MINISTRY OF HEALTH OF UKRAINE

ODESSA NATIONAL MEDICAL UNIVERSITY

Department of general and clinical pharmacology with the pharmacognosy

WORKBOOK
for independent work of students

The academic elective discipline "Clinical Pharmacology"
Specialty 221 "Stomatology"

Student _____course
_____faculty
Name _____
_____
Date of completion «___» _____ 20__ y.
Teacher: _____

Odessa – 20 y.

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Introduction

The introduction into clinical practice of a large number of drugs, the need to determine their effectiveness and safety of use, necessitates a unified approach to the system of studying their pharmacokinetics, pharmacodynamics, interaction and side effects in patients. This was the reason for the introduction of a new medical discipline - clinical pharmacology, in the program for training doctors in the late 60s and 70s of the XX century.

Clinical pharmacology is a science that deals with the study of drugs as applied to a specific sick person (WHO). She teaches the doctor to choose for the patient from all existing the most effective and most dangerous drug for individualized therapy and prevention, taking into account its concomitant diseases. In-depth knowledge of clinical pharmacology will help to determine the correct regimen for the use of drugs, its dosage form and route of administration, to prevent and eliminate adverse reactions and undesirable drug interactions.

The list of drugs used in stomatolgy is constantly growing. In his practice, the dentist must take into account the presence of concomitant somatic diseases in the patient, as well as the fact that the patient may already receive appropriate medication. All this requires knowledge of medicines, their optimal selection and rational use.

The aim of teaching the discipline "Clinical Pharmacology" is to train specialists with sufficient theoretical knowledge and practical skills to conduct the most rational drug therapy in a particular patient.

Discipline will help to master the methodology of choosing the most effective and safe medicines, as well as their combinations, taking into account the individual characteristics of the patient’s body, the course and form of the disease, the presence of concomitant pathology, based on evidence-based medicine.

The teacher at the beginning of the clinical pharmacology training cycle provides students with a workbook scheme, during the training process checks the status of tasks (printed or presented on electronic media, sent by e-mail, etc.), assesses the mastery of the discipline by test and other written control as well as the ability to solve typical problem situations.

Evaluation for the results of tasks in a workbook is included in the assessment of current and final control.

Possession (knowledge and skills of use in solving practical problems) of the material of the workbook guarantees the student a positive assessment of the discipline.

TOPIC 1. SUBJECT, TASKS OF CLINICAL PHARMACOLOGY. CLINICAL PHARMACODYNAMICS, PHARMACOKINETICS OF MEDICINES. CURATION OF PATIENTS.

Purpose: to study the subject, tasks, principles of clinical pharmacology, the basic concepts of discipline - pharmacokinetics, pharmacodynamics of drugs. Know the algorithm for choosing drugs for a particular patient, the scheme for writing a protocol for evaluating the effectiveness and safety of drugs for a particular patient.

The student must know:
- the basic concepts of clinical pharmacology ("clinical pharmacokinetics", "clinical pharmacodynamics", "clinical pharmacogenetics", "international non-proprietary name", etc.);
- basic principles of pharmacodynamics of drugs;
- the main parameters of clinical pharmacokinetics;
- mechanisms of absorption, distribution, biotransformation and excretion of drugs;
- the concept of transporters of drugs;
- features of the clinical pharmacology of drugs in children, the elderly, pregnant and lactating;
- the concept of evidence-based medicine.

The student must be able to:
- use the basic terms and concepts of clinical pharmacology;
- identify drugs with a narrow range of effects;
- interpret the basic parameters of the pharmacokinetics of drugs;
- determine the characteristics of the metabolism of drugs.

BASIC CONCEPTS OF THE TOPIC:

Clinical pharmacokinetics is
_____
Clinical pharmacodynamics is
_____

Full agonist
_____

Partial agonist
_____

Reversible and irreversible antagonism
_____
The effect of the drug
_____

The therapeutic index is
_____

Evidence-based medicine is
_____
_____
_____

Pharmacogenetics is
_____

Issues that are submitted to the current control

1. Definition of the subject of clinical pharmacology. The task of clinical pharmacology, its connection with other disciplines.
2. Clinical pharmacodynamics - definition. Types of action of physiologically active drugs.
3. Clinical pharmacokinetics - definition. The clinical significance of the main parameters of pharmacokinetics (bioavailability, volume of distribution, communication with proteins, half-life).
4. Mechanisms of drug absorption. Clinical significance.
5. Presystemic metabolism of drugs. Clinical significance.
6. The distribution of drugs in the body. Conditional distribution volume. Clinical significance.
7. Drug metabolism - definition, phases. The clinical significance of the induction and inhibition of biotransformation (give examples).
8. Ways to eliminate drugs from the body. Parameters. Clinical significance.
9. Clinical pharmacogenetics, key points. Give clinical examples.
10. The main provisions of evidence-based medicine. Organization of clinical trials of drugs.
11. Bioequivalence. Definition, clinical significance.
12. Brand drugs.
13. Generic drugs.
14. Age features of the use of drugs (give clinical examples regarding the age-related restrictions on the use of drugs).

Recommended literature

1. Merali Z. et al. Comprehensive medical reference and review for the Medical Council of Canada Qualifying Exam Part I and the United States Medical Licensing Exam Step 2. Toronto Notes. 32 Ed. 2016. P.123-131.
2. Davis C. et al. USMLE™. Step 1 Pharmacology Lecture Notes. 2013. 3-29.
3. Ritter J.M. et al. A Textbook of Clinical Pharmacology and Therapeutics. Fifth Edition. in 2008 by Hodder Arnold, an imprint of Hodden Education, part of Hachette Livre UK 465 p. (p.6-85).

4. Betram G Katzung Basic and Clinical Pharmacology, 14th Edition. - McGraw-Hill Medical, 2018.- 1235 p.
5. Clinical pharmacology: Manual for practical classes. – 2-nd edition / Edited by O.V.Kraydashenko. – Vinnytsya: Nova Khyna Publishers, 2010. – 192 p.
6. Emergency management of internal diseases / Edited by O.Babak and O.Bilovol. – Kyiv: AUS Medicine Publishing, 2010. – 448 p.

Tasks for self-study of the topic:

Exercise 1.

Phases of pharmacokinetics
а. receipt of drugs
б._____
в._____
г._____
д._____

Mechanisms of absorption
а. passive diffusion
б._____
в._____
г._____
д._____

Biotransformation phases
а._____
б._____

Mechanisms of elimination of drugs in the kidneys
а. passive glomerular filtration
б._____
в._____

Exercise 2.

