



Research Resources Center



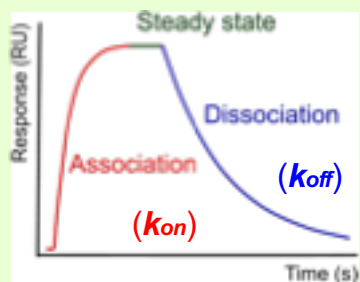
Director: Rich Minshall, PhD

Division/ Cores	Core Director	Faculty Advisor
Genome Research Division		
Sequencing Core	Kevin Kunstman	Bradley Merrill
Genomics Core	Zarema Arbieva	Gail Prins
Genome Editing Core	Maureen Regan	Bradley Merrill
Viral Vector Core	Jody Martin	John Solaro
Research Informatics	Mark Maienschein-Cline	
Bioanalytics, Biophysics & Cytomics Division		
Flow Cytometry Core	Balaji Ganesh	Bellur Prabhakar
Protein Core	Bao-Shiang Lee	Xiaoping Du
Mass Spectrometry Core	Hui Chen	Stephanie Cologna
Biophysics Core	Hyun Lee	Mike Caffrey
NMR Core	Ben Ramirez	Guido Pauli
High Throughput Screening Core	Kiira Ratia	Greg Thatcher
Scientific Imaging & Nanotechnology Division		
Electron Microscopy Core	Alan Nicholls	Robert Klie
Fluorescence Imaging Core	Peter Toth	Simon Alford
Animal Imaging Core	Weiguo Li, Leo Chen	Dieter Klatt
Cardiovascular Research Core	Jiwang Chen	Jan Kitajewski
Histology and Tissue Imaging Core	Maria Sverdlov	Peter Gann
Nanotechnology Core Facility	Anthony DiVenere	Ken Brezinsky
Support Units		
Biorepository	Klara Valgy-Nagy	
Scientific Computing Support	Sonika Anand	
Scientific Storeroom	Jenny Beck	
Fabrication and Repair Shop	Joel Rodriguez	

UIC Cores that support Drug Discovery and Development

BioPhysics, SPR, and NMR

Biacore T200 (SPR) for Direct Binding Analysis



K_D : binding affinity
 K_{on} : association rate
 K_{off} : dissociation rate

- 96-well plate, 384-well plate
- detection limit <100 Da
- small sample volume
- binding affinity : pM – 2 mM ranges

Other Biophysical Instruments for Purified Protein Quality Assessment



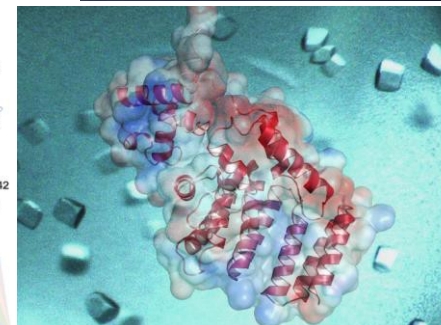
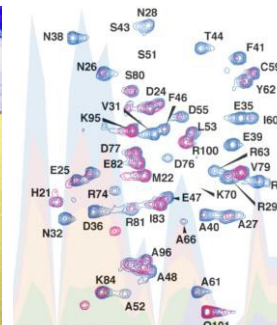
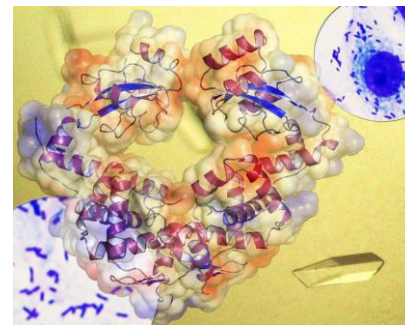
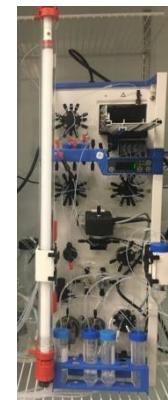
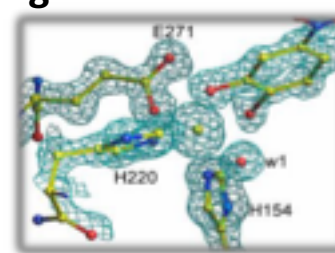
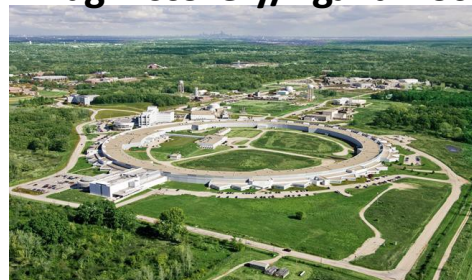
CD

