Ministry of Health of Ukraine
Poltava State Medical University

Approved"
at the meeting of the Department of
of Internal Medicine No. 3, Phthisiology
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Minutes № from
Head of the Department
Associate Professor _____ PhD
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METHODOLOGICAL RECOMMENDATIONS FOR CONDUCTING AND PREPARING FOR PRACTICAL CLASSES

Academic discipline	Clinical immunology and allergology
*Module **4***	Clinical immunology and allergology
Content module	Clinical immunology and allergology
*Topic **№10***	Basic principles of immunotherapy prescription. Immunorehabilitation, immunoprophylaxis
Course	5
Hours	2

Poltava 2023

Methodological recommendations for the practical training for independent work of students in preparation for the practical training and during the class were prepared by:
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Methodological recommendations were re-approved at the meeting of the Department of Internal Medicine of Internal Medicine №3 with Phthisiology_____
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1. Relevance of the topic.

The latest advances in theoretical and clinical immunology have revealed the subtle mechanisms of etiology and pathogenesis of various diseases accompanied by certain disorders of the immune system. This makes it possible to influence the course of immune reactions with the help of immunotropic therapy, the introduction of which into clinical practice is considered one of the most important achievements of modern medicine.

General aim: to study the classification, principles of use and pharmacological properties of the main immunotropic drugs.

Specific objectives:

1. To study the classification of immunotropic drugs.
2. To learn the basic principles of prescribing immunotropic drugs.
3. To study the pharmacological properties of immunotropic drugs of the thymic group.
4. To study the pharmacological properties of synthetic immunotropic drugs.
5. To study the immunotropic properties of immunotropic drugs of natural origin.
6. To study the pharmacological properties of interferon preparations.
7. To study the pharmacological properties of vaccine-type drugs.

Theoretical questions for practical training:

1. Define the concept of "immunotropic drugs".
2. Give a classification of immunotropic drugs
3. List the basic principles of the appointment of immunotropic agents
4. Give examples of immunotropic drugs of natural origin
5. Give examples of immunotropic drugs of synthetic origin
6. Give examples of immunotropic drugs that act mainly at the level of innate resistance factors

7. Give examples of immunotropic drugs that act primarily on the cellular immunity

8. Give examples of immunotropic drugs that act primarily on the humoral immune system

9. Give clinical and pharmacological characteristics of thymic drugs

10. Give clinical and pharmacological characteristics of immunoglobulin preparations

11. Give a clinical and pharmacological description of the drugs of the vaccine group

12. Give clinical and pharmacological characteristics of interferon drugs

Immunotropic drugs are those that have a direct or indirect effect on the activity of the body's immune system. In a broad sense, almost all currently known drugs can be classified as immunotropic, since the immune system is highly sensitive and always reacts in a certain way to the administration of certain substances. However, in practice, immunotropic drugs are understood to be only those products whose main pharmacological effect is directly related to the impact on immune processes.

Today, there is no unified classification of immunotropic drugs. All known immunotropic drugs can be divided into natural, synthetic and recombinant drugs by origin. Natural immunotropic agents, in turn, are divided into herbal (echinacea purpurea, licorice, Uncaria fomentosa, etc.), animal (e.g. thymic agents, erbisol, immunoglobulin preparations), bacterial (immudon, IRS-19, etc.), fungal (e.g. zymosan suspension, immunomax). Synthetic immunotropic preparations include polyoxydonium, galavit, levamisole and many others. Recombinant immunotropic drugs are those obtained using genetic engineering technologies. In particular, interferons and interleukins are classical recombinant immunotropic drugs.

All immunotropic drugs can be divided into those used for therapeutic purposes (the vast majority) and those used for specific prevention of infectious diseases (vaccines, serums). According to the principle of action, all immunotropic therapeutic drugs are divided into immunostimulants, immunomodulators, immunocorrectors and immunosuppressors. According to the mechanism of action, there are drugs that act mainly on the innate resistance system (methyluracil, polyoxydonium, dibazole, lycopene, etc.), on the cellular (immunophane, levamisole, interferon drugs) and on the humoral immunity (myelopod, splenin, immunoglobulin drugs).

