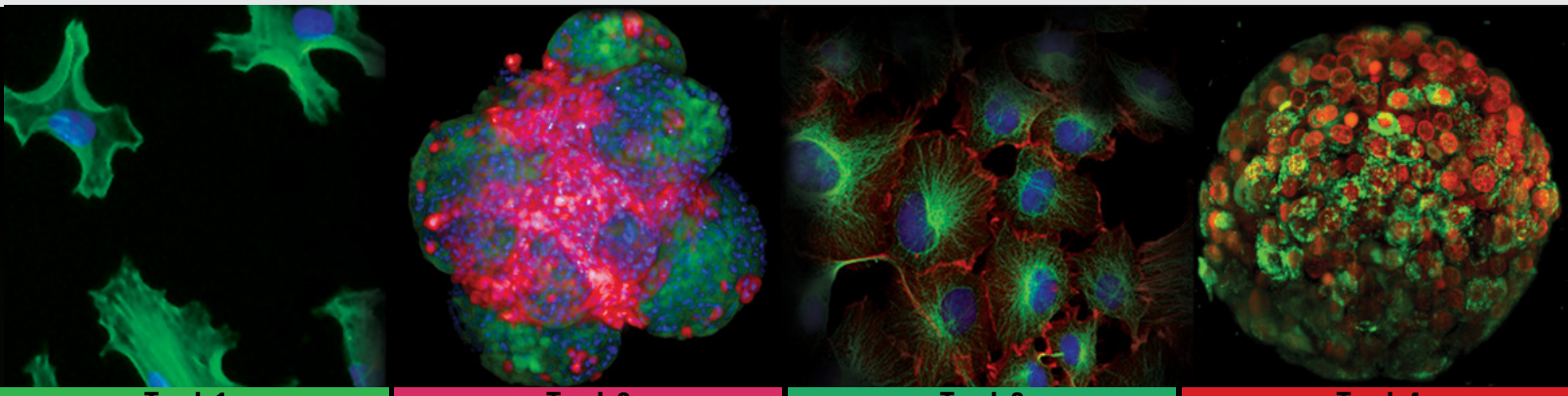
Cambridge Healthtech Institute

Fourteenth Annual

HIGH-CONTENT ANALYSIS & 3D SCREENING

October 31 - November 2, 2016
Boston Marriott | Cambridge, MA

THE ORIGINAL HIGH-CONTENT ANALYSIS CONFERENCE



Track 1
HIGH-CONTENT ANALYSIS

Track 2
3D CELL CULTURE

Track 3
PHENOTYPIC SCREENING

Track 4
SCREENING OF 3D MODELS

Coverage Includes:

- High-Content Screening of 3D Models
- Spheroid Models for Drug Screening
- High-Content Phenotypic Screening
- HCS Image Analysis and Modeling
- Phenotypic Screening in Human iPSC Models
- Organoids and Organotypic Cell Culture
- Organ-on-a-Chip
- Case Studies in Phenotypic Screening
- 3D Models for Oncology Drug Screening
- Patient-Derived Tumor Models for Screening
- Phenotypic Screening of 3D Models
- Quantitative Systems Pharmacology

Featured Speakers

Stuart Schreiber
Director, Center for the Science of Therapeutics, Broad Institute

Jeremy L. Jenkins
Director, Molecular Pathways, Novartis

D. Lansing Taylor
Director, Drug Discovery Institute, University of Pittsburgh

David C. Swinney
CEO, Institute for Rare and Neglected Diseases Drug Discovery (iRND3)

Register Early for Maximum Savings!

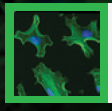
Corporate Sponsor: charles river

HighContentAnalysis.com

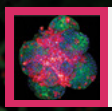
About the Event

Cambridge Healthtech Institute is pleased to bring the longest-running **High-Content Analysis & 3D Screening** Conference to the hub of biotech and pharmaceutical research - Cambridge, MA. Now in its **14th** year, the event explores the next generation in high-content and phenotypic screening and takes it to the third dimension. The High-Content Analysis and Phenotypic Screening stream will focus on the latest advancements in HCA technologies and applications, including phenotypic and high-content screening of 3D models, HCS image analysis and modeling, screening in physiologically-relevant cellular models, and case studies and strategies for successful phenotypic drug discovery. You can also join the expanded 3-day coverage on 3D cellular models and 3D screening at the concurrent stream, which features the latest spheroid, organoid and organotypic cell culture, and organ-on-a-chip technologies; patient-derived tumor models and human iPSC models for drug screening; and case studies in oncology drug discovery using 3D cellular models. Please join us at CHI's longest-running event dedicated to cutting-edge cellular screening!

October 31 - November 1

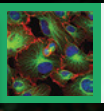


Track 1
High-Content Analysis

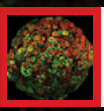


Track 2
3D Cell Culture:
Organoid, Spheroid & Organ-on-a-Chip Models

November 1 - 2



Track 3
Phenotypic Screening



Track 4
Screening & Functional Analysis of 3D Models

Dinner Short Courses*

Monday, October 31, 6:00-9:00 pm

(SC1) Introduction to High-Content Phenotypic Screening

The ever-increasing demand for improved productivity in research through the generation of robust analysis outputs has driven both the development and deployment of automated high-content analysis (HCA) and phenotypic cell-based approaches to drug discovery. In contrast to the more traditional cellular analysis and target-based approaches, here the researcher is able to evaluate the efficacy of potential therapeutics by monitoring the physiological state of cells through the simultaneous analysis of multiple cellular parameters in the context of an intact biological system. This course will cover the key features of HCS/A technologies and the best approaches to using these technologies for phenotypic cell-based screening.

Instructor:

Anthony M. Davies, Ph.D., Center Director, Translational Cell Imaging Queensland (TCIQ), Institute of Health Biomedical Innovation, Queensland University of Technology

Who should attend?

This course has been developed to introduce and facilitate scientists who are either moving into the field or who are interested in further developing new phenotypic discovery applications and tools for use with these technologies.

Learning Outcomes

- Develop a familiarity of the basics of HCS/A technologies
- Gain an understanding of the capabilities of this technology
- Learn of the latest developments in cell-based models for use in this field
- Get a better understanding of the key principles of assay design and development for phenotypic screening

Tuesday, November 1, 6:00-9:00 pm

(SC2) Expert ThinkTank: How to Meet the Need for Physiologically Relevant Assays

It used to be adequate to build target-specific and robust assays to drive lead optimization. These assays were relatively inexpensive and reliable and could be counted on to provide chemists with usable results. However, with time, it has become apparent that it is not enough to be robust and target specific. To build therapies for patients, we need to have assays that are more predictive of patient outcome. The current buzz words are "physiologically relevant assays." This session will explore the need for physiologically relevant assays and explore the ways that we can achieve this endpoint.

Discussion topics include:

- What is the driver for more physiologically-relevant assays?
- What is the current state of the art?
- Advantages and shortcomings of the current technologies
- What is needed to build more physiologically-relevant assays? What are the requirements for cells, assay systems and budget?
- What are the compromises that can be allowed when building tools?
- What would be the ideal outcome and timelines?

Moderator:

Lisa Minor, Ph.D., President, In Vitro Strategies, LLC

Panelists:

Edna Cukierman, Ph.D., Associate Professor, Cancer Biology Program, Fox Chase Cancer Center

Matthias Nees, Ph.D., Coordinator, HCS Lab, Turku Science Park/Finland

Bonnie Sloane, Ph.D., Distinguished Professor, Pharmacology, Wayne State University

Additional panelists to be announced

***Separate registration required.**

See HighContentAnalysis.com for additional details.

Sponsorship, Exhibit, & Lead Generation Opportunities

CHI offers comprehensive sponsorship packages which include presentation opportunities, exhibit space, branding and networking with specific prospects. Sponsorship allows you to achieve your objectives before, during, and long after the event. Any sponsorship can be customized to meet your company's needs and budget. Signing on early will allow you to maximize exposure to qualified decision-makers.

Podium Presentations – Available Within the Main Agenda!

Showcase your solutions to a guaranteed, targeted audience through a 15- or 30-minute presentation during a specific conference program, breakfast, lunch, or separate from the main agenda within a pre-conference workshop. Package includes exhibit space, on-site branding, and access to cooperative marketing efforts by CHI. For the luncheon option, lunches are delivered to attendees who are already seated in the main session room. Presentations will sell out quickly! Sign on early to secure your talk.

