GENETICS OF DRUG RESISTANCE IN PARASITOLOGY

CU characterization:

CU name:
Genetics of drug resistance in Parasitology

Scientific area acronym:
GFRP

Duration:
Semiannual

Working hours:
56

Contact hours:
30

ECTS:
2

Observations:
Optional UC

Teacher in charge and respective teaching load in the CU:
Fatima Nogueira – 1,5 h

Other teachers and respective teaching load in the CU:
Sandra Antunes – 2,0 h
Ana Domingues – 2,0 h
Carla Sousa – 4,0 h
João Pinto – 5,0 h
Sofia Cortes – 2,0 h
Isabel Maurício – 4,0 h
Manuela Calado – 4,0 h
Guest Lecturers – 12 h

Intended learning outcomes (knowledge, skills and competences to be developed by the students):
Through interaction with IHMT researchers, guests from outside the institution and autonomous research, at the end of the Genetics of Drug Resistance in Parasitology (GFP) course, students should:

• Understand the genetics of resistance to antiparasitics, phenotypic adaptation to the environment and the challenges in defining resistance.
• Recognize different areas of interest in the study of the genetics of resistance to antiparasitics and its current status;
• Define the main resistance mechanisms and their molecular basis in the context of medical parasitology.
• Pharmacogenetics and drug resistance in parasitology
• Understand, analyze and evaluate the applicability of some methodologies and tools for identifying genetic markers of resistance and their applicability in the monitoring, epidemiology and control of parasitic diseases with an impact on human health.
• Know and manipulate computational and bioinformatics tools used in medicinal chemistry for drug design and research into potential therapeutic targets.

Syllabus:

1. Introduction to the concept of drug resistance and parasitic infection. Notion of resistance genomics. Notion of phenotypic adaptation to the environment, resistance to antiparasitics, transmembrane transport of xenobiotics/drugs in eukaryotes.
2. Enzymes of the oxidative stress response system and efflux pumps in response to drugs, using the malaria parasite Plasmodium falciparum as an example.
3. Mechanisms of resistance to insecticides. Define the main resistance mechanisms and their molecular basis. Concept of resistance vs. tolerance. Types of resistance (physiological, behavioral).
4. Epidemiological importance of resistance to drugs currently in use in the therapy of leishmaniasis.
5. Resistance to anthelmintics. Genomics of resistance in nematodes, trematodes and cestodes.
6. Basic concepts of the tools - metabolomics, proteomics and transcriptomics.
7. Post-genomic tools for studying drug resistance: Experimental Design; Bioinformatics; Application examples.
8. Pharmacogenetics and drug-drug interactions. The concepts of pharmacogenetics and pharmacogenomics will be covered.
9. Computational tools of bioinformatics and medicinal chemistry used in drug design useful for identifying and overcoming resistance to antiparasitics.

Evidence of the syllabus coherence with the CU intended learning outcomes:

In general, the objectives of the Curricular Unit are integrated into the topics covered and interconnected with the program contents. These objectives are achieved through theoretical classes as well as practical activities such as laboratory techniques (namely objectives 3 and 5), and theoretical-practical exercises (namely objective 9).

Teaching/learning methodologies articulated with pedagogical model:

The teaching of this subject is based on the expository method, translated into theoretical classes; in the demonstrative method, applied in a practical laboratory class; in active and interrogative methods applied in theoretical-practical classes and in a practical class. There will also be tutorial guidance sessions to support self-study.

Assessment:

Student assessment will be based on student performance through a written multiple-choice test with 30 questions (0.57 points each) plus three short-answer questions (one 0.9 points and the other two 1 point each). Approval in the UC implies: i) compliance with a minimum attendance of 75% of the scheduled classes; Obtaining a minimum final grade of 10 (maximum of 20 points) in the written exam.

Evidence of the teaching methodologies coherence with the CU intended learning outcomes:

As aulas teóricas, caracterizadas por um processo de aprendizagem formal e expositivo, possibilitam que os alunos desenvolvam competências tanto genéricas quanto específicas, proporcionando uma abordagem global e multidisciplinar das temáticas que serão exploradas nas aulas subsequentes. Já as aulas teórico-práticas (objetivo 9) e as atividades laboratoriais (objetivos 3, 5 e 9) favorecem o desenvolvimento de maior autonomia pelos estudantes, permitindo-lhes planejar, conceber, adaptar e executar protocolos de investigação laboratorial com o objetivo de responder a hipóteses científicas previamente formuladas.

References for consultation / mandatory existence:

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