DLS

AUC

Macromolecular Structure

- Large-scale Protein Purification
- Protein Crystallization
- Structure Determination
 - Single-crystal X-Ray Diffraction
 - NMR spectroscopy
- Drug Discovery/Ligand Docking



Hyun Lee, PhD, Core Director
 Research Asst. Prof. of Medicinal Chemistry and Pharmacognosy

Ben Ramirez, PhD, Core Director
 Res. Assoc. Prof. of Biochemistry

Faculty Advisors and Oversight Committee:

Mike Caffrey, PhD
Arnon Lavie, PhD

Guido Pauli, PhD
Mike Johnson, PhD

Vadim Gaponenko, PhD
Jimmy Orjala, PhD

High-Throughput Screening Facility

Kiira Ratia, PhD, Core Director

Faculty Advisors:

Greg Thatcher, PhD

Jason Hickok, PhD



pre-screening services

- Assistance with biochemical and cell-based assay development and optimization for HTS

high-throughput screening

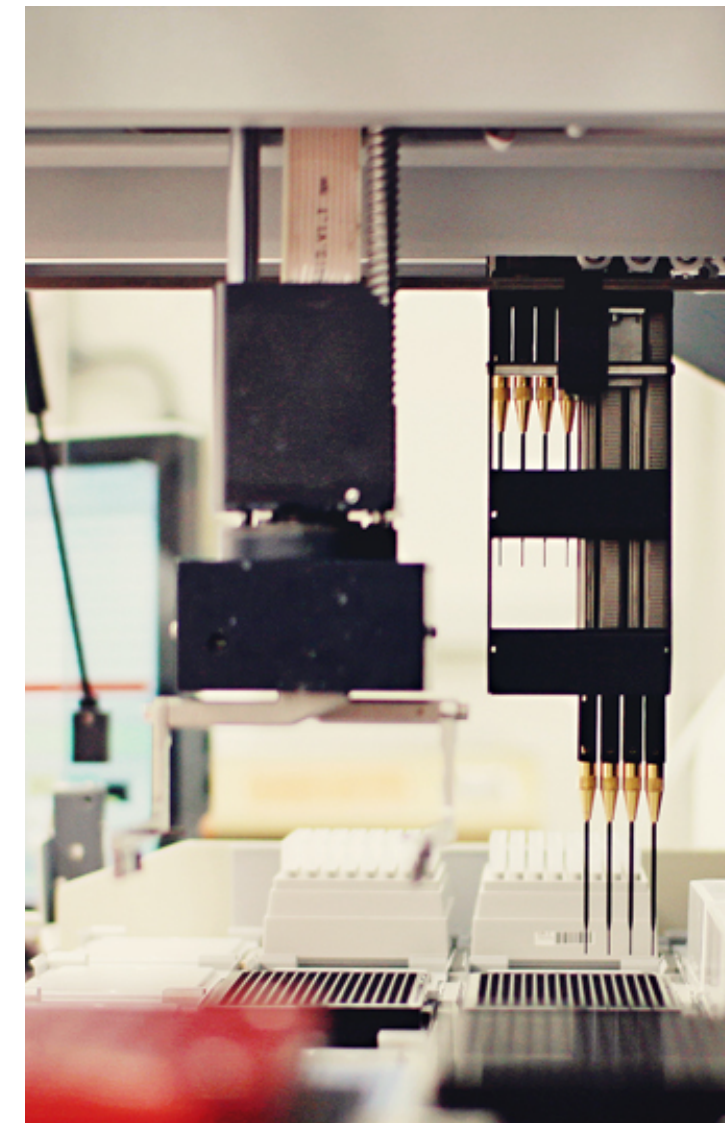
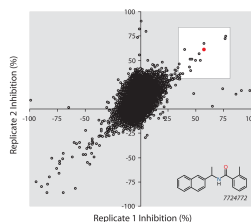
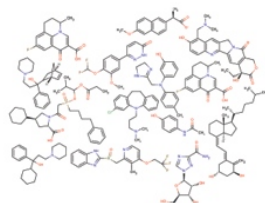
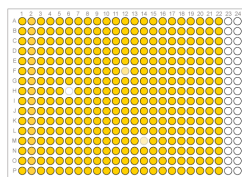
- Screening performed in-house on our robotic workstation and multimode plate readers
- Full data collection and analysis provided
- Diverse sets of compounds available for screening purposes (100,000+ commercial and proprietary compounds)

