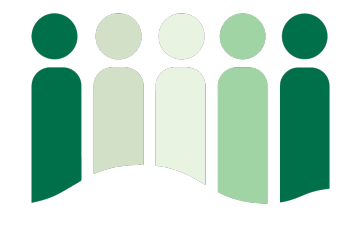


Heersink School of Medicine  
**2024 Annual Research Retreat**

**Strategic Focus Areas- Accomplishments and Goals  
FY23-FY24**



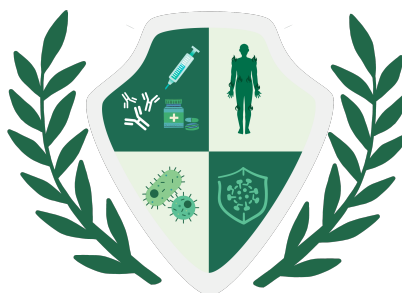
**Precision Health  
Powered by DTECH**



**Health Equity**



**Brain Health and Disease  
Across the Lifespan**



**I-4ward (Infection, Inflammation,  
Immunity, and Immuno-Therapy)**

## Brain Health and Disease Across the Lifespan – 2024 Annual Retreat updates

### **Accomplishments to date**

- *Strategic Neurosciences faculty recruitment.* Task force members (including Dr. Erik Roberson) helped to lead the renewed [Strategic Neurosciences](#) recruitment program, which seeks to recruit up to 20 faculty at all ranks as part of a major strategic initiative in the Neurosciences. This effort was launched in June 2023, and as of February 2024 this initiative has received over 150 applications and led to 10+ faculty candidate interviews and 3 successful recruitments.
- *Brain-PRIME postdoctoral program.* In August of 2023, the task force launched a new program to enhance recruitment of postdoctoral scholars to the UAB HSOM. Termed [Brain-PRIME](#) (Postdoctoral Research Initiative for Multidisciplinary Exploration), this program offers increased stipends, career development funds, advanced career mentoring and training, and a cohort-based streamlined application process. Directed by BHTF lead Dr. Jeremy Day, Brain-PRIME was designed to coincide with an overall expansion of Neuroscience faculty at UAB, and will foster a vital pipeline for diverse junior investigators to drive neuroscience research at UAB to new heights. In less than 6 months, the program has already received 16 applications and has made its first successful award offer to Dr. Aanishaa Jhaldiyal from Johns Hopkins University.
- *High resolution spatial transcriptomics.* The task force partnered with I-4ward focus area leader Dr. Fran Lund, D-Tech leaders, and other campus leaders in this space to help fund the purchase of a 10X Genomics Xenium instrument. This instrument permits high-performance *in situ* gene expression mapping to enable breakthrough discoveries using postmortem human brains, brain organoid systems, and brain samples from animal models. We contributed \$100,000 towards purchase of this instrument and obtained partner donations from many other campus centers and departments. Brain Health and I-4ward task force leaders worked together to obtain HSF-GEF support for this instrument in November 2023, and the instrument is now on campus awaiting installation in the [UAB Flow Cytometry and Single Cell Core Facility](#).
- *Bioinformatics recruitment.* The task force proposed additional recruitment of bioinformatics specialists into existing data science core facilities to prime the pump in this area and promote the implementation of big data and machine learning approaches for brain health. In pursuit of this goal, the BHTF committed \$25,000 (in partnership with additional commitments from the I-4ward theme) towards focused recruitment of a new data scientist into the HSOM bioinformatics community. We envision that this recruitment, in coordination with the [UAB Biological Data Sciences Core](#), will enhance capabilities in spatial and single cell transcriptomics, which was a shared goal across focus areas.
- *NeuroScholars awards.* In January 2024, we launched a new program called NeuroScholars, which seeks to boost recruitment of top neuroscience graduate trainees to UAB. Modeled on the highly successful AMC21 Scholar Program, NeuroScholars offers scientific discretionary funds to enhance the training experience, laboratory support, and advanced career training of GBS Neuroscience and Neuroengineering PhD students. Two NeuroScholar awards will be extended in this recruitment cycle.

**Short and long term goals.** In the coming year, we plan to continue working towards the previously established goals, in addition to continuing efforts on the accomplishments and initiatives outlined above.

