

## **SHARED RESEARCH EQUIPMENT and RESOURCES** **Updated February 2021**

### **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
- Located at Biotech Place BME, surgical biomechanics lab

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### **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
- Located at Biotech Place BME, robotics lab

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### **daVinci minimally invasive surgical robot material testing platform (DVRK)**

The custom daVinci surgical robot outfitted with 3<sup>rd</sup> party motion controllers to allow for surgeon and computer control of surgical tools for experimentation. The system uses a daVinci standard robot with two manipulator arms and one camera arm. This machine is useful for:

- Force and motion capture in simulated minimally invasive surgery
- Can collect material properties of tissues in simulated tissues and cadaveric, and animal models
- Force capture within 0.5N resolution with instrumented needle driver
- Magnetic position sensors allow motion capture relative to tissue landmarks in non-line of sight scenarios
- Surgical performance can be studied and evaluated
- Located at Biotech Place BME, robotics lab

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### **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 Located at Biotech Place

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### **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
- Located at Biotech Place BME, surgical biomechanics lab

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### **Carbon 3d M1 – Stereolithography Additive Manufacturing System**

The Carbon 3D M1 is an industrial grade production continuous liquid interface printing machine (CLIP) known for its wide library of engineering grade polymer materials and build speed. It has a build chamber of 144 x 81 x 330 mm (5.6 x 3.2 x 13 in.) with a layer thickness of 75 micron (0.003 in.) This machine is useful for:

- Close to Injection molded quality, opaque and translucent, high accuracy prototypes
  - Molds, jigs, fixtures, adaptors, tools, models, devices, instruments, etc.
- Medical models and medical device prototype printing
  - Medical grade materials available (autoclavable, biocompatible)
- Low volume production of custom parts (1s-1000s)
- Located at Biotech Place BME, Wake Health Additive Manufacturing Core Lab (WHAM)

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### **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 BME, machine shop

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### **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
- Located at Biotech Place BME, machine shop

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### **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
- Located at Biotech Place BME, machine shop

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### **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 nanomanipulation
- Simultaneous optical microscopy (bright field and fluorescence) and atomic force microscope imaging/manipulation/spectroscopy
- Located at Biotech Place

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### **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

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### **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 also monitor antithrombotic therapies. This machine is able to 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 both clinical and research settings
- Located at Biotech Place

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### **Agilent 6890 Gas Liquid Chromatographs with Parker Balston Hydrogen Generators**

These two GC's are used for the rapid and sensitive detection and identification of major sterol classes and over 37 different fatty acids.

- Hydrogen generated flame-ionizing detectors
- Auto-injector for uninterrupted workflow
- Data can be expressed as percent distribution or absolute mass

Contact Person: Dr. John Parks ([jparks@wakehealth.edu](mailto:jparks@wakehealth.edu)), Department of Internal Medicine/Section on Molecular Medicine, Lipids Lipoproteins and Atherosclerosis Analyses Core

### **Hitachi LaChrom Elite Chromatography Systems**

These two HPLC's are used in detection and identification of plasma lipoproteins by gel filtration chromatography.

- L2220 Autosampler
- Peltier Cooled
- On-line detection of lipoproteins by UV/VIS for Protein, Cholesterol or Triglyceride
- Fraction-collection compatible for preparative analysis.
- Chromatography in conjunction with cholesterol concentration determination enables the determination of cholesterol mass in the lipoprotein species.

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### **Chrome-Perfect Spirit Software for Online Chromatogram Analysis**

Software for the collection and analysis of data from HPLC's and GC's

- Capable of collecting data from 4 machines simultaneously.
- Flexible software that is user-friendly

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### **Beckman Coulter Optima Max-E Ultracentrifuge with TLA-55, TLA 120.1 and TLA 120.2 Rotors**

For the preparative separation of major lipoprotein classes by KBr density centrifugation.

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### **Instruments used to Facilitate Metabolic Experiments**

- Beckman T2-21 High Speed Centrifuge with JA21, JA20, JA18.1 and JA10 rotors
- ISCO High Pressure Liquid Chromatographs with online cholesterol monitoring
- Applied Biosystems 7500 Genetic PCR System
- Beckman Du640 Spectrophotometer
- Beckman Gamma 4000 Gamma Counter
- L7-70 Ultracentrifuges with 50.2Ti, 70.1Ti (3), SW27, SW40 (2), SW#55Ri,
- Beckman LS-7500 Liquid Scintillation Counter

- Digiflex Automatic Pipettes
- Mettler Toledo XS104 Analytical Balance
- Revco Ultralow Freezer 21 cu ft.
- Tecan GENios Fluorescence Microplate Reader

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**Eppendorf 5702 refrigerated centrifuge**

- For processing blood specimens

Contact Person: to Judy Holbrook LPN, CCRC (jholbroo@ wakehealth.edu)

**Thermo Scientific -80 freezer**

- For storage of frozen specimen

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**High Performance Liquid Chromatography**

- Analytical HPLC of biomolecules [Columns: 2.1mm, 3.9mm, 4.6mm
- C4, C18, Size Exclusion (TSK) 2000,3000,4000
- Automated Temperature control Column Heater
- Automated Auto sampler 2-2000ul injections with temperature control from 4 degrees to 35 centigrade
- Detection: variable wavelength 190nm-700nm programmable channels along with multiple wavelengths at a time.

**Protein purification** is performed using a Waters 650e HPLC & LC150 system. Flow rates from 0.1mL/min to 100mL/min. Columns: Ion exchange [DEAE, MonoQ, MonoS, Poros R1/H; Size Exclusion chromatography columns Superdex 200, & Sephacryl S-300HR. Prep columns: Porasil [40x100]; RP C8 [10 x 100 ] & RP C4 [25x100, 40x100];C18 [8x100, 25x100, 40x100, 40x200mm] Detection via UV-Vis dual wavelength detector Investigators can use this system to purify multi milligram quantities of biologically active proteins.

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Mark Morris, Technician ([jmmorris@wakehealth.edu](mailto:jmmorris@wakehealth.edu)) 716-2581

**Peptide and protein identification.** The Bruker Autoflex MALDI-TOF is a time-of-flight mass spectrometer with high sensitivity and mass accuracy. The instrument is used for mass analysis of unknown proteins and peptides, and accurate mass measurement of intact proteins up to 20 kDa.

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## **MOLECULAR DEVICES SPECTRAMAX M2E MICROPLATE READER and Aquamax Microplate Washer System**

- Spectramax M2E Microplate Reader analyzes a 96 well microplate using endpoint, kinetic, and spectral scan modes.
- Fluorescence and absorbance modes
- Softmax 7.1 Pro Software
- Temperature controlled that allows a microplate to incubate at 37° C.
- Location: Biotech Place

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## **ELISA ASSAY Automation:**

Molecular Devices Spectramax M2 plate scanner: Vis, UV, & Fluorescence with SoftMax Pro 7.1 software  
AquaMax 200 Plate washer  
BM100-4A plate shaker incubator  
Integra VIAFLO ASSIST & Integra VIAFLO ASSIST Plus Robot  
Various Voyager & Viaflo 8-12 channel Bluetooth controlled pipettes for robot

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## **Sequenom MassARRAY SNP Genotyping System**

The Sequenom Mass ARRAY SNP Genotyping system is a flexible platform used for genotyping applications. The system is fully automated and includes 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.