post-screen services

- cherry picking of hit compounds
- confirmatory assays (dose response curves)
- counter-screening & secondary assays

Equipment

- Tecan Freedom EVO 200 liquid handling platform (96-channel pipetting head, 8-channel pipetting arm, robot gripper arm, integrated shaker, barcode scanner, temperature-controlled carriers and shelves)
- Tecan Infinite F200 plate reader (absorbance, luminescence, fluorescence intensity, fluorescence polarization, TR-FRET)





Mass Spectrometry, Metabolomics & Proteomics Core

- Small molecule: molecular weight/structure determination by GC/LC-MS, high resolution MS and MS/MS
- Proteomics: protein Mw determination, identification, PTMs analysis, global quantitation by TMT/iTRAQ/SILAC
- Metabolomics: Untargeted survey and targeted quantitation
- Bioinformatics: statistical analysis and pathway analysis

Hui Chen, PhD, Core Director
 Yueting Wang, PhD, Asst. Director
 George Chlipala, PhD, Bioinformatics

Faculty Advisors:

Stephanie Cologna, PhD
 P. Subbaiah, PhD
 V. Natarajan, PhD
 Greg Thatcher, PhD
 Laura Sanchez, PhD

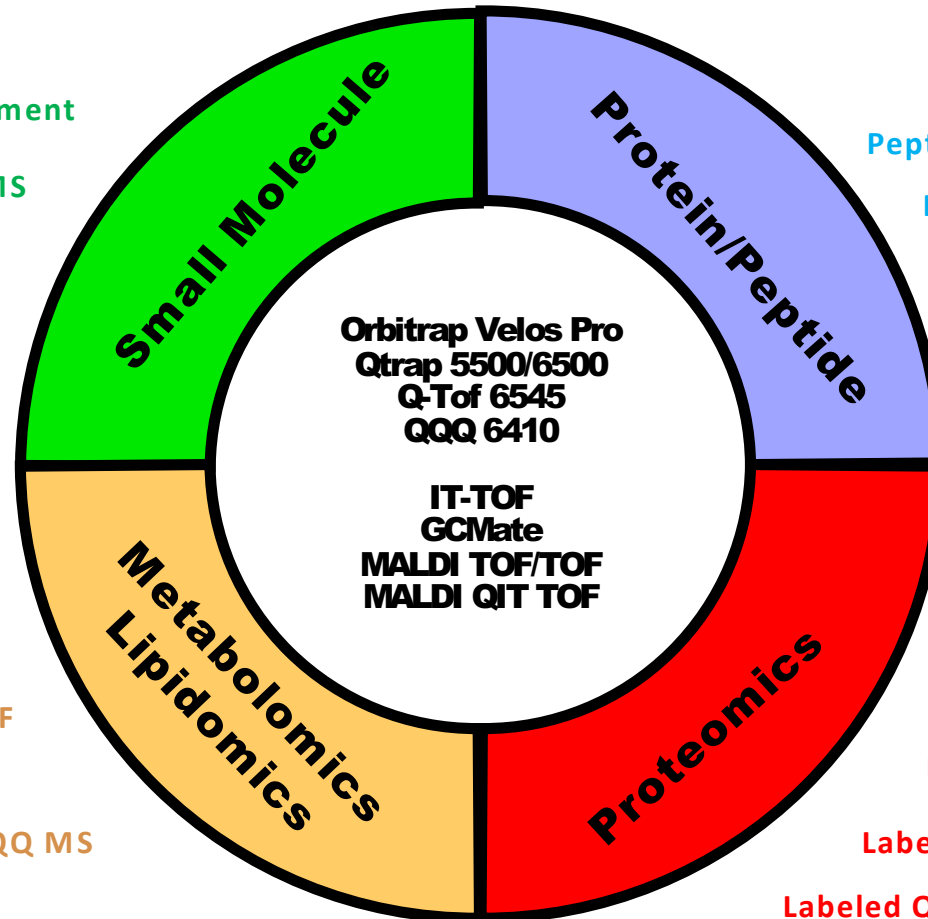
