Student Undergraduate Research Experience (SURE) Summer Symposium 2023

31 August 2023 | Convocation Hall
Symposium Program

We acknowledge that the SURE Summer Symposium takes place on Treaty 6 Territory and the Traditional Homeland of the Métis. We pay our respects to the First Nations and Métis ancestors of this place and reaffirm our relationship with one another.

SURE Summer Symposium 2023 – Program

Convocation Hall, Peter McKinnon Building 120

Time	Event	Details
8:30 am	**Registration**	Coffee and Light Refreshments
9:00 am – 9:30 am	**Opening Remarks**	**Welcome** (Dr. Mandy Fehr, Coordinator, Undergraduate Research Initiative) **Opening Remarks** (Dr. Debby Burshtyn, Dean of the College of Graduate & Postdoctoral Studies) **Student Welcome** (Elisabeth Bauman, USSU Vice-President Academic Affairs) **Career Services Welcome** (Brette Kristoff, Experiential Learning Coordinator, Career Services) **Introduction to Networking Activity**
9:30 am – 11:00 am	**Session 1**	Presentation Details Below
11:00 am – 11:30 am	**Break**	Prize Draws / Set-up for Session 2
11:30 am – 1:00 pm	**Session 2**	Presentation Details Below
1:00 pm – 1:30 pm	**Lunch**	Prize Draws / Set-up for Session 3
1:30 pm – 3:00 pm	**Session 3**	Presentation Details Below
3:00 pm – 3:30 pm	**Reception**	Celebration & Refreshments

Time	Event	Details
3:30 pm – 4:30 pm	**Awards Ceremony**	**Closing Congratulations** (Dr. Baljit Singh, Vice-President Research) **Presentation of Awards** *RBC Career Services People's Choice Award,* Presented by Brette Kristoff, Experiential Learning Coordinator, Career Services *CGPS Communications Award,* Presented by Dr. Debby Burshtyn, Dean of the College of Graduate and Postdoctoral Studies *OVPR Community Engagement Award*, Presented by Dr. Baljit Singh, Vice-President Research *OVPR Promising Future Scholar Award,* Presented by Dr. Baljit Singh, Vice President Research **Closing Comments** (Dr. Mandy Fehr, Coordinator, Undergraduate Research Initiative)

SURE Summer Symposium 2023 - Sessions

Session 1 9:30 am – 11:00 am	Session 2 11:30 am – 1:00 pm	Session 3 1:30 pm – 3:00 pm
1. Ally Seifert (2nd Year) 2. Aiden Glass (2nd Year) 3. Ariel Tirado (4th Year) 4. Ali Hussain (3rd Year) 5. Alexa Arnyek (4th Year) 6. Christine Joyce Francisco (2nd Year) 7. Rylan Bahrey (3rd Year) 8. Noah Lim (2nd Year) 9. Kendra DuRussel (3rd Year) 10. Mahboubeh Pordeli (4th Year) 11. Aafia Maqsood (2nd year MS) 12. Olivia Numedahl (2nd Year) 13. Zoey Johnston(4th Year) 14. Andy Kim (3rd Year) 15. Fraser McLeod (4th Year) 16. Angie Guarin Villarreal (5th year) 17. Isabella Thomson (4th Year) 18. Xander Slowenko (4th Year) 19. Jumanah Bahig (3rd Year) 20. Rachel Andres (4th Year) 21. Hya El-Baroudy (4th Year) 22. Jian Park (3rd Year) 23. Kayla Abrametz (4th Year) 24. Katherine Nicks (3rd Year)	1. Sara Pilon (3rd Year) 2. Narek Tamrazyan (2nd Year) 3. Nolen Timmerman (4th Year) 4. Ashley Fisher (3rd Year) 5. Kaitland Fior (3rd Year) 6. Alycia Kanters (4th Year) 7. Rylee Moody (2nd Year) 8. Xinyue (Susie) Xu (1st Year) 9. Rowen Greene (5th year) 10. Will Pahl (3rd Year) 11. Kara Walz (4th Year) 12. Ryan Chan (3rd Year) 13. Mehdi Khalaj (4th Year) 14. Dawn Omoluabi (2nd Year) 15. Amanda Ewen (3rd Year) 16. Rodrigo Godoy (2nd Year) 17. Mackenzie Heidel (2nd Year) 18. Annika Dixon (2nd Year) 19. Kate DeVito-Porter (2nd Year) 20. Rubana Syeda (3rd Year) 21. Anton Dmitriev (3rd Year) 22. Spencer Dmytruk (2nd Year) 23. Annaka Chorneyko (2nd Year) 24. Shruti (Karen) Kaur (1st Year) 25. Huzaifa Saeed (3rd Year)	1. Aaryan Patel (3rd Year) 2. Lyuba Pastushenko (2nd Year MS) 3. Khizra Haq (2nd Year) 4. Suzana Grazielli Cortiano Stubert (5th year) 5. Leonardo de Lima Henning (5th year) 6. Hassaan Sabir (3rd Year) 7. Ali Rizvi (2nd Year) 8. Kayla Joyce (2nd Year MS) 9. Dominic Weninger (2nd Year) 10. Pahul Singh (1st year) 11. Hanna Hashi (3rd Year) 12. Abdullah Qureshi (3rd Year) 13. Hana Rogers (3rd Year) 14. CJ Manning (4th Year) 15. Chi Vu (3rd Year) 16. Mahammad Ali Saritala (4th Year) 17. Caleb Hammond (3rd Year) 18. Vivian Heinrichs (2nd Year) 19. Mary Zhou (3rd Year) 20. Mykyta Shvets (2nd Year)

Session 1

9:30 am – 11:00 am, Convocation Hall

1. Ally Seifert (2nd Year) | Health Sciences

Project: Inflammation and Senescence in Chronic Neurodegeneration

Supervisor(s) and Collaborator(s): Jian Park, Ruoqi Yu, Khanh Ta, Dr. Jeff Dong

Description: I will present a poster about the research I have conducted as part of the Biomedical Summer research project program. As a member of Dr. Jeff Dong's Macrophage Immunology and Inflammation lab, my project focused on the role aging plays in microglia immunology in a model of MS. Research Abstract: Multiple sclerosis (MS) is a debilitating neuroinflammatory disease characterized by demyelination and neurodegeneration in the central nervous system (CNS). While treatments are available against the relapse-remitting form of MS where inflammation and demyelination cause reversible disabilities, effective therapeutics against chronic neurodegeneration that leads to irreversible disabilities in progressive MS as individuals age remain lacking. Oxidative phosphatidylcholines (OxPC) are critical biomarkers of oxidative stress in MS. We previously demonstrated that they are highly neurotoxic molecules that require microglia for clearance. Importantly, we also found aging exacerbated acute OxPC damage in the CNS, partially by impairing microglia function. The significant association of aging with MS progression and chronic neurodegeneration highlights the need to investigate how the aging CNS responds to chronic OxPC damage. Since OxPC are highly elevated in chronic MS lesions where reactive microglia/macrophages accumulate, we hypothesize that OxPC deposition in the CNS can promote chronic neurodegeneration and that aging impairs the neuroprotective functions of microglia in chronic lesions. To test this hypothesis, we injected purified, MS-relevant OxPC into the spinal cord white matter of young and aging mice and analyzed acute (day 7) and chronic (day 42) time points using quantitative confocal microscopy. Specifically, we compared microglia/macrophage proliferation (KI67), cellular senescence (H2-AX, P16), and neurodegeneration (βAPP). We also used acridine orange to assess cell death. Our results suggest decreased proliferation, increased microglia/macrophage senescence, and worsened neurodegeneration in the chronic OxPC lesion compared to the acute time point. Additionally, while KI67 was similar between young and aging mice, inflammation and senescence in aging lesions were elevated. Collectively, we provide new insights into how microglia/macrophages respond to chronic OxPC injury in the CNS and how aging may modify their response. Further investigations will help to understand the mechanisms that underly neurodegeneration associated with aging and MS progression.

2. Aiden Glass (2nd Year) | Physical and Life Sciences

Project: Mischief in memory tasks: Reevaluating cheating strategies employed in the odour span task in rats

Supervisor(s) and Collaborator(s): Timothy Onofrychuk, Quentin Greba, John Howland

Description: The odour span task (OST) infers working memory capacity by requiring rodents to discriminate between familiar and novel scents and perform a specific action to obtain a hidden food reward. To determine whether rats use mitigating strategies in the OST, rats' responses to novel scents and food cues were assessed. Rats accurately responded to novelty, but also reliably responded to the food scent alone, and performed at chance when both cues were presented in separate locations. Collectively, these results demonstrate the need for rigorous tests of potential mitigating strategies and hold wide implications for rodent odour discrimination-based behavioral tasks.

3. Ariel Tirado (4th Year) | Physical and Life Sciences

Project: Exploring In Situ Surface Enhanced Infrared Absorption Spectroscopy on Electrodeposited Copper Substrates within a Flow Cell

Supervisor(s) and Collaborator(s): Ian Burgess

Description: This project aims to explore copper as a metal substrate to perform surface sensitive Infrared Absorption Spectroscopy in a Flow-through electrochemical cell. The electrochemistry of copper deposition is explored as well as the quality of infrared absorption spectra of a surface probed test molecule, aiming to evaluate the benefits of this in situ technique for several applications, including the analysis of reaction kinetics and mechanisms.

4. Ali Hussain (3rd Year) | Health Sciences

Project: Human brain organoid protein profiles have more in common with the adult human brain than the mouse brain

Supervisor(s) and Collaborator(s): Darrell D. Mousseau (Supervisor) Tyler J. Wenzel Deborah N. Achuonye

Description: In vitro brain organoid tissue cultures were stained for various proteins that are present in human brain tissue. Data shows that these organoids (cultured over a time course of 90 days) exhibit proteins similar to human brain tissue than those exhibited by mouse brain tissue.