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## **Illumina HiScan and BeadStation 500GX System**

The Illumina HiScan is used for high through-put genetic analysis platform. The Illumina HiScan utilizes pre-designed 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

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## **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.),

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### **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)

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Contact person ViiA 7: Dr. Nichole Allred ([nallred@wakehealth.edu](mailto:nallred@wakehealth.edu)), Center for Precision Medicine

### **NovaSeq 6000 Next Generation DNA Sequencer**

The NovaSeq 6000 is a massive Next Generation DNA sequencer. This provides >300 Gb of sequencing data output in a single run providing >50 million reads per sample. This platform is suitable for the analysis of multiple DNA samples. Applications include:

- Whole genome sequencing
- DNA re-sequencing using custom capture arrays
- Exome sequencing
- Chromatin Immunoprecipitation DNA sequencing (ChIPseq)
- DNA methylation analysis (Methylation capture)
- RNA sequencing (RNAseq)
- Metagenomics
- Single cell RNAseq
- Spatial transcriptomics

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Dr. Laura Cox ([lcx@wakehealth.edu](mailto:lcx@wakehealth.edu)) Center for Precision Medicine

### **NextSeq 500 and 550 Next Generation DNA Sequencer s**

The SOLiD 5500XL W is a massive Next Generation DNA sequencer. This provides up to 400 million sequencing reads in a single run providing. This platform is suitable for the analysis of multiple DNA samples. This platform is suitable for the analysis of multiple DNA samples. Applications include:

- Whole genome sequencing
- DNA re-sequencing using custom capture arrays
- Exome sequencing
- Chromatin Immunoprecipitation DNA sequencing (ChIPseq)
- DNA methylation analysis (Methylation capture)
- RNA sequencing (RNAseq)
- Metagenomics
- Single cell RNAseq
- Spatial transcriptomics

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### **MiSeq and MiSeq DX Next Generation DNA Sequencers**

The MiSeq is a massive Next Generation DNA sequencer. This provides up to 30 million sequencing reads in a single run providing. This platform is suitable for the analysis of multiple DNA samples. Applications include:

- DNA re-sequencing using custom capture arrays
- Chromatin Immunoprecipitation DNA sequencing (ChIPseq)
- RNA sequencing (RNAseq)
- 16s Ribosomal sequencing
- Metagenomics

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### **Oxford Nanopore Next Generation DNA Sequencer**

The Oxford Nanopore Next Generation DNA sequencer is a 3<sup>rd</sup> generation DNA sequencer. This provides up to 30 million sequencing reads in a single run providing. This instrument can produce read lengths in excess of 10 kb and is suitable for identification of large genomic alternations and can directly measure epigenetic changes in nucleic acid structure. This is instrument can also directly sequence native RNA. Applications include:

- Whole genome sequencing
- DNA methylation analysis
- RNA sequencing (RNAseq)
- Metagenomics
- 16s Ribosomal sequencing

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### **Covaris DNA Focused Ultrasonicator for DNA Shearing**

A hydrosonic DNA shearer useful for:

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

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### **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

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### **Amersham Imager-600 RGB**

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.



- 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 silver-stained protein gels

Contact Person: Denise Herpai (336-713-7385)

### **IVIS Lumina Series III**

- Non-invasive (fluorescence/luminescence) imaging of cells in rodents.
- Fixed plane imaging of up to five mice using a high sensitivity CCD camera
- Filter pairs optimized for excitation and emission for fluorophores including GFP/FITC, Cy3/5, and ICG
- Available for use 24/7 for trained users on approved IACUC animal protocols by scheduling through the CVVL iLab page
- Free access to imaging software (Living Image) on a dedicated PC workstation
- Location: two instruments, one located on the second floor of the Gray Building on the Bowman Gray campus (Gray 2067) and a second at Biotech Place.
- Website: <https://school.wakehealth.edu/Research/Institutes-and-Centers/Comprehensive-Cancer-Center/Shared-Resources-and-Cores/Cell-Engineering>

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### **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: fifth floor of the Hanes Building on the Bowman Gray campus (Hanes 5032)
- Website: <https://school.wakehealth.edu/Research/Institutes-and-Centers/Comprehensive-Cancer-Center/Shared-Resources-and-Cores/Cell-Engineering>

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Dr. Ravi Singh, Director, Cell Engineering Shared Resource; [rasingh@wakehealth.edu](mailto:rasingh@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: fifth floor of the Hanes Building on the Bowman Gray campus (Hanes 5037)
- Website: <https://school.wakehealth.edu/Research/Institutes-and-Centers/Comprehensive-Cancer-Center/Shared-Resources-and-Cores/Cell-Engineering>

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Dr. JoLyn Turner, Core Lab Coordinator, Cell Engineering Shared Resource;  
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### **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

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Debbie Golden, EM Technologist [dgolden@wakehealth.edu](mailto:dgolden@wakehealth.edu) 336-716-2670

### **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

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### **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
- Retiga 6000, 14-bit Q capture camera and Cell Sens Dimensions 1.9 software

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### **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 spotsizes 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 microdissection

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### **Keyence BZ-X700**

The Keyence BZ-X700 is a fully automated all-in-one digital microscope system that houses 3 lenses and 3 filter cubes in automated turrets, and a software platform which is specifically integrated to operate with the selected hardware. The compact, fully-enclosed design enables it to become its own built-in dark room, while all objectives and filters are controlled through the software.

Contact Person: Alexei Mikhailov MD, PhD, Director, Cellular Imaging Core, [avmikhai@wakehealth.edu](mailto:avmikhai@wakehealth.edu)  
336-716-6277

Ken Grant, Supervisor and Chief EM Technologist– Cellular Imaging Core

[kgrant@wakehealth.edu](mailto:kgrant@wakehealth.edu) 336-716-6175

Paula Moore Graham, EM Technologist [pmoore@wakehealth.edu](mailto:pmoore@wakehealth.edu) 336-716-2670 2670

Debbie Golden, EM Technologist [dgolden@wakehealth.edu](mailto:dgolden@wakehealth.edu) 336-716-2670

### **Digital Pathology**

#### Scanner(s)

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

**Olympus VS110 BF/FL**

**Olympus VS200 BF**

**Olympus VS200 BF/FL**

**Hamamatsu Nanozoomer HT**

- Brightfield and Fluorescence
- ZStack
- EFI
- Tissue MicroArray (TMA)

- Software for viewing, annotation and measurements

### Analysis Software

#### **Visiopharm**

Contact Person(s): Michael Cohen MD, Professor, Pathology and Director, Virtual Microscopy Core, [mbcohen@wakehealth.edu](mailto:mbcohen@wakehealth.edu) 336-716-5080  
Patricia Warren, IT Program Director, Pathology and Manager, Virtual Microscopy Core, [twarren@wakehealth.edu](mailto:twarren@wakehealth.edu) 336-716-1520  
Andrew McGowan, DP Technician, Virtual Microscopy Core, [armcgowa@wakehealth.edu](mailto:armcgowa@wakehealth.edu) 336-716-1568

#### **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)<<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

Tumor Tissue and Pathology Shared Resource equipment includes:

- Tissue processor
- Cryostat
- Embedding station
- Microtome
- Slide stainer
- Refrigerators
- -20°C freezers
- -80°C freezers
- Necropsy suites
- Light microscopes
- Leica autostainer for immunohistochemistry and in situ hybridization
- gentleMACS™ Octo Dissociator with Heaters for single cell tissue dissociation
- TMA Master II with PCR for TMA creation

Contact Person: Dr. Greg Kucera ([gkucera@wakehealth.edu](mailto:gkucera@wakehealth.edu)<<mailto:gkucera@wakehealth.edu>>  
Tumor Tissue Shared Resource

