МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
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Module 1.
Clinical immunology and allergology.
Theme 9.
OPPORTUNITIES AND PROSPECTS OF IMMUNOTHROPIC THERAPY IN STOMATOLOGY

Manual for practical lessons students having higher medical education in English majoring in dentistry

Модуль 1.
Клінічна імунологія та алергологія.
Тема 9.
МОЖЛИВОСТІ ТА ПЕРСПЕКТИВИ ІМУНОТРОПНОЇ ТЕРАПІЇ В СТОМАТОЛОГІЇ

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Opportunities and prospect of immunothropic therapy in stomatology

Doctors of many specialties collide with clinical appearances of the immune system disturbances. It is appeared by presence of chronic inflammatory process or often relapsing diseases such as acute viral respiratory disease (AVRD), bronchitis, herpes, furunculosis, and other. However till now many people have prejudice relatively advisability of immunomodulators use. This opinion is formed on the one hand as consequence of interpretation's complication and frequently impossibility of fulfillment of immunologic analyses, but on the other hand – low effectiveness of immunomodulators of the first generation. However in the last 10 years knowledges how immune system works were extended and new higher effective and safe preparations were created. Treatment of many immune system diseases is ineffective today without applying of modern immunomodulators.

The preparatory stage

At the beginning of class, the instructor reveals the importance of the subject, defines the main goals and objectives of the lesson, assess the initial level of knowledge by solving tests and oral interviews. Students are given a task to work with patients.

Literature

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Tests to check the initial level of knowledge

1. Immunotherapy diseases can be:

A. active. *D. regional.* *G. medication.*
B. passive. *E. stimulating.* *H. non-pharmacological.*
C. systemic. *F. suppressive.* *I. only systemic and suppressive.*

2. Organisation of immunotherapy is

A. stimulation reduced immunoreactivity;
B. attenuation increased immunoreactivity;
C. replacement of the missing factor immunoreactivity;
D. None of the above.

3. Clinical criteria of appointment immunostimulatory therapy is

A. chronic purulent infection;
B. low efficiency of the treatment of the underlying disease (inflammation) by conventional means;
C. treatment with high doses of immunosuppressive agents
D. continuing glucocorticosteroid, antibacterial, radiotherapy.
E. None of the above.

4. Immunotropic preparations can be split by the action of the immune system by

A. immunosuppressants; *C. immunomodulators;* *E. synthetic;*
B. immunostimulants; *D. thymic;* *F. vegetable.*

5. What drugs are immunomodulators of bacterial origin?

A. immunofan *D. nucleinat sodium* *G. viferon*
B. cicloferon *E. timalin* *H. Immunal*
C. bronhomunal *F. roncoleukin*

6. Immunomodulators which are synthetic drugs?

A. immunofan *D. nucleinat sodium* *G. viferon*
B. cicloferon *E. timalin* *H. Immunal*
C. bronhomunal *F. roncoleukin*

7. What is immunomodulator interferon drugs?

A. immunofan *D. nucleinat sodium* *G. viferon*
B. cicloferon *E. timalin* *H. Immunal*
C. bronhomunal *F. roncoleukin*

8. What drugs are immunomodulators of interferones?

A. immunofan *D. nucleinat sodium* *G. viferon*
B. cicloferon *E. timalin* *H. Immunal*
C. bronhomunal *F. roncoleukin*

9. What immunomodulators obtained from organs of the immune system?

A. immunofan *D. nucleinat sodium* *G. viferon*
B. cicloferon *E. timalin* *H. Immunal*
C. bronhomunal *F. roncoleukin*

10. Immunomodulators which are analogues of cytokines?

A. immunofan	*D. nucleinat sodium*	*G. viferon*
B. cicloferon	*E. timalin*	*H. Immunal*
C. bronhomunal	*F. roncoleukin*	

Correct answers to the questions: 1 – A, B, C, D, E, F, G, H. **2** – A, B, C. **3** – A, B, C, D. **4** – A, B, C. **5** – C, D. **6** – A. **7** – G. **8** – B. **9** – E. **10** – F.

BASIC CONTENT OF THEME

Immunotropic therapy depending on the rendered effect is subdivided into immunostimulative, immunosupressive and immunomodulative therapy.

Immunostimulation is the method of immunity activating. Specific and unspecific immunostimulation is distinguished, which correspond either activating of concrete clone of immunocompetente cells or common strengthening of immune defense. The using of immunostimulative drugs expedient at presence of primary and secondary immunodeficits, attended with the recurrence bacterial and viral infections of respiratory tract, food channel, urogenetal tract, skin and other, in complex treatment of oncopathology.

Immunosupression is affect to immune system, directed on suppression of production or delete of antibodies and/or limphocites, specifically reactive on allo- or auto-antigens. Immunosupression is used in treatment of autoimmune and lymphoprolipherative diseases, during transplantation of organs and tissues.

Immunomodulation is the system of measures that returns immune status to initial, balanced state. Such therapy is indicated to healthy persons, which carried emotional stress or maximal physical loadings. Immunomodulative therapy is indicated persons with syndrome of the promoted fatigueability, which are in the risk of immunodeficit or autoimmune state development. It is here possible to deliver the complex of measures in optimization of organism immune reactions at the change of geoclimatic, ecological, light terms of man residence.

Immunoreabilitation is the complex of medical measures, directed to renewal of the broken functions of the immune system. The effect of immuno-reabilitation can be without the direct affecting immune system, due to treatment of the pathological states that promote development of immune disbalance.

Immunomodulators – drugs with immunotropic properties and activities, which in therapeutic dosages restore functions of immune system, effective immune defense.

The most simple immunomodulators classification worked out in the Russian State Scientific Central Institute of Immunology. According to this classification immunomodulators are divided into three groups: endogenous, exogenous, and synthetic. Immunoregulator peptides and cytokins, its recombinant or synthetic analogies concerned to immunomodulators of endogenous origin. The overwhelming majority of exogenous immunomodulators are substances of microbe origin – batteries and fungous. The third group of immunomodulators concerns synthetic substances, received in the result of the directed chemical synthesis.

I. **Products of physiological (biological) origin:** tactivin, timalin, timogen, vilosen, mielopid, timopoetin, immunofan, laferon, roferon-A, intron-A, immunoglobulins and other.

II. Products of microbial origin:

1. Living bacteria – BCG;
2. Lysats – bronchomunal, IRS-19, imudon;
4. Lipopolysacharides – pyrogenal, prodigiosan;
5. Yeast polysacharides – simosan, sodium nucleinat;
6. Ribosomes + protheoglicans – ribomunil;
7. Probiotics – linex.

III. Synthetic preparations: thimogen, licopid, levamisol, polioxidonium, groprinosin, neovir, cicloferon.

IV.Vitamins and antioxidants.