Basic principles of prescribing immunotropic drugs:

1) prescribing them only for immunodeficiency diseases;
2) preliminary use of detoxification therapy to improve the function of elimination organs (enzymes, sorbents, infusion therapy);
3) correct choice of a drug depending on the degree of dysfunction of a particular immune system and the stage of the pathological process;
4) preliminary determination of individual sensitivity to drugs, and sometimes to drug doses in vitro;
5) calculation of the optimal drug dose;
6) determination of an individual administration regimen;
7) in children and elderly people, it is necessary to follow the principle of slow gradual increase in the dose of the immunotropic drug.

Preparations of natural origin

Erbisol is a complex of non-protein, natural low-molecular-weight organic compounds of non-hormonal nature, derived from the embryonic tissue of bovine cattle. The product contains glycopeptides, peptides, nucleotides, amino acids. The pharmacological activity of the product is determined by the content of low molecular weight biologically active peptides, which activate natural, evolutionary control systems of the body responsible for the search and elimination of certain pathological changes. One of these systems is the immune system. Erbisol activates the immune system to accelerate the recovery of damaged and destruction of abnormal cells and tissues. The main immunomodulatory effect of the drug is manifested primarily through the action on the macrophage link, which is responsible for the repair of damaged cells and restoration of functional activity of organs and tissues, as well as through natural killer and cytotoxic T-lymphocytes responsible for the destruction of damaged cells that are not capable of regeneration or abnormal cells (mutant, malignant, virus carriers, etc.). Erbisol also has an immunocorrective effect. In case of immunological status disorders, the drug promotes its normalisation mainly by activating type 1 T-helper and T-killer cells.

The mechanism of action of erbisol is explained by the presence of "markers of the physiological state of cells", which are membrane glycoproteins located on the surface of most animal cells. "Cell physiological state markers" determine the immunogenicity of a tissue by providing the immune system with information about the physiological state of certain cells. In a normal physiological state, these "marker" molecules are synthesised into a normal standard molecule and, therefore,

are invisible to the body's immune system. In case of changes in the physiological state, such molecules are synthesised in a non-standard way, namely, with a changed conformation of their carbohydrate component, which leads to a change in the immunogenicity of the molecule, the severity of which is proportional to the severity of the disease, which is a certain alarm signal for the immune system.

Side effects. Erbisol is well tolerated by patients. No significant side effects of the drug have been reported. However, during the first 3 to 5 days of administration, exacerbation of inflammatory processes is possible. In case of high blood pressure, as well as in the phase of exacerbation of the pathological process, Erbisol should be used cautiously in a reduced dose.

Contraindications: individual intolerance to the drug.

Pharmaceutical form: 1 or 2 ml ampoules.

Thymic preparations

Thymalinum is a complex of polypeptide fractions isolated from the mammary gland (thymus) of cattle. The drug has a regulatory effect on the number of T- and B-lymphocytes, mainly by stimulating cellular immunity reactions and enhancing phagocytosis. Thymalin stimulates regeneration and haematopoiesis processes in case of their inhibition. It is used in acute and chronic purulent processes and inflammatory diseases, in burns, trophic ulcers, as well as after radiotherapy or chemotherapy in cancer patients. There is evidence of thymalin's effectiveness in the treatment of erysipelas infection, chronic pyelonephritis, in the chemotherapy of pulmonary tuberculosis and other diseases.

Before administration, the drug is diluted in 1-2 ml of isotonic NaCl solution to a uniform suspension. Thymaline is injected deeply into the muscle, avoiding entry into blood vessels. Adults are prescribed 5-20 mg of the drug daily (30-100 mg per course). Children under 1 year of age are administered 1 mg, 1 to 3 years of age - 1-2 mg, 4 to 6 years of age - 2-3 mg, 7 to 14 years of age - 3-5 mg. The treatment course lasts from 3 to 10 days, depending on the depth of immune disorder and clinical manifestations. If necessary, a repeat course is performed in 1-6 months. As a prophylactic treatment, the drug is administered intramuscularly daily to adults at 5-10 mg, and to children at 1-5 mg for 3 to 5 days.

