**FEDERAL STATE BUDGET EDUCATIONAL**
**HIGHER EDUCATION INSTITUTION**
**"ROSTOV STATE MEDICAL UNIVERSITY"**
**MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION**

FACULTY "Therapeutic and preventive"

# Evaluation materials

by discipline**"Pharmacology"**

Specialty 05/31/01 General Medicine

2023

**1. List of competencies formed by the discipline (in full or partially)***

***general professional (OPK):***

| Code and name general professional competence | Indicator(s) of achieving general professional competence |
|---|---|
| GPC-7 Treatment of diseases and conditions. Able to prescribe treatment and monitor its effectiveness and safety. | ID 1 GPC-7 Knows modern drug and combination treatment regimens in accordance with the standards of medical care.<br>ID 2 GPC-7 Able to recognize signs of typical complications during pharmacotherapy with the aim of its timely correction. |

**2. Types of assessment materials in accordance with the competencies being developed**

| Name competencies | Types of assessment materials | number of tasks for 1 competency |
|---|---|---|
| OPK-7 | Closed tasks | 25 with sample answers |
| | Open-ended tasks: Interview questions (65)<br><br>Addition tasks (10) | 75 with sample answers |

OPK-7

**Closed type tasks:**

Exercise 1.*Instructions: Choose several correct answers.*

Properties of glucocorticosteroids:

1. interact with intracellular receptors
2. inhibit phospholipase A2 and the "cascade" of arachidonic acid
3. block leukotriene receptors
4. have anti-inflammatory and antiallergic effects
5. used to treat peptic ulcers

***Correct answer: 1-***interact with intracellular receptors***, 2-*** inhibit phospholipase A2 and the "cascade" of arachidonic acid***, 4-***provide anti-inflammatory and antiallergic effect

Task 2.*Instructions: Choose several correct answers.*

Side effects of glucocorticosteroids:

1. "moon-shaped" face
2. decreased immunity
3. stimulation of the adrenal cortex

4. ulcerogenic effect
5. osteoporosis

***Correct answer: 1-***moon face***, 2-***decreased immunity***, 4-*** ulcerogenic effect***, 5-*** osteoporosis

Task 3.*Instructions: Match.*

The main mechanism of action of drugs for the treatment of type 2 diabetes mellitus is:

| | | | |
|---|---|---|---|
| 1 | Blockade of β-cell K+ channels | A | Acarbose |
| 2 | Stimulation of anaerobic glycolysis | B | Lipoic acid (thiocta) |
| 3 | Blockade of α-glucosidase | IN | Metformin |
| 4 | Sensitization of insulin receptors | G | Glibenclamide |
| 5 | Participation in the regulation of carbohydrate metabolism (vitamin-like agent) | D | Pioglitazone |

***Correct answer: 1-G, 2-B, 3-A, 4-D, 5-B***

Task 4.*Instructions: Match.*

Match medications with possible side effects:

| | | | |
|---|---|---|---|
| 1 | Extrapyramidal disorders | A | Lithium salts |
| 2 | Lethargy, drowsiness, memory impairment, ataxia | B | Antidepressants MAO inhibitors |
| 3 | Cheese syndrome, hypertension | IN | Antipsychotics |
| 4 | Dyspepsia, stomatitis, edema, renal dysfunction | G | Anxiolytics |

***Correct answer: 1-B, 2-D, 3-B, 4-A***

Task 5.*Instructions: Match.*

Establish a correspondence between drugs and pathological conditions:

| | | | |
|---|---|---|---|
| 1 | Epilepsy | A | Madopar |
| 2 | Psychoses | B | Amitriptyline |
| 3 | Depressive disorders | IN | Clozapine |
| 4 | Parkinson's disease | G | Phenobarbital |

***Correct answer: 1-G, 2-B, 3-B, 4-A***

Task 6.*Instructions: choose several correct answers.*

The group of opiate receptor agonist opioids includes the following drugs:

1. morphine hydrochloride
2. codeine phosphate
3. naloxone

4. fentanyl

***Correct answer: 1-***morphine hydrochloride***, 2-***codeine phosphate***, 4-***fentanyl

Task 7.*Instructions: choose several correct answers.*

The group of opioids, opiate receptor antagonists, includes the following drugs:

1. naloxone
2. buprenorphine
3. Naltrexone
4. prosidol

***Correct answer: 1-***naloxone,***3-***naltrexone

Task 8.*Instructions: Set the correct sequence.*

Determine the sequence of measures for severe acute poisoning with agonist opioids:

1. Detoxification (reducing the intake and accelerating the elimination of substances) - washing the stomach and intestines, introducing saline laxatives. Forced diuresis).
2. Administration of the "antidote" - (full competitive antagonist of opiate receptors) - naloxone - intravenously, fractionally (repeatedly every 15 minutes) until independent correct breathing appears.
3. Symptomatic therapy – administration of respiratory analeptics (etimizole, bemegride), "antivagal therapy" – atropine sulfate, anticonvulsants – Na hydroxybutyrate, etc.

***Correct answer: 2, 3, 1***

Task 9.*Instructions: Match.*

| | |
|---|---|
| A. Means for inhalation anesthesia | 1. Ether for anesthesia<br>2. Propanidid<br>3. Midazolam<br>4. Ftorotan<br>5. Nitrous oxide<br>6. Hexoborbital |
| B. Means for non-inhalational anesthesia | |

***Correct answer: A-1,4,5; B-2,3,6***

Task 10.*Instructions: Choose several correct answers.*

The secretion of the gastric glands is reduced:

1. gastrin
2. omeprozole
3. pirenzepine
4. enalapril
5. ranitidine

6. pepsin
7. benzohexonium

***Correct answer: 2-***omeprozole***,3-***pirenzepine***,5-***ranitidine***,7-***benzohexonium

Task 11.*Instructions: Match.*

Hepatoprotective agents:

| | | | |
|---|---|---|---|
| 1 | Flavonoids | A | Rutin |
| 2 | Vitamins of group P | B | Essentiale |
| 3 | Inducers of liver enzyme systems | IN | LIV-52 |
| 4 | Lipid peroxidation inhibitors | G | Legalon |
| 5 | Herbal preparations | D | Zixorin |

***Correct answer: 1-G, 2-A, 3-D, 4-B, 5-C***

Task 12.*Instructions: Match.*

Choleretic agents:

| | | | |
|---|---|---|---|
| 1 | Enhancers formation of bile (choleretics) | A | Magnesium sulfate |
| 2 | Means that promote the secretion of bile | B | Allohol |
| | | IN | Drotaverine |
| | | G | Cyqualon |
| | | D | Holosas |

***Correct answer: 1-B, D, D; 2-A, B***

Task 13.*Instructions: Choose several correct answers.*

Centrally acting antitussives are:
1. codeine
2. glaucine
3. prenoxdiazine
4. butamirate
5.bromhexine

***Correct answer: 1-***codeine***, 2-***glaucine***, 4-***butamirate

Task 14.*Instructions: Choose several correct answers.*

Secretomotor expectorants of reflex action are:
1. licorice roots
2. Thermopsis lanceolata grass
3. acetylcysteine
4. bromhexine
5. Oregano herb

***Correct answer: 1-***licorice roots,**2-**thermopsis lanceolata grass,**5-**oregano herb

Task 15.*Instructions: Choose several correct answers.*

To relieve bronchospasm, use:
1. aminophylline
2. salbutamol
3. salmeterol
4. ipratropium bromide
5. propranolol

***Correct answer: 1-***aminophylline***, 2-***salbutamol***, 4-***ipratropium bromide

Task 16.*Instructions: Choose several correct answers.*

Beclamethasone:
1. taken orally
2. used by inhalation
3. poorly absorbed into the blood from the bronchial mucosa
4. has a significant resorptive effect
5. can cause oral candidiasis

***Correct answer: 2-***used inhalation***, 3-***poorly absorbed into the blood from the bronchial mucosa***, 5-***may cause oral candidiasis

Task 17.*Instructions: Choose several correct answers.*

Main properties of heparin:
1. effective when administered parenterally
2. effective when taken orally
3. after intravenous administration, the effect develops immediately and lasts 2-6 hours
4. after intravenous administration, the effect develops after 18-24 hours and lasts several days
5. has anticoagulant properties in conditions*in vivo*And*in vitro*
6. has anticoagulant properties only in conditions*in vivo*

***Correct answer: 1-***effective when administered parenterally***, 3-***after intravenous administration, the effect develops immediately and lasts 2-6 hours***, 5-*** has anticoagulant properties in conditions*in vivo*And*in vitro*