V. Vegetable preparations: immunal.

VI. Enterosorbents: polysorb.

VII. Immunosupressors*:* glucocorticosteroids, asatioprin (imuran).

VIII. Complex enzymic preparations*:* vobensime, flobensime, vobemugos.

The immunomodulators of endogenous origin

At present time in quality of immunomodulators of endogenous origin immunoregulator peptides is applied. They are received from central organs of immunity (thymus and bone marrow, cytokines, interferons, effector proteins of immune systems (immunoglobulins).

Immunoregulator peptides received from central organs of immunity

Taktivin and **Timalin** are immunomodulators of the first generation, received on the basis of an extract of thymus tissue. Taktivin is a preparation of polypeptide nature, received from the thymic gland of the large horned cattle. Taktivin normalize quantitative and functional фсешмшен of T-system immunity, stimulate production of lymphokins and other indices of cellular immunity. It applies in adults in complex therapy of infectious, purulent, septic processes, in lymphoproliferative diseases (lymphogranulomatosis, lymphoid leucosis), ophthalmoherpes relapsing and other diseases immunity accompanying advantages defeat of T-system immunity.

Taktivin is produced as 0,01% solution in 1 ml (100 mcg) bottles or in ampules. It used SC for 1 ml (1–2 mcg on 1 kg of body mass) for the night during 5–14 days. In patients with immune disturbances tactivin is prescribed during 5–6 days with subsequent injections 1 td to 7–10 days. Surgical patients may receive tactivin 2 days before and 3 days after an operation.

Timalin is a complex of polypeptide fractions, received from the thymic gland of the large horned cattle. It regulates the quantity of T- and B-lymphocytes, stimulate reaction of cellular immunity; strengthen of phagocytosis. Timalin applies in adults and children in quality immunostimulator and

biostimulator in complex therapy of diseases, accompanying by reducing of cellular immunity, including acute and chronic purulent processes, and inflammatory diseases, burn diseases and trophic ulcers and ulcer disease, and also by immunity oppression hemopoietic function after radial or chemotherapy in oncological patients and other pathological processes.

Timalin produced in 10 mg bottles. Powder is dissolved in 1–2 ml sodium chloride solution before injection and enter IM 3–10 days 1td 5–20 mg in adults and 1– 0,5 mg in children. Total course dose, for adults – 30–100 mg, for children to 1 year – 1 mg, 1–3 years – 1–2 mg, 4–6 years – 2–3 mg, 7–14 years – 3–5 mg. Repeat course if necessary is prescribed in 1–6 months.

All tymical preparations render soft immunomodulating effect, tied together mainly with the increasing of number and functional activities of T-lymphocytes. But they have one shortcoming: they represent themselves indivisible mixture of biologically active peptides and they are difficulty standardized. Progress in the field of immunomodulators of thymical origin went on the line of creation of the second and third generation preparations, representing themselves synthetic analogies of natural thymus hormones or fragments of these hormones, possessing biological activities.

Vilozen is a thymic lowmolecular extract with T-supressor activation properties. Vilozen decreases IgÅ and stimulates IgE and IgG production, stabilizes cell membranes of basophiles. Vilozen indicates for pollinosis prophylaxis before 15–20 days to the supposed exacerbation. Vilozen is produced for 10 mg in amp. It apples intranasal in 1% solution 4–5 td, the course of treatment longs 14–20 days.

Immunofan. The next stage in creation of thymical preparations becomes from isolation of biologic active fragment one of the thymic hormones – timopoietin and creation on its basic preparation *Imunofan*, representing itself 32–36 amino-acid residuum of timopoietin. Imunofan shows high effectiveness for restoration disturbances of immunological reactivity by chronic bacterial and viral infections, surgical infections. Besides stimulation of immunological reactivity, Imunofan possesses expressed ability to activate antioxydant system of the organism.

These two properties of Immunofan allow recommend it for the complex therapy of oncological patients not only for up lifting of immunity, but also for elimination of toxic free radical and peroxide connections. Imunofan is indicated also treatment hepatitis B, opportunist infections in AIDS patients, brucellosis, long healing wounds of extremities, purulent-septic postoperative complications: burn shock, acute burn toxemia, associative trauma. Imunofan prescribes for immunocorrection of allergic diseases and permits for using in pediatry.

Immunofan produce in 0,005% solution in 1 ml ampoules, injects SC or IM. The course of treatment is 7–10 injections.

Myelopid is received from the bone marrow of mammals (pigs or calves) and contains six specific bone marrow mediators, named myelopeptides (MP). These substances possess ability to stimulate different tipes of immune response, especially humoral immunity. Each MP possesses definite biological action, totality of which stimulates its clinical effect. MP1 restores nominal balance activities of T-helpers and T-suppressors. MP2 suppresses proliferation of malignant cells and considerably reduce ability of tumoral cells to produce toxic substances, suppressing functional activity of T-lymphocytes. MP3 stimulates activity of phagocytes, and consequently raises anti-infection immunity. MP4 renders influence on differentiation of hemopoietic cells, spatially its leukopoietic effect. In patients with immunodeficient state myelopid stimulates antibodies production and restores functional activity of immunocompetent cells. Myelopid is indicated for patients with secondary immunodeficent states (in adults), for prevention of infectious, after surgical interventions, traumas, osteomyelitis and other pathological processes, inflammatory complications, chronic pulmonary diseases (exacerbation stage), (laryngitis, bronchitis, pneumonia); chronic pyoderma, atopic dermatitis and others, acute lymphoblastic and myeloblastic leykosis and non-Hodgkin's of T- and B- cellular lymphomas.

Mielopid produces in ampoules for 3 mg. 3–6 mg of drug dissolves in 1 ml of isotonic sodium chloride solution, injectes SC, 1 td, 3–5 injections for a course to rich positive dynamics of immunological indexes.

Cytokins

Cytokins are low molecular hormones, produces activated immuno-competent cells and being regulators of intercellular interactions. There are several groups of cytokins – interleukins (12 different interleukins), growth factors (epidermal, transforming grows factor-β, nerve growth factor), coloniestimulating factors, chemotaxis factors, tumor necrosis factor-α. Interleukins are the main participants of immune answer to microorganisms invasion, unspecific inflammatory reactions and antitumoral immunity realizationand.

Betaleukin is a human recombinant interleukin-1-beta (IL-1). Monocytes and macrophages realize IL-1 as the response to micro-organisms invasion, the first line of organism defence. One of the main properties of IL-1 concludes in ability to stimulate functions and increases the number of leukocytes. Betaleukin increases the interferon production and antibodies output, increases the thrombocytes level, accelerates reparative processes in damaged tissues.

Betaleukin indications are secondary immunodeficent states, developing after severe trauma (in the result of purulent-septic and purulent destructive processes, after extensive surgical interventions, and also by chronic septic states. Betaleukin is effective in quality of stimulator of leucopoiesis is toxic leukopenia II-IV degrees, complications chime-radio therapy of malignant tumors.

