

Platinum Plus-Sponsors Thermo-Fisher/FEI and Illumina present:

Midwest Association of Core Directors

9th Annual Meeting

October 24-26, 2018

Hosted by Case Western Reserve University and the Cleveland Clinic Lerner Research Institute

Main Meeting Venue: Tinkham Veale University Center

Platinum Plus Satellite Meetings

- Thermo/FEI - 10/24 8am to 1pm
 - *Case Western Reserve University The Toepfer Room, Adelbert Hall 2040 Adelbert Road (at Euclid Avenue) Cleveland, Ohio 44106*
 - Developing a World-Class Structural Biology Core Lab
 - Detailed structures of proteins and complexes can help us better understand their function in biology and disease. In the past several years, revolutionary new approaches using mass spectrometry and cryo-EM have provided very high resolution structural models for many important molecular machines and the pace of discovery is accelerating. In this session, you will learn about new state-of-the-art tools for structural analysis, with an emphasis on the combined use of native MS and cryo-EM to drive structure studies forward, plus an introduction to cryo-ET (electron tomography) for high resolution 3D mapping of biological systems. Representatives from Case Western Reserve and the University of Michigan will share their research as well as practical considerations for creating and operating such a facility.
- Illumina - 10/24 8:30am to 1pm
 - *Lerner Research Institute, Cleveland Clinic, 9500 Euclid Avenue, Room NA5-03 (5th Floor), Cleveland, Ohio 44195*
 - Sequencing Workshop
 - Please join the local Illumina team and your peers in an educational workshop and open discussion which will explore recent trends in both sequencing and array technologies. During this time, we'll provide an update on the latest technologies and economic models in the areas of Single-Cell Sequencing, RNA-seq and Metagenomics, including advanced topics like multi-kingdom analysis (bacteria, archaea, fungi, protists and viruses), host removal and metatranscriptomics.

There will be an opportunity to speak with Illumina specialists, as well as network with your peers, both old and new. A more detailed agenda will be provided to registered attendees as we get closer to the event.

Wednesday October 24

- 11am-4pm - Registration Desk Opens
- 1pm-5pm - Core Facility Tours - Choose 1 institution
 - CWRU choose up to 3 pairs of 30 minute tours
 - Solo - Microsoft HoloLens, Holoanatomy Facility
 - Space is limited to 20 people
 - NOTE: Responsible for own transportation (10-15 minute walk) to your connecting core tour rally point that you sign up for.
 - Tours only available for 1-3 pm time slot.
 - Pair 1
 - Imaging Research - MRI, PET, CT, UltraSound
 - Light Microscopy - Gated STED Super Resolution Confocal

- Pair 2
 - Proteomics and General Mass Spec
 - Genomics - Next Gen Sequencing
 - Pair 3
 - Case Comprehensive Cancer Center Flow Cytometry
 - Hematopoietic Biorepository and Cellular Therapy Core
 - Cleveland Clinic's Lerner Research Institute
 - Pair 1
 - Imaging - (Digital, EM, Histology, Light Microscopy)
 - Genomics - (Single Cell)
 - Pair 2
 - Hybridoma - (In Vitro CRISPR)
 - Cell, Media, and Glassware Services Core
 - Pair 3
 - Biorobotics Mechanical Testing
 - Mechanical Prototyping Core
 - 6pm-Opening Reception
 - Crawford Auto & Aviation Museum

Thursday October 25

- 7:30-8am - Breakfast
- 8-8:30am - Welcome and Introductions
- 8:30-9:30am - Plenary Keynote - Presentation
 - Dr. Mitchell Drumm
 - Case Western Reserve University, Department of Pediatrics and the Cystic Fibrosis Center
 - Cystic fibrosis: a model pipeline approach for genetic diseases
 - Therapeutic development approaches for single gene disorders have elements that are similar, regardless of the disease. Because of these similarities, core facilities can play a particularly large role in effectively and efficiently moving translational research forward. The first step for such disorders is identifying the gene or genes causing them, facilitated by sequencing facilities. Subsequent, broad characterizations of cellular and molecular effects caused by the disease gene can be accomplished by various "omics" surveys, such as transcriptome, proteome and metabolome profiling. With the advent of genomic engineering technologies, models of genetic disease can be rapidly generated on which various therapeutics can be tested. Additionally, therapeutic markers or endpoints can be developed and implemented through core facilities as well. We have used the availability of core facilities to complement research interests of individual labs working on the genetic disease cystic fibrosis, using next RNA-seq to develop an atlas of gene expression differences in tissues of CF mouse models, as well as cell models. We have used the small molecule, drug screening facility to search for potential therapeutic compounds and the targeting and transgenic core to develop mice with reporter systems that allow detection of various processes in vivo. Our small animal imaging core provides the knowledge and instrumentation to detect those reporters so that longitudinal studies can be carried out. With such a core facility pipeline available and in place, this strategy is being applied to many different genetic diseases.
- 9:30-10am - Break/Vendor Meetings
- 10-11am - Core Facilities 101 - Breakout Sessions #1
 - Admin Track - Panel - Rate Setting/Equipment Purchasing/Starting a new core
 - Ms. Lisa Wright, Dr. David Morgan