Side effects are usually not observed. Chills, dizziness, headache and muscle pain are sometimes observed. In this case, the drug should be discontinued.

Pharmaceutical form: in glass vials of 10 mg of dry substance, closed with rubber stoppers and sealed with an aluminium cap.

Tactivinum is a polypeptide preparation derived from the mammary gland of cattle. The product normalises the quantitative and functional parameters of the T-type immune system, stimulates the production of lymphokines, including interferons. It is used in adults in the complex therapy of infectious, purulent, septic processes, as well as in lymphoproliferative diseases, multiple sclerosis, psoriasis, and recurrent ophthalmic herpes.

Tactivin is administered subcutaneously at a dose of 1-2 mcg/kg body weight at night daily for 5-14 days. Repeated courses are carried out according to the following scheme: first, the optimal dose is calculated, which is then administered for 1-3 days once daily. The effect is manifested already on the first day, but reaches its maximum on the 6th - 7th day. In case of persistent immune disorders, tactivin is prescribed daily for 5-6 days, followed by the drug once every 7-10 days. In multiple sclerosis, the drug is taken daily for 5 days and then once every 5-14 days. The course of treatment in the latter case reaches 1 to 3 years. In surgical patients, tactivin is administered within 2 days before surgery and 3 days after it. In malignant neoplasms and autoimmune diseases, tactivin is prescribed in five to six-day courses during breaks in specific therapy. In recurrent ophthalmic herpes, the drug is administered at 0.01-0.025 mg per day every other day for 8-14 days. The course is repeated after 3-6 months, with tacivin used at 0.025-0.05 mg (25-50 mcg) every other day, 5 injections per course.

The drug is contraindicated in atopic asthma and pregnant women.

Pharmaceutical form: 0.01% solution in 1 ml vials (100 mcg) or ampouled lyophilised powder.

Thymoptinum is a complex of polypeptides from the mammalian pineal gland. It is similar to tactivin in terms of pharmacological action and indications for use.

The product is administered under the skin. Before administration, dissolve the contents of 1 vial in 0.5-1.0 ml of isotonic NaCl solution. It is prescribed for adults at the rate of 70 mcg per 1 m2 of body surface (about 100 mcg), with 4-5 injections at 4-day intervals per course. Repeated courses are recommended if necessary.

It is contraindicated in case of individual intolerance to the drug, pregnancy.

Pharmaceutical form: 100 mcg lyophilised powder in hermetically sealed glass vials.

Thymactidum is a complex of polypeptides from the thymus of calves and lambs. It induces the proliferation and differentiation of T-lymphocytes, normalises the ratio of T- and B-lymphocytes, and activates the phagocytic activity of neutrophils. It is similar in effect and indications to tactivin. It is used in the form of sublingual tablets (or behind the cheek) 1-1.5 hours before dinner, 1 tablet once every 4 days. The course consists of 5-7 tablets.

Side effects: allergic reactions are possible.

Pharmaceutical form: 0.25 mg tablets.

Vilozenum is a lyophilised diazylate of bovine mammary gland extract. It contains compounds of nucleotide and nucleoside nature, amino acids, oligopeptides, amines, inorganic salts. The drug has immunomodulatory activity, stimulating the proliferation and differentiation of T-lymphocytes, and suppresses the development of immediate hypersensitivity reactions. It is used topically in the form of nasal sprays or by intranasal inhalation in case of allergic diseases of the upper respiratory tract (pollinosis and other allergic rhinosinusopathies). It is prescribed for adults and older children. Before use, add 2 ml of boiled water or isotonic NaCl solution to the vial with Vilozen. 5-7 drops are instilled into each nostril 5 times a day or intranasal inhalation is performed. The course of treatment is 14-20 days. If necessary, the therapy is repeated. Treatment should be started at the first signs of the disease or as a preventive measure.

Side effects. In the first days of treatment, increased nasal congestion, transient headache.

