Stem Cell Technologies

PhD Advanced Course

November 21-25, 2022

ECTS: 6; Classes 22.5 hours

Course Coordinators:

Susana Solá, Faculty of Pharmacy, *Universidade de Lisboa*
Christa Rhiner, Champalimaud Foundation

Organizing Committee:

Faculty of Pharmacy, Universidade de Lisboa
Susana Solá
Joana Miranda
Joana Amaral
Rui Castro
Cecília Rodrigues

Faculty of Medicine, Universidade de Lisboa
Sara Xapelli

Champalimaud Foundation
Christa Rhiner
Adriana Sánchez-Danés

Introduction

Stem cell-based therapies are thriving. In fact, pharmaceutical companies are increasingly investing in stem cell technology to develop innovative and potentially valuable new treatments for severe human diseases, including cancer and neurological disorders, such as multiple sclerosis, Alzheimer´s and Parkinson´s disease, mood disorders, brain tumors and even stroke. Moreover, although seminal advances have occurred in understanding stem cell biology, further work is still needed to bridge the current gap between stem cell technologies and effective treatments for brain-related disorders. Stimulating the scientific interest in the topic will certainly accelerate and improve the successful transfer of stem cell-based discoveries from the bench to the bedside.

Goals and Learning Outcomes

The overall goal of the Stem Cell Technologies course is to train a new generation of researchers with the knowledge necessary to understand stem cell plasticity and consider innovative stem cell-based strategies for the treatment of a range of devastating disorders.

Specific competencies will be acquired to:

- Understand the biology of stem cells, and their role in tissue homeostasis, cancer and regeneration;
- Discuss their potential in biomedical research and the challenges of developing better stem cell-based therapies;
- Recognize cutting-edge stem cell tools and models to tackle human disease;
- Understand how pharmacology, toxicology and biomedical applications benefit from emerging scale-up stem cell technologies.

Assessment

Assessment will be based on active participation in the seminars and workshops.
The last workshop on Stem Cell-based business concepts will be an interactive forum in groups, where students will explain and discuss the technology and application of two biotechnology companies with stem cell-based concepts.

Registration and Fees

This course is free for 1st year Ph.D. students of FFUL and Champalimaud Foundation.

For other attendees, the registration is made through the **FenixEdu Platform** until November 14, 2022.

- Registration with evaluation: 125€
- Registration without evaluation: 100€

The Course will be in-person format at FFUL and Champalimaud Centre.

COURSE CONTENT

MONDAY – 21 November (@FFUL)
Stem Cells in Disease Modelling and Drug Discovery
Chairs: Susana Solá and Christa Rhiner

09h00	**Welcome and Working group guidelines** Course organizers
9h30	**Core concepts in stem cell regulation and clinical potential** Susana Solá iMed.ULisboa, Lisbon, Portugal

10h30 **The importance of neural stem cells behavior for spinal cord injury repair outcome**
Leonor Saúde
iMM, Lisbon, Portugal

11h30 **Break**

12h00 **Modeling Rett syndrome with human pluripotent stem cells**
Margarida Diogo
IST, Lisbon, Portugal

13h00 **Lunch break**
14h30 **Workshop:**
Neural stem cells and its potential for neuroregeneration: a Demo workshop.
Sara Xapelli
iMM, Lisbon, Portugal

17h30 **End of the day**

TUESDAY – 22 November (@CF)

Stem Cells in Tissue Homeostasis and Cancer

Chairs: Sara Xapelli and Adriana Sánchez-Danés

09h30 **Stem cells, cancer stem cells and tumor heterogeneity**
Adriana Sánchez-Danés
Campalimaud Foundation, Lisbon, Portugal

10h30 **Metabolism and stem cell derived tumors: using Drosophila brain tumors to understand how metabolic reprogramming drives tumor formation**
Catarina Homem
CEDOC, Lisbon, Portugal

11h30 **Break**

12h00 **What do stem cells and dormant disseminated tumor cells have in common?**
Ana Correia
Champalimaud Foundation, Lisbon, Portugal

13h00 **Lunch break**

14h30 **The neurobiology of individuality**
Gerd Kempermann *(Zoom format)*
Center for Regenerative Therapies Dresden, Dresden, Germany

15h30 **Rejuvenating strategies for stem cell-based therapies in aging**
Pedro Vitór
iMM, Lisbon, Portugal

16h30 **End of the day**

WEDNESDAY – 23 November (@FFUL)

Engineering Stem Cells

Chairs: Christa Rhiner and Joana Miranda

9h30 **Biology-inspired bioprocesses for the manufacturing of hiPSC-based therapy products**
Margarida Serra
IBET, Oeiras, Portugal

10h30 **Mesenchymal stem cells on the path to becoming an ATMP – a Peripheral Artery Disease (PAD) Case Study**
Miguel Santos
ITQB NOVA, Oeiras, Portugal

11h30 **Break**

12h00 **Stem cells as building blocks for disease modeling**
Patricia Pitrez
CNC, Coimbra, Portugal

13h00 **Lunch break**

14h30 **Workshop:**
Biomaterial-based strategies for stem cell engineering and regenerative medicine applications
João Silva and Paola Alberte
IBB, IST, Lisbon, Portugal

16h30 **End of the day**

THURSDAY – 24 November (@CF)

Stem Cells in Neurological Disorders

Chairs: Susana Solá and Rui Castro

9h30 **Repairing the brain following injury: how to call dormant neural stem cells into action?**
Christa Rhiner
Champalimaud Foundation, Lisbon, Portugal

10h30 **The properties of neural stem cells in aging and disease**
Juan Manuel Encinas *(Zoom format)*
Achucarro Basque Center for Neuroscience, Bizkaia, Spain

11h30 **Break**

12h00 **Neural stem and progenitor behaviours: lessons from flies**
Rita Sousa-Nunes *(Zoom format)*
Centre for Developmental Neurobiology, London, England

13h00 **Lunch break**

14h30 **Workshop:**

Benefits and risks of stem cell-based therapies
Christa Rhiner, Susana Solá and Sara Xapelli
iMed.ULisboa and Champalimaud Foundation, Lisbon, Portugal

16h30 **End of the day**

FRIDAY – 25 November (@FFUL)

Emerging Clinical Stem Cell Technologies

Chairs: Christa Rhiner and Susana Solá

9h00 **Patient-derived stem cells and organoids in ocular disease modeling and regenerative medicine**
Indumathi Mariappan *(Zoom format)*
Stem Cell Clinic, Hyderabad, India

10h00 **Workshop: Stem Cell-based business concepts**
Student presentations and discussion round

12h00 **Closing remarks**

End of course