AL-FARABI KAZAKH NATIONAL UNIVERSITY

*Faculty of Medicine and Healthcare, Higher School of Medicine*

*Department of Fundamental Medicine*

MZiB2216 "Mechanisms of Defense and Disease (medical genetics, medical microbiology, general pharmacology)"

Lectures of the General Pharmacology

**Lecture 1.**

*Introduction to Pharmacology.The value of the subject. Dosage Forms. INN, trade names. Drug prescription.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge in the field of General Pharmacology, Dosage Forms, INN, trade names, drug prescription.

*Content:*

Introduction to Pharmacology. The value of the subject. The sources of obtaining drugs. The ways to produce new drugs. Preclinical and clinical studies. Solid, liquid and soft dosage forms.

INN, trade names. Medicinal dosage forms. Drug prescription.

*Questions for control:*

1. Introduction to Pharmacology. The value of the subject. The sources of obtaining drugs.

2. The ways to produce new drugs. Preclinical and clinical studies. INN, trade names.

3. Drug prescription. Formulation. Definition. The concept of a medicinal substance, a dosage form and a medicinal preparation

**4**. Indicate approaches to assessing the effectiveness drugs depending on dosage forms that are determined by consistency, method of administration

**5**. Recipe: definition, rules of prescription in prescription drugs, features of prescribing poisonous, potent, narcotic drugs

**6**. Rank the drugs by Physico chemical features of them and solid drug forms. The concept of solid dosage forms and their varieties. Dosing methods.

a) Powders. Rules of prescription in the prescription.

b) Tablets. Features of prescribing.

c) Dragee. Capsules. Granules. The official form of prescription in the prescription.

**7**. Rank the drugs by Physico chemical features of them and soft drug forms and their varieties.

Ointments: definition, components. Prescription in the recipe

b) Pastes. The difference between pastes and ointments. Rules of prescription in the recipe.

c) Suppositories. Application of suppositories. Features of prescription writing.

**8**. Liquid dosage forms:

a) Solutions: definition, classification. Types of solvents. Features of prescription solutions.

b) Infusions and decoctions: the features of cooking, storage, dosing and prescription.

c) Indicate the approach of The concept of medicines, types of medicines. Describe main Rules for writing prescriptions.

**9**. Dosage forms for injection.

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
3. Essentials Of Medical Pharmacology by K.D. Tripathi [Electronic resource]: textbook / K.D. Tripathi. - 8th ed. - Jaypee Brothers Medical Publishers (P) Ltd:, 2019. - 1080 p. - ISBN 78-9352704996

**Lecture 2.**

*Pharmacokinetics. Principles of interaction between human bodies and drugs. Absorption, distribution, biotransformation and excretion of chemicals. Effects of impaired organ functions on pharmacokinetics.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge in the field of General Pharmacology and Pharmacokinetic.

*Content:*

Pharmacokinetics, Principles of interaction of human bodies with the drugs.

Absorption, distribution, biotransformation and excretion of chemicals. Effects of impaired organ functions on pharmacokinetics.

*Questions for control:*

1. Definition and objectives of general pharmacology. Main sections of pharmacology.
2. Pharmacokinetics of drugs, definition. Ways of drug administration.
3. Absorption of drugs from the injection site. Factors contributing to better absorption of medicinal substances.
4. Distribution of medicinal substances in the body. The importance of histohematological barriers in the distribution of drug substances.
5. Metabolism of medicinal substances in the body. Types of metabolic reactions of drugs
6. The role of microsomal liver enzymes in the metabolic reactions of drugs. Induction and depression of microsomal enzymes.
7. Excretion of drugs and their metabolites. Elimination, the period of semi-elimination.
8. Pharmacokinetic indexes.

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
3. Essentials Of Medical Pharmacology by K.D. Tripathi [Electronic resource]: textbook / K.D. Tripathi. - 8th ed. - Jaypee Brothers Medical Publishers (P) Ltd:, 2019. - 1080 p. - ISBN 78-9352704996

**Lecture 3.**

*Pharmacodynamics. Receptors. Principles of interaction between human bodies and drugs. Different mechanisms of action – agonism and antagonism to different types and subtypes of receptors, inhibition of enzymes, blocking or opening of channels.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge in the field of General Pharmacology and Pharmacodynamic.

*Content:*

Pharmacodynamics. Pharmacodynamics.Principles of interaction of drugs with human bodies.

Different mechanisms of action – agonism and antagonism to different types and subtypes of receptors, inhibition of enzymes, blocking or opening of channels.

