

EMPOWER ENVISION



EXCEL

MURC

MULTIDISCIPLINARY
UNDERGRADUATE
RESEARCH
CONFERENCE

PROGRAM GUIDE

MARCH 16, 2024



THE UNIVERSITY OF BRITISH COLUMBIA
Centre for Community Engaged Learning
Student Affairs



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LAND ACKNOWLEDGEMENT

The lands of what is now known as British Columbia have been cared for and inhabited by Indigenous Peoples since time immemorial. We specifically acknowledge that UBC's Vancouver Point Grey campus is situated on the traditional, ancestral, and unceded territory of the Musqueam people, and UBC's Okanagan campus is situated on the traditional, ancestral, and unceded territory of the Syilx people. It is in this recognition of being on unceded land where we will ground our conversations of research further.

We also acknowledge that given the hybrid format of this year's conference, MURC participants will be joining this conference from many places, near and far, and we also acknowledge the traditional owners and caretakers of those lands.



WHAT IS MURC?

The Multidisciplinary Undergraduate Research Conference (MURC) is an annual celebration of undergraduate research happening on the UBC campus. At MURC, student researchers showcase their research in an oral or poster presentation format. Work presented at the conference includes undergraduate theses, directed studies and other faculty-supervised research projects.

Our theme this year is “Empower, Envision and Excel”, we wish to focus on the researchers, particularly on the growth and self-discovery that they can generate for themselves. Empower focuses on our vision for students to be driven by their research and empowered by those in the field to start their own research journey. Envision emphasizing personal aspirations uncovered by their curiosity and exploration allowing them to envision their future. Excel reflects the ambitions of researchers while prioritizing personal growth and professional skills. Each presenter has a unique background and the goal is to put all of our diverse perspectives together to promote the pursuit of research with a multidisciplinary lens.

MURC | **MULTIDISCIPLINARY
UNDERGRADUATE
RESEARCH
CONFERENCE**

IS EXCITED TO FEATURE

**312 PRESENTATIONS
FROM
450 UNIQUE PRESENTERS**

SCHEDULE

March 16, 2024

Get an overview of the day

Time	Event	Location
8:00 am - 9:15 am	Wave 1 Virtual Presentation	Online
8:00 am - 9:30 am	Registration	SWNG Lobby
9:30 am - 10:15 am	<u>Keynote Presentation with Dr. Vivian Tsang</u>	CIRS 1250
10:30 am - 11:45 am	Wave 2 Oral Presentations Wave 2 Poster Presentations	SWNG Building Ponderosa Ballroom
12:00 pm - 1:15 pm	Wave 3 Oral Presentations Wave 3 Poster Presentations	SWNG Building Ponderosa Ballroom
1:30 pm - 2:00 pm	<u>Storytime: The Southern Resident Killer Whales: Evidenced Based Hope & Optimism Through Story</u>	PCN 1001
2:15 pm - 3:00 pm	<u>Panel: Picturing Possibilities Beyond the Books</u>	SWNG 105
3:15 pm - 4:30 pm	Wave 4 Oral Presentations Wave 4 Poster Presentations	SWNG Building Ponderosa Ballroom
4:45 pm - 6:00 pm	Wave 5 Oral Presentations Wave 5 Poster Presentations	SWNG Building Ponderosa Ballroom
6:15 pm - 6:45 pm	<u>Closing Ceremony & Awards</u>	SWNG 121

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KEYNOTE SPEAKER

Dr. Vivian WL Tsang

Dr. Vivian WL Tsang is a first-generation Canadian who started her academic journey at UBC. She has an MD from UBC, MPH from Harvard University, ICD.D from U of T Rotman School of Business, and is currently working on attaining her DPhil from Oxford University. She holds an Adjunct Professorship through Vancouver Island University and works as a psychiatry resident physician in Vancouver doing both inpatient and outpatient clinical work.

Most of her research work pertains to addiction psychiatry with the umbrella theme of 'drugs as a harm and drugs as an aid'. She is part of the Addictions and Concurrent Disorders Lab at UBC and Co-PI on the multi-site BC Fentanyl Cohort Study. She also runs her own research team at The Votum Lab. Dr. Tsang is the Research Lead of Roots to Thrive, a non-profit psychedelic clinic in Nanaimo. This clinic was the first to provide psilocybin to patients in BC under the Special Access Program. She is also one of the founding members and the Research Director of the new Naut sa Mawt Psychedelic Centre on Vancouver Island. She remains on the steering committee of C4T which is the Canadian Childhood Cannabinoid Clinical Trials group, one of the largest cannabis research groups in the country.

Dr. Tsang is the Executive Chair of the Board of Directors of Qi Integrated Health, a multi-modality health clinic on Burrard and West 7th. They offer ketamine-assisted therapy programs as well as other health services. In her free time, Dr. Tsang runs a registered Canadian Charity called The HOPE Initiative and is the National Director of a young person's research advisory group KidsCan which is part of an international conglomerate working on regulations for paediatric clinical trials. This group recently won a \$20 million CIHR grant to initiate a pediatric trials network for rare diseases.



STORYTIME SPEAKER



Dr. Sandra Scott

My work is guided by Wonder as the Heart of Inquiry and Eco Pedagogy, which I view as learning in, from, and alongside nature with Nature as Companion, Teacher, Mentor, and Guide. Science education is my home, and my experiences developing relationships, teaching, and learning alongside my students provide the foundation for all my pedagogical pursuits. I welcome and guide students on a journey to wonder through courses in Inquiry, Science Methods, Environmental Education, Research Methods, and field experiences in community. My teaching centres joy, evidence-based hope and optimism and follows a constructivist approach guided by collective noticings and wonderings.

PANELISTS

Jin Wen PhD Candidate

Jin completed his Master's degree in Health Psychology at the University of British Columbia in 2020. He is currently a PhD Candidate in the Health Psychology program under the supervision of Dr. Nancy Sin. Jin's research interest is examining how nightly sleep influences daily experiences of stress and emotions via ecological momentary assessments and biomarkers. His future goal is to strive to develop accessible interventions to help improve sleep hygiene as well as mitigate the negative effects of daily stress.



PANELISTS

Ilke Geladi

PhD Candidate

Ilke Geladi is a PhD candidate at the institute for resources, environment and sustainability (IRES) at UBC, a sessional instructor for BIOL180 and a public scholar. Her research explores questions related to the conservation of landbirds in the agricultural zone of Santa Cruz Island in the Galapagos archipelago. Her work takes on an interdisciplinary lens as she aims to tie together aspects from ecological, evolutionary and social disciplines to help eventually inform a conservation plan for landbirds in Galapagos. She completed her undergrad in Biology at McGill University and her Msc. in Tropical Biology through the European Erasmus Mundus Masters Programme.



Lianne Cho

PhD Candidate

Lianne is currently a 6th year student in UBC's MD/PhD program, which is a dual degree program for people who aspire to be physician-scientists. For her PhD, she is studying the relationships between early life experiences, trauma, substance use, and mental illness as part of the Hotel Study, which examines multimorbidity in those who are precariously housed. Generally speaking, Lianne is interested in exploring different ways of knowing, and in investigating how life experiences, social environments, and cultural elements interact to inform well-being. Her objective is to contribute to the advancement of personalized mental healthcare.

ROGERS COLLABORATIONS



Rogers has kindly sponsored MURC 2024. With their support, we were able to put this conference together. We are grateful for their continued contribution in promoting undergraduate research here at UBC.

FEATURED PROGRAMMING

BOOTHING

Want to learn more about research opportunities available at UBC and beyond? Stop by our boothing area to talk with local research-based companies, UBC programs, and student organizations to take your research to the next level! Boothing organizations include ORICE, the Canadian Journal of Undergraduate Research (CJUR), UBC Career Centre and more! Taking place from 10AM-6:00PM outside Ponderosa Ballroom, come visit the following organizations!



SPIN-THE-WHEEL

Test your luck with our new spin the wheel feature! Prizes consist of various MURC merch such as stickers, magnets, tote bags and a polaroid film for you to capture your MURC experience! Just inside the Ponderosa Commons Lobby.



PHOTOBOOTH

Stop by our photo booth outside Ponderosa Ballroom and capture your favourite memories with your friends and family or fellow presenters. Be sure to tag us @ubcmurc or #ubcmurc2024

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Wave 1

VIRTUAL
PRESENTATIONS

WAVE 1

VIRTUAL PRESENTATIONS

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Navigating Nepal's Independence and Sovereignty	Dipansha Tokas
mga: User-friendly R package for microbial genetic analysis for amplicon data	Erika Lin

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Charting Pathways: Enhancing Pain Management for Children with PIUO - A Visual Analysis of 72 Individuals' Pain Survey Scores	Faniry Ramorasata
Dining Democracy: Resident Councils' Influence on Food Issues in Long-Term Care	Isabel Huang

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The Sky's the Limit: Aerial Warfare in Operation Inherent Resolve and Counterterrorism Outcomes	Matthew Kielar

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Applicability of Self-healing Concrete for Resilient and Sustainable Construction	Savero Lukianto Chandra

MURC 2024

Presentation Format: Virtual Presentation (Room 1)

Presenter Name(s): Davin Hu

Presentation Title: Motor adaptation in response to different error signals

Abstract:

How do we maintain well-calibrated movements in a world where we constantly encounter changes to the environment and body? For instance, when we walk from concrete to ice, our gait — through an error-driven learning process called motor adaptation — modifies itself to produce different force outputs and timings to uphold our walking ability. Errors experienced in current movement lead to the recalibration of future movements. It is widely believed that motor adaptation is driven by sensory prediction error (SPE), the difference between actual and predicted sensory feedback associated with a motor command. Recent studies have also shown that adaptation can be modulated by task error (TE), the difference between motor outcome and task goal. However, whether TE alone can drive adaptation remains an open debate, making it unclear how different types of errors change our movement behaviors. To test this idea, we adopted a protocol that allowed us to separate TEs from SPEs. Participants were instructed to make reaches to visual targets presented on a horizontally-oriented monitor by sliding a stylus along a tablet positioned underneath the monitor. To assess learning from SPEs, the cursor representing the hand was rotated relative to its actual position. To assess learning from TEs, the target “jumped” mid-reach to a new location. Our results showed that there was robust adaptation to SPEs, but little-to-no adaptation to TEs alone. This suggests that the motor system is highly attuned to errors generated from disturbances to the body and not from disturbances to the task goal alone.

MURC 2024

Presentation Format: Virtual Presentation (Room 1)

Presenter Name(s): Dipansha Tokas

Presentation Title: Navigating Nepal's Independence and Sovereignty

Abstract:

Nepal is a country with a rich history and cultural resilience. Despite being surrounded by larger nations like India and China and being landlocked from all sides, it has maintained its independence and sovereignty. However, Nepal's significance is often overlooked in the discussions of major power-dominant countries in South Asia and Western countries. Unfortunately, small and lesser-known countries like Nepal are often neglected and forgotten, leading to a fading and burying of its rich history and culture. Our research aims to examine how dynamic interactions between geography, geopolitics, culture, and psychology have collectively safeguarded Nepal's independence. We will conduct a thorough review of a wide variety of data and literature to make observations. Additionally, we will interview relevant and knowledgeable individuals in the field, such as Pasang Yangjee Sherpa, assistant professor in the Department of Asian Studies. By generating awareness about Nepal's illustrious history and safeguarded independence, we can generate interest and promote better understanding and support for the country. This will prevent people from forgetting about this often-overlooked part of the world that holds so much knowledge.

MURC 2024

Presentation Format: Virtual Presentation (Room 1)

Presenter Name(s): Erika Lin

Presentation Title: mga: User-friendly R package for microbial genetic analysis for amplicon data

Abstract:

Studying microbes is fundamental in advancing a wide array of scientific fields, from ecology to medicine and pharmaceutical research. With the increasing use of amplicon sequencing technology, new bioinformatics tools are needed to process and analyze microbial DNA sequencing data. Existing software for microbiome analysis, although extensive and established, are often either inflexible or difficult to learn for new users. Furthermore, to ensure reproducibility, researchers frequently build their workflows by coding in command-line programs like R, an open-source software made for quantitative analysis and graphical visualization. However, available R packages target different steps of the DNA analysis process and may be unintuitive for those unfamiliar with coding. To address this lack of rigorous but also easy-to-use software for microbiome analysis, we developed the R package mga: Microbial Genetic Analysis, that streamlines several key steps of genetic data processing. This openly accessible software package distinguishes genetic sequences, classifies taxonomy, builds evolutionary and co-occurrence networks, and calculates key measures of ecological community structure from filtered DNA sequences. To effectively handle genetic data for any microbial community analysis, the core function `mga()` was designed to be comprehensive, versatile, and user-friendly, collapsing thousands of lines of code into a few simple, yet flexible inputs. Our package was tested with fungal and bacterial datasets, producing results consistent with the literature, and it is built to handle various microbial taxa targeted for amplicon sequencing. By facilitating diversity, community network, and differential analyses, mga supports reproducible and accessible microbiome research.

MURC 2024

Presentation Format: Virtual Presentation (Room 2)

Presenter Name(s): Isaac Qi

Presentation Title: “Don’t f*** with nature or it will f*** with you”; public perceptions on genetically engineered production cattle, analyzed using YouTube comments

Abstract:

Applications of genetic engineering (GE) within the livestock agriculture industry has the potential for significant strides toward improving animal welfare. Notable successes include improving heat stress resistance and the proliferation of the polled gene in cattle, eliminating the need for dehorning, a procedure often critiqued for its cruelty. Despite these advancements, public acceptance remains a crucial determinant in the widespread adoption and commercial success of genetically engineered (GE) livestock products. Understanding public perceptions is essential as consumer views significantly influence the feasibility of integrating GE technologies into mainstream agriculture. This study employs a novel approach to explore public perceptions of genetically engineered cattle by utilizing comments from YouTube videos as a primary data source. Deductive thematic analysis was selected to leverage a priori codes based on the extensive existing literature to systematically examine and interpret the public discourse surrounding GE cattle in the dairy and beef sectors. Results revealed that public opinions align closely with previously identified concerns, encompassing ethical and moral considerations, animal welfare concerns, environmental impacts, alternative approaches to livestock management, and uncertainties towards GE technologies. A noteworthy finding from this analysis is the dynamic exchange between individuals with differing levels of knowledge about genetic engineering, highlighting the significant role of public engagement and education in shaping informed and nuanced perceptions of GE practices. By assessing unfiltered social media responses, this research illuminates the complex landscape of public opinion on genetically engineered livestock, advocating for informed, ethical, and sustainable advances in genetic engineering technologies.

MURC 2024

Presentation Format: Virtual Presentation (Room 2)

Presenter Name(s): Faniry Ramorasata

Presentation Title: Charting Pathways: Enhancing Pain Management for Children with PIUO – A Visual Analysis of 72 Individuals' Pain Survey Scores

Abstract:

Background:

Infants, children, and youth with rare and complex central nervous system conditions often endure pain and irritability. This discomfort may result from medical procedures or physical issues such as muscle spasms. However, identifying the source can be challenging, leading pain specialists to refer to it as Pain & Irritability of Unknown Origin (PIUO).

Objective:

The objective is to enhance the treatment of children with complex conditions and PIUO while streamlining the process of identifying and addressing their pain.

Methods:

72 children with central nervous system conditions and impaired communication, participated in a six-month study across Canada. Randomized into the treatment group (PIUO pathway) or current standard care (waitlist), their pain survey scores were graphed over time to highlight individual pain management journeys and key events like hospitalizations or ER visits.

Results:

Visually assessing pain survey scores (ranging from 0 to 6) throughout the study, both groups generally demonstrated stability around baseline scores. However, participants in the PIUO pathway exhibited an average score reduction of almost 1 point from baseline (-0.8), whereas waitlisted individuals experienced a slightly smaller decrease (-0.5).

Conclusion:

This study holds significance in potentially establishing a protocol to alleviate pain in children. Addressing the need for effective pain management in this vulnerable population, the study underscores tailored approaches for children with complex conditions with broad implications for pediatric healthcare. Successful outcomes may lead to the formulation of guidelines and workshops to educate clinicians, disease advocacy groups, and families on the optimal approach to assessing and treating PIUO.

MURC 2024

Presentation Format: Virtual Presentation (Room 2)

Presenter Name(s): Isabel Huang

Presentation Title: Dining Democracy: Resident Councils' Influence on Food Issues in Long-Term Care

Abstract:

Food has been identified as a priority issue by residents and a key area of improvement in long-term care (Boelsma et al., 2014). In British Columbia, long-term care residents have the right to participate in a council. These groups meet regularly to discuss concerns and advocate for change. While previous studies have explored food (dis)satisfaction among residents, few have considered the role of resident councils in advocating for changes in food quality and the overall dining experience. This study sought to address this gap by: (1) describing the types of food issues that were brought up within resident council, (2) comparing the food issues residents were able to influence and which they were not, and (3) exploring the factors that shaped residents' ability to influence food-related issues.

Ethnographic research was undertaken with a resident council in a Vancouver care home. Data collection included observation of resident council meetings (n=8) and semi-structured interviews with members of resident council (n=8). Comments about food from fieldnotes and transcripts were coded into 4 categories (food and menu planning, mealtime experience, nutrition care, eating assistance), and analyzed using thematic analysis. Out of the 4 categories, residents affected the most change within food and menu planning and mealtime experience, while nutrition care and eating assistance received less attention and were perceived as specialized, individual concerns. These findings suggest that although resident council can improve the dining experience for residents, those requiring eating assistance or on specialized diets may require extra attention to be included.

MURC 2024

Presentation Format: Virtual Presentation (Room 3)

Presenter Name(s): Jamie Robson, Shauna Ndoping

Presentation Title: The Role of Near Solstice Solar Radiation on the Pacific Northwest Heatwave of 2021

Abstract:

In late June 2021, the Pacific Northwest was hit with a severe heatwave that broke national temperature records and made worldwide news. Studies published after the event attribute high temperatures to a “perfect storm” of rare events. We investigate the impact of the maximised near-surface incoming solar radiation resulting from the proximity of the summer solstice on the event’s extreme temperatures. Using a regional weather model over the Pacific Northwest, we model the dynamics of the heatwave event, changing the levels of incoming solar radiation to match those in August, July, and May. A model of the actual conditions in June 2021 are used as the control. We investigate differences in surface temperatures, surface heat fluxes, geopotential heights, and upper- and lower-level temperature differences between the experiments. June simulations break local temperature records over a wide region and by a larger margin than August simulations. The radiation differences increase surface heat fluxes as well as impacting upper-level dynamics and temperature profiles. However, the response of surface temperature largely follows the timing of direct solar heating, indicating little feedback influence from upper-level changes. Sensitivity tests show that the temperature responses are consistent across various model parameterizations. These results indicate that the temperatures were influenced by several degrees Celsius by peak radiation due to the summer solstice, although records would still have been broken under August solar radiation conditions.

MURC 2024

Presentation Format: Virtual Presentation (Room 3)

Presenter Name(s): Matthew Kielar

Presentation Title: The Sky's the Limit - Aerial Warfare in Operation Inherent Resolve and Counterterrorism Outcomes

Abstract:

This study analyses the applications of air power and their effects on terrorist violence during Operation Inherent Resolve (OIR), the U.S.-led campaign to defeat the Islamic State of Iraq and Syria (ISIS). Using data on coalition airstrikes and attacks conducted by ISIS, I assess the effects of targeting methods on ISIS' capacity for terror attacks and insurgent activities. In particular, this study looks at the differences between dynamic targeting, undertaken during compressed timelines against unanticipated targets, and deliberate targeting, prosecuted against deliberately planned targets known in advance. In general, aerial warfare strategies employed during OIR were broadly linked with noticeable reductions in ISIS-affiliated violence. However, I find differences in violence disrupting effects between targeting methods. While dynamic targeting of military assets had negligible effects on ISIS attacks, I find that deliberate targeting of ISIS infrastructure and logistical networks resulted in significant short-term decreases in the frequency of ISIS terror attacks and insurgent activities. These results present a few implications that could lead to a refinement of counterinsurgency strategies going forward, namely more precise applications of air power during campaigns against militant and insurgent groups.

MURC 2024

Presentation Format: Virtual Presentation (Room 4)

Presenter Name(s): Negarr Naderi

Presentation Title: UBC Pharmacy Academic Teaching Practicums: Environmental Scan and Recommended Updates

Abstract:

The UBC Pharmacy Academic Teaching Practicums play a vital role in shaping future pharmacist leaders and educators. The Faculty of Pharmaceutical Sciences offers two teaching practicums: PHRM 473 and the Hospital Residency Academic Teaching Practicum. First started in 2018, these practicums have expanded and grown in focus but they have not been formally evaluated with respect to preceptor experience and feedback. This study aimed to evaluate the effectiveness of these practicums from a preceptor perspective by conducting a literature review on teaching practicums and an environmental scan, and based on this scan make recommendations for further improvement. The environmental scan was conducted by interviewing eight faculty members who are preceptors in the academic teaching practicums. Interviewees were inquired about their role as a preceptor, asked to identify gaps in student knowledge, and suggest ways of enhancing the student learning experience while on practicum. The environmental scan showed that most faculty members have positive experiences with both teaching practicums. Based on identified gaps, recommendations to enhance the student learning experience included adding a self-reflection component (such as a reflective teaching philosophy activity), an activity whereby students are asked to create their own learning objectives, and providing students with an asynchronous module on the foundations of teaching prior to starting the practicums. From these recommendations, a simple resource guide was created to aid preceptors. The findings of this study hope to further improve the students' learning experience in the UBC Pharmacy Academic Teaching Practicums thereby better preparing them as future pharmacist- educators.

MURC 2024

Presentation Format: Virtual Presentation (Room 4)

Presenter Name(s): Savero Lukianto Chandra

Presentation Title: Applicability of Self-healing Concrete for Resilient and Sustainable Construction

Abstract:

Incorporation of healing agents in concrete structures has been gaining popularity to increase concrete's crack self-healing possibility (Van Tittelboom et al., 2012). Many studies have investigated the mechanical properties of self-healing concrete (SHC) and compared these parameters to those of normal concrete (Wang et al., 2019 & Meraz et al., 2023), yet there is still some gap in the realm of concrete technology that can be filled by the studies of SHC with local building codes. Additionally, imperative need is being felt to see how the self-healing properties of these materials could improve structural resilience. This study aims to identify the resilience of SHC as a novel construction material and how its application contributes to sustainable construction. Specifically, we aim to conduct a systematic literature review from exemplary studies that describe how different healing agents affect certain properties of SHC. The literature suggests that different healing agents may contribute differently to augmentation of a concrete's compressive strength, all still meeting the minimum mechanical properties criteria prescribed by NBCC.



