

MEDICAL UNIVERSITY – PLOVDIV
FACULTY OF PHARMACY

SYLLABUS
IN
DRUG INTERACTIONS

Approved by the Department Council on Protocol № 11/23.10.2024

Confirmed by the Faculty Council - Protocol № 9/13.11.2024

Name of the Course

"DRUG INTERACTIONS"

Syllabus

| Discipline | Final exam/ semester | According to the Faculty of Pharmacy curriculum of MU-Plovdiv Academic hours | | | | ECTS | Academic hours in semester | | | |
|-------------------|----------------------|--|----------|-----------|----------------|------|----------------------------|---|---------------|---|
| | | Auditorium | Lectures | Practices | Non-auditorium | | VII semester | | VIII semester | |
| | | | | | | | L | P | L | P |
| DRUG INTERACTIONS | VIII sem | 40 | 40 | 0 | 40 | 3 | 20 | 0 | 20 | 0 |

Name of the Course: "DRUG INTERACTIONS"

TYPE OF DISCIPLINE ACCORDING TO THE UNIFORM STATE REQUIREMENTS:

Freely elective discipline (FED)

LEVEL OF QUALIFICATION:

Master / M /

FORMS OF TRAINING:

Lectures, seminars

TRAINING COURSE: 4-th year

DURATION OF TRAINING:

Two semesters

TECHNICAL EQUIPMENT APPLIED IN THE TRAINING:

Multimedia presentations, discussions, illustrations with preparations and schemes.

Computer, multimedia, schemes, demonstration with video films

FORMS OF EVALUATION:

Ongoing control with oral examination and tests by sections. At the end of the VIII-th semester, students take an exam.

EVALUATION CRITERIA:

According to an approved academic standard.

ASPECTS OF EVALUATION CRITERIA:

1. / test;
2. / written examination, including a clinical case and a theoretical question;
3. / Oral interview.

SEMESTER EXAM:

in the VIII semester.

STATE EXAM:

None.

LECTURER:

Habilitated lecturer from the Department of Pharmacology, Toxicology and Pharmacotherapy of the Pharmaceutical Faculty at the Medical University of Plovdiv.

DEPARTMENT:

Pharmacology, Toxicology and Pharmacotherapy at the Pharmacy Faculty, Medical University of Plovdiv.

ANNOTATION

The curriculum in Drug Interactions for Master Pharmacists is in accordance with the qualification characteristics for their activity and the educational degree they acquire. The course is a freely elective subject in the training of a master pharmacist. Teaching includes a total of 40 teaching hours of lectures, distributed respectively 20 teaching hours in the VII and VIII semesters and ends with an exam. The study material is divided into two sections - General and Special. The general part presents the factors, mechanisms and levels of drug interactions, and the special part presents the drug interactions of the most commonly used groups of drugs and the possibilities for their avoidance.

In the course of study the students acquire knowledge about solving practical problems of everyday pharmaceutical practice related to the combined use of drugs and the resulting desired and undesirable drug interactions at the pharmaceutical, pharmacokinetic and pharmacodynamic levels.

BASIC AIMS OF THE DISCIPLINE

The main task of the curriculum is to acquire knowledge and skills to discover the mechanisms of useful and unwanted interactions in three areas:

- drug interactions
- interactions between medicines, foods, food supplements and beverages
- drug interactions and certain physiological and pathological conditions.

In vivo interactions, which affect the absorption, distribution, biotransformation and excretion of medicinal products, have a special place in teaching. Induction or inhibition of cytochrome P450 (CYP450) enzymes is often the cause of a number of clinically significant metabolic interactions with consequences of ineffective therapy or drug toxicity.

EXPECTED RESULTS

Upon completion of the training, students must have the following knowledge and skills:

- to know the mechanisms of drug interactions at biopharmaceutical, pharmacokinetic and pharmacodynamic levels;
- to know the characteristic drug interactions of the most frequently used pharmacological groups in everyday pharmaceutical practice;

- to be able to search and use up-to-date drug information related to drug interactions.

As participants in the therapeutic process, future pharmacists will have an additional resource of knowledge about the benefits and risks of combination drug therapy and thus will contribute professionally to the maximum possible safety of drug therapy.