Pharmacokinetics parameters

Parameter	Title	Clinical significance
$T_{1/2}$	Half-life	To determine the period of time required to achieve Css (4-5 T1/2), as well as the assessment of elimination (less accurate than clearance)
Vd		
Cl		
Css		
Tmax		
F		
AUC		

3. What is the main mechanism for the absorption of lipophilic drugs in the digestive tract?
A. filtration
B. passive diffusion
C. active transport
D. pinocytosis
E. all kinds

4. What factors affect intestinal absorption?
A. pH of gastric juice
B. vascularization
C. motility
D. condition of intestinal microflora
E all listed

5. The magnitude of the bioavailability of drugs depends primarily on:
A. routes of administration
B. frequency of admission
C. withdrawal rates
D. the effectiveness of the drug
E. duration of treatment

6. What is the protein fraction with which drugs in plasma are most often associated?
A. albumin
B. alpha globulin
C. beta globulin
D. gamma globulin
E. α1-glycoprotein

7. The patient is 68 years old, continuously receiving nitroglycerin for 2 months, but has recently noted a gradual decrease in the clinical effect. The doctor explained that this phenomenon is called:
A. Cumulation
B. Withdrawal syndrome
C. Tolerance
D. Idiosyncrasy
E.Tachyphylaxis

TOPIC 2, 5. CLINICAL AND PHARMACOLOGICAL CHARACTERISTICS OF ANTIANGINAL, ANTI-ISCHEMIC AND HYPOLIPIDEMIC DRUGS

Purpose: To learn the issues of effective and safe use of antianginal, anti-ischemic and hypolipidemic drugs.

The student must know:

- Etiopathogenesis, classification, general semiotics of coronary heart disease;
- evidence-based medicine on the use of antianginal and hypolipidemic drugs;
- parameters of pharmacokinetics and pharmacodynamics of the main antianginal and hypolipidemic drugs.

The student must be able to:

- taking into account the peculiarities of pharmacokinetics and pharmacodynamics, individual characteristics of the patient, determine the most optimal drug therapy for a patient with coronary heart disease, angina, acute coronary syndrome;
- determine the methods of clinical research of patients to assess the effectiveness and safety of the use of antianginal and hypolipidemic drugs and analyze their results;
- minimize the risks of adverse side effects and the interaction of antianginal and hypolipidemic drugs.

BASIC CONCEPTS OF THE TOPIC:

Coronary heart disease is ...

Stable angina pectoris is ....

Unstable angina pectoris is ...

An attack of angina pectoris is characterized by ...

Acute myocardial infarction is ...

Issues that are submitted to the current control

1. Give a modern classification of antianginal drugs.
2. Name the main groups of antianginal drugs.
3. Features of the pharmacokinetics of nitrates.
4. The mechanism of the antianginal effect of nitroglycerin, side effects, dangerous interactions.
5. The mechanism of antianginal effect of β-blockers.
6. Calcium channel blockers: the choice of drugs for the treatment of coronary heart disease, the mechanism of antianginal action, side effects.

7. Drugs with anti-ischemic action: classification, pharmacodynamics, side effects.
8. Classification of hypolipidemic drugs. Pharmacodynamics, complications of therapy.

Recommended literature

1. Merali Z. et al. Comprehensive medical reference and review for the Medical Council of Canada Qualifying Exam Part I and the United States Medical Licensing Exam Step 2. Toronto Notes. 32 Ed. 2016. P.123-131.
2. Davis C. et al. USMLE™. Step 1 Pharmacology Lecture Notes. 2013. 3-29.
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Tasks for self-study of the topic:

Exercise 1.
The main groups of antianginal drugs (give 1-2 examples)
A) nitrates (nitroglycerin, isosorbide mononitrate)
B) _____
C) _____

Exercise 2.
Ways to introduce nitrates into the body
A) _____
B) _____
C) _____

Exercise 3.
Pharmacodynamics of antianginal drugs

Groups	Mechanism of action	Side effects
Nitrates		
Beta-adrenoblockers		
Calcium channel blockers		

Exercise 4
Clinical pharmacology of hypolipidemic drugs

Group	Representative	Pharmacodynamics	Side effect	Interaction

Statins	Atorvastatin			
Fibrates	Fenofibrate			
Reverse absorption inhibitors	Esetimibe			

5. A woman, 75 years old, diagnosed with coronary heart disease: exertional angina, heart rhythm disturbance, complains of a recurring headache associated with taking nitroglycerin. What is the cause of the headache?
A. Dilation of the brain vessels
B. Spasm of cerebral vessels
C. Increased blood pressure
D. Increased intracranial pressure
E. Psychogenic effects

6. In the therapeutic department there is a patient, 65 years old, with stage II hypertension, diabetes mellitus. The woman suddenly developed an attack of angina pectoris. After taking nitroglycerin, the woman became lethargic, dizziness appeared, blood pressure - 100/65 mm RT. Art., heart rate - 95 beats in minute. How can one assess this condition of the patient?
A. Acute heart failure
B. Allergic reaction to nitroglycerin
C. Hypoglycemic coma
D. Hyperglycemic coma
E. Side effects of nitroglycerin

7. The patient, 56 years old, is undergoing treatment in the ophthalmology department for angle-closure glaucoma. At night, he had an attack of angina pectoris. Is he shown an antianginal drug - nitroglycerin?
A. Shown
B. Contraindicated
C. Indicated only parenterally
D. Indicated only orally
E. Indicated only by inhalation.

8. When compiling instructions for the clinical use of nitroglycerin in the “side effect” section, the student identified: arterial hypotension, dizziness, inhibition of renal function. A typical side effect is missed. Which one?
A. Constipation
B. Drowsiness
C. Vomiting
D. Headache
E. Profuse sweat

9. Which group of drugs increases the risk of myopathy due to interaction at the level of CYP3A4:
A. Thiazide diuretics
B. Statins
C. Nitrates
D. Beta-blockers
E. Calcium channel blockers

10. Patient L., 57 years old, has been suffering from hypertension for 5 years, does not regularly take antihypertensive drugs. Within 2 weeks, the appearance of burning pain behind the sternum with rapid walking. Smokes 2 packs of cigarettes per day. Height 167 cm, body weight 110 kg, waist 107 cm. Heart rate - 80 beats/min., Blood pressure - 165/100 mm Hg. On the ECG, the sinus rhythm, heart rate - 80/min., RV6> RV5> RV4. Total cholesterol - 6.81 mmol/l, HDL cholesterol - 1.23 mmol/l, LDL cholesterol - 3.78 mmol/l, glucose - 8.5 mmol/l, glycosylated hemoglobin - 7.5%.

10.1. For the correction of hyperlipidemia, the following is indicated:
A. Antiplatelet agents
B. β-blockers
C. ACE inhibitors
D. Statins
E. Calcium channel blockers

10.2. If it is impossible to achieve the target level of LDL cholesterol, the following must be added to treatment:
A. Essential phospholipids
B. Intestinal Cholesterol Absorption Inhibitors
C. Fibrates
D. Ursodeoxycholic acid
E. Nicotinic acid

TOPIC 2. CLINICAL AND PHARMACOLOGICAL CHARACTERISTICS OF ANTIHYPERTENSIVE AND HYPERTENSIVE DRUGS

Purpose: To learn the issues of effective and safe use of antihypertensive and hypertensive drugs.

