MIT Industrial Liaison Program Faculty Knowledgebase Report

2024 MIT Health Science Forum

September 26, 2024 9:00 am - 1:15 pm

9:00 AM	Registration and Light Breakfast
9:30 AM	Welcome and Introduction Rebekah Miller
9:40 AM	AI for Drug Discovery Bradley L. Pentelute
10:10 AM	HiExM: High-Throughput Expansion Microscopy to Enable Scalable Super-Resolution Imaging John Day
10:40 AM	MIT's Ecosystem Approach to Healthcare Innovation Collin M. Stultz Seema Basu
11:10 AM	Networking Break
11:35 AM	Humanizing Drug Development: Neurovascular Models of Neurological Diseases Francesca Michela Pramotton Postdoctoral Research Fellow MIT Department of Biological Engineering The Humanizing Drug Development (HDD) consortium focuses on developing an iPSC-derived neurovascular model of neurological diseases to investigate different transporter routes for drug delivery into the brain and for drug screening. Isogenic, self-assembled vascular networks of the blood-brain barrier are interfaced to midbrain organoids carrying familial Parkinson's or Alzheimer's disease mutations. These microphysiological systems are key to studying disease development and researching therapeutic possibilities.
11:55 AM	3D Microphysiological Skin Models for Subcutaneous Delivery of Therapeutics Maria Proestaki Postdoctoral Associate MIT Department of Biological Engineering The Humanizing Drug Development (HDD) Skin consortium focuses on developing a 3D microphysiological skin model for subcutaneous delivery of monoclonal antibodies or other therapeutics. The model consists of a self-assembled and perfusable blood vasculature while a lymphatic vasculature is also included in one integrated microfluidic device. This human skin microvascular model can be used for ADME or immune response studies and it can serve as a tool for predicting drug bioavailability.

12:15 PM

Startup Lightning Talks

Daniel Meyer

Kanav Setia

Maureen Deehan

Kfir Schreiber

12:45 PM

Cell Painting to Accelerate Drug Discovery: Finding Disease Phenotypes and Candidate Therapeutics Using Images

Anne Carpenter

Cell images contain a vast amount of quantifiable information about the status of the cell: for example, whether it is diseased, whether it is responding to a drug treatment, or whether a pathway has been disrupted by a genetic mutation. We aim to go beyond measuring individual cell phenotypes that biologists already know are relevant to a particular disease. Instead, in a strategy called image-based profiling, often using the Cell Painting assay, we extract hundreds of features of cells from microscopy images. Just like transcriptional profiling, the similarities and differences in the patterns of extracted features reveal connections among diseases, drugs, and genes.

We are harvesting similarities in image-based profiles to identify, at a single-cell level, how diseases, drugs, and genes affect cells, which can uncover small molecules' mechanism of action, discover gene functions, predict assay outcomes, discover disease-associated phenotypes, identify the functional impact of disease-associated alleles, and find novel therapeutic candidates. This is leading to a growing impact on the pharmaceutical industry as cell morphology becomes a powerful data source for systems biology alongside molecular omics.

1:15 PM

Bagged Lunch with Exhibit

1:20 PM

Poster Session

Kate Bridges

Katarina DiLillo

Julie McDonald

Kathryn Yammine

Anton Barybin