5. Alexa Arnyek (4th Year) | Physical and Life Sciences

Project: Wetlands may offset developmental impairments caused by neonicotinoid insecticides in aerial insectivores

Supervisor(s) and Collaborator(s): Biyao Han, Christy Morrissey

Description: Aerial insectivore bird populations are in steep decline across North America. This decline is believed to be associated with both direct pesticide exposure and the loss of wetlands resulting from agricultural intensification. Wetlands offer high food quantity and quality as aquatic insects contain polyunsaturated fatty acids (PUFAs) known to enhance nestling growth. This project aimed to test whether sublethal exposure to insecticides impairs tree swallow (Tachycineta bicolor) nestling development, and whether these adverse effects can be offset by increased wetland availability. Our study area consisted of 4 dry sites (<0.1% open water within 500 m) and 4 wet sites (>5% open water within 500 m) southeast of Saskatoon, Saskatchewan. In 2023, we administered oral doses of a neonicotinoid insecticide, either imidacloprid or clothianidin, to 5 chicks per nest, with doses ranging 0, 4, 6, 9, 13 µg/g and 0, 11, 23, 46, 75 µg/g respectively. Dosing occurred on day 7 and nestlings were weighed and measured on day 2, 4, 6, 7, 8, 9, 10, and 12 to monitor growth. Nestling body mass was significantly higher in wet sites than dry sites. Additionally, at high doses, nestlings in dry sites lost significantly more weight than nestlings in wet sites 24 hours post dosing. These results reveal the importance of wetland conservation for aerial insectivores living in intensive agricultural environments.

6. Christine Joyce Francisco (2nd Year) | Health Sciences

Project: The co-opting of common goods: mechanisms of xenosiderophore uptake by Acinetobacter baumannii

Supervisor(s) and Collaborator(s): Dr. Jessica R. Sheldon Dr. Dinesh Wellawa

Description: Acinetobacter baumannii is a resilient Gram-negative pathogen with extensive drug resistance and a remarkable ability to survive harsh conditions, including nutrient scarcity. It is particularly adept at acquiring essential iron, often through siderophores, which are small iron-

binding molecules that capture the metal from its environment for subsequent uptake. A. baumannii employs up to 21 TonB-dependent receptors (TBDRs) to uptake siderophores, nine of which were previously observed to be broadly metal-regulated. Three of these are involved in the uptake of endogenous siderophores, while the rest remain largely uncharacterized. In addition to using endogenously synthesized siderophores, A. baumannii appears to co-opt those produced by other organisms, known as xenosiderophores, wherein some of its TBDRs potentially facilitate piracy of known fungal xenosiderophore transporters. We hypothesize that A. baumannii uses multiple fungal siderophores to support its growth under iron limitation conditions using TBDRs. Currently, the use of siderophores to support the iron-dependent growth of A. baumannii is being assessed through bacterial growth curves and siderophore uptake assays that are well-established in the laboratory. In contrast, the iron-dependent expression of the nine TBDRs is being evaluated by qPCR. In future work, a putative iron-regulated xenosiderophore TBDR will be selected to generate a deletion mutant using recombineering, and the involvement of the TBDR in siderophore utilization will be assessed through the same approach mentioned above. All experiments are performed in biological triplicates and statistically analyzed using GraphPad Prism. Although the interactions between A. baumannii and fungi have not been interrogated, co-infections have been observed in critically ill individuals. Hence, understanding how A. baumannii co-opts common goods from complex communities will shed additional light on how it thrives in these nutrient-scarce niches, including during polymicrobial infections.

7. Rylan Bahrey (3rd Year) | Health Sciences

Project: Characterizing the interactions between bacteria and human amyloid proteins

Supervisor(s) and Collaborator(s): Dr. Aaron White

Description: Neurodegenerative diseases (ND) are a class of disorders that involve the abnormal processing and accumulation of proteins, called amyloids, within the central nervous system. Global prevalence of ND is high, with upwards of one billion people (1 in 6 individuals) currently suffering from some form of neurodegenerative ailment. Salmonella and E. coli bacteria are common causes of human illness worldwide and would seem to have no connection to ND. We and others have shown that Salmonella and E. coli can form biofilms, dense collections of bacteria, within the digestive tract during infections. Salmonella and E. coli both produce curli, a key biofilm protein that happens to be a bacterial amyloid. Curli proteins have a similar 3D structure to amyloid beta, a protein that accumulates as plaques in the brain of Alzheimer's disease patients. Our hypothesis is that curli produced in the human intestine can interact with amyloid beta and other human amyloids and stimulate their misfolding, perhaps triggering ND. Rylan's summer research will have two objectives: 1) To engineer E. coli to allow for efficient curli purification; and 2) To study the interactions between E. coli curli and different amyloids (amyloid beta and prions) using biophysical techniques: in vitro polymerization,

dynamic light scattering, and immunoblotting. Preliminary experiments show that Salmonella curli can interact with amyloids. This project is testing the concept that bacterial proteins can influence the progression of human ND.

8. Noah Lim (2nd Year) | Health Sciences

Project: Nanodiamonds as metabolic microscopes -developing quantum sensors for metabolic flux analysis

Supervisors: Badea Ildiko, Iulia-Andreea Spataru

Description: Nanodiamonds (NDs), used extensively in industry, have gained interest recently in the biomedical field. The objective of our research is to engineer novel nanomaterials that can bind and carry nucleic acids into mammalian cells. Our research advances knowledge regarding effectiveness and safety of functionalized diamond-core nanoparticles as drug delivery systems.

9. Kendra DuRussel (3rd Year) | Health Sciences

Project: Combined fluid resuscitation and norepinephrine augments blood pressure recovery without cerebral perfusion impairment during hemorrhagic shock in pigs

Supervisors(s) and Collaborator(s): T. Dylan Olver, Breanna J. Barlage, Gabriela Delgado, Jordan T. Wall, Laura E. Shaw, Corey R. Tomczak, Jen Loewen

Description: First-line treatment to recover blood pressure and perfusion after massive blood loss is fluid replacement. Norepinephrine (NE), a vasoconstrictor, is not used to treat blood loss for fear of constricting the already-compromised micro-circulation, potentially limiting blood flow to vital organs. We hypothesized that low-dose NE given in combination with fluid would have minimal vasoconstrictive effects while also improving blood pressure and cerebral perfusion.

10. Mahboubeh Pordeli (4th Year) | Health Sciences

Project: Adenosine A1 Receptor Signaling Regulates Equilibrative Nucleoside Transport Expression: Role of Protein Kinase CK2

Supervisor(s) and Collaborator(s): Dr. Francisco S. Cayabyab, Elisabet Jakova

Description: Adenosine is an important signaling molecule with essential functions in human physiology. Dysregulation of its homeostasis extracellularly and intracellularly can lead to neurodegeneration diseases such as Parkinson's disease (PD). We hypothesized that the chronic stimulation of A1R (an adenosine receptor) would lead to desensitization of the A1R and subsequently results in the downregulation of CK2 (a kinase) and the upregulation of ENT1(an adenosine transporter) expression levels that contributes to the pathophysiology of PD.

11. Aafia Maqsood (2nd year MS) | Medical Education, EDI

Project: UGME Policy Review Using an EDI Lens

Supervisor(s) and Collaborator(s): Dr. Greg Malin, Dr. Manuela Valle-Castro, Erin Walling

Description: The undergraduate medical education (UGME) program has policies that were developed within a specific colonial university system and may have inherent biases. Therefore, they may not fully represent or be equitable for all students—in particular, students of under-represented/minority groups. While diversity among healthcare providers has shown to enhance healthcare quality, structural barriers continue to exist in medical training. Our project included holding focus groups with staff, faculty and underrepresented student groups in the College of Medicine to learn about their experiences, using an EDI (equity, diversity, and inclusion) lens.

12. Olivia Numedahl (2nd Year) | Physical and Life Sciences

Project: Lattice Models of RNA-DNA R-loop Complexes

Supervisor(s) and Collaborator(s): Chris Soteros, Josh Delainey

Description: DNA and RNA typically occur in the cell as long polymers that are subjected to high levels of confinement. During cellular processes, changes to the geometry and topology of DNA and RNA can yield multi-stranded structures such as R-loops. An R-loop is a 3-stranded structure composed of an RNA-DNA complex and another single strand of DNA. R-loops can play either disruptive or regulatory roles in cellular processes, and it is thus important to understand factors influencing their formation and stability. It is known that both DNA sequence and geometry/topology affect R-loop formation, however, little is known about their geometric and topological properties. In this project we develop a simplified lattice model for studying R-loop formation and geometry. The model is inspired and informed by a formal grammar model developed by Ferrari and coworkers. We explore the model both theoretically and via computer simulation using Markov chains. The general goals are to explore the probability of R-loop formation and geometric properties of the R-loops.

13. Zoey Johnston (4th Year) | Physical and Life Sciences

Project: Developing a Solid-State Ion Selective Electrode for Environmental Monitoring

Supervisor(s) and Collaborator(s): Dr. Ian Burgess

Description: Ion selective electrodes (ISEs) are used in many disciplines most notably in health sciences and environmental chemistry. ISEs can detect ions to the micromolar concentrations by containing an ionophore which is specific to a targeted ion. Laser-induced graphene is highly conductive which supports the transport and complexation of the target ion and ionophore.

