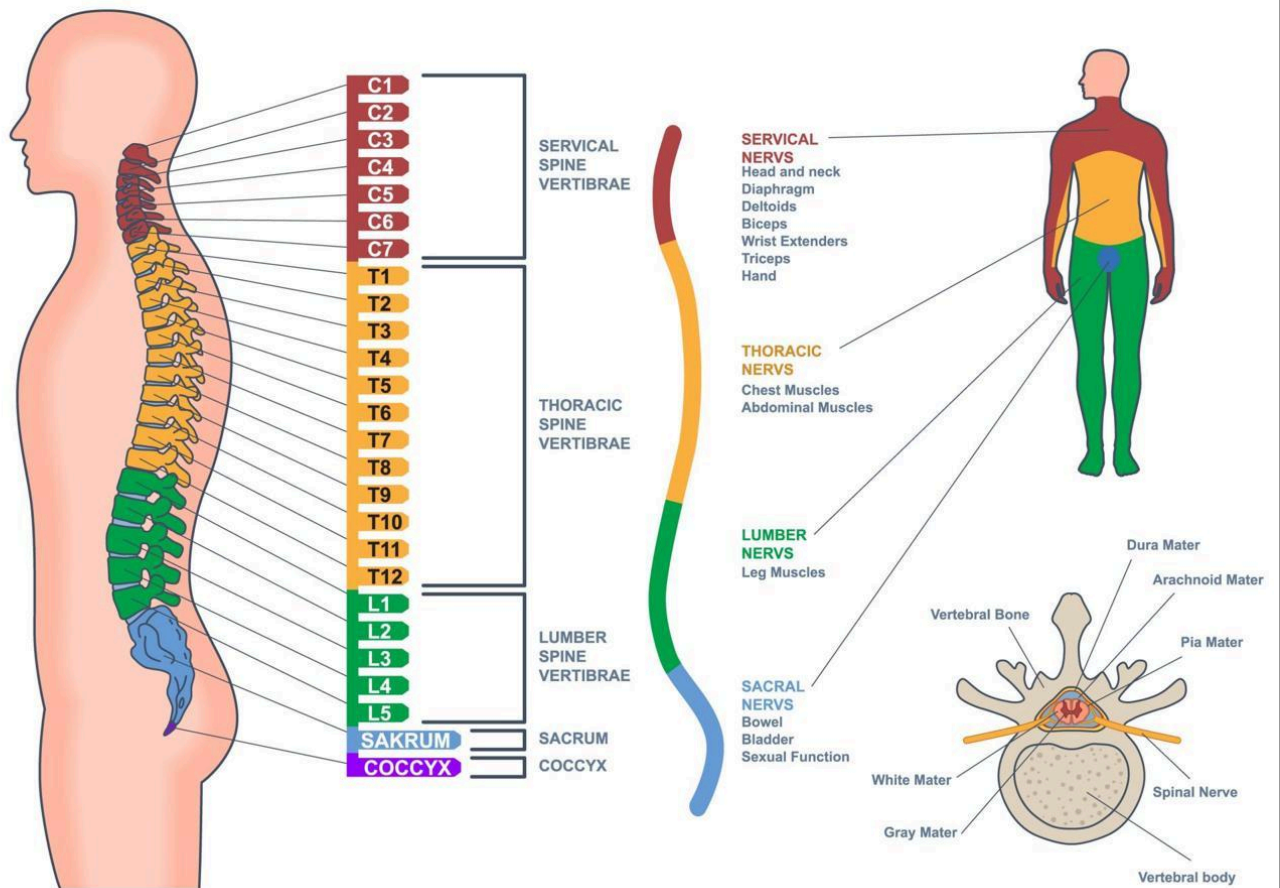
