

## How does the nervous system work?

The nervous system is made up of all the nerve cells in your body. It is through the nervous system that we communicate with the outside world and, at the same time, many mechanisms inside our body are controlled. The nervous system takes in information through our senses, processes the information and triggers reactions, such as making your muscles move or causing you to feel pain. For example, if you touch a hot plate, you reflexively pull back your hand and your nerves simultaneously send pain signals to your brain. Metabolic processes are also controlled by the nervous system.

There are many billions of nerve cells, also called neurons, in the nervous system. The brain alone has about 100 billion neurons in it. Each neuron has a cell body and various extensions. The shorter extensions (called dendrites) act like antennae: they receive signals from, for example, other neurons and pass them on to the cell body. The signals are then passed on via a long extension (the axon), which can be up to a meter long.

The nervous system has two parts, called the central nervous system and the peripheral nervous system due to their location in the body. The central nervous system (CNS) includes the nerves in the brain and spinal cord. It is safely contained within the skull and vertebral canal of the spine. All of the other nerves in the body are part of the peripheral nervous system (PNS).

Regardless of where they are in the body, a distinction can also be made between voluntary and involuntary nervous system. The voluntary nervous system (somatic nervous system) controls all the things that we are aware of and can consciously influence, such as moving our arms, legs and other parts of the body.

The involuntary nervous system (vegetative or autonomic nervous system) regulates the processes in the body that we cannot consciously influence. It is constantly active, regulating things such as breathing, heart beat and metabolic processes. It does this by receiving signals from the brain and passing them on to the body. It can also send signals in the other direction – from the body to the brain – providing your brain with information about how full your bladder is or how quickly your heart is beating, for example. The involuntary nervous system can react quickly to changes, altering processes

in the body to adapt. For instance, if your body gets too hot, your involuntary nervous system increases the blood circulation to your skin and makes you sweat more to cool your body down again.

Both the central and peripheral nervous systems have voluntary and involuntary parts. However, whereas these two parts are closely linked in the central nervous system, they are usually separate in other areas of the body.

The involuntary nervous system is made up of three parts:

- The sympathetic nervous system
- The parasympathetic nervous system
- The enteric (gastrointestinal) nervous system

The sympathetic and parasympathetic nervous systems usually do opposite things in the body. The sympathetic nervous system prepares your body for physical and mental activity. It makes your heart beat faster and stronger, opens your airways so you can breathe more easily, and inhibits digestion.

The parasympathetic nervous system is responsible for bodily functions when we are at rest: it stimulates digestion, activates various metabolic processes and helps us to relax. But the sympathetic and parasympathetic nervous systems do not always work in opposite directions; they sometimes complement each other too.

The enteric nervous system is a separate nervous system for the bowel, which, to a great extent, autonomously regulates bowel motility in digestion.