Фармакология
Учебная программа по специальности
1-79 01 01 Лечебное дело

Факультет лечебный
(название факультета)

Кафедра фармакологии
(название кафедры)

Курс III

Семестр 5, 6

Лекции 48 (количество часов)

Экзамен 6 (семестр)

Практические (семинарские) занятия
(количество часов)

Зачет 5 (семестр)

Лабораторные занятия 111 (количество часов)

Курсовой проект (работа)
(семестр)

Всего аудиторных часов по дисциплине 159 (количество часов)

Всего часов по дисциплине 276 (количество часов)

Форма получения высшего образования дневная

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2010 г.
Учебная программа составлена на основе: типовой учебной программы для высших учебных заведений по специальности 1-79 01 01 «Лечебное дело», утвержденной 07.07.2009, регистрационный номер ТД – Л.061/тип;

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21.06.2010 №
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The aim of the teaching and studying of pharmacology is to form special knowledge about modern drugs for treatment of different diseases.

The tasks of studying this subject include the knowledge of:
- modern principles and mechanisms of action of the drugs in different levels: molecular, cellular, organ, systemic;
- the most important principles of pharmacokinetics: absorption, distribution, biotransformation, excretion; principles of rational dosing of drugs, choosing of the drug’s form, route and regimen of administration;
- the main pharmacological effects leading to the therapeutic action of the drugs, indications and contraindication to them, the most important interactions between drugs;
- mechanisms and symptoms of adverse and toxic effects of drugs as well as the methods of minimization of their consequences.

The student must know:
- the nomenclature of the drugs;
- the main aspects of pharmacokinetics and pharmacodynamics of the drugs;
- clinical application of the drugs depending on an age of a patient;
- adverse and toxic effects of the drugs;
- limitations of the use of the drugs causing dependence, possible ways of prevention and treatment of the drug dependence;
- the rules of a clinical study and registration of new drugs.

The student must can:
- prescribe drugs in different forms;
- calculate a dose and regimen of administration of a drug on the base of pharmacokinetic parameters;
- correct regimen of dosing of a drug in diseases changing elimination of drugs.

CONTENTS OF THE PROGRAM

1. A subject of pharmacology. Terminology. Sources and stages of creation of medical products. The legislation in the field of medical products

Definition of pharmacology. The basic medical factors and therapy methods. Historical stages of development of pharmacology.

Essence of pharmacology as a science about management of processes of living organism by chemical substances (drugs). The basic concepts and pharmacology terms: pharmacological activity, action and efficiency of chemical substances. Definition of drugs and names of drugs. Advantage and risk of application of drugs. A state policy in the field of drugs, state and public control of a turn of drugs.

Sections of modern pharmacology: pharmacokinetics and pharmacodynamics, clinical pharmacology, pharmacology areas (chronopharmacology, immunopharmacology etc.). Pharmacy. The chemical nature of drugs. Chemical and physical and chemical determinants of pharmacological activity of drugs. The factors providing therapeutic effect of drugs, pharmacodynamic action and placebo-effects. Sources and stages of creation of drugs.
2. Pharmacokinetics of drugs

Pharmacokinetics bases. Principles of absorption of drugs


Bioavailability. Ways of introduction of drugs to an organism: the purposes, advantages and lacks. Presystemic elimination of drugs.

Distribution of drugs in an organism: compartments, ligands, the basic determinants. Volume of distribution of drugs and its relationship with water spaces of a body. Variability of volume of distribution depending on properties of drugs and an organism condition.

Pharmacokinetic models (single-compartment, two-compartment). Quantitative laws of absorption and elimination of drugs.

The basic pharmacokinetic parameters: a clearance, volume of distribution, a constant of elimination, half-life; their essence, principles of definition and quantitative expression, dimension, interrelation, value for management of a mode of absorption of drugs. The central dogma of pharmacokinetics: «Concentration of active substance in blood - key parameter for management of therapeutic effect of drugs».

Principles of absorption of drugs

The purposes of absorption and it’s variables: a dose, kinds of doses, ways and introduction intervals.

Characteristic of dose: therapeutic sense and the bases for its use; calculation of an individual loading dose based on pharmacokinetic parameters. Conditions and restrictions of use of loading doses.


Introduction of drugs in a blood with constant speed. Kinetic concentration of a drug in blood and its dependence from pharmacokinetic parameters, concentration of a solution and speed of introduction. Stationary concentration of a drug in blood ($C_{SS}$) and time of its achievement, calculation $C_{SS}$ on a dose and a drug clearance. Management of therapeutic concentration of a drug in blood.

Therapeutic and toxic ranges of concentration. Calculation of stationary therapeutic concentration and borders of its fluctuations (minimum, maximum) on a dose and pharmacokinetic to parameters. Management of therapeutic concentration of a drug at absorption. An adequate interval of introduction of discrete doses.

