

You've Got a Lot of Nerve: Parts of a Basic Neuron

Teacher Pages Activity 1D

Activity Objectives:

Using background material and a cut-and-paste student activity guide, students will be able to:

- Demonstrate an understanding of the anatomy of a neuron
- Relate structure to function of the neuron

Activity Description:

Cells in the nervous system have very unique designs that allow them to carry messages to and from the brain. Using the handout provided in this activity, students will work cooperatively within their groups to understand the structure and function of a neuron. Students will individually assemble a scrambled puzzle picture of a neuron on a blank sheet of paper and correctly label each part and write in the function of each part. Allow 15 minutes for this entire activity.

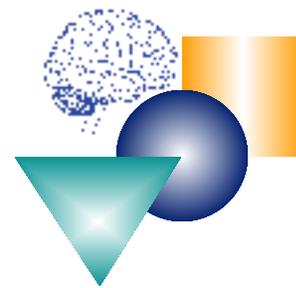
Activity Background:

The brain, like all organs of the body, is made up of cells. The brain is made of many types of cells. In *Activity 1C*, students learned about three types of cells found in the nervous system. These cells are – *neurons*, *glial cells*, and *microglial cells* (a specialized type of macrophage cell). In this activity, students will learn about neurons and their unique structure and function.

NEURONS: These cells relay messages and are specifically designed for information processing and signaling. Neurons transmit and receive nervous impulses (messages) between the brain and body and within the brain and spinal cord. There are three main types of neurons: *motor*, *sensory*, and *interneurons* (also called association neurons). *Motor neurons* carry impulses **from** the brain to muscles, glands, or other neurons in the peripheral nervous system (PNS). *Sensory neurons* carry impulses from sensory nerves (receptor cells) **to** the central nervous system (CNS). *Interneurons* are also involved in sending messages but are confined to the CNS.

ANATOMY OF A BASIC NEURON: Neurons are comprised of three major parts – *Dendrites*, *Cell Body*, and *Axon*.

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



Activity Overview



actually touch them, forming *synapses*. At the synapses, dendrites *receive messages* from other neurons. The synapse (which is the space between neurons) contains chemicals called *neurotransmitters*. These neurotransmitters assist in sending messages from one neuron to another neuron across synapses.

All neurons have a *cell body* (also known as soma, or perikaryon). 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 long cylindrical processes called axons. Some axons are insulated with a *myelin sheath, which is often compared to insulation found on electrical wire*. This insulation allows electrical messages to travel faster through the neurons. Axons have tiny branches at the end (terminal axons) that form *synapses* to other neurons. 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 (per student):

- ▼ 1 copy *Student Pages*
- ▼ Blank paper
- ▼ Scissors
- ▼ Glue or tape
- ▼ Ruler

Management Suggestions:

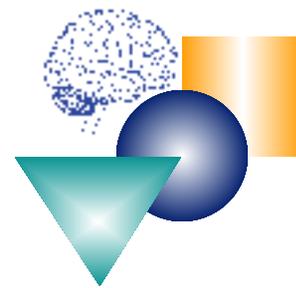
Divide students into small groups to allow collaboration on the activity.

Suggested Modifications:

For ESL and Special Education students, the teacher can provide sentence stems or fill in the blank notes for the cell function, requiring the student to complete the activity in this modified manner.

Suggested Extensions:

1. Have students research diseases of the nervous system involving the myelin sheath of neurons.
2. Have students research various types of neurons and explore how they are designed for the job they do (structure & function).
3. Students can make a clay model of a neuron on paper plates and label the parts and their functions.



Activity Overview Continued



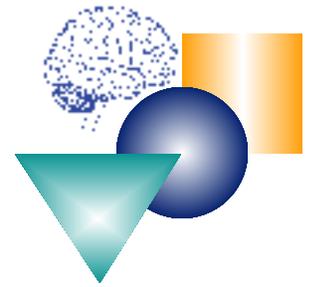
References Used:

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Neuroscience for Kids. University of Washington. "Neuron" retrieved on June 22, 2009 from: <http://faculty.washington.edu/chudler/cells.html>.

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Activity Overview Continued



LESSON 1
ACTIVITY 1D

The Brain: It's All In Your Mind