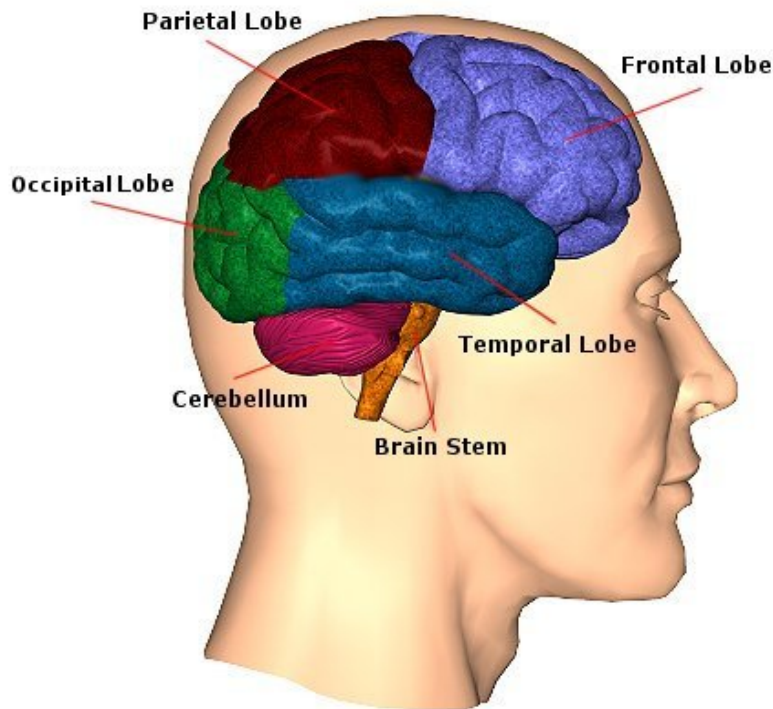


Brain Map



Brain Functions and Map

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In traumatic brain injury the brain may be injured in a specific location or the injury may be diffused to many different parts of the brain. It is this indefinite nature of brain injury that makes treatment unique for each individual patient. In the past twenty years, a great deal has been learned about brain function, and we learn more everyday. We can make guesses about the nature of the problems an individual may have from knowing the location of a lesion. Diagnostic procedures such as CT scans and MRI's can also provide information about a brain injury.

As rehabilitation specialists, however, we can also learn about an injury by observing the day to day activities of the patient. All the activities we perform each day, whether physical or mental, are directed by different parts of our brains. It is important that you become familiar with brain function to better understand how therapies, created by rehabilitation professionals, help brain injured patients. In order for you to better understand how the rehabilitation process works we will guide you through the different parts of the brain and indicate some of the functions and problems resulting from injury.

The brain has many parts including the cerebral cortex, brain stem, and cerebellum. By listing some of the functions of each part of the brain, we will provide an overview of what problems occur after injury to these parts. It is important to understand that the brain functions as a whole by interrelating its component parts. The injury may only disrupt a particular step of an activity that occurs in a specific part of the brain. The interruption of that activity at any particular step, or out of sequence, can reveal the problems associated with the injury. Below is a list of functions and deficits or problems revealed when injury occurs at particular locations.

CEREBRAL CORTEX

Frontal Lobe: Most anterior, right under the forehead.

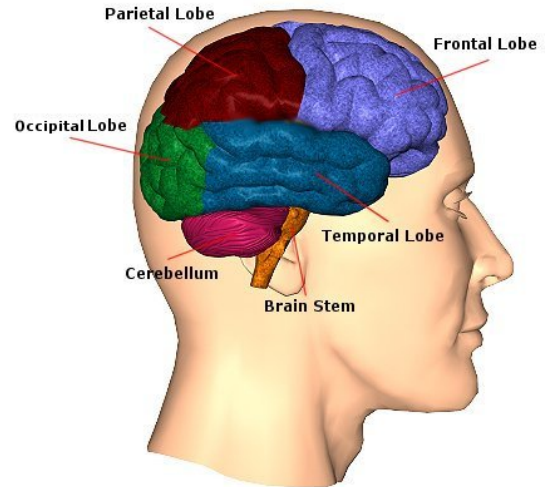
Functions:

How we know what we are doing within our environment (*Consciousness*).

