ACQUIRED IMMUNODEFICIENCY SYNDROME(AIDS), DEFINITION OF THE DISEASE

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Annotation. *Acquired immunodeficiency syndrome, or AIDS, is a life—threatening condition of the immune system in which severe infectious diseases and tumors develop.*

The term "AIDS" appeared in 1981-1982 at the Centers for Disease Control and Prevention in the United States after the development and description of several cases of pneumocystis pneumonia and Kaposi's sarcoma (multiple malignant neoplasms on the skin). The cause of this condition was HIV, which appeared around 70-80 years. XX century.

Almost all cases of AIDS are caused by HIV infection, which is why this term is used to describe the final stage of HIV. In the presence of the human immunodeficiency virus, the immune system cannot adequately respond to emerging external and internal threats.

Other causes of severe immunodeficiency may be damaging radiation, genetic mutations, taking anti-tumor drugs, etc.

In 1983, Luc Montagnier (Pasteur Institute, France) and Robert Gallo (National Cancer Institute, USA) discovered the human immunodeficiency virus almost simultaneously. It has a spherical shape with a diameter of up to 120 nm (0.00012 mm). The outer shell of the virus is represented by a two-layer lipid membrane with glycoproteins embedded in it, which help to attach and stay on the surface of target cells, and then penetrate them. The inner shell of the virus contains its "heart" — two strands of viral RNA and important enzymes that are involved in all chemical reactions and internal processes. In total, one virus contains several thousand different molecules.

The RNA of the virus contains several genes that are responsible for the reproduction of new viruses, its isolation from an infected cell and allow it to escape from an immune attack.

The taxonomy of the pathogen:

- Domain Viruses
- Realme — Riboviria
- Kingdom — Pararnavirae

• Type — Artverviricota
• Class — Revtraviricetes
• Order — Ortervirales
• Family — Retroviruses
• Genus — Lentiviruses
• Species — Human Immunodeficiency Virus 1 (HIV-1) and Human Immunodeficiency Virus 2 (HIV-2).

HIV-1 has 9 subtypes, is contagious and dangerous only to humans. Initially, the virus was presumably transmitted from chimpanzees. HIV-2 — theoretically, it is possible to get infected from animals, such as smoky mangobeys, but this happens extremely rarely and, in general, the total role of HIV-2 in human pathology is insignificant.

HIV multiplies only in the human body and dies when exposed to:
• any disinfectants and antiseptics;
• sunlight and ultraviolet light (from several to ten minutes);
• saliva and sweat;
• Sea water and soda.

It also loses activity when heated from 56 ° C and in an alkaline and acidic environment (for example, in soap solution, soda, lemon juice, Coca-Cola or beer).

In the dried state at room temperature without sunlight, the virus remains alive for 7 days. HIV persists for about the same time in syringes with blood if its temperature does not exceed 40 °C (the lifetime depends on the amount of blood, the amount of virus, temperature, humidity) and in dried blood at a temperature of about 4 °C. For two weeks, the virus remains viable in corpses at room temperature.

Despite the instability outside the human body, under favorable conditions (conservation), the virus can persist for years in blood and transfusion components. It can also live for 10 years in a frozen state, but immediately dies when thawed [5][7][8][9].

The prevalence of AIDS

According to the Joint United Nations Programme on HIV/In the 30 years since the beginning of the HIV epidemic, 80 million people have fallen ill, and at least 36 million people have died from AIDS.

According to data for 2020, there are about 37 million people living with HIV in the world (and more than half of them may not know about their diagnosis) — the largest number of infected people live in sub-Saharan Africa. In Russia, more than 1 million people with HIV have been registered (the real number may be twice as many) and about 388,000 people have died.

In 2020, 1.5 million people became infected with HIV, and 680 thousand people died of AIDS. At the same time, the number of new HIV infections decreased by 52%

compared to 1997, when the largest number of new cases were registered. Also, the number of deaths from AIDS decreased by 64% compared to 2004 (the largest number) [3].

How can you get infected with HIV and AIDS

The virus is found in a wide variety of tissues and cells, but in sufficient quantities to transmit the pathogen, it accumulates only in blood, breast milk, sperm and vaginal secretions.

Anyone can get HIV infection. There are about 1-2% of people who have some genetic resistance against the virus (CCR5 gene), however, it works only with sexual transmission (most likely due to insufficient amount of transmitted virus) and is ineffective with drug addiction and blood transfusion.

It is impossible to get infected with HIV in the following ways:

• by airborne droplets — through coughing, sneezing or talking;

• fecal-oral — through feces and urine, when eating food with blood particles of an HIV-infected person and using common utensils;

• contact — through sweat, handshake, ordinary kisses, non—penetrating sexual acts, in a communal pool, sauna, etc.;

• at a dentist's appointment - after using an antiseptic and sterilization, HIV dies;

• when taking blood, the sampling is carried out using disposable instruments, the puncture area is sterilized;

• from the bite of a blood—sucking insect - although in regions with a high incidence of the insect population, HIV was detected;

• from the bite of a sick person — if the bites are not accompanied by extensive wounds, in which the patient's blood enters the wound of a healthy person.