Immunoglobulin preparations

Sandoglobulin (human immunoglobulin for intravenous infusion). Each dose of the lyophilised product contains 1 g, 3 g, 6 g and 12 g of human immunoglobulin and 1.8 g, 5.2 g, 10.2 g and 20.4 g of sucrose, respectively. Sandoglobulin is a polyvalent human immunoglobulin that contains a wide range of opsonising and neutralising antibodies against bacteria, viruses and other pathogens. The drug is used as a substitute therapy for hypoimmunoglobulinaemia and as an immunomodulatory drug (for example, in autoimmune diseases). In patients with immunodeficiency

diseases, sandoglobulin replenishes the amount of IgG antibodies, which reduces the risk of infection. In some other immune system disorders, such as idiopathic (immune) thrombocytopenic purpura and Kawasaki syndrome, the mechanism that provides the positive effect of sandoglobulin has not yet been determined. Sandoglobulin is administered by intravenous infusion. Dosage regimens for various indications depend on the patient's immune system, disease severity and individual tolerance. There are no universal instructions for the use of the drug, so the following statements are for guidance only.

Hereditary and congenital immunodeficiency diseases: 0.2 to 0.8 g/kg body weight (most often 0.4 g/kg) at intervals of 3 to 4 weeks. The aim of therapy is to maintain minimum plasma IgG levels (at least 5 g/l). Acquired immunodeficiency diseases: 0.2 to 0.4 g/kg at intervals of 3 to 4 weeks. The dose recommended for the prevention of infections in patients undergoing bone marrow allotransplantation is 0.5 g/kg. It can be administered once 7 days before transplantation, repeated once a week for the first three months after transplantation and once a month for the next 9 months.

In idiopathic (immune) thrombocytopenic purpura (ITP), treatment with sandoglobulin is started at a dose of 0.4 g/kg per day for 5 consecutive days, or at a dose of 0.4-1 g/kg once or for 2 days. If necessary, 0.45 g/kg may be administered at 1-4 week intervals to maintain a normal platelet count. In Kawasaki syndrome, the dose of sandoglobulin is about 1.6 - 2.0 g/kg in several doses over 2 - 4 days as an adjunct to standard treatment with acetylsalicylic acid. In severe bacterial infections (including sepsis) and viral infections, the drug is used at a dose of 0.4 to 1.0 g/kg per day for 1 to 4 days.

For the prevention of infections in preterm and low-birth-weight infants, 0.5 to 1.0 g/kg of sandoglobulin is administered at 1-2 week intervals. In Guillain-Barré syndrome and chronic inflammatory demyelinating polyneuropathy, 0.4 g/kg of the drug is used for 5 consecutive days, and if necessary, the treatment is repeated after 4-week intervals. Depending on the patient's condition, the lyophilised drug can be dissolved in 0.9% sodium chloride solution, water for injection, or 5% glucose. The concentration of sandoglobulin in these solutions for intravenous administration can vary from 3 to 12%, depending on the volume used. Patients who are prescribed sandoglobulin treatment for the first time should be administered the drug as a 3% solution at an infusion rate of 0.5 to 1.0 ml/min (10 to 20 drops per minute). In the absence of adverse reactions during the first 15 minutes, the infusion rate can be gradually increased to a maximum of 2.5 ml/min (about 50 drops per minute). In patients who regularly receive and tolerate sandoglobulin, the drug can be administered in higher concentrations (up to 12%), but the infusion should always

be started at a low rate and the patient's condition should be carefully monitored with a gradual increase in the infusion rate.

Contraindications: hypersensitivity to human immunoglobulins, especially in patients with IgA deficiency.

If contraindications are taken into account, dosage recommendations are followed and the drug is administered carefully, severe adverse reactions to sandoglobulin are rare. They are more likely to occur during the first than during subsequent injections of the drug (either shortly after initiation or during the first 30-60 minutes of infusion) and may be of the anaphylactic type.

Normal human immunoglobulin for intravenous administration (Russia). In general, the indications for use of the drug are the same as for sandoglobulin. However, it should be noted that there have been no large-scale studies of the efficacy of this product.

