

Ministry of health care of Ukraine  
Highest state scientific institution of the Ukraine  
«Ukrainian medical stomatological academy»

"Approved"

at a meeting of the Department of Experimental  
and Clinical Pharmacology with Clinical  
Immunology and Allergology

**Head of the department**

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**Methodical guidance for students' self-directed  
work when preparing for practical session**

Academic subject	Clinical Immunology and Allergology
Semantic module №1	Immunological status. Immunodeficiency diseases and immune-pathology
Topic 6	<b>Basic principles of immunotropic therapy. Immunorehabilitation, immunoprophylaxis</b>
Year of study	5
Faculty	medical

### 1. Relevance of the topic:

Immunotropic called agents that are inherent in a direct or indirect impact on the activity of the immune system. In a broad sense to them unotropic drugs include virtually all known means today, because the immune system is highly sensitive and always responds in a certain way to the introduction of those or other substances. The task of the physician, a clinical immunologist is a practical mastery of the knowledge that and immunotropic drugs understood only by those means, the main pharmacological effect of which is directly related to effects on immune processes.

### 2. Specific objectives:

1. To acquire theoretical knowledge of the secular changes in central and peripheral organs of the immune system.
2. To characterize the main critical periods of the formation of the immune system of the child.
3. To master the basic provisions of the clinical and laboratory features of the dynamics of physiological about to rest in blood baby formula.
4. To acquire knowledge related to the clinical physiological and pathological changes of the immune status in people of advanced age.
5. To acquire information on the main environmental factors that can adversely affect the human immune reactivity

### 3. Basic knowledge, abilities, skills, necessary for a study themes (interdisciplinary integration)

The name of the previous disciplines	These skills
Anatomy	To know the structure and with thumys, lymph nodes, plaques, spleen, bone marrow. Conduct a physical examination of the patients.
Normal physiology	To know the functioning of the Central and Peripheral organs of the immune system. About know the basics of clinical and laboratory studies.
Biochemistry	Learn the basics of biochemical laboratory studies. Action and effect of cytokines of different groups of biologically active substances.
Microbiology and Virology	Know the immune response, diagnosis of bacteriuria rial and viral infections. About know the basics of special microbiological methods.
Therapy	Know the pathogenesis and clinical manifestations of allergic diseases and secondary immunodeficiencies. To be able to collect immunological and allergic history.
phthisiatry	To master the mechanisms of cells dependence and my constant immuno reaction course and clinical manifestations of tuberculosis.
Infectious diseases	Learn the pathogenesis, clinical manifestations of bacterial and viral infections. To be able to diagnose bacterial and viral infections.

### 4. Tasks for independent work during preparation for classes.

#### 4.1. List of basic terms, parameters, characteristics that must learn art udent while preparing for the class:

Term	definition
Aduvant	A substance that stimulates the non-specific immune response to an antigen and factors of different origin and composition that stimulates the immune system
Vaccination	The use of vaccines to create artificial acquired active specific immunity in order to prevent the development of infectious diseases in the team and individuals
Immunization	The method of creating an artificial immunity by introducing into the body weakened or killed pathogens (vaccine) or their components

Preparations interleukin	Roncoleukin, Betaleukin, Neupogen, filerastim, leykomaks, molgrastim
Immune deficiency syndrome	High sensitivity to infection by a violation of humoral, cellular immunity

#### 4.2. Theoretical questions for the class:

1. Mechanisms of maintenance of immune tolerance to fetal antigens.
2. The basic immunological mechanisms of physiological rest in the blood to the baby formula.
7. Characteristics of contemporary immunotropic means to learn the peculiarities of their effect on different parts of the immune system.
8. The basic principles for the use of drugs with them pendent action of the indirect action.
9. Tactics doctor, principles of treatment and prevention of diseases and immune dependent children of different age groups and persons of advanced age; particular purpose and immunotropic therapy.

#### 4.3. Practical questions for the class:

1. Detect and taken into account when interpreting the clinical and immunological their data secular features of the immune system of patients.
2. Conduct preventive treatment of dysfunctions of the immune system in different critical periods of the formation of the baby's immune system.
3. Appoint and formation of treatment, to determine prognosis, conduct primary and secondary immunization with them and pendent diseases
4. Know the basic principles of purpose and minutes immune therapy in treatment of immuno stenosis pendent's disease.
5. To be able to assign and immunotropic therapy in treatment of infectious diseases.
6. Evaluate the effectiveness of immunotherapy based on the assigned dynamic Studies of immunogramm.
7. Ability to take into account the side-effects and immunotropic therapies, especially in combination with traditional therapy.

