

CORE FACILITIES at UNC

Summer I 2017

Research Cores Newsletter

FROM THE OFFICE OF RESEARCH TECHNOLOGIES

Our UNC Core Facilities continue to provide outstanding resources which support the research community here at UNC, as well as regionally, nationally and internationally.

Funding assistance from the Core Facilities Advocacy Committee (CFAC) enables core facilities to upgrade and maintain their equipment and technologies.

Another use of funding from the CFAC is the development of new services and methodologies, which can then be made available to all investigators.

Last fiscal year several cores received method development awards:

The **MH Proteomics Center** expanded their sample preparation capabilities to include peptide fractionation prior to LC/MS/MS analysis. This technique is commonly used to increase the depth and coverage of the proteome, which is especially helpful when studying low-level proteins that might not get sampled during routine nanoLC/MS/MS analyses.

The MH Proteomics core has also added targeted quantitative proteomics analysis to their repertoire. Targeted proteomics is used for accurate, absolute quantification of selected targeted peptides/proteins and is useful for researchers who have a set of specific proteins they want to quantify across multiple samples.

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- Animal Metabolism Phenotyping
- Animal Models Core
- Animal Histopathology & Lab Medicine
- Animal Studies Core Facility
- Animal Surgery Core Lab
- Biobehavioral Laboratory
- Biomarker Mass Spectrometry
- Biomolecular NMR Lab
- Biospecimen Processing Facility
- BRIC Human Imaging
- BRIC Small Animal Imaging
- Center for Bioinformatics
- CF Tissue Procurement & Cell Culture
- CFAR Virology Immunology & Microbiology
- CGIBD Advanced Analytics
- CGIBD Histology
- CH Analytical & Nanofabrication Lab
- Chemistry Mass Spectrometry
- Confocal and Multiphoton Imaging
- Cytokine Analysis Facility
- Flow Cytometry Core Facility
- Functional Genomics Core
- High Throughput Genomic Sequencing
- High Throughput Peptide Library
- Histology Research Core Facility
- Hooker Imaging Core
- Human Pluripotent Stem Cell Facility
- Lenti-shRNA Core Facility
- Macromolecular Crystallography
- Macromolecular Interactions Facility
- Mammalian Genotyping Core
- MH Proteomics Center
- Microscopy Services Laboratory
- Mouse Behavioral Phenotyping
- Nanomedicines Characterization
- Organ Injury Core Facility
- RL Juliano Structural Bioinformatics
- Systems Genetics Core
- Tissue Procurement Facility
- Translational Pathology Lab.
- UNC CFAR Clinical Pharmacology
- UNC Metabolomics Laboratory
- UNC Microbiome Core Facility
- UNC RNAi Screening Facility
- Vector Core
- Vironomics Core
- Zebrafish Aquaculture Core



The Clinical and Translational Science Awards (CTSA) is a registered trademark of DHHS

Office of Research Technologies

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For more information on UNC Cores,
visit: www.med.unc.edu/corefacilities



Equipment Grant Awards

The Department of Chemistry Mass Spectrometry Lab was awarded funding from the National Institute of General Medical Sciences (NIGMS) for a Thermo Exactive GC mass spectrometer.

The North Carolina Biotechnology Center (NCBC) awarded grants to two UNC core facilities for new equipment: The Macromolecular X-Ray Crystallography Core will be installing a new Jansi Crystal plate imaging and storage system to replace their current instrument. The new imager comes with added capabilities such as UV imaging of crystallization drops, and will provide higher quality brightfield microscope images. The Flow Cytometry Core Facility will add a 4-laser Attune NxT flow cytometry analyzer.