### **MUSE™ Cardiology Information System, v 8.0**

The MUSE system consists of an application/database server that stores and analyze/interpret electrocardiographic (ECG) data. The MUSE application connects client workstations to the server over the network. These workstations access the server to perform system functions such as editing, test retrieval, system setup, running database searches, and checking system status. The EPICARE Center has developed and incorporated software program to MUSE that enables automated ECG Classification by Minnesota Code and Novacode

Depending on the device and the system configuration, ECG data could be obtained via:

- wired network
- wireless network
- modem
- floppy diskette
- secure digital (SD) card
- serial download cable
- any combination of these

Contact Person: Yashashwi Pokharel, M.B.B.S, M.S.C.R, Director, Epidemiological Cardiology Research Center [ypokhare@wakehealth.edu](mailto:ypokhare@wakehealth.edu) P: 716-8632 F: 716-0834  
5<sup>th</sup> floor 525 & Vine WF Innovation Quarter

### **Magellan ECG Research Workstation Software**

Developed by Marquette Medical Systems' Algorithm Group, the ECG Research Workstation is used to review and export ECG waveforms, interpretations, and measurements for research purposes. This system is considered as the older version of the MUSE system and is able to perform similar tasks.

- This includes automated ECG classification by Minnesota code and Novacode using EPICARE proprietary software.

Contact Person: Yashashwi Pokharel, M.B.B.S, M.S.C.R, Director, Epidemiological Cardiology Research Center [ypokhare@wakehealth.edu](mailto:ypokhare@wakehealth.edu) P: 716-8632 F: 716-0834  
5<sup>th</sup> floor 525 & Vine WF Innovation Quarter

### **MARS HOLTER ECG Department Server**

The MARS Ambulatory ECG System provides a robust set of features for analyzing, reviewing, editing, and reporting ECG data. It also provides a variety of interfaces to external applications and systems that extend the system's core functionality.

- The MARS system can acquire ECG data from a variety of sources. MARS supports acquisition from a number of digital Holter recorders. Some of the supported recorders can connect directly to the MARS system. Others, however, require a card reader to access their data.
- MARS also supports acquisition from the CARESCAPE CIC Pro clinical information system.
- The MARS system can print ECG data and patient reports to a number of networked or local laser printers.
- The MARS system provides a number of security measures to help restrict access to patient and ECG data.
- The MARS Ambulatory ECG System provides a remote support option that allows GE support personnel to diagnose and repair problems quickly and securely.

Contact Person: Yashashwi Pokharel, M.B.B.S, M.S.C.R, Director, Epidemiological Cardiology Research Center [ypokhare@wakehealth.edu](mailto:ypokhare@wakehealth.edu) P: 716-8632 F: 716-0834  
5<sup>th</sup> floor 525 & Vine WF Innovation Quarter

### **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](http://shimadzu.com)

Contact Person: Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Biotech 3rd floor)  
<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 (Biotech 3rd floor)  
<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 (Biotech 3rd floor)  
<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 (Biotech 3rd floor)  
<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 (Biotech 3rd floor)  
<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 (Biotech 3rd floor)  
<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 (Biotech 3rd floor)  
<https://www.adinstruments.com/research/.../wire-myograp>

#### **Thermo Scientific Ultima II Freezers**

- Chest freezers that store samples at -80°C.

Contact Person: Mark C. Chappell, PhD, Biochemistry of Hypertension and Organ Injury Lab and HPLC & Peptide Metabolism Core Facility in HVRC (Biotech 3rd floor)  
<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 (Biotech 3rd floor)  
<https://www.adinstruments.com/research/.../wire-myograp>

#### **TRANSONIC T402 2-CHANNEL MODULAR FLOWMETER**

- A microsurgical instrument and data analysis machine that is used for recording precision blood flow measurements in various research applications. This system is useful for
- Sensing and recording flow volume in rodent vasculature using perivascular flowprobes.

Contact person: Dr. Liliya Yamaleyeva ([lyamaley@wakehealth.edu](mailto:lyamaley@wakehealth.edu)), Hypertension and Vascular Research Center

#### **HARRIS MANUFACTURING CO FREEZER**

- A-80°C freezer that stands upright and has five shelves, each with its own door to help maintain a stable temperature. It holds and preserves precious samples collected by investigators for ongoing analytical research.

Contact person: Carolynne McGee ([cmcgee@wakehealth.edu](mailto:cmcgee@wakehealth.edu)), Hypertension and Vascular Research Center

#### **SIEMENS HEALTHCARE DIAGNOSTICS RAPIDLAB248 BLOOD GAS ANALYZER**

An analytical machine used for accurate determination of pH, PCO<sub>2</sub> and pO<sub>2</sub> in heparinized whole blood samples. This system is useful for

- Calculating various parameters of blood content including total carbon dioxide, blood and extra cellular fluid bases, oxygen saturation, etc.
- Helps indicate the presence of certain disorders or abnormalities in the lungs, kidney, and heart.

Contact person: Dr. Liliya Yamaleyeva ([lyamaley@wakehealth.edu](mailto:lyamaley@wakehealth.edu)) Hypertension and Vascular Research Center

### **RADNOTI BLOOD VESSEL PERFUSION SYSTEM**

- A special perfusion system used in blood vessel research pertaining to reactivity, endothelial function, and vasoreactive effects of various substances. The system allows researchers to simultaneously monitor multiple vessels, which are housed in a temperature controlled, flow adjusted system. This particular setup contains a transducer positioner, glass tissue/organ bath and an elaborate system of tubing for easy evacuation of water baths and experimental solutions.

Contact person: Dr. Liliya Yamaleyeva ([lyamaley@wakehealth.edu](mailto:lyamaley@wakehealth.edu)) Hypertension and Vascular Research Center

### **SAVANT SPEEDVAC CONCENTRATOR**

- Savant SpeedVac Concentrator is a general-purpose concentrator that allows 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, PhD and K. Bridget Brosnihan, PhD, Directors  
Pam Dean, Lab Manager  
Biomarker Analytical Core/ Hypertension & Vascular Research Center  
Biotech Place 1<sup>st</sup> floor

### **THERMO FISHER IEC-GP8R REFRIGERATED CENTRIFUGE**

- IEC-GP8R Refrigerated Centrifuge can spin a variety of centrifuge tubes (12x75mm-16x100mm) at speed of 1000 – 2500 rpm.

Contact person: TanYa Gwathmey, PhD and K. Bridget Brosnihan, PhD, Directors  
Pam Dean, Lab Manager  
Biomarker Analytical Core/ Hypertension & Vascular Research Center  
Biotech Place 1<sup>st</sup> floor

### **THERMO FISHER IEC-6000 REFRIGERATED CENTRIFUGE**

- IEC-6000 Refrigerated Centrifuge can spin a variety of centrifuge tubes (12x75mm-16x100mm, 15-50 ml) at speed of 1000 – 3000 rpm.



Contact person: TanYa Gwathmey, PhD and K. Bridget Brosnihan, PhD, Directors  
Pam Dean, Lab Manager  
Biomarker Analytical Core/ Hypertension & Vascular Research Center  
Biotech Place 1<sup>st</sup> floor

### **BECKMAN COULTER ACCUSPIN3R CENTRIFUGE**

- Accuspin3R Centrifuge can spin a variety of centrifuge tubes (12x75mm-16x100mm) at speed of 1000 – 4000 rpm.
- Variable temperature 2-28° C (refrigerated or room temperature).