Biotransformation and excretion of drugs. Correction of a mode of absorption of drugs at change of clearance and volume of distribution

Necessity of biotransformation of drugs and its biological sense. The basic of this process and the localization. Influence of biotransformation on activity of drugs. Phases of metabolic transformations of drugs. Microsomial metabolism of xenobiotics: the molecular base, an induction and inhibition. The basic types of biotransfor-
mation of drugs. A metabolism of drugs in toxic products. Clinical value of biotransformation of drugs: populational dispersion and genetic polymorphism of a metabolism of xenobiotics, influence on biotransformation of drugs of a sex, age, weights of a body, ecological factors, smoking, alcohol; metabolic interaction of drugs. The influencing of diseases on biotransformation of drugs.

Clearance - the basic of a pharmacokinetics determinant. A renal clearance of drugs and its components: a filtration, active secretion, reabsorption. Their quantitative and qualitative characteristics. The factors influencing on renal clearance. Dependence of a clearance on physical and chemical properties of drugs.

Clearance of drugs a liver: metabolic transformation and secretion in bile. Biological strategy of a metabolic a clearance. The basic properties of the substances allocated with bile; determinants and restrictions of a hepatic a clearance (enterohepatic circulation of drugs).


**Correction of a mode of absorption of drugs at various physiological and pathological conditions**

Strategy of the individual pharmacotherapy directed on maintenance of therapeutic concentration of a drug in blood. Amendments for calculation of individual values of volume of distribution taking into account an age, sex, weight of a body, excess weight (adiposity), секвестрации liquids, dehydration. Specific features of a metabolism of drugs (genetic, sexual, age). The diseases influencing pharmacokinetics of drugs.

Correction of drug therapy at diseases of a liver and kidneys. The general approaches. Correction of a mode of absorption under the control of the general a clearance of a drug; preferable variants. Correction of a mode of absorption under the control of residual function of kidneys, at defeats of a liver and other pathological conditions, drug interaction.

3. **Pharmacodynamics of drugs**

The nature of biological action of chemical substances. Physical and chemical action: the chemical nature of agents, their biological effects and application in medicine. Chemical mechanisms of action of drugs. Types of chemical reactions of drugs with a biosubstratum and the basic mechanisms of modulating influence of drugs on biological processes (molecular, metabolic, information).


Terms and concepts of quantitative pharmacology: effect, efficiency, activity, agonist (full, partial), the antagonist. Clinical distinction of concepts activity and efficiency of drugs. Interaction of drugs. Antagonism: pharmacological (competitive, not competitive), physiological, chemical. Character of change of effect of drugs (activity, efficiency) depending on antagonism type. Synergism and it’s kind. Measure-


4. Drugs acting on the peripheral nervous system

Drugs acting on the afferent nervous system

Afferent nervous system: structure and physiological role. Classification of drugs acting on the afferent nervous system.

Local anesthetics

Local anesthetics: lidocaine, procaine, tetracaine, bupivacaine, benzocaine, cocaine. Definition, mechanism of action, classification (by chemical structure and by duration of action). Factors influencing on the effect of the local anesthetics. Resorbtive action of the local anesthetics.

Methods of the local anesthesia (topical anesthesia, infiltrative anesthesia, regional anesthesia). Distinctive features of the most known local anesthetics (procaine, lidocaine, tetracaine, cocaine, benzocaine, bupivacaine, ropivacaine, prilocaine, articaine).

Astringent drugs, absorbing drugs, counterirritant drugs (main representatives, mechanisms of action, application).

Drugs acting on the efferent nervous system

Cholinergic drugs

Brief characterization of anatomy and physiology of the efferent nervous system and their subdivisions (somatic and autonomic nervous system). Neurotransmitters and receptors in the peripheral nervous system. Comparison of anatomy and physiological effects of parasympathetic and sympathetic nervous system.

Brief characteristic of cholinergic synapses. Biosynthesis and metabolism of acetylcholine. The main subtypes of cholinergic receptors: muscarinic (M₁ – M₅) and nicotinic (Nₐ and Nₐ), their localization.

Cholinergic agonists


Direct agonists of M,N-cholinergic receptors (carbachole), application. Indirect agonists of M,N-cholinergic receptors (cholinesterase inhibitors): neostygmne, physoestigmine, edrofonium, taretine, echotiofate. Mechanism of action, effects and clinical application.

Poisoning by cholinergic agonists: symptoms and treatment. Reactivators of cholinesterase and their application.
**Cholinergic antagonists**


**Adrenergic drugs**

Brief characterization of adrenergic synapses. Biosynthesis of norepinephrine and its elimination from the synapse (metabolism, pre-synaptic and post-synaptic uptake).

Subtypes of adrenergic receptors ($\alpha_1 - \alpha_2$, $\beta_1 - \beta_3$): localization, effects.

