**SHARED RESEARCH EQUIPMENT AND RESOURCES**

**MTS Systems - Landmark Servo Hydraulic Material Testing**

The custom Landmark Servo Hydraulic material testing machine is able to produce 25kN of force with an actuator travel of 300mm and a maximum velocity of 4m/s. This machine is useful for:

* Uni-axial Dynamic and Quasi-Static Material Testing
* Force control experiments accurate within 0.1N
* Extension control experiments accurate within 0.01mm
* Typically used to gather material properties, failure testing, fatigue testing
* Assortment of compatible fixtures, load cells, and contact/noncontact instruments
* Specialized resource; can only be used through department-trained personnel
* Located at Biotech Place

**Contact Person:** Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**Kuka Robotics - KR300 - R2500 Ultra Industrial 6-Axis Robot**

The Kuka KR300 large capacity industrial robot is able to produce ~4kN of static force in six degrees of freedom and move at 2m/s with a reach of 2.5m. This machine is useful for:

* 6DOF Dynamic and Quasi-Static Material Testing and Joint Simulation
* Force control experiments accurate within 2N
* Extension control experiments accurate within 0.1mm
* Typically used to simulate human joints for mechanical properties, failure testing, fatigue testing
* Assortment of compatible fixtures, used in conjunction with NDI optical tracking system
* Specialized resource; can only be used through department-trained personnel
* Located at Biotech Place

**Contact Person:** Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**Simbex - Head Impact Telemetry (HITS) Sideline Response System**

The HIT System is a real-time head kinematic measurement tool. It is primarily used to measure the linear and rotational acceleration of sensors mounted within helmets of sports participants. The system contains a base unit with computer and wireless transmitter to collect acceleration data wirelessly from sensor units mounted in football helmets. This machine is

Useful for:

* Real-time 6DOF acceleration data acquisition and processing
* Typically used to measure concussion risk in young athletes in conjunction with other clinical tools
* Specialized resource; can only be used through department-trained personnel
* Located at MRI Building, 2nd floor

**Contact Person:** Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**Philips - BV Libra C-arm Fluoroscope**

Clinical quality C-arm fluoroscope with a 6" image intensifier. This machine is useful for:

* Orthopedic imaging
* Typically used to measure quality of surgical repairs and relative motion of internal components used in biomechanical studies
* Specialized resource; can only be used through department-trained personnel
* Located at Biotech Place

**Contact Person:** Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**Zcorp - Z450 3D Printing Machine**

The Z450 is an all in one color powder additive manufacturing system and de-powdering station. It has a build chamber of 8"x10"x8" with a layer thickness of 0.004" and XY resolution of 0.002". This machine is useful for:

* Display quality color 3D prototypes
* Medical models and pre-surgical planning models
* Typically used to create surgical planning models of skulls for plastic surgery
* ability to cure models in cyanoacrylate and low viscosity epoxy
* Specialized resource; can only be used through department-trained personnel
* Located at Biotech Place

**Contact Person**: Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**Form Labs - FormOne 3D Printing Machine**

The FormOne is a desktop stereo lithography (SLA) 3D printing machine. It has a build chamber of 4.9"x4.9"x6.5" with a layer thickness of 0.001". This machine is useful for:

* Close to Injection molded quality, opaque and translucent, high accuracy prototypes
* Medical models and medical device prototype printing
* Typically used to create small clear highly accurate parts for medical devices
* Specialized resource; can only be used through department-trained personnel
* Located at Biotech Place

**Contact Person:** Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**Makerbot - Replicator Gen5 3D Printing Machine**

The Replicator gen5 is a desktop fused deposition modeling (FDM) 3D printing machine. It has a build chamber of 9.9"x7.8"x5.9" with a layer thickness of 0.004" using polylactic acid plastic (PLA). This machine is useful for:

* Large, functional plastic, medium accuracy prototypes
* Medical models and medical device prototype printing
* Typically used to create larger parts for medical devices and experiment fixturing parts
* Specialized resource; can only be used through department-trained personnel
* Located at Biotech Place

**Contact Person:** Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**MSC - Ventrax CNC Knee Mill**

Fagor 8055i controlled 3-axis CNC, 3HP knee mill. This machine is useful for:

* Milling, Drilling, Tapping
* Prototype, tooling, and fixturing manufacture
* CNC Conversational Programming and G-code interpretation
* Located at Biotech Place

**Contact Person:** Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**MSC - Ventrax Engine and Tool room Lathe**

Manual bench lathe, 2HP geared speed control between 70RPM and 1500RPM.This machine is useful for:

* Facing, Drilling, Tapping
* Prototype, tooling, and fixturing manufacture
* Specialized resource; can only be used through department-trained personnel
* Located at Biotech Place

**Contact Person:** Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**MSC - Ventrax Variable Speed Floor Drill Press**

Manual Drill Press, 2HP with variable speed between 170RPM and 2000RPM This machine is useful for:

* Drilling
* Prototype, tooling, and fixturing manufacture
* Specialized resource; can only be used through department-trained personnel
* Located at Biotech Place

**Contact Person**: Joel Stitzel (jstitzel@wakehealth.edu), Center for Injury Biomechanics

 Philip Brown (phibrown@wakehealth.edu), 716-0945, Biomedical Engineering

**Asylum MFP 3D Bio Atomic Force Microscope**

An atomic force microscope that can be operated independently or on top of an inverted optical microscope

This machine is useful for:

|  |  |  |
| --- | --- | --- |
| * 
 | * High-resolution imaging of molecules, cells, material surfaces, etc.
 |  |
| * 
 | * Direct force spectroscopy and Nano manipulation
 |
| * 
 | * Simultaneous optical microscopy (bright field and fluorescence) and atomic force microscope
 |  |
|  | * imaging/manipulation/spectroscopy
 |  |
| * 
 | * Located at Biotech Place
 |  |

**Contact Person:** Adam Hall (arhall@wakehealth.edu), Biomedical Engineering

**Harrick Plasma Expanded Plasma Cleaner**

A self-contained plasma (air and oxygen) generation tool with adjustable power up to 30 W This machine is useful for:

* Cleaning samples of organic contaminants
* Sterilization
* Forming free radicals for surface reactions
* Located at Biotech Place

**Contact Person:** Adam Hall (arhall@wakehealth.edu), Biomedical Engineering

**TEG® 5000 Thrombelastograph® Hemostasis Analyzer system, Haemonetics Corporation**

The TEG Hemostasis Analyzer system is a diagnostic instrument that provides comprehensive whole blood hemostasis testing that can help assess bleeding and thrombotic risks (clinically), and monitor antithrombotic therapies. This machine can quantify rate of clot formation, clot strength, and rate of clot degradation (due to lysis) in whole blood. It also has the capability to do platelet mapping and some platelet function tests.

This machine is useful for:

* Characterizing clot strength from whole blood samples (minimum 340 uL needed)
* Determining the contribution of fibrinogen and platelets to clot strength
* Can be used in clinical or research settings
* Located at Biotech Place

**Contact Person:** Ellie Rahbar (erahbar@wakehealth.edu), Biomedical Engineering

 Charlotte Waits (cwaits@wakehealth.edu), Biomedical Engineering

**Sequenom MassARRAY SNP Genotyping System**

The Sequenom Mass ARRAY SNP Genotyping system is a flexible platform used for genotyping applications. The system if fully automated and include the Assay Designer 4.0 is used for primer design and the MassArray-Typer 4.0 software to make genotype calls. The MassARRAY System offers the following features, which are essential to clinical genetics research:

* Capacity to analyze multiple classes of genetic markers.
* Ability to quickly create and modify customized assay panels.
* Flexible sample throughput, from few to thousands.
* High quality data with low operating costs.

**Contact person:** Dr. Tim Howard tdhoward@wakehealth.edu, Center for Genomics and Personalized Medicine

**Illumina HiScan and Bead Station 500GX System**

The Illumina HiScan is used for high through-put genetic analysis platform. The Illumina HiScan utilizes predesigned or custom designed chips to perform whole genome screens. The capabilities are:

* Ability to perform whole genome screens for SNPs (arrays from ~700,000 SNPs to >4 million SNPs)
* Whole genome gene expression
* Whole genome methylation analysis

**Contact person:** Dr. Tim Howard tdhoward@wakehealth.edu, Center for Genomics and Personalized Medicine

**Illumina MiSeq Next Generation DNA Sequencer**

The Illumina MiSeq is an easy-to-use bench top Next Generation sequencer. This system provides up to 15 Gb output with 25 million sequencing reads and 2x300bp read lengths. This platform is suitable for single or multiple sample analysis. The sample prep kits are optimized for a variety of applications including:

* Targeted DNA/RNA re-sequencing
* Exome sequencing
* Chromatin Immunoprecipitation DNA sequencing (ChIPseq)
* mRNA sequencing (RNAseq)
* Metagenomics

**Contact person:** Dr. Tim Howard tdhoward@wakehealth.edu, Center for Genomics and Personalized Medicine

**Affymetrix System**

The Affymetrix system is a genetic analysis platform. The system is a flexible analysis platform with applications including:

* SNP genotyping (whole genome screens)
* Copy Number Variation (CNV) analysis
* Gene expression analysis

**Contact person:** Dr. Tim Howard tdhoward@wakehealth.edu, Center for Genomics and Personalized Medicine

**Covaris DNA Focused Ultrasonicator for DNA Shearing**

A hydrosonic DNA shearer useful for:

* Shearing DNA for ChIPseq
* Preparation of next generation DNA sequencing libraries

Contact person: Dr. Greg Hawkins (ghawkins@wakehealth.edu) Center for Genomics and Personalized Medicine

**PyroMark Q96 MD Pyrosequencer**

The PyroMark Q96 MD Pyrosequencer is a highly sensitive and quantitative DNA sequencing platform that utilizes DNA sequencing by synthesis chemistry called pyrosequencing. This platform can analyze 96 samples per run and is useful for:

* Identification and quantification of DNA methylation
* Measuring allelic specific gene expression
* DNA polymorphism genotyping
* Quantifying SNP allele frequency in pooled samples
* Sequencing short PCR products that are difficult to sequence by Sanger sequencing methods

**Contact person:** Dr. Greg Hawkins (ghawkins@wakehealth.edu) Center for Genomics and Personalized Medicine

**Agilent Bioanalyzer 2000**

The Agilent Bioanalyzer 2000 is a highly chip based platform used for sensitive detection and quantification of DNA, RNA, and protein.

