Universitat Autònoma de Barcelona

2021/2022

Cancer and Radiobiology

Code: 42942
ECTS Credits: 6

Degree	Type	Year	Semester
4313782 Cytogenetics and Reproductive Biology	OT	0	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)

Teachers

Rosa Caballín Fernández
Anna Genescà Garrigosa
Montserrat Solanas García
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Jordi Camps Polo
Raquel Moral Cabrera
Itziar Salaverria Frigola
Mariona Terradas Ill

External teachers

Beatriz Bellosillo
Margarita Ortega

Prerequisites

There are not

Objectives and Contextualisation

- To recognize chromosome and molecular alterations related to specific cancer types and to understand their importance for diagnosis and prognostics.

- To explain the molecular bases of breast cancer, including genetic, epigenetic, and hormonal changes, as well as the influence of environmental factors.

- To know the biological effects of ionizing radiation interaction with DNA.

Competences

- Apply the basic tools of statistical analysis in cytogenetics and reproductive biology.
- Apply the scientific method and critical reasoning to problem solving.
- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
- Continue the learning process, to a large extent autonomously.
- Design experiments, analyse data and interpret findings.
- Identify and take into account the genetic, epigenetic and hormonal changes involved in the development of cancer in pursuit of a correct diagnosis and prognosis (Specialisation in Cytogenetics).
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
- Interpret, resolve and report on clinical cases or scientific findings in the area of the master's degree.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
- Use and manage bibliography or ICT resources in the master's programme, in one's first language and in English.
- Use creative, organisational and analytic skills when taking decisions.

Learning Outcomes

1. Apply the scientific method and critical reasoning to problem solving.
2. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
3. Continue the learning process, to a large extent autonomously.
4. Describe the importance of chromosomal and molecule alterations in the diagnosis of certain cancers and their prognosis factor.
5. Design experiments, analyse data and interpret findings.
6. Explain the biological effects of the interaction of ionising radiations with DNA.
7. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
8. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
9. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
10. Use and manage bibliography or ICT resources in the master's programme, in one's first language and in English.
11. Use creative, organisational and analytic skills when taking decisions.
12. Use statistical methods to estimate, through biological methods, the dose of exposure to ionising radiation.
13. Write articles or report scientific findings in the area of cancer or radiobiology.

Content

Part 1: Genetics of cancer: solid tumors and hematologic neoplasms

The unstable genome of tumoral cells, telomeric dysfunction, and chromosome instability. Cancer genomics. The colorectal cancer models, lung cancer, and urological tumors. Patterns of intratumoral heterogeneity. Treatment of cancer in the era of personalized medicine. Methodology for the analysis of the genome of the

tumor cell (PA). Genetics of mesenchymal and epithelial solid tumors. Genetics of hematological neoplasms. Acute leukemia, an example of acute lymphoblastic leukemia. Chronic leukemia, an example of chronic lymphocytic leukemia. Lymphomas.

Part 2: Molecular mechanisms of breast cancer

Molecular mechanisms of cancer. The example of breast cancer. Embryology and functional morphology of the normal breast and morphologic changes in breast cancer. Physiology of the normal mammary gland and pathophysiology of breast cancer. Genetic and epigenetic factors. Endocrine factors. Environmental factors and lifestyle. Clinical Basis of Breast Pathology. Biological diagnosis, prognosis, and predictive factors. Hereditary breast cancer.

Part 3: Radiobiology

Introduction to ionizing radiations and radioprotection. Induced DNA lesions and repair mechanisms. Radioinduced chromosome aberrations. Biological dosimetry (aberrations, methods of analysis, dose-effect curves, partial exposures). Radioprotectors and chromosome sensitivity. Telomeres, repair, and radiosensitivity. Effects of low-dose exposures. Aging and radiosensitivity.

Unless the restrictions imposed by the health authorities oblige a prioritization or reduction of contents, these are the contents that will be treated in this module of the master.

Methodology

The teaching methodology will consist of:

1.- Master lessons.

2.- Classroom practices

3.- Laboratory practices

3.- Discussion of scientific papers. Students must have read the papers beforehand to discuss them in class.

4.- Presentation of assignments

The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master classes	40	1.6	1, 4, 6, 7, 8, 9, 10
Type: Supervised			
Homework presentation and scientific articles discussion	17	0.68	1, 5, 11, 13, 7, 2, 3, 10, 12
Type: Autonomous			
Scientific papers reading and study	82	3.28	7, 3, 10

Assessment

To pass the subject, a minimum mark of 5 out of 10 is required. The course consists of three lessons with a weight, in time, of about 40% for lesson 1, 35% for lesson 2, and 25% for lesson 3. This weight will be maintained for the establishment of the final score, considering that attendance and active participation represents 10% of the final grade of each subject. The evaluation will consist of different types of tests: exams, preparation, and presentation of assignments and/or the resolution of problems and questions.

The students that did not pass, have the opportunity of a retake that will consist of a written exam, where the three topics will be weighted in a balanced way. To participate in the retake, the students must have been previously evaluated in a set of activities whose weight equals a minimum of two-thirds of the total grade of the subject or module. Therefore, students will obtain the "No Evaluable" qualification when the assessment activities carried out have a weight less than 67% in the final mark.

Student's assessments may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attendance and active participation	10%	3	0.12	1, 4, 5, 6, 11, 13, 7, 8, 2, 3, 9, 10, 12
Examination	35%	4	0.16	4, 6, 8, 2, 9, 10
Homework presentation	55%	4	0.16	1, 4, 5, 6, 11, 13, 7, 8, 2, 3, 9, 10, 12

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Software

Web-based CNApp and MUSICA tools