Contact Person: TanYa Gwathmey, PhD and K. Bridget Brosnihan, PhD, Directors  
Pam Dean, Lab Manager  
Biomarker Analytical Core/ Hypertension & Vascular Research Center  
Biotech Place 1<sup>st</sup> floor

### **FujiFilm 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 saturation quantifications

Contact person: Dr. Nildris Cruz-Diaz; [ncruzdia@wakhealth.edu](mailto:ncruzdia@wakhealth.edu), Hypertension and Vascular Research Center  
Dr. Liliya Yamaleyeva; [lyamaley@wakehelth.edu](mailto:lyamaley@wakehelth.edu), Hypertension and Vascular Research Center

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

- Equipment permits non-invasive imaging of bioluminescent and fluorescent signals in mice and cellplates.
- 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](mailto:ncruzdia@wakhealth.edu), Hypertension and Vascular Research  
Dr. Ravi Singh; [rasingh@wakehealth.edu](mailto: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 exvivo 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](mailto:ncruzdia@wakhealth.edu), Hypertension and Vascular Research

### **COLUMBUS NIBP 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](mailto:ncruzdia@wakhealth.edu), Hypertension and Vascular Research

### **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](mailto:ncruzdia@wakhealth.edu), Hypertension and Vascular Research

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

TSE 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 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](mailto:ncruzdia@wakhealth.edu), Hypertension and Vascular Research

### **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: Wayne Graham /Hypertension Cell and Molecular Biology Laboratory in HVRC (BTP suite 340)

### **HACKER-BRIGHT MICROTOME CRYOSTAT**

- Standard cryostat for sectioning frozen fixed or unfixed tissues.

Contact person: Wayne Graham /Hypertension Cell and Molecular Biology Laboratory in HVRC (BTP suite 340)

### **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](mailto:jvoncannon@wakhealth.edu)), Hypertension and Vascular Research Center

### **QuantStudio™ 3 Real-Time PCR System:**

The quant studio Real Time PCR system offers High resolution melt (HRM) analysis is based on detecting small differences in PCR melting (dissociation) curves. It is enabled by improved dsDNA binding dyes used in conjunction with real-time PCR instrumentation that has precise temperature ramp control and advanced data-capture capabilities. High-throughput data is achieved by HRM analysis using a QuantStudio qPCR System with Applied Biosystems™ MeltDoctor™ software, built-in protocols, and calibrations. Users can directly connect to Thermo Fisher Cloud to access and analyze your data anytime, from anywhere with an Internet connection. Back up and share files to collaborate with colleagues worldwide. Monitor your runs in real time from mobile devices through the Instrument Connect mobile app.

Contact person: Patricia E. Gallagher, PhD, and E. Ann Tallant, Ph.D., Hypertension Cell and Molecular Biology in HVRC (BTP-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, and E. Ann Tallant, Ph.D., 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: Dr. Patricia E. Gallagher ([pgallagh@wakehealth.edu](mailto:pgallagh@wakehealth.edu)), Dr. E. Ann Tallant ([atallant@wakehealth.edu](mailto:atallant@wakehealth.edu)) or Rob Lanning ([rlanning@wakehealth.edu](mailto:rlanning@wakehealth.edu)), Hypertension and Vascular Research Center

### **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 persons: Dr. Debra Diz; [ddiz@wakehealth.edu](mailto:ddiz@wakehealth.edu) or Brian Westwood; [bwestwoo@wakehealth.edu](mailto:bwestwoo@wakehealth.edu), Hypertension and Vascular Research Center

### **Clinical Non-Invasive Hemodynamics Core in HVRC (Janeway 5<sup>th</sup> 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](mailto: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](mailto: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](mailto:hshaltou@wakehealth.edu) Hypertension and Vascular Research Center

### **HDI/PULSE WAVE CR-2000, HYPERTENSION DIAGNOSTICS INC, EAGAN, MN)**

This machine evaluates the following parameters:

- The diastolic portion of the wave
- An estimate of the stroke volume and cardiac output
- Systemic vascular resistance and total vascular impedance

- Large artery and small artery elasticity indices, C1 and C2

Contact Person: Dr. Hossam Shaltout at: [hshaltou@wfakehealth.edu](mailto:hshaltou@wfakehealth.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@wfakehealth.edu](mailto:hshaltou@wfakehealth.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@wfakehealth.edu](mailto:hshaltou@wfakehealth.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 BRS software (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@wfakehealth.edu](mailto:hshaltou@wfakehealth.edu) Hypertension and Vascular Research Center

### **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 Screen<sup>1</sup>·ECP<sup>1</sup>, IgE, Total
- **Anemia / Iron Metabolism**-Ferritin ,Folate, RBC Folate, Vitamin B12
- **Bone Metabolism**-Osteocalcin<sup>1</sup>·PYRILINKS-D
- **Cardiac**-CKMB<sup>1</sup>·D-Dimer<sup>1</sup>, High-sensitivity CRP, Myoglobin, NTproBNP<sup>1</sup>·Troponin
- **Diabetes**-C-Peptide, Insulin, Microalbumin
- **Growth**-Growth Hormone (hGH), IGF-I, IGFBP-3
- **Reproductive Endocrinology**-Androstenedione, DHEAS, Estradiol, FSH, hCG, Free Beta HCG<sup>1</sup>·LH PAPP-A<sup>1</sup>·Progesterone, Prolactin, SHBG, Testosterone, Unconjugated Estriol
- **Metabolic**-ACTH, Cortisol, Homocysteine
- **Other**-β-2 Microglobulin, Gastrin, Nicotine Metabolites

Contact person: Dr. Barbara Nicklas ([bnicklas@wakehealth.edu](mailto:bnicklas@wakehealth.edu)), Gerontology and Geriatric Medicine.

### **Tecan Genios Microplate Reader:**

The GENios microplate reader is a three-in-one detection reader capable of measuring absorbance, fluorescence and luminescence reactions. Manufactured to measure of a number of reaction vessel formats used by researchers, the GENios microplate reader has the following capabilities:

- Designed to handle different microplate formats (6 to 384 wells), PCR tubes and cuvettes making it the ideal solution for many standard molecular biology procedures.
- Suitable for many applications ranging from gene expression and transfection studies
- Suitable for binding assays, ELISA (Enzyme-Linked Immunosorbent Assays)
- Enzyme kinetic measurements up to cell growth and proliferation studies, cytotoxicity and apoptotic (cell death) assays.

Contact person: Dr. Barbara Nicklas ([bnicklas@wakehealth.edu](mailto:bnicklas@wakehealth.edu)) Gerontology and Geriatric Medicine

### **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](mailto: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 and also clinical scans. We have a Hologic Horizon A with APEX 5 operating system and it is located on the first Floor Sticht Center within the new Clinical Research Center.

- Types of scans performed are Whole Body, AP lumbar, Hip, Proximal Femur, Forearm, IVA, and Lateral Spine

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

### **Transportation Services**

We have a full-time driver 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.

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

Contact person: Kim Kennedy ([kkennedy@wakehealth.edu](mailto: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 VO<sub>2</sub>

Contact person: Kim Kennedy ([kkennedy@wakehealth.edu](mailto: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](mailto: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](mailto: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](mailto: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 20,000 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](mailto:kkennedy@wakehealth.edu)) Gerontology and Geriatric Medicine

### **Sorvall Legend RT Refrigerated Centrifuge**

#### **Location: ED Clinical Decision Unit, Ground Floor, Ardmore Tower**

Refrigerated centrifuge with a swing bucket rotor, Maximum speed of 4100 RPM. Temperature control range of -10°C +40°C. This centrifuge offers the following features:

- Useful for processing blood and other biological samples
- Ability to process a large quantity of samples simultaneously.
- Temperature control.

