



**THE ROLE AND IMPORTANCE OF MODERN COMPUTER TECHNOLOGIES IN  
THE DIAGNOSIS AND TREATMENT OF DISEASES RELATED TO THE IMMUNE  
SYSTEM**

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**Abstract:** The following work highlights the role of modern computer technologies in the diagnosis and treatment of various types of diseases caused by the immune system. Currently, bioinformatics, data analysis systems, biotechnology and, most importantly, artificial intelligence, modern devices are playing an important role in diagnosing immune system diseases at an early stage, that is, before the disease progresses. Including, through computer tomography, genetic analysis programs, digital monitoring systems and the electronic health care systems that are becoming popular these days, doctors have the opportunity to make accurate and correct diagnoses and develop and analyze individual treatment plans.

The results of the study show that the widespread use of modern computer technologies in medical practice allows for early diagnosis of immune system diseases, improving the quality of treatment and improving the quality of life of all patients. In modern medicine, the digitalization of medicine involves training with the help of information and educational technologies, collecting, storing and using personalized medical data for all patients, electronic patient registration systems, health information systems, and programs for patients with immune system diseases. Many diseases occur in people with problems with the immune system. In this case, digital medicine helps in the early treatment of immune system diseases or in the complete treatment of the patient if he has a disease, in short, it makes our work easier and more organized.

**Keywords:** Autoimmune diseases, digital diagnostics, immunotherapy, artificial intelligence, genetic analysis, electronic medical database, nanotechnology, bioinformatics, medical record, biological therapy, electronic health record and information technology in healthcare.

**Introduction.** In recent years, the rapid development of computer technologies, biomedical information systems (DEMET), genetic analysis programs, artificial intelligence and simulation modules has led to fundamental changes in the field of immunology. For example, we can say that changes in the immune system are being analyzed at the molecular level using genome analysis and, most importantly, bioinformatics and machine learning technologies. Thanks to the above, we are able to determine the causes of immune system diseases, their genetic factors and comprehensive individual treatment strategies as accurately as possible.

The human body is always under the influence of various external and internal factors. Therefore, the immune system, which protects the human body from various viruses, microbes, fungi and many other pathogens, is extremely important for life. In cases where the immune system does not work, a number of serious pathological conditions may occur in the human body, such as various immunodeficiency syndromes, allergic reactions and autoimmune diseases, etc. Early



detection of all these and other emerging problems and effective treatment of the patient is one of the most urgent directions not only of modern medicine, but also of current information technologies.

Nowadays, computer tomography and magnetic resonance imaging, automated analysis programs for laboratory tests, including electronic medical records and databases, are very important in diagnosing and, as far as possible, treating almost all types of diseases related to the immune system. For example, analysis systems based on artificial intelligence can determine the ratio of immune cells in the blood, allowing the doctor to predict the stage of the disease and the dynamics of its course.

In recent times, the demand for information technology in medicine, that is, the IT sector, and working with graphs and tables in it, is very important. This in itself allows you to store any large amount of data, analysis results in an orderly manner, and find information quickly, easily, and conveniently at the right time. Developing information in a graphical form, presenting it to the public, modifying it as you wish, and processing it, as well as establishing connections between graphic objects and non-graphic objects in files, is called computer graphics in computer science. In general, computer graphics are divided into three main types. They are vector graphics, fractal graphics, and raster graphics. There is an important difference between the above, which is formed by the way light passes through the display screen.

The most common device today is a scanner. Recently, the scope of application of digital cameras is also increasing day by day. The difference between the above and ordinary cameras is that the image is not chemically recorded on film, but is recorded and stored in the microcircuits of the camera's memory. From there, any type of information can be transferred to a computer via a cable.

The science that studies the immune system in depth, which I would like to highlight, is Immunology. This science can be said to be one of the sciences that determines the development of modern medicine. There is a distinction between infectious and non-infectious immunology, and infectious immunology studies the mechanism of resistance to infectious diseases, the molecular structure of antibodies and their biosynthesis, the importance of cellular and humoral factors in the development of immunity, the activity of lymphocytes and macrophages, and a number of similar features. I should also note that it is engaged in the prevention and treatment of infectious diseases by improving special laboratory diagnostics. Non-infectious immunology is immunogenetics, that is, the location and functions of genes that control immune reactions, the determination of the mechanisms of transmission of these genes from generation to generation, the study of human leukocyte antigens, finding genetic markers of immune-related diseases; immunohematology, which is the study of blood diseases; transplantation immunology, which is the study of antigens specific to the species and individual, and transplantation of tissues and organs; immunopathology, which is the study of congenital and acquired diseases specific to the immune system; embryimmunology, which is the study of the basics of the development of a fetus that is partially foreign to the female body; immunohistochemistry, which is the study of the histology of organs and tissues of the immune system; immunodiagnosics, which is the diagnosis using immunological methods; immunotherapy, which is treatment with immune factors; immunoprophylaxis, which is the creation of immunity using various methods; ecological immunology, which is the study of the effect of environmental factors on the immune system, and many other branches.

