Cancer, Ageing and Rejuvenation Graduate School - CARe

Master's Programme

2022 - 2023

Title of the Teaching Unit (UE): ***Basic Biology of the Cell for Emerging Therapies (BBC-ET)***		
Semester: S1&2	**Number of ECTS: 6**	**Hourly volume: 60h**
Teaching Team	B Ségui, JC Pagès, C Clavel, N Jonca, L Nogueira, N Pell-Vidal, D Vieles-Marais, Recherche : N Gaudenzio, L Basso, L Casteilla, A Carrière, T Levade, L Orlando, D Vieles-Marais, S Giuriato, O Calvayrac, V Lobjois, PA Apoil, B Puissant G. Favre, I Ader, JF Arnal & G Serre. In addition, international speakers will be invited to give seminars.	
Objective	To give the molecular and cellular bases to understand the therapeutic evolutions with a focus on examples taken from the field of oncology and aging. Emphasis will be put on basic knowledge by showing how it is crucial to understand the field of innovative therapies. The teaching will focus on cellular approaches: the cell being the target, the elements of cellular physiology and their dysfunctions in the context of cancer and aging will be the subject of a first series of courses. The link to "markers" as well as the development of immunological and molecular tools will be presented in the context of their ability to counteract dysfunction within the target cell. The effects resulting from the interaction with the therapeutic agent will allow to give the principles of companion tests for example. The courses will be given in English in order to facilitate the reception of international students, including those from the University Research School CARe (Cancer, Ageing and Rejuvenation), co-directed by P. Valet and B. Ségui. This module will help students in the health profession to benefit from the EUR label, which will attest to transdisciplinary training, from the basics to the development of therapeutic strategies for personalized medicine. This module will benefit from the financial support of the EUR to invite international speakers who will contribute to the teaching in the form of lectures or workshops.	
Content	A) Structural elements necessary to understand molecular alterations in cancer and aging: - **Structural organization of cells:** • Nuclei, chromatin, genomes (L Orlando) 2h • Functional Genomics: expression and regulation (JC Pagès) 1h • Cellular compartments: structural and functional continuity (D Vieles-Marais) 1h • Cellular metabolic and links between metabolisms and cell biology control (A. Carrièrre; T Levade) 2h	

	• Physiological issues for the biodisponibility of dioxygen (JF Arnal) 1h • The cells in their environment: ECM-Cytoskeleton, and local network vesicular traffic (N Jonca) 2h - **Functional potentials of a cell according to the conditions of its tissue environment:** • Cellular differentiation and plasticity (L Casteilla) 2h • Cellular senescence, proliferation (C Clavel) 2h • Cell death (B Ségui) 2h • Autophagy (S Giuriato) 1h - **Cells within organisms:** • Macrophages: gene expression and differentiation (C Clavel) 2h • Basics on immune responses (B Ségui) 1,5h • Impact of ageing on immune responses (PA Apoil, B Puissant) 1,5h • Anticancer immune responses (B Ségui) 1h • Sensory nervous system: localization, cell diversity and primary function (N Gaudenzio L Basso) 2h • Neuro-immune interactions during pathophysiological processes (N Gaudenzio L Basso) 2h • Neurodegeneration (L Nogueira) 2h • Cellular Imaging (V Lobjois) 1h - **Example and principles for the development of therapeutic tools:** • From pathophysiology to targeted therapies in autoimmune diseases (G Serre) 2h • Cancer therapies: finding the target, building the arrow (G Favre, O Calvayrac) 2h • Cell renewal: technical “control” of differentiation (JC Pagès) 1h • Genetic diversity of tumoral cells and resistance or escape to therapies: Darwin vs Lamarck again? (JE Sarry) 2h ***Enseignement pratique-Practical Course (24H):*** - Scientific report analysis: 2 students 1 supervisor - Scientific report from a research team (4 presentations) - Workshop on ethics in biological science (Half-day course in common with Care) - International Research presentation
Pre-requisites	Good English level (B2) ; Basic Knowledge in Biology
Keywords	Cell Biology; Cell imaging; Bioinformatics; Cellular interactions; Personalized medicine
FTLV	Yes
Skills	Understanding key methods in basic cell Biology Interpretation of experimental data Improving knowledge in cell Biology Learning basics on how to generate and integrate big data Critical reading of scientific literature in Biology

	Scientific oral communication in English Basics on ethics in biological sciences
Block of Skills	Cell Biology knowledge and understanding, from basic mechanisms to the clinic. Written and oral communication in English