Wave 2

Poster and Oral
Presentations

WAVE 2

ORAL PRESENTATIONS

SWNG 107

A Model of the Cultural Evolution of Innovations	Aarohi Yadav
Designing Spectrophotometers: A Guide to Pedagogical Spectroscopy	Ahmad Mohammed Kamal, Mitchell Elschuk
Victim Blaming in the Media: A Study of Indigenous vs. White Women	Aiisha Rishi
Understanding the Dynamics of The Dopamine 1 Receptor in the Neocortex	Ali Tarik

SWNG 108

Current recommendations on research methodology and appropriate language use in literature involving Indigenous Peoples: a literature review	Amanda Lee
Isotopic Analysis on Faunal Remains from Holt Wood and Gleb Field, Wiltshire, England	Amy Thompson
Effects of 2-Pole and 3-Pole Galvanic Vestibular Stimulation on Motor Performance in Parkinson's Disease	Anjali Menon
The association of maternal autoimmune disease during pregnancy and attention deficit hyperactivity disorder in children	Ashki Shkur
Detection of Lung Cancer Recurrence Using Machine Learning to Determine Cell Sociology	Athena Li

WAVE 2

ORAL PRESENTATIONS

SWNG 109

Within the Threads of a Kokum Scarf: The Kokum Scarf as a Symbol of Early and Contemporary Ukrainian-Indigenous Relations in Canada Avery Shtykalo

ChatGPT and Academic Integrity: An Investigation of AI's Impact on Student-Instructor Relationships Beth Patrick

A comprehensive comparison of insulin gene expression states using proteomics and 3D live cell imaging Bhavya Sabbineni

Evaluating engineered tracking mRNAs in recombinant platelets for severe haemorrhage treatment Brenda Ma

Friendship Networks and Academic Achievement among Post-Secondary Undergraduate Students Brendan Lu

SWNG 110

The effects of an online link dissemination of a strength training guide on ST behaviours, confidence, and knowledge among health and exercise professionals and patients with rheumatoid arthritis Caitlin Chiu

Investigating thermal tolerance in the Atlantic killifish (*Fundulus Heteroclitus*) Cassidy Mark

Stressed Out and Zoned Out: Does Stress Mediate the Link Between Neuroticism and Mind Wandering Cecilia Liu

The effects of polyphenol quercetin on palmitate-induced lipotoxicity in primary human hepatocytes Celena Dell-Mendia

PILOT: A Novel Cell-Free Protein Synthesis and Purification Platform Chaehyeon Lee, Narjis Alhusseini

WAVE 2

ORAL PRESENTATIONS

SWNG 208

Case Series Assessing Patient Education for Complex Head and Neck Reconstruction	Diane Pan
Targeting mitochondrial adaptive response in pediatric bone sarcomas	Ellie Tiliakou
Being RAD; A community-based system for sharing Recreational Assistive Devices (RAD)	Emily Mah
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SWNG 210

Non-conservative Hamiltonian Mechanics and its Applications	Samson Ling
Investigating the effects of loss-of-function mutations in Parkinson's Disease-linked gene orthologs on dopamine-dependent behaviours in <i>C. elegans</i>	Christopher Mok
An Analysis of the Availability of Multilingual & Accessibility Features of Online Mammography Information Websites in Canada and The USA	Delnaz Dadkhah Tirani
Exposure Therapy and Glucocorticoids Improves Fear-Processing Networks in Acrophobia	Ridhi Walia

WAVE 2

POSTER PRESENTATIONS

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Analyzing the Impact of Noise Pollution on Marine Invertebrates: Investigating Noise Tolerance in the Shore Crab <i>Hemigrapsus oregonensis</i>	Abby Birch
TOR and BR signalling mediation of CLASP for Root Development	Aidan Gallant
Assessing the Significance of DNMT3A Mutation in Acute Myeloid Leukemia Survival	Alayne Mariano, Bella Lagman, Arman Borawake
Determining The Impact of Quercetin Polyphenols on The Insulin Secretion of Primary Human Pancreatic Islet Cells	Alperen Celik, Yasmine Bellahcen, Brianna Tsuyuki
Machine Learning for Cells Classification and Analysis of Immune Cell Infiltration in Renal Cell Carcinoma	Alqeshira Feyza, Anna Si Tu, Kamal Al Najem Azzam, Jiawei Liu
A Systematic Review of Blastocystis Immune Regulation	Amreen Aulakh
Age Differences in the Relationship Between Depression and Working Memory in an Adult Lifespan Sample	Amy Morales-Arellano
Diatoms on eelgrass: a snapshot of microscopic biodiversity in eelgrass meadows	Andrea Jackman

WAVE 2

POSTER PRESENTATIONS

Evaluating the mental health profiles of families of pediatric solid organ transplant recipients	Angela Peng, Caitlyn Woo, Mona Aboofazeli
Novel Wheelchair Camera Proximity Detection System	Angie Peng, Rohan Birk
Is decentralized and home-based medicine, using AI and technology, the future of medical care?	Anika Lee, Emily Park, Bryon Lee, Richard Tanuwijaya
Species Discovery of Marine Meiofauna in British Columbia	Anika Chen
Assessing the Importance of Marine Species-Species Dynamics in the Northeast Pacific through Statistical Network Analysis	Antonio Dias
Analyzing the Relationship Between Areas with Aging Populations and their Vulnerability to Climate Change	Ariya Bhuiyan, Naomi Tung, Chelsea Lim, Dhriya Popat
Sex specific variance in dietary intake may influence MIND diet scoring and its correlations with age of Parkinson's Disease onset.	Asha Octoman
Exploring the impact of perception and language on numerical estimation	Ashley Choo
The Social Transition: A Qualitative Exploration into the Friendship Experiences of Early Entrants to University	Aster Huang
Developing an In Vitro Lipid Nanoparticle-Based CRISPR Screen to Uncover Novel Regulators of Phagocytosis in Myeloid Cells for Immunotherapeutic Applications	Audrey Golsteyn
Rapid Systematic Literature Review: Camera Trap Sampling in Ecological Studies - Considerations of Wildlife Welfare	Ava Arends

WAVE 2

POSTER PRESENTATIONS

Probing Implicit Position Sense During Sensorimotor Adaptation	Ava Dugal
Exploring the effects of independent, recreational human-wildlife feeding interactions on offspring production in female fallow deer (<i>Dama dama</i>) in an urban parkland	Beth Downie
Dogs are a poor taxonomic model for human inflammatory bowel disease, but are potentially functionally relevant for human ulcerative colitis	Brian Deng, Nicholas Viegas, Max Yang, Renz Po, Sharisse Chan
Development of a novel, high-throughput flow cytometry method for evaluating synaptic protein signalling in isolated neuronal synaptosomes	Brian Deng
Modelling Type-2 Diabetes and Treatment: Examining the role of CD36-facilitated oxLDL uptake in Pancreatic Beta Cell Stress	Brian Liang, Cristy Nguyen, Annaliese Ferchau
The Culture Behind Career Choice: a socio-cultural perspective on careers in seasonal outdoor guiding.	Cameryn Harris
Opioid Stewardship: Hospital and Primary Care Pharmacist Collaboration	Carmen Leung, Joycelyn Lac
Fear of Mammograms	Carmen Golnaraghi
Effects of an early life infection on the physiology and function of the adult mouse brain	Carmen Choo
Brain Basis for Morphological Processing in 4-5-year-old Bilingual and Monolingual Children	Chloe Siu, Janice Chen
The Efficacy of Melatonin Supplementation on Fertility Outcomes in Women	Clara Buchinski

WAVE 2

POSTER PRESENTATIONS

Transforming Pharmacy Practicum Preparation	Deogan Harold, Manpreet Sandhu
The Mystery of Gene Silencing: Uncovering the Structure, Function, and Relationships of Heterochromatin in the Inactive X Chromosome	Douglas Musselman
Deciphering the Source and Compositions of the Deep Mantle Heterogeneities with Trace Element Compositions in Hawai'i Volcanoes	Elly Thistlethwaite
Effects of home range and water source overlap on pathogenic transmission in five baboon social groups	Emma Talarico
Investigating the Formulation Parameters and Mechanisms of mRNA-LNP-Mediated Tumour-Immune Cell Targeting and Regulation for Cancer Immunotherapy	David Tan
Morphology and molecular phylogeny of episymbiotic ciliates (Peritricha, Mobilida) of marine invertebrates with descriptions of <i>Urceolaria clepsydra</i> sp. nov. and <i>Urceolaria pacifica</i> sp. nov.	Gabrielle Martinez
Exploring the Role of <i>C. elegans</i> Gene <i>efk-1</i> in Stress Response and Translation Regulation: Implications for Cell Survival and Therapeutic Targets in Solid Tumors	Gahan Diwan
Associations between Shame-Proneness and Negative Emotions and their Relationship with Gender and Sexual Identity	Geetika Sadarangani
Dense Body Tracking and Social Touch Mapping: How AI is Utilized to Track Social and Movement Behaviour in Mice	Gloria Gu, Arwen Fong
Exploring the impacts of genetic variations and route of administration on morphine processing	Niloofer Gheshlaghi

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 107)

Presenter Name(s): Aarohi Yadav

Presentation Title: A Model of the Cultural Evolution of Innovations

Abstract:

Cultural evolution is a human process in which elements of culture, such as ideas, evolve by spreading through social means and being modified and built upon until eventually, they form a new idea or invention. Cultural evolution has had a profound impact on our species, with the oldest stone tools dating back millennia and continued innovations and inventions since then. This project aims to shed light on how ideas evolve, and on the cognitive processes that give rise to successful innovation by modelling cultural evolution with a large data set of American patents. Previous computational models of cultural evolution have ignored the psychological processes responsible for cultural change and have had limited scalability in terms of the size and complexity of the social network they could model. This project instead used an alternate theory called a Reflexively Autocatalytic Foodset-Generated (RAF) network that does not suffer from these limitations. An RAF network is a set of reactions that can rapidly multiply and keep multiplying without any external input. Leveraging RAF theory in the model allowed for a more accurate depiction of cultural evolution and a realistic representation of the complex evolution of ideas within a society. This study was the first to apply RAF theory to patent inventions and include cognitive processes of innovation in a model of cultural evolution.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 107)

Presenter Name(s): Ahmad Mohammed Kamal, Mitchell Elaschuk

Presentation Title: Designing Spectrophotometers: A Guide to Pedagogical Spectroscopy

Abstract:

The usage of spectrophotometers is widespread in laboratories with many fundamental measuring techniques relying upon these devices. Although based on clear principles, spectrophotometry is a field dependent on precision, governed by a balance of resolution and light intensity. Spectrometers can be expensive for non-research or non-industrial applications, and not well suited for pedagogical purposes. The construction of a budget-friendly spectrophotometer was achieved using three different prototypes. These consisted of using LED lights, colour filters, and a diffraction grating. Absorption of chemical solutions was measured using the Beer-Lambert Law and was compared with a commercial spectrophotometer. The LED lights and diffraction grating prototypes were the most correlated with the commercial spectrophotometer resulting in a 35% and 34% average percent error respectively.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 107)

Presenter Name(s): Aiisha Rishi

Presentation Title: Victim Blaming in the Media: A Study of Indigenous vs. White Women

Abstract:

Due to systemic discrimination, Canadian Indigenous women are seven times more likely to be murder victims than non-Indigenous women. However, cases involving Indigenous women's murders often receive less attention and are less likely to be taken seriously by authorities or reported in the media. This research investigates how Indigenous vs. white women's murders are reported in the media, particularly in terms of victim blaming. I analyzed articles on Indigenous women and white women's murders by using a qualitative analysis and a quantitative content analysis (CA) to help identify trends, biases, and disparities in articles. I found that Indigenous women's murders were more sensationalized, and their murders were more likely to be described in a 'storylike' manner and had more graphic details than their white counterparts. Indigenous women were more likely to be reduced to the sum of their victimhood in articles, while articles on white women were more likely to be 'all rounded.' Articles on Indigenous murder victims were 35.08% more victim-focused than white victims. Victim blaming for both groups was low, but there was more victim blaming for Indigenous female victims than non-Indigenous victims. These results are discussed in terms of how news reports reflect and perpetuate systemic racism and sexism. This study will help further our understanding of the ways that Indigenous women are portrayed in crime media.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 107)

Presenter Name(s): Ali Tarik

Presentation Title: Understanding the Dynamics of The Dopamine 1 Receptor in the Neocortex

Abstract:

Exploring the neocortex and the multimodal constituents of neuronal subpopulations within it is vital to understanding the brain's cellular and molecular composition and function. While the brain has been subject to intense research throughout the last century, layer 6b of the neocortex remains largely enigmatic. Importantly, Thus, I performed a multidisciplinary investigation to assess the possible heterogeneity within layer 6b of the mouse neocortex spanning connectivity, gene profile expression, and behaviour. Layer 6b neurons can be categorized according to their projection targets—importantly, the two broad categories are corticocortical projecting neurons and corticothalamic projecting neurons. My findings suggest that the corticothalamic circuits in layer 6b are largely parallel circuits and span neurons with a wide morphological profile ranging from classic pyramidal cells to inverted neurons. Layer 6b can be further sub categorized by the dopamine 1 receptor, a genetic marker with functional implications in layer 6b. My findings indicate that a large fraction of layer 6b neurons with projections to subcortical targets also express the dopamine 1 receptor. To assess the functional implications of this receptor on layer 6b neurons, I used a pharmacological approach via a D1 agonist and D1 antagonist to stimulate and block these receptors effects within layer 6b and assessed the animal's ability to perform behavioral tasks.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 108)

Presenter Name(s): Amanda Lee

Presentation Title: Current recommendations on research methodology and appropriate language use in literature involving Indigenous Peoples: a literature review

Abstract:

Aims: Language holds immense influence over our judgements and interactions; even subtle differences in the way we write about individuals can drastically impact how they are perceived. Current literature demonstrates the detrimental effects of deficit discourse in Indigenous health research, perpetuating power imbalances between Indigenous and Western populations. While current guidelines provide pragmatic recommendations on conducting research involving Indigenous Peoples, the quantity and content of guidance regarding language use during research dissemination remains unclear. Bridging this gap is crucial for fostering equitable representation in healthcare and beyond, informing culturally safe communication for policy-making and related disciplines. This review aims to identify current guidelines for conducting Indigenous-related research, determine the proportion which address language during research dissemination, and summarize their recommendations.

Methods: A narrative literature review was conducted to identify articles, books, and grey literature that guide appropriate research methodologies and language use when writing about Indigenous Peoples. Over 100 research and language guidelines were drawn from the initial search to establish common themes and gaps in recommendations. The language guidelines were further analyzed to identify specific guidance on reducing deficit discourse using strengths-based language.

Results: Initial results indicate a dearth of research guidelines which provide recommendations for appropriate language use during dissemination. Among language guidelines, very few provide specific guidance on reducing deficit discourse through strengths-based language. A detailed analysis of the review will be presented, along with a list of identified resources to guide research methodologies and promote language during dissemination that is respectful and supportive of Indigenous Peoples.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 108)

Presenter Name(s): Amy Thompson

Presentation Title: Isotopic Analysis on Faunal Remains from Holt Wood and Gleb Field, Wiltshire, England

Abstract:

Diet is a unique avenue which allows us to understand a community and its practices better, whether it be the diet of humans or the animals within their care. The Teffont project is a Roman archaeological site in Wiltshire, England, comprised of a large complex of buildings. An important feature of the excavation is a ritualistic structure where two areas, referred to as Gleb Field (GF) and Holt Wood (HW), are focused. They have been selected as contexts of interest to investigate variations in the diet of domesticated species (sheep/cattle) based on the hypothesis that fauna found at HW were used in a sacrificial manner. While studies have been conducted broadly in England, more research is needed within the local area of Teffont. It is hypothesized that the fauna's diet-derived isotopic values will reflect the chemical signatures of the local plant populations (C3) the animals would have consumed. Furthermore, heterogeneous nitrogen and carbon isotope data between HW and GF could indicate variability in the upbringing of the fauna due to the intention for ritual sacrifice. To conduct this research, stable isotope analysis for carbon and nitrogen will be used on sixty samples in collaboration with Cardiff University. By analyzing the diet of this fauna, it will be possible to compare the two areas' pastoral practices, which will provide valuable information for the Teffont Project to build upon.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 108)

Presenter Name(s): Anjali Menon

Presentation Title: Effects of 2-Pole and 3-Pole Galvanic Vestibular Stimulation on Motor Performance in Parkinson's Disease

Abstract:

Parkinson's Disease (PD) is a degenerative brain condition and currently, there are several non-invasive brain stimulation techniques being explored as treatment options for such patients. An emerging treatment that has promising applications for PD is Galvanic Vestibular Stimulation (GVS). GVS is a safe, non-invasive, and portable technique that affects the afferents of the vestibular system by conducting electrical current to the mastoid process behind the ears through electrodes. Several different arrangements of electrodes can be applied to subjects in a GVS experiment. For example, the 2-pole arrangement of electrodes is known to evoke a rolling motion in the head from left to right while the 4-pole system results in a yaw motion of the head from left to right. Although previous studies have investigated the effect of 2-pole and 4-pole systems on motion, few have thoroughly studied 3-pole systems on motion, and currently, no studies specify its application to Parkinson's patients. The 3-pole system provides a unique pitch movement of the head forward and back and with this new direction of movement, it is hypothesized that this system will improve motor performance in Parkinson's Patients.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 108)

Presenter Name(s): Ashki Shkur

Presentation Title: The association of maternal autoimmune disease during pregnancy and attention deficit hyperactivity disorder in children

Abstract:

Despite consistent increases in the prevalence of attention deficit hyperactivity disorder (ADHD) in children, the exact biological mechanisms of ADHD are still unknown. A wide range of research has identified maternal autoimmune disease during pregnancy as a potential risk factor for adverse neurodevelopment, since the accompanying maternal immune and inflammatory responses are capable of altering fetal neurodevelopment. Improving our understanding of the relationship between maternal autoimmune diseases during pregnancy and ADHD development in children can provide valuable insight into the possible biological mechanisms of ADHD and has the potential to help guide preventative efforts aimed at identifying children at risk of ADHD and facilitating early intervention. This literature review study aims to examine and integrate results from the current bed of research evidence investigating the association between maternal autoimmune diseases during pregnancy and ADHD in offspring. For this study, the MEDLINE (1946 to December 2023) database was searched using predetermined search terms. Studies were screened and selected to be included in this review if they: (a) were primary source literature, (b) focused on the impact of having one or more autoimmune diseases during pregnancy, and (c) assessed for ADHD diagnosis in children. Studies that were not written in English, were secondary source literature, used animal models of ADHD, and did not have their full text available were excluded. Based on the studies included in this review, maternal autoimmune disease during pregnancy is suggested to be an independent factor for the development of ADHD in offspring.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 108)

Presenter Name(s): Athena Li

Presentation Title: Detection of Lung Cancer Recurrence Using Machine Learning to Determine Cell Sociology

Abstract:

Lung and Breast cancer have remained the most common types of cancer, affecting millions worldwide every year. In the case of early stage non-small cell lung cancer, surgery remains the standard of care treatment, allowing for complete recovery. However, even after a curative procedure, up to 30-55% of patients will suffer from recurrence of the tumor and potentially die from it. Here, current progress of the long-term investigation into the use of machine learning for recurrence prognosis based upon tumor cell sociology is presented. This is done by first staining tumour slides using multiplex immunohistochemical techniques that can label and identify up to 12 cell types (leukocytes, tumour cells etc.). After staining, the slides are scanned, spectrally unmixed, aligned, and then processed by a machine learning algorithm, UNet. UNet is applied to the tumour slide image to segment cell nuclei and then each staining channel manually thresholded to help the accuracy of cell identification by UNet. After the tumour slide image processing by the algorithm, the location, number, identity and adjacency status of tumour, immune cells and connective tissue is given as a figure called the co-occurrence matrix. This information is anticipated to be analyzed by looking at the sociology (cell-cell interaction) of these cell label defined groups and how the observed interaction. This technique of cell sociology analysis will provide understanding of the spatial relationship between immune and tumour cells which is used to enhance our prognosis of cancer recurrence.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 109)

Presenter Name(s): Avery Shtykalo

Presentation Title: Within the Threads of a Kokum Scarf: The Kokum Scarf as a Symbol of Early and Contemporary Ukrainian-Indigenous Relations in Canada

Abstract:

When Ukrainian settlers arrived in the settler-colonial state of Canada beginning in the late 19th century, along with their culture and identity, they brought a scarf made of brightly coloured cotton cloth, patterned with vibrant flowers. During their settlement, cross-cultural, subversive connections were formed between Ukrainian settlers and Indigenous Peoples leading to the gifting, trading, and exchanging of the floral scarf into Indigenous communities. The scarf took on a new name once threaded into contemporary Indigenous culture and identity, the Kokum Scarf. Along with the new name, this traditional Ukrainian item gained new meanings through these relationships, and most recently in February 2022, the scarf became a symbol of Indigenous solidarity for Ukrainian peoples amidst the Russian invasion into Ukraine. The stories and meaning of the Kokum Scarf, in addition to positive historical settler-Indigenous relations in the settler-colonial state of Canada, had yet to be researched and written on. Therefore, by using Indigenous research methodologies based in relationality, we interviewed three women, Ukrainian and/or Indigenous, and contextualized the histories of the scarf to illicit new understandings and imaginations for restoring Indigenous-settler relationships. This research seeks to share stories of the Kokum Scarf, in an attempt to understand its historical meanings between Ukrainian and Indigenous communities and contemporary possibilities for decolonization, allyship, solidarity and reconciliation.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 109)

Presenter Name(s): Beth Patrick

Presentation Title: ChatGPT and Academic Integrity: An Investigation of AI's Impact on Student Instructor Relationships

Abstract:

ChatGPT, through its accessibility and ability to produce text that is increasingly indistinguishable from human language, has become one of the most popular consumer applications since its launch. Consequently, the chatbot and other Generative AI tools have raised many concerns and questions regarding its possible academic uses. Higher education has been an institution that incorporates new technology, yet as instructors aim to prevent cheating with the increasing popularity of Generative AI, maintaining a positive relationship between students and instructors may be challenging. The aim of this research is to understand how the use and surveillance of Generative AI (e.g. ChatGPT) in higher education can contribute to evolving ideas of academic integrity and trust. By collecting qualitative interview data from 8 undergraduate students and 3 professors from UBC, this research reveals how students' use of ChatGPT may not align with assumptions of plagiarism or academic dishonesty outlined in professors' policies, due to both the fear of possible consequences if caught, and a desire to maintain individual creativity and accomplishment with their work. Additionally, the research also finds that the different uses for ChatGPT, and strategies of preventing its use, often differ depending on the academic discipline. The project offers insight into how academic integrity is socially constructed, and how this construction can be affected by assumptions associated with new technology and its growing capabilities.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 109)

Presenter Name(s): Bhavya Sabbineni

Presentation Title: A comprehensive comparison of insulin gene expression states using proteomics and 3D live cell imaging

Abstract:

Background and aims: Diabetes is characterized by elevated blood sugar levels stemming from loss of insulin production by pancreatic β cells. Previously, FACS and single-cell RNA-seq analyses of islet cells in an Ins2GFP knock-in mouse model revealed that β cells can be sorted into two major GFP expressing populations, Ins2(GFP)HIGH and Ins2(GFP)LOW. However, the functional differences between the different β cell subpopulations in intact tissue were not well defined, and no comprehensive comparison of the two states at the protein level has been made. In this study, we used 3D live-cell imaging to analyze intact islets from male and female Ins2GFP mice, and perform mass spec-based proteomics to profile FACS purified Ins2GFP β cells. Preliminary 3D imaging data showed that β cells with high and low Ins2 gene activity exist in whole intact mouse islets, consistent with prior studies done with dispersed islet cells. Moreover, the results showed that cells with high GFP tended to cluster in the center of the islet. Proteomic comparisons of the two β cell expression states revealed that the Ins2(GFP)HIGH state is associated with a more mature β cell profile and had significant upregulation in pathways related to translation and metabolism, while the Ins2(GFP)LOW was associated with developmental and immunity pathways. This study will help us gain a deeper understanding of islet homeostasis and β cell biology, which is important for understanding the pathobiology of diabetes.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 109)

Presenter Name(s): Brenda Ma

Presentation Title: Evaluating engineered tracking mRNAs in recombinant platelets for severe haemorrhage treatment

Abstract:

Bleeding, formally known as Haemorrhage, is a pervasive issue particularly affecting individuals in the acute trauma population who sustain injuries due to situations of harm. Platelets play a crucial role in maintaining hemostasis, the process of repairing damaged blood vessels through formation of blood clots. While platelet transfusions are the current standard for treatment, they remain ineffective in extreme cases of blood loss where functional clotting at the site of injury is inhibited. Hence, there exists a relatively unexplored engineering effort to genetically modify platelets with improved targeting to vascular damage and encode factors to enhance blood clotting function. While exogenous protein expression in platelets has been achieved, maintaining persistent translation of fluorescent proteins to track these upregulated factors to their localised targets in-vivo has remained challenging. For this purpose, designer mRNAs leveraging viral mechanisms to commandeer host platelet translation encoding fluorescent proteins were developed and evaluated for expression. In particular, the viral genome derived P2A sequence was employed to induce ribosome skipping and link translation of proteins with impeded folding when otherwise directly fused together. By harnessing lipid nanoparticle technology as the mRNA delivery agent in creating recombinant platelets, this study demonstrated a promising link between viral elements in exploiting molecular mechanisms of translational control in platelets for improved fluorescent protein expression. Ultimately, optimizing mRNA engineering strategies in platelets is a step towards developing intrinsically fluorogenic and traceable mRNAs in a highly translational ex-vivo transfusion therapy to offload pressures on life saving platelet donors and essential blood banking services.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 109)

Presenter Name: Brendan Lu

Presentation Title: Friendship Networks and Academic Achievement among Post-Secondary Undergraduate Students

Abstract:

Friendships and academics are priorities for students, especially undergraduate degree candidates. However, they may come into conflict, and require a balance. This thesis will investigate the relationship between friendship network qualities and academic achievement. Existing studies on friendships vary in how they measure social fit, networks, and support, including who is considered. Academic achievement is primarily measured by grades. Existing findings – which primarily focus on elementary and secondary school levels – indicate that social networks and support reduce loneliness; and that social networks consequently enhance academic results, whereas loneliness presents as a risk factor. Based on these findings, this study will proceed to examine these trends among post-secondary undergraduate students from the University of British Columbia. Data will be collected and analyzed through a survey, offered to undergraduate students in their second year of attendance, regardless of year standing or faculty. In this study, friendships will be measured through scales of quality and loneliness. Academic achievement measurements will include letter grades, along with career skills (ranging from interpersonal communication to work ethic and expertise). Through quantitative survey data, this study may be a large and diverse sample; accurately showing how much the presently understood trend compares to an undergraduate setting.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 110)

Presenter Name(s): Caitlin Chiu

Presentation Title: The effects of online education of a strength training guide on ST behaviours, confidence, and knowledge among health and exercise professionals and patients with rheumatoid arthritis

Abstract:

Rheumatoid arthritis (RA) is a chronic, inflammatory, autoimmune disease that can affect any joint, often the hands and feet. To manage RA, alongside pharmacological treatments, strength training is an important disease management strategy that is safe, even for individuals with advanced disease progression. To guide health and exercise professionals (HEPs) and individuals living with RA on prescribing and participating in ST, the I START ST conversation guide was developed. However, there is a gap in knowledge on effective information dissemination and education strategies to support ST prescription and participation behaviour. This study aims to examine the impact of a dissemination and education intervention of the ISTART toolkit on ST prescription and participation behaviours. An online link to the I START educational intervention will be distributed via generic and personalized emails to HEPs and people living with RA. The intervention will include the ISTART conversation guide, an online lecture, and YouTube exercise videos featuring individuals with RA performing exercises alongside audio and visual cues for technique. Immediately following the intervention, questionnaires and semi-structured interviews will be administered to assess ST prescription and participation behaviours, confidence, attitudes, and knowledge underpinned by the theoretical domains framework (TDF). A follow-up questionnaire will be administered one month later to assess changes in behaviour. Semi-structured interviews will ask questions to better understand optimal strategies for dissemination and education.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 110)

Presenter Name(s): Cassidy Mark

Presentation Title: Investigating thermal tolerance of the Atlantic killifish (*Fundulus Heteroclitus*)

Abstract:

The impacts of climate change are not only causing warmer oceans but also increased intensity and frequency of extreme weather events. This has severe implications for aquatic ectotherms as temperature fluctuations can influence their development and physiological functions. The objective of this project was to explore the factors influencing thermal tolerance in fish across various life stages. To conduct this research, I used the Atlantic killifish (*Fundulus heteroclitus*), a small species of fish inhabiting estuaries and salt marshes along the Eastern Coast of North America. Killifish exhibit remarkable resilience to a wide range of environmental factors, such as temperature, making them ideal model organisms. For this work, thermal tolerance was measured by Critical Thermal Maximum (CTMax), the temperature at which the organism experiences loss of equilibrium (LOE), characterized by the fish flipping upside down. CTMax is determined by incrementally raising the water temperature until a specific endpoint, such as LOE. My research comprises two main components: first, examining CTMax methodology by investigating how different rates of temperature increase affect thermal tolerance in adult killifish. This is important as CTMax values can vary based on experimental parameters. Next, I explored how different developmental temperatures impact the thermal tolerance of killifish embryos. Despite the importance of early life stages, thermal tolerance in embryos remains largely understudied. Assessing the effects of temperature on upper thermal limits in embryos, a particularly vulnerable life stage, will provide insight into how populations will respond to climate change and inform conservation efforts in the future.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 110)

Presenter Name(s): Cecilia Liu

Presentation Title: Stressed Out and Zoned Out: Stress as a Mediator between Neuroticism and Mind Wandering

Abstract:

Mind wandering, when our thoughts are focused on content other than our external surroundings, takes up to half of our waking lives. It is particularly prevalent in individuals who report high levels of neuroticism, which is a personality trait characterized by negative emotions and worrying. Stress is linked to increased mind wandering, and past research shows that those with high neuroticism tend to report more daily stressors and have a higher risk of depression and anxiety. However, no prior work has examined if neurotic individuals' propensity for mind wandering is related to their perceived stress. Thus, this study aimed to examine stress as a mediator of the relationship between neuroticism and mind wandering. To induce mind wandering, participants completed an attention task that was simple enough to allow for off-task thoughts. Throughout the task, participants were interrupted with probes asking if they were "on-task" or "mind wandering". Behaviorally, mind wandering was defined as slower response times and increased errors during the task. Neuroticism and perceived stress were assessed using questionnaires. We expect that individuals with high neuroticism will mind wander more during the task, and that this relationship will be explained by increased perceived stress through a simple mediation model. This would suggest that stress could be a causal factor in why neurotic individuals mind wander more. Future research should examine the thought content during mind wandering with a particular focus on negative thoughts to gain insight into how neuroticism may lead to increased risk of anxiety and depression.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 110)

Presenter Name(s): Celena Dell-Mendia

Presentation Title: The effects of polyphenol quercetin on palmitate-induced lipotoxicity in primary human hepatocytes

Abstract:

Non-alcoholic fatty liver disease (NAFLD) encompasses a spectrum of conditions ranging from fatty liver to non-alcoholic steatohepatitis, with the possibility of progression to hepatocellular carcinoma if not treated. NAFLD's prevalence continues to rise 0.7% per year, indicating a clear need for further investigation into potential treatments. A key feature in the progression of NAFLD is lipotoxicity: the cell's inability to process, store, and export fatty acids. Previous studies have found polyphenols, a class of compounds present in plants, to have an ameliorating effect on lipid accumulation within liver cells; however, the mechanism behind this remains to be elucidated. This study aims to assess the response of hepatocytes experiencing lipotoxicity when exposed to quercetin, a polyphenol that has been shown to suppress lipid accumulation. Lipotoxicity has been simulated in primary human hepatocytes using palmitic acid; 24-hour exposure to 0.1 mM palmitic acid led to an increase in lipid accumulation, a decrease in cell viability, and differential expression of genes THBS2 and PCSK9. These are genes that have been reported to be upregulated in NAFLD. RT-qPCR data also suggests longer exposure may better simulate a lipotoxic environment. Cells will then be treated with quercetin across a nine-day exposure, after which the RNA levels of the candidate genes will be reassessed in addition to viability, proliferation, and lipid accumulation. Based on previous studies, we expect to see a decrease in lipotoxicity and improved hepatocyte function. This research will offer valuable insight into the prevention and treatment of NAFLD.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 110)

Presenter Name(s): Chaehyeon Lee, Narjis Alhusseini

Presentation Title: PILOT: A Novel Cell-Free Protein Synthesis and Purification Platform

Abstract:

Biologics are therapeutic proteins that are engineered to be produced within living cells. Cell-free protein synthesis (CFPS) is a recently developed biologics manufacturing protocol that utilizes cell lysates in place of viable cells, mitigating the issue of cellular cytotoxicity and resource intensity when producing biologics in vivo and at high concentrations. However, current CFPS systems are inefficient in energy usage and require an additional downstream protein purification step. This study introduces, PILOT - Platformed Inteins: A Linked Orthogonal Toolkit -, a novel CFPS platform that aims to address such drawbacks through its multifaceted approach to optimize energy usage and inteins to simultaneously produce and purify proteins. Inteins are intrinsic self-splicing proteins that allow the joining of separated protein subunits to confer the protein's target function; their usage in PILOT ensures orthogonality between protein biosynthesis and traceless purification in a *V. natriegens*-derived cell lysate. The PILOT system is implemented via the coupling of the MyxGyr A intein with an Elk16 self-aggregating solubility tag to optimize the purification of soluble proteins. Co-expressed is an intein-fused fluorescent reporter which signifies the expression of 3 methanol assimilation enzymes that utilize methanol, a sustainable and energy-efficient carbon source. Complementary mathematical modeling, in silico protein modeling, bioinformatics analysis, and hardware design were performed to confirm and improve the expression efficiency of target proteins. Preliminary experimental results suggest the expression StayGold, our proof-of-concept fluorescent protein; future iterations of this study can be performed by replacing StayGold with other clinically relevant biologics.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 208)

Presenter Name(s): Diane Pan

Presentation Title: Case Series Assessing Patient Education for Complex Head and Neck Reconstruction

Abstract:

Introduction

Advanced head and neck cancers (HNC) involving the facial skeleton often require aggressive resection, where reconstruction is provided by donor bone transplantation. Interventions improving health literacy have shown to increase adherence to health regimens, and for HNC patients, inadequate health literacy has also shown to be associated with lower social-emotional quality of life. While patient-centered care has been a growing field of interest in healthcare, there have been few studies focusing on improving education for HNC patients.

Objective

This case series focuses on evaluating use of 3D printed models that visualize the bony reconstruction as an effective intervention to improve education for patients undergoing reconstructive surgery.

Methods

This study will utilize a survey that assess preoperative procedural understanding with five statements on a Likert scale and anxiety using a Visual Analog Scale. Demographic and clinical information will be collected for sub-group analyses. Patients in the education group will be shown 3D models of their planned surgery, while control patients will not receive any intervention.

Results

The study thus far includes five education patients and four control patients. Preliminary results show that intervention patients score higher for all statements on procedural understanding.

Conclusion

In addition to evaluating the efficacy of the education tool, this study has potential to demonstrate its benefits in reducing preoperative anxiety and improving patient outlook during recovery. This case series provides support for future clinical studies which may further investigate the effects of education in this patient population and provide insights to improving patient-centered care.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 208)

Presenter Name(s): Ellie Tiliakou

Presentation Title: Targetting mitochondrial adaptive response in pediatric bone sarcomas

Abstract:

Osteosarcoma (OS) is the most common type of bone cancer affecting adolescents. The primary cause of OS mortality occurs when the cancer spreads to the lungs (termed lung metastasis). Current treatments for patients with OS lung metastasis have not improved survival for decades, emphasizing the importance of identifying new therapies. When OS spreads to the lung, cancer cells are subjected to toxic concentrations of oxygen-containing chemicals (called reactive oxygen species [ROS]), which damage various parts of the cell. Thus, cancer cells upregulate adaptive responses which protect against ROS-induced damage. We evaluated thiostrepton, an antibiotic that inhibits an adaptive mitochondrial protein called peroxiredoxin-3 (PRDX3), and examined its effect on metastatic OS cells. Previous investigations have determined thiostrepton's effects on localized cancers, however, its effect on metastatic OS is unknown. We hypothesized that thiostrepton will sensitize OS cells to ROS, thereby inducing cell death and preventing growth in the lung. To mimic the lung environment in test tube experiments, we treated cells with the chemical compound *tert*-butyl hydroperoxide (tBHP), which induces ROS damage. Through cell growth assays, we showed that sub-toxic levels of thiostrepton, combined with tBHP, increased OS cell death. To elucidate thiostrepton's mechanism of action, we are currently assessing its effects on tumour cell growth in 3D, changes in mitochondrial shape, PRDX3 protein levels, and the effect of treatment in mouse lung tissue. Our overall goal is to provide a basic science dataset that supports the clinical use of thiostrepton in the treatment of OS metastasis.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 208)

Presenter Name(s): Emily Mah

Presentation Title: Being RAD; A community-based system for sharing Recreational Assistive Devices (RAD)

Abstract:

British Columbia is one of the richest environments for outdoor leisure and recreation. To fully utilize these spaces, we must ensure that people have the necessary equipment to participate in outdoor activities. People with disabilities who require recreational adaptive devices (like wheelchairs or handcycles) can be discouraged from participating in outdoor recreation due to the cost and practicality of the devices. This creates barriers to low-cost and readily available activities. It poses a significant issue, considering that the poverty rate among individuals with mobility impairments is over twice that of the general population. To tackle these obstacles to participation, our community-based team, led by Tanelle Bolt, founder of RAD Society, will develop and assess online-accessible recreational assistive devices sharing program for individuals with mobility impairments. To guarantee the success of RAD, we will employ a collaborative, participatory research approach in the project's development. Our project aims to understand the needs, interests, and challenges of participation in physical outdoor activity, especially at a rental hub. Using descriptive qualitative method, we will reach an understanding of the barriers people with disabilities face in accessing recreation and how the RAD Gearbox can reduce these barriers. We will develop personas by case studying these responses into categories and identify trends in interviewee responses to identify actionable solutions. This research will expand the scope of low-cost and practical adaptive devices to increase participation in outdoor recreational activities for people with physical disabilities.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 208)

Presenter Name(s): Emma Lam

Presentation Title: Measuring steroid-synthesizing enzyme activity in songbird brain using mass spectrometry

Abstract:

Steroids synthesized locally within the brain (“neurosteroids”) can modulate behaviours. Neurosteroids can be synthesized de novo from cholesterol or from circulating precursor steroids. 3 β -hydroxysteroid dehydrogenase/ Δ 5-4 isomerase (3 β -HSD) is an enzyme that converts dehydroepiandrosterone (DHEA) and pregnenolone, both inactive sex steroid precursors, to androstenedione (AE) and progesterone respectively, which are both active sex steroids. 3 β -HSD is present in the brain of many vertebrate species in a region-specific manner. Thus, 3 β -HSD activity can alter the availability of active steroids within the brain and can modulate behaviour. It was not possible to measure 3 β -HSD activity in discrete avian brain regions (<2 mg tissue) with previous techniques that lacked sensitivity and specificity. We developed an assay to examine 3 β -HSD activity within microdissected regions of the song sparrow brain using liquid chromatography-tandem mass spectrometry (LC-MS/MS), an ultrasensitive and specific method for steroid quantification. We incubated 1.5 mg of song sparrow brain tissue with DHEA or pregnenolone, and then measured AE or progesterone produced using LC-MS/MS. Timecourse and saturation curve analyses were conducted with both precursors to determine the optimal incubation time and substrate concentration, respectively. We will use this method to investigate how 3 β -HSD activity across discrete regions of the song sparrow brain is acutely regulated, by the effects of stress, and chronically regulated, by the effects of season. This novel method enables us to measure steroidogenic enzyme activity in small tissue amounts with high sensitivity and specificity, providing vital insights into neurosteroid regulation of behaviour.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 210)

Presenter Name(s): Samson Ling

Presentation Title: Non-conservative Hamiltonian Mechanics and its Applications

Abstract:

In classical mechanics, the principle of least action asserts that an object's motion minimizes the action, a fundamental quantity tied to its energy. Lagrangian mechanics, born from this principle, excels in predicting trajectories within conservative fields where forces depend solely on position. Nevertheless, traditional Lagrangian mechanics face limitations in handling nonconservative forces like friction or air drag. Recent strides in double-coordinate Lagrangian mechanics have addressed this gap, especially in describing nonconservative forces.

Our research extends this innovative formalism to Hamiltonian mechanics, emphasizing symmetries in dynamic systems. The primary focus lies in applying non-conservative Hamiltonian mechanics to compute dissipation for physical quantities such as energy and angular momentum in non-conservative systems. The study explores consequential alterations in vital classical mechanics theorems, including Noether's and Liouville's theorems, enabling an investigation into the impact of dissipation on breaking the symmetry of the system. The results are validated by the Computational simulations to compare with classical examples like the damped harmonic oscillator, a falling ball with drag, and Maxwell elements.

Having established a robust non-conservative Hamiltonian formalism, our research aims to apply it to calculate dissipation resulting from gravitational waves in binary systems and address unresolved issues surrounding dissipation in physical systems. This work not only contributes to advancing our comprehension of nonconservative forces within Hamiltonian mechanics but also holds potential applications in gravitational wave physics and addresses open challenges in dissipative systems.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 210)

Presenter Name(s): Christopher Mok

Presentation Title: Investigating the effects of loss-of-function mutations in Parkinson's Disease-linked gene orthologs on dopamine-dependent behaviours in *C. elegans*

Abstract:

PD is the fastest-growing neurodegenerative disease globally, characterized by motor symptoms believed to be due to the death of dopamine neurons. The cause of PD is unclear, but researchers are uncovering a substantial genetic component of the disease. Although genome-wide association studies (GWAS) have identified numerous genes that may potentially be PD risk factors, it is unclear how they contribute to PD.

To better understand how these genes may affect PD development, this project aims to investigate the effects of loss-of-function mutations in PD risk genes. The nematode *Caenorhabditis elegans* is an ideal model organism to study orthologs (genetic equivalents) of such genes, due to its short life cycle and complete genome sequencing and connectome (neural connection) mapping. The Rankin Lab's Multi-Worm Tracker allows for the rapid and simultaneous tracking of many freely moving animals and precise data collection on a number of physical and behavioural attributes. Our experiments focus on studying the basal slowing response (BSR) in *C. elegans* as a function of specific ortholog mutations. BSR is a dopamine-mediated behaviour where *C. elegans* move slower in the presence of food; a lack of BSR in the presence of food suggests deficient dopamine neurotransmission. Additional characteristics such as movement speed and animal size will be measured and analyzed; we expect to see unique, ortholog-specific phenotypes (biological traits) that can help inform the role of these genes in the human context.

The results of this project will further our understanding of how different PD-linked gene orthologs affect dopamine-dependent behaviours and other phenotypes, as well as potentially identify new ways for how genes interact with each other to contribute to certain phenotypes. This research will inform disease modelling efforts in humans and expand our knowledge on the pathological and genetic bases of PD.

MURC 2024

Presentation Format: Oral Presentation (Wave 2 - SWNG 210)

Presenter Name(s): Delnaz Dadkhah Tirani

Presentation Title: An Analysis of the Availability of Multilingual & Accessibility Features of Online Mammography Information Websites in Canada and the USA

Abstract:

Breast cancer screening is crucial for early detection and better patient outcomes. However, the accessibility of information in native languages is lacking, especially for non-English-speaking populations. This study addresses this gap by examining the availability of multilingual and accessible breast cancer screening guidelines on websites in Canadian provinces, territories, and American states. The research hypothesizes that many online breast cancer screening guidelines do not offer multilingual options or accessibility features. This deficiency could hinder participation among non-English-speaking and vulnerable groups. To test this hypothesis, the study assessed 63 websites, focusing on multiple language options and accessibility features like screen reader compatibility, easy navigation, and alternative text for images. The evaluation revealed that 18 websites were only in English. While 27 offered content in French or Spanish, only 30 websites supported translations in more than four languages. Additionally, only 33% of these sites had accessibility enhancements, such as larger text sizes and dyslexia-friendly formats, indicating a significant lack of accommodation for diverse user needs. These findings underscore the urgent need for linguistic inclusivity and improved accessibility in online health resources, particularly for breast cancer screening. The scarcity of multilingual and accessible information on these websites forms a substantial barrier that can impact screening participation and outcomes for non-English-speaking and vulnerable populations. Addressing this need is crucial to ensure equitable access to health information and promote broader participation in breast cancer screening programs.

MURC 2024

Presentation Format: Oral Presentaton (Wave 2 - SWNG 210)

Presenter Name(s): Ridhi Walia

Presentation Title: Exposure Therapy and Glucocorticoids Improves Fear-Processing Networks in Acrophobia

Abstract:

Clinically, specific phobia is characterized by the development of unreasonable and persistent fear in response to exposure to a specific situation or object, which can result in panic attack and situation avoidance. Glucocorticoids, which are released during stressful or emotionally arousing experiences, enhance the consolidation of new memories, including extinction memory (a conditioned response gradually diminishes), but reduce the retrieval of previously stored memories. These memory-modulating properties of glucocorticoids have recently received considerable interest for therapeutic purposes because strong aversive memories lie at the core of several fear-related disorders. Moreover, exposure-based psychological treatment of these disorders relies on successful fear extinction.

This presentation outlines a CHIR grant proposal on the role of exposure therapy and glucocorticoids which could potentially help in the extinction of height phobia. The objectives of this research are to a) analyze extinction memory in relation to exposure therapy b) analyze the role of glucocorticoids in achieving fear reduction c) visualize the differences in neural correlates before and after the treatment. I present an experimental design with 3 groups (Group 1: 10 mg of cortisol, Group 2: 5 mg of cortisol and Group 3 : placebo (glucose) going through 3 trials of exposure based therapy within a week, and the final trial after a month.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Aaryamaan Verma

Presentation Title: Effects of Developmental and Acclimation Temperatures on Hypoxia Tolerance.

Abstract:

With climate change, sea surface temperatures are increasing resulting in frequent and drastic short-term fluctuations in water temperature and oxygen saturation. Thermal fluctuations are very stressful for ectotherms' growth and metabolism. Atlantic killifish have been consistently tolerating, and thriving in the face of these frequent stressors. Previous work suggests a link between thermal and hypoxia stressors in many fish species. So, we'll compare the time to loss of equilibrium under hypoxic conditions between individuals with varying thermal histories (26 + 0, 3, 5 or 7°C during incubation; acclimated to 10, 18 or 26°C as juveniles). We'll determine if differing thermal histories affect hypoxia tolerance. If so, we'll determine if these differences are a result of developmental plasticity, acclimation, or a combination of the two. We hypothesize that developmental groups with greater temperature fluctuations (26 + 7°C), and groups that experience a high acclimation temperature (26°C) will have the lowest tolerance to hypoxia. The results of the study will elucidate what thermally related life-history experiences make organisms better-adapted or worse-adapted at handling fluctuations associated with climate change.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Abby Birch

Presentation Title: Analyzing the Impact of Noise Pollution on Marine Invertebrates: Investigating Noise Tolerance in the Shore Crab *Hemigrapsus oregonensis*

Abstract:

Anthropogenic noise is now recognized as a significant marine pollutant. However, studies on the effects of noise pollution on marine invertebrates, particularly shore crabs, are scarce. To address this gap, we analyzed whether the shore crab *Hemigrapsus oregonensis* are capable of developing tolerance to shipping noise by examining individuals from both low and high noise sites. Three metrics were used to assess tolerance to noise: initial response to a simulated predator attack, time taken to seek shelter following such an attack and disruption during feeding. Tolerance was defined as reduced responses to noise in comparison to controls. It was hypothesized that crabs subjected to regular exposure to marine noise would exhibit increased tolerance levels compared to crabs with minimal noise exposure. The results suggest shipping noise significantly impacts the initial response of shore crabs after a simulated predator attack, regardless of site, with a 66% likelihood of movement in noise-exposed individuals compared to 32% in the controls. However, shipping noise did not significantly impact time to retreat to shelter after a simulated predator attack or cause disruption during feeding, irrespective of site. As noise levels at the collection sites did not significantly impact behavior, this indicates that crabs may not develop a tolerance to shipping noise. Further research is necessary to determine if noise represents a biologically significant pollutant for shore crabs. Understanding the impact of noise pollution on the shore crab can serve as a valuable resource for policymakers, aiding informed decision making regarding noise pollution management.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Aidan Gallant

Presentation Title: TOR and BR signalling mediation of CLASP for Root Development

Abstract:

The ability to control cell division is critical for life's survival and is tightly controlled by numerous proteins. One such group of proteins are microtubules, the scaffolding of the cell, which are required not only for the proper cellular function but proper division and elongation of cells within a plant's root. Here we show that a known microtubule associated protein CLASP is integral to the function of proper root cell division and is modulated by both plant stress hormones like Brassinosteroids (BR) and the sugar/ light integrator protein complex TOR. Brassinosteroids are known to decrease levels of CLASP while TOR inhibition has been shown to increase levels of CLASP, however the affect of treatment by both has yet to be studied. Using fluorescence microscopy and root measurements, we examine the effects of disrupting both Brassinosteroid and TOR signalling and explore the effects they both have on the CLASP dependent root development in *Arabidopsis thaliana*. We show that when both BR stimulation and TOR inhibition occur, a level of CLASP proteins is similar to no treatment, however the roots, in many ways do not resemble the no treatment group. This indicates that absolute CLASP levels are not the only factor for proper cell division and possibly the fluctuations of CLASP levels are required for proper cellular function. The implications of this work give us a better understanding of the mechanisms in proper root development and aid in our understandings of plants' response to stresses in the environment.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Alayne Mariano, Bella Lagman, Arman Borawake

Presentation Title: Assessing the Significance of DNMT3A Mutation in Acute Myeloid Leukemia Survival

Abstract:

Acute myeloid leukemia (AML) is one of the most common and fatal types of blood cancer, and is characterized by mutations in hematopoietic stem cells, which prevents the production of healthy blood cells. Mutations in the DNMT3A gene, which is responsible for DNA methylation and gene suppression, are present in approximately 20% of all AML patients. Although it is known that DNMT3A mutations are present in AML cases, the effects of the mutation on the biology of AML and patient outcomes are unknown. We hypothesize that DNMT3A is correlated with worse prognosis in AML as it plays essential roles in the development of functioning blood cells. AML patients will be observed to determine whether DNMT3A mutation contributes to the presentation of AML in patients. Pathway enrichment analysis will be implemented to distinguish dysregulated biological pathways. Differential expression will be implemented to determine whether certain genes are over/under expressed when comparing patients with mutated DNMT3A versus wild-type DNMT3A. The Kaplan-Meier curve will be implemented to determine whether DNMT3A mutation is negatively correlated with AML patient survival. We expect to observe a negative correlation between elevated DNMT3A mutation and patient survival, a positive correlation within case severity, and a significant role in defining genetic subtypes within AML. These results will aid in predicting patient survival and inform development of personalized treatments. Further investigation can explore other potential therapeutic strategies that can target DNMT3A-regulated genes to mitigate the adverse effects of DNMT3A mutations in AML, and overall deepen our understanding of AML pathogenesis.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Brianna Tsuyuki, Yasmine Bellahcen, Alperen Celik

Presentation Title: Determining The Impact of Quercetin Polyphenols on The Insulin Secretion of Primary Human Pancreatic Islet Cells

Abstract:

Insulin resistance is a significant contributor to the development of type 2 diabetes, characterized by an increase in pancreatic cell exhaustion and subsequent initiation of beta cell apoptosis, a process wherein cells undergo programmed cell death. This cascade leads to hyperglycemia (high blood glucose) as impaired beta cells lose their ability to respond to rising blood glucose, which is a hallmark of diabetes. Over time, excessive apoptosis of pancreatic β -cells constitutes a fundamental element in the pathophysiology of type 2 diabetes and may potentially contribute to the development of pancreatic endocrine tumors.

In the quest to address common complications in type 2 diabetes, researchers have spotlighted polyphenols as innovative agents capable of mitigating both pancreatic beta cell apoptosis and insulin resistance. Among these polyphenols, quercetin, typically investigated for its anti-inflammatory properties, has recently demonstrated a capacity to diminish islet cell apoptosis. This readily available polyphenol, predominantly found in berries and leafy greens, emerges as a promising candidate for preserving pancreatic islet cells. Nevertheless, existing studies present inconsistent findings regarding dose-dependent effects and primary mechanisms of action.

Our research endeavors to determine the impacts of quercetin on human pancreatic islet cells in vitro and quantify the resulting insulin secretion. The experimental approach involves treating cultures of human pancreatic islet cells with varying concentrations of quercetin, followed by an assessment of insulin production using the insulin secretion assay (ELISA). Through these investigations, we aspire to contribute valuable insights into the therapeutic potential of polyphenols for mitigating complications associated with type 2 diabetes, focusing on cellular responses rather than delving into molecular signaling pathways.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Alqeshira Feyza, Anna Si Tu, Kamal Al Najem Azzam, Jiawei Liu

Presentation Title: Machine Learning for Cells Classification and Analysis of Immune Cell Infiltration in Renal Cell Carcinoma

Abstract:

Renal cell carcinoma (RCC), a type of kidney cancer, is a significant public health challenge with a high global incidence and mortality rate. The role of immune cell infiltration in the outcomes of RCC patients is a growing area of interest, especially in the context of immunotherapy. However, the specific relationship between the level of immune cell infiltration and patient outcomes in RCC remains to be elucidated.

The study aims to classify cells and investigate whether RCC surrounded by more immune cells have better outcomes. It is significant due to the increasing importance of immune cell infiltration in cancer prognosis and treatment.

The study will be using a large public dataset, The Cancer Genome Atlas Kidney Renal Clear Cell Carcinoma (TCGA-KIRC). Machine learning models, particularly self-supervised models, will be employed to analyze the digital pathology imaging data and identify histological biomarkers associated with immune cell infiltration.

It is expected that the study will identify specific histological biomarkers indicative of immune cell infiltration in renal cancer samples. It anticipates finding a correlation between the level of immune cell infiltration and patient outcomes.