- Abstract Coming
- Imaging Track - Whole Animal Imaging-MRI, Ultrasound, PET
 - Dr. Chris Flask, Dr. Efstathios Karathanasis, Dr. Raymond Muzic
 - In vivo imaging of animal models has rapidly expanded over the past two decades to include multiple modalities including magnetic resonance imaging (MRI), radionuclide imaging (PET, SPECT), ultrasound, as well as multiple forms of optical imaging (i.e., bioluminescence and fluorescence). These specialized medical imaging systems provide unique opportunities to non-invasively probe into numerous anatomic, pathophysiologic, and metabolic features of animal models of cancer, diabetes, cardiovascular disease, neurologic diseases, inflammation, infectious diseases, and many other diseases. This session will provide a basic overview of these common modalities highlighting their relative strengths, weaknesses, and typical applications. Key skills obtained from this session will be help guide selection of the appropriate modality or modalities for specific applications.
- Genomics Track - Presentation - Next Generation Sequencing
 - Dr. Alexander Miron, Simone Edelheit
- 11am-12pm - Core Facilities 101 - Breakout Sessions #2
 - Admin Track - Panel - Social Roles in Science
 - Dr. Mary Winn, Nicole White
 - Imaging Track - Panel - Non-Whole Animal Imaging-EM/ Light/ Confocal
 - Dr. Sudha Chakrapani, Dr. Yoshikazu Imanishi, Dr. Mark Sanders
 - This session will broadly focus on the technological breakthroughs in multiple areas of microscopy. Cryo-Electron Microscopy (Cryo-EM) has revolutionized the field of molecular medicine, now enabling the determination of atomic structures of a wide variety of macromolecular therapeutic targets. Sudha Chakrapani will focus on the elucidation of serotonin receptor function at the molecular level and discuss cryo-EM workflow: from sample preparation, imaging, to structure determination. She will highlight the new initiatives at CWRU to bring this cutting-edge technology to the Cleveland Area.
 - Yoshikazu Imanishi will focus on ex-vivo confocal imaging of photoreceptor neurons for visualizing the transport of a prototypical G protein-coupled receptor, rhodopsin and long term monitoring of protein renewal in the retina of small animals. He will cover approaches such as protein labeling with photoconvertible fluorescent proteins and non-invasive live imaging of small molecules by multiphoton microscopy.
 - Mark Sanders will focus on how to incorporate screening and imaging tools in a shared facility. The Nikon Center of Excellence utilizes Nikon Elements High-Content package (Nikon Elements HC) on automated inverted scopes to do multi-pass imaging following intelligent image analysis decisions, especially during treatment-based results of live cells in plates or microfluidic chambers. These results are frequently used to facilitate in-vivo animal studies that utilize the intravital multi-photon scopes and or in-vivo fluorescence/bioluminescence or even μ PET/CT within this facility.
 - Other Topics Track - Panel - Innovation-Translation and Entrepreneurship
 - Anne Dechant, Kendra Gardiner, Jeff Epstein, Dr. Mark Chance
 - What is the ecosystem of moving innovations from research institutions to industry/start-up?
 - What institutions do we offer to support the pipeline?

- How do core facilities fit into this ecosystem?
 - What is missing, and what can be done to improve the current system in Cleveland and Northeast Ohio?
 - What can we learn from our Midwest counterparts?
- 12-1:15pm - Platinum Plus Sponsored Lunch Talks
 - FEI
 - Illumina
- 1:15-2:15pm - Plenary - Problem Solving - Working Session
- 2:15-3:30pm - Plenary - Problem Solving - Presentations
- 3:30-4pm - Break/Vendor Meetings
- 4-5pm - Core Facilities 101 - Breakout Sessions #3
 - Imaging Track - Panel - Flow Cytometry 101
 - Dr. Brian Grimberg
 - Genomics Track - Panel - Applications of CRISPR/Cas in Mouse and Rat Models
 - Dr. Ron Conlon, Dr. Thom Saunders, Dr. Craig Hodges
 - CRISPR/Cas9 has revolutionized biology by bringing targeted mutagenesis to all cells and organisms. Targeted mutagenesis has long been available in the mouse model, but CRISPR/Cas9 has made it faster, cheaper and more powerful. This session will introduce the basics of CRISPR/Cas9 mutagenesis, as well as provide a discussion of its application to mouse and rat models of health and disease.
 - Other Topics Track - Panel - Big Data and Bioinformatics 101
 - Dr. Mark Cameron, Dr. William Bush, Dr. Paola Saroufim, Dr. Pallavi Tiwari, Dr. Satish Viswanath, Dr. Vinay Varadan
- 5-6pm - Break, Vendor Meetings
- 6-8:15pm - Vendor Mixer and Halloween Costume Party