*Questions for control:*

1. Pharmacodynamics of medicinal agents, definition. The mechanism of action of drugs. The concept of specific receptors.
2. The essence of the receptor theory of the action of drugs. Affinity, inner activity. Agonists, antagonists, mimetics and blockers of specific receptors
3. Types of action of drugs (local, resorptive, reflex). Basic and non-basic pharmacological effects. The concept of the side effects of medicines.
4. Pharmacological and physiological factors affecting the magnitude of the therapeutic effect of the drug.
5. Genetic, biological and emotional factors affecting the magnitude of the pharmacological effect. The concept of a placebo.
6. Dose. Dependence of pharmacological effect on dose. Types of therapeutic doses: threshold, average and higher therapeutic dose. Latitude of the therapeutic effect of the drug.
7. Interaction of drugs with their combined use. Types of interaction: pharmaceutical, pharmacological. Synergism and antagonism of drugs.
8. Changes in the effect of drugs when they are repeated. Drug dependence (physical and mental). Adaptation (tolerance), sensitization, cumulation.
9. Toxic effects of medicines.

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
3. Essentials Of Medical Pharmacology by K.D. Tripathi [Electronic resource]: textbook / K.D. Tripathi. - 8th ed. - Jaypee Brothers Medical Publishers (P) Ltd:, 2019. - 1080 p. - ISBN 78-9352704996

**Lecture 4.**

*PNS. Cholinergic drugs. Acetylcholine, it’s effects on healthy human body. M and N cholinoreceptors, different subtypes. cholinomimetics. Cholinesterase inhibitors.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of the Cholinergic drugs, Acetylcholine, it’s function in healthy human body, M and N cholinoreceptors, different subtypes. **C**holinomimetics and Cholinesterase inhibitors.

*Content:*

Introduction:

Parasympathetic System

Adrenergic and Cholinergic Receptors

Parasempathomimetic medicines

Cholinergic Receptors *M1, M2, M3, NN, NM receptors*

Direct Acting Cholinergic Receptor Agonists Esters

Stereochemistry of Cholinergic Drugs

Clinical Uses of Cholinergic Agonists

Parasympathomimetic and Anticholinesterase Drugs

Muscarinic agonists

Clinical Uses of Parasympathomimetics

Acethylcholinesterase Inhibitors

Clinical Pharmacology of Acetylcholinesterase Inhibitors

Contraindications of Parasympathomimetic Drugs

Side Effects and Toxicity of Cholinergic Agents

Alzheimer

Nicotinic Receptor

*Questions for control:*

1. Construction and function of the cholinergic synapse. Types of cholinergic receptors. Effects of stimulation of M-cholinergic receptors and H-cholinergic receptors.
2. Classification of cholinergic drugs.
3. Anticholinesterase drugs (proserine, galantamine, physostigmine). Classification. Mechanism of action. Pharmacological properties. Application.
4. Sharp poisoning with anticholinesterase agents (and organophosphorus compounds). Symptoms of poisoning. Measures of assistance. Specific antidotes (dipiroxime, isonitrozine).
5. Features of pharmacodynamics of M-H-cholinomimetics. Mechanism of action of acetylcholine. Pharmacological properties.
6. M-cholinomimetics (aceclidine, pilocarpine). Differences from anticholinesterase agents. Pharmacological effects. Application.

* *Characterize (indications, contraindications, side effects) of this drugs: Pilocarpine, Physostigmine, Galantamine, Neostigmine, Nicotine, Cytisine.*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 5.**

*PNS. Cholinergic drugs. Cholinoblockers. Ganglion blockers.**Myorelaxants.**Cholinesterase reactivators*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of the Cholinoblockers and Cholinesterase reactivators.

*Content:*

Cholinergic drugs. Cholinoblockers and Cholinesterase reactivators. Ganglion blockers. Myorelaxants. Clinical Uses of anticholinergic Agonists

Acethylcholinesterase reactivators.

Side Effects and Toxicity of anticholinergic Agents

*Questions for control:*

1. M-cholinoblocking agents. Mechanism of action. Pharmacological properties of atropine (influence on the eye, cardiovascular system, glands, smooth muscles). Features of the action on the central nervous system. Indications for use.
2. Features of pharmacological action of scopolamine, platyphylline, Pirenzepine, Homatropine. Comparative characteristics, indications for use. Side effects.
3. Acute poisoning by M-cholino blockers. Symptomatic of poisoning. Measures of assistance.
4. Influence of N-cholinomimetic agents on the cardiovascular and respiratory system. Application. Side effects.
5. Ganglion blockers. Mechanism of action. Effects of stimulation of sympathetic and parasympathetic ganglia. Indications for use. Side effects.
6. Myorelaxants. Classification. The mechanism of action of depolarizing and nondepolarizing agents.
7. The principle of the action of muscle relaxants. Indications for use Possible complications in their use. Antagonists of muscle relaxants.