**Adrenergic agonists**

Classification of adrenergic agonists. $\alpha,\beta$-Adrenergic agonists: epinephrine, norepinephrine, ephedrine. Drugs of direct, indirect and mixed action, effects, pharmacokinetic properties and application. Comparison of epinephrine and norepinephrine.

$\alpha$-Adrenergic agonists: phenylephrine, xylometazoline, oxymetazoline, clonidine. Effects and application.

$\beta$-Adrenergic agonists: isoprenaline (isoproterenol), dobutamine, albuterol (salbutamol), terbutaline, ritodrine, fenoterol, salmeterol, formoterol. Classification (non-selective, selective $\beta_1$- and selective $\beta_2$-agonists), comparison of their effects and application.

Dopamine receptors: localization and effects. Effects and application of dopamine and other dopaminergic agonists.

**Adrenergic antagonists**

$\alpha$-$\alpha$, $\beta$-antagonists: phenoxybenzamine, phentolamine, prazosin, terazosin, doxazosin, tamsulosin. Non-selective and selective $\alpha_1$ agonists, effects, application.

Beta-adrenergic antagonists: propranolol, bisoprolol, pindolol, timolol, metoprolol, atenolol. Non-selective and selective $\beta_1$ antagonists, comparison of therapeutic and adverse effects, application.

Alfă, beta-antagonists: labetalol, carvedilol. Application.


**5. Drugs acting on the central nervous system**

Drugs for the general anaesthesia (COA). Ethanol. Anticonvulsant drugs.

Drugs for treatment of parkinsonism
History of a narcosis (general anesthesia). General anesthesia definition. An inhalation and not inhalation general anesthetics. Determinants of depth of a general anesthesia, speed of development and an exit from a general anesthesia. General anesthesia stages. Requirements to ideal general anesthetics. Concept about activity inhalation MAC (the minimum alveolar concentration). Molecular and neurophysiological mechanisms of action of general anesthetics.

Drugs for an inhalation general anesthesia: nitrous oxide, halothane, enflurane, isoflurane, sevoflurane.

Drugs for not inhalation general anesthesia: thiopental, propofol, etomidate, ketamine.


*Anticonvulsant (antiseizure) drugs:* Epilepsy - essence of a pathology, the basic clinical forms, principles of pharmacologic management. Antiseizure drugs (definition and classification). Mechanism of action and side effects of phenobarbital, phenytoin, carbamazepine, ethosuximide, clonazepam, valproic acid. Epileptic status (definition, tactics of the medicinal aid). Febrile seizures (definition, tactics of drug management).

*Drugs for treatment of parkinsonism:* Parkinsonism: essence of pathology and approaches to its management. Classification drugs for parkinsonism treatment, its mechanism of action. Features of action combined drugs ("Nacom", "Sinemet", etc.).

*Analgesics*

Mechanisms of perception of a pain and regulation of painful reactions. Nociceptive system, specific and nonspecific ways of carrying out of painful sensation; pain mediators. Antinociceptive system and it’s mediators. Opioid receptors - localisation, heterogeneity ( ), effects of activation, endogenous ligands.

*Narcotic analgesics (opioids) and their antagonists.*

The basic pharmacological effects opioids, molecular and cellular mechanisms of action, pharmacological effects, pharmacokinetics. The basic groups opioids:
- agonists opioids receptors (Morphine, Codeine, Trimeperidine, Fentanyl, Methadone);
- Agonist-antagonists (Pentazocine) and partial agonist of opioids receptors (Buprenorphine);
- Antagonists opioids (Naloxone, Naltrexone).


*Non-opioid analgetics:* paracetamol, ketorolac, methamizole, combined drugs.

*Analgesics of the mixed type of action (tramadol).*

Mechanisms of analgesic action, other pharmacological effects. Application, side effects, contraindications. The comparative characteristic not opioid and opioid
analgesic, criteria of a choice for treatment of different painful syndromes. Neuroleptanalgesia.

The drugs used for the treatment of painful neuropathic syndromes.

Migraine. Drugs for treatment of acute attacks: NSAIDS, paracetamol, agonists of 5NT1-receptors (sumatriptan), alcaloids an ergot (ergotamine), antivomiting drugs (methoclopramide). Drugs for prevention of attacks of a migraine: □-adrenoblockers, tricyclic antidepressants (amitriptyline), Ca$^{2+}$-channels blockers (flunarizine).

Acute and chronic painful syndromes: clonidine, amitriptyline, ketamine, pregabaline, gabapentine, carbamazepine, baclofen Mechanisms of action, application.

Psychotropic drugs

Psychotropic drugs: definition, main groups.

Antipsychotic drugs


Anxiolytic drugs

Anxiolytic (sedative-hypnotic) drugs: diazepam, chlordiazepoxide, nitrazepam, oxazepam, lorazepam, triazolam, alprazolam, zolpidem, buspirone. Definition, classification, possible mechanisms of action. Therapeutic and adverse effects, pharmacokinetic properties and possible application anxiolitics of benzodiazepine structure (benzodiazepine derivatives). Brief characterization of other anxiolitics.

