

Molecular Biology and Epidemiology of Gram-Positive Pathogenic Bacteria

CU characterization:

CU name: Molecular Biology and Epidemiology of Gram-Positive Pathogenic Bacteria

Scientific area acronym: Microbiology and Molecular Biology

Duration: Modular

Working hours: 42

Contact hours: 42

ECTS: 6

Observations:

Teacher in charge and respective teaching load in the CU: Maria Miragaia/Raquel Sá-Leão

Other teachers and respective teaching load in the CU:

Nome	Carga letiva
Raquel Sá-Leão	17 horas
Maria Miragaia	17 horas
Ana Cristina Paulo	4 horas
Carina Valente	3 horas
Mariana Pinho	1 horas
Pedro Matos Pereira	3 horas
Raquel Portela	3 horas
Rita Sobral	1 horas
Sónia Almeida	6 horas
Teresa Conceição	1 horas



Intended learning outcomes (knowledge, skills and competences to be developed by the students):

- Understanding the basic concepts of molecular epidemiology, molecular mechanisms of pathogenicity and antibiotic resistance, namely beta-lactams;

- Acquisition of tools that allow the use of state-of-the-art methods for molecular typing of Grampositive pathogens and identification of virulence and antibiotic resistance genes.

Syllabus:

- 1. Molecular typing of pathogenic bacteria;
- 2. Molecular epidemiology of Staphylococcus aureus;
- 3. Molecular epidemiology of coagulase-negative staphylococci;

4. Composition and localization of the cell synthesis machinery of the peptidoglycan of Staphylococcus aureus;

- 5. Mechanisms of resistance to antibiotics in Staphylococcus aureus;
- 6. Role of peptidoglycan in the pathogenesis of Staphylococcus aureus;
- 7. Epidemiology of Streptococcus pneumoniae in the era of conjugate vaccines;
- 8. Molecular diagnostics and genotyping in Streptococcus pneumoniae;
- 9. Population dynamics of Streptococcus pneumoniae: diversity, evolution and risk;
- 10. Competition in streptococci;
- 11. Enterococci: from dinner to pathogen.

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

The objective of the acquisition of basic concepts of molecular epidemiology, molecular mechanisms of pathogenicity and antibiotic resistance, namely beta-lactams, will be achieved through the exhibition classes focused on themes 1-11 of the program.

The objective of the acquisition of the necessary tools for the application of the most modern methods of molecular typing of Gram-positive pathogens and identification of antibiotic resistance and virulence genes will be achieved through laboratory classes focused on themes 1-11.

In these classes will be addressed several laboratory techniques, namely antibiotic susceptibility testing, biofilm formation, multilocus sequence typing (MLST), whole genome sequencing (WGS). In addition, bioinformatics analysis and WGS data visualization tools will be used.

Teaching methodologies (including assessment):

Theoretical and laboratory teaching; troubleshooting; tutorial guidance, study and theoretical and practical examination. The evaluation shall consist of an examination which includes the



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theoretical part and the practical part. The exam consists of 50 multiple choice questions, lasting 2 hours. The final grade corresponds to the exam grade.

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

The practical and theoretical classes aimed at solving concrete problems and using the most modern methods of molecular typing and determination of antibiotic resistance will allow to acquire the knowledge in a global, integrated and applied way, while enabling the acquisition of essential tools for the understanding of theoretical bases and the execution of laboratory work in the area of molecular epidemiology.

References for consultation / mandatory existence:

Barroso H, Meliço-Silvestre, A, Taveira N. 2014. Microbiologia Médica. Volume 1. 1st Edition. LIDEL, Lisbon, Portugal.

Teaching language: Portuguese / English

Classrooms/institution: Instituto de Tecnologia Química e Biológica António Xavier, Universidade Nova de Lisboa

Additional information on student's assessment (assessment type, criteria, schedule): The evaluation will be done through a written exam, including both the theoretical and practical parts. The final score will be the score of the exam.