



# Research Cores Handbook

University of Virginia School of Medicine

Office of Research Core Administration

September 2014





Dear Colleague:

Thank you for your interest in the UVA School of Medicine Shared Research Resources. Each School of Medicine Core, administered by the Office of Research Core Administration and the Dean's Office for Research prides itself on a history of providing the research community with outstanding services, reagents, instrumentation, research support, expertise and investigator support relevant to the ever changing needs of our faculty.

As you review the various cores and their offerings please consider seeking the consultation of the Core Director on the services your research requires. If you do not see a particular service you need please contact me and we can discuss whether that service could be added to a core's repertoire. As always, we welcome your thoughts and comments on the cores.



Sincerely,

A handwritten signature in black ink, appearing to read "J. W. Fox". The signature is stylized and cursive.

Jay W. Fox, Ph.D.

Professor of Microbiology, Immunology and Cancer Biology  
Associate Dean for Research Infrastructure  
Director, Office of Research Core Administration



# Major Service Areas

For a comprehensive list, see:

<http://www.medicine.virginia.edu/research/cores/services-in-research-cores.html>

## **Antibodies**

Lymphocyte Culture Center

## **Biomolecule analysis**

Biomedical Mass Spectrometry Facility

DNA Sciences

Bio NMR

Shared Instrumentation

## **Biospecimens**

Biorepository and Tissue Research Facility

## **Cell culture and analysis**

Flow Cytometry

Tissue Culture Facility

Shared Instrumentation

## **Flow cytometry**

Flow cytometry core

## **Gene targeting**

Gene Targeting and Transgenic Facility

## **Genomics**

DNA Sciences

Bioinformatics

Gene Targeting and Transgenic Facility

## **Histology**

Biorepository and Tissue Research Facility

Research Histology Core

## **Human physiology**

Exercise Physiology Core Laboratory

## **Imaging**

Advanced Microscopy Facility

Molecular Imaging Core

Biorepository and Tissue Research Facility

Shared Instrumentation

## **Protein analysis**

Biomedical Mass Spectrometry

Bio NMR

Shared Instrumentation

## **Reagents**

Molmart

## **Training**

Individual training or formal courses, depending on core

## **Transgenic mice**

Gene Targeting and Transgenic Facility

# **Research Cores Organization**

The shared research cores of the University of Virginia, School of Medicine are administratively located in the Office of Research Core Administration, under the Associate Dean for Research Infrastructure, Jay Fox. Each core has a director, a faculty advisor, and oversight committee.

The cores prepare annual reports, including funding requests. The School of Medicine Research Advisory Committee reviews the reports. Proposals for rates for services receive approval from Financial Reporting and Analysis before implementation.

New instruments are funded by NIH Shared Instrumentation Grants, Virginia's equipment trust fund and in some cases by groups of investigators.

Operating expenses are covered by user fees and support from the School of Medicine.

The Office of Research Core Administration provides support services to the cores. The cores enter billing information into the CORES system developed at Vanderbilt, and ORCA then sends billing notices to investigators who use the cores. ORCA helps cores develop budgets, including rates for services. ORCA assists with personnel matters, event planning and web site maintenance.

To see all research cores, their services, equipment and training opportunities, see: <http://www.medicine.virginia.edu/research/cores/orca>

## **Office of Research Core Administration contact information:**

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# ***Advanced Microscopy Facility***

## **Overview**

The facility provides access to electron and light microscopes, training in microscope use, a full range of TEM and SEM sample preparatory services, consultation regarding microscopy applications in biomedical investigations.

The Facility can perform microscopy services for researchers, or train researchers to perform their own imaging.

## **Services**

- Confocal Microscopy including FRAP, FRET, Live Cell Imaging, Time Lapse, Intravital Imaging
- Multi-photon microscopy
- Transmission Electron Microscopy
- Scanning Electron Microscopy
- Immunocytochemistry, autoradiography, negative staining, low-angle shadowing/imaging
- Training on all microscopes
- Critical point drying
- Sputter coating
- Ultramicrotomy
- Other sample preparation for electron microscopy
- Platinum replication for protein imaging
- Consultation on all microscopy projects

