

GLOSSARY OF TERMS

RELATING TO THE BRAIN

A

acetylcholine - a neurotransmitter that carries nerve impulses across a synapse from one neuron to another or from a neuron to a muscle.

afferent - carrying something (like a nerve impulse) toward the central part.

amygdala - a part of the brain (and part of the limbic system) that is used in emotion.

anterior - towards the front.

anterior commissure - a small fiber that connects the right and left cerebral hemispheres of the brain.

arachnoid - one of the three membranes that protects the brain and spinal cord. The space between the arachnoid and the pia (another membrane) is filled with cerebrospinal fluid, protecting the brain from physical blows and providing the brain with nutrients.

association cortex - any part of the cortex in which information is analyzed, processed, or stored.

astroglia or **astrocyte** - a type of glial cell that supports neurons.

autonomic nervous system - controls our life support systems that we don't consciously control, like breathing, digesting food, blood circulation, etc.

axon - the long extension of a neuron that carries nerve impulses away from the body of the cell.

axodendritic synapse - a synapse formed by contact between a presynaptic axon and a postsynaptic dendrite.

B

basal ganglia - groups of hundreds of thousands of neurons at the base of the cerebrum and in the upper brainstem; they help control well-learned movements (like walking) and sensation.

blood-brain barrier - the blood-brain barrier protects the brain from chemical intrusion from the rest of the body. Blood flowing into the brain is filtered so that many harmful chemicals cannot enter the brain.

brain - the organ in the body that is responsible for thought, memory, sensory interpretation, movement, and other vital functions.

brainstem or **brain stem** - the base of the brain. This part of the brain connects the brain's cerebrum to the spinal cord. The brain stem controls many automatic and motor functions. The brain stem is composed of the medulla oblongata, the pons, the midbrain, and the reticular formation.

C

cauda equina - (meaning "horse's tail" in Latin) the bundle of nerve roots below the end of the spinal cord.

caudal - toward the tail.

cell body (soma) - the cell body of the neuron; it contains the nucleus.

central nervous system (CNS) - the brain and spinal cord

central sulcus - a large groove in the brain that separates the frontal and parietal lobes

cerebellum - the part of the brain below the back of the cerebrum. It regulates balance, posture, movement, and muscle coordination.

cerebral aqueduct - the part of the ventricular system that connects the third and fourth ventricles

cerebral cortex - the outer layer of the cerebrum, composed of six cell layers of deeply folded and ridged gray matter.

cerebral hemisphere - one side of the cerebrum, the left or right side of the cerebrum.

cerebrospinal fluid (CSF) - a clear, watery liquid that surrounds and protects the brain and spinal cord, and is also found throughout the ventricle (brain cavities and tunnels). CSF cushions the brain and spinal cord from jolts. This fluid circulates through the brain and the spinal canal.

cerebrum - the largest and most complex portion of the brain. It controls thought, learning, and many other complex activities. It is divided into the left and right cerebral hemispheres

that are joined by the corpus callosum, which communicates between the two hemispheres. The right side of the brain controls the left side of the body, and vice versa. Each cerebral hemisphere is divided into four lobes: the frontal lobe (responsible for reasoning, emotions, judgment, and voluntary movement); the temporal lobe (contains centers of hearing, smells, and memory); the parietal lobe (responsible for touch and spoken language ability), and the occipital lobe (responsible for centers of vision and reading ability).

choroid plexus - vascular structures within the ventricular system that produce cerebrospinal fluid.

corpus callosum- a large bundle of nerve fibers that connect the two cerebral hemispheres.

cortex - the outer layer of the cerebrum, composed of six cell layers of deeply folded and ridged gray matter.

cranial nerves - 12 pairs of nerves that carry information to and from sense organs, muscles and internal organs. The cranial nerves include: olfactory nerve (smell), optic nerve (sight), oculomotor nerve (eye movement, dilation of pupil), trochlear nerve (eye movement), trigeminal nerve (sensation from the head and chewing muscles), abducens nerve,

cranium - the top of the skull; it protects the brain. The cranium and the facial bones make up the skull.

