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FUNDAMENTAL PRINCIPLES OF THE IMMUNE SYSTEM IN THE TEACHING OF BIOLOGICAL SCIENCES

Egamberdieva Lola Narmatovna
Chirchiq State Pedagogical Institute
Candidate of Biological Sciences,
Associate Professor
+998981271557
nodirabegim.2018@mail.ru

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Abstract:

People in the modern world live to a mature and very old age, despite the myriad of pathogenic microorganisms around. Immunity plays a special role in protecting against their hostile attacks. Teaching students to biological sciences, especially immunology, is very important.

Keywords: Biology, teaching, immunology, system, autoimmune system, lymphocytes, protection

The world is dominated by viruses and adapted people to viruses can prolong their lives. The transformation of the immune system into a complex of complex adaptable defense mechanisms, which it is now, has been going on for 400 million years.

The effectiveness of students' cognitive activity in the classroom depends on the students' mastering of practical, intellectual and general educational skills. And the mastery of various educational skills, in turn, depends on the organization of cognitive activity of schoolchildren in the classroom. The practice of teaching biology shows that students often stay in the role of passive listeners in the classroom. They listen to the teacher's explanation or the answers of their comrades, but their cognitive activity is sometimes ineffective: students do not always understand everything and remember little of what they have heard. Such a teacher's work in the classroom does not cause active work of schoolchildren to assimilate the material being studied. In connection with the above, the requirement for a modern lesson is of great importance - improving the effectiveness of educational activities of schoolchildren. It is important to think over such a form of its organization that would ensure high cognitive activity of students.

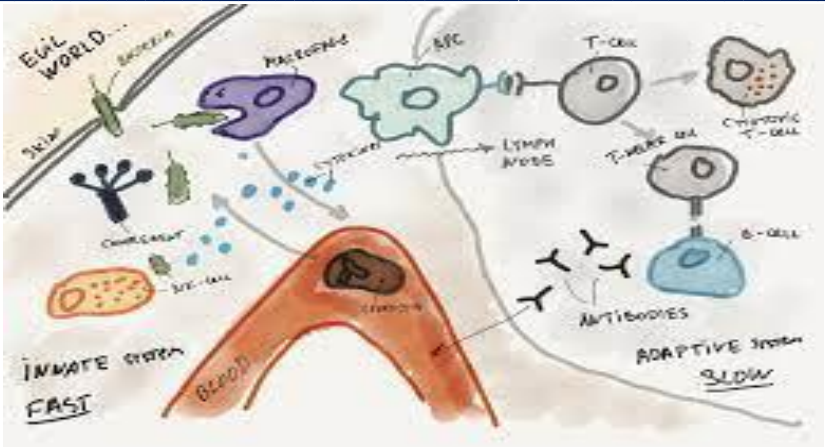
The multifunctionality of the methods obliges biology teachers to use them in such a way that they ensure not only the assimilation of knowledge by students, but also teach them to acquire new knowledge independently, so that cognitive activity develops, skills and methods of activity become more complicated.

In the process of teaching biology in the classroom, it is important to ensure both reproductive and creative cognitive activity of students. At the same time, it is necessary to achieve a gradual increase in the level of creativity, the transition from reproductive to creative activity, to find the optimal ratio of these activities in order to get the best results in mastering the basic knowledge and skills in the lesson.

The main task of the immune system is to protect our body from foreign and harmful substances, microorganisms, toxins and malignant cells. Only the constant development of the immune system ensures the protection of a living organism from the endless effects of dangerous internal and external factors. In the course of its evolution, the immune system has learned to suppress the destructive response to endogenous substances and not to have a detrimental effect on its own tissues. Most immunological reactions are short-term and controlled by regulatory mechanisms that prevent too strong a response. The immune system should be able to distinguish between harmful and safe. [1]

For example, the penetration of microorganisms or bacterial toxins is harmful to the body, and the inhalation of pollen or ingestion of food antigens from the stomach into the bloodstream is safe. A positive effect is the destruction of malignant cells or extraneous cellular material (for example, when infested by parasites), but a direct attack on the tissues of the host organism is a negative effect (for example, in autoimmune disease). The complex of mechanisms by which the immune system avoids destructive reactions directed against its own body is generally called tolerance. The vast majority of lymphocytes present in all primary lymphoid organs and directed against the body's own antigens are destroyed by the mechanisms of central tolerance. The mechanism of peripheral tolerance is realized in other endogenous structures or only in certain parts of the body. Pic.1