### Content Topics

#### Immunotropic PREPARATIONS

Immunotropic called means that are inherent in a direct or indirect impact on the activity of the immune system. In the broadest sense to the immune preparations include virtually all known by means of today, as the immune system is highly sensitive, and always reacts a certain way to the introduction of those or other substances. However, in practice under immunotropic preparations understand only the means, the main pharmacological effect of which is directly related to effects on immune processes.

All the immunotropic products can be divided into those which are used for therapeutic purposes (the vast majority) and those which are used for specific prevention of infectious diseases (vaccines, serums). By the principle of action all immunontropic products are divided into therapeutic purpose immunotrimmers, immunomodulators and immunosuppressants immunocollectors.

#### The list of drugs that are widely used for immunocorrection

The target effect of the drug	Names immunotropic funds
T-cell	Tim formulations and, rbisol, immuno Nofal, imidazole derivatives (dekaris, levamisole) diutsifon, preparations of IL-2 and IFN-gamma, nucleon and tension Na and galaskorbin, vitamins But E, Zp micronutrients) heparin
B-cells etochnoe link	Mielopid, polyoxidonium, likopid, galavit, immunoglobulin preparations, prodigiozan, pirogenal, salmozan, indomethacin, splenin.

Systemic effect on innate immunity factors	Adaptogens (carefully!), The preparations of echinacea, apilak, splenin, lysozyme preparations (lisobakt) glycyram, metiluratsil pentoksil, vitamin A
Phagocytosis	Polioksidony, likopid, nucleon and tension Na, metiluratsil pirogenal, prodigiozan
Natural killer cells	Preparations IFN alpha and beta, interferonogen (tsikloferon, amiksin, pirogenal, prodigiozan, Poludanum), mefenamic acid, dimexide, antivirals (amizon, groprinozin) Dibazolium

The following table shows immunotropic drugs that can be recommended for widespread use in diseases of the immune system in children.

#### **Immunotropic drugs that are recommended for use in children**

<b>drug</b>	<b>Act</b>
Dibazol 0.001-0.005 g per reception - 2-3 times a day for 2 hours before meals or 2 hours after meals for 1 month, repeated course - h / from 1 month	present, antispasmodic, hypotensive action, stimulates the spinal cord function detects moderate immune activity
Metatsil (Methyluracilum) 0.25-0.5 g per reception - 3 times a day for 1-1.5 months	Anabolic, anti-catabolic effect, accelerates cell regeneration, with Tim liruet cellular and humoral immune responses, leukocyte and promotes erythropoiesis and
Pentoxoy 0,015-0,01 g reception three times a day for 15-20 days	With Tim leykopoeza trimmer is used in respiratory diseases with neutropenia and oppression phagocytosis, gastric ulcer and chronic pancreatitis
Ruthin 0.02-0.05 g - 2-3 times a day	It is a component of the antioxidant systems of the body, reduces capillary permeability in inflammation. Is used in combination with ascorbic acid
Quercetin 0.05 g reception 2-3 times a day for 1.5-2 months	During the action of such routines. Used for the prevention and treatment of hemorrhagic diathesis in on, allergic, burns and radiation injury of capillaries
Diutsifon 0.1 g of 3-4 times per day for 3-4 weeks	It has art and stimulative effect on metabolic processes in the immune system. Used for dermatoses (psoriasis, scleroderma), COPD, rheumatoid arthritis, tuberculosis

Today found that such a distribution is rather arbitrary because the same minutes immunotropic drug can detect different properties depending on the dose and the particular clinical situation. Therefore, it is more correct to talk about them at the IMMUNE insulation, immunocorrection, immunomodulation as an immunotherapy direction, rather than on preparations immunomodulators and immunoncorrect immunos. In today's market there are quite a number of immunotropic preparations. Appointment of such funds should be under mandatory supervision immuno NOHD we, as each of the drugs having inhibitory effect on certain parts of immunity. Stimulation of the undisturbed level can lead to an increase in the imbalance in the immune response and the deepening of the existing defect.

#### **1. Immunotropic drugs of natural origin**

**Echinacea preparations.** The drug acts pre and substantially on cellular immunity and innate factors of resistance, because is widely used for acute and chronic viral infections. The main side effect of Echinacea preparations is the ability to detect excessive lymphoproliferative effect, which can increase the size of manifested as minutes but gave and cervical lymph nodes, high lymphocytosis according to the general analysis of blood. Excessive lymphoproliferative effect is

always dangerous induction of apoptosis of immune cells, because we do not recommend the routine use of echinacea preparations with SARS.

