



BRAIN POWER NEWS

Parent Newsletter

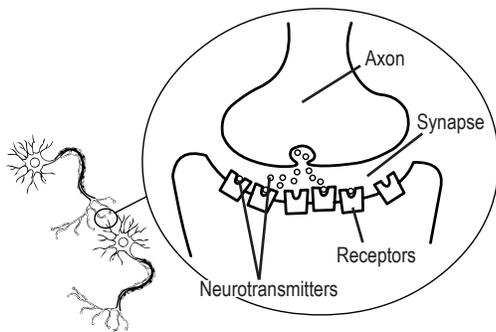
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Sending and Receiving Messages

How do we know if we hurt our foot? The way the brain receives information like this is explained in module 3 of the NIDA Junior Scientists Program.

Messages are sent throughout the body and received by the brain through a process called *neurotransmission*. The drawing below explains how neurotransmission works.

1. The cells shown here are called *neurons*. There are billions of neurons throughout the body. The illustration in the circle is an example of the process of neurotransmission.



2. If you hurt your foot, a message travels from your foot, via the neurons, to the brain. For communication between neurons to take place, an electrical impulse triggers the release of chemicals called *neurotransmitters*. Neurotransmitters are released into the space between the two neurons. This space is called the *synapse*.

3. When neurons communicate, the neurotransmitters from one neuron are released, cross the synapse, and attach themselves to special molecules in the next neuron called *receptors*. Receptors receive and process the message, then send it on to the next neuron.
4. Eventually, the message reaches the brain. The brain then gives directions about what to do next. In this case, the directions would be, "You hurt your foot on a tack. Sit down."

During the classroom activity, students simulate the process of neurotransmission. One student pretends to be the brain, another student is the foot, six students are neuron team members, and one student is the neurotransmitter. By acting out this process, students develop an understanding of our internal communication network. They also learn that the brain is the ultimate "information processor."

continued

We are introducing students to neurotransmission for several important reasons. For one, scientific information about the brain and the nervous system is growing at a rapid rate. By the time your child is an adult, we may understand the mechanisms behind many diseases of the nervous system, such as Alzheimer's disease and multiple sclerosis. People will need to understand how the brain works in order to make informed decisions about their health and the health of their families.

Another key reason for introducing neurotransmission is that we are paving the way for explaining what happens if people interfere with this process by taking drugs. Drugs have a major impact on neurotransmission. Students will be learning more about this during modules 4 through 6.



Science at Home

As a family, play "Whispering Down the Lane." One person whispers a sentence to a neighbor, who passes it on to the next person. Did the message arrive at its destination—by going through all your family members down the line—intact? Or did the message get confused? Either way, point out that neurotransmission is something like this game, although it is much more complicated. Messages have to go through neurons to the brain. Ask your child whether most messages are processed correctly by the brain. Then ask if the brain ever garbles messages. Give an example to your child, such as when you might say, "Get into the refrigerator," when you actually mean "Get into the bathtub."



What Does Your Child Think?

Have your child draw or write something about neurotransmission.

Additional Resources

The books and Web sites listed below have more information about neurotransmission.

National Institute on Drug Abuse (NIDA)

www.drugabuse.gov, 301-443-1124

This Web site contains information about drug abuse and a section designed specifically for parents, teachers, and students.

NIDA Drug Pubs

drugpubs.drugabuse.gov, 1-877-NIDA-NIH (1-877-643-2644)

Drug Pubs is NIDA's research dissemination center. Visitors can order hard copies of NIDA publications or download electronic versions in multiple formats.

National Clearinghouse for Alcohol and Drug Information (NCADI)

<http://store.samhsa.gov>, 1-800-729-6686

NCADI provides information and materials on substance abuse. Many free publications are available here.

Woolsey, T.A., Hanaway J., Gado, M.H., *The Brain Atlas: A Visual*

Guide to the Human Central Nervous System. Hoboken, New

Jersey: John Wiley & Sons, 2003. This book is a comprehensive and accurate atlas of the brain. It includes nearly 400 images of the brain and its pathways.

History of Neuroscience

<http://faculty.washington.edu/chudler/hist.html>

Lists the history of neuroscience starting from 4000 B.C. to the present.

Neuroscience for Kids

<http://faculty.washington.edu/chudler/neurok.html>

This site contains information on the brain and neurotransmission, activities, experiments, pictures, and other resources.