

hDMT workshop at iMNC conference

Challenges of the European Organ-on-Chip roadmap *Qualification and standardization*

Organizers

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Introduction

Emerging at the junction of tissue engineering and microfluidics, Organ-on-Chip (OoC) technology is widely postulated as a promising approach to creating new model systems for healthcare research. OoC models aim to recapitulate aspects of human anatomy, physiology and pathology for use in drug discovery, efficacy and toxicology and in personalized (or precision) medicine. The goal is to improve existing bioassays and provide insights into the mechanisms underlying the development and progression of diseases in humans. In addition, OoCs are considered as potential contributors to reducing the need, cost and ethical burden of animal studies.

In a recent EU-funded Coordination Support Action project called ORCHID (Organ-on-Chip in Development),¹ initiated by the Dutch Organ-on-Chip Consortium hDMT,² an inventory was made of current unmet needs that could be addressed by this technology as well as its key challenges, barriers and perspectives (1). This formed the basis for the European Organ-on-Chip roadmap (2). Six specific building blocks were identified for this roadmap: (1) application, (2) specification, (3) qualification, (4) standardization, (5) production and upscaling, and (6) adoption. The recently established European Organ-on-Chip Society (EUROoCS)³ will facilitate the dialogue and collaboration of all stakeholders involved in this roadmap, which is key to further acceptance, development and implementation of OoC technology.

Program

This workshop will focus on qualification and standardization. Regarding the characterization and qualification of OoC models there is a need for independent centers for testing their biological relevance and performance. There are many proof-of-concept models from many developers, but these are not always as robust and reproducible as end users usually need. To overcome this problem, a European Organ-on-Chip Infrastructure⁴ is now being prepared to bridge the gap between developers and end users. A second challenge is standardization, automation and inter-chip compatibility, which are currently limited and perceived as hurdles by end users in adopting OoC solutions. An important new step in the direction of standardization is the development of the Translational Organ-on-Chip Platform (TOP),⁵ led by the University of Twente, which provides infrastructure for automated microfluidic chip control. In addition, important steps are being taken in the Health.E Lighthouse Initiative⁶ to accelerate innovation in medical devices and systems by stimulating the development of open technology platforms and standards.

The first part of the workshop consists of three short presentations that will inform the participants about (1) the European OoC roadmap and the role of EUROoCS; (2) standardization challenges and initiatives and (3) characterization and qualification of OoC models. The second part of the workshop is an open and interactive session, in which the participants are invited to share their views and ideas on these challenges, and in which the possible benefit from other initiatives in similar areas will be explored.

¹ www.h2020-orchid.eu

² www.hdmt.technology

³ www.euroocs.eu

⁴ EOCl (coordinated by Leiden University Medical Center, the Netherlands).

⁵ <https://vimeo.com/341879526/b3064c7b78>

⁶ <https://www.ecsel.eu/health>

References

1. Mastrangeli et al. (2019), “Organ-on-Chip in Development: Towards a European roadmap for Organ-on-Chip”. ALTEX – Alternative to Animal Experimentation 36 (4), 650-668
<https://doi.org/10.14573/altex.1908271>
2. Mastrangeli et al. (2019), “Building blocks for a European Organ-on-Chip roadmap”. ALTEX – Alternatives to Animal Experimentation 36 (3), 481-492, <https://doi.org/10.14573/altex.1905221>