TICKS, OTHER ECTOPARASITES AND ASSOCIATED DISEASES IN THE GLOBAL WORLD

CU characterization:

CU name:

Ticks, other ectoparasites and associated diseases in a global world

Scientific area acronym:

EM

Duration:

Semestral

Working hours:

56

Contact hours:

32

ECTS:

2

Observations:

Optional CU

Teacher in charge and respective teaching load in the CU:

Mª Teresa Novo – 11.5 hours

Other teachers and respective teaching load in the CU:

Cláudia Conceição – 7 hours
Paulo Almeida – 5 hours
Luís Varandas – 4 hours
Luísa Vieira – 13 hours
Sandra Antunes – 11 hours
Ana Domingos – 10 hours

INSTITUTO DE HIGIENE E MEDICINA TROPICAL
DESDE 1902

TICKS, OTHER ECTOPARASITES AND ASSOCIATED DISEASES IN THE GLOBAL WORLD

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

After this unit, students should be able to:

1. To understand the globalization and health risks caused by the mobility of humans, other mammals, arthropods and pathogens.
2. To know the importance of ectoparasites in children, their prevention and control, and the mucocutaneous manifestations and allergic reactions to the bite of arthropods.
3. To know the false ectoparasitosis in humans or Ekbom syndrome.
4. Understand the development of allergic reactions to the bite of arthropods (hematophagous and non-hematophagous);
5. To define the importance of fleas in the epidemiology of plague and to identify the vector species.
6. To define the importance of ticks vectors of zoonotic spirochetes, to identify the species and the prevention and control.
7. To realize laboratorial techniques to detect *Borrelia burgdorferi* s.l. and use RNAi.
8. To know the cycle of transmission of pathogens by ticks, maintenance in nature, and transmission to humans.
9. To identify the virus/ticks with impact on public health, to know the genetic diversity, geographic distribution and the families.
10. To describe the laboratorial diagnostic methods based on the characteristics of the virus and on the course of infection.

Syllabus:

- **I.** Relation between ectoparasites, humans, pathogens and globalization
- **II.** Clinical features of ticks borne diseases and mucocutaneous manifestations of ectoparasitosis in humans
- **III.** Immune reactions to the bite of bloodsucking
- **IV.** and nonhematophagous arthropods
- **V.** Ekbom syndrome and its importance in the context of Medical Entomology
- **VI.** Ectoparasitosis in children of school age and preventive and control measures
- **VII.** Fleas, the epidemiology of plague, and identification of the vector species
- **VIII.** Ticks as vectors of the spirochete *Borrelia burgdorferi* s.l. complex
- **IX** Laboratorial detection of spirochetes in ticks
- **X.** Reference and molecular techniques for the laboratorial diagnosis of *B. burgdorferi* s.l.
- **XI.** Ticks control methods, functional analysis of vaccine development and the use of RNA interference techniques
- **XII.** Ticks borne viruses, transmission cycle, hosts, vectors, and vector-virus

TICKS, OTHER ECTOPARASITES AND ASSOCIATED DISEASES IN THE GLOBAL WORLD

Teaching methodologies (including assessment):

Students will be evaluated based on the following elements:

• The students' individual performance in the Seminar (70%) will consist of the presentation (PowerPoint) and discussion of scientific articles related to the subject taught, and previously drawn in the first class of the UC. Grids will be distributed, with the same parameters, to the evaluation of each student (0 to 20 values). These evaluations will be delivered by each Lecturer to the UC Coordinator at the end of the Seminar.

• Continuous assessment of students, based on the participation of theoretical classes (10%), theoretical-practical classes and practical-laboratory (20%);

• Any of the elements will be subject to a rating between 0 and 20 values. The final classification will be obtained from the formula:

(Classification in the Seminar) x 0.70 + (Classification in the participation of the practical and laboratory classes) x 0, 20 + (Classification in the participation of the theoretical classes) x 0,10

• The achievement of a minimum final classification of 10 values.

