

Chapter 1

Parts of the Brain

Living creatures are made up of cells. Groups of cells, similar in appearance and with the same function, form tissue. The brain is a soft mass of supportive tissues and nerve cells connected to the spinal cord. Nerves in the brain and spinal cord transmit messages throughout the body. The brain and spinal cord together form the central nervous system (CNS).

The central nervous system is the core of our existence. It controls our personality — thoughts, memory, intelligence, speech and understanding, emotions; senses — vision, hearing, taste, smell, touch; basic body functions — breathing, heart beat, blood pressure; and how we function in our environment — movement, balance, and coordination.

Learning about the normal workings of brain and spine will help you understand the symptoms of brain tumors, how they are diagnosed, and how they are treated.

Terminology

Detailed, enlarged diagrams of the brain can be found on page 7.

BASAL GANGLIA

The basal ganglia are masses of nerve cells deep within the cerebral hemispheres.

BRAIN STEM

The brain stem is the bottom-most portion of the brain, connecting the cerebrum with the spinal cord. The midbrain, pons, medulla oblongata and reticular formation are all part of the brain stem.

CEREBELLOPONTINE ANGLE

The angle between the pons and the cerebellum.

CEREBELLUM

The cerebellum is the second largest area of the brain. It consists of two hemispheres, or halves, as well as a middle portion. The cerebellum is connected to the brain stem.

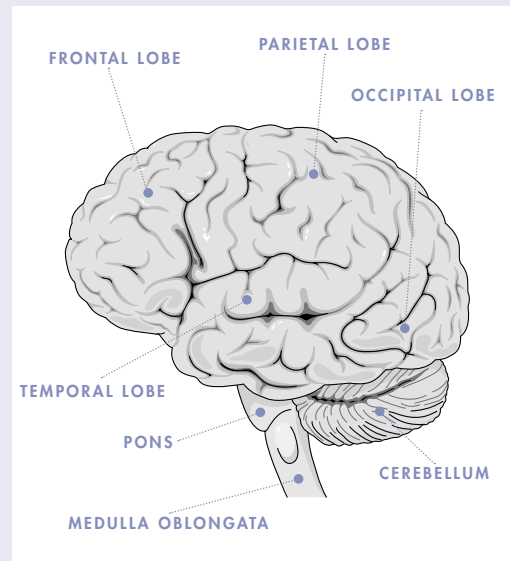
CEREBROSPINAL FLUID (CSF)

CSF is the clear, watery fluid made in the ventricles that bathes and cushions the brain and spinal cord. It circulates through the ventricles and the subarachnoid space.

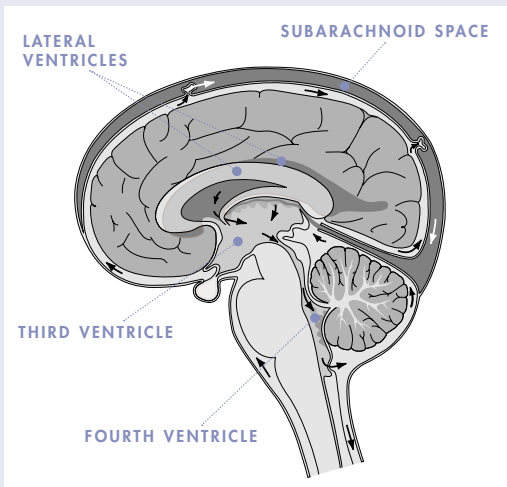
Each hemisphere is comprised of four sections called lobes: frontal, parietal, temporal, and occipital. Each lobe controls a specific group of activities. The outer layer of the cerebrum is made up of gray matter, which is nerve cells. Nerve cells control brain activity.

The inner portion of the cerebrum is mostly white matter with nerve fibers called axons. These are insulated by a fatty substance known as myelin. White matter carries information between nerve cells by conducting electrical impulses.

MAJOR PARTS OF THE BRAIN



CSF AND VENTRICLES



CHOROID PLEXUS

The choroid plexus produces spinal fluid that flows through the ventricles and meninges surrounding the brain and spinal cord.

CORPUS CALLOSUM

The corpus callosum is made of nerve fibers, deep in the brain, that connect the two halves of the cerebral hemispheres.

CRANIAL NERVES

There are 12 pairs of cranial nerves. Their functions are described in the illustration on the following page.