* Evaluation of DNA libraries for Next Generation DNA sequencing platforms
* RFLP analysis
* Analysis and quantification of sheared DNA
* Quality control analysis and quantification of whole RNA or purified mRNA
* Analysis of protein and protein fragments

**Contact person:** Dr. Greg Hawkins (ghawkins@wakehealth.edu) Center for Genomics and Personalized Medicine

**AutoPure LS DNA Isolation Robot**

The AutoPure DNA robot is a high throughput DNA purification platform suitable for isolating DNA from large volumes of whole blood (Gentra Systems, Inc.),

**Contact person:** Dr. Tim Howard tdhoward@wakehealth.edu, Center for Genomics and Personalized Medicine

**Life Technologies ABI7500 and ViiA 7 Real-Time PCR System**

These Real-Time PCR systems are useful for:

* Quantification of RNA and DNA
* Gene expression using Real-Time PCR
* Genotyping using TaqMan assays (custom or pre-designed)

**Contact person ABI 7500:** Dr. Tim Howard tdhoward@wakehealth.edu, Center for Genomics and Personalized Medicine

**Contact person ViiA 7**: Dr. Nichole Allred (nallred@wakehealth.edu), Center for Genomics and Personalized Medicine

**PTI DELTA RAM V Illuminator for Photon Tech Imaging System**

The PTI system is currently used for intracellular calcium imaging in cultured cells. (Currently only for Fura-2-AM)

* Capable to measure  fluorescent intensity (different filters may be required)
* Capable to test effects of drugs on intracellular calcium level in live cells using a perfusion system.

Contact person: Dr. Ken Hayashida (khayashi@wakehealth.edu, Pain Mechanisms Lab. Anesthesiology.

**Thermo Scientific Orbitrap Eclipse Tribrid Mass Spectrometer**

The Orbitrap Eclipse mass spectrometer is connected with Thermo Scientific Vanquish Neo nano-UPLC system via high field asymmetric waveform ion mobility spectrometry (FAIMS) interface to provide in-depth proteome profile in both qualitative and quantitative manner.

* Proteomics including single cell proteomics
* Recombinant protein or native protein complexes molecular weight and composition measurements
* Post-translational modification analyses (i.e. phosphorylation, oxidation)
* Large-scale proteome quantitation (i.e. TMT, SILAC)
* Targeted analysis for relative or absolute protein quantitation
* Discovery and validation of protein biomarkers
* Located at Hanes building, 2nd floor, room 2007

**Contact persons:** Dr. Cristina M. Furdui, Director, Proteomics and Metabolomics Shared Resource

 (cfurdui@wakehealth.edu), 336-716-2697

Dr. Jingyun Lee, Assistant Director, Proteomics and Metabolomics Shared Resource

(jilee@wakehealth.edu), 336-713-4194

**Thermo Scientific Q Exactive HF Hybrid Quadrupole-Orbitrap Mass Spectrometer**

The Q Exactive HF mass spectrometer is combined with Thermo Scientific Vanquish UPLC system and provides high mass resolution with high mass accuracy (HRAM) for untargeted compound identification services. This instrumentation is used for qualitative analysis of small molecules such as metabolites, phospholipids, natural products, and redox biomolecules.

* Metabolomics analysis
* Lipidomics analysis
* Redox couple measurement (i.e. NADP+/NADPH)
* Molecular weight measurement of macromolecules (i.e. protein, DNA)
* Discovery of metabolite biomarkers
* Located at NRC building, 2nd floor, room 220

**Contact persons:** Dr. Cristina M. Furdui, Director, Proteomics and Metabolomics Shared Resource (cfurdui@wakehealth.edu), 336-716-2697

Dr. Jingyun Lee, Assistant Director, Proteomics and Metabolomics Shared Resource (jilee@wakehealth.edu), 336-713-4194

**SCIEX Triple Quad 7500 Mass Spectrometer**

The SCIEX Triple Quad 7500 mass spectrometer is used for selective quantitation of metabolites, phenolic compounds, and pharmaceutical drugs. Optiflow Pro ion source provides sensitivity that covers a wide range of biomolecules. The equipment is capable of determining more than 60 oxylipins in 15 minutes using multiple reaction monitoring (MRM) acquisition with an assistance of reversed-phase separation.

* Targeted metabolomics
* Oxylipins and other lipid mediators
* Pharmacokinetic study of clinical drugs
* Natural products
* Redox couples (i.e. GSH/GSSG, cysteine/cystine)
* Validation of metabolite biomarkers
* Located at Hanes building, 2nd floor, room 2007

**Contact persons:** Dr. Cristina M. Furdui, Director, Proteomics and Metabolomics Shared Resource (cfurdui@wakehealth.edu), 336-716-2697

Dr. Jingyun Lee, Assistant Director, Proteomics and Metabolomics Shared Resource (jilee@wakehealth.edu), 336-713-4194

**Shimadzu LCMS-8050 Mass Spectrometer**

The LCMS-8050 is a triple quadrupole mass spectrometer used for analysis of metabolite and other small molecules. The equipment features a rapid scan rate, and fast polarity switching enables the simultaneous determination of primary metabolites, natural components, and various phenolic compounds.

* Targeted analysis of metabolites with ion-paring chromatography
* Targeted analysis of a broad range of small molecules
* Located at Hanes building, 2nd floor, room 2009

**Contact persons:** Dr. Cristina M. Furdui, Director, Proteomics and Metabolomics Shared Resource (cfurdui@wakehealth.edu), 336-716-2697

Dr. Jingyun Lee, Assistant Director, Proteomics and Metabolomics Shared Resource (jilee@wakehealth.edu), 336-713-4194

**Thermo Scientific TSQ Quantum XLS Triple Quadrupole Mass Spectrometer**

The XLS is coupled with the Thermo Scientific Trace gas chromatography to provide sensitive detection of volatile compounds. The instrumentation conducts electron impact and chemical ionization mass spectrometry in the positive and negative ion modes and performs collision-induced dissociation for structure analysis.

* SRM analysis of fatty acid methyl ester (FAME)
* Cholesterol and oxysterols analysis
* Analysis of volatile organic compounds (VOCs)
* Located at Hanes building, 2nd floor, room 2009

**Contact persons:** Dr. Cristina M. Furdui, Director, Proteomics and Metabolomics Shared Resource (cfurdui@wakehealth.edu), 336-716-2697

Dr. Jingyun Lee, Assistant Director, Proteomics and Metabolomics Shared Resource (jilee@wakehealth.edu), 336-713-4194

**Agilent Seahorse XFe24 Analyzer**

PMSR shares Agilent Seahorse XFe24 Analyzer to provide researchers a real-time cell analysis technique. The equipment detects discrete changes in cellular bioenergetics in real-time manner. Training is required prior to first use with our laboratory specialist.

* Measures oxygen consumption rate (OCR) and extracellular acidification rate (ECAR) of live cells
* Located at NRC building, 2nd floor, room 228

**Contact persons:** Dr. Cristina M. Furdui, Director, Proteomics and Metabolomics Shared Resource (cfurdui@wakehealth.edu), 336-716-2697

Dr. Jingyun Lee, Assistant Director, Proteomics and Metabolomics Shared Resource (jilee@wakehealth.edu), 336-713-4194

Dr. Kirtikar Shukla, Associate Staff Scientist, Molecular Medicine (kshukla@wakehealth.edu)

**Affymetrix Microarray Systems (Cartridge Array and GeneAtlas Array-Strip)**

The Affymetrix microarray systems are high-content state-of-the-art genetic screening platforms. The systems are flexible (gene focused or comprehensive, multi-species platforms) and customizable with applications including:

* Whole genome transcript and exon-level expression analysis
* Genome-wide SNP genotyping
* Whole genome methylation analysis (tiling arrays)
* Genome-wide copy number variation (CNV) analysis

**Contact persons:** Dr. Lance Miller (ldmiller@wakehealth.edu), Director Microarray Core

 Lou Craddock (lcraddoc@wakehealth.edu), Manager/Microarray Specialist

**Microarray Bioinformatics & Data Analysis**

* Microarray data QC, normalization, differential expression analysis
* Gene Ontology enrichment, clustering and visualization
* Higher-order informatics, network prediction, classification, data-mining

**Contact persons:** Dr. Lance Miller (ldmiller@wakehealth.edu), Director Microarray Core

 Lou Craddock (lcraddoc@wakehealth.edu), Manager/Microarray Specialist

**Agilent Bioanalyzer 2000**

* Determination of integrity, purity and quantity of nucleic acids, namely RNA
* Quantification and sizing of protein and DNA

**Contact persons:** Dr. Lance Miller (ldmiller@wakehealth.edu), Director Microarray Core

 Lou Craddock (lcraddoc@wakehealth.edu), Manager/Microarray Specialist

**GeneAmp PCR System 9700**

* Reverse transcription
* IVT labeling of biotin based cRNA
* RNA fragmentation
* Hybridization preparations
* Denaturing RNA for bioanalysis

**Contact persons:** Dr. Lance Miller (ldmiller@wakehealth.edu), Director Microarray Core

 Lou Craddock (lcraddoc@wakehealth.edu), Manager/Microarray Specialist

**Perkin Elmer Cetus-DNA Thermal Cycler**

* PCR
* Denaturing nucleic acids for bioanalysis
* Precision reactions and incubations

**Contact persons:** Dr. Lance Miller (ldmiller@wakehealth.edu), Director Microarray Core

 Lou Craddock (lcraddoc@wakehealth.edu), Manager/Microarray Specialist

**Eppendorf BioPhotometer**

* RNA concentration determination
* 260/280 and 260/230 ratio analysis to determine RNA purity

**Contact persons:** Dr. Lance Miller (ldmiller@wakehealth.edu), Director Microarray Core

 Lou Craddock (lcraddoc@wakehealth.edu), Manager/Microarray Specialist

**BioRad iCycler iQ Multiplex Real-Time PCR**

* Gene expression analysis by Real-Time PCR
* Quantification of RNA and DNA

**Contact persons:** Dr. Lance Miller (ldmiller@wakehealth.edu), Director Microarray Core

 Lou Craddock (lcraddoc@wakehealth.edu), Manager/Microarray Specialist

**Nucleic Acid Purification and QC for Genomic Applications**

* Custom isolation and QC assessment of microarray/NGS-quality RNA or DNA from clinical samples (e.g., fine-needle aspirates, core biopsies, FFPE sections, resected tissues)

**Contact persons:** Dr. Lance Miller (ldmiller@wakehealth.edu), Director Microarray Core

 Lou Craddock (lcraddoc@wakehealth.edu), Manager/Microarray Specialist

**LAS-3000 Imager**

The goal of the Analytical Imaging Facility is to provide equipment for the acquisition and analysis of images from radioactive, fluorescent, or chemiluminescent samples such as agarose and polyacrylamide gels, membranes, microplates, and microarrays.

