



# Organs- and Tissues-on-Chips

April 8–12, 2018 | Big Sky Resort | Big Sky, Montana | USA

## Scientific Organizers:

**Christopher P. Austin**, National Institutes of Health, USA

**Danilo Tagle**, NCATS, National Institutes of Health, USA

**Christine L. Mummery**, Leiden University Medical Center, Netherlands

**Brian R. Berridge**, GlaxoSmithKline, USA

*More than 30% of promising medications have failed in human clinical trials because they are determined to be toxic despite promising pre-clinical studies in 2-D cell culture and animal models. Another 60% fail due to lack of efficacy. Consequently, though several thousand diseases affect humans, only about 500 have approved treatments. However, with the growing understanding of human biology, along with increased availability of innovative technologies, there is now an unprecedented opportunity to translate scientific discoveries more efficiently into new, more effective and safer health interventions. Organs- or Tissues-on-Chips are innovative, alternative approaches that would enable early indications and potentially more reliable readouts of toxicity and efficacy. These microfabricated devices recapitulate the multicellular architectures, tissue-tissue interfaces, physicochemical microenvironments, vascular perfusion and innervation, producing in essence microphysiological systems that mimic human tissue and organ functionality not possible with conventional 2D or 3D culture systems. Through innovative biosensing and readout approaches, these devices employ high-resolution, real-time imaging and non-invasive analysis of biochemical, genetic and metabolic activities of living cells in a functional tissue and organ context. This technology has great potential to advance the study of tissue development, organ physiology and disease etiology. In the context of drug discovery and development, it should be especially valuable for the study of molecular mechanisms of action, prioritization of lead candidates, toxicity testing and biomarker identification. These microfabricated devices have also proven to be useful for modeling human diseases. The conference will touch on ongoing efforts and various applications of tissue-on-chips technology to studies in precision medicine, environmental exposures, reproduction and development, cancer and for use at the International Space Station.*


## Session Topics:

- Organs-on-Chips in Drug Development
- Integrated Organs-on-Chips
- Organs-on-Chips for Disease Modeling I & II
- Other Opportunities: 1) Tissue-on-Chips for Translational Research in Space; 2) Environmental Health
- Commercializing Tissue Chip Technologies
- Perspectives from Regulatory Agencies and the Pharmaceutical Industry
- Validating Tissue Chips  
*plus two workshops*

**Scholarship Application & Discounted Abstract Deadline: December 6, 2017**

**Abstract Deadline: January 9, 2018**

**Discounted Registration Deadline: February 6, 2018**



Note: Scholarships are available for graduate students and postdoctoral fellows and are awarded based on the abstract submitted. Submitting an abstract is an excellent opportunity to gain exposure for your work. Abstracts submitted by the abstract deadline will also be considered for short talks on the program.

Upper image of lung tissue on a chip courtesy of National Center for Advancing Translational Sciences, NIH

Meeting Hashtag: #KSchips

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# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## Organs- and Tissues-on-Chips (D1)

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### SUNDAY, APRIL 8

#### Arrival and Registration

### MONDAY, APRIL 9

#### Welcome and Keynote Address

**Christopher P. Austin**, National Institutes of Health, USA  
*Overview of Organs-on-Chips in Drug Development for Safety, Toxicity and Efficacy Testing*

#### Organs-on-Chips in Drug Development

**D. Lansing Taylor**, University of Pittsburgh Drug Discovery Institute, USA  
*Liver Microphysiology System as a Key Component in Quantitative Systems Pharmacology*

**Christine L. Mummery**, Leiden University Medical Center, Netherlands  
*Heart- and Vessels-on-Chip*

**Jonathan Himmelfarb**, University of Washington, USA  
*A Kidney on a Chip for Disease Modeling and Drug Efficacy Testing*  
**Short Talk(s) Chosen from Abstracts**

#### Integrated Organs-on-Chips

**Gordana V. Vunjak-Novakovic**, Columbia University, USA  
*Heart-Liver-Vasculature-Skin*

**Donald E. Ingber**, Wyss Institute for Biologically Inspired Engineering at Harvard, USA  
*DARPA Integrated 10-Organ System Using Microfluidic Platform*