## **Instrumentation**

- *JEOL 1230* transmission electron microscope with real-time digital imaging (2Kx2K), ultra high resolution digital imaging (4Kx4K) and film imaging
- *Zeiss Sigma VP HD*; field emission scanning electron microscope
- *Zeiss LSM 510* confocal microscope with Purple Diode laser
- *Zeiss LSM 510-META/FCS* confocal microscope with 3 lasers, an Eppendorf Micromanipulator and injector, heated stage for live cell imaging
- *Zeiss LSM 700* confocal microscope with 405, 488, 543, 633 nm lasers, ZEN software
- *Zeiss LSM 710 Multiphoton*. confocal microscope 4 channel detection, 405, 458, 488, 514, 561, 633 nm lasers. Coherent Chameleon Vision-S laser for 2-photon imaging. CO2 stage incubator with heating
- *Olympus BX51* microscope/digital camera: Brightfield, Fluorescence, Phase Contrast and DIC
- *Olympus SZX12* dual objective stereo microscope/digital camera: Brightfield, Darkfield and Fluorescence
- *High Resolution Vacuum Evaporator*; rotary shadowing
- *Leica Ultracut Ultramicrotomes* (3)
- *Critical Point Dryer*
- *Sputter Coater*

## Contact Information

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# Bioinformatics Core

## Overview

The Bioinformatics Core at UVA serves as a centralized resource for providing expert and timely bioinformatics consulting and data analysis solutions. The core offers services to investigators both within and outside UVA on both grant-funded and chargeback-based projects for management and analysis of large-scale biological datasets produced by high-throughput genomics experiments.

The Bioinformatics Core's mission is to build and maintain an infrastructure that enables the application of strong bioinformatics analysis with a measurable impact on the ability of UVA investigators to both publish their work and obtain new funding.

## Services

- Custom bioinformatics / biostatistical support
- Gene expression: microarray and RNA-seq
- DNA variation
- DNA binding / ChIP-seq
- DNA methylation: array and sequence-based analysis
- Grant and manuscript support
- Pathway and functional analysis

## Instrumentation

- Dedicated access to four dual-quad-core 128GB high-memory servers
- Shared access to 92 multi-core high-memory computing nodes; >1,500 cores and >3,000 GB RAM total as part of a high-performance computing cluster
- Access to subscription-based software for bioinformatics analysis: Ingenuity Pathway Analysis, OncoPrint Premium.
- Access to over 600 software packages for bioinformatics and statistical computing using the R/Bioconductor framework.

## Staff expertise

- Statistical computing with R
- Next Generation Sequencing (NGS) analysis
- Pathway analysis
- Study Design
- Data analysis

## Contact Information

*Director;* Stephen Turner

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*Office;* 1214 Health Sciences Library

*Web site;* <http://www.medicine.virginia.edu/research/cores/bioinformatics-core>

*Blog;* [GettingGeneticsDone.com](http://GettingGeneticsDone.com)





# ***Biomolecular Magnetic Resonance Facility***

## **Overview**

Nuclear magnetic resonance (NMR) spectroscopy provides information on molecular structure and dynamics at atomic level resolution. The UVa Biomolecular Magnetic Resonance Facility facilitates and promotes research which utilizes NMR spectroscopy to examine biologically important molecules. Assistance is available for all who wish to use NMR spectroscopy.

## **Services**

- Training for and access to the NMR spectrometers listed below
- Assistance with structure and dynamics characterization of molecules in solution

## **Instrumentation**

- *Bruker Avance III 800*, 4 RF channels, 5mm HCN Zpfg cryoprobe
- *Bruker Avance III 600*, 4 RF channels, 5mm HCN Zpfg cryoprobe
- *Bruker Avance DRX 600*, 4 RF channels, multiple probes, auto sample changer
- *Varian NMRS 600*, 4 RF channels, multiple probes
- *Varian NMRS 600*, 3 RF channels, multiple probes
- *Varian Inova 500*, 4 RF channels, multiple probes

## **Expertise**

Twenty five years of experience using nuclear magnetic resonance in research.

## **Contact Information**

*Director;* Jeff Ellena

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*Office;* Chemistry Building

*Web site;* <http://www.medicine.virginia.edu/research/cores/bmrf>





# ***Biorepository and Tissue Research Facility***

## **Overview**

The Biorepository and Tissue Research Facility:

- provides tissue samples from remnant surgical resection and autopsy specimens linked to clinicopathologic data while maintaining patient confidentiality.
- assists clinical trials and other investigator-initiated research studies in the collection and processing of blood, tissue, and other human biosamples.
- assists in the retrieval of archival histologic slides and tissue samples from the Department of Pathology.
- offers histology-based research services to support basic, translational and clinical research.

