



CAUSES OF AIDS AND MECHANISM OF DEVELOPMENT

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Annotation

This article examines the etiology, pathogenesis, and transmission routes of acquired immunodeficiency syndrome (AIDS). Particular attention is paid to the epidemiological situation globally and in Uzbekistan. The mechanisms of immunodeficiency development, early diagnosis methods, and modern approaches to prevention are analyzed. The importance of public health literacy and a healthy lifestyle in combating the spread of HIV infection is emphasized. The article contains practical prevention recommendations for students and the general public.

Key words: AIDS, HIV infection, immunodeficiency, epidemiology, prevention, antiretroviral therapy, healthy lifestyle, health education.

Introduction

Acquired immunodeficiency syndrome (AIDS), caused by the human immunodeficiency virus (HIV), remains one of the most serious medical and social problems of our time. Since its first identification in the early 1980s, HIV infection has become global, affecting millions of people worldwide. According to the World Health Organization (WHO), the total number of people living with HIV exceeds 38 million, with hundreds of thousands of new cases reported annually [1].

According to official statistics from the Ministry of Health of the Republic of Uzbekistan, 51,087 people have been diagnosed with HIV/AIDS in Uzbekistan as of 2025 [2]. These figures demonstrate the need for continuous improvement of prevention, diagnosis, and treatment measures, as well as increased public awareness, particularly among young people.

The aim of the study: to analyze the causes, mechanisms of development and main directions of AIDS prevention.

Materials and methods

The study was conducted using a systematic analysis of scientific literature, official statistical data from the WHO and the Ministry of Health of the Republic of Uzbekistan, as well as regulatory documents on HIV control. A review of current domestic and international publications on HIV/AIDS was conducted.

Results and discussion

Etiology and pathogenesis of HIV infection

The causative agent of AIDS, the human immunodeficiency virus (HIV), belongs to the Retroviridae family, genus Lentivirus. Genetic studies indicate a zoonotic origin for the virus,



likely transmitted from primates (chimpanzees) to humans in Central Africa in the early 20th century.

The pathogenesis of the disease is characterized by selective damage to immune system cells that carry the CD4 receptor on their surface (T-helper cells, macrophages, dendritic cells). Virus entry into the cell is mediated by the interaction of the viral glycoprotein gp120 with the CD4 receptor and co-receptors (CCR5, CXCR4). Following reverse transcription of the viral RNA and integration of proviral DNA into the host genome, latency ensues. Activation of transcription leads to the production of new viral particles, death of the infected cell, and a progressive decline in CD4+ lymphocyte count.

Transmission routes and epidemiology

The main routes of HIV transmission are well studied:

Sexual transmission (unprotected sexual intercourse) is the dominant mode of transmission in global epidemiology.

Parenteral route (through blood): when using non-sterile medical and non-medical (narcotic) instruments, transfusion of infected blood products.

Vertical transmission (from mother to child): during pregnancy, childbirth and breastfeeding.

In Uzbekistan, as in most Central Asian countries, the epidemic remains mixed, involving key population groups and the general population.

Clinical course and diagnosis

The course of HIV infection is divided into stages: the incubation period, acute primary infection, latent stage, and the stage of secondary diseases (AIDS). The absence of specific symptoms in the early stages makes laboratory diagnostics the cornerstone of infection control. The "gold standard" is the detection of HIV antibodies and the p24 viral antigen using enzyme-linked immunosorbent assay (ELISA), with mandatory confirmation of the results by immunoblotting.

Prevention and treatment

The modern strategy to combat HIV infection is based on three principles:

Primary prevention: raising public awareness, promoting safe behavior, using barrier contraceptives, harm reduction programs for injection drug users, ensuring the safety of medical procedures.

Secondary prevention (early detection): expanding access to voluntary HIV counselling and testing, especially among at-risk groups and pregnant women.

Antiretroviral therapy (ART): suppression of viral replication with drugs can significantly prolong the life of patients, improve its quality and reduce the viral load to an undetectable level, which is an effective method for preventing transmission (the "Undetectable = Untransmittable" strategy, U=U).

Non-specific prevention, including a healthy lifestyle (rational nutrition, giving up bad habits, physical activity), helps strengthen overall immunity.

Conclusions

AIDS is a natural outcome of chronic HIV infection, the pathogenetic basis of which is the progressive destruction of the CD4+ lymphocyte component of the immune system.

The HIV epidemic remains relevant in Uzbekistan, requiring continuous epidemiological monitoring and adaptation of national programs.



A key element in controlling the spread of HIV is a comprehensive approach that combines large-scale prevention efforts, early diagnosis and universal access to effective antiretroviral therapy.

Systematic health education, the development of health literacy and responsible behavior among young people are the most important tasks of educational and medical institutions.

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