



## Research Infrastructure Core Equipment

### Bio-analysis

#### Waters HPLC and UPLC systems

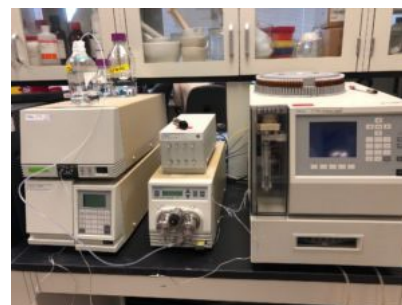
##### Key Features

- Three different Waters models coupled with a broad range of detectors – PDA, dual  $\lambda$  absorbance, UV/VIS, and fluorescence
- Enhanced separation resolution
- Increased sample through-put



##### Application

- Drug discovery
- Analyze drugs/metabolites in biological samples.
- In-vitro diagnostic test to analyze compounds (diagnostic indicators/ therapeutically monitored compounds)



#### SCIEX X500B QTOF System

##### Key Features

- Robust, high-performance high-resolution MS/MS system
- High mass resolution (>30,000 resolution)
- High mass accuracy (<1ppm accuracy for  $m/z > 50$ amu)
- Removal of interference from complex sample matrices
- Quantify linearly up to 4 orders of magnitude
- Identify analytes based on MS/MS (IDA and SWATH™ MS/MSALL, ion ratios and MS/MS spectra)

##### Application

- Identify metabolites
- Analyze larger molecule



## AB SCIEX QTrap 4000 and 6500 UPLC-MS/MS coupled with Shimadzu Nexera X2 UHPLC System

### Key Features

- Scan rates of up to 20,000 Da/sec
- 20ms polarity switch
- Quantitative MRM<sup>3</sup> workflows
- Linear ion trap capabilities
- Detection of analytes with rapid Data Dependent Acquisition (DDA)
- Data Independent Acquisition (DIA) strategy, SWATH technology



### Application

- Include all capabilities of AB SCIEX 4000 qtrap UPLC/MS/MS system
- Achieve lowest limits of quantitation in complex matrices
- Obtain comprehensive peptide sequence confirmation and simplify MRM assay development of peptide quantification
- Simultaneously quantitate mrms and perform full library scans to search for contaminants

## Formulation

### Darwin PH09 stability Chamber

#### Key Features

- Performance specifications exceeding FDA and ICH requirements
- Excellent humidity control and avoids hot spots during mapping

#### Application

- Stability studies of compound/formulation in development
- Standardize ph/stability/solubility profiles of active pharmaceutical ingredients (api)
- Compatibility studies to identify the best ingredients to enhance api performance across dosage forms



### LV1 Low Volume Microfluidizer Homogenizer

#### Key Features

- Small sample size requirements (1-6 ml)
- Produces tunable nanoscale vesicles with narrowest particle size distribution for high-throughput drug screening and drug delivery

#### Application

- Nanoencapsulation
- Nanoemulsions
- Nanosuspensions
- Deagglomeration
- Liposomes
- Cell disruption (yeasts and plant cells)



## Zetasizer Nano ZS

### Application

Measurements of:

- Size/electrophoretic mobility of proteins
- Zeta potential of colloids/nanoparticles
- Protein mobility
- Microrheology of protein/polymer solutions
- Molecular weight and second virial coefficient,  $a_2$ , of macromolecules  $k_d$
- DIs interaction parameter
- Size detector for sec or fff



## SOTAX CE 7smart USP Apparatus 4 – Flow Through Cell Dissolution

### Application

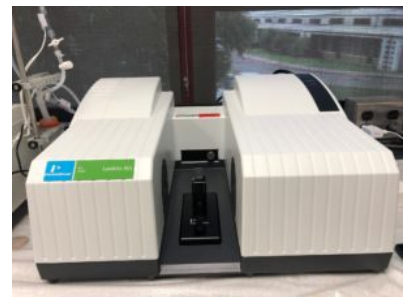
- Flexibility and ability to characterize the release properties of a wide variety of formulations for in-vitro drug release testing