* The LAS-3000 is a CCD camera-based system, which allows for detection of chemiluminescent and UV/fluorescent signals.

**Contact Persons:** Denise Herpai - dgibo@wakehealth.edu, Training on use of Typhoon Imagers. 336-713-7385

**Software** **ImageQuant TL7.0 and ImageQuant 5.2 software**

* available on computers in the facility for the analysis of 8 to 16 bit grayscale TIFF, .gel, or .ds files captured by these or other imagers.

**Contact Persons:** Denise Herpai - dgibo@wakehealth.edu, Training on use of Typhoon Imagers. 336-713-7385

**LiCor Odyssey - Room NRC 412**

A fluorescent imaging system capable of scanning far-red fluorescence (700 and 800nm).  It can be used for western blots and other fluorescent applications

**Contact Persons:** Denise Herpai - dgibo@wakehealth.edu, Training on use of Typhoon Imagers. 336-713-7385

**Amersham Imager-600 RGB Room Hane 4048**

CCD camera-based multi-label imager capable of capturing and analyzing images from DNA gels,

chemiluminescent and fluorescent Western blots (red, blue, and green fluorophores), and Coomassie or silverstained

protein gels

**Contact Persons:** Denise Herpai - dgibo@wakehealth.edu, Training on use of Typhoon Imagers. 336-713-738

**Biospherix Xvivo X3 Hypoxia hood and cell culture combo**

* Growth of cells in low oxygen (hypoxic) conditions
* Available for use 24/7 for trained users by scheduling through the CVVL iLab

**Location**

The Biospherix Xvivo X3 is located on the fifth floor of the Hanes Building on the Bowman Gray campus (Hanes 5032)

**Contact person**: Dr. Ravi Singh, Director, Cell and Viral Vector Lab rasingh@wakehealth.edu

 Dr. Bethany Kerr, Assistant Professor, Cancer Biology bkerr@wakehealth.edu

**Essen Biosciences IncuCyte Zoom**

* Real-time, quantitative live-cell analysis
* Available 9 AM to 5 PM to trained users by scheduling through the Shared resources iLab page

**Location**

The Essen Biosciences IncuCyte Zoom is located on the fifth floor of the Hanes Building on the Bowman Gray campus (Hanes 5021 – moving to Hanes 5037 soon)

**Contact person:** Dr. Ravi Singh, Director, Cell and Viral Vector Lab rasingh@wakehealth.edu

 Dr. Gagan Deep, Assistant Professor, Cancer Biology gdeep@wakehealth.edu

**Whole Slide Imaging (wsi) Scanners**

These scanners are used to create digital images of glass slides (10x, 20x, 40x, oil immersion 60x & 100x)

Olympus VS110 BF/FL (5 slide)

Olympus VS200 BF (6 slide)

Olympus VS200 BF/FL (200 slide)

Hamamatsu Nanozoomer HT (210 slide)

* Brightfield (BF) and Fluorescence (FL)
* DarkField
* ZStack
* EFI
* Tissue MicroArray (TMA)
* Software for viewing, annotation, and measurements

**Analysis Software**

Visiopharm

Visiopharm is a solution providing classic image analysis and tissue data mining tools combined with AI and Deep Learning to get the best of both worlds. Users can train their own algorithms from scratch, tailored to their need or use – and adapt – from Visiopharm’s pre-built and ready-to-use AI apps. The core licenses their Research suite of APPS which consist of 100+ ready-to-use APPS and include their Nuclei Segmentation APP, Tumor-Stroma separation APP, Metastasis Detection APP, and the Glomeruli Segmentation APP amongst those.

**Core Contact Person(s):** Alexei Mikhailov MD PhD

Assistant Professor, Pathology

Director, Virtual Microscopy Core (Digital Pathology)

Email: avmikhai@wakehealth.edu

Patricia Warren, IT Program Director

Manager, Virtual Microscopy Core (Digital Pathology)

Email: twarren@wakehealth.edu

Office: 336-716-1520

Ashley Davis

Coordinator, Virtual Microscopy Core (Digital Pathology)

Email: A.Davis@wakehealth.edu

Office: 336-716-1266

**Flow Cytometry Shared Resource**

**Introduction**

Flow Cytometry is used to provide rapid single cell analysis, affords researchers the ability to identify specific populations of cells. Populations can be isolated under sterile conditions if desired. Instruments in the Flow Cytometry Core Facility are capable of multi-parameter analysis or sorting. Most any type of particle, both cellular and non-cellular, can be analyzed by the flow cytometers. Measurement of DNA and RNA content for cell cycle analysis, chromosome analysis, cell cycle specific nuclear and cytoplasmic proteins, cytokine production, proliferation, protein phosphorylation, apoptosis markers, substituted deoxyuridine incorporation, stem cell side-population detection, expression of fluorescent proteins (GFP, DsRed, etc.), Ca++ flux detection, reactive oxygen species, cell surface markers using labeled antibodies or substrates, cell viability, intracellular ion concentration or pH, and membrane potential. Cell lysates and serum are readily analyzed with bead based substrate immunoassays. Bacteria can be analyzed based on AT/GC ratios, DNA and RNA content, and membrane potential. Yeasts, protozoans, parasites and other small multicellular organisms can be analyzed as long as they are small enough and can be aligned to pass through the flow cell. Recently, extracellular vesicles ranging from 100nM and larger can be analyzed, enumerated, and isolated.

**Becton-Dickinson FACS Aria Flow Cytometer Cell Sorter**

Currently (4/6/2023) is only partially functional. There is no service contract on this instrument.

A service contract is no longer available.

The BD FACS Aria is a cell sorter with three lasers (405nm, 488nm and 635nm) and able to detect forward scatter, side scatter and nine fluorescence parameters. It has three sorting nozzles (70, 100 and 130 micron) to accommodate a wide range of cell types. The cell sorter can sort both fixed and living cells. For sorting of living cells from potentially biohazardous sources (e.g. transfected cells, infected cells, fresh tissue from human and nonhuman primates, etc.). The BD FACS Aria is mounted within a BioProtect Hood to prevent hazardous aerosols from escaping from the sorter into the room. The hood and cell sorter are maintained in their own room separate from the flow cytometer analyzers. Flow cytometer cell sorter is located in Biotech Place, Rm. 2E-002

**Contact Persons:** Dr. Jason Grayson (jgrayson@wakehealth.edu)

 Dr. James Wood (jawood@wakeheath.edu) Comprehensive Cancer Center

 Dr. John F. Whitesides (Jfwhites@wakehealth.edu) Comprehensive Cancer Center

**Becton-Dickinson FACS Canto II Flow Cytometer Analyzer**

The BD FACS Canto II is an analyzer with three lasers (405nm, 488nm and 635nm) and able to detect forward scatter, side scatter and eight fluorescence parameters. Flow cytometer analyzer is located in Hanes 4th Floor, Rm 4063.

**Contact Persons:** Dr. Jason Grayson (jgrayson@wakehealth.edu)

 Dr. James Wood (jawood@wakeheath.edu) Comprehensive Cancer Center

 Dr. John F. Whitesides (Jfwhites@wakehealth.edu) Comprehensive Cancer Center

**Becton-Dickinson LSRFortessa X-20 Flow Cytometer Analyzer**

The BD LSRFortessa X-20 is an analyzer with five lasers (405nm, 488nm, 635nm, 355nm and 561nm) and able to detect forward scatter, side scatter and eighteen fluorescence parameters. Flow cytometer analyzer is located in Biotech Place, Rm. 2E-001.

**Contact Persons:** Dr. Jason Grayson (jgrayson@wakehealth.edu)

 Dr. James Wood (jawood@wakeheath.edu) Comprehensive Cancer Center

 Dr. John F. Whitesides (Jfwhites@wakehealth.edu) Comprehensive Cancer Center

**Becton-Dickinson FACSCalibur Flow Cytometer Analyzers**

The BD FACSCalibur analyzer is located in Biotech Place, Rm. 2E-001: The BD FACSCalibur is currently (4/6/2023) working but is not on a service contract.

The BD FACSCalibur is an analyzer with two lasers (488nm and 635nm) and able to detect forward scatter, side scatter and four fluorescence parameters.

**Contact Persons:** Dr. Jason Grayson (jgrayson@wakehealth.edu)

 Dr. James Wood (jawood@wakeheath.edu) Comprehensive Cancer Center

Dr. John F. Whitesides (Jfwhites@wakehealth.edu) Comprehensive Cancer Center

**BD Accuri C6 Flow Cytometer** **Analyze**r

Is not currently working (4/6/2023) and is not on a service contract. A service contract is no longer available. Future service unknown.

The BD Accuri C6 is an analyzer with two lasers (488nm and 640nm) and able to detect forward scatter, side scatter and four fluorescence parameters. The Flow cytometer analyzer is located in Hanes 4th Floor, Rm 4063

**Contact Persons:** Dr. Jason Grayson (jgrayson@wakehealth.edu)

Dr. James Wood (jawood@wakeheath.edu) Comprehensive Cancer Center

 Dr. John F. Whitesides (Jfwhites@wakehealth.edu) Comprehensive Cancer Center

**Nanocellect Wolf Fluidic Cell Sorter and N1 Single Dispenser**

The Nanocellect Wolf Fluidic Cell Sorter is a state-of-the art fluidic cell sorter instrument that increases the cell sorting options at Atrium Wake Forest School of Medicine and thereby strengthens NIH-funded research across several current and future projects. The Wolf Cell Sorter has a single 488nm laser and collects 5 parameters: Forward scatter, back (side) scatter and 3 colors of fluorescence (525 ± 25 nm (FITC, GFP); 585 ± 20 nm (PE); 665 nm Long Pass (PerCP-Cy5.5)). The Wolf Cell Sorter is located on the 4th Floor of Hanes Building in Room 4063. It will be available 24/7. The Wolf Cell Sorter can be run by trained operators. Training can be arranged by contacting Dr. James Wood and Dr. John Whitesides.