Pharmacokinetic (PK) Assessment

Exact Mass via EI/CI/FAB on GC-Mate MS

Exact Mass via ESI/APCI on IT TOF MS

Structure Analysis via Fragmentation

Targeted Quantification on QQQ MS



Untargeted analysis on Q-TOF

Targeted analysis on QQQ MS

Peptide/intact protein isoelectric fractionation via OFFGEL

Peptide Separation/Purification via LC

Protein/Peptide Mw Determination

Peptide mapping/Protein Characterization

Protein ID from 1D/2D SDS PAGE

Protein/Peptide Targeted Quantification on QQQ MS

Global Proteomics ID

Various PTMs Analysis

Biomarker Discovery

Label-free Quantification

Labeled Quantification via TMT/iTRAQ/SILAC

Cardiovascular Research Core



Rodent Models

Heart Failure: Trans aortic constriction (TAC)

Heart Attack: Coronary artery ligation

Stroke: Middle cerebral artery occlusion (MCAO)

Sepsis: Cecal ligation and puncture (CLP)

Pulmonary Hypertension: Hypoxia/Sugen

Physiological Monitoring/Services

High-resolution echocardiography

In vivo hemodynamics (PV loops)

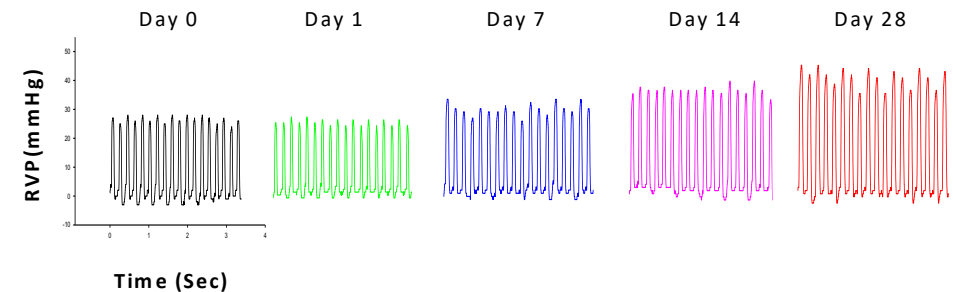
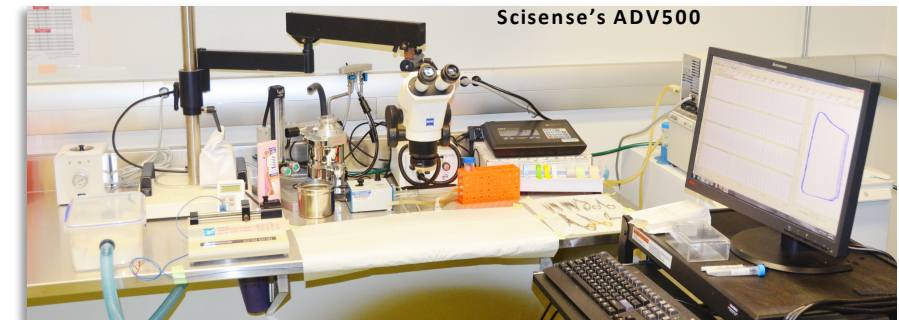
Electrocardiography

