



# UNLOOC mitigates the use of animal testing in drug development by designing groundbreaking Organ-on-Chips technologies

14.5.2024, Jena, Germany - The EU project UNLOOC (Unlocking the data content of Organ-on-Chips) has just been launched on 14<sup>th</sup> of May 2024 in Jena. The three-year project consortium, funded by Chips Joint Undertaking and national agencies, aims to develop groundbreaking Organ-on-Chips (OOC) technologies to mitigate the challenges posed by use of animals in drug development and testing. Direct use of human cells is a real game changer, bridging the gender gap and allowing personalized medicine.

## Challenges and ethical implications of animal testing in drug development

Before drugs can proceed to clinical trials on human subjects, animal models have traditionally been used to validate the effectiveness, toxicity and pharmacokinetics of the drug. However, use of animal models comes with many potential challenges, such as low translational probability to humans, high failure rates in clinical trials, excessive costs in drug development, and risk of death caused by unwanted side effects in approved drugs.

To mitigate these severe risks in drug development, better methods to test drugs on human models or corresponding target groups are needed. As an ethical implication, the potential suffering of the estimated 100 million animals currently used for drug experiments should also be avoided.

## UNLOOC brings together 51 organisations in 10 countries

The European UNLOOC project (Unlocking data content of Organ-on-Chips) tackles the challenge inherent in animal testing of drugs, bringing together 51 organisations in academia, research and technology companies from 10 European countries. The project with an overall budget of roughly €70 million receives €14 million in funding from the Chips Joint Undertaking and €18 million from national agencies to demonstrate through its five novel use cases how the groundbreaking methods using Organ-on-a-Chip (OOC) technology enable the development of more effective treatments, leaving animal subjects out of the equation. The OOC technology to be developed in the UNLOOC project will not only enable controlled drug testing, but also the modelling of disease pathophysiology.

The UNLOOC use cases will focus on:

- Off-the-shelf 3D organ models replicating human diversity by using a highly innovative cryopreservation method.
- Developing market-ready single-organ and multi-organ smart OOC multi-well plates.
- Designing artificial epithelium to assess transdermal drug delivery, skin penetration, absorbance, and toxicity validated in a toxicity and drug delivery scenario.
- Designing a blood brain barrier platform that is affordable for biomedical research labs and scalable for contract research organisations (CROs).



*This project is supported by the Chips Joint Undertaking and its members Belgium, Germany, Hungary, Ireland, Italy, the Netherlands, Portugal, Romania, Spain, Switzerland. This work includes top-up funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).*





- Developing an advanced lung-on-a-chip platform to better assess the safety of new drug candidates.

OOC is a rapidly advancing technology aiming to replicate the physiological and functional properties of human organs on a microstructured platform. OOC systems consist of microfluidic channels lined with living cells that mimic the structures and functions of specific organs. By emulating the microenvironment of organs, OOCs provide a powerful tool for drug development, disease modelling and personalised medicine.

A game changer in the development of Organ-on-Chips technologies

The UNLOOC project consortium is coordinated by Dr. Claudia Gärtner, CEO at microfluidic ChipShop. She explains: “A key argument for using OOC systems is the direct use of human cells, which means that the effect of substances on the real target can be evaluated. In addition, cells from target groups or even individual patients can be implemented in such systems, and the combination with induced pluripotent stem cells can be easily achieved.” She continues: “Keeping in mind that most clinical studies involve healthy male test persons, our approach is a real game changer by bridging the gender gap and introducing experiments for drugs meant for infants.” The outcomes of the UNLOOC project will provide tools not only for testing of new drug candidates but also for setting up disease models to develop therapies in a relevant and controlled environment.

The applications developed and validated in the project will be used by scientists in both academia and pharma companies to drive more comprehensive drug development, create safe cosmetics without animal testing, and gain new insights into diseases. Given the large OOC market and its large projected growth, these solutions are of great economic value and will place Europe at the forefront of this booming research field.

UNLOOC merges microfluidics, biological application, microelectronics, AI (artificial intelligence) and Key Digital Technologies (KDT) to form future products and novel pathways in drug development. The importance of this topic for the European competitiveness was stressed during the kick-off meeting, where the Thuringian Minister of Economy, Sciences and Digital Society, Wolfgang Tiefensee, congratulated the UNLOOC team. For Minister Tiefensee, it was a particular pleasure to join this kick-off as with *microfluidic ChipShop*, the coordinator comes from Thuringia.