Betaleykin enter SC or IV drops. Betaleykin is applied in a dose 15–20 μg/kg body mass as leucopoetic stimulator and in dose of 5–8 μg/kg body mass for immunostimulation. 5 days course IV drops or SC. Content of ampoule (small bottle) with preparation before using dissolve in 1 ml sterile 0,9% solution of sodium chloride or water for injections and lead to a volume to 500 (100) ml with 0,9% solution of sodium chloride and conduct IV infusion. Duration of infusion – 120 to 180 min. Preparation is dissolved in 0,5–1,0 ml 0,9% solution of sodium chloride or water for injections for IV injection. Preparation is produced in ampoules (small bottles) for 0,001 mg (1000 μg), 0,0005 mg (500 μg) or 0,00005 mg (50 μg).

Ronkoleukin is a recombinant human interleukin-2 (IL-2). IL-2 produces in organism of T-lymphocytes-helpers and carries out the key role in the process of initiation and the development of immune response. The preparation stimulates the proliferation of T-lymphocytes, activates them, in the result of that they turn into cytotoxic and killing cells, which are capable to destroy various pathogenic microorganisms and malignant cells. IL-2 strengthens the formation of immunoglobulins by B-cells, makes more active the monocytes function and tissue macrophages activity. In general, IL-2 possesses immuno-modulating action, directed to strengthening of antibacterial, antiviral, antimycotic and antitumoral immune response. Ronkoleukin is applied in complex treatment of sepsis and severe infectious-inflammatory processes of different localization (peritonitis, endometritis, abscesses, meningitis, mediastinitis, osteomyelitis, pancreatitis, paranephritis, pyelonephritis, pneumonia, pleyritis, salpingitis, phlegmon of soft tissues), and also burn disease, tuberculosis, chronic hepatitis C, mycosis, chlamydiosis, chronic herpes. Ronkoleukin in combination with alpha-interferon has effective immunotherapeutic effect in treatment of disseminated kidney cancer. The high effectiveness of preparation is established in treatment of the urinary bladder cancer, colorectal cancer of the III–IV stages, tumor of the brain, malignant disseminated skin melanoma, malignant mammals' neoplasms, prostatic gland cancer and ovaries cancer.

Ronkoleykin enters SC or IV 1 time per days in doses to 2 mg. Content of ampoule is conducted in 1,5–2,0 ml of 0,9% solution of sodium chloride and SC enter 1 time per days. For IV injections ronkoleukin from an ampoule is carried in 400 ml of 0,9% solution of sodium chloride for injections. For saving of biological activity of Ronkoleykin solution in a dropper it is necessary to add 10% solution of human whey albumen in: 6 ml, if an ampoule is used with a 0.5 mg (500 000 IU) of recombinant IL-2; 4 ml, if an ampoule is used with a 0.25 mg (250 000 IU) of recombinant IL-2; 2 ml, if an ampoule is used with a 0.1 mg (100 000 IU) of recombinant IL-2. IV infusion of solution is carried out during 4–6 hours.

Course of Ronkoleykin treatment of septic states: posttraumatic, surgical, obstetric-gynaecological, burn, wound and other types of sepsis is 1–3 SC or IV injections for 0,5–1,0 mg with interruptions in 1–3 days.

The course of Ronkoleykin treatment of cancer includes:

– single SC or IV injection of Ronkoleykin in a dose 0,5 mg after 24 h to the operation;

– Ronkoleykin infusions since the second day after nephrectomy with the interval of 48 h;

– cancer of III stage – preparation is entered fivefold in the valid for one occasion dose of a 1 mg,

– cancer of IV stage and presence of plural metastases in lungs – preparation is entered 10 times in a valid for one occasion dose 3 mg.

The repeated courses conduct through 1 - 2 months at obligatory control the correlation of limphocites CD4/CD8. Ronkoleykin produces in ampoules for 1 ml in doses for a 1 mg of RIL-2 (1 000 000 IU), 0,5 mg of RIL-2 (500 000 IU), 0,25 mg of RIL-2 (250 000 IU) or 0,1 mg of RIL-2 (100 000 IU).

Interferons

Interferons are protective substances of protein nature, which are worked out by cells in the response of viruses invasion and also in influence of natural or synthetic substances (interferon inductors). Interferons are factors of the organism nonspecific defence from viruses, bacterias, chlamydies, pathogenic funges, tumor cells, but at the same time they may regulates intercellular interactions in the immune system. They refer to immunomodulators of endogenous origin. Three types of human interferons are separated: alfa-interferon (leukocytic), beta-interferon (fibroblastic) and gamma-interferon (immune).

A human leukocyteinterferon has anti-virus, immune-modulating, antytumoric activity, reduces the risk of metastases developed after the primary tumor operative deleting.

Mechanism of interferon action may be represented schematically by the following manner: interferons connect in the cell with the specific receptors that leads to cell synthesis about 30 proteins which supply above mentioned higher effects of interferon. In particularly, regulator peptides are synthesized, they prevent the penetration of viruses in to cell, synthesis of new viruses in cell, stimulate activity of cytotoxic of T-lymphocytes and macrophages.

At present time several modern preparations of alfa-interferons are produced, which are divided into natural and recombinant. Leukocytic interferon for injections contains all subtypes of alfa-interferons in natural, physiological correlation. Apply in oncology Leukocytic interferon is included in complex treatment of melanoma, kidney, ovaries cancers and others.

The human dry leukocyte interferon (Interferonum leukocyticum humanum siccum) is produced in lyophilisate kind in ampoules. Ampoules

contain 1000 IU of interferon. In one ampoule there are 1000 IU of interferon. Human leukocyte interferon was synthesized in the culture of leucocytes, extracted from blood of donors. Preparation contains the albumens of donor blood, mainly albumin. Preparation is intended for a prophylaxis and treatment of flu and other acute viral infections of respiratory tract. It is necessary in the beginning of infection and continues use until the danger of infection is saved. Preparation is applied by burying of water solution in the cavity of nose. An ampoule with preparation is unsealed right before the use. For dissolution the boiled water, frappe to the room temperature, is used. Water is poured in an ampoule to the line, proper 2 ml and shake to complete dissolution of content. Solution of preparation is a transparent liquid, colourless, or having different tints fromyellow to brightly-rose color. Solution of preparation can be kept at a temperature not higher 10°C during days. In every nasal channel it is necessary to enter for 0,25 ml (for 5 drops) of solution 2 times per days with an interval 6 hours.

Human leukocyte interferon for injections is applied intramuscular or intravenously (stream or tiny) or in marrow. Human leukocyte interferon for injections is produced for 1 ml (1 dose) with antiviral activity of interferon-alfa 0,1 million IU, 0,5 million IU, 1 million IU, 3 million IU. For IV tiny infusion content of ampoule is conducted in 100–400 ml of glucose-salt solution.

In acute hepatitis B preparation intramuscular enters for 1–3 million IU 2–3 times per a week not less than 3 weeks. To the patients with hepatic encephalopaty and expressed intoxication a valid dose is multiplied to 3–5 million IU. In the first 1–3 days it is recommended to alternate IV infusion with intramuscular one. Expense of preparation on a course in moderate form 10–30 million IU, in heavy is 30–55 million IU.