Pressure and hemodynamics

IVIS Bioluminescence Imaging

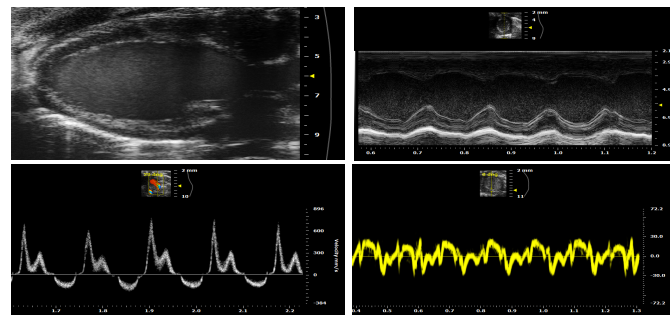
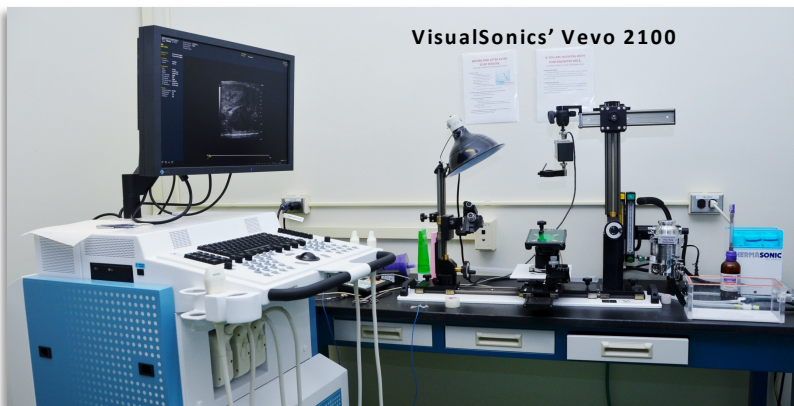
Jiwan Chen, PhD, Core Director
Maricela Castellon, MS, Asst. Director

Faculty Advisors:
Jan Kitajewski, PhD
John Solaro, PhD
Rich Minshall, PhD



Representative right ventricular systolic pressure of a wild-type mouse during hypoxia exposure (10% O₂).

VisualSonics' Vevo 2100



A: B-mode/parasternal long-axis view; B: M-mode/parasternal short-axis view; C: Pulsed Doppler; D: Tissue Doppler from the apical view.

Preclinical Imaging

MRI

- Anatomical MRI
- Functional MRI
- Localized NMR Spectroscopy
- MR Elastography

- 9.4 Tesla MRI
- Three gradient sets
- Multiple RF coils
- Anesthesia and temperature controls
- Animal gating system

