

## GENERAL PHYSIOLOGY OF EXCITABLE TISSUES

*Qudratova Sarvinoz Murodillo kizi*

*Assistant of Samarkand State Medical University*

*Samadov Ravshan Robimovich*

*Student of Samarkand State Medical University*

**Abstract:** The excitatory system is composed mainly of nerve and muscle fibers, which respond to internal influences and the organization. Three articles consider the physiological processes in the excitatory system and their channels, the protection of ion channels, the absorption of membrane potential, the important role of nerve impulses in the recovery of the nerve impulse. The article provides an in-depth analysis of the specific features of the nerve and muscle fibers, the degree of excitability and the role of these processes in the life of the organism. help, the electrophysiological properties of the excitatory reaction, the protection of individual parts and biochemical processes through them.

**Keywords:** Nerve, muscle, endocrine cells, membrane potential, excitation threshold, refractory period, transmitters.

Excitable tissues are tissues that can generate rapid and variable electrical signals (action potentials) in response to external stimuli, and examples of such tissues include nervous tissue, muscle tissue, and some endocrine cells. Nerve cells (neurons) transmit information throughout the body by transmitting nerve impulses. Muscle cells provide movement by contracting. Some endocrine cells, such as the chromaffin cells of the adrenal gland, have the ability to be stimulated to release hormones. All cells can switch from a physiologically quiescent state to an excited state in response to stimuli. However, the term "excitable tissue" is used specifically only for nervous, muscular, and glandular tissues, since in these tissues excitation occurs with the occurrence of an electrical impulse that propagates along the cell membrane. Excitability is understood as the ability of a living cell to respond to given stimuli with excitation. Excitation is manifested by the response of tissues to given stimuli with specific (transmission of impulses through nervous tissue, muscle contraction, secretion of secretions by glands) and general reactions (generation of action potentials, metabolic changes).

The main characteristics of excitable tissues are as follows:

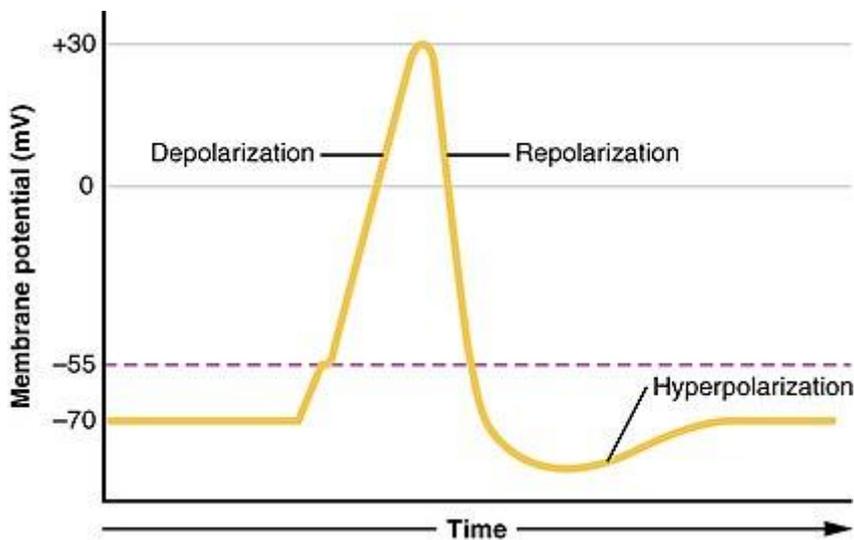
**Membrane potential** The membrane potential of excitable cells is present at rest due to the uneven distribution of ions in the membranes. Normally, the interior of the cell is negatively charged relative to the exterior (-70 mV to -90 mV), and this potential is maintained by the selective permeability of ion channels and the activity of ion pumps (e.g., the Na<sup>+</sup>/K<sup>+</sup> pump).

Ion channels are protein channels located in the membrane that allow the movement of specific ions (Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Cl<sup>-</sup>) across the membrane. Ion channels can have a "gating"

mechanism, meaning they open or close in response to a specific signal (e.g., a change in membrane potential, ligand binding).

**Action potential** An action potential is generated when the membrane potential reaches a certain threshold. This is a rapid and short-term change in membrane potential that leads to the transmission of nerve impulses and muscle contraction and consists of the following stages.

- a) Depolarization
- b) Repolarization
- c) Hyperpolarization



When the membrane potential reaches a certain threshold, an action potential is generated.