## **Services**

Biospecimen procurement, processing and banking

- Human tissue procurement from clinical specimens and preservation
  - Surgical resection specimens (targeted collection of remnant material)
  - Autopsy specimens (targeted collection of remnant material)
  - Study-specific collection of non-remnant material (consented)
- Banked specimens for future research (>30,000 specimens available)
- Biofluid sample processing
  - Clinical trial support (processing, logistics, shipping)
  - Processing for other investigator-initiated studies
  - Pickup from UVA Health System Hospital and clinics
  - Samples collected by phlebotomy services
- Enzymatic dissociation and viable freezing of tissue samples
- Peripheral blood leukocyte (PBL) Ficoll isolation and viable freezing
- Extraction of nucleic acids and protein from tissue samples including microcapillary electrophoresis and RNA amplification and labeling

Histology-based research techniques

- Paraffin embedding of human tissue specimens
- Histologic sectioning of fixed human tissue specimens
- Cryostat sectioning of frozen human tissue specimens
  - Training on instrument
  - Equipment usage
- Cytospin preparation of fluids containing cells
- Histology-guided macrodissection to enrich for specific cell types
- Laser microdissection
  - Training on instrument
  - Equipment usage
- Immunohistochemistry
  - Performed on human and animal tissues
  - Panel of "standard" antibodies
  - Custom immunohistochemistry (Investigator-supplied antibody)
- Custom tissue microarray manufacture
- Tissue microarray of the most common human carcinomas (159 cases)

## Instrumentation

### Major equipment

- *Arcturus XT-Ti microdissection apparatus (new 2014)* microdissection of fixed or frozen tissue; IR and UV laser capture modes; bright-field, fluorescence, and phase contrast specimen visualization (user operated)
- *Leica ASLMD laser microdissection apparatus* microdissection of fixed or frozen tissue; UV laser capture; bright field & fluorescence specimen visualization (user operated)
- *Pathology Devices TMArrayer* production of tissue microarrays
- *QIAGEN TissueLyser II* fully automated protein and nucleic acid extraction
- *Bio-Rad Experion microcapillary electrophoresis system* microscale/LabChip RNA and DNA analysis
- *Bio-Rad CFX96 Touch System* 6-channel Real-time PCR (qPCR) apparatus
- *DAKO Autostainer/Autostainer Plus* automated immunohistochemistry platform
- *DAKO PT Link pretreatment module* semi-automated deparaffinization and antigen retrieval
- *Leica 3050S research cryostat* preparation of frozen tissue sections (user operated)
- *Olympus BX41TF with Camera and Olympus Microsuite Pathology* bright-field photomicroscopy and remote collaboration
- *Leica SCN400 digital whole-slide scanner with SlidePath Digital Image Hub, Tissue IA, and OpTMA Module* bright-field whole slide imaging, image analysis, and tissue microarray de-arraying, annotation, and analysis
- *Sakura Finetek VIP5 Processor* automated processing of formalin-fixed tissue
- *Sakura Finetek Tissue-Tek TEC* preparation of paraffin blocks
- *Microm HM 325 with collimator* microtome for sectioning paraffin blocks and tissue microarrays
- *MVE-Chart 1536P vapor phase LN2 freezers* vapor phase biospecimen storage
- *-80° C freezers* biospecimen storage

## Expertise

Craig Rumpel; human subjects regulations, biosafety and Category B shipping, laser microdissection, biorepository science and biorepository informatics

Patcharin Pramoonjago; molecular and cellular biology and is expert in cell culture, mutational analysis, RNA analysis, protein analysis

## Contact Information

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*Office:* room B705A, MR6 Building

*Technical Director;* Pat Pramoonjago

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# DNA Sciences Core

## Overview

The DNA Sciences Core provides expertise to investigators for experimental design, sample preparation, protocol optimization and execution and data analysis. The scope of services provided by the program areas includes DNA sequencing and genomic analyses carried out via deep sequencing (“next-gen”) and Sanger sequencing, to suit a wide range of research projects requiring nucleic acid sequences. The core also provides gene expression and genotyping on microarray and real time PCR platforms. The DNA Sciences Core works synergistically with the Biorepository and Tissue Research Facility and Bioinformatics Core by sharing resources and complementary expertise in bioinformatics.

## Services

- DNA Genome Analysis and Nucleic Acid Library Preparation
  - Single read or paired-end
  - DNA/RNA sequencing
  - ChIPSeq
  - Small RNA characterization
- Affymetrix GeneChip Microarray
- DNA Sequencing
  - Sanger sequencing: plasmids, PCR amplicons, BAC, YAC
  - Gene walking for specified region and length
  - MiSeq sequencing of BAC and YAC
- Real Time PCR Gene Expression and Genotyping
  - SNP
  - miRNA
  - Gene expression
- DNA Fragment Analysis