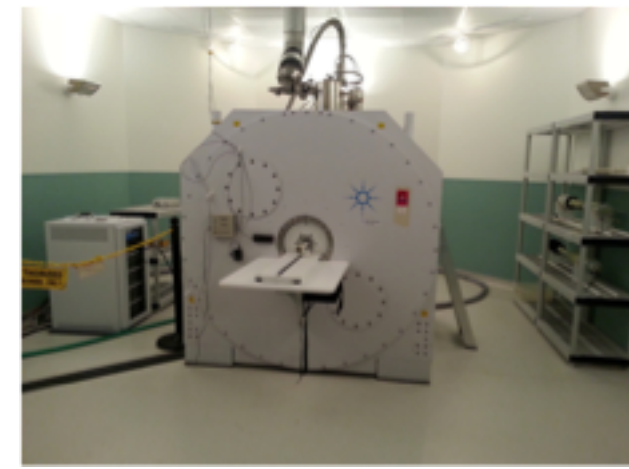
Weiguo Li, PhD, Core Director

Faculty Advisors:

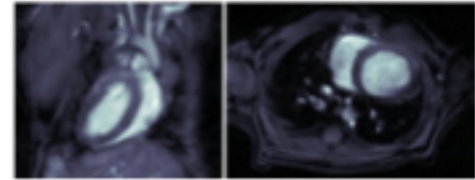
Dieter Klatt, PhD

Tom Royston, PhD

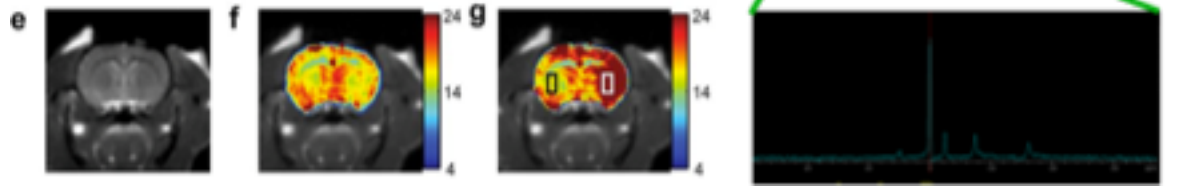
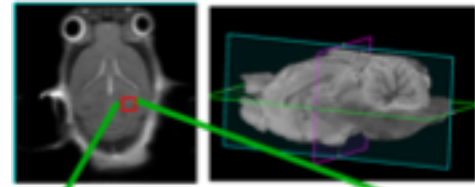
Rich Megan, PhD



Heart and lung



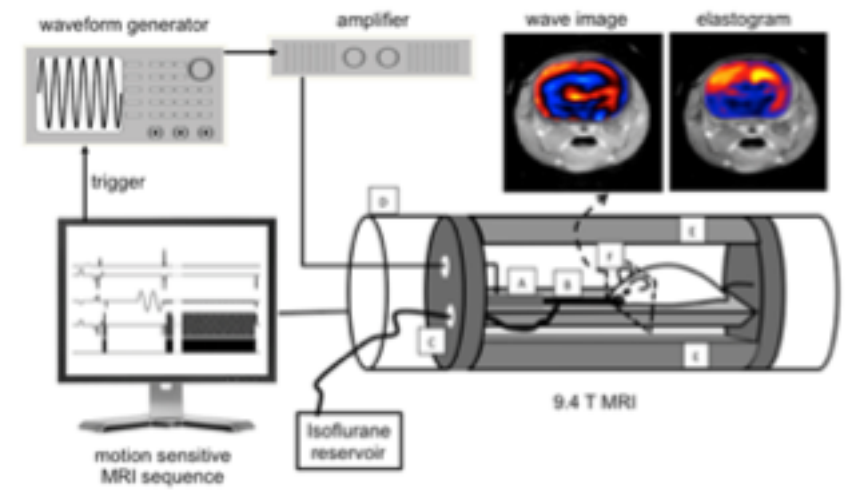
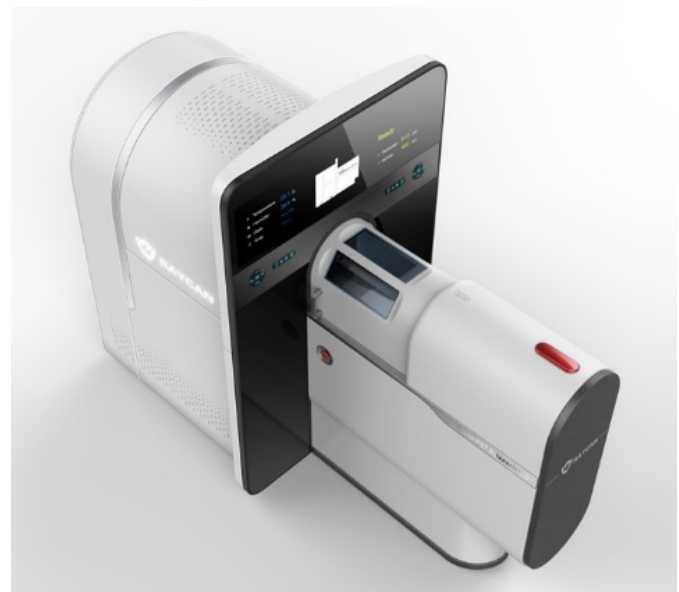
Brain and MRS



