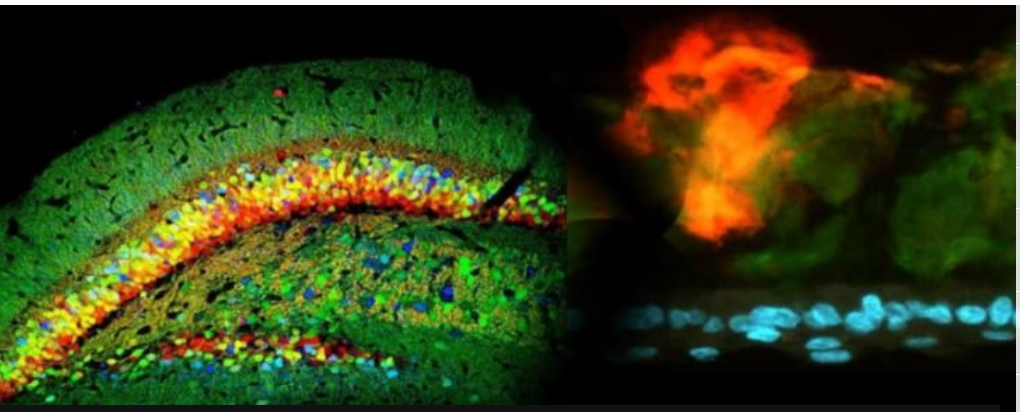

CORE FACILITIES at UNC *Summer | 2016*

Research Cores Newsletter

FROM THE OFFICE OF RESEARCH TECHNOLOGIES

As use of technologies expand and decline, it is critical that we maintain our core facilities at a level where they can keep current with emerging methodologies, develop and implement new services, retain qualified well trained staff, and provide the latest instrumentation so they are able to play an integral role in the research enterprise at UNC.

Core Directors must wear many hats to run a core facility, but above all they are scientists and partners in research. Although many of the cores operate as recharge service centers and charge for services according to federal costing guidelines, rates are only allowed to include certain direct expenses, so Institutional support is a major component of keeping cores operating at high performance.

Funding from the Core Facilities Advocacy Committee (CFAC), SOM Office of Research, and Departments and Centers, help keep our cores on track. CFAC awards to the biomedical cores totaled more than one million dollars in fiscal year 2016, supporting equipment purchases including matching funds for equipment grants, emergency repairs, method development, and other operating expenses.

Our core facilities continue to evolve to meet the changing needs of the UNC research community. Read about some of the developments taking place in the core facilities at UNC.

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Office of Research Technologies

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

Animal Clinical Chemistry
Animal Histopathology
Animal Metabolism Phenotyping
Animal Models Core
Animal Studies Core Facility
Animal Surgery Core Lab
Antibody Core Facility
Atomic Absorption Spectroscopy
Biobehavioral Laboratory
Biomarker Mass Spectrometry
Biomolecular NMR Lab
Biospecimen Processing Facility
BRIC Human Imaging
BRIC Small Animal Imaging
Center for BioInformatics
CFAR Virology Immunology & Microbiology
CGIBD Advanced Analytics
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 Arrays
Histology Research Core Facility
Hooker Imaging Core
Human Pluripotent Stem Cell Fac.
LCCC Genomics Core
Lenti-shRNA Core Facility
Macromolecular Crystallography
Macromolecular Interactions Fac.
Mammalian Genotyping Core
MH Proteomics Center
Microscopy Services Laboratory
Mouse Behavioral Phenotyping
Nanomedicines Characterization
RL Juliano Structural BioInformatics
Systems Genetics Core
Tissue Culture Facility
Tissue Procurement Facility
Translational Pathology Lab.
UNC CFAR Clinical Pharmacology
UNC Metabolomics Laboratory
UNC Microbiome Core Facility
UNC RNAi Screening Fac
Vector Core
Vironomics Core
Zebrafish Aquaculture Core

"Typical measures of world class stature focus on outputs: publications, patents, citations , and other bibliometrics. ... But there is nearly universal agreement that research excellence can be measured not only by outputs but also by inputs, such as the caliber of scientific talent, the quality of the research facilities, a balanced national Investment in research among fields and disciplines, the working environments, and how research is planned and managed."