• The 2nd period exam, for students who fail or fail in the 1st period (Seminar and / or practical and laboratory classes and / or theoretical classes) or that require improvement of grade, will be made through a theoretical exam composed of 20 questions of multiple choice and a medium development question (maximum one page). This exam will not have consultation.

• The Assessment of the UC, and the respective Faculty, will be carried out through the system of evaluation of the quality of teaching in force in the IHMT (anonymous student satisfaction questionnaire).

References for consultation / mandatory existence:

- Billo BM et al., 2006. Diagnoses of Hymenoptera venom allergy. Allergy, 60 (11): 1339-1349.
- Hinkle NC, 2010. Ekbom Syndrome. The challenge of “Invisible Bug”. Annu. Rev. Entomol. 55: 77-94.
- Lane RP & Crosskey RW. 1993. Medical insects and arachnids. Chapman and Hall, London, UK, 723pp.
- Leigheb G et al., 2005. Thysanoptera dermatitis. JEADV, 19: 722-724.
- Chrdlea *et al*., 2016. Tick-borne encephalitis: What travelers should know when visiting an endemic country? *Human vaccines & Immunotherapeutics*, 12: 2694–2699.
- Louro *et al*., 2005. Febre escaro-nodular: uma zoonose benigna? *Medicina Interna*, 13: 14-18.
- Nelder *et al*., 2016. Human pathogens associated with the blacklegged tick *Ixodes scapularis*: a systematic review. *Parasites & Vectors*: 9-265.
- Sousa *et al*., 2003. Sobre a realidade da febre escaro-nodular em Portugal. *Acta Médica Portuguesa*, 16: 429-436.
- Billingsley P *et al.,* 2006. Immune interactions between mosquitoes and their hosts. *Parasite Immunology*, 28: 143-153.

TICKS, OTHER ECTOPARASITES AND ASSOCIATED DISEASES IN THE GLOBAL WORLD

References for consultation / mandatory existence: (continuation)

- Peng Z & Simons FE, 2004. Mosquito allergy: immune mechanisms and recombinant salivary allergens. *International archives of allergy and applied immunology*, 133: 198-209.
- Ribeiro JM *et al.,* 2007. An annotated catalogue of salivary glands transcripts in the adult female mosquito *Aedes aegypti*. *BMC Genomics*. 2007 Jan 4;8:6. http://www.biomedcentral.com/1471-2164/8/.
- Valenzuela JG, 2002. High-throughput approaches to study salivary proteins and genes from vectors of disease. *Insect of Biochemistry and Molecular Biology*, 32: 1199-1209.
- Wikel S, 1996. Host immunity to ticks. *Annu Ver Entomol*, 41: 1-22.
- Eisenhower C & Farrington EA, 2012. Advancements in the treatment of head lice in pediatrics. *Journal of Pediatric Health Care*, 26: 451-461. http://dx.doi.org/10.1016/j.pedhc.
- Jacobson CC & Abel EA, 2012. Parasitic infestations. *J Am Acad Dermatol*, 56: 1026-1043.
- Smith CH & Godman RD, 2012. An incurable itch. Head lice. *Canadian Family Physician*, 58: 839-841.
- Veracx A & Raoult D, 2012. Biology and genetics of human head and body lice. *Trends Parasitol*, 28 (12): 563-571.
- Lindgren E & Jaeson LGT, 2006. Lyme borreliosis in Europe: influences of climatic and climatic changes, epidemiology, ecology and adaptation measures. http.//www.euro.who.int/ data/assets/pdf file/0006/968819/E89522.pdf
- Voordouw MJ, 2015. Co-feeding transmission in Lyme disease pathogens. *Parasitol*,142 (2): 290-302. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4313706/pdf/S0031182014001486a.pdf
- Krupta M *et al.,* 2007. Biological aspects of Lyme disease spirochetes: unique bacteria of the *Borrelia burgdorgeri* sensu lato species group. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub*, 151 (2): 175-186.
- Mannelli A *et al.,* 2012. Ecology *Borrelia burgdorgeri* sensu lato in Europe: transmission dynamics in multi-host systems influence of molecular processes and effects of climatic change. *FEMS Microbiol Rev*, 36: 837-861.
- *Protocolo de Técnicas laboratoriais (serológicas e moleculares) fornecidos pelo Docente.*
- *Nowakowski J et al.,* 2001. Laboratory Diagnostic Techniques for Patients with Early Lyme disease Associated with Erythema Migrans: A Comparison of Different Techniques. *Clin Inf Dis*, 33: 2023-2027.
- The laboratory diagnosis of Lyme borreliosis: Guidelines from the Canadian Public Health Laboratory network. *Can J Infct Dis Med Microbiol*, 18 (2): 145-148.