* *Characterize (indications, contraindications, side effects) of this drugs: Pipekuronium, Succinylcholine, Atropine, Solifenacin, Hyoscin, Atracurium.*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 6.**

*PNS. Adrenergic drugs. Noradrenaline and adrenaline (Norepinephrine and epinephrine), their functions in healthy human body. Alfa and beta adrenoreceptors, different subtypes. Adrenomimetics.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of the PNS, Adrenergic drugs, Noradrenaline and adrenaline, their functions in the healthy human body, Alfa and beta adrenoreceptors, different subtypes and adrenomimetics.

*Content:*

Classification of adrenergic agents.

Substances that stimulate α and β-adrenergic receptors. *location of α1, α2, β1, β2, β3 receptor subtypes*  Sympathomimetics (ephedrine hydrochloride, cocaine , entacapone).

Means stimulating mainly α-adrenergic receptors. β-adrenomimetics.

The use of β-adrenomimetics. Influence on the tone of the myometrium.

*Questions for control:*

1. Adrenergic synapse. Effects of stimulation of α and β-adrenergic receptors.
2. Classification of adrenergic agents.
3. Substances that stimulate α and β-adrenergic receptors. Mechanism of action. Pharmacological effects of epinephrine (adrenaline hydrochloride) on the heart, blood vessels, pupil, smooth muscles of internal organs, carbohydrate, fat and lipid metabolism, etc. Side effects. Indications and contraindications for use.
4. Sympathomimetics (ephedrine hydrochloride). Mechanism of action. Main pharmacological effects. Differences from epinephrine. Side effects. Indications for use.
5. Means stimulating mainly α-adrenergic receptors. Major pharmacological effects. Indications and contraindications for use. Comparative characteristics of norepinephrine and mezaton.
6. β-adrenomimetics. Division into selective and nonselective β-adrenomimetics. Peculiarities of pharmacokinetics and pharmacodynamics of Isoproterenol. The use of β-adrenomimetics. Influence on the tone of the myometrium.

* *Characterize (indications, contraindications, side effects) of this drugs: Adrenaline (epinephrine), Phenylephrine, Naphazoline, Ephedrine, Clonidine, Dobutamine, Salbutamol, Salmeterol, Isoprenaline (historical).*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 7.**

*Adrenoblockers. Alfa beta adrenoceptor antagonists, Sympatholytics*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of the PNS, Adrenergic drugs, different subtypes of Adrenoblockers. Sympatholytics.

*Content:*

α-adrenoblockers. β-adrenoblockers.

Division into selective and non-selective β-adrenoblockers. Sympatholytics.

*Questions for control:*

* α-adrenoblockers. Basic pharmacological effects of phentolamine. Differences between prazosin and phentolamine. Side effects. Indications for use.
* β-adrenoblockers. The mechanism of development of pharmacological effects. Indications for use. Side effects. Division into selective and non-selective β-adrenoblockers.
* Sympatholytics. Mechanism of action. The main pharmacokinetic and pharmacodynamic features of this group.
* *Characterize (indications, contraindications, side effects) of this drugs: Phentolamine (historical), Yohimbine, Prazosin / doxazosin, Tamsulosin, Propranolol, Metoprolol, Atenolol, Labetalol.*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 8**

*Antianginal drugs. Antihypertensive drugs. Diuretics, Ca blockers, Nitrates, ACEI*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of antianginal, antihypertensive drugs and diuretics.

*Content:*

Antianginal drugs. Nitrates. Diuretics and antihypertensive drugs

Mechanisms of regulation of water-salt metabolism

Thiazide, loop and potassium sparing diuretics.

Mechanisms of regulation of blood pressure  *RAAS (renin-angiotensin-aldosterone system)*

Mechanisms of action of hypertension drugs,

*Alpha-blockers*

Alfa 2 agonists

Antagonists of beta 1 receptors

ACE inhibitors

AR blockers

Calcium channel blockers

*Questions for control:*

1. Explain mechanisms of cardiac ischemia.
2. Explain function of RAAS (renin-angiotensin-aldosterone system).
3. Explain mechanisms of regulation of water-salt balance.
4. Compare direct and indirect vasodilators.
5. Explain function of RAAS (renin-angiotensin-aldosterone system).
6. Explain mechanisms of regulation of water-salt balance.
7. Compare direct and indirect vasodilators.