The overall benefits of the Wolf Cell Sorter are 1) the ability to isolate cells that have been transduced, transfected and/or modified by CRISPR/Cas9, 2) preparation of single cells for genomic studies of single cells and DNA/RNA sequencing, as a companion technology, 3) easy to use and 24/7 availability for greater flexibility and access for time-sensitive clinical research samples, 4) the ability to use low sample volumes (100 microliters), 5) single cell indexed sorting into multi-well plates using small sample volumes, and 6) low impact fluidic sorting resulting in increased cell viability and preserved functionality. The Wolf cell sorter technology is particularly suitable for live cell recovery for precision analysis such as single cell sequencing. Optimal sorting purity and yield is obtained at an average rate of 120 cells per second. Given the improved viability of the sorted cells, this is equivalent to sorting at over 300 cells per second on the high speed Astrios EQ cell sorter.

The Wolf Cell Sorter with N1 single cell dispenser strategically expands Precision Medicine and Cancer Genomics at the Medical Center Campus. In addition, its gentle single cell capability will provide an improved pipeline for single cell mRNA and DNA sequencing, which has been brought online in Cancer Genomics, Bioinformatics and Proteomics/Metabolomics Shared Resources. The Wolf Cell Sorter will improve the per-cell gene detection rate. Thus, this instrument will expand our capacity for translational research at WFSM.

Initially the Wolf cell sorter will be available by contacting Dr. James Wood or Dr. John Whitesides. Once trained, users will be able to schedule the Wolf cell sorter through iLab. It is anticipated that most sorts will require about 3 hours for sorting 1 million cells ~~as~~.

Sorting cartridges are guaranteed to work for the day of the sorting session and for up to 8 hours of sorting. Sorting cartridges are available for purchase.

**Contact Persons:** Dr. Jason Grayson (jgrayson@wakehealth.edu)

 Dr. James Wood (jawood@wakeheath.edu) Comprehensive Cancer Center

 Dr. John F. Whitesides (Jfwhites@wakehealth.edu) Comprehensive Cancer Center

**Comprehensive Cancer Center Analysis Computers and Flow Cytometry Analysis Softwar**e

Each flow cytometer analyzer and cell sorter has flow Cytometry analysis software on its respective workstation. Additionally, there is also a separate analysis computer at the Biotech Place (2E-001) for offline analysis of flow cytometer data with CellQuest and FlowJo analysis software. The shared resource at the BioTech Place lab has a Windows PC analysis computer with FACS Diva 8.0 and FCS Express with Multicycle installed. In the Hanes 4th Floor Room 4063, co-located with the BD FACS Canto II is a computer with DNA analysis programs, ModFit, FCS Express with Multicycle, and FlowJo installed.

**Contact Persons:** Dr. Jason Grayson (jgrayson@wakehealth.edu)

 Dr. James Wood (jawood@wakeheath.edu) Comprehensive Cancer Center

 Dr. John F. Whitesides (Jfwhites@wakehealth.edu) Comprehensive Cancer Center

**FEI Tecnai BioTwin Transmission Electron Microscope (120 keV)**

This microscope is used to image cellular ultrastructure, viruses, bacteria, macomolecules and nanoparticles. The Cellular Imaging Shared Resource is equipped to carry out all phases of sample preparation for electron microscopy with a staff that includes a technical engineer/manager and two technologists

* 0.34 nm resolution
* 2 Vu AMT camera capable of 12 mega pixel images
* Software for measurements and stitching of images
* Reicher-Jung Ultracut E microtomes for producing thin sections suitable for viewing with the transmission electron microscope

**Contact Person:** Alexei Mikhailov, Director avmikhai@wakehealth.edu 336-716-2677

Debbie Golden, Supervisor and Chief EM Technologist– Cellular Imaging Core

dgolden@wakehealth.edu

**Zeiss LSM 510 Laser Scanning Confocal Microscope on a Zeiss Axiovert 100 M Inverted Platform** This microscope is used to produce two and three-dimensional images of cells, tissues and biomaterials which are labelled with up to three different fluorophores.

* Three color imaging with an argon-ion laser(488nm) , a HeNe 543 and a HeNe 633 laser
* Intensity measurements
* Time series capability
* 3D projections
* Image processing and analysis software included
* The Cellular Imaging Shared Resource staff trains and assists all microscope users

**Contact Person:** Alexei Mikhailov, Director avmikhai@wakehealth.edu 336-716-2677

Debbie Golden, Supervisor and Chief EM Technologist– Cellular Imaging Core

dgolden@wakehealth.edu

**Zeiss Axioplan 2 Fluorescence Microscope**

This microscope is used to produce brightfield, phase and epi- fluorescent images of tissue sections and cultured cells. The Cellular Imaging Shared Resource staff trains and assists all microscope users.

* Upright format available for imaging
* Capable of imaging uv, fluorescein and rhodamine labelled cells and tissues
* Captures images using polarized light
* AttoArc mercury lamp controller
* Zeiss AxioCam camera capable of 14 bit 3900 X 3090 scanned color images

**Contact Person:** Alexei Mikhailov, Director avmikhai@wakehealth.edu 336-716-2677

Debbie Golden, Supervisor and Chief EM Technologist– Cellular Imaging Core

dgolden@wakehealth.edu

 Paula Graham, EM Technologist pmoore@wakehealth.edu 336-716-267

**Olympus IX-70 Fluorescence Microscope**

This microscope is used to produce brightfield, phase and epi-fluorescent images of tissue sections and cultured cells either fixed or alive. The Cellular Imaging Shared Resource staff trains and assists all microscope users.

* Inverted format available for imaging
* Capable of imaging uv, fluorescein, rhodamine and far red labelled cells and tissues
* Coy Laboratory Products air recirculator and heater for long term observations of cells
* Eppendorf Micromanipulator InjectMan for direct injection into the nucleus and/or cytoplasm of cultured cells
* Sutter P-30 Micropipette Puller used to make injection pipettes for the InjectMan
* Dage MTI 300T B/W camera

**Contact Person:**  Alexei Mikhailov, Director avmikhai@wakehealth.edu 336-716-2677

Debbie Golden, Supervisor and Chief EM Technologist– Cellular Imaging Core

dgolden@wakehealth.edu

**Arcturus PixCell II Laser Microdissection System**

This microscope is used to selectively extract individual cells from a blood smear, culture or sections (paraffin/frozen) for the purpose of protein and dna/ rna analysis. The Cellular Imaging Shared Resource staff trains and assists all microscope users.

* Inverted format for imaging
* Capable of imaging brightfield, uv, fluorescein, and rhodamine labelled cells
* Microdissection spotsize of 7.5 µm for individual cell extraction
* Microdissection spotsizes of 15 and 30 µm for multiple cell extractions
* Imaging software for the documentation of tissue and cells before and after micro dissection

**Contact Person:** Alexei Mikhailov, Director avmikhai@wakehealth.edu 336-716-2677

Debbie Golden, Supervisor and Chief EM Technologist– Cellular Imaging Core

dgolden@wakehealth.edu

**X-ray Crystallography**

The X-ray facility houses **Rigaku Saturn 92-Micromax007 and RaxisIV/RUH diffractometer with dual VariMx-HF Confocal Optic Systems** and all the necessary ancillary equipment (e.g. microscopes, crystallization cabinets, and cryo-cooling devices). Macromolecular X-ray crystallography is an experimental scientific method to determine the three-dimensional structure of proteins, DNA/RNA, their complexes, and the complexes of a variety of ligands including cofactors, substrates, drug candidates, etc. We use this information to develop novel therapies, as it is essential for assessing and exploiting the biological function of the target protein.

* Development of PI3K-kinase inhibitors
* Development of fatty acid synthase inhibitors
* Dissection of the molecular basis for peroxiredoxin inactivation and repair by sulfiredoxin
* Structure and function of the mammalian TREX1 3' exonuclease and RNase H2 enzymes
* Consulting on all aspects of protein expression, purification and feasibility of structure determination
* Identification of crystallization conditions and possible other existing structures
* Access to X-ray diffraction facility
* Determination of the molecular structure through collaboration

**Contact Persons:** W. Todd Lowther, PhD Associate Professor, Department of Biochemistry http://www.wakehealth.edu/Faculty/Lowther-William-T.htm,

Thomas Hollis, PhD Associate Professor, Department of Biochemistry <http://www.wakehealth.edu/Faculty/Hollis-Thomas.htm>,

**Wyatt Dawn Heleos-II and Optilab Rex Light-Scattering Detectors**

These devices in combination with HPLC provides an absolute method of molecular weight determination for lipoprotein particles

**Computational Biosciences**

The Computational Bioscience portion of the Crystallography and Computational Biosciences Shared Resource provides access to cutting-edge modeling and simulation methods through consultation and collaboration with the director, Fred Salsbury, PhD. Our main expertise lies in structure-based classical modeling, docking and analysis, but additional expertise exists in computational biology/bioinformatics, and in quantum mechanical calculations

* Molecular simulations of mismatch repair proteins
* Molecular simulations of redox proteins
* Analysis of communication within proteins based on molecular simulations
* Computational modification and docking of drug leads into active sites
* Quantum mechanical calculations of model systems of novel DNA-Zn interactions
* Provide consultation to determine if the problem is amenable to computation.
* Provide consultation to decide what sort of computations need to be performed.
* Provide consultation to determine if the scale of the computations involved are worth the time
* Calculations performed include:
* Molecular dynamics
* Protein-protein docking
* Protein-ligand docking
* Various bioinformatics analyses
* Reaction-diffusion modeling, quantum mechanical calculations and other mathematical modeling

**Contact Persons:** Freddie R. Salsbury, Jr., PhD; http://, Associate Professor, Department of Physics

**Tumor Bank- Tumor - Tissue Shared Resource**

The Tumor Bank stores fresh tissue excised in the course of standard operations to remove tumors. Samples are derived from remnant tissues not necessary for diagnostic or treatment related purposes. In addition, leukemia and bone marrow samples are also collected.

* These samples are important because they allow our faculty the ability to answer vital, basic and population science research questions related to risk factors and outcomes.
* The Tumor Tissue Facility strictly monitors quality control, so that tissues are consistent and reliable for research.

