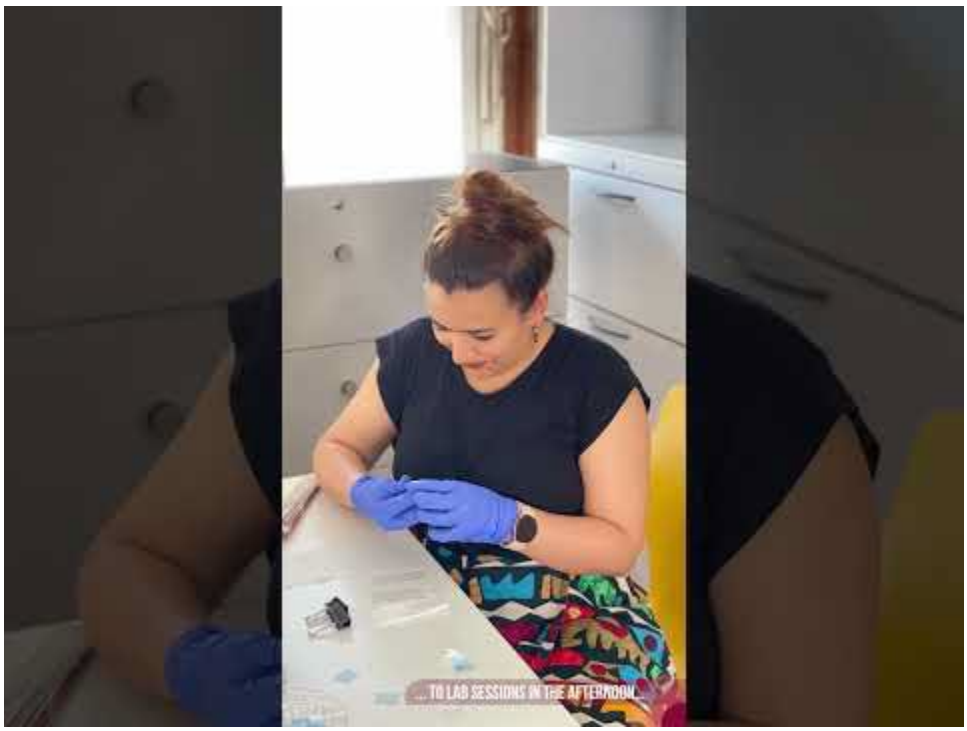
Exploring the Cutting-Edge World of Organ-on-Chip at EUROoCS SUMMER SCHOOL 2023

The EUROoCS Teaching & Training group recently showcased the first EUROoCS SUMMER SCHOOL. This pioneering initiative united 24 early career researchers in organ-on-a-chip technology from across Europe and around the world, offering a dynamic program with a diverse range of lectures and hands-on sessions. Organized by Torsten Mayr, Peter Loskill, Silke Keller, Thomas E. Winkler, Gülden Akçay, and Julia Rogal, this immersive summer school took place from September 11th to 15th at the Eberhard Karls Universität Tübingen in collaboration with the 3R-Center Tübingen for In vitro Models and Alternatives to Animal Testing.



This is a summary of the lectures, lab hands on training and social events.

Microfabrication: Crafting the Future of Organ-on-Chip Technology

Organ-on-Chip (OoC) technology relies heavily on microfabrication techniques, which make it possible to create miniature devices that accurately emulate the intricate characteristics of human organs. The EUROoCS SUMMER SCHOOL kicked off with a lecture by Maria Tenje from Uppsala University, where she pondered the intricacies of microfabrication methods.

Stem Cells: Pioneering Versatility in OoC Research

Stem cells serve as versatile tools in OoC research, paving the way for the creation of physiologically relevant and disease-specific models. Julia Rogal from Karolinska Institutet highlighted their role in drug testing, disease modeling, and regenerative medicine.

Biomaterials: Innovations in ECM Mimicry

Lisa Rebers from the Fraunhofer-Institut für Grenzflächen- und Bioverfahrenstechnik IGB delivered a remarkable lecture on innovative biomaterials and hydrogels for OoC systems. These materials replicate the extracellular matrix (ECM), creating a natural microenvironment for cells in a tissue.

Microfluidic Dynamics: Precision in Fluid Flow

In the domain of OoC, the meticulous management of fluid flow parameters holds utmost importance. Andries van der Meer, hailing from the University of Twente and serving as the chair of EUROoCS, illuminated attendees with a lecture covering critical elements of microfluidics, particularly focusing on how laminar flow and wall shear stress are affected when scaling down.

Organoids - Unveiling the Magic of Organoids:

Kevin Achberger from Eberhard Karls Universität Tübingen introduced students to organoids, self-organized 3D structures with the remarkable ability to faithfully replicate the characteristics and functions of human organs. These miniaturized models provide invaluable insights into disease mechanisms and drug responses.

Sensors: Revolutionizing Real-time Monitoring

Torsten Mayr from Graz University of Technology introduced to optical sensing and *in-situ* measurement in organ-on-chips. In-line sensors open new frontiers for real-time monitoring and analysis of cell activities on a chip.

Good Cell and Tissue Culture Practice (GCCP): Ethics and Reliability

Lucia Selfa Aspiroz, PhD from the European Commission's Joint Research Centre, emphasized the significance of GCCP in ensuring robust, reliable, and ethical research in the OoC field. Maintaining the integrity and reproducibility of cell culture systems is paramount.

Imaging: Revealing Hidden Realms

Cutting-edge imaging techniques grant live access to the intricate world of cells and organoids within OoC systems. Julia Marzi, an imaging expert from Eberhard Karls Universität Tübingen and NMI Naturwissenschaftliches und Medizinisches Institut, shared insights into microscopy, Raman spectroscopy, live cell imaging, biophotonics, and spectroscopy.

Omics Readouts: Deciphering Molecular Insights

Steven Ray Wilson from Universitet Oslo talked about the power of omics as a versatile tool in advancing OoC technology, with a special focus on mass spectrometry.

Regulatory Space: Navigating Acceptance

Susanne Brendler-Schwaab from the Bundesinstitut für Arzneimittel und Medizinprodukte addressed the path to regulatory acceptance for OoC systems. She shed light on what's needed for OoC's future in regulatory processes and the evaluation criteria used by regulators.

Immunology: Eliciting the Mysteries of Immunology: A Journey into In Vitro Models

After providing a brief introduction to immunology, Alex Weber from Eberhard Karls Universität Tübingen delved into the challenges associated with studying in vitro models of immunology.

In addition to these enriching academic sessions, the summer school also provided invaluable hands-on experience across a wide spectrum of areas. Participants delved into Microfabrication, Cell Culture, Biomaterials, Optical Sensors, Image Analysis, and TEER measurements, gaining practical experience in these specific topics.

Beyond academic exploration, participants enjoyed engaging social events, including a lively TATAbox Game Night, Summer School Dinner, and a relaxing Punt Boat Tour on the Neckar River.

This summer school served as a platform for knowledge exchange, hands-on learning, and networking, contributing significantly to the advancement of Organ-on-Chip research and its applications in biomedicine.

The EUROoCS SUMMER SCHOOL was made possible by the generous support of our sponsors

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