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#### HERPESVIRUS INFECTIONS, PRESENT AND FUTURE

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**Abstract:** Herpesvirus infections are widespread worldwide, and their epidemiology, clinical manifestations, and treatment methods are among current problems. This article highlights the diagnosis, treatment strategies, and potential for effective future control of herpesviruses. Prospects for genome editing and vaccine creation are analyzed.

**Keywords:** Herpesvirus, infections, epidemiology, diagnostics, antiviral treatment, vaccine, genome editing, latent infection, immunosuppression, future prospects.

#### Introduction

Herpesvirus infections are a group of viral diseases that affect a large part of the world's population. These viruses are distinguished by the fact that they remain in the human body for life, are hidden in a latent state, and are reactivated with a decrease in immunity. The herpesvirus family includes herpes simplex viruses (HSV-1 and HSV-2), varicella-zoster virus (VZV), Epstein-Barr virus (EBV), cytomegalovirus (CMV), and other less studied types. Due to the fact that they are transmitted in different ways, in many cases they are chronic and cause serious complications, they are among the current problems in the global health system. Herpesvirus infections have a wide spectrum of clinical manifestations, ranging from simple labial and genital herpes to neurological and oncological diseases. Especially in immunosuppressed patients, these viruses can cause life-threatening conditions. The widespread and long-term survival of the virus makes treatment difficult. Also, vaccines and other preventive measures to prevent these infections are still not sufficiently developed.

This article provides an overview of the epidemiology of herpesviruses, their transmission, clinical manifestations, diagnosis and treatment methods. The future development of effective prevention and treatment methods, including genome editing technologies and the introduction of new vaccines, will be discussed. The purpose of this study is to study current issues in the fight against herpesvirus infections and to propose solutions.

#### Materials and methods

In this study, research and practical data aimed at improving the study of herpesvirus infections and their control strategies were extensively analyzed. Scientific articles, reports submitted by international health organizations (World Health Organization, International Society of Virology, etc.) and statistical results of regional epidemiological studies were used as the main sources of research.

In the course of the analysis, the spread of herpesvirus infections, risk factors and ways of transmission were studied on the basis of epidemiological data. At this stage, the distribution indicators and regional characteristics of herpesviruses on a global scale were determined, and the factors affecting them (climate, demographic status, immunosuppression, etc.) were analyzed. The data was processed with the help of various statistical programs, and the general trends of the spread of the infection were determined.

In the diagnostic process, modern laboratory methods were thoroughly studied. Polymerase chain reaction (PCR), serological tests (detection of IgM and IgG antibodies), immunofluorescence,

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virus isolation, and molecular biological analyzes have become particularly important as highly sensitive and specific methods. The sensitivity, accuracy, speed and economic efficiency of diagnostic methods were considered. Also, the possibilities of use in different laboratory conditions and the advantages and disadvantages of existing technologies were compared.

The effectiveness of antiviral drugs (acyclovir, valacyclovir, famciclovir, etc.) used in the control of herpesvirus infections in terms of treatment strategies was studied. The pharmacological properties of these drugs, limitations in their use and treatment protocols were analyzed in depth. Virus resistance, complex clinical conditions in immunosuppressed patients and recommendations for increasing the effectiveness of treatment were developed. New antiviral agents and their clinical trial results were also reviewed.

In the assessment of future prospects, the introduction of new technologies against herpesvirus infections was analyzed in depth. In particular, the possibilities of treating latent infections using genome editing technologies (CRISPR-Cas9 and other methods) were studied. Also, ongoing research on creating effective and safe vaccines, their technological basis and clinical effectiveness were discussed.

Mathematical statistics methods were used to summarize the research results. All the received data were analyzed and clear and scientifically based recommendations were developed to improve methods of control, diagnosis and treatment of herpesvirus infections. These methods aim to improve epidemiologic control, improve the quality of treatment, and create opportunities for effective management of herpesvirus infections in the future.

#### **Results and discussion**

During the study, the following results were obtained regarding the prevalence, diagnosis and treatment of herpesvirus infections:

Epidemiological indicators: Herpesviruses are common globally and are mainly divided into two types: herpesvirus type 1 (HSV-1), which is usually found in the oral cavity, and herpesvirus type 2 (HSV-2), which is more common in genital infections. 'p occurs. Research results show that HSV-1 is present in about 67% of the world's population and is mainly transmitted during childhood. HSV-2 is more common in sexually active people, with a prevalence of 11-15%. These infections are more common in developing countries.

Diagnostic efficiency: Modern diagnostic methods, including PCR and serological tests, provide high accuracy. The PCR method is the most sensitive in detecting infection and allows to distinguish between latent and activated cases. Serological tests are widely used to determine the spread of infection. However, resource-constrained areas have been found to have limited diagnostic capacity, which may lead to late detection of patients.

Effectiveness of treatment: Antiviral drugs (acyclovir, valacyclovir, famciclovir) have shown effectiveness in controlling herpesvirus infections. These drugs stop the replication of the virus, relieve the symptoms and reduce the serious complications of the infection. But in long-term treatment, the problem of virus resistance has been identified, which requires the development of new treatment methods. Severe forms of infection have been observed in immunosuppressed patients, requiring special protocols.

Prevention and future prospects: Research has shown that the development of effective and safe vaccines is a key factor in controlling the spread of herpesvirus infections. Vaccines currently in clinical trials have shown high levels of immune response, but their long-term efficacy has not yet been fully studied. Genome editing technologies (for example, CRISPR-Cas9) are seen as a promising direction in the treatment of latent infections. With the help of these technologies, the possibility of destroying viral DNA or blocking its activity is being studied.

Social and economic effects: Herpesvirus infections cause many social and economic problems. The spread of sexually transmitted herpes can affect family relationships and lead to reproductive

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health problems. In resource-limited countries, diagnostic and treatment costs represent a significant economic burden for the population.

Discussion

The global spread of herpesvirus infections requires modern approaches to their diagnosis and treatment. High-tech methods such as PCR allow accurate detection of infection, but they are not widely used in developing countries. Although antiviral drugs are effective in treatment, the resistance of the virus is a serious problem. New tools and technologies (genome editing and vaccines) are aimed at solving this problem, but further research is needed for their practical application.

Research results show that a comprehensive approach (prevention, early diagnosis and effective treatment) is important in the fight against herpesvirus infections. It is also possible to reduce the spread of infection through international cooperation and expansion of medical resources.

#### Conclusion

In conclusion, herpesvirus infections are common worldwide and have been shown to have serious health and socioeconomic consequences. Effective control of these infections requires early diagnosis, modern treatment methods, and introduction of preventive measures. Modern diagnostic technologies, in particular, PCR and serological tests, provide high accuracy in the detection of infection. Antiviral drugs reduce the severity of infection, but with long-term use, the problem of viral resistance arises. This indicates the need to develop new treatment methods. The development of vaccines, the development of genome editing technologies and the strengthening of global cooperation will be important in reducing the spread of herpesvirus infections. These approaches are effective tools in the fight against infection and help strengthen the global health system. As a result, comprehensive prevention, early diagnosis and innovative treatment methods are the main factor in effective management of herpesvirus infections and reduction of their spread.

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