Invitation-Only VIP Dinner/Hospitality Suite

Sponsors will select their top prospects from the conference pre-registration list for an evening of networking at the hotel or at a choice local venue. CHI will extend invitations and deliver prospects, helping you to make the most out of this invaluable opportunity. Evening will be customized according to sponsor's objectives i.e.:

- Purely social
- Focus group
- Reception style
- Plated dinner with specific conversation focus

User Group Meeting/Custom Event

Co-locate your user group meeting or custom event. CHI will help market the event, manage logistical operations, develop the agenda, and more. CHI can handle the entirety of the meeting or select aspects.

Exhibit

Exhibitors will enjoy facilitated networking opportunities with qualified delegates. Speak face-to-face with prospective clients and showcase your latest product, service, or solution.

One-on-One Meetings

Select your top prospects from the pre-conference registration list. CHI will reach out to your prospects and arrange the meeting for you. A minimum number of meetings will be guaranteed, depending on your marketing objectives and needs. A very limited number of these packages will be sold.

Additional branding and promotional opportunities are available, including:

- Conference Tote Bags
- Literature Distribution (Tote Bag Insert or Chair Drop)
- Badge Lanyards
- Padfolios
- Program Guide Advertisement

Looking for additional ways to drive leads to your sales team?

CHI's Lead Generation Programs will help you obtain more targeted, quality leads throughout the year. We will mine our database of 800,000+ life science professionals to your specific needs. We guarantee a minimum of 100 leads per program! Opportunities include:

- Whitepapers
- Web Symposia
- Custom Market Research Surveys
- Podcasts

For sponsorship and exhibit information, please contact:
Angela Parsons, VP Business Development
781-972-5467 | aparsons@healthtech.com

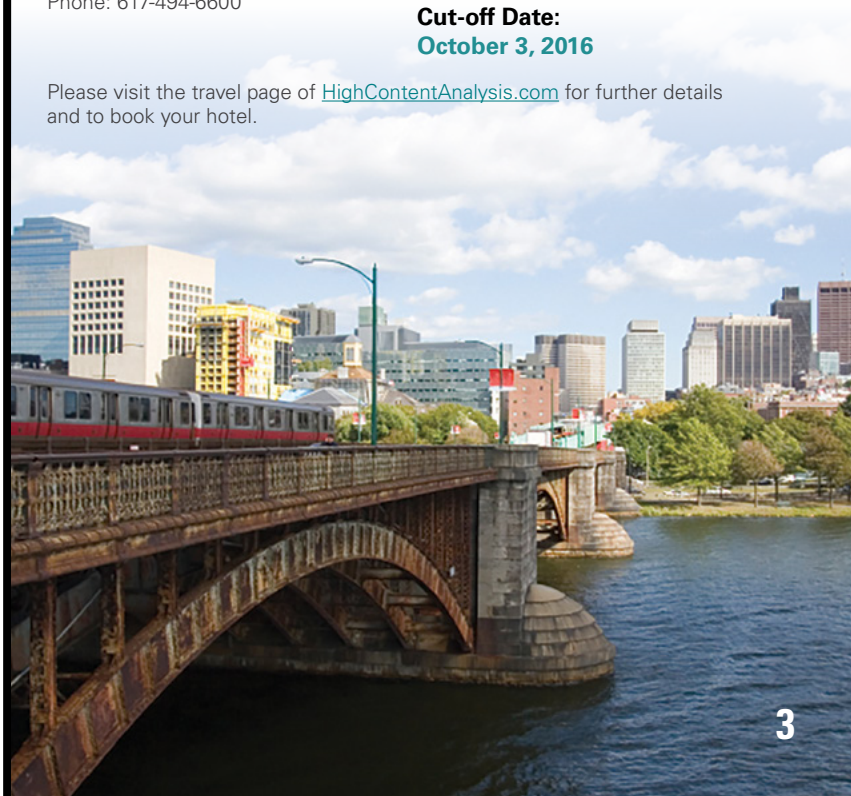
Conference Hotel:

Boston Marriott Hotel
50 Broadway St.
Cambridge, MA 02142
Phone: 617-494-6600

Discounted Room Rate:
$279 s/d

Discounted Room Rate Cut-off Date:
October 3, 2016

Please visit the travel page of HighContentAnalysis.com for further details and to book your hotel.



Cambridge Healthtech Institute's Fourteenth Annual

HIGH-CONTENT ANALYSIS

Taking High-Content Screening to the New Dimension

MONDAY, OCTOBER 31

7:00 am Conference Registration and Morning Coffee

Opening Plenary Session

8:00 Chairperson's Opening Remarks

D. Lansing Taylor, Ph.D., Director, University of Pittsburgh Drug Discovery Institute & Allegheny Foundation Professor of Computational and Systems Biology, University of Pittsburgh

8:10 Phenotypic Responses to Small Molecules as a Means to Illuminate Chemistry and Biology

Stuart Schreiber, Ph.D., Director, Center for the Science of Therapeutics, Broad Institute

My lecture will focus on using: modern asymmetric synthesis in generating 3D compounds having novel (previously unknown) mechanisms of action (nMoA) in probe and therapeutics discovery, phenotypic multiplexed measurements to create performance-diverse compound libraries, and real-time biological annotation of synthetic compounds as a means to increase the potential of chemistry to impact biology and medicine. Examples will be selected from cancer and microbial therapeutics discovery.

8:35 Investigating Metastatic Breast Cancer in the Liver Niche through Quantitative Systems Pharmacology

D. Lansing Taylor, Ph.D., Director, University of Pittsburgh Drug Discovery Institute & Allegheny Foundation Professor of Computational and Systems Biology, University of Pittsburgh

We are investigating the mechanism(s) of disease progression of metastatic breast cancer (MBC) using a platform based on quantitative systems pharmacology (QSP). QSP involves an integrated and iterative application of computational and systems biology combined with experimental approaches. A key component of QSP is the development and use of disease relevant experimental models. We have developed a human, microfluidic, 4-cell liver model to explore the mechanisms of extravasation and dormancy in MBC.

9:00 A High-Content Imaging Approach to Characterize and Address Heterogeneity in an Organotypic Model of Human Alveolar Epithelium

Christophe Antczak, Ph.D., Lab Head, Center for Proteomic Chemistry, Novartis Institutes for BioMedical Research

Organoid cell models that recapitulate aspects of tissue organization/function are of great interest for drug discovery. However, their multi-cell type and three-dimensional organization presents a challenge for quantitative readouts. We developed methods for confocal image analysis of a spheroid model of human alveolar epithelium that helped characterize and address its heterogeneity, intrinsic to organotypic cultures derived from pluripotent cells.

9:25 Coffee Break in the Exhibit Hall with Poster Viewing

HCS Image Analysis and Modeling

10:10 Chairperson's Opening Remarks

Anne E. Carpenter, Ph.D., Director, Imaging Platform, Broad Institute of Harvard and MIT

10:15 Learning Dynamic Models of 3D Cell Organization and Perturbation

Robert F. Murphy, Ph.D., Ray and Stephanie Lane Professor, Computational Biology and Professor, Biological Sciences, Biomedical Engineering, and Machine Learning, Head, Computational Biology, School of Computer Science, Carnegie Mellon University

Generative models provide a more powerful way of comparing sets of 3D images and 3D movies (such as from different cell types or conditions) than descriptive features. They permit comparison across different microscopes and settings, and yield interpretable insights. For example, models constructed from T cells expressing tagged signaling proteins revealed specific roles in co-stimulation by antigen-presenting cells, and models of PC12 cells undergoing differentiation revealed changes in mitochondrial distribution.

10:40 Richer Phenotypes through Image Informatics: Targeting Diseases and Characterizing Compounds via Image-Based Profiling

Shantanu Singh, Ph.D., Senior Computational Biologist, Broad Institute of Harvard and MIT

Microscopy images contain rich information about the state of cells, tissues and organisms. Yet most so-called "high-content" phenotypic screening experiments measure only one or two morphological features. Our laboratory aims to harvest the rich information in images by extracting patterns of morphological changes ("profiles") from cells in response to perturbation by small molecules and/or genetic manipulation. These profiles are used to identify similarities and differences between various chemical or genetic treatments, with the ultimate goal to identify the causes and potential cures of disease. The image analysis algorithms and data mining approaches we develop are freely available through the biologist-friendly open-source software, CellProfiler (www.cellprofiler.org), for both small- and large-scale experiments.

