BIOGRAPHICAL SKETCH

NAME: Butts, Molly Rae

eRA COMMONS USER NAME (credential, e.g., agency login): buttsmolly

POSITION TITLE: Postdoctoral Researcher

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	END DATE MM/YYYY	FIELD OF STUDY
Allegheny College in Meadville, PA	B.S.	08/2010	05/2014	Neuroscience
Marshall University in Huntington, WV	Ph.D.	07/2014	07/2019	Biomedical Research
Marshall University in Huntington, WV	Postdoctoral Training	07/2019	Present	Clinical and Translational Sciences

A. Personal Statement

My research interests involve investigating alterations in ion and nutrient absorption in the small intestine during various disease states including during obesity, chronic intestinal inflammation, and during alcohol use. My academic training and research experience at Marshall University have provided me with a well-rounded and diverse background in multiple biomedical, clinical and translational disciplines including cellular biology, physiology, and genetics. As a predoctoral student with Dr. Sundaram, I was able to receive first-hand training in crypt and villus cell isolation across a variety of mammalian model systems. I was able to learn general laboratory procedures including cell culture, protein isolation, immunocytochemistry, immunohistochemistry and radioactive uptake techniques required to investigate intestinal physiology. Furthermore, I also have experience in mouse organoid procedures from Dr. Anjaparavanda Naren's lab (http://www.cincinnatichildrens.org/bio/n/ap-naren/). For my postdoctoral training, I have expanded my research interests into the field of obesity. I am currently using a mammalian model system of obesity to further research intestinal physiology. Moreover, I truly believe that my current work and expertise in the field of intestinal research can allow me to be an integral part of the current research proposal.

1. Butts M., Singh Paulraj R., Haynes J., Arthur S., Singh S. and Sundaram U. (2019). Moderate Alcohol Consumption Inhibits Sodium-Dependent Glutamine Co-Transport in Rat Intestinal Epithelial Cells in vitro and ex vivo. *Nutrients*. **11(10)**.

2. Butts M. R., Haynes J., Arthur S., Singh S. and Sundaram U. (2019). Moderate Alcohol Consumption Uniquely Regulates Sodium-Dependent Glucose Co-Transport in Rat Intestinal Epithelial Cells In Vitro and In Vivo. *The Journal of Nutrition*. **nxz277**.

3. Palaniappan B., Arthur S., Sundaram V.L., Butts M., Sundaram S., Mani K., Singh S., Nepal N. and Sundaram U. (2019). Inhibition of Intestinal Villus Cell Na/K-ATPase Mediates Altered Glucose and NaCl Absorption in Obesity-Associated Diabetes and Hypertension. *The FASEB Journal*. **33**.

B. Positions and Honors

Positions and Employment

2013-2014 Research Assistant, Allegheny College
2014-2019 Predoctoral researcher, Marshall University
2019-present Postdoctoral Researcher, Marshall University

Other Experience and Professional Memberships

2014-2019 Member, Graduate Student Organization
2015-present Member, American Gastroenterological Association
2016-present Member, Research Society on Alcoholism

Honors

2010-2014 Alden Scholar, Allegheny College
2017 Graduate Student Organization Scholarship, Marshall University
2018 Poster of Distinction, Digestive Diseases Week, Washington D.C.
2018 Best Overall Performance as a Graduate Student, Marshall University
2019 Best Oral Presentation, Marshall University Health Sciences Research Day
2019 1st Poster Prize, BioMedical Transporters Conference, Lucerne, Switzerland

C. Contribution to Science

Early Career: In my previous work, I set up a protocol for investigating the effect of ethanol on big potassium (BK) channels in *Zenopus llaevis* oocytes. The BK channel is a potassium selective channel responsible for allowing a large efflux of potassium and decreasing membrane excitability in the nervous system. The BK channel is sensitive to ethanol and upon ethanol exposure, the channel is held open for an abnormally long period of time. In order to further investigate the effect of ethanol on this channel, I injected *Zenopus llaevis* oocytes with BK channel RNA. Using a two-electrode voltage clamp (TEVC), I measured the activity of the channel when exposed to ethanol and found that the channel did have inhibitory effects on the membrane excitability. Furthermore, I set the ground work for imaging this channel using green fluorescence protein when the channel is exposed to ethanol for set amounts of time in order to see how the channel is trafficked in response to exposure to ethanol. Although currently unpublished, this research will help elucidate the effect ethanol has on the nervous system. My work helped establish the protocol for measuring from BK channels with a TEVC as well as measuring fluorescence intensity of GFP-BK channels for Dr. Lauren French's lab.