In chronic hepatitis B or D preparation is applied intramuscular for 1–3 million IU 1–2 times per a week to achieving steady remission (3 months and more). To the children to age 3 years a valid dose must be reduced to 0,1–0,5 million IU.

In heavy viral and viral-bacterial neuro-infections (serose and push meningo-encephalitises, meningo-encephalo-polyrariculo-neuritises) preparation is entered IM for 3 million IU one time in days, daily, during 3–10 days. A total expense of preparation on a course is 9–30 million IU.

In recidive genital herpes application of preparation is begun in the period of intensifying diseases, IM, for 1–3 million IU daily 3 days, after for 1 million IU in a day 2 times. Totally on a cycle 5–11 million IU is required. In case of occurring of intensifying the course of introduction is repeated.

In dissipated sclerosis preparation is entered IM for 1 million IU 2 times per day during the first 10 days, after, at presence of positive dynamics, the multipleness is reduced by to 1–2 injections in a week to 6 months. Expense of preparation on a course 40–50 million IU.

In acute lymhpoblastic or myeloblastic leucosis preparation is applied in a complex with chemotherapy:

1. In acute period IV (tiny) or in marrow for 1–3 million IU in a day to the offensive of remission. Expense of preparation in acute period 10–30 million IU and more.

2. In the period of remission IM for 1–3 million IU 1 time per week during 6 month, in subsequent – 1 time per 2 weeks to 2 years. Total expense on a course 75–100 million IU.

In youvenile respirator papilomatosis treatment is begun immediately after the deletion of papilomas. Preparation is entered IM for 1–3 million IU daily during 45–50 days, and then 3 times per week one month. A course dose is 60–100 million IU. Courses repeat 2 times with an interval 2–6 months, taking into account the clinical picture of disease.

Reaction on introduction: At intensive courses introductions are possible getting up of temperature, chill, fatigueability, convertible leucopenia develops sometimes, that must not serve as an obstacle for application of preparation. At growth of these phenomena decrease the valid dose of preparation to 0,5–1,0 million IU.

Preparation is produced in ampoules for 0,1, 0,5, 1,0, 3,0 million IU for 10 ampoules in a pack.

Leukinferon is a complex preparation, containing 10 000 IU of natural alfa-interferon and complex of cytokins of the first phase of the immune response (IL1,6 and 12, tumor necrosis factor, macrophages and leukocytes migration inhibitor factors). Besides antiviral activity preparation possesses the wide spectrum of immunomodulating action in particularly is capable to activate practically all stages of phagocytic process. Leukinferon is applied for the treatment of many viral diseases, bacterial infections, including sepsis and tuberculosis, chlamidial, mucoplasmic, herpetic infections, oncological diseases.

The basic method of introduction is intramuscular. Daily dose for children to 1 year equals the half of ampoule (5 000 IU interferon). Daily dose for children is more senior than 1th, for teenagers and adults equals content of one ampoule (10 000 IU).

If the use of preparation an inhalation method content of ampoule is dissolved in 5 ml of the distilled water. It is recommended to use ultrasonic inhalers.

If to treat viral hepatitis preparation is entered IM daily during 3–7 days, and then in a day or two, to steady normalization of clinical symptoms and biochemical indexes, but no less than 10 days.

If to treat heavy and moderate forms of flu and other ARVD, including with the phenomena of obstruction of bronchial tubes for the children of pectoral age, apply combination of IM injections (in the morning) and inhalations (in the evening) during 3–5 days daily.

If to treat acute and chronic inflammatory diseases (wound infection, sepsis, peritonitis, endometritis, adnexitis, urogenital infections, pyelonephritis, skin inflammation) preparation is entered IM, usually makes 10–15 injections.

For surgical patients with the risk development of festering-inflammatory complications preparation can be appointed day prior to an operation with subsequent single introduction on one ampoule on 1, 3 and 5 days.

If to treat acute and chronic lung diseases (bronchitis, pneumonia, tuberculosis) it is recommended to combine daily IM injections with inhalations, conducted 2 times per a week, during 1–2 weeks, after IM 2–3 times per a week to the steady improvement of the clinical state.

Preparation is indicated in a process of radio and chemotherapy for oncologic patients at presence of leuko- and limphopenia, depressing of phagocytic and cytolytic activity of blood, and also worsening of feel. Leykinferon enter 2–3 times per a week during all course of cytostatic treatment and two weeks after its completion.

Preparation is produced in ampoules for 2 ml, containing for 5 000 IU interferon in 1 ml, 10 ampoules in a pack.

Eye drops **Lokferon** contain also cleaning and concentrated human leukocytic interferon with activity of 8.000 ME in the bottle. Apply by treatment eyes diseases of viral etiology. Lokferon is used for treatment diseases of eyes viral (herpes, adenoviral) etiology (conjunctivitises, keratitis, keratouveitis). Preparation can be used similarly intranasal. Preparation is applied as drops. Content of small bottle is dissolved in the distilled or boiled water: in 1 ml for treatment of herpesviral keratitis, in 2 ml for treatment of adenoviral conjunctivitises, in 4 ml for treatment and prophylaxis of flu. Term of storage the dissolved preparation is 48 h at a temperature not higher +10 degrees. For treatment of acute stage the disease ***Lokferon*** bury in an eye 8 times per a day in combination with basic therapy. As far as diminishing of the inflammation the quantity of burying is abbreviated to 4–6 times per a day. Depending on severity of disease the course of treatment makes from 2 to 4 weeks.

If to treat flu, ***Lokferon*** enter for 0,25 ml (5 drops) in every nasal opening in 1–2 h no less than 5 times per day during 2–3 days.

Preparation is produced in bottles or ampoules, containing 8 000 IU.

Immunoglobulins

The treatment serums are prototypes of the modern immoglobulin preparations and some of which (antidiphtheric and antitetanus serums) up till now do not lose its clinical importance. However the development technology of processing blood preparations allows to incarnate ideas of passive immunization first in species of concentrated immunoglobulin preparations for intramuscular injection, and then immunoglobulins for intravenous using.

For a long time effectiveness of immunoglobulin preparations are exclusively explained at the expense of passive transfer of antibodies. Connecting with corresponding antigens, antibodies neutralize them, transfer into insoluble form in the result of that phagocytosis mechanism are started, dependent complement lysis and following antigenous elimination from the organism. However, last years in connection with the proofing of effectiveness of intravenous immunoglobulins by some autoimmune diseases proper immunomodulating role of immunoglobulins are actively studied. Intravenous immunoglobulins are found the ability to change of interleukins production and level receptors expression to IL-2. Also influence of immunoglobulins preparation on activity of different subpopulation of T-lymphocytes and stimulating action on phagocytosis processes were demonstrated.