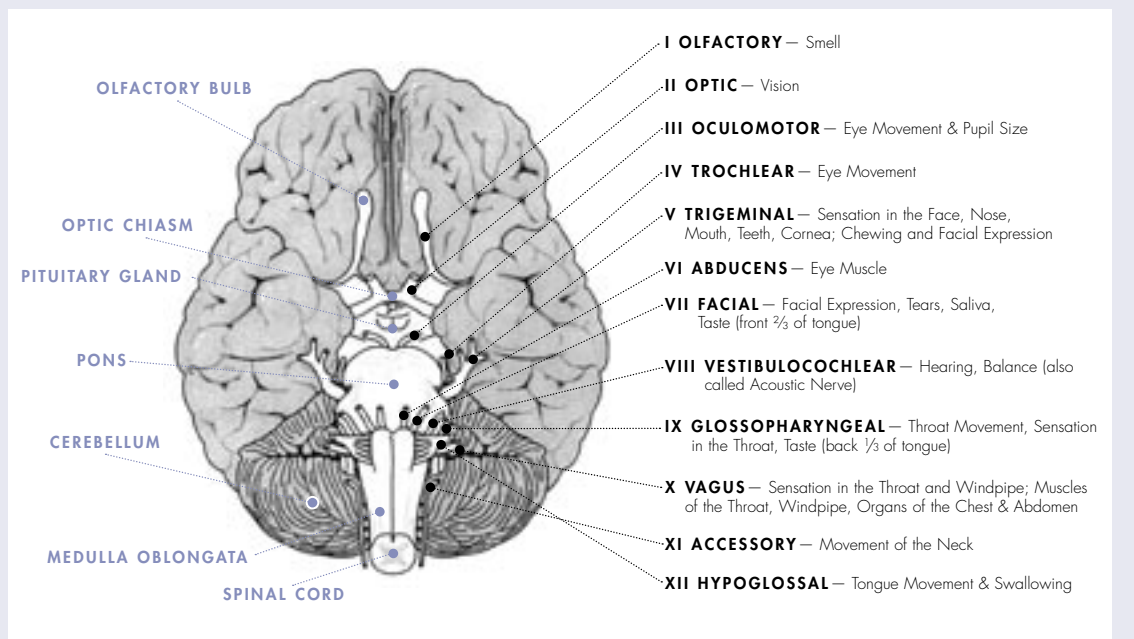
CEREBRUM/CEREBRAL HEMISPHERES

The largest area of the brain is the cerebrum which consists of the right and left hemispheres. In general, the right cerebral hemisphere controls the left side of the body and the left cerebral hemisphere controls the right side of the body.

GLIAL TISSUE (NEUROGLIA)

Glia is the supportive tissue of the brain. The cells which make up this tissue are called glial cells. The most common glial cells are astrocytes and oligodendrocytes. Ependymal cells are another form of glia. Unlike nerves,

CRANIAL NERVES *view from bottom of brain*



glia can reproduce itself. Glial cells are the origin of the largest percentage of brain tumors, i.e., astrocytomas (including glioblastoma), oligodendrogliomas, and ependymomas. Astrocytes are involved with the blood brain barrier and brain metabolism. Oligodendrocytes maintain the myelin covering of nerve cells. Myelin helps transmit information between nerve cells.

HYPOTHALAMUS

The hypothalamus makes up part of the wall of the third ventricle and is the base of the optic chiasm.

MEDULLA OBLONGATA

The medulla oblongata, a part of the brain stem, connects the brain with the spinal cord. It contains the origins of the 9th, 10th, 11th, and 12th cranial nerves.

MENINGES

The meninges are three membranes that completely cover the brain and the spinal cord. Spinal fluid flows in the space between two of the membranes. A tumor called meningioma arises from the meninges.

MIDBRAIN

The midbrain is the short portion of the brain stem between the pons and the cerebral hemispheres. The top of the midbrain is called the tectum (or tectal area). The 3rd and 4th cranial nerves originate in the midbrain.

