

Professional Science Masters Programs (PSM)

Featuring The Graduating Class of Spring 2023:

Bioinformatics. Bioinnovation. Biotechnology

Final Capstone Presentation



**Temple
University**

Wednesday, May 3rd, 2023 & Thursday, May 4th, 2023

College of Science
and Technology



Bryn Victoria Queeley

***PSM, Bioinnovation – Degree-
Class of ‘23***

***Wednesday; May 3rd, 2023
Time: 2:30pm - 4:30pm EST
BIO LIFE Room #234***

Capstone Project Title: “Optimizing the process of mRNA Synthesizing”

Abstract: Synthesizing mRNA can be a lengthy and tedious process not only that, RNA is delicate; and therefore extremely vulnerable to degradation. In the process of making mRNA there are several steps that must be taken, they have to be followed in chronological order and are usually timed. Additionally, there are several calculations that are used to produce desired yields and results. There are also several different reagents and chemicals used throughout the process. Throughout the entire process there must be a high level of cleanliness to prevent introduction of RNases and or endotoxins.



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Cecelia Nguyen

*PSM, Bioinnovation – Degree-
Class of '23*

Wednesday; May 3rd, 2023

Time: 2:30pm - 4:30pm EST

BIO LIFE Room #234



College of Science
and Technology

Capstone Project Title: “A Training Guide to Publications in the Medical Communications Industry”

Abstract: Medical Communications deals with the development of informational materials relevant to healthcare and medicine (American Medical Writers Association). Such materials can include ad boards, pamphlets, manuscripts, and much more. The goal of these materials is to relay information to patients, health care professionals, or other stakeholders about how a particular drug or product works. A medical communications agency is contracted by a pharmaceutical or medical device company to help develop and produce these materials up until the final product is ready to be published or presented.

Capstone Project Title:

“Integrin $\alpha 4 \beta 7$ -dependent uptake of hematopoietic stem cell extracellular vesicles promotes homing to the bone marrow”



Danielle Kobulsky

***PSM, Biotechnology – Degree-
Class of '23***

***Wednesday, May 3rd, 2023
Time: 2:30pm - 4:30pm EST
BIO LIFE Room #234***

Abstract: In this study, the effects of HSPC EV uptake into BMECs were investigated. HSPC EVs derived from *ex vivo* expansion cultures showed significant uptake into BMECs that was diminished with an $\alpha 4 \beta 7$ integrin antagonist. Transcriptional profiling of BMECs cocultured with HSPCs showed increases in chemokine CXC motif ligand 1 (CXCL1), monocyte chemoattractant protein-1 (MCP-1, CCL2), and chemokine CC motif ligand 7 (CCL7, MCP-3), that were confirmed to be upregulated after direct HSPC EV exposure. Activation of ERK1/2 (p42/44) and the canonical NF- κ B pathway were observed in BMECs cocultured with HSPCs. Parallel profiling of HSPCs cocultured with BMECs showed upregulation of the corresponding MCP chemokine receptor CCR2. Finally, *in vitro* chemotaxis of HSPCs toward BMECs was mitigated by integrin $\alpha 4 \beta 7$ or CXCR2 blockade, suggesting a role for HSPC EVs in promoting cell migration. Overall, these findings contribute to understanding mechanisms of cellular crosstalk that mediate HSPC homing to an endothelial cell-rich bone marrow niche after transplantation and may provide a novel therapeutic avenue for improving stem cell engraftment.



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Capstone Project Title:
“Advantages of anti-CEA CAR-NK Regional Delivery against
Adenocarcinoma Hepatic Metastases”



Grace Alexander
*PSM, Bioinnovation –
Degree-
Class of ‘23*

*Wednesday; May 3rd, 2023
Time: 2:30pm - 4:30pm EST
BIO LIFE Room #234*



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and Technology

Abstract: Due to the immunosuppressive environment of the intrahepatic space, liver metastases are a major cause of morbidity and mortality in patients with colorectal adenocarcinoma. A 2015 attempt by Katz et al. to combat liver metastases via regional delivery of CAR-T targeting CEA, a biotarget used in the treatment of adenocarcinoma liver metastases, delivered promising, if somewhat limited results. Patients experienced adverse events indicating inflammatory response, a known risk of CAR-T infusion; improvement upon the treatment’s survival of the immunosuppressive intrahepatic space remained necessary; and concerns have been raised regarding the presence of circulating CAR-T cells following direct delivery, as this places patients at risk of toxicity. Particularly promising against heterogeneous and metastatic solid tumors, the success of CAR-NK cells in combating lung cancer growth in mouse models when engineered for co-expression with chimeric co-stimulatory converting receptors (CCCRs) suggests their potential as a therapy resistant to immunosuppressive environments, particularly that of solid tumors. Additionally, CAR-NK therapy poses several safety advantages over CAR-T therapy, secreting cytokines that do not exhibit inflammatory effects, and carrying a lower risk of toxicity due to the shortened lifespan of circulating CAR-NK. Therefore, this project proposes a follow-up to Katz et al.’s 2015 study, investigating whether regional delivery of CCCR-co-expressing anti-CEA CAR-NK therapy may improve patient outcomes. Study success should be evaluated in terms of therapy resistance to the intrahepatic immunosuppressive environment, reduction of adverse events due to inflammatory response, and reduction of toxicity risk due to circulation of the therapy in the bloodstream.