14. Andy Kim (3rd Year) | Health Sciences

Project: Identification of Reference Genes for Gene Expression Analysis of Glycogen Degrading Enzymes in Gardnerella swidsinskii by Real-Time Quantitative PCR

Supervisor(s) and Collaborator(s): Janet E. Hill, Champika Fernando, Divanthika Kularatne

Description: Accurate measurement of relative gene expression using real-time quantitative PCR relies on the identification of appropriate reference genes whose expression levels remain constant under the conditions of the study. Currently, no reference genes for been identified for the gene expression analysis for Gardnerella spp. This poses an obstacle in further understanding the biology of these clinically significant

members of the vaginal microbiome. This study aimed to bridge this gap and identify suitable reference genes for G. swidsinskii to be applied in the investigation of whether relative abundance of substrates and products affect the gene expression of glycogen degrading enzymes. Ten candidate reference genes conserved across all G. swidsinskii strains and representative of different functional categories were selected for evaluation. Primers were designed for candidate reference genes and two genes of interest (α-amylase and α-amylase-pullulanase), and product specific amplification and satisfactory efficiency were evaluated. Of the ten candidate reference genes, seven were shown to be specific and efficient. Cultures were grown in a 96- well plate in modified NYC III medium supplemented with 10% heat inactive bovine serum and 1% maltotriose or oyster glycogen, and cells were harvested during the exponential phase of growth. From the harvested cells, RNA extraction and first strand cDNA synthesis was performed in preparation of qPCR. Analysis of the Cq values from qPCR of candidate reference genes by NormFinder, geNorm, BestKeeper and RefFinder revealed uppS (polyprenyl diphosphate synthase) as the top comprehensively ranked reference gene. The interpretation of the Cq values for α-amylase and α-amylase-pullulanase was performed by applying the appropriate reference genes in the calculation of relative gene expression levels. No significant difference in gene expression of α-amylase and α-amylase-pullulanase in media supplemented with maltotriose or glycogen was observed suggesting expression is not influenced by substrate availability.

15. Fraser McLeod (4th Year) | Physical and Life Sciences

Project: A Quantum Framework for Geometric Optimization Problems

Supervisor(s) and Collaborator(s): Dr. Debajyoti Mondal, Bharadwaj Vuppala

Description: We investigate the quantum advantage over classical computing in the domain of 3SUM-HARD problems. Expanding upon recent advances on *quantum algorithms for computational geometry*, we develop a framework that can be applied to speed up a plethora of geometric optimization problems. Using the framework, we show that well-known geometric problems such as POINT-ON-Q-LINES, DEEPEST-REGION, and DISK-PLACEMENT can be solved in $O(n^{(1+o(1)})$ quantum time, an improvement on their $O(n^2)$ classical time. Our results underscore the advantages of quantum computing and support the Quantum-3SUM-Conjecture, that 3SUM cannot be solved in $O(n^{(1-\varepsilon)})$quantum time for any $\varepsilon > 0$. We believe our framework, which has been shown to work for a variety of problems, can be expanded further for problems beyond geometric domains.

16. Angie Guarin Villarreal (5th year) | Physical and Life Sciences

Project: DNA origami Nanotechnology

Supervisor(s) and Collaborator(s): Amy Stevens

Description: We investigate the quantum advantage over classical computing in the domain of 3SUM-HARD problems. Expanding upon recent advances on quantum algorithms for computational geometry, we develop a framework that can be applied to speed up a plethora of geometric optimization problems. Using the framework, we show that well-known geometric problems such as POINT-ON-Q-LINES, DEEPEST-REGION, and DISK-PLACEMENT can be solved in O(n(1+o(1)) quantum time, an improvement on their O(n2) classical time. Our results underscore the advantages of quantum computing and support the Quantum-3SUM-Conjecture, that 3SUM cannot be solved in O(n(1-ε))quantum time for any ε > 0. We believe our framework, which has been shown to work for a variety of problems, can be expanded further for problems beyond geometric domains.

17. Isabella Thomson (4th Year) | Physical and Life Sciences

Project: Determining the abundance of Olpidium brassicae in canola roots

Supervisor(s) and Collaborator(s): Dr. Bobbi Helgason (UofS Honours Thesis Supervisor), Dr. Tim Dumonceaux (AAFC Collaboration), Dr. Jennifer Town (AFFC Collaboration)

Description: Fungal endophyte Olpidium Brassicae is hyper-abundant in canola roots, dominating the other fungi present in canola root fungal amplicon libraries. It's functional role in the broader fungal community is not well defined, and it's effect on canola growth and yield is largely unknown. Existing data regarding O. Brassicae abundance is largely limited to relative comparisons. The aim of this project is to use quantitative PCR to absolutely quantify the presence of O. Brassicae in canola root samples across the province to begin to paint a better picture of how this fungus effects this important western Canadian crop.

18. Xander Slowenko (4th Year) | Physical and Life Sciences

Project: Response of a locust motion-sensitive neuron to object motion in the rear visual field

Supervisor(s) and Collaborator(s): Jack Gray

Description: Dr. Gray studies visual cues in locusts that mediate collision avoidance behaviour during flight. The firing rate of a single pair of visual neurons reflects properties of an approaching object that could represent a threat. The locust has a 360° field of view and can detect objects approaching from nearly any direction, however we do not know the response of the neurons to objects approaching in the rear visual field. My project involves recording activity from the descending contralateral movement detectors (DCMDs), a pair of neurons responsible for object avoidance, and analyzing the collected data.

19. Jumanah Bahig (3rd Year) | Health Sciences

Project: Comparative Analysis of High Flux and Low Flux Dialysis Membranes: In-Situ Synchrotron Imaging and Experimental Ex-Vivo Studies

Supervisor(s) and Collaborator(s): Dr. Amira Abdelrasoul, Dr. Ahmed Shoker

Description: This study conducts a comparative analysis between high flux and low flux dialysis membranes utilizing a dual approach: ex-vivo analysis and synchrotron in-situ investigations. The primary objective is to gain comprehensive insights into the performance and attributes of these membranes, ultimately assessing their efficiency and suitability for dialysis applications.

20. Rachel Andres (4th Year) | Health Sciences

Project: The in vivo intoxication equivalency of ∆9-tetrahydrocannabipherol compared to THC

Supervisor(s) and Collaborator(s): Dr. Robert Laprairie, Kenzie Halter

Description: In this project, we compared the intoxicating effects of THCP, a phytocannabinoid, to delta9-THC. Experiments were performed in mice and behavioural and pharmacokinetic data was ascertained.

21. Hya El-Baroudy (4th Year) | Health Sciences

Project: Macrophage migration inhibitory factor (MIF) as a potential therapeutic target for cisplatin induced peripheral neuropathy
Supervisor(s) and Collaborator(s): Dr. Anand Krishnan

Description: Chemotherapy-induced peripheral neuropathy (CIPN) is a painful condition caused by damage to the peripheral nerves as a result of the neurotoxic side effects of chemotherapeutic agents. CIPN occurs in just under half of patients receiving cancer therapy treatment and is the reason why most patients withdraw from life-saving treatment early. Macrophage migration inhibitory factory (MIF) is a pro- inflammatory mediator that has been shown to be involved in multiple neuropathies including Guillian-Barre Syndrome (GBS) and diabetic foot disease. However, to our knowledge, there have been no relevant studies that have explored the potential role of MIF in CIPN. Therefore, we hypothesized that MIF would play a role in promoting CIPN and therein, inhibiting MIF would help to suppress CIPN. A cisplatin-induced neuropathy model was used in Cx3cr1CreERT2-Rosa26R-EYFP transgenic female mice (n = 20). Sandwich ELISA results revealed significant increases in serum MIF levels of cisplatin treated mice (CP) (n = 5, *p < 0.05). Additionally, Von Frey filament assays showed that CP mice (n = 5) had significant increases in percent change of mechanical pain sensitivity compared to all other groups (****p < 0.0001), whereas co-treatment with MIF inhibitor CPSI-1306 (n = 5) had comparable outcomes to the controls (n = 5). Quantification of axons in the epidermis of mice footpads stained with PGP9.5 using the Fiji program showed no significant differences between all four groups in mean axon lengths or axon counts. However, qualitative Iba-1 staining showed increase in macrophage infiltration in CP treated mice compared to all other groups. Overall, we found that MIF inhibition protected from cisplatin-induced neuropathy through mediated suppression of neuroinflammation, but not through prevention of terminal axon loss.

22. Jian Park (3rd Year) | Health Sciences

Project: Oxidized Lipids Induce Microglia and Macrophage Cell Death

Supervisor(s) and Collaborator(s): Jeff Dong, Kenny Ta, Shirley Yu, Ally Seifert

Description: Multiple sclerosis (MS) is a chronic neuroinflammatory disease characterized by demyelination and neurodegeneration in the central nervous system (CNS). At steady state, axons are myelinated by sheaths of lipids that aid in electrical conduction but during MS the oxidation of myelin associated lipids can lead to the production of cytotoxic molecules such as oxidized phosphatidylcholines (OxPC). Our previous research found OxPC elevation in MS lesions and their injection into the spinal cord white matter of mice induced demyelination and neurodegeneration. These OxPC-induced white matter lesions contains clusters of microglia/macrophages, which are the primary immune cells that respond to OxPC deposition in the CNS. How microglia/macrophages respond to OxPC-induced lesions needs additional investigation. To assess the response of microglia/macrophages to OxPC, we stimulated microglia/macrophages in vitro overnight with oxidized 1-palmitoyl-2-arachidonoyl-sn-glycero-3-phosphocholine (OxPAPC) or 1-palmitoyl-2-(5'-oxo-valeroyl)-sn-glycero-3-phosphocholine (POVPC). In addition, we stimulated monocytes, precursor cells to macrophages, with OxPAPC and POVPC. Over the period of 20 hours, we observed cell death and increased OxPC deposition in both the monocyte and microglia/macrophage cultures. We anticipate our results will aid future experiments in understanding how microglia/macrophages respond to OxPC, thereby better informing their function in the context of oxidative stress injury in MS.

