

BIOLOGY VII

Section Moderator: Dr. Darlene Panvini
Room: Beaman Hitch Science Building 208
Time: 9:00 – 9:30 PM

9:00 – 9:15
“Caffeine’s Effect on the Learning Activity of *Danio rerio*”

Roshni N. Patel
Faculty Advisor: Dr. Lori McGrew

Caffeine acts as an adenosine blocker in the brain. Adenosine is the nucleoside that is responsible for promoting in sleep. It is found throughout the body and is a byproduct of cell work. Caffeine is similar in structure to adenosine which is important because it is this shape that allows caffeine to effect neural receptors that would normally react to adenosine. Adenosine is also linked to dopamine levels in the body. The decrease of adenosine can stimulate dopamine. This is important because dopamine is responsible for cognition in the frontal cortex which is important for problem solving, memory, and attention. If caffeine can inhibit the reception of adenosine and adenosine inhibits dopamine, this would indicate that an increase in caffeine would increase dopamine. It was then hypothesized that if zebrafish are treated with caffeine this would decrease adenosine and increase dopamine in their system, leading to greater cognitive skills. To test this hypothesis a rapid learning paradigm was created, and fish were tested at three different concentrations of caffeine, .50 g/L, .25 g/L, and .10 g/L. The latter two concentrations showed a marginally significant result of increased short term learning. The data can provide information on how caffeine plays a significant role in the function of short term memory, which may offer insight into the significance of learning techniques of students.

9:15 – 9:30
"Presence of Pantone-Valentine Leukocidin in Community Associated Methicillin-Resistant *Staphylococcus aureus* Isolates on Belmont University’s Campus"

Brittany R. Moe
Faculty Advisor: Dr. Jennifer T. Thomas

Methicillin-Resistant *Staphylococcus aureus* (MRSA) has become a major concern for public health. While it is normally seen in hospital settings with immuno-compromised patients, community-associated strains (CA-MRSA) have become common. In addition to MRSA’s resistance to standard antibiotics, increased pathogenicity has been observed in CA-MRSA strains. The presence of a Pantone Valentine Leukocidin toxin (PVL), an exotoxin that lyses host cells, accounts for this increase in disease severity. We examined whether or not CA-MRSA isolates found on Belmont University’s campus contain the gene that encodes the PVL toxin through PCR analysis. Three of 15 MRSA isolates were positive for the PVL gene. Interestingly, 2 of 8 methicillin-sensitive isolates were also positive for the PVL gene. Furthermore, presence of the *mecA* gene, which confers resistance for some MRSA strains, did

not correlate with expression of PVL. The presence of the PVL toxin on Belmont's campus further emphasizes the need to implement measures to decrease infection rates.