11:05 Quantitative Time-Lapse Fluorescence Microscopy as a Compelling *in vitro* Screening Tool for Drug Combination Therapies in Cancer

Ozan Alkan, Ph.D., Senior Scientist and Team Leader, RNAi R&D, Merrimack Pharmaceuticals

Our goal is to gain mechanistic understanding of DNA damage response pathway topology and to develop a predictive computational model of the involved mechanisms. The model will help rationally design therapies targeting the DDR pathway. In particular the discovery of synergistic and potentiating effects of drug combinations using standard-of-care drugs, such as topoisomerase poisons doxorubicin and irinotecan/SN38, and existing or novel DDR targeting modulators/inhibitors are in the main focus of the analysis.

11:30 Sponsored Presentation *(Opportunity Available)*

12:00 pm Luncheon Presentation *(Sponsorship Opportunity Available)* **or Lunch on Your Own**

High-Content Phenotypic Screening

1:30 Chairperson's Opening Remarks

Regis Doyonnas, Ph.D., Senior Principal Scientist, Primary Pharmacology Group, High Content Screening Lead, Worldwide R&D, Pfizer

1:35 Exploring Biology with Information-Rich Probes in Complex Phenotypic Screens

Jeremy L. Jenkins, Ph.D., Director, Developmental & Molecular Pathways, DMP Research Informatics, Novartis Institutes for BioMedical Research

High-content screening formats that increase disease relevance may also restrict assay throughput. Several computational strategies and experimental case studies are presented in which biologically diverse library content is used to drive biological hypothesis generation for high-content screening results.

2:00 Power and Challenges of High-Content Phenotypic Screening in Drug Discovery

Regis Doyonnas, Ph.D., Senior Principal Scientist, Primary Pharmacology Group, High Content Screening Lead, Worldwide R&D, Pfizer

Phenotypic drug discovery brings "great power that comes with great responsibility"...and many challenges. 1) As assays become more and more physiologically relevant there is a need to capture as many read-outs as possible, and the complexity of these assays increases. 2) The acquisitions of these read-outs require highly sophisticated instrumentation with maximum flexibility for kinetic experiments, 3D culture and maximum sub-cellular resolution. 3) The data generated is therefore complex and require solid infrastructure and workflow processes to run these assays at scale while mining all single cell parameters generated. This talk will highlight high-content phenotypic methods and processes developed at Pfizer to address these challenges to push the boundaries of phenotypic drug discovery programs.

2:25 Sponsored Presentation *(Opportunity Available)*

2:55 Refreshment Break in the Exhibit Hall with Poster Viewing

3:45 A Phenotypic Screen for Modulators of Adipogenic Differentiation

Dana Nojima, Ph.D., Senior Scientist, Discovery Technology, Amgen

4:10 Multiplexed Fluorescence Imaging Using Nucleic Acid Probe Exchange

Mark Bathe, Ph.D., Associate Professor, Biological Engineering, MIT

Fluorescence imaging offers the potential to characterize neuronal synapse protein and mRNA levels and localizations *in situ*. However, current imaging approaches can simultaneously interrogate no more than four of the several dozen molecules of interest in any given neuronal sample. To overcome this obstacle, we are developing a fluorescence imaging assay that enables highly multiplexed molecular characterization of protein and mRNA expression levels and localizations in intact neurons.

4:35 Evolution on a Plate: Cancer Cell Response to Therapy as a Stochastic, Darwinian Process

Arijit Chakravarty, Ph.D., Director, Modeling and Simulation, Takeda

An emerging viewpoint in the field frames cancer progression and response as evolutionary processes. What are the implications for cell-based and high-content work? In this talk, I will discuss the practical consequences of thinking of cancer as an evolutionary process, using as specific applications the development of a novel *in vitro* high-content evolutionary assay platform, and the application of evolutionary theory to traditional *in vitro* dose-response assays.

5:00-6:00 Welcome Reception in the Exhibit Hall with Poster Viewing

5:45 Short Course Registration

6:00-9:00 Dinner Short Course*
(SC1) Introduction to High-Content Phenotypic Screening

**Separate registration required*

TUESDAY, NOVEMBER 1

7:30 am Breakfast Presentation *(Sponsorship Opportunity Available)* **or Morning Coffee**

High-Content Screening of 3D Models

8:25 Chairperson's Remarks

Matthias Nees, Ph.D., Coordinator, HCS Lab, Turku Science Park/Finland

8:30 Supporting Phenotypic Drug Screening Efforts with 2D & 3D High-Content Analysis during Early Pharmaceutical Drug Research

Stefan Prechtl, Ph.D., Senior Scientist, Bayer HealthCare AG

Automated imaging systems in combination with sophisticated IT infrastructure meet the needs for high-content analysis (HCA) of large data sets and can efficiently support modern pharmaceutical drug research. By evaluating, analyzing and quantifying the impact of compound treatment under physiological conditions, when it cannot be done by standard screening systems, HCA-driven approaches positively impact the lead-finding process. At Bayer Healthcare, we exploit this technology in several different therapeutic areas ranging from cell signaling via tumor metabolism to epigenetic regulation to support research projects that are aiming for the identification of novel chemical entities. Two-dimensional cell culture systems as well as three-dimensional cell culture systems are routinely used in a wide range of assay methods that are based on immunocytochemistry, reporter gene expression and live-cell imaging. Especially, three-dimensional cell culture systems enable an improved drug research support as these systems mimic the different metabolic microenvironments found in tumors under physiological conditions. A well-established and reliably running HCA facility significantly supports pharmaceutical research. Nevertheless, remarkable challenges not only pop up during the initial setup of such a complex system, they also routinely emerge whenever new assays are developed, and need to be overcome for a consistent HCA-based compound profiling support.

8:55 Fast & Curious: Combining Speed of Analysis with Physiologically Relevant, Complex Tissue Models for Informative High-Content Screening

Matthias Nees, Ph.D., Coordinator, HCS Lab, Turku Science Park/Finland

Model systems for oncology typically do not address the complex tissue architecture of clinical, solid cancers—and only few approaches aim to capture the complexity, heterogeneity and dynamics that occur in the tumor microenvironment. To facilitate this goal, ultrafast, automated image analyses are required that reconcile the needs for significant experimental throughput with an option to faithfully capture the biology of cancers in drug discovery.

9:20 Sponsored Presentation *(Opportunity Available)*

9:50 Coffee Break in the Exhibit Hall with Poster Viewing

Phenotypic Screening in Human iPSC Models

10:40 Chairperson's Remarks

Mark Mercola, Ph.D., Professor, Department of Medicine and Cardiovascular Institute, Stanford University School of Medicine

10:45 Phenotypic Screening of hiPSC-Derived Neuronal Networks Using Multielectrode Arrays

Anne G. Bang, Ph.D., Director, Cell Biology, Prebys Center, Sanford Burnham Prebys Medical Discovery Institute

Neurological disease modeling and drug discovery efforts would greatly benefit from human cell-based platforms to study neuronal networks and synaptic plasticity. Using human induced pluripotent stem cell (hiPSC)-derived neurons, we have developed a multielectrode array (MEA) assay in multi-well formats that recapitulates physiologically relevant synchronized bursting properties sensitive to shifts in excitation/inhibition balance. We will discuss use of this assay for compound screening and modeling of synaptic plasticity.

11:10 High-Content Analysis in Human iPSC-Derived Cardiomyocytes to Identify Future Heart Failure Therapeutics

Charles C. Hong, M.D., Ph.D., Associate Professor, Cardiovascular Medicine, Pharmacology, and Cell and Developmental Biology, Vanderbilt University School of Medicine

In a manner analogous to classic mutagenesis screens, the Hong Lab conducts high-content chemical screens using zebrafish and cell-based platforms to discover small molecules with therapeutic potential. We recently developed a Matrigel Mattress method to assess both systolic and diastolic functions in cardiomyocytes derived from human induced pluripotent stem cells (hiPSC-CMs). Using this method as a platform for drug discovery, we identified a novel class of potential heart failure therapeutics that exerts inotropic and lusitropic effects *in vitro* and *in vivo* without the deleterious chronotropic effects.

11:35 Using Patient-Derived iPSC Cardiomyocytes to Optimize Drugs for Heart Rhythm Disorders

Mark Mercola, Ph.D., Professor, Department of Medicine and Cardiovascular Institute, Stanford University School of Medicine

The advent of patient iPSC-derived cardiomyocytes promises to reintroduce the patient into the early stages of drug discovery. To bring "disease-in-dish" models into drug and drug target discovery tools, we have developed statistically robust high throughput physiological screening to evaluate the effects of small molecules, genes, and proteins on cardiomyocyte cell cycle, contractility, Ca2+ transient and action potential (AP) kinetics. We are developing a pipeline of combinatorial screening, and biochemical target identification is used to decipher disease mechanisms and point to new drug targets. Examples of large-scale physiological screening include cardiotoxicity of oncology drugs, progress to elucidate mechanisms of familial dilated cardiomyopathy, and the use of screening to develop structure activity relationships for specific on-target and proarrhythmic effects of a small molecule drug.