Task 18.*Instructions: Choose several correct answers.*

Main properties of warfarin:
1. effective when administered parenterally
2. effective when taken orally
3. the action develops immediately and lasts 2-6 hours

4. the effect develops after 18-24 hours and lasts several days
5. has anticoagulant properties in conditions *in vivo* And *in vitro*
6. has anticoagulant properties only in conditions *in vivo*
7. subject to cumulation
8. not subject to cumulation

***Correct answer: 2-***effective when taken orally***, 4-***the effect develops after 18-24 hours and lasts several days***, 6-***has anticoagulant properties only in conditions *in vivo*, ***7-***subject to cumulation

Task 19.*Instructions: Choose several correct answers.*

Antiplatelet agents include:
1. acetylsalicylic acid
2. clopidogrel
3. ethamsylate
4. rivaroxaban
5. abciximab
6. fraxiparine

***Correct answer: 1-***acetylsalicylic acid***, 2-***clopidogrel***, 5-***abciximab

Task 20.*Instructions: Choose several correct answers*

Drugs that inhibit the renin-angiotensin system:
1. losartan
2. enalapril
3. propranolol
4. hydrochlorothiazide
5. doxazosin

***Correct answer: 1-***losartan***, 2-***enalapril

Task 21.*Instructions: Choose several correct answers*

Lipid-lowering drugs:
1. simvastatin
2. ezetimibe
3. gemfibrozil
4. cholestyramine
5. laropiprant

***Correct answer: 1-***simvastatin***, 2-***ezetimibe***, 3-***gemfibrozil***, 4-***cholestyramine

Task 22.*Instructions: Choose several correct answers*

Classification of NSAIDs by selectivity to COX:

| | | | |
|---|---|---|---|
| 1 | Non-selective inhibitor of COX-1, 2 | A | Ibuprofen |
| 2 | Selective COX-1 inhibitor | B | Meloxicam |

| | | | |
|---|---|---|---|
| 3 | Selective inhibitor of COX-1 in the central nervous system | IN | Acetisalicylic acid (low dose) |
| 4 | Selective COX-2 inhibitor | G | Paracetamol |
| 5 | Highly selective COX-2 inhibitor | D | Celecoxib |

***Correct answer: 1-A, 2-B, 3-D, 4-B, 5-D***

Task 23.*Instructions: Choose several correct answers.*

Inhibitors of microbial β-lactamases are:

1. tazobactam
2. clavulanic acid
3. cilastatin
4. sulbactam
5. tienam

***Correct answer: 1-***tazobactam***, 2-***clavulanic acid***, 4-***sulbactam

Task 24.*Instructions: Match.*

Match the type of action with the drug:

| | | | |
|---|---|---|---|
| 1 | Bactericidal effect | A | Ampicillin |
| 2 | Bacteriostatic effect | B | Tetracycline |
| | | IN | Erythromycin |
| | | G | Levomycetin |
| | | D | Cefotaxime |
| | | E | Polymyxin |
| | | AND | Imipenem |

***Correct answer:*****1-A, D, E, F; 2-B, V, G**

Task 25.*Instructions: Match.*

Match the group of antibiotics with the characteristic side effect:

| | | | |
|---|---|---|---|
| 1 | Penicillins | A | Ototoxicity |
| 2 | Aminoglycosides | B | Excitation of the central nervous system |
| 3 | Tetracyclines | IN | Allergic reactions |
| 4 | Levomycetin | G | Hepatotoxicity |
| 5 | Cephalosporins | D | Inhibition of hematopoiesis |
| | | E | Nephrotoxicity |
| | | AND | Cardiotoxicity |

***Correct answer: 1-B, 2-A, E, 3-D, 4-D, 5-E***

**Open type tasks:**

Interview Questions

Task 1. Name the types of hormonal therapy and describe their features.

***Correct answer:***

1. Replacement therapy - external administration of physiological doses of hormones in case of hypoproduction.
2. Stimulation of the function of peripheral glands - the use of tropic hormones of the anterior pituitary gland; the use of blockers of specific receptors of the hypothalamic-pituitary system to activate the release of releasing hormones by the hypothalamus and tropic hormones of the anterior pituitary gland.
3. Suppression of the function of peripheral glands - inhibition of hormone synthesis in the gland itself; treatment of hormone-dependent tumors (large doses); stimulation of specific receptors of the hypothalamic-pituitary system to inhibit the release of releasing hormones by the hypothalamus and tropic hormones of the anterior pituitary gland.
4. Pharmacodynamic therapy (non-hormonal) - for inflammation, allergies, shock. The use of supraphysiological doses of hormonal drugs in the absence of endocrine pathology to obtain their pharmacodynamic effects.

Task 2. Describe the features of type 1 diabetes and its treatment. Insulin preparations.

***Correct answer:***

Type 1 diabetes mellitus is characterized by insulin deficiency; patients require lifelong insulin replacement therapy. In medical practice, 3 types of insulin are used - beef, pork, human. Bovine insulin differs from human insulin by only 3 amino acids, while porcine insulin differs by only one amino acid. In this regard, pig insulin is more homologous to human insulin and less antigenic than bovine insulin. Currently, in all developed countries it is not recommended to use beef insulins for the treatment of people with diabetes due to the risk of infection with spongiform encephalopathy ("mad cow disease"). Depending on the duration of action, insulin preparations are divided into several groups:

1. Ultra-short-acting insulins;
2. Short-acting insulins (simple insulins);
3. Extended-acting insulins (medium-acting insulins);
4. Long-acting insulins;
5. Mixed insulins (ready-made mixtures of short- and long-acting insulins);
6. Insulins lacking peak action.

Task 3. List the side effects of insulin drugs.

***Correct answer:***

1. Allergic reactions to insulin.
2. Lipodystrophy - a violation of lipogenesis and lipolysis in the subcutaneous tissue in the area of insulin injections.

3. Insulin edema - occurs at the beginning of treatment and is associated with the cessation of polyuria and an increase in the volume of intracellular fluid.
4. The “dawn” phenomenon. Hyperglycemia in the early morning hours (between 5-8 am). It is caused by circadian rhythms in the secretion of contrainsular hormones - cortisol and growth hormone.
5. Hypoglycemic states and hypoglycemic coma. Associated either with exceeding the dose of administered insulin or with a violation of the insulin therapy regimen (administration of insulin without subsequent meals, intense physical activity). 6. Insulin resistance (decrease in tissue sensitivity to the action of insulin and the need to increase its daily dose to 100-200 IU.
7. Sommogyi syndrome (chronic insulin overdose).

Task 4. Classification of drugs for the treatment of type 2 diabetes mellitus and their mechanisms of action.

***Correct answer:***

Sulfonylurea drugs stimulate insulin secretion. Glinides -
stimulation of insulin secretion.
Biguanides - decreases the production of glucose by the liver. Reducing insulin resistance in muscle and fat tissue.
Thiazolidinediones (Glitazones) - reducing insulin resistance of muscle and adipose tissue, reducing glucose production by the liver.
Alpha-glucosidase inhibitors - slow down the absorption of carbohydrates in the intestine. Glucagon-like peptide-1 receptor agonists (arGLP-1) - glucose-dependent stimulation of insulin secretion, glucose-dependent decrease in glucagon secretion and decrease in liver glucose production, slowdown in gastric emptying, reduction in food intake, weight loss.
Dipeptidyl peptidase-4 inhibitors (DPP-4) - glucose-dependent stimulation of insulin secretion, glucose-dependent decrease in glucagon secretion, decrease in liver glucose production, do not slow down gastric emptying, neutral effect on body weight.
Inhibitors of sodium-glucose cotransporter type 2 (IGLT-2) (Gliflozins) - decreased reabsorption of glucose in the kidneys, decreased body weight, insulin-independent mechanism of action.

Task 5. Describe the possibilities of pharmacological correction of hypofunction of the thyroid gland.

***Correct answer:***

The problem of correcting decreased thyroid function is currently being solved in 2 ways:
1. If the hormone-secreting capabilities of the gland are preserved, then the deficiency of T3 and T4 can be compensated by introducing small doses of iodides into the body. At the same time, they will stimulate the production of their own thyroid hormones.
2. If the hormone-secreting function of the thyroid gland is lost due to its autoimmune, radiation, infectious, mechanical or other damage, then resort to hormone replacement therapy with artificial thyroid hormones.