- *Spatial transcriptomics voucher program.* As a short-term goal, we have plans to launch a voucher program to support application of spatial transcriptomics (e.g., 10X Xenium platform) by HSOM users in Task Force relevant domains. This program will be launched in Spring 2024.
- *Creation of a UAB Brain, Biospecimen, and Data Repository.* As a long-term goal, we propose a strategic investment to grow a facility that would facilitate collection of biosamples and other relevant clinical/diagnostic data across the UAB Health System and Children's Hospital of Alabama, integrate biosample metadata with existing patient genetic databases, and collect/maintain relevant "neurodata" from ongoing neurosurgery, PET, and MRI activities at UAB.
- *Support for research activities by residents.* Traditionally, medical residents have not been well integrated into UAB's research enterprise. We hope to focus efforts towards developing and growing research-track residency programs in mental health, neurodegeneration and aging, pediatric neurology, and addictions.
- *Infrastructure investments.* Longer term goals include plans to invest in computational infrastructure for brain health, including a UAB Neuroscience Supercomputer and additional capital equipment.

## Disruptive Technology Empowering Precision Medicine (D-TECH) Task Force- 2024 Updates

### Annual Research Retreat Summary

**Mission:** The overarching goal of the Disruptive Technology Empowering Precision Medicine (D-TECH) strategic area is to transform research and healthcare at UAB by defining new ways to integrate cutting-edge technologies into biomedical research and precision healthcare. The D-TECH strategic area encompasses an expansive mission, effectively covering any research at UAB that relies on the rapidly advancing infrastructure in informatics, artificial intelligence, Electronic Health Record (EHR), and high dimensional multimodal data management on one hand, and the expanding experimental, technical informatics, and computing infrastructure on the other hand.

**Task Force:** The D-TECH Task Force is transitioning leadership from Amy Weinmann to Co-leads Ralph Zottola and Javier Neyra. Membership in the Task Force was already transitioning. The scope is broad. We believe that it will be more productive to work within domain-specific task-focused subgroups: Big data, AI and Digital Health; Electronic Health Records; Imaging/Biomarkers; and Precision Medicine and Omics.

#### Priorities for 2024

- Complete assembly of an interdisciplinary and complementary team.
- Projects:
  - A. **“Data Service” Discovery:** In large complex organizations like UAB, data is stored in many places. Access to quality data is critical for novel research. Consumers of the data (researchers) require ways to locate, process and analyze the information they need without concern for the specific location of that data. We essentially need web services for data so our time can be spent innovating rather than gathering and managing/cleaning the data. This effort is intended to inform our team about the art of implementing and sustaining effective “Data Services”.
  - B. **Pilot 1:** Develop scalable and reproducible data pipelines for utilization in research and quality assurance (e.g., research Picture Archiving and Communication Systems (PACS) integration and multi-modal device data with patient-level data from other research and clinical repositories from Data Warehouse and real-time EHR clinical data)  
\*Regulatory, governance, analytics, security, management, inventory procedures will be developed and evaluated with key stakeholder feedback
  - C. **Pilot 2:** Create virtual IT computing infrastructure and human analytic resources to support data pipeline coding, storage, and utilization in research and quality assurance.  
\*Regulatory, governance, analytics, security, management, inventory procedures will be developed and evaluated with key stakeholder feedback

#### Current D-TECH Membership

- Carlos Cardenas
- James Cimino
- Suzanne E Lapi
- Alexander Mackinnon
- Merry Lynn McDonald
- Matthew Might
- Javier Neyra
- Andrew D Smith
- Ralph Zottola
- Amy Weinmann

# **Heersink School of Medicine (HSOM) Health Equity Research Focus Area (HERFA)**

## **Progress Report: HSOM 2024 Research Retreat**

### **HEALTH EQUITY (HE) EXTRAMURAL RESEARCH: SYSTEMATIC LANDSCAPE SURVEY:**

- Established a protocol to conduct a foundational assessment of current extramural HE funding portfolio within the HSOM.
- HE grants will be stratified by thematic pillars: women's health across the lifespan, global and rural health, sexual and gender minority health, and health system and chronic diseases.
- HE grants will be mapped to NIMHD framework with additional classification by disease focus.
- Insights gained will guide strategic recruitment and investments, enhancing extramural funding and scholarship.
- Findings will serve as a baseline for future evaluation of growth of extramural HSOM HE funding portfolio.

### **STRATEGIC RECRUITMENT:**

- Major strategic initiative to recruit up to 12 investigators, expanding the health equity research portfolio.
- Positions available for tenured, tenure-track, and non-tenure-earning faculty across 28 academic departments.
- Co-chairs Dr. Cherrington and Dr. Asif leading the Strategic Recruitment team.
- Active distribution of job postings by the HERFA leadership with 23 applications received to date.

### **COMMUNITY ENGAGEMENT:**

- Prioritized strengthening relationships and collaborations among community focused research faculty and staff.
- Established Collaborative Health Equity Council (CHEC) to facilitate direct and indirect support to HERFA.
- Inaugurated the first Community Engagement Council (CEC) on November 29th, 2023. 20 participants spanning numerous HSOM departments, centers and institutes.
- Sponsored inaugural DRIVEN Academy and Global Health Symposium.

### **COMMUNICATIONS INTERNAL AND EXTERNAL PLAN:**

- Launched promotional initiatives, incorporating photo and videography as well as voice recordings to convey the UAB story, showcasing our dedication and significant advancements in promoting HE. Notably, the collateral is currently in the process of being developed.
- Promotional/recruitment video featuring Mayor Randall Woodfin and HSOM leadership.
- Potential re-use for HSOM departments, divisions, centers, institutes, and other HSOM research focus groups.

### **HSOM HERFA SHORT TERM GOALS (next 12 months):**

- Present finalized results of the HE Systematic Landscape Survey to CHEC on March 8, 2024, to inform priorities.
- Collate existing health equity training and pathway programs situated to educational arc; e.g., R25, T32.
- Monitor progress of strategic recruitment with updates from Co-Chairs; goal 4-6 faculty hires in CY 2024.
- Sponsor events promoting Health Equity, e.g., Dr. Timiya Nolan, Health Equity Conference in Birmingham, 2024.
- Formalize the Community Engagement Council as a high-level counterpart of the CHEC and finalize development of shared resources such as heat mapping with support from Social Determinants of Health (SDoH) Core.
- Develop and deploy promotional communications materials to convey the UAB story.
- Support identification of 2-3 large extramural HE funding opportunities and teams, e.g. ARPA-H HEROES.

### **HSOM HERFA LONG TERM GOALS (3-5 years):**

- Increase CEC engagement by at least 30% through the consistent implementation of quarterly meetings.
- Utilize heat mapping resources to identify and prioritize community needs, resulting in at least 15% increase in the geographic reach and relevance of community programs.
- Establish measurable communication metrics, such as increased website traffic, social media engagement, and event attendance, with a target of 20% growth annually.
- Increase number of unique extramurally funded HSOM HE focused investigators by at least 20%.
- Increase total HSOM HE extramural research portfolio by at least 25%.
- Achieve a clinical meaningful improvement in at least 2-3 HE outcomes metric at a health system, community or population level.

**Inflammation, Infection, Immunity, Immunotherapy (I-4ward) Task Force-2023 Updates.** A survey of the ~300 UAB I-4ward researchers identified four immediate Priority Areas for investment.

**Access to Cutting-edge Technology.** To drive transformational advancements in our understanding of immune, inflammatory, and infectious diseases, I-4ward invested in technologies that support multi-omic analyses in human and animal *tissues* with **single-cell spatial resolution**. With matching investments by the HSOM Immunology Institute (II) and the O'Neal Comprehensive Cancer Center (OCCC), I-4ward purchased the **Lunaphore COMET multiplex imaging system, high-performance computer workstations, and access to Visiopharm software (5 workstations)**. The COMET (<https://lunaphore.com/>) is used to perform immune-fluorescence analysis on fixed or fresh tissue sections (multiplex 40 antibodies). Visiopharm employs deep learning-based algorithms (<https://visiopharm.com/>) to define tissue and cellular structures and is used to analyze the COMET images. In addition, I-4ward and Brain Health raised >\$600K in matching support and were awarded an **HSF-GEF grant** for the **10X-Genomics Xenium single-cell resolution spatial transcriptomics platform**. The Xenium ([Xenium 10X](https://xenium.10xgenomics.com/)) is used to measure gene transcripts at true single cell resolution in fresh or fixed tissue sections. The COMET and Xenium platforms can be linked so that *proteomic and transcriptomic spatial profiling may be performed on the same tissue sections*. Both are housed and managed by the UAB Flow Cytometry and Single-Cell Core. COMET panels [antibodies specific for either human (n=28) or mouse (n=28) proteins that cover the main immune cell types and tissue defining markers] have been validated for healthy and diseased mouse and human tissue arrays. The Visiopharm workstations are open, and training for early adopters is complete. Training sessions were recorded and posted on a UAB Kalutra channel. Azure virtual computing systems were built and are running the analysis suite. Panel design has been discussed with 16 investigators, and at least 10 grants already have been submitted listing this service. Wide rollout of access to COMET is anticipated within the next few weeks. Xenium is awaiting IT support and 10X-Genomics for installation.

*Immediate and long-term priorities* include: (1) rollout of COMET technology to all researchers (March 2024); (2) installation, optimization, and rollout of Xenium technology (late 2024); (3) workshops on uses of spatial platforms (summer 2024); (4) I-4ward supported vouchers for use of platforms (RFA late spring 2024); (5) investment in other multi-omics platforms and imaging modalities (early 2025); and (6) investment in research platforms that facilitate I-4ward focused faculty recruitment and build capabilities of existing faculty (ongoing).

**Informatics Pipelines and Training to Build and Expand I-4ward Relevant Research.** To best leverage the new single cell 'omics platforms, individuals with specialized training in informatics are critical. I-4ward is partnering with the Brain Health and Disease group and **has invested in an informatics group specializing in single cell datasets**. This group is embedded within the UAB Biologic Data Science Core (BDSC). One full-time informaticist has been identified and is responsible for building pipelines that will allow investigators to process the single cell data sets spatial datasets. A working group that includes technical, data informatics, and IT experts is being established. Group members will be provided with financial support (effort) to build advanced analytic tools and COMET/Xenium integration tools.

*Immediate and long-term priorities* include: (1) supporting existing experts to design and validate a multi-omic platform to integrate different types of single cell and other imaging modality data sets; (2) performing more advanced analyses that are not available "out of the box" (ongoing); (2) developing and supporting training workshops for scientists (summer 2024); (3) deploy early pipeline analytic tools (fall 2024); (4) establishing a single cell consulting service for scientists (fall 2024); (4) initiating I-4ward supported vouchers for analytic support; (5) hiring additional informatics staff members for analytic and training support (late 2024); and (6) participating in cluster hires for I-4ward focused faculty. These efforts by I-4ward will support the infrastructure needed to recruit these faculty and to build capabilities of existing faculty (ongoing).

**Recruiting a Talented Trainee Pool for I-4ward Researchers.** These efforts will begin in 2024. Analysis of I-4ward focused multi-omics data sets require a workforce with training in complimentary fields like computational biology, medical and biologic informatics, (bio)statistics, epidemiology, and (pre)clinical models of disease. Post-doctoral fellows (PDF) with expertise in these areas are in high demand and difficult to recruit to UAB. Our *Immediate Goal* is to build on the early success of the post-doctoral program (Brain-PRIME) established by the Brain Health group to recruit PDFs who will advance multi-'omics research and analysis in I-4ward laboratories.

**Service Centers to Develop Resources for Bench, Translational and Clinical Researchers.** These efforts will begin in 2024. *Immediate Goals* include complementing single cell, imaging, and associated informatics platforms with a service center to help researchers link their biologic data sets to the clinical data associated with the tissue samples. I-4ward will partner with the UAB Health Equity Task Force to provide resources to deploy the Learning Health System Platform that will allow researchers to define data bundles of clinical information that can be queried for cohorts of interest on demand. In the coming year, I-4ward will provide resources and expertise to build and validate I-4ward-centric clinical data bundles. A second goal is to develop a platform to link I-4ward scientists with UAB clinicians who can identify patient cohorts and patient repository samples for studies.