The findings of this study will have significant implications for the prognosis and treatment of RCC patients. If a strong association is found between immune cell infiltration and patient outcomes, it can lead to the development of novel prognostic markers and treatment strategies, especially immunotherapy. The study will contribute to the growing body of knowledge on the role of immune cell infiltration in kidney cancer prognosis and treatment.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Amreen Aulakh

Presentation Title: A Systematic Review of Blastocystis Immune Regulation

Abstract:

Blastocystis, a protist, is the most prevalent large intestine eukaryotic parasite in humans and animals, with convergent effects on host health. This protist plays a role in gastrointestinal disease pathogenesis but has recently been found to be a marker of good health. This may be due to its genetic diversity, differing host lifestyles and the experimental design of studies. This review aims to explore the effect of Blastocystis on the host immune system, pro-inflammatory or anti-inflammatory, through a comprehensive analysis of 25 studies, including observational and experimental, while analyzing gaps in the existing literature. The most prevalent outcome of Blastocystis was found to be pro-inflammatory. An equal number of observational and in-vivo studies reported pro-inflammatory or anti-inflammatory associations of Blastocystis, while ex-vivo and in-vitro studies exclusively found pro-inflammatory or no effects, suggesting that the outcome of colonization may be impacted by experimental design. It was observed that the outcome of a study was also associated with the pro-inflammatory or anti-inflammatory tendency of the investigated cytokines as well as the inherent nature of the Blastocystis isolates utilized, potentially producing a bias in the existing literature. Different genetic subtypes, model systems and publication year of the study gave rise to diversity in the result of Blastocystis colonization, with newer studies being associated with more anti-inflammatory effects. These findings coupled with the evolving attitudes towards the immunoregulatory role of Blastocystis provide insights to shape the future research on this protist.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Amy Morales-Arellano

Presentation Title: Age Differences in the Relationship Between Depression and Working Memory in an Adult Lifespan Sample

Abstract:

Depression has been associated with cognitive deficits across multiple domains, including working memory (WM). Specifically, depression may be related to a reduced prefrontal cortex volume, the primary site for executive functions including WM, particularly in young adults. However, the specific relationship between depressive symptoms and WM across age in healthy adults remains unclear. The present study evaluated the relationship between depressive symptoms and subjective WM in a community-based sample of adults. We expected higher depression scores to predict more reported WM deficits. Further, this relationship is expected to be stronger in younger adults, compared to middle-aged and older adults. Two-hundred and fifty (N = 250) adults, 25-88 years of age reported depressive symptoms on the Center for Epidemiological Studies Depression Scale (CES-D), and subjective WM deficits using the Adult Executive Functioning Inventory (ADEXI) WM subscale. Higher ADEXI WM subscores indicate more perceived WM deficits. Two linear regression models evaluated depressive symptoms as a predictor of self-reported WM and assessed an age moderation. Depression scores predicted WM scores, such that higher depression scores were associated with more WM deficits ($p < .001$). Further, age moderated this relationship; higher depressive symptoms predicted lower subjective WM performance more strongly in younger, compared to middle-aged and older adults. These results indicate depression symptoms may be differentially related to WM across the lifespan. Depression prevalence and symptomatology differ greatly with age. Understanding how age may modulate depressive symptoms may inform future investigations of the risks and protective aspects of age and age-tailored methods of improving health outcomes.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Andrea Jackman

Presentation Title: Diatoms on eelgrass: a snapshot of microscopic biodiversity in eelgrass meadows

Abstract:

Eelgrass (*Zostera marina*) is a marine plant that forms the foundation of some of the most important and valuable ecosystems in Canada: eelgrass meadows. Eelgrass meadows are being lost at unprecedented rates and to be able to conserve this vital ecosystem we need to understand its composition and species interactions. Diatoms are single-celled photosynthetic algae that can be found in the water, sediment, or as epiphytes on eelgrass in eelgrass meadows. Diatoms play an important role in this ecosystem by increasing productivity, providing a food source for herbivores, acting as bioindicators, and more. Despite their important role in the ecosystem, not much is known about diatom diversity and spatial structure in eelgrass meadows. To investigate diatom biodiversity, two blades were collected from ten eelgrass individuals in Montague Harbour, Galiano Island, British Columbia on March 7th, 2021. The base, middle, and tip of one blade from each individual were swabbed for Illumina sequencing, allowing us to identify the bacteria, diatoms, and eukaryotes present on the leaves. The base, middle, and tip regions of the other leaf from each individual were imaged using scanning electron microscopy and diatoms were morphologically identified from the images. Through molecular and morphological analysis, we identified 65 genera of diatoms. The most common diatom genera were *Cocconeis*, *Tabularia*, and *Navicula* which is consistent with previous studies on eelgrass. Contrary to our expectations, we found no spatial differences in diatom identity between blade regions.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Mona Aboofazeli, Angela Peng, Caitlyn Woo

Presentation Title: Evaluating the mental health profiles of families of pediatric solid organ transplant recipients

Abstract:

Solid organ transplantation (SOT) is a life-saving procedure for children experiencing end-stage organ failure. The families of these patients play a pivotal role in the success of SOT outside hospital care and often commit to a demanding care regimen. These burdens weigh heavily and have been shown to adversely impact family functioning, which has been associated with poorer graft survival outcomes, chronic stress, and psychological issues in parents and caretakers. Despite this, little is known about the mental health impacts of SOT on families. We hypothesize that the families of pediatric SOT patients will demonstrate increased stress and mental health symptoms compared to healthy controls. We will recruit approximately 50 immediate family members (parents and siblings) of pediatric SOT patients from the Multi-Organ Transplant Program at BC Children's Hospital and 50 healthy controls, matched by gender and age. Both cohorts will complete an online questionnaire that will evaluate depression, anxiety, trauma, and health-related quality of life using validated screening tools. These tools include the Multicultural Quality of Life Index, Generalized Anxiety Disorder Scale, Patient Health Questionnaire, and the Parent Trauma Response Questionnaire. For participants aged 18 years and under, the Pediatric Quality of Life Inventory, Revised Children's Anxiety and Depression Scale, and the Child Trauma Screening Questionnaire will be used. Descriptive and inferential statistics will be performed using SPSS to assess differences in these parameters between groups. Findings from this study will help quantify the mental health challenges faced by the families of pediatric SOT recipients.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Angie Peng, Rohan Birk

Presentation Title: Novel Wheelchair Camera Proximity Detection System

Abstract:

Approximately 2% of the world's population are wheelchair users or require wheelchair aid. A survey of 30 wheelchair users revealed that 100% of participants reported a lack in their field of vision (FOV) behind them, stating this significantly impedes their quality of life (QOL). With a limited FOV, driving on uneven outdoor terrain, through narrow hallways, crowded environments and even participating in recreational activities can be a safety hazard. Collision risks with objects, or other individuals can lead to injuries for both the wheelchair user and those in the nearby vicinity. Vehicle transfers can be challenging, and accidental damage to public property is common. These risks cause increased stress for the user, negatively impacting their QOL. This project collaborates with an individual at the Technology for Living with Disabilities Society searching for a wheelchair-camera-detection system that provides FOV behind the chair and offers visual cues to alert the user of potential obstacles. Ongoing consultations provide up-to-date project goals, defining specific functionality requirements. A comprehensive literary review of material properties and their use within the biotechnology sector, along with the client's specified goals revealed 3D printing the mechanical sub-system using acrylonitrile-butadiene-styrene to be the optimal choice. The electrical sub-system was simulated using Tinkercad, then prototyped using an ArduinoUno, RaspberryPi, ultrasonic distance sensors, RGB LED modules, wide-lens camera, and a 5" digital screen. Further work involves the integration between the mechanical and electrical sub-systems, and installation onto the client's wheelchair. This work increases accessibility for wheelchair users internationally and improves their QOL.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Anika Lee, Bryon Lee, Richard Tanuwijaya, Emily Park

Presentation Title: Is decentralized and home-based medicine, using AI and technology, the future of medical care?

Abstract:

The recent global pandemic has shifted perspectives in the delivery of medical care in communities, as the usage of online consultations and decentralized medical care steadily increases. This transition underscores the potential of home-based medical care, as online consultations may produce efficacy rates similar to that of in-person consultations. While most of our current healthcare takes place in hospitals and clinics, current challenges with limited accessibility for individuals with disabilities, escalating medical costs, and the lack of healthcare workers highlight the need for exploration of alternative care models. Implementing decentralized medical care may address some of these issues, improving the efficiency and accessibility of medical care. Integration of AI models and other technological advancements further enhance efficacy rates in this evolving landscape. Through an extensive literature review, this study identifies wearable sensors, monitoring technologies, telecommunication models and the integration of AI models, as key drivers in the decentralization of medical care. These innovations can enhance comfort and provide greater accessibility of medical procedures for patients in the years to come.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Anika Chen

Presentation Title: Species Discovery of Marine Meiofauna in British Columbia

Abstract:

The spaces between the grains of sand of marine sediments harbor one of the world's most neglected reservoirs of biodiversity in the form of organisms collectively known as "meiofauna". Meiofauna are microscopic animals (63 μm –1 mm in size) that are phylogenetically diverse, highly abundant, and ubiquitous in marine sediments around the globe. However, the majority of the world's marine environments have been largely under-explored for meiofaunal diversity, especially the coastal margin of British Columbia (BC). To document BC's marine meiofaunal diversity, this study tested for the presence of and characterized new marine meiofaunal species within poorly understood clades of animals. Marine sediments were collected at various coastal locations in BC, from which meiofauna were extracted. Using high-resolution microscopy, isolated meiofauna were photographed to comprehensively describe morphological characteristics. Genomic DNA was extracted from these isolates to obtain 18S and 28S rDNA sequences that were used in phylogenetic analyses. Altogether, the morphological and molecular phylogenetic data were combined to delimit different meiofaunal species and to reconstruct their deeper evolutionary relationships. This research will help to elucidate the evolutionary history of marine meiofaunal species living in the Northeastern Pacific Ocean and facilitate the discovery of new species to improve our understanding of BC's marine biodiversity. As meiofauna are directly affected by changes to their environment, documenting this unexplored diversity and their interrelationships is a crucial first step in understanding and eventually mitigating the impacts of anthropogenic disturbances on our marine environments.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Antonio Dias

Presentation Title: Assessing the Importance of Marine Species-Species Dynamics in the Northeast Pacific through Statistical Network Analysis

Abstract:

Network analyses are an important cross-functional tool in the field of marine ecology, being used to determine linkages between species within a specific ecological region. Research within the Northeast Pacific – ranging from California to Alaska – with respect to competitive species-species interactions in higher trophic brackets is especially underdeveloped, as the plethora of studies emphasize the importance of a species (and its taxonomic family), without delving into the essence of the trophic hierarchy. This research sought to conjoin a multitude of investigations within the Northeast Pacific, compiling a database evidencing the major prey species across the region, as well as the predatory species which utilized them as a source of energy. From this index, a trophic network was analyzed, wherein, species were measured in terms of their centrality, which delineated their importance to the region. Five species scored highly throughout analysis of centrality and plot evenness: *Prionace glauca*, *Isurus oxyrinchus*, *Carcharodon Carcharias*, *Phoca vitulina* and *Callorhinus Ursinus*, evidencing that – apart from *C. carcharias* – secondary trophic predators provide integral value to the network. Further research can be undertaken to verify predatory species which scored lowly throughout analysis, as results are dependent on the amount of data available – species with fewer studies will have less certainty than species which are commonly researched. Studies can also involve the importance of specific prey species within the database – prey that are readily consumed by an array of predators should be physiologically examined for their potential biochemical content availability.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Ariya Bhuiyan, Naomi Tung, Chelsea Lim, Dhriya Popat

Presentation Title: Analyzing the Relationship Between Areas with Aging Populations and their Vulnerability to Climate Change

Abstract:

Due to the baby boomer generation, healthcare advancement, and healthier lifestyles, an increasing proportion of our population is aging. This has a large impact on Canadian society as the proportion of Canadians over 65 is expected to grow 70% in the next 40 years. Meanwhile, the climate change crisis poses a threat to aging populations as older adults tend to be more vulnerable to the effects of climate change. “Age-friendly” cities, which tend to be more resilient, can be an effective strategy to mitigate the impact of climate change on the aging population. Considering the limited research on the link between climate change and “age-friendly cities”, our research aims to explore the relationship between areas with a larger proportion of older adults and areas vulnerable to climate change. We hypothesize that areas with a larger number of older adults will correspondingly be more exposed to the impacts of climate change. We will examine the spatial distribution of older adult populations through the Metro Vancouver region, and determine the correlation with climate change related exposures to determine overall trends. We will also produce a heat map of areas with the highest density of older adults and greatest climate change exposures. Since older adults are more vulnerable to the impacts of climate change, it is vital to understand whether these areas also face greater exposure. Additionally, these identified areas may be appropriate priority areas for additional climate change interventions, such as additional cooling centers, increased tree canopy, or additional public health programming.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Asha Octoman

Presentation Title: Sex specific variance in dietary intake may influence MIND diet scoring and its correlations with age of Parkinson's Disease onset.

Abstract:

Background: Parkinson's disease (PD) is an age-related neurodegenerative disease. The Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet is shown to correlate with a later age of PD onset in a sex-dependent manner. Identifying which food groups contribute most heavily to these findings will highlight interplay between the MIND diet, PD onset, and biological sex.

Methods: Dietary patterns over the past year were assessed using the EPIC-Norfolk Food Frequency Questionnaire for 166 participants with PD and 100 controls. MIND dietary adherence was calculated using food group consumption cutoffs outlined by Morris et al, giving MIND scores (/15) for each participant.

Results: PCA plots of food group data showed distinct groupings for MIND diet tertiles for all subgroups. MIND tertiles were separated predominantly along principal component axis 1 for all subgroups. The same three food groups contributed the most variance across this axis for both sexes: beans, leafy greens, and miscellaneous vegetables; however, other food groups were sex dependent. It was found that the food group consumption correlated with the MIND scores in a sex-specific manner. Food group consumption also correlated with the age of PD onset in a sex specific manner.

Conclusion: We validated that the MIND diet is capturing a reasonable amount of the total variance observed in the MIND diet food groups. Although several key food groups are well represented by the MIND diet in both sexes, sex-specific consumption of other food groups may partially explain the sex-dependent correlation between the MIND diet and PD onset observed previously.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Ashley Choo

Presentation Title: Exploring the impact of perception and language on magnitude estimation

Abstract:

Without counting/measuring, we can easily estimate the quantity of objects around us. For example, with just a quick glance, we could guess how many empty seats there are in a classroom. How does the human mind come to this? How do we convert our perceptual experiences (eg. our sense of all the 'stuff' in our world) to linguistic ones (e.g., estimating that there are about 'thirty' empty seats)?

Here, we explore the relationship between our perceptual abilities and estimation across three dimensions (number, length, and area), testing whether perception predicts how well we estimate.

Adults completed two tasks in each dimension: a perceptual task (e.g., judging which side had more dots) and an estimation task (e.g., judging how many items there are). We find that participant's accuracy was far better in length and area compared to number. Yet, despite this, participants were not better at estimating in these dimensions compared to number. That is, better perceptual abilities did not predict better estimation abilities, suggesting a dissociation between perception and estimation. At the same time estimation abilities were strongly correlated with each other (i.e., how well participants estimated in number predicted how well they could estimate in length and area). This suggests a common mechanism underlies estimation across dimensions, one that is not explained by perception, alone.

Taken together, these results contribute to our understanding of how we reason about and represent our rich world. We discuss these findings within the broader context of how language and perception interact.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Aster Huang

Presentation Title: The Social Transition: A Qualitative Exploration into the Friendship Experiences of Early Entrants to University

Abstract:

Some highly gifted individuals undergo accelerated learning, and some among them matriculate into university up to several years earlier than their same-age peers. Early entrants to university face the daunting task of not only taking higher-level classes at a young age, but also socializing and making friends with peers who are years older than them. Early entrance programs (EEPs) are controversial among parents and educators especially in terms of socioemotional adjustment, despite research finding that acceleration leads to healthy social relationships for most students. EEPs are rare and understudied, and studies that focus especially on early entrants' socialization and university adjustment are rarer still.

The present study is the first to study early entrants' friendships in detail; using a qualitative method guided by narrative and phenomenological approaches, it provided a close look into the social lives of early entrants. Preliminary data from interviews with alumni from UTP, an EEP affiliated with UBC, revealed several themes that encompass conceptualizations of age and maturity, social success at UBC, and UTP's unique environment as a secondary school program. Conclusions from this study may influence the curriculum and structure of UTP and potential dedicated supports to be implemented for alumni after graduation from UTP, and its results could also be applied to inform educators and policymakers in special education globally.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Audrey Golsteyn

Presentation Title: Developing an In Vitro Lipid Nanoparticle-Based CRISPR Screen to Uncover Novel Regulators of Phagocytosis in Myeloid Cells for Immunotherapeutic Applications

Abstract:

The last decade has seen a significant shift in cancer research, exemplified by the 2018 Nobel Prize in Medicine awarded for the work in cancer immunotherapies. Cancer cells suppress immune cell activity and avoid detection by overexpressing specific ligands. One subset of these ligands, known as "Don't eat me signals," engages phagocytic inhibitory receptors on immune cells, reducing immune cell-mediated tumor cell clearance. The identification and neutralization of such inhibitory regulators is required for the development of new and effective immunotherapies. CRISPR technology presents the opportunity to explore these interactions, thereby identifying novel therapeutic targets to enhance the immunological response against cancer.

Current CRISPR screens rely on viral vectors to knockout specific genes for loss of function experiments, making their accessibility to researchers difficult due to the safety requirements associated with viral delivery systems. We have established a Lipid Nanoparticle (LNP) based CRISPR screen to identify novel phagocytosis regulators. We aim to validate our CRISPR screen using established phagocytosis regulators—SIRP α and PIRB—and proceed to investigate the roles of less-explored regulators such as Lyn and SHP-1. Using our optimized screening methods, we seek to validate the impact of identified phagocytosis regulators in vitro using various cancer models.

Following this, we aim to demonstrate the translatability of our approach in vivo using Rosa-cas9-KI MC38 tumour model mice and LNP-mediated gRNA delivery to induce gene KOs. These studies will establish the foundation for strategies to explore the relationship between newly identified genes and phagocytosis, with implications for future cancer immunotherapy development.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Ava Arends

Presentation Title: Rapid Systematic Literature Review: Camera Trap Sampling in Ecological Studies
- Considerations of Wildlife Welfare

Abstract:

The use of camera traps in wildlife conservation and ecological research is a popular data collection method due to perceived low interference levels for animals being studied. However, there is evidence that some species alter their behaviour in response when exposed to this technology. The primary aim of this study was to address whether researchers in the ecology and forestry fields are making considerations for wildlife welfare and the possible impacts of cameras on animal behaviour. A secondary aim was to investigate how this technology is framed in terms of either negative or positive welfare impacts. In this rapid systematic literature review, we identified 271 papers published in the last five years, in the fields of ecology and forestry, that met our inclusion and exclusion criteria. Surprisingly, only 8% of the papers considered the possible wildlife welfare impacts of camera use on species of interest, and of these, 33% framed the use of camera traps as positive for welfare, irrespective of any evidence. We strongly encourage researchers in this field to consider the potential impacts of this technology. Whilst we recognize that the use of camera traps avoids direct handling of animals, the disturbance effects of this technology are still relatively unknown for wildlife species and could impact result reliability. This should not be ignored and should at a minimum be acknowledged in the limitations of these studies.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Ava Dugal

Presentation Title: Probing Implicit Position Sense During Sensorimotor Adaptation

Abstract:

Explicit (subject to conscious awareness) and implicit (processes we are typically unaware of) sensorimotor adaptation have been studied using variants of visually guided reaching tasks where visual perturbations (e.g. visuomotor feedback rotation) are introduced to create incongruities between sources of sensory feedback (such as vision and proprioception) and the motor output. An example is the clamped visual feedback task, designed to study implicit sensorimotor adaptation. Participants reach with their unseen hand to visual targets while receiving feedback in the form of a visual cursor. The cursor's path is rotated relative to the target, regardless of the actual reach direction, and participants are instructed to ignore the cursor and continue aiming for the target. Despite these instructions, participants adapt their reach trajectories in the opposite direction of the irrelevant visual cursor's rotation. Moreover, they remain unaware that they are no longer reaching to the target. This suggests that there is a discrepancy between explicit processes (aim for the target) and implicit processes (adapting away from the target) as a result of the error signals created by the visual cursor rotation. The aim of this project is to distinguish between explicit and implicit awareness of limb position sense during sensorimotor adaptation. The specific objective is to study whether the motor system has an accurate, but implicit, estimate of where the limb is during the movement as a person adapts to the visual perturbation, despite the incorrect explicit belief that the hand is going to the visual target.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Beth Downie

Presentation Title: Exploring the effects of independent, recreational human-wildlife feeding interactions on offspring production in female fallow deer (*Dama dama*) in an urban parkland

Abstract:

Intentional wildlife feeding, specifically unmonitored handfeeding, is on the rise globally. However, recent research has shown that inter-individual variability may be playing a role, with only bolder individuals within targeted wildlife populations choosing to interact directly with humans. This means that only a subset of individuals is receiving supplemental nutrition with potential reproductive benefits. As a result, ecologists and wildlife managers are becoming increasingly concerned that this popular activity may be resulting in undesirable artificial selection, specifically for bolder behavioral subtypes. Our study aims to address these concerns using female fallow deer (*Dama dama*), a popular target for this activity across the continent of Europe, as our study species. Analyzing datasets previously collected from 2018-2021, we test whether those females that are consistently accepting food are indeed showing greater reproductive output than females who avoid humans and if the management strategies that were introduced to reduce feeding within our study site resulted in any reproductive change. Additionally, we test if there is an impact on offspring sex ratios between the two subgroups and if the consistently engaging females are having their fawns earlier due to their supplemented diet. The ultimate goal of this study is to inform wildlife managers on whether artificial selection may be occurring as a direct result of this recreational feeding, which would predict potential long-term changes in population dynamics. Wildlife managers can also use these findings to determine whether new management strategies need to be employed to maintain healthy and varied populations within their sites.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Names(s): Sharisse Chan, Brian Deng, Renz Po, Nicholas Viegas, Max Yang

Presentation Title: Dogs are a poor taxonomic model for human inflammatory bowel disease, but are potentially functionally relevant for human ulcerative colitis

Abstract:

Inflammatory bowel disease (IBD) is an inflammatory condition affecting the gastrointestinal tract. Human IBD consists of two subtypes, Crohn's Disease (CD) and Ulcerative Colitis (UC) which continue to have large global health and economic implications. Dogs have previously been investigated as a potential research model for human IBD, but not against these specific IBD subtypes. We explored the microbial diversity and abundance, as well as the functional pathways of the gut microbiome in IBD dogs against UC and CD humans, to investigate if IBD dogs may serve as a model for a particular human IBD subtype. We utilized a combined 16S rRNA dataset of IBD dogs and humans to compare diversity metrics, taxonomic abundance, core microbiome, indicator species, differential abundance, and predictive functional analyses. We found a difference in gut microbial composition between dogs and humans, further supported by a lack of common taxonomic groups in both core microbiome and indicator species analyses. In addition, we found a significant reduction in the abundance of taxa in IBD dogs against human disease states during differential abundance analysis. Despite significant species-driven differences, our predictive functional pathway analysis indicates similarity in shared metabolic pathways of IBD dogs and UC humans. The compositional differences between dogs and humans suggest that dogs are not a reliable taxonomic model for inflammatory bowel disease subtypes in humans, but are potentially functionally relevant for human ulcerative colitis.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Brian Deng

Presentation Title: Development of a novel flow cytometry method for high throughput analysis of synaptic protein signalling in isolated synaptosomes

Abstract:

Synapses are points of contact between neurons that transmit organized signals and are crucial for normal brain function. Synaptic dysfunction is a major determinant in several neurodevelopmental and neurodegenerative diseases, often affecting neuron function and memory. In many diseases, communication between neuronal synapses through action potentials that lead to downstream protein signalling is disrupted. Synaptosomes are an accessible model for studying synaptic signalling molecules, as they consist of detached but intact synaptic terminals that are functionally active. This *ex vivo* model retains its catalogue of *in vivo* proteins and can be activated using potassium chloride (KCl) to simulate an action potential. Although activity-dependent protein signalling has been previously explored in neurological diseases, current tools to evaluate synaptic protein expression are limited. Here, we developed a novel flow cytometry protocol to evaluate protein expression in thousands of isolated mouse synaptosomes. Synaptosomes were isolated from murine neurons, activated with 30 mM KCl, and then stained with antibodies for flow cytometry analysis. Our results demonstrate antibody validation for pre- and post-synaptic markers to verify intact synaptosomes and offer a high-throughput method to evaluate rapid changes in synaptic proteins. Future genetic manipulations in neurons in the context of disease using this novel assay will help elucidate the role of various epigenetic factors in regulating neurological diseases.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Annaliese Ferchau, Cristy Nguyen, Brian Liang

Presentation Title: Modelling Type-2 Diabetes and Treatment: Examining the role of CD36-facilitated oxLDL uptake in Pancreatic Beta Cell Stress

Abstract:

Pancreatic beta cell (β -cell) dysfunction decreases insulin secretion, which is a major cause of type 2 diabetes (T2D). A receptor found on β -cells, cluster of differentiation 36 (CD36), takes up oxidized low-density lipoproteins (oxLDLs). Elevated oxLDL levels decrease insulin secretion and are common in T2D patients. While oxLDLs are known to contribute to endoplasmic reticulum (ER) stress, which promotes prolonged inflammation and dysfunction of β -cells, the relationship between the inhibition of ER stress, oxLDL levels and β -cell function is unknown. We hypothesize inhibiting ER stress proteins by tauroursodeoxycholic acid (TUDCA) will negate the pathogenetic effects of CD36-facilitated oxLDL uptake. CRISPR/Cas9 edited human pancreatic β -cell lines (EndoC- β H5) with knockout (KO) CD36, as well as an unedited wild-type (WT) control will be treated in high glucose (20mM) to induce hyperglycaemic stress, as seen in T2D. CD36 expression and oxLDL uptake will be quantified using flow cytometry and ELISA, respectively. Under TUDCA-treated and control conditions, the expression of ER stress proteins JNK and NF- κ B in response to oxLDL uptake will be determined via Western blotting. β -cell function will be determined by insulin secretion of glucose-incubated cells pre-incubated with Krebs-Ringer Bicarbonate (KRB) buffer, measured using ELISA. We expect that TUDCA-treated cells will have decreased JNK and NF- κ B expression and increased insulin secretion compared to the control. The determined efficacy of TUDCA treatment in ER stress inhibition and β -cell function improvement may lead to T2D dietary interventions involving antioxidant-rich foods to reduce oxLDL levels. Further research may lead to designing other protein-specific T2D treatments.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Cameryn Harris

Presentation Title: The Culture Behind Career Choice: a socio-cultural perspective on careers in seasonal outdoor guiding.