Antidepressant drugs


Comparison of different groups of antidepressants. Adverse effects of antidepressants. Overdosing of tricyclic antidepressants: symptoms, treatment.

Mood-stabilizing drugs


Psychostimulants


Nootropic drugs

Nootropic drugs (psychometabolic stimulators): pyracetam, gamma-amnobutyric acid. Definition, mechanisms of action, effects, possible application.
6. Pharmacology of autacoids
Autacoids – definition, main representatives. Histamine: physiological role, main subtypes of histamine receptors, effects of their activation. Histamine antagonists: main subgroups, effects, application.
Serotonin (5-hydroxytryptamine): physiological role, main subtypes of serotonin receptors, effects of their application. Agonists and antagonists of serotonin: the main representatives, effects, application.
Nitric oxide: biosynthesis, main effects. Nitric oxide donors and drugs increasing the effects of endogenous nitric oxide: main representatives, application.
Angiotensin II: biosynthesis, main effects. Inhibitors of renine-angiotensin system: mechanisms of the action, application.
Bradykinin: main effects. Drugs acting on biosynthesis and effects of bradykinin. Other vasoactive peptides (natriuretic peptides, endothelin etc): effects, possible application in medicine.

7. Drugs acting on the genito-urinary tract
Diuretics
Definition of diuretics. Classification: thiazides and thiazide-like diuretics (hydrochlorothiazide, chlorthalidone, indapamide), loop diuretics (furosemide, bumetanide, etacrinic acid), potassium-sparing diuretics (spirinolactone, eplerenone, triamterene), carbonhydrase inhibitors (acetazolamide), osmotic diuretics (mannitol).
Sites and mechanisms of action of the main groups of diuretics. Comparison of the diuretics by efficacy, influence on electrolyte balance, adverse effects and application.

Drugs acting on myometrium
Classification of drugs acting on myometrium: drugs inducing rhythmic contractions (oxytocin, dinoprostone, dinoprost), drugs inducing tonic contractions (ergonovine), drugs inhibiting contractions of myometrium (fenoterol, ritodrine). Clinical application of these groups.

8. Drugs acting on cardiovascular system
Antihypertensive drugs
Principles of pharmacotherapy of an arterial hypertensia. The basic antihypertensive drugs:
- diuretics (hydrochlothiazide, indapamide);
- Inhibitors of angiotensin (to specify pharmacological groups and its main representatives), main pharmacokinetic and pharmacodynamic properties (including the mechanism of action and side effects). (captopril, enalapril, lisinopril, losartan);
- β-adrenoblockers (propranolol, metoprolol, bisoprolol) and mixed α, β-adrenoblockers (labetalol, carvedilol);
- calcium channels blockers (nifedipine, amlodipine, verapamil, dithiazem).

Adjunct drugs: the central action antihypertensives (clonidine, methyldopa), α₁-adrenoblockers (prazosin), vasodilators (diazoxide, fenoldopam, hydralazine, minoxidil, sodium nitroprusside), sympatholytics (guanethidine).


**Drugs for the treatment of the coronary artery disease (ischemic heart disease) and other local vascular disorders**

Coronary artery disease (ischemic heart disease): definition, the main forms. Drugs for the treatment of angina pectoris (antianginal drugs): the main groups. Nitrites (nitroglycerine, isosorbide mononitrate, molsidomine), Ca++ channel blockers (nifedipine, amlodipine, verapamil), beta-antagonists (metoprolol, bisoprolol, propranolol), drugs of other groups (trimethazidine, ivabradine). Mechanisms of action, adverse effects. The role of antiplatelet drugs (aspirine, clopidogrel) in the treatment of coronary artery disease.

Treatment of myocardial infarction: the main groups of drugs, mechanisms of their beneficial effects in myocardial infarction.

Hypolipidemic drugs. Definition, classification. Statins (atorvastatin, simvastatin), PPAR receptor agonists (gemfibrozil), bile acid sequestrants (cholestipol, cholestyramine), nicotinic acid.

The main forms of brain vascular disorders (stroke, migraine), general approaches to their treatment, the main groups of drugs.

**Drugs for treatment of congestive heart failure**

Congestive heart failure: definition, the main pathogenetic mechanisms; the role of sympathetic nervous system and renin-angiotensin system in the pathogenesis of the congestive heart failure. The main approaches for the treatment of the congestive heart failure, pharmacological groups for realizing of this approaches.

Cardiac glycosides (digoxin, digitoxin), definition, main drugs and plants containing them. Mechanism of action and main pharmacologic effects of the cardiac glycosides. Pharmacokinetic properties of the main cardiac glycosides. Intoxication by cardiac glycosides: predisposing factors, symptoms, treatment. Brief characterization of other drugs with positive inotropic action (phosphodiesterase inhibitors, beta-1 adrenergic agonists).

