

SHARED RESOURCES



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Table of Contents

Animal Facility	4
Bioinformatics	5
Biomedical Research Support Core	6
BSL-3 Facility	7
Flow Cytometry	8
Fox Chase Cancer Center – Cell Culture Facility	9
Fox Chase Cancer Center – Transgenic Mouse Facility	10
Genomics	11
Histotechnology	12
Humanized Models of Disease (HMD) Core	13
Imaging	14
Integrated Structural Biology Facility - Sidney Kimmel Cancer Center at Jefferson Health	15
Molecular Screening & Protein Expression	16
Proteomics & Metabolomics	17
Research Supply Center	18
How to Utilize Wistar’s Shared Resources	19

A comprehensive review of each of our Shared Resources can be found at: wistar.org/resources



Dario C. Altieri, M.D.



Luis J. Montaner, D.V.M., M.Sc., D.Phil.

WELCOME TO WISTAR'S SHARED RESOURCES

Dear Colleagues,

As a National Cancer Institute (NCI)-designated Cancer Center, it is our privilege and responsibility to share our resources, when possible, with the greater research community.

The Wistar Institute Shared Resources, also known as core facilities, provide innovative opportunities as well as our technological and professional expertise to address an investigator's experimental requirements.

Wistar Shared Resources are a "force multiplier" and an efficient and cost-effective way to augment your research with the expertise and capabilities of Wistar laboratories. Many of Wistar's Shared Resources are approved by the NCI and supported by the Cancer Center Support Grant (CCSG).

Wistar continues to assemble state-of-the-art shared resources to function as engines of discovery for our investigators including our recent Humanized Models of Disease (HMD) Core. The HMD Core offers Wistar researchers the resources to effectively study diseases in mice carrying human cells, tissues, and organ systems. Learn more on page 13.

The CCSG-supported Shared Resources include Animal Facility, Bioinformatics, Flow Cytometry, Genomics, Imaging, Molecular Screening & Protein Expression, Proteomics & Metabolomics, and a Biomedical Research Support Core. Additional Shared Resources include BSL-3 Facility, Histotechnology, a Research Supply Center, and the Humanized Models of Disease Core.

Through agreements with outside institutions, Wistar researchers have preferred access to collaborating resources, including the Integrated Structural Biology Shared Resource at Jefferson Health's Sidney Kimmel Cancer Center and the Cell Culture and Transgenic Mouse Facilities at the Fox Chase Cancer Center.

It is Wistar's responsibility to strengthen the collective outcomes of all our work in the name of potentially lifesaving scientific progress. It is our honor to share our resources and we hope that you will use this guide of services and equipment that Wistar Shared Resources can offer as an informational tool to explore all the scientific opportunities at your disposal.

Sincerely,

Dario C. Altieri, M.D.

President & CEO
Director, Ellen and Ronald Caplan Cancer Center
Robert and Penny Fox Distinguished Professor
The Wistar Institute

Luis J. Montaner, D.V.M., M.Sc., D.Phil.

Vice President for Scientific Operations
Associate Director for Shared Resources
Professor, Ellen and Ronald Caplan Cancer Center
Director, HIV-1 Immunopathogenesis Laboratory
Herbert Kean, M.D., Family Professor
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Animal Facility

Jessie Villanueva, Ph.D., Scientific Director
Denise DiFrancesco, B.A., R.L.A.T.G., C.M.A.R., I.L.A.M.,
Managing Director

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Overview

The **ANIMAL FACILITY SHARED RESOURCE** facilitates research through compassionate and efficient management of animal populations. The vivarium operates as a modified barrier facility and is equipped with quarantine and procedure rooms, holding rooms with biosafety cabinets, an imaging/holding room equipped with a PerkinElmer IVIS Spectrum CT small animal imager, Vega preclinical ultrasound system, 2-photon imager, and additional support areas. In addition, the Facility provides access to a Small Animal Radiation Research Platform (SARRP), an image guided microirradiation system, delivering low energy X-rays for whole body irradiation or targeted radiotherapy of small animals. The Facility has housing space for more than 6,000 sterile, disposable, and individually ventilated mouse cages. Space for housing limited numbers of small animal species other than mice may also be available upon request.

Wistar's Animal Care and Use Program, overseen by Wistar's Institutional Animal Care and Use Committee (IACUC), is fully accredited by AAALAC International, has an assurance on file with the Office of Laboratory Animal Welfare at the NIH and is a registered USDA research institution.

Laboratory Animal Medicine and Husbandry

- Animal procurement
- Animal health surveillance
- NSG colony maintenance and breeding

Breeding Colony Management and Services

- Veterinary care and pharmacy
- Veterinary Technician
- Services
- Quarantine housing
- Technical support and training
- Mouse pathology
- Breeding consultations
- Transgenic services in collaboration with Fox Chase Cancer Center

Equipment & Features

- Ventilated, sterile, disposable caging system
- Common use anesthesia and CO₂ machines
- PerkinElmer IVIS SpectrumCT small animal imager
- Sonovolt Vega preclinical ultrasound system
- Hydrogen peroxide decontamination chamber
- Isolation cubicles
- Procedure room
- Irradiator access
- 2-Photon Imager
- Small animal research platform (SARRP)

Mouse Pathology

Peter Vogel, D.V.M., Ph.D., DACVP a board-certified veterinary pathologist and expert in mouse histopathology and embryology, provides consultation and scientific collaboration. Services include: project consultation, histology slide evaluation and report preparation, and image development. Mouse pathology services are free for Wistar Cancer Center members. To request services, email Dr. Vogel at apetervogel@yahoo.com. Provide a detailed summary of your experimental protocol, key experimental questions, and material to be provided.