The acquisition of knowledge in this discipline is a prerequisite for successful upgrading of the next subject in their education, namely the discipline of Pharmacotherapy, studied in the fifth year. This knowledge makes it possible to develop therapeutic strategies of combination therapy and contributes to the creation of combined dose-fixed drugs.

LECTURES – THESIS

Lectures during the VII-th semester

Lecture No. 1 – 2 hours

DRUG INTERACTIONS - BASIC PROVISIONS.

DRUG INTERACTIONS AT THE LEVEL OF DRUG ABSORPTION AND BINDING WITH PLASMA PROTEINS.

1. Types of drug interactions – pharmacokinetic (PK) and pharmacodynamic (PD).
2. Basic pharmacokinetic indicators.
3. Transmembrane transport of drugs.
4. Types of transmembrane transport.
5. Direction of movement of drug molecules and driving force.
6. Examples.
7. Binding to plasma and tissue proteins.

Lecture No. 2 – 2 hours

DRUG INTERACTIONS AT THE LEVEL OF DRUG DISTRIBUTION IN THE BODY

1. Passage of drugs through the barrier systems – blood-brain, placental.
2. Bioavailability and bioequivalence.
3. Types of bioavailability.
4. Examples.
5. Solubility of drugs - lipo- and hydrophilicity.
6. Types of barrier systems.
7. Examples.

Lecture No. 3 – 2 hours

DRUG INTERACTIONS AT THE LEVEL OF METABOLISM AND ELIMINATION OF DRUGS FROM THE BODY

1. Definition of drug metabolism.
2. Phases of biotransformation.
3. Enzyme systems involved in light metabolism - CYP - 450.
4. Enzyme inducers – examples.
5. Enzyme inhibitors – examples.
6. Importance of liver failure for drug metabolism.
7. Ways of drug elimination from the body.
8. Transport systems in kidneys, lungs, SCT.
9. Importance of renal failure for elimination of drugs from the body.

Lecture No. 4 – 2 hours

DRUG INTERACTIONS IN CHILDHOOD, OLD AGE AND PREGNANCY. GENETIC POLYMORPHISM.

1. Pharmacokinetic behavior of medicines in childhood.
2. Pharmacokinetic behavior of drugs in old age.
3. Pharmacokinetic behavior of drugs during pregnancy.
4. Pharmacokinetic behavior of drugs in case of genetic polymorphism.

Lecture No. 5 – 2 hours

DRUG INTERACTIONS IN PATHOLOGICAL CONDITIONS AND HARMFUL HABITS

1. Pharmacokinetic behavior of drugs in heart failure.
2. Pharmacokinetic behavior of drugs in liver failure.
3. Pharmacokinetic behavior of drugs in renal failure.
4. Influence of smoking on the pharmacokinetics of drugs.
5. Influence of alcohol on the pharmacokinetics of drugs.
6. Influence of environmental factors on the pharmacokinetics of drugs - temperature, atmospheric pressure, ionizing radiation, etc.

Lecture No. 6 – 2 hours

THERAPEUTIC DRUG MONITORING AND ADR RECORDING SYSTEM

1. Application of medicinal products in a cumulative dosing regimen.
2. Examples.
3. Application of medicinal products in a non-cumulative dosage regimen.
4. Examples.
5. Definition, principles and clinical significance of therapeutic drug monitoring.
6. Ways and procedures for reporting NDR.
7. Notification of adverse drug reactions.

Lecture No. 7 – 2 hours

CNS DRUG INTERACTIONS - ANTIPILEPTICS AND ANTIDEPRESSANTS

1. PK/PD interactions of antiepileptic drugs - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of antidepressants - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 8 – 2 hours

DRUG INTERACTIONS OF DRUGS, SEDATIVES AND NEUROLEPTICS

1. PK/PD interactions of hypnotics - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of neuroleptics - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 9 – 2 hours

DRUG INTERACTIONS OF ANTIPSYCHOTICS AND ANXIOLYTICS

1. PK/PD interactions of antipsychotics - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of anxiolytics - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 10 – 2 hours

DRUG INTERACTIONS OF ACE INHIBITORS AND SARTANS

1. PK/PD interactions of ACE inhibitors - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of sartans - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lectures during the VIII-th semester

Lecture No. 11 – 2 hours

DRUG INTERACTIONS OF DIGITALIS GLYCOSIDES AND DIURETICS

1. PK/PD interactions of digitalis glycosides - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of diuretics - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 12 – 2 hours

DRUG INTERACTIONS OF CALCIUM ANTAGONISTS

1. PK/PD interactions of dihydropyridine calcium antagonists - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of non-dihydropyridine calcium antagonists - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 13 – 2 hours

DRUG INTERACTIONS OF ANTIARRHYTHMICS.

