





Elemental Materials Technology Hunter

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Chapter 10: The Nervous System

10.1 The Nervous System: An Introduction

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The nervous system is the body's communication system. It consists of the brain, spinal cord, and peripheral nerves. The brain is the central processing unit, receiving and interpreting information from the environment and directing the body's response. The spinal cord is the main pathway for information between the brain and the rest of the body. Peripheral nerves branch out from the spinal cord to reach every part of the body.

The nervous system is divided into the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS includes the brain and spinal cord. The PNS includes all other nerves in the body. The PNS is further divided into the somatic nervous system, which controls voluntary movements, and the autonomic nervous system, which controls involuntary functions like heart rate and digestion.

The nervous system is made up of neurons, which are specialized cells that transmit information. Each neuron has a cell body (soma) containing the nucleus, and long projections called dendrites and an axon. Dendrites receive signals from other neurons or the environment, and the axon carries the signal away from the cell body. The axon is covered by a myelin sheath, which speeds up the transmission of the signal.

Neurons are connected to each other at junctions called synapses. At a synapse, the axon of one neuron meets the dendrite of another neuron. The signal is passed from one neuron to the next through the release of neurotransmitters. These chemical messengers bind to receptors on the dendrite of the next neuron, triggering a new signal.

The nervous system is also organized into different regions. The brain is divided into the cerebrum, cerebellum, and brainstem. The cerebrum is the largest part of the brain and is responsible for higher-level functions like thought, memory, and emotion. The cerebellum is smaller and is involved in coordination and balance. The brainstem connects the brain to the spinal cord and is responsible for basic life-sustaining functions like breathing and heart rate.

The spinal cord is a long, thin, tube-like structure that runs from the base of the brain down to the lower back. It is made up of 31 vertebrae. The spinal cord is surrounded by a protective layer called the meninges. It contains the cell bodies of many neurons and is the main pathway for information between the brain and the rest of the body.

The peripheral nervous system (PNS) consists of all the nerves in the body that are not part of the CNS. These nerves branch out from the spinal cord to reach every part of the body. They are responsible for carrying signals between the CNS and the rest of the body. The PNS is divided into the somatic nervous system and the autonomic nervous system.

The somatic nervous system controls voluntary movements. It carries signals from the brain and spinal cord to the muscles and skin. The autonomic nervous system controls involuntary functions like heart rate, digestion, and breathing. It is divided into the sympathetic nervous system, which is responsible for the 'fight or flight' response, and the parasympathetic nervous system, which is responsible for the 'rest and digest' response.

The nervous system is a complex and highly organized system that is essential for the body's survival. It allows us to sense our environment, think, and move. Without the nervous system, we would be unable to function.