The student must know:

- etiopathogenesis of arterial hypertension;
- general semiotics and diagnostic criteria for arterial hypertension;
- evidence-based medicine for antihypertensive therapy;
- pharmacokinetics and pharmacodynamics parameters of the main antihypertensive drugs;
- etiopathogenesis and classification of arterial hypotension;
- general semiotics and diagnostic criteria for arterial hypotension;
- evidence-based medicine for hypertensive therapy;
- pharmacokinetics and pharmacodynamics parameters of the main hypertensive drugs.

The student must be able to:

- taking into account the peculiarities of pharmacokinetics and pharmacodynamics, individual characteristics of the patient, determine the most optimal scheme of antihypertensive and hypertensive therapy;
- determine the methods of clinical research of patients to assess the effectiveness and safety of the use of antihypertensive and hypertensive drugs and analyze their results;
- minimize the risks of adverse side effects and the interaction of antihypertensive and hypertensive drugs.

BASIC CONCEPTS OF THE TOPIC:

Arterial hypertension is _____
Arterial hypotension is _____
Comorbidity is
_____

Endothelial dysfunction is _____
Systolic blood pressure is _____
Diastolic blood pressure is _____
The main endogenous systems involved in the regulation of vascular tone
_____
_____

Issues that are submitted to the current control

1. Classification of antihypertensive drugs.
2. Classification, mechanism of action, pharmacokinetics of ACE inhibitors, side effects, contraindications, dangerous interactions.
3. Classification of β-blockers, the main pharmacological effects, the mechanism of antihypertensive action, the pharmacokinetics of atenolol and propranolol, side effects, contraindications, dangerous interactions.
4. Classification of calcium antagonists, the main pharmacological effects, the effect on the basic parameters of hemodynamics, especially the pharmacokinetics of nifedipine, side effects, contraindications, dangerous interactions.
5. Angiotensin II receptor blockers: pharmacokinetic features, side effects, contraindications, dangerous interactions.
6. Classification of diuretic drugs. The mechanism of action of hydrochlorothiazide and indapamide, side effects, contraindications, dangerous interactions.
7. Classification of hypertensive drugs.
8. Adrenomimetics, mechanism of action, pharmacokinetics, side effects.
9. Dopaminomimetics, mechanism of action, pharmacokinetics, side effects.
10. Analeptics, mechanism of action, pharmacokinetics, side effects.

Recommended literature

1. Merali Z. et al. Comprehensive medical reference and review for the Medical Council of Canada Qualifying Exam Part I and the United States Medical Licensing Exam Step 2. Toronto Notes. 32 Ed. 2016. P.123-131.
2. Davis C. et al. USMLE™. Step 1 Pharmacology Lecture Notes. 2013. 3-29.
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Tasks for self-study of the topic:

Exercise 1.
First line of antihypertensive drugs (give an example)
Beta-blockers (bisoprolol)
Calcium channel blockers (_____)
_____(_____)

_____(_____)
_____(_____)

Second line of antihypertensive drugs (give an example)
_____(_____)
_____(_____)
_____(_____)
_____(_____)
_____(_____)

Exercise 2.

Give examples of possible combinations of antihypertensive drugs.

Exercise 3.

The most common side effects:
Beta-adrenoblockers
_____
ACE inhibitors
_____
Calcium channel
blockers_____
Thiazide diuretics _____

Exercise 4.

The main classes of hypertensive drugs (name the pharmacological group, give examples):
1._____
2._____
3._____
4._____
5._____

5. What is the reason for the appearance of dry cough in a patient who takes lisinopril for a long time to treat arterial hypertension?

A. Inhibition of angiotensin receptors

B. An increase in blood levels of aldestrone

C. Depletion of norepinephrine

D. Increased bradykinin concentration

6. A patient suffering from bronchial asthma is diagnosed with arterial hypertension. What antihypertensive drug is contraindicated in a patient?

A. Verapamil

B. Hypothiazide

C. Propranolol

D. Captopril

E. Losartan

7. The patient, 43 years old, was admitted to the cardiology department with complaints of palpitations, dizziness, emotional lability, irritability, and superficial sleep. Normal BP = 130/85 mmHg. Over the past 4-5 years, against the background of psychoemotional stresses, blood pressure increased to 180/100 mm Hg. An ECG revealed sinus tachycardia, left ventricular hypertrophy. No pathological abnormalities from other organs were detected. From the groups of drugs listed below, determine the drugs of choice for the patient.

A. Calcium Antagonists

B. Beta blockers

C. Diuretics

D. ACE inhibitors

E. Myotropic antispasmodics

8. A 42-year-old patient complains of intense headache, thirst, frequent urination, bouts of severe weakness and pain in the muscles of both legs. Objectively: blood pressure - 200/120 mm Hg, expansion of the borders of the heart, deafness of heart sounds. Serum potassium - 2.9 mmol/L. Which remedy will be most effective for controlling blood pressure?

A. Doxazosin

B. Propranolol

S. Clonidine

D. Nifedipine

E. Veroshpiron

9. A family doctor examines a patient at the age of 45 who complains of a sharp throbbing pain in the head, “fog” in front of his eyes, a feeling of heat, nausea, and pain in the heart. AO - 210/100 mm Hg, pulse - 78 beats / min. The patient associates this condition with a conflict situation at work. The patient was diagnosed with hypertensive crisis and an ambulance was called. What drug from the patient’s first-aid kit can be used for

emergency care before the ambulance arrives? Indicate the route of administration.

A. Enalapril tablets

B. Clonidine tablets

C. Hydrochlorothiazide tablets

D. Nifedipine tablets

E. Tincture of Valerian in drops

10. Patient K., 53 years old, has chronic kidney disease (nephrotic syndrome), the average level of blood pressure is 150/90 mm Hg. About which the drug spironolactone is constantly taking at a dose of 200 mg per day. Within two months, the increase in blood pressure to 170/100 mm RT. Art. The doctor prescribed a constant intake of the drug enalapril at a dose of 20 mg twice a day and aspartame 2 tablets 3 times a day.

Task: Is the patient treated according to the protocol? What factors increase the risk of drug interactions? Adjust treatment if necessary.

TOPIC 5. CLINICAL AND PHARMACOLOGICAL CHARACTERISTICS OF DRUGS INFLUENCING THE PROCESSES OF BLOOD COAGULATION (THROMBOLYTICS, ANTICOAGULANTS, ANTIPLATELETS, COAGULANTS)

Purpose: To learn the issues of effective and safe use of antithrombotic and hemostatic drugs.

The student must know:

- Phases and coagulation factors;
- the main pathophysiological mechanisms of hemostasis;
- clinical and pharmacological properties of drugs that affect platelet aggregation, blood coagulation and fibrinolysis;
- indications for the use of drugs;
- pharmacokinetics and pharmacodynamics parameters of the main drug groups affecting blood coagulation.