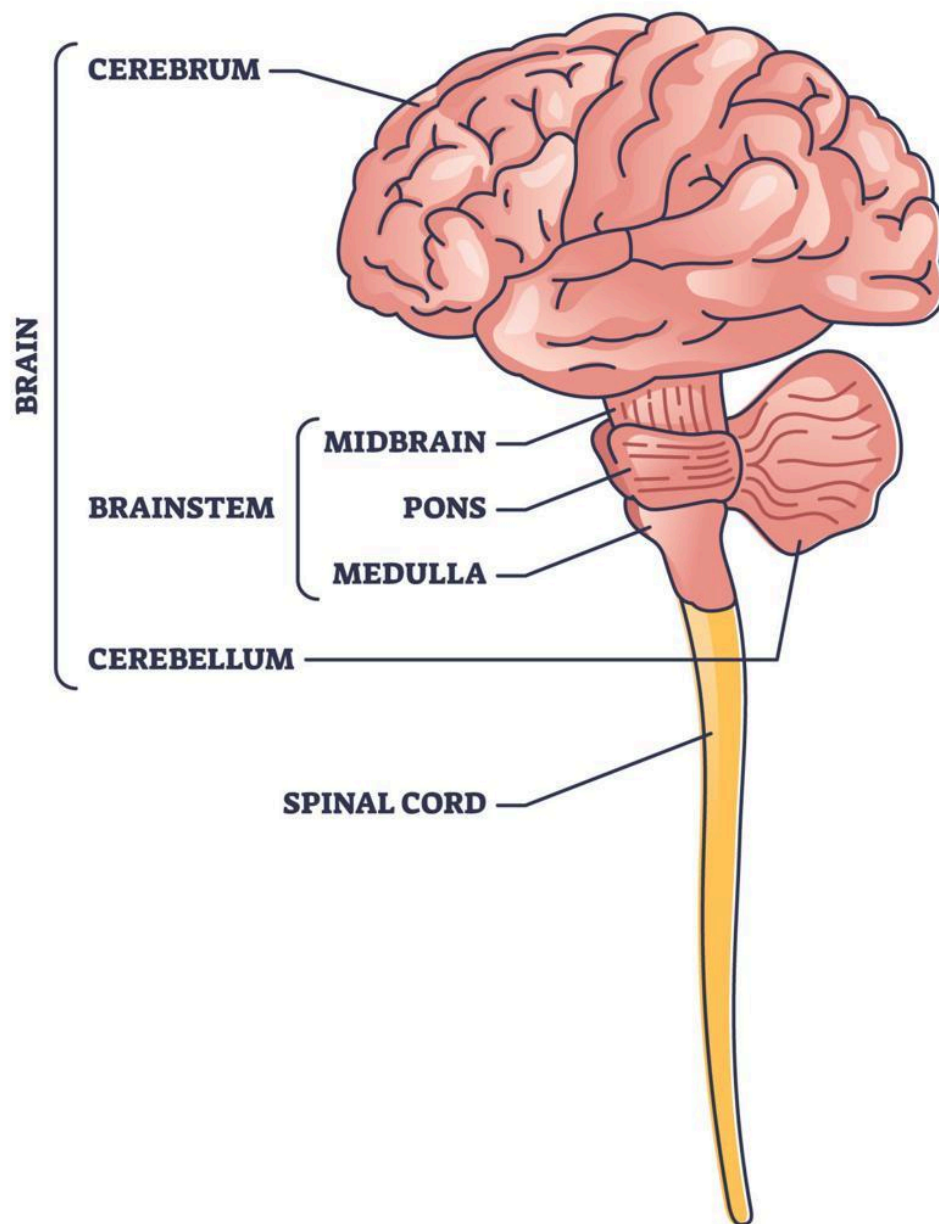