12:00 pm Close of Conference.

Stay on to attend the Phenotypic Screening conference.

Cambridge Healthtech Institute's Second Annual

3D CELL CULTURE:

Organoid, Spheroid & Organ-on-a-Chip Models

Physiologically Relevant 3D Cellular Models for Drug Discovery and Disease Modeling

MONDAY, OCTOBER 31

7:00 am Conference Registration and Morning Coffee

Opening Plenary Session

8:00 Chairperson's Opening Remarks

D. Lansing Taylor, Ph.D., Director, University of Pittsburgh Drug Discovery Institute & Allegheny Foundation Professor of Computational and Systems Biology, University of Pittsburgh

8:10 Phenotypic Responses to Small Molecules as a Means to Illuminate Chemistry and Biology

Stuart Schreiber, Ph.D., Director, Center for the Science of Therapeutics, Broad Institute

My lecture will focus on using: modern asymmetric synthesis in generating 3D compounds having novel (previously unknown) mechanisms of action (nMoA) in probe and therapeutics discovery, phenotypic multiplexed measurements to create performance-diverse compound libraries, and real-time biological annotation of synthetic compounds as a means to increase the potential of chemistry to impact biology and medicine. Examples will be selected from cancer and microbial therapeutics discovery.

8:35 Investigating Metastatic Breast Cancer in the Liver Niche through Quantitative Systems Pharmacology

D. Lansing Taylor, Ph.D., Director, University of Pittsburgh Drug Discovery Institute & Allegheny Foundation Professor of Computational and Systems Biology, University of Pittsburgh

We are investigating the mechanism(s) of disease progression of metastatic breast cancer (MBC) using a platform based on quantitative systems pharmacology (QSP). QSP involves an integrated and iterative application of computational and systems biology combined with experimental approaches. A key component of QSP is the development and use of disease relevant experimental models. We have developed a human, microfluidic, 4-cell liver model to explore the mechanisms of extravasation and dormancy in MBC.

9:00 A High-Content Imaging Approach to Characterize and Address Heterogeneity in an Organotypic Model of Human Alveolar Epithelium

Christophe Antczak, Ph.D., Lab Head, Center for Proteomic Chemistry, Novartis Institutes for BioMedical Research

Organoid cell models that recapitulate aspects of tissue organization/function are of great interest for drug discovery. However, their multi-cell type and three-dimensional organization presents a challenge for quantitative readouts. We developed methods for confocal image analysis of a spheroid model of human alveolar epithelium that helped characterize and address its heterogeneity, intrinsic to organotypic cultures derived from pluripotent cells.

9:25 Coffee Break in the Exhibit Hall with Poster Viewing

Spheroid Models for Drug Screening

10:10 Chairperson's Opening Remarks

Hossein Tavana, Ph.D., Associate Professor, Biomedical Engineering, University of Akron

10:15 Multi-Parametric and Molecular Analysis of Oncology Drug Screening with Aqueous Biphasic Tumor Spheroids

Hossein Tavana, Ph.D., Associate Professor, Biomedical Engineering, University of Akron

We present a robotic approach to microprint uniformly-sized tumor spheroids using an aqueous two-phase microtechnology and demonstrate high throughput screening of chemotherapeutics and molecular inhibitors against tumor spheroids of different cancer cells. We introduce a multi-parametric scoring system to rank the effectiveness of compounds and utilize protein expression studies to resolve molecular targets of effective drugs. This microtechnology will facilitate compound screening with realistic tumor models in preclinical drug discovery.

10:40 3D Spheroid Models for Studying Ovarian Cancer Chemoresistance and Tumor Recurrence

Geeta Mehta, Ph.D., Assistant Professor, Biomedical Engineering, University of Michigan

The majority of ovarian cancers are diagnosed at advanced stages, with tumors metastasized at the time of diagnosis. Although the standard of care treatment with tumor debulking surgery and combination carboplatin-paclitaxel chemotherapy have an initial cure rate of ~80%, the advanced stage disease is incurable. Patients with advanced disease develop chemoresistant tumors with malignant ascites, with progressively shorter disease-free intervals. Malignant ascites play a major role in the progression of the advanced-stage disease. We have developed a physiological relevant 3D spheroid model of patient-derived ovarian cancer cells, which recapitulates *in vivo* ovarian tumor spheroids in the ascites. By utilizing this model, we are exploring the peritoneal metastasis and chemoresistance in the context of the ovarian tumor microenvironment. We are also investigating the mechanisms of tumor recurrence after chemotherapy, using the patient-derived tumor cells.

11:05 Use of 3-D Airway Organoids from Primary Human Airway Basal Cells in High-Throughput Screening

Marc Hild, Ph.D., Senior Investigator, Novartis Institutes for BioMedical Research

The ability of human airway basal cells to serve as progenitor cells in the conducting airway makes them an attractive target in a number of respiratory diseases associated with epithelial remodeling. We established conditions for the culture of 'bronchospheres', three-dimensional (3-D) organoids that are derived from primary human airway basal cells. Mature bronchospheres are composed of functional multi-ciliated cells, mucin-producing goblet cells, and airway basal cells. In contrast to existing methods used for the culture of well-differentiated human airway epithelial cells, bronchospheres do not require growth on a permeable support and can be cultured in 384-well assay plates. The system provides a mechanism for investigating the regulation of basal cell fate during airway epithelial morphogenesis, as well as a basis for studying the function of the human airway epithelium in high-throughput qPCR assays.

11:30 Sponsored Presentation *(Opportunity Available)*

12:00 pm Luncheon Presentation *(Sponsorship Opportunity Available)* **or Lunch on Your Own**

Organ-on-a-Chip

1:30 Chairperson's Opening Remarks

Murat Cirit, Ph.D., Director, Systems Pharmacology, Massachusetts Institute of Technology

1:35 Human Physiome on a Chip: Merging Tissue Engineering and Systems Pharmacology

Murat Cirit, Ph.D., Director, Systems Pharmacology, Massachusetts Institute of Technology

In vitro models have been utilized in various stages for preclinical development. Such models have advantages such as high-throughput capability, low cost, well-controlled experimental parameters and fewer ethical concerns. The simplicity of the conventional *in vitro* models makes them incapable of achieving adequate physiological relevance for mimicking the human body; however, organ-on-a-chip technologies are dynamic systems that have complex three-dimensional microenvironment and intracellular communications. Hence, there is an urgent need to develop more physiologically relevant *in vitro* systems responsive to drugs for more reliable *in vitro-in vivo* translation (IVIVT) from preclinical results to clinical outcomes.

2:00 Predictive Toxicity Testing in a 3D Microphysiological Model of the Human Kidney Proximal Tubule

Edward Kelly, Ph.D., Associate Professor, Pharmaceutics, University of Washington, Seattle

The kidney proximal tubule is the primary site of drug-induced nephrotoxicity. I will describe the development of a three-dimensional flow-directed proximal tubule microphysiological system (MPS). This MPS is an ideal platform for *ex vivo* modeling of nephrotoxicity. Towards this goal, we have evaluated nephrotoxicity in response to exposure to multiple toxicants, including the heavy metal pollutant cadmium, the antibiotic polymyxin B and the Chinese herbal product aristolochic acid.

2:25 Sponsored Presentation *(Opportunity Available)*

2:55 Refreshment Break in the Exhibit Hall with Poster Viewing

3:45 Microscale Bioengineering of Chronic Diseases

Shuichi Takayama, Ph.D., Professor, Biomedical Engineering, University of Michigan

This presentation will describe microengineered culture systems that aim to recapitulate an aspect of detrimental cell-microenvironment interactions that lead to diseases. Some themes that will be discussed include microfluidic studies of tissue disorganization and extracellular matrix invasion, microscale collagen contraction assays for study of fibrosis, and micro-printed inflammatory biomaterials that modulate immune response.

4:10 Dynamic Vascularized Microtissue Models for Drug Development

Craig A. Simmons, Ph.D., Professor, Mechanical & Biomedical Engineering, University of Toronto

While microtissue and organ-on-a-chip models hold great promise to improve the efficacy and efficiency of *in vitro* drug testing, their incorporation into the drug development pipeline requires a balance between physiological relevance and device utility that has yet to be achieved. I will describe microfluidic platform technologies we are developing to model dynamic vascularized tissues, embodied as standard 96-well microplates to facilitate adoption.

