

# **BRAIN REGIONS OVERVIEW**

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The brain is divided into four regions. They are the:

1. **CEREBRUM:** Consists of four lobes (frontal, parietal, occipital and temporal) that are responsible for intelligence, information processing, language, personality, and conscience.
  - The vast surface area of the cerebrum is aided by many folds—gyri (ridges) and sulci (grooves)
2. **CEREBELLUM:** coordinates motor activities
3. **DIENCEPHALON**
  - **Thalamus:** major processing and relay information center for cerebrum (“air traffic control”)—brain connection for optic nerve
  - **Hypothalamus:** primary controller of homeostasis; exerts many of its effects by releasing hormones, so it is considered a gland
    - body temperature
    - food and water intake
    - sleep and circadian rhythms
    - controls the pituitary gland
    - part of our limbic system (emotional brain)
    - can regulate brainstem activities to alter heart rate, blood pressure and breathing
    - involved in memory
  - **Epithalamus:** contains the pineal gland, which releases melatonin (a hormone that increases in the circulation in the dark and helps make you sleepy at night).
4. **BRAINSTEM**
  - **Midbrain:** important in visual and auditory reflexes
  - **Pons:** involved in respiration, brain connection for several cranial nerves
  - **Medulla oblongata:** contains nuclei that control breathing, heart rate and blood pressure

**Neurons:** Functional cells within the nervous system. They have a cell body, called a soma, and many axons that may project over long distances to meet up with another neuron cell body. At a very simplistic level, the cell body is like a computer, and the axon is like the cord that passes information along.

**Myelination:** Fatty substance wrapped around axons like rubber insulating a wire. The fat speeds up the signal and helps ensure it makes it to its destination without “petering” out. The fat is white and so areas of the brain that are “highways” of axons appear as **white matter**.

**Gray matter:** Cell bodies (nuclei) or unmyelinated neurons in the brain or spinal cord – appear gray

- **Nucleus:** group of unmyelinated cell bodies in the brain or spinal cord
  - **Basal nuclei:** Groups of unmyelinated cell bodies deep inside the cerebral hemispheres, usually involved in fine motor control.
- **Ganglion** group of unmyelinated cell bodies anywhere outside of the spinal cord
- The outer centimeter or so of the cerebrum is gray matter and referred to as the **cerebral cortex**. It includes cells responsible for interpretation and processing. When we describe functions associated with the lobes of the cerebrum, we are referring to locations of gray matter.

**White matter:** myelinated axons – appear white

- **Tract:** group of myelinated axons in the brain
- **Nerve:** group of myelinated axons anywhere outside of the spinal cord