Contact person: Lauren Koehler Department of Emergency Medicine ([lekoehle@wakehealth.edu](mailto:lekoehle@wakehealth.edu))

### **Sorvall Legend X1 Refrigerated Centrifuge**

#### **Location: Gray 3170**

Refrigerated centrifuge with a swing bucket rotor, Maximum speed of 15200 RPM. Temperature control range of -10°C +40°C. This centrifuge offers the following features:

- Useful for processing blood and other biological samples, including COVID samples
- Ability to process a large quantity of samples simultaneously.
- Temperature control.

Contact person: Lauren Koehler Department of Emergency Medicine ([lekoehle@wakehealth.edu](mailto:lekoehle@wakehealth.edu))

### **Kenmore 2-8°C Refrigerator**

#### **Location: ED, SB, Ardmore Tower**

This refrigerator is used to store biological research samples and lab supplies. This refrigerator offers the following features:

- SPOT temperature monitoring

Contact person: Lauren Koehler Department of Emergency Medicine ([lekoehle@wakehealth.edu](mailto:lekoehle@wakehealth.edu))

### **Siemens MAGNETOM Skyra 3T MRI**

The facility houses a Siemens MAGNETOM Skyra 3T MRI scanner with TIM technology operating on a E11C platform with the following features:

- 3T Siemens Skyra operating at E11C platform
- Gradient field strength of 45 mT/m, SR 200 T/m/s
- 70 cm open bore design, weight limit 550 lbs
- Capable of Advanced DTI, BOLD, Spectroscopy, ASL, Map-It (cartilage) and Advanced Cardiac Imaging
- Equipped with stimulation equipment for fMRI studies



- Various coils including 32 channel head coil, 32 channel Neonatal 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](mailto:tchavann@wakehealth.edu) 716-3630

### **Bruker Biospec 70/30 USR micro-MRI 7T**

The 7T Facility is located on the basement level of the Nutrition Research building. It is operated by dedicated MRI registered technologists during normal business hours.

The 7T Bruker pre-clinical MRI Scanner techniques currently available include:

- Diameter of clear bore: >300mm
- Stray-field (5 Gauss): +/-3m axial, +/- 2m radial
- Length: 1.49m
- Diameter: 1.652m
- 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.

Contact Person: Tara Chavanne [tchavann@wakehealth.edu](mailto:tchavann@wakehealth.edu) 716-3630

### **Siemens SOMATOM Definition Flash CT Scanner in Clarkson Campus**

The SOMATOM Definition Flash contains the Stellar Detector, including TrueSignal and Edge Technology. Both take CT imaging where it has never gone before by routinely generating ultra-thin 0.5 mm slices e.g. for most accurate stenosis, plaque and stent analysis. Besides, it enables reduction of dose for all scans, resulting in for example sub-mSv cardiac imaging. Dual Energy automatically provides a second contrast for the best possible diagnosis without any extra dose. The Definition Flash CT has two Stella detectors with a routine spatial resolution of up to 0.3mm and a number of slice of up to 128. Patient table to support ultra-fast spiral scanning and up to 200cm scan range. Motor-driven table height adjustment from min. 48 cm to max. 92 cm, longitudinal movement of the tabletop 200 cm in increments of 0.5 mm, positioning accuracy +/- 0.25 mm from any direction. Horizontal scan range 200 cm. Table height can be controlled alternatively by means of foot switch (2 each on both sides of the patient table). In the case of emergency stop or power failure, the tabletop can also be moved manually in horizontal direction. Max. table load: 220 kg/485 lbs, Table feed speed: 2-458 mm/s, Distance between gantry front and table base 40 cm.

Contact Person: Tara Chavanne [tchavann@wakehealth.edu](mailto:tchavann@wakehealth.edu) 716-3630

### **GE 800 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 Solingapuram Sai, [ksolinga@wakehealth.edu](mailto:ksolinga@wakehealth.edu), 716-5630

### **GE 64-slice PET/CT Discovery ST Scanner**

The PET/CT Discovery ST Scanner has 24 detector rings that provide 47 contiguous image planes over a maximum 70 cm transaxial field of view with CT attenuation correction. Axial spatial resolution of this scanner is 3.27 mm at the center of the gantry. Data acquisition modes include static, dynamic, whole body, and gated. The room is equipped with anesthesia gases and exhaust for scavenging the gases. There is a dedicated viewing area to interpret scans and a data analysis room. In addition, a dedicated research PACS for PET has been created to store PET data in DICOM format (images and raw data). oxygen-15, nitrogen-13, carbon-11, and fluorine-18 production. Radiotracers are automatically transferred to the radiochemistry processing systems

Contact Person: Kiran Solingapuram Sai, [ksolinga@wakehealth.edu](mailto:ksolinga@wakehealth.edu), 716-5630

### **Radiochemistry Laboratories**

Radiochemistry laboratory (1,350 sq. ft.): Two Capintech Hot Cells, two Comecere hot cells, two GE [11C] synthesis boxes and a [18F] Trasis AllinOne synthesis box for radiochemistry—the entire production lab is certified to USP<797> ISO class 5/7 compliant work area for human tracer preparation.

QC lab: WATERS and UV Varian Analytical HPLC, attached with UV and radioisotope detectors for analysis, and a Agilent Gas Chromatography for all QC-QA analytical work.

Contact Person: Kiran Solingapuram Sai, [ksolinga@wakehealth.edu](mailto:ksolinga@wakehealth.edu), 716-5630

### **TriFoil microPET/CT scanner**

This new, high performance PET benchtop system with in-line X-ray CT provides the ability to visualize and quantify biological processes over a wide range of PET tracer activities with a reconstructed isotropic image resolution of <1.0 µl (<1mm). The InSyTe Lab PET system is the first preclinical PET with continuous bed motion PET detection, maintains uniform signal-to-noise sensitivity across the entire scan range.

Contact Person: Kiran Solingapuram Sai, [ksolinga@wakehealth.edu](mailto:ksolinga@wakehealth.edu), 716-5630

### **OEC 9800 Plus- C-arm Fluoroscope**

Clinical quality C-arm fluoroscope that is designed with a variety of x-ray applications in mind. These applications include but are not limited to orthopedic, vascular, neurovascular and cardiovascular procedures. The unit offers a 1K x 1K high resolution imaging system with GE image intelligence technology that provides for crisp and clear images. The workstation is outfitted with digital flat panel screens that includes an intuitive touch screen based interface. In addition, there is software available for use in obtaining quantitative measures such as distance and stenosis. Located at the Clarkson Campus.

- 9" Image intensifier -Tri-mode 9"/6"/4.5"- (23cm/15cm/11cm resolution respectively)
- Variety of imaging modes including pulsed fluoro, high level fluoro, digital cine (up to 30fps), digital spot and radiographic
- Up to 120 kvP
- Up to 300 mAs
- DICOMM 3.0 interface
- Network/PACS system capable

Contact Person: Dr. Susan Appt [sappt@wakehealth.edu](mailto:sappt@wakehealth.edu) 716-1637

### **Ecotron – Digital Portable X-ray**

Compact size and light weight radiological device for veterinary use that can be applied for radiographic evaluation of many systems within the body. Provides high resolution imaging at lower dosages. Portable unit currently located at Clarkson Campus.