HIV infection is possible when three important conditions are met:

• the source of infection is a sick person with a significant viral load;

• a person susceptible to infection is any healthy person;

• favorable circumstances for the transmission of the virus — damaged skin or mucous membranes, injection of infected material into the body or its mechanical rubbing. At the same time, dried biological material (blood, semen) does not pose a danger to humans.

Ways to get infected with HIV:

• vaginal intercourse without a condom — both partners are at risk approximately equally, but most women with HIV have become infected in this way;

• anal intercourse without a condom — the receiving partner is more vulnerable, since the virus easily overcomes the small intestinal mucosa;

• sharing needles, syringes and other cutting and stabbing medical instruments - when using drugs;

• mother—to-child transmission of HIV is possible during pregnancy, childbirth or breastfeeding, transmission without prevention is about 20%, however, if the mother treats HIV throughout pregnancy and after it, the risk of infecting the child is less than 1% [7][9];

• oral sex is a rare type of transmission, possible with high viral load, damage to the mucous membrane of the mouth and genitals, ejaculation, mouth ulcers or bleeding gums;

• transfusion of blood and its components, organ and tissue transplantation is an extremely rare type of transmission, since all materials are carefully checked, infection in this case is usually associated with human error or intentional action;

• deep kissing is an extremely rare type of transmission, possible if both partners have bleeding gums or have extensive ulcers in their mouths;

• tattoos and piercings are a theoretical risk if manipulations are performed in unsanitary conditions.

For 2020, the most common ways of HIV infection in Russia are:

• intravenous injection of drugs with one syringe — 50 %;

• heterosexual unprotected sexual contact — at least 47 %;

• homosexual contact — 1.5 %;

• transmission of the virus from an infected mother to a child — 0,6 % [14][15].

Risk factors for the development of AIDS:

• risky sexual behavior — promiscuous sex, sex without a condom;

• alcohol consumption;

• taking drugs;

• a permanent HIV-infected sexual partner — with unprotected sex with a patient who is not undergoing special HIV therapy;

• Poverty.

Constant sex without a condom in a heterosexual couple, where one of the partners is HIV-infected, increases the risk of infection by up to 30-40% during the year, and the probability of infection of the wife from the husband is higher than the husband from the wife [7].

The universal spread of HIV/Insufficient information about the disease, ways of infection, methods of prevention and treatment has led to the formation of so—called "AIDS phobia" - a condition when a person is constantly afraid of getting AIDS, finds imaginary symptoms or associates real signs of another disease with AIDS, while not trusting the results of repeated negative HIV tests [1][3][5][7].

As a rule, an incubation period lasts for several years after infection, during which a person has no obvious symptoms (excluding the acute period of the disease). Only after a while, when the virus significantly weakens the immune system, the final phase of the disease begins, in which the symptoms of AIDS appear.

On average, 10 years pass from the moment of HIV infection to the development of AIDS, from the moment of AIDS development to death — from 6 to 22 months. The lifetime from the moment of infection to death without treatment ranges from 7.5 to 11.6 years [7].

The conditional limit of the onset of AIDS is considered to be a critical decrease in the cells of the immune system that fight infections: the level of CD4+ cells becomes below 0.2×10*9/l (200 cells/ml).

The main sign of AIDS is the development of secondary lesions that directly threaten the patient's life, which are practically not found in healthy people (for example, opportunistic infections and tumors).

Opportunistic infections are diseases whose pathogens usually do not lead to diseases and affect the body only in conditions favorable to them. At the same time, the frequency of such infections varies in different countries depending on the prevalence of infectious agents, the patient population and the level of coverage of therapy.

AIDS-indicator diseases

Since AIDS is a condition in which other diseases develop, it is more correct to use the term "AIDS—indicator diseases", that is, associated with AIDS:

• Pneumocystosis is one of the most common infections in AIDS, which leads to death. It is usually localized in the lungs, but it can also affect other organs. It is mainly transmitted directly from humans through the respiratory tract with sputum and mucus. There is also an intrauterine infection. The disease can develop both after activation of a "dormant" infection, and with a new infection. It is characterized by a slow increase in sweating and body temperature (up to 38-40 ° C), the gradual development of weakness, intoxication and shortness of breath: at first it appears only with physical exertion, and then it manifests itself more and more strongly and does not go away even in a calm state. At first, the cough resembles an allergic one with a feeling of tickling behind the sternum, then it descends and becomes stronger, while sputum is not released. Patients look pale, with the development of shortness of breath, their nasolabial triangle turns blue, the frequency of respiratory movements increases from 20 to 60 times per minute, breathing becomes shallow and harsh, wheezing is rarely heard. The pulse also increases, respiratory and cardiovascular insufficiency increases, and pronounced anxiety appears. Chest pain and the development of pneumothorax are possible. If the disease is not treated, the process can become fatal. Among the lesions of other organs, retinitis, thyroiditis, hepatitis and skin lesions are the most common.

