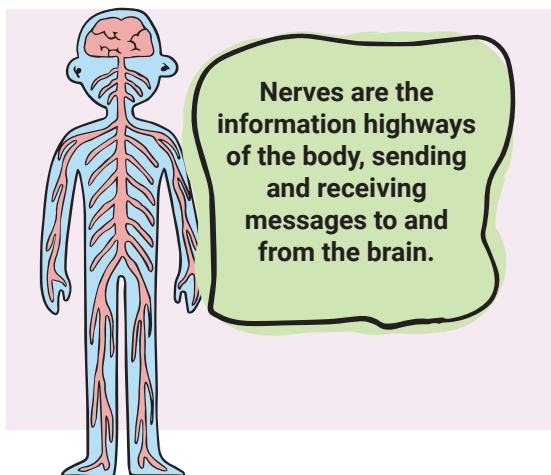


# How does the brain work?

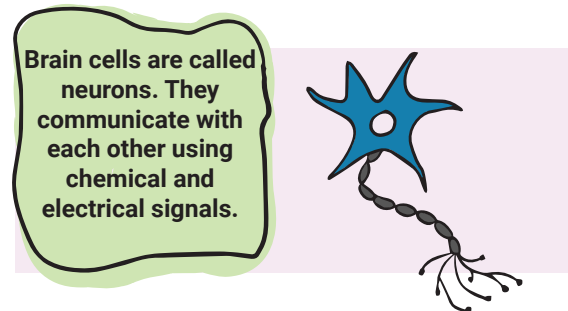
By Elizabeth A. Weaver II

Some people say it's more complicated than the universe! The organ inside your head, known as the brain, is one of the most complex systems known to man. With billions of cells, the human brain plays an important role in everyday life. From the five senses, to emotions, all the way to how much we sleep at night, our brain controls everything. It even helps us move our muscles, play music, and make art. Your brain is helping you read this right now! But how does something so small do so much?

In some ways, your brain is like a computer; it receives input and processes it. Your body collects information, like sights and sounds, from the outside world through the five senses. This information travels to the brain along bundles of cells, called nerves. When you think about information traveling along nerves, imagine cars traveling along highways. Just like cars travel to and from their destinations on highways, information travels to and from your brain and other parts of your body along nerves. Cars need fuel to keep going, right? Electrical signals within the nerves act like fuel for the



information and keep it moving along your nerves until it reaches the brain. One important function of the senses and nerves is to turn information from the outside world into messages your brain can understand.



Once the brain receives the message from your nerves, specialized brain cells called neurons communicate with one another and send signals to other parts of the brain to try to understand the input. The brain has roughly 100 billion neurons. Even more impressive is that each of those neurons can make thousands of different connections within the brain. These connections allow the neurons to send chemical and electrical signals to one another. These signals help the neurons communicate information to each other.

In a way, the neurons talk to one another. Can you imagine 100 billion people talking to each other at the same time? It would be pretty confusing. The brain, however, is arranged into different areas known as lobes. They help the brain and all of the signals stay organized. Oftentimes, different parts of the brain work together to accomplish complicated behaviors like talking and learning.

Let's take a look at how your brain might process a dog greeting you at your front door. When you hear a sound, like a dog bark, special tiny bones in your ears begin to vibrate. This vibration causes an electrical signal to go to your brain via the auditory nerve. The auditory nerve carries the signal to the temporal lobe, where the specialized auditory cortex is located.

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Around the same time your ears hear the dog bark, your eyes receive a signal in the form of light reflecting off of the dog. Through special cells in the back of your eye, the light is turned into an electrical signal and travels down a nerve toward the brain. The nerve is called the optic nerve.

Now your brain has at least two pieces of information: 1. the sound of a dog barking, and 2. the picture of a dog in front of you. The temporal and occipital lobes, along with many other parts of the brain, then work together to identify the animal as a dog. Other sections of the brain chime in with more information and help you recognize whether you know the dog and understand if the dog looks happy, sad, or angry. Finally, your frontal lobe, which helps in decision-making, becomes involved in the process and helps you decide what you might want to do next. Your brain can then send signals via motor neurons to tell your hand to pet the dog. All of this can happen in under one second! In fact, your brain can process an image in under 13 milliseconds!

With 100 billion neurons, the brain is capable of unbelievable things. Believe it or not, shortly after you were born you had even more connections between neurons than you do today. As you grow up, your experiences and environment help your brain decide which connections you need to keep. In addition, genetic information influences your brain's development. Genetic information is passed down from your biological parents through genes. Genes contain a blueprint or recipe for things like your hair and eye color. In other words, the genes give instructions to your body about how to develop. Along with physical features, genes can influence behavior. Although it is very complicated to understand what is inherited through genes and what is learned through experiences, many behaviors appear to be a combination of both environment and genetics.

To keep your brain healthy, you have to take care of it just like any other body part. Eating healthy foods, like fruits and vegetables, has been shown to be important and helpful to brain function. In addition, wearing helmets and protecting your brain from hard

hits helps the brain stay healthy.

Getting enough sleep (at your age, that means at least 10 hours a day) allows your brain to recharge and improves decision-making, creativity, and emotional well-being. Finally, continuing to challenge your brain is just like building a muscle. The more you use it, the stronger all the connections inside your brain become!