23. Kayla Abrametz (4th Year) | Health Sciences

Project: Rational design of a hyperactive telomere resolvase

Supervisor(s) and Collaborator(s): Kerri Kobryn

Description: The project designs and tests mutants expected to produce hyperactivity in a DNA cleavage and rejoining enzyme called a telomere resolvase that make the hairpin telomeres of the plant pathogen Agrobacterium tumefaciens. The mutants were designed based on comparing actual structures to modeled apo-structures.

24. Katherine Nicks (3rd Year) | Computer Science

Project: A systematic review on users' perception of explanations in recommender systems

Supervisor(s) and Collaborator(s): Professor Julita Vassileva; Elaheh Jafari

Description: We conducted a systematic review of recommender systems, with a focus on identifying the factors and features that contribute to the effectiveness of recommendations in gaining user trust.

Session 2

11:30 am – 1:00 pm, Convocation Hall

1. Sara Pilon (3rd Year) | Humanities, Fine Arts and Social Sciences

Project: Our History is Our Foundation: Honouring Ilarion Ukrainian Residents

Supervisor(s) and Collaborator(s): Jessy Lee Saas (MA), Zoey Smith (BA., Hons), Dr. Jim Handy, Dr. Cheryl Troupe, Ilarion Residence Retirement Home, The Department of History Co-Lab for Community Engaged Research. Adele Danyliuk, Mary Graham, Garth Graham, Bertha Gryba, Elaine Gulutzan, Gloria Hrabowy, Ernie Stefenuk, Elizabeth Ullrich, Loyd Ullrich, Julia Yachiw.

Description: This project is a collaboration between the University of Saskatchewan's Department of History Co-Lab and Ilarion Residence Retirement Home in Saskatoon.

Our project utilizes an oral history methodology which aims to honour the lives of Ilarion's Ukrainian residents through the recording of their life histories via film and transcription. The subsequent creation of two documentaries and donation of project materials to the provincial archives will further contribute to our collective understanding of Ukrainians' experiences in Saskatchewan from the 1940's onward.

Our work would not be possible without the partnership of Ilarion's Ukrainian residents who welcomed us into their homes, sharing stories of their lives, of joy, and of lessons learned. We thank them for their many contributions to this work and the opportunity to learn with and from them.

2. Narek Tamrazyan (2nd Year) | Computer Science

Project: Building a Tool for Facilitating Efficient Program Comprehension Utilizing Dynamic Abstract Source Code Summary Tree

Supervisor(s) and Collaborator(s): Dr. Banani Roy, Justin Schneider

Description: The goal of my project is to facilitate the program comprehension of large-scale projects for new developers. Program comprehension is the process of understanding the implementation and behavior of a software system. It is a challenging and essential part of project maintenance and can take up more than half of the total development efforts and project costs. Software maintenance is vital for handling bugs which in flight control software can lead to fatal plane crashes or errors in self-driving car programs and can cause an increased risk of accidents. Software bugs can also have massive economic impacts, for example, with only 606 bugs costing $1.7 trillion worldwide in 2017, affecting 3.7 billion people and over 300 companies. Software developers also need to comprehend the source code of legacy software which is old but useful. In many cases, this software needs to be migrated to a modern environment as its development technology gets outdated and does not update anymore. For example, The Cold Region Hydrological Modeling (CRHM) system was originally written in Borland C++ and as the programming platform got outdated, it was migrated to a modern C++ environment. I have been involved in the development of a tool called HCPC that extracts and visualizes execution paths and patterns from the dynamic call graphs documented by the instrumented programs. The tool allows a developer to observe how different functions are connected or what features of the program cause the execution of particular methods. The abstract representation of the program's implementation shows itself as an easier and more convenient way for a programmer to become familiar with large projects. As case studies, I am exploring the source code of different source code systems, such as CRHM and Jupiter Client, to understand the effectiveness of the developed tool.

3. Nolen Timmerman (4th Year) | Interdisciplinary

Project: GNAT - A Web Application for the Visualization of Genomic Neighbourhoods

Supervisor(s) and Collaborator(s): Dr. Lingling Jin, Dr. Chantel Trost, Dr. Alan R. Davidson

Description: I developed a web application (GNAT - Gene Neighbourhood Analysis Tool) that takes as input a protein of interest and generates interactive visualizations of the genes upstream and downstream of the protein and all homologs found within a specified database, as well as the phylogenetic distribution of these homologs. This tool is especially useful for biologists studying gene that clusters (e.g., bacterial operons and anti-CRISPR genes) as it provides a user-friendly and visually appealing way for the researcher to browse through many genomic neighbourhoods and potentially identify new genes that cluster or interact with the protein of interest.

4. Ashley Fisher (3rd Year) | Health Sciences

Project: Study of gut-neutron interaction in cystic fibrosis using intestinal organoids

Supervisor(s) and Collaborator(s): Veronica Campanucci

Description: I have developed 3D intestinal organoids cultured from mice and co-cultured them with DRG neurons to study the interactions between them, with particular focus on how neurons from cystic fibrosis (CF) models impact the intestinal epithelium of the organoids.

5. Kaitland Fior (3rd Year) | Health Sciences

Project: Elucidating mechanisms of neuronal uptake of A1 antibodies in a model of multiple sclerosis

Supervisor(s) and Collaborator(s): Hannah Salapa, Michael Levin

Description: As a neurodegenerative disease, multiple sclerosis (MS) results in the loss of neurons. Prior research has shown that one characteristic of MS pathology is abnormal RNA binding protein (RBP) function. Additionally, as an autoimmune disease, MS patients have been found to produce antibodies to the RBP heterogenous nuclear ribonucleoprotein A1 (A1). Addition of A1 antibodies in multiple systems results in endogenous A1 dysfunction which proceeds neurite loss, a measure of neurodegeneration. While previous experiments by our lab show A1 antibodies within neurons, the mechanism mediating A1 antibody entry into neurons is incompletely understood. We hypothesize one pathway of A1 antibody uptake into neurons occurs through antibody binding with Fc receptors, specifically FcγRIII (CD16), which is recognized by A1 antibodies. A neuronal cell line and primary mouse neurons were treated with A1 antibodies and FcγRIII expression was evaluated by immunocytochemistry and Western blot. A1 antibodies were present within cells as early as 15 minutes post-addition and there was an increase in the number of A1 antibody positive cells over time. Addition of A1 antibodies to both a neuronal cell line and primary mouse neurons resulted in a 50% increased band density of FcyRIII expression by Western blot compared to untreated cells. These data indicate one potential mechanism of A1 antibody entry into neurons is via the FcyRIII receptor, which may contribute to the pathogenesis of neurodegeneration in MS.

6. Alycia Kanters (4th Year) | Health Sciences

Project: Exploring the Association Between Laterality and Outcomes in Primary Unilateral Cleft Lip Repair

Supervisor(s) and Collaborator(s): Dr. Michael Bezuhly (Dalhousie University)

Description: The right-sided cleft lip is less frequently encountered than the left-sided cleft lip for reasons yet to be understood. Due to the infrequent occurrence, right-sided cleft lip is acknowledged by many surgeons to be more severe and more challenging to repair.
Methods: The Smile Index proposed by Dr. Caroline Yao and colleagues was used to determine the severity of the cleft pre-operation condition and post-operative outcome acceptability of a prospectively collected dataset from children with unilateral cleft lip at selected Operation Smile surgical program sites. Results: 143 patients were analyzed for pre-operation severity, 112 patients (78.3%) were
categorized as severe, and 31 patients (21.7%) were categorized as non-severe. For left-sided
cleft patients, 66 (75.9%) were categorized as severe and 21 (24.1%) were categorized as nonsevere. For right-sided cleft patients 46 (82.1%) were categorized as severe and 10 (17.6%) were non-severe. 148 patients were analyzed for post-operative acceptability, 125 patients (85.4%) were categorized as acceptable outcomes, and 23 patients (15.5%) were categorized as unacceptable outcomes. For left-sided cleft patients, 76 (83.5%) were categorized as acceptable outcomes and 15 (16.5%) were categorized as unacceptable outcomes. For right-sided cleft patients, 49 (86.0%) were categorized as acceptable outcomes and 8 (14.0%) were categorized as unacceptable outcomes.
Conclusions: Based on data provided by our international cohort, it has been determined that there is no significant difference in the laterality and severity of a cleft lip, in addition, there is no significant difference in the laterality and outcome acceptability of a cleft lip repair.

7. Rylee Moody (2nd Year) | Physical and Life Sciences

Project: Study of Radiation Effects on Various Operational Amplifier

Supervisor(s) and Collaborator(s): Bo Sun, Jerry Yang, Jamie Cardenas Chavez, Dave Hiemstra, Li Chen

Description: In this project, setup several operational amplifiers were setup and tested in a radiation free environment. A long-term radiation dose was applied to the operational amplifiers and their behaviour was monitored and studied.

8. Xinyue (Susie) Xu (1st Year) | Physical and Life Sciences

Project: Secretion system related phenotypes across Klebsiella pneumoniae isolates

Supervisor(s) and Collaborator(s): Jenny-Lee Thomassin (supervisor), Amy Lee (collaborator), Hannah G. Braun (in laboratory mentor)

Description: My project is focused on identifying features shared by disease-causing Klebsiella isolated from humans, farm and domestic animals, and the environment. This summer, I used phenotypic tests and western blot to determine the frequency of various phenotypes in a subset of Klebsiella pneumoniae isolates. A secretion system was found to be functional in most isolates tested, while other phenotypes were found to be variable among the isolates. More work is needed to determine if these variable phenotypes can be associated with Klebsiella isolated from specific host or environmental locations.

