BIOGRAPHICAL SKETCH

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NAME: Andrew England

eRA COMMONS USER NAME (credential, e.g., agency login): [redacted]

POSITION TITLE: Graduate Research Assistant

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Wake Forest University, Winston-Salem, NC	B.S.	08/2018	05/2022	Chemistry (Medicinal Chemistry & Drug Discovery)
Temple University Lewis Katz School of Medicine, Philadelphia, PA	Ph.D.	08/2023		Biomedical Science (Neuroscience)

A. Personal Statement

My research focuses on understanding how neuromodulatory circuits regulate neural function and how engineered cellular systems can be used to restore function after nervous system injury. More broadly, I am interested in integrating stem cell engineering, in vivo circuit manipulation, and computational analysis to understand how multi-modal neural systems interact and how these interactions can be modulated to repair dysfunctional circuitry. **My long-term goal is to establish a research program that integrates causal perturbation of neural circuits, large-scale multimodal datasets, and computational approaches to extract mechanistic insights into neural function and repair.** To accomplish this, I aim to obtain a faculty position at a research-intensive university. Inspired by the example of my previous mentors, I am committed to teaching and mentorship. So far, I have mentored one undergraduate student in Dr. Smith's lab, and this has greatly reinforced my desire to pursue a career training the next generation of scientists.

My research training began as an undergraduate in the laboratory of Dr. Allyn Howlett, a pioneer of endocannabinoid receptor signaling. There, I studied the intracellular signaling mechanisms of cannabinoid receptor type 1 and developed technical expertise in mammalian cell culture, co-immunoprecipitation, and protein analysis. These studies grounded my early training in mechanistic cell biology while prompting broader questions about how molecular signaling events propagate through neural circuits to influence behavior and disease. This experience shaped my interest in linking molecular perturbations to systems-level neural function.

As a graduate researcher, I have expanded this perspective to include human stem cell models and in vivo circuit-level approaches relevant to regenerative neurobiology. Under the mentorship of Dr. George Smith, I am developing expertise in engineered viral vectors for CNS delivery and in experimental systems that interrogate neuromodulatory circuits following spinal cord injury. In parallel, I have developed hands-on expertise in human induced pluripotent stem cell (iPS cell or iPSC) culture, directed differentiation, and experimental design through my work with Dr. Kim. In May 2025, I further strengthened this training at the Stanford Brain Organogenesis Workshop hosted by Dr. Sergiu Paşca, where I received advanced instruction in brain organoid generation, functional characterization, and transplantation paradigms. Participation in the Cold Spring Harbor meeting on Development and 3D Modeling of the Human Brain further allowed me to engage with leaders in the field and contextualize my work within emerging advances in human neurodevelopmental modeling. Together, these experiences have prepared me to design experiments using human iPS cell-derived neural systems while connecting cellular models to circuit-level neuroscience.

The training supported by this fellowship will allow me to integrate these experimental approaches with quantitative and computational analysis of complex neural data. Working with Dr. Smith will provide

advanced training in neural circuit interrogation and modulation, including chemogenetic approaches, viral vector engineering, and in vivo methods such as stereotaxic injection and circuit-specific manipulation. Mentorship from Dr. Kim will deepen my expertise in stem cell–derived neural systems, including morphogen patterning, directed differentiation, and functional validation of engineered neuronal populations. Importantly, I will integrate these experimental approaches with computational analysis of high-dimension behavior and kinematic data, positioning me to bridge molecular perturbation with systems-level functional outcomes.

Beyond my laboratory training, I have developed leadership skills through my service on my graduate program's student government board, progressing from Secretary to President-elect and soon to be President. In these roles, I have advocated for trainees, strengthened cross-institutional partnerships across the greater Philadelphia area, and engaged corporate sponsors to expand opportunities and resources for our student body. Furthermore, I view visibility, advocacy, and inclusivity as core responsibilities within science and am committed to fostering research environments where individuals from all backgrounds can thrive.

This fellowship will provide the structured cross-disciplinary training necessary for me to integrate stem cell engineering, neural circuit manipulation, and computational modeling to study and repair complex neural systems. Above all, this fellowship represents a structured mentorship opportunity in the areas of science I intend to build my career around. Mechanistic circuit interrogation, bioengineered cellular systems, and machine learning-driven behavioral phenotyping are the methodological pillars of the research program I am working toward. Through this fellowship, these distinct approaches have the opportunity to converge for the first time in my training, establishing the foundation of independent investigative career aimed at resolving the circuit basis of neurotrauma and neurodevelopmental disability.

