



RESEARCH IN LEISHMANIASIS: APPLIED ANALYSIS AND METHODOLOGIES

Curricular Unit (CU) characterization

CU name:

Research in Leishmaniasis: applied analysis and methodologies

Scientific area acronym:

PM

Duration:

Modular

Working hours:

36

Contact hours:

27

ECTS:

2

Observations:

Optional CU

Teachers in charge of CU:

Sofia Cortes – 15 hours

Other teachers:

Carla Maia - 6 hours

José Manuel Cristóvão - 9 hours

Maria Armanda Rodrigues - 2 hours

Guest teachers - 6 hours

Intended learning outcomes:

1. Identify molecular techniques used in the diagnosis and leishmaniasis research. Recognize the importance of immunological studies.
2. Identify new molecular tools applied to gene manipulation of trypanosomosis.
3. Acquire knowledge about the diagnosis and control of human leishmaniasis and recognize its veterinary importance.
4. Describe and implement methodologies used in the investigation and laboratory diagnosis of parasitological, serological, and molecular infections caused by *Leishmania* sp.
5. Apply theoretical knowledge in carrying out the different proposed laboratory methodologies.
6. Integrate knowledge about the potential repercussions of climate and environmental changes on sandfly species and vector transmission of *Leishmania* sp.



CU contents:

- I. Gene editing tools applied to trypanosomatids; practical examples and use of online tools for planning and generating genetically modified parasites.
- II. Immunology applied to leishmaniasis.
- III. Execution of laboratory techniques used in the diagnosis and investigation of Leishmaniasis: cultures, indirect immunofluorescence, ITS1-PCR-RFLP, ELISA.
- IV. Climate change and the repercussions on the vector transmission of Leishmania, on variations in expansion and densities of phlebotomines and on periods of vector activity; Definition of monitoring, control, and mitigation of vector transmission.
- V. Microscopic observation of sand flies infected by *Leishmania*.
- VI. Canine leishmaniasis: clinical and laboratory aspects.
- VII. Practical exercises and final exam to consolidate and evaluate acquired knowledge.

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

In general, and in conjunction with the themes covered throughout the CU, the objectives are interrelated with the programmatic contents. The objectives are guaranteed through the elaboration of laboratory techniques and theoretical-practical exercises, with objectives 4 and 5 being interrelated with contents III and V. All objectives are reflected in programmatic content VII, through the elaboration of exercises throughout several classes, reinforcing the knowledge acquired and the students' ability to critically analyze results.

Teaching methodologies and Assessment:

This CU aims to transmit theoretical knowledge and practical skills on various tools used in research and diagnosis of leishmaniasis through expository, interrogative, demonstrative and active methodologies. The CU will consist of theoretical classes (4.5h), theoretical-practical classes (6.5h), laboratory practices (9h), tutorials (3h) and a seminar (1.5h). In theoretical-practical classes, online tools, gamification and perception and knowledge consolidation questionnaires will be used. In practical sessions, students, in groups, will have the opportunity to perform different laboratory techniques and discuss the results based on case studies; Exercises will be carried out in class and on Moodle to consolidate knowledge.

At the end of the UC, students took a written test consisting of 30 multiple choice questions, 10 true/false questions and two short answer questions.

The final assessment of the UC consists in: active participation in practical classes, to perform exercises and procedure sheets proposed in practical and theoretical-practical classes (weighting of 25%) and a final written test (weighting of 75%).

To obtain frequency in the Curricular Unit, it is mandatory: i) attendance in at least 75% of the classes taught and a final average ≥ 10 points (out of 20).

For students who fail or want to improve their score, there will be a second exam that will count 100% of the UC grade.



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

The techniques performed in practical classes and the discussion of the results obtained allow students to acquire laboratory work capacity for manipulation, identification, and diagnosis of trypanosomatids and their vectors. The technological capabilities and good practices acquired will serve as a basis for preparing methodologies for similar studies with other pathogens.

Research and the importance of climate change allow for the acquisition of knowledge and reflection on the present and future in the relationship between the ecosystem and the capacity to transmit infections.

Students will also develop interpersonal and systemic skills, through the preparation, analysis, interpretation, and group discussion of the results obtained in the various classes.

References for consultation / mandatory existence:

- Beneke T., et al (2017). A CRISPR Cas9 high-throughput genome editing toolkit for kinetoplastids. Royal Society Open Science 10.1098/rsos.170095. <https://doi.org/10.1098/rsos.170095>
- Rocha, R., Pereira, A., & Maia, C. (2023). A global perspective on non-autochthonous canine and feline Leishmania infection and leishmaniosis in the 21st century. Acta tropica, 237, 106710. <https://doi.org/10.1016/j.actatropica.2022.106710>
- Alten B et al. (2016). Seasonal dynamics of Phlebotomine sand fly proven vectors of Mediterranean Leishmaniasis caused by *Leishmania infantum*. Plos NTD, 10, 2. <http://dx.doi.10.1371/journal.pntd.0004458>
- Van der Auwera G et al. (2016). Comparison of Leishmania typing results obtained from 16 European clinical laboratories in 2014. Euro surveillance: bulletin European sur les maladies transmissibles = European communicable disease bulletin, 21(49), 30418. <https://doi.org/10.2807/1560-7917.ES.2016.21.49.30418>
- Maia C et al. (2009). Diagnosis of canine leishmaniasis: Conventional and molecular techniques using different tissues. Vet J, 179: 142-144. DOI: 10.1016/j.tvjl.2007.08.009

Teaching language:

Portuguese

Classrooms/institution:

IHMT and zoom