**Linda G. Griffith**, Massachusetts Institute of Technology, USA  
*DARPA Integrated 10-Organ System Using a Microwell System*  
**Short Talk Chosen from Abstracts**

#### Poster Session 1

### TUESDAY, APRIL 10

#### Organs-on-Chips for Disease Modeling I

**Kevin Kit Parker**, Harvard University, USA  
*Cardiomyocytes-on-Chips as Models for Barth Syndrome and Long QT*

**Nancy L. Allbritton**, University of North Carolina, Chapel Hill and North Carolina State University, USA  
*Intestinal Simulacra on a Microscale*

**Steven George**, University of Washington, USA  
*Heart-on-a-Chip: 3D in vitro Models of Atrial Conduction*

**George Truskey**, Duke University, USA  
*Microphysiological Systems Vascular Model of Progeria*

#### Organs-on-Chips for Disease Modeling II

**Helena Therese Hogberg**, Johns Hopkins Bloomberg School of Public Health, USA  
*3D Neuronal Microphysiology Systems and Neuronal Disease Models*  
**Speaker to be Announced**

**Kevin E. Healy**, University of California, Berkeley, USA  
*Congenital Central Hypoventilation Syndrome (Autonomic Nervous System)*  
**Short Talk Chosen from Abstracts**

#### Poster Session 2

### WEDNESDAY, APRIL 11

#### Other Opportunities: 1) Tissue-on-Chips for Translational Research in Space 2) Environmental Health

**Rocky S. Tuan**, University of Pittsburgh School of Medicine, USA  
*3D Osteochondral Microtissue Models to Study Skeletal Pathogenesis under Degenerative and Microgravity Conditions*

**Bruce R. Conklin**, Gladstone Institutes and UCSF, USA  
*Engineering Disease-Specific iPS Cells for Personalized Medicine Research*

**Warren M. Casey**, NICEATM, NIEHS, National Institutes of Health, USA  
*Estrogen Disruptors and Tissue Chips: Assessment of Chemical Compounds Have the Potential to Disrupt Processes in the Human Body that May Lead to Negative Health Effects*

**Richard S. Paules**, NIEHS, National Institutes of Health, USA  
*Tox21 Efforts in Improving Toxicology and Human Safety Assessment*  
**Short Talk(s) Chosen from Abstracts**

#### Workshop 1

##### Short Talks Chosen from Abstracts

#### Commercializing Tissue Chips Technologies

**Geraldine A. Hamilton**, Emulate Inc., USA  
*Commercializing Lung and GI on Chips*

**Thomas Neumann**, Nortis, Inc., USA  
*How Organ-on-Chip Technologies will Revolutionize in-vitro Methods*

**Uwe Marx**, TissUse GmbH and Technische Universität Berlin, Germany  
*Commercializing Integrated 4-Organ Tissue Chips*  
**Short Talk Chosen from Abstracts**

#### Poster Session 3

### THURSDAY, APRIL 12

#### Perspectives from Regulatory Agencies and Pharmaceutical Industry

**Donna Mendrick**, Food and Drug Administration, USA  
*FDA Perspectives on Tissues-on-Chips*

**Sonja Beken†**, European Medicines Agency, Federal Agency for Medicines and Health Products, Belgium  
*European Regulatory Agency Perspectives on Tissues-on-Chips*

**Adrian Roth**, F. Hoffmann-La Roche Ltd, Switzerland  
*Industry Perspectives on Validation of Tissue Chip Technology*

**Brian R. Berridge**, GlaxoSmithKline, USA  
*Use of Tissue Chips to Improve Clinical Translation*  
**Short Talk(s) Chosen from Abstracts**

#### Workshop 2

##### Short Talks Chosen from Abstracts

#### Validating Tissue Chips

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**Ivan Rusyn**, Texas A&M University, USA

*Tissue Chip Validation Center at Texas A&M University (Tex-Val Center)*

**Murat Cirit**, Massachusetts Institute of Technology, USA

*Quantitative Characterization of Microphysiological Systems*

**Mark E. Schurdak**, University of Pittsburgh, USA

*Microphysiological Systems Database*

### Meeting Wrap-Up: Outcomes and Future Directions

**Danilo Tagle**, NCATS, National Institutes of Health, USA

*What's on the Horizon for Tissues-on-Chips?*

### FRIDAY, APRIL 13

#### Departure