## LAMBDA 465 UV/Vis Spectrophotometer

### Application:

- determination of drug content to support formulation screening and quality control
- PK studies
- Determination of pKa and LogD



## CytoViva Enhanced Darkfield Hyperspectral Microscope Imaging System

### Application

- Analytical confirmation of nano-scale materials and their interactions in solution, live cells, tissue, and materials based matrices
- Provides spectral analysis of materials and biologicals imaged
- Supports research in nano-drug delivery and nano-toxicology. Detects non-fluorescent and fluorescently labeled components in live cells and nano-materials



## **PK-PD**

### **Leica CM1950 Clinical Cryostat, Combining CM1950 with Cytoviva-enhanced dark-field illumination system**

#### **Key Features**

- Optimized cooling system
- Rapid specimen freezing
- Smooth specimen orientation for high-quality sectioning

#### **Application**

- Preparation of tissue section samples
- In vivo studies of drug efficacy and toxicology for drug development, pk/pd, target engagement, and toxicology studies
- Combined with cytoviva-enhanced dark-field illumination system



### **Beckman Coulter DTX 880 Multimode Detector**

#### **Application:**

- Fluorescence detection, time-resolved fluorescence, and fluorescence polarization
- Luminescence detection (glow luminescence)
- Absorbance detection in the visible range (340 nm to 650 nm, DTX 800) or UV and visible range (230 nm to 750 nm, DTX 880)
- Scan measurement types: endpoint, kinetic, multiple wavelength, linear scan and area scan



#### **Software:**

WinNonLin / Phoenix from Certara  
Phoenix NLME from Certara  
GastroPlus from Simulation Plus  
SigmaPlot  
Graphpad Prism  
SAS

#### **Application:**

Consultation on Experimental Design for PK/PD Correlation and Modeling Analyses

## PK Modeling Development and Simulation

- Individual PK Modeling
- Pop PK Modeling
- Advanced Modelings
- Parent/metabolite Co-modeling
- Enterohepatic cycling modeling
- PBPK modeling (with Biodistribution profiles)

## PD Modeling and Determination of Parameters (Emax and EC50)

- Emax model
- Sigmoidal Emax model

## PK/PD Modeling

- Direct effect model
- Indirect effect model
- Define predictive pk parameter(s) for pd outcomes
- Define exposure/efficacy and exposure/toxicity levels
- Guide dosing strategy by recommending rational dose and dose regimen for further efficacy studies
- Interspecies allometric scaling to project pk parameters in humans, and recommend first in human (fih) dose for ind application

## **Molecular and Cellular Biology**

### **Biorad T100 thermal cycler**

#### **Key Features:**

- Intuitive touch screen: easy programming using a large color touch screen and intuitive interface
- Consistent results: robust design ensures effective and consistent performance run to run
- Easy optimization: this gradient thermal cycler allows fast PCR optimization using a unique thermal gradient.
- Easy protocol management: protocols can be organized using personalized folders or a USB flash drive

#### **Application:**

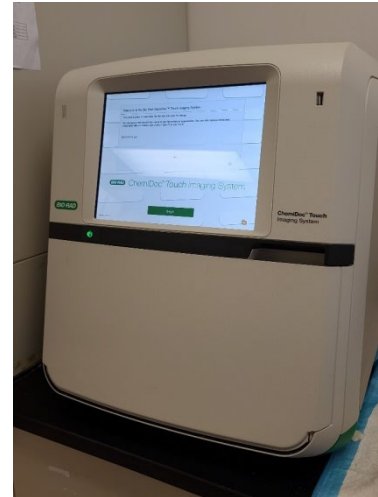
- Nucleic acid amplification (PCR)
- Gene cloning and analysis
- Gene expression analysis
- Mutational analysis
- Cycle sequencing



## **Biorad ChemiDoc Touch Imaging System**

### **Key Features:**

- All-in-one flexible imaging: get precise, reproducible chemiluminescence and colorimetric blot detection, analysis, and gel documentation in a single system
- Sample trays and Smart Tray Technology: different sample trays available to cover diverse imaging applications. Smart Tray Technology automatically recognizes the application-specific trays and adjusts imaging parameters and software options according
- Stain-free protein normalization: stain-free imaging permits the normalization of bands to total protein in both in gels and blots; eliminate the need for housekeeping proteins



### **Applications:**

- Protein, including stain-free, and nucleic acid gel imaging and documentation
- Identify and quantify proteins, nucleic acids, protein-ligand interactions etc., with chemiluminescence, or colorimetric detection.