9. Rowen Greene (5th year) | Health Sciences

Project: Tumoroid micro-tissues as a representative model of the tumour microenvironment in triple negative breast cancer

Supervisor(s) and Collaborator(s): Dr. Dean Chamberlain (PI)

Description: The tumor microenvironment (TME) plays a critical role in dictating the response of a tumor to treatment. Traditional cancer research that focuses on two-dimensional tissue culture methods largely neglects the role of the TME in predicting the treatment response. Tumoroid microtissues are 2mm long, three-dimensional models that mimic the TME of tumors in vivo and can be easily fabricated in the lab. In this project, baseline cell viability and tumoroid growth characteristics were analyzed over a 21-day time course. Analysis of hypoxia within the tumoroids revealed a lack of oxygen in the core due to rapid cell division during the growth period. Thus, the model may provide a foundation for research into the signature hypoxia-induced changes that occur within the TME of triple negative breast cancer.

10. Will Pahl (3rd Year) | Physical and Life Sciences

Project: Reassessing CSA S304-14 Geometry Requirements for Masonry Prism Testing in Canada

Supervisor(s) and Collaborator(s): Dr. Lisa Feldman

Description: Masonry prisms are used in Canada to verify the strength of masonry structures on Canadian jobsites. However, CSA standards dictate overly large and cumbersome prisms. This project aimed to reduce the size of prisms used in Canada. 126 concrete masonry prisms were built and tested under axial compression in the Structures Lab to determine the effects of varying physical parameters on prism strength. Correlation factors were established between CSA and ASTM codes to allow for the use of smaller prisms in Canada.

11. Kara Walz (4th Year) | Interdisciplinary

Project: Providing therapeutics to the developing world: optical sensors for protein detection

Supervisor(s) and Collaborator(s): Dr. Keith Pardee (University of Toronto), Dr. Mohammad Simchi (University of Toronto)

Description: Many developing regions of the world lack access to lifesaving resources including vaccines, therapeutics, and diagnostic tools; significant efforts are being made to address this. The present work involves developing optical sensors to be used in optimization experiments for, and in tandem with, devices for use at the point of care. The use of these sensors is intended to progress the efforts within cell-free synthetic biology to decentralize healthcare.

12. Ryan Chan (3rd Year) | Health Sciences

Project: Take-Home Naloxone Use and Access in Older Adults Living with Pain: A Scoping Review

Supervisor(s) and Collaborator(s): Erin Yakiwchuk, Katelyn Halpape

Description: Background: Opioids are a common treatment for older adults living with pain. With high rates of polypharmacy and chronic comorbidities, older adults are at risk of experiencing opioid overdose. Take-home naloxone (THN) has evidence to support reduction in opioid-related harms. It is unknown what THN initiatives are available for older adults, especially those living with chronic pain.
Objectives: To summarize the literature regarding THN focused on older adults using opioids for pain, including facilitators and barriers to THN access, knowledge gaps, and pharmacist-led initiatives.

Methods: A scoping review guided by Arksey and O'Malley's framework and PRISMA-ScR guidelines was performed. Search methods involved searching six bibliographic databases, reference harvesting, and citation tracking. Study eligibility was determined by pre-set criteria including age, with inter-researcher consensus for discrepancies. Data were extracted and categorized through thematic analysis.
Results: Four studies were identified. The mean patient age in the studies was 60.1 to 80.3 years old and primarily female and Caucasian individuals were included. Four studies detailed THN programs in primary care settings with older adults taking opioids for pain management. Two studies highlighted patient-specific risk factors for opioid overdose, including concomitant use of benzodiazepines and/or gabapentinoids, mean morphine milligram equivalents per day greater than or equal to 50, and previous opioid overdoses. Educational programs increased patient interest in THN. Conclusion: There is limited literature published about THN for older adults living with pain and no literature on pharmacist-led initiatives in this area. Future research on THN provision in older adults, including pharmacist-led initiatives, could help to optimize care for older adults living with pain.

13. Mehdi Khalaj (4th Year) | Interdisciplinary (Computer Science and Agriculture)

Project: Towards Federated Learning for Privacy-Preserving Analysis of Agricultural Data

Supervisor(s) and Collaborator(s): Sakib Mostafa, Debajyoti Mondal, and Ian Stavness

Description: In modern farming, digital data is becoming increasingly important for improving economic and environmental sustainability. However, there are concerns about data privacy and unintended uses of farm-level data. Recent machine learning developments, such as Federated Learning (FL) and privacy-preserving technologies, can help overcome the issues of data privacy and usage. By avoiding centralized data gathering and model training, farmers can leverage data analysis findings without disclosing their sensitive information. For example, in plant breeding, FL can help preserve the privacy of omics data in developing new plant breeds. This project aims to examine privacy-preserving FL methodologies tailored to farm-level agricultural data, constructing a cross-silo federated learning model (data is partitioned into silos, each with an associated trainer) that promotes data sharing across supply chains. As a proof-of-concept, we compare the classical centralized machine learning (ML) approach to the privacy-preserving FL approach on two computer vision tasks for three categories of plant image datasets. Our results show that the FL approach, in both image classification and object detection tasks, performs almost the same as using the classic ML to train the same models on an individual data source containing all the images. For instance, the accuracy of the classic ML-based image classifier on the Plant Village dataset is 98% which is 1% less than the accuracy of the FL-based image classifier where the FL was trained with 3 and 9 clients which dataset split uniformly between them (which is 99%). The results for the non-uniform dataset split between the clients also show that the accuracy for the image classification task on the Plant Village dataset for both FL (three different scenarios) and classic ML approaches

are almost the same (around 98%). For the object detection task, we observed a 3% improvement in Mean Average Precision (mAP) using the FL approach (70%) compared to the classic ML approach (67%). In addition to the quantitative results, the FL approach helps to avoid centralized data gathering and model training, thus allowing plant breeders to utilize the output of deep learning models without sharing their information and exchanging their sensitive data.

14. Dawn Omoluabi (2nd Year) | Interdisciplinary (Computer Science and Plant Science)

Project: GreenSkEye Web: Full Stack Web Application with Server-side Data Management

Supervisor(s) and Collaborators: Dr Lingling Jin, Dr Ian Stavness, Rodrigo Godoy,Amanda Ewen

Description: GreenSkEye Web is comprised of a full-stack web application for monitoring iPhones actively capturing images using the GreenSkEye iOS App and a data server for storing plant images for use in the GreenSkEye Image Analysis Toolkit.

15. Amanda Ewen (3rd Year) | Computer Science

Project: GreenSkEye Analytics Toolkit: Towards Imaging and Analysis for Pant Disease Progression

Supervisor(s) and Collaborators: Amanda Ewen, Dawn Omoluabi, Rodrigo Godoy, Lipu Wang, M. Alejandra Oviedo-Ludena, Luis Ponce Molina, Randy Kutcher, Lingling Jin*, Ian Stavness*

Description: Greenskeye is a project aimed to create an iOS app for easy imaging and analysis of plants in greenhouses throughout campus. My project focused on the analysis aspect, using image processing to extract colour information from images and summarize it for plant scientists

16. Rodrigo Godoy (2nd Year) | Interdisciplinary (Computer Science and Bioinformatics)

Project: GreenSkEye iPhone App: Towards Continuous Plant Imaging with Smartphones

Supervisor(s) and Collaborators: Dr. Lingling Jin, Dr. Ian Stavness, Amanda Ewen, Dawn Omoluabi

Description: Build an iOS app to capture photos of plants in different environments for research purposes.

17. Mackenzie Heidel (2nd Year) | Family Medicine

Project: The True Complexities of “Standard” Family Practice Visits Unmasked

Supervisor(s) and Collaborator(s): Adam Clay, Megan Dash, Danielle Cutts.

Description: We examined whether family physicians routinely address multiple different concerns for their patients during a single visit and whether patient and physician demographics influence both how many concerns a patient presents with and how many concerns a physician can address in a single visit. Understanding the frequency at which family physicians address more than one concern per visit could inform future standard family practice visit length and billing practices.

18. Annika Dixon (2nd Year) | Health Sciences

Project: Using CRISPR/cas9 technology to establish a model of neurodegeneration in MS

Supervisor(s) and Collaborator(s): Hannah Salapa, Michael Levin

Description: CRISPR-mediated knockout model of hnRNP A1 in neuronal cells to assess the effect of loss of hnRNP A1 on neurons thus providing insight into hnRNP A1-mediated mechanisms of neurodegeneration. We hypothesize that knockout of hnRNP A1 will result in increased neurodegeneration by altering RNA metabolism, including expression of key neuronal RNAs and changes in splicing.

19. Kate DeVito-Porter (2nd Year) | Medicine

Project: Chest Compressions under Transesophageal Echocardiographic Guidance: Analysis of Healthcare Provider Experiences

Supervisor(s) and Collaborator(s): Dr. Paul Olszynski

Description: Sudden cardiac death is one of the leading causes of death in Canada. TEE guided CPR, which is in limited use across North American in the clinical setting, offers healthcare providers TEE guidance during cardiac arrest and thus the ability to receive real time visual feedback to adjust compressions including the area that compressions. This study was developed to determine if experience with TEE-guided CPR could provide insights into how lay-person compressions could be improved in OHCA.

20. Rubana Syeda (3rd Year) | Interdisciplinary

Project: Transcriptomics of the Powdery Mildew fungus during Infection Process

Supervisor(s) and Collaborator(s): Thulani Hewavithana, Yuanyuan Ji, Daniel Wei, Dr.Lingling Jin

Description: Analyzing expression of Powdery mildew fungus (a common fungus that affects a wide range of plants) on Arabidopsis thaliana (a model plant) using Bioinformatics tools/ pipelines and RNA-seq methods using time series data from the biology wet lab.