The student must be able to:

- Assess the benefit/risk ratio of the use of drugs that affect platelet aggregation, blood coagulation and fibrinolysis, minimize the risk;
- provide for side effects and interaction when prescribing drugs that affect blood coagulation;
- to help the patient with an overdose of drugs that affect blood coagulation, with acute bleeding after tooth extraction;
- provide modern classifications of drugs that affect platelet aggregation, blood coagulation and fibrinolysis and conduct their pharmacotherapeutic analysis.

BASIC CONCEPTS OF THE TOPIC:

Fibrinolysis -

Coagulation -

Hemostasis -

Anticoagulants are -

Antiplatelet agents are -

Thrombolytics are -

Procoagulants are -

Issues that are submitted to the current control

1. Classification of procoagulants. Pharmacodynamics, complications of therapy with aminocaproic acid, ethamsylate, aprotinin.
2. Classification of antithrombotic drugs.
3. Classification, clinical pharmacodynamics and pharmacokinetics of direct anticoagulants. Contraindications, especially the use of heparin. Antidote for overdose.
4. Classification, clinical pharmacodynamics and pharmacokinetics of indirect anticoagulants. Contraindications, especially the use of heparin. Antidote for overdose.
5. Classification, clinical pharmacodynamics and pharmacokinetics of antiplatelet agents. Contraindications, especially the use of acetylsalicylic acid in stomatology.
6. Thrombolytics: pharmacodynamics, pharmacokinetics, clinical features.
7. Methods and methods for monitoring the efficacy and safety of drugs that affect the ability of blood to coagulate.

Recommended literature

1. Merali Z. et al. Comprehensive medical reference and review for the Medical Council of Canada Qualifying Exam Part I and the United States Medical Licensing Exam Step 2. Toronto Notes. 32 Ed. 2016. P.123-131.
2. Davis C. et al. USMLE™. Step 1 Pharmacology Lecture Notes. 2013. 3-29.
3. Ritter J.M. et al. A Textbook of Clinical Pharmacology and Therapeutics. Fifth Edition. in 2008 by Hodder Arnold, an imprint of Hodden Education, part of Hachette Livre UK 465 p. (p.6-85).
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Tasks for self-study of the topic:

Exercise 1.

Write recipes for:

- - acetylsalicylic acid in tablets
- - ticlopidine in tablets
- - heparin in flacons
- - warfarin in tablets
- - protamine sulfate in ampoules
- - thrombin in flacons
- - etamzilate in tablets and ampoules

- - menadione (vikasol) in tablets and ampoules
- - streptokinase in ampoules
- - aminocaproic acid in flacons

Exercise 2.

Fill in the table

Drugs	Indications for use	Side effects
Acetylsalicylic acid		
Ticlopidine		
Heparin		
Warfarin		
Protamine sulfat		
Thrombin		
Etamzilate		
Mebadione		
Streptokinase		
Aminocaproic acid		

Exercise 3.

Among the listed drugs, select agents that have the ability to inhibit platelet aggregation:
-Heparin
-Alteplaza
-Dipyridamole
-Clopidogrel
-Ticlopidine
-Aminocaproic acid
-Acetylsalicylic acid

Exercise 4.

Among the listed drugs, select hemostatic local action:
-Calcium Chloride
-Menadione
-Aminocaproic acid
-Acetylsalicylic acid
-Thrombin
-Hemostatic sponge
-Etamzilate

Exercise 5.

Specify the mechanisms of antifibrinolytic action of aminocaproic acid:
A. Acts directly on fibrin, stabilizing it
B. Blocks activators of profibrinolysin
C. Inhibits the conversion of profibrinolysin to fibrinolysin
D. inhibits the action of fibrinolysin
E. Reduces trypsin and kallikrein activity

Exercise 6.

Fill in the table

Pathological conditions	The main clinical manifestations	Prescription drug groups
Thrombocytopenia		
Hypercoagulation		
Hypocoagulation		
Hemorrhagic syndrome of the newborn		

Exercise 7.

Fill in the table

Hemostatics	Anticoagulants	Fibrinolytics

TOPIC 3. CLINICAL AND PHARMACOLOGICAL CHARACTERISTICS OF ANTIBACTERIAL DRUGS

Purpose: To learn the basic principles of the clinical and pharmacological approach of rational antibacterial therapy, monitoring of efficacy and safety.

The student must know:

- Etiopathogenesis, general semiotics and diagnostic criteria for infectious and inflammatory diseases and their complications;
- clinical and laboratory indications for antibiotic therapy;
- the basic principles of rational antibiotic therapy;
- classification and name of representatives of the main groups of antibacterial agents;
- the mechanism of action of various groups of antibiotics;
- side effects of antibiotics of various groups;
- microbiological basis of antibiotic therapy;
- the position of the pharmacokinetic/pharmacodynamic model of antibiotic therapy.

The student must be able to:

- determine the indications for antibiotic therapy in a particular patient;
- prescribe the most active and less toxic drugs based on empirical antibiotic therapy, data from microbiological studies, pharmacokinetics, pharmacodynamics, interactions with other drugs;
- determine the duration of the course of antimicrobial therapy and ways to control its effectiveness and safety.

BASIC CONCEPTS OF THE TOPIC:

Antibacterial drugs -
Antibiotics are -
Empirical antibiotic therapy is _____
Bactericidal action is _____
The bacteriostatic effect is _____
The sensitivity of the pathogen is _____
The resistance of the pathogen is _____
The post-antibiotic effect is _____
Multi-resistance is _____
The minimum inhibitory concentration is _____

Issues that are submitted to the current control

1. The basic rules of rational antibiotic therapy.
2. The mechanism of action of antibacterial drugs.
3. The principles of choosing antibacterial drugs in stomatology.
4. Prevention of the development of resistance of microorganisms to antibacterial drugs.
5. Name the complication groups of antibiotic therapy. Methods for their identification and prevention rules.
6. Age features of the use of antibacterial drugs. Features of their use during pregnancy and breastfeeding.
7. Clinical and pharmacological characteristics of penicillins (classification, pharmacodynamics, pharmacokinetics).
8. Complications of therapy caused by penicillins. Rules for the prevention of complications of penicillin therapy.
9. Clinical pharmacology of cefalosporins: classification, pharmacodynamics, features of pharmacokinetics, complications of therapy.
10. Clinical pharmacology of aminoglycosides: classification, pharmacodynamics, complications of therapy. The mechanism of development of ototoxic and nephrotoxic effects.
11. Clinical pharmacology of macrolides: classification, pharmacodynamics, pharmacokinetics, complications of therapy.
12. Clinical pharmacology of fluoroquinolones: pharmacodynamics, pharmacokinetics, complications of therapy.

Recommended literature

1. Merali Z. et al. Comprehensive medical reference and review for the Medical Council of Canada Qualifying Exam Part I and the United States Medical Licensing Exam Step 2. Toronto Notes. 32 Ed. 2016. P.123-131.
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Tasks for self-study of the topic:

Exercise 1.

Clinical and laboratory criteria for bacterial infection

_____
_____
_____
_____
_____
_____

Exercise 2.