The role of other drugs which are used for the treatment of the congestive heart failure: ACE inhibitors (enalapril, lisinopril, trandolapril), angiotensin receptor antagonists (losartan), diuretics (furosemide, spironolactone), beta-adrenergic antagonists (metoprolol, bisoprolol, carvedilol), vasodilators), vasodilators (isosorbide dinitrate, hydralazine). Mechanisms of their beneficial action in the congestive heart failure.

**Antiarrhythmic drugs**
Classification of antiarrhythmic drugs for tachyarrhythmia treatment (classification of Vaughan-Williams, with the list of main drugs). Main drugs for tachyarrhythmia treatment (quinidine, procainamide, disopyramide, lidocaine, mexiletine, propafenone, propranolol, esmolol, amiodaron, sotalol, verapamil, adenosine, digoxin), its pharmacodynamic and pharmacokinetic properties. The choice of drugs for the treatment of supraventricular and ventricular arrhythmias. Bradyarrhythmias, their characteristic and directions in their elimination (atropine, isoproterenol and their use).

9. Drugs acting on the respiratory system

Directions of pharmacotherapy of patients with a syndrome of bronchial obstruction: a choice of preparations for treatment of bronchial asthma and chronic obstructive pulmonary disease: β-adrenomimetics (salbutamol, salmeterol), corticosteroids (beclomethasone, budesonide), mast cell inhibitors (cromolin-sodium), M-cholinoblockers (Ipratropium), leukotriens antagonists (zaflurilukast). A choice of a drug for individual pharmacotherapy of a bronchial asthma, treatment of asthmatic attacks or their preventive maintenance.

Analeptics (stimulators of the respiratory centre): nicotinamide, doxapram.
Surphactants and stimulators of their synthesis (ambroxol).
Expectorants (guaifenesin, ambroxol, acetylcysteine): definition, classification (on the mechanism of action), application.
Antitussive drugs (codeine, dextromethorphan, prenoxidazin): mechanism of action, application, side effects.

Principles and directions of pharmacotherapy of pulmonary edema in cardiology practice. Morphine, furosemide, mannitol, sodium nitroprusside, hexamethonium, aminophylline, ethanol and their usefulness in various clinical settings.

10. Drugs used for treatment of gastrointestinal diseases

The drugs used at disturbances of appetite (orlistat, cyproheptadine).
The drugs used at insufficient secretory function of stomach (replacement therapy).
The drugs used for treatment of peptic ulcer disease (PUD): almagel, ranitidine, pirenzepine, omeprazole, sucralfat, Tab "De-Nol", metronidazole, clarithromycin. Principles of therapy, classification of preparations and the mechanism and actions.
The drugs used at insufficient and excessive secretory function of pancreas (Tab. "Mezym" etc). The pathogenetic therapy of acute pancreatitis (aprotinin). Drugs used in disturbances of bile secretion and treatment of gallstone colic (Tab. "Allochol", ursodeoxycholic acid, drotaverine).
Hepatoprotectors (Caps. “Essenciale”): definition and application.
Laxative drugs (definition, classification, the mechanism of action, the indication for use). Drugs for treatment of diarrhea.
-Emetic drugs (apomorphine, ipecacuana), antiemetic drugs (metoclopramide, ondansetron, scopolamine, meclizine). Mechanisms of action, application
11. Drugs acting on the blood

**Drugs acting on hemostasis**

The main physiologic aspects of hemostasis and fibrinolysis. Classification of drugs acting on hemostasis (antithrombotic and hemostatic drugs).

Antiplatelet drugs: definition, the main representatives (aspirin, clopidogrel, dipyridamol, abciximab, tirofiban). Mechanisms of action, possible application, adverse effects.

Anticoagulant drugs: definition, classification. Directly-acting (heparine, lepirudine, argatroban, danaparoid) and indirectly-acting anticoagulants (warfarine), mechanisms of action, pharmacokinetic properties, possible application, adverse effects. Drugs used in overdosing of directly-acting and indirectly-acting anticoagulants.

Thrombolytic (fibrinolytic) drugs (streptokinase, urokinase, tissue plasminogen activator). Definition, mechanisms of action, possible application, comparison of adverse effects.

Drugs for the treatment of bleeding disorders (hemostatic drugs): phytonadione, aminocaproic acid, tranexamic acid. Mechanisms of action, possible application, adverse effects.

**Drugs acting on hematopoiesis**

The main physiologic aspects of hematopoiesis, the main kinds of disorders of hematopoiesis. Drugs acting on hematopoiesis (ferrose sulfate, iron dextran, cyanocobalamin, folic acid, epoetin alfa), classification.

Iron-deficient anemias – the main causes. Drugs for the treatment of iron-deficient anemias: classification, basic principles of application, possible adverse effect.