Bioinformatics

Andrew Kossenkov, Ph.D., Co-Scientific Director
Louise C. Showe, Ph.D., Co-Scientific Director

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Overview

The **BIOINFORMATICS SHARED RESOURCE** continuously develops new and efficient approaches to data analysis as a response to emerging research needs. Facility functions include: statistical analyses and computational modeling; advanced bioinformatics tools for integrative cancer biology; and data management. Routine data analyses include large scale information datasets (omics data) generated by high-throughput technologies, which address the following areas:

- Gene expression (bulk RNA-seq including single-cell RNA-seq both regular and spatial, smRNA-seq, Nanostring, legacy microarrays)
- Gene regulation (ChIP-seq, CUT&RUN, ATAC-seq, epigenetic profiling, methylation assays)
- 3D genome organization (HiC, Hi-ChIP)
- Genome and transcriptome sequencing (alternate splicing, RNA editing, mutation detection, CNV)
- Biomarkers (discovering markers in mRNA, miRNA, and protein expression data)
- Proteomic analyses (mass spectrometry-based spectra, LCMS, DIGE, RPPM, etc.)
- Polymorphism genotyping (e.g. Single Nucleotide [SNP] and Copy Number variations [CGH], LOH)
- Pathway and network analysis
- Integration of multi-platform data
- Other customized data analysis projects

Equipment & Features

- High-performance computational clusters
- Integrated Wistar IT infrastructure
- Dedicated servers
- Access to storage and backup

Services

- High-throughput data analysis:
 - Next generation sequencing data analysis
 - Single-cell RNA-seq
 - Proteomics and metabolomics data
 - Enrichment Analysis (Ingenuity, DAVID)
- Comprehensive analysis of complex projects that require multi-platform data integration
- Consultation and support of experimental design and customized bioinformatics services
- Statistical consultation and predictive model building
- Computational support for data management, high- performance computing, and custom programming
- Centralized computation resources, including data management and collaboration tools, sequence databases, homology algorithms, and other sequence manipulation tools
- Web-based application/database development and management
- Training: Genome Browser, Ingenuity, DAVID
- Grant and publication support: results, methods, figures
- Advanced biological models and illustrations



Biomedical Research Support Core

Luis J. Montaner, D.V.M., M.Sc., D.Phil.,

Scientific Director

Livio Azzoni, M.D., Ph.D., Managing Director

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PHLEBOTOMY

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Overview

The **BIOMEDICAL RESEARCH SUPPORT CORE (BRSC)** provides a robust infrastructure to support mechanistic, patient-oriented research. The BRSC manages resource commitment associated with clinical studies, including adhering to requirements of compliance with regulatory directives governing research in human subjects. Services include phlebotomy, tissue microarrays and sample procurement for clinical studies. BRSC services also include access to the proprietary CDETweb® Toolbox, an Electronic Data Management platform dedicated to specimen procurement and clinical trial support. Clinical data management services include data collection, storage and extraction, data quality management, regulatory reporting, and connection with statistical teams for data analysis.

Disclaimer: The Biomedical Research Support Core is only available to Wistar researchers.



Services

- **Blood products procurement**
Phlebotomy: staff solicit and collect blood (10 ml - 500 ml) donations from healthy individuals for research. An experienced phlebotomist coordinates the collection, performed under protocols approved by Wistar's Institutional Review Board.
- **Clinical study data management**
utilizes the CDETweb® system and can be customized to fit individual project needs. Staff provide consultation, training and assistance for trial design, regulatory compliance, grant application budgeting, protocol preparation, data management, planning, implementation, storage, monitoring, and reporting for regulatory submissions.
- **Biospecimen accrual for clinical studies** is provided in collaboration with the Helen F. Graham Cancer Center (HFGCC) at Christiana Care Health System. Human Subject Research protocols for collection of fresh biospecimens, including umbilical cord blood, fine-needle aspirate, biopsies, surgical resections, and biological fluids from cancer patients are supervised by Wistar-HFGCC Institutional Review Board. HFGCC staff perform patient recruitment, sample collection and shipment for Wistar investigators. Approved researchers access clinical study data through CDETweb® Toolbox applications. Pilot projects, up to 10 samples for proof-of-concept, are also available and do not require full regulatory review. Contact the BRSC to initiate a clinical study collaboration with HFGCC.
- **Tissue microarrays** are created at Wistar (Histopathology Facility) using specimens collected at HFGCC. Our sample repository includes a richly annotated library of more than 5,000 formalin- fixed paraffin embedded (FFPE) tissue blocks, representing 58 tissues (e.g. ovary, skin, prostate, lung, breast). Tissue microarrays addressing programmatic needs may be prepared free of charge (please discuss programmatic requests with the Core Scientific Director). Arrays can be designed by the user (using a dedicated application in CDETweb® Toolbox, account required) or by the Core based on the user's needs.



BSL-3 Facility

Luis J. Montaner, D.V.M., M.Sc., D.Phil.,

Scientific Director

Michele Ho, Facility Manager

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Overview

The **BIOSAFETY LEVEL-3 (BSL-3) FACILITY** provides a certified environment for working with infectious agents (e.g., Chikungunya, SARS-CoV-2) requiring BSL-3 level containment. Training required for working in the Facility is provided by the Facility manager and Wistar's Biosafety Officer and includes BSL-3 facility standard operating procedures (SOPs), review of experimental agents and procedures requiring BSL-3 level containment by Wistar's Biosafety Officer and IBC representatives, and hands-on training sessions with trained BSL-3 researchers, a Wistar Biosafety Officer, and a Facility manager. Users are also expected to receive appropriate immunizations and complete medical surveillance programs.

In compliance with BSL-3 regulations, access to the Facility is restricted and monitored by access control procedures including a biometric access control system. The Facility is maintained under negative pressure, provides all required personal protective equipment (PPE) items, and a decontamination infrastructure including a pass-through autoclave for deactivation and disposal of all BSL-3 laboratory waste.

Disclaimer: The Bsl-3 Facility is only available to Wistar researchers.