Drugs used for hypothyroidism. Iodides:

• Potassium iodide
• Lugol's solution

Thyroid hormone preparations:
Monocomponent:
• Liothyronine (Triiodothyronine, T3)
• Levothyroxine sodium (L-thyroxine, T4)
Combined:
• Thyrotom (Liothyronine + Levothyroxine)
• Iodotirox (Levothyroxine + Potassium iodide)
• Thyreocomb (Liothyronine+Levothyroxine+Potassium iodide)

Task 6. What are antithyroid drugs and their classification.

***Correct answer:***

Antithyroid drugs are drugs that reduce the level of thyroid hormones in the body and transfer it to a state of eu- or hypothyroidism. It should be remembered that antithyroid drugs reduce not only elevated, but also normal levels of thyroid hormones, so their use without proper control can lead to the development of deep hypothyroidism and myxedematous coma. Inhibiting TSH production by the adenohypophysis:

• Iodine preparations (suppressive therapy)
Inhibiting the synthesis of thyroid hormones by thyroid follicles:
• Thioamides: thiamazole, propylthiouracil Those that interfere with the penetration of iodine into the thyroid follicles:
• Anionic inhibitors: potassium perchlorate
X-ray contrast media:
• iopanoic acid
Destroying cells of thyroid follicles:
• Radioactive iodine (I131)

Task 7. Describe the side effects of glucocorticoid therapy.

***Correct answer:***

- **Infectious complications of GCS therapy**(bacterial, viral, fungal, parasitic) more often develop in patients with underlying immune disorders.
- **Musculoskeletal system:**myopathy, osteoporosis, pathological fractures, vertebral compression fractures, aseptic necrosis of the femoral head.
- **Gastrointestinal tract:**steroid ulcers of the stomach and intestines, bleeding, perforation, esophagitis.
- **Leather:**hemorrhages, acne, stretch marks, thinning of the skin, atrophy of the skin and subcutaneous fiber with intramuscular injection (the most dangerous is injection into the deltoid muscle).
- **Endocrine system:**delayed puberty, suppression of the hypothalamic pituitary-adrenal system, growth retardation in children, menstrual irregularities (secondary amenorrhea), steroid diabetes, manifestation of latent diabetes.
- **Regeneration:**impaired wound healing.
- **The cardiovascular system:**hypertension.
- **CNS:**unstable mood, psychosis, pseudotumor cerebri syndrome.
- **Eyes:**glaucoma, posterior subcapsular cataract, exophthalmos.

- **In one-electrolyte metabolism**: sodium and water retention, hypokalemia, edema, hyperosmolar coma.
- **Metabolic disorders**: hyperglycemia, hyperlipidemia, increased appetite, Cushingoid syndrome, negative nitrogen balance.
- **Secondary adrenal insufficiency**. The most severe complications of glucocorticosteroid therapy, potentially life-threatening, include secondary adrenal insufficiency, which is a consequence of suppression of the hypothalamic-pituitary-adrenal system with long-term use of glucocorticosteroids.

Task 8. To treat what forms of mental disorders are antipsychotics used?

***Correct answer:***

For the treatment of psychoses and other types of psychotic disorders with productive symptoms.

Task 9. For what purpose do I mainly use Z-group hypnotics (zolpidem, zapiclone, zaleplon)?

***Correct answer:***

Z-group hypnotics are characterized by a rapid onset and short duration of action (approximately 3–4 hours), so they should be used for insomnia, which is characterized by difficulty falling asleep. For insomnia of the "early awakening" type, they are not very effective.

Task 10. What is the general mechanism of action of antipsychotic drugs (APS)?

***Correct answer:***

The main ideas about the mechanism of action of APS are associated with the blockade of dopamine receptors (type D2) in the central nervous system (dopamine hypothesis).

Task 11. Anxiolytics or tranquilizers. Define and indicate the main pharmacological effects.

***Correct answer:***

These are psychotropic drugs that have the ability to eliminate psycho-emotional disorders of a neurotic nature: fears, anxiety, tension, anxiety, stop panic attacks, etc. Main effects: anxiolytic, hypnotic-sedative, anticonvulsant, muscle relaxant, potentiation of the action of narcotic analgesics.

Task 12. Differences in the clinical profile of "classical" or typical antipsychotics from atypical antipsychotics (aAPS)?

***Correct answer:***

Atypical antipsychotics have a clinical profile equivalent to the positive symptoms of antipsychotic action, but with less frequent symptoms.

extrapyramidal symptoms and less hyperprolactinemia compared to typical APS.

Task 13. What opioid analgesic is used to relieve labor pain? Justify your choice.

***Correct answer:***

The drug is promedol (trimeperidine), since its central effects are weaker than those of morphine (3-4 times), and therefore it does not inhibit the labor activity of the uterus and does not depress the respiratory center in the fetus, and also does not cause spasm of the smooth muscles of the birth canal (weak peripheral effects). Exceeding the therapeutic dose, or repeated administration (before 6 - 8 hours) has the opposite effect to the expected effect!

Task 14. What opioid analgesics are used to suppress dry (non-productive cough)? Justify your choice.

***Correct answer:***

Codeine and ethylmorphine preparations. These are “weak” analgesics, and all the effects are 5-7 times weaker than morphine (including the antitussive), but pronounced enough to suppress cough against the background of other (undesirable) effects, and they also have a low narcotic potency. In addition, “antitussive” doses are in the subanalgesic range, which also ensures a low level of “typical” undesirable effects of agonist opioids.

Task 15. What opioid analgesics are used to relieve cholelithiasis and renal colic.

***Correct answer:***

In gallstone colic, renal colic (after making a diagnosis and deciding on surgical treatment!!!), preference is given to promedol (trimeperidine) or omnopon due to the absence (in a therapeutic dose) of a spastic effect on smooth muscles or the presence of an antispasmodic effect in the latter (in Omnopon contains the alkaloid papaverine).

Task 16. For what purpose are opioid analgesics included in premedication?

***Correct answer:***

Premedication – preparation for anesthesia. Opioid analgesics (morphine, promedol) potentiate the effects of narcotic substances (reducing the dose of the latter and reducing undesirable effects) and eliminate their shortcomings (absence or insufficient analgesia).

Task 17. What measures of care for acute poisoning with agonist opioids are used as “specific treatment” (antidotes and antagonists)?

***Correct answer:***

Administration of the opiate receptor antagonist naloxone: intravenously 1-2 ml with repeated administration (if necessary) every 10-15 minutes (no more than 8 ml);
a) until independent “correct” breathing appears, followed by symptomatic correction of bradypnea (respiratory analeptics);
b) in the absence of spontaneous breathing - transfer to mechanical ventilation and symptomatic treatment.

Task 18. List the types of local anesthesia.

***Correct answer:***

- Superficial (terminal, application) – the anesthetic is applied to the mucous membrane or wound surface.
- Infiltration – an anesthetic solution is sequentially injected into the skin (mucous) and deeper tissues.
- Conduction (regional, regional) – anesthetic is injected along the nerve or into the area nerve plexus. This type of anesthesia also includes spinal and epidural varieties.

Task 19. Describe the mechanism of action of local anesthetics.

***Correct answer:***

The mechanism of action of MA is the penetration of the non-ionized form of MA through the membrane into the nerve fiber, its intracellular ionization and the closure of the “inactivation” (h-gate) Na+ channels by the ionized MA molecule.

Task 20. Side and toxic effects of MA on the cardiovascular system.

***Correct answer:***

Blockade of Na+ channels in the cells of the conduction system of the heart and working myocardium reduces the rate of depolarization (both spontaneous diastolic and evoked). This causes a decrease in automaticity, excitability and conductivity in myocardial structures, and therefore can lead to antiarrhythmic or proarrhythmic effects. In addition, due to a decrease in the supply of Na+ into the smooth muscle cell of blood vessels, the tone of the latter decreases, which causes vasodilation, a drop in peripheral vascular resistance and, as a consequence, a drop in blood pressure.

Task 21. Define anesthesia. Classification of anesthetic drugs.

***Correct answer:***

Anesthetics are drugs of different chemical structures that have a depressing effect on the central nervous system, causing temporary, reversible loss of consciousness, depression of all types of sensitivity, decreased muscle tone and reflex activity with moderate inhibition of vital centers of the medulla oblongata.

Classification of anesthesia:
1. Means for inhalation anesthesia:

- Volatile liquids: halothane (fluorothane), enflurane (ethrane), isoflurane (foran), diethyl ether, sevoflurane, etc.
- Gaseous: nitrous oxide.