21. Anton Dmitriev (3rd Year) | Health Sciences

Project: Exploiting Genetic Interactions of MEMO1 for Selective Chemotherapy of Lung Cancer

Supervisor(s) and Collaborator(s): Dr. Franco Vizeacoumar

Description: MEMO1 is an evolutionary conserved metal binding protein implicated in many fundamental physiological processes. While MEMO1's primary cellular function is unknown, it is overexpressed in many types of cancer, including breast and lung cancer, modulating cancer metastasis through increased cell motility. Synthetic dosage lethality (SDL) is a phenomenon when the silencing of one gene combined with

overexpression of another gene is lethal to the cancer cell. To identify potential SDL interactions between MEMO1 and other genes in lung cancer cells, DepMap gene essentiality and MEMO1 expression datasets were analyzed using a principal component analysis of the difference in gene essentiality score and p-value. This in silico analysis identified GMPS, IMPDH2, ELL, ADSL, and UXS1 as the five top genes showing the strongest SDL interactions with MEMO1. IMPDH2 is the target of the experimental antitumor drug tiazofurin, suggesting that tiazofurin may be an effective chemotherapeutic agent against lung cancer associated with MEMO1 overexpression. Ongoing cell viability assays indicate a stronger inhibitory effect of tiazofurin on lung cancer cell lines with high MEMO1 expression level compared to those with low MEMO1 levels. High throughput screening of 1800 FDA approved drugs on lung cancer cell lines, revealed eight drugs with a stronger inhibitory effect on a high-MEMO1 lung cancer cell line compared to the low- MEMO1 cell line. Testing in additional lung cancer cell lines and validation of the hits is ongoing. The compounds identified in this screening represent potential chemotherapeutic agents that exploit the SDL principle for selective targeting of high-MEMO1 cancers.

22. Spencer Dmytruk (2nd Year) | Health Sciences

Project: Identification of ToxCast library chemicals that can induce pre-mRNA splicing defects in C. elegans

Supervisor(s) and Collaborator(s): Dr. Michael Wu

Description: Pre-mRNA splicing is an essential step in transcription and gene expression. Errors in the splicing and processing of pre-mRNA can lead to the translation of non-functional or damaging proteins. These splicing errors can be induced by environmental factors and have been linked to aging and related chronic diseases. Our lab used the nematode *C. elegans* as a model to screen the U.S. EPA ToxCast's library of over 4600 concerning environmental chemicals to try and identify chemicals linked to splicing defects

23. Annaka Chorneyko (2nd Year) | Health Sciences

Project: Sex-related changes in muscle activation during an overhead lift task

Supervisor(s) and Collaborator(s): Dr. Angelica Lang

Description: This study compares muscle activation between females and males during a functional task protocol, and assesses if differences are related to shoulder kinematic differences.

24. Shruti (Karen) Kaur (1st Year) | Engineering and Computer Science

Project: Autonomous Equipment in the mining industry - boon or bane?

Supervisor(s) and Collaborator(s): Ms. Donna Beneteau (Department of Civil, Geological and Environmental Engineering)

Description: In recent years, technological advancements have been integrated into mining equipment, leading to the emergence of autonomous machinery, leading to the emergence of autonomous machinery in local companies including Nutrien, BHP, and Cameco. This research highlights that equipment is moving towards operating with minimal or almost no human workers present at the underground mine site. Although automation increases production rates and improves safety in the workplace, accessing information about technological advances can be challenging, as they are not openly shared due to reasons of confidentiality and the significant time and cost investments involved. To shed some light on the matter, interviews were conducted in addition to the official technical reports were used. To conclude, challenges are highlighted with corresponding valuable insight sharing.

25. Huzaifa Saeed (3rd Year) | Health Sciences

Project: Endoscopic Versus Open Surgery for Juvenile Nasopharyngeal Angiofibroma

Supervisor(s) and Collaborator(s): Michelle M. Carr, Jeremy Walsh, Yousef Omar, James Macaskill

Description: Objective: Juvenile Nasopharyngeal Angiofibroma (JNA) is a rare, vascular tumor that often arises in the nasopharynx of adolescent males. The purpose of this study was to investigate endoscopic versus open surgical approaches for managing JNA.
Methods: A multi-institutional retrospective study was done using the American College of Surgeons National Surgical Quality Improvement Program - Pediatric (ACS NSQIP-P) database to identify patients under the age of 18 who underwent surgery for JNA between 2012 and 2021. ICD9 code (210.7) and ICD10 code (D10.6) representing “benign neoplasm of nasopharynx” were used to select patients.
Results: 106 patients were identified, mean age was 13.6 yr (95% CI 13.0-14.2), 103 (97%) were male and 3 (3%) were female. 83 (78%) surgeries were performed endoscopically (END) and 23 (22%) were performed open (OPN). There was no difference between these groups for

age, sex, or preoperative comorbidities (p>.05). Operative time was significantly shorter in the END group (196 min vs 291 min, p=.003), as was days until discharge (1.0 vs 2, p=.023). There was no difference in mean blood volume lost with 836 ml for END and 854 ml for OPN (p>.05). Seven (8%) in the END group had postoperative bleeding, versus 10 (43%) in the OPN group (p<.001).
Conclusion: Open surgeries for JNA have increased morbidity likely reflecting larger tumors. Almost half of all patients undergoing open procedures bleed post-operatively which bears closer scrutiny geared to improvement.

Session 3

1:30 pm – 3:00 pm, Convocation Hall

1. Aaryan Patel (3rd Year) | Interdisciplinary (Computer Science, Chemistry)

Project: Beamline Automation Software for the Canadian Light Source

Supervisor(s) and Collaborator(s): Denis Denis Spasyuk

Description: Description: Beamline Automation at the Canadian Macromolecular Crystallography Facility (CLS) located at the Canadian Light Source (CLS) would enable scientists and researchers to conduct research more effectively. This project involved developing two key pieces of software to accomplish automation tasks: SCREENER & LOOPER. As implied, SCREENER is a software program developed to screen X-ray Diffraction (XRD). Our novel approach remains significantly faster than other industrial and academic software, screening a singular frame of XRD in 0.226 seconds, compared to 32.12 seconds of the average alternative software. More importantly, SCREENER has custom a Command Line Interface (CLI) and an integrated python wrapping capabilities enabling easy conversion of data for processing. Additionally, LOOPER is a sample cantering computer vision model used to align the sample loop directly under the beam. This is implemented using the YOLOv8 framework, which consists of 53 coevolutionary layered neural network. LOOPER identifies two main segments from the input stream: loop and crystal. The location of these objects are recognized, returned as coordinates relative to the beam, and moved accordingly. As of now, these groundbreaking programs are undergoing rigorous testing within the Industrial MX group at CLS. Their anticipated integration, poised to coincide with the extended shut-down in 2024. This project heralds a new era of advanced automation at the CLS, enabling researchers to navigate complex scientific pursuits with unprecedented ease and precision.

2. Lyuba Pastushenko (2nd Year MS) | Health Sciences, Medicine (Pediatric Cardiology)

Project: A Retrospective Review of Children with Genetically Acquired Aortopathy in Saskatchewan

Supervisor(s) and Collaborator(s): Dr. Tim Bradley

Description: Background: Thoracic aortic aneurysm is often undiagnosed and has a very poor prognosis when presenting with acute aortic dissection. Early diagnosis, expert medical management, and elective aortic surgery are the cornerstones of improvement of long-term survival. International guidelines now recommend the acute and long-term management of these children within multidisciplinary aortopathy clinics under the care of professionals with specific training and experience. The aim of this study was to identify all children being followed in Saskatchewan with genetically acquired aortopathy and describe their genotype and clinical phenotype. Methods: We conducted a retrospective chart review of all children being followed in Saskatchewan with genetically acquired aortopathy. We collected data on genotype, clinical presentation, medical and surgical management and the rate of aortic growth. Results: To date, of the 18 children included (mean age 12.6±5.6 years, 13 males), 17 have Marfan syndrome and 1 has Loeys-Dietz syndrome. The duration of follow-up was up to 13 years, ranging from 1 to 14 clinic visits. Medical management has included angiotensin receptor blockers, beta-blockers or a combination of both in 13 and elective valve sparing aortic root replacement has been required in 3 children. Annual rates of change of aortic root dimension and initial aortic root z-score for body surface area were higher in the children who have required surgery or are approaching surgical indication.
Conclusions: To date, this a descriptive study pending further analysis. However, this data is also to be submitted to the Canadian Aortopathy and Connective Tissues Disorder (Can-ACT) Registry. This national registry aims to identify all Canadian children with genetically acquired aortopathy, describe their clinical phenotype and genotype, foster the development of national clinical management guidelines and facilitate high impact research to improve all aspect of their care.