Equipment & Features

- Biosafety cabinets (Class II A2)
- CO₂ incubators and forced air incubators
- -80°C and -20°C freezers and refrigerators
- Inverted fluorescence and bright field microscopes
- Pass-through autoclave (Steam Sterilizer)
- Additional equipment: benchtop centrifuges, vortexes, automatic cell counters, heat blocks, microwave, pipets, and pipet aids

Flow Cytometry

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Scientific Director

Jeffrey Faust, MBA, Managing Director

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Overview

The **FLOW CYTOMETRY SHARED RESOURCE** provides users with the technological resources and professional assistance for high-quality, multi-parameter flow cytometry analyses and sorting. The Facility is capable of cell sorting (sterile, at speeds up to 30,000 cells/sec) from homogeneous or mixed cell populations based on up to 48 fluorochromes, sorting up to six separate populations simultaneously, including human-derived samples at BSL-2+ level. An option for investigator-performed, user-friendly cell sorting is also available.

Facility personnel aid investigators in creating efficient and cost-effective experimental designs by way of optimizing cytometry-specific reagent and fluorochrome selection; and assist in training and operation of user-friendly analysis instruments.

Technical support is also provided for: analyses of flow data for publication, presentation, and inclusion in grant applications; management of cytometric data (storage, archiving, and retrieval); and management of a site license for low-cost post-acquisition analysis software.



Services

Multi-parameter flow cytometry analysis

(up to 28 fluors) supporting experimental protocols, in either a user-friendly or operator-assisted format.

Fluorescence cell sorting (sterile) at rates up to 30,000 cells/second, sorting up to six populations simultaneously, utilizing 48 fluorescent detectors, including spectral (FACSymphony S6 SE) or 32 fluorescent detectors (MoFlo Astrios EQ), under BSL-2+ conditions. Both instruments have the capability of clonal sorting into plates up to 1536 wells. The FACSMelody provides an option for investigator-performed sorting at rates up to 8,000 cells/second, sorting up to two populations simultaneously, utilizing nine detectors; this instrument also has the capacity for clonal sorting into plates up to 384 wells

Training and Consulting:

Training investigators for "user-friendly" analytical flow cytometry and cell sorting, including a complete video curriculum for analysis instruments; consulting and assistance in development of appropriate staining panels or techniques.

Equipment & Features

Analysis Instruments:

- (2) FACSymphony A5 SEs with high-throughput sampler – 5 lasers, 35 fluors traditional, up to 48 fluors spectral
- FACSymphony A3 analyzer with high-throughput sampler – 5 lasers, 28 fluors
- LSRII high-speed analyzer – 4 lasers, 18 fluors
- FACSCelesta analyzer with high-throughput sampler – 3 lasers, 12 fluors

Cell Sorting Instruments (available at BSL2+ level):

- FACSymphony S6 SE – 48 fluors, 5 lasers, spectral enabled; capable of sorting into plates
- MoFlo Astrios – 32 fluors, 7 lasers; capable of sorting into plates
- FACSMelody – 9 fluors, 3 lasers; capable of sorting into plates

Fox Chase Cell Culture Facility

Kerry Campbell, Ph.D., Facility Director

Tim Kwok, Ph.D., Facility Manager



Location: External Institutional Resource

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Overview

The **CELL CULTURE FACILITY (CCF)** at Fox Chase Cancer Center (FCCC) serves as a primary resource for monoclonal antibody (mAb) production by Wistar researchers. The CCF provides reagents, equipment, technical expertise, consultation and training to support mammalian cell culture efforts.

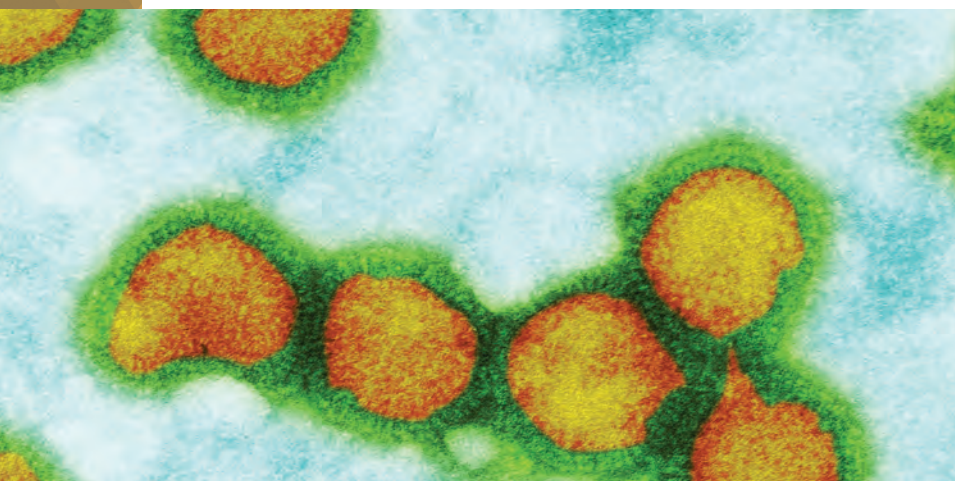
Researchers have access to the expertise of Kerry Campbell, Ph.D., CCF Director, and Tim Kwok, Ph.D., CCF Manager. Additional benefits include discounted user fees (same rates as FCCC members), priority in scheduling, and free consultation with CCF staff.