## Instrumentation

- *ABI 3730* DNA Analyzer; Sanger DNA sequencing
- *Illumina Genome Analyzer II*; Next gen sequencing
- *Illumina MiSeq sequencing system*:small scale next gen sequencing projects
- *Affymetrix Gene Chip System*:studying changes in gene expression
- *ABI Prism® 7900HT Sequence Detection System*: real time PCR
- *Bio-Rad* Droplet Digital PCR System: gene expression, rare mutation, and copy number

## Staff expertise

Yongde Bao, PhD, director, of this core has extensive training in analytical chemistry and has acquired extensive expertise in all aspects of core operations, including protocol development and appraisal of new technologies in genome research. He also has keen interest in the development of bioinformatics enabling him to offer assistance to

investigators in every step of their research projects from experimental planning to data analysis and data mining. He has served as a member of Research Groups in various national and international organizations. He is also ad hoc editor/reviewer for a number of biotechnical journals.

Alyson Prorock, develops new data analysis procedures accessing the latest bioinformatics tools available.

## Contact Information

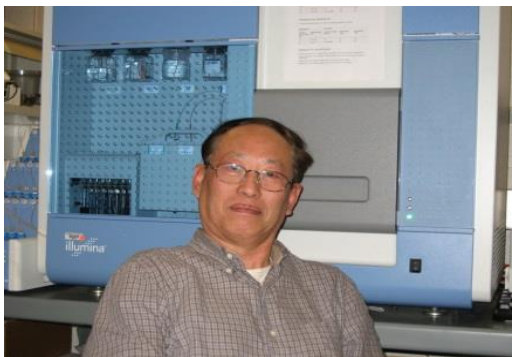
*Director:* Yongde Bao, PhD

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*Location:* room 1044, Jordan Hall

*Web site:* <http://www.medicine.virginia.edu/research/cores/biomolec/dna/dnascience-page>



# ***Exercise Physiology Core Laboratory***

## **Overview**

The Exercise Physiology Core Laboratory was established to promote the expansion and enhancement of clinical research that incorporates exercise physiology and body composition into either the research questions or the research design. Over the years, we have added measures of resting and exercise oxygen consumption, lactate threshold assessment, endothelial function, regional distribution of body fat, body composition assessment via whole body air displacement plethysmography (BOD POD), anthropometry including diameters, circumferences, and skinfolds and the use of acute exercise and/or exercise training as an intervention.

## **Services**

- Graded Exercise Testing by treadmill or cycle ergometer
- Exercise Training Interventions
- Basal, Resting and Exercise Metabolic Measures
- Body Composition and Anthropometrics
- Functional Measurements
- Physical Activity Questionnaires
- Imaging

## **Instrumentation**

- *SensorMedics Vmax Metabolic Stress Testing Systems*; Clinical measurement of oxygen consumption during exercise
- *GE Case Exercise Testing System including ECG and Treadmill*; Clinical measurement of oxygen consumption during exercise
- *Monark Arm Crank Ergometer*; Upper body ergometer
- *SensorMedics Delta Trac Bedside Metabolic System*; Measurement of basal or resting metabolism
- *Quinton Q-Stress ECG system*; Electrocardiograph for exercise testing; compatible with Lode ergometer
- *Lode Bicycle Ergometer*; Electronically calibrated research ergometer
- *BOD POD GS Body Composition Tracking System (COSMED)*; Measurement of body composition including body volume, body fat, body fat-free mass
- *sliceOmatic (TomoVision)*; Medical image analysis software for measurement, segmentation and analyzes of multi-slice scanner data.
- *Brachial Analyzer (MIA Vascular Research Tools 5)*; Medical image analysis software for the assessment of Flow Mediated Dilation (FMD)/endothelial function of brachial artery from ultrasound image data.

## **Expertise**

Judy Weltman MS, CCRC, Laboratory Manager, has over 20 years of experience managing the Exercise Physiology Core laboratory. She has extensive experience working with investigators in the area of Exercise Science and with laboratory testing procedures.

Shannon Slovensky MEd, Research Assistant, has extensive experience with the Exercise Physiology laboratory testing procedures as well as considerable expertise in leading community based exercise programs.

Arthur Weltman, PhD, FACSM, Laboratory Director, is a well-established scholar in the area of Exercise Physiology with over 200 publications in refereed journals and a long-standing history of NIH funding.