Abstract:

For my undergraduate honors thesis I am researching the factors that attract individuals to pursue seasonal outdoor guiding work. These jobs can be characterized by precarious conditions, encompassing physically demanding labor, seasonal limitations, and vulnerability to weather conditions. Despite these challenges young people choose these career path and by doing so alter a cultural pattern of labor within a capitalist paradigm.

The elements of precarity make the decision to enter seasonal outdoor guiding careers appear as a risky and uncertain choice. The field of economics has extensively studied risk and variability of outcomes as well as behavior around uncertain outcomes. Economic approaches to studying risk and uncertainty rely on theoretical interpretations of behavior through mathematical models aimed to quantify the outcomes and understand the decision-making process as a function.

I use an anthropological approach to examine the influential factors that go into the decision-making process of individuals who pursue careers in seasonal outdoor guiding. My goal is to provide a literature review of the contemporary theories that lead me to understand that there are aspects of the decision-making process that are subjectively decided and informed by socio-cultural knowledge and ideology.

Drawing on the work of Pierre Bourdieu, Mary Douglas, and Michael Chibnik, I propose that the decision to pursue a career in seasonal outdoor guiding, like behavioral choices, is informed by cultural structures, regulations, social identities and group affiliations, habitus, and cultural heuristics. The inclination towards alternative career paths, such as seasonal outdoor guiding, represents a socio-cultural shift in how this type of labor is socially and culturally defined by the informing factors. I am conducting ethnographic research with seasonal outdoor guides to understand these shifting perspectives.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Carmen Leung, Joycelyn Lac

Presentation Title: Opioid Stewardship: Hospital and Primary Care Pharmacist Collaboration

Abstract:

In response to the opioid crisis, opioid stewardship programs have been initiated. Hospital-based opioid stewardship pharmacists optimize pain management during in-patient stays but lack capacity to make adjustments post-discharge. A collaboration between hospital-based opioid stewardship pharmacists and primary care pharmacists at the UBC Pharmacists Clinic (the Clinic) was developed to address this gap. Patients were referred to the Clinic if they were seen by a hospital-based opioid stewardship pharmacist. Clinic pharmacists met with patients for 60-minute initial appointments, providing follow-up as needed. A retrospective chart review was undertaken for patients seen between November 1, 2021 and April 19, 2023. Data were collected from each patient's initial Clinic appointment to 3 months later.

The objective was to describe the impact of this collaboration on continuity of care for patients' pain management. The Clinic saw 22 patients, most for opioid tapers (86%) experiencing acute pain (73%). Top reasons for hospital pharmacist pain care plans not being fully implemented were suboptimal effect (28%), insufficient supply (13%), patient preference (13%), and discharge prescription different than recommendation (13%). 114 recommendations were made to address 89 drug therapy problems, including to change medication and/or dose. For recommendations with known outcomes, 69% were accepted (23% rejected by patients, 8% rejected by prescribers). Total daily dose of opioids decreased from 49.4 milligrams morphine equivalent (MME) to 41.6 MME, with 5 patients discontinuing opioids. Hospital and primary care pharmacist collaboration provided continuity of care post-discharge. Primary care pharmacists addressed changing pain care plan needs as patients returned home.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Carmen Golnaraghi

Presentation Title: Fear of Mammograms

Abstract:

Understanding the online narrative surrounding breast cancer screening technologies is crucial for grasping the impact of online platforms in providing health-related information and support. Social media is a powerful tool for health promotion where women share their diverse experiences regarding mammograms, thus heavily influencing public perception and decision-making regarding the use of screening devices. This study aims to understand social media's role in breast cancer awareness and how future awareness campaigns can be optimized.

A sentiment analysis was conducted on online breast cancer support group discussions. Using the keyword "fear of mammograms," 298 posts from female users were analyzed and categorized as "negative" or "positive" based on tone, language, and punctuation. The number of users who previously underwent mammography was observed. These categorizations allowed for deeper analysis of females' perception towards screening and how this spread of information and sentiment analysis influences public perception and response.

For the keyword "Fear of Mammograms," out of 298 comments, the sentiment was largely negative, particularly among women who had never undergone a mammogram. These users expressed fear about pain and potential harm to breast implants. However, positive comments came predominantly from women who experienced pain-free mammograms.

The collected data indicates that negative social media comments, primarily posted by women without knowledge of screening devices, contribute to the spread of misinformation and unnecessary fear to avoid the use of mammograms. Therefore, awareness campaigns with more effective communication strategies should be implemented to ensure women's decisions are not based on perceptions of screening on misinformation.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Carmen Choo

Presentation Title: Effects of an early life infection on the physiology and function of the adult mouse brain

Abstract:

Glucocorticoids (GCs) are steroid hormones that are secreted by the adrenal glands in response to stress. GCs are increased in response to infections, and during neurodevelopment can influence neurogenesis and synaptic plasticity. The main GC in mice is corticosterone, and during early postnatal development corticosterone levels are suppressed, known as the stress hyporesponsive period (SHRP). However, recent studies have shown that the brain locally produces GCs during the SHRP in response to immune stress. The long-term impacts of GC increases during the SHRP are not well known, but have the potential to alter neurodevelopment and shape responses to future immune stimuli. This project aims to address whether early-life bacterial infections have enduring effects on neurosteroid regulation in the adult brain. To test this, we used *E coli* lipopolysaccharide (LPS) as an immune stimulus during the SHRP and in adulthood. We hypothesize that LPS during the SHRP (“1st hit”) will reprogram release of GCs in the brain after a second stressor in adulthood (“2nd hit”). Male and female neonatal mice were injected intraperitoneally with saline or LPS and then again with saline or LPS in adulthood (2x2). Corticosterone, its precursor 11- deoxycorticosterone, and metabolite 11-dehydrocorticosterone, were measured in the hypothalamus and hippocampus using liquid chromatography-tandem mass spectrometry (LC-MS/MS). Preliminary results suggest neonatal LPS treatment alters GC responses to later infections in the blood and brain in a sex-dependent manner. Understanding the long-term effects of an early life immune challenge can elucidate the mechanisms driving altered behaviour and neural function in adulthood.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Chloe Siu, Janice Chen

Presentation Title: Brain Basis for Morphological Processing in 4-5-year-old Bilingual and Monolingual Children

Abstract:

Morphological awareness, or the ability to recognize, understand and use word morphemes, is essential in supporting children's language and reading development (e.g. bedroom = bed-room). Previous research shows that children demonstrate this ability from the age of four. Bilingual transfer, the application of linguistic features from a structurally different language to another, is found in literate kids. Chinese is heavily based on compound words and less on affix words, which allows for transfer of this knowledge to understand English vocabularies. The current knowledge gap lies in the brain mechanism for morphological awareness and the role of bilingualism from preliterate stages. We hypothesize that bilingual children will show more activity in their middle temporal gyrus (MTG), a region essential to processing semantic meaning, as they will use their experience with Chinese to understand English. Bilingual children are also expected to demonstrate an enhanced activity in their inferior frontal gyrus (IFG) to adapt analytical skills as Chinese lacks an affixes structure. Using functional Near-Infrared Spectroscopy technology, we examined two conditions: compounds (e.g. bed-room, class-room, mushroom) and affixes (e.g. rac-er, help-er, burger). In both conditions, sets of three words are presented and participants are prompted to select words with the same morphemes. Our preliminary results show activity in both MTG and IFG in bilingual children, with English monolingual children showing slightly less activity in MTG and significantly less activity in IFG. These results imply that Chinese Bilinguals and English monolingual readers adapt different brain mechanisms in processing meanings of words.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Clara Buchinski

Presentation Title: The Efficacy of Melatonin Supplementation on Fertility Outcomes in Women

Abstract:

Melatonin supplements are widely consumed to treat sleep disorders. In addition to regulating circadian rhythms, melatonin acts as a powerful antioxidant within many body systems, directly and indirectly scavenging free radicals. Free radicals are produced in excess during ovulation and have been found to contribute to ovarian oxidative stress, which induces oocyte damage. Poor-quality oocytes have been correlated with unsuccessful fertility outcomes. Within the female reproductive system, high concentrations of melatonin have been detected in the follicular fluid, suggesting that melatonin may play a role in ovarian oxidative balance. While exogenous melatonin is commonly used to ameliorate sleep patterns, questions persist about the influence of melatonin supplementation on fertility outcomes. Due to melatonin's antioxidative capacity and presence within the female reproductive system, it has been speculated that melatonin supplementation may be a means of restoring the oxidative balance in the ovaries, thus supporting fertility. A literature search on the MEDLINE Ovid database was conducted to retrieve articles detailing melatonin's effect on fertility outcomes. Secondary searches were also executed to gather articles from other relevant systemic reviews. The findings indicate that melatonin supplementation restores ovarian oxidative balance and protects oocyte quality in patients undergoing fertility treatments with assisted reproductive technologies. Said effects promote successful conception and increase pregnancy rates in infertile women. These results elucidate the power of melatonin's role as an antioxidant within the female reproductive system and suggest that supplementing melatonin may increase the likelihood of successful fertility outcomes.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Deogan Harold, Manpreet Sandhu

Presentation Title: Transforming Pharmacy Practicum Preparation

Abstract:

The aim of this project was to evaluate the different approaches to preparing students for their experiential education practicums in the UBC Entry-to-practice Doctor of Pharmacy program and to identify aspects of practicum preparation orientations that could be improved. Two students undertook four sequential steps: environmental scan of methods used in pharmacy schools across Canada, literature search to review methods used in pharmacy schools in North America, stakeholder survey to gain student perspectives on current practicum preparation, and stakeholder interviews to assess methods of preparing students for practicums applied in pharmacy programs across Canada. The results obtained from the survey and interviews were analyzed using both quantitative and qualitative approaches. The literature search found that simulations and workshops had positive results in preparing students for practicum. The suggestions made by students from the survey to improve practicum orientations included online modality, keeping the duration to within one hour, and including real-life cases into the curriculum. The survey also found 30% of respondents expressed interest in a pre- practicum course, whereas 48% were possibly interested with more information. Recommendations from the findings of the four project steps included the implementation of panels led by upper-year students and active preceptors. This project identified approaches to pharmacy practicum preparation that could be used to optimize the current methods at UBC. In particular, implementation of a pre- practicum course could be further explored to better support students in their transition into practicum, and engagement with patient care.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Douglas Musselman

Presentation Title: The Mystery of Gene Silencing: Uncovering the Structure, Function, and Relationships of Heterochromatin in the Inactive X Chromosome

Abstract:

Gene silencing, the process by which the cell prevents specific genes from being transcribed, has long been thought to occur via the formation of 10 nm chromatin (DNA-protein complexes) into bulky, 30 nm fibres that inhibit transcription. However, this model was overturned in 2012 when researchers observed that constitutive heterochromatin (permanently 'off' genes) exists exclusively in 10 nm fibres in vivo. Thus, our understanding of how genes are silenced was called into question. Gene silencing is a foundational idea in modern genetics: the reason your eyeballs express different proteins than your stomach. Currently, leading models suggest that inactive DNA contains more nucleosome proteins per chromatin fibre, and transcription is prevented by way of an unfavourable energy barrier. We hypothesize, however, that the number of nucleosomes per chromatin fibre is no different between heterochromatin and euchromatin ('on' genes). Using image slabs obtained through advanced electron microscopy techniques, we have reconstructed three-dimensional tomograms of the inactive X chromosome, a large body of conditional heterochromatin in placental female mammals. Using this approach, chromatin fibres can be visualised, and nucleosomes can be discerned in 3-dimensional space in situ. Our preliminary data indicates that the nucleosome density per chromosome fibre does not change between heterochromatin and euchromatin, contrary to the current structure-function model of chromatin fibres. These results will encourage new angles of research in the field of gene silencing, and will provide valuable insight regarding the 3D structure of our DNA. Future research may inquire as to a possible mechanism mediating this silencing.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Elly Thistlethwaite

Presentation Title: Deciphering the Source and Compositions of the Deep Mantle Heterogeneities with Trace Element Compositions in Hawai'i Volcanoes

Abstract:

The Earth is composed of three primary layers: the core, the mantle, and the crust. The most voluminous layer is the mantle, which accounts for 84% of Earth's volume and drives large-scale geological processes, including the formation and recycling of the solid outer crust. Through geochemical and geophysical studies, the mantle has been shown to be made of different components, caused by the presence of recycled crustal material all the way down to the core-mantle boundary. Mantle plumes rise from the deep mantle to melt at the base of the crust, generating volcanic chains on the surface as tectonic plates move over them. These erupted lavas contain geochemical signatures that are a proxy for the deep mantle composition, and studying these signatures offers an opportunity to learn about the structure and composition of the deep mantle.

The Hawai'i mantle plume has produced the Hawaiian Islands over the last 5 million years in the Pacific Ocean. The geochemical signatures these islands exhibit indicate differences in the mantle component that's sourcing the Hawai'i plume. I will conduct a large-scale literature review of the current trace element data of these islands to investigate the similarities and differences within their compositions. I will also explore the role of recycled crustal material in creating the mantle component that sources the Hawai'i plume.

This study will provide new insight into how recycling crustal material processes affect the mantle's structure and composition, while deepening the understanding of the mantle that would otherwise be inaccessible.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Emma Talarico

Presentation Title: Effects of home range and water source overlap on pathogenic transmission in five baboon social groups

Abstract:

Environmental transmission of parasites and some well-studied bacterial pathogens (e.g. *E. coli*) between social groups of mammals via overlapping resources and territories is well-established. However, the manners through which animal social groups acquire and share other gut microbes across common environments is not well understood. This knowledge gap becomes especially important when considering less well-studied pathogenic microbes, as these could also have implications for inter-species transmission with livestock that share resources. We hypothesize that groups with a high level of home range and sleeping grove overlap will exhibit high levels of similarity in pathogen abundances and that watering holes shared between social groups facilitate the transmission of pathogenic microbes between social groups. We are looking at microbiome samples collected from 227 baboons in five social groups. Home ranges, drinking holes, and sleeping groves were collected for each group over a 60-day period. Any genera appearing in at least 66% of samples are screened for potential pathogenicity against bacterial databases, and then we analyze if home range, sleeping groves and drinking hole overlap between groups affect the spread of pathogenic microbes. We expect to see high similarities of abundances of pathogenic microbes between groups with high home range and sleeping grove overlap. Similarly, we expect to see low abundance of potential pathogens prior to a group visiting a watering hole, and significantly higher abundance of those pathogens post-visit. This study will provide information on the effect of shared environment on the spread of less well-studied pathogens between wild primate social groups.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): David Tan

Presentation Title: Investigating the Formulation Parameters and Mechanisms of mRNA-LNP-Mediated Tumour-Immune Cell Targeting and Regulation for Cancer Immunotherapy

Abstract:

Cancer immunotherapy has made major breakthroughs, however: the immunosuppressive tumour microenvironment (iTME) that represents a barrier to effective endogenous anti-tumour immunity needs to be overcome when developing effective approaches. Tumour-associated macrophages (TAMs) make up the majority population within the iTME, which are polarized to pro-tumoral TAMs by the TME for cancer progression. Pro-tumoral TAMs employ immunosuppressive mechanisms and cytokines like IL-10, IL-13, and TGF- β to promote tumor development. The Harder Lab is developing messenger RNA-lipid nanoparticle (mRNA- LNP) therapeutics aimed at targeting macrophages and other myeloid cells to improve solid tumour treatment. My project involved validating and screening the chemical analogues of this formulation *ex vivo* on tumour-associated immune cells derived from C57B1/6 mice with subcutaneous MC38 adenocarcinoma tumours. My research is aimed at defining the LNP formulation space required for tumour immune cell targeting and regulation with the goal of developing LNPs for immunotherapy.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Gabrielle Martinez

Presentation Title: Morphology and molecular phylogeny of episymbiotic ciliates (Peritricha, Mobilida) of marine invertebrates with descriptions of *Urceolaria clepsydra* sp. nov. and *Urceolaria pacifica* sp. nov.

Abstract:

Mobilid ciliates form a diverse group of episymbionts of aquatic animals and fall within three families: Trichodinidae, Urceolariidae, and Polycyclidae. Trichodinids mostly infect fish, and urceolariids infect a diverse range of marine invertebrates. The Polycyclidae was established for mobilid ciliates that infect only sea cucumbers; however, until now molecular phylogenetic data were unavailable for members of this group. In this study, we discovered and characterized two novel mobilid species, one infecting sea cucumbers (*Eupentacta quinquesemita*) and one infecting brachiopods (*Terebratalia transversa*) collected from the coast of British Columbia, Canada. These new mobilid species were characterized at the morphological level using light microscopy (LM) and scanning electron microscopy (SEM). We also inferred the molecular phylogenetic positions of these species using small subunit (SSU) rDNA sequences, which demonstrated that the two new species belong to the genus *Urceolaria*: *U. clepsydra* n. sp. and *U. pacifica* n. sp. In addition, these data question the validity of the Polycyclidae because *U. clepsydra* n. sp. from sea cucumbers is clearly nested within the Urceolariidae. This study expands the molecular phylogenetic and comparative morphological data available for mobilid ciliates, which improves the systematics and inferences about the evolutionary history of this poorly understood group of marine episymbionts.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Gahan Diwan

Presentation Title: Exploring the Role of *C. elegans* Gene *efk-1* in Stress Response and Translation Regulation: Implications for Cell Survival and Therapeutic Targets in Solid Tumors

Abstract:

Solid tumor cells frequently experience starvation. In turn, they activate cellular stress responses to survive and proliferate. The mammalian eukaryotic elongation factor 2/eEF2 kinase (eEF2K) promotes starvation resistance by regulating translation. In starvation, eEF2K phosphorylates and inactivates its only known target eEF2, a key driver of translation elongation, thereby conserving energy for cell survival. Inhibiting eEF2K activity is a therefore potential anti-tumor therapeutic approach, but how eEF2K promotes starvation survival remains unclear.

We study eEF2K in the model organism *C. elegans*, where it is conserved as *efk-1* and is required for starvation survival. Surprisingly, our preliminary data show that the *C. elegans* *efk-1* does not increase eEF2 phosphorylation in starvation. We hypothesized that *efk-1* promotes starvation survival through an alternative pathway independent of translation. To test this, we assessed translation rate during starvation using puromycin incorporation/Western blot assay. We showed that *efk-1* loss does not change overall translation rates, confirming that *efk-1* functions in a translation independent manner. Further, to test if *efk-1* kinase activity is required for starvation survival, we used CRISPR to generate kinase-dead *efk-1* mutants. We confirmed through qPCR and Western blot that these retain *efk-1* expression but completely lack eEF2 phosphorylation.

Altogether, we show that *efk-1* enhances starvation resistance through a noncanonical, translation-independent mechanism. In future studies, we will test whether this novel *efk-1* function depends on its kinase activity using kinase-dead *efk-1* mutants. The insights gained from this research may contribute to the identification of potential therapeutic targets for solid tumors.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Geetika Sadarangani

Presentation Title: Associations between Shame-Proneness and Negative Emotions and their Relationship with Sexual and Gender Identity

Abstract:

High shame-prone individuals may experience more intense negative emotions and risk for mental health issues, with gender stereotypes suggesting elevated levels of shame, stress, and anxiety in cisgender women compared to cisgender men. Additionally, sexual minorities tend to have a lower tolerance for shame-related emotions and encounter greater negative emotions. This study aims to understand the associations between shame proneness and negative emotions, while addressing a gap in the literature by investigating potential variations based on sexual and gender minority (SGM) identity. Our research questions were: (1) is shame-proneness related to the experience of negative emotions and (2) do these associations vary by SGM identity? Better understanding these associations will help for identifying protective factors against various mental health challenges, given known disparities for SGM individuals. We used behavioural observations of undergraduate participants (expected N = 130), collecting self-reported measures of emotions after a resting baseline task and a stressor task. The stressor was a video-recorded spontaneous speech task. After the stressor, participants reported their distress during the speech in a video mediated recall task in addition to reporting their emotional states via questionnaire. We used multiple regression analyses to test the main effects of shame proneness, SGM status, and their interaction in predicting self-reported negative emotions. We found that individuals high in shame-proneness did not experience greater negative emotions during the speech task nor did it have a significant interaction with SGM identity. However, SGM status was associated with an increase in overall self-reported negative emotions.

MURC 2024

Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Gloria Gu, Arwen Fong

Presentation Title: Dense Body Tracking and Social Touch Mapping: How AI is Utilized to Track Social and Movement Behaviour in Mice

Abstract:

As society moves past COVID-19, questions have been raised about the lasting impacts of the pandemic on our behavior. More specifically, to control the spread of the virus, social distancing was enforced for years, and now that we can come into contact with each other once again, the question of whether chronic social isolation has any long-term effects remains. The current study proposes using AI technology to track and predict movement patterns and behavior. We compared chronically isolated versus regularly socialized mice using Runway's greenscreen AI. The program removed backgrounds on videos of mice moving around in their cage so that we could focus solely on the mice's bodies, eyes, and tails. This led to more accurate movement tracking. The study found that socially isolated mice tended to stay close to the borders of their environment, while regularly isolated mice tended to move around more freely in their enclosure. Thus, through the implementation of AI, we can more efficiently study the effects of chronic social isolation in mice. Future directions could include examining human movement patterns using similar AI technology, which could allow for further research into the effects of chronic isolation on human behavior and more understanding of how COVID-19 impacted society.

MURC 2024

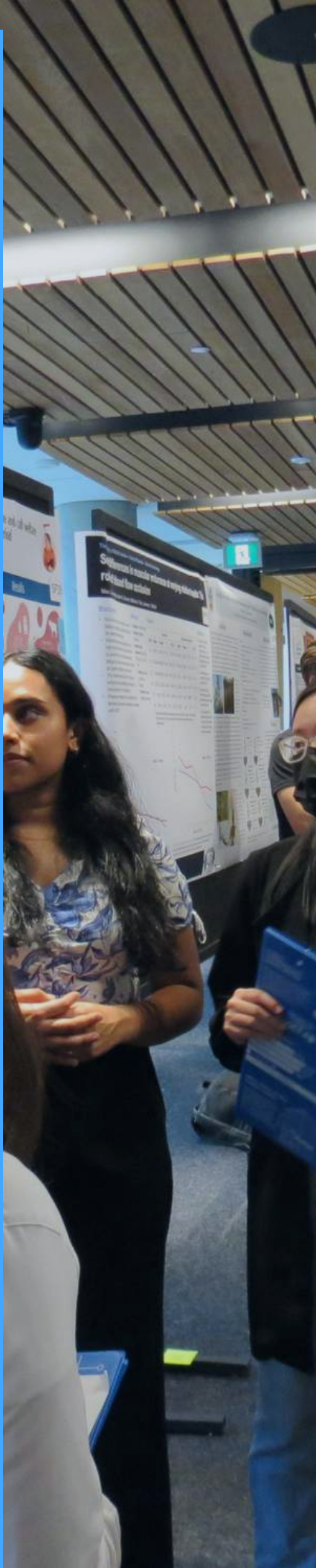
Presentation Format: Poster Presentation (Wave 2 - Ponderosa Ballroom)

Presenter Name(s): Niloofar Gheshlaghi

Presentation Title: Exploring the impacts of genetic variations and route of administration on morphine processing

Abstract:

Of the opioids, morphine is the gold standard for treating moderate to severe pain in children. However, adequate pain management is still lacking, with an estimated 33% of hospitalized patients reporting minimal relief from their medications. This is likely, due in part, to variations in genes responsible for drug processing in the body, particularly those impacting morphine's main liver transporter, SLC22A1 leading to varying degrees of therapeutic drug concentrations. Also, depending on the method of drug administration (e.g. orally or intravenously (IV)), total drug concentrations in the body will vary, however the effects of genetic variation on orally administered morphine exposure is seldom studied in children. To develop our understanding of the impact of oral administration on morphine processing in children with SLC22A1 variations, a pediatric pharmacokinetic (PK) model by Fukuda et al. was adapted in R for a single six-year-old patient. A 0.2 mg/kg morphine dose (both IV and oral) was simulated across SLC22A1 genotypes. Plasma concentrations over time were then compared. When comparing exposure following oral administration, $AUC_{0-\infty}$ was 52% greater for a patient with two loss-of-function alleles (64.6 ng*h/mL) compared to a patient with other genotypes (42.6 ng*h/mL). The relative difference in the change in $AUC_{0-\infty}$ was estimated to be ~2.5x greater following oral versus IV dosing (which was found to be about 20%). The results of this study demonstrate the importance of considering administration route when evaluating the impact of genetic variation as well as the power of PK modeling in supporting genetic discoveries.