The threshold of excitation is the minimum level of depolarization that the membrane potential must reach to generate an action potential; if the stimulation does not reach the threshold of excitation, no action potential is generated.

**Refractory period** After the generation of an action potential, the cell is unable to respond to new stimulation for a certain period of time. This period is called the refractory period and is divided into two phases: the absolute refractory period and the relative refractory period. During the absolute refractory period, the cell cannot respond to any stimulation. During the relative refractory period, the cell can respond to a stronger stimulation.

The specific properties of nervous and muscular tissues, their degree of excitability, and the role of these processes in the life of the organism.

Nervous tissue consists of neurons and glial cells. Neurons are the basic functional units and are specialized for receiving, processing, and transmitting impulses. Glial cells support, nourish, and protect neurons. Neurons are excitable tissue because they can generate action potentials in

response to external stimuli. When the threshold of excitation is reached, the membrane potential changes dramatically, which leads to the propagation of the impulse. Neurons transmit impulses over long distances via axons. The myelin sheath surrounds the axon and increases the speed of impulses. Communication is established between neurons (or between neurons and other cells) through synapses. When an impulse reaches a synapse, transmitters are released, which bind to receptors and either excite or inhibit an action potential in a neighboring cell. The nervous system can change its structure and function in response to experience and learning. This may be due to the formation of new neurons, the strengthening or weakening of synapses, and the reorganization of neuronal networks.

Muscle tissue is made up of muscle cells that are specialized for contraction. There are three types of muscle tissue: skeletal muscle, smooth muscle, and cardiac muscle. Muscle cells are also excitable tissue, but their excitation does not always lead to contraction. The main function of muscle cells is to contract. Contraction is accomplished by the sliding of actin and myosin filaments, in which calcium ions play an important role. Prolonged or repeated contractions can lead to muscle fatigue. Fatigue can be caused by the accumulation of metabolic products, depletion of energy reserves, or problems at the neuromuscular junction. Muscles can increase in size (hypertrophy) as a result of exercise and training, or shrink (atrophy) as a result of disuse.

In receiving and processing information, the sensory system receives and processes information from the environment and internal organs. It provides movement by controlling muscle contraction. It regulates the internal environment, such as temperature, blood pressure, and breathing. The mental functions provide mental functions such as learning, memory, emotions, thinking, and language.

Nervous and muscular tissues form an interconnected system that is essential for the vital functions of the organism. The nervous system receives and processes information, and the muscular system provides movement. The coordinated operation of these two systems allows the organism to adapt to the environment and maintain vital functions.

### **Conclusion:**

The physiology of excitable tissues is very complex and depends on many factors. The normal functioning of these tissues is essential for the vital functions of the body. The normal functioning of tissues helps to regulate movement, sensation, and the activity of internal organs. Dysfunction of excitable tissues can lead to various diseases. Therefore, a complete understanding of the physiology of excitable tissues requires knowledge from various disciplines (biochemistry, biophysics, molecular biology, physiology). Research in this area is ongoing, and new discoveries may open new opportunities for the treatment and prevention of various diseases in the future.

### **References:**

1. Nuritdinov E. N. Odam fiziologiyasi //Toshkent:«Aloqachi. – 2005. – T. 505.
2. Aminov B., Tilavov T., Mavlonov O. Odam va uning salomatligi //Toshkent: O ‘qituvchi. – 2006.

