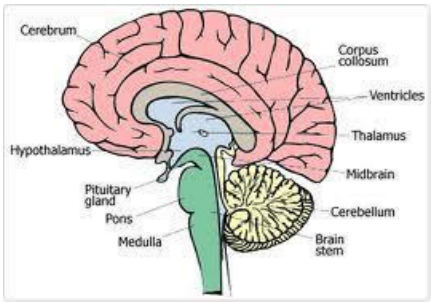
UT Health Austin Pediatric Neurosciences
at Dell Children's
Austin, TX 78723

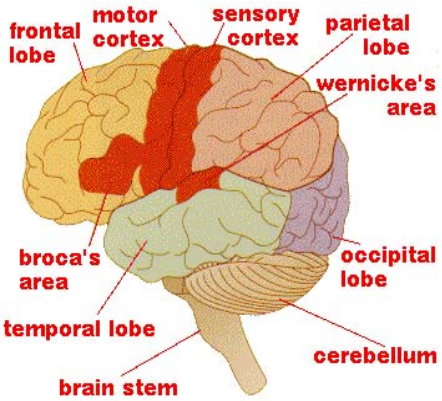
The Human Brain

The **brain** and the **spinal cord** make up the **central nervous system**. The central nervous system determines our personality, memories, thoughts, senses, and movements—all the things that make us who we are. It also controls more automatic functions such as heartbeat, breathing, and blood pressure.



The **cerebrum** is the largest region of the brain. It is divided into two halves, or **hemispheres**. These are then divided into four smaller **lobes**. Each of these lobes has specific responsibilities:

- The **frontal lobes** are located at the front of the brain. The frontal lobes play a role in personality, problem-solving, reasoning, attention, and focus.
    - **Broca's area** is a small region in the frontal lobe, usually on the left side, that is important for language function and speech.
    - The **motor cortex** is in the back of the frontal lobes and controls body movement. Because each hemisphere of the brain controls the opposite side of the body, the left motor cortex controls movement on the right side of the body, and the right motor cortex controls movement on the left side.

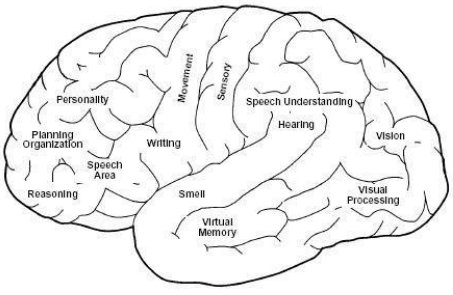


- The **parietal lobes** are responsible for receiving and interpreting sensory information from the body, such as touch, temperature, pain, and pressure. They also play a role in reasoning and math skills.

- The **temporal lobes** are important for understanding spoken language and sounds. They also play a role in memory and emotion.
    - **Wernicke's area** is a small area in the temporal lobe that is involved in understanding language.

- The **occipital lobes** are located at the back of the brain. They are important for receiving and interpreting visual information.

There are also some deep structures (called the **diencephalon**) that serve important functions:



- The **thalamus** acts as a "relay station" for information that passes through the brain. It sends incoming information to other areas of the brain for interpretation.
- The **hypothalamus** controls some of the automatic (or **autonomic**) functions of the brain. It controls hormone systems (via the pituitary gland), hunger and digestion, sleep, and body temperature.
- The **pituitary gland** controls several hormone systems, including the thyroid hormone, growth hormone, and sex hormone systems.

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The **cerebellum** (Latin for "little brain") is located at the base of the brain in the back. It is in a region called the posterior fossa. The cerebellum helps control balance, coordination, and muscle tone.

The **brain stem** carries information back and forth between the brain and the rest of the body. It is made up of the midbrain, pons, and medulla.

- The **midbrain** carries out many functions. It is involved in sleep and wake cycles, and it processes sensory information like vision and hearing.
- The **pons** is directly connected to the cerebellum. It helps coordinate movements of the eyes and face.
- The **medulla** controls heart rate, breathing, and swallowing.

The outer surface of the brain is composed of **gray matter** (so named because it looks gray). The gray matter is made up of the cell bodies of the **neurons**, or nerve cells, and forms the **cerebral cortex**, the outermost layer of the brain. Most seizures come from the cortex.

Beneath the gray matter is the **white matter**, which is made up of myelinated, or insulated, fibers. White matter is a common area for inflammation and autoimmune processes that are associated with several neurological diseases, such as multiple sclerosis (MS).

The brain receives its blood supply from the **carotid arteries** (the two big arteries on the sides of the neck) and from the **vertebrobasilar** system (made up of the vertebral and basilar arteries on the back of the neck). These arteries can be affected in strokes, some autoimmune diseases, and injuries.

Resources and References:

https://www.ninds.nih.gov/health-information/patient-caregiver-education/brain-basics-know-your-brain
https://www.medlink.com/handouts/brain-anatomy

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