The mechanism of action of different groups of antimicrobial drugs

Group of drugs	Mechanism of action
Penicillins	Бактерицидная. Нарушают синтез пептидогликана (основной компонент стенки бактерий)
Cefalosporins	
Karbapenems	
Glycopeptides	
Macrolides	
Aminoglycosydes	
Fluoroquinolones	
Tetracyclines	
Sulfonamides	
Nitroimidazoles	

Exercise 3.

What are the complications of antibacterial therapy?

Type of complication	Antibacterial group and representative	Clinical manifestations of complications	Prevention methods
A (dose dependent)	Aminoglycosides (gentamicin)	Ototoxicity Nephrotoxicity	Minimize the duration of toxic concentrations of drugs in the blood
A (dose dependent)	Fluoroquinolones		
D (delayed)	Fluoroquinolones		

A (dose dependent)	Tetracyclines (doxicycline)		
A (dose dependent)	Macrolides		
A (dose dependent)	Penicillins		
B (dose independent)	Penicillins		
B (dose independent)	Cefalosporines		

Exercise 4.

Causes of antibiotic resistance

_____

_____

_____

_____

_____

_____

Exercise 5.

A patient, 15 years old, with community-acquired pneumonia, after 3 days of ineffective antibiotic therapy with amoxicillin, obtained the results of a microbiological study of sputum - Haemophilus influenzae, sensitive to ceftibutene with a MIS of 1 mg/l.

Provide a short clinical and pharmaceutical description of ceftibutene.

Choose the most rational regimen for ceftibutene use.

Exercise 6.

A 4-year-old patient with hospital pneumonia obtained the results of a microbiological sputum test - MRSA, sensitive to vancomycin with a MIS of 1 mg / L.

What is MRSA?

Provide a short clinical and pharmaceutical description of vancomycin.

Choose the most rational regimen for vancomycin.

Exercise 7.

Age features of the use of antibacterial drugs

Groups of antimicrobial drugs	Age restrictions on their use	What is the reason for the restriction?
Sulfonamides		
Nitrofuranes		
Fluoroquinolones		
Penicillins		
Cefalosporines		
Karbapenems		
Glycopeptides		
Aminoglycosides		
Macrolides		
Tetracyclines		
Amphecamines		

8. A 54-year-old patient complains of frequent painful urination, chills, fever up to 38^0C. In urine: protein - 0.33 g/l, white blood cells up to 50-60 in n/a, red blood cells - 5-8 in n/a, gram-negative bacilli. Prescribe therapy.

A. Ciprofloxacin
B. Erythromycin
C. Ceporin
D. Oxacillin
E. Tetracycline

9. A 67-year-old patient is being treated for relapse of infiltrative tuberculosis S6 of the left lung. Accepts: isoniazid, rifampicin, streptomycin, pyrazinamide, ethambutol. The patient complained of hearing impairment. Which of these drugs caused this side effect?

A. Pyrazinamide
B. Isoniazid
C. Ethambutol
D. Streptomycin
E. Rifampicin

10. A 30-year-old patient with a diagnosis of acute osteomyelitis was prescribed an antibiotic that penetrates well into bone tissue. What remedy was chosen?

A. Benzylpenicillin
B. Lincomycin
C. Polymyxin-M
D. Ampicillin
E. Bicillin-3

TOPIC 4. CLINICAL AND PHARMACOLOGICAL CHARACTERISTIC OF ANTI-INFLAMMATORY DRUGS (NON-STEROIDAL AND STEROIDAL).

Purpose: To learn the basic principles of the clinical and pharmacological approach of rational anti-inflammatory therapy, monitoring the effectiveness and safety of the use of non-steroid and steroid drugs.

The student must know:

- Etiological and pathogenetic mechanisms of the inflammatory process;
- the main factors in the inflammatory process of the maxillofacial region;
- classification and name of representatives of the main groups of anti-inflammatory drugs;
- the main parameters of the pharmacokinetics and pharmacodynamics of NSAIDs and corticosteroids;
- The main side effects and the interaction of anti-inflammatory drugs.

The student must be able to:

- determine the indications and make a rational choice of an anti-inflammatory drug;
- determine the main methods of clinical examination of patients to assess the choice of non-steroidal and steroidal anti-inflammatory drugs;
- minimize the risks of adverse side effects and the interaction of these drugs;
- determine the duration of the course of anti-inflammatory therapy and ways to control its effectiveness and safety.

BASIC CONCEPTS OF THE TOPIC:

Inflammation is -

Phospholipase is -

Cyclooxygenase is -

Types of cyclooxygenases -

Nonsteroidal anti-inflammatory drugs -

Glucocorticosteroids -

Types of steroid therapy -

Withdrawal syndrome –

Issues that are submitted to the current control

1. General mechanisms of anti-inflammatory action of corticosteroids. Pharmacodynamics.
2. Pharmacokinetics of corticosteroids.
3. Indications, contraindications, complications when using GCS.
4. The basic principles of hormonal and anti-inflammatory therapy:
a) the choice of the drug, the optimal dose and way of administration;
b) the features of the course of treatment in order to prevent severe disorders of all types of metabolism in the body;
c) gradual withdrawal of the drug in order to avoid withdrawal syndrome.
5. Classification of non-steroidal anti-inflammatory drugs.
6. General mechanisms of anti-inflammatory action of NSAIDs. Pharmacodynamics.
7. Pharmacokinetics of NSAIDs.
8. Indications, contraindications, complications when using NSAIDs.
9. Principles of rational use of NSAIDs.
10. Comparative characteristics of non-steroidal anti-inflammatory drugs: pharmacodynamics features.
11. Pharmacokinetics and clinical use of NSAIDs.
12. Side effects. Contraindications for use.

Recommended literature

1. Merali Z. et al. Comprehensive medical reference and review for the Medical Council of Canada Qualifying Exam Part I and the United States Medical Licensing Exam Step 2. Toronto Notes. 32 Ed. 2016. P.123-131.
2. Davis C. et al. USMLE™. Step 1 Pharmacology Lecture Notes. 2013. 3-29.
3. Ritter J.M. et al. A Textbook of Clinical Pharmacology and Therapeutics. Fifth Edition. in 2008 by Hodder Arnold, an imprint of Hodden Education, part of Hachette Livre UK 465 p. (p.6-85).
4. Betram G Katzung Basic and Clinical Pharmacology, 14th Edition. - McGraw-Hill Medical, 2018.- 1235 p.
5. Clinical pharmacology: Manual for practical classes. – 2-nd edition / Edited by O.V.Kraydashenko. – Vinnytsya: Nova Khyna Publishers, 2010. – 192 p.
6. Emergency management of internal diseases / Edited by O.Babak and O.Bilovol. – Kyiv: AUS Medicine Publishing, 2010. – 448 p.

