

Biology Bits

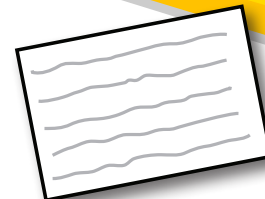
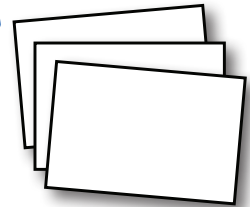
Bite-size Science

Trying new things can be hard. When you play a new sport, you have to learn and remember a whole new set of rules. When you try new food, you may end up not liking it (and you may even wish you could spit it out). The same goes for school. Learning information can be really hard and sometimes scary.

With food, what's the best way to start with something new? Trying a very small piece. You can take a tiny bite...taste it, feel the texture of it, and decide if you want more. Just like with new food, new information can also be easier to learn if you start off with really tiny bites.

Biology Bits stories are a great way for you to learn about biology a little bit at a time. We've broken down information into pieces that are very tiny—bite-sized, we call them. You can try just reading the Biology Bits at first. Cutting out the cards will let you organize them however you want, or use them as flashcards while you read.

Then, when you're ready to move on, use the empty cards to write out what you learned. You can copy what was already written, or try to write it in your own words if you are up for a challenge. Just remember, don't bite off too much at once!



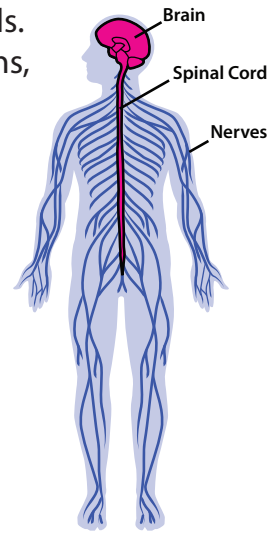
Written by Patrick McGurrin

For more information on nerve cells, visit:
<http://askbiologist.asu.edu/explore/nervous-journey>

This set of bits will teach you about the system that senses the world around you and controls your body:
your nervous system.

Hungry for more bits? Visit:
<http://askbiologist.asu.edu/activities/biology-bits>

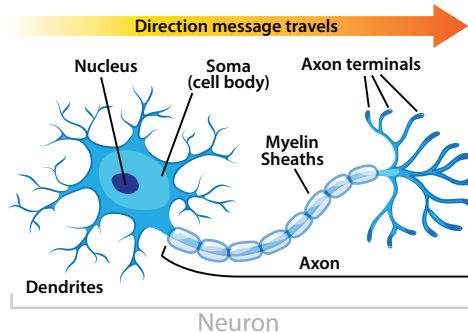
The human body is made of trillions of cells. All of these cells have a special job. Neurons, or nerve cells, are the cells that allow the brain to communicate with the rest of the body. Neurons are in every part of your body, from the tip of your nose to the tips of your toes. Together, all the neurons in the body make up the nervous system. They allow the body to see, hear, taste, feel, move, and a lot more.



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Like other cells, neurons have parts that help them do certain jobs. Dendrites are at one end of the cell. They look like the branches of a tree. Dendrites receive messages from other neurons. The message then moves through the axon to the other end of the neuron. An axon looks like a long, thin tube that also branches at the end. The message moves to the tips of the axon and then into the space between neurons. From there the message can move to the next neuron.



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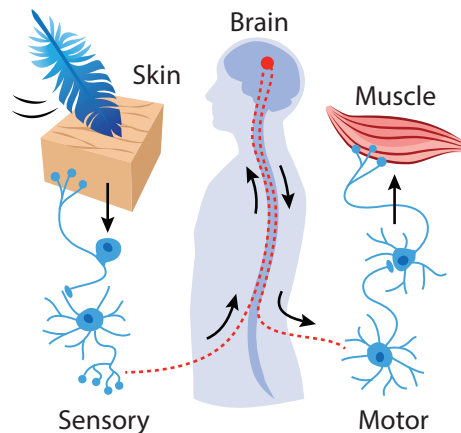


Your brain and your big toe seem pretty far apart to a small cell. But if cells pass signals to each other, they can cover that distance in no time. Neurons talk to one another to help you to move your toes or scratch your nose. They talk by sending electrical signals called action potentials. These signals move fast, up to 150 meters per second. That's like running the length of a football field in less than a second. The nervous system needs to be fast. It helps you react to catch a ball or avoid something hot.



