Welcome to the 18th Annual PURE Symposium *"Fall Session"!*

Thur Nov 17th, 2022, LSF 207

Snacks 3:45, Talks begin at 4:00pm

This Semester's Presentations and Speakers:

4:00 – 4:20pm:

"The Effect of Cellular Differentiation on Adeno-Associated Viral Vector Genome Status"

Student: Farouk Chatila Faculty Mentor: Dr. Jennifer Lyles

Gene therapy is a cutting-edge technique used to treat genetic disorders by introducing a functional copy of a mutated or absent gene. This type of treatment requires a vector for delivery of the functional gene, and among the most successful gene therapy vectors is Adeno-associated virus (AAV). Critical to the success of the therapy, AAV vectors are known for their long-term persistence following a single administration of the vector. Specifically, the vector genome persists in the host cell nucleus in an episomal circular state independent of the host cell chromosomes. Previous research suggests that different molecular mechanisms are employed in undifferentiated (dividing) and differentiated (non-dividing) cells regarding AAV transduction and that this may have an impact on the final status, or confirmation, of the vector genome. The purpose of this study is to clearly define the status of AAV vector genomes in undifferentiated and differentiated cells and to better understand the transition of vector genome conformation during the process of cellular differentiation. To accomplish this, the status of the AAV vector genome will be investigated in a single cell population—before differentiation, during differentiation, and after differentiation—using C2C12 cells. These murine myoblasts will be infected with AAV-2 and induced to differentiate into myotubes via serum starvation. Samples will be collected before, during, and after differentiation and analyzed for gene expression (fluorescence microscopy), intracellular vector genome concentration (qPCR), and vector genome status (Southern blot). This study is in the early stages of development; data collection and analysis are ongoing.

4:20 – 4:40pm:

"Examining Helping Behaviors in Female Rats"

Student: Jaylanna Smalls Faculty Mentor: Dr. Shayna Wrighten

The act of being empathetic includes sharing and acting on the feelings of others. There are a number of studies that test the validity of this in smaller mammals such as rats. One way of indirectly examining empathy in rats is by looking at helping behavior. For example, it has been shown by multiple groups that rats will open a door to release a trapped cagemate. These results have been shown to be true both when the trapped rat is in a dry apparatus and in a wet apparatus. In our experiments, we examined helping in female rats so that we could further understand the factors that play a role in rats being more likely to help their cagemate.

The apparatus used was transparent in color and a rectangular shape. The inside was separated into two sides (dry side and pool side) by a transparent wall that included a round slide door that could only be opened from the dry side. With enough force to the protruding lever or the side of the door itself, the door could be opened allowing access to the pool side. The experiments took place at 5-minute intervals on consecutive days for four or five days (depending on the experiment). For the control experiment, the selected rat was placed on the dry side with the sliding door closed and timed to see, if and when, the sliding door was opened. If the door was opened, the time was recorded. Following the control, the same rats were used to examine helping behavior. One rat was selected as the helper rat while the other is labeled as the helpee. The helpee rat was placed on the pool side first, followed by the helper rat being placed on the dry side. The rats maintained these positions throughout the trials (i.e. the helper rat was always the helper rat and always started on the dry side). If the helper rat managed to open the door, the time it took was recorded and both rats continued to be monitored until the end of the 5 minute trial. During this time, the rats are able to interact with one another. At the end of the trial, the rats were removed from the apparatus, the apparatus was cleaned and sanitized, and the experiment is repeated with the next pair of rats. In experiments examining helping behavior in the absence of previous experience as a control rat, the same protocol was followed with the exception of having the rats spend time in the apparatus without the cagemate prior to the helping experiments.

We found that when given an option, all the rats preferred to spend more time in the dry side compared to the pool side. Additionally, the rats were more inclined and quicker to open the door when there was a cagemate present on the other side of the door opposed to when the pool side was empty.

Our data provided evidence that there may be some underlying motivator from the distressing pool rat. Though this behavior does point to the fact that the rats may be capable of presenting with empathetic capabilities there are additional factors showing that these behaviors might be learned and in fact be reinforced by the pool rat as a strong motivator of initiating the help received. Further research is needed in order to better understand the motivators behind the rat's ability to help and the overall influence of the rat in need.

The Department of Biology at FMU strongly encourages student participation in research activities. We offer many opportunities for undergraduates to assist in faculty research or develop their own independent research projects. Students can earn academic credit through Special Studies (BIOL 497) and Honors Independent Study.

If you are interested in learning more about PURE or available research opportunities, scan the QR code below. You can also contact Dr. Barbeau (tbarbeau@fmarion.edu), the coordinator of PURE, to answer any questions you might have and get you started on a research project!