Tasks for self-study of the topic:

Exercise 1.
Fill in the table

Drugs	Glucocorticoid activity	Mineralocorticoid activity	Duration of action
Cortisone	1	1	
Prednisolone	4	0,3	
Triamcynolone	5	0	
Betamethasone	25	0	
Dexamethasone	30	0	

Exercise 2.
Fill in the table of basic control methods for prolonged use of NSAIDs

System / organ	Control methods
Gastro-intestinal tract	Every 1-3 months - analysis of feces for occult blood, periodically conduct gastrofibroscopy
Kidneys	
Liver	
Bone marrow Hematopoiesis	

Exercise 3.
Fill in the table of the influence of NSAIDs on the effect of other drugs

Group of drugs	Action	Recommendations
Indirect anticoagulants	Inhibition of metabolism in the liver, increased anticoagulant effect	Strict coagulogram control; avoid co-administration with NSAIDs
Aminoglycoside antibiotics		
Diuretics		
Hypoglycemic drugs (sulfonylureas derivatives)		
Antihypertensive drugs		

4. A patient with atopic dermatitis has been using dexamethasone for a long time. During the examination, he found an increase in blood sugar. This is because glucocorticosteroids:
A. Activate gluconeogenesis
B. Activate glycogen synthesis
C. Increase intestinal absorption of glucose
D. Suppress glycogen synthesis
E. Activate insulin breakdown

5. The patient was outpatiently treated with dexamethasone for chronic autoimmune hepatitis. The phenomena of hepatitis almost disappeared and the patient independently stopped taking the drug. However, a relapse occurred a day later, and the disease was more intense than at the beginning. Indicate the cause of this complication:
A. Patient rheumatism
B. Adrenal insufficiency has occurred
C. Accelerated elimination of glucocorticoids
D. Withdrawal syndrome developed
E. Slow down glucocorticoid transport

6 Indicate a remedy that has an antiallergic effect, as well as anti-inflammatory, antitoxic and antishock effects, inhibits the cooperation of T-lymphocytes, inhibits antibody formation and the formation of immune complexes:
A. Nimesulide
B. Indomethacin
C. Ibuprofen
D. Prednisone
E. Cetirizine

7. A 27-year-old patient with a history of bronchial asthma was stung by a bee. There was a feeling of pressure in the chest, lack of air, difficulty exhaling, a feeling of heat in the upper half of the body, dizziness, severe itching, cramps. Objectively: noisy, wheezing breathing, blood pressure - 90/60 mm Hg, Ps - 110 / min. Auscultatory: rhythmic tones, weakened; above the lungs - hard breathing, dry wheezing. Which group of drugs should be used first?
A. Methylxanthines
B. Cardiac glycosides
C. GCS
D. Anticonvulsants
E. Analgesics

TOPIC 3, 4. CLINICAL AND PHARMACOLOGICAL CHARACTERISTICS OF ANESTHETICS AND ANTISEPTICS.

Purpose: To assimilate the principles of the clinical and pharmaceutical approach to the choice of anesthetics and antiseptics, control over efficacy and safety.

The student must know:

- Features of the pharmacokinetics and pharmacodynamics of local and general anesthetics;
- indications for the use of general anesthesia in dental practice;
- indications for the use of local anesthetics (esters, substituted amides, other chemical groups);
- classification, indications for the use of antiseptics in stomatology.

The student must be able to:

- select local anesthetics;
- make a selection of local antiseptics;
- carry out the prevention of adverse reactions;
- provide for possible drug interactions.

BASIC CONCEPTS OF THE TOPIC:

Anesthesia is -

Local anesthesia is -

Types of local anesthesia in stomatology -

Narcosis is -

Aseptic is -

Antiseptic is -

Classification of drugs with antibacterial activity used in stomatology -

Issues that are submitted to the current control

1. Physiological mechanisms of suppression of pain sensitivity in direct contact with the membrane of the nerve fiber.
2. Classification of drugs for local anesthesia.
3. Types of local anesthesia in dental practice.

4. The mechanism of action of local anesthetics, the concept of action potential, sodium channels, type of myelin fibers. Combined use with a vasoconstrictor.
5. Pharmacokinetics of local anesthetics (lidocaine, bupivacaine, articaine)
6. Indications and contraindications for the use of drugs for local anesthesia.
7. Drug interactions for local anesthesia.
8. Side effects of local anesthetics.
9. Narcosis, types of narcosis.
10. Indications for general anesthesia in dental practice.
11. The concept of antiseptics and antiseptic agents. Classification of local antiseptics.
12. The mechanism of action of various groups of local antiseptics.

Recommended literature

1. Merali Z. et al. Comprehensive medical reference and review for the Medical Council of Canada Qualifying Exam Part I and the United States Medical Licensing Exam Step 2. Toronto Notes. 32 Ed. 2016. P.123-131.
2. Davis C. et al. USMLE™. Step 1 Pharmacology Lecture Notes. 2013. 3-29.
3. Ritter J.M. et al. A Textbook of Clinical Pharmacology and Therapeutics. Fifth Edition. in 2008 by Hodder Arnold, an imprint of Hodden Education, part of Hachette Livre UK 465 p. (p.6-85).
4. Betram G Katzung Basic and Clinical Pharmacology, 14th Edition. - McGraw-Hill Medical, 2018.- 1235 p.
5. Clinical pharmacology: Manual for practical classes. – 2-nd edition / Edited by O.V.Kraydashenko. – Vinnytsya: Nova Khyna Publishers, 2010. – 192 p.
6. Emergency management of internal diseases / Edited by O.Babak and O.Bilovol. – Kyiv: AUS Medicine Publishing, 2010. – 448 p.

Tasks for self-study of the topic:

Exercise 1.

Classification of local anesthetics:
Esters - anestezin (benzocaine), novocaine (procaine hydrochloride), dicaine
Substituted amides - ...
Combined drugs -….

Exercise 2.
Fill the table Pharmacokinetic and pharmacodynamic properties of some local anesthetics

Index	Novocaine	Lidocaine	Mepivacaine	Articaine	Bupivacaine
The degree of binding to plasma proteins, %	5,8				
$T_{1/2}$, min.	1				
Distribution coefficient	8,9				
Относительная сила действия	1				
Toxicity (in relation to novocaine)	1				
Duration of action	Short-term				
Speed of action	Slow				

Exercise 3.
Types of local anesthesia (drugs)
A) _____
B) _____
C) _____

Exercise 4.
Pharmacodynamics of local anesthetics

Group	Mechanism of action	Side effects
Substituted amides		
……		

Exercise 5.
A patient, 64 years old, suffered a myocardial infarction a month ago. In the dental office he should be treated with pulpitis 12. Choose an anesthetic method:
A. Medication + vasoconstrictor anesthetics
B. Anesthetic with vasoconstrictor
C. Premedication + anesthetic without vasoconstrictor
D. Premedication + anesthetic with vasoconstrictor
E. Medication + anesthetics without a vasoconstrictor
Explain your choice.

TOPIC IWS 2, 3. CLINICAL AND PHARMACOLOGICAL CHARACTERISTICS OF DRUGS INFLUENCING ON BRONCHIAL PASSABILITY AND ANTIALLERGIC DRUGS

Purpose: To assimilate the principles of the clinical and pharmaceutical approach to the selection of drugs that affect bronchial passability and antiallergic drugs, control of efficacy and safety.

