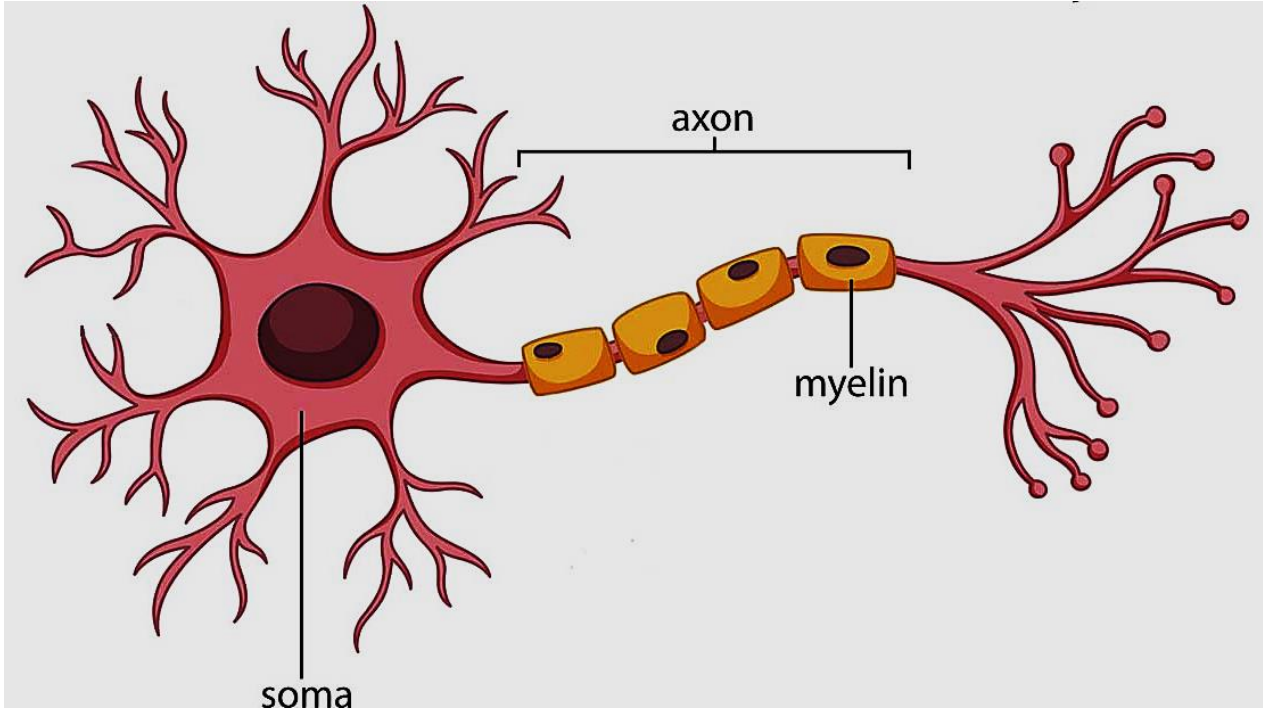
BRAIN الدماغ

The brain is vital organ that serves as the control center of the human body. It is responsible for a wide range of functions, including cognition, sensory processing, motor control, and the regulation of bodily processes.



Structure

The brain is made up of billions of nerve cells (neurons) which connected by specialized fibers called axons. These axons form a network of connections called synapses, which allow neurons to communicate with each other.



Processing Information

The brain receives information through our senses, which are processed by specialized areas of the brain. For example:

- ✓ **Vision:** the optic nerve sends visual information to the occipital lobe, which processes visual information.
- ✓ **Hearing:** the auditory nerve sends auditory information to the temporal lobe, which processes auditory information.
- ✓ **Touch:** the somatosensory cortex processes information from the skin, muscles, and joints.

Decision-Making

The brain uses information from our senses to make decisions. For example, when we see a snake, our brain processes the visual information and sends a signal to our muscles to move our feet away from the snake.

Memory

The brain stores memories in specialized areas, such as the hippocampus and the cerebral cortex. These areas are responsible for encoding, storing, and retrieving memories.