Services

- Hybridoma production to generate monoclonal antibodies
- Generation of culture supernatants
- Development of gene-manipulated mouse embryonic stem cells
- Establishment of primary cultures from human and animal tissue samples
- Cell transformation, cell banking and screening for detection of mycoplasma contamination in cultured cells
- Basic cell culture, propagation and cell validation support
- Consultation to assist in experimental design

Equipment & Features

- Sanyo large capacity incubators and a Sanyo low oxygen incubator
- Model Z1 Coulter Counter
- Beckman GS-6R refrigerated centrifuge, Hermle Z-382K refrigerated centrifuge, Eppendorf 5702 clinical centrifuge, RC-5 Sorvall Superspeed centrifuges
- Millipore Biocell water filtration and ELIX deionization systems
- Nucleofector II and 96-well Shuttle Nucleofector for electroporation
- Class II biosafety sterile hoods, MVE XLC-510 liquid nitrogen tanks, and a LABS 20K tank





Fox Chase Transgenic Mouse Facility

Dietmer Kappes, Ph.D., Facility Director
Xiang (Sean) Hua, M.S., Facility Manager



TEMPLE HEALTH

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Overview

The **TRANSGENIC MOUSE FACILITY (TMF)** at Fox Chase Cancer Center (FCCC) provides researchers with access to technology and expertise for generating transgenic and genetically modified mouse lines and for cryopreservation and rederivation of important mouse lines developed at Wistar. Services are coordinated by the Wistar Animal Facility and include production of transgenic mice by pronuclear injections of transgene constructs, production of knockout/knockin mice by injecting gene-targeted ES cells into blastocysts, generation of gene-targeted embryonic stem cell clones by homologous recombination, and embryo cryopreservation and rederivation.

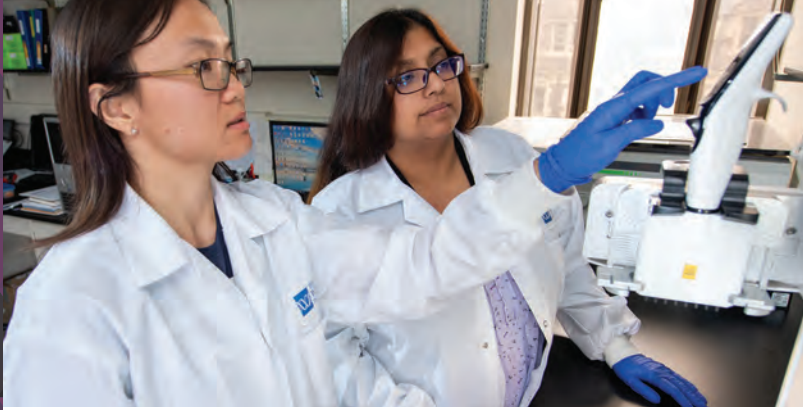
Upon consultation, the Wistar Animal Facility staff initiate services, and once specific requirements have been determined, they are performed in the Wistar Animal Facility or in the TMF at FCCC. Mouse lines developed at FCCC are brought into the Wistar Animal Facility barrier through quarantine. Researchers receive access to discounted user fees (same rate as FCCC members), priority in scheduling, and free consultation with TMF staff.

Services

- Cryopreservation and revival of cryopreserved mouse lines
- ES cell targeting
- Transgenic mouse production
- Rederivation
- Technical service for minor procedures
- Consultation

Equipment & Features

- Nikon TE-200 inverted microscope with DIC optics
- Olympus IX-71 inverted microscope with DIC optics
- Leica and Narishige micromanipulators
- Vibration-free stations and cooling injection chambers
- Stereomicroscopes, micropipette puller and microforge
- Xyclones laser module with RED-I target locator
- LN₂ storage tanks



Genomics

Louise Showe, Ph.D., Scientific Director
Sonali Majumdar, M.Sc., Managing Director

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 genomics@wistar.org
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Overview

The **GENOMICS SHARED RESOURCE** serves as a hub for consultation and scientific interaction relating to nucleic acid-based methods. It provides expertise and support to ensure the best possible outcomes for genomic-related projects. The Facility supports several state-of-the-art platforms for a wide variety of nucleic acid-based studies, including massively parallel sequencing as well as routine capillary sequencing. The Facility also supports projects related to RNA sequencing, ChIP-Seq, smRNA-Seq, whole genome, exome and targeted resequencing, bulk TCR and BCR immune repertoire profiling, single cell sequencing, and gene expression studies using Quant-seq or the NanoString platform. In addition, we support SNP genotyping analysis using TaqMan assays, KIR allele genotyping, HLA typing, and microsatellite assays. Consultation is provided to assist with experimental design and for the development of custom services.

Equipment & Features

- Illumina NextSeq2000
- Illumina NextSeq1000
- 10x Genomics Chromium Controller
- Nanostring GeoMx Digital Spatial Profiler
- Nanostring CosMx single cell Digital Spatial Profiler (June 2023)
- NanoString nCounter Analysis System
- ThermoFisher SeqStudio
- Covaris High Performance Ultrasonicator
- GE Healthcare Bioscience ImageQuant LAS4010
- Agilent TapeStation
- Agilent 2100 Bioanalyzer
- Integra Assist Plus liquid handler