Digital PET/CT (July 2018)

Leo Chen, PhD
(expert in PET)

Steve DiMagno, PhD
(expert in Radiochemistry)



UICentre
Collaborative
Engagement in
Novel
Therapeutic
Research &
Enterprise

The vision of UICentre is to create a collaborative, entrepreneurial environment conducive both to the cutting-edge science that drives drug discovery and to the translation of this science towards clinical application benefiting society at large

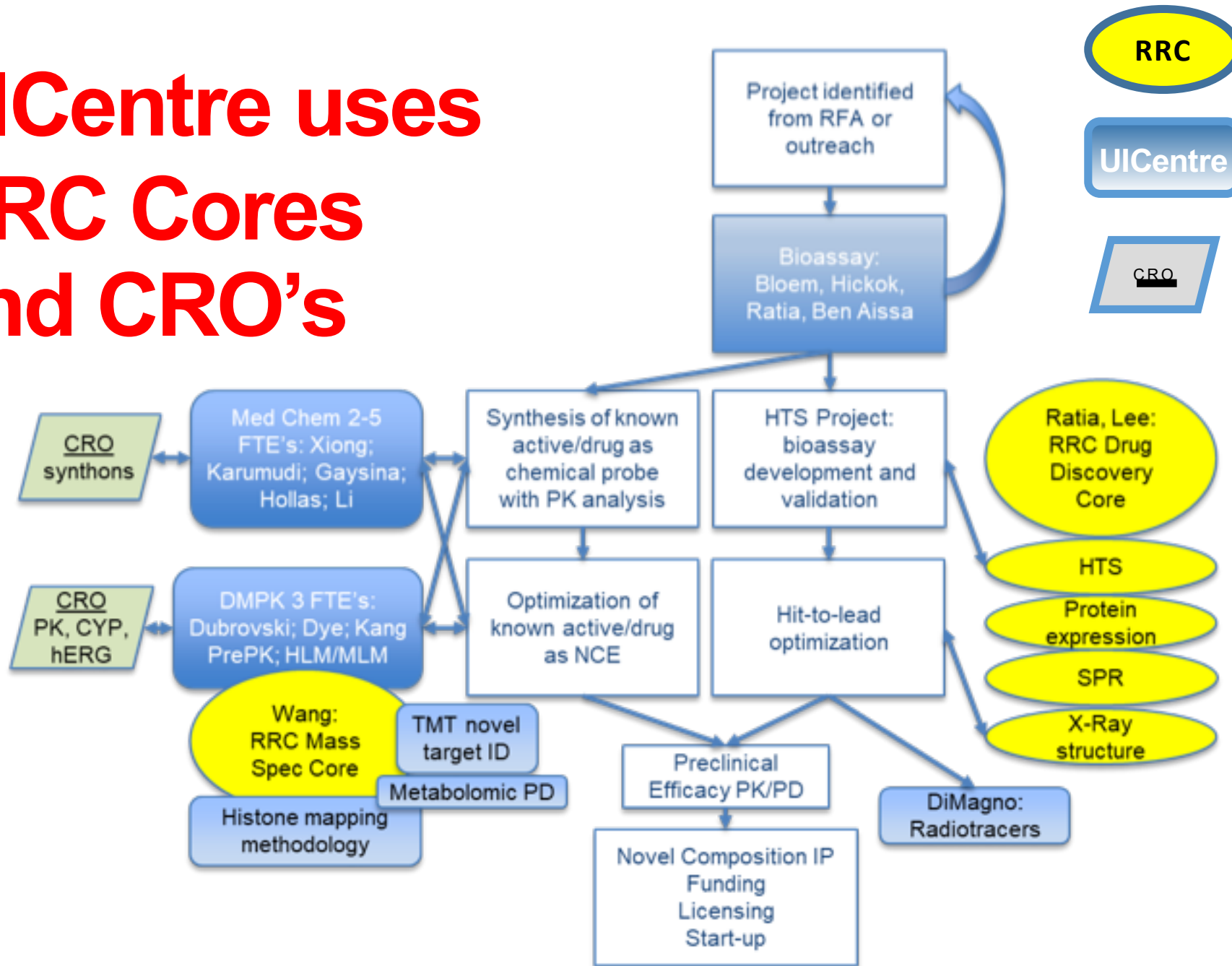
UICentre will bring together members from across UIC with varied skill sets and provide seed funding, external expertise, project management, and core services

