

**Practical/Theoretical Course on State-of-the-Art Methods in
Stem Cells, Cell Therapies, and Bioengineering**

**PRE-CONFERENCE WORKSHOP ~ July 9, 2021
Virtual Agenda**

- The cost for attending the online workshop has been reduced to \$125 per person to encourage trainees to participate and learn new techniques in the field.
- All workshop recordings will be available from Monday, July 5 for registered workshop attendees to watch at their leisure.
- On Friday, July 9 we will host an hour-long question and answer session where all registered workshop attendees will have the opportunity to interact with the workshop hosts.

July 5-9, 2021

Recorded Workshop Presentations Available On Demand

July 9, 2021

Live Q&A Session Schedule

(Times listed are for the Eastern Time Zone)

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| A. 9:00 – 10:00 AM | Decellularization of Rodent Lungs
Hosted by Dr. Dan Weiss's Lab (University of Vermont, USA) |
| B. 10:00 – 11:00 AM | Light-Sheet Microscopy
Hosted by Dr. John Stegmayr, Wagner Lab (Lund University, SWE) |
| C. 11:00 – 12:00 Noon | Precision Cut Lung Slices
Hosted by Dr. Darcy Wagner's Lab (Lund University, SWE) |
| D. 1:00 – 2:00 PM | In-situ Proteomics
Hosted by Dr. Jia-Ren Lin, Laboratory of Systems Biology
(Harvard University, USA) |
| E. 2:00 – 3:00 PM | Lung-on-Chips
Hosted by Dr. Janna Nawroth, Ryan Lab (USC, USA) <i>and</i>
Dr. Anne van der Does (Leiden University, NLD) |
| F. 3:00 – 4:00 PM | Pluripotent Airway Models
Hosted by Dr. Amy Ryan's Lab (USC, USA) |

(See next page for workshop content.)

Workshop Content

A. Decellularization of rodent lungs – Hosted by Dr. Dan Weiss's Lab (University of Vermont, USA)

Techniques to be covered:

- 1) Dissection of mouse and rat to obtain heart-lung-trachea bloc
- 2) Preparation of rodent heart-lung-trachea bloc for de/recellularization
- 3) Decellularization
- 4) Recellularization
- 5) Application of above techniques to larger lungs: pig/human

We'll plan on approximately 1.5 hour and have both videos as well as didactics/printed protocols to share.

B. Precision cut lung slices - Hosted by Dr. Darcy Wagner's Lab (Lund University, SWE)

Precision cut lung slices (PCLS) are increasingly used for studying pathomechanisms and evaluating potential therapies. This model offers a number of potential benefits including reducing overall animal numbers, allowing for paired comparisons in samples derived from the same biological organisms, as well as use of human tissue. In this workshop, we will cover the basics of what PCLS can be used for and how to leverage the benefits of the model. We will also cover limitations of the model as well as which state-of-the art molecular and imaging-based techniques have been used thus far.

C. Lung-on-Chips - Hosted by Dr. Janna Nawroth, Ryan Lab (USC, USA) and Dr. Anne van der Does (Leiden University, NLD)

In this workshop we will explain the goals and motivation for using lung-on-chip technology and discuss multiple case studies of published models, including their specific designs, advantages, limitations, and applications. We will present the commercial Emulate platform focusing on scientific rationale and goals of using lung-on-chip models, case studies discussing specific lung-on-chip designs, pros and cons, applications, and lessons learned, detailed discussion of Emulate platform (hardware components, setup requirements, cost, functionalities etc.) and protocols and practical considerations for working with the Emulate chip (video demonstrations)

D. In-situ Proteomics – Hosted by Dr. Jia-Ren Lin, Laboratory of Systems Biology (Harvard University, USA)

- 1) Brief introduction of highly multiplexed tissue imaging
- 2) Protocols & experimental setups
- 3) Softwares of imaging processing & visualization
- 4) High-dimensional single-cell analysis

E. Light-sheet microscopy – Hosted by Dr. John Stegmayr, Wagner Lab (Lund University, SWE)

Three-dimensional imaging of large biological samples (e.g. whole/dissected organs, organoids, or engineered biomaterials), with high spatiotemporal resolution, is gaining interest for studying the physiology, pathology, and development of organs or biological models. Light-sheet microscopy is an emerging imaging technique which facilitates imaging of large samples by, for example, significantly reducing the image acquisition time, photo bleaching, and photo toxicity while retaining high spatial resolution. This workshop aims to give an introduction to light-sheet microscopy, sample preparation (e.g. optical clearing and staining), image analysis/visualization, and possible applications for pulmonary-related research.

F. Pluripotent stem cell airway models – Hosted by Dr. Amy Ryan's Lab (USC, USA)

Pluripotent stem cells have enormous potential for modeling airway diseases, evaluating mechanisms of lung repair and regeneration and for application as cellular therapeutic. This workshop will focus on the latest developments in the differentiation of pluripotent stem cells into airway epithelium including a detailed discussion of current protocols, including their advantages, limitations, and applications. We will also compare 2D and 3D models, evaluate methods to purify and characterize putative basal cells and discuss their potential in cellular therapy.