INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Immunohistochemistry and Molecular Pathology			Field of study	Biomedical Laboratory Sciences		
Bachelor in	Biomedical Laboratory Sciences			School	School of Health		
Academic Year	2022/2023	Year of study	3	Level	1-3	ECTS credits	5.0
Type	Semestral	Semester	2	Code	9995-550-3204-00-22		

Workload (hours)	135	Contact hours	T	TP	PL	TC	S	E	OT	O
			-	22,5	30	-	-	-	7,5	-

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): Jose Pedro dos Santos Neves, Celso Tome dos Santos Lopes, Daniela Sofia Carvalho Alves

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Analyze the historical contribution of immunohistochemistry in the context of Pathology appreciating critically its importance as an aid to diagnosis.
2. Characterize from the biological, physical, chemical and immunological point of view, major IHC and MP methodologies recognizing the essential conditions for its implementation
3. To plan, implement and monitor immunohistochemical methods in biomedical context, taking into account the target cell or tissue.
4. Planning, control and interpret technical procedures by macro and microscopic observation of chemical or physical reactions of organic products in order to implement corrective measures
5. Prepare summary reports of used techniques contributing to their diagnostic interpretation.
6. Recognize the importance of carrying out the techniques safely.
7. Manage reagents and materials in a sustainable manner from the economic and environmental point of view.

Prerequisites

Before the course unit the learner is expected to be able to:
1. Know the basic concepts of human histology and anatomy.
2. Know the basic concepts of cell and molecular biology.
3. Know the basic concepts of immunology and histotecnhology.

Course contents

Immunohistochemistry, immunocytochemistry and methods of molecular pathology Immunological concepts in immunohistochemistry Prerequisites for immunohistochemistry Basic immunohistochemistry immunohistochemical methods Solving specific problems Interpretation of results Automation Quality control Management and safety in the laboratory of immunohistochemistry and molecular pathology Molecular pathology: palications in pathology diagnosis

Course contents (extended version)

1. Immunohistochemistry, immunocytochemistry and methods of molecular pathology
   - historical background
   - Applications in biomedical context: diagnosis, prognosis, therapeutic indication and research
2. Immunological concepts in immunohistochemistry
   - Special features of antibody-antigen binding
   - Antibodies production
3. Prerequisites for immunohistochemistry
4. Immunohistochemistry basics
   - Immunofluorescence
   - Immunoenzymology
5. Immunohistochemical methods
   - Antibody dilution and incubation
   - Handling and storage of reagents
   - Direct methods
   - Indirect methods: avidin-biotin, polymer
6. Solving specific problems
   - Antigen retrieval
   - non-specific immunolabeling
   - Application in cytological sample
7. Results interpretation
   - lymphocyte markers
   - Markers for intermediate filaments
   - Prognostic markers in breast carcinoma
8. Quality control
9. Automation
10. Management and safety in the immunohistochemistry and molecular pathology laboratory
11. Molecular Pathology: General concepts
12. DNA extraction: Micro and macro dissection in formalin fixed, paraffin embedded tissues
13. In situ hybridization: CISH, SISH and FISH
14. Methods with signal amplification: in situ PCR; FRET and PLA. Applications in diagnosis.

Recommended reading

1. Elias J. (2003). Immunohistopathology: a practical approach to diagnosis, 2th edition. Nova Iorque: American Society for Clinical Pathology
2. Borges-Ferro A (2014). Imunohistoquímica. Lisboa, Portugal: Autor
3. Polak, J; Noorden, S. ; (2003). Introduction to Immunocytochemistry, 3rd edition. Londres: BIOS Scientific Publishers
4. Dako (2009). Immunohistochemical staining methods (Kumar G, Rudbeck L, eds.), 5th edition. Carpinteria: Dako
5. Hayat M. (2002). Microscopy, Immunohistochemistry and Antigen Retrieval Methods: For Light and Electron Microscopy. Nova Iorque: Kluwer Academic/Plenum Publishers

Teaching and learning methods

In lectures it will be used expository, interrogative and active methodologies, giving focus to the presentation, discussion and argumentation of scientific texts. In practical classes will be given emphasis to the demonstrative method and problem-solving strategies of laboratory cases using small groups. It will be held student's individual follow up with providing feedback.

Assessment methods

1. Continuous assessment - (Regular, Student Worker) (Final)
   - Intermediate Written Test - 60% (Immunohistochemistry and Molecular Pathology)
   - Intermediate Written Test - 40% (Practical contents (35%) + reports of practical classes (5%))
2. Exam - (Student Worker) (Final)
   - Final Written Exam - 100% (The theoretical component 60% + practical component 40% obtained through written examination)
3. Resource Exam - (Regular, Student Worker) (Supplementary)
   - Final Written Exam - 100% (The theoretical component 60% + practical component 40% obtained through written examination)

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

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26-04-2023	27-04-2023	28-06-2023	28-06-2023