Preparations of lysates of microorganisms

(immunotropic vaccines)

Imudon. This is an antigenic multivalent complex preparation consisting of fragments of inactivated microorganisms that are most commonly found in pathological processes in the oral cavity. The antigens of such microorganisms activate the immune system, which is manifested by increased phagocytic activity of macrophages, increased content of lysozyme and sIgA in saliva, increased number and activation of plasma cells. As there is a so-called "mucosal solidarity" phenomenon, local immunity is enhanced not only in the oral cavity, but also on all mucous membranes of the macrobiota. To achieve maximum effect, it is recommended to use the drug after a course of detoxification therapy.

Indications for use. The drug is used for the treatment and prevention of gingivitis, periodontitis, stomatitis, glossitis, tonsillitis and pharyngitis. For the treatment of acute and exacerbations of chronic diseases, Immudon is prescribed at a dose of 8 tablets per day for a course of 10 days. 1 tablet is dissolved in the oral cavity every 2-3 hours. For the prevention of oral diseases, the drug is taken at a dose of 6 tablets per day for a course of 20 days.

Side effects. Allergic reactions and dyspeptic phenomena are possible.

Contraindications. Allergic reactions to the drug are a contraindication to the use of Immudon.

IRS-19. It is a complex preparation of bacterial lysates, which are the most common causative agents of upper respiratory tract infections. The lysis of microorganisms is carried out by an original biological technique that allows obtaining non-pathogenic bacterial fragments with preserved specific antigenic properties. Due to these properties, the lysate initiates immune defence reactions in the upper respiratory tract mucosa, which manifests itself in the form of activation and proliferation of immunocompetent cells, increased levels of lysozyme, sIgA and interferons, and enhanced phagocytosis.

Indications for use. The drug is recommended for the treatment of acute and chronic infectious diseases of the ENT organs (sinusitis, rhinitis, otitis media), tracheitis, bronchitis, rhinotracheobronchitis, as well as in the pre- and postoperative period for the prevention of infectious complications of ENT surgery.

For the treatment of upper respiratory tract infections, the drug is administered as an instillation into each nostril 2-5 times a day until the symptoms of the disease are eliminated. For prophylaxis, the drug is taken in a different dose: 2 instillations in each nostril per day for 2 weeks.

Side effects. At the beginning of administration, inflammatory manifestations may increase due to activation of immune reactions. Allergic reactions in the form of urticaria are rare.

Contraindications. IRS-19 is contraindicated in case of allergic reactions to the drug.

Ribomunil. The drug contains ribosomes of microorganisms that most often cause respiratory tract infections (Klebsiella pneumoniae, Diplococcus pneumoniae, Streptococcus pyogenes, Haemophilus influenzae), as well as proteoglycans of the Klebsiella pneumoniae cell wall. It is known that prokaryotic ribosomes differ significantly in structure from similar organelles of eukaryotic organisms, which virtually eliminates the possibility of cross-reactions to human autoantigens.

The drug is intended for the treatment and prevention of recurrent infections of the ear, throat and nose, as well as the respiratory system (bronchitis, tracheobronchitis, infection-dependent bronchial asthma). The ribosomal fraction of the drug activates T- and B-lymphocytes specific for these antigens, which provides a vaccine effect through the synthesis of antibodies to pathogens of the respiratory tract. Klebsiella pneumoniae proteoglycans have a modulatory effect on innate resistance factors, activating macrophages and neutrophils for chemotaxis, adhesion and phagocytosis, as well as increasing the production of α-IFN and interleukins (IL-1β, IL-6, IL-8).

Dosing. A single dose of the drug is 3 tablets in the morning on an empty stomach. The dosage regimen: the first 4 days of the week for 3 weeks, in the next 2-5 months the drug is taken the first 4 days of each month.

Side effects. Transient hypersalivation at the beginning of treatment is possible.

Contraindications. Hypersensitivity to the components of the drug.

Pharmaceutical form: tablets in a blister pack No. 12.

