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Current Understanding Of Pathogens Of Parenterally Transmitted Infectious Diseases

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Since the 60s of the last century, the main factors limiting allogeneic blood transfusion in clinical practice are not the reactions and complications associated with isosensitization of the patient with antigenic determinants of the cells and plasma factors of the donor blood, but complications caused by contamination with blood or components of pathogens. was.

INTRODUCTION

Currently, donor blood is tested for a limited number of infections - as in most countries of the world, only markers of 5 blood-borne infections (HIV, hepatitis B, C, brucellosis and ulcer) are detected. At the same time, it is known that a large number of pathogens of blood-borne infections associated with various types of microorganisms can be transmitted by blood, its components and preparations: bacteria, viruses, parasites, rickettsiae (1/1 table). In the last decade, the situation regarding infection during blood transfusions has become more complicated due to reports of possible transmission of infectious prion proteins, although retrospective studies from 1995 to 2005 reliably confirmed cases of transmission of the disease according to the US Centers for Disease Control and Prevention. not registered in the center.

Table 1.1

The main causes of infectious diseases transmitted by blood components and blood products

No	Pathogens	Pathogen type	Risk of transmission
Viruses			
1	Hepatitis A	Picivirus Minor	There are reports of contamination with plasma products
2	Hepatitis B	Haepadnovirus	Very big
3	Hepatitis C	Phlaivirus	Very big
4	Hepatitis D	Viroid	High, but only in the presence of HBV
5	Hepatitis E	Hepatitis E is not classified	It has been proven that it can be transmitted

			through blood components
6	Hepatitis G	Phlavivirus	Very small
7	HIV 1, 2	Retrovirus	Very big
8	Human T-lymphotropic virus (HTLV) 1.2	Retrovirus	High in endemic centers
9	West Nile fever	A virus in the western direction	It has very high endemic foci
10	Herpes simplex virus (HSV) 1.2	Herpesviridae	Very small
11	Cytomegalovirus (CMV)	Herpesviridae	Very small
12	Epstein-Barr virus (EBV)	Herpesviridae	Very small
Bacteria			
13	Syphilis	Treponema pallidum	Very small
14	Yersiniosis	Yersinia enterocolitica	High in endemic foci
Parasites			
15	Plasmodium malaria	Blood parasite	High in endemic areas
	Visceral leishmaniasis	Leishmania donovani	Possible in endemic areas
	Trypanosomiasis	Trypanosoma crusi	High in endemic foci
	Chagas disease	Trypanosoma africanus	High in endemic foci
	Babesiosis	Babesia microti	High in endemic foci
	Swan fever	Coxiella brunettei	High in endemic foci

Viral hepatitis. Among the infections transmitted by blood transfusion, viral hepatitis is of great importance. In recent years, thanks to the use of methods of virology, biology, genetic engineering (in particular, recombinant technology), new horizons have been opened for understanding the problem of "viral hepatitis" and its further study. In particular, studies have shown that the "hepatitis alphabet" is not over yet. There remains a place for viral hepatitis caused by other pathogens. However, the probability of the occurrence of such infections is not very high, because in order for a "new" virus to become dangerous as a source of post-transfusion complications, it must have a number of characteristics: a very wide spread in the population, a mechanism of parenteral transmission, a long period of viremia period, high pathogenicity, sufficiently long incubation period and/or causing asymptomatic carriage .

Despite the fact that the issue of post-transfusion complications caused by "new" viruses remains controversial, they are attracting the attention of transfusion specialists as one of the new sources of blood-borne complications. Hepatitis B,

C, D, G, A, TT, SEN-V viruses of different intensity can be transmitted parenterally and cause post-transfusion hepatitis (PTH).

In different countries, the proportion of parenterally transmitted hepatitis was 2-17% in the early 1990s. By 2000-2003. it has decreased to 0.3-7% as the quality of donor screening has improved. The number of cases of PTH depends on the level of morbidity in a certain area, the frequency of asymptomatic carriage, the laboratory support of the blood service, etc. It is called the main risk as a source of infection. "Healthy" virus carriers, as they are usually unrecognizable, lead an active lifestyle and can be donors.

