

## Undergraduate Research Symposium May 17, 2019 Mary Gates Hall

### Online Proceedings

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#### POSTER SESSION 1

MGH 258, Easel 182

11:00 AM to 1:00 PM

##### **Specific c-Jun N-terminal Kinase (JNK) Activities in a Chronic Epilepsy Rat Model**

*Marium Narejo Khan, Senior, Neurobiology*

*Mentor: Nicholas Poolos, Neurology*

*Mentor: Francis Concepcion, Neurology*

c-Jun N-terminal kinases (JNKs) are members of the mitogen-activated protein kinases (MAPKs) family that are derived from three genes: *Jnk1*, *Jnk2*, and *Jnk3*. JNKs have been implicated in several cellular responses to homeostatic insults, including inflammation and apoptosis. We previously reported in a chronic epilepsy rat model significant elevated levels of phosphorylated JNKs (pJNKs), which indicate increased JNK activities. Additionally, we demonstrated that pharmacological manipulations of JNK proportionally affected seizure frequency. In this set of experiments, we attempted to identify which of the JNK isoforms (JNK1, JNK2, JNK3) contribute to the overall increased pJNK levels in our animal model of epilepsy. This would provide us insights as to the role(s) of JNKs in this disease. We measured the phosphorylation levels of the individual isoforms after pJNK enrichment from the CA1 hippocampal tissue of chronic epileptic rats and their age controls. The amount of protein was normalized by pJNK levels between experimental and control samples. We found a significant increase in activation levels of JNK2 in chronic epilepsy at  $130 \pm 9\%$  ( $n=6$ ,  $p=0.018$ ) when compared to naïve, nonepileptic controls but insignificant changes in activation levels of JNK1 ( $97 \pm 14\%$ ,  $n=5$ ,  $p=0.83$ ) and JNK3 ( $98 \pm 17\%$ ,  $n=6$ ,  $p=0.92$ ). Previously, we had found in rats that JNK1 predominantly exists in the 46kDa size; JNK3 predominantly exists in the 54 kDa; and JNK2 exists in both sizes equally. We further analyze which of the JNK bands (46 kDa and 54 kDa or both) contribute to the elevated phosphorylated JNK levels. Given the previous pharmacological observation that JNK manipulation does influence seizure frequency in epilepsy, this investigation is imperative as it will allow us to narrow our focus to a specific JNK isoform to study further.

#### POSTER SESSION 3

Balcony, Easel 100

2:30 PM to 4:00 PM

##### **Investigating Student Perceptions of Demonstrations in Large Undergraduate Chemistry Courses**

*Roma Seo, Senior, Biochemistry*

*William Y. Mun, Senior, Chemistry*

*Beth Ann Cassidy, Sophomore, Pre-Sciences*

*Mentor: Tam'ra-Kay Francis, Chemistry*

Lecture demonstrations have a long history of use in science learning spaces. While extant research in STEM education show that demonstrations can be used to rouse student interest, some studies suggest that demonstrations have little to no effect on improving students' understanding of the concepts taught in class. In chemistry, demonstrations are commonly used in lectures with the belief that student understanding of chemical concepts improves from observations of chemical phenomena. The purpose of this mixed methods study was to investigate students' perceptions of lecture demonstrations and their usefulness in preparing for exams. To measure students' perception of lecture demonstrations, a survey was administered to first year students ( $n < 1500$ ) in nine introductory chemistry classes over two quarters. Initial findings reveal that while students do in fact remember and enjoy lecture demonstrations, they found it difficult to apply demonstration concepts to problems on exams. Results also suggest a strong link between student engagement and exam performance. Overall this study highlights the importance of soliciting student feedback for improving and designing course materials and tools. Various strategies and implications for practice are also addressed.