Services

- **Illumina Next-Generation Sequencing (NextSeq2000 and MiSeq)**
 - Gene Expression Analysis: Lexogen QuantSeq
 - 3' mRNA-Seq library prep kit is used to generate Illumina compatible libraries.
 - Transcriptome analysis: RNA-seq, RNA-IP and small RNA-seq
 - Genome sequencing, Exome and Amplicon sequencing
 - ChIP-seq
 - BCR and TCR immune repertoire profiling
 - Targeted sequencing
 - Single cell gene expression, single cell immune profiling, scATAC-Seq
 - NanoString nCounter platform: Multiplexed quantification of nucleic acids without sample amplification
 - Other applications: miRNA, lncRNA, CNV and CHIP/RIP
- **Single cell analysis platforms**
 - **10x Genomics Chromium Controller**
The chromium system uses GemCode technology to enable thousands of micro-reactions in parallel. A two-step partitioning process allows thousands of single cells and their transcripts to be uniquely barcoded and then pooled for downstream processing and library preparation for single cell gene expression analysis, immune repertoire profiling and epigenetic studies. In addition, feature barcoding technology using specific oligonucleotide sequences to identify cell surface proteins and CRISPR alterations can be done simultaneously.
- **Spatial platforms:**
 - **Nanostring GeoMx Digital Spatial Profiler** provides morphological context in spatial transcriptomics and proteomics from just one tissue slide. It seamlessly integrates current histology and genomics workflows and has the capacity to simultaneously detect more than 20,000 RNA transcripts or 140 protein targets using barcoded RNA probes or antibodies. At the same time, fluorescently labeled morphological markers are added for easy selection of biologically relevant areas of interest.
 - **Nanostring CosMx Spatial Molecular Imager** allows rapid quantification and visualization of up to 1,000 RNA and 64 protein analytes at single cell and subcellular resolution. Applications include definition of cell types, cell states, tissue microenvironment phenotypes and gene expression networks within a single cell context.
- **Digital PCR**
 - The QX200 Droplet Digital PCR system enables absolute quantification of targets by partitioning a qPCR reaction into millions of picoliter-sized droplets. Each droplet contains either 0 or 1 molecule of interest. Every droplet is measured for fluorescence to generate a negative or positive signal, providing a true digital result.
- **Capillary DNA sequencing**
- **16-panel microsatellite analysis**
- **HLA typing**
- **KIR allele genotyping**
- **C. bovis Detection**
- **qPCR services using Taqman assays**
- **SNP genotyping analysis**

Additional Services

- RNA and DNA preparation and quality control for all services
- NGS library preparation
- qRT-PCR: primer selection through data extraction
- Experimental consultation and project troubleshooting

Histotechnology

Daniel Claiborne, Ph.D., Scientific Director
Fangping Chen, HT (ASCP), Managing Director

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(215) 898-0027

Overview

The **HISTOTECHNOLOGY SHARED RESOURCE** provides services for fixing, processing and paraffin or OCT-embedding of all types of tissues for light microscopy (e.g. routine stains, immunohistochemistry or in situ hybridization).

The Facility staff performs routine hematoxylin and eosin staining, deparaffinization and antigen retrieval (for IHC, IF, ISH, FISH, special staining), immunochemistry, ISH, and FISH staining, as well as specialized staining and slide preparation for immunohistochemistry and in situ hybridization. Frozen sectioning is also available, including consultation regarding freezing and fixing techniques to optimize experimental results.



Services

- Processing, embedding, sectioning, and histochemical staining of specimens
- Paraffin and frozen sectioning are routinely available for light microscopy and in situ hybridization

Hybridization

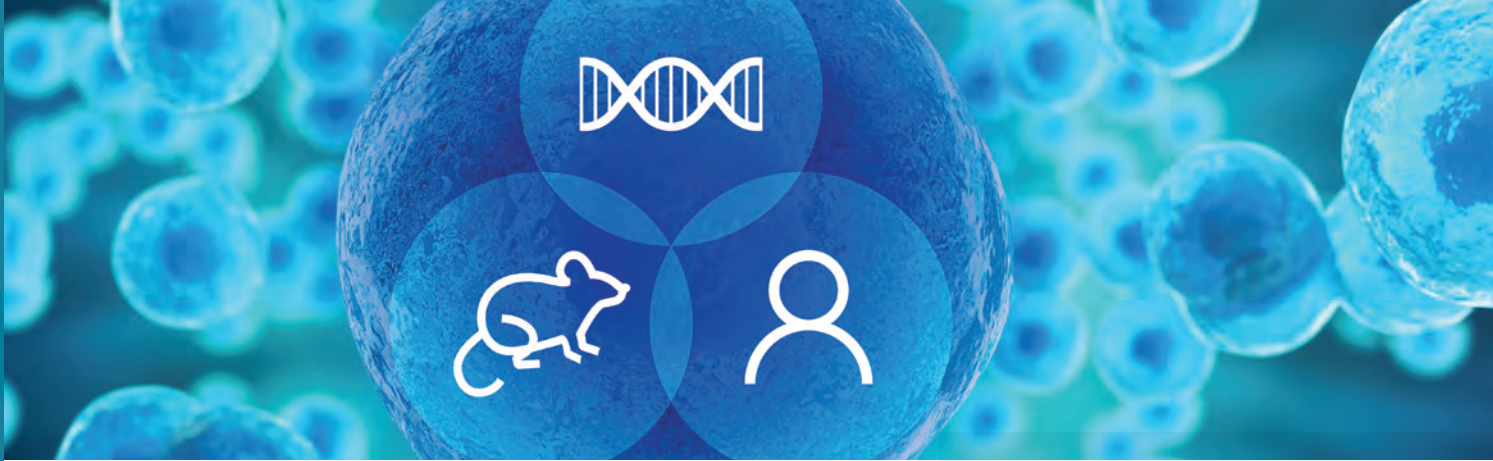
- Tissue preparation for DNA/RNA extraction
- Various histochemical staining procedures are performed, including those required for neuropathology

Neuropathology

- Immunohistochemistry (IHC), fluorescence staining, ISH, FISH and optimization
- Special procedures and staining protocols
- Consultation regarding freezing and fixing techniques

Equipment

- Thermo cryostar NX50
- Thermo Excelsior AS tissue processor
- Dakewe auto stainer
- Dakewe coverslipping machine
- TissueTek embedding center
- Thermo HM355S microtome
- Thermo Mircon HM450(sliding) microtome
- Biocare Intellipath IHC stainer



Humanized Models of Disease (HMD) Core

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Co-Scientific Director

Dr. Meenhard Herlyn, D.V.M., D.Sc.,

Co-Scientific Director

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Overview

The **Humanized Models of Disease (HMD) Core** provides investigators humanized mouse models to effectively conduct translatable research in biomedicine. Humanized mouse models are particularly suited to the investigation of disease and development of therapeutics. The objective of Core service is to deliver standard BLT humanized mice, Wistar humanized mice (WH mice: BLT+ AAV cocktail), archiving/provision of tumor tissues-generation of patient-derived xenograft mice (PDX mice), and the development of primary organoid (tumor) tissue cultures. In late 2023, the Core is planning on expanding services to include ovarian, lung and breast cancer tissue for PDX and organoid culture systems.