A high percentage of HBsAg and anti-HCV antibody carriage was found in non-remunerated donors (2.1 and 3.9%), the percentage of infected among staff donors is lower (0.47 and 0.94%), and it is insignificant among plasma donors. and platelets (0.41 and 0.45%). The percentage of those infected with hepatitis B and C among relative donors is 2.7-3.3 times higher (5.7 and 12.8%, respectively) compared to non-reciprocal donors.

The share of hepatitis B in the structure of PTH in different countries is 40-50%, and hepatitis C is 50-88%.

In the United States in 1998, the incidence of posttransfusion hepatitis B infection was 1.2%. in 2000-2001. approximately 4 million people had antibodies against hepatitis C virus and 2.7 million people had active infection. In Moscow from 1995 to 1998. the incidence of hepatitis B increased by 1.5 times, hepatitis C by 2.7 times. Hepatitis C accounts for approximately 60% of all PTHs. In recent years, due to the improvement of the quality of donor screening, the percentage of transfusion hepatitis infection in Russia and Moscow has decreased to 7.5-13% in 1990-1991. In 2001-2003, to 0.2-0.8%, the total number of donors with hepatitis B and C markers also decreased slightly. Nevertheless, the analysis of registered cases of post-transfusion hepatitis infection shows the need to continue work on their prevention by improving the quality of laboratory testing of donor blood.

Hepatitis B is caused by a DNA-containing virus with a complex ultrastructural and antigenic organization, including DNA, DNA polymerase and 4 antigens. The virus is covered with a spherical lipid-protein outer envelope containing HBsAg. The inner layer consists of repetitive protein structures that can be immunologically identified as hepatitis B virus core antigen (HBcAg). With partial denaturation of HBcAg in the serum of patients, it is said. hepatitis B virus infection antigen (HBeAg). HBxAg antigen is less studied. [305]. Each of the HBV antigens responds to humoral immunity, which is manifested by the production of appropriate antibodies - anti-HBsAg, anti-HBcAg, anti-HBeAg and anti-HBxAg.

Since the presence of HBsAg confirms the presence of both acute and chronic HBV infection, it is mandatory to detect it in the examination of donors. Hepatitis B virus is highly contagious. It is resistant to the effects of many external factors and can be stored at room temperature for 3 months, in a refrigerator at minus 8-100 ° C - up to six months, in dried plasma or frozen - for years.

Vaccination plays an important role in the system of measures aimed at preventing PTH caused by hepatitis B virus. In the program of the World Health Organization [413], the implementation of extensive vaccine prevention programs in Great Britain, Belgium, Italy and the United States reduced the incidence rate to 1-4 per 100,000 population, the possibility of transition to chronic forms and death. created. Vaccination against hepatitis B is also preventive against hepatitis D, because the hepatitis D virus cannot multiply in the body without the presence of HBsAg. Vaccination of children against hepatitis B reduces the risk of primary liver cancer.

The WHO-recommended strategy calls for universal vaccination of newborns and high-risk groups in countries with a carrier rate of more than 2% and an infected population of more than 20%. In countries where the virus carrier rate is 0.5% and 5-6% of the population is infected, it is recommended to vaccinate newborns from infected mothers or those who fall into "risk groups". The importance of vaccine prevention for Russia is determined by the presence of many patients with chronic forms and carriers, which are considered the main sources of infection in the country.

There have also been some changes in the structure of hepatitis B transmission routes. Almost universal screening of donors for the presence of HBsAg by enzyme-linked immunosorbent assay (ELISA) and transfusion of components and blood products or diagnosis and treatment due to the use of disposable instruments. the proportion of hepatitis associated with carrying out procedures has decreased. an increase in the number of patients infected by intravenous drug use or sexually transmitted infections. The high incidence of hepatitis among young children suggests that the perinatal route of pathogen transmission is largely preserved.

The economic damage associated with the treatment of patients with parenteral forms of hepatitis B is 700 million rubles per year.