4:35 Miniaturized 3D Cell Cultures on a Micropillar/Microwell Chip for Toxicology Assessment

Moo-Yeal Lee, Ph.D., Assistant Professor, Chemical & Biomedical Engineering, Cleveland State University

Recent advancement in "microarray bioprinting" on a micropillar/microwell chip offers new opportunities for high-throughput screening of compounds on miniaturized 3D-cultured human cells. Nanoscale human cell printing in tunable hydrogels on a robust and flexible chip platform allows us to create micro-tissues, which can be exposed to various stimuli, including compounds, enzymes, and recombinant viruses, and then stained with fluorescent dyes for high-content imaging, ultimately enhancing the predictability of compound toxicity.

5:00-6:00 Welcome Reception in the Exhibit Hall with Poster Viewing

5:45 Short Course Registration

6:00-9:00 Dinner Short Course*
(SC1) Introduction to High-Content Phenotypic Screening
**Separate registration required*

TUESDAY, NOVEMBER 1

7:30 am Breakfast Presentation *(Sponsorship Opportunity Available)* **or Morning Coffee**

High-Content Screening of 3D Models

8:25 Chairperson's Remarks

Matthias Nees, Ph.D., Coordinator, HCS Lab, Turku Science Park/Finland

8:30 Supporting Phenotypic Drug Screening Efforts with 2D & 3D High-Content Analysis during Early Pharmaceutical Drug Research

Stefan Prechtl, Ph.D., Senior Scientist, Bayer HealthCare AG

Automated imaging systems in combination with sophisticated IT infrastructure meet the needs for high-content analysis (HCA) of large data sets and can efficiently support modern pharmaceutical drug research. By evaluating, analyzing and quantifying the impact of compound treatment under physiological conditions, when it cannot be done by standard screening systems, HCA-driven approaches positively impact the lead-finding process. At Bayer Healthcare, we exploit this technology in several different therapeutic areas ranging from cell signaling via tumor metabolism to epigenetic regulation to support research projects that are aiming for the identification of novel chemical entities. Two-dimensional cell culture systems as well as three-dimensional cell culture systems are routinely used in a wide range of assay methods that are based on immunocytochemistry, reporter gene expression and live-cell imaging. Especially, three-dimensional cell culture systems enable an improved drug research support as these systems mimic the different metabolic microenvironments found in tumors under physiological conditions. A well-established and reliably running HCA facility significantly supports pharmaceutical research. Nevertheless, remarkable challenges not only pop up during the initial setup of such a complex system, they also routinely emerge whenever new assays are developed, and need to be overcome for a consistent HCA-based compound profiling support.

8:55 Fast & Curious: Combining Speed of Analysis with Physiologically Relevant, Complex Tissue Models for Informative High-Content Screening

Matthias Nees, Ph.D., Coordinator, HCS Lab, Turku Science Park/Finland

Model systems for oncology typically do not address the complex tissue architecture of clinical, solid cancers—and only few approaches aim to capture the complexity, heterogeneity and dynamics that occur in the tumor microenvironment. To facilitate this goal, ultrafast, automated image analyses are required that reconcile the needs for significant experimental throughput with an option to faithfully capture the biology of cancers in drug discovery.

9:20 Sponsored Presentation *(Opportunity Available)*

9:50 Coffee Break in the Exhibit Hall with Poster Viewing

Organoids and Organotypic Cell Culture

10:40 Chairperson's Remarks

Shay Soker, Ph.D., Professor, Regenerative Medicine, Wake Forest Institute for Regenerative Medicine, Wake Forest School of Medicine

10:45 Tissue-Engineered 3D Organoids as Models of Development and Disease

Shay Soker, Ph.D., Professor, Regenerative Medicine, Wake Forest Institute for Regenerative Medicine, Wake Forest School of Medicine

3D human tissue organoids replicate native tissue structure and function and thus are superior to traditional 2D cultures and animal models. We are using bioengineered organoids to study liver development and congenital diseases, liver metabolism and liver cancer. Other tissue organoids are used for modeling cancer and the impact of the tumor microenvironment on tumor cell growth and drug response for future use in personalized/precision medicine.

11:10 Alzheimer's in a Dish: Perspective and Challenges

Doo Yeon Kim, Ph.D., Assistant Professor, Genetics and Aging Research Unit, Mass General Institute for Neurodegenerative Disease, Massachusetts General Hospital/ Harvard Medical School

Recently, we developed a novel 3D human neural cell culture model of Alzheimer's disease (AD) that recapitulates two key pathogenic events of AD. In this presentation, we will show our follow-up studies including: 1) 3D culture model based on single-clonal human stem cells, 2) analysis of functional deficits in our 3D AD cell models, and 3) our efforts to optimize our 3D AD models into a high-throughput AD drug screening system.

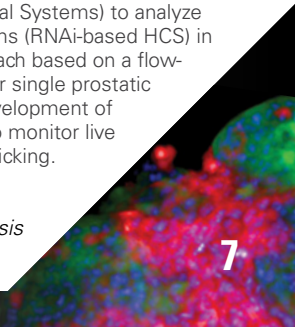
11:35 Organoid-Based High-Content Screening

Xavier Gidrol, Ph.D., Lab Director, CEA/INSERM/UGA

To analyze the phenotypic consequences of genetic perturbation in mammalian cells with drugs, RNAi or expression vectors, there are increasing needs for systematic cell-based high-content screening (HCS) approaches. Although several groups are performing HCS in human cell lines, the real challenge in translational research remains screening on a reduced number of primary cells directly obtained from patients in a microenvironment that would resemble the original tissues. While standard monolayer two-dimensional culture conditions are poor mimics of the cellular environment *in situ*, microfabricated systems enable three-dimensional organoid cultures and have the potential to provide biological insight not achievable before. We use microfluidics and MEMS (MicroElectroMechanical Systems) to analyze the phenotypic consequences of genetic perturbations (RNAi-based HCS) in 3D organoids. Specifically, we present a novel approach based on a flow-focusing microfluidic system that encapsulates either single prostatic or mammary cell in Matrigel beads and assay for development of organoids. We developed new imaging technology to monitor live organoids self-assembly and inter-organoids cell trafficking.

12:00 pm Close of Conference.

Stay on to attend the Screening & Functional Analysis of 3D Models conference.



Track 3

November 1 - 2

Cambridge Healthtech Institute's Fourth Annual

PHENOTYPIC SCREENING

Maximizing Information in Early Drug Discovery for Better Target and Drug Selection

TUESDAY, NOVEMBER 1

11:00 am Conference Registration

12:15 pm Luncheon Presentation: Phenotypic Primary Human Cell-Based Assays for Fibrosis

Sponsored by charles river

Jeroen DeGroot, Ph.D., Senior Director, Biology, Charles River Laboratories

Human primary cell-based assays representing fibrosis pathophysiology are key for target and drug discovery for fibrotic diseases. Profiling of these assays using compounds targeting various molecular mechanisms validates the translational application. High content imaging in 384 well format allows high throughput screening of small molecule as well as RNAi libraries.

12:45 Dessert Break in the Exhibit Hall with Poster Viewing

Strategies in Phenotypic Screening

1:30 Chairperson's Opening Remarks

David C. Swinney, Ph.D., CEO, Institute for Rare and Neglected Diseases Drug Discovery (iRND3)

1:35 Strategies that Identified Targets of Medicines Discovered with Phenotypic Screens

David C. Swinney, Ph.D., CEO, Institute for Rare and Neglected Diseases Drug Discovery (iRND3)

Phenotypic screening as a drug discovery strategy identifies candidate medicines independent of specific molecular hypotheses. Subsequently, the candidate medicine can be used to identify the MMOA and target to facilitate development, as well as to identify follow on molecules. A number of different strategies are employed to identify these targets. Successful strategies used to identify targets of first-in-class NMEs discovered with empirical/phenotypic screening will be discussed in this talk.

2:00 The Phenomics Discovery Initiative: Bringing Predictive Biology to the Best Technology

Paul Andrews, Ph.D., Director of Operations, National Phenotypic Screening Centre, University of Dundee; Director and Owner, Stem Cell Solutions

The National Phenotypic Screening Centre was created with >$14M of government investment and launched in 2015 with labs in three top-tier UK Universities: Dundee, Edinburgh and Oxford. We recently announced the Phenomics Discovery Initiative (PDi)—a pre-competitive consortium open to Pharma/Biotech where we use our academic and clinical network to source, develop and screen novel complex disease-relevant phenotypic assays. Janssen/J&J is PDi's founding member.