The student must know:

- Etiological and pathogenetic mechanisms of bronchial obstruction syndrome;
- etiopathogenetic mechanisms of allergic reactions;
- classification of the main groups of drugs used in bronchial obstruction syndrome;
- the main parameters of pharmacokinetics and pharmacodynamics of bronchodilators, anti-inflammatory drugs, mucolytics, antiallergic drugs;
- the main side effects and the interaction of the studied drugs.

The student must be able to:

- determine the indications and make a rational choice of an antiallergic drug;
- determine the main methods of clinical examination of patients to assess the choice of bronchodilators, mucolytics, antiallergic drugs;
- minimize the risks of adverse side effects and the interaction of these drugs;
- determine the duration of the course of bronchodilator and antiallergic therapy and ways to control its effectiveness and safety.

BASIC CONCEPTS OF THE TOPIC:

Symptom is -

Syndrome is -

Bronchial obstruction syndrome -

Allergy is -

Allergic conditions of an immediate type -

Allergic conditions of the delayed type -

Types of histamine receptors (classification, localization, pathophysiology) –

Issues that are submitted to the current control

1. Clinical and pharmacological characteristics of β2-agonists (classification, pharmacodynamics, indications for the use of salbutamol and salmeterol, side effects, drug interactions).
2. Features of the use of M-anticholinergics for bronchial obstruction syndrome.
3. Indicated for the use of inhaled glucocorticoids in bronchial obstruction syndrome. Pharmacodynamics, pharmacokinetics, side effects of beclomethasone and fluticasone.
4. Pharmacodynamics and pharmacokinetics of methylxanthines. Indications, side effects, dangerous interactions.
5. Clinical and pharmacological characteristics of mucolytics: classification, pharmacodynamics, especially the use of acetylcysteine and ambroxol.
6. Classification of antiallergic drugs.
7. The use of corticosteroids as an antiallergic drugs.
8. Antihistamines: classification, mechanisms of action, clinical features.
9. Histamine blockers: classification, features of pharmacokinetics, pharmacodynamics, side effects.
10. Stabilizers of mast cell membranes: mechanism of action, indications for use.

Recommended literature

1. Merali Z. et al. Comprehensive medical reference and review for the Medical Council of Canada Qualifying Exam Part I and the United States Medical Licensing Exam Step 2. Toronto Notes. 32 Ed. 2016. P.123-131.
2. Davis C. et al. USMLE™. Step 1 Pharmacology Lecture Notes. 2013. 3-29.
3. Ritter J.M. et al. A Textbook of Clinical Pharmacology and Therapeutics. Fifth Edition. in 2008 by Hodder Arnold, an imprint of Hodden Education, part of Hachette Livre UK 465 p. (p.6-85).
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6. Emergency management of internal diseases / Edited by O.Babak and O.Bilovol. – Kyiv: AUS Medicine Publishing, 2010. – 448 p.

Tasks for self-study of the topic:

1. Indicate a remedy that has an antiallergic effect, as well as anti-inflammatory, antitoxic and antishock effects, inhibits the cooperation of T-lymphocytes, inhibits antibody formation and the formation of immune complexes:

A. Prednisolone
B. Indomethacin

C. Ibuprofen
D. Nimesulide
E. Cetirizine

2. A patient at the age of 47 years is ill with bronchial asthma of an infectious etiology. Recently, attacks have become more frequent, and are not stopped by inhalation of salbutamol and fenoterol. With a severe attack, he sought emergency help. Which group of drugs should be urgently prescribed?

A. Methylxanthines
B. GCS
C. Anticholinergics
D. β2 agonists
E. Cardiac glycosides

3. At the examination by a pediatrician, a 9-year-old girl with a history of intermittent wheezing. Recently, he did not take any drugs. Objectively: anxiety and perioral cyanosis. Marked expansion of intercostal spaces. On auscultation: breathing is weakened, dry scattered rales that are heard from a distance. The child is hospitalized. Which of the following is not indicated for emergency care of a child?

A. Oxygen therapy
B. Inhalation of salbutamol
C. GCS
D. Inhalation of cromoline sodium
E. Eufillin i.v.

4. A 27-year-old patient with a history of bronchial asthma was stung by a bee. There was a feeling of compression in the chest, lack of air, difficulty exhaling, a feeling of heat in the upper half of the body, dizziness, severe itching, cramps. Objectively: noisy, wheezing breathing, blood pressure 90/60 mm Hg, Ps-110 / min. Auscultatory: rhythmic tones, weakened; above the lungs - hard breathing, dry wheezing. Which group of drugs should be used first?

A. Methylxanthines
B. Cardiac glycosides
C. GCS
D. Anticonvulsants
E. Analgesics

5. A patient, 40 years old, suffers from bronchial asthma and a violation of the heart rhythm in the form of bradyarrhythmia. Which pharmacological group drugs should be prescribed to eliminate bronchospasm?

A. M-cholinomimetics
B. Anticholinesterase agents
C. M-anticholinergics
D. β-blockers
E. Muscle relaxants

6. The boy, 5 years old, had an asthma attack at night, which was characterized by: dry cough, expiratory dyspnea, chest tightness. The auxiliary muscles are involved in the act of breathing. A history of asthma attacks 1-2 times a month for 3 years, atopic dermatitis from 2 years. The drug of choice for first aid at the prehospital stage are:

A. Methylxanthines
B. Prolonged beta2 agonists
C. Inhaled anticholinergics
D. Inhaled glucocorticosteroids
E. Short-acting beta2 agonists

7. Fill the table

Mucoactive drugs

Mechanism of action	Drugs
Direct mucolytic	
Direct mucohydrant	
Indirect mucoregulator	
Surface active and loosening	
Drugs that stimulating gastropulmonary reflex	
Drugs that alter the activity of the bronchial glands	

TOPIC 1. UNWANTED ADVERSE REACTIONS TO DRUGS. INTERACTION OF DRUGS.

Purpose: To learn how to diagnose and prevent the occurrence of adverse adverse reactions to drugs and drug interactions.

The student must know:

- classification of adverse reactions to drugs;
- types of drug interactions.

The student must be able to:

- determine the type of adverse reaction to the drug;
- fill out a report card about an adverse reaction and/or lack of effectiveness of the drug in its medical use;
- assess the risk of drug interactions with other drugs, food, alcohol, nicotine.

BASIC CONCEPTS OF THE TOPIC:

A side effect is -

Adverse reaction is -

Drug interactions -

Pharmacokinetic interaction of drugs -

Pharmacodynamic interaction of drugs -

Synergism is -

Antagonism is -

Issues that are submitted to the current control

1. Drug Interaction - definition. The purpose of combination therapy.
2. Types of interaction, the result of interaction. Give clinical examples.
3. Side effects of drugs - definition.
4. Classification of adverse reactions.
5. Methods of prevention and treatment of complications of pharmacotherapy.
6. The mechanisms of toxic effects of drugs.
7. General principles for the diagnosis of drugs poisoning.
8. General principles for the treatment of acute drug poisoning.
9. The concept of antidote therapy.
10. Classification and types of antidotes.

