**Basic Information**
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College: McMicken College of Arts and Sciences

Major: Neuroscience

Title of Project: Biomedical Research and Mentoring Program (RaMP)

Thematic Area: Research

Expected Project Start Date: January/February 2015

Expected Project End Date: May 2015

**Project Information**

1. Provide a detailed abstract of your proposed honors experiential learning project.

I am proposing to be an undergraduate research assistant at a lab in Children’s Hospital as part of the Biomedical Research and Mentoring program. I hope to work in the Danzer lab under Dr. Candi LaSarge, where I will research the fundamental mechanisms of epilepsy. Epilepsy is a common neurological condition for which no cure exists. In order to develop novel targeted treatment options, it is necessary to uncover the neuronal mechanisms initiating structural and functional changes that contribute to spontaneous seizures. Our lab is using a transgenic mouse model that spontaneously develops seizures to investigate changes in neuronal morphology and migration associated with epilepsy and the subsequent physiological alterations to the neuronal network. Current projects that I will be working on include selectivity inhibiting activity from abnormal granule cells to determine their role in the epileptic network, determining morphological characteristics of neurons from control and epileptic mice, and analyzing changes in neighboring hippocampal cells in response to an epileptic network. These experiments will provide a greater understanding of the way in which abnormal neuronal development contributes to the progression of epilepsy. I will be able to learn laboratory techniques to assist in these projects, including sterile laboratory techniques, animal handling, DNA isolation, PCR, tissue preparation, immunohistochemistry, neuronal reconstruction, and analysis of cell populations. I will also be exposed to more advanced experimental techniques such as confocal microscopy, transcardial perfusions, and acute slice physiology. This research will allow me to learn the basic skills of working in the lab as well as getting accustomed to the varying lab and research techniques.

**Clearly and thoroughly address how each of the following elements will be exhibited in your work:**

1. Connection to Learning Outcomes within the Honors Thematic Area (identified above)
* Ability to frame and develop the research project question or problem.

The research project has to be molded around what the lab I am joining is currently working on, so that has to be around the topic of epilepsy. Current projects that I can be working on include selectivity inhibiting activity from abnormal granule cells to determine their role in the epileptic network, determining morphological characteristics of neurons from control and epileptic mice, and analyzing changes in neighboring hippocampal cells in response to an epileptic network. These experiments will provide a greater understanding of the way in which abnormal neuronal development contributes to the progression of epilepsy. I also hope to progress in difficulty of research as time goes on, of course this spring semester will be my first opportunity to work as part of a formal research team, and I understand that it may start out very simply at first but I hope to learn and become able to work on harder methods of research by the end of the semester and hopefully over the summer.

* Possess a well-developed awareness of literature in the field.

Read the assigned readings that were sent to me to become well versed in the topic of epilepsy and what is currently known about it. Some of the reading that was sent to me discusses dentate granules and their effects of neurological behavior, the topic is difficult and confusing so I went to the biology/chemistry library in Revieschl to learn more about it. While most of what I’ve learned so far is the anatomical structure, there is much more that can be researched. I have also recently met with my biology professor, Dr. Kinkle, and I brought up the topic of my research and he recommended me some other professors that I can go to for more help and suggestions of books to read and help me with the topic.

1. Connection to Goals and Academic Theories (include reference list, as appropriate)
2. This research project helps me with my long term goal to go to Medical School. I understand that I need to keep good grades, but I also need research experience, shadowing, volunteer work, and extracurriculars. So this research assistant position will be my first step into working towards graduate school. I will be able to gain research experience as well as make connections with faculty in Children’s Hospital that I hope to utilize in the future.
3. I was sent some reading to do for the research that I am joining. This reading includes a medical journal by my mentor and the PI of the lab, Dr. Danzer, “Mechanisms regulating neuronal excitability and seizure development following mTOR pathway hyperactivation.” Another journal that was sent to me was “Excessive Activation of mTOR in Postnatally Generated Granule Cells Is Sufficient to Cause Epilepsy” and discusses the involvement of dentate granules with epilepsy, one of the goals of the lab.
4. Initiative, Independence, and/or Creativity

As the research assistant in the lab, it will be difficult to make a substantial significant contribution to the project. But I am very motivated and interested in learning about the topic of research and will put forth the effort necessary to help and assist with the other researchers. I will strive to be a fast learner and put forth the reading and studying outside of the lab as to make sure the other researchers don’t need to waste time explaining different things to me. Once I have learned the basic lab techniques and begin to work more on my own I hope to find more efficient ways to research and study different aspects of the research and bring in new ideas. As the undergraduate member of the lab I hope to bring in unique and simpler ideas that the graduate school students and graduates may have overlooked.

1. Reflection

This lab is experience is very important to my academic future and career and so I want to be able to get the most out of the experience, and by reflecting on the different things I am doing in the lab I will be able to get the most out of this opportunity. I will keep a lab notebook that I will use for the lab techniques and methods I learn while researching so that I can use it as I continue my education. But I will also keep a blog and update it weekly with research progress, pictures of interesting things in the lab, and what I’ve learned. Different questions and topics I can include in the blog will include: something new I’ve learned, my progress for the week, How can I improve my skills? What have I learned? Is there something that still confuses me? How will I be able to use this in the future?

1. Dissemination

My most important audience for this research project and my reflection of it is myself, so that I can learn from what I am doing and become a better student and research assistant. I will also share my research with my learning community who also have been doing shadowing, clinical research, and working as assistant technicians in pharmacies. I might be able to show them something and help them, but more importantly I will be able to learn and improve through any feedback from my peers, who share the same goal of myself of learning the ropes as a freshman to better our future.

1. Project Advisor(s)

I hope Kayti Kenard will be my advisor for this project. But I also would like to ask Dr. Brian Kinkle to be one of my project advisors. I have already spoken to him about my research and as a freshman biology teacher he knows the goals I have of learning how to do research and becoming accustomed to the different lab skills and techniques I will need as my academic career continues.

1. Budget (if applicable)

 A budget is unnecessary as the research is unpaid, and I am not requested grant funding for the first semester of research. I will be able to walk or take the shuttle to Children’s Hospital so transportation will be free.