### **Contact Information**

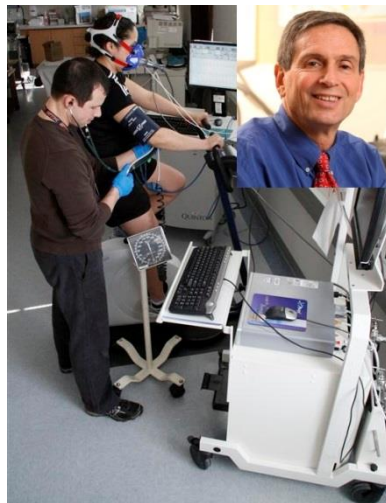
*Director;* Arthur L. Weltman, PhD

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*Office;* Private Clinics, Room 5526

*Web site;* <http://www.medicine.virginia.edu/research/cores/exercise-physiology>



# **Flow Cytometry Core Facility**

## **Overview**

The Flow Cytometry Core Facility is housed in Jordan Hall 2<sup>nd</sup> floor (Room 2011, 2013) and provides all investigators at the University of Virginia access to high quality, cost effective flow cytometry services. By providing these services, as well as the scientific expertise necessary to effectively use this technology, the facility serves to enhance the scope and quality of scientific research performed at the University.

With state of the art instrumentation researchers have the option, once trained, of performing their own analysis or utilizing the expertise of the facility's staff to run their samples for them. Specialized training classes are offered for those researchers who wish to better understand the principles and techniques employed in this technology and prefer to directly acquire and/or analyze their own samples.

## **Services**

- Flow cytometry acquisition/analysis
- Imaging cytometry
- Cell sorting
- Mass Cytometry
- Assays of biomolecules using Luminex technology
- Training

## **Instrumentation**

- Becton Dickinson FACSVantage SE TurboSort DIVA; 4 way cell sorting on up to 10 parameters
- BD Influx cell sorter; 5 lasers, 15 colors 6way/single cell sorting colors in a Baker BioProtect hood under BSL2 conditions
- Becton Dickinson/Cytek FACSCalibur Benchtop Analyzers; 4 instruments with 4 to 10 color analyses and 96 well plate acquisition.
- Beckman Coulter CyAn ADP LX; 9 color analyses at up to 30,000 cells/sec
- Becton Dickinson LSRFortessa 4 laser 16 color analyses at up to 30,000 events/sec
- Amnis ImageStreamX MKII; 4 lasers, brightfield illumination, 20, 40, 60X magnification; imaging and flow cytometry,
- Luminex 100 IS System and MagPix System; multiplex analysis for multiple analytes such as cytokines, chemokines, cell signaling proteins
- Data Analysis Workstations; 4 Mac stations with FloJow and Modfit software, 2 PCs
- BD Influx cell sorter; 5 lasers, 15 colors sorting under BSL3 conditions into multiple containers
- DVS Sciences CyTOF Mass Cytometer, capable of analyzing up to 40 analytes using heavy metal tagged reagents.
- Miltenyi AutoMACSPro magnetic cell separator

- **Expertise**

- Michael Solga, M.S. (14 years) and Victor Guo, Ph.D (7 years) have comprehensive flow cytometry experience, including assay development, experimental design, acquisition, sorting, and data analyses.
- Director, Joanne Lannigan, M.S. has over 30 years of experience in all aspects of flow cytometry

## Contact Information

*Director:* Joanne Lannigan

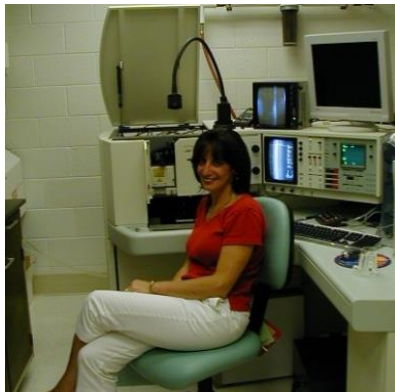
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*Web site;* <http://www.medicine.virginia.edu/research/cores/FlowCytometry>

*Facebook;* <https://www.facebook.com/uvaflow>



# Gene Targeting and Transgenic Facility

## Overview

The Gene Targeting and Transgenic Facility (GTTF) at the University of Virginia provides user-oriented service to efficiently produce and preserve genetically engineered mouse strains for animal model research for investigators at UVa and their collaborators in other academic institutions.

GTTF's mission is to support transgenic and gene targeting research endeavors, to advance genetic technologies for germline and ES cell manipulations, and to serve as a resource for design, development and derivation of customized mouse strains.