TICKS, OTHER ECTOPARASITES AND ASSOCIATED DISEASES IN THE GLOBAL WORLD

References for consultation / mandatory existence: (continuation)

- *Nowakowski J et al.,* 2001. Laboratory Diagnostic Techniques for Patients with Early Lyme disease Associated with Erythema Migrans: A Comparison of Different Techniques. Clin Inf Dis, 33: 2023-2027.
- The laboratory diagnosis of Lyme borreliosis: Guidelines from the Canadian Public Health Laboratory network. *Can J Infct Dis Med Microbiol*, 18 (2): 145-148.
- CDC, Tick-borne Encephalitis (TBE). https://www.cdc.gov/vhf/tbe/diagnosis/index.html
- ECDC Epidemiological situation of tick-borne encephalitis in the European Union and European Free Trade Association countries, 59pp.

https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/TBE-in-EU-EFTA.pdf

- Lewis, R.E., 1993. Fleas (Siphonaptera). **In** *Medical Insects and Arachnides*. Lane, R.P. & Crosskey, R.W. Eds.: 529-575.
- Ribeiro, H., 1974. Sifonápteros de Angola (Insecta, Siphonaptera) – Estudo sistemático e dados biológicos interessando à epidemiologia da peste. *An. Inst. Hig. Med. Trop.*, **2** (1/4): 3-200.
- WHO, Plague manual: epidemiology, distribution, surveillance and control. (*WHO/CDS/CSR/EDC/99.2)* (http://who.int/csr/resources/publications/plague/whocdscsredc992a.pdf?ua=1)
- http://www.cdc.gov/plague/
- http://www.who.int/topics/plague/en/
- Tomassone *et al.*, 2018. Neglected aspects of tick-borne rickettsioses. *Parasites & Vectors* 11: 263.
- Portillo *et al.*, 2015. Rickettsioses in Europe. *Microbes Infect.* 17(11-12): 834-8.
- Parola P. *et al.,* 2013. Update on tick-borne rickttsioses around the world: geographic approach. *Clin Microbiol Rev*, 26 (4): 657-702.
- Silaghi et al., 2017. Guidelines for the Direct Detection of *Anaplasma* spp. *in* Diagnosis and Epidemiological Studies. *Vector Borne Zoonotic Dis.* 17(1): 12-22.
- Sousa R *et al.,* 2006. *Rickettsia sibirica* isolation from a patient and detection in ticks, Portugal. *Emerg Infect Dis*, 12 (7): 1103-1108.
- Domingos A *et al.,* 2013. Approaches towards tick and tick-borne diseases control. *Rev Soc Bras Med Trop*, 46 (3): 265-269.
- De la Fuente J & Merino O, 2013. Vaccinomics, the new road to tick vaccines. *Vaccine*, 50: 5923-5929.
- Antunes S *et al.,* 2012. Functional genomics studies of *Rhipicephalus* (*Boophilus*) *annulatus* ticks in response to infection with the cattle protozoan parasite, *Babesia bigemina*. *Int J Parasitol* 42 (2): 187-195.
- Kocan KM *al.,* 2011. RNA interference in ticks. *J Vos Exp* doi:10.3791/2474.