2:25 Sponsored Presentation *(Opportunity Available)*

2:55 Refreshment Break in the Exhibit Hall with Poster Viewing

3:45 Improving the Reproducibility of Cellular Assays and Phenotypic Screens

Anthony M. Davies, Ph.D., Center Director, Translational Cell Imaging Queensland (TCIQ), Institute of Health Biomedical Innovation, Queensland University of Technology

Over the last few years, there have been a number of reports highlighting the problem of poor reproducibility in biological research. Indeed it was reported by *Nature News* that irreproducible biology research costs approximately $28 billion per year in the U.S. alone. In this presentation, we will describe our plans and current progress in attempting to address this issue specifically in the area of cell-based assays and phenotypic screening. This Australian-led initiative will incorporate and utilize both methodological and technological innovations to meet our project aims. Currently our focus is on the utilization of high-content imaging and analysis for this task.

4:10 Accelerating Drug Discovery through a Dual-Ligand Based Phenotypic Screening Strategy

Neil Carragher, Ph.D., Professor, Drug Discovery, Institute of Genetics and Molecular Medicine, University of Edinburgh

We present our iterative phenotypic screening strategy, which focuses on sub-library screening of small boutique chemical sets across informative/context-based phenotypic assay panels. Using an agile strategy that combines ligand-based inhibitor design and phenotypic screening in an iterative manner, we demonstrate the rapid discovery of an orally-available, ATP-competitive, kinase inhibitor that displays high selectivity and potent antiproliferative and anti-invasive activity against breast cancer cells.

4:35 Lessons Learned in Phenotypic Drug Discovery

Fabien Vincent, Ph.D., Associate Research Fellow, Assay Development and Pharmacology, Hit Discovery and Lead Profiling, Pfizer Global Research & Development

This presentation will cover a collection of scientific vignettes (i.e. lessons) based on in-house experience with phenotypic drug discovery and touch on a broad range of topics including designing the best phenotypic assays, primary cells and donor-to-donor variability analysis, hit triage and validation, use and misuse of chemogenomics libraries, and toxicity and safety derisking of PDD hits.

5:45 ThinkTank Registration

6:00-9:00 Dinner Expert ThinkTank* (SC2): How to Meet the Need for Physiologically Relevant Assays

**Separate registration required*

WEDNESDAY, NOVEMBER 2

7:30 am Breakfast Presentation *(Sponsorship Opportunity Available)* **or Morning Coffee**

Case Studies in Phenotypic Screening

8:25 Chairperson's Remarks

Bridget Wagner, Ph.D., Director, Pancreatic Cell Biology and Metabolic Disease, Broad Institute

8:30 A Phenotypic Approach to the Chemical Biology of Diabetes

Bridget Wagner, Ph.D., Director, Pancreatic Cell Biology and Metabolic Disease, Broad Institute

A loss of beta-cell mass and biologically active insulin is a central feature of both type 1 and type 2 diabetes. A chemical means of promoting beta-cell viability or function could have an enormous impact clinically by providing a disease-modifying therapy. Here I will discuss how my group is identifying small molecules that promote beta-cell regeneration, viability and function.

8:55 A Quantitative Systems Biology Program for Identifying Novel Therapeutic Approaches for Huntington's Disease

Mark Schurdak, Ph.D., Director of Operations, University of Pittsburgh Drug Discovery Institute

We have implemented a Quantitative Systems Pharmacology (QSP) program that determines the mechanism(s) of disease progression and mechanism(s) of action of drugs on multi-scale systems through iterative and integrated computational and experimental methods to inform the development of optimal therapeutic strategies. Using the QSP approach we identified a number of probes with different canonical mechanisms that prevented HD-induced cytotoxicity and have demonstrated that combinations of

these probes showed enhanced protective effects relative to single probes suggesting distinct mechanisms may be involved. These data will help guide the elucidation of pathways involved in HD neuroprotection.

9:20 Sponsored Presentation *(Opportunity Available)*

9:50 Networking Coffee Break

10:15 Phenotypic Screening for Cardiomyocyte Proliferation

Jeffrey Saucerman, Ph.D., Assistant Professor, Biomedical Engineering, University of Virginia

The adult mammalian heart has a limited ability to regenerate cardiomyocytes. Here, I will discuss our high-content phenotypic screens with primary and human iPSC-derived cardiomyocytes to identify genes and compounds that enhance cardiomyocyte proliferation. We have developed live-cell assays for quantifying changes in cardiomyocyte cell numbers, DNA content, and bi-nucleation. High-content analysis is combined with systems pharmacology analyses to prioritize new therapeutic targets and molecular networks.

10:40 Functional Profiling of Tumor Infiltrating Lymphocytes: Selection of Single Cells for Genomic Analysis

Sheila Ranganath, Ph.D., Director, R&D, Enumeral

Enumeral Biomedical utilizes a proprietary single cell screening and recovery platform to identify and isolate antibodies from murine B cells with diverse binding and functional properties. This approach was used to discover novel anti-PD-1 antibodies including 244C8, which stimulates a differentiated cytokine profile from immune cells. The discovery and characterization of 244C8 and other anti-PD-1 antibodies discovered at Enumeral will be discussed.

11:05 Whole-Organism Chemical Screening Using Zebrafish Larvae Identifies a Role for Sigma-1 Receptors in Controlling Fear Responses

Andrew J. Rennekamp, Ph.D., Research Fellow in Medicine, Massachusetts General Hospital, Harvard Medical School, and Broad Institute

Freezing and fleeing in response to an acute threat is a behavioral trait observed in most animals. The ability to choose an appropriate defense response during a threatening situation has consequences not only for survival but also for mental health. In this talk, I will demonstrate how a new target-agnostic chemical screen was used to discover novel neuroactive small molecules and a role for sigma-1 receptors in defense response selection.

11:30 Luncheon Presentation *(Sponsorship Opportunity Available)* **or Lunch on Your Own**

Phenotypic Screening of 3D Models

12:40 pm Chairperson's Remarks

David Nolte, Ph.D., Professor, Physics, Purdue University; CTO, Animated Dynamics, Inc.

12:45 Implementing 3D Phenotypic and Target-Based Models to Interrogate Small Molecule Inhibition of the MAPK Pathway

Lesley Mathews Griner, Ph.D., Investigator II, Lab Head, Molecular Pharmacology, Oncology Research, Novartis Institutes for BioMedical Research

1:10 Phenotypic Screening for Cancer Therapeutic Efficacy in 3D Tissues

David Nolte, Ph.D., Professor, Physics, Purdue University; CTO, Animated Dynamics, Inc.

The three-dimensional cellular context is a key element influencing how cells respond to chemotherapeutics. Cellular adhesions, local membrane forces, intercellular signaling, and interactions with the extracellular matrix provide a microenvironment in which cancer proliferates and within which it responds to treatment. Biodynamic phenotypic profiling images dynamic processes deep inside 3D tissues, testing therapeutic efficacy *in vitro* while maintaining biological relevance, providing accurate measurements of individual response to therapy.

1:35 Label-Free Optical Molecular Imaging for *in situ* Viability Screening in 3D Engineered Tissues

Mary-Ann Mycek, Ph.D., Professor and Associate Chair for Translational Research, Department of Biomedical Engineering, College of Engineering & Medical School, University of Michigan

Noninvasive and label-free optical molecular imaging with metrics obtained from quantitative image analysis reliably screened viability in 3D living engineered tissues manufactured from primary human cells. Such optically derived metrics for tissue morphology and function could serve as quality control release criteria for cell-based tissue-engineered devices prior to implantation in patients, a critical regulatory requirement in regenerative medicine.