CSF (cerebrospinal fluid) - a clear, watery liquid that surrounds the brain and spinal cord, and is also found throughout the ventricle (brain cavities and tunnels). CSF cushions the brain and spinal cord from jolts.

D

dendrites - the branching structure of a neuron that receives messages.

dorsal - on the back or upper surface.

dorsal root - a bundle of nerve fibers that bring information to the spinal cord.

dura matter - a tough, translucent membrane that protects the brain and spinal cord.

E

efferent - carrying something (like a nerve impulse) away from the central part.

electroencephalogram (EEG) - a graphical record of the electrical activity of the brain. Electrodes are placed on the scalp to obtain this information.

"Eloquent" brain - The parts of the brain that control the senses, speech, and motor functions.

endocrine gland - ductless glands that secrete endocrine hormones; examples include the pituitary and thyroid.

F

fornix - a pathway that connects the hippocampus and the mamillary bodies.

frontal lobe - the top, front regions of each of the cerebral hemispheres. They are used for reasoning, emotions, judgment, and voluntary movement.

G

ganglion - a group of neuron bodies (not in the brain or spinal cord)

glial cells - nerve cells that form a supporting network for the neurons in the brain. The word "glia" comes from the Greek word for glue.

gray matter - central nervous tissue that is relatively dark in color (in contrast to white matter) because of the relatively high proportion of nerve cell nuclei present

gyrus - (plural is gyri) - these are high areas on the brain that are separated by fissures.

H

hormones - biochemical substances that are produced by specific cells, tissues, or glands in the body. Hormones regulate the growth and functions of cells and tissues in the body. A examples of a hormone is insulin, which is secreted by the pancreas. Hormones were first discovered by the British scientists William Bayliss and Ernest Starling in 1902.

hypothalamus - a region in the upper part of the brainstem that acts as a relay to the pituitary gland - it controls body temperature, circadian cycles, sleep, moods, hormonal body processes, hunger, and thirst. The hypothalamus is part of the limbic system and works with the pituitary gland.

I

inferior colliculus - a structure in the midbrain that is used in hearing

L

lateral - to the side

left hemisphere - the left half of the cerebrum - it is the center for speech and language. In some left-handed people, however, the right hemisphere controls speech.

limbic system - the interconnected areas of the brain that are used in emotions and some other behaviors.

M

medulla oblongata - the lowest section of the brainstem (at the top end of the spinal cord); it controls automatic functions including heartbeat, breathing, swallowing, etc.

meninges - a series of three protective membranes (the dura matter, the arachnoid, and the pia) that cover the brain and the spinal cord.

microglia - a type of glial cell in the CNS

midbrain (mesencephalon) - a middle area of the brainstem that contains many important nerves (including the origins of the third and fourth cranial nerves which control eye movement and eyelid opening).

motor cortex - the part of both frontal lobes of the brain that controls voluntary muscle movements.

motoneurons (multipolar neurons) - neurons responsible for movement - the cell bodies of these neurons are located within the brain or spinal cord and the axons are located in muscle fibers

myelin - a fatty substance that covers axons.

myelin sheath - a fatty substance that surrounds and protects some nerve fibers.

N

neuroglia - connective or supporting tissues of the nervous system.

neuron - a nerve cell. Neurons have specialized projections (dendrites and axons) and communicate with each other via an electrochemical process. The word "neuron" was coined by the German scientist Heinrich Wilhelm Gottfried von Waldeyer-Hartz in 1891 (he also coined the term "chromosome").

neuroscience - the study of the brain and the nervous system.

neurotransmitters - chemicals that transmit nerve impulses between neurons. Some neurotransmitters include acetylcholine, dopamine, endorphin, epinephrine, serotonin, and histamine.

node of Ranvier - one of the many gaps in the myelin sheath - this is where the action potential occurs during saltatory conduction along the axon

nucleus - the organelle in the cell body of the neuron (and all cells) that contains the genetic material of the cell (DNA in chromosomes). It is where DNA (deoxyribonucleic acid) replicates itself, and where RNA (ribonucleic acid) is made.