Wave 3

Poster and Oral
Presentations

WAVE 3

ORAL PRESENTATIONS

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Altered Astroglial mGluR5 signaling in Alzheimer Disease	Selina Park, Keren Chen
Seismic Site Effects: A Case Study of the February 2023 Earthquake in Turkey with Machine Learning Applications	Ezekiel Camacho
Understanding CRNA: A multimethod research of patient and provider perspectives	Niloo Gheshlaghi

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Economic Burden of COPD: A Comparative Literature Review of Various Healthcare Systems Globally	Farshad Felfelian
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Empowering Youth Mental Health: A Novel Youth Pilot Study Integrating Community of Practice (CoP) Psychotherapy for Treatment-Resistant Disorders	Georgia Simkin, Sofia Serrano
Generating motion library of Parkinson's disease using DeepMimic	Hugo Yu, Neil Lin, Alexander Xie

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Parkinson's disease status, but not high sodium consumption, is correlated with alterations in the gut microbiome	Jamila Huseynova, Sana Alayoubi, Ethan Wong, Ives Chau
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WAVE 3

ORAL PRESENTATIONS

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Closing the Curriculum Gap: An Umbrella Review of Pedagogical Strategies for Teaching Skills in Kinesiology and Physiotherapy	Jessie Hall
When ChatGPT is told to write like a news reporter: How to detect AI-generated disinformation	Cici Liu
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WAVE 3

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Assessing the teratogenic effect of Neutral Red dye on the heart rate of chick embryos in the early stages of development	Hana Salehi, Rozhina Sedigh
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Enhancing Cognitive Health in the Elderly: A Comparative Study of Multimodal Exercise and Balance Training in Managing Mild Cognitive Impairment	Charis Law
Error Detection: A Mediator Between Formal Math and the Approximate Number System (ANS)	Heyli Arcese
Assessing Impact on Phytoplankton Ecosystems in the Strait of Georgia and Fraser River"	Lee Zheng, Nathan Wong
Exploring the Therapeutic Potential of Tr1 Cell Therapy: Fecal Lipocalin 2 as a Biomarker in DSS-Induced Colitis Mouse Models	Insha Majeed
The Valorisation of Chicken Manure Through The Rearing of Black Soldier Flies	Irene Lam

WAVE 3

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Adaptation of Pathogens to Temperature Changes: Insights into Virulence and Morphological Plasticity	James Foward
A proposed study: The feasibility of assessing ventilation defects using ¹⁹ F MRI in pediatric cystic fibrosis patients	Jane Hsu, Muskan Poddar
Revolutionizing Prostate Cancer Treatment: The Promise of a9L Aptamer Therapy	Jasleen Dhillon, Gabrielle Walji, Nandini Sharma, Aura Balita
Detecting Monosodium Urate Deposition in the Carotid Arteries	Jason Chang
Impact of elevated CO ₂ on cold-stressed maize	Jayni Chang
The Effects of Muscle Tendon Vibration on Performance of a Two-Dimensional Aiming Task	Jessica Zhang
Less is More: Optimization of Magnetic Resonance Spectroscopy Thermometry (MRS-T)	Amy Zhao

WAVE 3

POSTER PRESENTATIONS

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Assessing the Effectiveness of British Columbia's Forest Carbon Offset Program	Joaquin Gutierrez Diaz
Characterizing the Sex-biased Role of Insulin Signaling in Diet-induced Obesity in <i>D. Melanogaster</i>	Joyce Xi
Risk Evaluation Screening and Targeted Reduction of Endometrial Cancer (RESToRE): Recruitment Strategies	Kaila Villarey, Tanvi Khurana, Karman Johal, Pamela Bai
Infants' Emerging Auditory Processing of Pitch Contour in Music and Speech	Kanna Yagi, Ela Turkkari
Posting about prevention: Co-creating social media recommendations for dementia researchers	Katie T. Roy
Nudibranch (<i>Flabellina trilineata</i>) Nematocyst Acquisition from Cnidarian Polyps and Diet Preference Under Different Thermal Regimes	Kayla Heiman, Jessica Chi
Exploring the Association Between Discharge Destination on Stroke Patient Outcomes	Kayly Choy
Exploring the relationship between social stress and gut microbiome diversity in tree swallows	Kendle Speers
No species-level evidence of <i>Mytilus edulis</i> species complex thermophilization in the Pasley Island Archipelago after the 2021 Pacific Northwest Heat Dome	Kyla Terenzek

WAVE 3

POSTER PRESENTATIONS

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Is perspective-taking a precursor to prosociality? Exploring longitudinal associations between implicit Theory of Mind and helpfulness in toddlers.	Laura Joyce
Unraveling the ZDHHC21 enigma in neuronal physiology and Alzheimer's disease	Lynn Choi, Renee Chai, Vania Amani
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Reciprocating Agitation – Thermal Processing (RA-TP) Sterilization Effects on the Physicochemical Properties of Dairy Milk	Madeleine Soegiarto
How Do Weather Patterns Affect Human-Black Bear Interactions on Vancouver Island?	Maddie Trotter, Antonina Ozynska, Namita Giri
Optimizing the Management of Pain and Irritability in Children with Severe Neurological Impairment	Mahnoor Faisal
Characterizing and Evaluating the Porphyry Fertility of the Telegraph Property Plutonic Rocks Using Petrography and Geochemistry	Maiya Callister
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MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 107)

Presenter Name(s): Erhan Qian

Presentation Title: Comparing Levels of Perfectionism in the Global East and West

Abstract:

Current studies on levels of perfectionism as a multidimensional construct are overwhelmingly based in Western countries and done on adults. There is a lack of studies (1) investigating the presence of perfectionism in children and adolescents in Asian countries and subsequently, a deficit in studies (2) comparing perfectionism levels between Western and Eastern regions. This study addresses this gap and sheds light on potential cultural differences in mean levels of perfectionism in children and adolescents. Two separate meta-analyses were conducted evaluating the levels of child-adolescent perfectionism in Western and Asian countries respectively. Studies included used the Child-Adolescent Perfectionism Scale (CAPS) to evaluate perfectionism in samples with a mean age of ≤ 17 . Relevant information, including sample characteristics, mean perfectionism scores, and country of data collection were extracted and statistically analyzed using a simple ANOVA test. The study acts as an exploratory comparison of overall child-adolescent perfectionism levels in Western and Asian countries, and its results may further expand on the implications of perfectionism within a region's culture.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 107)

Presenter Name(s): Selina Park, Keren Chen

Presentation Title: Altered Astroglial mGluR5 signaling in Alzheimer's Disease

Abstract:

Alzheimer disease (AD) is a condition which damages the brain, leading to the progressive loss of memory and ability to think. One characteristic of AD is β -Amyloid ($A\beta$), a harmful protein which builds up in AD brains. $A\beta$ disrupts the signaling function of a receptor found on brain neurons known as metabotropic glutamate receptor 5 (mGluR5), which is important for memory. However, while we know how $A\beta$ affects mGluR5 signaling in neurons, we do not know how $A\beta$ affects mGluR5 in astrocytes, a type of brain cell that helps to ensure the brain is supplied with enough blood. In AD, blood flow to the brain is impaired and this may contribute to memory loss, but it is still unknown how mGluR5 function in astrocytes contributes to this impairment. In this study, we hypothesized that if $A\beta$ interferes with mGluR5 function in astrocytes, then $A\beta$ exposure would alter how mGluR5 signaling pathways. We exposed mouse astrocytes to $A\beta$ and then extracted the astrocyte proteins to assess changes in the activation of mGluR5 signaling proteins. We found that exposure to $A\beta$ altered signaling proteins involved in pathways that are important for preventing the build-up of toxic proteins and keeping brain cells alive. We also found that treating astrocytes with a drug that negatively modulates mGluR5 helps to restore these pathways and reverses the effects of $A\beta$. These results could help explain how astrocytes and mGluR5 signaling contributes to AD, laying the foundation for the development of novel AD therapeutics.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 107)

Presenter Name(s): Ezekiel Camacho

Presentation Title: Seismic Site Response Quantification: A Case Study of the February 2023 Events in Turkey

Abstract:

This study aims to investigate the role of seismic site effects and the significance of effective input motions on structures affected by the February 2023 Turkey event. Understanding site effects is especially crucial as it represents the initial step towards safe, resilient, and economic structural design. Included in seismic site effects is the faulting mechanism, as well as how the resulting seismic waves travel through the connected media in the form of body and surface waves.

By identifying these, the nature of the strain motion that will eventually hit the structure will be ascertained through a seismic hazard analysis that considers all those factors and numerous historic events. Finally, a risk assessment can be performed for the estimation of probable financial losses.

The focus of this study lies within the seismic characteristics in terms of the faults as well as geotechnical properties of the region and how they might interact to result in such catastrophic damages. Following a sophisticated literature review, the available seismic data are analyzed using specialized software tools (e.g., DeepSoil© and SeismoSignal©). To enhance the understanding of site effects, an analysis of ground motion data is conducted to gain insights into the frequency content during typical seismic events.

The study extends to include the application of various machine learning models within a suitable programming language environment for seismic site response analysis. An improved understanding of site effects will help lay the groundwork for more effective seismic risk assessment and mitigation strategies in earthquake-prone regions. Implementing novel methods to correctly characterize the seismic motion that structures are likely to experience, safety protocols can be upgraded to account for the evolving nature of engineering and seismic risk, as well as loss mitigation in earthquake-prone areas.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 107)

Presenter Name(s): Niloo Gheshlaghi

Presentation Title: Understanding CRNA: A multimethod research of patient and provider perspectives

Abstract:

Cost related non-adherence (CRNA) to medication encompasses a series of behaviours whereby patients do not take medication as prescribed because they cannot afford their prescriptions. To understand the complexities of CRNA, our objectives were to conduct a multi-pronged project examining the experiences of both patients and providers. To do so, we conducted interviews with healthcare providers and front-line healthcare staff and synthesized Canadian qualitative studies centered around CRNA. Interviews were completed with eight providers with various roles (e.g., physician, nurse practitioner) and healthcare settings (e.g., primary care, ambulatory care). Our search strategy isolated 5 studies that met inclusion criteria and featured a total of 568 participants. Thematic analysis of interview transcripts isolated three global themes: 1) How CRNA shapes provider practice; 2) Barriers for providers attempting to support patients through CRNA; 3) Provider perspectives on CRNA. Analysis of includes Canadian CRNA studies also isolated three global themes; 1) What CRNA looks like for patients; 2) Relationships with providers; 3) coping strategies. Together, these themes provide us with an overview of the experiences and perspectives of providers supporting patients through CRNA as well as an insight to the ways CRNA impacts and shapes patient lives. To our knowledge, this is the first qualitative study to explore experiences of providers for patients experiencing CRNA. Our synthesis of qualitative research studies provides a comprehensive understanding of CRNA from patients' perspectives. With this multifaceted approach we hope to then inform initiatives that reduce the burden of CRNA.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 108)

Presenter Name(s): Farshad Felfelian

Presentation Title: Economic Burden of COPD: A Comparative Literature Review of Various Healthcare Systems Globally

Abstract:

Introduction: Exposure to harmful particulates may lead to chronic obstructive pulmonary disease (COPD). As COPD progresses, it imposes a growing economic burden. However, in the past decade, there is no comprehensive review that attempts to evaluate and compare the total direct and indirect cost of COPD to patients and society across the various healthcare jurisdictions globally.

Methods: This review examines the global economic burden of COPD across the US, Canada, China, Europe, and various other healthcare systems. The final review is based on 13 articles distilled from over 50 studies since 2015. All cost components were inflation adjusted and tabulated in Canadian Dollars.

Notable Results: Over 66% of COPD-related hospital admissions involve ongoing smokers despite constituting only 10-45% of COPD patients. In Canada, estimates of direct costs to the healthcare system range from \$3000 to \$12,000 per person per year (PPPY), primarily due to hospitalizations. In the US, direct costs exceed \$90,000 over the final two years of patients' lives. Indirect costs to patients range from \$5000 to \$9000 PPPY across Canada, with median lost productivity estimated at \$1000/year for US based COPD patients.

Discussion:

Exacerbations are the primary cause of hospitalization in many jurisdictions, yet direct medical cost estimates significantly underestimate the total cost of COPD. Patients pay not just directly for out-of-pocket medical expenses, but also indirectly through lost sick-day income, and a lowered future earnings potential. Society's productivity suffers as families take on informal caregiver roles and human capital is expended to care for patients. The seemingly small dollar value of indirect costs in certain countries is due to lower labor values, but the loss of human capital remains nonetheless significant.

Policy Implications: COPD is a preventable and treatable condition. Socioeconomic determinants of health significantly influence rates of COPD. Older, more underprivileged patients experience a larger economic burden. Individuals without health insurance face more lost workdays due to illness. This review shows that improving determinants of health, enhancing primary care access, and pharmacotherapy coverage could result in substantial cost savings.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 108)

Presenter Name(s): Gabby Abando

Presentation Title: 'Tao po!': An exploration of the role of Filipino neighbourhoods in maintaining community

Abstract:

Within the last fifty years, Filipinos have become one of the largest 'visible minority' groups in Canada. Though literature extensively describes how Filipino lives stretch across space, more rarely are such conversations grounded in the daily settings and spaces they occupy; even less so how and why these spaces become spaces that bind communities together – thus their importance. Understanding space as a dialectic between society and space, spaces must be understood in the context of their everyday making and remaking, push and pull between the actors who occupy it – and yet much literature on Filipino diasporic space is written in the retrospective. As Vancouver's own Joyce-Collingwood neighbourhood, a commonly known 'hub' for Filipino immigrants, teeters on the edge of gentrification, capturing the space as it functions for the community offers valuable insight into how communities generate their own space, and how space tends to these communities. With this in mind, the following project investigates the specific mechanisms by which Filipino-Canadians feel attached to a space that imbues it with a community and cultural significance. This project uses a combination of ethnographic field notes and semi-structured interviews with Filipino-Canadian Joyce-Collingwood residents and regulars analyzed through qualitative coding methods to uncover the felt sense of Joyce-Collingwood for Filipino-Canadians. Though this project is still a work in progress, we expect to uncover insight into how Joyce-Collingwood's location as a major transit hub, available services and resources, available cultural products, and the demographic of the neighbourhood make it a uniquely Filipino-Canadian space.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 108)

Presenter Name(s): Georgia Simkin, Sofia Serrano

Presentation Title: Empowering Youth Mental Health: A Novel Youth Pilot Study Integrating Community of Practice (CoP) Psychotherapy for Treatment-Resistant Disorders

Abstract:

According to the Canadian Institute for Health Information, 70% of individuals with mental illness exhibit symptoms before turning 18, affecting around 1.2 million Canadian youth (up to 20% of the youth population). Thus, it remains critical to develop innovative strategies for effectively providing treatment for mental health illnesses for youth. To address this issue, an innovative pilot study is proposed, adapting the successful community of practice (CoP) group psychotherapy model for youth. Previously tested in adults, the 12-week program will feature 12 CoP group therapy sessions, focusing on support, resilience development, and addressing treatment resistant mental health disorders. The adult pilot demonstrated a 79% improvement in depression (Dames et al., 2022). CoP emphasizes expanding conscious awareness, nervous system regulation, and self and other compassion. Youth participants will be recruited through physician referrals for PTSD, depression, substance use disorder, and/or anxiety diagnoses. The program will be implemented at Roots to Thrive (RTT), Canada's only multidisciplinary, nonprofit healthcare practice legally providing evidence-informed, multi-week group therapy programs. RTT, is rooted in trauma-informed practices, health promotion, harm reduction, and spiritual health. Over the 12-week CoP program, youth will address trauma and relational attachment issues, fostering resilience in an environment promoting learning integration into daily life. The anticipated findings from the youth pilot are predicted to parallel the significant improvements in mental well-being observed in the adult pilot program. In the future, a CoP approach can be envisioned as a form of standardized practice for treatment resistant youth mental health disorders.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 108)

Presenter Name(s): Hugo Yu, Neil Lin, Alexander Xie

Presentation Title: Generating motion library of Parkinson's disease using DeepMimic

Abstract:

This research paper was motivated by the lack of data on patients with motor deficits, largely due to privacy regulations. Acquiring this data can help train machine learning classification models, which helps with early diagnosis. Existing motion libraries are collected from subjects without any movement disabilities. The challenge of developing the motion library lies in the scarcity of motor-deficit motion data. One approach, consisting of simply converting existing video data into a 3D motion library, would mean that the motion library is too small. We attempted to combat this problem with a model called DeepMimic, which learns to imitate a specified motion given motion capture files, allowing us to generate a more diverse set of Parkinson's-like motion data. To start, we were provided a small patient dataset of Parkinson's by our supervisor. We converted video data into a series of 2D poses using OpenPose, which was converted into 3D motion data using VideoPose3D, which in turn was used to train DeepMimic. Using this method, we expect to generate a motion library of 50+ motion files. These results can serve as proof of concept in synthetically generating motion libraries. The creation of a motion library of patients with Parkinson's can allow future developers to build models that may recognize the gait particular to Parkinson's disease, helping with early detection and diagnosis of motor diseases. Future work involves implementing modern pose estimation algorithms or streamlining the motion generation pipeline to make it easier to generalize to other motion deficits.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 109)

Presenter Name(s): Tony Jiang

Presentation Title: View through the Meta Quest 3 camera: A pioneering trial of mixed reality for DIEP flap harvest

Abstract:

During a deep inferior epigastric perforator (DIEP) flap harvest, the accurate localization of the intramuscular course of epigastric arteries and perforators is key to reducing the length of the reconstruction surgery as well as improving patient outcomes. Mixed reality (MR) integrates preoperative computed tomography (CT) data with the physical patient anatomy allowing virtual and real-world elements to blend seamlessly, allowing surgeons to view underlying anatomy without an incision. We hypothesize that the intraoperative use of the mass-market and standalone Meta Quest 3 headset will prove effective in assisting the localization and dissection of intramuscular vessels. A custom application was developed that overlaid segmented models to the patient. The segmented models contained separate volumes of skin, subcutaneous fat, muscle, and vascular tissue that were segmented from the preoperative CT scans. Metal fiducials were placed onto the patient during the preoperative CT and their respective locations were marked via a permanent marker. Through a combination of hand-tracking and manual adjustment, the model was overlaid over the patient during the procedure using the previously marked locations of fiducial markers. Through initial trials, the Meta Quest 3 can provide adequate overlay information for accurate and efficient localization of perforators and intramuscular vessel courses. The accessibility and cost-effectiveness of mass-market devices open new possibilities for implementation in the medical field, marking a promising advancement in mixed-reality headsets and surgery.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 109)

Presenter Name(s): Hershdeep Singh Buttar

Presentation Title: How do environmental conditions influence allometric scaling in humans?

Abstract:

Allometric scaling is when different parts of an organism grow at different rates, i.e. some body parts grow faster compared to others. Allometric scaling has applications in many scientific fields including behavioural studies and drug development research (Huang and Riviere, 2014). Further, it is known that genetics and the environment both influence allometric growth patterns in humans. Advancement in genetic techniques, such as genome wide analysis, allow the scientific community to better understand how variations in the genes lead to different allometric growth patterns (Uffelmann et al., 2021). However, limited research has been done to determine the extent to which the environment influences human growth patterns. This article conducts a literature review to explore the evolutionary trends and analyze monozygotic/dizygotic twin studies to determine the influence of the environment on height and body size/weight. Research shows how low nutritional + due to socioeconomic resources leads to stunting which slows down the allometric scaling growth curves. These findings highlight the extent to which allometric scaling can influence social factors as these findings have implications to analyze food insecurity experienced worldwide.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 109)

Presenter Name(s): Isabel Salazar

Presentation Title: Homosexuality from a Heterosexual Lens: A Thematic Analysis of Yuri and Yaoi Hentai

Abstract:

Due to the lack of extensive sex education, many 2SLGBTQIA+ adolescents turn to pornography to explore their sexualities. In their sexual exploration, some teenagers consume *hentai*—a type of Japanese pornography known for depicting perverse sexual desires in a comic or animated format. Despite the major role pornography can play in informing 2SLGBTQIA+ adolescents about their sexuality, no research has explored how hentai depicts homoerotic relations. This paper aims to fill this gap by identifying recurring themes in two standalone hentai videos depicting same-sex sexual activity between women (termed as *yuri*) and men (termed as *yaoi*). Images, events, and dialogue in each video were chronicled and grouped based on common themes. All themes pointed towards the idea that *yuri* and *yaoi* hentai are created for heterosexual audiences, despite being labelled as homoerotic. *Yuri* hentai targets the male audience by facilitating their imagination as the male main character at the center of sexual pleasure from various women. In doing so, it commodifies its female characters and diminishes its female viewers. On the other hand, *yaoi* hentai targets the female audience by including numerous *shoujo* elements. *Shoujo* is a genre of Japanese media aimed at the “maiden” audience; in their portrayal of male homosexuality to meet the female audience demand, *shoujo* fetishizes and stigmatizes homosexuality both implicitly and explicitly. Ultimately, these themes reveal that *yuri* and *yaoi* hentai’s strategies to please heterosexual audiences perpetuate harmful homophobic tropes.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 109)

Presenter Name(s): Shona Sinclair

Presentation Title: Predicting transcription factor binding tracks for novel cell types using deep learning

Abstract:

Every cell in an organism contains the same DNA sequence. However, the regulatory proteins present within the cell vary between different cell types. Transcription factors (TFs) are proteins that bind accessible genomic cis-regulatory elements, such as enhancers and promoters, which interact in the 3D genome and mediate transcription. As transcription regulation involves the interactions of many proteins on the genome, it is challenging to determine how TFs bind in different cell types, given the variation in regulatory mechanisms. By experimental techniques, one can track the binding of TFs across the genome for a particular cell type and produce a binding signal (TF track). Unfortunately, these tests can be costly and labour intensive. Here we seek to predict the TF track from the DNA sequence for a cell type for which only the DNA accessibility data is available, without performing experimental assays. Existing methods that predict epigenetic tracks have utilized deep learning, so we will use a deep learning model to produce the TF track for a particular DNA sequence and its accessibility information. Our model will be constructed using Pytorch, and much of the code will be modified from existing models. The model will include both convolution and self-attention modules, and will be trained on publicly accessible bioinformatics data. Thus we intend to construct a deep learning model for predicting TF tracks for novel cell types, which can be used to better understand transcription regulation in different cell types.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 110)

Presenter Name(s): Jamila Huseynova, Sana Alayoubi, Ethan Wong, Ives Chau

Presentation Title: Parkinson's disease status, but not high sodium consumption, is correlated with alterations in the gut microbiome

Abstract:

Globally, Parkinson's disease (PD) is emerging as the most rapidly growing neurological disorder. PD is associated with a strongly altered gut microbial composition, which may promote disease in part by increasing inflammation. A high sodium diet (HSD) has been shown to alter gut microbial composition in a pro-inflammatory manner, and thus our study aimed to determine whether people with PD who had HSDs experienced more dysbiosis than those with lower sodium intake. If a correlation between HSDs and an exacerbated PD gut phenotype exists, adopting low-sodium diets could emerge as a viable strategy to mitigate PD gut dysbiosis and alleviate associated downstream symptoms. We examined differences in gut microbial diversity and composition related to an HSD within a cross-sectional cohort of individuals both with and without PD (n=281). Our approach involved employing alpha and beta diversity analyses alongside differential abundance analyses at the species level. An HSD was associated with significant differences in gut microbial composition within the control subjects, but not those with PD. Thus, our findings suggest that the factors underlying the distinct gut microbial profile associated with PD appear to exert a more pronounced influence than the impact of sodium. Based on our findings, there is no compelling evidence to advise individuals with PD against consuming HSD for alleviating gastrointestinal dysbiosis.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 110)

Presenter Name(s): Jason Lin

Presentation Title: The effect of sex hormone changes during puberty on the corrected QT interval of individuals with congenital long QT syndrome: A systematic review

Abstract:

Congenital long QT syndrome (LQTS) is a cardiac arrhythmia syndrome that can often lead to fainting or cardiac arrest. It is characterized by a delay in cardiac muscle relaxation, indicated by a prolonged corrected QT interval (QTc) on an electrocardiogram resulting from genetic mutations on cardiac ion channels. While previous research has identified a prolonged QTc as a major risk factor for cardiac events, the effect of sex hormones on the QTc remains unclear, particularly during puberty. Thus, this systematic review examined the effect of sex hormone changes during puberty on the QTc in individuals with LQTS. Following PRISMA guidelines, three databases were searched using the key terms, "long QT syndrome," "sex hormone," "testosterone," "estrogen," and "progesterone." Studies were included if they assessed individuals with LQTS, sex hormone changes due to puberty, and QTc. Among 2299 articles generated, 89 studies underwent full-text review, and six studies met the inclusion criteria. The results of the analysis indicated that before puberty, the QTc was longer in males than in females. After puberty, the QTc shortened significantly in males, while the QTc change in females was unclear. These findings suggest that sex hormone changes after puberty onset may significantly shorten the QTc of males but not females with LQTS, indicating that the risk of cardiac events is higher in pre-puberty males and post-puberty females. This study offers a comprehensive analysis of the effect of sex hormones on the QTc of males and females with LQTS and can improve LQTS diagnosis and risk stratification.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 110)

Presenter Name(s): Jason Li

Presentation Title: The Impact of Familiarity of an Exam Question on Exam Performance

Abstract:

Previous research and observations have shown that exam scores are not necessarily related to the objective difficulty of a question (e.g., the number of steps or level of math involved), but rather related to how familiar a question is perceived to be to a student. This project investigates the connection between one's perception of the familiarity of a question, which is given by a familiarity score, to their performance on the question, which would be given by their question score. Preliminary results indicate a positive correlation between familiarity and performance, suggesting that the design of exam questions profoundly affects student outcomes. In other words, a student's ability to recognize and navigate familiar questions contributes significantly to overall performance. A practice exam consisting of 12 questions, each with three to four variants altering surface features while retaining the core concept, was designed to assess this hypothesis and administered to students enrolled in the PHYS 117 course at the University of British Columbia. The implications of this research extend beyond physics education, offering insights into cognitive processes that could inform pedagogical strategies across disciplines.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 110)

Presenter Name(s): Jeanette Hsu

Presentation Title: Proprioception thresholds of stance width in standing balance

Abstract:

Proprioception is critical to controlling posture and maintaining stability during standing balance, which involves a series of carefully orchestrated interactions between the bipedal posture and the ground surface. Changes in lower limb configuration will affect body dynamics, and thereby, the control of standing balance. In this study, lower limb proprioception will be investigated using a mechatronic device to manipulate stance width at varying velocities and displacements. Previous studies on lower limb proprioception utilized assessment methods that immobilized the participant. However, our device allows for proprioception investigation in conditions akin to daily living. We hypothesize that the velocity thresholds at which participants can correctly identify the direction of movement will be larger for participants with a wider stance width than those with a normal (shoulder width) stance width. The participant stands on two moving platforms that widen or narrow their stance at a randomized velocity and displacement, and is asked to verbally identify the direction of stance width change with “in” or “out.” The response time is how long the brain takes to register the direction in which the legs have been displaced. We expect the wide stance participants to have a larger variation of balance, and thus, require larger velocity thresholds to be able to correctly identify the direction in which the force plates are moving compared to normal stance participants. These results will provide practical insights into the body’s principles of standing balance control, as well as quantifying biomechanical features of standing balance.