SPINAL CORD



CENTRAL NERVOUS SYSTEM



The spinal cord is a long bundle of nerve tissue that runs from the bottom of the brain down the center of the back. It is one of the two main parts of the central nervous system, which is the control system of the body made up of the brain and spinal cord. If the brain is the command center where decisions are made, the spinal cord is the main communication highway that carries messages between the brain and the rest of the body.

The spinal cord sits inside the spine, also called the vertebral column. The vertebral column is a stack of bones called vertebrae. These bones form a protective tunnel called the vertebral canal, which surrounds and protects the spinal cord. Protection is necessary because the spinal cord is extremely important and also delicate. Damage to it can interrupt communication between the brain and parts of the body.

The spinal cord begins at the brainstem, which is the lower part of the brain that connects the brain to the spinal cord. From there the spinal cord travels downward through the back. In adults it usually reaches to the upper part of the lower back before it ends. Even though the spinal cord itself ends there, the nerves continue downward in bundles.

The spinal cord is made of nervous tissue, which is tissue specialized for sending signals. The main cells in nervous tissue are called neurons. A neuron is a nerve cell designed to carry electrical signals through the body. These signals allow the brain and body to communicate almost instantly.

Each neuron has a long extension called an axon, which acts like a wire that carries signals from one place to another. Many of these nerve fibers bundle together inside the spinal cord, allowing messages to travel quickly between the brain and the body.

The spinal cord has two main kinds of tissue called gray matter and white matter. Gray matter is the area where nerve cells process information. It contains many neuron cell bodies. White matter surrounds the gray matter and contains long nerve fibers that carry signals up and down the spinal cord. The white color comes from a fatty coating called myelin, which insulates nerve fibers and helps electrical signals travel faster.

When scientists look at a cross section of the spinal cord, the gray matter forms a shape that looks like a butterfly or the letter “H.” The upper parts of this shape are called dorsal horns, which handle sensory information. The lower parts are called ventral horns, which send commands to muscles.

The spinal cord works with spinal nerves that branch out from it at many points along its length. Humans have 31 pairs of spinal nerves. Each pair connects the spinal cord to a different part of the body. These nerves allow signals to travel back and forth between the body and the brain.

Some nerves carry sensory information to the brain. Sensory information is information about what the body is experiencing. For example, when you touch something hot,

special cells in the skin detect the heat. These cells send signals through sensory nerves into the spinal cord, which then sends the signal upward to the brain. The brain interprets the signal as pain or heat.

Other nerves carry motor signals, which are commands from the brain to the muscles. When the brain decides to move a muscle—such as lifting an arm—the command travels down the spinal cord and exits through motor nerves that connect to the muscles. The muscles then contract, creating movement.

One of the most interesting jobs of the spinal cord is controlling reflexes. A reflex is a very fast automatic response that happens without the brain needing to think about it. Reflexes protect the body from harm.

For example, if you accidentally touch a very hot object, your hand pulls away almost instantly. This happens so quickly that the brain does not need to make the decision first. Instead, the sensory signal enters the spinal cord, which immediately sends a signal back to the muscles telling them to move the hand away. This pathway is called a reflex arc.

The spinal cord is surrounded by protective layers called the meninges. The meninges are three layers of membranes that wrap around both the brain and spinal cord. Between these layers is a clear liquid called cerebrospinal fluid. This fluid cushions the spinal cord and brain, helping protect them from sudden movements or impacts.

Because the spinal cord carries signals between the brain and the body, injuries to the spinal cord can interrupt these signals. When communication is blocked, the brain can no longer send commands to certain muscles or receive sensations from certain areas.

This can lead to paralysis, which means loss of the ability to move muscles voluntarily. If the injury affects the lower body, it is called paraplegia. If it affects both arms and legs, it is called quadriplegia. The effects depend on where along the spinal cord the damage occurs.

The spinal cord is therefore one of the most important structures in the human body. It acts as the body's information highway, constantly sending messages between the brain and every region of the body. It allows the brain to control movement, receive sensory information, and react quickly to potential danger through reflexes.

Without the spinal cord, the brain would not be able to communicate with the rest of the body. Every step you take, every object you touch, and every movement you make depends on signals traveling through this long column of nerve tissue running down the center of your back.