INFRAFRONTIER *in vitro* models and technologies

Webinar Agenda

19 March 2026 *10 :00 - 12 :00 & 13 :00 - 15 :00*

10:00 Welcome and introduction

10:10 **Derivation of Mouse Embryonic Fibroblasts and Embryonic Stem cells by Dr. Alasdair Allan (MRC Harwell) and Dr. Marie Wattenhofer-Donze (ICS)**

Mouse Embryonic Fibroblasts (MEFs) are a primary cell culture type that can be used for molecular and cellular assays. They can be used in a versatile fashion for examples to produce cell lysates, in transfection assays where other additional constructs are introduced in the cells or for cell imaging. Embryonic Stem (ES) cells are cultured as established cell lines that maintain pluripotency (ability to differentiate in different lineages) and the capacity to populate an animal when injected in blastocysts. The protocols for the rederivation of MEFs and ES cells from mouse embryos will be presented and the validation of these models will be discussed.

11:00 **Organ-on-Chip: dynamic miniaturized models of physiological functions by Dr. Anna Herald (Karolinska Institutet)**

Advances in microfabrication, tissue engineering, microfluidics, and biomaterials have led to the development of more physiologically relevant *in vitro* models called organ-on-a-chip (OoC) systems. The emerging OoC technology aims to address some of the shortcomings of 2D cell culture systems and animal models by providing an *in vivo*-like microenvironment for cells and tissues. OoC systems are designed to mimic intrinsic features of human tissues—including fluid flow to provide nutrients to cells and tissues and remove metabolic wastes, to provide mechanical stresses, and to possess a 3D architecture that mimics the tissue-tissue interfaces. These platforms consist of microfluidic channels that can range in size from 10 to 1000 µm and minimize the amounts of reagents for culturing cells. OoC platforms can be used for preclinical drug screening, basic developmental biological studies, disease modeling, and disease mechanism identification. Here we will give an overview of the OoC design and application process and then focus on OoC models of the blood-brain-barrier and brain.

12:00 Lunch Break

13:00 **Organoids: a new perspective in disease modeling and preclinical drug testing by Dr. Elina Christodoulou-Vafeiadou (Biomedcode)**

Organoids are three dimensional, self-organizing structures, closely resembling their corresponding *in vivo* organs and they are rapidly gaining ground as *in vitro* disease models. Here we will present the principles of this novel technology including its advantages and weaknesses, we will outline the methodology involved in developing intestinal and lung alveolar organoids embedded in 3D Matrigel or with an Air Liquid Interface (ALI) approach mimicking the *in vivo* environment and we will discuss their use as preclinical tools for disease modeling and drug screening.

14:00 **3D bioprinting: a new technology for generating *in vitro* tissue models by Prof. Dr. Maik Dahlhoff (Vetmeduni)**

3D tissue printing is a new technology that is driving innovations in many research areas. Cells can be arranged by 3D printers with a high spatial resolution on slides or dishes and build living tissues or even mini organs. 3D printers join cells to form a complex 3D structure with the help of biocompatible materials, such as collagen, alginate or gelatin, and with Matrigel as extracellular matrix. 3D bioprinting is being used in engineering, biomaterial research, physics, cell biology and medicine and 3D bioprints have been used for transplantations of tissues such as vascular grafts, bone, cartilaginous grafts, tracheal splints, skin and heart. Additionally, 3D cancer models allow researchers to study the microenvironment of tumors, which is difficult to do in the widely used two-dimensional cell culture models3D bioprinted cancer models could be a perfect way to replace animal models and fulfil the 3R ideas

15:00 End of webinar

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101188158.