Study program: Integrated Academic Studies in Pharmacy

Course title: Pharmacogenetics

Teacher Nataša S. Vučinić

Course status: elective

ECTS Credits: 3

Condition: Biology with Human genetics; Pharmacokinetics

Course aim

The aim of the course is to teach students the latest knowledge related to biochemical and physiological effects of drugs on the molecular level and their mechanisms of action. To explain them clinical testing of target genes whose variation affects drug metabolism and can give a different response to the drug. Analysis of the effects of drugs may represent a good basis both for better and more rational therapeutic use and for designing new, potentially curative substances and therapeutic approaches. The knowledge of pharmacogenetics is essential for the formation of "personalized therapy".

Expected outcome of the course:

That students learn the specific technologies and methods for the identification of gene mutations and the functional consequences of mutations. To understand how genetic polymorphisms of enzymes and drug transporters may be associated with increased adverse drug reactions. To be able to relate important examples of pharmacogenetic biomarkers for the prediction of adverse reactions to the drug. To understand the use of pharmacogenetic regulatory guides for drug development. Students will realize the importance and ethical use of pharmacogenetics and personalized medicine

Course description

Theoretical education

1. Concept of pharmacogenetics and its historical development
2. Pharmacogenetics and pharmacoeconomics; differences and significance
3. Pharmacokinetics of drugs: mechanisms of drug action, drug- receptor interactions: basis of pharmacodynamics
4. Classification of receptors
5. Molecular basis for heritage (monogenic, multifactorial and polygenic)
6. Main types of genetic variation (6 main classes) and their consequences
7. Methods to identify mutation and to investigate their function
8. Pharmacogenetic polymorphisms
9. Clinically important genetic polymorphisms in enzymes
10. Clinically important genetic polymorphisms in drug transporters
11. The significance between pharmacogenetic therapy for different diseases
12. Connection between certan HLA alleles and adverse drug effects
13. Ethical issues in pharmacogenetics and the use of biobanks
14. Preventive and predictive significance of personalized medicine
15. Personalized medicine in future from pharmacogenetics to pharmacogenomics

Practical education

Exercises-tasks- examples and practice choosing and dosing drugs based on pharmacogenic analysis of targeted genes
Laboratory work: DNA isolation, PCR, RFLP, electrophoretic methods
Stdents research, essays

Literature

Compulsory

1. Jorde L, Carey J, Bamshad M. Medical Genetics fifth edition. Elsevier, 2016.
2. Turnpenny P, Ellard S. Emery's Elements of Medical Genetics. Churchill Livingstone, 2007.

Additional

1. Strachan T, Read AP. Human Molecular Genetics 4th Edition. Garland Publishing, UK, 2011.
2. Alberts B, Johnson A, lewis J, Morgan D, Raff M, Roberts K, Walter P. Molecular Biology of the Cell, Sixth Edition. Garland Science, Taylor & Francis Group, New York, US, 2015.
3. Thompson&Thompson. Genetics in Medicine. Nussbaum,Saunders Elsevier, 2007

Number of active classes	**Theoretical classes:** 30	**Practical classes:** 15

Teaching methods Lectures, practice and research			
Student activity assessment (maximally 100 points)			
Pre-exam activities	**points**	**Final exam**	**points**
Lectures		Written	60
Practices	10	Oral	
Colloquium		.....	
Essay	30		