3. Bozorov Erkin Hodjievich, Kubaev Asaliddin Esirgapovich, & Hodjieva Mokhlaroim Erkin qizi. (2023). Levels of Mathematical Modeling in Medicine and Medical Diagnostics. *International Journal of Studies in Natural and Medical Sciences*, 2(4), 97–106. Retrieved from <https://scholarsdigest.org/index.php/ijsnms/article/view/139>
4. Hojiyevich B. E., Esirgapovich K. A. INTERACTIVE EDUCATIONAL METHODS USED IN THE TEACHING OF MATHEMATICAL MODELING //Open Access Repository. – 2023. – Т. 4. – №. 03. – С. 96-103.
5. Тоштемирова Х. Ч., Кубаев А. Э. РАДИОЛОГИЯ СОХАСИДА ТИББИЙ ТАСВИРЛАР //Modern education and development. – 2025. – Т. 18. – №. 7. – С. 94-104.
6. Кубаев А. Э., Бахрамов Р. Р., Абдуллаева С. Б. Тиббий тасвирларни тиббиётдаги ахамияти //Academic research in educational sciences. – 2021. – Т. 2. – №. 12. – С. 872-877.
7. Bakhrarov R., Malikov M. The method of using the functional-differential equation in detecting parasites in children //International Journal of Innovations in Engineering Research and Technology. – 2021. – Т. 8. – №. 3. – С. 10-14.
8. Кубаев А., Икромова Н. ЖЕНЬШЕНЬ: ЛЕЧЕБНЫЕ СВОЙСТВА И ПРОТИВОПОКАЗАНИЯ //International Bulletin of Medical Sciences and Clinical Research. – 2023. – Т. 3. – №. 2. – С. 52-56.
9. Кубаев А. Э. и др. ПОЛЕЗНЫЕ СВОЙСТВА РАСТЕНИЯ-ШИПОВНИКА //PEDAGOG. – 2022. – Т. 1. – №. 4. – С. 961-963.
10. Кубаев А. Э. и др. “MOBIL ALOQA TIZIMLARINI RIVOJLANTIRISH ISTIQBOLLARI” MAVZUSINI O ‘QITISH METODIKASI //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIIY JURNALI. – 2023. – Т. 3. – №. 3. – С. 491-496.
11. Esirgapovich, K. A. ., & Ubaydullaevich, G. D. . (2023). Visual Imaging Processes in Medical Imaging. *INTERNATIONAL JOURNAL OF INCLUSIVE AND SUSTAINABLE EDUCATION*, 2(2), 35–40. Retrieved from <http://inter-publishing.com/index.php/IJISE/article/view/1041>
12. Xusainov A., Kubayev A. AXBOROT TEXNOLOGIYALARINING BIZNESDAGI O’RNI //Eurasian Journal of Mathematical Theory and Computer Sciences. – 2023. – Т. 3. – №. 1. – С. 38-41.
13. Садиллоевна, Э. С., & Эсиргапович, К. А. (2023). Сахарный Диабет. *Research Journal of Trauma and Disability Studies*, 2(4), 109–112. Retrieved from <http://journals.academiczone.net/index.php/rjtds/article/view/697>
14. [Bozorov Erkin Hodjievich, & Kubaev Asaliddin Esirgapovich. \(2023\). Medical Diagnostic Models. International Journal of Studies in Natural and Medical Sciences, 2\(4\), 87–96. Retrieved from https://scholarsdigest.org/index.php/ijsnms/article/view/138](https://scholarsdigest.org/index.php/ijsnms/article/view/138)
15. Khojiyevich , B. E. ., & Esirgapovich , K. A. . (2023). Mathematical Models and Their Classification the Use of Problem-Solving Technologies in Teaching the Subject. *INTERNATIONAL JOURNAL OF INCLUSIVE AND SUSTAINABLE EDUCATION*, 2(5), 1–7. Retrieved from
16. <https://inter-publishing.com/index.php/IJISE/article/view/1628>
17. Bozorov Erkin Hodjievich, Kubaev Asaliddin Esirgapovich, & Hodjiev Shohjakhan Erkin o’g’li. (2023). Structural Models, Classification of the Pharmacokinetics of Drugs, Substances. *International Journal of Studies in Advanced Education*, 2(04), 56–64. Retrieved from <https://scholarsdigest.org/index.php/ijiae/article/view/141>



18. Samandarova S., Musaev O. S. CLASSIFICATION OF ANTHRAX //Innovative research in modern education. – 2023. – Т. 1. – №. 1. – С. 159-162.
19. Xojiyevich B. E., Esirgapovich K. A. INTERACTIVE EDUCATIONAL METHODS USED IN THE TEACHING OF MATHEMATICAL MODELING //Open Access Repository. – 2023. – Т. 4. – №. 03. – С. 96-103.
20. Shomirzayeva N., Kubayev A. E. UNKNOWN PROPERTIES OF MEDICINAL PLANTS IN UZBEKISTAN //Development of pedagogical technologies in modern sciences. – 2023. – Т. 2. – №. 11. – С. 93-95.
21. Бозоров Э. Х. и др. «Биология ва тиббиётда математик моделлаштиришнинг таснифи ва турлари. Тиббиётда математик моделлаштириш» мавзусидаги амалий дарсни интерфаол таълим методларидан фойдаланган холда модуль тизимида онлайн ўтиш //Journal of Universal Science Research. – 2023. – Т. 1. – №. 11. – С. 43-61.