In recent years, interest in completely natural products aimed at strengthening the natural defense system of the human body has been increasing day by day. So now I would like to highlight a



plant with such properties, or rather, I would like to introduce you to the extract obtained from it. It is echinacea extract. This extract is a complex of biologically active substances obtained from natural plants, which mainly serves to prevent various diseases, improve sleep, restore memory, prevent fatigue and dry skin, and most importantly, prevent immunodeficiency and protect against a number of other diseases. Its roots, leaves and flowers are used. It contains polysaccharides, essential oils, alkylamides, flavonoids, vitamin C and phenolic acids.

**The main beneficial properties of echinacea extract are as follows:**

It increases the activity of white blood cells, or leukocytes, in the human body, helping to strengthen immunity and strengthen natural defenses against bacteria, viruses, fungi.

It has antiviral and antibacterial effects; relieves infections such as flu, colds, measles, mumps, and chickenpox.

It is useful in a number of conditions such as sore throats, colds, and nasal congestion, and has an anti-inflammatory effect.

It helps with eczema, wounds, acne, and burns when applied externally, and significantly improves skin condition.

It has an antioxidant effect, which means it neutralizes free radicals and slows down the aging process.

If we discuss the scientific basis, studies show that echinacea extract, when taken regularly as a prophylactic, reduces the occurrence of colds. It relieves symptoms one or two days earlier in viral diseases.

There are several forms of its use:

1. In the form of drops, i.e. in the form of a solution
2. In the form of a liquid (infusion or tea)
3. In the form of a soft cream or ointment applied to the surface
4. In the form of capsules and tablets

As with all products with medicinal properties, there are precautions for echinacea extract. If we list these, it can cause an allergic reaction, especially for those who are allergic to plants belonging to the Asteraceae family. The reason is that the echinacea plant also belongs to the Asteraceae family.

It is not recommended for people who have or are prone to autoimmune diseases. In this disease, the human immune system mistakenly recognizes its own body as a “foreign object” and attacks itself, which means that under normal circumstances the immune system eliminates microbes such as bacteria and viruses. However, in autoimmune diseases, it also attacks healthy cells and tissues. Naturally, this can result in chronic inflammation and tissue damage within the body.

Of course, pregnant and lactating women should consult a doctor and take it, otherwise they may unknowingly encounter negative consequences. In conclusion, echinacea extract is a natural scientific stimulant, an important tool that strengthens the immune system and increases the defenses of the human body, and is very useful in cold weather and when immunity is reduced. It has long been used in folk and scientific medicine as an immunity booster, cold and flu remedy, which is very helpful. Along with its beneficial properties, I must also clearly state that it must be used in correct and accurate doses, observing precautions. That is why echinacea extract is emphasized as a natural medicine that has a special place in both modern medicine and folk medicine. Then in medicine, medicines obtained from natural plant and animal products are



called Galenic preparations. Today, we can say that echinacea extract is one of the biologically active substances that is widely used in the pharmaceutical industry.

**Conclusion.** Currently, the widespread introduction of digital technologies in medicine is of great importance for the early detection and control of diseases related to the immune system. With the help of the above technologies, it is possible to analyze the activity of the immune system, identify changes in the body in response to the effects of microorganisms, and to identify the early stages of the development of diseases and to treat them. Artificial intelligence (AI), biotechnology, genetic analysis programs, digital informatization and big data analysis are creating opportunities for accurate diagnosis in immunology and then developing personalized treatment strategies. Digital medical systems create a convenient environment for medical workers, making it much easier to collect, store and process analysis results.

As a result of the above, the possibility of remotely monitoring the condition of patients with diseases of the immune system, their condition, rapid receipt of clinical results and increasing the effectiveness of treatment is expanding. The provision of information technologies not only facilitates diagnosis and treatment, but also creates an opportunity to significantly improve the quality of medical services.

The reforms being implemented in the Republic of Uzbekistan to digitize the healthcare system are introducing the latest steps in the diagnosis and treatment of diseases of the immune system. The widespread introduction of electronic medical records, laboratory information systems and telemedicine services is shaping an innovative approach in the field of medicine.

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