The Brain

The more you know about the brain, the easier it is to understand your brain injury.

The brain is a complex organ that acts as the control centre for all of the body's actions and functions. Billions of nerve cells in the brain respond to messages that allow the person to perform bodily processes such as emotions, judgment, movement, and thought processes.

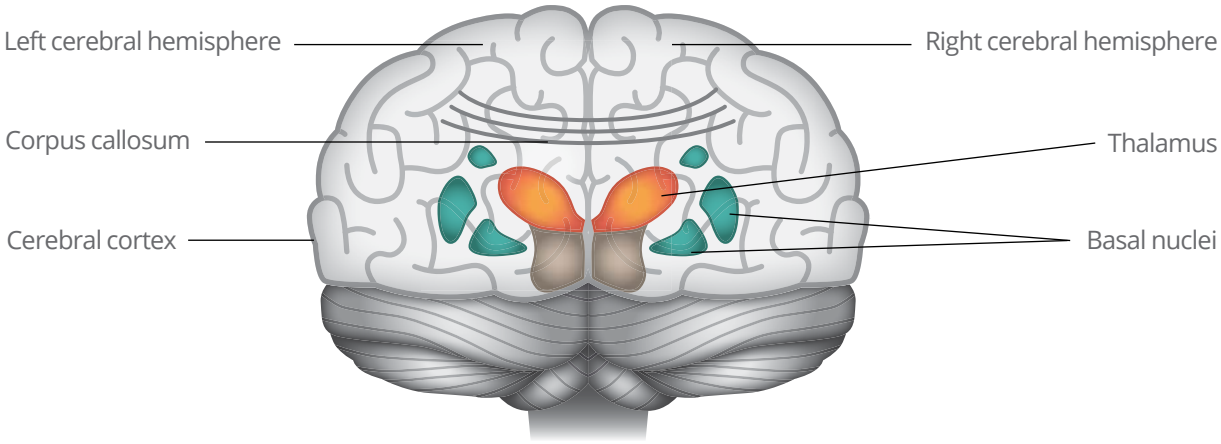
The brain has six parts: the frontal lobe, parietal lobe, temporal lobe, occipital lobe, cerebellum and the brain stem. Each part has different functions and links to other parts of the brain to perform specific tasks. However, when a brain injury occurs and one or more of these areas is affected, normal functioning may be altered depending on the location and the severity of the injury.

ANATOMY OF THE BRAIN

The brain weighs about 1-1.5 kilograms (2-3 pounds) and is located inside the skull. Just inside the skull, the brain is surrounded by a clear fluid called **cerebrospinal fluid (CSF).** This fluid allows the brain to float within the skull, which provides it with protection by acting as a cushion.

The cerebellum is the largest part of the brain. Its function is to coordinate movement. Damage to this area can result in **difficulties with balance.** Movements may be slow and uncoordinated. It may seem as though the person is "missing their target" due to difficulties with judging distance and coordinating hand-eye movements. The cerebellum is divided into a left and right hemisphere.

Figure 2. Cerebral Hemispheres

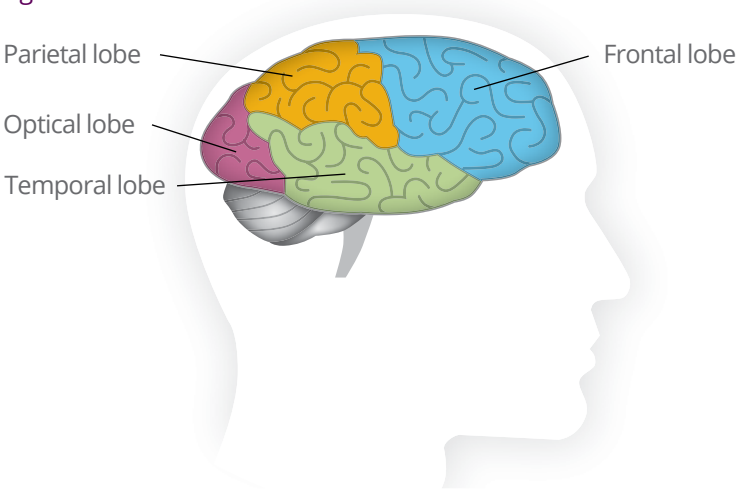


Lobes of the Brain

The brain is divided into four lobes:

- frontal
- occipital
- temporal
- parietal

Figure 3. Lobes of the brain



Frontal lobe

The frontal lobe is the largest of the four lobes. This lobe is responsible for executive functions, which refer to higher level, more complex thinking. Injury is common in the frontal lobe area because it is located in front of the brain and sits inside the skull near its bony ridges.

The frontal lobe is also responsible for the following:

- problem-solving
- planning and anticipation
- organizing and sequencing
- understanding abstract concepts
- attention and concentration
- memory
- judgment
- impulse control
- social and sexual behaviours
- self-awareness and insight

Parietal lobe

The parietal lobe, being near the back, is more protected from traumatic injury, but it can also be injured. Functions of this lobe include:

- sense of touch
- identification of sizes, shapes, colours
- spatial awareness
- visual attention
- integration of senses

Damage to this area of the brain can result in **difficulties with perception, such as recognizing objects and a sense of one's body in relation to space.** It can also result in difficulties with mathematics, writing, and telling the difference between right and left. This area of the brain plays a role in putting together the information received from different senses. Therefore, damage to this area can significantly affect the way the individual understands and interacts with his or her environment.

Temporal lobe

The temporal lobe is involved in memory and in the primary organization of sensory input. Other functions of this lobe include:

- organization and categorization
- learning
- concept of time
- understanding verbal language
- emotion
- hearing
- visual perception

Damage to this area of the brain can result in **memory problems and difficulties learning new information.** This happens when damage results in difficulty committing new information to memory. The person may also experience difficulties understanding spoken or written language. This is known as **receptive aphasia.**

Occipital lobe

The occipital lobe is involved in processing and interpreting visual information. Damage to this area can result in **difficulties with vision**. Damage to the left occipital lobe may cause problems with seeing things on the right side. For example, the person may only eat food on the left side of the plate due to not seeing the food on the right. Damage to the right occipital lobe may cause problems in seeing things on the left side.

BRAIN STEM

This part of the brain is basic to the body's core functions because it is the link between the brain and the spinal cord. The spinal cord communicates information between the brain and the body. The deeper structures of the brain also include the cerebellum, thalamus and hypothalamus.

This part of the brain controls:

- breathing
- blood pressure
- consciousness
- sleep cycle
- swallowing
- temperature regulation
- heart rate

Damage to this area can **interrupt communication between the brain and the body**. In addition, the body may have a hard time regulating vital functions such as heart rate, breathing rate, and body temperature. Other effects may include difficulties paying attention or staying awake.

There could be other effects of damage to this area that aren't listed here. The nature and the extent of the effects will depend on how many areas of the brain have been injured.

Figure 4: the brain stem