*Characterize (indications, contraindications, side effects) this drugs: Alpha-blockers (repeat), Beta-blockers (repeat), captopril, enalapril, losartan, nifedipine, amlodipine, clonidine, moxonidine, furosemide, hydrochlorothiazide, indapamide, spironolactone, Nitroglycerine, Isosorbide dinitrate, B-blockers (repeat), verapamil,*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 9.**

*Pharmacology of the hematopoietic system and hemostasis.Preparations for the treatment of anemia. Coagulation disorders. Drugs, enhancing drugs and reducing coagulation.Drugs, increasing and reducing platelet aggregation.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of Pharmacology of the hematopoietic system and hemostasis, preparations for the treatment of anemia, coagulation disorders. drugs, enhancing drugs and reducing coagulation, drugs increasing and reducing platelet aggregation and lipid-lowering agents.

*Content:*

Pharmacology of the hematopoietic system

hemostasis

Preparations for the treatment of anemia

Coagulation disorders

Drugs, enhancing drugs and reducing coagulation

Drugs, increasing and reducing platelet aggregation

Lipid-lowering agents.

*Questions for control:*

1. *Compare and define different causes of anemia*
2. *List indications for antiagregant (antiplatelet) ant anticoagulant therapy*
3. *Explain mechanism of development of atherosclerosis.*
4. *Characterize (indications, contraindications, side effects) this drugs: iron supplements, folic acid and B12 preparation, ASA, clopidogrel, dabigatran, warfarin, rivaroxaban, menadione, aminocaproic acid, atorvastatin*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 10.**

*Pharmacology of ES. Diabetes melitus.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of Pharmacology of Endocrine system and Diabetes melitus.

*Content:*

The mechanisms of development of type Idiabetes melitus

Type II diabetes melitus

Insuline Secreation

Mechanism of action of the Insulin

Sulfonamides

Biguanides

Incretines

Insulines

*Questions for control:*

1. Compare mechanisms of development of type I and type II diabetes melitus.

2. Explain principle insulin replacement therapy, its principles.

3. Describe drugs, used in in treatment of type II diabetes: Insulin secretagogues. Insulin sensitizers. Agents acting on the absorption and excretion of glucose.

4. Tell the function of glucagon and amylin

5. Characterize (indications, contraindications, side effects) this drugs: insulins, metformin, glibenclamide, repaglinide, pioglitazone, canagliflozin, liraglutide, sitagliptin

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 11**

*Anti-inflammatory drugs. Nonsteroidal anti-inflammatory drugs. Steroidal anti-inflammatory drugs*

Goal:

Demonstrate knowledge and understanding of advanced knowledge of Antiainflammatory drugs, Mechanisms of action, Nonsteroidal anti-inflammatory drugs. Steroidal anti-inflammatory drugs.

*Content:*

Antiainflammatory drugs, Mechanisms of action, Nonsteroidal anti-inflammatory drugs. Inflammatory mechanisms. COX. COX subtypes. Selective and nonselective COX inhibitors. Steroidal anti-inflammatory drugs.

*Questions for control:*

1. Explain mechanisms of inflammation.
2. Metabolism of arachidonic acid in pathological processes. Synthesis of prostaglandins.
3. Classification of NSAIDs
4. Classification of steroidal antiinfalammatory drugs
5. Mechanism of action of steroidal antiinfalammatory drugs and NSAIDs
6. Pharmacological effects of NSAIDs and steroidal antiinfalammatory drugs
7. Comparative characteristics of NSAIDs and steroidal antiinfalammatory drugs
8. Side effects and toxic effects of NSAIDs and steroidal antiinfalammatory drugs

*Characterize (indications, contraindications, side effects) this drugs: Aspirin, Metamizole, Celecoxib, Piroxicam, Ibuprofen, Diclofenac, Meloxicam, Prednisolone, Dexamethasone, Fludrocortisone.*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 12**

*Opioid system. Opioid agonists and antagonists. Addiction.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of Opioid agonists and antagonists. Addiction.

*Content:*

Opioid agonists and antagonists. Addiction.

The causes of abuse (biological, psychological, social).

The mechanisms of drug dependence.

Tolerance and dependence.

Undesirable drug reactions.

Acute intoxication.

Treatment of acute poisoning.