**Contact Person:** Dr. Greg Kucera (gkucera@wakehealth.edu<mailto:gkucera@wakehealth.edu

Tumor Tissue Shared Resource

**Advanced Tumor Bank - Tissue Shared Resource**

The Advanced Tumor Bank functions in the same way as the Tumor Bank except that additional information related to the samples is available to researchers. All Advanced Tumor Bank participants have consented to donate tissue, blood and/or body fluids, and have signed a HIPAA waiver to release demographic information.

* These samples are important because they allow our faculty the ability to answer vital, basic and population science research questions related to risk factors and outcomes.
* The Tumor Tissue Facility strictly monitors quality control, so that tissues are consistent and reliable for research.

**Contact Person:** Dr. Greg Kucera (gkucera@wakehealth.edu<mailto:gkucera@wakehealth.edu

Tumor Tissue Shared Resource

**Epidemiological Cardiology Research Center (EPICARE)**

EPICARE is one of the units affiliated with the Section on Cardiovascular Medicine, Department of Medicine. For more than 40 years, EPICARE has been the leading electrocardiogram (ECG) reading center for epidemiological studies and clinical trials both nationally and internationally. The center's mission is to establish the prognostic and diagnostic significance of ECGs for population studies. EPICARE is at the forefront of developing novel criteria for identifying cardiac events, including silent myocardial infarction, myocardial ischemia, left ventricular hypertrophy (LVH), repolarization abnormalities, conduction defects, arrhythmias, and heart rate variability.

**Services:**

EPICARE offers several services to document, classify and detect ECG abnormalities in clinical trials and epidemiologic studies, including:

* The use of the Minnesota ECG Classification standards to objectively describe bio-electrical phenomena in uniform and clearly defined terms. This classification system is widely used worldwide and allows for consistent comparison and pooling of ECG findings across different studies.
* The provision of raw digital ECG data, as well as the amplitudes and durations of each part of the ECG waveforms, which can be useful for advanced analytic techniques such as deep learning and machine learning, and for developing artificial intelligence ECG models.
* Visual or computer serial ECG comparisons to document evolving Q-waves, evolving ST-T waves, evolving bundle branch block, and the progression or regression of ECG-LVH.
* Automatic logging, tracking, and inventory of received ECGs, as well as computerized billing based on the number of ECGs completed.
* Central training of ECG technicians, certification, and quality assurance monitoring, which helps to ensure the quality of ECG data across different sites.
* Review of ECG alerts and reporting back to the clinical sites, which ensures timely identification and management of ECG abnormalities in study participants.

**Equipment:**

To fulfill its mission and services, EPICARE utilizes the following ECG management systems:

* **MUSE™ Cardiology Information System**

The MUSE system is composed of an application/database server that stores and processes electrocardiographic (ECG) data. Client workstations connect to the server over the network through the MUSE application to access system functions such as editing, test retrieval, system setup, running database searches, and checking system status. EPICARE has developed software programs that have been incorporated into MUSE, enabling automated ECG Classification using the Minnesota Code. There are various ways in which ECG data can be transferred to the MUSE system, depending on the device and system configuration. These include wired network, wireless network, modem, secure digital (SD) card, serial download cable, or any combination of these.

**Contact Person:** Elsayed Z. Soliman, MD, Director, Epidemiological Cardiology Research Center

esoliman@wakehealth.edu ; Phone: 336-716-5530; Fax: 336-716-9188

* **Magellan ECG Research Workstation Software**

The ECG Research Workstation, developed by Marquette Medical Systems’ Algorithm Group, is used for reviewing and exporting ECG waveforms, interpretations, and measurements for research purposes. Although it is an older system compared to MUSE, it is capable of performing similar tasks, such as automated ECG classification by the Minnesota Code and Novacode using EPICARE proprietary software.

**Contact Person:** Elsayed Z. Soliman, MD, Director, Epidemiological Cardiology Research Center

esoliman@wakehealth.edu ; Phone: 336-716-5530; Fax: 336-716-9188

* **MARS HOLTER ECG Department Server**

The MARS Ambulatory ECG System is designed to provide a comprehensive set of features for analyzing, reviewing, editing, and reporting 48-hour ECG data. It also offers a variety of interfaces to external applications and systems that can extend the system's core functionality. The MARS system can acquire ECG data from multiple sources, including digital Holter recorders. Some of the supported recorders can directly connect to the MARS system, while others require a card reader to access their data. In addition, MARS also supports acquisition from the CARESCAPE CIC Pro clinical information system. The system can print ECG data and patient reports to several networked or local laser printers. The system also provides multiple security measures to help restrict access to patient and ECG data, ensuring data privacy and confidentiality.

**Contact Person:** Elsayed Z. Soliman, MD, Director, Epidemiological Cardiology Research Center

esoliman@wakehealth.edu ; Phone: 336-716-5530; Fax: 336-716-9188

**Shimadzu Prominence HPLC Systems Including UV, Y-Detector and Data Acquisition Systems**

* These HPLC systems are used to separate and detect various peptides using high pressure liquid chromatography. See **shimadzu.com**

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Milli Q Water Purification System**

* A cartridge system used to purify RO water.

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Biorad Benchmark Plus Microplate Reader**

* Analyzes a 96 well plate using endpoint and kinetic modes, has variable wavelengths from 340-800nm. Also is temperature controlled and can incubate plates at 37C.

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Sorvall Stratos Centrifuge**

* Refrigerated centrifuge that can spin 1.0- 2.0 microfuge tubes at various speeds up to 28,000g.

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Sorvall Legend Centrifuge**

* Refrigerated centrifuge that can spin a variety of centrifuge tubes from 1.0ml microfuge tubes to 15ml conical tubes at various speeds up to 20,000g for microfuge tubes.

**Contact Person**:Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Sorvall RC2-B Centrifuge**

* Floor model refrigerated centrifuge that can spin 12 ml tubes up to 20,000g. (Note this centrifuge is about 40 years old)

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**IEC GP8-R Centrifuge**

* Refrigerated centrifuge that spins centrifuge tubes (12x75mm to 15ml) up to 3000rpm

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Beckman Coulter Optima Ultracentrifuge**

* Refrigerated Ultracentrifuge with 2 rotors. The TLA-55 rotor can spin 1.5ml Beckman Ultracentrifuge tubes at speeds up to 130,000g. The TLA-110 rotor can spin Beckman Optiseal tubes up to 600,000g.

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Packard Cobra II Gamma Counter**

* Automated gamma counter that detects gamma radiation. Each rack holds 20 12x75mm tubes, and can count 5 tubes at one time. Currently is used for counting 125Iodine.

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Thermo Scientific Ultima II Freezers**

* Chest freezers that store samples at -80oC.

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Danish Myo Technology**

* (DMT) wire myograph system (Model 620M, ADI Instruments)
* Determine vascular reactivity in small vessels with a data acquisition system for 6 chambers.

**Contact Person:** Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Hanes 6th floor)

[**https://www.adinstruments.com/research/.../wire-myograp**](https://www.adinstruments.com/research/.../wire-myograp)

**Siemens Immulite Analyzer**:

The Immulite is a sequential, multi-sample, random access, chemiluminescent immunoanalyzer capable of running 120 samples/hour with a continuous run capacity every 42 minutes.

The assay menu includes the following biomarkers:

* **Allergy**
AlaTOP Allergy Screen1,,,ECP1,IgE, Total
* **Anemia / Iron Metabolism-**Ferritin ,Folate, RBC Folate, Vitamin B12
* **Bone Metabolism-**Osteocalcin1,PYRILINKS-D
* **Cardiac-**CKMB1,D-Dimer1,High-sensitivity CRP,Myoglobin,NTproBNP1,Troponin
* **Diabetes-**C-Peptide, Insulin, Microalbumin
* **Growth-**Growth Hormone (hGH), IGF-I, IGFBP-3
* **Reproductive Endocrinology-**Androstenedione, DHEAS, Estradiol, FSH, hCG, Free Beta HCG1,LH PAPP-A1,Progesterone,Prolactin,SHBG,Testosterone,Unconjugated Estriol
* **Metabolic-A**CTH, Cortisol, Homocysteine
* **Other-**ß-2 Microglobulin, Gastrin, Nicotine Metabolites

**ELLA Automated Immunoassay System**

In less than 90 minutes, you get highly reproducible validated assay data and consistent biomarker detection with no manual steps. The assay performance behind that data includes sub-pictogram level sensitivity, 4+ logs of dynamic range and precision that rivals the best laboratory automation.

**Luminex LX200**

* A Luminex assay is a type of immunoassay that precisely measures multiple analytes in one sample. The Luminex® xMAP® technology is a bead-based immunoassay that allows for multiplex detection of up to 100 analytes simultaneously. Color-coded microspheres, or beads, are internally dyed with different proportions of red and infrared fluorophores that correspond to a distinct spectral signature, or bead region. The quantification of multiple cytokines and other biomarkers in a sample provides critical information about biological processes and diseases.

**Contact person:** Heather Gregory, hgregory@wakehealth.edu, Biogerontology Lab 336-713-7126

**Tecan Infinite 200 PRO Microplate Reader**

* The Tecan M200 is a multi-detection microplate reader used for a wide range of biological applications. This modular Tecan plate reader is a monochromator-based system, with no need for filters, giving users a range from 230-1000 nm Abs or 300-600nm FI in 1 nm steps. With a spectrally enhanced, red-sensitive PMT, the FI range extends to 330-850nm for NIR readings.

Modules featured can be Monochromator absorbance, fluorescence top, fluorescence bottom, Luminescence, Incubation, injection, and enhanced photomultiplier tube (PMT) for red sensitivity. Please see individual SKU numbers for a list of installed modules.

These modules allow for several assays to be used on the Tecan M200, some of these include protein quantification, ELISA, binding studies, DNA quantification, gene expression, immunoassays, toxicity, cell viability, RNA quantification, cell-based and enzyme assays. The enhanced PMT extends the emission wavelength range from 330-600 up to 330-850nm. The heating module that’s installed on the microplate reader, allows for the chamber to keep at 37°C for those temperature-sensitive samples.

The Tecan M200 can read a variety of microplates from 6 up to 384 well plates, along with PCR plates. The Tecan M200 Microplate Reader is driven by Magellan software, which allows you to easily navigate a run from start to finish. The user can choose from predetermined assays or build their own from scratch.