B_{12} (folate)-deficient anemias – the main causes, principles of therapy. Mechanism of influence of cyanocobalamin and folic acid on hematopoiesis.

Hematopoetic factors (sargramostim, filgrastim) – principle of action, application.

10. Средства, регулирующие тканевой обмен

10.1. Гормональные и антигормональные средства. Средства, влияющие на тонус и сократительную активность миометрия

Гормональные препараты, их синтетические аналоги, заменители и антагонисты. Источники получения. Принципы биологической стандартизации и дозирования. Классификация.

Препараты гормонов гипоталамуса, гипофиза, эпифиза

Препараты гормонов гипоталамуса: октреотид, гонадорелин, госерелин, протиредин. Влияние гипоталамических гормонов на секрецию гормонов передней доли гипофиза. Применение в медицине.

Препараты гормонов передней доли гипофиза: соматропин, тетракозактид, гонадотропины (урофоллитропин, хорионический гонадотропин, лютропин альфа, менотропины), пиротропин. Влияние гормонов передней доли гипофиза на эндокринные железы. Применение в медицинской практике. Антагонисты гормонов передней доли гипофиза: антагонист рецепторов гормона роста (пегвисомант), ингибитор секреции
пролактина (бромокриптин), ингибитор выделения гонадотропных гормонов (даниялозол).

Препараты гормонов задней доли гипофиза: окситоцин, терлипрессин, десмопрессин. Использование препаратов окситоцина в акушерской практике. Антидиуретические свойства вазопрессина, влияние на тонус кишечника и сосудов. Применение десмопрессина и терлипрессина.

Препараты гормонов эпифиза (мелатонин). Фармакологическая активность, применение в медицинской практике.

**Тиреоидные и антитиреоидные средства**

Препараты тиреоидных гормонов: левотироксин натрия (Т₄), лиотиронин (Т₃). Терапевтическое применение.

Антитиреоидные средства: тиамазол, пропилтиоурацил, йодиды, радиоактивный йод, β-адреноблокаторы. Механизмы действия, применение, побочные эффекты и осложнения.

**Препараты гормона паращитовидных желез** (паратиреоидин). Влияние на обмен фосфора и кальция. Применение.

**Гормональные препараты поджелудочной железы и синтетические противодиабетические средства**

Препараты инсулина короткого и пролонгированного действия (инсулин растворимый, инсулин-изофан, инсулина-цинк кристаллического суспензия, инсулин-цинк комбинированного суспензия, инсулин двухфазный). Источники получения. Влияние инсулина на обмен веществ. Принципы дозирования и пути введения инсулина, осложнения инсулинотерапии.

Пероральные гипогликемические средства: глибенкламид, метформин. Механизм действия, показания к применению, побочные эффекты.

Другие противодиабетические средства: повышающие чувствительность тканей к инсулину (пиоглитазон), стимулирующие высвобождение инсулина (репаглинид), тормозящие всасывание углеводов из кишечника (акарбоза).

**Анта́гонисты инсулина:** глюкагон, эпинефрин, глюкокортикостероиды (ГКС). Механизмы действия, применение.

**Препараты гормонов коры надпочечников**

ГКС: гидрокортизон, метилпреднизолон, преднизолон, триамцинолон, дексаметазон, бетаметазон, флудрокортизон. Влияние ГКС на обмен веществ в организме. Противовоспалительные и противоаллергические свойства ГКС. Терапевтическое применение, побочное действие. Синтетические ГКС для местного применения.

Минералокортикостероиды: дезоксикортион, флудрокортизон. Биологическое действие и применение минералокортикостероидов.

Ингибиторы синтеза кортикостероидов (аминоглютетимид).

**Препараты женских половых гормонов**

Эстрогенные препараты: эстрадиол, этиниэстрadiол, гексэстрол, модуляторы эстрогеновых рецепторов (ралоксифен).

Гестагенные препараты: прогестерон, дидрогестерон.
Химическое строение и физиологическое значение эстрогенов и гестагенов, терапевтическое применение. Заместительная гормональная терапия при климактерических расстройствах.

Антигоницисты эстрогенов и прогестинов: тамоксифен, мифепристон. Применение в медицине.

Противозачаточные средства (гормональные контрацептивы): Марвелон, Антеовин, Три-регол, норэстистерон; постконтрацептивные (левоноргестрел). Принципы действия, побочные эффекты.

Препараты мужских половых гормонов, анаболические стероиды

Андрогенные препараты (тестостерон и его эфиры). Фармакологическая активность. Показания к применению, побочные эффекты.

Антиандрогенные препараты (флутамид). Применение в медицине.

Анаболические стероиды (нандролон). Влияние анаболических стероидов на метаболические процессы. Применение, побочные эффекты.

Гормональные регуляторы минерального гомеостаза и другие препараты, влияющие на метаболизм костной ткани

Паратиреоидные и антипаратиреоидные средства; бисфосфонаты (алендроновая кислота). Механизмы действия. Применение, побочные эффекты.

