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The **nervous system** is the part of an [animal](https://en.wikipedia.org/wiki/Animal) that coordinates its actions by transmitting [signals](https://en.wikipedia.org/wiki/Action_potential) to and from different parts of its body. The nervous system detects environmental changes that impact the body, then works in tandem with the endocrine system to respond to such events.[[1]](https://en.wikipedia.org/wiki/Nervous_system#cite_note-1) [Nervous tissue](https://en.wikipedia.org/wiki/Nervous_tissue) first arose in [wormlike organisms](https://en.wikipedia.org/wiki/Ediacara_biota) about 550 to 600 million years ago. In vertebrates it consists of two main parts, the [central nervous system](https://en.wikipedia.org/wiki/Central_nervous_system) (CNS) and the [peripheral nervous system](https://en.wikipedia.org/wiki/Peripheral_nervous_system) (PNS). The CNS consists of the [brain](https://en.wikipedia.org/wiki/Brain) and [spinal cord](https://en.wikipedia.org/wiki/Spinal_cord). The PNS consists mainly of [nerves](https://en.wikipedia.org/wiki/Nerve), which are enclosed bundles of the long fibers or [axons](https://en.wikipedia.org/wiki/Axon), that connect the CNS to every other part of the body. Nerves that transmit signals from the brain are called [*motor*](https://en.wikipedia.org/wiki/Motor_nerve_fibers) or [*efferent*](https://en.wikipedia.org/wiki/Efferent_nerve_fiber)nerves, while those nerves that transmit information from the body to the CNS are called *sensory* or *afferent*. [Spinal nerves](https://en.wikipedia.org/wiki/Spinal_nerve) serve both functions and are called *mixed* nerves. The PNS is divided into three separate subsystems, the [somatic](https://en.wikipedia.org/wiki/Somatic_nervous_system), [autonomic](https://en.wikipedia.org/wiki/Autonomic_nervous_system), and [enteric](https://en.wikipedia.org/wiki/Enteric_nervous_system) nervous systems. Somatic nerves mediate voluntary movement. The autonomic nervous system is further subdivided into the [sympathetic](https://en.wikipedia.org/wiki/Sympathetic_nervous_system) and the [parasympathetic](https://en.wikipedia.org/wiki/Parasympathetic_nervous_system) nervous systems. The sympathetic nervous system is activated in cases of emergencies to mobilize energy, while the parasympathetic nervous system is activated when organisms are in a relaxed state. The enteric nervous system functions to control the [gastrointestinal](https://en.wikipedia.org/wiki/Gastrointestinal) system. Both autonomic and enteric nervous systems function involuntarily. Nerves that exit from the cranium are called [cranial nerves](https://en.wikipedia.org/wiki/Cranial_nerves) while those exiting from the spinal cord are called [spinal nerves](https://en.wikipedia.org/wiki/Spinal_nerves).

At the cellular level, the nervous system is defined by the presence of a special type of cell, called the [neuron](https://en.wikipedia.org/wiki/Neuron), also known as a "nerve cell". Neurons have special structures that allow them to send signals rapidly and precisely to other cells. They send these signals in the form of electrochemical waves traveling along thin fibers called [axons](https://en.wikipedia.org/wiki/Axon), which cause chemicals called [neurotransmitters](https://en.wikipedia.org/wiki/Neurotransmitter) to be released at junctions called [synapses](https://en.wikipedia.org/wiki/Synapse). A cell that receives a synaptic signal from a neuron may be excited, inhibited, or otherwise modulated. The connections between neurons can form [neural pathways](https://en.wikipedia.org/wiki/Neural_pathway), [neural circuits](https://en.wikipedia.org/wiki/Neural_circuit), and larger [networks](https://en.wikipedia.org/wiki/Large_scale_brain_networks) that generate an organism's perception of the world and determine its behavior. Along with neurons, the nervous system contains other specialized cells called [glial cells](https://en.wikipedia.org/wiki/Neuroglia) (or simply glia), which provide structural and metabolic support.

Nervous systems are found in most multicellular animals, but vary greatly in complexity.[[2]](https://en.wikipedia.org/wiki/Nervous_system#cite_note-Columbia-2) The only multicellular animals that have no nervous system at all are [sponges](https://en.wikipedia.org/wiki/Sponge), [placozoans](https://en.wikipedia.org/wiki/Placozoa), and [mesozoans](https://en.wikipedia.org/wiki/Mesozoa), which have very simple body plans. The nervous systems of the [radially symmetric](https://en.wikipedia.org/wiki/Radial_symmetry) organisms [ctenophores](https://en.wikipedia.org/wiki/Ctenophores) (comb jellies) and [cnidarians](https://en.wikipedia.org/wiki/Cnidarians) (which include [anemones](https://en.wikipedia.org/wiki/Sea_anemone), [hydras](https://en.wikipedia.org/wiki/Hydras), [corals](https://en.wikipedia.org/wiki/Corals) and [jellyfish](https://en.wikipedia.org/wiki/Jellyfish)) consist of a diffuse [nerve net](https://en.wikipedia.org/wiki/Nerve_net). All other animal species, with the exception of a few types of worm, have a nervous system containing a brain, a central cord (or two cords running in [parallel](https://en.wikipedia.org/wiki/Parallel_%28geometry%29)), and nerves radiating from the brain and central cord. The size of the nervous system ranges from a few hundred cells in the simplest worms, to around 300 billion cells in African elephants.[[3]](https://en.wikipedia.org/wiki/Nervous_system#cite_note-3)

The central nervous system functions to send signals from one cell to others, or from one part of the body to others and to receive feedback. Malfunction of the nervous system can occur as a result of genetic defects, physical damage due to trauma or toxicity, infection or simply of ageing. The medical specialty of [neurology](https://en.wikipedia.org/wiki/Neurology) studies disorders of the nervous system and looks for interventions that can prevent or treat them. In the peripheral nervous system, the most common problem is the failure of nerve conduction, which can be due to different causes including [diabetic neuropathy](https://en.wikipedia.org/wiki/Diabetic_neuropathy) and demyelinating disorders such as [multiple sclerosis](https://en.wikipedia.org/wiki/Multiple_sclerosis) and [amyotrophic lateral sclerosis](https://en.wikipedia.org/wiki/Amyotrophic_lateral_sclerosis). [Neuroscience](https://en.wikipedia.org/wiki/Neuroscience) is the field of science that focuses on the study of the nervous system.

