This workshop offers a comprehensive examination of experimental skin regenerative medicine, emphasizing on cell and gene-based approaches. Participants will gain proficiency in culture and manipulation of skin cells in both 2D and 3D modalities, focusing on preserving stem cell functionality and regenerative capacities. The course addresses the application of these strategies in scenarios such as chronic wounds, large skin losses from trauma, and genetic disorders. Essential wound healing concepts are covered, enabling participants to tackle specific challenges with appropriate therapeutic tools.

The curriculum also delves into advanced skin gene therapy strategies (e.g. genome editing) to address inherited skin defects impairing regeneration. Discussions extend to pre-clinical models and clinical applications, providing a comprehensive understanding of translational aspects in regenerative medicine. Additionally, the course explores the complexity of cellular populations influencing skin physiology. Participants will learn to analyze and manage large datasets derived from regenerative skin approaches, incorporating artificial intelligence methods. This course offers a thorough exploration of theoretical foundations and practical applications in experimental skin regenerative medicine.

**Learning Objectives**

1. **Skin Cell Culture Mastery:**
   Attain proficiency in cultivating and managing skin cells in 2D and 3D, emphasizing the preservation of stem cell functionality for effective regenerative applications.

2. **Application of Cell-based and other advanced skin Regenerative approaches:**
   Gain insight on the use of skin regenerative therapies strategically, grounded in a solid understanding of wound healing concepts, to address specific challenges like chronic wounds, traumatic skin losses, and genetic disorders.

3. **Advanced Gene Therapy Skills:**
   Development of competence in advanced skin gene therapy strategies to address inherited skin defects, encompassing both theoretical insights and practical considerations in pre-clinical models and clinical applications.

4. **Data Analysis and AI Integration:**
   Explore the complexity of cellular populations in skin physiology and acquire skills in analyzing large datasets from regenerative skin approaches, incorporating artificial intelligence methods for comprehensive data management and interpretation.
Faculty

Course Chair: Fernando LARCHER
CIEMAT-UC3M, Madrid

Course Co-Chair: Diego VELASCO
UC3M, Madrid

International Speakers:
- Sabine WERNER
  ETH, Zurich
- Michele DE LUCA
  UNIMORE, Modena
- Christine BALDESCHI
  iSTEM, Evry
- John CONNELLY
  Queen Mary University, London
- M. Peter MARINKOVICH
  Stanford University, USA
- Ulrich KOLLER
  DEBRA Haus, Salzburg
- Julia REICHELT
  Hamad Medical Corporation, Qatar
- Clarisse GANIER
  King’s College, London
- Matthias TITEUX
  INSERM, Paris
- Alexander NYSTROM
  University Freiburg, Freiburg

Tutors /Local Speakers:
- Sara G LLAMES
  CCST, Oviedo
- Marta GARCÍA
  UC3M, Madrid
- María J ESCAMEZ
  UC3M, Madrid
- Paloma PEREZ
  IBV, Valencia
- Marta CARRETERO
  CIEMAT, Madrid
- Carlos LEÓN
  UC3M, Madrid
- Ramón G ESCUDERO
  CIEMAT, Madrid
- Joaquin DOPAZO
  Fundación Progreso y Salud, Sevilla

Assistants:
- Blanca DUARTE
- Angélica CORRAL

Programme

DAY 1
Monday, 01 July 2024

Keratinocyte Biology and culture (2D)

14.00-14.30  Reception and registration of participants
14.30-14.45  Welcome Address - Fernando Larcher, Diego Velasco
14.45-15.45  Keynote conference: Human epidermal stem cells in skin regeneration - Michele De Luca
15.45-16.15  Coffee break
16.15-16.45  Human and mouse keratinocyte culture methods I - Fernando Larcher
16.45-17.30  Human and mouse keratinocyte culture methods II. Derivation from iPSC - Christine Baldeschi

DAY 2
Tuesday, 02 July 2024

3D skin cultures

09.00-09.30  Overview 3D skin cultures - Fernando Larcher
09.30-10.15  Plasma-based skin equivalents - Sara Llames
10.15-10.45  Complex organotypic skin models - John Connelly
10.45-11.15  Coffee Break
11.15-11.45  Skin organoids - Julia Reichelt
11.45-12.15  Skin Bioprinting - Diego Velasco
12.15-13.30  Demonstration organotypic culture preparation - Sara Llames; Diego Velasco
13.30-14.30  Lunch Break
14.30-16.00  Demonstration Skin Bio-printing - Diego Velasco
16.00-18.00  Presentations by participants
DAY 3
Wednesday, 03 July 2024

Wound healing and skin diseases models
09.00-09.45 Critical players in normal and impaired wound healing - Sabine Werner
09.45-10.15 GPCR in skin homeostasis and regeneration - Marta Carretero
10.15-11.00 Mesenchymal stem cells to treat chronic skin wounds - María J Escamez
11.00-11.30 Coffee break
11.30-12.15 Skin substitutes for chronic ulcers, burns and large wounds - Sara Llames
12.15-12.45 Advanced wound healing therapies - Marta Carretero
12.45-14.00 Lunch break
14.00-14.30 Introduction 3D, KO mice, skin-humanized models - Fernando Larcher
14.30-15.15 Animal skin disease models I. Prevalent diseases - Paloma Pérez
15.15-16.00 Animal skin disease models II (rare diseases) - Alex Nyström
16.00-16.30 Coffee break
16.30-18.00 Presentations by participants.

DAY 4
Thursday, 04 July 2024

Gene therapy and clinical studies
09.00-09.30 Skin gene therapy overview - Fernando Larcher
09.30-10.15 Genome editing I - Ulrich Koller
10.15-11.00 Genome editing II (in vivo) - Marta García
11.00-11.30 Coffee Break
11.30-12.15 Exon skipping / AONs - Matthias Titeux
12.15-12.45 Overview of Cell and gene therapy clinical trials for genodermatoses - Fernando Larcher, María José Escamez
12.45-13.30 Ex vivo gene therapy in the clinic - Peter Marinkovich
13.30-14.00 In vivo gene therapy in the clinic - Peter Marinkovich
14.00-15.00 Lunch Break
15.00-16.30 Demonstration: keratinocyte genome editing - TBD
16.30-18.00 Presentations by participants
20.30-22.30 Networking Dinner with participants and faculty members

DAY 5
Friday, 05 July 2024

Omics and AI in dermatological research
09.00-09.45 Multiomic studies of skin biology and pathology. Overview - Carlos León
09.45-10.15 Dissecting complex cutaneous traits trough RNAseq - Ramón G. Escudero
10.15-11.00 Cell heterogeneity. Single cell RNAsec-studies - Clarisse Ganier
11.00-11.30 Coffee Break
11.30-12.00 Artificial intelligence to study rare diseases including genodermatoses - Joaquín Dopazo
12.00-14.00 Presentations by participants
14.00 Closing of the course and farewell - Fernando Larcher

The course might be subject to change

EADV
European Academy of Dermatology and Venereology
Via Balestra 22 B, 6900 Lugano, Switzerland
www.eadv.org

ESDR
European Society for Dermatological Research
Rue Cingria 7, 1205 Geneva, Switzerland
www.esdr.org