

General structure of autonomic nervous system

The **autonomic nervous system** (ANS) includes neurons of the central and peripheral nervous system. The name autonomic nervous system refers to the independence of its functions from the central nervous system (the ANS works **reflexively**, it is not controlled by our will). The activity of the system affects basic life functions related to food intake, circulation, metabolism and functions associated with sustaining life. The ANS is referred to as the *vegetative nervous system* (especially in older literature).

Function

The function of the ANS is to **regulate** the internal environment of the body, ensuring the proper functioning and activities of internal organs, **innervation** of smooth muscle, heart, blood vessels and glands. Autonomic neuropathy (cardiovascular autonomic neuropathy, gastrointestinal, etc.) can cause disturbances in ANS function.

Arrangement in a chain sensory neuron - interneuron - motor neuron.

The structures forming the ANS are located first in specialized formations - ganglia, truncus sympathicus and autonomic nerve plexuses of internal organs, then in the CNS in the brain and spinal cord where efferent neurons are, and also in the peripheral NS in organs and tissues.

An efferent neuron does not communicate with the target organ or tissue directly, but through at least one insertion neuron.

Construction

The mother cells of the **autonomic (vegetative) nervous system** are found in the cell clusters of the ganglia of the brain and spinal cord. The nerves of the ANS are made up of at least two neurons. The nerves form visceromotor systems that begin in the CNS. Unlike somatomotor nerves, they do not flow directly from the CNS, but are switched to other neurons in the ganglia during the course of the pathway. Therefore, there are so-called **preganglionic neurons** going to the ganglion and **postganglionic neurons** going from the ganglion onward, to the next neuron or to innervated tissue.

Dividing

The autonomic nervous system is divided into two functional groups:

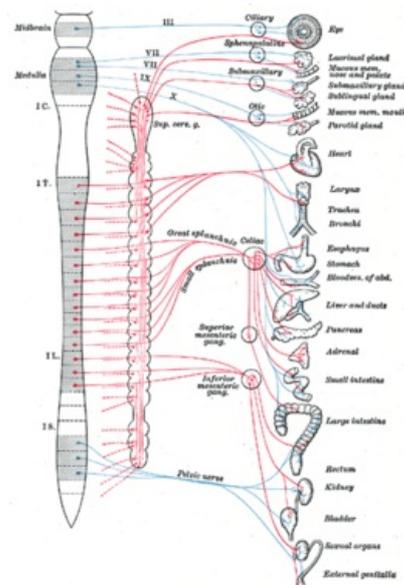
- **sympathetic** (pars sympathica) - prepares the organism to attack, defend or flee
- **parasympathetic** (pars parasympathica) - keeps the organism calm during rest and digestion
- **ENS - enteric nervous system** - but this is more of a separate system

The **pars sympathica** has nuclei in the CNS, which form the nucleus *intermediolateralis* on the sides of the quintuplets between segments C8 - L3 (that is why we call the sympathetic system **the thoracolumbar system**).

The **pars parasympathica** has nuclei in the CNS near the cephalic nerves (called the cephalic parasympathetic) and in *the nucleus intermediolateralis* on the sides of the calcaneus in the range of segments S2 - S4 (called the sacral parasympathetic). Therefore, we refer to the parasympathetic system as the **craniosacral system**.

In addition to the sympathetic and parasympathetic systems, there is a third component of the ANS - **the enteric (intramural) system**. The enteric system consists of nerve plexuses and small ganglia in the wall of the organs of the alimentary canal, approximately from the cardia of the stomach to the upper edge of the internal sphincter of the anus. It controls the muscular tension (**tonus**) and movements of the walls of the alimentary canal and the secretory activity of their glands. After the sympathetic and parasympathetic fibers are severed, much of the function of the enteric system is retained. This is due to the fact that only a small proportion of the neurons of the enteric system are directly innervated by sympathetic and parasympathetic fibers.

Comparison of sympathetic and parasympathetic system



Sympathetic (red) and parasympathetic (blue)

Sympathetic and parasympathetic have **antagonistic** (opposing) effects on most organs. E.g. sympathetic increases cardiac output, parasympathetic decreases it. Sympathetic increases body temperature, parasympathetic decreases it. Conversely, the parasympathetic increases glandular secretion and movement of the digestive tube, and the sympathetic in turn has a depressant effect.

The basic neurotransmitter of the preganglionic neuron of both sympathetic and parasympathetic is **acetylcholine**, the neurotransmitter of the postganglionic sympathetic is **noradrenaline** and the postganglionic neurotransmitter of the parasympathetic is acetylcholine.

Links

Related articles

- Truncus sympaticus
- Head parasympathetic
- Sacral parasympathetic
- Cardiovascular autonomic neuropathy

External links

- Vegetative nervous system(Slovak wikipedia)

Resources

- ČIHÁK, Radomír - GRIM, Miloš. *Anatomie 3*. 2. edition. Grada, 2004. ISBN 80-247-1132-X.
- UŠÁKOVÁ, Katarína. *Biológia pre gymnáziá 6*. 3. edition. 2010. ISBN 9788080912178.
- PETROVICKÝ, Pavel. *Klinická neuroanatomie CNS s aplikovanou neurologií a neurochirurgií*. 1. edition. 2008. ISBN 978-80-7387-039-3.