3. Khizra Haq (2nd Year) | Health Sciences

Project: Exploring Zebrafish Heart Dynamics: Transcriptional Regulation of Cardiac Morphogenesis and Function

Supervisor(s) and Collaborator(s): Dr. Michelle Collins

Description: Cardiac morphogenesis and function are tightly controlled by transcriptional regulators, as disruptions can lead to phenotypes similar to those found in various cardiovascular diseases. Studying disruptions in transcriptional regulators not only provides insights into their role, but the data obtained can also be used to further cardiovascular disease treatment. In this study, two transcriptional regulators were investigated: transcription factor EB (TFEB) and pitx2c. Zebrafish were chosen to model cardiac function due to their high genomic resemblance to humans. Pitx2c is a transcriptional regulator involved in the precise positioning of cardiac structures by repressing left-sided sinoatrial node pacemaker activity. Thus, it is hypothesized that pitx2c mutants will exhibit smaller atrial areas. Whole-mount in-situ hybridization (ISH) was performed on pitx2c heterozygous in-cross zebrafish at 72 and 120 hours post fertilization (hpf) using an alpha myosin heavy chain probe, labeling the atria. Results supported that pitx2c mutants displayed reduced atrial areas. The other transcriptional regulator, TFEB, is involved in the

biogenesis of cardiac endosome and lysosome calcium channels. Calcium movement, facilitated by cardiac calcium channels, is necessary for heartbeats. Since TFEB regulates the expression of genes essential for cardiac function, tfeb mutants are hypothesized to exhibit weakened cardiac function. Heart movies captured from tfeb heterozygous in-cross zebrafish at 120 hpf were analyzed to measure heart rate, heart rate variation, and fractional shortening. However, the results did not reveal any distinct trends among tfeb mutants. In summary, pitx2c mutants demonstrated a reduced atrial area, implying it has a critical role in early cardiac development. Conversely, no discernible trends were observed in tfeb mutants, requiring further investigation.

4. Suzana Grazielli Cortiano Stubert (5th year) | Health Sciences

Project: In vitro organ culture: establishment of a protocol for the culture of swine tonsils.

Supervisor(s) and Collaborator(s): Fernanda Luiza Facioli, Sulove Koirala, Matheus Oliveira Costa.

Description: Tonsils act as the initial detection and defense system against microbes entering a host organism. Thus, they play a pivotal role in the pathogenesis of many infectious diseases. In vitro organ culture preserves the cellular composition and three-dimensional characteristics of an organ, but maintaining viable and functional cells for an extended period of time is challenging. This study aimed to develop a methodology for culturing swine tonsils. Healthy (n=4) donors were used to obtain explants (1cm3) of tonsils which were then cultured in 6-well plates using a cell strainer on liquid media. Explants were sampled after 0h, 8h, 12h and 24h in culture for histopathology. Photographs of the slides were taken and the images were used to count the number of viable cells per cm2 on each slide. Our data revealed an average reduction in the number of cells of 24.6% (SD=5.91%) between 0h and 24h in the 5 trials conducted. We hypothesized that cells may have migrated to the medium, since lymphocytes are mobile cells. Next, we propose to evaluate the use of a collagen matrix instead of cell strainers, increasing the cell contact with both medium and oxygen and minimizing mobility, in an attempt to improve cell viability. Our plan is to obtain explants (n=40) from pigs (n=2) and randomly culture them using cell strainers (n=20) or collagen matrix foams (n=20). Once in culture, media (1mL/well) will be sampled from the wells every 8 hours. Using trypan blue dye and a Neubauer chamber, we will count live and dead cells to evaluate cell migration. We expect this approach to clarify the fate of tonsil cells in the first 24 hours of culture .

5. Leonardo de Lima Henning (5th year) | Physical and Life Sciences

Project: Quantifying variability in plant-soil interactions across Saskatchewan grasslands

Supervisor(s) and Collaborator(s): Jonathan Bennett

Description: As soil microbiota can change according to land use, this project aims to evaluate how grazing and pasture restauration impact soil microbiota, and thus the consequences for soil-associated ecosystems functions like carbon storage and plant productivity. For this, we have collected soil samples from grazing sites varying in intensity and rest time, and from pasture restoration sites as well. The samples were collected from soils with different biological, chemical, and physical characteristics to evaluate how this can affect soil microbiota. These samples will be used to analyze soil microbial diversity, abundance and composition, soil carbon storage, and the effects of these microbiota on plants productivity. We are conducting a greenhouse experiment with alfalfa (Medicago sativa), smooth brome (Bromus inermis), northern wheatgrass (Agropyron cristatum)and american vetch (Vicia americana) grown in sterile soils inoculated with the soil samples from the field. These plants will be harvested after three months to evaluate how the soil microbial inocula affect plant shoot and root production . To determine the microbial abundance and diversity we will use phospholipid fatty acid analysis and DNA focusing on bacteria and fungi . These data will then be combined in statistical models to quantify how grazing management, pasture restoration, and local conditions affect soil microbial communities and their effect on carbon storage and plant growth. Knowing these relationships, we hope to help the livestock industry be more sustainable, as it can play a major role in curbing climate change.

6. Hassaan Sabir (3rd Year) | Physical and Life Sciences

Project: Incidental memory for objects and odours: task optimization and neural substrates

Supervisor(s) and Collaborator(s): DAN L. MCELROY, ILNE L. BARNARD, AIDEN E. GLASS, JOHN G. HOWLAND

Description: What do you remember about your commute to the university today? Such memory is termed incidental memory, a memory acquired without conscious intention. For my summer project, I helped develop and optimize tests to the study the capacity of incidental memories for objects and odours in rats. Ongoing experiments are using the immediate early gene c-fos to correlate activation of cortico-limbic brain regions that underlie performance of these incidental memory tests.

7. Ali Rizvi (2nd Year) | Health Sciences

Project: 4D Tracking of Individual Trabecular Bone Remodelling Events Using Synchrotron Micro-CT

Supervisor(s) and Collaborator(s): Dr. David Cooper

Description: My project used synchrotron micro-CT at the Canadian Light Source (CLS) alongside desktop micro-CT to track changes in rabbit trabecular bones over a two-week period.

8. Kayla Joyce (2nd Year MS) | Health Sciences

Project: A comparison of nucleic acid amplification tests to Nugent score in diagnosis of bacterial vaginosis

Supervisor(s) and Collaborator(s): Dr. Ninad Mehta & Dr. Camille Hamula

Description: Diagnosis of bacterial vaginosis (BV) is complicated by ambiguous clinical presentation and suboptimal laboratory methods. Microscopic analysis of vaginal smears via the Nugent scoring system with quantitation of normal vaginal flora is considered the current gold-standard. This method is labor intensive with suboptimal performance due to subjective technician interpretation. Indeterminate designations via Nugent score complicate assessment for treatment. Nucleic acid amplification tests (NAATs) with varying diagnostic algorithms incorporating bacterial identity and quantity may be an improved approach to BV diagnostics. This study aims to evaluate performance of a molecular NAAT approach to BV diagnosis in comparison to the Nugent scoring system. We collected 198 residual vaginal samples tested via Nugent score and analyzed them with two NAAT assays: i) the BD MAXTM Vaginal Panel (BD Diagnostics, MD, USA) and ii) the AptimaR BV Assay on the Panther system (Hologic, CA, USA). Percent agreement between Nugent scores and PCR results was calculated. Overall percent agreement ranged from 82.8-88.9% (Cohen's kappa 0.45-0.72). A total of 27.3% of samples designated indeterminate by Nugent score were positive by one or both NAATs. Our findings suggest NAATs may have improved sensitivity over Nugent score for detection of BV.

9. Dominic Weninger (2nd Year) | Physical and Life Sciences

Project: Utilization of a Bio-flocculant in the coagulation-flocculation process for the removal of arsenic from water

Supervisor(s) and Collaborator(s): Deysi Venegas-Garcia, Lee D. Wilson

Description: The project will be a poster with a brief explanation of the process, the experimental reasoning and steps taken. Then experimental procedure, experimental results and a conclusion. There will be graphics and references for additional resources.

10. Pahul Singh (1st year) | Physical and Life Sciences

Project: Decoding the spillover potential of retroviruses

Supervisor(s) and Collaborator(s): Omar Haque, Kaushal Baid, Sauhard Shrivastva, Arinjay Banerjee

Description: Bats are being increasingly recognized as hosts of multiple viruses ranging from neuropathogenic lyssaviruses to respiratory coronaviruses; however, infected bat species seldom demonstrate clinical signs of severe disease. The ability of bats to suppress inflammatory responses and adequately recruit a potent innate immune response allows them to remain asymptomatic upon infection with certain viruses [1]. Restriction factors are capsid binding anti-viral proteins that act as watchful guards of the cell before the innate and adaptative immune response bring in the rest of the cavalry. TRIM5α is a post-entry restriction factor for various retroviruses and consists of three main domains; B-box, RING, and coiled coil domain [2]. These are followed by a B30.2 domain involved in viral specificity consisting of four variable regions [2]. Restriction of viral infection occurs when a pair of alpha helices in the coiled coil domain dimerize in response to infection, which is followed by oligomerization of TRIM5α initiated by the B-box. The RING domain is responsible for the recruitment of the E3-ubiquitin ligase which ubiquitinates the TRIM5α oligomer and sends the complex for proteasomal degradation [3]. The B30.2 domain consists of three variable regions and a SPRY domain all of which are involved in binding the virus and mediating specificity of viral interaction [4]. Here, we have cloned and expressed TRIM5α mutants from Eptesicus fuscus bats through site-directed mutagenesis in the V1, V2, V3, and SPRY domains of this restriction factor. All these regions exhibited positive evolutionary selection and we hypothesize that the domains play a vital role in restricting lentivirus/retrovirus infection in bats [5]. Determining potential variability between bat and human TRIM5α amino acid sequences could carve a path towards the development of more potent therapeutics against lentiviruses such as HIV and a better understanding of the antiviral response in bats.

11. Hanna Hashi (3rd Year) | Humanities, Fine Arts and Social Sciences

Project: Rediscovering Julia Perry's works for wind instruments

Supervisor(s) and Collaborator(s): Dr. Amanda Lalonde

Description: Description: This project will discuss the variety of compositions for wind instruments by the African-American neo-classical composer Julia Perry. Perry had a successful career in the early 20th century as a vocalist, composer, and conductor in Europe and America, and her larger symphonic works have been preserved due to her fame. However, her compositions written for solo and smaller chamber ensembles of wind instrumentation have received less attention. Due to her passing at the early age of 55, many of her works were not preserved and published successfully, and so her wind instrument compositions are not as easily accessible. Researching and discussing her compositions for wind instruments will bring awareness to the variety of her works and to her successful musical career that was ended too soon. In addition, creating knowledge about her works could help to add much-needed diversity and representation to the wind repertoire.