*Questions for control:*

1. Give definitions to “abuse”, “addiction”, “tolerance”, “ withdrawal”
2. Compare physical and psychological dependence
3. Tell common mechanisms of addiction treatment.
4. Analgesia. Definition, clinical significance. Types of analgesics.
5. Classification of narcotic analgesics.
6. Mechanism of action of narcotic analgesics.
7. Pharmacological effects of morphine. Effects due to the influence on the central nervous system, on the cardiovascular system, the gastrointestinal tract.
8. Indication for the use of narcotic analgesics (morphine), side effects.
9. Comparative characteristics of drugs. Indications for use. The concept of neuroleptanalgesia.
10. Acute poisoning with narcotic analgesics and the basic principles of its pharmacotherapy.

*Characterize (mechanism of action, addiction potential, toxicity) this drugs: Opiates, morphine, fentanyl, tramadol, buprenorphine, naloxone, pentazocine*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 13.**

*Antibiotics. Principles of antimicrobial therapy. Mechanisms of formation, prevention and overcoming of resistance. beta-lactams, Macrolides, Tetracyclines, Aminoglycosides.* *Peptide antibiotics.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge of Antibiotics, Classification of antibiotics, Prerequisites to the antibiotic, Mechanisms of formation, prevention and overcoming of resistance.

*Content:*

gram-positive and gram-negative bacteria

mechanisms of development of resistance

Penicillin

Aminoglicosides

Macrolides

teracyclines

Peptide Antibiotics.

*Questions for control:*

1. Explain the difference between gram-positive and gram-negative bacteria
2. Define fungi, chlamydia, mycoplasma, viruses.
3. Explain mechanisms of development of resistance. List methods of overcoming resistance
4. Describe pharmacological effects od Beta-lactams, Macrolides, Tetracyclines, Aminoglycosides, Peptide antibiotics.

*Characterize (indications, contraindications, side effects) this drugs: Penicillin, amoxicillin, oxacillin, cefazolin, cefuroxime, ceftriaxone cefepime, Ceftaroline, imipenem, aztreonam, clindamycin, erythromycin, azithromycin, clarithromycin, vancomycin, Streptomycin, gentamicin, doxycycline, Tigecycline, chloramphenicol*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 14.**

*Antibiotics.* *Nitroimidazoles and nitrofurans. fluoroquinolones. Linezolid. Sulfonamides. Trimethoprim.TB.*

*Goal:*

Demonstrate knowledge and understanding of advanced knowledge Nitroimidazoles and nitrofurans, fluoroquinolones, Linezolid, Sulfonamides, Trimethoprim.TB.

*Content:*

Antibiotics.

Nitroimidazoles and nitrofurans.

Quinolones. Linezolid. Sulfonamides. Trimethoprim.

Antituberculous drugs.

*Questions for control:*

1. Pharmacological effects of Nitrofurans.
2. Pharmacological effects of Nitroimidazoles.
3. Pharmacological effects of fluoroquinolones. Linezolid.
4. Pharmacological effects of Sulfonamides. Trimethoprim.
5. Classification of antituberculous drugs.
6. Synthetic antituberculous drugs.

*Characterize (indications, contraindications, side effects) this drugs: metronidazole, furazolidone, nitroksolin, ciprofloxacin, linezolid, Sulfametoksazol,trimethoprim, isoniazid, pyrazinamide, ethambutol, rifampicin, ethionamide, Streptomycin, PASA.*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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**Lecture 15.**

*Antiviral drugs. Treatment of HIV infection. Antifungals*

Goal:

Demonstrate knowledge and understanding of advanced knowledge of Antiviral drugs, treatment of HIV infection, antifungals.

*Content:*

Antifungal preparations.

Antiviral drugs.

Treatment of HIV infection.

*Questions for control:*

1. Define fungi, viruses.
2. Describe pharmacological effects of Antifungal preparations.
3. Describe pharmacological effects of antiviral drugs.
4. Treatment of HIV infection.

*Characterize (indications, contraindications, side effects) this drugs: amphotericin B, ketoconazole, fluconazole, caspofungin, cycloserine, acyclovir, rimantadine, ribavirin, sofosbuvir, interferons, stavudine, zidovudine, saquinavir*

*Recommended References:*

1. Goodman and Gilman’s. The Pharmacological Basis of Therapeutics 13 th edition. Laurence L. Brunton. Mc Graw Hill Education. 2018.
2. Bertram G. Katzung, MD, PhD. Basic and Clinical Pharmacology 14 th edition. International Edition ISBN 978-1-260-28817-9; MHID 1-260-28817-X.Copyright © 2018.
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