Hepatitis B is one of the most dangerous occupational infections. The incidence of hepatitis B is higher among health care workers, and the symptoms of hepatitis infection are generally more common in the general population. Every year, more than 500 healthcare workers in Northern Europe and more than 6.5 thousand in Southern Europe are infected with HBV. In general, in Western European countries, about 18,000 employees of medical institutions are infected with the hepatitis B virus every year, i.e. an average of 50 people a day and about 350 people die from the long-term effects of hepatitis B - cirrhosis or primary liver cancer. Almost 50% of patients in 30% of healthcare workers at a hemodialysis center in the United States have symptoms of current or previous infection.

Vaccination against hepatitis B in Russia since 1996, by order of the Ministry of Health of the Russian Federation, individuals who form certain risk groups, including children born to mothers infected with HBsAg and all newborns in hyperendemic regions for hepatitis B provided among infants. ... transport rate of 5% and higher. The accumulated experience in the implementation of vaccine prevention programs, although it shows positive results, forces us to admit that the scale of its implementation is still very small and does not correspond to the severity of the epidemic situation. In most regions of Russia, only people at high risk of hepatitis B virus infection are immunized, in some regions only 1.1% of children born to HBsAg carriers are vaccinated. With the intensive involvement of people aged 15 to 30 years in the epidemic process, WHO recommends routine vaccination of adolescents aged 12-14 years. Due to the lack of funds in Russia, it is impossible to fully implement the necessary measures.

The severity of the epidemic situation and the low effectiveness of the anti-epidemic and preventive measures indicate the need to introduce various preventive vaccination programs. In this regard, an additional preventive measure can be, including vaccination of patients who have to undergo planned invasive procedures. surgical interventions using a large amount of hemocomponents. For people at risk, the most effective means of protection against hepatitis B is vaccination, which should be done by health workers when they enter the health care system. In Moscow in 1986-1994. before the mass vaccination of medical workers, the incidence rate was 3-3.5 times higher than in the adult population. After the

introduction of vaccination for healthcare workers, rates decreased from 60.7 per 100,000 healthcare workers in 1993 to 4.1 in 2003. In order to preserve the obtained results, it is necessary to continue and strengthen the work in this direction.

Hepatitis Ccharacterized by high heterogeneity of the viral genome encoding structural (core and two envelope proteins El and E2) and non-structural proteins (NS2, NS3, NS4a, NS4b, NS5a, NS5b). Currently, 6 genotypes of the hepatitis C virus are known (HCV and 6 subtypes, numbered in the order of their discovery.

Acute hepatitis C is relatively mild, the incubation period is 7-8 weeks. Post-transfusion hepatitis often becomes chronic - in 80% of cases. In addition, when infected with the hepatitis C virus, the disease is often asymptomatic, and the incidence of anicteric forms is about 70%. The disease often develops without clinical manifestations and in 50% of cases it becomes a slow chronic form, which ends with cirrhosis of the liver in about 20%, and in 3-8% of patients - with the development of hepatocellular carcinoma. Viral RNA is detected 1-2 weeks after infection. Viremia is detected 5-10 weeks before the onset of clinical signs, and antibodies are detected 10-12 weeks after infection, but may not appear for 3-6 months. In most patients, antibodies disappear several years after recovery; in the chronic phase of the disease, they often persist throughout life.

Hepatitis D. Hepatitis D accounts for 7-10% of post-transfusion hepatitis. Hepatitis D virus (HBV) can only reproduce in the presence of HBV because the infectious virus consists of an outer envelope containing hepatitis D virus RNA (internal antigen) and HBsAg. The prevalence of hepatitis D virus is correlated with the level of HBV disease and has been reported in different regions, ranging from 0.1% to 30% of the total number of HBV infections. On average, approximately 7.7% of patients with chronic hepatitis B are co-infected with VGO. In addition, the frequency of hepatitis D markers in PCR-negative patients with hepatitis B was statistically significantly higher (13.6%) than in PCR-positive patients (4.4%). Infection can occur with both pathogens at the same time - HBV / VGO co-infection (mixed hepatitis B + D) or when HBV is infected with the hepatitis B virus, with the appearance of HBV / VGO - superinfection.