**Contact person**: Heather Gregory, hgregory@wakehealth.edu, Biogerontology Lab 336-713-7126

**SphygmoCor XCEL**

The SphygmoCor XCEL is a cuff-based device that provides non-invasive blood pressure and arterial stiffness measurements in 60 seconds. Results are displayed in relation to reference values based on the age and gender of healthy individuals.  Specific vascular measures include:

* Brachial blood pressure
* Central (aortic) blood pressure
* Augmentation index (a measure of peripheral arterial stiffness)
* Carotid-femoral pulse wave velocity (a measure of aortic stiffness)

**Contact person:** Tina Brinkley, PhD (tbrinkle@wakehealth.edu) Gerontology and Geriatric Medicine

**DEXA (Dual Energy X-ray Absorptiometry)**

A DEXA scan is a special x-ray procedure that determines your body composition, including your bone mineral density, bone density content, lean tissue, and body fat. We perform scans for research studies. We have a Hologic Horizon A with software version 5.6 Apex and it is located 1st Floor Sticht Center within the CRU.

* Types of scans performed are Whole Body, AP lumbar, Hip and Lateral Spine

**Contact person:** Kim Kennedy (kkennedy@wakehealth.edu) Gerontology and Geriatric Medicine

**Transportation Services**

We have a staff of two full-time drivers and a fleet consisting of one van and two crossover vehicles with which we can pick up research participants for their screening, clinic, or intervention visits. Additional services include, but are not limited to, transporting visiting dignitaries and timely delivery of specimen samples or equipment. We charge per mile and current rates are $0.75/mile.

* Mature, friendly, helpful drivers
* Late model, very clean and well-kept vehicles (Ford Flexes)
* Convenient, comfortable, and punctual transportation service
* User-friendly scheduling

**Contact person:**  Kim Kennedy (kkennedy@wakehealth.edu) Gerontology and Geriatric Medicine

**Medical Graphics Ultima Cardiorespiratory Cart**

This system is useful for:

* Indirect calorimetry for measurement of resting metabolic rate
* Electrocardiograph tracings
* Maximal graded exercise testing with measurement of VO2

**Contact person:** Kim Kennedy (kkennedy@wakehealth.edu Gerontology and Geriatric Medicine

**AMTI AccuSway Force and Motion Platform**

This system is useful for:

* Measuring postural sway
* Measuring ground reaction forces

**Contact person:** Kim Kennedy (kkennedy@wakehealth.edu ) Gerontology and Geriatric Medicine

**GAITrite Portable Mat**

This system is used for temporospatial gait analysis.

* Applicable to a wide spectrum of disciplines: Geriatrics, Neurology, Orthopedics, Orthotics & Prosthetics, Pediatrics, Physiotherapy & Rehabilitation.
* Exportable footfall, gait cycle, walk and test level measurements.
* Ease of use for data capture, analysis and report generation.

**Contact person:** Kim Kennedy (kkennedy@wakehealth.edu ) Gerontology and Geriatric Medicine

**BIODEX System 4 Pro**

This system is used to measure the amount of force a person is able to produce at different speeds and ranges of motion. Multi-mode operation; isokinetic, isometric, isotonic, reactive eccentric and passive

* Concentric speed up to 500 deg/sec
* Eccentric speed up to 300 deg/sec
* Concentric torque up to 500 ft-lb (680 Nm)
* Eccentric torque up to 400 ft-lb (544 Nm)
* Passive speed as low as .25 deg/sec
- Passive torque as low as .5 ft-lb
- Isotonic torque as low as .5 ft-lb

**Contact person:** Kim Kennedy (kkennedy@wakehealth.edu ) Gerontology and Geriatric Medicine

**Recruitment of Research Participants**

The Aging Center and Pepper Center at WFSM have extensive experience with recruitment of older adults into observational and intervention trials. We utilize all local media as well as our internal VITAL database that contains the names and addresses of over 22,000 people in our community that are interested in research. We mail a newsletter twice per year to this database. Help can include:

* Assistance with direct mail that is targeted to a certain age/race/gender/zip code
* Placement of ads in our VITAL newsletter
* Placing ads in local newspapers
* Creating ads using the creative communication online tool

**Contact person:** Kim Kennedy (kkennedy@wakehealth.edu) Gerontology and Geriatric Medicine

**The Core for Cellular Respirometry (CCR)- Oroboros and Seahorse instruments**

The Core for Cellular Respirometry (CCR) aims to provide cellular respirometry and other metabolic profiling services to research faculty across the Wake Forest institution and select external users. Cellular Respirometry is a research tool for analyzing the metabolic rate of many microorganisms, cells, or isolated mitochondria by analyzing their oxygen consumption in the presence of nutritive substrates or selective inhibitors. If prospective core users are interested in PBMC and platelet profiling, whole blood can be provided for isolation.

The CCR is located in the Nutrition Research Building Rm 140. The lab space is equipped with a Non-CO2 incubator, water bath, multiple cell counters, a microscope and camera, and other necessary tools for cell plating and culturing for Seahorse and Oroboros assays. A cell culture room is available for limited use across the hall for Core users, as is a -80 Freezer room.

Core Equipment List:

Seahorse XFe96

Seahorse XFe24

Oroboros O2K #1

Oroboros O2K #2

Oroboros O2K #3

Oroboros O2K #4

**Services Available**

PBMC isolation

Data Analysis

**Contact person:** Philip Kramer, PhD (pkramer@wakehealth.edu) Gerontology and Geriatric Medicine

**Leica Autostainer XL**

* Incorporates microprocessor control and user programmability to provide versatility with up to 15 programs available.
* Used for automated Hematolylin and Eosin staining of sections/cells on glass slides.
* Used for deparaffinization of paraffin sections for use in special stains or immunohistochemistry
* Used for dehydration and clearing of sections at the end of special staining procedures

**Contact Person**: Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician 336-713-7284.

**Leica IP-S Slide Printer**

* Permanently imprints 4 lines of information directly on glass microscope 1” x 3” slides

**Contact Person**:             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336- 713-7284

**Leica CM1850 and CM1950 Cryostats**

* Allows slicing of thin (3 microns) or thick (up to 100 microns) frozen tissue samples

**Contact Person:**             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Leica RM2255 Rotary Microtomes**

* Allows slicing of thin (0.5micron) or thick (up to 100 microns) resin/plastic embedded samples

**Contact Person:**             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Leica RM2265 Rotary Motorized Microtome**

* Allows slicing of thin (0.5 micron) or thick (up to 100 microns) resin/plastic embedded samples
* Allows slicing of thin (3 microns) or thick (up to 100 microns) paraffin embedded samples

**Contact Person**:           Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Leica EG1160 Embedding Center**

* Used for embedding paraffin processed samples into shaped molds
* Allows user the ability to carefully orient samples

**Contact Person:**             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Sakura VIP 5 Tissue Processor**

* Used for dehydration, clearing and paraffin infiltration of fixed small to large tissue samples
* 12 programs that allow a large variety of length of processing run for various sizes and density of fixed tissue samples

**Contact Person:**             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Dako PT Link Antigen Removal Processor**

* Pre-treatment system that optimizes staining consistency in tissue. Allows the entire pre-treatment process of deparaffinization, rehydration and epitope retrieval to be combined into a well-documented, 3-in-1 specimen preparation procedure.

**Contact Person:**             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Spex Cryomill**

* Large cryogenic grinder that accommodates samples from 0.1 to 100 grams to grind samples into a fine powder.

**Contact Person:**             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Cytopro 7620 Cytocentrifuge**

* A complete general purpose cytocentrifuge system for depositing cells onto microscope slides
* Incorporated microprocessor control and user programmability to provide great versatility.

**Contact Person:**             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Histology Fee for Service is available**

**Contact Person:**             Cynthia Zimmerman (czimmerm@wakehealth.edu), WFIRM Histology Core Technician

 336-713-7284.

**Leica DM 4000B**

* Upright microscope mainly for fixed specimen slide imaging
* Transmitted Light images- Brightfield
* Multi-channel fluorescence imaging- Dapi, GFP, Cy5, and  Texas Red
* Camera- Hammamatsu ORCA flash 4.0LT monochrome for FL imaging and Olympus DP73 color camera for Bright field imaging
* Optics:
	+ HCX FL Plan 1.25x/0.04
	+ HCX FL Plan 2.5x/0.07
	+ HCX PL Fluotar 10x/0.3
	+ HCX PL Fluotar 20x/0.5
	+ HCX PL Fluotar 40x/0.75
	+ HCX PL APO Oil 40x/1.25-0.75
	+ HCX PL APO Oil 63x/1.40-0.60

**Contact Person:**             Kenneth Gyabaah (kgyabaah@wakehealth.edu), WFIRM Imaging Core Technician

 336-713-1486.

**Olympus BX-63 Multispectral Imaging system**

* Upright microscope with motorized ultrasonic stage and universal condenser
* Allows for automated whole slide scanning and multi- image alignment
* Transmitted Light images- Brightfield, Phase contrast, DIC, and Polarized light
* Multi-channel fluorescence imaging- Dapi, GFP, Texas Red, and Cy5
* Illuminator- LED lamp for TL and X-CITE 120LED Boost for FL
* Camera- Olympus DP80 dual monochrome/color for both FL and TL imaging
* Optics:
	+ Plan Apo N 2.0x/0.08
	+ UPlanSApo4x/0.16
	+ UPlanSApo10x/0.4
	+ UPlanSApo20x/0.75
	+ UPLanSApo40x/0.95
	+ UPlanSApo60x/1.35 Oil

**Contact Person:**             Kenneth Gyabaah (kgyabaah@wakehealth.edu), WFIRM Imaging Core Technician

336-713-1486.

**Olympus IX83**

* Inverted microscope with motorized ultrasonic stage and universal condenser
* Allows for automated plate and slide scanning, and multi- image alignment
* Transmitted Light images- Brightfield, Phase contrast, DIC, and Polarized light
* Multi-channel fluorescence imaging- Dapi, GFP, Texas Red, and Cy5
* Live cell imaging with Tokai Hit set up
* Illuminator- LED lamp for TL and X-CITE 120LED Boost for FL
* Camera- Hammamatsu ORCA Flash 4.0 monochrome for FL imaging
* Optics:
	+ UPlanSApo4x/0.13
	+ UPlanFLN10x/0.3 Ph1
	+ LUCPlanFLN20x/0.45 Ph1
	+ LUCPlanFLN40x/0.6 Ph2
	+ UPlanSApo60x/1.35 Oil

**Contact Person:**             Kenneth Gyabaah (kgyabaah@wakehealth.edu), WFIRM Imaging Core Technician

 336-713-1486.