Средства, влияющие на тонус и сократительную функцию миометрия

Средства для усиления родовой деятельности (окситоцин, динопрост); средства для остановки маточных кровотечений (препараты спорыни, окситоцин), токолитические средства (гексопреналин). Фармакологические эффекты и механизмы действия, применение.

10.2. Противовоспалительные и противоподагрические средства

ГКС: преднизолон, метилпреднизолон, триамцинолон, дексаметазон, бетаметазон. Механизмы действия. Основные схемы применения ГКС. Побочные эффекты и способы их предупреждения.

Нестероидные противовоспалительные средства (НПВС): ацетилсалициловая кислота, диклофенак, ибупрофен, напроксен, индометацин, этодолак, набуметон, мелоксикам, целекоксиб.

Механизмы противовоспалительного действия (влияние на медиаторы и клетки воспаления, процессы синтеза простагландинов (ЦОГ-1 и ЦОГ-2), моноамины, кинины, пролиферацию фибробластов, синтез кисьих мукopolисахаридов, фактор транскрипции NF-kB, метаболизм хряща), другие фармакологические эффекты. Показания и противопоказания к применению. Побочные эффекты, их предупреждение.

Противоподагрические средства

Ингибиторы синтеза мочевой кислоты (аллопуринол), урикурические средства (сульфаниламиды, пребенезид); средства, применяемые при острых приступах подагры: НПВС, ГКС, колхицин. Механизмы действия, применение, побочные эффекты.

10.3. Противоаллергические средства. Иммуномодуляторы. Витамины и витаминоподобные средства. Соли щелочных и щелочноземельных металлов

Средства, применяемые при аллергических реакциях немедленного типа.
Противогистаминные средства (блокаторы Н1-гистаминовых рецепторов): дифенгидрамин, клемастин, лоратадин, цетиризин, ципрогептадин.
Стаbilизаторы мембран тучных клеток (кромоглициевая кислота).
ГКС. Механизмы противоаллергического действия, показания и способы применению.
Антагонисты лейкотриеновых рецепторов (зафирлукаст).
Механизмы действия противоаллергических средств, сравнительная характеристика, побочные эффекты, применение.
Средства, применяемые при анафилактическом шоке: эпинефрин, ГКС, допамин, сальбутамол, противогистаминные средства. Принципы действия.
Средства, применяемые при аллергических реакциях замедленного типа.
Базисные противовоспалительные средства: ауренофин, пеницилламин, хлорохин, сульфосалазин; иммуносупрессанты: циклоспорин, такролимус, антилимфоцитарные иммуноглобулины, препараты моно克莱ональных антител — базиликсимаб; цитотоксические средства — метотрексат.

Иммуномодуляторы
Иммунорегуляторные пептиды (интерферон гамма-1b и другие интерфероны); интерфероногенены (тиророн, арбидол); препараты тимуса (тимоген). Механизмы действия. Применение в медицинской практике. Иммуносупрессивные свойства цитостатических средств (см. «Противобластомные средства»).

11. Chemotherapeutic drugs
11.2. Antibiotics
β-lactamic antibiotics and another inhibitors of the synthesis of a cellular wall:
- Penicillin: penicillin G, benzathine penicillin, oxacillin, ampicillin, amoxicillin, piperacillin, amoxicillin/clavulanat (Augmentin);
- Cefalosporins: cefazolin, cefuroxime, cefaclor, cefotaxime, ceftazidime, ceftriaxone, cefepim;. Classification of cefalosporins (generations I-IV) and their spectrum of antimicrobial activity, stability to β-laktamases, ways of introduction, the indication;
- Carbapenems (imipenem/cilastatin, meropenem, ertapenem);
- Monobactams (aztreonam);
- Glycopeptides (vancomycin, teicoplanin).
The antibiotics breaking permeability of a cytoplasmatic membrane:
- Polypeptides (polymyxins);
- Polyns (nystatin, amphotericin B).
Antibiotics, which inhibit synthesis of nucleinic acids. Ansamycins (rifampicin).

Antibiotics, which inhibit synthesis of proteins:
- Aminoglycosides (streptomycin, gentamycin, amikacin);
- Tetracyclines (tetracycline, doxycycline);
- Macrolids and azalids (erythromycin, azithromycin, clarithromycin, telithromycin);
- Amphenicols (chloramphenicol);
- Linkosamids (clindamycin);
- Antibiotics of steroid structure (Fusidic acid);
- Oxazolidinones (linezolid).

Pharmacodynamics, a spectrum of antibacterial action of antibiotics of various groups, ways of administration, pharmacokinetci features, adverse and toxic effects.

11.3. Synthetic antibiotics

Sulfonamides (definition, classification with the name of the basic preparations (co-trimoxazole (sulfametaxazole/trimethoprim), sulfalene, sulfadoxin/pyrimethamine (Fansidar), sulfacetamide), a principle of action, clinical significance, adverse effects).

