



Teacher Guide

WebQuest: The Structure of the Nervous System

Lesson Summary: Exercise your students' web search skills while they learn about the structure and function of the nervous system. Students will visit three websites and view several animations of the synapse.

Grade Level 9-12

**Lesson Length
1-2 class periods**

Objectives—Students will

- identify major parts of the brain: the cerebrum and its 4 lobes, as well as parts of the limbic system and brain stem.
- identify the parts of a neuron and describe each part's function.
- describe a synapse and how information is transmitted across the synapse.
- appreciate what happens in the brain when we learn.

Assessment Options

- Draw and label different parts of the cerebrum, cerebellum, limbic system, and brain stem.
- Answer the questions in the WebQuest student guide.
- Informally assess group cooperation and ability to work together.

Materials

- computer with internet access
- student guide
- projector (optional)

Terms

amygdala - part of the brain involved in processing the memory of emotional reactions, notably fear and anger ([Sheep Brain Dissection](#))

axon - the neuronal process that sends the signal or message away from the cell body toward target cells or neurons ([Connect the Neurons](#), [Close-up of the Nervous System](#), [Bead Neuron](#))

axon terminal - the very end part of an axon that makes a synaptic contact with another cell; the point where neurotransmitters are released ([Connect the Neurons](#), [Close-up of the Nervous System](#))

brainstem - the part of the central nervous system connecting the brain to the spinal cord. The brainstem contains pathways sending information to and receiving information from the spinal cord and peripheral nerves. It also contains neurons that control respiration and regulation of heart rhythms. ([Sheep Brain Dissection](#))

cell body - the bulbous part of the neuron, also called the soma, that contains the nucleus. Dendrites and axons are processes off of the cell body.

cerebellum - the highly folded part of the central nervous system above or dorsal to the brainstem that helps control movement, balance, and muscle coordination ([Sheep Brain Dissection](#), [Close-up of the Nervous System](#))

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- cerebral cortex - the largest and most complex part of the mammalian central nervous system; appears as tightly packed fat ridges (gyri) and narrow folds (sulci); responsible for all forms of conscious experience, including perception, emotion, thought, and planning. Cortex means bark in Greek; the bark of the cork tree looks a lot like the cerebral cortex. ([Sheep Brain Dissection](#), [Close-up of the Nervous System](#), [Memory Items](#))
- cerebrum - see cerebral cortex ([Sheep Brain Dissection](#), [Close-up of the Nervous System](#))
- dendrite - tree-like extension of the neuronal cell body; receives chemical neurotransmitter signals or messages from other neurons ([Bead Neuron](#))
- frontal lobe - front region of the cerebrum; concerned with intellectual functioning, including cognitive processes, behavior, planning, inhibition of instincts and drives, and declarative memory; motor cortex ([Sheep Brain Dissection](#), [Motor Learning](#))
- hippocampus - the oldest part of cerebral cortex responsible for spatial localization, formation of declarative memory, and transfer of short-term to long-term memories ([Sheep Brain Dissection](#), [Memory Items](#))
- neuron - a cell that is specialized for the transmission of information and characterized by long fibrous projections called axons, and shorter, branch-like projections called dendrites; the basic functional unit of the nervous system; also called a nerve cell ([Virtual Neurons](#), [Connect the Neurons](#), [Close-up of the Nervous System](#), [Bead Neuron](#))
- neuron, post-synaptic - the neuron whose dendrites receive the neurotransmitter ([Connect the Neurons](#))
- neuron, pre-synaptic - the neuron that releases the neurotransmitter ([Connect the Neurons](#))
- neurotransmitter - at a synapse, a chemical released by nerve terminals that binds to receptors on dendrites of neighboring neurons; neurotransmitters relay information across the space between one neuron's nerve terminal and another neuron's dendrites. ([Connect the Neurons](#))
- occipital lobe - the most caudal region of the cerebrum; receives sensory information from the eyes; visual cortex ([Sheep Brain Dissection](#), [Motor Learning](#))
- parietal lobe - region of the cerebrum located in the dorsal and medial region of the posterior cerebrum; processes higher sensory and language functions; association cortex ([Sheep Brain Dissection](#), [Motor Learning](#))
- post-synaptic neuron - see neuron, post-synaptic ([Connect the Neurons](#))
- pre-synaptic neuron - see neuron, pre-synaptic ([Connect the Neurons](#))
- receptor - a special molecule on a dendrite that tastes each specific neurotransmitter; neurotransmitter and receptor must fit together like a lock and key ([Connect the Neurons](#))
- synapse - the gap between two neurons forming the site of information transfer, via neurotransmitters, from one neuron to another, including the presynaptic nerve terminal and the post-synaptic dendritic site; at synapses, neurotransmitters released from pre-synaptic axon terminals bind to receptors on post-synaptic dendrites ([Connect the Neurons](#))
- temporal lobe - ventral region of the lateral cerebrum located near the temples and ears; concerned with smell, taste, hearing, visual associations, some aspects of memory, and a person's sense of self ([Sheep Brain Dissection](#))
- threshold - the minimum amount of depolarization (becoming more positive) of cell membrane potential needed to cause an action potential to fire in a neuron ([Virtual Neurons](#), [Close up of the Nervous System](#), [Connect the Neurons](#))

Engage and Explore

1. Inform students that they will be using the internet to visit 3 websites shown below. Information and animations may be embedded in the webpages within these websites and they may have to click through a number of pages to find the specific information they seek.

serendipstudio.org/bb/kinser/Structure1.html

https://mind.ilstu.edu/curriculum/neurons_intro/index.html

BrainU YouTube Channel: [The Synapse](#) and [Synapses Change!](#)

2. Give each student a copy of the WebQuest student guide, giving them time to read through it and ask any questions.
3. Allow time for students to visit each website and answer the questions in the student guide.

Develop Questions

1. Encourage students to discuss their findings with each other.
2. Let them share questions they have about their discoveries.

Explore and Explain

1. Project the websites on the wall as a visual aid to discussion.
2. Encourage students to ask their questions in the large group.

Expand

1. Ask students to draw two neurons in synapse and to label the parts without looking at their notes or the web.
2. If a microscope and slides of neurons are available, give students time to look at neurons under magnification.