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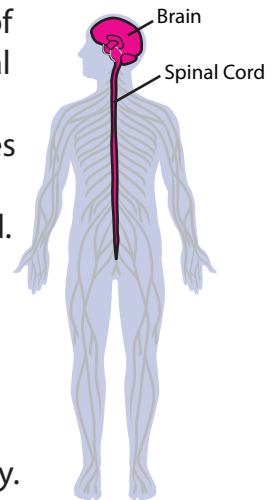
The body sends two kinds of signals, sensory and motor. Sensory signals help you use your senses to explore the world around you. They tell you when you touch, see, feel, hear, or taste something. Neurons carry sensory signals from all around your body to the brain. Motor signals go the opposite way. They go from the brain to your muscles. They help you move or pick up objects.



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The brain and spinal cord are large groups of neurons. Together they are called the central nervous system. The brain is located in the skull. The spinal cord runs through the bones of the spine. If you feel your skull or your spine, you can tell that those bones are hard. They help protect the brain and spinal cord from injury. The central nervous system needs to be kept safe because it is so important. The brain is the center of the nervous system. The spinal cord helps the brain communicate with the rest of the body.

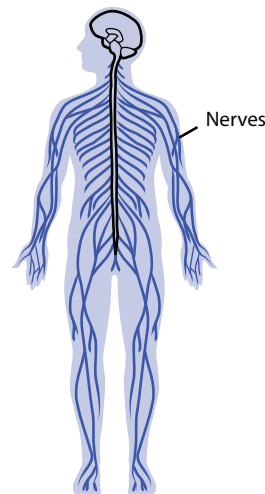


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■ Central Nervous System (CNS)



The peripheral nervous system (PNS) is made of the nerve cells that are not in the brain or the spinal cord. One part of the PNS, the autonomic system, controls things that you aren't able to. The autonomic system has two parts. The parasympathetic part helps your body to do things while relaxing, like digest food and slow your heartbeat. The sympathetic part is more active when you're stressed. It might increase your heart rate and help you take in more oxygen.

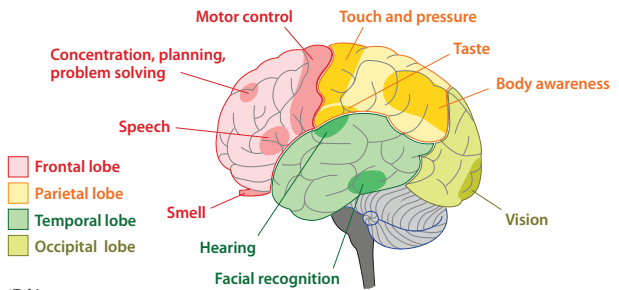


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■ Peripheral Nervous System (PNS)

The outer part of the brain is the cerebral cortex. Each section, or lobe, has a job. The frontal lobe shapes your personality. It also helps you move your body. The parietal lobe lets you know where your arms and legs are, even when you can't see them. The temporal lobe helps you hear things around you. The occipital lobe is at the back of the brain and it helps you to see.

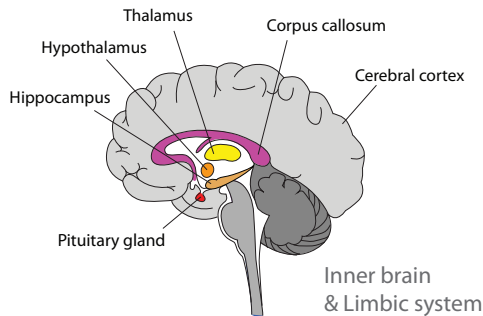
Cerebral cortex



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The inner brain is just like it sounds, in the middle of your brain. It helps your cerebral cortex to talk with other parts of the brain. The thalamus is also located here. It is the brain's control center. It checks the messages going into or out of your brain. This helps make sure messages go to the right place. Another important part is also found here: the limbic system. This system lets you feel emotions and remember things.