## **Tissue Culture System**

### **Key Features:**

- Tissue culture hood
- CO2 incubator
- Brightfield/fluorescence microscope

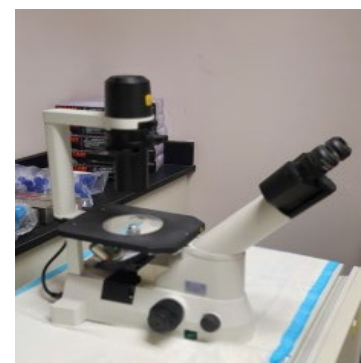
### **Application**

- Tissue culture
- Sterilized environment for performing cellular assays
- Visualize cells under bright field or fluorescence.



## **Rotary Cell culture system**

- 3D cell culture
- Sterilized environment for performing cellular assays
- Simulate the microgravity conditions for cell growth



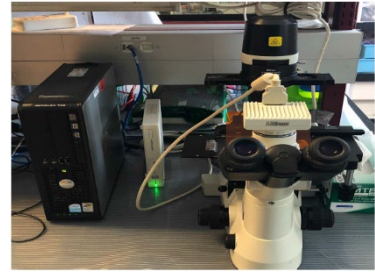
## **Nikon ECLIPSE TS100**

- Phase contrast and NAMC observations
- flat, sharp and clear images



### DeNovix DS -11 Spectrophotometer

- quantify nucleic acids and protein
- Small sample volume (0.5-1.0 uL)
- No dilutions necessary
- Nucleic Acid Quantification: dsDNA, RNA, ssDNA
- Protein and Peptide Quantification: BSA, IgG, custom proteins
- Colorimetric Assays: Bradford, BCA, Lowry, Pierce 660
- Kinetic Assays: Fully customizable, 37-45°C
- OD600 Microbial Cell Cultures: Optical density and cell/mL calculations
- Fluorescence Nucleic Acid Quantification: DeNovix dsDNA, DeNovix RNA, Qubit®, custom assays
- Fluorescence Protein Quantification: Commonly used kits and custom assays
- Basic Fluorometer: Pre-configured and user-defined fluorophores



### Tecan Infinite 200 PRO

- Absorbance
- Absorbance spectra
- Fluorescence (top and bottom), Fluorescence spectra (top and bottom)
- Time-resolved fluorescence (TRF)
- ELISA
- DNA/RNA quantification
- Nucleic acid labeling efficiency
- Protein quantification
- ATP quantification
- Ca<sup>2+</sup> detection



### PCR (Eppendorf Mastercycler personal)

- Up to 100 programs
- Compact thermal cyclers with Peltier heating and cooling



### Biorad Western blot Analysis System

- Absorbance
- Absorbance spectra
- Fluorescence (top and bottom), Fluorescence spectra (top and bottom)
- Time-resolved fluorescence (TRF)

## **High Performance Computing Laboratory**

- A Linux cluster
- A 62 compute nodes with dual quad-core and 12-way cores Intel Xeon hyper-threaded processors
- A total storage capacity is 30 TB
- A 1Gb management network
- A high- speed, low-latency copper 10 Gb production network

## **Low Field Nuclear Magnetic Resonance Laboratory**

- Earth field Terranova MRI system (Magritek)
- Continuous Wave NMR spectrometer (Tel-Atomic)
- National Instruments Data Acquisition system
- High Resolution Raman Spectrometer (Avantes)
- Electronics prototyping station