Word count: 244

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 110)

Presenter Name(s): Jessica Luo, Samantha Pang, Nicholas West, Matthias Görges

Presentation Title: Exploring Parental Perspectives on Pediatric Surgical Recovery: Insights from a Qualitative Analysis of Free-text Comments in a Postoperative Survey

Abstract:

A 2011-2018 BC Children's Hospital study demonstrated that narrative data could provide actionable feedback for systematic quality improvement. An opportunity to revisit family experiences emerged in 2023 when a longitudinal survey study on pediatric postoperative pain and recovery included narrative comments. Responses were analyzed to understand families' perspectives regarding their children's surgical experience.

Participants were parents/guardians of 0-18-year-olds who underwent same-day or inpatient surgery. Surveys were sent on postoperative days 1, 2, 3, 7, 15, 30, and 90. Participants were asked to rate their satisfaction with their child's recovery and had opportunities to write comments. Data and thematic content analysis were conducted.

Overall, 433/500 (87%) enrolled families completed at least one follow-up survey; 242/433 (56%) provided 485 comments. Of those who commented, the median (IQR) patient age was 7 (3-13) years, with 160 (66%) being male. Positive remarks were largely made on clinical care and recovery experiences. Improvement opportunities centred around "communication" with subthemes highlighting concerns regarding "continuity of care," "clarity of discharge instructions," and "pre-operative discussions." Other themes included "pain/recovery expectations" and "hospital admission duration".

Some families felt underprepared to manage postoperative pain after discharge, which potentially contributed to lower satisfaction levels. Future work should aim to improve current communication strategies: procedure-specific documents may be revised to facilitate care team interactions so that postoperative instructions are clear and streamlined. Additionally, projects implementing active family engagement at discharge may be explored. Our longitudinal survey scheme may be expanded to support quality improvement, involving near-real-time feedback, to improve patient/family healthcare experiences.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 208)

Presenter Name(s): Roy Hung

Presentation Title: Deep reinforcement learning for cancer whole slide image classification

Abstract:

Breast cancer is the leading form of cancer diagnosed in Canadian women. Analyzing whole slide image (WSI), or digital pathology image, is important for early-cancer diagnosis. Using WSIs to manually screen for cancer can be very tedious and time-consuming. Thus, automated AI tools like DL (deep learning) have been developed to improve the efficiency of cancer WSI screening procedures.

While numerous studies used deep supervised learning techniques for WSI analysis, such techniques require large amounts of annotated data, and are impeded by the high dimensionality of WSIs. We hypothesize that deep reinforcement learning (DRL), a scarcely used technique for medical image analysis, will have astonishing performance in WSI classification compared to other DL techniques.

We propose a nested DRL algorithm. We use the CAMELYON17 dataset, which consists of lesion-level WSI annotations of breast cancer metastases. The outer DRL algorithm uses a soft actor critic (SAC) method to find the optimal policy (action taken at each state) to reach lesion targets (metastases) in the WSI, generating a trail connecting lesions. A continuous action space represents the angle of direction of movement. The reward function is distance-dependent relative to lesion annotations. The inner DRL algorithm uses deep deterministic policy gradients (DPG), using the trails generated previously as the state space and deciding if the trail is consistent with detection of lesions.

We expect the nested DRL algorithm to achieve a high accuracy in detecting metastases. Our research will demonstrate the potential of DRL for medical imaging tasks and ultimately improve patient outcomes.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 208)

Presenter Name(s): Juliet Ware

Presentation Title: How could the relationship between happiness and greenhouse gas emissions inform global climate action?

Abstract:

This study provides an exploratory statistical assessment of the relationship between individual happiness and greenhouse gas (GHG) per capita emissions, and of the mediating factors of this relationship. Building on research which urges sustainable development to integrate subjective well-being, we collected 45 multidisciplinary indices that might impact the environmental and human health of every member state of the United Nations ($N = 196$). We also created a corresponding dataset for the 50 states in the U.S., providing both a global and country level analysis. We are curious to understand whether the relationship between individual happiness and GHG per capita emissions is mediated by the collected indices. We have found that happiness positively and significantly predicts GHG per capita emissions at a global level, $R^2=.243$, $F(1, 141)=46.479$, $p<.001$), however this result was not found in the U.S. dataset. At a global level, preliminary results reveal significant and full mediations of this relationship, which include an index of water quality, an index of human development, and an index of gender inequality. An index of the fragility of the state was also found to partially mediate the relationship. We have not found significant mediations in the U.S., which may be due to the U.S. being an outlier in global GHG per capita emissions, although this still needs further exploration. These early findings suggest the mediation of socio-environmental components at the intersection of happiness and climate change, providing an empirical foundation for social development practices to complement global climate policy.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 208)

Presenter Name(s): Kaitlin Law

Presentation Title: Plasma-Derived Exosomes as a Biomarker of Traumatic Brain Injury and Predictor of Long-term Psychiatric Symptoms

Abstract:

Over 160,000 Canadians each year sustain at least one traumatic brain injury (TBI). The current leading diagnostic tool for traumatic brain injury (TBI) relies on subjective reports, leaving many cases undiagnosed. TBI is associated with an increased risk of mood and anxiety disorders, such as generalized anxiety disorder. Exosomes are small lipid-bound sacs, known as extracellular vesicles, released by all cells and play a role in immune response and protein removal. Thus, highlighting the need for a tool that can predict psychiatric outcomes.

This study aims to determine if differences in the makeup of exosomes following TBI could help predict psychiatric symptoms and create a valuable diagnostic tool for medicine. Subjects included children and young adults between the ages of 14-24 years with mild (n=15) or moderate/severe (n=15) TBI and orthopedic or soft-tissue trauma controls (n=15). Blood samples were taken at 12 hours post injury. Total exosomes were extracted from plasma samples using size exclusion chromatography, a method isolating particles based on size. Subsequently, antibody-linked resin was used to isolate neuronal derived exosomes (NDEs).

Exosomes were successfully isolated from healthy samples and identified based on morphology. Subsequently, proteins that make up the neuronal exosomes will be identified and used to compare between healthy individuals and those with TBI. These proteins, known as markers, can potentially be of use in predicting psychiatric symptoms and generation of a diagnostic tool.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 208)

Presenter Name(s): Kalli McIver, Jacob Sablan

Presentation Title: Beyond the Verbal, Into the Visual: An Analysis of Life Maps from a Diverse Group of Hard-Working Students

Abstract:

Life maps, a visual methodology, go beyond verbal modes of thinking and help access a “wider dimension of experience” (Bagnoli, 2009). In the Hard-Working Student Study (funded by the SSHRC), the life mapping activity sought to reveal the reasoning and thought processes underpinning the decisions of diverse working students between high school and second year of university. Our presentation features an analysis of 16 life maps and answers the following questions: how did students represent their experiences visually? Were there differences between students whose parents have different levels of education? And how was the concept of time visually represented on the maps? Our analysis considered the life maps individually for rhetorical, visual, and organizational insights into the students’ conceptions of time. We iteratively analyzed each life map using theories of temporality from the discipline including lived time—students’ subjective experiences of time—and “woven time”—the merging of work with everyday life (Miller, 2015). We then noted any trends and insights across the group and compared them to the study’s findings. Our results demonstrate that despite being an activity focused on past decision making, many participants expressed an orientation to the future. Furthermore, we found notable differences in the future orientations for first-generation and non-first-generation students. The results of this visual analysis enrich that of transcript data in this study by highlighting the usefulness of life maps for graphically organizing young people’s stories and offering insights into questions about temporality that are better suited to visual methods (Worth, 2010).

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 210)

Presenter Name(s): Jessie Hall

Presentation Title: Closing the Curriculum Gap: An Umbrella Review of Pedagogical Strategies for Teaching Skills in Kinesiology and Physiotherapy

Abstract:

Kinesiology programs in Canada were historically designed as the “non-professional study of human physical movement” (p. 155; Elliott, 2007). As a result, the development of kinesiology as a professional degree program has reported gaps within curriculums, such as faculty who lack clinical experience and teaching strategies that are not conducive to facilitating skill development related to professional practice. This review of reviews seeks to determine best practices for teaching skills related to professional practice in exercise prescription-related disciplines (i.e., kinesiology and physiotherapy). Conduct and reporting of this review of reviews followed best practices outlined by the Joanna Briggs Institute. MEDLINE OVID, ERIC Embase, and SPORTDiscus databases were systematically searched for reviews. Inclusion criteria were articles: a) with kinesiology or physiotherapy learners or practitioners, b) that assessed a pedagogical strategy, c) reported a skill related to kinesiology or physiotherapy professional practice as an outcome and d) were written in English. Article screening and data extraction were performed in duplicate. Article risk of bias was assessed using the AMSTAR-2. Results are forthcoming. These findings will support the development of a new curriculum pathway in the UBC School of Kinesiology and help inform skill-related teaching approaches in kinesiology more broadly. Exercise plays a crucial role in the prevention and management of chronic health conditions, thus providing proper clinical, skill-based training to future exercise professionals is essential.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 210)

Presenter Name(s): Cici Liu

Presentation Title: When ChatGPT is told to write like a health news reporter: How to detect AI-generated misinformation

Abstract:

Generative AI can rapidly produce fabricated health-related news that threatens public health, erodes trust, and induces unrest. While certain features aiding in the differentiation between fake and real news have been identified, the effectiveness of these markers is compromised by the AI's ability to closely replicate the writing style of trusted sources. This study aims to identify linguistic, semantic, and topic-related features that human observers can uniquely associate with AI-generated misinformation. Utilizing Natural Language Processing (NLP) techniques, this research analyzes features in health news generated by the advanced GPT-3.5 Turbo large language model, comparing them to those in human-written articles. Key findings highlight that AI-generated misinformation tends to feature shorter sentences, fewer verifiable facts, and a higher level of affirmativeness, subjectivity, and emotional content compared to authentic news. These insights are crucial for understanding AI-fabricated content's nature and are instrumental in developing automated detection tools in the future.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 210)

Presenter Name(s): Morven Shan

Presentation Title: Cross-species Comparison of a Seed Dormancy Regulator in *Arabidopsis thaliana* and *Oryza sativa* during Seed-to-seedling Transition

Abstract:

Seed dormancy is an important trait acquired during seed development that can be defined as a temporary failure of a viable seed to complete germination. This adaptive trait can help seeds survive adverse conditions and restart growth in a suitable environment. The seed dormancy 4 gene (SDR4) that has been identified in some plant species regulates seed dormancy and the seed-to-seedling transition. In rice, the SDR4 gene confers seed dormancy and prevents pre-harvest sprouting so that seeds will not germinate within the spike due to improper dormancy, under wet conditions, which reduces grain yield. However, the SDR4 gene in *Arabidopsis thaliana*, a small weed from the mustard family, helps seeds break dormancy and promote germination functioning by an opposite mechanism to rice. The detailed functions and mechanisms of SDR4 genes in monocots and eudicots are still largely unknown. I hypothesize that the regulatory region rather than the protein-coding sequence of rice SDR4 gene contributes to conferring seed dormancy in rice. The functional complementation assay has been carried out using molecular cloning to investigate if the rice SDR4 protein-coding sequence involves in conferring dormancy by transferring rice SDR4 protein-coding sequence to *Arabidopsis sdr4* mutant. A phylogenetic analysis of SDR4 gene family will be performed to examine evolutionary differences between monocots and eudicots. I expect to see that introducing rice SDR4 protein into *Arabidopsis sdr4* mutant will restore wild-type phenotype. This study offers insight into how SDR4 functions in agronomically significant species and provides possibilities for engineering crops with a desired trait.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 210)

Presenter Name: Joshua Lowery

Presentation Title: The Effects of Physical Activity Lifestyle on In-vivo Passive Stiffness of the Lumbar Spine

Abstract:

Low back pain has a lifetime prevalence of 84% in the Canadian population and can limit one's mobility and capacity to work. The amount of resistance that the passive tissues of the lumbar spine provide against load is known as passive stiffness and is a determining factor for both the risk of injury and the overall stability of the lumbar spine. Many factors affect the lumbar spine's passive stiffness, including age and prolonged sitting. However, the effects of physical activity habits have yet to be determined. Therefore, this investigation aims to determine the effects of physical activity lifestyle on lumbar spine passive stiffness in healthy adults during flexion and extension. Lower passive stiffness is hypothesized to be seen in inactive individuals as sedentary behaviours such as prolonged sitting are known to elicit creep in the spinal tissues. Participants were classified as either active or inactive following the completion of the International Physical Activity Questionnaire (n=20 per group). Flexion and extension trials were then completed on a custom jig which allowed rotation about the lumbar spine. Following the completion of this dataset, the trials will be analyzed to determine both the stiffness of their lumbar spine and potential differences in the characteristics of the passive stiffness curve between groups. The results of this investigation will help to understand the implications of physical activity habits on lumbar spine passive stiffness, informing adequate physical activity recommendations to minimize the prevalence of low back pain.

MURC 2024

Presentation Format: Oral Presentation (Wave 3 - SWNG 210)

Presenter Name: Josh Chiu

Presentation Title: Assessing the Impact of Laser-Induced Damage on Image Detection and Navigation Algorithms in Critical Applications

Abstract:

This research delves into the resilience of image detection and navigation algorithms when subjected to laser-induced damage on camera sensors. As technology continues to integrate imaging systems into diverse applications, understanding the vulnerabilities and robustness of these algorithms becomes paramount. The study employs a comprehensive approach, systematically examining the impact of laser damage on a variety of image detection and navigation algorithms used in fields such as autonomous vehicles, surveillance, and robotic systems.

Through experimentation and analysis, the research evaluates the algorithms' performance under varying degrees of laser-induced stress, assessing their ability to maintain functionality and accuracy in real-world scenarios. The findings aim to provide insights into the vulnerabilities of existing algorithms and further guide the development of more resilient systems. Additionally, the research explores potential mitigation strategies to enhance the algorithms' resistance to laser damage. Ultimately, the goal of this investigation contributes to the broader understanding of algorithmic resilience and fosters the development of more reliable and secure image processing technologies.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Grace Zigart, Johanna Clyne

Presentation Title: ZooMS identification of avian faunal remains from Locarno Beach (DhRt-6)

Abstract:

The Locarno Beach Site (DhRt-6) is an archaeological site dating between 3300-2400 years before present located within xʷməθkʷəy̓əm (Musqueam) territory in what is now the City of Vancouver. Previously, vertebrate remains at this site have been identified using morphological analysis, which relies on osteological features to identify the remains. However this approach can only be used on relatively complete bones with well-preserved diagnostic features. In this study, we analyzed 34 bird remains from the Locarno Beach site to determine their taxa—i.e. their order, family, or species classification—using both morphological analysis and Zooarchaeology by Mass Spectrometry (ZooMS). ZooMS is a biomolecular technique that analyzes bone proteins (specifically collagen peptides) for taxonomic identification. It relies on a database of known peptide markers to make positive identifications, however this database is often biased towards European mammals. Recently, several new identification markers have been determined for North American birds, opening up new avenues for archaeological research. The purpose of this study is twofold: First, we aim to identify the taxa of the bird remains to add to the literature on the Locarno Beach site. Secondly, we aim to test the efficacy of novel ZooMS identifiers for North American birds by comparing the current ZooMS database to our results, along with information on the use of birds by First Nations peoples in British Columbia. 8 have been tentatively identified to the order level, 22 have been identified to the family level, and 4 were unidentifiable. The most common identification is Anatidae, a taxonomic family of waterfowl composed of ducks, geese, and swans. Out of the 19 Anatidae identifications, 18 of these are ducks and 1 is likely a goose. These results suggest that more peptide markers are required for identifications down to the sub-family or species level. Given the prominence of Anatidae identifications in our assemblage and the importance of waterfowl as a traditional food source for Musqueam, we suggest that new entries into the ZooMS database focus on markers for Anatidae subfamilies.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Grace Ewart, Jerry Hung, Arwen Fong, Satvika Suresha

Presentation Title: Does the phenotype of the immune infiltrate affect the response of triple negative tumours to immune checkpoint blockade therapy?

Abstract:

Triple-negative breast cancers (TNBC) lack progesterone, estrogen, and human epidermal growth factor receptors. Consequently, traditional hormone therapies are ineffective against TNBC resulting in fewer treatment options compared to other types of breast cancer. However, immunotherapy has emerged as an effective treatment for TNBC due to higher expression of PD-L1 and more tumour infiltrating lymphocytes (TILs) in TNBCs compared to other types of breast tumours. Here, we aim to (1) characterize the immune infiltrate of TNBC patient tumor biopsies, and (2) assess how patients respond to immune checkpoint blockade (ICB) therapy based on immune infiltration of tumours. We will collect tumour biopsies from treatment naive females with TNBC, and conduct imaging mass cytometry to identify infiltrating immune cells, including lymphoid and myeloid lineage cells. Patients will be subject to immune checkpoint blockade therapy and receive monthly checkups, where mammograms will be performed to assess structural changes of the cancer to determine the effectiveness of the treatment over time. We predict the treatment will be more effective in patients with high levels of TILs and myeloid derived suppressor cells (MDSCs). The results of this study may confirm that a higher presence of TILs and MDSCs generally correlates to better response to ICB therapy.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Hana Salehi, Rozhina Sedigh

Presentation Title: Assessing the teratogenic effect of Neutral Red dye on the heart rate of chick embryos in the early stages of development

Abstract:

As the prevalence of human birth defects persists despite significant medical advances, developmental biology is becoming increasingly important to study. However, minimal research has been conducted on the optimization of developmental research procedures to minimize confounding variables. As such, the following study aims to assess the teratogenic effect of Neutral Red (NR) dye, commonly employed for vital staining during laboratory procedures, on embryonic heart rate of the chick in the early stages of development. The study was conducted through treating chick eggs at an early developmental stage with varying NR concentrations, and observing heart rates at various times post-treatment. The results of this investigation revealed that the addition of NR for better visualization does not significantly impact heart rate, yet a noteworthy temporal rise in heart rate occurs for all treatment groups. These findings suggest that the use of the dye for vital staining in future developmental studies on the chick is safe, and unlikely to act as a confounding variable if used in accordance with laboratory procedures. Furthermore, future researchers should acknowledge the increase in heart rate over time at early developmental stages when working with this model system. Studies such as this are significant, as limited research has been conducted regarding the application of NR, leaving the safety of its usage on early embryonic structures primarily unexplored. Moreover, as chick embryos continue to serve as a prominent model system for developmental research, a better understanding of experimental procedures used on them can minimize confounding variables in future studies.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Heather Lu

Presentation Title: Plasma-Derived Exosomes as a Biomarker of Traumatic Brain Injury

Abstract:

Background:

Traumatic brain injury (TBI) is a leading cause of disability and death in children and young adults. While there is currently no clinically useful TBI biomarker, exosomes have been proposed as a promising candidate. Exosomes are extracellular vesicles secreted by the cell that play a role in intercellular communication. Exosomes released by brain cells can cross the blood-brain barrier and can be isolated from blood to examine brain pathology. Astrocytes are glial cells in the central nervous system (CNS) that mediate neuroinflammation and repair. Glial fibrillary acidic protein (GFAP) is a key protein that is upregulated in astrocytes upon CNS damage. Thus, measuring GFAP levels in astrocyte-derived exosomes (ADEs) could be used for TBI prognosis. The objective of this study is to determine whether GFAP levels in ADEs are elevated in plasma samples of patients with TBI. We hypothesize that GFAP levels will be elevated in ADEs of patients with mild and moderate/severe TBI compared to controls.

Methods:

Blood samples were collected from children and young adults with mild or moderate/severe TBI and controls without head injury. Total exosomes were extracted from plasma samples using size-exclusion chromatography and incubated with an anti-GLAST antibody to isolate ADEs.

Results:

GFAP levels in ADE preparations will be quantified using an ELISA assay.

Implications:

The effects of TBI are heterogeneous, making it difficult to predict individual clinical outcomes. This preliminary research on ADEs as a TBI biomarker could lead to the development of specific and inexpensive prognostic tests that could improve TBI care."

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Charis Law

Presentation Title: Enhancing Cognitive Health in the Elderly: The Effects of Multimodal Exercise Program on Global Cognitive Function of Individuals with Mild Cognitive Impairment

Abstract:

Background:

As we age, our cognitive abilities can begin to decline, a phenomenon often seen in a condition known as mild cognitive impairment (MCI). MCI is a concern as it can lead to more serious cognitive disorders, including Alzheimer's disease and other dementias. Physical exercise is recognized as a potential intervention to slow down or improve this decline. This study compares two types of exercise programs: a multimodal exercise program (MMEP), which includes a variety of activities such as aerobic exercise and resistance training, and a balance and tone training program (BAT), which focuses on gentle activities like stretching and balancing exercises. This study investigates the comparative efficacy of a multimodal exercise program (MMEP) versus a balance and tone training program (BAT) on global cognitive function in older adults with MCI, potentially influencing future recommendations for preventing cognitive decline associated with aging.

Method:

We conducted a 6-month randomized controlled trial, 40 participants aged 60 and above with MCI were enrolled and randomized into two groups: 1) a multimodal exercise program including aerobic and resistance training, and 2) a balance and tone training program. Both groups met for 60-minute sessions, three times per week. Cognitive function was assessed using the Montreal Cognitive Assessment (MoCA) at baseline and post-intervention. Data were analyzed using Analysis of Covariance (ANCOVA) to compare the changes in cognitive scores while controlling for baseline scores and age.

Results:

The MMEP group demonstrated significant effect on MoCA score changes ($p=0.030$), in which the final MoCA score of MMEP group is significantly higher than the BAT group. Non-overlapping confidence intervals are shown.

Conclusion:

The multimodal exercise program (MMEP), combining aerobic training (AT) and resistance training (RT), enhances cognitive function in MCI patients more significantly than balance and tone training (BAT). This efficacy of MMEP stems from AT's ability to increase cerebral blood flow and neurotrophins like BDNF, IGF-1, and VEGF, crucial for neuroplasticity and brain health. RT complements this by similarly boosting BDNF levels. Their synergistic action targets key cognitive functions, suggesting MMEP's comprehensive approach is highly effective, warranting further exploration for cognitive enhancement strategies.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Heyli Arcese

Presentation Title: Error Detection: A Mediator Between Formal Math and the Approximate Number System (ANS)

Abstract:

Humans represent mathematical concepts in at least two ways: precisely, through school-taught formal mathematics, and imprecisely, through an innate and universal number sense (the Approximate Number System – ANS) that we use to make rapid estimations. For example, we can decide which of two lines has more people without counting. Research reveals that those with better ANS accuracy display better math performance throughout life. However, the mechanisms behind this relationship remain unclear. We explore error detection, our ability to notice when an answer is wrong, as a potential mediating mechanism. This capacity is necessary while learning since math problems have many potential answers and few cues to determine if an answer is correct.