Excerpt from Furthering America's Research Enterprise, Committee on Assessing the Value of Research in Advancing National Goals
Richard F. Celeste, Ann Griswold, Miron L. Straf, *Editors,* November 2014

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!

CORE FACILITY UPDATES

This fall, the The Animal Clinical Chemistry and Gene Expression Lab will be combining with the Animal Histopathology Lab under the new core name of ***Animal Pathology and Laboratory Medicine Facility.***

Hyung-Suk Kim, PhD, long time Director of the **Animal Clinical Chemistry and Gene Expression Lab** has announced his upcoming retirement this fall. The animal laboratory medicine services currently offered through his facility will be transferred to the **Animal Histopathology Core** and the clinical laboratory testing equipment will be updated.

The unified core will be renamed the **Animal Pathology and Laboratory Medicine Core** to reflect the expanded services. The newly combined core will provide investigators with seamless services for animal pathology needs, from tissues to biologic fluids.

Stephanie Montgomery, PhD, DVM, Faculty Director for the Animal Histopathology Core, will be overseeing the Animal Pathology and Laboratory Medicine Core. Dr. Montgomery says, "A comprehensive animal pathology core to coordinate pathology support for UNC investigators utilizing animal models will assist and promote multidisciplinary studies". The combined core will offer pathology consultation, frozen and paraffin slide preparation, routine histologic and special tissue stains, immunohistochemical stains, Luminex assays, hematology, urinalysis, cytology, blood smears, and clinical chemistry.

IntegratedGENOMICSCores

Many of the DNA sequencing and microarray services are being consolidated under the umbrella of the Integrated Genomics Cores in order to provide more streamlined operations.

The **High Throughput Sequencing Facility (HTSF)** offers Illumina MiSeq, HiSeq2500 Rapid Run and High Output and the new HiSEq4000 High Output platforms. In addition, the PacBio RS system is suitable for obtaining long reads and the Ion Proton system for very rapid sequence turn around.

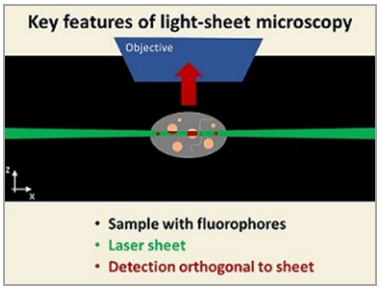
The Lineberger Genomics Core has merged its functions into the HTSF including support for Agilent microarrays and custom library preparation. The **Mammalian Genotyping Core** supports Illumina microarrays for genotyping and qPCR while the **Functional Genomics Core** provides Affymetrix plate based expression and genotyping microarray services.

continued on page 4 . . .

EMERGING TECHNOLOGY: LIGHT SHEET MICROSCOPY

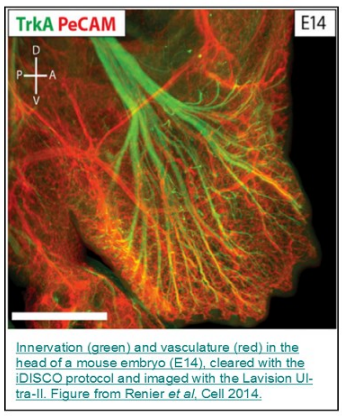
The Microscopy Services Lab will soon be offering light sheet imaging, thanks to an NCBC grant awarded in April 2016, coupled with matching funds from CFAC and the Dept. of Pathology and Lab Medicine

The MSL will be installing a LaVision Ultra II Light Sheet Microscope, an ideal platform to address questions at the cellular scale (microns) in large samples (up to millimeters in diameter). This microscope will be a valuable tool for research in neuroscience, development, vascular biology, cancer biology, and other fields. Researchers have used this system to study embryo development, map brain activity, trace neural connections, describe three-dimensional vascular networks and follow immune cell infiltration into diverse organs, among many other applications.