12. Abdullah Qureshi (3rd Year) | Health Sciences

Project: High-throughput Identification of Chemicals Associated with Dopaminergic Neurodegeneration in relation to Parkinson's Disease

Supervisor(s) and Collaborator(s): Dr. Michael Wu

Description: Our environment is a key determinant of human health and recent research has proven chronic exposure to chemicals - even at low concentrations - can lead to chronic diseases. Therefore, my aim was to identify any previously uncharacterized novel environmental chemicals that may induce neurodegeneration and be a risk factor for Parkinson's disease. In the Wu lab, we utilize the genetic organism Caenorhabditis elegans which is perfect for my project as they are model organisms for evaluating developmental neurotoxicology. The transgenic strain of C. elegans used for this study expresses a dual reporter system and has a red-fluorescent protein (RFP) linked to the dop-3 (dopamine receptor-3) gene and green-fluorescent protein (GFP) linked to the dat-1 (dopamine transporter-1) gene allowing us to visualize these 2 dopaminergic markers that are expressed in muscle and neurons to identify chemicals that exhibit dopaminergic neurotoxicity. I screened this strain of worms against the U.S EPA ToxCast library which consists of around 5,000 chemicals to identify any that exhibit neurotoxicity and/or induce locomotor defects. As a result, we identified 11 chemicals ranging from herbicides, fungicides, ink toner, and glaze for ceramics, additives for condiments, medicine components, dyes, and industrial reagents that require further experimentation.

13. Hana Rogers (3rd Year) | Physical and Life Sciences

Project: Investigation of candidate genes on chromosome 18 for gestation length in beef cattle

Supervisor(s) and Collaborator(s): Mika Asai-Coakwell, Bart Lardner, Tim Mutsvangwa

Description: The length of gestation is important in beef cattle production because shorter gestation lengths can improve reproductive efficiency for producers and animal health by reducing calving difficulty and allowing the dam more time to recover before the next gestation. Unlike other reproductive traits, gestation length is moderately heritable, meaning it can also be selected for. This study identified positional and candidate genes on bovine chromosome 18 which is where several previous studies have found associations to reproductive traits in beef and dairy cattle. KLK13, KLK14, and CEACAM18 were examined for variations such as insertions, deletions or single nucleotide changes in the DNA that could be associated with a shorter or longer gestation length. These variations could then act as genetic markers for producers in the future when selecting for gestation length, rather than having to breed the animals first to record gestation length.

14. CJ Manning (4th Year) | Interdisciplinary (Food Science and Agriculture)

Project: Development of plant-based eggs using canola proteins

Supervisor(s) and Collaborator(s): Dr. Michael Nickerson, Andrea Stone, Colten Nickerson

Description: This study aims to develop a plant-based egg replacer that mimics the texture and rheological properties of the real egg by high-pressure homogenization (HPH). Also, to examine the impact of adding high-methoxyl (HM) pectin and calcium as texture modifiers. Canola protein isolate (CPI), the plant protein used in this project, was formulated with other ingredients such as hydrocolloids, salts, and vegetable oil to make up the egg replacer emulsion. The emulsions were subjected to high-pressure homogenization at 20,000 psi for six cycles. Emulsions were evaluated on their gelation, viscosity, and droplet size, followed by their performance in pan-frying. The colour and textural properties of the scrambled egg patty were also examined. It was found that plant-based high-pressure homogenized scrambled egg made from CPI has good potential as a plant-based egg replacer. Also, the addition of calcium improved the gelation of the fried plant-based eggs. Further studies on emulsion stability and comparison with the whole liquid egg and market sample, together with appropriate statistical analysis, will be the next step of this study.

15. Chi Vu (3rd Year) | Computer Science

Project: Using Topic Modelling to Identify Challenges Developers Face When Working with Scientific Workflow Management Systems

Supervisor(s) and Collaborator(s): Dr. Banani Roy, Khairul Alam

Description: This project focuses on using topic modelling to investigate the difficulties encountered by developers when working with scientific workflow management systems. It utilizes the BERTopic library to extract meaningful topics from data collected from Stack Overflow posts and GitHub Issues. This study builds on previous analysis that employed LDA techniques and unigram/bigram for text categorization. The aim is to gain insights into common issues and challenges faced by developers in this field, potentially leading to the development of more efficient and user-friendly tools for scientific workflow management systems. By utilizing real-world data, the research ensures practical concerns are addressed, ultimately improving the usability and effectiveness of these systems.

16. Mahammad Ali Saritala (4th Year) | Chemical and Materials Engineering

Project: Assessment of Fibrinogen Attachment to Innovative Zwittronic and Pseudozwittronic Cellulose Triacetate Membrane Matrices using Synchrotron Radiation Micro-computed Tomography (SR-μCT)

Supervisor(s) and Collaborator(s): Dr. Amira Abdelrasoul

Description: This study utilizes Synchrotron Radiation Micro-computed Tomography (SR-μCT) to investigate the attachment of Fibrinogen to innovative Zwittronic and pseudozwittronic Cellulose Triacetate Membrane Matrices. The aim is to uncover key interactions and structural changes at a microscopic level, providing valuable insights for optimizing these new membrane materials.

17. Caleb Hammond (3rd Year) | Health Sciences

Project: Exploring the role of MANF-Neuroplastin axis in adult neuron outgrowth

Supervisor(s) and Collaborator(s): Dr. Anand Krishnan, Bhadrapriya Sivakumar
Description: Peripheral nerves are essential connections in the body and integrate the physiological functions of other adult tissues. The nerves encounter several forms of physiological and metabolic challenges and associated insults during their lifetime. Despite these challenges, the nerves maintain their structural and functional integrity. For example, nerve damage can result from increased metabolic demands of the tissues that they innervate, sports-related injuries, non-supervised exercise, etc. In response, peripheral nerves regenerate and reinnervate target tissues

to maintain bodily functions. However, the molecular mechanism of peripheral nerve regeneration is poorly understood, and the lack of such knowledge poses hurdles in developing therapies for improving nerve regeneration and repair for tackling major nerve insults. Our lab recently identified that the neurotrophic factor, mesencephalic astrocyte-derived neurotrophic factor (MANF), which we recently found expressed in the peripheral neurons, promotes adult peripheral neuron outgrowth in vitro. However, the mechanism by which it promotes neuron outgrowth is unknown. Although not established, a recent study demonstrated that the adhesion molecule Neuroplastin (NPTN) serves as a receptor for MANF. Our lab found that NPTN is expressed in peripheral neurons. My summer research examined if NPTN is critical for MANF-dependent peripheral neuron outgrowth. Exploring the critical importance of the MANF-NPTN axis in peripheral neurite extension will advance the fundamental knowledge of peripheral nerve regeneration. It may also reveal an ideal therapeutic intervention point for neurodegenerative disorders, including several neuropathies.

18. Vivian Heinrichs (2nd Year) | Health Sciences

Project: Acute Effects of Lower Trapezius Activation Exercises on Shoulder Musculature during Functional Tasks

Supervisor(s) and Collaborator(s): Angelica Lang, Annaka Chorneyko

Description: Subacromial Pain Syndrome (SAPS) refers to shoulder pain localized to the acromion, and it is associated with irregular scapular kinematics and muscle activity. In patients with SAPS, the upper trapezius (UT) activity is abnormally increased and the muscle activity of the lower trapezius (LT) and serratus anterior (SA) are inhibited. Exercises to rehabilitate the scapular kinematics and activate the weakened muscles may be effective at reducing the pain and disability of patients with SAPS. The present study examined the effectiveness of previously reported LT activating exercises and their impact on shoulder musculature in a functional task protocol. This study found that the exercises as a whole did not effectively or preferentially recruit the LT over the UT. Despite the limited effectiveness of the exercises, a small, but significant, increase in LT activity was noted in the Right Overhead Reach task. Previous literature has documented abnormalities in overhead reaches in populations with pathological shoulders. Since the overhead reach appears to be a movement where pathological populations experience biomechanical changes, it is of therapeutic interest that these flawed exercises were able to invoke a change in LT activity. This suggests that this may be an avenue of research that warrants further investigation.

19. Mary Zhou (3rd Year) | Health Sciences

Project: Duration of hypothalamic-pituitary-adrenal axis (HPAA) suppression after long-term immunosuppressive oral prednisolone therapy in dogs

Supervisor(s) and Collaborator(s): Mathieu Paulin, Chantal McMillan, Jasmine Gu, Dorsa Mehrabanpour, Elisabeth Snead

Description: The objective of our study was to measure the duration and magnitude of HPA axis suppression in healthy dogs from prednisolone drug therapy, as this is fundamental physiological data missing from the literature despite widespread drug use. Dogs were administered a placebo for 14 days followed by prednisolone for 35 days which was then abruptly discontinued. Following discontinuation HPAA function was assessed every 1-2 weeks (2 weeks post-therapy=P2, etc) until recovery was evident in all dogs.

20. Mykyta Shvets (2nd Year) | Physical and Life Sciences

Project: Quantum Simulations of Quantum Materials: A Proof of Concept

Supervisor(s) and Collaborator(s): Steven Rayan

Description: Hamiltonian simulation uses quantum computers to solve complex scientific problems accurately and efficiently, such as predicting molecular structures and material properties. It offers the potential for exact solutions and valuable insights into the power of quantum information processing.

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