Graduate Career: During the course of my graduate research, I focused on the effect of moderate alcohol exposure on nutrient absorption in mammalian intestinal cells. My graduate

research provided a novel insight into the effect of a moderate dosage of alcohol, achieved monthly by a majority of the population of the United States, on the vital glucose and glutamine nutrient co-transporters both *in vitro* and *in vivo.* This work was original, as no research had focused on the effect of alcohol on the primary glutamine or glucose co-transporter. Glutamine, as the main fuel source for the small intestine, is absorbed through the sodium-dependent glutamine co-transporter B0AT1 (*SLC6A19*), was significantly decreased in response to moderate alcohol based on a decrease in the maximal rate of uptake of the B0AT1 co-transporter. Furthermore, glucose is absorbed in the mammalian small intestine by the sodium-dependent glucose co-transporter SGLT1 (*SLC5A1*). Moderate alcohol consumption also significantly decreased glucose absorption as well, but due to a decrease in the affinity of the SGLT1 co-transporter to its substrate. For both co-transporters, protein expression studies, radioactive uptakes, immunocytochemistry and immunohistochemistry experiments were conducted both *in vivo* and *in vitro*. These results were published in two major journals below. In addition to this work, I was also able to aid in the investigation of obesity on various nutrient co-transporters in the small intestine. In response to obesity in various mammalian model systems, SGLT1 and the chloride-bicarbonate exchanger DRA were stimulated. However, the sodium-proton exchanger NHE3 was unaltered in response to obesity. This background in obesity and nutrient absorption studies provide an in depth background into obesity-related nutrition studies that will benefit the current proposal.

1. Butts M.R., Singh R.P., Haynes J., Arthur S., Singh S. Sundaram U. (2019). Moderate Alcohol Consumption Inhibits Sodium-Dependent Glutamine Co-Transport in Rat Intestinal Epithelial Cells in Vitro and Ex Vivo. *Nutrients.* **11:13**.
2. Butts M. R., Haynes J., Arthur S., Singh S. and Sundaram U. (2019). Moderate Alcohol Consumption Uniquely Regulates Sodium-Dependent Glucose Co-Transport in Rat Intestinal Epithelial Cells In Vitro and In Vivo. *The Journal of Nutrition.* nxz277.

Postdoctoral Career: As a postdoctoral researcher, my investigations have focused on the effect of moderate alcohol on nutrient absorption during obesity in isolated intestinal villus cells. This provides an important clinical link between my graduate research and the current obesity epidemic. This work will provide vital mechanistic pathways and therapeutic options during obesity which until now, has not yet been investigated. My previous experience in glucose and glutamine co-transport studies will greatly aid in the current proposal.

D. Additional Information: Research Support and/or Scholastic Performance

Research Support:

During my career as a graduate student, we applied and received funding from the West Virginia Space Grant Consortium. The one-year grant included partial support for my graduate stipend and the research into the effect of moderate alcohol consumption on intestinal glucose absorption in Sprague Dawley rats. For the first time, this work explored the effect of a moderate dosage of alcohol on the sodium-dependent glucose co-transporter SGLT1 in the mammalian small intestine.

Scholastic Performance

Year	Science Course Title	Grade
2014	Intro to Research	CR
2014	Biochemical and Molecular Foundations	B
2014	Communications in Bioscience I	CR
2015	Communications in Bioscience II	CR
2015	Physiology of the Cell	A
2015	Neuroscience and Development Literature Review	CR
2015	Research Conduct	CR
2015	Molecular Cloning	A
2015-2019	Cardiovascular Disease, Obesity, and Diabetes Research Colloquium	CR
2016	Biomedical Research Statistics	A
2016	Experimental Approaches to Physiology	B
2019	Teaching Practicum	CR

(CR stand for credit awarded. All classes with CR were not able to be taken for a grade, only credit no credit).