PREVENTION AND THERAPY OF INFECTIOUS DISEASES

CU characterization:

CU name:
Prevention and Therapy of Infectious Diseases

Scientific area acronym:
XXXX

Duration:
Semiannual

Working hours:
56 h

Contact hours:
T (12 h); P (4 h)

ECTS:
2

Observations:
Observations

Teacher in charge and respective teaching load in the CU:
Prof.ª Doutora Isabel Maria dos Santos Leitão Couto (IHMT, NOVA) (icouto@ihmt.unl.pt)
Prof. Doutor João Mário Brás da Piedade (IHMT, NOVA) (jp@ihmt.unl.pt)

Other teachers and respective teaching load in the CU:
Prof. Doutor Miguel Viveiros Bettencourt (IHMT, NOVA)
Prof. Doutor Ricardo Manuel Soares Parreira (IHMT, NOVA)
Doutora Sofia Maria Mourão Marques dos Santos Costa (IHMT, NOVA)
Dr.ª Cristina Toscano Figueiredo (NMS|FCM, NOVA)

Intended learning outcomes (knowledge, skills and competences to be developed by the students):
1. To describe the different types of (viral) licensed vaccines and their advantages and disadvantages;
2. To understand the scientific grounds of contemporary methodologies used in the development and production of new vaccines;
3. To explain the scientific basis of therapeutic interventions against viral diseases and antiviral-drug resistance mechanisms;

4. To describe the mechanisms of action of antibiotics and associated resistance mechanisms;
5. To exemplify different methodologies for antibiotic susceptibility tests;
6. To perform antibiotic susceptibility tests and to interpret their results;
7. To understand the principles of antimicrobial therapy and to discuss consequences of antibiotic misuse.

Syllabus:

A. Historical perspective and fundamentals of vaccination. Live attenuated, inactivated and subunit vaccines. Adjuvants. The Portuguese National Vaccination Programme;
B. New vaccine development approaches. VLPs, viral and bacterial vectors. DNA, peptide and edible vaccines;
C. Major classes of antiviral agents in clinical use and mechanisms of action. Resistance to antiviral agents and combination therapy;
D. Major classes of antibiotics and mechanisms of action. Description and exemplification of the main mechanisms of antibiotic resistance;
E. Antibiotic susceptibility tests. Practical execution of antibiograms in solid media. Result reading and interpretation, using the EUCAST and CLSI guidelines;
F. Program for Prevention and Control of Infection and Resistance to Antimicrobials. Rational prescription of antibiotics. Consequences of the use and abuse of antibiotics. Situation in Portugal, when compared to other countries. Control of antibiotic resistance spread.

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

The contents of theme A are intended to solidify the knowledge on traditional vaccines in use (objective 1) and, naturally, lead the student to the acknowledgment of vaccine alternative approaches (syllabus B) and some of the new technologies of production used (objective 2). The contents of theoretical classes C and D provide basic knowledge about antiviral and antibacterial drugs, allowing the students to achieve objectives 3 and 4. The practical class (program contents E) provides the technical competences related to objectives 5 and 6 and the autonomy to critically interpret the test results. The information on antibiotics acquired with D and E is also applied in the understanding and critical analysis of the contents F, as embodied in learning objective 7.

Teaching methodologies (including assessment):

The course has a strong expository character (6 lectures, 12 hrs.). However, the student is led to think critically about the contents and regularly during the class, being questioned and asked to formulate opinions. The lectures are supported by information in digital format (PowerPoint). In the practical classes (4 hrs.), students will carry out and interpret two antimicrobial susceptibility tests. Considering the rapid evolution of knowledge in this area, the bibliography is updated annually. The assessment consists of a final written exam, with 30 multiple-choice questions, covering theoretical and practical contents.

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

The course has a strong expository character, serving primarily to provide basic concepts and alert students to relevant and current issues related to the fight against viral and bacterial infections. The knowledge gained, though broad in nature, should contribute to the acquisition of a critical view on the subject, namely in what concerns the problem of drug resistance and the need for new drugs and vaccines. Mainly, the several specific objectives formulated are expected to converge on the overall objective of the students being able to autonomously understand and interpret scientific literature and formulate opinions about these subjects.

References for consultation / mandatory existence:

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- CDC (2019). Antibiotic Resistance Threats in the United States, 2019. Atlanta, GA: U.S. Department of Health and Human Services, CDC. DOI: http://dx.doi.org/10.15620/cdc:82532.
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- Chan HT, Daniell H (2015). Plant-made oral vaccines against human infectious diseases. Are we there yet? Plant Biotechnol J., 13:1056-70.
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- Flint J, et al. (2020). Principles of Virology. ASM Press, Washington, DC + John Wiley & Sons, Inc., Hoboken, NJ, 5.ª Ed. (2 vols.).
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- Naghavi, Mohsen et al. 2024. Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050. The Lancet, 404: 1199 – 1226. /doi.org/10.1016/ S0140-6736(24)01867-1
- Tacconelli E, et al. (2018). WHO Pathogens Priority List Working Group. Discovery, research, and development of new antibiotics: the WHO priority list of antibiotic-resistant bacteria and tuberculosis. Lancet Infect Dis., 18:318-27. doi: 10.1016/S1473-3099(17)30753-3.
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