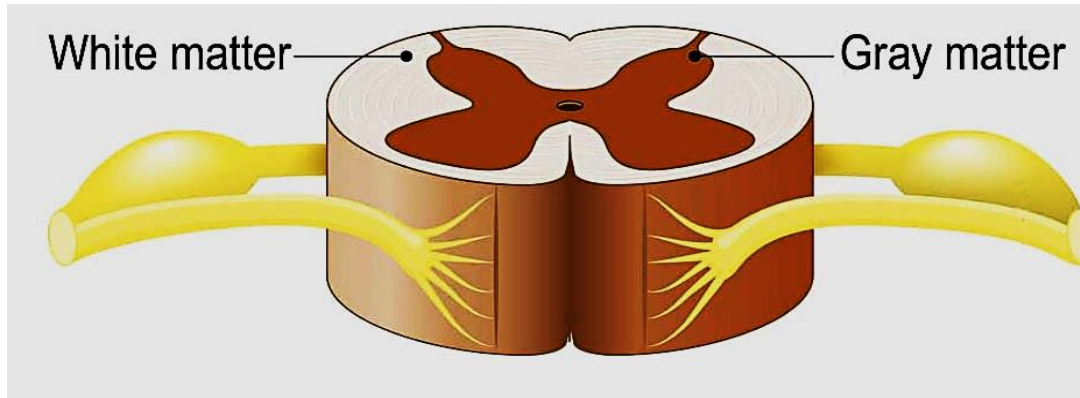
Emotions

The brain processes emotions through specialized areas, such as the amygdala and the hypothalamus. These areas are responsible for regulating emotions like fear, anger, and happiness.

Brain Regions

- 1. Cerebrum:** is the largest part of the brain in front of brain. It is divided into two hemispheres, the left and right hemispheres. The cerebrum is responsible for higher cognitive functions, such as thinking, memory, perception, and voluntary movement.
- 2. Cerebellum:** “little brain” is located at the back of the brain, just below the cerebrum. It is responsible for motor control, balance, posture, and fine-tuning of movements.
- 3. Brainstem:** “middle brain” is located at the base of the brain and connects the brain to the spinal cord. It includes the midbrain, pons, and medulla. The brainstem is responsible for vital functions such as breathing, heart rate regulation, and basic involuntary movements (sleep-wake cycles).
- 4. Spinal Cord:** while technically not part of the brain, the spinal cord extends from the bottom of the medulla and through a large opening in the bottom of the skull.

Supported by the vertebrae, the spinal cord carries messages to and from the brain and the rest of the body.



Deeper Structures Within the Brain

✓ Pituitary Gland الغدة النخامية

Sometimes called the “master gland,” the pituitary gland is a pea-sized structure found deep in the brain behind the bridge of the nose. The pituitary gland governs the function of other glands in the body, regulating the flow of hormones from the thyroid, adrenals, ovaries and testicles. It receives chemical signals from the hypothalamus through its stalk and blood supply.

✓ Amygdala لوزة المخيخ

Small, almond-shaped structures, an amygdala is located under each half (hemisphere) of the brain. Included in the limbic system, the amygdalae regulate emotion and memory and are associated with the brain’s reward system, stress, and the “fight or flight” response when someone perceives a threat.