**Manaks.** Pharmacological properties of the drug due to the presence in its composition and tetra pentacyclic oxidized alkaloids, glycosides quinic acid, terpenes, saponins, polyphenols, procyanidins on in, flavonoids. The tool is used to remove immune defects DHS for the treatment of chronic viral infections, and chronic fatigue syndrome, because the drug has a dramatic effect antiasthenic minutes. Plant extracts "cat's claw I" contain components of opposite effect (immune them from trimmers and cytostatics).

**"Ukraine"** – immunomodulative agent, obtained on the basis of an extract of celandine. The active ingredient is a series of celandine alkaloids. The drug is widely used in oncology due to the modulating effect on cellular immunity. Research has brought the efficiency of "Ukraine" with the DHS, which appear mainly bronchological pathology (chronic and recurrent bronchitis, pneumonia). It was shown that the drug not only increases the content of T lymphocytes and enhances their functional activity, but also exerts a modulation effect on phagocytosis and IgG synthesis. The evidence regarding the impact of "Ukraine" in the processes of synthesis of other classes of antibodies in the above studies has been received. Due to the inhibitory modulation of phagocytosis and T immunity drug can be recommended for the treatment of chronic fatigue syndrome.

## **2. Immunotropics products of animal origin**

**Erbi salts** is a complex non-protein low molecular weight organic compounds of natural non-hormonal origin, derived from embryonic tissue of cattle. In its composition preparation comprises glycopeptides, peptides, nucleotides, amino acids. Erbisol activates the immune system with respect to accelerating the renewal of damaged and destroy abnormal cells and tissues. The main immunomodulating effect of the drug is primarily due to the effect on macrophage link, which is responsible for the repair of damaged cells

The tool is used to remove immune defects DHS for the treatment of chronic viral infections, and chronic fatigue syndrome, because the drug has a dramatic effect antiasthenic minutes.

### ***RP G Timic drugs***

**Timalin** is a complex polypeptide fractions isolated and breakfast on prostate (Thumys) in cattle. The drug carries a regulating effect on the number of T and B lymphocytes, mainly stimulating the cellular immune response, as well as enhancing phagocytosis. Timalin stimulates regeneration processes of hematopoiesis and in case of harassment. Used for acute and chronic purulent processes and incendiary diseases, burn disease, venous ulcers, and after radiotherapy or chemotherapy in cancer patients. **T-activin** - means normalizes the quantitative and functional indices of pre immuno substantially T-links of immunity, stimulates the production of lymphokines, including - interferons. Use in adults in the treatment of infectious diseases, septic, septic processes, as well as blood and lymph proliferative diseases, multiple sclerosis, psoriasis, ophthalmic recurrent. **Timoptin** is a complex of polypeptides from the thyroid gland of mammals. For pharmacological action and indications for use of similarity. **vilozen** It is a lyophilized extract diazilatome and on thyroid gland of cattle. The drug has immunomodulative it well, the activity, stimulating the proliferation and differentiation of T lymphocytes, and inhibits the development of immediate-type hypersensitivity reactions. It is used topically in the form of dropping nose or by intranasal x inhalation in allergic their upper respiratory tract

## **3. Preparations immunoglobulin**

Immunoglobulin preparations are used as a means of substitution therapy with hypogammaglobulinemia, by intramuscular or intravenous administration. Advantages of immunoglobulin for intravenous administration:

- the drug can be administered in a large amount;
- the effect comes quickly;
- noted a more complete use of the drug;
- there is almost no anticomplementary activity.

During the last time it found that immunoglobulin preparations make expressive immunomodulatory action, which extends the indications for their use. With a syndrome Gia on-

Barre syndrome, which is accompanied by hypergammaglobulinemia, high efficiency immunoglobulin therapy is explained by the immunomodulatory effects of drugs. **Pentaglobin** - a donor immunoglobulin preparation for the on / in the introduction. Pentaglobin contains a large number of them and opsonize specific neutralizing antibodies against a variety of bacteria, viruses and toxins. In addition, the clinical efficacy of the drug is associated with the presence of so-called natural antibodies that target the molecular patterns of pathogen and is a component of innate resistance.

#### **4. Immunotropic preparations of bacterial origin**

**Prodigiozan** is a high-polymer complex lipopolysaccharide, a microorganism isolated from prodigiozum. The drug is activated in Lanka immunity and function of the adrenal cortex. Action prodigiozan and significantly associated with stimulation of the endogenous cytokine synthesis, in particular to the activation of interferon production. Prodigiozan used in chronic inflammatory processes in the postoperative period, the treatment with antibiotics for wounds go weak, when using radiation therapy.

