

Understanding the Nervous System

The nervous system is a complex system including the brain, spinal cord and nerves. It interprets and responds to information received through the senses.

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The brain - a recap

The brain is the body's control center. The average brain weighs about 1.5kg and is estimated to be made up of around 100 billion cells. The brain controls everything we do, from basic body functions to our movements, speech, senses and aspects of our personality.

Hemispheres of the brain

The brain is divided into two cerebral hemispheres - the left hemisphere and the right hemisphere. Each hemisphere tends to specialize in certain functions but the two hemispheres work seamlessly together, sharing information.

Lobes of the brain

The brain is divided further into "lobes" that handle specific areas of function. They include the frontal, parietal, temporal and occipital lobes.

Other parts of the brain

The **cerebellum** is involved in "doing" rather than "thinking" activities such as vital functions, balance and coordination.

The **brain stem** controls vital functions like breathing, blood pressure, blood circulation, swallowing, appetite, body temperature and digestion. Any damage in the brain stem can produce widespread and profound effects.

The Nervous system

The brain communicates messages through a complex network of nerves that travel throughout our body. Together, the brain and nerves are known as the nervous system, while the spinal cord and the brain make up the central nervous system.

On their own, the nerves that run throughout our body are called the peripheral nervous system (PNS). They relay information from our brain through our spinal cord to the body, and back again. The autonomic nervous system (ANS) is part of the peripheral nervous system. It conveys messages from all the organs in our chest, abdomen and pelvis. For example, it manages our "fight and flight" responses, our "rest and digest" responses. It looks after the automatic activities of our heart and blood vessels and plays an important part in sexual response and bladder control.

Neurones - basic building blocks

The basic building blocks of the nervous system are nerve cells or neurones (also called neurons). We are born with about 100 billion neurones. Neurones are connected by synapses which carry electrical signals and chemical neurotransmitters.

Gray matter is formed when neurones cluster together on the outer part of the brain and inner part of the spinal cord.

White matter is found on the inner part of the brain and outer part of the spinal cord. It is made up of bundles of nerve fibers called axons, which are long thin extensions of neurones. Axons are covered by a white, fatty substance called myelin which insulates them, like the plastic coating of an electric wire. The axons then bundle together, like the individual telegraph wires in a cable, to form a nerve.

How it all works

The brain is in constant contact with all parts of the body, sending instructions and receiving feedback from the senses. The axons carry these messages as tiny electrical currents or nerve impulses.

Outgoing messages are sent from the brain along the motor pathways to activate the muscles of the body. The neurones that make up these pathways are called motor neurones.

Incoming messages sent from the senses back to the spinal cord and brain come along the sensory pathways. These are called sensory neurones.

How brain injury affects the nervous system

The various causes of brain injury can affect the way the nervous system functions by:

- affecting brain function itself
- affecting the brain's ability to communicate with the rest of the body
- affecting the ability of muscles to respond to the brain's orders (nerve impulses).