✓ Hippocampus (الحُصين) قرن آمون

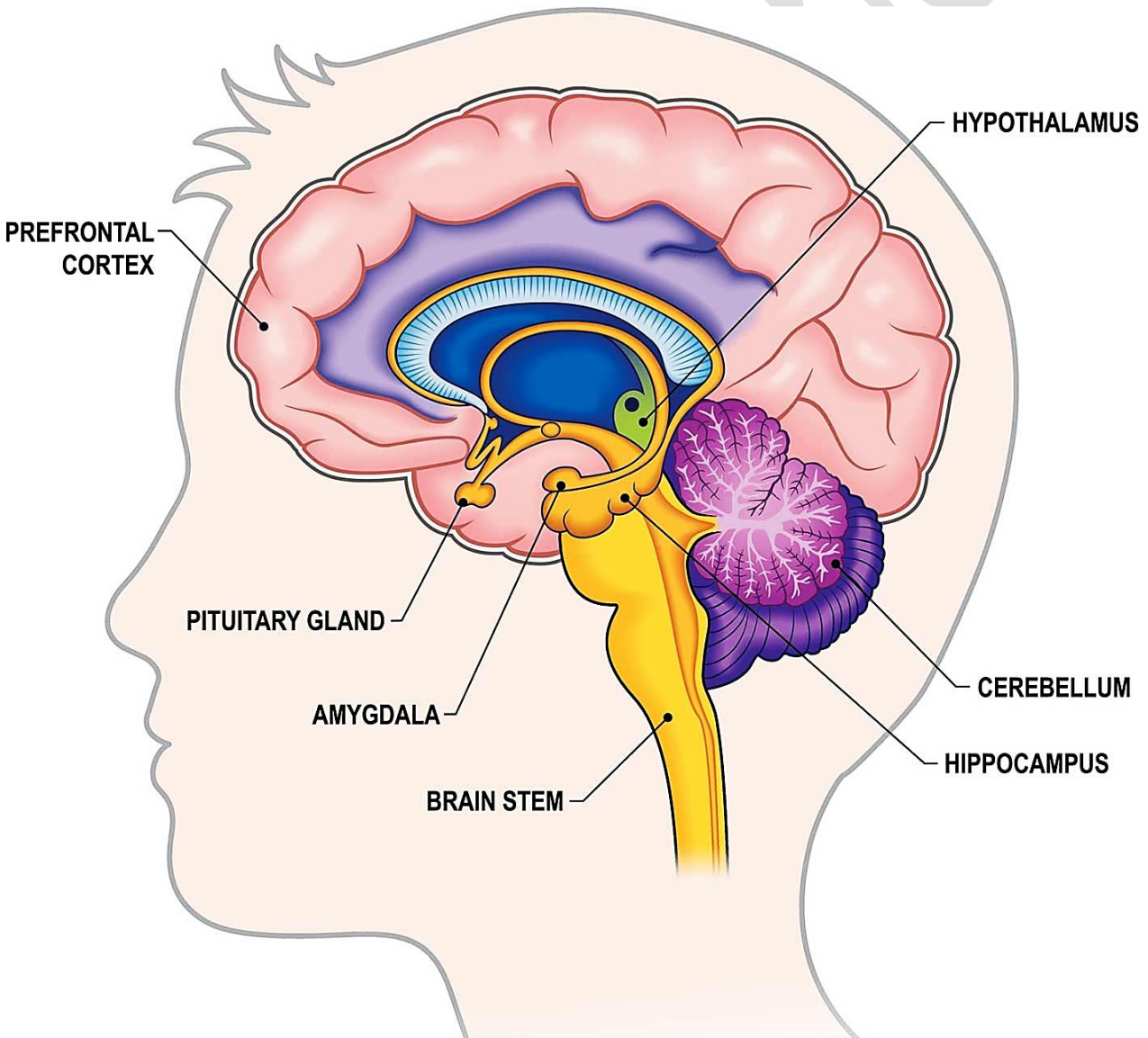
A curved seahorse-shaped organ on the underside of each temporal lobe, the hippocampus is part of a larger structure called the hippocampal formation. It supports memory, learning, navigation and perception of space. It receives information from the cerebral cortex and may play a role in Alzheimer’s disease.

✓ Hypothalamus تحت المهاد

The hypothalamus is located above the pituitary gland and sends it chemical messages that control its function. It regulates body temperature, synchronizes sleep patterns, controls hunger and thirst and also plays a role in some aspects of memory and emotion.