## Services

- Transgenic and knockout mouse production
- Gene targeting with mouse embryonic stem cells
- Congenic line derivation and mouse genetic background characterization
- Cryopreservation of embryos or sperm, and rederivation from frozen embryos or sperm
- Genotyping and breeding assistance

## Instrumentation

- *Leica DMIRB and DMIL inverted microscopes*
- *Leica MZ75 high performance stereomicroscopes*
- *Leitz micromanipulators*
- *Sutter P-87 micropipette puller*
- *De Fonbrune microforge*
- *Bio-Cool BCIV40A Controlled-Rate Freezer*
- *XYClone laser system*
- *BTX ECM630 Electroporator*
- *Eppendorf EP Gradient Mastercycler*
- *UVIdoc LCD Gel Documentation System*

## Expertise

- Mouse genetics and disease models
- Consultation for project initiation and grant proposals
- Transgenic workshop

## Contact Information

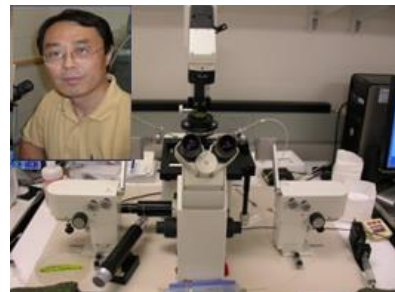
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# Lymphocyte Culture Center

## Overview

The Lymphocyte Culture constructs lymphocyte-myeloma hybridomas for production of monoclonal antibodies using current technology and methods backed by many years of experience. The Center provides:

- Production and selection of hybridomas
- Production and purification of antibodies
- Consultation of antibody choice
- Cryostorage of hybridomas for future use
- Production simplified by approved animal experimentation protocols
- Hands off production for investigators
- Expertise on use of monoclonal antibodies

## Services

- Hybridoma generation
- Antibody production
- Antibody purification

## Instrumentation

- *Shimadzu HPLC* antibody purification
- *Liquid nitrogen cell banks*

## Expertise

- Mouse immunizations
- Lymphocyte-myeloma hybridoma construction & selection
- ELISA for specific antibody production
- Monoclonal antibody production in vitro (bioreactors)
- Antibody purification
- Cell culture
- Hybridoma cryopreservation and long-term storage

## Contact Information

*Director;* Sallie Adams

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# Mass Spectrometry Facility

## Overview

The W.M. Keck Biomedical Mass Spectrometry Laboratory within the Biomolecular Research Facility was established 18 years ago to bring state of the art mass spectrometry techniques to the University of Virginia. The facility works with proteins, peptides and other biological molecules in areas such as identification and relative or absolute quantification. For quality control experiments where mass analysis is sufficient (peptide synthesis, reaction products, etc) the facility offers open access training on its MALDI-TOF instrument. More complex experiments are performed by highly trained staff on the triple quadrupole and orbitrap instruments. These experiments range from identification of proteins or peptides from gels, solutions, or biological matrices to relative quantification using spectral counts or SILAC (stable isotopes) to absolute quantification using multiple reaction monitoring (MRM). The lab stands ready to assist with experimental planning, data analysis, manuscript preparation, and grant writing.

## Services

- Protein identification and sequencing from gel or solution by either peptide mass fingerprinting or ESI-LC/MS/MS at the low femtomole level.
- Analysis of protein mixtures such as tissue and media.
- Analysis of tissue samples prepared by Laser Capture Microdissection.
- Proteomics, comparison of proteins in samples using chemical/isotopic labels or label free analysis.
- Absolute quantitation of proteins using labeled peptides and selective reaction monitoring.
- Identification of phosphorylation sites using titanium dioxide enrichment.
- Identification of post-translational modifications (phosphorylation, ubiquitination, etc).
- *De Novo* (manual) sequence analysis of novel proteins to obtain sufficient sequence data for cloning.
- High resolution, high mass accuracy measurements of peptides and small proteins by ESI.
- Mass determination by MALDI mass measurements for confirming identity of peptides and proteins, either by staff or open access self service.
- Identification of interaction partners.

## Instrumentation

- *Thermo Scientific LTQ Orbitrap Velos* for high accuracy, high sensitivity analysis
- *Bruker Microflex* for mass analysis by MALDI
- *Thermo Scientific TSQ Quantum Access MAX* triple quadrupole instrument for quantification by SRM

## Expertise

Nicholas Sherman, PhD - biological and analytical chemistry of proteins, peptides and their post-translational modifications, data interpretation

Erin Jeffery, PhD - biological and analytical chemistry of proteins, peptides and their post-translational modifications, instrument operation

