STEM Scholars 2019 ASC Projects

Row 1

Research Group	Larimore
Project Title	**Endosomal Trafficking in Rett**
Research Question, Hypothesis, or Conjecture	endosomal trafficking is impaired in neurons lacking a functional MECP2
Project Description	This project will contribute to the knowledge related to trafficking of sub-cellular components in Rett Syndrome. Rett Syndrome (RTT) is a neurodevelopmental disorder affecting approximately 1 in 10,000 girls, and has been classified as an autism spectrum disorder (ASD). RTT results from a mutation in the MECP2 gene located on the X chromosome (Amir et al., 1999; Wan et al., 1999). Patients with RTT develop typically from six to 18 months, at which point they regress, eventually losing hand control and the ability to verbally communicate. As with many patients on the autism spectrum, there are severe learning and memory deficits as well (Chapleau et al., 2013b). Treatments for patients with RTT include physical and occupational therapy to alleviate some of the loss of motor control. To date, no treatment can reverse the symptoms of RTT. Additional research aimed at investigating the biological etiology of RTT may yield new therapeutic options, not only for RTT, but for similar diseases on the AS as well. Endosomal trafficking is responsible for recycling receptors and trafficking of important proteins like integral membrane proteins, membrane receptors such as AMPAR, and neurotransmitters like GABA (Delaney et al., 2002; Park et al., 2004; Park et al., 2006). In a report by Chahrour et al., over 2000 mRNAs were altered in the hypothalamus of Mecp2-/y mice compared to age-matched controls (Chahrour et al., 2008). Among those reported, subunits for the endosome-related Biogenesis for Lysosome Related Organelle Complex 1 (BLOC-1) pallidin and cappuccino showed altered mRNA levels. Our previous work demonstrated that Pallidin was also reduced in the Mecp2-/y hippocampus as well (Larimore et al., 2013). Based on this information, we hypothesize that endosomal trafficking is impaired in neurons lacking a functional MECP2, which has not yet been described. Data suggest that cargo trafficked through the endosomal pathway is disrupted in RTT (Chahrour et al., 2008; Larimore et al., 2013; Xu and Pozzo-Miller, 2017). We will define the kinetics of endosomal trafficking in RTT. Proper kinetics in endosomal trafficking are necessary for proper receptor insertions for learning and memory as well as spine morphology and maintenance. Using primary cultured neurons isolated from the cortex and hippocampus, we will use the transferrin pulse-chase paradigm to determine any alteration in kinetics of transferrin-based endosomal trafficking.
Introductory References	Larimore et al 2013 Chapleau et al 2009
Project Timeline (weekly)	Rough Draft of Timeline Wk1: literature review WK 2: project formation WK 3: protocol Training WK 4: trial one of the experiment

	WK 5: trial two of the experiment WK 6: trial three of the experiment WK 7: Data analysis WK 8: poster prep
Expected Learning Outcomes	Student Research Objectives: Upon successful completion of this experience, the student will achieve the following objectives: 1. Understand neurodevelopment. 2. Present scientific research in a professional manner. 3. Utilize multiple molecular biology techniques in an active lab setting gaining research experience for future endeavors in research.
Research Team	All undergrads
PI Last Name	Larimore
PI FirstName	Jennifer
PI Email	jlarimore@agnesscott.edu
Department	Biology and Neuroscience Program
Mentor2 First Name	
Mentor2 Last Name	
Mentor2 Email	
4 or 8 Week Project	8 weeks
Project Dates	May 20th - July 12th
# of full-time student positions requested (1-3)	2
Novice Requirements	BIO 110 and BIO 111 with good standing.
Advanced Requirements	N/A
Recommended Preparation	