OPTIC CHIASM

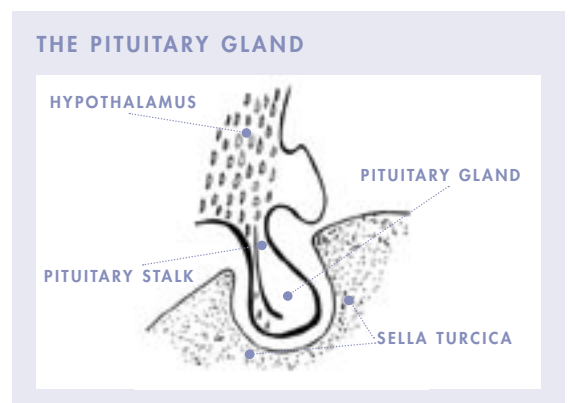
The optic chiasm is the area under the hypothalamus where each of the two optic nerves crosses over to the opposite side, forming an X shape.

PINEAL GLAND

The pineal gland lies below the corpus callosum. It produces the hormone melatonin. This hormone is believed to control the biological rhythm of the body.

PITUITARY GLAND

The pituitary gland is attached to, and receives messages from, the hypothalamus. The pituitary gland is composed of two lobes — the anterior and the posterior. Several hormones are produced by the pituitary including prolactin, corticotropin, and growth hormone.



PONS

The pons, a part of the brain stem, contains the origins of the 5th, 6th, 7th, and 8th cranial nerves.

POSTERIOR FOSSA (INFRATENTORIUM)

The tentorium separates the posterior fossa from the cerebral hemispheres. The area *below* the tentorium is called the infratentorium, or the posterior fossa. This area within the skull contains the cerebellum and the brain stem.

The area *above* the tentorium is called the supratentorium.

RETICULAR FORMATION

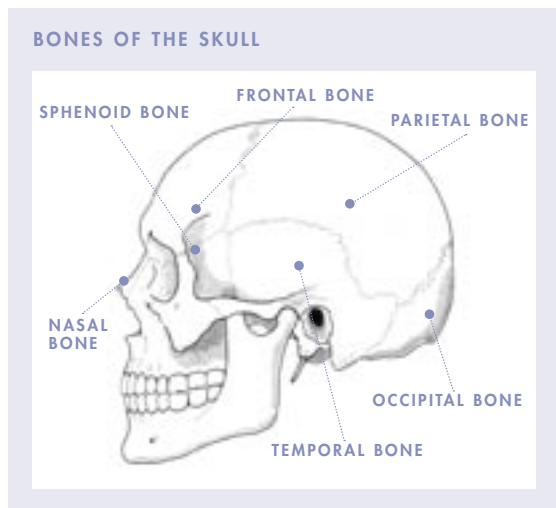
The reticular formation is the central core of the brain stem. It connects with all parts of the brain and brain stem.

SELLAR REGION (SUPRASELLAR, PARASELLAR)

The sellar region is the area around the sella turcica. The sella turcica is a hollow in the skull bone that contains the pituitary gland.

SKULL BASE

Skull base refers to the bony areas that support the bottom of the frontal lobes, the bottom of the temporal lobes, and the brain stem and cerebellum.



SPINAL CORD

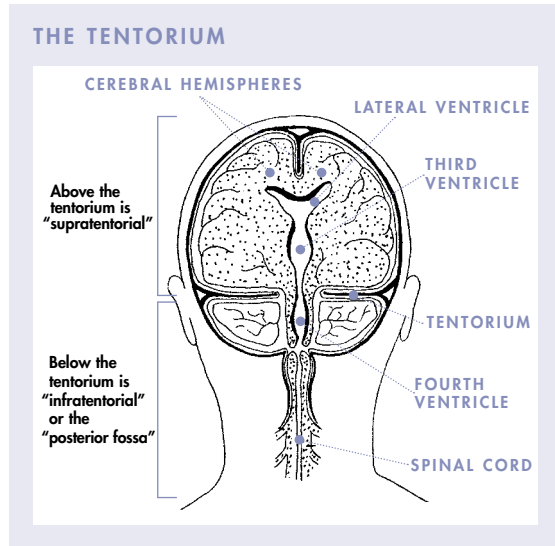
The spinal cord is made up of neurons and their extensions, i.e., nerve fibers. It begins in the medulla oblongata of the brain and continues through the hollow center of the vertebrae (the bones of the spine). The spinal cord is covered by the meninges. Cerebrospinal fluid flows through the meninges.

SUPRATENTORIUM

The supratentorium is the area above the tentorium containing the cerebral hemispheres.

TENTORIUM

The tentorium is a flap of meninges separating the cerebral hemispheres from the structures in the posterior fossa.