2. Means for non-inhalation anesthesia
   - Short-acting: propofol (deprivan, recofol)), propanidide (sombrevin), etomidate, fluorotane, ketamine (ketalar, calypsol)
   - Medium duration of action - barbituric acid derivative thiopental sodium, hexenal
   - Long-acting - sodium hydroxybutyrate

Task 22. Indicate the advantages of halothane (fluorothane) as a means for inhalation anesthesia.

***Correct answer:***

The advantages of halothane as an inhalation anesthetic include:
- High narcotic activity
- No respiratory irritation
- Moderate muscle relaxation
- Antispasmodic effect on the larynx, bronchi and uterus
- Quick introduction (3-5 minutes) and recovery from anesthesia (5-10 minutes)
- Weakly expressed excitation phase
- No flammability

Task 23. Indicate the advantages of propofol as a means for non-inhalation anesthesia.

***Correct answer:***

The advantages of propofol as a means for non-inhalation anesthesia include:
- Rapid induction of anesthesia (30-40 seconds with intravenous administration)
- Duration of action3-10 minutes
- Rapid recovery of consciousness (4 minutes)
- Short stage of excitation
- Neuroprotective effect
- Acceleration of recovery of brain functions after hypoxia

Task 24. Name the agents that reduce the secretion of hydrochloric acid.

***Correct answer:***

***1. H2 receptor blockers*****(ranitidine, famotidine)**effectively reduce secretion HC1 and when systematically administered to patients with gastric and duodenal ulcers for 4-6 weeks promote scarring of the ulcer. These drugs are prescribed orally 2 times a day. *Side effects:*nausea, headache, cardiac arrhythmias, allergic reactions, withdrawal syndrome (maintenance therapy is recommended after the course of treatment).

***2. H+, K+-ATPase inhibitors*****(proton pump blockers) - omeprazole (Omez), lansoprazole, pantoprazole**- in the tubules of parietal cells they become active substances that inhibit H+, K+-ATPase. When prescribing drugs during

After several days, almost complete inhibition of HC1 secretion is possible. These drugs are prescribed once a day, and when systematically administered to patients with peptic ulcers, they promote scarring of the ulcer in 4-6 weeks.
*Side effects*: nausea, diarrhea, weakness, liver dysfunction, activation of the microbial flora of the gastrointestinal tract.
***3. M-anticholinergics*** reduce the influence of parasympathetic innervation on parietal cells, enterochromaffin-like cells and gastrin-producing cells. In this regard, m-anticholinergic drugs reduce the secretion of HCl. For peptic ulcers, pirenzepine (Gastrozepin) is recommended, which predominantly blocks M1-cholinergic receptors of enterochromaffin-like cells of the stomach and reduces the release of histamine; thus selectively reducing HCl secretion. Atropine in doses in which the drug reduces the secretion of HCl causes dry mouth, dilated pupils, paralysis of accommodation, tachycardia and therefore is currently used less frequently for peptic ulcers.

Task 25. Name the drugs related to gastroprotectors. Definition, classification. Pharmacological mechanisms of protection.

***Correct answer:***

Gastroprotectors are drugs that increase the resistance of the gastric mucosa and 12PK to the effects of aggressive factors.

***Classification***:
1. Film-forming agents – preparations of colloidal bismuth (visuta tripotassium dicitrate), sucralfate.
2. Adsorbing and enveloping – simaldrat.
3. Cytoprotective – misoprostol, rebamipide.
4. Regeneration stimulants - methyluracil, pentoxyl, etadene, methandienone, potassium orotate, drugs containing ATP, biogenic stimulants (aloe, Kalanchoe juice, royal jelly, propolis), brown rosehip oil, solcoseryl.
5. Stimulators of mucus formation - preparations of licorice root, white cabbage juice.

***Pharmacological mechanisms of protection:***

- Increasing the resistance of stomach cells and12PCs to the effects of aggressive factors (true cytoprotection).
- Increasing mucus secretion and increasing its resistance to acid - peptic aggression.
- Stimulation of the secretion of bicarbonates by mucosal cells.
- Increasing the resistance of capillaries to adverse influences and normalization of MC in the gastric mucosa and 12PC.
- Stimulation of regeneration of cells of the gastric mucosa and12pcs.
- Mechanical protection of mucosal defects.

Task 26. Name hepatoprotective agents. Definition. Classification. Pharmacological effects. Indications for use, side effects.

***Correct answer:***

Hepatoprotectors are a group of drugs that prevent the destruction of cell membranes of hepatocytes and stimulate their regeneration.

***Classification**:*
1. Amino acids and their derivatives (Hepa-Meri, Ademethionine, Metadoxin).
2.Essential phospholipids (Essentiale, Essliver Forte)
3. Herbal preparations (Phosphoglyph, Legalon, Silibor)
4. Inducers of liver enzyme systems (Zixorin)
5. Vitamins of group P (Rutin, Quercetin)

***Pharmacological effects:***
• Increases the liver's resistance to pathological influences;
• Strengthen the neutralizing function of the liver;
• Stimulate the activity of enzymatic systems;
• Capable of restoring liver function in case of various injuries.

***Indications for use:***
1. Fatty liver
2. Chronic hepatitis (alcoholic, drug-related)
3. Cirrhosis of the liver
4. Intrahepatic cholestasis
5. Cholangitis
6. Toxic encephalopathy

***Side effects:***allergic reactions.

Task 27. Name emetics. Drugs. Indications and contraindications for use.

***Correct answer:***

Emetics are medications that cause vomiting. Emetics:

- *Central action*(apomorphine hydrochloride)
- *Peripheral action*(copper sulfate, zinc sulfate, thermopsis preparations and ipecac).

***Apomorphine hydrochloride–***affects dopamine receptors in the trigger zoneIV ventricle of the brain.*Pharmacodynamics*- Stimulates dopamine D2 receptors in the trigger zone of the vomiting center, which leads to vomiting.*Side effects effects***:**collapse, hallucinations, symptoms of central nervous system depression.

***Preparations of thermopsis and ipecac–***stimulate the vomiting center reflexively. *Copper sulfate*-when taken orally, it irritates receptors gastric mucosa, which leads to reflex activation of the vomiting center. To induce vomiting, 15-20 ml in the form of a 1% solution is sufficient. Currently not used as an emetic.

Task 28. Name antiemetics.

***Correct answer:***

***Antiemetics:***

1)*Serotonin antagonists5-HT3 receptors*(ondansetron, granisetron)
*2) Dopamine D2 receptor antagonists*

- Benzamide derivatives (metoclopramide, trimethobenzamide)
- Phenothiazine derivatives (thiethylperazine, perphenazine)
- Butyrophenone derivatives (haloperidol)

3)*Histamine H blockers1-receptors*(dimenhydrinate, diphenylhydramine, diprazine)
4)*M-cholinergic receptor blockers*(scopolamine)
5)*Cannabinoids*(dronabinol)

Task 29. List the pharmacological effects of β-2 adrenergic agonists.

***Correct answer:***

1. Relax the smooth muscles of the bronchi throughout the bronchial tree.
2. Activate mucociliary clearance.
3. Reduce the secretory activity of mast cells, basophils, eosinophils, macrophages, T-lymphocytes and neutrophils.
4. Reduce vascular permeability and swelling of the bronchial mucosa.
5. Increase the contractility of a tired diaphragm.
6.Prevent bronchospasm caused by allergens, methacholine, histamine, cold and physical activity (bronchoprotective effect).

Task 30. Adverse drug reactions of theophylline.

***Correct answer:***

ADRs caused by theophylline are dose-dependent.
Dose 15-20 mcg/ml: development of side effects from the digestive tract (anorexia, nausea, vomiting, diarrhea)
Dose 20-30 mcg/ml: the appearance of adverse reactions from the cardiovascular system (tachycardia, rhythm disturbances up to ventricular fibrillation).
Dose 25-30 mcg/mg: the occurrence of reactions from the central nervous system (insomnia, hand tremors, motor and mental agitation, convulsions).
Dose 30-50 mcg/ml: possible death.
Due to the significant variability in plasma concentrations of theophylline and the narrow therapeutic latitude, it is recommended to prescribe methylxanthines only under the control of drug concentrations in the blood plasma (it should not exceed 20 mcg/ml).

Task 31. Medicines used to dilate the bronchi.

***Correct answer:***

Bronchial dilators:
1) β-2-adrenergic receptor agonists (*Short acting*: salbutamol, fenoterol, terbutaline;*Long-lasting*: Formoterol (with rapid onset of action); Salmeterol (slow onset)
2) M-cholinergic receptor blockers (Ipratropium bromide (short-acting); Tiotropium bromide (long-acting)).
3) Methylxanthines (Euphylline, Theophylline)

Task 32. List the advantages of inhaled glucocorticoids.

