

NERVOUS TISSUE

Abdiyeva Sevinch Toshquvvat kizi

Samarqand Davlat

Tibbiyot universituti

2-kurs talabasi

3-Ilmiy rahbar: Dilfuza Shodiyorova Saydullayevna

Abstract: Nervous tissue is one of the most specialized tissues in the human body, responsible for receiving, transmitting, and processing information. It serves as the structural and functional basis of the nervous system, enabling rapid communication between different organs and systems. This article discusses the structure of nervous tissue, the role of neurons and glial cells, synaptic transmission, as well as the organization of the central and peripheral nervous systems.

Keywords: nervous tissue, neuron, glial cells, synapse, myelin sheath, central nervous system (CNS), peripheral nervous system (PNS), impulse transmission.

Introduction

The human body is a complex biological system that requires precise regulation of physiological processes. This regulation is ensured primarily by the nervous system, which is built upon nervous tissue. Nervous tissue is unique because it is capable of generating, conducting, and processing electrical impulses at extremely high speed. It is mainly composed of neurons, the excitable cells that transmit information, and glial cells, which provide structural, metabolic, and protective support to neurons.

Scientific sources emphasize that nervous tissue integrates the functions of the body into a unified system, enabling both voluntary and involuntary actions, maintaining homeostasis, and allowing the organism to adapt to internal and external environmental changes (Ross & Pawlina, 2019; Junqueira, 2015).

Main Body

1. Neurons

Neurons are the fundamental units of nervous tissue and are structurally adapted to transmit signals. A typical neuron consists of three main parts:

Cell body (soma): contains the nucleus and organelles; responsible for metabolic activity.

Dendrites: short, branching extensions that receive incoming signals from other neurons.

Axon: a long projection that transmits impulses to other neurons, muscles, or glands.

The ability of neurons to generate and propagate action potentials ensures rapid communication across the body. Neurons differ in size, shape, and function, and are classified into sensory neurons, motor neurons, and interneurons.

2. Synapses

Neurons communicate with one another through synapses, specialized junctions where signals are transmitted. Synaptic transmission can be:

Chemical synapses, where neurotransmitters (acetylcholine, dopamine, serotonin, etc.) are released into the synaptic cleft.

Electrical synapses, where direct ionic currents pass through gap junctions, allowing faster transmission.

This process ensures coordinated activity within the nervous system, linking billions of neurons into an intricate network.

3. Glial Cells

Glial cells, also known as neuroglia, outnumber neurons and perform vital supportive roles. They do not transmit electrical impulses but are essential for the optimal functioning of neurons. Major types include:

Astrocytes: maintain the blood-brain barrier, regulate ion balance, and provide metabolic support.

Oligodendrocytes: form the myelin sheath in the CNS.

Schwann cells: form the myelin sheath in the PNS.

Microglia: act as immune defense cells, removing pathogens and debris.

The myelin sheath plays a crucial role in increasing the speed of nerve impulse conduction, a process known as saltatory conduction.

4. Central and Peripheral Nervous System

Central Nervous System (CNS): consists of the brain and spinal cord. In the brain, gray matter is primarily composed of neuronal cell bodies, while white matter is made up of myelinated axons. The CNS is the command center for processing information.

Peripheral Nervous System (PNS): includes nerves and ganglia outside the CNS. It connects the CNS with organs, muscles, and glands, ensuring sensory input and motor output. Peripheral nerves are protected by connective tissue layers: endoneurium, perineurium, and epineurium.

Results and Discussion

The functional harmony between neurons and glial cells makes nervous tissue one of the most complex systems in biology. Thanks to its structure, the human body can respond to stimuli almost instantly, coordinate voluntary and involuntary functions, and sustain higher mental activities such as learning, memory, and emotions.

Research in histology shows that studying nervous tissue at the microscopic level is essential for understanding neurological disorders such as multiple sclerosis, Alzheimer's disease, and peripheral neuropathies (Abdurakhmonov & Yusupova, 2010).

Conclusion

Nervous tissue is the cornerstone of the nervous system and the body's control mechanisms. Neurons ensure the rapid transmission of information, while glial cells provide indispensable support and protection. A deep understanding of nervous tissue not only clarifies the normal functioning of the body but also contributes to the diagnosis and treatment of neurological diseases. Therefore, nervous tissue can be regarded as the primary biological foundation of communication and coordination in living organisms.

References

1. Ross M.H., Pawlina W. Histology: A Text and Atlas. Philadelphia: Wolters Kluwer, 2019.
2. Junqueira L.C. Basic Histology: Text and Atlas. McGraw-Hill, 2015.
3. Abdurakhmonov A., Yusupova Kh. Histology. Tashkent: Uzbekistan Publishing House, 2010.