Brain Health and Disease Across the Lifespan – 2024 Progress Report

Accomplishments to date

- *Strategic Neurosciences faculty recruitment.* Task force members (including Dr. Erik Roberson and Dr. Jeremy Day) helped to lead the renewed Strategic Neurosciences recruitment program, which was re-launched in June of 2023 and seeks to recruit up to 20 faculty at all ranks as part of a major strategic initiative in the Neurosciences. As of August 2024 this initiative has received over 180 applications and led to numerous faculty candidate interviews and 6 successful recruitments into 6 distinct HSOM departments.
- *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 Brain Health and Disease Across the Lifespan Task Force lead Dr. Jeremy Day, Brain-PRIME was designed 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 its first year, the program has received 27 applications (15 based in United States, 12 international). Five Brain-PRIME awardees selected for the inaugural cohort (see list below).
    - Dr. Aanishaa Jhaldiyal, PhD (Johns Hopkins University)
      UAB mentor: Dr. Erik Roberson, Department of Neurology
    - Dr. Abigail Schwarz, PhD (University of Arizona)
      UAB mentor: Dr. Jasper Heinsbroek, Department of Neurobiology
    - Dr. Allie Smith, PhD (University of Mississippi Medical Center)
      UAB mentor: Dr. Brianna De Miranda, Department of Neurology
    - Dr. Hee Kyung Lee, PhD (Yonsei Wonju College of Medicine, South Korea)
      UAB mentor: Dr. HaoSheng Sun, Department of Cell Developmental and Integrative Biology
    - Dr. Chrisropther Driskill, PhD (University of Texas at Dallas)
      UAB mentor: Dr. Jamie Peters, Department of Neurobiology

  Based on outstanding success, the Brain-PRIME program was launched for a second year in August of 2024. The School of Engineering has also committed funds to support entry of a Brain-PRIME awardee into a neuroengineering research lab, demonstrating cross-school collaborations for this program). The Brain-PRIME program has also served as a model for similar efforts under development by the Health Equity and I-4ward task force groups, as well as the O'Neal Cancer Center.
- *High resolution spatial transcriptomics*. The task force partnered with I-4ward (Infection, Inflammation, Immunity, and Immuno-Therapy) focus area leader Dr. Fran Lund and other campus entities in this space to help fund the purchase of the 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 has been installed in the UAB Flow Cytometry and Single Cell Core Facility. With Xenium instrument use now underway, the Brain Health task force is developing plans to support the integration of this instrument into ongoing UAB research via a voucher program.
- *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 Brain Health task force 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.
- *Advertising UAB as a destination for brain health and disease research.* In 2024, the Brain Health Task Force commissioned a series of 3-4 minute videos that will be used for advertising and recruiting purposes at the undergraduate, graduate, postdoctoral fellow, and faculty levels. The goal of these

videos is to highlight the exceptional impact of neuroscience-related research at clinical care at UAB. Filming and editing for these videos took place in 2024, and included campus leaders (such as neuroscience program directors and department chairs) as well as UAB trainees. Videos are currently being finalized for broad dissemination.

- *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. One NeuroScholar award was accepted in this recruitment cycle, for the top student in the GBS Neuroscience application process. This program will be re-launched in the 2024-2025 recruiting cycle. A goal of the Brain Health task force was to increase the number of graduate trainees in task force relevant research areas by 10% each year for the next five years. Pursuant to this goal, the Graduate Biomedical Sciences (GBS) Neuroscience theme enrolled the most graduate students of any theme in 2024, and reached a decade-long high point in admissions.

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 geared towards supporting application of spatial transcriptomics (e.g., 10X Xenium platform) by HSOM users in Task Force relevant domains. We are currently awaiting instrument validation and plan to launch this program in fall 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.

Task force members:

Dr. Jeremy Day, PhD (Task force lead)
Dr. Alayne Markland, DO
Dr. Matt Alexander, PhD
Dr. Nicole Bentley, MD
Dr. Donna Murdaugh, PhD
Dr. Erik Roberson, MD, PhD
Dr. Karen Cropsey, PsyD
Dr. Brian Samuels, MD, PhD
Dr. Bobby Brunner, MD
Dr. Rachel June Smith, PhD

Program Manager: Audrey Coachman, MHA