LEUKEMIC NICHE AND IMMUNE-EFFECTOR CELLS

1.- General information					
Code	303030	Plan		ECTS	3
Type	Elective	Course	2026/2027	Periodicity	2st Semester
Language		Spanish			
Department	Cancer Research Center				
Virtual Platform	https://cicloud.dep.usal.es/				

1.1.- Faculty			
Professor Coordinator	Prof. Dr. Fermín Sánchez-Guijo Martín		
Department	Medicine		
Research area	Hematology and the Cell Therapy		
Center	Faculty of Medicine		
Tutorial	Appointment by email		
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Professor Coordinator	Dra. Sandra Muntion Olave		
Department	Medicine		
Research area	Hematology and the Cell Therapy		
Center	Faculty of Medicine		
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Professor	Dra. Almudena Navarro Bailón		
Department	Physiology and Pharmacology		
Research area	Hematology and the Cell Therapy		
Center	Faculty of Medicine		
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Professor	Dra. Silvia Preciado Pérez		
Research area	Hematology and the Cell Therapy		
Center	University Hospital of Salamanca		
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2.- Previous recommendations

It is recommended that students have previous knowledge of cell culture biology and basic methodology.

3.- Aims of the subject

Understand:

1. The concept of stem cell and the different types of stem cells that exist in the bone marrow: hematopoietic, mesenchymal, endothelial.
2. The mechanisms involved in the regulation of hematopoiesis. The role of the bone marrow microenvironment and the hematopoietic niche.
3. The role that these cells and their microenvironment play in the development of hematological malignancies and other neoplasms.

To know:

1. The usual methodologies used in a Cell Culture and Cell Therapy laboratory.
2. What are they and how are the different assays carried out for the study of hematopoiesis (e.g. clonogenic studies, long-term cultures, etc.). Analysis of the interrelation between hematopoietic cells and the microenvironment.
3. How mesenchymal cells are manipulated and expanded. What are the main sources of procurement. Characterization and its therapeutic potential.
4. How endothelial progenitors are obtained. Characterization and clinical use.
6. What are the main animal models to assess bone marrow cell engraftment in the context of cell therapy.
7. The main biosafety and quality control procedures used in a cell therapy laboratory.

4.- Skills to be acquired / Learning outcomes

Skills

4.1: Basic skills:

-To know the concept of stem cells and their different types, with their main characteristics, their potential therapeutic uses and their role in the physiopathology of tumours.

-Understand the methodological basis for conducting preclinical studies that evaluate the role of

microenvironmental cells in tumors.

-To know the latest therapeutic strategies in cancer based on cell immunotherapy, with emphasis on cell production and regulation.

4.2: Specific skills:

-Understanding the role of bone marrow as a cellular source and knowing why hematopoietic stem cell transplantation has laid the foundation for other cellular therapy application and modern cellular immunotherapy.

-To be able to differentiate the characteristics of embryonic cells, cells obtained by somatic nuclear transfer, induced reprogrammed cells (iPS) and adult cells.

-To know the properties and methods of isolation and characterization of mesenchymal stromal cells (MSC).

-To know the properties and methods of isolation and characterization of endothelial progenitor cells (EPC).

-To know the role of all these cell types in the physiopathology of tumours, especially in hematological malignancies.

-To know the concept of extracellular vesicles are and their potential in the diagnosis and monitoring of cancers, and their implications for their physiopathology.

-To learn the current regulation, processes and methodology of the production of modified cells used in cellular immunotherapy (immunoefector cells).

4.3: Transferable skills:

-To know the basic procedures of a cell culture, haematopoiesis and cell therapy laboratory.

-To know the requirements of sterility and biosafety of work in Cell Production Units and GMP laboratories.

5.- Contents (Syllabus)

Master classes:

Topic 1. History of the knowledge of hematopoiesis and methods of study.

Topic 2. Hematopoietic transplantation as a basis for the development of cell therapy.

Topic 3. Structure and regulation of hematopoiesis.

Topic 4. The mesenchymal stromal cell: multipotent and immunomodulatory capacity.

Topic 5. Preclinical studies to evaluate the immunomodulatory capacity of MSCs.

Topic 6. Animal models for the evaluation of graft-versus-host disease, engraftment and inflammation.

Topic 7. iPS: concept, development and importance.