Hepatitis AIt is traditionally considered to be an oral-fecal-transmitted disease, but in 1991 it was published in Australia about the spread of this disease by parenteral infection among drug addicts and homosexuals. HG Klein described cases of hepatitis A in hemophiliacs treated with factor VIII concentrate. A. Diwan et al. report 2 cases of hepatitis A infection with leucolayer and FFP with dedosed erythrocytes from a single donor. Since the frequency of occurrence of hepatitis A virus (HAV) among donors is 1 case per 1000 people per year, contamination in 18-20 thousand units of blood donation plasma for a typical plasma pool (4500 liters) will be 1 viremic unit. 107 or 108 degrees contain infectious units of HAV . Despite the high prevalence of hepatitis A in Russia (about 85% of the population has IgG antibodies to HAV), cases of parenteral infection have not yet been reported.

In 1997, a virus called TTV (transfusion-transmitted virus) was isolated from a patient with probably parenteral and blood-borne transmission. This was confirmed by the data that it was reliably detected more often in patients with a history of blood transfusion (26.4%) than in those without blood transfusion (4.2%). In addition to the parenteral route of transmission, there are reports of transmission of the virus from the mother to the fetus - the vertical route [309] and food - through the meat of infected animals. Diagnosis is carried out by the PCR method. There is information on the detection of hepatitis TT virus (HTT) in the blood of donors from the USA (up to 1%), Italy (22%), Brazil (more than 60%). The frequency of anti-TT

antibodies reached 37% in patients with multiple transfusions and 44% in patients with hemophilia. The obtained data allow us to conclude that there are many ways of infection with this virus and that there are people infected with viremia, but there is no information about its pathogenicity for humans and the development of PTH.

Hepatitis Gfirst described in 1996, and Hepatitis G virus (HV G) has been identified in approximately 2 percent of donors in the United States. It is more common than HCV but is not associated with liver damage.

In 1999, researchers identified a new virus, Sen-V, associated with hepatitis of unknown etiology, named after the initials of the person whose blood was first detected. It has been suggested that it may be associated with the development of post-transfusion hepatitis. However, specific studies have shown that, like BTG, it does not cause liver pathology and is probably not related to blood transfusion. Genetic analysis showed that the SEN-V virus is closely related to the BTT family.

AIDS virus. Acquired Immune Deficiency Syndrome (AIDS) - The first publications on Acquired Immune Deficiency Syndrome (AIDS) date back to 1981. As it turned out later, AIDS is only a late, open and actually terminal stage of the disease. The infectious agent was discovered in 1983 by the International Committee of Experts on the Taxonomy of Viruses in 1986 and gave it the name "Immunodeficiency virus" (HIV) - human immunodeficiency virus (HIV). In the same year, L. Montagnier found a variant of HIV that could not be detected by conventional testing systems in HIV-2 living in West Africa.

To date, according to WHO data, hundreds of thousands of patients have been registered in 160 countries of the world. In the United States, the number of patients doubles every 6-8 months; In West African countries, the number of infected people reaches 40-60 percent of the total population. The first case of HIV infection in a citizen of the USSR was reported in 1988, after returning from West Africa [132]. In order to prevent HIV infection, a network of specialized laboratories was created to examine the population and donors. In the last decade, the incidence in Russia has a clear upward trend - in December 1998, the number of patients crossed the ten thousandth line. The incidence rate in Russia is currently 46.4 people per 100,000 inhabitants. This indicator increased by 1.8 times last year. In 2003, compared to 2002, the proportion of blood rejected for HIV increased by 1% and 0.8%, respectively [161]. In terms of the number of people infected with HIV, the Moscow region is in the leading position - 9381 people, Moscow takes the second place in the country - 8388 people, the third place is the Irkutsk region - 6142 people. If such growth rates continue for at least 2 years, more than 1 million people will be infected in Russia, of which 90% are young people aged 15-30. Every 50 inhabitants of the planet can be affected by the first decade of this century. The group of children born to HIV-infected mothers is also increasing. From 1987 to 1998, their number was 15, in 1999 - already 70, in 2000 - 150.

HIV belongs to the family of retroviruses, a subfamily of lentiviruses (slow viruses), which are characterized by a long latency period that corresponds to the first stage of the disease (the stage of "quiet virus"), the next stage of illness and death. Retroviruses are also distinguished by the presence in the virion of reverse transcriptase (revertase), an enzyme that synthesizes DNA in the viral RNA matrix. The structure of the virus is encoded by three genes - ENV, CAG, POL.