...to enhance the transit of therapeutics and preventive interventions along the developmental pipeline; disseminate innovative translational research methods and best practices...



UIC CENTER FOR CLINICAL AND
UNIVERSITY OF ILLINOIS
AT CHICAGO TRANSLATIONAL SCIENCE

UICentre uses RRC Cores and CRO's



UICentre Drug Discovery Model

Director: Greg Thatcher, PhD
thatcher@uic.edu

- 1. Pipeline discovery: Incubation-to-Bioassay-to-HTS**
 - 7x HTS campaigns completed
 - Pipeline shift to oncology to support the UI Cancer Center
- 2. Strategic discovery exploiting established biology/chemistry at UIC**
 - 1 IND; 1 license; 3x start-up companies supported
- 3. Service, Inception, Workshops, and Training Grants**
 - Service support of funded grants
 - Inception of new methodologies for campus-wide use

- **The only GLP-compliant academic toxicology laboratory in Chicagoland; > 30 years of service**
- **The only academic laboratory in the US that can carry out ALL necessary in vitro and in vivo studies for IND and NDA submissions to the FDA**
- **Current focus is on NCI and BARDA contract work but has additional capacity to develop entire IND package needed to initiate a clinical trial for 2 new drugs/year**



Alex Lyubimov, MD PhD,
Director
lyubimov@uic.edu

- **Provides all necessary preclinical services for IND/NDA drug submission**
- **> 30 drugs successfully submitted to FDA**
- Animal toxicology studies
- Analytical formulation analysis and plasma/tissue bioanalysis
- PK and biodistribution studies, PK specialist on site
- In vitro metabolism
- Genotoxicity
- ADA, Abs titer, neutralization and biomarkers assays



Student Awards to CBC affiliated trainees to attend the 2018 Drug Safety Gordon Research Conference



[Find a Conference](#)



Drug Safety
Gordon Research Conference

Contemporary Advances and Challenges in Drug Safety Assessment

June 10 - 15, 2018 **Look forward to seeing you all in 2020!**



Five CBC community members received Student Awards to attend the 2018 Drug Safety Gordon Research Conference. The winners are *(from the left)*: Misuk Bae (UIC), Lauren Gutgesell (UIC), Irawati (Angki) Kandela (NU), Judy Prasad (UChicago) and Gianina Varea (UChicago).