Intramuscular immunoglobulins, using in the clinic from 50th years, have relatively low bioaccessibility. Resorption of the preparation comes true from the injection place during 2–3 days and more half of preparation exposes to destruction of proteolytic ferments. In many countres are used intramuscular immunoglobulins containing higher titres antibodies to antigens of definite stimulus: virus of tick-borne, influenza, herpes, cytomegalovirus, HBs-antigen.

Intravenous immunoglobulins have essential advances so it's applying permit in the shortest time to create in blood effective antibody concentrations. At present time the whole row of Human immunoglobulins for intravenous injection is producted (Pentaglobin, Oktagam, Sandoglobulin, Venoglobulin and oth.). Intravenous immunoglobulins are applied by primary immuno-deficiences (agammaglobulinemia, selective deficience JgG and others), hypogammaglobulinemia, chronic lymphoid leucosis, thrombocytopenic purpura, others autoimmune diseases, severe viral bacterial infections, sepsis, for prophylaxis of infectious complications in premature children.

Normal humen immunoglobulin for intravenous using (Immuno-globulinum normale humanum injectionibus intravenosa) Preparation is active albuminous fraction, extracted from human donors plasma, tested on absence of antibodies to human immunodeficit viruses (HIV-1 and HIV-2), to hepatitis C virus and superficial antigen virus of hepatitis B (HbsAg).

Indications for using preparation are treatment of heavy toxic forms of bacterial and viral infections, postoperative complications, accompanied septicemia for children and adults.

Method of application and dosage. For children the valid dose of preparation makes 3–4 ml/kg of body wait, but no more than 25 ml. Immunoglobulin before introduction has to conducte by 0,9% sodium chloride solution or 5% glucose solution in proportion 1 part of preparation and 4 parts of solution. Divorced immunoglobulin usiously is used intravenously tiny in speed 8–10 drops/min. Infusions conduct daily during 3–5 days.

For adults the valid dose of preparation makes 25–50 ml. Immunoglobulin (without the additional breeding) is used intravenously tiny in speed of 30-40 drops/min. The course of treatment consists of 3–10 infusions, conducted in 24–72 hours (depending of disease severity). Immunoglobulin for intravenous using is applied only in the clinic conditions at the observance of all rules of aseptics. Before using bottles maintain at the temperature of 18–22^{o}C no less than 2 hours. Turbid, containing sediment solutions are not subject application. Immunoglobulin infusions can combine with the usion of other medications.

Reactions to immunoglobulin usion, as a rule, are absent. In sum persons with changed immune reactivity allergic reactions can develop, in very rare cases anaphilactic shock can be, in this connection persons recieving preparation, In the department, where used preparation, there must be facilities of antyshock therapy.

Form of preparation: small bottles for 10, 25 and 50 ml.

Pentaglobin is immunoglobulin for intravenous using. Composition: 1 ml solution contains: immunoglobulin M – 6 mg, immunoglobulinA – 6 mg, immunoglobulinG – 38 mg.

Indications: Treatment of bacterial infections. Therapy patients with immunodeficit or severe secondary immune insufficiency.

Method of application and dosage.

1. New-born and pectoral childrens: 5 ml/kg of body wait daily during 3 days.

2. Children and adults;

a) therapy of severe bacterial infections; 5 ml/kg of body wait during 3 days.

b) therapy of patients with immunodeficit and secondary immune insufficiency syndrome antibodies B tipe: 3–5 ml/kg of body wait.

In the case of necessity the repeated course after a week interruption.

Method of using: Before using it is necessary to warm up preparation to the room temperature or body temperature. It is necessary to provide intravenous infusion of Pentaglobin with the speed: to the new-born and pectoral children – 1,7 ml/kg of body wait throu perfusom; to the children and adults – 0,4 ml/kg of body wait, alternatively: first 100 ml (0,4 ml/kg body wait), after that 0,2 ml/kg of body wait is continuous to achievement 15,0 ml/kg of body wait during 72 hours.

Examples:

	Body wait	Main dose in the 1 day	Speed of infusion	Duration of infusion
New-born	3 kg	15 ml	5 ml/h	3 h
Child	20 kg	100 ml	8 ml/h	12,5 h
Adult	70 kg	350 ml	28 ml/h	12,5 h

Formof issue: Ampoule with conten 10 ml or 20 ml. Small bottles for infusions 50 ml or 100 ml.

Hepatect – immunoglobulin against hepatitis B, 1 ml solution contains 100 mg of albumin, antibodies against the virus of hepatitis B in amount 50 IU.

Indications: Urgent prophylaxis of hepatitis B after a contact with the infected material (blood, plasma, whey), prophylaxis of liver transplant infecting for HbsAg-positive patients, prophylaxis of hepatitis B in new-borns, which mothers are the transmitters of superficial antigen of hepatitis B virus, for subjects promoted increased or permanent risk of infection (before an operation, repeated hemotransfusions, hemodialis, etc.), incapable of making enough amount of protective antibodies.

Method of application and dose:

Preparation is used IV slowly, with speed no more than 20 drops/min (1 ml/min) (an ampoule is preliminary heated to the room temperature or body temperature).

Urgent prophylaxis: 6–12 IU/kg, but no less than 10 ml.

Prophylaxis at the high risk of infection: 7 IU/kg, but no less than 10 ml, after each 2 monthes (in default of antibodies to HBs – through 1 month) to appearance of antibodies.

Prophylaxis of liver transplant infecting: after the delete of liver and to transplantation – 10 000 IU (200 ml), after an operation – 2 000 IU (40 ml) daily during 7 days and further in accordance with the results of monthly control (immunoglobulin contents in blood no less than 100 IU/l).

Prophylaxis of hepatitis of B in new-born: singly 20 IU/kg, but no less than 2 ml.

It is possible to mix up only with isotonic solution of sodium chloride.

Form of issue: In ampoules for 2 or 10 ml.

Immunomodulators of exogenous origin

Bacterial and fungous preparations refer to immunomodulators of exogenous origin. To medical applying is permitted such means of microbial origin as BCG, Pirogenal, Prodigiosan, Sodium nucleinat, Ribomunil, Bronchomunal. All of them posess ability to strengthen functional activity of neutrophils and macrophages.

At present time BCG vaccine has no independent significance in a quality of immunomodulator. Exception concerns the method of immune therapy of urinary bladder cancer, with applying vaccine "BCG-Imuron". Vaccine "BCG-Imuron" contains living lyophilizing bacteria vaccine BCG-1 strain. Preparation is applied in the kind of instillation in the urine bladder. The living mycobacteria propagating themselves intracellular bring to nonspecific stimulation of cell immune response. "BCG-Imuron" is intended for prophylaxis of relapse of superficial cancer of urinary bladder after operative tumor remove and also for treatment of small tumors of urinary bladder, removing of which is impossible.

Composition: Preparation contains living mycobacteries vaccine culture of BCG-1, lyophylisated in 1,5% solution of glutamine sodium. A valid for one occasion therapeutic dose (100–120 BCG-1 mycobacteries) is maintained in four ampoules of preparation.