**IRS-19.** This is a complex preparation of lysates of bacteria that are the most common pathogens of infectious diseases of the upper respiratory tract. Lysis was done by microorganisms original biological technique that allows to obtain non-pathogenic bacteria fragments with stored specific antigenic properties. Owing to these properties lysate initiates in the upper respiratory tract mucosal immune defensive reactions implementation, which is manifested as proliferation and activation of immune cells, increased levels of lysozyme and interferon enhance phagocytosis. The drug should be used for the treatment of acute and chronic infectious 's diseases of upper respiratory tract (sinusitis, rhinitis, otitis), tracheitis, bronchitis, rinotraheobronchitis.

**Ribomunil.** The drug contains ribosomes microorganisms that most commonly cause respiratory infections (*Klebsiella pneumoniae*, *Diplococcus pneumoniae*, *Streptococcus pyogenes*, *Haemophilus influenzae*. And called that prokaryotic ribosomes in significantly different for the jets Keturah from similar organelles caritic EQF their organisms, which virtually eliminates the possibility of cross-reactions to autoantigens person. The drug is intended for the treatment and prevention of recurrent ear infections, nose and throat, and respiratory (bronchitis, tracheobronchitis, infection he stenosis dependence of bronchial asthma). ribosomal I fraction of the drug activates the T and B lymphocytes, According to specific antigens that provides vaccinating effect by synthesis of antibodies to the agents of respiratory tract infections.

#### **5. Immunotropic preparations of fungal origin**

**Zymosan suspension** is a suspension of polysaccharides which are obtained from the culture of baker's yeast. The drug is recommended for use as a non-specific with leykopoeza with radiation therapy and cancer chemotherapy. For prevention of leukopenia used together with radiation therapy or chemotherapy.

**Immunomax** is immunotropic drug that is derived from the mushroom *Lentinula edodes* and *Grifula frondosa*. Active ingredients are grifolan that enhances the activity of macrophages, the so-called D-fraction which potentiates cell mediated immunity. In addition, the product contains a number of substances that are recognized by macrophages and endritnymi cells like pathogens knit molecular templates that ensures the activation of the immune system in a natural way. It should be noted that mushrooms, of which the preparation obtained contain molecular patterns that belong to different types of organisms (plant cellulose, chitin, animal, bacterial polysaccharides) that provides triple action on activation antigenpresent suitable cells.

#### **6. Immunotropic drugs of synthetic origin**

**Timogen** is synthetically obtained dipeptide, which consists of glutamine and tryptophan amino acid residues. The drug has immuno nose Tim L act, and enhances the activity of innate factors of resistance. Indications for use of the drug are responsible for the immune so they have lators timic group.

**Likopid** – immunomodulative second drug, for that is the chemical nature of glucose-minilmuramil dipeptide. This factor licopid is a universal minimum component of the bacterial wall, which acts as a natural modulator of the immune system. Likopid modulates all parts of the immune system, but in the first place - macrophage phagocytic-link, whose defeat has played a leading role in the pathogenesis of chronic suppurative infections. When administered likopid and

activated uptake and destruction by phagocytes pathogens, the transfer of information of microbes other immunocompetent cells that recognize and destroy virus-infected cells. Likopid induces the synthesis of interferon, which is one of the key factors that ensure anti-viral and anti-tumor immunity. The drug normalizes the reduced level of white blood cells.

**Polioxidone** modulates the immune defense mechanisms mediating the activation of phagocytosis and antibody education, increasing the body's resistance to bacterial and viral infections. Polioxidone resumes normal course of immune reactions in severe immunodeficiency disease. In aging, ionizing irradiation injury, steroid therapy, cytotoxic agents, and also in terms of cancer. Importantly, the drug inherent defined detoxification, antioxidant and membrane property. The tool is characterized by prolonged action, it combines well with different groups of medicines (antibiotics, anti-viral, anti-tumor, antihistamine, broncholytic, hormones, etc.).

**Galavit.** Targets galavita actions are antitumorigenesis and phagocytosis. When using this tool there is a growing synthesis of immunoglobulin G and to increase their affinity for epitopes of the pathogen as well. It is most likely that the increase affinity and antibodies is due to primarily increased phagocytosis process, which leads to a transformation in progress in the completion of phagocytosis and improve the quality of antigen presentation. A distinctive feature of galavita a regulatory effect on the proliferation of natural killer cells and T cells by stimulating the synthesis of interferon. **Immuno Nofal** on chemical structures is a hexapeptide (Arinin alpha Aspara-lysyl-valyl-tyrosyl-arginine). Immuno Nofal completely absorbed from the injection site and is rapidly degraded to amino acids, which are included in its composition. The drug is inherent in immunoregulation, detoxification, hepatoprotective action. It causes inactivation of peroxide compounds and compounds which are free radicals. Mode of action of this peptide immunomodulatory is based on the achievement of the correction of immune system and oxidant-antioxidant systems of the body