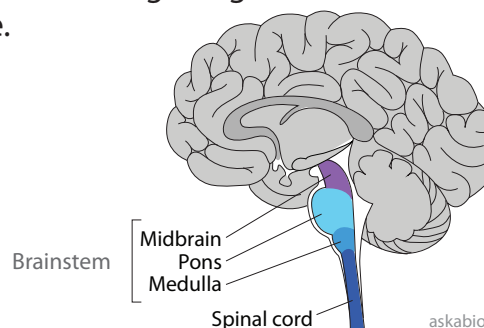


Inner brain
& Limbic system

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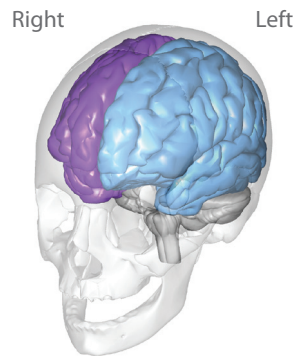


The brainstem is a lower part of the brain. It is what connects the brain with the spinal cord. It is made of three parts. These are the midbrain, the medulla, and the pons. The brainstem controls many things that we don't have to think about. This includes controlling things like our heart rate and blood pressure.



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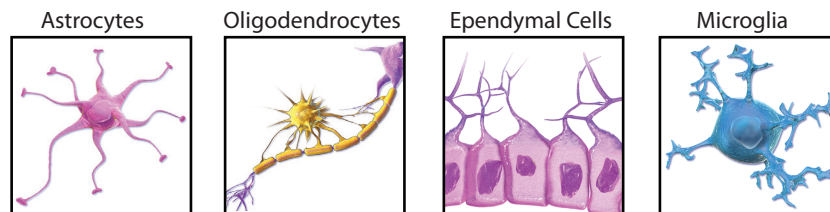
The brain has two sides that are almost the same. In general, the right side of the brain controls the left side of the body. The left side of the brain controls the right side of the body. Imagine if the left side of your body didn't know what the right side was doing. Walking, talking, and using your hands would be very hard. The tissue that connects the left and right sides of the brain is the corpus callosum. This lets the two sides of the brain talk to each other.



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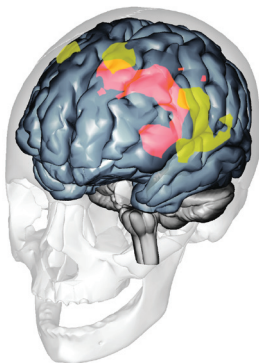
The brain is made up of more than just neurons. Glial cells are special cells in the brain. Their main job is to take care of the neurons. They provide nutrients to neurons to keep them healthy. They also cover them in a protective layer called myelin to help them send their signals as fast as the body requires. You can think of them like doctors or nurses for neurons. Below are different types of Glial cells.



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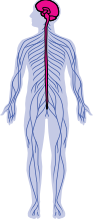
The brain is very complex. How did we learn what each part of the brain does? Scientists can record the activity in the brain. They can look to see what part of the brain is active when a person performs an action (like talking and walking). This tells them the purpose of different parts of the brain. They are beginning to understand what many parts of the brain do, but have much more to explore.



Scientists can now use a special instrument (called fMRI) to look inside the skull to see how the parts of the brain work. This image shows the parts of the brain that are involved with speech.

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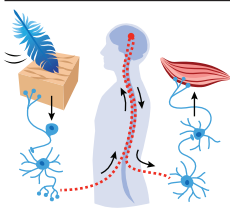
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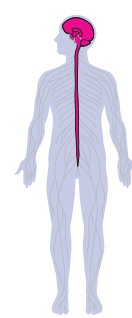
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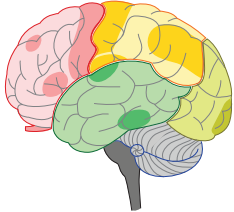
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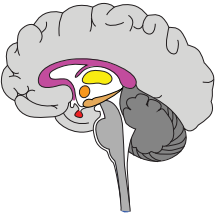


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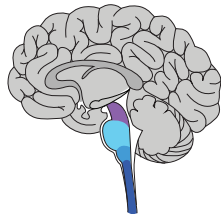
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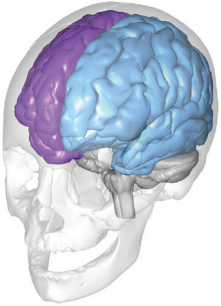