***Correct answer:***

Inhaled glucocorticoids (ICS) occupy an important place in the treatment of asthma and COPD. Unlike oral glucocorticoids, they have the following advantages, which ensure their high efficiency and minimal systemic effect:

1. high affinity for receptors;
2. pronounced local anti-inflammatory activity;
3. lower (about 100 times) therapeutic doses;
4. low bioavailability

Task 33. What are mucoactive drugs and their classification.

***Correct answer:***

Mucoactive agents are a class of chemical agents that help clear mucus or phlegm from the upper and lower respiratory tract, including the lungs, bronchi, and trachea. Mucoactive drugs include expectorants, mucolytics, mucoregulators and mucokinetics. These drugs are used to treat respiratory problems that are complicated by excessive mucus production or inhalation.

Direct-acting drugs: Mucolytics (thiolytics: acetylcysteine, cysteine; proteolytic enzymes: trypsin, streptokinase, ribonuclease, DNase); Mucohydrants (potassium iodide, hypertonic saline solutions, water) Indirect-acting drugs: Mucoregulators (carbocysteine); Surface-active and secretion-thinning agents (bromhexine, ambroxol); Drugs that stimulate gastropulmonary reflux (thermopsis, marshmallow, licorice, sodium citrate, mucaltin preparations); Bronchorricas (pinenes, terpenes, methanes, phenolic derivatives).

Task 34. List breathing stimulants.

***Correct answer:***

• Agents that directly activate the respiratory center (Bemegride, Caffeine, Etimizole)
• Reflex-type agents (Cititon, Lobelin)
• Mixed-type agents (Cordiamin, Camphor, Sulphocamphocoin, Carbon dioxide)

Task 35. Main pharmacodynamic effects of antileukotriene drugs.

***Correct answer:***

All leukotriene receptor inhibitors prevent LTD4-induced bronchoconstruction, prevent the development of inflammation, edema, reduce vascular permeability, reduce mucus secretion by eliminating the effects of leukotriene mediators (leukotrienes C4, D4, E4 cause spasm of the smooth muscles of the bronchi and blood vessels, swelling of the bronchial mucosa, attract

eosinophils into the focus of allergic inflammation, increase mucus secretion, reduce mucociliary transport; leukotriene B4 causes chemotaxis of eosinophils, adhesion of neutrophils to the endothelium, aggregation and release of proteases, increases capillary permeability).
The development of the therapeutic effect occurs during the first weeks, and sometimes the first days, of taking antileukotrienes.

Task 36. Side effects of M-anticholinergic drugs.

***Correct answer:***

1. Pupil dilation (mydriasis), increased intraocular pressure, paralysis of accommodation. The pupil dilates due to relaxation of the orbicularis iris muscle. In this case, the iris thickens, the corners of the anterior chamber of the eye close, and the outflow of intraocular fluid becomes difficult - intraocular pressure increases (M-cholinergic blockers are contraindicated in glaucoma - increased intraocular pressure). Accommodation paralysis is associated with relaxation of the ciliary muscle, leading to tension in the ligament of cinnamon and flattening of the lens: its refractive power decreases, the eye is set to the far point of vision (farsightedness): the patient has difficulty seeing nearby objects and is unable to read and write.
2. Suppression of the secretory activity of the exocrine glands: salivary, bronchial, sweat, gastric and intestinal. Manifested by dry mouth and difficulty swallowing, dry skin, decreased secretion of gastric juice, decreased formation of bronchial mucus; Decreased sweating can lead to increased body temperature (hyperthermia).

3. Increased heart rate (tachycardia) as a result of weakening (cessation) of vagal influences on the heart and the predominance of sympathetic impulses.
4. Relaxation of the smooth muscles of internal organs (antispasmodic effect). Since the vagus nerve determines its tone and contractions, M-anticholinergic blockers create the inability of cells to perceive vagal impulses, which leads to relaxation of smooth muscles and the elimination of muscle spasm (gastrointestinal tract, bronchi, ureters and bladder, gallbladder and bile ducts). Therefore, drugs of this group in combination with painkillers are widely used for intestinal, hepatic and renal colic.

5. The effect on the central nervous system is manifested in drugs that penetrate the blood-brain barrier. Atropine excites the central nervous system and, in case of overdose, causes anxiety, motor and speech agitation, and psychosis (confusion, delirium, hallucinations). Scopolamine, on the contrary, depresses the central nervous system and weakens vestibular disorders (dizziness, imbalance).

Task 37. Antitussive drugs and their classification.

***Correct answer:***

Antitussives are medicines that suppress cough.

- Centrally acting drugs (Narcotics (codeine, morphine, hydrocodone); Non-narcotic (butamirate, glaucine))
- Peripheral acting drugs (prenoxdiazine (libexin))

• Combined (with antitussive and expectorant effect (stoptussin); With antitussive, bronchodilator and antimicrobial effects (broncholitin)).

Task 38. Indications for prescribing methylxanthines.

***Correct answer:***

• As drugs for basic therapy for COPD and bronchial asthma.
• For the treatment of broncho-obstructive syndrome of any origin.
• For pulmonary hypertension.
• For sleep apnea syndrome.
• For chronic cerebrovascular insufficiency
• In combination therapy of chronic kidney diseases (glomerulonephritis)

Task 39. List the drugs used for myocardial infarction.

***Correct answer:***

Myocardial infarction is usually accompanied by very severe pain in the heart area, cardiac arrhythmias, heart failure, and decreased blood pressure.

A common cause of myocardial infarction is coronary artery thrombosis. The main measures for myocardial infarction are aimed at:
1) pain relief (intravenous administration of morphine or other narcotic analgesic);
2) elimination of arrhythmias (intravenous drip administration of lidocaine for ventricular tachyarrhythmias; administration of lidocaine is not recommended for long-term prevention of arrhythmias);
3) possible elimination or reduction of myocardial ischemia (fibrinolytic substances, intravenous nitroglycerin);
4) reducing the oxygen demand of the mycardium (nitrates, atenolol);
5) prevention of new myocardial infarction (antiplatelet agents, anticoagulants, (3-adrenergic blockers).
In the acute phase of myocardial infarction, it is recommended, starting from the first hours, to prescribe:
- oxygen;
- intravenous slow administration of morphine (5 mg in 10 ml of isotonic 0.9% sodium chloride solution);
- acetylsalicylic acid orally 160-325 mg 1 time per day;
- according to indications, intravenous fibrinolytic agent (alteplase, streptokinase);
- intravenous administration of nitroglycerin;
- for ventricular tachyarrhythmia or extrasystole - intravenous drip administration of lidocaine;
- with satisfactory heart rate and blood pressure - slow (over 5 minutes) intravenous administration of atenolol.
In the future, to prevent a new myocardial infarction, they continue to prescribe acetylsalicylic acid, β-blockers, nitrates, and also use ACE inhibitors, and in case of severe atherosclerosis - statins.

Task 40. Explain the antianginal effect of nitroglycerin.

***Correct answer:***

1. Nitroglycerin dilates venous vessels and reduces venous pressure - the flow of venous blood to the heart decreases (preload on the heart decreases). As a result, the work of the heart decreases, and the heart's need for oxygen decreases. Since with a decrease in blood supply to the chambers of the heart, the tension of its walls decreases, extravasal compression of the coronary vessels decreases and coronary blood flow improves.

2. Nitroglycerin dilates arterial vessels and lowers blood pressure - the afterload on the heart is reduced, the work of the heart is reduced, and the heart's need for oxygen is reduced.
Lowering blood pressure is only beneficial to a certain extent because lowering blood pressure reduces the flow of blood into the coronary vessels.

3. Nitroglycerin dilates large coronary vessels and improves collateral circulation (increases oxygen delivery). In particular, the collateral vessels that connect the large subepicardial arteries with the arteries of the subendocardium dilate. The total coronary blood flow (90% determined by the lumen of small coronary vessels) changes little. There is a redistribution of coronary blood in favor of the ischemic area.

Task 41. List the side effects of nitroglycerin.

***Correct answer:***

1. From the cardiovascular system: associated with its vasodilating effect. So, when taking nitroglycerin under the tongue, flushing of the face, neck, and a feeling of heat are possible. Due to the expansion and pulsation of the blood vessels in the brain, a throbbing headache may occur, sometimes very severe. The drug should not be used if intracranial pressure is increased. From the digestive system: nausea, vomiting.