O

occipital lobe - the region at the back of each cerebral hemisphere that contains the centers of vision and reading ability.

optic chiasm - controls vision and the optic nerve. It is the area in the front of the brain where the optic nerves cross one another.

P

paleoneurology - the study of fossils brains (from brain casts, called endocasts).

parietal lobe - the middle lobe of each cerebral hemisphere between the frontal and occipital lobes; it contains important sensory centers.

peripheral nervous system - the part of the nervous system that includes the cranial nerves and the spinal nerves.

pia - the innermost layer of the meninges. It is adjacent to the surface of the brain and the arachnoid.

pineal body - a pinecone-shaped gland-like structure located in the brain. It produces melanin and influences the onset of puberty.

pituitary gland - a gland attached to the base of the brain that secretes hormones.

plexus - a network of nerves or veins

pons - the part of the brainstem that joins the hemispheres of the cerebellum and connects the cerebrum with the cerebellum. It is where the four pairs of cranial nerves originate: the

fifth (facial sensation); the sixth (eye movement); the seventh (taste, facial expression, eyelid closure); and the eighth (hearing and balance)

posterior - towards the back

posterior fossa - the part of the skull that contains the brain stem and the cerebellum.

proprioception - the response to internal stimuli.

pseudounipolar cells - a type of neuron that has two axons (instead of one axon and one dendrite). One axon is oriented towards the spinal cord, the other axon is oriented toward either skin or muscle.

R

reticular formation - a network of nerve cells in the brainstem that are involved in maintaining sleep or wakefulness.

right hemisphere - the right half of the cerebrum - it processes visual information.

S

Schwann's cells - cells that produce myelin

sensory cortex - any part of the brain that receives messages from a sense organ (like the eyes, nose, tongue, or ears) or messages of touch and temperature from anywhere in the body.

sensory neuron (bipolar neuron) - an afferent nerve cell that carries sensory information (like sound, touch, taste, smell, or sight) to the central nervous system.

skull - the bones that comprise the head.

soma (cell body) - the cell body of the neuron; it contains the nucleus.

somatosensory cortex - an area of the sensory cortex in the parietal lobes that receives messages of touch, temperature, and certain other bodily sensations.

spinal cord - a thick bundle of nerve fibers that runs from the base of the brain to the hip area, running through the spine (vertebrae).

stereognosis - the appreciation of form through touch

sulcus (plural sulci) - a long groove on the surface of the brain

suprachiasmatic nucleus - the area of the hypothalamus that controls circadian rhythms (day and night cycles and the biological clock) and reproduction cycles.

synapse - a structure where an impulse passes from one neuron to another across a gap. The word "synapse" was coined by Sir Charles Scott Sherrington in 1897.

T

tactile sensation - the sense of touch

tectum - the dorsal (top) portion of the midbrain (mesencephalon)

tegmentum - ventral (bottom) part of the midbrain (mesencephalon)

temporal lobe - the region at the lower side of each cerebral hemisphere; contains centers of hearing and memory.

thalamus - a small structure at the top of the brainstem that serves as a relay center for sensory information, pain, attention, and alertness.

V

ventral - lower or underneath

ventricle - four small hollow spaces in the brain that are filled with cerebrospinal fluid - they contain the choroid plexus, which produce cerebrospinal fluid (CSF).

vertebra (plural vertebrae) - one of many small bones that make up the spine. The spinal cord runs through the vertebrae.

viscera - organs in the body

W

white matter - heavily myelinated central nervous tissue that is light in color (in contrast to gray matter) - it consists mostly of axons covered with the insulating lipid-protein sheath myelin.