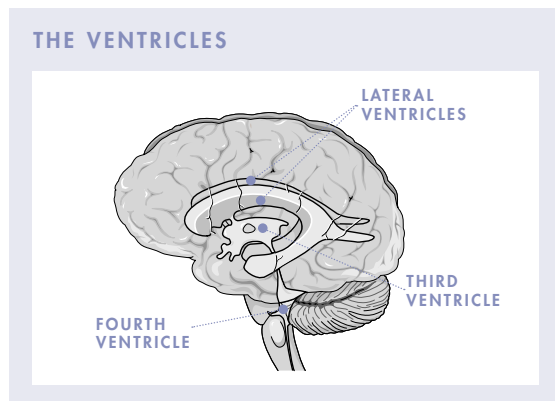
THALAMUS

The thalamus surrounds the third ventricle.

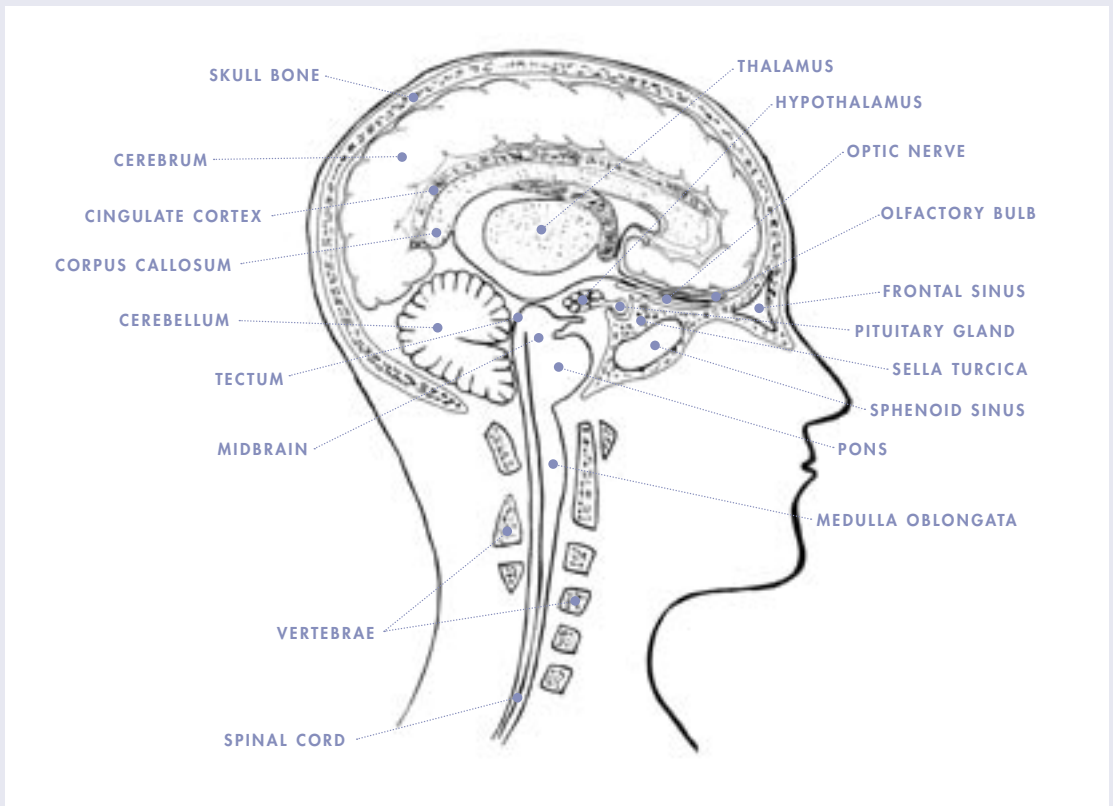
VENTRICLES

These are connected cavities (the lateral, third, and fourth ventricles) that contain cerebrospinal fluid. The fluid is produced by the choroid plexus, and flows through the ventricles and the subarachnoid space of the meninges.

There are two lateral ventricles, one in each cerebral hemisphere. The third ventricle is beneath the corpus callosum and surrounded by the thalamus. The fourth ventricle is an expansion of the central canal of the medulla oblongata.



CROSS SECTION OF THE BRAIN



SIDE VIEW OF THE BRAIN