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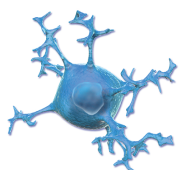
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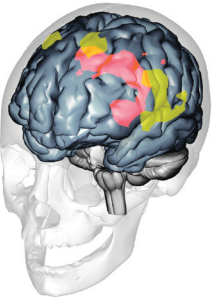




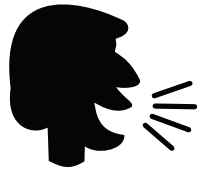


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How do you say?

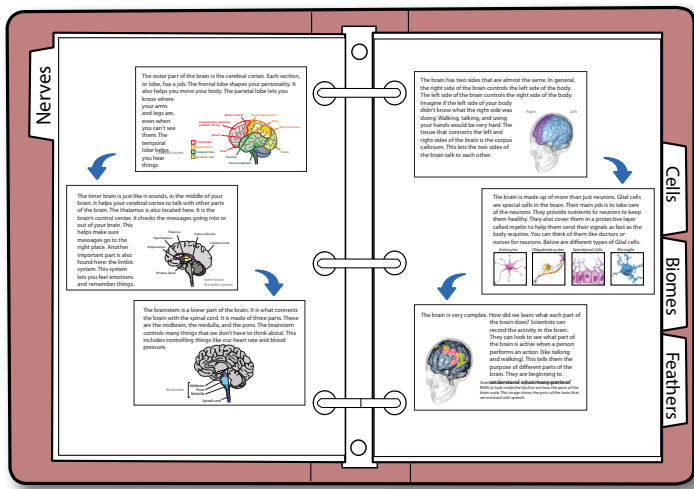
- Hypothalamus** – [high-puh-**thal**-uh-muhs]
- Corpus callosum** – [**core** puhs] [kuh-**loh**-suhm]
- Cerebral cortex** – [suh-**ree**-bruh-l] [**core**-tex]
- Pituitary gland** – [pi-**too**-i-ter-ee] [gland]
- Hippocampus** – [hip-a-**kam**-pus]
- Thalamus** – [**thal**-uh-muhs]
- Astrocyte** – [**as**-tro-sight]
- Oligodendrocyte** – [oli-go-**den**-dro-cyte]
- Ependymal cell** – [uh-**pen**-duh-mul] [cell]
- Microglia** – [mi-**crog**-lee-uh]
- Dendrite** – [**den**-dright]



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Instructions

Ready to begin? You can use these bits in many ways. You can print the pages and place them in a notebook for review. You can also cut each card out to re-organize them any way you want.

The empty cards can be used to write out what you learned in your own words, or to copy what's already written. Also included is a pronunciation guide, to help you learn how to say the more complicated words.

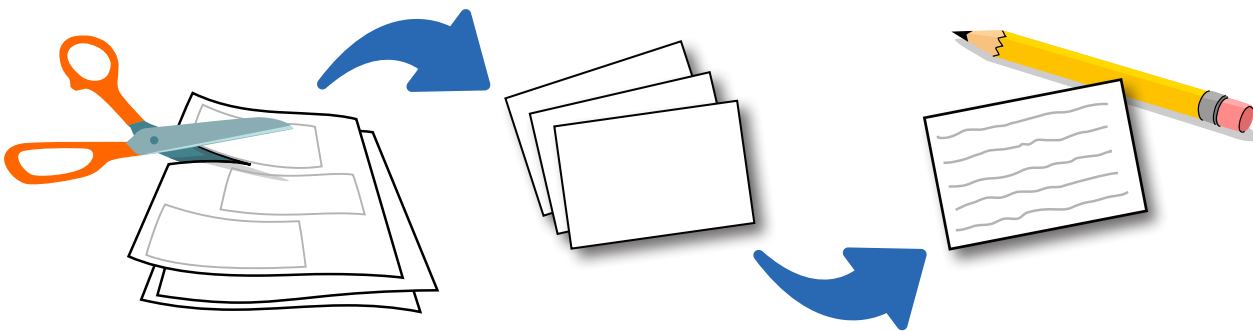


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- Glial cells