Equipment & Features

- Dedicated vivarium holding rooms for inoculation and experimentation with humanized and PDX mice
- Horiba ABX Micros ES 60 Hematology Analyzer

Disclaimer: Resources of the Humanized Models of Disease Core are only available to Wistar researchers and based on availability.

Services

- Provision of 12–14-week BLT or WH mice using fetal tissue or cord blood derived CD34+ stem cells
- Provision of melanoma PDX mice using NSG.
- Testing of all mice for levels of reconstitution
- Transfer/invoice if mice have >20% human CD45+ lymphocytes engraftment
- Drafts of "grant friendly" text to describe models, grant budget units to include, and support letters
- Provision of advice on items needed per inclusion of fetal tissue in NIH proposals

Any work related to customized differentiation methods or research use of BLT or WH mice past 12-14 weeks will require collaboration and is outside the scope of Core services. Please reach out to learn more as several labs have added humanized mice into their protocols.

Imaging

Qing Chen, M.D., Ph.D., Scientific Director
James Hayden, R.B.P, F.B.C.A., Managing Director

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(215) 898-3887

Overview

The imaging of complex cellular structures is used to determine how the temporal and spatial organization of regulatory events within cells, tissues and organisms impacts both normal and pathological processes. The state-of-the-art **IMAGING SHARED RESOURCE** provides access to standard and advanced imaging systems capable of reaching these goals and assistance with advanced image analysis solutions. Researchers may be trained for unassisted use of core instrumentation, while full-service assistance by staff and drop-off services are also available for qualitative or quantitative image capture. Pre-clinical imaging and intervention is provided within the Wistar Animal Facility using a suite of small animal imaging systems. The Facility also offers expert technical assistance with experimental design to optimize imaging results, enabling users to get more out of the imaging technology.

Services

- Brightfield and fluorescence widefield microscopy
- Whole Slide Imaging (WSI) in brightfield and fluorescence
- Spectral confocal microscopy
- 2-photon and intravital imaging
- Advanced quantitative imaging (FRET, FRAP, photobleaching, colocalization)
- 2-D and 3-D live-cell, multi-channel, multipoint, time-lapse imaging
- Automated plate scanning for brightfield and fluorescence
- Low magnification and photomacrography
- Pre-clinical whole body luminescence, fluorescence and microCT imaging
- Pre-clinical ultrasound imaging
- Pre-clinical whole body and targeted radiotherapy
- Personalized assistance and training on all imaging systems
- Personalized image analysis services and training
- Assistance with microscopes within researcher's labs
- Traditional photographic services

Equipment & Features

- **Upright widefield microscopes (brightfield and fluorescence)**
 - Nikon 80i upright microscope
 - Nikon NiE motorized, automated upright microscope
 - Nikon SMZ800 and 1500 stereomicroscopes
 - Hamamatsu Nanozoomer S60 whole slide scanner
- **Inverted widefield microscopes (brightfield and fluorescence)**
 - Fully Automated Nikon Eclipse TiE inverted microscope with environmental chamber
 - Semi-automated Nikon TE300 inverted microscope with environmental chamber
 - Nikon TE2000 inverted microscope
- **Laser-based instruments (for fixed and live-cell imaging)**
 - Leica TCS SP8 X WLL laser scanning spectral confocal microscope with environmental chamber and white light laser
 - Leica TCS SP5 II laser scanning spectral confocal microscope with environmental chamber
 - Leica TCS SP8 MP 2-photon and intravital microscope
- **Pre-clinical imaging systems**
 - Perkin Elmer IVIS SpectrumCT small animal whole body imager
 - PerkinElmer Vega ultrasound system with Image Guided Injection
 - Xstrahl Small Animal Radiation Research Platform (SARRP)
- **Other**
 - Traditional digital camera systems
 - Advanced image analysis workstations



Integrated Structural Biology

Dr. Dmitry Temiakov, Director
Dr. Ashok Nayak, Ph.D., Facility Manager



Location: External Institutional Resource
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Phone: (215) 503-4573

Overview

The **INTEGRATED STRUCTURAL BIOLOGY SHARED RESOURCE** at Sidney Kimmel Cancer Center-Jefferson Health provides researchers with access to technology and expertise for projects that require a combination of crystallization, X-ray data collection, structure determination, and functional dissection of macromolecular interactions. Cryo-electron microscopy services include access to a 200 kV Glacios/Falcon 4 microscope, vitrobot and clipping station, including training for use of the instruments. New users may take advantage of a proof-of-concept service, where the Cryo-EM Facility Manager will perform vitrification, screen grids and collect representative micrographs on behalf of the user. Training is also available for user-friendly access to the Glacios, vitrobot and clipping station.

X-ray crystallography and molecular characterization services include access to HydrallPlusOne and Oryx8 crystallization robots for high-throughput crystallization screening, and a Rigaku MicroMax-007HF microfocus rotating anode X-ray generator dual equipped for data collection from macromolecular crystals and Small Angle X-Ray Scattering. The facility also provides access to instrumentation for biophysical characterization of proteins, and protein/protein and protein/DNA interactions.

Researchers have enhanced access to the expertise of Dr. Gino Cingolani, PhD, Director of X-ray Crystallography, Dr. David (Chun-Feng) Hou, PhD Cryo-EM Manager, and Dr. Ravi Lokareddy, PhD, X-ray Crystallography Manager. Additional benefits include discounted user fees (same rates as SKCC members).

Under the terms of our agreement these services and discounted rates are only available to Wistar investigators.



