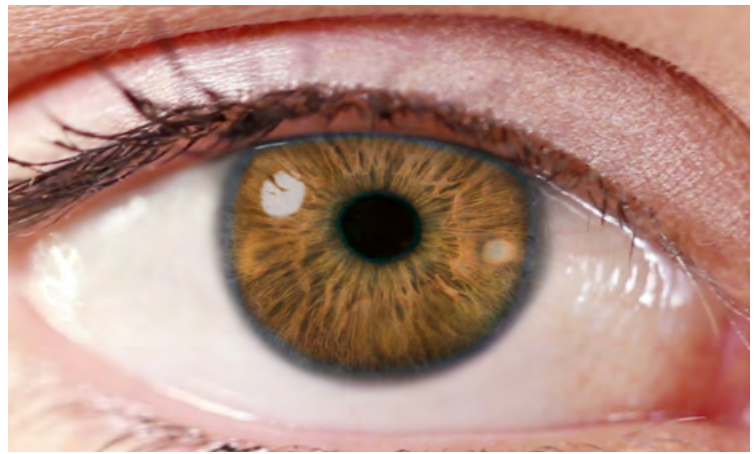


The Nervous System

- 12.1 [Organization of the Human Body](#)
- 12.2 [Homeostasis](#)
- 12.3 **The Brain**
- 12.4 [The Nervous System](#)
- 12.5 [How Neurons Fire](#)
- 12.6 [How Neurons Communicate](#)
- 12.7 [The Senses](#)



12.3 The Brain

Your brain makes you who you are. All of your thoughts, feelings, and desires come from your brain. Your brain also controls all of your activities—both conscious ones such as choosing a shirt or kicking a soccer ball and unconscious ones such as breathing, blood circulation, and digestion. Your brain “heads up” your nervous system and is made up of five main parts (Figure 12.3).

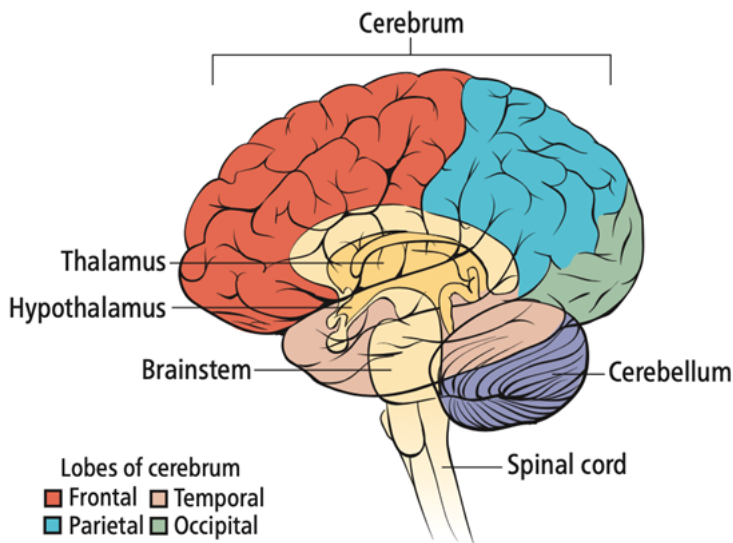


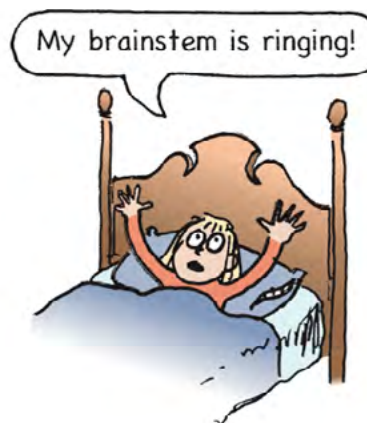
FIGURE 12.3

The major parts of the human brain are the brainstem, cerebellum, cerebrum, thalamus, and hypothalamus.