Broncho-munal. This is a preparation of lysates of bacteria that cause respiratory tract infections (Diplococcus pneumoniae, Klebsiella pneumoniae, Haemophilus influenzae, Streptococcus pyogenes, Klebsiella ozaenae, Staphylococcus aureus, Streptococcus viridans, Neiserria catarrhalis).

The drug is recommended for chronic and recurrent respiratory tract infections (brochitis, tonsillitis, pharyngitis, rhinitis, sinusitis, otitis media). Broncho-munal provides immunisation to the antigens of the most common pathogens of respiratory tract infections by inducing the activation, proliferation and differentiation of specific T and B lymphocytes, as well as increasing the production of immunoglobulins (mainly sIgA, but also IgG). Due to the principle of "mucosal solidarity", the formed immunocompetent cells and immunoglobulins are supplied to all mucous membranes, not only to the mucous membranes of the respiratory system, which provides a generalised protective effect.

Method of application. One capsule daily for 10 days of the month for 3 consecutive months for the prevention of infections. For treatment, the drug is used as one capsule for 10 to 30 days (depending on the severity of the disease). For the next 2 months, Broncho-Munal is taken as 1 capsule for 10 consecutive days. 10-day intervals are recommended between courses.

Side effects. When using the drug, mild dyspeptic disorders and fever may sometimes occur.

Contraindication is individual hypersensitivity to the components of the drug.

Pharmaceutical form: 7 mg capsules, No. 10 or No. 30 in a package.

Recombinant immunotropic drugs

Interferon preparations

INTERFERON PREPARATIONS □

VIFERON (RUSSIA) (human recombinant IFN-□2a) is a new dosage form of human recombinant IFN-□2a in the form of suppositories.

Indications: infectious and inflammatory diseases in the neonatal period in full-term and preterm infants (CNS infections, pneumonia, omphalitis, conjunctivitis), hepatitis B, C and D in children and adults, glomerulonephritis associated with herpes and cytomegalovirus infections in children and adults, herpes, chlamydia, cytomegalovirus infection in children and adults.

Dosage and administration: for children under 7 years of age - Viferon-1, for children over 7 years of age and adults - Viferon-2.

Pneumonia and infectious diseases of the central nervous system: 2 suppositories per day with a 12-hour interval daily for 5 days, 2-3 courses with 5 days' breaks.

Glomerulonephritis: 2 suppositories per day with a 12-hour interval for 10 days, then 3 times a week for 6-12 months.

Chronic active hepatitis B, C, and D in children: 2 suppositories per day with a 12-hour interval daily for 10 days, then 2 suppositories per day with a 12-hour interval 3 times a week for 6-12 months.

Herpes, chlamydia and cytomegalovirus infection in adults: 2 suppositories per day at 12-hour intervals daily for 10 days, and then 2 suppositories per day at 12-hour intervals 3 times a week for 3-12 months.

Currently, studies of viferon in pregnant women with infectious and inflammatory pathology are being conducted to reduce morbidity and mortality in newborns.

There are no contraindications.

No side effects have been identified.

Pharmaceutical form: suppositories containing 200 and 400 M0 IFN per 1 g of base (respectively, viferon-1 and viferon-2) and membrane-stabilising additives.

REAFERON (RUSSIA) (human recombinant IFN-□2) is a drug obtained by culturing a bacterial strain of Pseudomonas sp. containing a recombinant plasmid of the human IFN-□2 gene in its genetic machinery.

Reaferon has antiviral, antitumour and immunomodulatory effects. When administered topically, the drug does not enter the bloodstream; when sprayed into the respiratory tract, it is detected in the lung tissue and in very small amounts in the blood. It is excreted mainly through the renal tubules. With prolonged use, some patients develop antibodies to Referon, which may lead to a decrease in the effectiveness of treatment.

Reaferon is available for intramuscular, subconjunctival and topical use as a lyophilised powder in ampoules at 1□106 IU. The drug is recommended for adults and children with acute lymphoblastic leukaemia, juvenile papillomatosis in children, as well as for adults with malignant diseases, acute and chronic active hepatitis B virus, multiple sclerosis, and viral eye diseases.

