CORE DAY 2024



Emory Integrated Core Facilities

INNOVATION IS AT OUR CORE

Emory University Convocation Hall

Thursday, November 21st, 2024

9 AM – 5 PM



Innovation is at our Core

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Core Day Agenda

Time	Activity
9:00 AM	Arrival and Check-in with Coffee & Pastries
9:20 AM	Dr. Cassandra Quave
	Assistant Dean of Research Cores, Emory SOM
	Introduction to Core Day
9:30 AM	Dr. David Stephens
	Vice President for Research, Woodruff Health Sciences Center
	Welcoming Remarks
9:40 AM	Exhibit Hall Opens
9:45 AM	Laura Fox-Goharioon
	Core Director, Integrated Cellular Imaging Core
	The Integrated Cellular Imaging Core: Bridging Expertise and Technology for
	Advanced Imaging in Research
10:00 AM	Dr. Anton Bryksin
	Director, Molecular Evolution Core Laboratory, Georgia Institute of
	Technology
	Synergizing Strengths: The Power of Partnership in Core Facility Services
10:15 AM	Coffee Break
10:45 AM	Dr. Hari Trivedi
	Al Image Extraction Core (Al ₂ EC)
	Large Scale Radiology Dataset Extraction and Curation for AI: Experiences in
	Breast Imaging
11:00 AM	Dr. Tim Denning
	President of the Georgia Research Alliance
	The Case for Alliance
11:15 AM	Lunch Break
12:15 PM	Dr. Jeremy Boss
	Interim Associate Dean for Research Cores, Emory SOM
	State of the Cores
12:30 PM	Dr. Adriana Harbuzariu
	Core Director, Emory Stem Cell and Organoids Core (ESCOC)
	Generation and application of gene edited cell lines in iPSC
12:45 PM	Dr. Deborah Mook
	Executive Director. Emory Division of Animal Research
	Division of Animal Resources
1:00 PM	Dr. Lyra Griffiths
	Core Director, Emory Integrated Genomics Core (EIGC)
	Genomics Services at EIGC
1:15 PM	Dr. Ricardo Guerrero-Ferreira

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	Core Director, Robert P. Apkarian Integrated Electron Microscopy Core
	(IEMC)
	Electron Microscopy Applications at the IEMC
1:30 PM	Coffee Break
1:45 PM	Jeff Carter
	Client Relationship Manager, Stratocore
	Enhanced User Experience and Delivery of Core Services with Stratocore
	PPMS
2:00 PM	Dr. Rafael Medina
	Scientific Director, Emory High Containment Facility
	Establishing a state-of-the-art High Containment Facility at Emory University
2:15 PM	Dr. Rheinallt Jones
	Scientific Director, Emory Gnotobiotic Animal Core
	The Emory Gnotobiotic Animal Core
2:30 PM	Dr. Varughese Mulamoottil
	Research Professional, UGA Complex Carbohydrate Research Center
	Collaboration, Service and Trainings at the Complex Carbohydrate Research
	Center
2:45 PM	Dr. Nael McCarty
	Scientific Director, Emory Integrated Biorepository Core (EIBC)
	Introducing The Emory Integrated Biorepository Core!
3:00 PM	Group Photo
3:15 PM	Hors d'oeuvres & Poster Networking Event
4:30 PM	Dr. Sandra Wong
	Dean of Emory University School of Medicine
	Closing Remarks & Awards Ceremony

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Thanks to Our Sponsors!

The Emory Integrated Core Facilities' Core Day wouldn't be possible without the support of our sponsors! Take a moment to chat with our sponsors at their booths or poster. Participate in our meeting bingo card game to receive a raffle ticket for one of our ten raffle prizes!

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Oral Presentations

Learn more about the cutting-edge resources available to Georgia researchers through our research cores. Our featured speakers include members Emory leadership, GRA leadership, EICF Core Directors, and scientists from across the Georgia network! See the full schedule of talks on our agenda on pages 2-3 of the program.

Dr. Cassandra Quave - Introduction to Core Day

Assistant Dean of Research Cores, Emory University School of Medicine



Core Day 2024 showcases research resources available to researchers at Emory University and our institutional partners across the state of Georgia. In this short introduction, Dr. Quave will recognize our generous sponsors, orient Core Day participants to the program, and highlight activities and opportunities for networking throughout the event.

Cassandra Quave, Ph.D. is the Thomas J. Lawley, MD Professor of Dermatology, Associate Professor of Dermatology and Human Health, Herbarium Curator, and Assistant Dean of Research Cores at Emory University. She leads a research group focused on anti-infective drug discovery and teaches courses on medicinal plants, food, and health. Quave is a Guggenheim Fellow, Fellow of the National Academy of Inventors, and CNN Champion for Change. She authored the acclaimed memoir, The Plant Hunter, and hosts the podcast 'Foodie Pharmacology'. She holds seven patents, has over 100 scientific publications, and co-founded biotech startups PhytoTEK and Verdant Scientific. Her work has been featured in the New York Times Magazine, BBC Science Focus, PBS, NPR, and the National Geographic Channel. Quave writes the Substack newsletter 'Nature's Pharmacy' and contributes to The Conversation, The Wall Street Journal, and The Washington Post.

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Dr. David Stephens – Welcoming Remarks

Vice President for Research, Woodruff Health Sciences Center



Dr. Stephens will offer welcoming remarks for core day, elaborating on the critical role that our network of cores plays in supporting state of the art research at Emory University and our Georgia partner institutions.

David S. Stephens, MD, is the Stephen W. Schwarzmann Distinguished Professor of Medicine at Emory University. He also serves as the Vice President for Research in the Robert W. Woodruff Health Sciences Center and is Chair Emeritus of the Department of Medicine in the Emory School of Medicine. After receiving his MD degree from Wake Forest University School of Medicine, Dr. Stephens conducted research at Walter Reed Army Medical Center and the National Institutes of Health (NIH). He completed his clinical training in internal medicine and infectious diseases and a research fellowship in microbial pathogenesis (pathogenic Neisseria) at Vanderbilt University School of Medicine.

Dr. Stephens is also professor of microbiology and immunology in the School of Medicine and professor of epidemiology at Emory's Rollins School of Public Health. His laboratory is an international leader in efforts to define the molecular basis for the virulence of and vaccines to prevent Neisseria meningitidis and Streptococcus pneumoniae. He has contributed to more than 300 publications in infectious diseases, molecular pathogenesis, epidemiology, vaccinology and immunology. He is the principal investigator of the NIH (NIAID) Infectious Diseases Clinical Research Consortium (IDCRC) that encompasses the nation's long-standing Vaccine and Treatment Evaluation Units (VTEUs) engaged in COVID-19 vaccine and therapeutic trials.

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Laura Fox-Goharioon – The Integrated Cellular Imaging Core: Bridging Expertise and Technology for Advanced Imaging in Research

Core Director, Integrated Cellular Imaging Core



An introduction to the ICI Core, showcasing our dedicated team, state-of -the-art equipment and commitment to educating microscope users and engaging with the broader research community.

Laura joined Emory University in 1985 to work in Dr. Winfield Sale's lab in the Department of Cell Biology, where she spent 27 years researching the regulation of the molecular motor dynein. She is proficient in a wide array of lab techniques, including various light microscopy methods such as dark field, phase contrast, DIC, and fluorescence microscopy, as well as both SEM and TEM. Since the Integrated Cellular Imaging (ICI) Core's inception in 2012, Laura has played an integral part, starting as an imaging scientist supporting users at the Whitehead location and advancing to Core Director in 2022.

Dr. Anton Bryksin – Synergizing Strengths: The Power of Partnership in Core Facility Services



The Molecular Evolution Core Laboratory at Georgia Tech, part of the Petit Institute for Bioengineering and Bioscience, has transformed dramatically since the COVID-19 pandemic, shifting from emergency response to sustained innovation. Initially adapted to provide critical clinical testing services, the lab has since built strong partnerships with Georgia Tech's Stamps Health Center, Office of Sustainability, Office of Emergency Management, Children's Healthcare of Atlanta, and the Emory Integrated Genomics Core, forming an integrated model of core services. These collaborations have fostered impactful initiatives, including the Biotechnology Skills Development Program, which prepares students and professionals with advanced skills in biotechnology and sustainability, and the TipCycle program, which advances sustainable practices by reusing single-use plastics in laboratory settings. Our Clinical Services program now applies molecular diagnostics in an attempt to solve saliva-based strep testing, in partnership with CHOA. Our Wastewater Surveillance program, initially focused

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on COVID-19, has expanded to monitor multiple pathogens, providing early health risk indicators for proactive campus health strategies. Collectively, these programs highlight the transformative power of partnership in the advancement of core facility services.

Anton Bryksin, PhD, earned his MS in Biochemistry from Novosibirsk State University in Russia. He then pursued her academic journey at New York Medical College and the Institute of Chemical Biology and Fundamental Medicine, where he obtained his PhD in Biochemistry. Following his doctoral studies, he pursued postdoctoral training in Evolutionary Biology in the Department of Biochemistry at Emory University. Dr. Bryksin then joined Bluebird Bio as a Research Scientist, where he contributed to pioneering genetic solutions for rare disorders.

Currently, Dr. Bryksin is a Regent's Researcher at the Petit Institute for Bioengineering and Bioscience at the Georgia Institute of Technology in Atlanta, GA, where he directs the Molecular Evolution Core Facility Laboratory. In this role, he oversees high-throughput sequencing, genomic analysis, directed evolution, and the clinical divisions of the laboratory. His research focuses on directed evolution and clinical applications, and he is actively involved in education through the Biotechnology Skills Development Program for undergraduate students. Dr. Bryksin's dedication to research, innovation, and teaching has been recognized through numerous awards.

Dr. Hari Trivedi – Large Scale Radiology Dataset Extraction and Curation for AI: Experiences in Breast Imaging



Curation and validation of large-scale datasets are critical for advancing AI models in healthcare. The Imaging Extraction and De-Identification Core at Emory supports these efforts by providing access to vast radiology datasets, enabling researchers to validate AI models effectively. For breast cancer, screening mammography datasets are essential, as they help test AI models across diverse populations and imaging modalities including mammography, digital breast tomosynthesis, ultrasound, and MRI. By leveraging such large datasets, researchers can assess AI models under varied conditions, identify confounders, and conduct error analyses, such as examining cases involving small masses or calcifications. This process ensures that AI models are not only accurate but also generalizable across different patient demographics and clinical settings.

Dr. Trivedi is an Associate Professor in the Departments of Radiology, Biomedical Informatics, and Emergency Medicine and also serves as Co-director of the Healthcare Innovation and Translational Informatics lab and the AI Image Extraction Core. His work focuses on large scale data extraction and de-identification to build and curate large datasets for training and validation of AI models. One such dataset, the Emory Breast Imaging Datsaet (EMBED) contains 3.5M images

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for 110,000 patients and has been downloaded at 300 institutions worldwide and used in validation of 5 FDA cleared breast AI models.

Dr. Tim Denning – The Case for Alliance



Dr. Denning will discuss and why GRA benefits universities and our state.

Tim Denning became GRA's fifth president and CEO in November 2023, joining the Alliance after serving as vice president of research and economic development at Georgia State University.

Dr. Jeremy Boss – State of the Cores



The Emory Integrated Cores have had a major impact on research success at Emory. Just how many people/labs use our cores, how many grants does it support...? I will discuss the impact of the cores on research at Emory using FY24 data collected.

Jeremy M. Boss, PhD, is Professor and Chair of the Department of Microbiology and Immunology at Emory University School of Medicine in Atlanta, Georgia. Dr. Boss is the Emory Chair in Basic Sciences Research and also serves as associate dean of basic research at Emory University School of Medicine. He is a member of the Cancer Immunology Research Program at Winship Cancer Institute. Dr. Boss received his PhD in Molecular Biology from the State University of New York in Albany, NY. He completed his postdoctoral training in Immunology at Harvard University in Cambridge, MA.

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Dr. Adriana Harbuzariu – Generation and application of gene edited cell lines in iPSC



Emory Stem Cell and Organoids Core (ESCOC) provides support for principal investigators at Emory University and beyond. Our services include: somatic cells reprogramming to induced pluripotent stem cells (iPSC), differentiation of iPSC to various cell types and generation of genetically modified iPSC lines. In this presentation, we will describe how CRIPSR-Cas9 system was used to generate gene edited iPSC lines in collaboration with Emory Integrated Genomics Core, how we characterized the newly developed cell lines and how we used these cells to model diseases, paving the path towards personalized medicine.

After receiving her MD degree from Romania, Adriana Harbuzariu continued her post-doctoral research at Mayo Clinic in Rochester, MN, University of Pittsburgh and Morehouse School of Medicine in Atlanta, GA. Before joining Emory Stem Cell and Organoids Core, she published a number of first author papers in the field of adult and stem cell research.

Dr. Deborah Mook – Division of Animal Resources



The Division of Animal Resources (DAR) provides wholesome housing, husbandry and veterinary care for a menagerie of 15 species of animals. The DAR additionally provides a variety of research support services, including clinical diagnostics, managed breeding, aquatics expertise, researcher training, large animal anesthesia and surgical support, rodent anesthesia suites, and veterinary consultation. This talk will provide information on those services for the research community.

Dr. Mook earned her veterinary degree from The University of Wisconsin-Madison before practicing small animal medicine in Chicago and laboratory animal medicine at Louisiana State University. In 2001, Mook came to Emory, where she's held positions as a clinical veterinarian and associate director of DAR, with a faculty appointment in Pathology and Laboratory Medicine. In 2024, Dr. Mook accepted the position of Executive Director of the DAR, and will lead the division through the coming years of research growth and advancement.

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Dr. Lyra Griffiths – Genomics Services at EIGC

Core Director, Emory Integrated Genomics Core



The Emory Integrated Genomics Core (EIGC) is supported by the School of Medicine and the Winship Cancer Institute. The central mission of the core is to provide a top-tier genomics resource that is widely available to the Emory research community. The EIGC is a full-service genomics core, helping investigators to plan genomics-based projects and utilizing cutting-edge genomics technologies in a research and CLIA setting. The EIGC works closely with the Emory Integrated Computational Core (EICC) in order to enhance quality data processing and analysis. We will highlight specific cutting-edge genomics technologies offered by EIGC.

Dr. Griffiths received her PhD from Emory University and spent 9 years doing research at St Jude Children's Research Hospital. Dr. Griffiths has served as the Core Director for EIGC since 2019. As Core Director, Dr. Griffiths provides help to investigators to plan genomics projects, identifies and implements new genomics technologies needed at Emory, and oversees the operations of EIGC.

Dr. Ricardo Guerrero-Ferreira – Electron Microscopy Applications at the IEMC



The Robert P. Apkarian Integrated Electron Microscopy Core (IEMC) at Emory University serves as a premier facility offering cutting-edge electron microscopy tools, expertise, and training. The IEMC delivers high-quality imaging and analysis to support a wide range of research endeavors, from small-scale studies to large, collaborative projects. With two locations on Emory's campus, the IEMC provides flexible access to conventional and advanced microscopy techniques. The Cherry L. Emerson Hall site specializes in transmission electron microscopy (TEM), scanning electron microscopy (SEM), cryo-TEM, and tomography, while the Biochemistry Connector site focuses on conventional TEM, cryo-TEM, and tomography. Investigators from any institution are welcome to utilize the facility's services and resources.

Before joining Emory as Core Director in 2019, Dr. Guerrero-Ferreira held a postdoctoral position at the Center for Cellular Imaging and Nano-Analytics (C-CINA) at the University of Basel, Switzerland. Previously, he worked as a Life Sciences Applications Engineer at ThermoFisher Scientific, where he trained investigators on high-end Transmission Electron Microscopes for single particle and tomography applications. He also completed postdoctoral research at the Laboratory of Structural Biology and Biophysics at EPFL in Lausanne, Switzerland, and in the

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Division of Pediatric Infectious Diseases at Emory University. He earned his PhD in Biology from New Mexico State University (USA).

Jeff Carter – Enhanced User Experience and Delivery of Core Services with Stratocore PPMS



Stratocore PPMS, used widely at academic institutions globally, allows researchers to conduct productive science. This will be a quick overview, along with highlighting the new Catalogue feature that will contribute to efficient resource management, enhance user experience, promote collaboration, and support the overall goals of the core facilities.

Jeff Carter is a client relationship manager at Stratocore, with a focus on pre-sales client consultation, post-sales client implementation, and application support for customers in North America.

Dr. Rafael Medina – Establishing a State-of-the-Art High Containment Facility at Emory



The Emory University School of Medicine is currently establishing a brand new state-of-the-art "Emory High Containment Facility (EHCF)" for conducting research with Risk Group 3 (RG3), with an anticipated start during Fall of 2025. The EHCF is located at the Heath Sciences Research Building II (HSRBII) at the School of Medicine and consists of a ~6,000 sqf. of space, which includes six in-vitro biosafety level 3 (BSL3), six in-vivo animal BSL3 (ABSL3) suites and five specialized procedure suites. The EHCF is a highly sophisticated and modern infrastructure, that will be equipped to perform: i) in vitro and in vivo research with RG3 viral and bacterial pathogens, ii) Ultracentrifugation and single cell molecular work, iii) Flow Cytometry and Sorting, iv) Immunofluorescence and Confocal Microscopy, and v) Histopathology. The EHC program will offer specialized expert support and adhere to high biosafety and biosecurity standards, providing investigators with a unique opportunity to conduct toptier biocontainment research and contribute to advancing knowledge in infectious diseases.

Dr. Rafael A. Medina, Ph.D., is Associate Professor in the Department of Pathology and Laboratory Medicine and part of the Emory Vaccine Center and serves as the Scientific Director of the BSL3

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facilities at Emory University School of Medicine. Dr. Medina has over 23 years of research experience on emerging and zoonotic viruses, including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), Influenza viruses and Hantavirus. He currently conducts basic and translational interdisciplinary research using systems biology approaches to understand the molecular basis of disease, resilience, pathogenesis and host responses induced by RNA viruses. Dr. Medina He is also Senior Virology Editor of the journal Microbiology Spectrum, part of the editorial board of the Journal of Virology and has served as an ad hoc reviewer for multiple scientific journals in the area and as a member of the review panel of multiple international research programs.

Dr. Rheinallt Jones – The Emory Gnotobiotic Animal Core



The Emory Gnotobiotic Animal Core provides germ-free C57BL/6 mice to Emory and Georgia investigators. The core facilitates the re-derivation of knockout or transgenic mice to germ-free status, and provides service for murine manipulations in hermetically sealed ISOcageP Bioexclusion cages to preserve microbiome diversity. Further services include colonization of germ-free mice with human patient microbiome, and IP injections into germ-free and gnotobiotic mice in an ABSL-2 vivarium.

Rheinallt Jones is an Associate Professor at the Division of Gastroenterology, Hepatology and Nutrition of the Department of Pediatrics, Emory University. His research focus is identifying the functional elements and molecular mechanisms that mediate the interactions between host cells and beneficial microbes, also known as probiotics. His current focus is identifying how microbiome-generated bioactive metabolites that permeate from the gut to every organ and system in the body impact host biology and pathology. He is also the founder and Director of the Emory Gnotobiotic Animal Core, where he uses germ-free animals in his studies into host cell and microbiome-associated phenotypes, where he colonizes germ-free mice to establish the causality of microbiome and determines if the phenotype observed in the human is transferred to the mouse via the microbiome.

Dr. Varughese Mulamoottil – Collaboration, Service and Trainings at the Complex Carbohydrate Research Center



Over the past three decades, the Analytical Services and Training at the Complex Carbohydrate Research Center (AST-CCRC) has significantly expanded its global collaborations with universities, federal agencies, and industries. Specializing in the detailed structural characterization of glycoconjugates, the CCRC's extensive expertise spans a wide range of analytical methodologies crucial for comprehensive glycobiology research. The CCRC's collaborative projects cover a broad array glycomics, of fields, including glycoproteomics, glycosaminoglycans (GAGs), GAG-derived products, polysaccharides, lipopolysaccharides (LPS), peptidoglycans (PGs), and glycolipids. AST-CCRC excels in developing new analytical techniques and refining existing methods to meet the specific needs of our users and also for our in-house research, advancing the field and providing customized solutions to complex research challenges.

The CCRC offers annual training courses focused on the structural characterization of glycans in glycoproteins, glycolipids, polysaccharides, and GAGs, as well as mass spectrometry and software analysis. This includes hands-on experience, complemented by faculty-led lectures to undergraduate and graduate students, postdoctoral research associates, and visiting scientists from the United States and around the world.

Dr. Mulamoottil earned his Ph.D. in Organic Chemistry from the Institute of Chemical Technology, University of Mumbai, India, in 2005. Following a brief tenure at Clariant Chemicals (R&PD), he joined Ewha Womans University in Seoul, South Korea, where he served as a postdoctoral fellow and later as a Research Professor, focusing on developing novel nucleoside templates for antiviral and anticancer applications. In 2014, Dr. Mulamoottil joined the Drug Discovery group at the University of Georgia (UGA) and subsequently moved to the Complex Carbohydrate Research Center as a Research Professional, where he has been instrumental in creating new tools for the structural characterization of plant and microbial polysaccharides.

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Dr. Nael McCarty – Introducing... The Emory Integrated Biorepository Core!



The EIBC is open for business, with highly discounted prices for the next two years. EIBC staff are excited to work with investigators to accomplish their research goals. In this brief presentation, I will describe the vision for the EIBC's work over the coming several years.

Nael McCarty, PhD, is the Marcus Professor of Cystic Fibrosis and full professor of Pediatrics. In addition to serving as the Scientific Director for the EIBC, McCarty leads the Emory+Children's Cystic Fibrosis Center of Excellence, "CF@LANTA", leading the tripartite mission of research, clinical care, and education/outreach. His work included launching the CF Biospecimen Repository (CF-BR) which provides to investigators patient-derived samples (bacterial isolates, blood, urine, epithelial cells, etc.) tied to clinical metadata that is managed via the new Georgia CF Data Warehouse. He is building on this experience in his efforts to link Emory's investigators, all across the Woodruff Health Science Center, to samples collected from patients seen at Emory Healthcare sites; this will serve as Phase II of the EIBC. McCarty also currently serves as Director of the Molecular and Systems Pharmacology doctoral program. His lab studies the impact of cystic fibrosis on the airway epithelium, how the epithelium is damaged by neutrophils as they transmigrate into the airspace to fight chronic infection, and how those processes are worsened in the context of CF-related diabetes.

Dean Sandra Wong – Closing Remarks and Awards Ceremony



Dean Wong will offer closing remarks on the importance of integrated core facilities and present our annual core day awards.

Dr. Wong is the dean of the School of Medicine in March 2024. She also serves as the chief academic officer for Emory Healthcare. Dr. Wong previously served as the chair of the Department of Surgery at the Dartmouth Hitchcock Medical Center, where she was responsible for overseeing

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all aspects of research, education, and clinical operations, and a professor of surgery in the Geisel School of Medicine at Dartmouth.

She is an international leader in surgical oncology, specializing in the management of soft tissue sarcomas, melanoma, and non-melanoma skin cancers. Dr. Wong is a globally recognized health services researcher with an extensive record of research funding and more than 250 peer-reviewed studies to her credit. She has held leadership positions in several prominent professional organizations including the Society of Surgical Oncology, the Society of University Surgeons, and the Society of Surgical Chairs. She is also an editorial board member of the Journal of the American College of Surgeons and the Journal of Surgical Oncology, a deputy editor for Annals of Surgical Oncology, and an associate editor for Annals of Surgery. Dr. Wong has been honored with numerous medical student and resident teaching awards.

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Poster Session Abstracts

Join us in the exhibit hall to learn more about core resources at Emory University and our Georgia partners! Posters from our cores are arranged based on scientific theme below. The exhibition hall will be open from 9:45 AM – 4:30 PM. Join us from 3:15-4:30 PM for hors d'oeuvre and a special networking event with core directors in the poster hall.

Al and Machine Learning

AI Image Extraction Core (AI2EC)

Aawez Mansuri, Judy Gichoya, Hari Trivedi*

Emory University; https://www.cores.emory.edu/aiec/index.html

The Imaging Extraction and De-Identification Core at Emory provides radiology image extraction and deidentification services to support clinical, translational, and AI research. Utilizing advanced pipelines, the core enables the secure retrieval of de-identified imaging data from the Picture Archiving and Communications System (PACS) across Emory, as well as newly included sites at Grady Health System (GHS) and Children's Healthcare of Atlanta (CHoA). These services are crucial for large-scale research projects, especially those involving clinical trials, where vast amounts of imaging data are necessary to train AI models and conduct medical analyses. By centralizing access to imaging data, the core streamlines research workflows, offering services such as cohort identification, image extraction, and compliance with privacy regulations. The expansion to GHS and CHoA ensures access to diverse patient populations, including pediatric and underserved demographics, improving the robustness and applicability of AI models developed using the extracted data. The core plays a vital role in advancing medical research and supports collaborations both within Emory and with external research partners, ensuring that researchers have the radiology data they need to drive innovations in healthcare.

Georgia CTSA Informatics Core

Chad Robichaux*, Matthew D. Pagel*, Alasdair Gent*, Barney Chan*, Megan Schwinne, Nita Deshpande, Dileep Gunda, Tony Pan, Timothy Buchman, Rishikesan Kamaliswaran

Emory University; https://georgiactsa.org/research/informatics/index.html

The switch to a new Electronic Medical Record (EMR) in October 2022 provided an opportunity to reevaluate real-time prediction model development and deployment plans. We used an existing, operational model that predicts the onset of sepsis in adult acute care patients using streaming data as a template to build the architecture to deploy real-time Machine Learning (ML) models. We aim to create a generalizable architecture to support similar machine learning efforts at Emory and other collaborating institutions.

Amazon Web Services (AWS) Cloud was chosen as the preferred platform to deploy real-time prediction models, due to its flexibility and amenability for accelerated deployment. AWS supports language agnostic model deployment, scheduling, and configuring of model input and output. We leveraged AWS Event Bridge, Lambda, Sagemaker, and S3 services. The architecture supports the

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capture of clinical data for a cohort, extraction, and transformations of data elements to fit the model's needs. We begin with a list of patients for whom all the required data elements for the model, such as encounters, vitals, and labs, are retrieved from the EMR through Application Programming Interface (API) calls. The model is triggered periodically and patient-level prediction results, consisting of prediction scores and additional metadata, are filed back into the EMR, which can then be added to clinical dashboards or other views, allowing for integration with bedside care. In parallel with the AWS implementation, we have deployed our Sepsis model in test mode in our EMR vendor-cloud environment and are currently evaluating our performance with prospective data.

Medical Informatics and AI Core (MIAI Core)

Chad Robichaux, MPH; Matthew D. Pagel, BS; Dileep Gunda; Barney Chan, MS; Megan Schwinne, MPH; Nita Deshpande, PhD; Tony Pan, PhD; Michael Proctor, BS

Emory University; https://www.cores.emory.edu/miiai/index.html

The Medical Informatics and AI (MIAI) Core, alongside CTSA Informatics and led by Emory's BMI Department, offers extensive support for biomedical data science. Our services cover data access, preprocessing, de-identification, natural language processing (NLP), large language models (LLMs), data normalization, machine learning, and AI model development and deployment.

Vision and Mission: MIAI Core aims to address a critical need in Emory's research ecosystem by providing advanced informatics and AI support across various data types and applications. We help faculty achieve research goals, secure funding, and drive clinical innovations. Our expertise spans LLMs, NLP, machine learning, wearables, telemedicine, and data mining.

Key Services: The core provides five major services: consulting, data extraction, data analysis (using machine learning, deep learning, NLP, and LLMs), software/model development, and software/model deployment. These services support the entire research cycle from concept to deployment.

Unique Value: Since its inception in 2020, the MIAI Core has collaborated on over 60 projects with 38 faculty members. With 16 faculty members specializing in informatics and AI, we bring over 200 years of collective experience. Our unique expertise includes clinical data de-identification, ontology mapping, and advanced AI model building. We are leaders in wearables, telemedicine, and signal processing, offering cutting-edge AI resources and large database management capabilities.

MIAI Core also plans to offer AI model validation services for FDA applications, positioning it as a leader in informatics and AI, driving innovation in research and clinical advancements.

Analytical Chemistry (NMR, X-ray diffraction, HPLC, Mass Spectroscopy)

Emory Glycomics and Molecular Interactions Core

Yi Lasanajak, Afzal Yacoob*, Xuezheng Song, Blaine Roberts

Innovation is at our Core

Emory University; https://www.cores.emory.edu/egmic/

Emory Glycomics and Molecular Interactions Core (EGMIC) is equipped with top-of-the-line LC-MS instruments. Our core provides extensive support to researchers through a broad range of mass spectrometry tools and techniques. This includes the options to learn to conduct LC-MS analysis for trainees or to have our dedicated staff run the samples. We are unique in the world by offering ion mobility mass spectrometry with electron capture dissociation. These techniques allow characterization of the shape and quaternary structure of proteins, and resolve glycan, and lipid isomers. In addition, we conduct validation of reagents especially recombinant proteins and synthetic peptides. This allows the user to confirm they received what they ordered or made the correct protein. We find 10% or more of synthetic peptides from reputable suppliers are incorrect and recombinant proteins contain surprising additions or truncations ~25% of the time. LC-MS offers precise molecular mass measurements and comprehensive analyses of proteins, peptides, glycans, and oligonucleotides. For antibodies, proteins and peptides, LC-MS provides insights into purity, folding stages, dimer configurations, protein interactions, post-translational modifications, and topdown sequencing. In glycan analysis, LC-MS enables the study of various glycoforms and glycosylation in monoclonal antibodies, utilizing workflows such as Agilent InstantPC tagging for rapid and high-throughput N-glycan composition analysis. Validation of synthetic oligonucleotides, LC-MS delivers critical data on sequence confirmation, purity, and structural modifications. Our team is dedicated to helping you leverage LC-MS to gain deeper insights into your samples, ensuring high-quality data and impactful scientific outcomes.

Emory HPLC Bioanalytical Core

Rong Fu*; Hyder Jinnah; Ellen Hess

Emory University; https://www.cores.emory.edu/hplc/

The HPLC Bioanalytical Core is one of the members of the Emory Integrated Core Facilities. We measure monoamines, amino acids, and purines using UPLC/UHPLC/HPLC methods in a variety of biological matrices including tissue extracts, cell lysates, plasma, serum, CSF, urine, and microdialysate. In addition, we provide expertise to develop and validate UPLC/UHPLC/HPLC methods to measure small molecule compounds, peptides, and proteins.

Emory NMR Research Center

Bing Wang

Emory University; www.emory.edu/NMR

Emory NMR Research Center houses six high resolution solution NMR spectrometers from 400 MHz to 800 MHz (field strength from 9.4 Tesla to 18.8 Tesla). Whether you are working with small molecules or complex biomolecules, our facility can meet your needs.

Innovation is at our Core

Four of the instruments are equipped with sample changers, allowing for continuous, 24/7 automated sample runs. This enables the spectrometers to handle high-throughput samples and makes it possible for users with minimum NMR hardware experience to be able to use the spectrometers.

Our newly installed 800 MHz NMR with a cryo-probe offers the highest possible sensitivity, ideal for studying proteins, nucleic acids and metabolomics. All NMR data are securely saved on our data server and can be accessed from anywhere on campus. Emory users have access to the MestreNova NMR processing software for both PC and Mac. Our team is here to assist you with your NMR needs, from instrument operation training, data analysis to help you running specific NMR experiments.

Emory X-ray Crystallography Center

John Bacsa

Emory University; http://xray.chemistry.emory.edu/

The primary function of the X-ray Center is the complete determination of the three-dimensional arrangement of atoms and molecules in inorganic, organometallic, organic, and biological compounds. Chemists and biologists use this structural information to validate and improve inorganic and organic syntheses, as well as to understand the biological activity of various compounds. Many laboratories rely heavily on the Center for unambiguous structural characterization of their products, not only to establish relative and absolute stereochemistry but also to confirm the regioselectivity outcomes of reactions. Our recently acquired rotating anode microfocus source from Biochemistry enables the determination of macromolecular structures, including protein crystal structures.

Mass Spectrometry Center in Chemistry

Frederick Strobel*

Emory University; https://chemistry.emory.edu/msc/

The mass spectrometry center provides varies kinds of mass spectrometry services. Specializing in smaller molecule work, some of the services include accurate mass measurements, which is commonly used for synthetic chemist to confirm structures. LC-MS capabilities are available for analysis of complex mixtures. ICP-MS is another available service.

EMORY CORE DAY 2024 Innovation is at our Core

Animal Research

Animal Physiology Core

Rebeccah Wood

Emory University; https://www.pedsresearch.org/research/cores/animal-physiology-core/overview/

The Animal Physiology Core is a centralized resource specializing in survival surgery for rats and mice in addition to assistance with USDA regulated animals. The Core Director assists all investigators with development of IACUC protocols and training (if requested). Surgical services currently offered by the Core include but are not limited to: bile duct ligation, vessel cannulation, pump implantation, splenectomy, myocardial infarction, 5/6th nephrectomy, liver-ischemia reperfusion, and ultrasound guided injection ideally suited for targeted drug or cell therapy delivery. Any new surgical or technical procedures considered. The Core also has a Visualsonics Vevo 3100 High Frequency Ultrasound system that allows high resolution small animal ultrasound examinations for noninvasive measurement of in-vivo structure and function. Studies can either be conducted in an assisted fashion or investigators can reserve the equipment and utilize their own laboratory personnel.

Cancer Animal Model Shared Resource

Yuning Hou*, Chunzi Huang, Jianmei Wang, Melissa Gilbert-Ross

Emory University; https://winshipcancer.emory.edu/research/shared-resources/cancer-animalmodels.php

The Cancer Animal Models Shared Resource (CAMS) at Winship Cancer Institute provides cuttingedge services for cancer research. Our comprehensive suite of techniques includes sophisticated colony management, diverse cancer animal model development, and precise tumor measurement. We offer advanced drug and cell delivery methods, including pump implantation, and utilize stateof-the-art in vivo imaging technologies such as fluorescence and bioluminescent imaging. Our facility is equipped with cone beam CT and microCT for high-resolution imaging. A key feature of CAMS is the SmART (Small Animal Radiation Therapy) system, which integrates high-resolution CT imaging with precise radiation delivery. This system enables image-guided irradiation and supports whole-body irradiation. Recent technological additions to CAMS include intrafemoral injection for bone-related cancer models, ultrasound-guided injection for tumor establishment, and ovariectomy for breast tumor and hormone-dependent cancer research. These capabilities, combined with our expertise in IACUC protocol assistance, consulting, and custom services, position CAMS as a vital resource in accelerating cancer research and therapeutic development.

Innovation is at our Core

Division of Animal Resources

Maya E. Meeks*, Lorna Waldrop, Wai Hanson

Emory University; https://cores.emory.edu/dar/index.html

The Division of Animal Resources (DAR) offers a range of specialized services to support animalbased research at Emory University, including Clinical Diagnostics, Large Animal Surgical Services, Training Support, Managed Breeding Services, and Aquatic Core Services. DAR provides technical expertise, consultation, and training that enhances the quality of research conducted by investigators across campus. DAR's comprehensive support for animal research plays a critical role in advancing scientific discovery at Emory.

For Core Day 2024, the Quality Assurance & Diagnostic Laboratory (QA DX Lab) will present a poster highlighting DAR's diagnostic services. The QA DX Lab manages small sample analyses from the various species housed on campus and provides services such as live animal sample collection and necropsy support at study completion. The lab's diagnostic capabilities cover cardiovascular, diabetes, renal, liver, toxicology, and immunology systems, offering in-house assays like clinical chemistry panels, complete blood counts (CBC), ATP quantification, and microscopy for biological samples, including whole blood cytology, urinalysis, fecal analysis, and parasitic evaluations. Additional QA DX services include Rental of a handheld blood gas analyzer and necropsy suite rental.

Emory Gnotobiotic Animal Core

Caroline R. Addis, Amanda J. Metzger, and Rheinallt M. Jones

Emory University; https://www.cores.emory.edu/egac/index.html

Emory Gnotobiotic Animal Core is located in the Health Sciences Research Building (HSRB), situated in rooms next to the Specific Pathogen Free (SPF) murine housing, as well as the Transgenic Mouse and Gene Targeting Core. The facility contains 3' foot wide rigid isolators (Parkbio), each with the capacity to house 12 mice cages each. The facility also has Tecniplast ISOcageP Bioexclusion cages.

Emory University Rodent Behavioral Core

Jason Schroeder* and David Weinshenker

Emory University; https://www.cores.emory.edu/rbc/index.html

The Emory University Rodent Behavioral Core is supported by the Emory University School of Medicine and is one of the Emory Integrated Core Facilities (EICF). We plan, execute, and analyze behavioral experiments examining activity, arousal, coordinated movement, learning and memory, anxiety, depression, seizure susceptibility, reward/reinforcement, and aggression in mice and rats.

Innovation is at our Core

Mouse Transgenic and Gene Targeting Core (TMF)

Karolina Nitsche*, Steven Roache, John M. Wambua, Tamara Caspary

Emory University; https://www.cores.emory.edu/tmf/index.html

"The Mouse Transgenic and Gene Targeting Core (TMF), one of the Emory Integrated Core Facilities (EICF), provides state-of-the-art equipment and expertise for making genetically engineered mouse models, moving alleles on or off-campus, or cryopreserving existing strains of mice. The TMF is located in a designated high-end SPF animal facility on the ground floor of the Emory Health Sciences Research Building I. The laboratory space includes a fully equipped tissue culture suite dedicated to embryonic stem (ES) cell culture, an embryology laboratory, a microinjection/embryo manipulation space, a surgical suite, a molecular biology space, and a cryopreserved embryo/sperm archival space. The TMF lab is supported by 3 staff members. The Core Director (Dr. Karolina Nitsche) and Scientific Director (Dr. Tamara Caspary) provide grant application support and project consultation.

The core facility is fully equipped to perform all experimental procedures associated with the production of genetically modified mice. In addition, it has research space and equipment to assist laboratories with auxiliary procedures for the production and analysis of genetically modified mice. These include rederivation and cryopreservation services, as well as custom mouse needs. The TMF now has several services available in rats, including sperm and embryo cryopreservation and semen evaluation.

Translational Neuroscience Core

Thais Buchman, Danielle Babbitt, Roy Raheb Khelo, Marybeth G. Yonk, Nicholas M. Boulis

Emory University - SOM Department of Neurosurgery; https://www.cores.emory.edu/tnc/

The Translational Neuroscience Core (TNC) is a cross-disciplinary scientific core that supports the advancement of translational research in neuroscience. The TNC provides investigators and translational programs with a variety of specialized neurosurgical techniques, instrumentation, and equipment. The TNC is unique in performing highly specialized procedures in the brain, spinal cord, and peripheral nerves from pilot experiments to preclinical testing. These procedures are often necessary to advance preclinical research in the fields of Gene and Stem Cell Therapy, Nerve Repair, Neuromodulation, Chronic Pain, etc.

The TNC offers the following services: Consulting; Preparation of Animal Protocols and Reports; Neurosurgical Training; Neurosurgical Services; Intraparenchymal, Intrathecal, Intracerebral Delivery of Therapies; Post-op Observations and Documentation; Large Animal Perfusion and Tissue Harvesting; Intra-op Fluoroscopy. The TNC is supported by the Department of Neurosurgery and the Emory University School of Medicine.

Innovation is at our Core

Biomarkers and Immunoassays

Emory Multiplexed Immunoassay Core

Sandra Garraway*, Jianjun Chang*

Emory University; https://www.cores.emory.edu/emic/index.html

Emory Multiplexed Immunoassay Core (EMIC) is one of the Emory Integrated Core Facilities (EICF). It is supported by The Georgia Clinical & translational Science Alliance and the Emory University School of Medicine. EMIC performs and analyzes immunoassays on the MSD platform and houses a high-sensitive imaging detection system Meso Scale Discovery Quickplex SQ120.

MSD assays provide a rapid and convenient method for measuring the concentration of specific molecules in complex biological matrices such as plasma, CSF, tissues etc. It supports a wide variety of assays from different research area including immunology, neurobiology, oncology, toxicology and metabolic etc. MSD assays run in 96-well or 384-well microtiter plates and can be singled or multiplexed for efficient processing.

Emory Primate Center Biomarkers Core

Kelly Ethun*, Lori Fralick, Xing Zhang

Emory University; https://biomarkers.enprc.emory.edu/

The Biomarkers Core Laboratory at the Emory National Primate Research Center (EPC) provides investigators with critical hormone assay services and the specialized expertise necessary to obtain high-quality data from basic, preclinical, and translational research studies. Primary core services include the analysis of non-human primate, rodent, and human samples for steroid, peptide, and protein hormones as well as other small molecules relevant to neuroendocrinology, psychoneuroimmunology (stress physiology and inflammation), reproductive biology, and cardiometabolic health. Primary quantification methods include immunoassays and liquid chromatography with tandem mass spectrometry (LC-MS/MS). The EPC Biomarkers Core also develops, validates, and optimizes new assays upon request. New standard assays include: i) An LC-MS/MS assay for measuring trace levels of oxytocin in CSF and serum; and ii) An estrogen LC-MS/MS panel for measuring trace levels of estradiol, estrone, and estriol in serum. Recently acquired instrumentation includes a new Shimadzu 8060NX LC-MS/MS system. More information can be found on the Core website: https://biomarkers.enprc.emory.edu/

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Biorepository

Emory Integrated Biorepository Core (EIBC)

Mohammad Hossain*, Nael McCarty

Emory University; https://cores.emory.edu/eibc/news/index.html

The Emory Integrated Biorepository Core (EIBC) is a brand-new member of the Emory Integrated Core Facilities (EICF). The EIBC is equipped with a highly sophisticated robotic-controlled Hamilton BiOS M7 - 80°C freezer with ~3 million samples storage capacity and is created with a mission aspiring to be a preeminent center of excellence in biobanking as a central resource for the Emory research community and as an essential partner in developing personalized healthcare for patient populations at Emory and affiliated institutions.

We aim to provide efficient storage and retrieval of biospecimens, a critical need of researchers and clinical investigators initially of the HSRB I and II buildings. The EIBC is now fully set up and ready to accept samples from investigators. The EIBC functions through an established bidirectional Laboratory Information Management System (LIMS) generated by merging the OpenSpecimen and Hamilton BiOS software packages. Through this LIMS, all listed investigators can submit their request to store samples in the BiOS and to retrieve their stored samples from the BiOS using their lab computers. The EIBC will provide technical support for sample acquisition and processing as needed to clinical investigators without current lab facilities; develop a biobanking reservoir with various cellular populations; develop methods to store various patient-derived samples tied to clinical attributes. The established EIBC bidirectional LIMS will provide efficient service to investigators to store their storage quality without any sample loss error.

The Winship Cancer Tissue and Pathology Shared Resource

Burcu Ergonul, Vaunita Parihar, Jennifer Robertson*

Emory University; <u>https://winshipcancer.emory.edu/research/shared-resources/cancer-tissue-pathology.php</u>

The Winship Cancer Tissue and Pathology Shared Resource (CTPSR) offers comprehensive biorepository and histopathologic services to support basic, clinical, and translational research. Since 2017, CTPSR has collaborated with the Winship Discovery team to build a biobank of 22,000 samples from over 13,000 consented subjects across all major disease groups. More than 8,100 biospecimens collected from these participants have been distributed to researchers. Biorepository services include tissue, blood, and other biospecimen collection, specimen processing, temperature-monitored storage (-80 or LN2), and distribution of de-identified samples along with pathology and clinical data. CTPSR facilitates retrospective research through access to the Emory Department of Pathology's clinical archive which includes clinical FFPE blocks and corresponding H&E and IHC slides from Emory patients. CTPSR helps initiate biospecimen research through project consultation, assistance with IRB protocols, and identification of patient cohorts and/or cases of interest.

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CTPSR also provides research pathology services, including basic and advanced histology techniques such as tissue processing and embedding, H&E staining, routine and specialized IHC (including multiplex IHC), tissue microarrays, and an expanding portfolio of digital pathology-related technologies. An average of 10,000 slides are scanned annually by the shared resource. The cloud-based Concentriq Image Management platform streamlines image sharing and collaboration and provides an easy to use system for image viewing, organization, and annotation. The newly integrated HALO Quantitative Image Analysis platform simplifies the interpretation of images with intuitive modules designed for high-throughput quantitative tissue analysis. Analysis modules facilitate tissue classification, perform nearest neighbor and proximity analyses, quantify biomarkers, and streamline TMA analyses.

Biostatistics/Computation

Pediatric Biostatistics Core

Scott Gillespie*, Shasha Bai, Zhulin He, Adrianna Westbrook McCook, Laura Johnson, Andrew Jergel, Hui Huang, Cynthia Sinha, Katie Liu

Emory Department of Pediatrics; <u>https://www.pedsresearch.org/research/cores/biostatistics-core/overview/</u>

The Pediatric Biostatistics Core, established in 2009, supports pediatric researchers at Emory University, Children's Healthcare of Atlanta, Georgia Institute of Technology, Morehouse School of Medicine, and other institutions. The Core provides high-rigor statistical and qualitative research expertise to ensure impactful and reproducible findings across child health disciplines. Offering comprehensive services in study design, grant applications, protocol development, data analysis, publication preparation, and statistical education, the Core also specializes in qualitative research. This includes support in designing, collecting, and analyzing data through focus groups, interviews, and observations. As one of the nation's most productive pediatric biostatistics units, the Core manages 400-500 active projects, collaborates on up to 100 grant applications, and co-authors 100-150 scientific articles annually.

To further support child health research, the Core offers the Pediatric Biostatistics Award, which provides up to 30 hours of biostatistics support for projects with the potential to impact child health research. Awarded projects must acknowledge the institutional support of the Core from Children's Healthcare of Atlanta and Emory University. Eligible projects require clear aims, hypotheses, and a fully specified data dictionary. Investigators with limited or no funding for biostatistical support are encouraged to apply, and non-awarded proposals are eligible for resubmission. Through its combined statistical and qualitative expertise, the Core remains committed to advancing pediatric research and fostering impactful discoveries.

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The Biostatistics Collaboration Core

Azhar Nizam, Raphiel Murden*, Ammar Rashied

Emory University, https://www.cores.emory.edu/bcc/

The Biostatistics Collaboration Core (BCC) is housed in the Department of Biostatistics and Bioinformatics in the Rollins School of Public Health of Emory University. BCC team members include faculty, staff and students from that department. While our primary interest is in assuring the appropriate use of statistical methodology in research, the BCC offers a complete range of services from database development, implementation, and maintenance to production of publication-quality graphic and tabular material to support the presentation and publication of research results.

BCC tasks are classified into short-term tasks that can be completed within three to six months (start to finish) with clear deliverables. Each task has a fixed cost based on typical time and effort associated with the task. Obtaining biostatistical advice early on in a project can often improve the chances of meeting study objectives. While the BCC will work on analyses of already-collected data, we encourage investigators to connect with the BCC during the early planning stage of a study, before data collection. Researchers who are interested in initiating a collaboration with the BCC should send a request to <u>bcc@emory.edu</u>.

Winship Biostatistics Shared Resource

Jeffrey Switchenko*, Yuan Liu, Tarrant McPherson, Subir Goyal, Manali Rupji, Ashley McCook-Veal, Angelo Marra, Angel Ji

Emory University

The overall goal of the Winship Biostatistics Shared Resource is to provide outstanding statistical and analytical support to Winship's basic, translational, clinical, and population research projects. The Biostatistics Shared Resource provides statistical support for all Winship investigator-initiated clinical trials, translational studies, basic research, and Winship's team science projects. The overarching aims of the Biostatistics Shared Resource are: (1) to support Winship basic science, preclinical, observational, and clinical investigators by developing and conducting appropriate study design, statistical methods, and analytical methods; (2) to support the Protocol Review and Monitoring Committee and the Data and Safety Monitoring Committee; and (3) provide training in the fundamentals of biostatistics for trainees and early career researchers. The Biostatistics Shared Resource contributes to Winship member research through clinical trial design, national and statewide database expertise, assistance on basic and translational research, and team science initiatives. The Biostatistics Shared Resource also partners with other shared resources, including the Winship DATA Shared Resource, Bioinformatics Shared Resource, and Emory Integrated Genomics Core to provide a pipeline of computational support, data integration, storage, and sharing options to Winship members.

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Clinical and Translational Research

Georgia Clinical & Translational Science Alliance (Georgia CTSA)

Karen Lindsley *

Emory University, Georgia Tech, Morehouse School of Medicine, and UGA; <u>www.GeorgiaCTSA.org</u>

The Georgia Clinical & Translational Science Alliance (Georgia CTSA), funded through the National Center for Advancing Translational Sciences, part of the National Institutes of Health's Clinical and Translational Science Awards, shares a common vision to translate laboratory discoveries into treatments for patients, engage communities in clinical research efforts, and train the next generation of clinical investigators.

To improve health in Georgia and beyond, Georgia CTSA provides:

- Research education and career development
- Mentoring, collaboration, networking, and team science assistance
- Funding opportunities including pilot grants
- Grant writing support
- Expert consultations & services in biostatistics, epidemiology, informatics, ethics, and regulatory knowledge
- Clinical research support for adults and children
- Georgia CTSA Clinical Research Centers (GCRCs) offer dedicated space, experience staff, and resources include nursing services, coordinator and regulatory services, laboratory services, bionutrition services, and study support
- Assistance with multi-site clinical research
- Community engagement and partnership including recruitment and integrating special populations
- Support with translation of ideas from concept to practice
- High-impact, emerging innovation and translation practices including AppHatchery mobile app consulting and development service
- Conferences including annual Southeast Regional Clinical and Translational Science Conference and Health Services Research Day

Learn more or submit a request, visit www.GeorgiaCTSA.org. Email <u>GeorgiaCTSA@emory.edu</u> to subscribe to the Georgia CTSA Weekly eRoundup newsletter. Published every Friday at 10:00 AM ET, each issue contains featured news, funding, education and training, research resources, innovation and translation, community announcements, and events.

Investigational Drug Service

Susan Rogers, Sy Tran*

Emory University, https://www.cores.emory.edu/ids/

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IDS is an integral part of clinical research at Emory University. We provide a wide range of services related to investigational drug therapies for all Emory investigators. Our primary purpose is to insure that research drugs are handled safely, accurately and effectively throughout the Emory system. IDS ensures compliance with regulatory requirements of the FDA, JCAHO, AAHRP, Code of Federal Regulations, Georgia Board of Pharmacy and University policies and procedures.

Flow Cytometry

Emory Flow Cytometry Core

Robert E. Karaffa, II.*

Emory University, https://www.cores.emory.edu/efcc/

Since 2001, the Emory University School of Medicine Flow Cytometry Core Facility has provided flow cytometry services to the campus community as well as the surrounding area. More precisely, this core facility has put its stamp on providing sorting services when the research client needs it. Over the 23 years of its existence, under the direction and leadership of Dr. Rafi Ahmed, this facility has met demand any time it is required. Other flow cytometry facilities shut their doors for the day @ 1700 hrs. We do not. We serve our clients when they need us; the work must get done, and if samples cannot be prepared on time as agreed due to circumstances outside our control, we adjust our schedules to accommodate our clients' needs. In addition, our staff prides itself on going the extra mile; other facilities will struggle and throw in the towel on tough experiments like FRET or 10X. We do not.

Emory + Pediatric's/Winship Flow Cytometry Core

Aaron Rae*, David Archer

Emory University; https://www.pedsresearch.org/research/cores/flow-cytometry-core/overview/

The Pediatrics/Winship Flow Cytometry Core provides cytometry services to the Emory campus as well as external users. The Core has two aims: (1) to provide investigators with exceptional training, services, and educational opportunities to support the use of flow cytometry, including support for flow cytometry-based techniques, experimental design, panel design, instrument training, data collection, analysis, and educational events, and (2) to maintain and implement the latest cutting-edge technologies to advance research. In 2022, Flow SR successfully gained recognition from the International Society for the Advancement of Cytometry for achieving excellence in operations. The SR has two dedicated cell sorters and nine cell analyzers to support the cytometry needs of Emory investigators, including fundamental cellular analyses and studies investigating 30+ parameters on samples. Furthermore, the Core provides workstations for offline data analysis with multiple software packages, including cytometry informatics. The Core has three sites: the largest site is on the 3rd floor of the HSRB I which consists of two dedicated cell sorter rooms capable of BSL2(+) level sorting and wet lab space housing analysis instruments. The second site is in Emory Clinic B within

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the Winship SR hub, and the third site is in Winship Building C (C5027). Since 2022, the Flow SR has supported over 579 users, 164 different PI's and 10 external that include members of the GRA as well as various therapeutic firms. In the future the Flow SR will focus on acquiring new spectral-based sorting, imaging technologies, and increasing cytometry research support for Winship clinical trials.

Genetics and Genomics

Emory Integrated Computational Core

Rich Johnston*

Emory University; https://www.cores.emory.edu/eicc/

The Emory Integrated Computational Core (EICC) is a member core of the Emory Integrated Core Facilities and serves as the Bioinformatics Shared Resource for Winship. Our mission is to provide cutting-edge computational and bioinformatics support to Emory researchers and users of the EICF.

Emory Integrated Genomics Core

Lyra Griffiths*, Daria Zugic, Alaa Ahmed, Jordan Brown, Yao Huang, Weiya He, Keith Kurt, Oskar Laur, Tom Schneider, Anne Piantadosi, Christopher Scharer

Emory University; https://www.cores.emory.edu/eigc/

The Emory Integrated Genomics Core (EIGC) is supported by the Winship Cancer Institute and the School of Medicine. The central mission of the core is to provide a top-tier genomics resource that is widely available to the Emory research community. The EIGC is a full-service genomics core, helping investigators to plan genomics-based projects and utilizing cutting-edge genomics technologies in a research and CLIA setting. The EIGC works closely with the Emory Integrated Computational Core (EICC) in order to enhance quality data processing and analysis. We will highlight cutting-edge technologies including spatial profiling, long-read sequencing, viral genome sequencing, and single cell sequencing.

Emory Primate Center Genomics Core

Michelle Lee*, Emma Shippee*, Steven Bosinger

Emory University; https://enprc.emory.edu/nhp_genomics_core/index.html

The EPC Genomics Core provides cutting-edge genomic and bioinformatic services to scientists at the Emory National Primate Research Center (ENPRC), as well as to researchers at Emory, and across the U.S. The Core has been in continuous operation since 2012. GenCore activities are currently centered on the use of an Illumina NovaSeq 6000 instrument, and we offer the following services:

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- Bulk RNA-Seq
- Immune repertoire sequencing
- Single-cell genomics: gene expression, immune profiling, cell surface protein, chromatin accessibility, fixed RNA profiling.
- Visium HD spatial transcriptomics
- Bioinformatics support

The Viral Vector Core

Xinping Huang, Ranjita Betarbet, Peng Jin

Emory University; https://neurology.emory.edu/ENNCF/viral_vector/

The mission of the Viral Vector Core is to pave the way for gene delivery in neuroscience research. The Viral Vector Core is focused on high-titer, high-throughput production of Lentiviral vectors (LV) and recombinant adeno-associated virus (rAAV) to deliver and express interested genes in either dividing or non-dividing mammalian cells, primary culture and in vivo.

The viral vector core (VVC) is located in the Whitehead Research Building 5th on the Emory University campus. The VVC is open to all Emory and non-Emory researchers. The mission of the Viral Vector Core is to pave the way for gene delivery. The Viral Vector Core is focused on high-titer, high-throughput production of Lentiviral vectors and recombinant adeno-associated viral vector (rAAV) to deliver and express interested genes in either dividing or non-dividing mammalian cells, primary culture and in vivo. The core has become an important technological resource for all investigators.

Implementation Science

Intervention Development, Dissemination, and Implementation Shared Resource

Shaheen Rana*, Cam Escoffery, Alexandra Morshed, Kristi Logue

Emory University; <u>https://winshipcancer.emory.edu/research/shared-resources/intervention-development-dissemination-implementation.php</u>

The Intervention Development, Dissemination, and Implementation (IDDI) Shared Resource's mission is to provide Winship members with access to expertise in behavioral and implementation science research methods. Our expertise supports Winship members in developing, testing or disseminating behavioral, educational and systems interventions to prevent cancer, detect cancer early and/or improve survivorship among Georgia residents.

We have a track record of helping researchers refine research questions, identify and develop instruments to answer those questions, and collect and analyze behavioral research data using quantitative, qualitative and mixed methods approaches. IDDI contributes to Winship member

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research by providing direct services, including study coordination, protocol development, instrument development, qualitative and quantitative data collection, mixed methods and qualitative data analysis and interpretation, and study summary reports and manuscript/presentation preparation for any Winship line of investigation. These services highlight the teams' strengths in formative and implementation research working with diverse populations, and support Winship's goal of addressing Georgia's cancer disparities in the catchment area.

Microscopy

Emory Integrated Cellular Imaging Core

Laura Fox-Goharioon*, April Reedy*, Stoyan Ivanov, Hunter Hakimian, Shaojin (Mark) You, Hai (Harold) Vo

Emory University; www.ici.emory.edu

The Integrated Cellular Imaging Core (ICIC) provides state-of-the-art light microscopy and image analysis technology. We offer confocal and live cell imaging, multi-photon animal and tissue imaging, widefield with deconvolution, super resolution, and image analysis. To effectively implement these technologies, we provide consultations, expert training, and support for all our systems. Along with providing access to equipment, another goal of ICI is to serve as a nucleator for the cell imaging community at Emory. We want to unite diverse microscopy interests, allowing investigators to share ideas, expertise, and instrumentation. Developing new imaging techniques and acquiring new cutting-edge equipment are central to our mission.

Imaging and Analysis at Georgia Electron Microscopy

Eric Formo*

University of Georgia; https://gem.uga.edu/

Georgia Electron Microscopy (GEM), located on the main campus of the University of Georgia in Athens, GA, offers a wide range of microscopy capabilities and services encompassing both electron- and x-ray-based imaging and analysis techniques to meet the needs of researchers across disciplines. Our major instrumentation for transmission electron microscopy includes a TFS Tundra cryo-TEM with Falcon II camera for single particle analysis, and a JEOL 2100Plus TEM with dual cameras (AMT NanoSprint and Direct Electron DE-16) for conventional TEM work as well as cryo imaging, including tomography. Our range of scanning (transmission) electron microscopes includes a large chamber SEM with 150mm energy dispersive spectroscopy (EDS) detector (TFS Teneo SEM), a variable pressure SEM (Hitachi SU3900) equipped with a Quorum cryo-preparation system and EDS, and an ultrahigh resolution low kV S(T)EM (Hitachi SU9000EA) featuring windowless EDS, electron energy loss spectroscopy (EELS), and an in situ hot stage that can attain temperatures up to 1100 °C. For x-ray microscopy (micro-CT), we use Sigray's Eclipse instrument, which can reach a spatial resolution of 300 nm and features phase contrast imaging mode, as well as in situ

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experimental capabilities. In addition, GEM offers a full range of sample preparation and data collection services by staff, including fresh and fixed tissues, negative staining, fixation, ion milling, ultramicrotomy, sputter coating, and cryo techniques. Of interest to students and researchers, we provide hands-on instrument training and regular workshops covering SEM methods, traditional biological sample prep and imaging, cryo imaging and prep, and micro-CT imaging and in situ usage.

Robert P. Apkarian Integrated Electron Microscopy Core

Sondip K. Biswas, Srihari Ravi Koripella, Ricardo Guerrero-Ferreira*, Keith E. Prater, Jeannette V. Taylor, Ted J. Whitworth

Emory University; https://www.cores.emory.edu/iemc

The Robert P. Apkarian Integrated Electron Microscopy Core (IEMC) at Emory University serves as a premier facility offering cutting-edge electron microscopy tools, expertise, and training. Catering to academic researchers and industrial clients alike, the IEMC delivers high-quality imaging and analysis to support a wide range of research endeavors, from small-scale studies to large, collaborative projects. With two locations on Emory's campus, the IEMC provides flexible access to conventional and advanced microscopy techniques. The Cherry L. Emerson Hall site specializes in transmission electron microscopy (TEM), scanning electron microscopy (SEM), cryo-TEM, and tomography, while the Biochemistry Connector site focuses on conventional TEM, cryo-TEM, and tomography. Investigators from any institution are welcome to utilize the facility's services and resources.

Omics (Metabolomics, Lipidomics, Proteomics, Glycomics)

Analytical Services & Training – Complex Carbohydrate Research Center

Varughese A. Mulamoottil,* Christian Heiss, Artur Muszynski, Ian Black, Stephanie Archer-Hartmann, Jiri Vlach, Li Tan, Xu Yang, Bhoj Kumar, Nathan Murray, Lei Huang, Jie Lun Cheng, Sergei Shalygin, Mehrnoush T. Ghahfarrokhi, Ambrish Kumar, Liyanage D. P. Fernando, Krishna M. Manchuri, Hadi Tabani, Sonali Sunsunwal, Jose A. Villalobos Jr., Marium Khaleque and Parastoo Azadi

University of Georgia; https://ast.uga.edu/

Over the past three decades, the Analytical Services and Training at the Complex Carbohydrate Research Center (AST-CCRC) has significantly expanded its global collaborations with universities, federal agencies, and industries. Specializing in the detailed structural characterization of glycoconjugates, the CCRC's extensive expertise spans a wide range of analytical methodologies crucial for comprehensive glycobiology research. Our advanced instrumentation includes Thermo Ascend-MS, Thermo Orbitrap-Eclipse MS, Thermo Orbitrap-Fusion MS, Waters Synapt XS MS, Bruker RapiFlex MALDI-MS, AB SCIEX TOF/TOF 5800 MALDI-MS, SPR, various separation techniques, and GC-MS. Additionally, the NMR facility boasts cutting-edge resources for high-field NMR

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spectroscopy, featuring a newly installed 1.1 GHz spectrometer, along with 900 MHz, 800 MHz, three 600 MHz, and 500 MHz spectrometers. These instruments are equipped with specialized probes, such as HRMAS for solid-state analysis, and multiple cryoprobes tailored for biomolecular NMR applications.

The CCRC's collaborative projects cover a broad array of fields, including glycomics, glycoproteomics, glycosaminoglycans (GAGs), GAG-derived products, polysaccharides, lipopolysaccharides (LPS), peptidoglycans (PGs), and glycolipids. AST-CCRC excels in developing new analytical techniques and refining existing methods to meet the specific needs of our users and also for our in-house research, advancing the field and providing customized solutions to complex research challenges.

The CCRC offers annual training courses focused on the structural characterization of glycans in glycoproteins, glycolipids, polysaccharides, and GAGs, as well as mass spectrometry and software analysis. This includes hands-on experience, complemented by faculty-led lectures to undergraduate and graduate students, postdoctoral research associates, and visiting scientists from the United States and around the world.

Emory Integrated Metabolomics and Lipidomics Core

Chih-Yu Chen*, Xueyun Liu Gulbin*, Zhenxin Hou, Kavitha Kettimuthu, Grey Won, Emily Judd, Kristal Maner-Smith, Eric Ortlund

Emory University; https://www.cores.emory.edu/eimlc/

The Emory Integrated Metabolomics and Lipidomics Core (EIMLC) is an innovative multi-omics facility that specializes in the analysis of lipid mediators and soluble metabolites. We perform untargeted, high resolution lipidomics/metabolomics as well as targeted lipidomics on bioactive lipid subclasses including polyunsaturated fatty acids (PUFA), non-esterified and short chain fatty acids, bile acids, oxylipins, endocannabinoids, etc. The EIMLC also offers custom analyses for user specified molecules or metabolites of interest. Analyses can be performed on a wide variety of biological matrices to support clinical and research efforts, such as plasma/serum, tissue biopsy, feces, urine, cell culture, and others. Subsequent to analyses, the EIMLC provides downstream data integration to get a more comprehensive view of potential pathway activation. These analyses provide enhanced understanding of lipid mediators and small metabolites whose abundance may be monitored as biomarkers to predict and follow the progression of a wide range of diseases, such as metabolic disorders (e.g. obesity, Type II diabetes, and NAFLD), neurodegenerative diseases (e.g. Alzheimer's Disease and Parkinson's Disease), and certain cancers (e.g. prostate and breast).

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Emory Integrated Proteomics Core

Pritha Bagchi*, Duc M. Duong, Nicholas T. Seyfried

Emory University; https://www.cores.emory.edu/eipc/

The Emory Integrated Proteomics Core (EIPC) provides state-of-the-art mass spectrometry technology and proteomics analysis. Our mission is to offer a comprehensive service for our users, including experimental design, sample preparation, and data interpretation. We have the expertise in quantitative analysis of proteins (both TMT and labe-free) and post-translational modifications using a sensitive nanoLC-MS/MS platform. Additionally, developing novel mass spectrometry-based techniques and acquiring new cutting-edge equipment are pivotal to our mission to provide better services to the users.

The EIPC facility is equipped to perform proteomics analyses on samples from a wide variety of biological matrices (e.g. CSF, plasma, tissues, cell lines, etc.) to support both clinical and basic research efforts of our users. The members of our core facility have a wide breadth of interests and experience in proteomic applications in the fields of translational neuroscience, cell biology, genetics, cancer biology, immunology, etc.

Along with providing service on proteomics analysis, another goal of the EIPC members is to serve as collaborators for the interdisciplinary research projects. Our objective is to unite diverse research interests in answering a common scientific question by allowing investigators to share ideas, expertise, and instrumentation. Please contact us at EIPC@emory.edu about your research needs or interests.

Research IT/Informatics

Winship Data and Technology Applications Shared Resource

Ravi B. Parikh, Madhusmita Behera, LePaige Godfrey Cox

Emory University; <u>https://winshipcancer.emory.edu/research/shared-resources/data-and-technology-applications.php</u>

The core mission of the Data and Technology Applications Shared Resource (Data SR) is to provide comprehensive and cutting-edge informatics support to multidisciplinary Winship investigators. The Data SR facilitates collaborative research through application of state-of-the-art technologies and methods to centralize the use of data in population-based research, translational science and clinical trials. It supports real-world data services by using advanced and robust tools to collect, manage, store, and disseminate data. The team provides support for custom application development (mobile and web apps), data management services (analytics, clinical abstraction, genomics), case report form development (Advarra EDC, REDCap, OpenSpecimen), population databases (NCDB, SEER, SEER-Medicare), project consultation, and specialized contract services. The Data SR collaborates with other Emory SRs to provide services to Winship Members, academic partners, and external collaborators.

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Stem Cells

Emory Stem Cell and Organoids Core

Anna G Griggs*, Adriana Harbuzariu and Gary J Bassell

Emory University; https://www.cores.emory.edu/escc/

Emory Stem Cell and Organoids Core (ESCOC), part of Emory Integrated Core Facilities (EICF), is located in Whitehead Biomedical Research Building in Cell Biology Department, Rooms 425 and 468. We provide an advanced research platform for Emory investigators and for those outside of the university. Our team specializes in reprogramming somatic cells (fibroblasts, peripheral blood mononuclear cells, urine-derived cells) via non-integrating methods to induced pluripotent stem cells (iPSCs). The newly generated iPSC lines are authenticated based on International Society for Stem Cells Research (ISSCR) recommendations for genomic integrity (Karyotyping-G-banding and SNP arrays), expression of markers of undifferentiated state and capacity to differentiate to all germ lines (endoderm, mesoderm, and ectoderm). Moreover, we offer iPSC differentiation to various cell types in 2D cell culture (cardiomyocytes, neural progenitor cells, cortical neurons, microglia) and organoids (cerebral, lung) as 3D models of disease. Our services also include knock-out gene editing in iPSCs to study disease mechanisms, drug effects, and potential regenerative therapies. Our core assists investigators during grant applications by providing letters of support and during manuscript preparations by describing the methods that were used to generate various cell lines. In addition, we provide training to staff, graduate students, postdoctoral researchers, and junior investigators with an interest in human stem cells.

Single-Cell, Spatial Multiomics

Bruker Spatial Biology

Jasmine Madrigal*, Claire Williams, Ashley Heck, Lidan Wu, Kimberly Young, Maximilian Walter, Rachel Liu, Aster Wardhani, Alyssa Rosenbloom, Patrick Danaher, Margaret Hoang, Joseph Beechem

Bruker, https://brukerspatialbiology.com/

Multiomicprofiling of healthy and diseased brains with high-plex single-cell spatial molecular imaging

Single cell transcriptomics and proteomics can provide complementary information about the form and function of neurons and glia throughout the brain. However, most high-plex spatial analyses to date have primarily utilized one of these two modalities to interrogate cell activity and cell-tocell communication. Here, we simultaneously leveraged the detection of 68 proteins and over 6,000 RNA targets on the same FFPE human brain sections to perform extended segmentation of neural processes and integrated analyses of protein and RNA expression. The protein targets are well-suited for dissecting neurodegenerative disease pathology (e.g. amyloid beta variants). Moreover, they cover major neural cell types and enable robust cell typing, alongside 4,900 neuroscience-related genes.

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Sustainability

Molecular Evolution Core Laboratory

Adam Fallah*, Dr. Anton Bryksin

Georgia Institute of Technology; <u>https://research.gatech.edu/bio/research/core-facilities/molecular-evolution-core</u>

The Molecular Evolution Core laboratory created the first ever campus-wide reuse-based service program to address growing single-use plastic waste concerns. In 2021, the TipCycle program was created to allow research laboratories across Georgia Tech's campus to reuse their pipette tips multiple times before discarding as opposed to the traditional modality of single-use. In the past three years, TipCycle has saved over six tons of plastic waste with over one million pipette tips being washed and reused numerous times. Currently, TipCycle has over twelve research laboratories being serviced across Georgia Tech's campus and is a testament to the potential for academic institutions across the world to reduce and reuse their plastic waste while saving on costs.

Systems Imaging

Center for Systems Imaging Core

John Oshinski*, Joy Staulcup

Emory University; https://www.cores.emory.edu/csic/index.html

The Center for Systems Imaging Core (CSIC) is an Emory University/School of Medicine Integrated Core core facility dedicated to providing state-of-the art human and pre-clinical imaging, as well as radiopharmaceutical development to the Emory community. CSIC is the cross-disciplinary scientific, administrative, and educational home for imaging sciences at Emory University. The goals of this center are to: (1) support the advancement of scientific research focused on the development of imaging biomarkers, (2) promote the development and application of biomedical imaging technology particularly magnetic resonance imaging, (3) provide core services for human and animal imaging studies, and (4) to build cross-cutting educational and training programs.

MicroCT and Biomechanics Core Labs

Steven Woodard, Laxminarayanan Krishnan*

Georgia Institute of Technology; <u>https://research.gatech.edu/bio/research/core-facilities/microcomputed-tomography-core</u>

Micro-computed tomography (uCT) is an X-ray imaging technique used for high resolution, nondestructive assessment of materials including musculoskeletal tissues and engineered biomaterials. Research applications include quantitative assessment of bone healing after fractures or large volumetric defects,

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skeletal phenotyping, vascular remodeling, developmental biology, and microstructure of materials both natural and engineered. We support live animal imaging studies as well as robust biomechanical testing facilities to better understand structure-function relationships.

Awards

EICF Scientific Director of the Year

Each year, the EICF leadership team selects one Scientific Director for recognition of their exceptional contributions to EICF. This individual represents excellent leadership qualities in line with the mission and vision of the EICF.

EICF Core or Technical Director of the Year

Each year, the EICF leadership team selects one Core or Technical Director for recognition of their exceptional dedication to EICF. This individual has made significant contributions toward leading a team within their core as well as to broaden the research capabilities of the EICF cores.

EICF Staff Member of the Year

Each year, the EICF leadership team selects one staff member for recognition of their exceptional contributions to EICF. This individual has significantly impacted research, teamwork, reliability, work attitude, innovation, and the mission of Emory.

EICF Core Citation Awards

Each year, our cores award individuals who have made an outstanding contribution within the past year. Award categories include DEI, greatest scientific contribution, development of a new service, most team-oriented.

Winship SR Scientific Director of the Year

Award will be given to recognize an outstanding Winship SR Scientific Director based on exceptional leadership and service contributions to Winship.

Winship SR Technical Director of the Year

Award will be given to recognize an outstanding Winship SR Technical Director based on exceptional leadership and service contributions to Winship.

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Winship SR Staff Member of the Year

Award will be given to recognize an outstanding Winship SR Staff Member based on exceptional leadership and service contributions to Winship.

Winship SR Staff Recognition Awards

Awards will be given to Winship SR Staff Members who have made an outstanding contribution within the past year in categories including DEI, greatest scientific contribution, development of a new service, and teamwork.

Core Day Integrated Cell Imaging Core (ICI) Image Competition

Every year, ICI showcases their users' most stunning microscopy images. Images will be displayed during Core Day, and all attendees are invited to vote for their favorite image. Winners in the 1st, 2nd, and 3rd places, along with the top video entry, will earn exciting prizes—and, of course, ultimate bragging rights.

Raffle and Prizes

A raffle card will be provided to all attendees. We will hold a raffle for attendees who visit at least 3 sponsor companies and 6 EICF poster presenters. Please present your raffle card to the sponsor tables and EICF poster presenters who will sign off that you have visited the location. Return the card to the registration desk by 4 pm, and we will select 10 winners during the closing remarks and awards ceremony for a special prize.