✓ Pineal Gland الغدة الصنوبرية

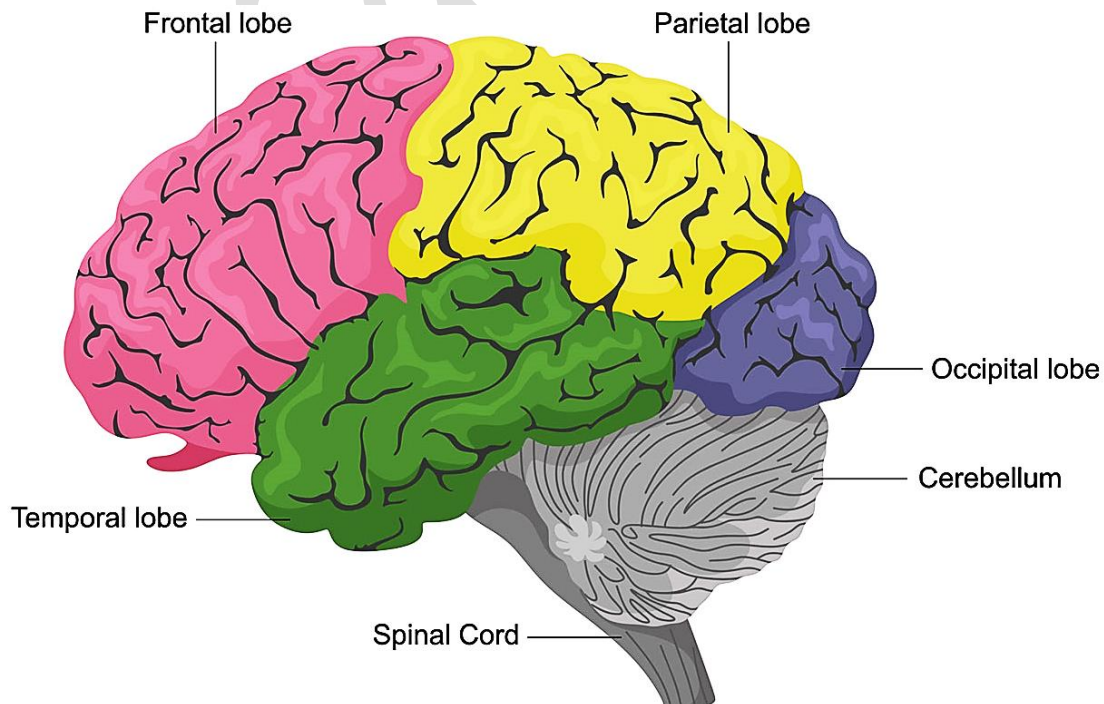
The pineal gland is located deep in the brain and attached by a stalk to the top of the third ventricle. The pineal gland responds to light and dark and secretes melatonin, which regulates circadian rhythms and the sleep-wake cycle.



Lobes of the Brain فصوص الدماغ

Each brain hemisphere (parts of the cerebrum) has four sections, called lobes: frontal, parietal, temporal and occipital. Each lobe controls specific functions