**Olympus Fluoview FV10i Confocal Microscope**

* Bench top Laser Scanning Confocal microscope equipped with four lasers (405/473/559/635nm). Manufactured with people new to microscopy in mind, this confocal system is very easy to use and feature a navigator to assist users in setting acquisition parameters. It comes with 2 objectives (10x dry, 60x oil) and supports multi-area time lapse (MATL). Fluoview software available for image editing and analysis.

**Contact Person**:             Kenneth Gyabaah (kgyabaah@wakehealth.edu), WFIRM Imaging Core Technician

336-713-1486.

**Leica TCS LSI Macro Confocal Microscope**

* A fully motorized upright stereomicroscope with a point scanner.
* Automated optical zoom system (up to 16x zoom factor) allows for smooth magnification changes.
* Precision z-control in Galvo mode (10nm z steps in a 500micron range).
* Equipped with 4 lasers (405/488/561/635nm), you can stain up to four dyes per specimen

**Contact Person:**             Kenneth Gyabaah (kgyabaah@wakehealth.edu), WFIRM Imaging Core Technician

336-713-1486.

**Hitachi SU1000 scanning electron microscope (FLEXSEM 1000)**

* Compact variable pressure SEM
* Resolution: 4nm at 20kV (SE:High vacuum mode), 5nm at 20kV (BSE: Low vacuum mode)

**Contact Person:**             Kenneth Gyabaah (kgyabaah@wakehealth.edu), WFIRM Imaging Core Technician

336-713-1486.

**Imaging Fee for Service is available**

**Contact Person:**             Kenneth Gyabaah (kgyabaah@wakehealth.edu), WFIRM Imaging Core Technician

336-713-1486.

**Zeiss Solo C-Arm Fluoroscope**

* This compact unit is capable of producing high-quality radiographic images/fluoroscopy whilst keeping the dose to a minimum.
* Files can be saved to USB

**Contact Person:**             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**Zeiss Operating Microscope**

* Motorized zoom and focus, binocular tubes 12.5x/f170

**Contact Person:**             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**IDEXX Testing**

* CBC
* Blood Chemistry (ALB, ALB/GLOB, ALKP, ALT, AMYL, BUN, BUN/CREA, Ca, CHOL, CREA, GGT, GLOB, GLU, LIPA, PHOS, TBIL, TP)
* PTT (Prothombin time)
* aPTT (activated partial prothromboplastin time)
* Urinalysis with sediment (detects presence of formed elements such as blood cells, casts, bacteria, and crystals)
* Blood gas testing
* \*Additional testing available.
* Results can be saved to USB or printed

**Contact Person:**             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**Vimago CT Scanner**

* 32 slice scanner that converts data into 3D images
* Fits small animals up to 50cm in thorax and table capacity of 450lbs

**Contact Person**:             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**Century SV120 and Reliance LV250 Sterilizers**

* Steam autoclaves. Cycle times approximately 1 hour in duration

**Contact Person:**             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**Sterrad 100S Sterilization System**

* Sterilizes medical devices by diffusing hydrogen peroxide into the chamber. No absorbable materials can be run. Cycle times approximately 1 hour in duration.

**Contact Person:**             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**3M Ethylene Oxide Sterilization**

* Runs on Friday at 55C, available for pickup on Monday.

**Contact Person:**             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**Surgery Core Technician Assistance**

* Available for sedation, anesthetic induction and maintenance, surgical prep, recovery, tissue harvest and collection

**Contact Person:**             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**Surgery Core Surgeon**

* Transplant surgeon available for a wide array of animal models and procedures.

**Contact Person:**             Jovanna Perez (jnperez@wakehealth.edu), WFIRM Surgery Core Technician

**DSI DATAQUEST A.R.T. TELEMETRY SYSTEM (Hanes 7029)**

DSI Telemetry system provides monitoring of physiological parameter in small animals models using freely moving animals. The system support simultaneous data acquisition and analysis in 24 rats. The telemetry system is useful in:

* Continuous monitoring of blood pressure, heart rate, and activity up to 6 months in minimally disturbed animals
* Monitoring of diurnal variations in blood pressure, heart rate, and activity
* Reliable detection of small changes in blood pressure (~5 mm Hg)
* Collecting blood pressure data for analysis of central regulation of blood pressure by evaluation of spontaneous baroreflex sensitivity

**Contact Person:** Jessica VonCannon (jvoncannon@wakhealth.edu), Hypertension and Vascular Research Center

**COLUMBUS NIBP-2 NON-INVASIVE BP MONITORING SYSTEM (Hanes 7029)**

* A tail cuff blood pressure system for use in rodents.

**Contact persons**: Jessica VonCannon (jvoncannon@wakhealth.edu)

**Applied Biosystems QuantStudio3 Real Time PCR system**

* System combines thermal cycling, fluorescence detection, and application-specific software. It detects accumulated polymerase chain reaction (PCR) product cycle-by-cycle, thus making quantification available immediately after completion of PCR, without the need for further process analysis.

**Contact person:** Patricia E. Gallagher, PhD. Hypertension Cell and Molecular Biology in HVRC (BTP Suite 340)

**Agilent 2100 Bioanalyzer**

* The Agilent 2100 Bioanalyzer system provides sizing, quantitation and quality control of DNA, RNA, proteins and cells on a single platform, providing high quality digital data.

**Contact person:** Patricia E. Gallagher, PhD. Hypertension Cell and Molecular Biology in HVRC (BTP Suite 340)

**Leica Microtome**

* The Leica manual rotary microtome sections tissue in paraffin-embedded blocks for immunocytochemistry.

**Contact persons:** Mark Landrum (Mark Landrum@wakehealth.edu), Hypertension and Vascular Research Center (BTP Suite 340)

**MCID COMPUTERIZED DENSITOMETRY WORKSTATION**

* A computer based imaging system for acquiring black and white images of films for gels and receptor autoradiography. The system consists of a light box with controlled variable illumination, a video camera input and computer software (MCID/M5+ IMAGING SYSTEM W/NEC POWERMATE 8100 COMPUTER) for capturing and measuring density of images and standards for absolute and relative quantification.

**Contact person:** Debra I. Diz, PhD or Brian Westwood, HVRC Imaging Laboratory (BTP Suite 340)

**HACKER-BRIGHT MICROTOME CRYOSTAT**

* Standard cryostat for sectioning frozen fixed or unfixed tissues.

**Contact person:** Wayne Graham wgraham@wakehealth.edu HVRC Integrated Physiology/Pharmacology Laboratory (BTP Suite 340)

**Clinical Non-Invasive Hemodynamics Core in HVRC (Janeway 5th floor)**

* Our non-invasive testing capabilities include a variety of measures of vascular and autonomic function. The descriptions below highlight the main purpose of each machine. Tests are available for both research studies and clinical patient diagnosis and management.

**Contact Person:** Dr. Hossam Shaltout at: hshaltou@wakehealth.edu Hypertension and Vascular Research Center.

**ELECTRICAL IMPEDANCE CARDIOGRAPHY (ICG), THE BIOZ®, MODEL BZ 4110-101D, BY CARDIO DYNAMICS, SAN DIEGO, CA**

The technology relies upon the minute current transmitted across the thorax by ICG seeking its path of least resistance. The impedance changes of the blood flow through the aortic arch are measured on a beat by beat sequence from which we can measure the following parameters:

* Stroke volume (SV)
* Cardiac output (CO)
* Systemic vascular resistance (SVR)
* Thoracic fluid volume (TFC) and other hemodynamic variables are calculated.
* The simplicity of the procedure allows the recording of twelve hemodynamic variables within minutes.

**Contact Person:** Dr. Hossam Shaltout at: hshaltou@wakehealth.edu Hypertension and Vascular Research Center

**THE SPHYGOMOCOR PX PULSE WAVE ANALYSIS SYSTEM (MODEL SCOR-PX), BY ATCOR MEDICAL, LISLE, IL**

This device measures the following parameters:

* Central aortic pressure
* Pulse wave velocity
* Augmentation and augmentation index of the pulse wave.

**Contact Person:** Dr. Hossam Shaltout at: hshaltou@wakehealth.edu Hypertension and Vascular Research Center

**COLIN VP-2000/1000 VASCULAR PROFILING SYSTEM BY COLIN CORPORATION, SAN ANTONIO, TX**

This machine measures:

* Arterial pulse wave velocity simultaneously and bilaterally
* carotid-femoral (cf), brachial-heart, heart-femoral, femoral-ankle, and brachial-ankle (ba) pulse wave velocity
* The ankle/brachial index (ABI)
* The carotid augmentation index

**Contact Person:** Dr. Hossam Shaltout at: hshaltou@wakehealth.edu Hypertension and Vascular Research Center

**AMBULATORY BLOOD PRESSURE MONITORING, ABPM. SPACELABS MEDICAL, MODEL 90207, ISSAQUAH, WA**

Standard 24 hour monitoring certainly is the most readily available and commonly used device. It records

* Sleeping and active blood pressure and heart rate
* Blood pressure variance, and nocturnal changes.

**Contact Person:** Dr. Hossam Shaltout at: hshaltou@wakehealth.edu Hypertension and Vascular Research Center

**CNAP MONITOR 500 NONINVASIVE BLOOD PRESSURE AMPLIFIER WITH DETERMINATION OF BAROREFLEX SENSITIVITY (BRS) FOR CONTROL OF HEART RATE, HEART RATE VARIABILITY (HRV) AND BLOOD PRESSURE VARIABILITY (BPV)**

Continuous blood pressure, heart rate acquired from noninvasive finger arterial pressure measurement via Biopac system in addition to ECG for a minimum of 10 minutes. Systolic arterial pressure (SAP) and RR intervals (RRI) files generated via the data acquisition system (BIOPAC acquisition software, Santa Barbara, CA) at 1000 HZ will be analyzed using Nevrokard BRSsoftware (Nevrokard BRS**,** Medistar, Ljubljana, Slovenia) to obtain the following measures of BRS, HRV and BPV.