HIV is an intracellular lymphotropic virus that primarily affects T-helper cells that carry the CD4 and CD8 receptors that recognize the virus's target cells. These receptors are found on

macrophages, eosinophils, B-lymphocytes and other cells. M cells of the rectal mucosa and sperm, despite the lack of CD4 receptors on their surfaces, can adsorb and transmit the virus, which is important for sexual transmission.

HIV infection belongs to anthroponosis. The source of infection is patients at any stage of the disease and virus carriers. The natural ways of transmission include sexual (with homo and heterosexual contacts) and vertical - from an infected mother to a fetus. Artificial, artificial way - plays an important role with various medical interventions and blood transfusions.

The AIDS problem was mainly related to transmission of the virus through blood components and drugs. In countries where AIDS is endemic (USA, Western Europe), post-transfusion infection accounted for 2-3% of all registered patients. With the introduction of HIV-infected blood components, the probability of developing the disease exceeds 90%.

Recipients of multiple blood transfusions are at increased risk. These include, first of all, patients with hemophilia. In the United States, 1 percent of hemophiliacs who received factor VIII concentrates and 2 percent of patients who received transfusions developed AIDS. During the first 10 years of the epidemic, the number of new AIDS cases from any cause increased by 65-90% per year. By the mid-1990s, the share of blood-borne HIV infection in the world epidemic was 3-5%.

In the last decade of the 20th century, the efforts of blood transfusion specialists were aimed at reducing the risk of spreading viral infections - they began to carefully approach the selection of donors; more improved test systems for pathogen screening and methods for neutralizing viruses in the blood have been developed. All of these interventions have reduced viral infections during transfusion. By 2004, modern blood testing methods have reduced the risk of HIV infection to approximately 1 in 670,000, hepatitis B to 1 in 137,000, and hepatitis C to 1 in 100,000 doses of blood components. It is believed that the introduction of NAT technologies (nucleic acid detection) reduces the risk of infection from a blood dose by 5-10 times.

Thus, the introduction of new laboratory technologies significantly reduces the risk of post-transfusion infectious complications, but this only affects infections for markers that are tested in donor blood. However, it should be kept in mind that blood is generally not screened for a number of hemotransmissible pathogens. Thus, it is true that viruses of the herpes group are transmitted through blood.

Herpesviruses. Grouped into the family Herpesviridae and containing more than 70 species, among which CMV, HSV types 1 and 2, EBV, varicella-zoster virus and herpes zoster virus (VOG), human herpes virus (HSV) VI are important for humans. and types VII. Information on the identification of type VIII VG is available.

Herpes viruses are common in the human population; they can infect all organs and systems of the human body and cause latent, acute and chronic infections.

According to the World Health Organization, the total number of patients with herpes infection in the world is about 20 million people. 10-12% of recipients of multiple blood transfusions become infected [87]. Among healthy donors in the United States, the detection rate of antibodies against herpes simplex virus type VIII associated with Kaposi's sarcoma is as high as 6.1% 0.7%) in primary negative recipients of hemocomponents, herpes virus type VIII markers were detected. Patients with immunosuppression, which can lead to severe disease and death, are at high risk for herpesvirus types VI, VII, and VIII. According to the WHO, the mortality rate of herpes infection is

15.8% and is second only to hepatitis mortality at 38.5%.

The risk of CMV infection increases dramatically in immunocompromised individuals. CMV-induced PTH accounts for 2-10% of transfusion-related disease. CMV infection during exchange blood transfusion is detected in 50% of previously seronegative newborns. The incidence of CMV transmission is increased in multiple hemotransfusion recipients. The consequences of post-transfusion CMV infection may be impaired regeneration processes, increased susceptibility to common infectious diseases as a result of CMV-induced immunosuppression, rejection of transplanted organs and tissues, and the risk of cancer development. Complications caused by CMV may result in death in 25% of kidney transplant patients or transplant rejection in 20% of patients.