Imunobiological properties: Living mycobacterise BCG-1 culture, propagating oneself intracellular, result in unspecific stimulation of cellular immune answer.

Method of application and dosage: The vaccine BCG – imuron is applied by intrauretery.

The prophylaxis of superficial urinary bladder cancer relapses is carried out in 3 weeks after the delete of tumour. Urinary bladder are provided an elastic catheter. After emptying the urinary bladder is washed sterile physiological solution. It is necessary to be argued that blood is absent in a washed liquid. The vaccine dose is conducted in 50 ml of physiological solution and enter through the catheter in an urinary bladder. A patient must retain solution in an urinary bladder during 2 hours. In 2 hours an urinary bladder is emptied in disinfectant solution (5% chloramine) on 6 hours.

Recommended valid for one occasion dose of "BCG-1 Imuron" vaccine is 100–120 mg 1 time per a week. The course of immunoprophylaxes consists of 6–8 weeklies instolations of preparation.

The chart of treatment of superficial cancer of urinary bladder is similar.

The vaccine "BCG-1 Imuron" is kept on the specially selected room in a refrigerator under lock and key. In the same room conduct catheter disinfection and breeding of vaccine. Tableware and instruments, applied for this purpose, it is categorically forbidden to use in other aims. There are kept in a separate closet under lock and key.

Studying mechanism of immunomodulating action of BCG vaccine showed, that it is reproduced with the help of inner layer of cell wall of mycobacteria tuberculosis – peptidoglikan, while in the composition with peptidoglikan an active beginning is the muramildipeptid. Muramildipeptid enters contain of peptidoglikan of cell wall is practically all known as grampositive and also gramnegative bacteria. However in the strength of high pyrogeness and other unfavorable side effects muramildipeptid itself renders unfitness for clinical use. Therefore the search of its structural analogies begins.

Likopid has a low pyrogeness and higher immunomodulating potential.

Composition: Active matter: glucosaminilmuramildipeptid – 0,001 g and 0,01 g.

Likopid influences upon the all three main immunity sections: phagocytosis, cell and humoral immunity, stimulates leukopoiesis and regenerative processes. Biological activity of preparation is conditioned the presence of specific centers of fastening (receptors) by glucosaminilmuramildipeptid, localised in phagocyte and T-lymphocyte endoplasme. Likopid stimulates functional (bactericidal,

cytotoxyc) activity of phagocytes (neutrophyls, macrophages), strengthens proliferation of T- and B-lymphocytes, promotes synthesis of specific antibodies. Pharmacological action is carried out by means of strengthening of making interleucynes (IL-1, IL-6, IL-12), tumor necrotic factor-α, γ-interpheron, colony-stimulative factors. Likopid promotes activity of natural killers.

The main indications to Likopid appointment: chronic non-specific lung diseases as in the stage of aggravation and also remission, acute and chronic purulent inflammatory processes (postoperative, posttraumatic, wounds), trophic ulcers, tuberculosis; acute and chronic viral infections, especially genital and labial herpes, herpetic keratitis and keratouveitis, circular lichen; cytomegaloviral infection; disturbances of neck of uterus, caused by virus of human pappilomas, bacterial and candidous vaginitis, urogenital infections.

Likopid uses by treatment of bacterial pneumonia in maturity and premature children. Likopid is applied in complex treatment of chronic viral hepatitis in children. Though Likopid is capable to stimulate ripening of glukuroniltransferase of liver of newborn children, its effectiveness is tested by conjugative hyperbilirubinanemia in neonatal period.

Likopid apply sublingual (under a tongue) or inward on an empty stomach, for 30 min to the meal. In adults for prophylaxis of afteroperative complications Likopid is appointed for 1 mg under a tongue 1 time per day during 10 days; of festering-septic processes of skin and soft tissues – for 2 mg under a tongue 2–3 times per day during 10 days; of festering-septic processes - for 10 mg 1 times per day during 10 days; of chronic infections of lungs – for 1–2 mg under a tongue1 time per days during 10 days, of tuberculosis – for 10 mg 1 time per day under a tongue during 10 days, of herpetic infection – for 2 mg 1–2 times per day under a tongue during 6 days; in heavy forms – for 10 mg 1–2 times per days under a tongue during 6 days, in the defeats of neck uterus by the papiloma virus of man – for 10 mg 1 time per day during 10 days, in psoriasis – for 10–20 mg 1–2 times per days during 10 days and further in a day for 10–20 mg during the followings 10 days. For children in age 1–16 years Likopid used in pills for 1 mg. Form of issue: Pills for 1 mg and 10 mg.

Bronkhomunal is lysation of bacteria, more frequent than all followed with inflammation respiratory tracts (only 8 exciters). Bronkhomunal promotes natural protective forces of organism, stimulates specific antimicrobial immunity, diminishing frequency of infecting and necessity of adopting antibiotics.

Used for a fight against infections, which cause inflammatory processes in nose and pharings, bronchial tubes and lungs. Recommended in infections of respiratory tract, as a mean of prophylaxis or additional therapy.

The imunostimulatory effect of Bronkhomunal is conditioned influence on macrophages, T-limphocytes, natural killers, cytokine synthesis rises in this connection (IL-2, γ-interferone and TNF-α). Produced in capsules for 3,5 mg and 7 mg. Accepted on an empty stomach in the morning in acute phase of

disease for to 1 capsule during 10–30 days, and with the purpose of prophilaxis – for 10 days in a month in that dose.

Imudon is mixture of lysatus 14 microorganisms, including lacto-bacteria. Used with the purpose of immunetherapie in stomatology.

Testimonies: 1) inflammatory and infectious processes in oral cavity, including erytematosis and ulcerous gingivitis, superficial and deep paradontosis, stomatitis, glossitis; 2) ulceration, caused dentures.

Produced in pills for 0,05 g. In acute processes appoint 8 pills in a day during 10 days, in chronic are 6 pills in a day during 20 days and more. It is recommended to conduct treatment 2–3 times per a year.

Ribomunil is preparation of microbia origin of new generation. The ribosomes of four cultures of microbes enter in the complement of preparation, most often followed with infections respiratory tracts (Klebsiella pneumoniae, Streptococcus pneumoniae. Streptococcus pyogenes, Haemophilus influenzae). Ribosomes, saving specificity of the indicated exciters, give the less sides effects at their introduction to the organism, as compared to extracts of bacteria. Protheoglycan, abstracted from the cellular membrane of Klebsiella pneumoniae enters in the complement of Ribomunil. The role of protheoglycan is taken to stimulation of immunity due to activation of macrophages and synthesis IL-1, IL-6, interferons with subsequent stimulation of T-, B-lymphocytes and natural killers. The system of immunity activated thus more effectively answers on present persons in Ribomunil ribosomes, synthesizing specific antibodies. One of major features of Ribomunil action is its ability for certain to multiply the concentration of specific secretory Ig A.

Produced in pills. Appointed for 3 pills on an empty stomach in the first 4 days during 3 weeks of 1th month of treatment, and then in the first 4 days each of subsequent 5 months.

