



The Hebrew University of Jerusalem

Syllabus

Principles of neurotoxins Pharmacology - 64871

Last update 10-10-2021

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: School of Pharmacy

Academic year: 0

Semester: 1st Semester

Teaching Languages: English

Campus: Ein Karem

Course/Module Coordinator: Prof. Philip Lazarovici

Coordinator Email: philipl@ekmd.huji.ac.il

Coordinator Office Hours: thursday 3-5 p.m.

Teaching Staff:

Course/Module description:

A thorough understanding of cellular and molecular mechanisms involved in the microbial, plant and animal toxic effects provides an important tool for assessment of human health risk. New aspects, major advances, and new areas in molecular and cellular biology provides updated sources of information to review the functional aspects of toxins action offering an integrated framework to explain how they achieve selective toxicity. In this course I would like to present the general principles (signal transduction pathways) that link toxin-induced toxicity with the molecular pathways that underlie their toxic effects. The purpose of this pharmacodynamics approach is to generate a conceptual bridge between multiple events at the molecular level and the determinants of toxicity at the physiological and cellular level. Specific examples of toxins will be carefully chosen to illustrate and highlight the fundamental mechanisms of toxicity at different cellular and biochemical levels. The lectures and seminars will include for each toxin an identification description, lethal dose, known biological mechanism of action, its use as a pharmacological tool in biomedical research and potential translational medicine uses. A general framework pharmacodynamics scheme (including 8-12 cellular signaling pathways) and individual toxins targeting plasma membrane phospholipids, receptors (cholinergic nicotinic, glutamate, GABA), G-proteins (cholera, pertussis), different effectors (phospholipases, adenylate and guanylate cyclases, etc) will be presented, focusing on the signaling events. The students will present the key publications in the field and will present in the seminars selected topic on specific toxins. By linking molecular pathways to more general biomedical contexts, we will ensure that the student is not lost in the details and instead receives a broad understanding of the molecular pharmacological processes underlying microbial, plant and animal toxicity.

Course/Module aims:

Learning of structure and function of toxins. understanding the pathology of diseases induced by toxins and pharmacological approaches for therapy

Learning outcomes - On successful completion of this module, students should be able to:

At the end of the course the student will master the basic pharmacodynamics molecular principles of toxin action

Attendance requirements(%):

85

Teaching arrangement and method of instruction: lectures and seminars

Course/Module Content:

Course topics:

- 1. General principles of toxin pharmacology (4h)*
- 2. Pordaxin – from pore forming activity to specific presynaptic effects and neurotransmitter release (4h)*
- 3. Snake venom toxins selectively antagonizing nicotinic and muscarinic receptors and acetylcholine esterase (6h)*
- 4. Microbial toxins target intracellular signaling molecules and membrane permeability (6h)*
- 5. Plant mycotoxins inhibit molecular steps of protein synthesis and form DNA adducts (6h)*
- 6. Bacterial, plant and animal toxins as pharmacological tools (2h)*

Required Reading:

reviews and articles

Additional Reading Material:

Course/Module evaluation:

End of year written/oral examination 40 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 60 %

Assignments 0 %

Reports 0 %

Research project 0 %

Quizzes 0 %

Other 0 %

Additional information: