CURRICULUM VITAE

Breanna Leigh Bishop

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EDUCATION

2023 B.S. Molecular and Cellular Biology
Minor: Psychology
Harding University
Searcy, AR
GPA: 4.00

Awards/Scholarships

2019-2023 Harding Academic Scholarship Recipient
2020 Outstanding Chemistry Student Award
2021 Coons Farrar Scholarship Recipient
2021 Otis Nichols Endowed Scholar Award
2022 Pryor Scholarship for Biology Recipient
2022 Science and Nursing Advisory Council Convocation Scholarship Recipient
2023 Outstanding Molecular and Cellular Biology Student Award
2023 Senior Seminar MVP Recipient
2019-2023 Dean's List

RESEARCH EXPERIENCE

- January 2021-Present: Undergraduate Neuroscience Research Assistant, Harding University
  Currently, elucidating the effects of microRNA, mir-147b, on microglial cells in the context of neuroinflammation and Alzheimer's Disease.

Summary

- January 2021-May 2021
  - Published research demonstrates that the resident immune cells of the brain, microglial cells, exhibit decreased phagocytosis and increased cytokine production in response to ethanol exposure. Our lab sought to understand microglial recovery following acute ethanol stimulation in-vitro. Previous students found that microglial phagocytosis is impaired following treatment with 25 mM and 100 mM ethanol for 2 hours. Interestingly, their data also suggest a partial, time-dependent recovery of phagocytosis upon removal of ethanol and 12 or 24 hours of incubation in fresh media. I contributed to this project by measuring metabolism in ethanol-treated cells with and without recovery using a Seahorse XF-HS metabolic analyzer. The data showed that 25mM and 100mM ethanol treatment significantly increased ATP production. In addition, ATP production decreased in cells treated with 25mM after 22 hours of recovery. Together this data helped assess the impact of acute ethanol exposure on microglial activation and provide further evidence for time-dependent recovery. Overall, this project contributes to our understanding of the long-term effects of ethanol on microglia functioning, and the dynamics of microglial activation.
- May 2021-May 2022; August 2022-Present
  - Abnormal iron accumulation and microglial activation are associated with the progression of neurodegenerative diseases such as Alzheimer's disease. Iron dysregulation in microglia cells promotes a dystrophy and potentiates microglial

activation in response to A$\beta_{40/42}$. The mechanism(s) of how iron and Aβ converge is unclear. In a preliminary proteomic analysis, Normal mucosa of esophagus-specific gene 1 (NMES1) was identified as a potential intersection point of iron and Aβ. *C15orf48* is the host gene for the NMES1 protein that also produces a microRNA, mir-147b. Our lab proposes NMES1 and mir-147b as an important intersection point of iron and Aβ linked to the hyperactivation of microglia. As a first step in this investigation, we have been exploring how the modulation of mir-147b influences microglial activation in-vitro. We transfected microglial cells with either a mir-147b mimic or inhibitor and measured reactive oxygen species production, TNF-α production, and phagocytosis following Aβ treatment. Our data show that inhibition of mir-147b potentiated IMG cell activation and a mir-147b mimic suppressed reactive oxygen species production. This suggests an immunoregulatory role for mir-147b in the context of Aβ stimulation. Currently, will are measuring mir-147b expression in the presence and absence of Aβ. Future studies will examine the impact of NMES1 and mir-147b on microglial metabolism. This data expands on the current literature about mechanisms underlying microglial activation states and contributes to understanding the role of iron in disease-associated inflammation.

TECHNIQUE AND SOFTWARE EXPERIENCE

- Cell culture techniques
- Lipofection of miRNA
- RNA extraction
- ELISA
- Quantitative PCR
- Flow cytometry
- Seahorse XF-HS metabolic analyzer
- SciNote

TEACHING

- Fall 2020-Spring 2023: General Chemistry Supplemental Instructor (SI), Harding University
  Prepare review sheets, lead study sessions, field students' questions, and serve as a peer mentor.

PROFESSIONAL EXPERIENCE

- May 2023-Present: Lecturer of Biology, Harding University Searcy, AR

  Assist in laboratory preparation and instruction for Freshmen Biology Lab(s) and Anatomy and Physiology 2 Lab(s). My responsibilities also including grading, serving as a technician for a neuroscience lab in the department, and guest lecturing when needed. I have guest lectured for Cell Biology, Anatomy and Physiology 2, and Freshmen Biology Lab.

- May 2020-August 2020; December 2020-January 2021: Registered Behavioral Technician (RBT), Scarab Behavioral Health Services Nashville, TN

  Provided In-Home Behavioral Therapy/Applied Behavior Analysis (ABA) for children and youth diagnosed with autism spectrum disorder. Primary responsibilities included the creation and direct implementation of treatment plans. I planned interventions and activities related to problem behavior reduction and skill acquisition that I conducted during sessions with clients. In addition, I collected and reported data on progress and setbacks. Finally, I provided support and training to my clients' parents on ABA therapy.

- May 2021-October 2021: Behavioral Technician, Independent Case Management, Inc.
  Searcy, AR

  Provided In-Home Behavioral Therapy for a child diagnosed with autism spectrum disorder. I implemented evidence-based intervention strategies outlined by my client's Individual Treatment Plan (ITP) given to me by my supervisor and lead therapist. In addition, I was responsible for collecting and reporting data relevant to the ITP and following an assigned daily rotation during sessions. Rotations included interventions such as Pivotal Response Treatment (PRT), Discrete Trial Training (DTT), cooperative play, puzzles, story time, etc.

SERVICE

- Fall 2019-Spring 2019: Maple House Volunteer, Searcy, AR
  Mentored and tutored elementary kids in the local neighborhood after school.

- Summer 2022: Global Outreach Mission Internship
  Served as a mission intern and English teacher in Tirana, Albania with the World English Institute (WEI).

Mentoring

- Fall 2020-Presentt: Teaching Assistant, Harding University
  Engage with students, grade lab reports, and assist the instructor during class.

- Fall 2022-Spring 2023: Supplemental Instructor (SI) Observer, Harding University
  Observe SI leaders and provide constructive feedback and encouragement.

CONFERENCES ATTENDED

- 2020: Faculty for Undergraduate Neuroscience Virtual Symposium
  Oral Presentation- *Microglia Have Hangovers Too: Time-dependent Recovery After Ethanol Exposure*

- 2021: Society for Neuroscience
  Virtual Poster Presentation- *Cultured Microglia Exhibit Time-dependent Recovery After Ethanol Exposure*

- 2021: Southeast IDeA Network Meeting
  Poster Presentation- *Cultured Microglia Exhibit Time-dependent Recovery After Ethanol Exposure*

- 2022: Arkansas Academy of Sciences Annual Meeting
  Oral Presentation- *Microglia have hangovers too: examining time-dependent recovery after ethanol exposure in culture*

- 2022: Society for Neuroscience
  Poster Presentation- *Iron Suppresses NMES1 in Cultured Murine Microglia Associated with Hyperactivation in Response to Amyloid-Beta Stimulation*

- 2023: Society for Neuroscience
  Poster Presentation- *Iron Suppresses Inflammatory Regulators in Cultured Microglia: Exploring NMES1 and mir-147b in the Context of Aβ*