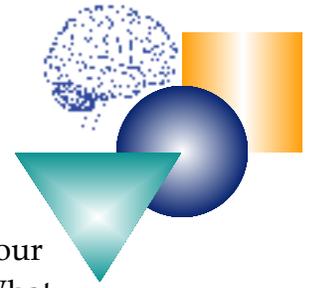


Your Wires are Really Crossed: Communication in the Nervous System

Student Pages Activity 1E



Introduction:

Have you ever wondered how your body knows how to move? How does your body know to move one foot in front of the other to walk? What tells your foot to kick a soccer ball? How do your fingers push the buttons to text your friend? All of these things happen because of communication in your body via neural pathways. In this activity, you will simulate how neural pathways transfer information through the body.



Background:

Your *central nervous system (CNS)* is made up of the brain and spinal cord. The *peripheral nervous system (PNS)* is made up of nerves outside the CNS. Nerves of the PNS connect the CNS to sense organs (skin, nose, eyes, etc.), organs in the body, muscles, blood vessels, and glands. See **Figure 1 Central Nervous System & Peripheral Nervous System**. Communication between the CNS and PNS is essential to allow us to detect, interpret, and respond to *stimuli*. Stimuli are changes in our environment and can be internal or external.

Neurons relay messages about what you're thinking, feeling, or doing. Neurons are designed to send and receive messages in the nervous system. There are three main types of neurons: *motor*, *sensory*, and *interneurons* (also called association neurons). *Motor neurons* carry impulses from the brain to the body. *Sensory neurons* carry impulses from the body to the central nervous system (CNS). *Interneurons* are also involved in sending messages but only in the CNS.

Anatomy of a basic neuron: Neurons are comprised of three major parts – *Dendrites*, *Cell Body*, and *Axon*. See **Figure 2 Neuron**, next page.

Most neurons have a series of branching extensions called *dendrites*. They look something like small tree branches. *Dendrites* extend out from the cell body. These dendrites come very close to other neurons, but never actually touch them, forming synapses. At the synapses, dendrites receive messages from other

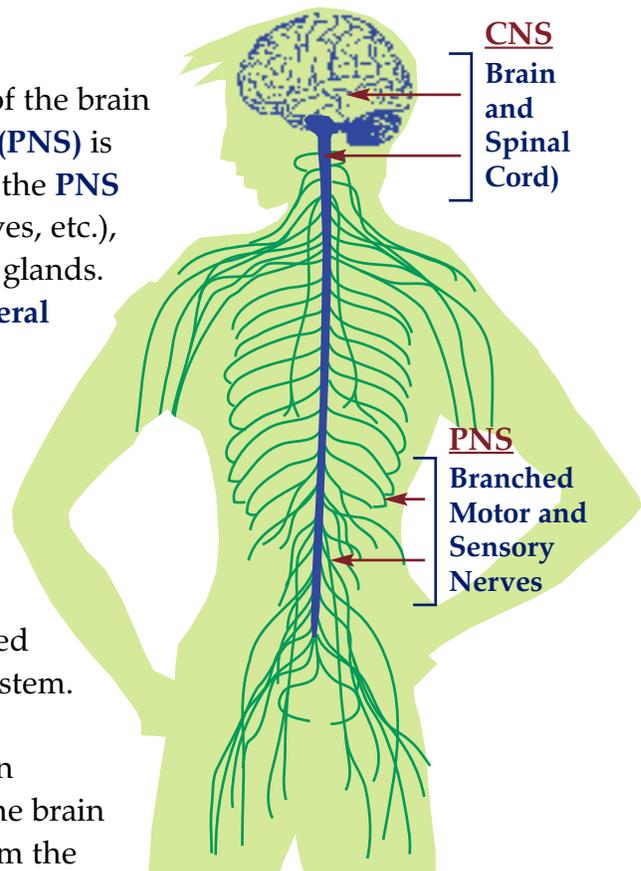


Figure 1 Central and Peripheral Nervous System



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neurons. The *synapse* (which is the space between neurons) contains chemicals called neurotransmitters. These *neurotransmitters* help in sending messages from one neuron to another neuron across synapses.

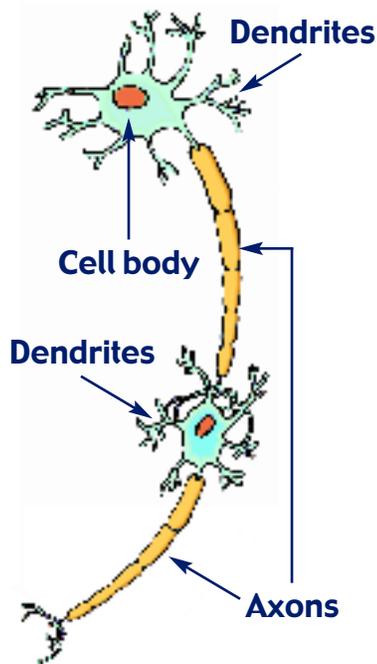
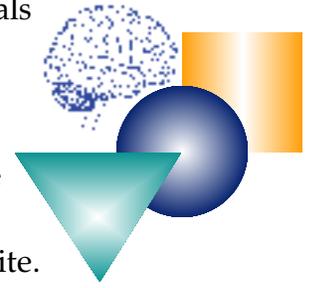


Figure 2 Neuron

All neurons have a *cell body*. The *cell body* is the central part of the neuron and contains the cell nucleus, but does not include the axon or dendrite. Cell bodies range from about 5 to 100 μm in diameter.

The neurons conduct signals away from the cell body by *axons*. Some axons are short and are only about a millimeter in length. Other axons in the spinal cord can range up to a meter or more in length.

Neurons have two signaling mechanisms; electrical and chemical. Electrical signals are sent rapidly through the neurons. Chemical messages travel between the axons of one neuron and the dendrites of another at the synapses. Neurons send messages at different speeds ranging from as slow as 0.5 meters/second to as fast as 120 meters/ second (equivalent to 268 miles/hour.)

Materials:

- ▼ *Student Task Cards*
- ▼ 1 class set of the *Student Pages* from this activity
- ▼ 1 copy of *Processing Out Pages* per student

Instructions:

The simulation will be a whole-class activity guided by your teacher.



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