Friday October 26th

- 7:30-8am - Breakfast
- 8-9am - State of the Science Breakout Sessions #1
 - Administrative Track - Hands-on Practicum - Balanced Scorecard for Facility Evaluation
 - Nicole White
 - Genomics Track - Presentation - EpiGenomics
 - Dr. Claudia LaLancette and Dr. Thomas Lanigan
 - Topics:
 - What is epigenetics?
 - Why is it importance?
 - What is the current state of the field?
 - The future of the field of epigenetics, with a focus on functional validation.
- 9-9:30am - Break/Vendor Meetings
- 9:30-10:30am - State of the Science Breakout Sessions #2
 - Imaging Track - Panel - SEM/Volume Scope Imaging
 - Dr. Christopher Gilpin, Dr. Graham Kidd
 - Mass Spectrometry Track - Presentation - Imaging Mass Spectrometry: Current Status and Feasibility in a Core Facility
 - Dr. Kevin Schey
 - Discuss current state of imaging mass spectrometry (IMS) and provide examples
 - Discuss future directions of IMS
 - Discuss feasibility of providing IMS services in a Core environment

- Other Topics Track - Panel - *Drug Discovery and High Throughput Screening*
 - Dr. Drew Adams, Dr. Shaun Stauffer
 - Academic investigators are increasingly interested in initiating early stage drug discovery projects and often use core facilities to execute experiments in high-throughput screening, hit-to-lead, medicinal chemistry, and in vivo pharmacology. This session will examine best practices for advancing drug discovery projects using academic core facilities, with a focus on HTS and medicinal chemistry. Discussion points include collaboration models, issues of intellectual property, obtaining institutional support and pilot funding for high-risk projects, and navigating projects across 'valleys of death' at each stage in the process. We will conclude with a discussion session to broadly survey issues relating to the various core facilities that can accelerate translational research in academia.
- 10:30-11:30am - State of the Science Breakout Sessions #3
 - Administrative Track - Presentation - *Program Income Calculating and Reporting for Core Facilities*
 - Dr. Susan Meyn
 - Genomics Track - Presentation - *Advanced RNA Profiling and RNA Biology*
 - Dr. Eckhard Jankowsky
 - Gene expression is regulated in large part through the RNA life-cycle, which occurs in several distinct steps, including processing, translation and decay. Simple RNA abundance measurements often fail to capture critical regulatory steps, thus limiting the utility of RNA-seq approaches to obtain instructive biological information. We show how advanced transcriptome-wide approaches that focus on defined steps in the lifecycle of RNAs, including ribosome profiling, iCLIP, and RNA half-life measurements, provide unprecedented insight into RNA biology and facilitate identification of therapeutic targets and biomarkers. We then outline how the Advanced RNA Profiling Core offers these technologies as a service to the scientific community.
 - Other Topics Track - Panel - *Biomaterials - Challenges of the 21 st Century Center: Becoming more than an accumulation of instruments and measurement expertise*
 - Dr. Steven Eppell, Ryan Milosh, Dr. Anirban Sen Gupta
 - Perhaps THE prime challenge of 21st century science is to more effectively translate scientific discovery to the marketplace. Federal funding agencies have been driving individual investigators in this direction since the 1980's. For most of this time, the translational challenge has been shouldered primarily by the individual principle investigators with some institutional support from offices of technology transfer. This session will explore the possibility that existing centers might expand their roles becoming the nexus of the key stakeholders involved in the translational process. Special attention will be given to how this idea may play out with biomaterials centers.
- 11:30am-12:45pm - Platinum Sponsored Lunch Lightning Talks
 - iLab
- 12:45-1:45pm - Ending Keynote - Panel
 - Dr. Martina Veigl, Lindsay Stetson
 - *Single Cell Genomics and Cancer*
- 1:45pm - Awards and Announcements
- 2pm MWACD Business Meeting
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