Topic 8. Extracellular vesicles: concept and applications. Role in the development and maintenance of tumors. Biomarkers.

Topic 9. The marrow microenvironment in myelodysplastic syndromes.

Topic 10. The marrow microenvironment in other hemopathies.

Topic 11. Cellular immunotherapy: concept and applications.

Topic 12. CAR cells: practical applications, approved indications, adverse effects.

Topic 13: Preclinical studies to evaluate CAR cells.

Topic 14. Cellular immunotherapy. Concept and applications

Topic 15. European regulations for cell therapy. Concept of GMP Lab. Importance of quality control

and biosafety in cell therapy.

Practical lessons*:

The practical component of the program consists of short instructional videos available on Studium, which allow students to familiarize themselves with the working methods in a hematopoiesis and advanced therapies laboratory. As a complementary and voluntary option, interested students may visit the Cell Therapy Unit at the University Hospital of Salamanca, where practical sessions will be organized based on the number of students and priorities.

Seminars:

Integrated with the theoretical instruction, the seminars are structured around group discussions of key issues and current controversies related to advanced therapies in dentistry, encouraging active student participation and critical thinking.

6.- Teaching methodology

Theoretical classes: The student must attend the theoretical sessions of the course (16 hours). During these sessions, powerpoint presentations will be used and participation will be stimulated through the discussion of previously recommended bibliography.

Practical classes: The practical component of the program consists of short instructional videos available on Studium, which allow students to familiarize themselves with the working methods in a hematopoiesis and advanced therapies laboratory. As a complementary and voluntary option, interested students may visit the Cell Therapy Unit at the University Hospital of Salamanca, where practical sessions will be organized based on the number of students and priorities.

Seminars: Integrated with the theoretical instruction, the seminars are structured around group discussions of key issues and current controversies related to advanced therapies in dentistry, encouraging active student participation and critical thinking.

Tutorials: face-to-face or not at a time to be agreed upon and with the full availability of the teaching staff to guide and resolve doubts**.**

Autonomous work of the student: To extend information, to study, to solve problems and to prepare the seminars.

Evaluation: There will be a written multiple-choice test which will be 40% of the grade. The remaining 60% will be evaluated from assistance and participation in classes, practices and seminars through continuous evaluation

6.1.- Estimated learning time

		Hours tutored by the teacher		Individual work (hours)	TOTAL HOURS
		Attendance required (hours)	Distance learning (hours)		
Lectures		15		5	20
Practices	- In classroom	5		2,5	2,5
	- In laboratory			2,5	7,5
	- In computer classroom				
	- Countryside				
	- Others (specify)				
Seminars		4		20	24
Work presentations and debates					
Tutorials		7			7
Online activities					
Work preparation					
Other activities					
Exams - evaluation		1		8	9
TOTAL		**37**		**38**	**75**

7.- Materials, other bibliographical, electronic references or any other type of resource

Atala A. Principles of Regenerative Medicine (3rd Ed.). Elsevier, 2019.

Baronzio G. Cancer Microenvironment and Therapeutic Implications: Tumor Pathophysiology Mechanisms and Therapeutic Strategies. Springer, 2010.

Warburton D. Stem Cells, Tissue Engineering and Regenerative Medicine. World Scientific, 2015.

Normas de Correcta Fabricación, Medicamentos de uso humano y uso vetenerinario (4ª edición). Agencia Española de Medicamentos y Productos Sanitarios, Ministerio de Sanidad, 2011.

Balkhi M. Basics of Chimeric Antigen Receptor (CAR) Immunotherapy. Elsevier, 2019.

RICORS de Terapias Avanzadas, ISCIII. https://www.redterav.es/

International Society for Cellular Therapy. http://www.celltherapysociety.org/

International Society for Stem Cell Research. http://www.isscr.org/

Mesenchymal Cell News. https://www.mesenchymalcellnews.com/

8.- Assessment

8.1: Assessment Criteria:

8.2: Assessment Systems:

Evaluation of assistance and participation in theoretical sessions, practical sessions and seminars (continuous evaluation) (60 % of the final grade)

Written evaluation of the course (multiple-choice test) (40% of the final grade).

8.3: General Considerations and Recommendations for Assessment and Resit:

Continuous evaluation: asistance and active participation.

9.- Weekly Teaching Schedule