- Model# EPX-F2800
- kV range 40kv -120kv
- mAs range 0.4mAs -100mAs
- Min FOV: 5cm x 5cm
- Max FOV: 40cm x 40cm

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Eric McCloud [emccloud@wakehealth.edu](mailto:emccloud@wakehealth.edu) 713-1318

### **Alcon – Accurus 800 CS**

A multifunctional surgical tool that can be utilized in anterior and posterior segment ophthalmic surgeries. Its capabilities include driving a variety of probes and handpieces which provide the ability to cut vitreous and tissues, emulsify the lens, illuminate the posterior segment of the eye, and apply diathermy for hemostasis. The unit is capable of providing vacuum for removing ocular matter and irrigation/infusion to restore eye fluid. The operator controls the console functions using the graphical user interface screen, front panel keys and footswitch. Mobile unit currently located on Clarkson Campus.

- Vacuum 600 mmHg
- Max coagulation 40khz
- Vitrectomy speed 2500 cuts/min

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Eric McCloud [emccloud@wakehealth.edu](mailto:emccloud@wakehealth.edu) 713-1318

### **3M – Steri-Vac Ethylene Oxide Sterilization System**

A dual cycle EO gas sterilizer unit which provides for a highly penetrating sterilant that offers proven effectiveness in killing all viable microorganisms including spores. The major advantage with this sterilization method is that it is well suited for sterilizing instruments, devices and other equipment that are sensitive to moisture and heat. Located on Clarkson Campus.

- Hot cycle (55°C) : sterilization ~2hr:45min , recommended aeration 12 hr
- Cold cycle (37°C): sterilization ~4hr:45min, recommended aeration 32 hr
- Separate aerator unit available for increased throughput, if needed.

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### **GEM 4000 – Blood Gas Analyzer**

An analytical machine used for accurate determination of pH, pO<sub>2</sub>, pCO<sub>2</sub>, Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Cl<sup>-</sup>, glucose, lactate, hematocrit, total bilirubin(tBili) and CO-Oximetry from heparinized whole blood samples. These measured parameters, along with derived parameters, aid the trained user in assessing metabolic status to help diagnose and/or treat a plethora of medical conditions.

- The machine has two primary components: the analyzer and a disposable, multi-use cartridge
- Color touch screen operation with simple menus and buttons

- Cartridge is a self-contained system to handle reagents and biohazardous waste with no user involvement.

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### **Moduflex Optimax – Anesthesia system**

Veterinary anesthesia machine with conventional CO<sub>2</sub> absorber with Hallowell EMC ventilator attachment.

- Fitted with both isoflurane and sevoflurane anesthetic vaporizers
- Oxygen and/or air carrier gas capable
- Active waste anesthetic gas scavenger system

Contact Person: Dr. Susan Appt [sappt@wakehealth.edu](mailto:sappt@wakehealth.edu) 716-1637  
Eric McCloud [emccloud@wakehealth.edu](mailto:emccloud@wakehealth.edu) 713-1318

### **Twilio Text Messaging Service**

Twilio® is a cloud-based communications platform which offers departments across Wake Forest Baptist Health a HIPAA-compliant text messaging service. This gives faculty, staff, or researchers the ability to communicate with patients and research participants in a way that does not risk the release of protected health information (PHI). The Digital Communications Core (DComm) oversees the use of WFBH's Twilio account and facilitates its use.

Contact Person: Elena Wright, ([eswright@wakehealth.edu](mailto:eswright@wakehealth.edu)) Program Manager  
David Miller, MD, MS, ([dmiller@wakehealth.edu](mailto:dmiller@wakehealth.edu)) Faculty Director

### **Crystallography and Computational Biosciences**

The X-ray facility houses a Rigaku Micromax 007 X-ray source with dual VariMax-HF Confocal Optic Systems coupled to Pilatus3M and RAXIS4+ detectors. Data collection is performed under cryogenic cooling conditions. The facility also houses a Gryphon 96-well crystallization robot and all the necessary ancillary equipment, such as microscopes and crystallization cabinets. The crystallography computational facility contains several multi-processor graphics workstations with hardware stereo for model-building and refinement. It also houses a Linux cluster with the appropriate software for all crystallographic calculations (COOT, CCP4i, PHENIX, etc.), molecular dynamics, in silico drug docking, and homology modeling. The computational biosciences equipment includes access to the Wake Forest DEAC Blade Center-based CPU/GPU-based cluster with 3892 CPU cores with 19.351 TB of total cpu-RAM, two NVIDIA Tesla P100 GPU cards, and 12 V100 GPU cards plus 197.86 TB of attached SATA storage, with an 8% fairshare. This equipment also includes several Mac Workstations for visualization, programming, and statistical analysis with 112TB of NAS Drobo storage. The main parallel computational resources are six 4-GPU Metrocubo workstations. Eight GPUs are GeForce GTX 680s each, with 1536 cores and 4GB RAM, and each are benchmarked at 3.1 Teraflops. Sixteen GPUs are GTX 780s, each with 2304 cores, 4 GB memory and benchmarked at 4.0 Teraflops. If additional parallel resources are ever needed, then on-demand cloud-based GPU resources could be used at cost.

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

Freddie R. Salsbury, Jr., PhD, Professor and Scott Family Fellow, Department of Physics, <https://www.physics.wfu.edu/wfu-phy-people/wfu-phy-people/fred-salsbury>

## **TSE phenomaster system**

The TSE Phenomaster is an automated metabolic system to study whole body energy metabolism in live animals like mice and rats. This system allows multiple animal cages to be simultaneously monitored for several days in a nearly fully automated way which provides highly reproducible and reliable assessment of energy expenditure. The components measured by this system are:

- Oxygen consumption (VO<sub>2</sub>) (ml/(kg x h) or ml/h)
- Carbon dioxide production (VCO<sub>2</sub>) (ml/(kg x h) or ml/h)
- RER, respiratory exchange rate (VCO<sub>2</sub>/VO<sub>2</sub>)
- H, heat (kcal/(kg x h) or Kcal/h)
- Food and water intake
- Physical activity measurements
- Running wheel

Contact person: Shalini Jain, PhD ([sjain@wakehealth.edu](mailto:sjain@wakehealth.edu)) Department of Endocrinology, Metabolic phenotyping shared resource (MPSR)

Location: The Phenomaster is located in the Animal facility in Biotech Place research building located on Patterson Avenue in downtown Winston-Salem.

## **Flow Cytometry Shared Resource, Comprehensive Cancer Center**

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-populations detection, expression of fluorescent proteins (GFP, DsRed, etc.), Ca<sup>++</sup> 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.
- Exosomes can be analyzed and sorted on the Astrios EQ using the shorter wavelength lasers and additional light scatter channels.

Contact Persons: Dr. Jason Grayson ([jgrayson@wakehealth.edu](mailto:jgrayson@wakehealth.edu))  
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Dr. John Whitesides, ([jfwhites@wakehealth.edu](mailto:jfwhites@wakehealth.edu)),

## **Flow Cytometer Cell Sorters**

### **Beckman-Coulter Astrios EQ**

The Beckman-Coulter Astrios EQ is a state-of-the art cell sorter maintained in a laminar flow biohazard hood that tremendously increases the cell sorting capabilities at Wake Forest School of Medicine (WFSM) The Astrios EQ is a flow cytometer cell sorter with 23 parameters (FSC, 4 SSC and 18 Fluorescence) and 5-lasers (405 nm, 488 nm, 640 nm, 561nm, and 355 nm).