2:00 Close of Conference

Lead Sponsoring Publications

American Laboratory

American Pharmaceutical Review

Biocompare The Buyer's Guide for Life Scientists

Bio·IT World

Drug Discovery Today

Pharmaceutical Outsourcing

Science AAAS

The Scientist Exploring Life, Inspiring Innovation

Sponsoring Publications

Clinical Informatics News Clinical Trials to the Clinic

Computational and Structural Biotechnology Journal

Diagnostics World

DDNews

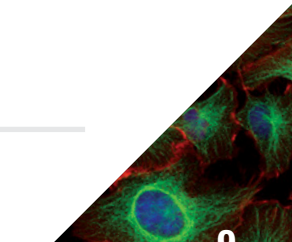
H·C·R HighContentReview.com

Insight Pharma Reports Expert Intelligence for Better Decisions

Web Partners

BioSpace

genomeweb



Track 4

November 1 - 2

Cambridge Healthtech Institute's Fourth Annual

SCREENING AND FUNCTIONAL ANALYSIS OF 3D MODELS

Complex Cellular Models Predictive of Human Response to Improve Early Decision Making

TUESDAY, NOVEMBER 1

11:00 am Conference Registration

12:45 pm Dessert Break in the Exhibit Hall with Poster Viewing

3D Models for Oncology Drug Screening

1:30 Chairperson's Opening Remarks

Bonnie Sloane, Ph.D., Distinguished Professor, Pharmacology, Wayne State University

1:35 Image-Based Quantification of Tumor Heterogeneity and Treatment Response in Microfluidic and Heterocellular 3D Models for Ovarian Cancer

Imran Rizvi, Ph.D., Assistant Professor, Dermatology, Harvard Medical School, and Assistant in Biomedical Engineering, Wellman Center for Photomedicine, Massachusetts General Hospital

Targeting the molecular and microenvironmental determinants of tumor heterogeneity is critical to overcoming treatment resistance. Development of bioengineered models and image analysis tools to design mechanistically informed combinations that overcome heterogeneity from physical stress and stromal partners in ovarian cancer is described. Priming hetero-cellular 3D ovarian cancer nodules with photodynamic therapy (PDT), a clinically approved, light-based biophysical modality, significantly improves response to chemotherapy and decreases heterogeneity in complex 3D tumor models.

2:00 Application of Heterogeneity Analysis in Cellular Models and Tissues in the Context of Quantitative Systems Pharmacology

Albert Gough, Ph.D., Associate Professor, Drug Discovery Institute, University of Pittsburgh

Quantitative Systems Pharmacology uses data from patient samples to develop and validate cell models for applications in discovery. Both types of data exhibit heterogeneity, and it is essential to understand the spatial and population components of heterogeneity. In this presentation, I will discuss the application of pairwise mutual information to the quantitation of spatial heterogeneity and the application of heterogeneity indices to the quantitation of population heterogeneity in cell models.

2:25 Sponsored Presentation *(Opportunity Available)*

2:55 Refreshment Break in the Exhibit Hall with Poster Viewing

3:45 Pathomimetic Cancer Avatars for Screening and Functional Analyses

Bonnie Sloane, Ph.D., Distinguished Professor, Pharmacology, Wayne State University

Our laboratories have pioneered novel techniques for functional live-cell imaging of protease activity in pathomimetic avatars that model both cellular and non-cellular aspects of tumors and their microenvironment. These pathomimetic avatars allow us to test interventions that impact directly or indirectly on proteolytic pathways. To facilitate their use for screening of therapeutic approaches, we have fabricated culture chambers that support long-term growth and live-cell imaging. We predict that pathomimetic avatars grown in our engineered chambers will accelerate identification of druggable pathways, screening of drug and natural product libraries and the entry of validated drugs or natural products into clinical trials.

4:10 Quantitative Signatures of Cancer Cell Shape and Phenotypic Heterogeneity in 4D

Chris Bakal, Ph.D., Team Leader, Dynamical Cell Systems, The Institute of Cancer Research

Here I will discuss how the evolution of our quantitative profiling methods, developed originally in 2D systems, now allows us to perform high-throughput screens for regulators of cancer cell shape in 3D and 4D. In particular, I will discuss the identification of genes encoding components of signaling networks that couple mechanical and geometrical aspects of the extracellular matrix (ECM) to changes in cell shape, and how dysregulation of these networks leads to increased phenotypic heterogeneity that is characteristic of aggressive tumor populations. Finally, I will discuss how we validate our findings *in vivo* using novel integrative analysis.

4:35 Choosing and Designing 3D Cell Culture Models for High-Throughput Screening of Nutrients, Raw Materials and Drugs

Sophie A. Lelièvre, DVM, Ph.D., LLMPH, Professor, Basic Medical Sciences, Scientific Director, 3D Cell Culture Core (3D3C) Facility, Purdue University Discovery Park

Each cell culture model ought to be tailored to the scientific query. I will give examples of important phases in the design of 3D cell culture models, and address differences between classical 3D culture systems and organs-on-a-chip for the purpose of high-throughput screening. Discussion points will also emphasize the importance of the cell culture medium and of the readouts for the mimcry of *in vivo* tissue structure and function.

5:45 ThinkTank Registration

6:00-9:00 Dinner Expert ThinkTank* (SC2): How to Meet the Need for Physiologically Relevant Assays

**Separate registration required*

WEDNESDAY, NOVEMBER 2

7:30 am Breakfast Presentation *(Sponsorship Opportunity Available)* **or Morning Coffee**

Patient-Derived Tumor Models for Screening and Functional Analysis

8:25 Chairperson's Remarks

Geoffrey A. Bartholomeusz, Ph.D., Associate Professor/Director, Target Identification and Validation Program, Department of Experimental Therapeutics, The University of Texas MD Anderson Cancer Center

8:30 Clinical Relevance of Patient-Derived 3D Tumor Microenvironments via Quantitative Multi-Spectral Imaging Approaches

Edna Cukierman, Ph.D., Associate Professor, Cancer Biology Program, Fox Chase Cancer Center

The role of desmoplasia in cancers (e.g., pancreatic) remains unclear. Our desmoplastic 3D model uses cells harvested from surgical samples and allows dissecting between desmoplastic fibroblast-derived extracellular matrices and matrix-induced cellular responses. *In vitro* findings are validated using the original surgical samples in an integrative approach combining multi-colored immunofluorescence and a new quantitative algorithm. This process is then applied to human tissue cohorts granting clinical relevance to our mechanistic findings.

8:55 Patient-Derived 3D Neurospheres for Glioblastoma Drug Screening

Darren Finlay, Ph.D., Research Assistant Professor and Director of Tumor Analysis, Sanford Burnham Prebys Medical Discovery Institute

3D spheroid tumor culture models more accurately represent the environment of cancers *in situ*. Furthermore, patient-derived cultures that have never been exposed to fetal bovine serum are actually representative of patients' cancers whereas commonly used cell lines rarely are. Here we show isolation and characterizations of patient-derived glioblastoma "stem-like" cells, and demonstrate their utility as 3D neurospheres for drug screening and patient sub-stratification.

9:20 Sponsored Presentation *(Opportunity Available)*

9:50 Networking Coffee Break

10:15 Use of *ex vivo* Models Generated from PDX Tumors as a Platform for Anti-Cancer Drug Discovery

Geoffrey A. Bartholomeusz, Ph.D., Associate Professor/Director, Target Identification and Validation Program, Department of Experimental Therapeutics, The University of Texas MD Anderson Cancer Center

Patient-derived xenograft (PDX) systems, an important component in the personalized approach for cancer therapy, are however, costly and time consuming. We have developed an *ex vivo* tumor tissue system closely replicating the original PDX tumor, and preliminary data suggests its potential to serve as a platform to identify new therapies for solid tumors. We predict our *ex vivo* system will significantly reduce both the cost and turnaround time associated with PDX systems.

10:40 A Hyaluronic Acid-Based Hydrogel System for 3D High Throughput Drug Screening

Pamela E. Constantinou, Ph.D., Assistant Research Professor, Department of BioSciences, Rice University

Using a hyaluronic acid (HA)-based hydrogel system, we have coupled high-throughput robotic delivery with automated advanced imaging, to provide a highly reproducible system for drug screens on spheroid cultures of prostate and endometrial cancer cell lines and, more recently, PDX models.

11:05 High-Content Profiling of Primary Patient-Derived 3D Tumor Models for Response Prediction and Tailored Cancer Therapy

Christoph Sachse, Ph.D., Site Head Berlin, NMI TT Pharmaservices

We will present two complementary approaches: (1) in a patient-derived 3D co-culture model of tumor spheroids and T lymphocytes, image-based analyses allow the evaluation of lymphocyte infiltration and T cell-induced cytotoxic effects upon *in vitro* drug treatment; (2) together with our collaborators CPO and Charité, patient-derived 3D tumor cell cultures (PD3D) were subjected to *in vitro* drug testing, NGS panel sequencing and comprehensive proteomic analyses of several signal transduction pathways.

11:30 Luncheon Presentation *(Sponsorship Opportunity Available)* **or Lunch on Your Own**

Phenotypic Screening of 3D Models

12:40 pm Chairperson's Remarks

David Nolte, Ph.D., Professor, Physics, Purdue University; CTO, Animated Dynamics, Inc.