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2025 – present	Ph.D. Candidate, Temple University
2024 – present	President-elect, Student Government, Lewis Katz School of Medicine Biomedical Sciences
2023 – 2025	Ph.D. Student, Temple University
2023 – 2024	Secretary, Student Government, Lewis Katz School of Medicine Biomedical Sciences
2022 – 2023	Research Assistant, Wake Forest University
2020 – 2022	Undergraduate Research Assistant, Wake Forest University
2022 – 2023	Member, American Society for Pharmacology and Experimental Therapeutics (ASPET)

Honors and Awards

2025	Stanford Brain Organogenesis Workshop, Stanford University (selected trainee)
2022	STARR Travel Award, Wake Forest University
2018 – 2020	Dean's List Recipient, Wake Forest University

C. Contributions to Science

1. **Undergraduate Research**: I was trained in the laboratory of Dr. Allyn Howlett at Wake Forest University School of Medicine. Dr. Howlett has long received acclaim in the field of pharmacology for her initial discovery and characterization of the CB1 cannabinoid receptor and pioneering work in the field of endocannabinoids. In her lab, I investigated how Cannabinoid Receptor Interacting Protein 1a (CRIP1a), a relatively new and understudied CB1 receptor interacting protein, associated with the beta-gamma subunit of Gi/o. This work was particularly intriguing as proteins like CRIP1a have not been identified or classified, and thus, understanding mechanisms behind CB1R interacting proteins may help identify novel functions for GPCRs or mechanisms of GPCR-mediated inhibition. Through this work, we generated several poster presentations for national and international conferences:
    a. **England, AC***, Hughes, EK, Lowther WT, Howlett, AC. (2021). CRIP1a exhibits differential binding with G protein subtypes. *Wake Forest University Undergraduate Research Day*, Winston-Salem, NC, USA.
    b. Hughes, EK, Kabler, SL, **England, AC**, Clodfelter JE, Lowther WT, Howlett AC. (2022). Cannabinoid Receptor Interacting Protein 1a (CRIP1a): Function as a Gαi Carrier. *32nd Annual Symposium on the Cannabinoids,* International Cannabinoid Research Society, Galway, Ireland.

c. Hughes, EK, **England, AC**, Kabler, SL, Lowther, WT, Howlett AC. (2022). Giα and β Proteins Associate in a Complex with Cannabinoid Receptor Interacting Protein 1a (CRIP1a). *Experimental Biology 2022*, Philadelphia, PA, USA.

2. **Graduate Research**: During my graduate rotation with Dr. George Smith, I assembled a viral construct that uses artificially expressed human surface proteins and exogenous focal application of a bacterial pore-forming toxin to selectively lesion axons of the spinal column with high spatial and projection specificity. I worked as part of a team effort to complete all steps of viral packaging from sub-cloning ranging through the purification of rAAV particles and *in vivo* validation. **The products of this work directly contributed to a successful R21 NIH grant for the Smith Lab**.
    a. Smith, GM, Rajavong, J, Chen J, **England, AC**, Qin X. (2024). Genetic method to selectively lesion axons or prune axonal terminals. *Society for Neuroscience 2024*, Chicago, IL, USA.

    Additionally, during my graduate rotation with Dr. Seonhee Kim, I was trained in the maintenance of human induced pluripotent stem cells and human embryonic stem cells, quantitative imaging and analysis (e.g., confocal microscopy), and production of unguided human brain organoids (also known as cerebral organoids) using commercially available kits and protocols. I used YAP1 wild-type and knockout embryonic stem cells (hES cells) to generate cerebral organoids for addressing the role of YAP1 in early cortical development and neurulation. I identified that hES cells lacking YAP1 were unable to produce neuroectoderm tissue or differentiate into neuroprogenitor cells under cerebral organoid neural induction conditions. After this intriguing finding, I hypothesized and subsequently confirmed that using dual SMAD inhibitors (blocking TGFß and BMP signaling) would restore the ability to produce neuroectoderm tissue. I presented this work as a poster at my university's poster symposium and the Cold Spring Harbor Development & 3D Modeling of the Human Brain meeting in 2024.
    b. **England, AC***, Park R, Estarás C, Kim S. (2024). Yap is required for neuroepithelium and cortical layer development. *Human Development & 3D Brain Modeling*, Cold Spring Harbor, NY, USA.
    c. **England, AC***, Park R, Estarás C, Kim S. (2024). Yap is required for neuroepithelium and cortical layer development. *23rd Annual Dawn Marks Research Day*, Temple University, Philadelphia, PA, USA.

    My ongoing predoctoral research with Dr. George Smith focuses on the contribution of neuromodulatory deficits to loss of locomotion and abnormal nociception following spinal cord injury. Using serotonergic neurons developed from human pluripotent stem cells and chemogenetic tools such as designer receptors exclusively activated by designer drugs (DREADDs) to modulate neurotransmitter release, we aim to establish novel therapeutic avenues for human spinal cord injury patients. Additionally, using transgenic (Tph2-iCre) rats, we are studying the underlying mechanistic contribution of serotonin to functional recovery of locomotion and investigating the effect of loss of descending supraspinal serotonergic input on quantitative locomotion kinematics in healthy and injured rats. Collectively, this work will establish a necessity and sufficiency of serotonin in the recovery of locomotion after spinal cord injury and generate preclinical evidence for the validity of stem cell-based serotonergic therapeutics.