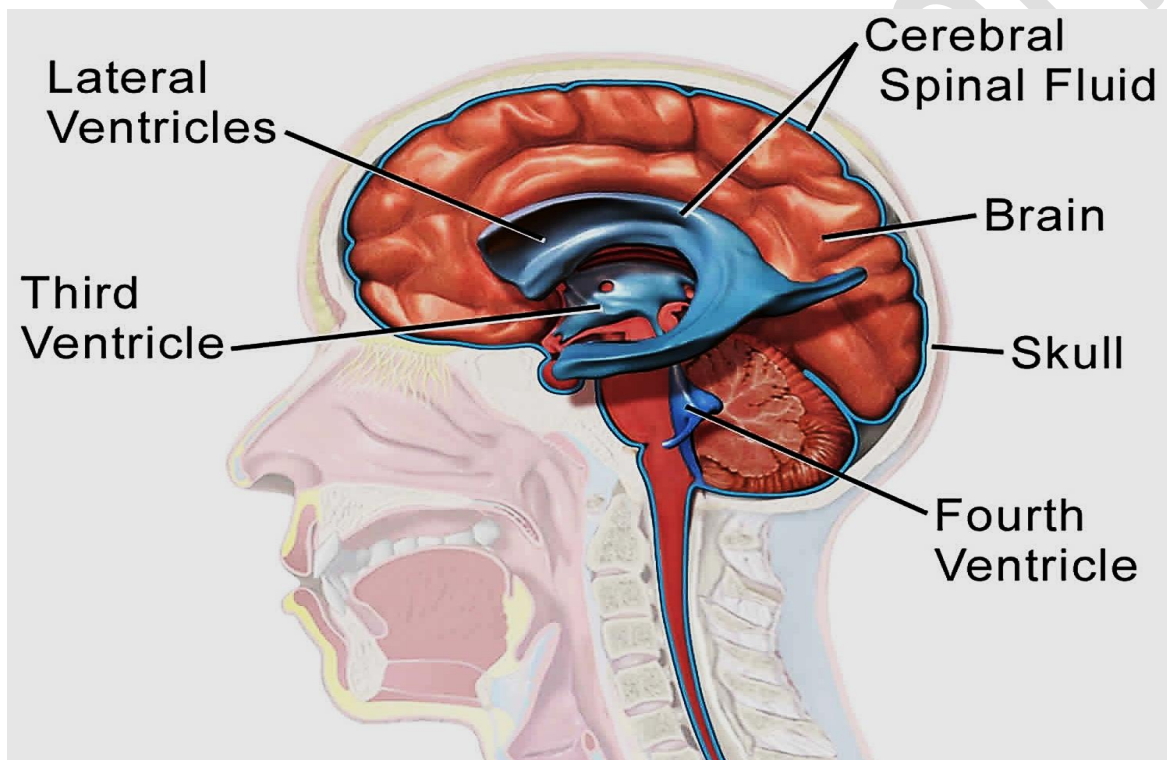
- ✚ **The frontal lobe:** The frontal lobe is located at the front of the brain and is involved in higher cognitive functions and executive control. It is responsible for planning, decision-making, problem-solving, and social behavior.
- ✚ **The parietal lobe:** The parietal lobe is situated near the top and back of the brain. It processes sensory information and is responsible for integrating and interpreting sensory input from various modalities, such as touch, temperature, and proprioception (awareness of body position in space).
- ✚ **The temporal lobe:** The temporal lobe is located on the sides of the brain, just above the ears. It is primarily responsible for short-term memory, speech, musical rhythm and some degree of smell recognition.
- ✚ **The occipital lobe:** The occipital lobe is situated at the back of the brain and is primarily responsible for visual processing. It receives information from the eyes and processes visual stimuli, allowing us to perceive and interpret the visual world.



Ventricles and Cerebrospinal Fluid البطينين والسائل النخاعي

The ventricles of the brain are a system of interconnected cavities filled with cerebrospinal fluid (CSF) that circulates in and around the ventricles and the spinal cord, and between the meninges. CSF surrounds and cushions the spinal cord and brain, washes out waste and impurities, and delivers nutrients.

There are four ventricles in the brain: two lateral ventricles, the third ventricle, and the fourth ventricle.