1. PK/PD interactions of antiarrhythmic drugs - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 14 – 2 hours

DRUG INTERACTIONS OF NITRO-DRUGS

1. PK/PD interactions of nitropreparations - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 15 – 2 hours

DRUG INTERACTIONS OF BETA BLOCKERS

1. PK/PD interactions of beta blockers - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 16 – 2 hours

DRUG INTERACTIONS OF DRUGS AFFECTING THE RESPIRATORY SYSTEM

1. PK/PD interactions of drugs affecting the respiratory system - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 17 – 2 hours

DRUG INTERACTIONS OF NON-STEROID ANTI-INFLAMMATORY AGENTS

1. PK/PD interactions of nonsteroidal anti-inflammatory drugs - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 18 – 2 hours

PHARMACOKINETIC PROPERTIES OF ANTIBIOTICS AND CHEMOTHERAPEUTICS

1. PK/PD interactions of antibiotics - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of chemotherapeutic agents - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 19 – 2 hours

DRUG INTERACTIONS OF INSULIN AND ORAL ANTIDIABETIC AGENTS

1. PK/PD interactions of insulin – resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of oral antidiabetic agents - absorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

Lecture No. 20 – 2 hours

DRUG INTERACTIONS OF COAGULANTS, ANTICOAGULANTS, PLATELET ANTIGGREGANTS

1. PK/PD interactions of coagulants – resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
2. PK/PD interactions of anticoagulants - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.
3. PK/PD interactions of platelet antiaggregants - resorption, binding to plasma proteins, distribution, metabolism, excretion, adverse drug reactions.

BIBLIOGRAPHY

1. Pharmacotherapy: A Pathophysiologic Approach, 11-th Edition 2020 by McGraw Hill. www.pharmacotherapyonline.com
2. *Goodman C. Gilmans*, The Pharmacological basis of Therapeutics Editors Joel, G. Hardman, Lee E. Limbird consulting editor Alfred Goodman Gilman tenth edition, Mc Graw – Hill, Medical publishing division 2001.
3. *Walker R. Whittlesea C.* Clinical pharmacy and therapeutics. Churchill Livingstone Elsevier 2012.
4. *Atkinson A, Haung Sh, Lertora J, Markey S.* Principles of Clinical Pharmacology. Academic Press is an Imprint of Elsevier 2012.

CONSPECTUS

ON DRUG INTERACTIONS

GENERAL PART

1. Drug interactions - basics.
2. Drug interactions at the level of drug resorption.
3. Drug interactions at the level of plasma protein binding.
4. Drug interactions changing the bioavailability of drugs.
5. Drug interactions at the level of distribution of drugs in the body and transport of drugs through barrier systems.
6. Drug interactions at the level of metabolism.
7. Drug interactions at the level of drug elimination.
8. Management of drug interactions through therapeutic drug monitoring and the ADR registration system.
9. Drug interactions in childhood, old age and during pregnancy. Genetic polymorphism and drug interactions.
10. Drug interactions in pathological conditions and harmful habits.

SPECIAL PART

11. Drug interactions of agents acting on the CNS - antiepileptic agents.
12. Drug interactions of sleeping pills.
13. Drug interactions of neuroleptics.
14. Drug interactions of antidepressants.
15. Drug interactions of beta blockers.
16. Drug interactions of digitalis glycosides.
17. Drug interactions of calcium antagonists.
18. Drug interactions of antiarrhythmic drugs.
19. Drug interactions of antianginal drugs.
20. Drug interactions of ACE inhibitors and sartans.
21. Drug interactions of anti-inflammatory agents and analgesics.
22. Drug interactions affecting the respiratory system.
23. Drug interactions of antibiotics and chemotherapeutics.
24. Drug interactions of insulin and oral antidiabetic agents.
25. Drug interactions of coagulants, anticoagulants and platelet antiaggregants.
26. Drug interactions of diuretics.

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