12:45 Implementing 3D Phenotypic and Target-Based Models to Interrogate Small Molecule Inhibition of the MAPK Pathway

Lesley Mathews Griner, Ph.D., Investigator II, Lab Head, Molecular Pharmacology, Oncology Research, Novartis Institutes for BioMedical Research

1:10 Phenotypic Screening for Cancer Therapeutic Efficacy in 3D Tissues

David Nolte, Ph.D., Professor, Physics, Purdue University; CTO, Animated Dynamics, Inc.

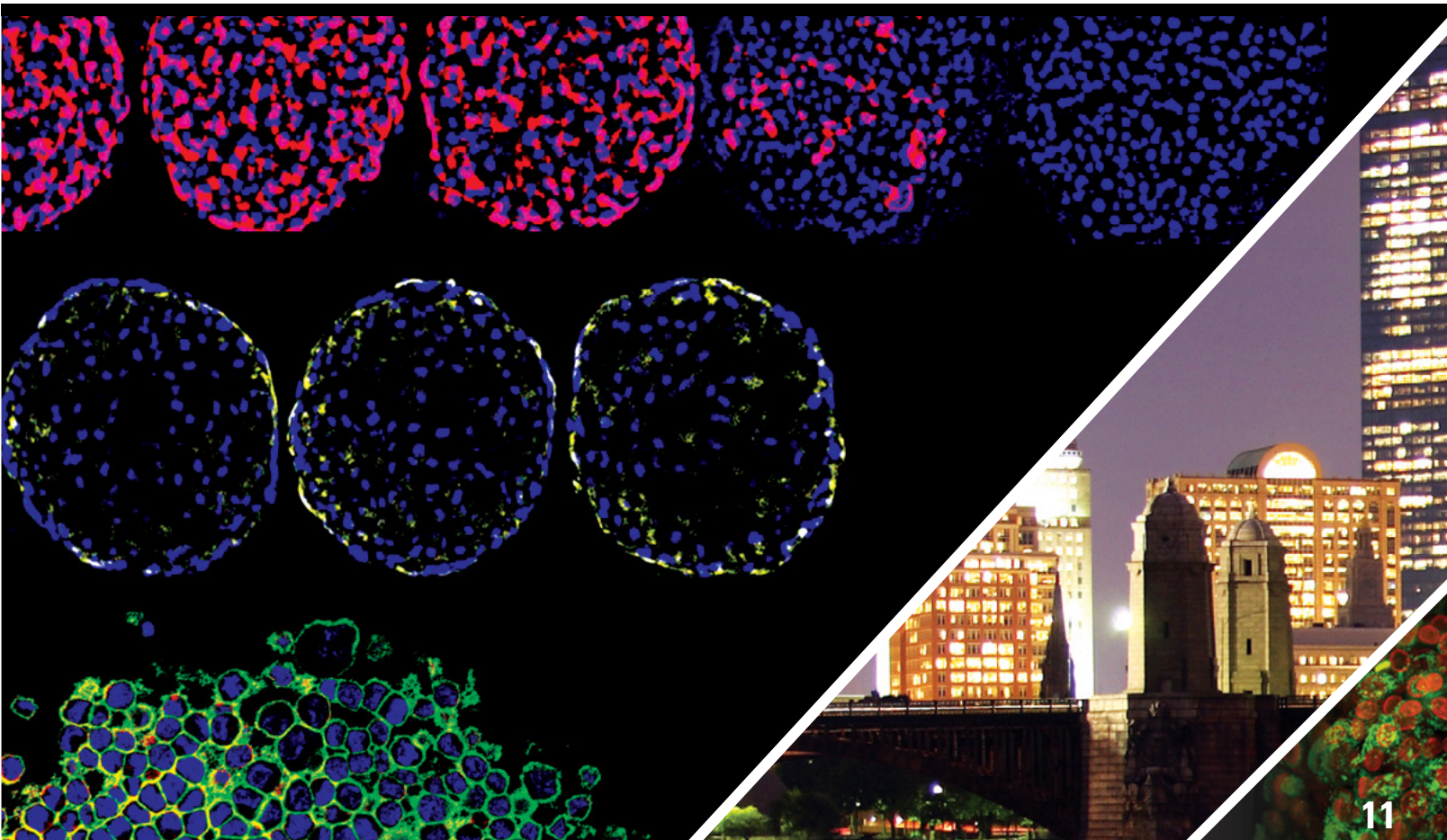
The three-dimensional cellular context is a key element influencing how cells respond to chemotherapeutics. Cellular adhesions, local membrane forces, intercellular signaling, and interactions with the extracellular matrix provide a microenvironment in which cancer proliferates and within which it responds to treatment. Biodynamic phenotypic profiling images dynamic processes deep inside 3D tissues, testing therapeutic efficacy *in vitro* while maintaining biological relevance, providing accurate measurements of individual response to therapy.

1:35 Label-Free Optical Molecular Imaging for *in situ* Viability Screening in 3D Engineered Tissues

Mary-Ann Mycek, Ph.D., Professor and Associate Chair for Translational Research, Department of Biomedical Engineering, College of Engineering & Medical School, University of Michigan

Noninvasive and label-free optical molecular imaging with metrics obtained from quantitative image analysis reliably screened viability in 3D living engineered tissues manufactured from primary human cells. Such optically derived metrics for tissue morphology and function could serve as quality control release criteria for cell-based tissue-engineered devices prior to implantation in patients, a critical regulatory requirement in regenerative medicine.

2:00 Close of Conference



Pricing and Registration Information

CONFERENCE PRICING

	Commercial	Academic, Government, Hospital-affiliated
All Access Conference Pricing BEST VALUE! (Includes access to 2 tracks, excludes short courses)		
Early Rate - Registrations on or before August 5	$2,299	$999
Advance Rate - Registrations on or before September 23	$2,499	$1,099
Standard Rate - Registrations after September 23 and on-site	$2,599	$1,199
Single Conference Pricing (Includes access to 1 track, excludes short courses)		
Early Rate - Registrations on or before August 5	$1,399	$649
Advance Rate - Registrations on or before September 23	$1,599	$729
Standard Rate - Registrations after September 23 and on-site	$1,799	$799

October 31 - November 1	November 1 - 2
Track 1: High-Content Analysis	Track 3: Phenotypic Screening
Track 2: 3D Cell Culture: Organoid, Spheroid, & Organ-on-a-Chip Models	Track 4: Screening & Functional Analysis of 3D Models

DINNER SHORT COURSES

One short course	$595	$295
Two short courses	$895	$495

Monday, October 31	Tuesday, November 1
(SC1) Dinner Short Course: Introduction to High-Content Phenotypic Screening	(SC2) Dinner Expert ThinkTank: How to Meet the Need for Physiologically Relevant Assays

CONFERENCE DISCOUNTS

Poster Submission - Discount ($50 Off): Poster abstracts are due by September 23, 2016. Once your registration has been fully processed, we will send an email containing a unique link allowing you to submit your poster abstract. If you do not receive your link within 5 business days, please contact jring@healthtech.com. *CHI reserves the right to publish your poster title and abstract in various marketing materials and products.

REGISTER 3 - 4th IS FREE: Individuals must register for the same conference or conference combination and submit completed registration form together for discount to apply.

Alumni Discount: Cambridge Healthtech Institute (CHI) appreciates your past participation at High-Content Analysis. As a result of the great loyalty you have shown us, we are pleased to extend to you the exclusive opportunity to save an additional 20% off the registration rate.

Group Discounts: Discounts are available for multiple attendees from the same organization. For more information on group rates contact Catherine Almquist, at calmquist@healthtech.com or 781-972-5447.

If you are unable to attend but would like to purchase the High-Content Analysis & 3D Screening CD for $750 (plus shipping), please visit HighContentAnalysis.com. Massachusetts delivery will include sales tax.

ADDITIONAL REGISTRATION DETAILS

Each registration includes all conference sessions, posters and exhibits, food functions, and access to the conference proceedings link.

Handicapped Equal Access: In accordance with the ADA, Cambridge Healthtech Institute is pleased to arrange special accommodations for attendees with special needs. All requests for such assistance must be submitted in writing to CHI at least 30 days prior to the start of the meeting.

To view our Substitutions/ Cancellations Policy, go to healthtech.com/regdetails

Video and or audio recording of any kind is prohibited onsite at all CHI events.

How to Register: **HighContentAnalysis.com**

reg@healthtech.com • P: 781.972.5400 or Toll-free in the U.S. 888.999.6288

Please use keycode **HCAF** when registering!

Please refer to the Registration Code below:

Cambridge Healthtech Institute
250 First Avenue, Suite 300
Needham, MA 02494
www.healthtech.com
Fax: 781-972-5425