Candidiasis is more common than others. Various manifestations of the disease are possible: from superficial candidiasis to systemic with damage to internal organs. With superficial candidiasis, red indistinct blisters or ulcers appear on the skin (more

often in the groin, armpits and under the breast), nail damage is possible. Vulvovaginitis often develops. Almost all patients have oral candidiasis in various forms and combinations: white plaque deposits, red and white spots, inflammation of the mucous membrane and skin of the lips, which are accompanied by burning, while the taste changes or disappears. Esophageal candidiasis is characterized by difficulty swallowing, in which the patient develops pain behind the sternum. Symptoms of damage to the stomach, small and large intestines may also be associated, such as nausea, heartburn, discomfort and abdominal pain, stool disorders, weight loss, but these symptoms are not specific. When the respiratory tract is affected, patients are concerned about sore throat, hoarseness of voice, cough, lung lesions may join (cough with sputum, with progression — an increase in body temperature, an increased cough with abundant sputum and an admixture of blood). There is a risk of candidal meningitis and meningoencephalitis (without specific symptoms).

For the specific diagnosis of HIV, three types of tests are used with different diagnostic values and the time interval after infection at which the virus can be detected:

• Blood PCR — detects the virus itself and its amount on the 10th day after infection and later. However, when HIV multiplies inactive, the test cannot detect it. Among the disadvantages of blood PCR is also its high cost and the fact that it usually detects only HIV-1.

• Blood ELISA of the 4th generation is the most common, cheap and reliable method of detecting HIV, which consists in an "antigen-antibody" reaction. When analyzing blood from a vein, it is enough that 6 weeks (from 18 days) have passed after infection, an express blood test from a finger can detect the virus in 18-90 days.

• ELISA tests of blood or saliva for antibodies — carried out 23-90 days after infection. These are the tests of the last generation, they try not to use them.

Scientists continue to improve the tests. They try to make them more accurate and sensitive in order to detect HIV as early as possible after infection.

Immunological tests indicate the development of AIDS, that is, the suppression of the immune system. Severe immunodeficiency is established when the level of cells with CD4 receptors is less than 200 cells /μl (less than 15%).

Differential diagnosis

AIDS is characterized by a wide variety of manifestations, so it is impossible to differentiate it. The only reliable criterion is a laboratory test for HIV [1][2][5][6].

To clarify specific lesions of the body, a biochemical analysis of blood and urine is performed, ECG, echocardiography, ultrasound of the abdominal cavity, CT and MRI are performed.

AIDS Treatment

It is impossible to cure HIV, but it is possible to prevent its transition to the AIDS stage or reverse the development of AIDS and restore the functioning of the immune system.

To prevent the development of AIDS, it is necessary to start specific antiretroviral therapy (ART) as early as possible, which inhibits the virus and increases immunity. This is especially important for HIV-infected children, as their immune system is not yet fully developed.

Treatment should be started at any stage of the development of the process, regardless of the time of infection and the level of immunity. Continuous therapy will allow you to:

• maintain a small amount of virus in the blood (from less than 200 copies /ml to an undetectable viral load);

• maintain high CD4 cell levels;

• avoid the development of AIDS-associated diseases and live like a person without HIV;

• to protect loved ones, sexual partner and unborn child;

• to avoid the development of HIV mutations and possible resistance to its treatment.

Like any medication, HIV medications can have side effects (for example, cause nausea, diarrhea, headache, sleep disorders, dry mouth or rash), but do not be afraid of them. As a rule, they take place within a month. Also, a wide arsenal of existing drugs allows you to individually choose the right medicine. Now a new generation of drugs is being introduced into practice, which must be taken not every day, but only once every 1-2 months [1][6][7][9].

A vaccine that could completely cure HIV has not yet been developed, but scientists continue to work on it.

Depending on the prevailing opportunistic infection, antibacterial and antiviral medications may be required, often in combination with drugs from other groups, while treatment takes longer.

As a rule, therapy is carried out in a specialized hospital. If insufficiency of several organs develops, treatment takes place in the intensive care unit.

Forecast. Prevention

If you start therapy at the first signs of AIDS, the life span of patients is almost the same as that of people without HIV. In advanced cases, the prognoses are individual, but most often patients manage to stabilize their condition and increase their quality and life expectancy.

AIDS prevention

Pre-contact and post-contact prophylaxis are considered to be an effective method of preventing HIV infection.

Pre-contact prophylaxis involves constant medication if a person is at risk.

Post-exposure prophylaxis is carried out within 72 hours after possible infection. At this time, it is recommended to consult a doctor and, according to his appointment, start taking a certain set of medications, for example:

• Tenofovir + Emtricitabine + Raltegravir;
• Tenofovir + Lamivudine + Lopinavir or Ritonavir;
• Tenofovir + Emtricitabine + Darunavir or Ritonavir.

1. It is also necessary to prevent the disease:
2. • use condoms during sexual contact;
3. • use disposable or sterile instruments when performing any interventions that violate the integrity of the skin and mucous membranes;
4. • avoid risky sexual behavior and do not use drugs;
5. • be regularly tested for HIV if a person is at risk (at least once a year to donate blood ELISA);
6. • stick to a healthy diet;
7. • exercise regularly;
8. • give up smoking and alcohol, the abuse of which increases the likelihood of risky behavior and, as a result, infection [1][3][7][8].

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