Core Customer User Surveys

Core Customer User Surveys are important tools for evaluating core services. If you receive core satisfaction surveys, please take the time to complete these brief questionnaires. Your feedback will assist the core facility as well as the Office of Research Technologies & CFAC in improving and strengthening core services available for your research program. *Thank you!*

MASS SPECTROMETRY RESOURCES AT UNC

Mass Spectrometry (MS) is a powerful analytical technique used to measure the mass of molecules. Data generated by MS enhances our understanding of the physical, chemical, or biological properties of compounds. UNC has a wealth of MS resources for you to utilize in your research project. With three core facilities on campus, you will find technical expertise and services ranging from quantitative small molecule analysis and elemental composition determination to large molecule mass determination and proteomic profiling.

The Biomarker Mass Spectrometry Core in the Gillings School of Global Public Health has expertise in qualitative and quantitative analysis of a variety of low molecular weight biomarkers of exposure and effect. Examples of some of the analytes measured include environmental toxicants, DNA adducts, short chain fatty acids, metabolites, amino acids and short peptides, and metals. The core works with diverse sample matrices including drinking water, plant extracts, in vitro cell lysates, biological fluids and tissue extracts. The facility is open to all UNC researchers, and offers full service analysis, new method development, and training for independent operation of our instrumentation.

The Michael Hooker Proteomics Facility in the School of Medicine offers mass spectrometry-based proteomics services to identify and quantify proteins on systems-wide or targeted level. From this, a protein's post-translational modifications, protein-protein interactions and global changes in the proteome or phosphoproteome can be measured. The facility offers an array of sample preparation and instrumentation services, as well as method development and in-depth consultation. Facility staff can assist with statistical and bioinformatics analysis so that researchers can get the most out of their data.

The Department of Chemistry Mass Spectrometry Laboratory specializes in small molecule MS analysis. Their suite of instrumentation is capable of accurate mass determination for both volatile and non-volatile speciation. The lab also provides high quality inline liquid chromatographic separations coupled with and without photodiode array detection (PDA). The lab is well versed in small molecule characterization, fragmentation, and quantitation. Client's research span a wide range of applications from plant phytohormones to photoredox catalyzed reaction mechanisms to drug interaction studies. Services can be tailored to meet the most demanding analytical experiments. The lab offers individualized user training for undergraduate, graduate, & post-doctoral scholars.

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The **Human Pluripotent Stem Cell Core** will be offering gene editing services using the CRISPR/Cas9 system, which has emerged as a powerful tool for functional genomics studies. This system is very efficient in creating gene knockouts and gene knock-ins in stem cells as well as other mammalian cell types.

The **Mouse Behavioral Phenotyping Core** will be adding new methods for high-throughput behavior analysis using 3-dimensional imaging and machine-learning approaches. The focus will be on tests for complex behaviors relevant to human clinical disorders, such as abnormal repetitive stereotypies and gait analysis (a useful early indicator of neurodegeneration). Once these tests are running smoothly, the more challenging social interaction procedures and ultrasonic vocalization classification systems will be developed.

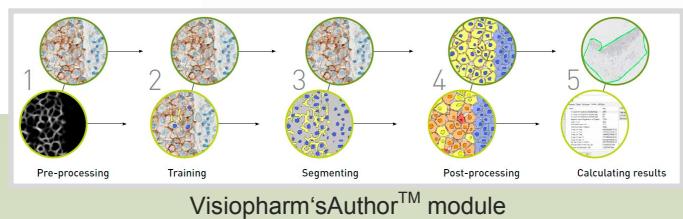
If you are interested in seeing a new technique or service offered in a core, please discuss this with the core director and if feasible, they can apply for a method development grant.

Cite our Cores

If you use UNC core facilities and data generated in our cores is used in a publication, please acknowledge the core's contributions towards the research.

For more information on guidelines for citing a core facility in a publication, please refer to the ABRF guidelines on citations, which can be accessed from the Core Facilities website.

Core instrumentation acquired through S10 grants must also be referenced in all resulting publications. Each core can provide you with their appropriate citation.