2. From the central nervous system: rarely (especially in case of overdose) - anxiety, psychotic reactions.
3. Allergic reactions: rarely - skin rash, itching. Local reactions: mild itching, burning, redness of the skin. Other: methemoglobinemia.
A decrease in blood pressure may be accompanied by tachycardia, dizziness, and tinnitus; orthostatic hypotension is possible. An overdose of nitroglycerin may result in vascular collapse (a sharp drop in blood pressure) and fainting.

Task 42. Describe the mechanism of action and effects of ACE inhibitors.

***Correct answer:***

Angiotensin-converting enzyme (ACE) promotes the conversion of angiotensin I to angiotensin II and also inactivates bradykinin, which dilates blood vessels and irritates sensory receptors.
ACE inhibitors interfere with the formation of angiotensin II. In this regard: 1) the vasoconstrictor effect of angiotensin II decreases;
2) the stimulating effect of angiotensin II on the sympathetic nervous system decreases;

3) the stimulating effect of angiotensin II on the synthesis and secretion of aldosterone decreases (with a decrease in aldosterone secretion, the excretion of Na+ from the body increases and the excretion of K+ is delayed).
In addition, when ACE is inhibited, the inactivating effect of ACE on bradykinin is eliminated—bradykinin levels increase. Bradykinin has a vasodilating effect, increases vascular permeability, and stimulates sensitive nerve endings.

Decreased angiotensin II levels, Na+ excretion and increased bradykinin levels lead to dilation of blood vessels and a decrease in blood pressure. The heart rate changes little.

Task 43. Name the side effects of ACE inhibitors.

***Correct answer:***

• arterial hypotension upon first use, especially against the background dehydration (effect of diuretics, excessive sweating);
• dry cough;
• urticaria, skin itching;
• angioedema;
• headache, dizziness;
• taste disturbances, nausea, vomiting, diarrhea or constipation;
• hyperkalemia (decreased aldosterone production);
• proteinuria (especially in patients with impaired renal function);

Task 44. Name potassium-sparing diuretics. Mechanisms of action and pharmacological effects. Indications for clinical use. Side effects and contraindications.

***Correct answer:***

Drugs of this group - amiloride, triamterene, spironolactone act in the terminal part of the distal tubules and in the cortical part of the collecting ducts. They interfere with the reabsorption of Na+ ions; amiloride and triamterene act directly on sodium channels; spironolactone blocks aldosterone receptors and thus interferes with the action of aldosterone. In this case, the reabsorption of Na+ in this section of the tubules is disrupted and the secretion of K+ and Mg2+ ions decreases.
Thus, drugs in this group increase the excretion of Na+ from the body and delay the excretion of K+ and Mg2+.
Amiloride and triamterene are weak diuretics; prescribed internally; amiloride acts for 24 hours, triamterene for 12 hours. They are used in combination with diuretics that promote the removal of K+ and Mg2+ from the body (thiazides, thiazide-like diuretics, loop diuretics).

Side effects: nausea, headache, hyperkalemia, hypermagnesemia, bradycardia, paresthesia, leg cramps.
Spironolactone (veroshpiron, aldactone) interferes with the action of aldosterone and thus increases the excretion of Na+ and delays the excretion of K+; Mg2+ excretion also decreases.
Spironolactone is a moderately effective diuretic. The magnitude of the diuretic effect increases with increasing aldosterone levels. In the body, spironolactone is converted into the active metabolite canrenone, the t1/2 of which is 18-24 hours. Diuretic

The effect of spironolactone develops within 2-3 days and persists for 2-3 days after cessation of treatment.
Indications for use: primary hyperaldosteronism, edema, arterial hypertension, congestive heart failure, and also as a corrector for diuretics that cause hypokalemia and hypomagnesemia.
Side effects of spironolactone: nausea, vomiting, diarrhea, headache, hyperkalemia, skeletal muscle spasms, hirsutism, impotence, gynecomastia, menstrual irregularities, skin rashes.

Task 45. Name the indications for the use of propranolol.

***Correct answer:***

1. Angina pectoris; Due to the weakening and slowing of heart contractions, propranolol reduces oxygen consumption by the heart.
2. Myocardial infarction. After the acute phase of myocardial infarction, when the patient's condition is stable, the use of propranolol prevents recurrent infarctions and reduces the mortality of patients (the mechanism is unclear; apparently, a decrease in the heart's oxygen demand, a redistribution of coronary blood flow in favor of the ischemic area of the myocardium, and an antiarrhythmic effect are important).
3. Cardiac arrhythmias. Propranolol reduces the automaticity of the sinus node, the automaticity and conductivity of the atrioventricular node, and the automaticity of Purkinje fibers. Effective for supraventricular tachyarrhythmias: sinus tachycardia, paroxysmal atrial tachycardia, atrial fibrillation and flutter (to normalize the rhythm of ventricular contractions). Can be used for ventricular extrasystoles associated with increased automaticity.
4. Arterial hypertension. Propranolol reduces cardiac output (weakens and slows down the heart's contractions) and in isolated systolic hypertension may lower blood pressure upon first use. However, usually with a single use of propranolol, blood pressure decreases slightly, since by blocking β2-adrenergic receptors of blood vessels, propranolol causes vasoconstriction and an increase in total peripheral resistance.
With the systematic administration of propranolol for 1-2 weeks, vasoconstriction is replaced by their dilation and blood pressure is significantly reduced. Vasodilation is explained by:
1) restoration of the baroreceptor depressor reflex (weakened in patients with hypertension),
2) inhibition of central sympathetic influences on the heart and blood vessels,
3) the inhibitory effect of propranolol on renin secretion (block of β1-adrenergic receptors),
4) blockade of presynaptic β2-adrenergic receptors (the release of norepinephrine by sympathetic fibers decreases).

Task 46. List the side effects of propranolol.

***Correct answer:***

1.weakness during physical exertion, excessive weakening of heart contractions (possible heart failure),
2. bradycardia,
3.difficulty in atrioventricular conduction,
4.dry eyes,
5. feeling of coldness in the extremities (constriction of peripheral blood vessels),

6.increased bronchial tone (patients with bronchial asthma may develop bronchospasm),
7.increased myometrial tone,
8.hypoglycemia (elimination of the hyperglycemic effect of adrenaline associated with activation of β2-adrenergic receptors); propranolol enhances the effect of hypoglycemic agents.
In addition, nausea, vomiting, diarrhea, cramping abdominal pain, drowsiness, depression, attacks of disorientation, hallucinations, impotence, alopecia, skin rashes are possible. Propranolol reduces plasma HDL levels.
Propranolol is characterized by a pronounced withdrawal syndrome: if the drug is abruptly stopped, an exacerbation of coronary insufficiency and arterial hypertension is possible. Propranolol is contraindicated in heart failure, atrioventricular conduction disorders, peripheral vascular spasms, bronchial asthma, and pregnancy. Propranolol enhances the effect of hypoglycemic drugs used for diabetes.

Task 47. Describe the mechanism of action, indications for use and side effects of “loop diuretics”.

***Correct answer:***

Loop diuretics are more effective than thiazides and thiazide-like compounds. They act in the thick segment of the ascending loop of Henle, disrupting the joint reabsorption (co-transport) of Na+, K+, 2CI-, as well as the reabsorption of Ca2+ and Mg2+. These ions are excreted from the body along with water. The excretion of uric acid is delayed.
Decreased ion reabsorption in the thick segment of the loop of Henle reduces the osmotic pressure in the intercellular fluid of the surrounding tissue. In this regard, the reabsorption of water in the collecting ducts decreases. This also ensures the high diuretic effectiveness of loop diuretics.
Furosemide (Lasix) is one of the most effective diuretics and fast-acting natriuretics. Removes about 20% of Na+ filtrate. When taken orally, it acts after about 30 minutes for 4-6 hours. When administered intravenously, the effect begins after 10 minutes and lasts 2-3 hours.
Indications for use:
1) acute pulmonary edema with left ventricular failure (intravenous administration);
2) peripheral edema associated with heart failure and kidney disease;

3) arterial hypertension;
4) to remove toxic substances from the body (forced diuresis method). Side effects of furosemide: increased urination, weakness, dizziness, dry mouth, nausea, hypokalemia (less than with thiazides), hypomagnesemia, hypocalcemia, hypercalciuria (contraindicated in urolithiasis), hyperuricemia, hyperglycemia, hearing loss (changes the ion composition of the endolym- fy), paresthesia, photosensitivity of the skin, skin rashes.