Equipment & Features

- 200 kV Glacios/Falcon 4 microscope, vitrobot and clipping station
- HydrallPlusOne and Oryx8 crystallization robots for high-throughput crystallization screening
- Rigaku MicroMax-007HF microfocus rotating anode X-ray generator
- Beckman Coulter Analytical Ultracentrifuge (ProteomeLab XL-I/A Protein Characterization System)
- JASCO J-810 Spectropolarimeter
- BIACORE 3000 SPR biosensor
- KinExA 3000
- Isothermal Titration Calorimeters:
- MicroCal-ITC
- TA Instruments Nano-ITC

Molecular Screening & Protein Expression

Joseph Salvino, Ph.D., Scientific Director
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Overview

The **MOLECULAR SCREENING & PROTEIN EXPRESSION SHARED RESOURCE** fosters collaboration and enables researchers to discover small molecule compounds and molecular genetic targets suitable to further study protein functions, signaling pathways, and cells in pure or complex biological systems. The Facility provides access to small molecule and lentiviral shRNA libraries, laboratory robotics, high-throughput screens (HTS), data analysis and interpretation,

and post-screen advancement. Guidance is provided for target justification, assay development, miniaturization, robotic automation, and adaptation to HTS-compatible, high-density microplate (384-well) formats.

Expert technical assistance is available in designing biochemical and cell-based functional assays for compound testing and/or high-throughput screening, characterizing binding interactions using label-free surface plasmon resonance, and recombinant protein production/purification in bacteria.



Services

Screening:

- Development and optimization of miniaturized biochemical and cell-based assays.
- Assessment of bimolecular interactions using label-free SPR
- High-throughput screening and pharmacological profiling of small molecule libraries
- Data analysis and interpretation
- Drug combination studies screening for synergistic cytotoxicity
- Hit validation and quantitative assessment of compound activity required for post-screen advancement
- Small molecule analytical services
- Western blotting and in-cell western assays
- Consultation, training, project management, and grant preparation

Protein:

- Expression plasmid engineering
 - Recombinant protein production and purification from bacteria
 - Lentivirus preparation

Equipment & Features

- Echo 650 Acoustic liquid handler with Access Workstation
- Biacore T200
- PerkinElmer Operetta High-Content Screening reader
- ClarioStar Plus Plate Reader
- EnVision multi-label microplate reader
- Cytation 5 plate reader/cell imager
- Janus Verispan 8-tip automated pipetting workstation
- Janus MDT automated pipetting workstation
- MicroFlo reagent dispensers
- Agilent HPLC system
- Access to a FACSCalibur with auto-sampler, TopCount NTX and Applied Biosystems 7900HT
- Libraries and sub-libraries of compounds spanning various pathways and targets – contact the facility for more information
- BSL-1 and BSL-2 tissue culture suites
- TRCN shRNA library of druggable genome

Proteomics & Metabolomics

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Overview

The **PROTEOMICS AND METABOLOMICS SHARED RESOURCE** provides high-sensitivity proteomics, metabolomics, and lipidomics analyses using state-of-the-art mass spectrometry instrumentation and methodologies. Consultation with facility staff is recommended to ensure optimal experimental design and sample processing.

Proteomics

The Proteomics Facility offers a comprehensive proteomic infrastructure for identification, quantification, and characterization of proteins. This includes various platforms for protein and peptide separation, and advanced instrumentation for MS and LC-MS/MS analyses.

Major services offered by the facility include: 1) protein extraction from cells and tissues; 2) quantitative, in-depth global comparisons of proteomes from cells, secretomes, tissues or biological fluids using label-free quantitation (LFQ) based on integrated ion current, SILAC labeling or TMT isobaric tags; 3) global quantitative comparisons of post-translational modifications such as ubiquitination, acetylation, O-GlcNAcylation and phosphorylation; 4) detailed characterization of individual purified proteins including post-translational modifications; 5) identification of components in protein complexes (e.g., pull-downs, RIME and proximity labeling); 6) cross-linking MS using MS-cleavable crosslinkers for structural analysis of protein complexes; 7) targeted quantitative analysis using multiplexed parallel reaction monitoring; and 8) characterization of intact protein and peptide masses using ESI-MS.

The facility also has a comprehensive suite of software for proteomics data processing and visualization, pathway and network analysis, and differential protein expression analysis.

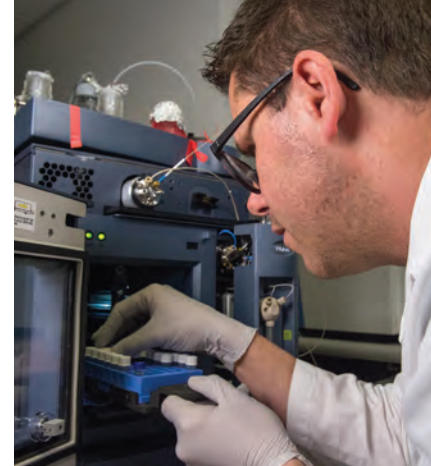
Metabolomics

The Metabolomics Facility offers a wide-range of LC-MS-based metabolomics and lipidomics services for analysis of polar metabolites or lipids (typically 50-2000 Da) extracted from a variety of matrices such as cultured or primary cells, conditioned media, biological fluids, or tissues.

Specific services offered by the facility include: 1) untargeted analysis of polar metabolites or lipids (separate assays) with compound annotation and relative quantitation; 2) isotope tracer analysis to examine metabolic flux using stable isotope tracers (e.g., uniformly or positionally labeled with ^{13}C - or ^{15}N); 3) targeted analysis polar metabolites or lipids of interest; 5) custom assays for relative or absolute quantification of small molecules, such as drugs or drug metabolites; 6) measurement of accurate monoisotopic mass to confirm expected synthesis product. In most cases, these services include data acquisition via LC-MS, data processing (e.g., peak picking, alignment between samples, quantification, metabolite annotation, and normalization), and statistical analysis (univariate and multivariate).