It is advisable to introduce screening of donor blood for the presence of markers of CMV infection during blood collection for blood recipients with transplanted organs. The prevalence of interstitial infection with CMV ranges from 1 to 12%.

With transfusion of blood components or allogeneic transplantation of organs and tissues, the patient may have EBV infection and reactivation of latent infection. EBV infection is one of the causes of death in myelogenous transplantation. Interestingly, in patients with infective endocarditis, the distribution of all antigens of the Human Leukocyte Antigens (HLA) system to which the EBV immunodominant epitope is bound is reduced, and the resulting complex is recognized by cytotoxic lymphocytes, which causes resistance.

All individuals positive for EBV infection. The presence of specific antibodies of the IgM and IgG classes serve as laboratory indicators of infection. At the same time, the traditional serological examination has certain limitations, because the presence of antibodies in the blood (in 85-90% of healthy donors) is not a defining sign of an active process due to the high infection rate of the population.

Human T-lymphotropic viruses.Human T-lymphotropic viruses (HLTV) types I and II cause dangerous diseases of the blood system and damage the central nervous system. HTLV-I stands for retroviruses and HTLV-II stands for oncoviruses. They have a clear lymphotropic, neurotropic and special affinity for CD4 + cells. HTLV-I induces T cell proliferation in vitro and is the cause of adult T cell leukemia. HTLV-I is not widespread in European countries. HTLV-I is detected among Europeans who have sexual contact with endemic countries (Africa, Japan, the Caribbean) or inhabitants of endemic areas. There are reports of HTLV-I prevalence in Sakhalin [296] and Latvia, where this virus was detected in 0.3% of donors and antibodies in 0.8% of people with hemoblastosis [93]. The prevalence of HTLV-I was 1.7% in Khabarovsk region, 2.2% in Primorsk region, and 1.6% in Sakhalin region.

HTLV-II is even rarer in European countries. The natural routes of HTLV-I/II include the genital and vertical routes from mother to fetus. For the first time, transmission of HTLV-I with blood components was described in 1984, and seroconversion was detected in 54-63% of recipients. When infected, the incubation period in infected recipients ranges from 15 days to 3 months.

In the United States, mandatory testing of antibodies against HTLV-I and HTLV-II is performed in donors, among whom the number of carriers is 0.016%. (Goodman C., 2003). In Brazil, donors have been screened for HTLV-I/II viruses since 1993. The prevalence of HTLV-I/II markers among donors ranges from 0.04 to 1%. The causes of seroconversion in previously negative donors are the presence of infected people in the family (35%), blood transfusion (25%), multiple sexual relations (30%), drugs (15%).

Parvovirus B-19.Parvovirus B-19 is the first of the human pathogenic parvoviruses to be found incidentally in the blood of a healthy donor during hepatitis B screening.

It belongs to the group of single-stranded DNA viruses with a size of 15 to 28 nm [256]. The risk of parvovirus B-19 infection is multifaceted when using blood products prepared from a plasma pool. The detection rate of parvovirus B-19 among donors in Portugal was 0.12% in blood PCR testing.

Parvovirus B-19 can cause a variety of illnesses, ranging from asymptomatic to life-threatening. It can cause the development of acute arthritis, aplastic crisis, hemolytic anemia and fetal diseases that lead to spontaneous abortion. Risk groups are immunocompromised recipients, patients with chronic hemolytic anemia, and pregnant women.

West Nile virus.In 2001, the possibility of transmission of West Nile virus (West Nile pathogen \VNVX, the risk of transmission is high in endemic foci [319, 232, 355]) with blood products was revealed. and other mammals. In addition, human infection with ANT-V is asymptomatic, causing a subfebrile reaction in about 20% of cases, and less than 1% of patients develop encephalitis or meningitis.

The virus was discovered in the United States in 1999, where cases of West Nile fever and transfusion transmission were reported [341]. A 2002 Canadian donor survey identified viremic individuals [249]. Currently, very simple and effective methods have been developed for the detection of markers of this virus in the blood of donors.