[1] **Бурместер Г.-Р.** Б91 Наглядная иммунология / Г.-Р. Бурместер, А. Пецутто ; пер. с англ. — 5-е изд. —М. : Лаборатория знаний, 2019.— 320 с. : ил. — (Наглядная медицина). ISBN 978-5-00101-207-8

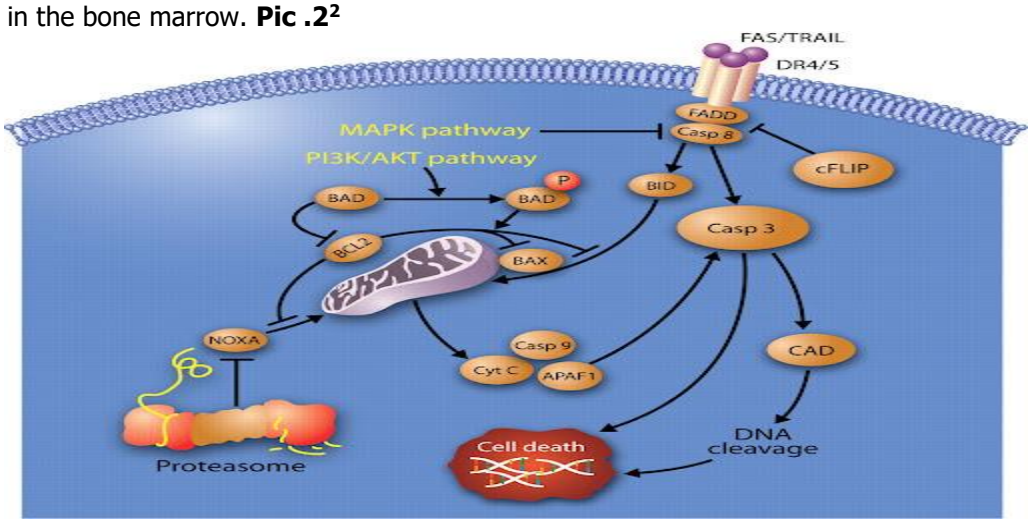


More ancient innate defense mechanisms are called nonspecific, because they are activated regardless of the nature of the pathogen; they are also called non-clonal defense mechanisms, because their manifestation does not require a special clone of cells. Examples include the acidic layer of the skin, intact epidermis, complement system, antimicrobial enzymatic systems, as well as non-specific mediators (interferons and interleukins). Granulocytes, the monocyte/macrophage system, and killer cells are involved in these mechanisms. The latter carry out a connection between a specific and non-specific immune response. The inflammatory response contributes to the concentration of the body's defenses on the affected area, which is achieved through a complex interaction of soluble and cellular components; this is an important nonspecific defense mechanism.

The first stage in the implementation of this mechanism is the release of mediators that dilate blood vessels and promote better permeability of capillary walls. Then granulocytes penetrate into the affected area, which are later replaced by macrophages. Granulocytes represent the "first line of defense", as a result of which most pathogens die. The remaining pathogens and cell decay products undergo phagocytosis by macrophages.

All blood components, including immune system cells, originate from pluripotent hematopoietic stem cells of the bone marrow. Under the action of soluble mediators (cytokines) and contact signals provided by stromal cells, these absolutely undifferentiated progenitor cells turn into various blood cells (Fig. A). Pluripotent hematopoietic stem cells are one of the few cells of the body capable of self-reproduction, that is, they can divide without undergoing differentiation and thereby providing an infinite source of blood cells. The bone marrow produces 1.75 • 1011 erythrocytes (red blood cells) and 7• 1010 leukocytes (white blood cells) per day and, if necessary, can increase this number several times. Such progenitor cells can give rise to colonies of differentiated cells in vitro.