Dosage. It is prescribed for viral herpetic lesions at a dose of 1 million IU 10 times per course, for chronic hepatitis B - 3 million IU in a course of 10-15 injections, for malignant tumours (bladder cancer, leukaemia, etc.) the dose is increased to 10 million IU. The drug is administered intramuscularly.

Side effects: chills, fever, fatigue, headache, dyspeptic symptoms, skin rashes and itching, leukaemia and thrombocytopenia, increased levels of liver enzymes in the blood.

Contraindications: allergic diseases. Due to the pyrogenicity of the drug in cardiovascular diseases, it should be used under ECG monitoring.

β-Interferon drugs

FERON (human fibroblast-derived IFN-□) has a broad spectrum of antiviral activity, which is realised through the immune defence system. The antiviral activity of feron has been demonstrated against Herpes simpex, Naricella zoster, Polio-, Adenoviruses and other viruses. The drug induces the synthesis of antiviral proteins by cells that limit the spread of the virus in the body. In viral hepatitis, the antiviral activity of feron is 6 times higher than that of IFN-□2.

Pheron has a clear antitumour effect, which is realised through cytostatic mechanisms (inhibition of DNA synthesis in tumour cells, cell cycle prolongation,

inhibition of protein synthesis). The immunoregulatory effect of the drug is to enhance the activity of natural killer cells, T-cell and antibody-dependent cellular cytotoxicity reactions, and phagocytosis by macrophages.

The drug is intended for intravenous administration and topical use.

Hypersensitivity symptoms in the form of rash and itching may occur with the administration of pherone. In this case, the drug is discontinued. Leukopenia, thrombocytopenia, erythropenia, and oligochromemia may also develop. In some patients, the level of liver enzymes, as well as alkaline phosphatase and lactate dehydrogenase, increases, and albuminuria appears.

Deterioration of the patient's general condition is manifested in the form of fever (relieved by administration of antipyretic agents), chills, apathy, etc.

Contraindications. Hypersensitivity to pherone or bovine serum albumin, as well as to vaccines.

Pharmaceutical form: vials containing 1x106 IU and 3x106 IU.

Test questions

1. Immunotropic drugs are prescribed for

A) patients with IDD

B) patients with secondary immune deficiency

C) patients with any dysfunction of the immune system

D) there are no correct answers

2. Immunotropic drugs of natural origin include

A) immunoglobulin preparations, erbisol

B) interferon and interleukin preparations

C) thymogen, polyoxidonium

D) immunophane, thymaline

3. Immunotropic agents of recombinant origin include

A) immunoglobulin preparations, erbisol

B) interferon and interleukin preparations

C) thymogen, polyoxidonium

D) immunophane, thymalin

4. Immunotropic agents of synthetic origin include

A) immunoglobulin preparations, erbisol

B) interferon and interleukin preparations

C) thymogen, polyoxidonium

D) immunophane, thymaline

1. The main point of application of thymic drugs

A) antibiogenesis

B) myelopoiesis

C) activity of B-lymphocytes

D) activity of T-lymphocytes

2. The secondary pharmacological effect of thymic drugs is

A) enhancement of phagocytosis

B) enhancement of antibody formation

C) increased activity of T-lymphocytes

D) increased activity of B-lymphocytes

7. The main point of application of the drug polyoxidonium

A) phagocytosis

B) antibiogenesis

C) activity of T-lymphocytes

D) activity of natural killer cells

8. The main point of application of the drug myelopide

A) phagocytosis

B) activity of B-lymphocytes

C) activity of natural killer cells

D) activity of T-lymphocytes

9. The main point of application of immunotropic action of dibazole

A) phagocytosis

B) antibiogenesis

C) activity of T-lymphocytes

D) activity of natural killer cells

10. The main point of application of interferon drugs

A) humoral immunity

B) myelopoiesis

C) cellular immunity

D) lymphopoiesis

Correct answers.

1. А

2. А

3. Б

4. В

5. Г

6. А

7. А

8. Б

9. Г

10. В