Lauren Royer

*PSM, Bioinnovation – Degree-
Class of '23*

Wednesday; May 3rd, 2023

Time: 2:30pm - 4:30pm EST

BIO LIFE Room #234

Capstone Project Title:

“Multiscale Evaluation of Ion Channels for Translational
Value as Therapeutic Targets”

Abstract: Proteins of ion channels play crucial physiological roles in electrically excitable cells. As such, several drugs or drug candidates target specifically one or more members of this large and diverse protein family. Target regions are often conserved but ion channel modulators carry an added level of complexity. Typically, these specific modulators do not bind into a well-defined pocket on the protein surface but they show numerous binding regions, each responsible for a distinct modulatory effect. To assess target regions, protein candidates will be compared through alignment and statistical models built into a multiscale approach to evaluate phylogenetic relationships and potential therapeutic applications.



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Natasha Narayanan

*PSM, Biotechnology – Degree-
Class of '23*

Wednesday, May 3rd, 2023

Time: 2:30pm - 4:30pm EST

BIO LIFE Room #234



**College of Science
and Technology**

Capstone Project Title:

“Nuchal Subcutaneous Fat as Measured on MRI as a Parameter of Body
Composition in the Imaging Follow-up of Pediatric Craniopharyngioma
Patients”

Abstract: One specific application of MRIs concerns nuchal skinfold thickness (NST) in pediatric patients with craniopharyngioma (CP). NST refers to the skin at the back of the neck, and is being observed as a potential “marker of regional nuchal adipose tissue” in such patients (9). Craniopharyngiomas are one of the most demanding childhood brain tumors due to their location in the brain and the slow growth that commonly results in delayed diagnosis (7). Although histologically benign, the location of these tumors directly invades and/or puts pressure against the hypothalamic-pituitary axis in over 50% of patients (7). This axis is responsible for controlling homeostasis and hormone levels within the body. One particular outcome of craniopharyngioma is hypothalamic obesity, which is different from normal obesity in that hormone regulation is affected due to an impacted hypothalamus (8). Children with this form of obesity are observed to have hyperphagia coupled with slow metabolism, resulting in rapid, consistent weight gain even if food intake is low (8). Pediatric craniopharyngioma patients have similar BMI levels compared with the general population even in cases of hypothalamic obesity (9). This finding does not correlate with the increased risk of cardiovascular disease (CVD) in these patients, as CVD is generally associated with higher BMIs (9). It is hypothesized that regional obesity may correspond more with CVD compared with overall obesity (9). For these reasons, reliable body composition assessment is key in gaining a better understanding of a patient’s health. In this study, MRIs are used to measure NST with the goal of contributing to nascent research concerning the hypothesis of whether NST is a viable parameter of body composition analysis in pediatric CP patients.



Erin M. Theiller
*PSM, Bioinformatics –
Degree-
Class of '23*

*Thursday; May 4th, 2023
Time: 3:00pm - 3:45pm EST
BIO LIFE Room #234*



College of Science
and Technology

Capstone Project Title:

*“Understanding the Evolutionary Drivers of *Leptospira*
Pathogenicity through Phylogenetic Analysis”*

Abstract: Leptospirosis is a zoonotic disease caused by pathogenic spirochetes of the genus *Leptospira*. It is an emerging infectious disease, with increasing frequency and severity of outbreaks. The genus is quite complex, with species that can cause lethal human disease. *Leptospira* species are divided into those that are infectious for mammals and those that are non-infectious, environmental saprophytes. Infectious *Leptospira* are further divided into pathogenic and intermediate pathogenic members. Despite significant progress in understanding the epidemiology and pathogenesis of leptospirosis, the genus as a whole is vastly understudied. This study aims to provide a framework for understanding the evolution and diversity of *Leptospira* through phylogenetic analysis. By identifying and curating gene families, this study provides insights into the general processes by which *Leptospira* bacteria evolve to become pathogenic to humans.