

Doctoral School: **Biology Doctoral School**
Doctoral Program: Neuroscience and Human Biology

Subject code: **BIO/7/3**

Subject title: **Neuropharmacology L**

Teacher and Neptun code: **Dr. Tarnawa István (KL472K)**

Credits: 4

Class hours: 2 hours/week, lecture

Aims of the course

The lecture provides a detailed overview of the types of drugs acting on the nervous system, their mechanism of action, and certain aspects of drug research and development.

Contents of the course

1. Introduction, basic concepts. Neurological and psychiatric disorders. The concept of medicine, the history of pharmacology. Defining key concepts. A brief description of the neuropsychiatric disorders discussed during the course.
2. Molecular basis of drug effects, receptor theory. Structures that mediate the effects of drugs, their interaction with drug molecules. Quantitative characterization of the interaction, dose-response relationships.
3. Molecular targets of drugs acting on the central nervous system (CNS) - ion channels. The role of different ion channels in the regulation of neuronal excitability and in diseases affecting the nervous system. Drugs acting on ligand- and voltage-gated ion channels.
4. Molecular targets of CNS drugs - G-protein-coupled receptors. Structure, function and pathological role of G-protein coupled receptors. Therapy of various diseases through influencing the function of G-protein coupled receptors.
5. Pharmacokinetics - special requirements for CNS drugs. The fate of drugs in the body; absorption, distribution, metabolism and elimination. The role of the blood-brain barrier.
6. The pharmacology of pain. Mechanism of pain, characteristics of pathological pain, pain disorders. Non-steroidal anti-inflammatory analgesics, narcotic analgesics, analgesics with other mechanisms of action.
7. Anxiolytics, sedato-hypnotics, anti-OCD agents. Conditions that result from the disruption of the central nervous system excitation-inhibition balance. Characterization of anxiety and related diseases, drugs used in their therapy.
8. Antiepileptics, muscle relaxants acting centrally. Characteristics of epilepsy, the pathomechanism of various epileptic diseases. Medication options for epilepsy.
9. Drugs for neurodegenerative diseases (stroke, Parkinson's, Alzheimer's disease). Acute and chronic diseases associated with neuronal cell death. The process and pathological role of excitotoxicity. Special involvement of neurotransmitter systems in individual diseases.
10. Antipsychotics, anti-ASD, anti-ADHD agents. Psychosis and schizophrenia. Diseases similar to schizophrenia. Mode of action and use of antipsychotics.
11. Medication for depression and related diseases. The pathogenesis and pathomechanism of depression, the mode of action of antidepressant drugs.
12. CNS stimulants, drugs, drug addiction. The process of the development of addictions, its neural mechanism. Drug abuse, various addictive agents. Drugs used to treat addiction.
13. Experimental methods in CNS drug research. An overview of the major experimental methods used in drug discovery. In vitro studies at the molecular, cellular, and tissue levels. Disease models.
14. The process of research and development of CNS drugs. The process of drug research and development. Phases, time- and cost demand of preclinical and clinical research.

Requirements

Oral exam

Grade is determined by the exam result.

Literature

Power point slides, circa 350 slides