The principle behind the microscope is simple: samples with fluorescent tags are illuminated with thin sheets of light, and the resulting fluorescence is collected with a camera placed orthogonal to the illumination plane. This allows extremely fast three-dimensional imaging of large samples, particularly when compared to confocal or multiphoton microscopes. A sample as large as an adult mouse brain can be fully scanned in three dimensions in less than ten minutes, which is orders of magnitude faster than the time required on a laser scanning confocal or multiphoton microscope.

A key requirement for success when using large samples is rendering them transparent. Fortunately, there has been a huge push to develop protocols for clearing fixed tissue in the last few years. The Lavision Ultra II is compatible with all of these protocols, including those based on organic solvents which would severely corrode typical microscope objectives.



Innervation (green) and vasculature (red) in the head of a mouse embryo (E14), cleared with the iDISCO protocol and imaged with the Lavision Ultra-II. Figure from Renier *et al.* Cell 2014.

The system configuration is such that up to five fluorescence channels can be acquired sequentially, and all typical fluorophores compatible with the most popular clearing methods can be used.

If you would like to discuss further how this technology could catalyze your research, please contact Pablo Ariel, MSL Director (pablo_ariel@med.unc.edu).

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 read the ABRF guidelines on citations on the Core Facilities website.

Core instrumentation acquired through S10 grants must also be referenced in all resulting publications .

The core can provide you with the appropriate citation.

Congratulations

Laura Herring, PhD, is moving into the directorship for the Michael Hooker Proteomics Center.

Dr. Herring has been managing the facility for the past year and is now transitioning to the permanent director position within the new HR Core Director Track.

Continued form page 2 . . .

Sanger sequencing services at the Genome Analysis Facility have been discontinued due to declining usage and the availability of commercially offered options, but look for its knowledgeable and friendly staff members in their new positions in the HTSF.

A new user interface system is in the final stages of development and testing. When fully implemented, the new TracSeq system will further streamline operations while making the sample workflow more transparent for investigators. A customer support person is now in place and available to answer any questions about projects in process.

The goal of all these changes "under the hood" in the genomics core facilities is to improve overall operations and the processing of samples quickly, efficiently and transparently.

Continual testing and evaluation of new platforms and protocols will ensure we have the latest technology in place to meet the rapidly evolving needs of UNC researchers.

Watch for seminars this fall on new genomics technologies, and please contact the core with techniques and protocols you are interested in learning more about.

NEW INSTRUMENTATION AND SERVICES

The **Hooker Imaging Core** (HIC) will be installing an Olympus VivaView FL microscope, previously located in the Olympus Center, but now available for all users through the HIC.

The VivaView FL microscope is a long-term live-cell widefield microscope housed inside of a modified tissue culture incubator. It is capable of both transmitted (DIC) and fluorescent time-lapse imaging of live cells over an extended period of time (up to 5 days). It uses a high NA 20x lens and has a unique rotary stage that houses 8 x 35mm dishes in order to monitor parallel treatments (8) in the same experiment. It also can record multiple positions within those dishes to increase data throughput. These features make the VivaView particularly useful for long term live cell imaging of scratch wounding and other assays.

The **Michael Hooker Proteomics Center** has expanded their Phosphoproteomic capabilities to include large-scale global (whole cell) analysis.

Mass spectrometry-based phosphoproteomics has greatly advanced; it is now possible to identify and quantify thousands of phosphorylation events in one sample. Phosphorylation is an important post-translational modification that often times regulates the activity of a protein.

Dr. Herring, Director of the Proteomics Center, has extensive experience in this field and has optimized a global phosphoproteomic workflow here at UNC. The Proteomics Center also has the ability to map phosphorylation sites on purified proteins.

The **Zebrafish Aquaculture Core** acquired a complete swim tunnel system for use in assessing total physiological performance of juvenile and adult zebrafish.

Zebrafish are an important model for understanding the molecular and genetic basis of cardiovascular, muscle and neuronal development and have been increasingly used to examine these adult phenotypes. Increasing understanding could be important for developing therapeutics for congenital and acquired diseases.