Task 48. Describe the mechanism of action of statins.

***Correct answer:***

Statins - lovastatin (mevacor), simvastatin, pravastatin, fluvastatin, atorvastatin disrupt the initial stage of cholesterol synthesis in the liver (inhibit 3-

hydroxy-3-methylglutaryl coenzyme A reductase). This leads to a decrease in cholesterol levels in the liver.
To obtain the necessary cholesterol, hepatocytes synthesize LDL receptors, receptor-dependent endocytosis of LDL increases, and the level of LDL in the blood plasma decreases.
When using statins, VLDL and LDLP levels may moderately decrease and HDL levels may increase slightly.
Statins are the most effective lipid-lowering drugs. When used systematically, they can reduce LDL cholesterol levels by 40%. They are used mainly for type IIa hyperlipoproteinemia. They are prescribed orally once a day at night, since cholesterol synthesis is activated at night.
Side effects of statins: nausea, diarrhea, headache, liver dysfunction, skin rashes. A characteristic side effect is myopathy (associated with an increase in creatine phosphokinase in the blood). Myopathy is manifested by pain in the muscles of the limbs (myalgia), especially when the muscles are tense. In rare cases, rhabdomyolysis is possible. Statins cannot be combined with fibrates, which also cause similar myopathy.

Task 49. Name the possible mechanisms of action of antiplatelet agents.

***Correct answer:***

1. Elimination of the effect of thromboxane $A_2$ in particular by inhibiting cyclooxygenase
2. Stimulation of prostacyclin receptors
3. Suppression of platelet phosphodiesterase activity
4. Interfering with the action of ADP on platelets
5. Blockade of glycoproteins IIb/IIIa of platelet membranes

Task 50. List the main pharmacological effects of heparin.

***Correct answer:***

1. Anticoagulant
2. Antiplatelet
3. Fibrinolytic activity
4. Hypolipidemic
5. Decreased proliferation of smooth muscle cells
6. Anti-inflammatory, analgesic effect
7. Hypoglycemic effect
8. Antiallergic and immunosuppressive effects

Task 51. List the main advantages of low molecular weight heparins (LMWH) over unfractionated heparin (UFH) preparations

***Correct answer:***

1. Long duration of biological activity, which allows you to prescribe medications 1-2 times a day.
2. They have greater bioavailability when administered subcutaneously (about 90%), because V to a lesser extent than UFH bind to plasma proteins, endothelial cells and macrophages.

3. More “predictable anticoagulation response” to the administered dose and, Accordingly, their use requires less laboratory control.

4. To a lesser extent they form immunogenic complexes with platelet factor 4, therefore less likely to cause thrombocytopenia.

5. Less danger of developing osteoporosis.

Task 52. List the main side effects of indirect anticoagulants.

***Correct answer:***

1. Hemorrhagic syndrome.
2. Dyspeptic phenomena
3. Allergic reactions
4. Nephro- and hepatotoxicity (with long-term use).
5. Withdrawal syndrome (in the form of “rebound thrombosis”)
6. “Coumarin” necrosis of soft tissues (buttocks, cheeks).
7. Teratogenic effect (“fetal warfarin syndrome”).
8. Paramedicinal reactions.

Task 53. List the main indications for the use of fibrinolytics.

***Correct answer:***

1. Acute myocardial infarction (in the first 4-6 hours after the onset of a painful attack).
2. TELA (within 5-14 days).
3. Peripheral arterial thrombosis.
4. Deep vein thrombosis.

Task 54. Name the classification of hemostatic drugs, give examples.

***Correct answer:***

1. Proaggregants: adroxon, etamsylate, calcium and serotonin preparations
2. Procoagulants: direct (thrombin, fibrinogen, protamine sulfate) and indirect (vitamin K preparations (phytomenadione, vikasol))
3. Fibrinolysis inhibitors: acids (ε-aminocaproic acid, para-aminomethylbenzoic acid (Ambene), tranexamic acid) and protease inhibitors (aprotinin (contrical, gordox))

Task 55. List the main advantages of iron (III) hydroxide polymaltose over iron salt preparations.

***Correct answer:***

1. Absorption is carried out predominantly by active transport, therefore - high safety, no risk of overdose and intoxication

2. No interaction with other drugs and food

3. Pleasant taste
4. Darkening of tooth enamel only in rare cases
5. Good tolerability and patient adherence to treatment

Task 56. List the main indications for prescribing parenteral iron preparations.

***Correct answer:***

1. Severe anemia (Hb<70 g/l)
2. Intolerance to oral medications or inability to take oral medications
3. An established diagnosis of gastrointestinal pathology with impaired iron absorption (malabsorption syndrome, enteritis, Crohn's disease, H. pylori infection, celiac disease)

Task 57. What are erythropoietin preparations? Give examples and main indications for use.

***Correct answer:***

Erythropoietin preparations are classified as drugs that stimulate erythropoiesis. For example: Epoetin alfa (Eprex), Epoetin beta (Recormon). They are used for anemia associated with chronic renal failure, bone marrow lesions, malignant tumors, AIDS, and anemia in premature infants. The drugs are administered subcutaneously and intravenously. The effect develops after 1-2 weeks, hematopoiesis normalizes after 8-12 weeks.

Task 58. Classification of anti-inflammatory drugs.

***Correct answer:***

1. Steroid anti-inflammatory drugs:
glucocorticoids, ACTH;
2. Non-steroidal anti-inflammatory drugs;
3. Basic (acts against inflammation of an autoimmune nature, slow-acting antirheumatic drugs):
3. 1. Drugs of choice (first-line drugs):
A) 4-aminoquinoline derivatives – chloroquine, hydroxychloroquine; B)
Gold preparations – auronafin;
3.2. Reserve drugs (second-line drugs): A)
cytostatics - methotrexate, azathioprine;
B) colchicine;
4. Others - fenspiride (erespal).

Task 59. Pharmacodynamic effects of NSAIDs.

***Correct answer:***

1. Anti-inflammatory effect.
NSAIDs primarily suppress the exudation phase. The most powerful drugs - coxibs, indomethacin, diclofenac, phenylbutazone - also act on the phase

proliferation (reducing collagen synthesis and associated tissue sclerosis), but weaker than in the exudative phase. NSAIDs have virtually no effect on the alteration phase. In terms of anti-inflammatory activity, all NSAIDs are inferior to glucocorticoids, which, by inhibiting the enzyme phospholipase $A_2$, inhibit the metabolism of phospholipids and disrupt the formation of both prostaglandins and leukotrienes, which are also the most important mediators of inflammation.

2. Analgesic effect.

It manifests itself to a greater extent in pain of mild to moderate intensity, which is localized in the muscles, joints, tendons, nerve trunks, as well as in headaches or toothaches. For severe visceral pain, most NSAIDs are less effective and inferior in the analgesic effect to drugs of the morphine group (narcotic analgesics). At the same time, a number of controlled studies have shown a fairly high analgesic activity of diclofenac, ketorolac, ketoprofen, metamizole for colic and postoperative pain. The effectiveness of NSAIDs for renal colic that occurs in patients with urolithiasis is largely due to the inhibition of PG-E production$_2$in the kidneys, decreased renal blood flow and urine production. This leads to a decrease in pressure in the renal pelvis and ureters above the site of obstruction and provides a long-term analgesic effect. The advantage of NSAIDs over narcotic analgesics is that they do not depress the respiratory center, do not cause euphoria and drug dependence, and in case of colic, it is also important that they do not have a spasmogenic effect.

3. Antipyretic effect.

NSAIDs only work for fever. They do not affect normal body temperature, which is different from “hypothermic” drugs (chlorpromazine and others).

4. Anti-aggregation effect.

As a result of inhibition of COX-1 in platelets, the synthesis of the endogenous proaggregant thromboxane is suppressed. Aspirin has the strongest and longest-lasting antiaggregation activity, which irreversibly suppresses the platelet’s ability to aggregate for the entire duration of its life (7 days). The antiaggregation effect of other NSAIDs is weaker and reversible. Selective COX-2 inhibitors do not affect platelet aggregation.

5. Immunosuppressive effect.

It is expressed moderately, manifests itself with long-term use and has a “secondary” character: by reducing capillary permeability, NSAIDs impede the contact of immunocompetent cells with the antigen and the contact of antibodies with the substrate.

Task 60. Describe the side effects of NSAIDs.

***Correct answer:***

1. Gastrointestinal tract:

1) Lungs – nausea, vomiting, gastralgia, diarrhea.

2) Severe - erosions, ulcers, gastrointestinal bleeding. Ulcerogenic activity.