Bacterial infections.Of the large number of blood-borne bacteria, donor blood is tested only for the presence of markers of the causative agent of syphilis - Treponema pallidum. The first report of syphilis infection by blood transfusion appeared in 1915 and was the first known blood-borne transmission of the infectious disease. The patient's blood is infectious at any stage of the disease, but the real danger of transfusion of the syphilitic pathogen occurs during the incubation period, before the appearance of clinical symptoms. This is due to the fact that serological examination prevents transfusion of blood components of a donor with syphilis at any stage of the disease, except for the incubation period (6-7 weeks from the moment of infection) and the first three weeks of primary syphilis, usually using screening tests such as microreactions . precipitation (MP), compliment binding reactions (CSC) are still negative. The use of ELISA blood test allows to shorten this seronegative period to 3 weeks, because modern test systems detect IgM antibodies to Treponema pallidum 3 weeks after infection. Since there are almost no methods that allow to determine the presence of the causative agent of syphilis in the body during the first weeks after infection (the seronegative period of the "window"), it is important to question the viability of Treponema Pallidum in hemocomponents depending on their storage conditions and the concentration of microorganisms in the unit. volume. Studies have shown that Treponema Pallidum dies after 72-120 hours of storage at 40C in the mass of erythrocytes. The infectiousness of hemocomponents containing 5x104 bacteria in 1 ml is 48 hours, their number is 1.25x106 - 72 hours, and 2.5x107 is 120 hours. In fact, transfusion of erythrocyte mass, even from an sro-negative donor, is safe 5 days after harvest.

According to the Ministry of Health of the Russian Federation, the incidence rate has increased approximately 70 times since 1989, and by 1998 it was 264.6 per 100,000 population. By 2003, the incidence rate had decreased, but remained very high. . The incidence rate may be 2-3 times higher than those registered. At the same time, there is an increase in the number of cases with an obliterated clinical picture and asymptomatic course. In this

regard, the introduction of highly sensitive and specific diagnostic test systems for syphilis into the blood service practice is of particular importance.

At the same time, there have been no strictly documented cases of transfusion syphilis in the United States and European countries in the last 30 years, and in the Moscow region in the last 20 years. In this regard, the American Association of Blood Banks proposed in 1995 to refuse to test donated blood for syphilis, but the FDA decided to consider it as a surrogate test for HIV and viral hepatitis and to continue testing. However, GA Herrezza et al. analyzed the results of more than 4 million happy donors and found that these surrogate tests did not increase the safety of the viruses. A randomized PCR test of Treponema pallidum DNA and RNA in 150 platelet concentrates from blood donors with positive tests for treponemal antibodies was conducted abroad and in our country, and it was possible to conclude that it was negative. test results of the examined samples.

The absence of DNA and RNA of the causative agent of syphilis in the seropositive blood of donors explains the absence of reliable cases of transfusion syphilis. However, at this time, it is too early to completely exclude existing methods of testing blood donors for syphilis. Even in the absence of clear evidence of syphilis infection through blood transfusion, OK Loseva, MN Gadzhimuradov cite 2 cases that occurred in 1997-1998, that is, with a very high probability of infection during blood transfusion. Also, according to them, there is an unsolved problem of contamination through blood products that have not been heat-treated during the manufacturing process. It is possible to reduce the amount of disposal and disposal of plasma pools or drugs obtained from them, if they are known to contain seropositive plasma from at least one donor (currently it is several hundred liters), only with the introduction of PCR testing methods Syphilis in automatic mode is possible.

In the last decade, the post-transfusion complications caused by bacterial contamination of blood components have received much attention in developed countries. Bacterial contamination can occur through the skin or when receiving blood components from a donor with asymptomatic bacteremia. Severe complications due to bacterial contamination were reported with every 6th contaminated dose infusion. In France in 1994-1998. reported 185 complications from bacterial contamination of blood components, of which 18 were fatal. In the literature, there are cases of infection of gram-positive bacteria with a mass of erythrocytes, in particular, pathogens of salmonellosis. Yersinia enterocolitica infection has been reported, resulting in the death of 11 erythroma recipients.

