Universitat Autònoma de Barcelona

2018/2019

Cancer and Radiobiology

Code: 42942
ECTS Credits: 6

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

Contact

Name: Lleonard Barrios Sanromà

Email: Lleonard.Barrios@uab.cat

Use of languages

Principal working language: catalan (cat)

Teachers

Rosa Caballín Fernández

Eduard Escrich Escriche

Anna Genescà Garrigosa

Rosa Miró Ametller

Joan Francesc Barquinero Estruch

Laura Tusell Padrós

Gemma Armengol Rosell

Prerequisites

There are not

Objectives and Contextualisation

- To describe chromosome and molecular alterations related to specific cancer types and 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 explain the biological effects of ionizing radiation interaction with DNA.

Skills

- 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

Lesson 1: Genetics of cancer

The unstable genome of a tumoral cell, telomeric dysfunction and chromosome instability. Genetics of haematological diseases. Acute leukaemia, the example of acute lymphoblastic leukaemia. Chronic leukaemia, the example of chronic lymphocytic leukaemia. Genetics of mesenchymal and epithelial solid tumours. Colon cancer as a model. Methodologies for genome analyses, transcriptome or methylome of the tumoral cell.

Lesson 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 physiopathology of breast cancer. Genetic and epigenetic factors. Endocrine factors and mechanisms of hormonal action. Environmental factors and life style. Clinical basis of breast pathology, metastasis. Biological factors for prognosis. Heritable breast cancer and prevention.

Lesson 3: Radiobiology

Introduction to ionising 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.

Methodology

Teaching methodology will include:

1.- Master classes

2.- Discussion of research papers previously read

3.- Homework presentation

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

Evaluation

To pass the subject, a minimum grade of 5 is required. The course consists in 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 the attendance and active participation represents 10% of the final grade of each subject.

Lesson 2 will be evaluated by an exam and lessons 1 and 3 by homework presentation.

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 to a minimum of two thirds of the total grade of the subject or module. Therefore, students will obtain the "No Avaluable" qualification when the assessment activities carried out have a weight less than 67% in the final grade.

Evaluation 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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