The facility also offers services for sample processing, including preparation for specific sample types (e.g., tissue homogenization) and metabolite/lipid extraction dependent on downstream assay (monophasic or biphasic liquid extraction, solid-phase extraction).

Through inter-institutional agreements, members of the Fox Chase Cancer Center at Temple University and the Kimmel Cancer Center at Thomas Jefferson University have access to Wistar Proteomics & Metabolomics at the same rates as Wistar Cancer Center members.



Capabilities

- Ultra-high performance liquid chromatography – Mass Spectrometry (UHPLC-MS)
- Tandem mass spectrometry (MS/MS) via higher-energy collisional dissociation (HCD)
- High-resolution, accurate-mass (HRAM) mass spectrometry with resolution up to 240,000 (FWHM) at m/z 200 and mass accuracy <5ppm

Equipment & Features

- Thermo Q Exactive HF-X mass spectrometer with Thermo Vanquish Horizon UHPLC system
- Thermo Q Exactive HF mass spectrometer with Thermo Ultimate 3000 RSLCnano UHPLC system
- Thermo Q Exactive Plus mass spectrometer with Thermo Vanquish Neo UHPLC system
- Agilent 1100 microbore HPLC with UV detector and fraction collector
- Agilent Seahorse XFe96 analyzer
- Labconco refrigerated CentriVap vacuum concentrator system
- Organomation N-EVAP 34-position nitrogen evaporator
- CryoMill cryogenic grinder
- Multiple PC servers with archived data storage and a comprehensive suite of commercial and free software for -omics data analysis

Research Supply Center

Anna Rivera, Procurement Manager

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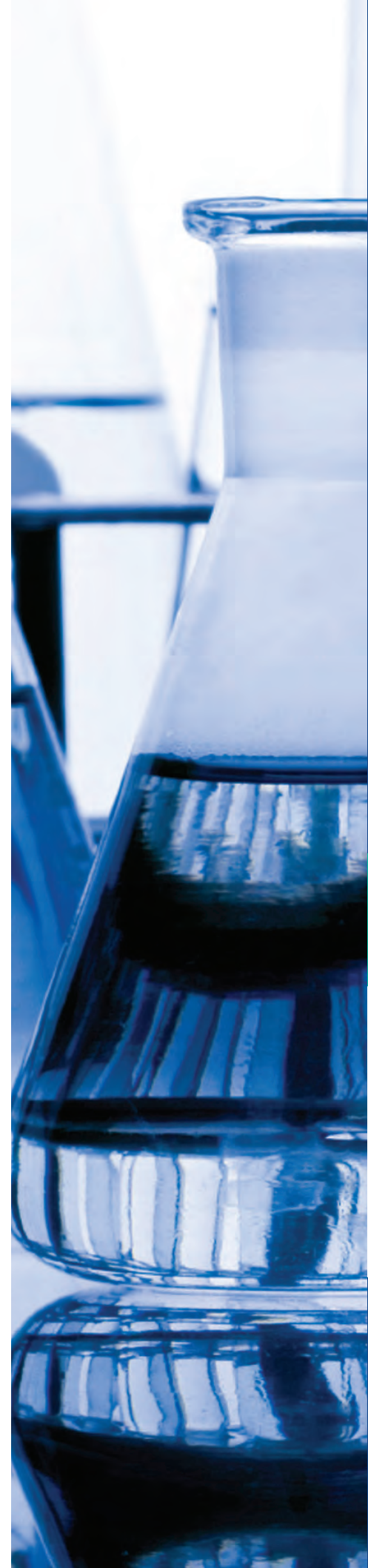
Overview

The **RESEARCH SUPPLY CENTER** furnishes a large selection of plasticware for all scientists at the Institute. Plasticware products are displayed in a showroom for pickup by individual laboratories. In addition to the convenience of having a centralized facility, the economy of scale provided by this center allows considerable savings to be passed along to users.

Services

- Centralized media/biologics – Search and place orders from an inventory of commonly used cell culture reagents, including fetal bovine serum, as well as a wide range of reagents used in molecular biology (restriction enzymes, polymerases, and nick-translation kits)
- Waste handling containers – Sharps containers, glass
- boxes, burn boxes, and red biohazard bags
- Ethanol may also be ordered through Research Supply

Disclaimer: The Research Supply Center is only available to Wistar researchers.



How to Utilize Wistar's Shared Resources

All researchers are encouraged to contact a Shared Resource Manager or Director to discuss available services. More in-depth information about our Shared Resources are available at wistar.org/resources.

Wistar's Office of Science Administration oversees the BSL-3, Histotechnology, and Research Supply Shared Resources and ensures the Cancer Center Shared Resources have the necessary Institute support.

For general information, assistance, or to provide feedback about Shared Resources equipment or services, contact:



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The **Wistar Institute** is an international leader in biomedical research with special expertise in cancer, immunology, infectious diseases, and vaccine development. Founded in 1892 as the first independent, nonprofit, biomedical research institute in the United States, Wistar works actively to ensure that research advances move from the laboratory to the clinic as quickly as possible.

In 1972, Wistar became the first cancer center in the city of Philadelphia to be designated a National Cancer Institute (NCI) Cancer Center and the first in the nation solely devoted to fundamental research in the biology of cancer. For more than 40 years, Wistar has maintained this distinction for its cutting-edge accomplishments in biomedical research and demonstrated scientific leadership. In 2014, an NCI review panel recommended renewal of Wistar's Cancer Center Support Grant with the highest possible rating of "Exceptional." The rating was based on the leadership of Wistar's President and CEO, and Ellen and Ronald Caplan Cancer Center Director Dario C. Altieri, M.D., as well as the strength of Wistar's research programs, Shared Resources, and educational outreach efforts.



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