Synthetic immunomodulators

Polioxidony is an oxygenated derivative polyetilenpiperosin with high molecular weight. Preparation possesses the wide spectrum of action. Polioxidony increases the functional activity of T- and B-lymphocytes, NK-cells. It stimulates activity of phagocytes to absorb and digest microorganismes, rising of neutrophils migration activity. Summary consequence of natural immunity factors activation is rising of stability to bacterial and viral infections. Polioxidony also has desintoxicative propertes, because ability to sorb on its molecule surfaces different toxic substances and goes them from the organism.

The preparation showed high effectiveness of all acute and chronic infection-inflammatory processes of any localization and any origin. In strength of its immunomodulating, detoxic, antioxidant, membranostabilising properties of Polioxidony engages the leading position in urology, gynecology, surgery, pulmonary, allergology and oncologic practice. The preparation is fine

connected with all antibiotics, antiviral and antifungous means, with interferons and its inductors and goes into the complex schemes of treatment of many infectious diseases. Polioxidony is one of the not many immunomodulators, recommended for applying by acute infectious and allergic processes.

To the adults preparation is appointed by intramuscular or intravenously (tiny) in doses 6–12 mgs one time in days daily, in a day, 2 times or 1 time per a week depending on a diagnosis and weight of disease. A form of issue is small bottles or ampoules from neutral glass, containing 0,003 ã or 0.006 ã.

Glutoxim is the first and only singe representative of the new substance class – thiopoietins. Glutoxim represents itself chemically synthesized gexapeptid, being structural analogy of natural metabolite – oxygenated glutation. Glutoxim activates antiperoxide enzimes, glutationreductase, glutationtransferase and glutationperoxidase, which in their turn activate intercellular reactions of thiol exchange and also processes of synthesis, sulfur and phosphorus containing macroergetic connections, which is necessary for normal functioning intercellular regulatoring systems. The work of cell in a new oxygenated restoration regime and change of dynamics of phosphorylating of key-blocks-signal transferring systems and transcriptional factor in the first place of immunocompetent cells define immunomodulating and systemic cytoprotectoring effect of the preparation. Special Glutoxim property is ability to render differential influence on normal (stimulation of proliferation and differentiation) and transformation (induction of apoptosis). To the main immunophysiological properties of preparation refer activation of phagocytes system; strengthening of medullar hemopoiesis and restoration level of neutrophiles, monocytes in peripheral blood; increasing the endogenous production of IL-1, IL-6, TNF, INF, erythropoietin, reproduction of effects IL-2 and lead to induction and expression of its receptors.

Glutoxim is applied in prophylaxis and treatment of secondary immunodeficient states, associated with radioactive, chemical, infectious factors; tumors different localizations as a component of antitumoral therapy; acute and chronic viral hepatitis B and hepatitis C; for potentiation curative effects of antibacterial therapy of chronic obstructive lungs diseases; for prophylaxis of postoperative purulent complications; for rising organism stability to different pathological influences – infectious agents, chemical or physical factors (intoxication, radiation and etcetera).

Preparation of Glutoksim is injected intravenously, intramuscular, hypodermic. Apply daily for 5–40 mg (on a 1 course – 50–300 mgs) depending on character of disease. Form of issue: solution for injections 0,5%; 1% and 3% (ampoules) for 1 or 2 ml.

Galavit is an active derivative of phthalgidrosidis. Galavit possesses anti-inflammatory and immunomodulating properties. Its main pharmacological

effects stipulate capability to influence on functional and metabolic activity of macrophages. By inflammatory diseases the preparation inhibits excessive synthesis of tumor necrosis factor-β, interleukin-1, active forms of oxygen and other inflammatory cytokins in hyperactivated macrophages, determinins degree of inflammatory reactions. Normalization the regulating function of macrophages brings to lowering their autoagression level. Besides the influence on monocyto-macrophageous section, the preparation stimulates microbicidal activity of neutrophilic granulocytes, strengthening of phagocytosis and raising nonspecifical resistance of the organism to infectious diseases, and also antimicrobic defence.

Galavit is applied to pathogenetic treatment of acute infectious diseases (intestinal infections, hepatitis, rose, purulent meningitis, diseases of urinogenital sphere, posttraumatic osteomyelitis, obstructive bronchitis, pneumonia) and chronic inflammatory diseases, including autoimmune component in pathogenesis (non-specific colitis, Crohn's disease, defeat of liver of different etiology, sclerodermia, reactive arthritis, system lupus erythematous, Bechtchet's syndrome, rheumatism and others), the secondary immunologic insufficiency, and also for correction immunity of oncologic patients (before and postoperative period, receiving radial and chemotherapy, for prophylaxis of postoperative complications).

Galavit is entered by intramuscular. Before injection preparation is conducted in 2 ml waters for injections or 0,9% physiological solution. In an acute period an initial dose makes 200 mgs, after – for 100 mgs of 2–3 time per day to improve patient state. A course is 15–25 injections. In a chronic period enter 100 mgs of preparation 1 time per 3 days. A course is to 20 injections. Preparation is produced in bottles containing 100 mgs of Galavit.

Groprinozin is immunostimulator with antiviral activity. A immuno-stimulatory action is conditioned influence on the function of T-lymphocytes (activating synthesis of cytokynes), increase of phagocytic activity of macrophages. The antiviral activity is related to the damage of replication both DNA- and RNA-containing viruses. At the same time preparation possesses interferon activity.

Testimonies. 1. Infections, caused the viruses of herpes group (zoster, genital herpes, encephalitis); 2. Other viral infections, especially in combination with the immunosupressive states (measles, chicken-pox, flu).

Produced in pills for 500 mgs. 50 mgs/kg of mass of body are used in a dose, at heavy processes are 100 mgs/kg. Course of treatment – 5 days. A dose is divided into 3–4 receptions and accept after a meal. In 8 days a course repeats oneself.

Interferon inductors

The most interferon inductors concern also to synthetic immunomodulators. Interferon inductors represent themselves heterogeneous on composition family of high and low molecular synthetic and natural connections, uniting

ability to provoke in organism formation of personal endogenous interferon. Interferon inductors possess antiviral, immunomodulating and other distinctive effects for interferon.

Poludan (complex of poliadenylic and poliuridinal acids) is one of the most first inductors of interferon, applying in the 70th years. Its interferon inductious activity is not high. Poludan is used in species of eye drops and injections under conjunctiva by herpetic kerataconjuctivitis and also in kind of application by herpetic vulvo-vaginitis and colpitis. Form of issue: bottle 5 ml preparation for eye drops or solution for injections – 200 mcg (100 UN).