- How we initiate activity in response to our environment.
- Judgments we make about what occurs in our daily activities.
- Controls our emotional response.
- Controls our expressive language.
- Assigns meaning to the words we choose.
- Involves word associations.
- Memory for habits and motor activities.

Observed Problems:

- Loss of simple movement of various body parts (Paralysis).
- Inability to plan a sequence of complex movements needed to complete multi-stepped tasks, such as making coffee (Sequencing).
- Loss of spontaneity in interacting with others.
- Loss of flexibility in thinking. Persistence of a single thought (Perseveration).
- Inability to focus on task (Attending).
- Mood changes (Emotionally Labile).
- Changes in social behavior.
- Changes in personality.
- Difficulty with problem solving.
- Inability to express language (Broca's Aphasia).



Parietal Lobe: Near the back and top of the head.

Functions:

- Location for visual attention.
- Location for touch perception.
- Goal directed voluntary movements.
- Manipulation of objects.
- Integration of different senses that allows for understanding a single concept.

Observed Problems:

- Inability to attend to more than one object at a time. Inability to name an object (Anomia).
- Inability to locate the words for writing (Agraphia).
- Problems with reading (Alexia).
- Difficulty with drawing objects.
- Difficulty in distinguishing left from right.
- Difficulty with doing mathematics (Dyscalculia).
- Lack of awareness of certain body parts and/or surrounding space (Apraxia) that leads to difficulties in self-care.
- Inability to focus visual attention.
- Difficulties with eye and hand coordination.

Occipital Lobes: Most posterior, at the back of the head.

Functions:

- Vision

Observed Problems:

- Defects in vision (Visual Field Cuts).
- Difficulty with locating objects in environment.
- Difficulty with identifying colors (Color Agnosia).
- Production of hallucinations Visual illusions - inaccurately seeing objects.
- Word blindness - inability to recognize words.
- Difficulty in recognizing drawn objects. Inability to recognize the movement of an object (Movement Agnosia).
- Difficulties with reading and writing.

Temporal Lobes: Side of head above ears.

Functions:

- Hearing ability
- Memory acquisition
- Some visual perceptions
- Categorization of objects.

Observed Problems:

- Difficulty in recognizing faces (Prosopagnosia).
- Difficulty in understanding spoken words (Wernicke's Aphasia).
- Disturbance with selective attention to what we see and hear.
- Difficulty with identification of, and verbalization about objects.
- Short-term memory loss.
- Interference with long-term memory Increased or decreased interest in sexual behavior.
- Inability to categorize objects (Categorization).
- Right lobe damage can cause persistent talking.
- Increased aggressive behavior.

BRAIN STEM

Deep in Brain, leads to the spinal cord.

Functions:

- Breathing
- Heart Rate
- Swallowing
- Reflexes to seeing and hearing (Startle Response).
- Controls sweating, blood pressure, digestion, temperature (Autonomic Nervous System). Affects level of alertness.
- Ability to sleep.
- Sense of balance (Vestibular Function).

Observed Problems:

- Decreased vital capacity in breathing, important for speech.
- Swallowing food and water (Dysphagia).
- Difficulty with organization/perception of the environment.
- Problems with balance and movement.
- Dizziness and nausea (Vertigo).
- Sleeping difficulties (Insomnia, sleep apnea).

CEREBELLUM

Located at the base of the skull.

Functions:

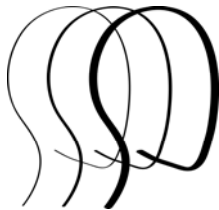
- Coordination of voluntary movement
- Balance and equilibrium
- Some memory for reflex motor acts.

Observed Problems:

- Loss of ability to coordinate fine movements.
- Loss of ability to walk.
- Inability to reach out and grab objects.
- Tremors.
- Dizziness (Vertigo).
- Slurred Speech (Scanning Speech).
- Inability to make rapid movements.

Obtaining a general understanding of the brain and its functions is important to understanding the rehabilitation process. It is very important, however, to understand that the rehabilitation professional is concerned with the whole person. The identification of individual problems gives the rehabilitation team areas in which to focus treatment plans. All of these plans are designed to work toward the rehabilitation of the whole person. Each problem area affects other areas and many times resolving one problem has a major impact on other problems. For example, reestablishing postural balance and eliminating dizziness greatly enhances concentration and attention which allows for improved cognition and problem solving.

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