## Contact Information

*Director;* Nicholas Sherman, PhD

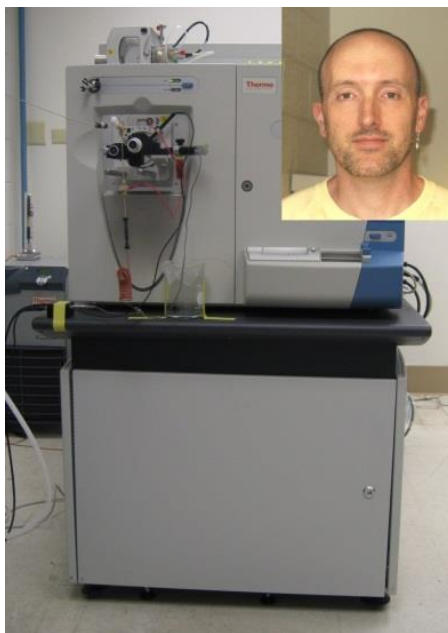
*Phone number;* 434.924.0070

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*Office;* room 1034, Jordan Hall

*Web site;*

[http://www.medicine.virginia.edu/research/cores/biomolec/ProteinAnalysisbyMassSpectrometry/mass\\_spectrometry-core](http://www.medicine.virginia.edu/research/cores/biomolec/ProteinAnalysisbyMassSpectrometry/mass_spectrometry-core)



# Molecular Electron Microscopy Core

## Overview

The Molecular Electron Microscopy Core (MEMC) is a state-of-the-art facility dedicated to high-resolution electron cryomicroscopy (cryoEM) and electron cryotomography of biological specimen. It houses three electron microscopes, a 120kV Spirit, a 200kV F20, and a 300kV Titan Krios. These microscopes are available to researchers either for direct use, or aided by MEMC personnel, to collect data aimed at high-resolution structural biology projects.

## Services

- training in electron microscopy
- direct use of microscopes
- MEMC personnel aided data collection
- sample preparation

## Instrumentation

- *FEI Spirit* - 120KV microscope with tungsten filament and 2kx2k CCD camera
- *FEI F20* - 200KV microscope with feild emission gun and 4kx4k CCD camera
- *FEI Titan Krios* - 300KV microscope with XFEG and Falcon II direct electron detector camera

## Expertise

Kelly Dryden has been involved in cryoEM and image analysis for over 25 years

## Contact Information

*Director;* Kelly Dryden

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*Office;* room 232, Snyder Building, Fontaine Research Park

*Web site;* <http://www.medicine.virginia.edu/research/cores/molecular-electron-microscopy-core>





# Molecular Imaging Core

## Overview

The Molecular Imaging Core images small animals and cells with MRI, luminescence, fluorescence, PET and can combine techniques. The core also operates a cyclotron which produces PET isotopes, and has chemistry facilities to synthesize radio-labeled imaging agents.

## Services

- MRI imaging
- fluorescence imaging
- PET imaging
- Production of  $^{18}\text{F}$ ,  $^{11}\text{C}$ ,  $^{13}\text{N}$  and  $^{15}\text{O}$  and other isotopes in cyclotron
- Synthesis of radiolabeled imaging agents

## Instrumentation

- *Bruker/Siemens 7Tesla MRI* for small animal imaging
- *Varian 200/400 4.7 Tesla MRI* with Varian Direct Drive console for small animal imaging
- *Caliper IVIS Spectrum bioluminescence and fluorescence scanner* scans can be combined with MRI and CT scans
- *Siemens Medical Solutions Focus 120 Positron Emission Tomography (PET) scanner*
- *SA Instruments model 1025 and 1025L*; physiological monitoring of animals in MRI, PET and SPECT scanners
- *Siemens Eclipse™ HP 11 MeV Cyclotron* production of  $^{18}\text{F}$ ,  $^{11}\text{C}$ ,  $^{13}\text{N}$ , and  $^{15}\text{O}$
- *Von Gahlen minicells* production of radiolabeled imaging agents

## Expertise

Stuart S. Berr, has successfully collaborated with many investigators using micro imaging techniques including *in vivo* MRI, PET, and luminescence/fluorescence. In addition to running the core lab, he has been directing research aimed at the development of imaging tools to track and quantify leukocytes. More recently he has been working on the delivery of imaging and therapeutic agents to tumor associated macrophages using liposomes..

R. Jack Roy, BS is a licensed radiology technologist with over twenty years experience both in clinical and preclinical imaging. He is in charge of running the preclinical ClinScan MRI located in the MR4 building. He helps investigators design and implement experiments involving the MRI and helps to train investigators in the use of the scanners.

## Contact Information

*Director;* Stuart Berr

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*Web site;* <http://www.medicine.virginia.edu/research/cores/MolecularImagingCore>





# Research Histology Core

## Overview

Our goal is to provide research histology services to primary investigators and researchers throughout the various departments of the University, and in the external biomedical community. The lab provides a comprehensive range of histological research techniques. A wide spectrum of stains are available.