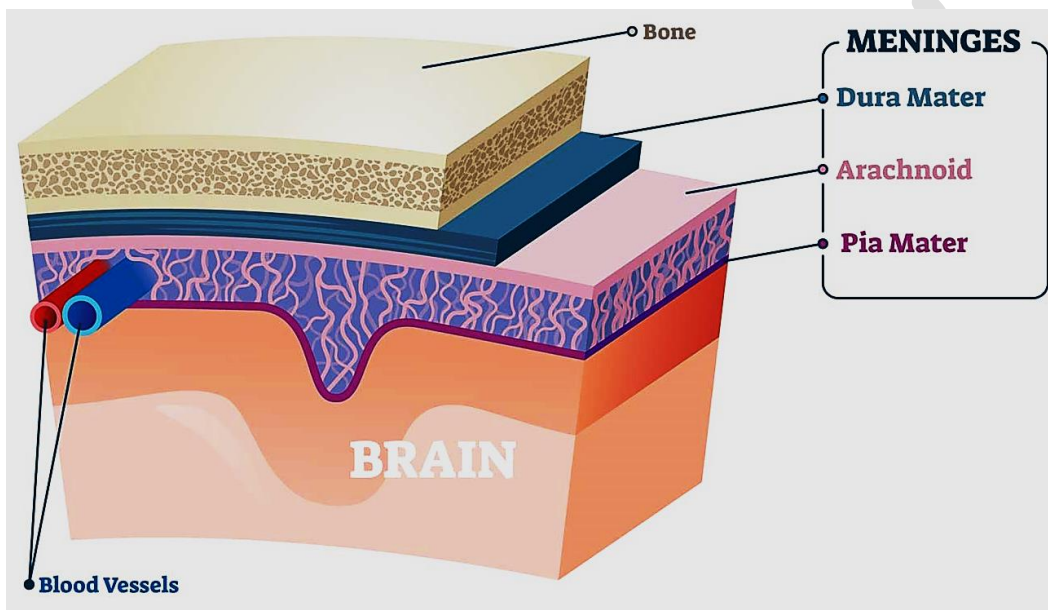
Brain Coverings: Meninges

Three layers of protective covering called meninges surround the brain and the spinal cord.

1. Dura Mater: the outermost layer, is thick and tough. It includes two layers: the periosteal and the meningeal layer is below that. Spaces between the layers allow for the passage of veins and arteries that supply blood flow to the brain.

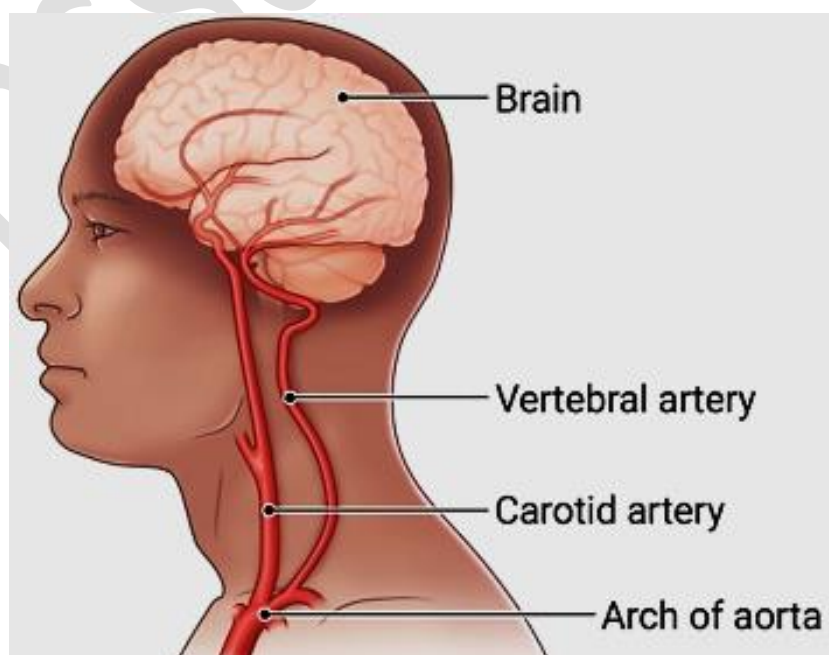
2. arachnoid mater: is a thin, weblike layer of connective tissue that does not contain nerves or blood vessels. Below the arachnoid mater is the cerebrospinal fluid (CSF).

3. pia mater: is a thin membrane that hugs the surface of the brain and follows its contours. The pia mater is rich with veins and arteries.



Blood Supply to the Brain

Two sets of blood vessels supply blood and oxygen to the brain: the vertebral arteries and the carotid arteries.



Brain Functions

The brain is responsible for many functions, including:

- Thinking and problem-solving
- Language and communication
- Emotions and moods
- Memory and learning
- Movement and coordination
- Sleep and wake cycles
- Regulating bodily functions like breathing, heart rate, and digestion

Brain Disorders

Brain disorders can affect the way the brain processes information, making it difficult to think, communicate, or control bodily functions. Common brain disorders include:

- Alzheimer's disease (مرض الزهايمر) النسيان
- Parkinson's disease الشلل الرعاشي
- Schizophrenia انفصام الشخصية
- Autism spectrum disorder اضطرابات طيف التوحد
- Epilepsy مرض الصرع
- Traumatic brain injury إصابة الدماغ الرضية

