



#8652

THE BRAIN: THE FIRST COMPUTER

Grade Levels: 4-8

13 minutes

ALLEGRO PRODUCTIONS 1997

DESCRIPTION

The human brain is often compared to a computer, but this three-pound organ is far more complex, powerful, and capable than the most advanced computer. Everything we do, are, think, and feel begins with the brain. Defines the parts and functions of a brain cell, explores how the brain works, and mentions brain chemicals.

ACADEMIC STANDARDS

Subject Area: Life Sciences

- ◆ Standard: Understands the structure and function of cells and organisms
 - Benchmark: Knows that multicellular organisms have a variety of specialized cells, tissues, organs, and organ systems that perform specialized functions (e.g., digestion, respiration, reproduction, circulation, excretion, movement, control and coordination, protection from disease)

INSTRUCTIONAL GOALS

1. To study how the brain works.
2. To identify major parts of the brain.
3. To illustrate that our brains control all our other organs and bodily functions.
4. To illustrate that the brain is the center of all of our thoughts, ideas, memories, dreams, and feelings.

BACKGROUND INFORMATION

Our brains control all our other organs and bodily functions; and are the centers of all our thoughts and ideas, memories, dreams, and feelings—our minds.

The brain is made up of specialized cells called *neurons*. Each neuron consists of branchlike *dendrites* with *receptors* to receive messages from other neurons, a *cell body*, and a tube-shaped *axon* to relay messages from the cell body to other neurons. The axon of one neuron is separated from the dendrites of another neuron by a tiny gap called a *synapse*.

The brain uses many different chemical messengers called *neurotransmitters* to transmit messages between the neurons and to control the body. A neurotransmitter called *dopamine* affects a special network of neurons referred to as "the pleasure

circuit," and is released when a person experiences something pleasurable. They can pass through the *blood-brain barrier*, which protects the brain from many potentially harmful substances that could get into it through the bloodstream.

Also featured is a segment on how the brain uses another important chemical, *adrenaline*, to help us react faster in dangerous situations.

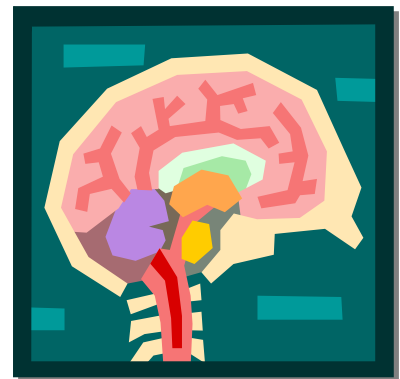
The computer analogy is continued in explaining that parts of the brain have to be "programmed" so that the brain and the body work in harmony.

VOCABULARY

- | | |
|------------------------|----------------------|
| 1. adrenaline | 7. neurons |
| 2. axon | 8. neurotransmitters |
| 3. blood-brain barrier | 9. PET scan |
| 4. cell body | 10. receptors |
| 5. dendrites | 11. synapse |
| 6. dopamine | |

BEFORE SHOWING

Show an illustration or model of a human brain, identify its major parts (cerebrum, cerebellum, and brain stem), and mention their general functions.



AFTER SHOWING

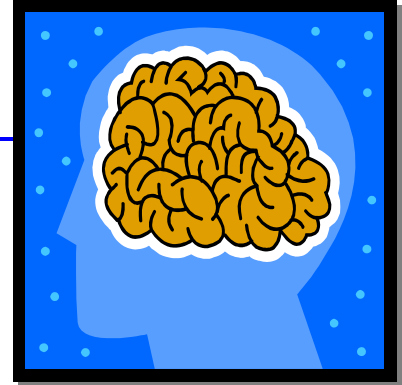
Discussion Items and Questions

1. On average, how many cells make up the human brain?
2. What is a brain cell called, and what are its parts?
3. What is the name for chemicals that send messages to nerves?
4. What protects the brain from many harmful substances that could enter it through the bloodstream?
5. How does adrenaline help us react faster in dangerous situations?
6. Use a model or diagram of the human brain to point out its main parts and discuss their major functions.
7. Discuss the human nervous system and its components.
8. Discuss the connection between the brain and adrenaline. Where in the body is adrenaline produced? Recall incidents that required acting quickly, such as to avoid danger. Were there any physical or mental sensations?

Applications and Activities

1. Research and report on modern medical imaging techniques such as EEG, CAT, MRI, and PET scans.

2. Use this video as part of a "drug unit," emphasizing the role of the neurotransmitter implicated in addictions.
3. Reinforce how information travels between neurons by making cards (to be held or hung around the neck) for neuron parts. Ask students to organize themselves in the proper sequence, and pass a ball to represent the transmission of a neurotransmitter between neurons.
4. Sketch on the board a sequence of neurons with the following cell parts (from left to right): dendrites, cell body, axon, synapse, and other parts. Ask students to:
5. sketch a nucleus in each cell body; and
6. label the dendrites, cell bodies, axons, synapses.



RELATED RESOURCES



Captioned Media Program

- Drug Danger: In the Brain #3026
- The Evolution of the Brain #3460
- Nervous System #2575

World Wide Web



The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid-safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **NEUROSCIENCE FOR KIDS**

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

"Explore the Nervous System" includes the brain, the spinal cord, the neuron, and other parts. There's also "Experiments and Activities," keep up to date on current events and new discoveries in brain research, and other brain-related topics.

- **THE BRAIN IS THE BOSS**

http://www.kidshealth.org/kid/body/brain_nosw.html

Learn about the several important parts of your brain, and click on one of the many different topics available about this organ.