1. **Brainstem.** Can you imagine how much less you would get done if you had to remember to breathe every few seconds? It’s a good thing the brainstem does this for you. The brainstem connects the spinal cord to the rest of the brain. It controls many of the body’s basic, involuntary activities, such as heartbeat, respiration, and digestion. The brainstem also wakes you up every morning, bringing your body from sleep to wakefulness (Figure 12.4).

FIGURE 12.4

The brainstem controls the transition between sleep and wakefulness.



2. Cerebellum. The cerebellum controls balance, posture, coordination, and fine movements. It also controls all the motions you perform “without thinking.” Consider bicycle riding. When you first learn how to ride a bike, you think very carefully about what your arms and legs are doing, and your motion is very awkward. With enough practice, though, you can ride a bike easily—“without thinking.” When you do something “without thinking,” it means the cerebellum has taken over.

3. Cerebrum. The cerebrum is the largest part of the brain. It contains more than 10 billion neurons! The cerebrum is responsible for high-level functions such as reasoning, problem solving, language, and creativity. Your personality also resides in your cerebrum. The cerebrum collects information from the senses and controls all the conscious, voluntary activities of the body. The cerebrum has a right hemisphere (right side) and a left hemisphere (left side). The right hemisphere controls the left side of the body, and vice versa. This means that when you move your right hand, it’s actually the left hemisphere of your cerebrum that controls that action.

Most of the information processing that occurs in the cerebrum takes place in the cerebral cortex, the thin layer that covers the surface of the cerebrum. “Wrinkles” in the cerebral cortex give the brain its familiar convoluted appearance and increase the surface area available for information processing.

Each cerebral hemisphere consists of four lobes that are responsible for different activities. The *frontal lobes* deal with reasoning, voluntary movements, and speech. The *parietal lobes* take in sensory information about temperature, touch, taste, and pain. The *occipital lobes* process what you see—that is, visual information. The *temporal lobes* deal with sound and help you comprehend language.

The control of certain cognitive functions is dominated by either the right or left cerebral hemisphere. The left hemisphere is more adept at math, reasoning, language, and detail-oriented activities. The right hemisphere is more adept at spatial relationships, emotional processing, and music. This distinction has led to the popular conception of “left-brained” people who are organized, analytical, and attentive to detail and “right-brained” people who are intuitive, flexible, and creative.

Incidentally, this description of the different functions of the two sides of the brain applies to most right-handed people as well as most left-handed people. However, where 5% of right-handed people may have some of the functions “flipped” or reversed, up to 30% of left-handed people have brains with the functions reversed.

4. Thalamus. The thalamus receives information from many different parts of the brain. It sorts and filters this information and then passes it on to the cerebrum.

5. Hypothalamus. The hypothalamus is responsible for emotions such as pleasure and rage. It also controls bodily drives such as hunger, thirst, and sex drive and regulates body temperature and blood pressure. Another function of the hypothalamus is to control your body’s internal clock, which tells you when it is day and when it is night. The hypothalamus performs some of its activities using molecules called hormones, which we will discuss in the next chapter.



READING CHECK

1. Io is reading a book. Which lobes of the cerebrum is she using?
2. In sports, it's called choking. It's a tense, decisive moment in a game, and the pressure's on. The ball comes toward you—it's an easy play. But suddenly you become extremely aware of all your movements, and then it happens—the ball rolls right between your legs. What part of the brain normally controls practiced, automated movements? What part of your brain takes over when you choke?

CHECK YOUR ANSWERS

1. Io is using her occipital lobes to process visual information (the letters on the pages of her book) and her temporal lobes to comprehend language.
2. Automated movements that you can perform “without thinking” are normally controlled by the cerebellum. When you consciously control your movements and choke, you are using the frontal lobes of the cerebrum.



To read more about the parts of the brain and see a cool 3-D animation of the brain, go to:

<https://www.visiblebody.com/learn/nervous/brain>