Recommended literature

1. Davis C. et al. USMLE™. Step 1 Pharmacology Lecture Notes. 2013. 3-29.
2. Ritter J.M. et al. A Textbook of Clinical Pharmacology and Therapeutics. Fifth Edition. in 2008 by Hodder Arnold, an imprint of Hodden Education, part of Hachette Livre UK 465 p. (p.6-85).
3. Betram G Katzung Basic and Clinical Pharmacology, 14th Edition. - McGraw-Hill Medical, 2018.- 1235 p.
4. Clinical pharmacology: Manual for practical classes. – 2-nd edition / Edited by O.V.Kraydashenko. – Vinnytsya: Nova Khyna Publishers, 2010. – 192 p.
5. Emergency management of internal diseases / Edited by O.Babak and O.Bilovol. – Kyiv: AUS Medicine Publishing, 2010. – 448 p.

Tasks for self-study of the topic:

Exercise 1.
Classification of side effects (5 types)

Type A - predicted effects. This includes _____

Тип B -

Тип C -

Тип D -

Тип E –

Exercise 2.
Classification of drugs by the risk of teratogenic reactions

Exercise 3.
Fill the table
Isoforms of cytochrome P450, their substrates, inhibitors and inducers

Cyp450	Substrates	Inducers	Inhibitors	Genetic polymorphism
1A2	Theophylline Caffeine Clozapine Acetaminophen	Smoking Broccoli Grilled food	Fluoroquinolones Macrolides Cimetidine Amiodarone Fluvoxamine	No
2C9				
2C19				

2D6				
2E1				
3A4				

4. Indicate which of the following antibacterial drugs is an inducer of metabolic enzymes?

A. Chloramphenicol
B. Rifampicin
C. Clarithromycin
D. Amoxicillin
E. Azithromycin

5. The patient with peptic ulcer was prescribed omeprazole in the usual dose. After 2 weeks, the patient's condition worsened. There were constipation, nausea, severe sweating. The doctor suspected an adverse reaction. The study showed mutations in both alleles of the CYP2C19 gene. Indicate what type of adverse reaction is possible in this patient?

A. Predicted
B. Unpredictable
C. Long-term use
D. Delayed
E. Cancellations

6. The pharmacist advised the patient who acquired ofloxacin to refrain from eating foods containing a lot of calcium (milk, cheese, eggs) while he was taking. It's connected with:

A. Enhanced reabsorption
B. Changes in the distribution of ofloxacin
C. Acceleration of biotransformation
D. The formation of chelate complexes
E. Enhanced elimination

7. In a 20-year-old patient who took cefadox for the treatment of acute otitis media, on the fourth day of taking the drug, the appearance of diarrhea was noted. Antibiotic-associated diarrhea has been diagnosed.

What type of adverse reaction does this patient have?

Indicate the means of preventing this complication.

Appendix 1

Study protocol for the efficacy and safety of drug use
(according to the supervision of patients)
Educational research work

Student _____
(Name, course, group, faculty)
Head _____

PROTOCOL
studies of the pharmacodynamics of the drug _____
Patient (name, age, body weight) _____
Clinical diagnosis: underlying disease _____
Complications of the underlying disease _____
Concomitant diseases _____
Study date: from _____ to _____

1. Treatment of the patient (provide in the form of prescriptions the 5 most significant drugs, including those selected for careful analysis)
2. The rationale for the appointment of drugs (international, commercial names, chemical structure, features of the introduction, pharmacokinetics, pharmacodynamics of drugs)
_____
_____
_____
3. Expected therapeutic effect _____
_____
_____
4. Possible side effects _____
_____
_____
5.List the signs by which the therapeutic effectiveness of the drug will be monitored

Before treatment		After treatment
	Subjective	
A)_____		_____
B)_____		_____
C)_____		_____
D)_____		_____
E)_____		_____
	Objective	
A)_____		_____
B)_____		_____
C)_____		_____
D)_____		_____
	Laboratory-instrumental	
A)_____		_____
B)_____		_____
C)_____		_____
D)_____		_____

6. List the symptoms by which side effects of the drug will be controlled.

Side effects	The presence of a reaction in the patient (yes, no)
Subjective	
A)_____	_____
B)_____	_____
C)_____	_____
D)_____	_____
E)_____	_____
Objective	
A)_____	_____
B)_____	_____
C)_____	_____
D)_____	_____
Laboratory-instrumental	
A)_____	_____
B)_____	_____
C)_____	_____
D)_____	_____

7. Evaluation of combination therapy (consider the possibility of co-administration of the studied drug with other drugs from section No. 1: pharmacokinetic, pharmacodynamic, pharmaceutical compatibility)_____
_____

8. Conclusions and recommendations (effectiveness of treatment, prognosis of further use, the possibility of replacing other drugs)_____
_____
_____

The study conducted _____ Protocol checked _____

List of references literature

Appendix 2

The list of drugs that are submitted to the final control - test

Means for local anesthesia	1. Articaine hydrochloride 2. Anestezin 3. Procaine 4. Lidocaine hydrochloride
Means for general anesthesia	5. Propofol 6. Fluorotan
Antiseptics	7. Furacilin 8. Chlorhexidine 9. Hydrogen Peroxide 10. Microcide
Antibacterial chemotherapeutic drugs	11. Ciprofloxacin 12. Sulfadimesin 13. Metronidazole 14. Azithromycin 15. Ceftriaxone 16. Amoxicillin/clavulanic acid 17. Lincomycine hydrochloride
Proteolytic enzymes	18. Chymotrypsine
Anti-inflammatory drugs	19. Ibuprofen 20. Nimesulide 21. Metamizole sodium 22. Paracetamol 23. Hydrocortisone 24. Prednisolone
Antivirals drugs	25. Acyclovir 26. Interferon
Sorbents	27. Activated carbon
Calcium-containing and fluorine-containing preparations	28. Calcium chloride 29. Calcium glycerophosphate 30. Calcemin
Vitamins	31. Retinol acetate 32. Tocopherol acetate 33. Ascorbic acid
Antifungal drugs	34. Nystatin 35. Fluconazole 36. Clotrimazole 37. Miconazole
Antihistamines	38. Loratadine 39. Cetirizine 40. Diphenhydramine 41. Clemastine 42. Levocetirizine 43. Desloratadine
Drugs for the cardiovascular system diseases	44. Nitroglycerin 45. Nifedipine 46. Verapamil 47. Bisoprolol 48. Captopril

Respiratory system drugs	49. Salbutamol 50. Eufillin 51. Oxeladine 52. Codeine
Drugs, which influence on the gastrointestinal tract	53. Almagel 54. Omeprazole 55. Famotidine 56. Sucralfat