New Instrumentation and Technology

The **Translational Pathology Lab** acquired Visiopharm's image analysis software, an ideal tool for advanced virtual multiplexing and co-localization studies. The core will be able to perform a perfect alignment of any number of slides (brightfield and fluorescence) with any type of stains, and to investigate relationships between different structures and biomarkers. The software will be very beneficial for cancer researchers studying the tumor microenvironment, including density and spatial localization of the different immune cell populations

The **Biomedical Research Imaging Center (BRIC), Human Imaging component**, added psychophysiological monitoring equipment, which allows investigators to assess peripheral physiological activity simultaneous with central nervous system activation measured with functional MRI. Users can quantify human participants' changes in blood pressure, heart rate, skin conductance, and other physiological parameters while they complete tasks in the MRI scanner. These measures serve as indicators of autonomic nervous system activation, and, more generally, reflect levels of stress, arousal, and attention that are critical to the research of much of the user base of the BRIC. Data generated by this equipment is also crucial for the understanding of the resting-state functional connectivity of the brain, one of the most exciting and cutting-edge areas of research in functional brain imaging that is currently not supported at UNC.

The **Macromolecular Interactions Facility (MacInFac)**, purchased a Nanotemper Micro Scale Thermophoresis (MST)-based Monolith NT-115, a powerful new technology for quantifying biomolecular interactions. By precisely measuring the fluorescence signal in a microscopic temperature gradient induced by an infrared laser, it measures the Kd values in the range of 1 nM – 1 mM.

NEW INVOICING SOFTWARE FOR CORES

Update on progress of iLabs invoicing software

Implementation

In November 2016, the University contracted with Agilent Technologies to provide their web based invoicing software package, iLab Operations Software, to 30 UNC core facilities. Included in the iLab license is a feature rich billing and invoicing program that will be fully integrated with UNC's PeopleSoft for seamless tracking and billing.

iLabs management system will decrease the amount of administrative burden on the core facility staff, allowing more time to devote to providing core services to users.

Features include a scheduling component with the ability to set access levels and track actual usage vs. scheduled usage, dynamic reporting capabilities for better management within the core, and automated billing from orders.

The first wave of cores implementation is in process this summer, with the expected go live date the end of August. We anticipate that by summer 2019 all thirty cores will be fully implemented and ordering and invoicing will be done through the iLabs portal located on each core's website.

Advantages for investigators:

- * Consistent, easy to use interface for the ordering process
- * ONYEN log-in
- * One-time profile set-up applies across all cores using the system
- * ChartField Strings (CFS) pre-loaded from PeopleSoft reduces entry errors
- * Ability to monitor the status of order requests and reservations in the system at any time
- * iLabs links to funding sources.: the PI of a grant will be able to control access to each funding source

Watch for notice on trainings on using the iLabs system this fall, and visit the core facilities website for updates on the iLabs implementation and training information.

WELCOME

Please welcome Michelle Itano, PhD, new Director of the Neuroscience Center's **Confocal and Multiphoton Imaging Facility**.

Itano completed a Ph.D. here at UNC in Cell Biology and Physiology under the supervision of Dr. Ken Jacobson, and conducted postdoctoral research at The Rockefeller University in the Laboratory of Cellular Biophysics.

Her research has been dedicated to the development and application of cutting-edge microscopy techniques including image analysis, confocal microscopy, total internal reflection fluorescence microscopy, super-resolution microscopy, particle tracking, and correlated scanning electron-fluorescence microscopy.

Dr. Itano's goal as director is to continue the rich history of the imaging facility's work to advance the research of its users with state-of-the-art imaging support and expertise.



"I'm excited to use my experience to help users customize imaging techniques and analyses to their specific research needs."

The Neuroscience Center Confocal and Multiphoton Imaging Facility is located in the Neuroscience Research Building, rooms 8104 and 8122.

<http://www.med.unc.edu/neuroscience/core-facilities/confocal-and-multiphoton-imaging>