

A CLINICAL OVERVIEW OF THE NERVOUS SYSTEM

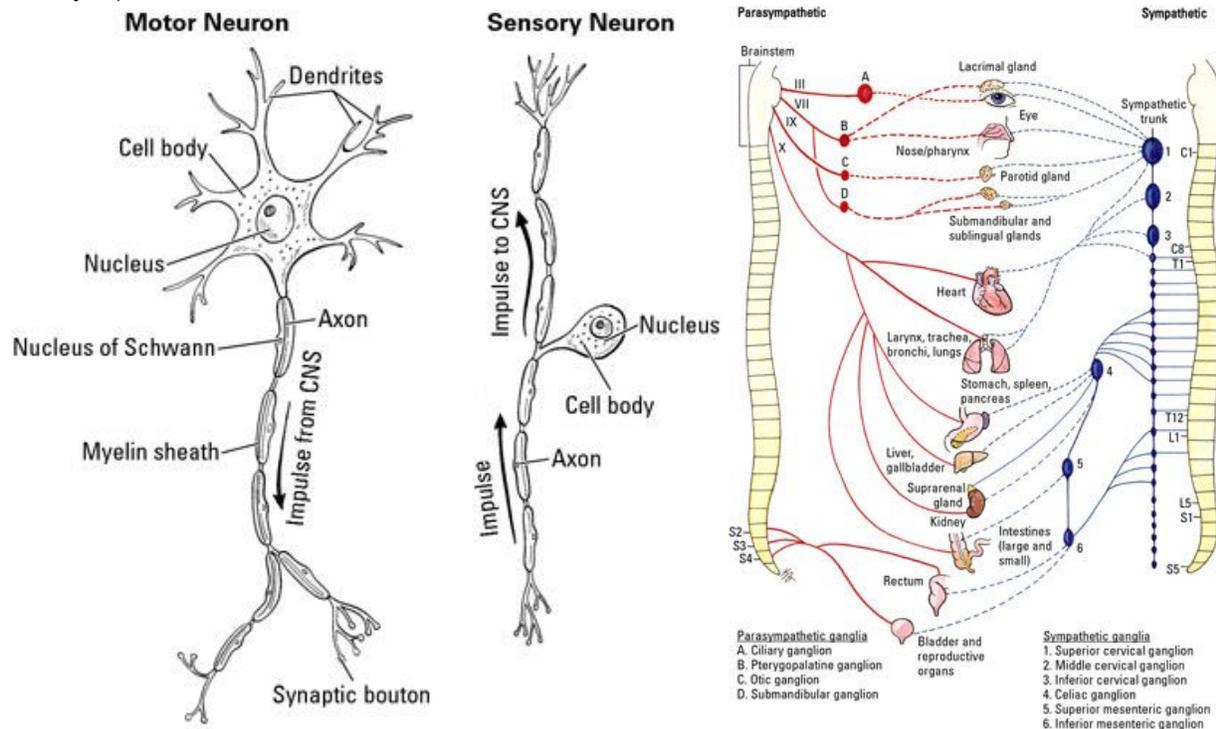
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The nervous system is the control center for your body. It interprets the things your body senses, and it sends information to the muscles and glands, telling them what to do. It also runs the systems you don't have to think about, like the digestive and cardiovascular systems. The nervous system is also responsible for your moods and your thoughts.

The structures of the nervous system include your brain, spinal cord, and nerves that reach to every part of your body. Following are the two common ways to divide up the nervous system:

- **Central and peripheral:** The central nervous system (CNS) includes the brain and spinal cord, and the peripheral nervous system (PNS) is all the nerves that branch out from the spinal cord and the brain and travel throughout the body.
- **Somatic and autonomic:** The somatic nervous system regulates the movement of skeletal muscles, and the autonomic nervous system controls involuntary actions such as heart rate, digestion, and perspiration.

Neurons are the building blocks of the nervous system. Each neuron has a cell body with extensions called dendrites and an axon. Dendrites are the receiving part of a neuron. The signal received at the dendrite is transmitted toward the cell body of the neuron in the form of an electrical impulse. The impulse is transmitted away from the cell body to another neuron, muscle, or gland by the axon, which terminates at a synaptic bouton.



A motor neuron carries signals away from the central nervous system.

THE CENTRAL NERVOUS SYSTEM

The central nervous system (CNS) includes the brain and the spinal cord. The focus of the central nervous system is on coordinating incoming and outgoing neural impulses. It's also responsible for your thought processes.

The CNS receives sensory input and produces motor responses via nerves. A nerve is composed of a bundle of neurons. Most nerves of the peripheral nervous system contain both sensory neurons and motor neurons. The sensory neurons in the peripheral nerve carry sensory impulses to the CNS. The CNS processes this information and sends the appropriate motor signals back to the nerves via the motor neurons.

Disorders of the central nervous system can affect either the brain or the spinal cord and can be due to trauma, infection, autoimmune disorders, tissue degeneration, strokes, or tumors. Examples of nervous-system disorders include Alzheimer's disease and other forms of dementia, multiple sclerosis, Parkinson's disease, and meningitis.

THE PERIPHERAL NERVOUS SYSTEM

The peripheral nervous system (PNS) connects the central nervous system with the peripheral parts of the body. Peripheral nerves are made up of bundles of nerve fibers, and they're categorized as either cranial nerves that arise from the brain or spinal nerves that arise from the spinal cord.

Peripheral nerves are protected by three layers of connective tissue:

- **Endoneurium:** This delicate layer surrounds each individual nerve fiber.
- **Perineurium:** This dense connective tissue surrounds a bundle of nerve fibers called a fascicle.
- **Epineurium:** This thick layer of connective tissue surrounds a bundle of fascicles. The epineurium includes lymphatics, fat, and blood vessels that supply the nerve.

THE SOMATIC NERVOUS SYSTEM

The somatic nervous system includes the sensory input and the motor innervation to most of the body, except for the organs, smooth muscles, and glands. It deals with the parts of the body you can move voluntarily.

THE AUTONOMIC NERVOUS SYSTEM

The autonomic nervous system works with the involuntary parts of the body, including the muscles of the heart, the digestive system, and the glands. The autonomic nervous system includes both visceral afferent fibers and the visceral efferent fibers.

- **Afferent fibers:** These fibers carry pain and other impulses from the internal organs and help regulate visceral functions.
- **Efferent fibers:** These nerve fibers stimulate smooth muscles, glands, and the heart. Two efferent neurons are needed for the conduction of a nerve impulse to an organ. The cell body of the first neuron, also called the preganglionic neuron, is found in the gray matter of the central nervous system. The axon synapses (meets with) the cell body of the second neuron, called the postganglionic neuron.

The autonomic nervous system has two divisions: the sympathetic and parasympathetic nervous systems.

- The sympathetic part of the autonomic system (or the thoracolumbar division) prepares the body for emergency situations, also known as fight-or-flight reactions. It increases the heart rate, constricts blood flow to the most peripheral arteries, and raises blood pressure. The point is to supply more blood to the brain, heart, and muscles by reducing blood flow to the skin and to the digestive system.
- The parasympathetic part (or the craniosacral division) of the autonomic system is active during times of rest and normal conditions by decreasing the heart rate and stimulating the digestive system. This part of the autonomic system helps you rest and digest.

Questions (Notebook)

- 1) What's the difference between the central nervous system(CNS) and peripheral nervous system(PNS)?
- 2) What's the difference between the somatic and autonomic nervous system?
- 3) What is the purpose of a neuron?
- 4) What's the difference between the sympathetic and parasympathetic part of the autonomic nervous system?