A challenging project and almost 100 leading scientists in the field in Jena make us curious about the results in 3 years. Numerous new products and publications as well as a spin-off are planned. The bar is set high.

Consortium project partners

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Project partners in alphabetical order:

AbbVie Ireland NL B.V. (IE), Alveolix AG (CH), BEOnChip S.L. (ES), Carl Zeiss Microscopy GmbH (DE), Core Life Analytics (NL), CSEM Centre Suisse d'Electronique et de Microtechnique SA - Recherche et Developpement (CH), Cytes Biotechnologies S.L. (ES), Demcon life sciences & health Enschede (NL), Demcon Sync Biosystems B.V. (NL), Demcon Curonix B.V., EBERS Medical Technology SL (ES), HUN-REN Energiatudományi Kutatóközpont (HU), European Infrastructure of Open Screening Platforms for Chemical Biology (EU-OPENSSCREEN) - EU-OPENSSCREEN ERIC (DE), Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. (DE), Fundacio Institut de Bioenginyeria de Catalunya (ES), FUNDACION DE LA COMUNIDAD VALENCIANA CENTRO DE INVESTIGACION PRINCIPE FELIPE (ES), Fundacion Instituto de Investigación Sanitaria Aragón (ES), HES-SO Haute école spécialisée de Suisse occidentale (CH), I+Med S. Coop. (ES), InSphero AG (CH), Instituto de Engenharia de Sistemas e Computadores (INESC), Investigação e Desenvolvimento em Lisboa (PT), Instituto de Engenharia de Sistemas e Computadores (INESC) Microsistemas e Nanotecnologias (PT), Institutul National de Cercetaredezvoltare pentru Microtehnologie (ROU), Interuniversity MicroElectronics Center IMEC (Belgium), Ihs Weigling S.L. (ES), Jobst Technologies GmbH (DE), Lionix International (NL), Lipotype GmbH (DE), Locsense B.V. (NL), Micronit BV (NL), microfluidic ChipShop GmbH (DE), Multi Channel Systems MCS GmbH (DE), Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO (NL), Nuromedia GmbH (DE), okolab s.r.l. (IT), Ost - Ostschweizer Fachhochschule (CH), Philips Electronics Nederland B.V. (Netherlands), S.C. DDS Diagnostic S.R.L. (ROU), SiliconGate LDA (PT), Spiden AG (CH), Stelar Security Technology Law Research (DE), Stichting IMEC Nederland (NL), Technische Universiteit Delft (NL), Technische Universität Braunschweig (DE), Universidad de Zaragoza (ES), Universidad del País Vasco/Euskal Herriko Unibertsitatea (ES), Universidade de Santiago de Compostela (ES), Universiteit Maastricht (NL), University College Cork - National University of Ireland, Cork (IE), University of Pavia (IT), Viscofan España S.L.U. (ES).

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About microfluidic ChipShop (MFCS)

MFCS is an international leader in the design and manufacture of lab-on-a-chip systems. Design and manufacture of the consumables and the corresponding operating instrument and the implementation of the biological assays on the microfluidic systems through to biological validation are covered. Another unique selling point is the internationally successful *Lab-on-a-Chip Catalogue* with standard microfluidic chips, instruments, reagents or all necessary accessories like tubes, fluidic interfaces, holders etc. and application instructions for lab-on-a-chip applications. With a modular concept for formats, connections and interfaces, the company has set standards that enable the fast and cost-effective realization of new products. MFCS was founded in 2002, the company and its subsidiary employ around 110 people. The company is family owned and run by owner, founder and CEO Dr. Claudia Gärtner. The company founders Dr. Claudia Gärtner and Dr. Holger Becker were among the first scientists who established methods of in the field of polymer microfabrication for microfluidic applications.



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### About Chips Joint Undertaking

Chips Joint Undertaking supports research, development, innovation and future manufacturing capacities in the European semiconductor ecosystem. Launched by the European Union Council Regulation No 2021/2085 and amended in September 2023 as part of the Chips for Europe Initiative, it confronts semiconductor shortages and strengthens Europe's digital autonomy, engaging a significant EU, national/regional and private industry funding of nearly €11 billion.



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