**7. Preparations with interferonogenic second activity (inducer of endogenous interferon)** **Poludan. Cicloferon** - a drug that admission to the body leads to a significant increase in the production of endogenous interferon. The result of this effect is to enhance cellular immunity. The drug used in infections caused by intracellular microorganisms (herpes simplex, herpes zoster, Epstein-Barr virus, CMV, adenovirus and others.). In addition, Cicloferon can be used as an adjunct in the treatment of AIDS, which are based on defective cellular link. The advantage of cicloferon of drugs interferon is a mild (better tolerability) and no inhibitory effect on the synthesis of endogenous interferon. **Amiksin.** This drug is an oral inducer of endogenous interferon prolonged action. Amiksin Indications for use are the same as for the preparations of interferons.

### **Materials for students' self-directed work**

#### **A. Tests to verify the initial level of knowledge:**

1) What is the phagocytic activity of neutrophils and macrophages of the newborn?

1. LOWER +
2. reinforced
3. missing
4. meets this adult

2) What is the level of lysozyme in body fluids of a newborn?

1. reduced
2. increased +
3. lysozyme missing
4. meets this adult

3) What are the levels of interferon production in the newborn?

1. reduced +
2. increased
3. Interferons are not produced
4. meets this adult

4). Products which IgG subclasses observed in newborns?

1. of IgG 1
2. of IgG 2+
3. of IgG 3
4. of IgG 4+

5). K Tim antibody education and phagocytosis include:

1. immuno Nofal
2. likopid
3. polyoxidonium +
4. Ukraine

6) deficiency is a component of the complement observed in newborns?

1. C1
2. With 3
3. C5 +
4. C7

7) The newborn phenomenon autoaggression :

1. actively developing
2. developed as in other age groups of children
3. hardly develops +
4. Only actively developing auto immune I thyroid pathology.

8) activity of natural x killers in newborns:

1. increased
2. moderately reduced
3. The reduced activity of CD8 alone
4. A significant reduction in activity of NK -kle t c +

9) Production of specific antibodies in the newborn:

1. increased
2. LOWER +
3. The higher district and only up to a gram-negative flora
4. reduced only to the gram-positive flora

10) What violation of synthesis of IgA is observed in newborns:

1. The reduction of the secretory and syvoroto CHN th components +
2. The reduction only syvoroto CHN th component
3. The reduction of only the secretory component
4. increased secretory and serum -screw components

11). Stimulators of B-lymphocytes and phagocytosis is:

1. amizol
2. immuno Nofal
3. polyoxidonium +
4. prodigiozan

12). Article imu lyatom natural killer cells is :

1. amizol
2. immuno Nofal
3. polyoxidonium
4. prodigiozan +



## **B. Tasks for self-control:**

**Task №1 .** Patient D., 52 years. Receiving chemotherapy after surgery pulm. In the course of treatment found: Er. 2: June 1012 / L, 111 g Hb / l, KP 0.84; LA 2.3 x 10<sup>9</sup> / L, BS 2%, 5% E., P. 1% C. 48% Lim. 40% M 4%, ESR 40 mm T. 7%, Vt. 35% About 58%.

**Q:** Doctor tactics.

- a) continue chemotherapy;
- b) to stop the chemotherapy;
- c) to continue with the parallel use of chemotherapy immunos Tim lators?

**The answer is:** as much as possible to stop chemotherapy. By including lymphoma therapy - and leucopoiesis ( immuno Nofal, likopid et al.).

**Task №2.** The patient surgical re-observed phenomena peritonitis. - What is the main genesis of this pathology?

**Answer :** - Which immunotropic drugs in the first place need to apply?

**Answer :** - As a rule, - Gram-negative flora

- The preparations of immunoglobulins, primarily - pentaglobin.

**Task №3.** The newborn is marked clinical signs of systemic experiences of the body similar to the microwave. Given the state of the immune system in this group of children, explain the possibility or impossibility of auto immuno constant pathology?

**Answer:** In a typical newborn supresivny type immune responses due not only to T-suppressor, but not mature T-lymphocytes; This in turn prevents the development of self-aggression.

**Task №4.** Why, as a rule, from the point of view of immunity pneumonia in newborns characterized by complicated course?

**Answer:** This is primarily due to manifestations of incomplete phagocytosis.

**Task №5.** What else can be the cause of the weakness of antibacterial protection in newborns?

**Answer:** Low blood activity; low production of IgG2, IgA, IgM.

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