Amixin is a low molecular interferon inductor. Amixin stimulates formation in organism all interferons: α, β and γ. Maximal interferon level in blood reaches approximately in 24 hours after taking of Amixin, raising in comparison with its initial value tens of time. The important peculiarity of Amixin is long circulation (up to 8 weeks) of therapeutic interferon concentration after the course taking of the preparation. Considerable and prolonged Amixin stimulation in working out of endogenous interferon provides its wide universal diapason of antiviral activity. Amixin also stimulates humoral immunal response, increasing production of Ig M and Ig G, restores correlation T-helpers/T-suppressors. Amixin is applied for prophylaxis of influenza and other ARVD, treatment of severe forms of influenza, acute and chronic hepatitis B and C, relapsing genital herpes, cytomegaloviral infection, chlamydiosis, multiple sclerosis.

Preparation is adopted inward after a meal. For the unspecific prophylaxis of viral hepatitis A – 0,125 g in a week during 6 weeks. For treatment of viral hepatitis A in the first day for 0,125 g 2 times, after for 0,125 g in 48 hours. On the course of treatment goes 1,25 g (10 pills). For treatment of acute hepatitis B in the first and second days for 0,125 g then for 0,125 g in 48 hours. On the course of treatment goes 2 g (16 pills). In chronic hepatitis B in the initial phase of treatment – the first two days for 0,25 g then 0,125 g in 48 hours. Phase of continuation (from 1,25 g – 10 pills to 2,5 g – 20 pills) – for 0,125 g in a week, duration of therapy – 3,5–6 months. In acute hepatitis C – the first and second days for 0,125 g, then – for 0,125 g in 48 hours. Course of treatment of 2,5 g (20 pills). At chronic hepatitis C in initial phase of treatment – the first two days for 0,25 g then 0,125 g in 48 hours. Phase of continuation (2,5 g are 20 pills) – for 0,125 g in a week. Duration of therapy – 6 months.

In treatment of flu and other ARVID – in the first two days of illness for 0,125 g, then in 48 hours for 0,125 g. On the course of treatment 0,750 g. For the prophylaxis of flu and other ARVID – 0,125 g one time week during 6 weeks. For treatment of herpetic, cytomegaloviruses infections in the first two days for 0,125 g, then in 48 hours for 0,125 g. Course dose – 2,5 g. In urogenital and respiratory chlamidiasis – the first two days for 0,125 g; then in 48 hours for 0,125 g. The course dose 1,25 g.

Neovir is low molecular interferon inductor (derivative carboxymethulcridon). Neovir introduces the high titres of endogenous interferon in organism, especially of early interferon-γ. The preparation possesses immunomodulating, antiviral, antitumor activities. Neovir applies by viral hepatitis B and hepatitis C and also by urethritis, cervicitis, salpingitis of chlamidious etiology, viral encephalitis.

Method of application and dose: Solution for injections is entered by intramuscular, a valid for one occasion therapeutic dose makes 250 mgs (1 ampoule) or 4–6 mgs on the kg of mass of body of patient. Course of treatment, consists of 5–7 intramuscular injections of Neovir, with an interval 48 hours. Form of issue: Solution for injections 12,5% in ampoules for 2 ml.

Cyclopheron is a preparation like Neovir (methylglucaminal salt of carboxymethyl kridon), mechanism of action and showing is similar such as in Neovir.

Cyclopheron apply intramuscular or intravenously one time in days on a chart: on 1, 2, 4, 6, 8, 11, 14, 17, 20, 23, 26, 29 days, valid for one occasion dose – 0.25–0.5 g. A course of treatment is 10 injections.

The presence of great number of immunomodulators must not frighten the practical doctors. The immune system consists of the whole row of narrowly connected in functional plan of components the task of which concludes in elimination from organism the heterologous substances of antigenous nature. Relatively specific agents may be in each component of this system. Era of immunocorregent therapy only begins, and after applying in clinical practice in the end will be selected the more effective preparations which as aspirin, cardiac glycosides, antibiotics and others, for a long time will come in the number of basis preparations by treatment one or another diseases.

Tests for verification final level of knowledge

1. Immunomodulators which are herbal medicines?

A. immunofan	*D. nucleinat sodium*	*G. viferon*
B. cicloferon	*E. timalin*	*H. Immunal*
C. bronhomunal	*F. roncoleukin*	

2. Conducting immunotherapy justified situations:

A. Persons having clinical signs of impaired immunity and changes of immunological parameters.

B. Persons having clinical signs of disorders of the immune system in the absence of changes in immunological parameters were revealed by routine laboratory tests.

C. Persons having only changes immunological parameters without clinical signs of disease of the immune system.

D. Individuals who have no changes in immunological parameters and without clinical signs of immune system deficiency.

3. Which is preferable to appoint immunomodulators cells in lesions monoyto - macrophage system

A. polioxidony *C. mielopid*
B. timalin *D. immunoglobulin human normal*

4. Which is preferable to appoint immunomodulators for defects of cellular immunity

A. polioxidony *C. mielopid*
B. timalin *D. immunoglobulin human normal*

5. Which is preferable to appoint immunomodulators in violation of the synthesis of antibodies by B-lymphocytes

A. polioxidony *C. mielopid*
B. timalin *D. immunoglobulin human normal*

6. Which is preferable to appoint immunomodulators in violation of humoral immunity (agammaglobulinemia)

A polioxidony *C mielopid*
B timalin *D immunoglobulin human normal*

7. Which of the following vaccines are used for influenza vaccination.

A. DTP B. Influvak C. Havrix D. BCG E. OPV

8. What are the terms in which it is recommended to be vaccinated against influenza.

A. in April *D. in January - February*
B. during the epidemic *E. May-June*
C. in October -November

9. What could be the manifestation of nervous system lesions after vaccination?

A. Encephalitis.
B. Meningitis.
C. Polineyroradikulopatiya.
D. Vaccine-associated paralytic poliomyelitis.
E. All answers are correct.

10. With what intervals and what preparations need to be periodically revaccination to maintain immunity against tetanus at a sufficient level?

A. with an interval of 10 years, the introduction of AC-toxoid or Td toxoid;
B. every 5 years, the introduction of AC- toxoid or Td toxoid;
C. with an interval of 10 years, the introduction of AC-toxoid Td toxoid;
D. with an interval of 10 years, the introduction of AC-toxoid or DTP vaccine;
E. with an interval of 5 years, the introduction of AC-toxoid.

Correct answers to the questions: 1 – H. 2 – A, B, C. **3** – A. **4** – B. **5** – C. **6** – D. **7** – B. **8** – C. **9** – E. **10** – A.

Навчальне видання

Модуль 1. Клінічна імунологія та алергологія.
Тема 9.
МОЖЛИВОСТІ ТА ПЕРСПЕКТИВИ ІМУНОТРОПНОЇ ТЕРАПІЇ В СТОМАТОЛОГІЇ

Методичні вказівки до практичних занять студентів медичних вузів з англійською мовою навчання за спеціальністю "Стоматологія"

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Module 1.
Clinical immunology and allergology.
Theme 9.
OPPORTUNITIES AND PROSPECTS OF IMMUNOTHROPIC THERAPY IN STOMATOLOGY

Manual for practical lessons students having higher medical education in English majoring in dentistry