The first three lasers, 405 nm, 488 nm and 640 nm are the same as found in all our existing BD analyzers and cell sorter. The last two lasers, 561 nm and 355 nm lasers add new cell sorting capabilities to provide services that are new to flow cytometry assays in the WFUBH CCC Flow Cytometry Shared Resource.

The 561nm laser was included because it can more efficiently excite the fluorescent proteins with red emissions e.g., DsRed, mCherry, etc. The 561nm laser will capture 100% more of the signals from cells labelled with red fluorescent proteins than the BD FACS Aria did with the 488 nm laser.

The 355nm laser was included to (a) take advantage of the new Brilliant UV dyes, (b) provide another way to detect stem cells by the side-population method, and (c) easily detect DNA content without interference with staining of RNA. We have explored using side-population detection with Dye Cycle Violet with some success with the violet 405nm laser on the BD FACS Aria. The side-population method will provide some additional discrimination of the stem cells compared to antibody labeling alone. The high power 355nm laser with Hoechst 33258 or 33342 will provide crisper results than the 405nm and Dye Cycle Violet combination. The 355nm will also efficiently excite the DNA-specific dye DAPI to provide high-quality DNA histograms without the need to eliminate RNA, as with the frequently used Propidium Iodide dye. The UV laser can also be used to monitor calcium uptake during cell activation.

The filters for the fluorescence parameters were chosen to match the filters in the BD Fortessa X20. (See below) We anticipate that fluorescence panels developed to work on the BD Fortessa X20 will port easily over to the Beckman-Coulter Astrios EQ. As such the Astrios EQ is available as a backup instrument when the BD Fortessa X20 is down, or to relieve scheduling conflicts when the BD Fortessa X20 is fully booked. As an analysis service the Astrios costs only \$25 more than the BD Fortessa X20 since it is operator run and there is no sort setup fee for analysis.

The Astrios EQ is a sense-in-air cell sorter. This technology allows superior sorting of a wider range of samples types and sample quality compared to the sense-in-quartz FACS Aria currently in use. In the sense-in-air design, the sample is directed through the sort tip before it is analyzed and sorted, disrupting any cell clusters before they are analyzed. Additionally, the cells in the sample are axially aligned by a flow cell with a conical design and gently focused into a narrow sample stream. This minimizes the interaction between the cells and the edges of the sorting nozzle. The sense-in-air cell sorters operate over a wider range of pressures and droplet break-off frequencies, thus making it easier to adjust the operating conditions to minimize damage to sensitive cells and maintaining high throughput. We are looking forward to the higher throughput of a sense-in-air cell sorter to shorten the time needed to complete a sort, providing for better sample viability and the possibility of more sorts/reduced wait time ultimately increasing the quality and efficiency of our Core.

The following is a list of important features of the Astrios EQ high-speed sorter that surpass the BD FACS Aria

- A patented forward scatter detection system that provides enhanced collection of forward scatter parameters with 2 independent PMT's. Particles from 0.2 to 30 microns are resolved

- Side-scatter detection at 4 different wavelengths (405 nm, 488 nm, 640 nm and 561 nm) for enhanced detection of small particles (e.g. exosomes) .
- Selectable factory-masks allow user to adjust small and large particle sensitivity
- Display and print Summit filter setup as part of the Run Report extracted from an FCS file
- QC criteria and results for each detector available for each POD display
- SmartSampler sample tube input from 0.5ml to 50ml
- Only sorter capable of >70,000 sort decisions/second, validated performance
- IntelliSort II, a fully beadless drop delay determination and monitoring system, enable the optimal drop delay to be set without the use of fluorescent particles in the sample line
- Mixed Mode sorting: only sorter where each sort stream is capable of having its own sort mode (Enrich, Purify, Single) programmed. Soft aborts and waste can be collected for resorting as well.
- 6-way sorting into 12 x 75 mm tubes
- plate sorting for up to 1536-well
- Index sorting with intuitive mapping of events

The Beckman-Coulter Astrios EQ flow cytometer cell sorter is located in the Biotech Place, 2<sup>nd</sup> Floor, Rm 2E-002.

Contact Persons: Dr. Jason Grayson ([jgrayson@wakehealth.edu](mailto:jgrayson@wakehealth.edu))  
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### **Becton-Dickinson FACS Aria**

(The FACS Aria is no longer maintained under a service contract. It will be maintained as long as it is economically feasible.)

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 non-human primates, etc.). The BD FACS Aria is installed in 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. The flow cytometer cell sorter is located in the Biotech Place, 2<sup>nd</sup> Floor, Rm 2E-002.

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### **Nanocollect Wolf Fluidic Cell Sorter with N1 Single Cell Depositor**

The Nanocollect Wolf Fluidic Cell Sorter with N1 Single Cell Depositor has a single 488nm laser with two scatter detectors and three fluorescence detectors. This is a minimal system but adequate for the sorting what we have been asked to sort to date. Applications that are run on the Accuri in the lab, are easily adapted to run on the Wolf. Additionally, the cells exit in a drop that forms slowly and is deposited into a catch tube or well in a multi-well plate. This cell is exposed to minimal stress. This serves to preserve the viability and functionality of the cell.

The Wolf cell sorter is optimized for single cell sorting into plates with the N1 Single Cell Dispenser. It is capable of full indexed single cell sorting into 96 or 384 well plates. This means that the measurements of each cell deposited in each well can be called up from the data file and checked. The low sorting rate of the

fluidic sorter is better matched to the cell deposition process. This results in lower sample loss and allows smaller sample volumes with fewer cells lost. The Wolf is specified as working with down to 100 microliter volumes. This capability is particularly useful for the analysis of clinical biopsy samples that are often available only with a limited amount of sample volume and cells.

Fluidic cell sorters operate at very low pressures and low throughput rates. The sorted cells do not experience the near explosive decompression experienced when cells exit the sorting tip of a droplet sorter. This improves cell viability and preserves cell function. The Wolf cell sorter can be used for bulk sorting of small numbers (<<1e06) of cells.

The Wolf cell sorter is located in the Hanes building, 4<sup>th</sup> Floor, Room 4063.

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Dr. John Whitesides ([jfwhites@wakehealth.edu](mailto:jfwhites@wakehealth.edu)), Comprehensive Cancer Center

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

The Q Exactive HF coupled with Thermo Scientific Vanquish UHPLC system is a high-resolution, accurate-mass spectrometry system which enables measurement of numerous metabolites in biological specimen in high-throughput manner. The instrument supports various applications target metabolites, phospholipids, and other bioactive compounds. This system is used for:

- Broad metabolomics analysis
- Untargeted lipidomics analysis
- Cardiolipins analysis
- Redox molecules measurement (i.e. NADPH)
- Location: NRC 220

Contact persons: Dr. Cristina Furdui, Core Director, Proteomics and Metabolomics Shared Resource, ([cfurdui@wakehealth.edu](mailto:cfurdui@wakehealth.edu)) (336) 716-2697  
Dr. Jingyun Lee, Senior Research Scientist, Proteomics and Metabolomics Shared Resource, ([jilee@wakehealth.edu](mailto:jilee@wakehealth.edu)) (336) 713-4194

### **Thermo Scientific Orbitrap Velos Pro Mass Spectrometer**

The Orbitrap Velos Pro is combined with Thermo Scientific Dionex Ultimate-3000 nano-UHPLC system, which provides high mass resolution (< 10ppm) with high mass accuracy provides in depth analysis of complex biological samples. The instrument supports various applications cover the identification and quantification of proteins and peptides. This system belongs to Dr. Furdui's lab and is shared with PMSR for:

- Global protein identification
- Targeted proteomics analysis by parallel reaction monitoring (PRM)
- Redox proteomics (i.e. total reversible oxidation analysis)
- Identification of various post-translational modifications of proteins (e.g. phosphorylation)
- Relative & absolute quantitative proteomics (e.g. SILAC, TMT, AQUA)
- Protein molecular weight determination
- Location: NRC 220

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Dr. Jingyun Lee, Senior Research Scientist, Proteomics and Metabolomics Shared Resource, ([jilee@wakehealth.edu](mailto:jilee@wakehealth.edu)) (336) 713-4194



### **Shimadzu LCMS-8050 Triple Quadrupole Mass Spectrometer**

The LCMS-8050 is equipped with Shimadzu Prominence UHPLC system and it is characterized by high sensitivity, rapid scan rate, and fast polarity switching allows for quantitative MRM (multiple reaction monitoring) analysis of a variety of metabolites simultaneously, in both the positive and negative modes. This system is used for:

- Relative quantitative analysis of metabolites associated with primary metabolism
- Quantitative analysis of 180 metabolites including acylcarnitines, amino acids, monosaccharides, sphingolipids, glycerophospholipids, 17 steroid hormones, and 19 bile acids using Biocrates p180 kit
- Lipids and lipid mediators (e.g. oxylipins)
- SRM analysis of small molecules and pharmaceuticals
- Location: Hanes 2009

Contact persons: Dr. Cristina Furdui, Core Director, Proteomics and Metabolomics Shared Resource, ([cfurdui@wakehealth.edu](mailto:cfurdui@wakehealth.edu)) (336) 716-2697  
Mr. Anderson Cox, Research Lab Technician IV, Proteomics and Metabolomics Shared Resource, ([aocox@wakehealth.edu](mailto:aocox@wakehealth.edu)) (336) 716-2345

### **Thermo Scientific TSQ Quantum Discovery Max Triple Quadrupole Mass Spectrometer**

The Discovery Max is equipped with an Agilent HPLC system. The instrumentation conducts electrospray mass spectrometry in the positive and negative ion modes and performs collision-induced dissociation for structure analysis. This system is used for:

- Selected reaction monitoring (SRM) analysis of small molecules and pharmaceuticals
- Common neutral loss, precursor and parent ion analysis to identify common features for structure analysis
- Analysis of mass with unit mass resolution
- Direct infusion mass spectrometry for pattern analysis
- Location: Hanes 2007

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

The XLS is equipped with a Trace gas chromatograph and Triplus cooled autosampler. The instrumentation conducts electron impact and chemical ionization mass spectrometry in the positive and negative ion modes and will perform collision-induced dissociation for structure analysis. The Facility performs lipid and metabolite isolation as required for analysis. This system is used for:

- SRM analysis of volatile lipids (e.g. FAME) and other metabolites
- Common neutral loss, precursor and parent ion analysis to identify common features for structure analysis
- Analysis of mass with unit mass resolution
- Location: Hanes 2009

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### **Flow Cytometry Cell Analyzers**

## **Becton-Dickinson FACS Fortessa X-20**

The BD FACS Fortessa X-20 is a state-of-the-art cell analyzer that tremendously increases the cell analysis capabilities at Wake Forest School of Medicine (WFSM). The Fortessa X-20 has 20 parameters (FSC, SSC and 18 Fluorescence) and 5-lasers (405 nm, 488 nm, 640 nm, 561nm, and 355 nm).

The first three lasers, 405 nm, 488 nm and 640 nm are the same as found in all our older BD analyzers and cell sorter. The last two lasers, 561 nm and 355 nm lasers add new capabilities to provide services that are new to flow cytometry assays in the WFUBH CCC Flow Cytometry Shared Resource.

The 561nm laser was included because it can more efficiently excite the fluorescent proteins with red emissions e.g., DsRed, mCherry, etc. The 561nm laser will capture 100% more of the signals from cells labelled with red fluorescent proteins than the BD FACS Aria did with the 488 nm laser.

The 355nm laser was included to (a) take advantage of the new Brilliant UV dyes, (b) provide another way to detect stem cells by the side-population method, and (c) easily detect DNA content without interference with staining of RNA. We have explored using side-population detection with Dye Cycle Violet with some success with the violet 405nm laser on the BD FACSAria and FACS Canto II. The side-population method will provide some additional discrimination of the stem cells compared to antibody labeling alone. The high power 355nm laser with Hoechst 33258 or 33342 will provide crisper results than the 405nm and Dye Cycle Violet combination. The 355nm will also efficiently excite the DNA-specific dye DAPI to provide high-quality DNA histograms without the need to eliminate RNA, as with the frequently used Propidium Iodide dye. The UV laser can also be used to monitor calcium uptake during cell activation.

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Dr. John Whitesides ([jfwhites@wakehealth.edu](mailto:jfwhites@wakehealth.edu)), Comprehensive Cancer Center

## **Becton-Dickinson FACS Canto II**

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. The flow cytometer analyzer is located in the Hanes building, 4<sup>th</sup> Floor, Room 4063.

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## **The Becton-Dickinson Accuri C6**

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

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Dr. James Wood ([jawood@wakehealth.edu](mailto:jawood@wakehealth.edu)), Comprehensive Cancer Center

## **Becton-Dickinson FACS Calibur**

(Not maintained under service contract, availability is not guaranteed)

The BD FACS Calibur is an analyzer with two lasers (488nm and 635nm) and able to detect forward scatter, side scatter and four fluorescence parameters. The Flow cytometer analyzer is located in Biotech Place, room 2E-001.

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### **Analysis Computers and Flow Cytometry Analysis Software**

The flow cytometer analyzers and cell sorters have flow cytometry analysis software on their respective workstations for acquisition and initial analysis. Additionally, there is also a separate analysis computer at the Biotech Place for offline analysis of flow cytometer data with CellQuest and FlowJo analysis software. The shared resource through the Cancer Biology Department has a site license of FCS Express that labs can purchase licenses to use. Also, in the Hanes 4th Floor Room 4063, is a computer with FCS Express analysis software as well as DNA analysis programs, ModFit and Multicycle, installed.

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Dr. John Whitesides ([jfwhites@wakehealth.edu](mailto:jfwhites@wakehealth.edu)) Comprehensive Cancer Center

### **Leica Autostainer XL**

- Incorporates microprocessor control and user programmability to provide versatility with up to 15 programs available.
- Used for automated Hematoxylin 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](mailto: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](mailto: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

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### **Leica RM2145 and RM2255 Rotary Microtomes**

- Allows slicing of thin or thick (up to 100 microns) paraffin embedded samples

Contact Person: Cynthia Zimmerman ([czimmerm@wakehealth.edu](mailto: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](mailto: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

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### **Leica ASP300S 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](mailto:czimmerm@wakehealth.edu)), WFIRM Histology Core Technician 336-713-7284.

### **Cytopro 7620 Cyto centrifuge**

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

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

### **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: Emily Whitaker ([ee Whitak@wakehealth.edu](mailto:ee Whitak@wakehealth.edu)), WFIRM Surgery Core Technician 336-713-8465.

### **Century SV120 and Reliance LV250 Sterilizers**

- Steam autoclaves. Cycle times approximately 1 hour in duration

Contact Person: Emily Whitaker ([ee Whitak@wakehealth.edu](mailto:ee Whitak@wakehealth.edu)), WFIRM Surgery Core Technician 336-713-8465.

### **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- Hamamatsu 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

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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

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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- Hamamatsu 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

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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.

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### **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

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### **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)

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