## Services

- Tissue processing and embedding
- Decalcification
- OCT embedding of frozen tissues
- Step/level sectioning
- Cryostat sectioning
- Routine and special stains
  - H&E
  - Masson and Gomori Trichrome
  - PAS (periodic acid Schiff)
  - Aldehyde Fuschin
  - Giesma
  - Verhoff's Elastin
  - Picrosirius Red
  - Toluidine Blue
- Sections for immunohistology staining

## Instrumentation

- *tissue processor* formalin fixed tissues
- *tissue processor* for Bouin's fixed tissues
- *tissue embedding station*
- *microtomes*
- *automated stainer*
- *cryostat*
- *-80°C freezer*

## Expertise

Sheri VanHoose: 23 years as Medical Technologist, 12 years in Histology and Lab Manager

Virginia Rubianes: 35 years as Medical Technologist, 10 years in Histology

Joyce Nash: 40 years experience in Histology (specializing in cryosection technique), Electron Microscopy and Immunohistochemical staining technique.

## Contact Information

*Lab manager:* Sheri VanHoose

*Phone number:* 434.924.9205

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*Office:* MR4 Building, Room 1123

*Web site:*

<http://www.medicine.virginia.edu/research/cores/histology>





# Shared Instrumentation Core

## Overview

The core provides access to user operated instruments which are available at all hours. The core also provides some separation services by HPLC and FPLC, and a slide scanning service. There is introductory training for several instruments.

## Services

- Fluorescence and absorbance plate reading
- Circular dichroism
- Densitometry and image analysis
- Slide scanning
- Real time label free cell analysis to measure cell growth, toxicity, invasion
- Chromatography by HPLC and FPLC

## Instrumentation

- *Molecular Devices Gemini EM Spectramax*: fluorescent plate reader
- *Biotek*: absorbance plate reader
- *Aviv model 410*; circular dichroism measurement
- *Bio-Rad GS800*; film and gel scanning
- *ImageQuant TL*; software for quantitation of bands on film and gel images
- *Aperio ScanScope CS*; microscope slide scanner
- *Acea xCELLigence DP*; cell analysis instrument
- *Beckman System Gold HPLC*; reverse phase chromatography using 4.6 mm diameter columns
- *Dionex Ultimate U3000*; chromatography using small columns
- *GE Healthcare AKTA FPLC*; medium pressure chromatography using ion exchange and gel filtration

## Expertise

Protein chemistry  
Chromatography  
Analytical instrumentation operation

## Contact

*Director:* John Shannon

*Phone:* 434.243.9399

*E-mail:* [jds1c@virginia.com](mailto:jds1c@virginia.com)

*Web site:*

[http://www.medicine.virginia.edu/research/cores/biomolec/Shared\\_Instrumentation/Shared\\_Instrumentation](http://www.medicine.virginia.edu/research/cores/biomolec/Shared_Instrumentation/Shared_Instrumentation)





# ***Tissue Culture Facility-Molmart***

## **Overview**

The Tissue Culture Facility-Molmart provides cell services and reagents to University of Virginia researchers. The services are mycoplasma testing, baculovirus titer measurements, growing of cultured cells and cell storage. This core also supplies on site cell culture reagents, molecular biology reagents and supplies at contract prices without shipping or eVA costs. The core also handles oligonucleotides ordered with Invitrogen.

## **Services**

- baculovirus titring
- amplification and titration of high-titer recombinant baculovirus stock
- scale up of virus inocula and protein production in suspension (wave mixer up to 10 liters)
- post-infection harvest of insect cells and supernatant
- co-infection for production of protein of interest
- Mycoplasma testing of cell lines within an hour depending on work load
- cell storage in liquid nitrogen
- ordering cell lines from ATCC upon request of the PI
- expanding and creating frozen cells stock
- technical support and consultation
- sterile hood space for new investigators needing tissue culture space
- educational services through individual training courses
- Self service supplies in Jordan Hall
- Special orders for supplies

## **Instrumentation**

- *Inverted microscopes*
- *Sterile hoods*
- *Incubators for tissue culture*
- *Cryogenic storage Dewars*
- *-86°C ultra low freezer*

## **Expertise**

Consultation in developing protocols for cell growth capabilities and methods.

Eradication of mycoplasma contamination.

Transient and stable transfection.

Rescue of low viability cell cultures

Validation of custom and commercial tissue culture serum, media and reagents

Many years of laboratory management.

## **Contact Information**

*Director; Nena Fox*

*Manager: Linda Beggerly*

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*Web site; <http://www.medicine.virginia.edu/research/cores/TissueCultureFacility>*  
*(tissue culture) and*

*<http://www.medicine.virginia.edu/research/cores/molmart> (supplies)*