* Measures of sympathetic function
* Measures of parasympathetic function
* Measures of baroreflex control of heart rate
* Non-invasive blood pressure and heart rate
* Heart rate variability
* Blood pressure variability

**Contact Person:** Dr. Hossam Shaltout at: hshaltou@wakehealth.edu Hypertension and Vascular Research Center

**FujiFil VISUALSONICS VEVO LAZR PHOTOACUSTIC IMAGING SYSTEM (BTP 1E-020)**

Vevo LAZR imaging system offers high-frequency, high-resolution digital imaging with linear array technology in a wide range of applications in small animal models. It also integrates ultrasound modality with photoacoustic based modality that enables co-registration of photoacoustic and anatomical images in both 2D and 3D planes. Applications include:

* Comprehensive assessment of cardiac structure and function
* Anatomical identification of blood vessels and blood flow quantification
* Assessment of organ or tumor perfusion using contrast imaging functionality and microbubble perfusion
* Visualization and quantification of molecular markers in vivo, in real-time
* Monitoring of tumor growth, volume, and angiogenesis
* Tissue hypoxia assessments through hemoglobin content and oxygen saturationquantifications

**Contact person:** Dr. Nildris Cruz-Diaz; ncruzdia@wakhealth.edu, Hypertension and Vascular Research Center

 Dr. Liliya Yamaleyeva; lyamaley@wakehelth.edu, Hypertension and Vascular Research Center

**BIOPAC MP100 BIOFEEDBACK WORKSTATION**

A computer based acquisition system that consists of several components including hardware and software. The system is generally used for continuous data collection of physiological processes and responses. This system is useful for

* Cardio-pulmonary measurements
* Neuro-physiology measurements
* Aggregate sample collection
* Data plotting, calculation and interpretation

**Contact person:** Liliya Yamaleyeva, MD, MS / Hypertension and Vascular Research Center

**LIVING SYSTEMS MICRO VESSEL IMAGING SYSTEM**

A complex system used to measure vascular reactivity in a temperature and pH controlled system when exposed to various vascular mediators. This system is helpful for

* Analyzing the effects of different stimulants and suppressants on in-vitro vessel reactivity.

**Contact person:**  Liliya Yamaleyeva, MD, MS / Hypertension and Vascular Research Center

**BECKMAN COULTER LS6500 LIQUID SCINTILLATION BETA COUNTER**

* LS6500 is used for assay analysis and sample extraction efficiency using H3 radioactive isotope.

**Contact person**: Mark Chappell, PhD, / Hypertension & Vascular Research Center (Biotech Place 3rd Floor)

**CALIPER RAPID TRACE SPE ROBOTIC WORKSTATION SYSTEM**

* Rapid Trace SPE Robotic is an automated sample Solid Phase Extraction (SPE) system.
* Uses 3 ml SPE cartridges for urine Angiotension extractions.
* We have four workstations (units).
* Can process up to 10 samples on each workstation in approximately 2 hours unattended.

**Contact person:** Mark Chappell, PhD, / Hypertension & Vascular Research Center (Biotech Place 3rd Floor)

**SAVANT SPEEDVAC CONCENTRATOR**

* Savant SpeedVac Concentrator is a general-purpose concentrator that provides concentration of both aqueous and mild organic solvent-based samples for research applications.
* Allows you to choose vacuum, heat, and time setting.
* Holds up to 200 12x75mm or 13x100mm tubes.

**Contact person:** TanYa Gwathmey-Williams, MD, PhD, Biomarker Analytical Core Laboratory (Biotech Place 1S-011 Equipment Room)

**Lab Contact Person:** Pam Dean, Lab Manager, Biomarker Analytical Core Laboratory (Biotech Place 1S-Suite 136)

**IVIS Lumina (BTP 1E-020)**

* Equipment permits non-invasive imaging of bioluminescent and fluorescent signals in mice and cell plates.
* It is most useful for a) longitudinal imaging of tumor growth and response to therapy, or b) tracking the movement, development and localization of various cell populations (immune cells, stromal cells, blood vessels, etc.).

**Contact person:** Dr. Nildris Cruz-Diaz; ncruzdia@wakhealth.edu, Hypertension and Vascular Research

 Dr. Ravi Singh; rasingh@wakehealth.edu, CVVL Core

**ECHOMRI (BTP 1E-020)**

* Equipment offers the body composition for live animals, measuring whole body fat, lean, free water and total water masses. Can be used for mice and rats.
* Equipment offers the body composition for ex-vivo organs, measuring whole body fat and lean masses.
* It is most useful for longitudinal studies for animals.

**Contact person:** Dr. Nildris Cruz-Diaz; ncruzdia@wakhealth.edu, Hypertension and Vascular Research Center

**COLUMBUS NIBP-8 NON-INVASIVE BP MONITORING SYSTEM (BTP 1N-012)**

* A tail cuff blood pressure system for use in rats and mice.

**Contact person:** Dr. Nildris Cruz-Diaz; ncruzdia@wakhealth.edu, Hypertension and Vascular Research

 Center

**Lenderking Metabolism Cages (BTP 1N-013)**

* Equipment offers urine and poop collection for individual rats.
* Can be used for water and food consumption for individual rats.

**Contact person:** Dr. Nildris Cruz-Diaz; ncruzdia@wakhealth.edu, Hypertension and Vascular Research Center

**TSE TELEMETRY SYSTEM (BTP 1N-013)**

TSETelemetry system provides monitoring of physiological parameter in small animals models using freely moving animals. The system support simultaneous data acquisition and analysis in 24 rats. The telemetry system is useful in:

* Continuous monitoring of blood pressure, heart rate, and activity in minimally disturbed animals
* Monitoring of diurnal variations in blood pressure, heart rate, and activity
* Reliable detection of small changes in blood pressure (~5 mm Hg)
* Collecting blood pressure data for analysis of central regulation of blood pressure by evaluation of spontaneous baroreflex sensitivity

**Contact person:** Dr. Nildris Cruz-Diaz; ncruzdia@wakhealth.edu, Hypertension and Vascular Research

**Siemens MAGNETOM Skyra 3T MRI Scanner**

The Siemens MAGNETOM Skyra 3T MRI Scanner with TIM Technology has the following features:

* 3T Siemens Skyra operating at D13 platform
* Gradient field strength of 45 mT/m, SR 200 T/m/s
* 70 cm open bore design, weight limit 500 lbs.
* Capable of Advanced DTI, BOLD,  Spectroscopy, ASL, Map-It (cartilage)
* Equipped with stimulation equipment for fMRI studies
* Various coils including 32 channel head coil, 20 channel head/neck, 18 channel body, 32 channel spine, 15 channel knee and surface loop coils.
* Contrast Power Injector

**Contact Person:** Tara Chavanne - tchavann@wakehealth.edu. Translational Imaging Program

 336-716-3630

**GE PETtrace 10 Cyclotron**

The GE PETtrace Radiotracer Production System is a compact, automated cyclotron and radiochemistry system designed for the fast, easy, and efficient production of PET radiotracers. The PETtrace System is centered on a compact negative ion cyclotron of proven design. The PETtrace Cyclotron features a vertical mid-plane and can accelerate protons to 16.5 MeV and deuterons to 8.4 MeV of energy. The system can be configured with various targets/process systems for production of common PET radioisotopes. The high performance, flexible design is ideal for applications in a research setting.

* oxygen-15, nitrogen-13, carbon-11, and fluorine-18 production
* Tracers automatically transferred to the radiochemistry processing systems

**Contact Person:** Kiran Solingapuaum Sai, PhD, ksolinga@wakehealth.edu. Translational Imaging Program 336-716-5630

**Radiochemistry Laboratories**

Radiochemistry laboratory (1,350 sq. ft.): Two Capintech Hot Cells, two Comecere hot cells, four mini-cells, and a GE [11C] methyl iodide synthesis box for radiochemistry and a Trasis AllinOne synthesis box for [18F] radiochemistry. In an area remote from the hot cells and shielded fume is a laboratory containing three fume hoods, a shielded rotary evaporator, and a rotary chromatatron, and a laminar flow hood.  Two additional Hot Cells were installed in 2005. Laboratory contains a separate dedicated QC room and final vial preparation suite that contains a USP<797> compliant work area for human tracer preparation.

Organic chemistry laboratory (860 sq. ft.): three fume hoods, two rotary evaporators, one Perkin Elmer series 1600 FT-IR for characterization of synthesized compounds, a high range vacuum pump, several (more than five) HPLC systems attached with radioisotope and UV detectors for radiochemical synthesis, Varian GLC (TC and radiation detectors), and TLC scanner.

A second organic chemistry laboratory (478 sq. ft.): three chemical fume hoods, a rotary evaporator, two high vacuum pumps, and several routine laboratory instrumentation to perform chemical synthesis.

Metabolite analysis lab: Varian Analytical HPLC (attached with UV and radioisotope detectors) for metabolite analysis, three micro-centrifuges, a rotary evaporator, and a Packard Cobra II auto-gamma counter.

**Contact Person:** Kiran Solingapuaum Sai, PhD, ksolinga@wakehealth.edu. Translational Imaging Program 336-716-5630

**MicroPET/CT -** Offers the following capabilities:

* Equipped with High Performance PET/CT Imaging with Advanced Technology from TriFoil LabPET/CT
* Achieves sub-mm spatial resolution along with high visual accuracy
* Associated with High sensitivity detectors
* Procedures can be completed within 10-60 min period during which animals can be safely anesthetized
* Located in the MRI building, Ground Floor

**Contact Person:** Tara Chavanne - tchavann@wakehealth.edu. Translational Imaging Program

 336-716-3630

[**7T Bruker pre-clinical MRI Scanner**](https://www.bruker.com/products/mr/preclinical-mri/biospec/overview.html)- The techniques currently available include:

* in vivo mouse, rat, and non-human structural primate imaging (T1w, T2w, T2 FLAIR)
* mouse and rat cardiac and atherosclerosis imaging
* Proton/Fluorine Spectroscopy
* magnetically labeled cell tracking
* Advanced neuroimaging techniques, such as, Diffusion Tensor Imaging
* **Located** on the basement level of the Nutrition Research Building

**Contact Person:** Tara Chavanne - tchavann@wakehealth.edu. Translational Imaging Program

 336-716-3630