Bacterial contamination of platelets poses a risk of rapid bacterial growth due to storage of platelets at 22°C. Studies at a Canadian blood center have shown that an average of one in 1,000 platelet concentrates contains bacterial contamination [236]. The risk of transfusion-associated bacterial sepsis increases with increasing platelet shelf life. Therefore, platelets with a shelf life of 5 days or less are recommended for clinical use, despite the development of preservatives that allow platelets to remain useful for longer periods of time [356]. From 1995 to 2002 in Great Britain. 26 cases of post-transfusion bacterial infections were registered, 6 of which were fatal. Frequency of contamination of erythrocyte concentrates 1: 1255 (0.1%), combined platelets - 0.5% (1: 204).

With microbial contamination of at least one dose of platelets and provided that 1% of these transfusions cause patient death, the resulting mortality rate per 100,000 transfusions is higher than HIV infection. In this regard, many studies are being conducted to improve bacteriological control

methods, the introduction of which allowed to establish the frequency of bacterial contamination of platelets - 1 per 1000-3000 . In the USA, Canada and Great Britain, bacterial sepsis is the most common complication after transfusion. and the death rate is up to 23%. The increase in population migration in the modern world leads to the possibility of transfusion of non-endemic pathogens, in particular, Babesia microti, the causative agent of Babesiosis, which is endemic to the coastal regions of the northeastern United States. The causative agent of Chagas disease is distributed in Latin America.

Prions.In recent years, reports of prion infections have attracted the attention of transfusion specialists. The first report on the possible risk of blood-borne prion infection appeared in 1996 [247]. In England, a variant of CJD, an infection considered to be the equivalent of bovine spongiform encephalopathy (SPES), has been identified. SPES was later found to be caused by the same prion strain as the new CJD variant.

The clinical manifestations of different forms of TSE in humans are similar. The disease, as a rule, occurs in middle-aged and older people. However, a new variant of CJD described in the United Kingdom is characterized by a younger age of patients - adolescents, younger than 20 years. It was assumed that the pathogen can be transmitted through blood. In this regard, European countries, which previously received donor plasma from England, rejected the source of these blood products. Some authors were of the opinion that donor blood contains a certain amount of infectious protein. But it later became clear that there is not enough reliable evidence that the CJD pathogen is transmitted through blood components. There is very little information in the literature about CJD infection after blood transfusion: in the recipient after blood transfusion , one patient containing plasma from a patient with CJD in a single liver receptor after receiving pooled globulin [375]. A number of authors suggest that TSEs are contagious to humans and can be transmitted during various therapeutic procedures, in particular, growth hormone - somatotropin injection, dura mater transplantation, cornea. In April 2002, the first case of CJD in the United States was reported in a UK citizen. However, in none of the described cases there is clear evidence that the resulting disease is related to the transfusion of hemocomponents.

Because the potential risk of this route of transmission is very high, extensive epidemiological studies of CJD have been conducted in different countries to determine the incidence, geographic distribution, family foci, associations with dietary characteristics, etc. is going The structural similarity of the infectious prion protein and its normal (cellular) isoform leads to the fact that during the development of prion diseases in humans and animals, antibodies for the PrP8c infectious prion protein, which is perceived as "own" by the immune system, are not detected. This situation complicates the laboratory diagnosis of diseases, their immunotherapy and immunoprophylaxis.

The growing interest in prions and prion diseases in the world is primarily due to the fact that prions represent a completely new class of infectious diseases, and it is no exaggeration to compare their discovery with the discovery of microorganisms by A. Levenguk or with the discovery of DI possible Ivanovsky viruses. There is no doubt that today we are familiar with only the tip of the iceberg, but the main part of it, which is still hidden from us, seems to be related to the problem called "conformational diseases" today, which is caused by the influence of constitutional proteins on the size and / or can change shape and turn from vital to lethal, causing severe and sometimes fatal suffering. The American Neuropathological Association established the

National Prion Surveillance Center in 1997 to monitor CJD and other prion diseases.

Thus, despite the reliable and significant progress of blood transfusion and blood transfusion services in the prevention of post-transfusion viral complications, the risk of contamination of infectious agents with hemocomponents remains. Infectious and viral safety of blood transfusion remains one of the most important problems. Further advances in transfusion medicine, especially blood transfusion, depend largely on the protection of the recipient from infectious and viral infections.

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