Myeloid progenitor cells successively turn into the following types of cells: megakaryocytes (very large multinucleated cells, whose fragmentation forms platelets), erythroblasts (these cells divide further and turn into circulating erythrocytes), myeloblasts (can turn into neutrophils, eosinophils and basophils, having a segmented nucleus and called polymorphonuclear leukocytes, unlike other mononuclear cells), monoblasts (monocyte precursors) and dendritic cells. Granulocytes, monocytes and dendritic cells have the ability to absorb particles, microorganisms and liquids and are therefore called phagocytes ("phago" from Greek. there is). Under the action of soluble mediators called chemokines, white blood cells migrate from the bloodstream to the tissues, where they repair the damaged area and remove bacteria, parasites and dead cells that caused inflammation. After migration into the tissues, blood monocytes turn into macrophages. The most important cells of the immune system are lymphocytes, originating from common progenitor cells in the bone marrow. **Pic .2**[2]



[2] http://a-v-efremov.narod.ru/phot.html

There are two types of lymphocytes: T-lymphocytes, responsible for the cellular immune response, and B-lymphocytes, producing antibodies and responsible for the humoral immune response. There are cells of the third type - natural killer cells, which are also part of the lymphatic system. These cells are related to T-lymphocytes, but their origin is still a matter of debate, since they also have some features of myeloid cells. B. Mechanism of protection against infection The main function of the immune system is to protect the body from infection. Innate immunity is the most ancient method of protection, which has significant similarities in organisms of different species. Its main elements are phagocytic cells, blood proteins and natural cell chillers. The principles of operation of this system are based on the recognition of typical molecular structures common to various pathogens. Innate immunity is triggered almost immediately after exposure to the pathogen - usually this process develops in a few hours.

Acquired immunity from a phylogenetic point of view is a younger mechanism; it is based on the existence of receptors highly specific to certain regions (epitopes) of pathogens. These receptors can be associated with the cell (on T-lymphocytes and some B-lymphocytes) or be in a secreted form (antibodies produced by B-lymphocytes). A single T- or B-lymphocyte proliferates and forms a huge number of identical daughter cells (clonal expansion). This specific response develops over several days or weeks. In the plasticity of stem cells, being in a specialized tissue, a hematopoietic progenitor cell can differentially transform into various blood cells or tissue-specific cells: hepatocytes, neurons, muscle cells or endothelium. The signals governing the laws of differentiation into specialized cells remain largely unexplored. A small number of hematopoietic stem cells circulate in the peripheral blood. Morphologically, they do not differ from small lymphocytes.

Analyzing the proposed programs that guide teachers in selecting the content of lessons, we came to the conclusion that, taking into account the increased attention to the development of basic concepts, their allocation in the program for each topic contributes, as well as the inclusion of basic knowledge in the section "Basic requirements for knowledge and skills of students". For the purpose of the most lasting assimilation of the basic concepts by students, mastering the leading ideas of the subject, their cognitive activity is organized in the lesson. It is aimed not only at mastering knowledge, but also at the formation of skills, a positive attitude to their health and the health of others.

LITERATURE

1. Khaitov R.M., Ignatieva G.A., Sidorovich I.G. Immunology. Norm and pathology. Textbook– - 3rd ed., M., Medicine, 2010. - 752 p
2. Kovalchuk L.V., Gankovskaya L.V., Meshkova R.Ya. Clinical immunology and allergology with the basics of general immunology. Textbook. Geotar-Media, 2011
3. Khaitov P.M., Ignatieva G.L., Sidorovich I.G. Immunology. Textbook // Moscow. Medicine. - 2000
4. D. Mail, J. Brostoff, D. B. Roth, A. Reutt Immunology // Publishing house: Logosphere, 2007 - 568 pages.
5. Бурместер Г.-Р. Б91 Наглядная иммунология / Г.-Р. Бурместер, А. Пецутто ; пер. с англ. — 5-е изд. —М. : Лаборатория знаний, 2019.— 320 с. : ил. — (Наглядная медицина). ISBN 978-5-00101-207-8
6. A,K,Raximov, Jononova R.N, Egamberdieva L. N.International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 07, 2020. ISSN: 1475-7192 P. 8136-8142, Methodological support using innovative teaching for the development of natural and scientific outlook of students