2. Kidneys:

1) Lungs – fluid retention (edema, rise in blood pressure)

2) Severe toxic nephritis, worsening HF due to an increase in blood volume. The most nephrotoxic are indomethacin, paracetamol, salicylates.

3. Hepatotoxic: increased levels of transaminases in the blood (damage to hepatocytes, development of toxic hepatitis (indomethacin)).

4. Allergic reactions. Widal's syndrome (rhinitis, mucosal polyposis, urticaria, bronchospasm - due to increased leukotrienes)
5. Neurosensory sphere – headache, dizziness, fatigue. Retinopathy and keratopathy (indomethacin is deposited in the retina); optic neuritis (ibuprofen); psychosis, hallucinations (indomethacin)
6. Hematotoxic effects. Hematopoietic disorders (up to agranulocytosis) - salicylates, indomethacin.
7. Teratogenic effect.
8. Reye's syndrome - in children. A week after suffering from acute respiratory viral infection due to acetylated salicylates (manifests in the form of toxic encephalopathy, acute fatty degeneration of the liver, brain and kidneys)

Task 61. The mechanism of action of fluoroquinolones. Do microorganisms develop resistance to fluoroquinolones? Describe the mechanisms of resistance formation.

***Correct answer:***

Fluoroquinolones inhibit DNA gyrase (topoisomerase II), which leads to disruption of supercoiling of bacterial DNA - the reproduction of bacteria is disrupted and they die. Bacterial resistance develops quite quickly. A denser cell wall is formed, and the bacteria secrete more active gyrase.

Task 62. What groups of microorganisms, besides bacteria, are sensitive to tetracyclines?

***Correct answer:***

Rickettsia and chlamydia are the drugs of choice for chlamydia.

Task 63. What is the reason for the pronounced toxicity of sulfonamides on the kidneys?

***Correct answer:***

Sulfonamides are acetylated in the liver and excreted through the kidneys. In the case of low fluid content in the tubules, acetylated urine crystals damage the renal tubules to the point of necrosis.

Task 64. Why does superinfection develop more often when antibiotics are used orally?

***Correct answer:***

When taken orally, the antibiotic acts directly on the intestinal microflora in maximum concentration.

Task 65. Describe the mechanism of action of penicillins. Why are most penicillins not prescribed orally?

***Correct answer:***

Penicillins in the microbial cell inhibit the binding of muramic acid to the bacterial wall, and this leads to its lysis. Penicillins are destroyed in the acidic environment of the stomach. The still available oral penicillin G must be taken in very large doses. However, it is difficult to determine the required dosage of the substance, because HCl production varies from patient to patient.

Addition tasks

Task 1. Preventive antibiotics are only possible when _____.

***Correct answer:***

rheumatism, bacterial endocarditis, immunodeficiency states, frequently recurring infections.

Task 2. To carry out neuroleptanalgisia, a combined administration of _____ and a narcotic analgesic is used.

***Correct answer:***

antipsychotic

Task 3. For fever, NSAIDs are prescribed at a temperature of _____ and above, with the exception of fever in children with a history of _____.

***Correct answer:***

38.5°C; convulsions

Task 4. The group of direct-acting oral anticoagulants includes, for example: dabigatran - a selective inhibitor of _____ factor and rivaroxaban - a selective inhibitor of _____ factor.

***Correct answer:***

IIa; Ha

Task 5. Omalizumab (xolair) blocks free IgE molecules, and thereby reduces the level of free IgE, which is a trigger for the unfolding of the _____ cascade.

***Correct answer:***

allergic reactions

Task 6._____ - medications that normalize the motor activity of the esophagus, stomach and intestines.

***Correct answer:***

prokinetics

Task 7._____ are drugs that reduce the aggressiveness of gastric contents by chemically neutralizing hydrochloric acid (HCl) and binding pepsin already released into the stomach cavity.

***Correct answer:***

antacid medications

Task 8. Nifedipine acts mainly on blood vessels and has little effect on the myocardium. As a result, the performance of the heart _____ against the background of a decrease in its work. Verapamil affects the conductivity and contractile function of the heart, leading to a decrease in its efficiency.

***Correct answer:***

increases

Task 9. Treatment with losartan significantly _____ the degree of left ventricular hypertrophy, since this substance reduces the afterload on the heart.

***Correct answer:***

reduces

Task 10. Nitrates are used for angina pectoris because they not only _____ the work of the heart, but also increase its perfusion. In addition, they help prevent the formation of blood clots that threaten myocardial infarction.

***Correct answer:***

reduce

**CRITERIA for assessing competencies and rating scales**

| **Grade "unsatisfactory" (not accepted) or absence formation competencies** | **Grade "satisfactorily" (passed) or satisfactory (threshold) level of development competencies** | **Grade "Fine" (passed) or sufficient level development competencies** | **Grade "Great" (passed) or high level development competencies** |
|---|---|---|---|
| failure to student on one's own demonstrate knowledge when solving assignments, lack independence in application of skills. Absence availability confirmation formation competencies indicates negative development results academic discipline | student demonstrates independence in application of knowledge skills and abilities to solve educational tasks in full According to sample given teacher, by tasks, solution of which there were shown teacher, it should be considered that competence formed on satisfactory level. | student demonstrates independent application knowledge, skills and skills at decision tasks, tasks similar samples that confirms Availability formed competencies for higher level. Availability such competencies for sufficient level testifies about sustainable fixed practical skill | student demonstrates ability to full independence in choosing a method solutions non-standard assignments within disciplines with using knowledge, skills and skills, received as in development progress given disciplines and adjacent disciplines should be considered competence formed on high level. |

***Criteria for assessing test control:***

| percentage of correct answers | Marks |
|---|---|
| 91-100 | Great |
| 81-90 | Fine |
| 70-80 | satisfactorily |
| Less than 70 | unsatisfactory |

When grading tasks with multiple correct answers, one error is allowed.

***Interview assessment criteria:***

| **Mark** | **Descriptors** | | |
|---|---|---|---|
| | **strength of knowledge** | **ability to explain** | **logic and** |

| | | | |
|---|---|---|---|
| | | **(introduce)** **the essence of phenomena, processes, do** **conclusions** | **sequence** **b answer** |
| Great | strength of knowledge, knowledge of basic processes of the studied subject area, the answer is different depth and completeness disclosure of the topic; possession terminological apparatus; logic and consistency answer | high skill explain the essence phenomena, processes, events, do conclusions and generalizations, give reasoned answers, give examples | high logic And subsequence answer |
| Fine | solid knowledge main processes subject matter being studied area, different depth and completeness disclosure of the topic; possession terminological apparatus; free possession monologue speech, however one is allowed - two inaccuracies in the answer | ability to explain essence, phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples; however one or two inaccuracies in the answer are allowed | logic and subsequence answer |
| satisfy flax | satisfactory process knowledge subject matter being studied areas, answer, different insufficient depth and completeness of disclosure Topics; knowledge of basic theoretical issues. Several are allowed errors in content answer | satisfactory ability to give reasoned answers and provide examples; satisfactorily formed analysis skills phenomena, processes. Allowed several errors in content of the answer | satisfactory logic and subsequence answer |
| dissatisfy strictly | poor knowledge of the subject area being studied, shallow opening Topics; poor knowledge main issues theories, weak skills analysis of phenomena, processes. Allowed serious mistakes in content of the answer | inability to give reasoned answers | absence logic and sequences answer |

***Criteria for assessing situational tasks:***

| Mark | Descriptors | | | |
|---|---|---|---|---|
| | **understanding Problems** | **analysis situations** | **skills solutions situations** | **professional thinking** |
| Great | complete implication problems. All requirements, declared task, completed | high benefit analyze situation, draw conclusions | high benefit select method solutions problems, faithful solution skills situations | high level professional thoughts |
| Fine | complete implication problems. All requirements, declared task, completed | benefit analyze situation, draw conclusions | benefit select method solutions problems faithful solution skills situations | residual level professional thoughts. one goes down - there are inaccuracies in reply |
| satisfy flax | astastic implication problems. majority requirements declared task, completed | please satisfy nyaya benefit analyze situation, draw conclusions | satisfactory skills solutions situations, falsity with choosing a method solutions to the problem | residual level professional thoughts. falls more a bunch of inaccuracies in reply or error sequences solutions |
| dissatisfy strictly | misunderstanding problems. legs requirements, declared task, not completed. No Tveta. Did not have experiments to solve hello | izkaya benefit analyze situation | insufficient solution skills situations | missing |