Quinolones (definition, classification with the name of the basic preparations (nalidixic acid, norfloxacin, ciprofloxacin, levofloxacin, ofloxacin, moxifloxacin), a principle of action, clinical significance, adverse effects).

Nitrofurans, 8-oxyquinolines and nitroimidazole derivatives, (definition, classification with the name of the basic preparations (nitroxoline, nitrofurantoin, metronidazole), a principle of action, clinical significance, adverse effects).

11.4. Drugs for the treatment of tuberculosis, antiviral, antifungal drugs

Drugs for the treatment of tuberculosis (classification, the comparative characteristic of main drugs: isoniazid, rifampicin, etambutol, aminosalicylic acid, streptomycin). Principles of pharmacotherapy of patients with tuberculosis. The pharmacological characteristic drugs for the treatment of leprosy (dapsone, clofazimine).

Antiviral drugs

Drugs for the treatment of viral diseases of respiratory system: a flu or respiratory syncytial virus (RSV): classification, a spectrum of action, feature of pharmacokinetics and pharmacodynamics, indications for use and side effects (zanamivir, oseltamivir, ribavirine, rimantadine).

Drugs for the treatment of herpes diseases (acyclovir, idoxuridine, trifluridine): the comparative characteristic of drugs.

Pharmacological characteristic of drugs for the treatment of cytomegalovirus diseases (ganciclovir).

Drugs for the treatment of retroviral infection (HIV): classification and main features (zidovudine, lamivudine, zalcitabine, nevirapine, saquinavir, ritonavir).

Drugs for the treatment of virus hepatitis (interferon alfa-2b).
**Antifungal drugs**

Antifungals (classification, a spectrum of action, feature of pharmacokinetics and pharmacodynamics, indications for use and side effects of nystatin, natamycin, ketoconazole,itraconazole, clotrimazole, amphotericin B, fluconazole, flucytosine, terbinafine)

11.5. Drugs for treatment of protozoal infections and antihelmintics. Antiseptic and disinfectants

Drugs for treatment of protozoal infections (chloroquine, primaquine, quinine, malaron, doxycycline, stibogluconate, melarsoprol, nifurtimox, clindamycin, diloxanide furoate), classification.

The pharmacological characteristic antimalarial drugs, classification. Chemoprophylaxis of malaria.

Drugs for treatment of amebiasis (classification, the mechanism of action, application, and side effects).

Short pharmacological characteristic of the drugs for the treatment of lambliosis (giardiasis), pneumocystosis, toxoplasmosis, trichomoniasis, leishmaniosis, trypanosomiasis.

Antihelmintic drugs (mebendazole, albendazol, ivermectine, pyrantel pamoate, dimethylcarbamazine, thiabendazole, praziquantel, niclosamide), classification.

Drugs for nematode infections (spectrum of action, applications).

Drugs for trematode and cestode infections (spectrum of action, applications).

**Antiseptic and disinfectants**

Antiseptic and disinfectants (definition, classification with the name of the basic preparations, a principle of action, clinical significance). Concept about antiseptics and disinfection. Difference antiseptic from other antibacterial drugs. Requirements to antiseptics.

Detergents: cethylpyridinim chloride.

Metals solt - mercury chloride.

Halogens: chloramine, iodine drugs.

Acids and alkalis: boric acid, ammonia drugs.

Aromatic antiseptics: phenol.

Aliphatic antiseptics: ethanol, formaldehyde.

Oxidizers: permanganate of potassium, hydrogen peroxide.

Derivatives of nitrophurane (furacilline).

Dyes: methylene blue, diamond green.

Biguanids (chlorhexidine).

Features of application of separate antiseptics. Principles of treatment of acute poisonings with antiseptics.

11.6. Antineoplastic drugs

Alkyling drugs: cyclophosphamide, melphalan, busulphan.
Antimethabolites: methotrexate, 5-fluorouracil, cytarabine, mercaptopurine.
The drugs breaking a mitosis: vincristin, paclitaxel, ethopoxide.
Antibiotics: bleomycine, doxorubicine, mytomycin.
Enzymes (L-asparaginaza).
Platinum drugs (cysplatine).

Joint prescription of drugs (polypharmacotherapy or the combined therapy). Indications for the combined therapy. Kinds and mechanisms of drug interactions. Possible results of interaction of drugs. Pharmaceutical and pharmacological incompatibility.

Principles of treatment of acute drug poisonings
Classification of pharmacological substances by toxicity and danger degree. The basic mechanisms of toxic action. Principles of treatment of poisonings with pharmacological substances. First aid, measures of the help depending on a way of receipt of substances to an organism. The basic groups of antidotes and their mechanism of action. Conditions and restrictions for their application. Preventive maintenance of acute poisonings by drugs.