We devised two novel tasks to measure individual and developmental differences in math error detection and math performance in children aged 5-8 (N = 111). Participants watched as a puppet solved 22 age-appropriate math problems while answering half of the questions correctly and decided whether the puppet's answers were right. Then, we measured participants' ANS using the PANAMATH task (comparing which of two sets of dots is larger without counting). Finally, participants solved the same 22 math problems as the puppet. Our findings indicate that error detection partially mediates the relationship between the ANS and formal math. Better ANS accuracy enables children to more effectively identify errors, thereby contributing to improved performance in formal math. By understanding the relationship between number sense, formal math, and error detection, educators can tailor instructional strategies to support children's mathematical learning.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Lee Zheng, Nathan Wong

Presentation Title: Assessing Impact on Phytoplankton Ecosystems in the Strait of Georgia and Fraser River"

Abstract:

Black Carbon is a class of carbon compounds that form through the burning of biofuel, biomass, and fossil fuels. Wildfires frequencies have increased over the last decade due to various climatological and sociopolitical reasons, indicating that more black carbon is being released to the environment . Aerosols are particles suspended in any type of fluid, with iron and phosphorus being examples of elements released via wildfire-generated aerosols. This proposed study examines how BCA affects near-shore (Strait of Georgia and the Fraser River), and offshore phytoplankton populations differently. Since average temperatures across the Pacific Northwest have increased significantly, wildfires influenced by such temperatures can lead to a cascade of effects, such as fluctuations in phytoplankton ecosystems due to an increase in black carbon distribution. For this purpose, we selected two marine stations, one near-shore and one offshore. Phytoplankton samples will be taken from each station and introduced to varying concentrations of BCA and pH to re-enact the effects of a wildfire season in British Columbia. The phytoplankton population exposed to higher BCA levels is expected to see proportionate increases in population, and pH of similar levels prior to ocean acidification. This research is significant because phytoplankton are primary producers, with the ecosystem depending on their vitality. Yet, excess can lead to dead zones, posing environmental risks. Tracking BCA deposition and influence on phytoplankton is crucial for effective marine conservation strategies.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Insha Majeed

Presentation Title: Exploring the Therapeutic Potential of Tr1 Cell Therapy: Fecal Lipocalin 2 as a Biomarker in DSS-Induced Colitis Mouse Models

Abstract:

Inflammatory Bowel Disease (IBD) is a chronic condition involving recurrent gastrointestinal inflammation, leading to symptoms such as abdominal pain and diarrhea. A prospective targeted approach to address gut inflammation without compromising overall immune function utilizes Type 1 regulatory T cells (Tr1 cells), which are known for their ability to produce large amounts of interleukin-10, an anti-inflammatory cytokine, and aid in reducing inflammatory related damage. Tr1 cell therapy has previously shown efficacy in mitigating inflammation in two mouse models of IBD. However, the impact of this therapy on Fecal Lipocalin 2 (LCN-2), a validated biomarker for colonic epithelial tissue inflammation in IBD, remains unexplored. We hypothesize that Tr1 cell therapy will reduce inflammation, leading to a corresponding decrease in LCN-2 levels. C57BL/6 mice were administered Tr1 cell therapy in half of the mice before inducing Dextran sulfate-induced (DSS) colitis, with the remainder serving as controls. Following a 7-day DSS treatment, mice were allowed to recover, and stool samples were collected on days 7 and 14. LCN-2 levels were quantified using the Mouse Lipocalin-2/NGAL ELISA. Anticipated results include the manifestation of colitis in mice, with inflammation peaking at day 7, leading to elevated LCN-2 levels. Tr1 cell-treated mice are expected to exhibit reduced inflammation and lower LCN-2 levels compared to control mice when exposed to the DSS solution. These findings offer crucial insights into how Tr1 cell therapy effectively treats IBD by modulating specific biomarkers like Fecal Lipocalin 2 (LCN-2) and reducing colonic epithelial tissue inflammation.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Irene Lam

Presentation Title: The Valorisation of Chicken Manure Through The Rearing of Black Soldier Flies

Abstract:

The poultry sector is among the fastest growing agro-based industries fueled by an increasing demand for egg and meat products. However, livestock-based food production, a significant contributor to environmental issues such as climate change, biodiversity loss, and land degradation, necessitates a closer examination. Manure management, an increasingly pressing issue particularly at the farm level, stands out as a major source of environmental impact due to its high concentrations of minerals, nutrients, and metals. Compared to other manures, chicken manure is higher in nitrogen, potassium, phosphorus and calcium, and is also rich in organic matter. This study examines the growth performance of Black Soldier Fly Larvae (BSFL, *Hermetia illucens*) fed on substrates consisting of solid chicken manure with different ratios of chicken mortalities and field waste. Then, a thorough safety assessment was performed to serve as a guideline for how to assess the safety of these high risk organic waste streams as feed for BSFL. Thus, investigating the economic and environmental sustainability as well as feed efficacy, feed safety and practicability of rearing BSFL on chicken manure-based diets can be integral to exploring the different methods of manure treatments. The results of these tests are explained within the context of regulations in Canada. It is intended that these references and the physical and chemical profile of the BSFL reared on organic waste motivate comprehensive industry safety practices when evaluating new feed sources and encourage practitioners to consider this alternative protein source as feed for their poultry farming purposes.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Issac Chen

Presentation Title: Investigating the role of elevated insulin in pancreatic cancer (PC) aggressiveness

Abstract:

This research aims to investigate the relationship between elevated insulin levels and pancreatic cancer (PC) progression. The result of this study will verify the relationship between high insulin levels and PC cell spread and will provide insights into the mechanisms of how increased insulin contributes to a more aggressive spread of PC cells. Future studies may choose to focus on the identified protein candidates to discover new interventions for PC progression.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Jayde Grimard, Natasha Kruger

Presentation Title: Earth, Sea and Sky: A Zooarchaeological Analysis of Faunal Material from Temyiq Tuyuryaq (Old Togiak) Alaska

Abstract:

Temyiq Tuyuryaq (Old Togiak) is an archaeological village site located in the Yup'ik village of Togiak situated in Bristol Bay on the southwest coast of Alaska. Excavations conducted here are a part of a long-term research partnership, Temyiq Tuyuryaq: collaborative archaeology the Yup'it way, a collaborative, community-led project that focuses on serving the community through collaborative archaeology, education and data sovereignty, prioritising youth and their futures. Here, we will present our analysis of the Temyiq Tuyuryaq (TT) faunal assemblage in which we aimed to identify faunal elements and classify the assemblage into the lowest taxonomic group. Specifically, we looked at the faunal specimens from the excavation years of 2018 and 2019, where we have thus far identified 26 specimens using comparative zooarchaeological methods. We have identified the presence of mammalian, avian, and fish species in this assemblage, and further analysis will be done in coming months. As we continue our research, we expect to be able to continue to narrow the taxonomic classes that we can identify, therefore this research represents our preliminary interpretations of the archaeological data from TT. Our current and future analyses will allow for patterns and connections to be made about the culture and diet of the Old Togiak Village and how these practices have been translated to contemporary ways of life in the new village. This zooarchaeological analysis represents and builds on our ongoing collaborative relationship with our Togiak partners, whom we aim to share our results with in the spring.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): James Wu

Presentation Title: Delineating the nhr-49 Stress Response Pathway in *C. elegans*

Abstract:

Cancer cells are characterized by their ability to survive and proliferate in stressful conditions, such as those with low nutrients or oxygen. We can gain a better understanding of how cancer develops under these conditions by studying the molecular pathways underlying stress response. Our lab investigates these cellular stress response pathways in the roundworm *Caenorhabditis elegans* as a model organism, as the genes that regulate these stress responses are evolutionarily conserved. nhr-49 is a member of the Nuclear Hormone Receptor family of transcription factors and is an important stress response regulator in *C. elegans*, yet the molecular mechanism and its partners are not well characterized. To explore this pathway, our lab conducted a reverse genetic RNA interference screen which revealed new candidate genes that may act in the nhr-49 pathway to confer stress responses. I am now conducting stress response and longevity assays using mutants with genetic knockouts of these genes. These assays involve exposing *C. elegans* to oxidative stress, hypoxic (low oxygen) conditions, or starvation. I also cross these mutants with the nhr-49 knockout strain, which is sensitive to stress, to generate double mutants. I then conduct these assays on the double mutants to determine whether these genes act in the nhr-49 pathway. With these studies, I will delineate which genes act with nhr-49 to shed light on this poorly mapped stress response pathway. My research thus aims to characterize genes involved in molecular stress response whose human orthologs may be therapeutic targets in diseases like cancer.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): James Foward

Presentation Title: Adaptation of Pathogens to Temperature Changes: Insights into Virulence and Morphological Plasticity

Abstract:

In a warming world, the adaptation of pathogens to rising temperatures is critical for predicting shifts in disease dynamics and impacts on individual host health. While the influence of temperature on virulence evolution is being recognized, the knowledge on underlying mechanisms is limited. Our investigation examines changes at the phenotypic scale using bacterial pathogen populations (genus: *Leucobacter*) experimentally evolved in nematode worms at an optimal temperature and under ecologically relevant warming. Populations evolved without a host at the optimal temperature demonstrated a loss in virulence, while those at the higher temperature, maintained virulence. At warm temperatures, we found using microscopy a notable reduction in cell width, suggesting morphological plasticity driven by temperature may influence pathogen virulence. Moreover, populations that preserved their virulence at elevated temperatures exhibited slower growth rates, indicative of a potential growth delay advantage associated with virulence. Our results demonstrate how temperature, cellular adaptation, and pathogen aggressiveness form a complex interplay that could dictate disease outcomes. This research sheds light on the mechanisms of pathogen adaptation to thermal changes and highlights the importance of such understanding in the management of infectious diseases amidst climatic changes.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Jane Hsu, Muskan Poddar

Presentation Title: A proposed study: The feasibility of assessing ventilation defects using 19F MRI in pediatric cystic fibrosis patients

Abstract:

Cystic fibrosis (CF) is a hereditary disease caused by mutations in the Cystic Fibrosis Transmembrane Conductance Regulator gene resulting in abnormal mucus secretion, causing blockages and damage to lungs and other organs. The use of hyperpolarized 129Xe in Magnetic Resonance Imaging (MRI) has been established as a feasible technique in mapping lung function of CF patients. The use of fluorinated gasses (19F) for MRI is a potentially less expensive alternative that does not require hyperpolarization. Previous studies have compared multiple breath wash-in 19F MRI to single breath-hold 129Xe, but none have compared multiple breath techniques between both methods. Furthermore, the practicality of 19F MRI in pediatric CF patients remains unknown. This study examines the applicability of 19F MRI in revealing pulmonary ventilation defects in pediatric CF patients through comparison with 129Xe MRI. It was hypothesized that 19F MRI will yield results comparable to 129Xe MRI when used to assess regions of pulmonary defects within same-day tests in CF patients and healthy controls. Subjects included 20 pediatric CF patients and 15 healthy controls ranging 6-18 years of age. Each patient underwent multiple breath 129Xe MRI and 19F MRI tests. MRI images were acquired, and fractional ventilation maps were compared between the methods. It is expected that both methods distinguished healthy patients from CF patients and exhibited statistically significant similar areas and volumes of ventilation defects. Based on these results, multiple breath washout 19F MRI tests are a feasible MRI method for pediatric CF patients.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Jasleen Dhillon, Gabrielle Walji, Nandini Sharma, Aura Balita

Presentation Title: Revolutionizing Prostate Cancer Treatment: The Promise of a9L Aptamer Therapy

Abstract:

Prostate cancer (PCa) ranks as the second most commonly diagnosed cancer among men globally, posing significant health challenges. Current treatments include chemotherapy, bone-modifying drugs and surgery which have off-target effects and low therapeutic indexes. Aptamers, small oligonucleotides that bind to specific targets, are gaining attention for their more targeted drug delivery systems of therapeutic agents, thereby reducing system toxicity. Among these, Prostate-Specific Membrane Antigen (PSMA) aptamers, notably A9L, a truncated form of the A9 RNA aptamer, show promise. A9L targets PSMA on cancer cells, inhibiting their enzymatic activity and offering a potential avenue for targeted cancer therapy. This study focuses on implementing A9L in clinical practice for treating PCa, building upon previous research identifying A9L's capacity to retain binding activity and functionality for large-scale synthesis as a therapeutic inhibitor of PSMA. We propose a clinical trial assessing the efficacy of A9L aptamer in prostate cancer treatment. The study involves three groups with 15 patients, each with progressive metastatic prostate cancer. The first group receives A9L aptamer treatment, the second a non-binding aptamer, and the third, standard prostate cancer treatments (external and internal radiation therapy, and radiopharmaceutical therapy). This double-blind study administers A9L through continuous intravenous infusion over 96 hours at 10mg/kg/day. We expect to see no further progression of tumour growth for 2-9 months after A9L aptamer treatment. The integration of A9L aptamers in prostate cancer treatment marks a significant advancement in oncology, potentially enhancing the precision and effectiveness of cancer therapies, thereby reshaping cancer care and research.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Jason Chang

Presentation Title: Detecting Monosodium Urate Deposition in the Carotid Arteries

Abstract:

Gout is the most common form of inflammatory arthritis with a rise in cases across the globe. It is caused by large deposits of uric acid throughout the body that eventually forms monosodium urate. While gout is commonly found in joints, cardiovascular diseases (CVD) are one of the main concerns for patients with gout due to its higher prevalence. However, the exact mechanism of how monosodium urate (MSU) deposits links gout and CVD together is still unclear.

This study's main objective is to evaluate whether DECT can positively identify MSU deposits within the carotid arteries through imaging analysis. This is followed by a secondary objective in determining the volume of MSU deposits and evaluating MSU's effects on CVD.

This study looks at 83 gout-positive cases, with no potential confounding variables for plaques, with images of DECT Neck/Spine from 2015-2022. Images were then post-processed using Syngo.ViaVB30 with gout application to positively identify deposits of MSU in the carotids. Volumetric analysis with calcium scoring of the identified deposits was performed and then compared to the matched gout patients without MSU deposits and the control group. Preliminary results identified MSU deposits in 23% of gout-positive cases. These cases also demonstrated larger plaque volume compared to matched gout patients without MSU deposits and control group.

Understanding the presence of MSU within the carotid can help better understand the link between CVD and gout. This understanding and early detection can help physicians with timely management of CVD and provide them with necessary information for intervention.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Jayni Chang

Presentation Title: Impact of elevated CO₂ on cold-stressed maize

Abstract:

Maize is an important staple crop worldwide, but its yield is compromised by unpredictable cold weather events, particularly in spring when seeds are sown. Previous studies show that elevated CO₂ (eCO₂) benefits drought- and heat- stressed maize, however, research is lacking on the combined effects of eCO₂ and cold stress on maize. To investigate the effects of eCO₂ on cold-stressed maize in early development, we used maize genotypes representing different cold tolerance categories: 'low', 'medium', 'high', and 'very high' cold tolerance. Maize seedlings were exposed to cold temperature (12-20°C), combined with either CO₂ (400 ppm) or eCO₂ (800 ppm) for 30 days. Then, maize seedlings were allowed to recover under optimal greenhouse conditions (18-32°C and 400ppm) and leaf samples were collected for further analysis. We performed a colorimetric assay on leaf samples to quantify different metabolites indicative of plant stress: photosynthetic pigments, free amino acids, soluble sugars, starch, phenolic compounds, flavonoids and malondialdehyde. Light absorbance data was acquired with a microplate reader and used to estimate metabolite concentrations. A two-way ANOVA test will be used to determine the effect of cold tolerance and treatment on metabolite concentration. Lastly, we observed severe wilting in maize seedlings exposed to cold temperature and eCO₂. Further investigation is needed to elucidate the potential effects of climate change on maize productivity and global food security.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Jessica Zhang

Presentation Title: The Effects of Muscle Tendon Vibration on Performance of a Two-Dimensional Aiming Task

Abstract:

The sense of position and movement of our limbs, or kinesthesia, relies on a combination of peripherally derived afferent information and a centrally derived sense of effort. Information from the periphery relies primarily on the muscle spindles. Muscle vibration has been shown to be an effective tool for stimulating the muscle spindles and creating kinesthetic illusions that cause an individual to believe their muscle is at a longer length, or is being lengthened at a rate faster than it actually is. Previous research has typically studied single degree of freedom movements. We hypothesize that the kinesthetic illusions experienced in one-dimensional movements will carry over to two-dimensional movements about the wrist. We will use a targeting paradigm where participants will perform wrist movements in an attempt to hit targets displayed on a vertical screen. The objective is to study the effects of agonist (Ag), antagonist (Ant), and simultaneous (Ag-Ant) vibration of the forearm muscles during these movements. We will quantify the constant and variable errors to illustrate the effect of vibration illusions on targeting accuracy in this two-dimensional setting. We expect to observe increased variable error during Ag-Ant vibration, and increased constant error in the direction opposite of the vibration-induced illusions during single-muscle vibration, but only during movements where the vibrated muscle is not an agonist. These results will inform further research on the ability to create shifts in the perception of limb position (i.e. proprioceptive shifts and recalibration) and how these proprioceptive shifts influence sensorimotor control of the limbs.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Amy Zhao

Presentation Title: Less is More: Optimization of Magnetic Resonance Spectroscopy Thermometry (MRS-T)

Authors: JingYing Zhao, Erin MacMillan, John L.K. Kramer, Paulina S. Scheuren.

Abstract:

Magnetic resonance spectroscopy thermometry (MRS-T) has been proposed as a non-invasive measure to estimate brain temperature. However, there is no consensus on the optimal approach to MRS-T data acquisition and analysis. This study aimed to identify the optimal number of signal averages (NSA) needed to reliably estimate temperature in the cingulate cortex, thus defining the shortest possible time of MRS-T acquisition.

Forty-eight healthy individuals (25F/24M, mean age 27.6 ± 6.4) underwent a 3T single-voxel MRS scan (sLASER; voxel size: $24 \times 22 \times 15 \text{mm}^3$; TE/TR=32/5000ms) from the perigenual anterior cingulate cortex (pACC), anterior and posterior midcingulate cortex (aMCC, pMCC), and posterior cingulate cortex (PCC).

Data were processed (eddy current correction, frequency alignment) into 64, 32, and 16 NSAs and temperature was estimated as the chemical shift difference between the water and N-acetyl-aspartate peaks. Temperature ($^{\circ}\text{C}$) did not differ between the pACC (37.28 ± 0.66), aMCC (37.23 ± 0.67), pMCC (37.28 ± 0.71), and PCC (37.37 ± 0.81) for 64 NSAs. Brain temperature showed excellent reliability when reducing from 64 to 32 or 16 NSAs (intraclass correlation coefficients > 0.9) in all regions.

Our preliminary findings indicate that MRS-T derived brain temperature can be reliably assessed with shorter scan times (i.e., lower NSA). In the future, MRS-T may represent a valuable tool to reliably estimate brain temperature with shorter scans.

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Jiyang Xin, Pardis Shirvani, Isa Huang

Presentation Title: Promoting Role of ILC3s in Lung Cancer Activation and Growth

Abstract:

Innate Lymphoid Cells (ILCs), a recently discovered immune cell family devoid of antigen-specific receptors, play a pivotal role in both innate and adaptive immune responses across diverse tissues. Classified into ILC1s, ILC2s, and ILC3s, each subgroup exhibits distinct transcription factors and effector cytokines, contributing significantly to immune surveillance, tissue homeostasis, and defense against pathogens. ILC3s, which are one of the most important immune cells in the human respiratory system, can be activated by cytokines such as IL-23 and IL-1 β , and ILC3s will produce cytokines such as IL-22 and IL-17 as responses for activation. IL-23 and IL-1 β are two types of inflammatory cytokines that can indirectly prompt the development of Non-Small Cell Lung Cancer (NSCLC). As IL-22 is one of the major cytokines produced by ILC3s, and several previous studies have shed light on the involvement of IL-22 in NSCLC pathogenesis through the activation of STAT2 and AKT signaling pathways. The purpose of our study is to investigate ILC3 involvement in NSCLC development and progression. Using different tumor mice models, we discovered ILC3 expansion in the NSCLC microenvironment and surprisingly, the lack of ILC3 slowed tumor progression. Flow cytometric analysis revealed increased IL-22 production by ILC3s in the tumor model and this result was confirmed by ELISA analysis. Based on these results, our study showed that ILC3s are activated in the NSCLC tumor microenvironment and activated ILC3s produce cytokines such as IL-17 and IL-22 which promote tumor progression.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Joaquín Gutierrez Diaz

Presentation Title: Assessing the Effectiveness of British Columbia's Forest Carbon Offset Program

Abstract:

Forest carbon offset programs are widely used for climate change mitigation globally. Hosting about 9% of the world's forestland, forest carbon sequestration is particularly relevant for British Columbia's (BC) carbon neutrality. However, the efficacy of these programs in offsetting emissions depends on whether additional emissions are truly reduced (additionality), if offset emissions are shifted elsewhere (leakage), and the long-term stability of carbon storage (permanence). To effectively quantify carbon removals in any offset project, a thoughtful accounting protocol that mitigates the aforementioned challenges is necessary. Previous research has assessed the design and feasibility of previous versions of BC's Forest Carbon Offset Program (FCOP) and other North American protocols. This study aims to assess the effectiveness of BC's latest FCOP in conservatively quantifying carbon removals. A quantitative and qualitative assessment of two offset protocols: FCOP and Climate Action Reserve will be conducted. I apply a Structured Decision-Making framework to assess the protocols' approaches to additionality, leakage, and permanence through a mix of qualitative and quantitative indicators. Quantitatively, a spreadsheet model, utilizing CBM-CFS3 carbon model data, will calculate credits across protocols to determine the most conservative approach for a hypothetical case study, modeled after BC's Great Bear Project. Expected results include a comprehensive effectiveness assessment of BC's protocol, along with recommendations for improvement, modeled after approaches from similar North American protocols. While not a primary emission reduction tool, effective offset protocols are essential for addressing hard-to-decarbonize sectors and maximizing climate change mitigation solutions.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Joyce Xi

Presentation Title: Characterizing the Sex-biased Role of Insulin Signaling in Diet-induced Obesity in *D. Melanogaster*

Abstract:

Obesity—the excess accumulation of fat—is a growing problem around the world. It may gradually lead to metabolic diseases such as type 2 diabetes as insulin resistance increases. Despite extensive research being done on these diseases, male-female differences in their progression remains poorly understood. Compounding this issue is the increasing prevalence of fatty and sugary diets, especially in affluent developed countries. Consequently, the sex-biased interplay between insulin signaling pathways and nutrient rich diets in the development of metabolic diseases is largely unknown.

Drosophila melanogaster (fruit flies) emerges as an ideal model organism to model metabolic diseases as their insulin-producing cells (IPCs) and insulin-like peptides are homologous to human beta cells and insulin, respectively. Previous studies showed that controlled apoptosis of IPCs in *Drosophila* extends lifespan and reduces fat accumulation. This observation can potentially be applied to sex-specific human therapies to treat obesity and related metabolic diseases.

Our experiment aims to characterize sex-biased roles of the insulin signaling pathway in *Drosophila* given fatty and sugary diets during aging. To control insulin production, we will subject male and female flies to heat shocks to induce IPC death via the UAS-Gal4 system. Percentage body fat measurements will be taken every 5, 10, 15, and 20 days to evaluate fat accumulation. Early results show that there are male-female differences in fat storage when IPC ablation and diet are assessed independently, with mean fat storage generally being higher in females than males.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Kaila Villarey, Tanvi Khurana, Karman Johal, Pamela Bai

Presentation Title: Risk Evaluation and Screening to Tailor prevention and Reduce the incidence of Endometrial cancer (RESToRE): Recruitment Strategies

Abstract:

Background: Endometrial cancer (EC) is the most common gynecologic malignancy in the developed world, with a 50% projected rise in incidence in British Columbia (BC) in the next ten years. RESToRE is a multifaceted clinical study that assesses the feasibility and acceptability of a risk-stratified screening and intervention protocol for EC. As poor participant recruitment remains a limitation to cancer research, one aim of RESToRE is to assess effective strategies for recruiting eligible post-menopausal individuals.

Objective: Determine which recruitment strategies (ex. social media advertisements, newspaper advertisements, posters, online recruitment platforms, patient recruitment services) effectively recruit a diverse demographic of post-menopausal women at risk for endometrial cancer in BC.

Methods: Initial recruitment strategies were limited to REACH BC and paid social media advertisements on Facebook, Instagram, and Google. Approaches such as sending posters to medical clinics and community centers, newspaper advertisements, posting in targeted Facebook groups, and collaborating with TrialFacts were employed later during the recruitment timeline. Participants self-reported "Where did you hear about the study" in the initial consent survey.

Results: So far, social media has proven to be the most successful recruitment strategy, recruiting 39.2% of all eligible and 39.3% of all eligible high-risk participants. For social media alone, the cost per participant for eligible and eligible high-risk participants were \$18.21 and \$185.41, respectively. Of the eligible high-risk participants, 39.2% are from rural areas.

Significance: Determining successful recruitment strategies for EC studies will set the foundation for future research aiming to recruit a similar demographic.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Kanna Yagi, Ela Turkkkan

Presentation Title: Infants' Emerging Auditory Processing of Pitch Contour in Music and Speech

Abstract:

Previous research indicates that newborn infants can detect utterance-level melody and rhythm contours. Japanese, but not English, uses a pitch accent to distinguish some speech sounds, and by 10 months Japanese infants can detect pitch changes in speech sounds. Thus, we test whether 10 to 12-month-old English-learning infants' development of auditory processing of pitch contour is similar to that of Japanese-learning infants. Another goal is to understand if exposure to music at home relates to these sensitivities. In this study, we recruited 16 10 to 12-month-old English monolingual infants from the Early Development Research Group database. We hypothesize that English monolingual infants, particularly those exposed to music at home, will develop the ability to process Japanese speech and music at the same rate. Infants are exposed to two trials—one with a five-note melody in piano tone and another with a five-syllable Japanese non-word. We will use a decline in looking time as evidence of the infants' habituation to the stimuli. After the infants have habituated to the stimulus, they are presented with the habituated familiar stimulus and an unfamiliar stimulus with a change at a single sound in a 5-sound sequence. As English monolingual infants are not frequently exposed to Japanese pitch accent patterns, we predict they will process patterns on a broader, more general level than the Japanese infants. Furthermore, we predict that infants with greater exposure to music at home will better detect pitch changes in music and speech.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Katie T. Roy

Presentation Title: Posting about prevention: Co-creating social media recommendations for dementia prevention research

Abstract:

Social media creates additional avenues for dementia prevention researchers to engage the public, including healthy, eligible individuals who may not otherwise recognise dementia research opportunities. Social media used for such purposes should reflect the values and priorities of the potential participants. Therefore, practical guidance for dementia prevention researchers is needed. We aimed to create consensus recommendations to support ethical social media use in dementia prevention research. We used a modified Delphi process involving three rounds of surveys and conference calls to establish group consensus, which was defined a priori as $\geq 70\%$. There were 16 panelists with professional ($n=6$) and lived ($n=10$) experiences. Based on results of previous project phases, panelists reached consensus on twenty-six items. Round 1 finalized two items that addressed the ethics of closed social media groups (88%) and employing people active on social media to recruit their off-line contacts (79%). In Round 2 nine items reached consensus on handling stigma (93%), misinformation (79%), public criticism (71%), and other relevant issues. Fifteen items reached agreement in Round 3, including ranking appropriate language for different audiences (e.g. young, healthy adults, symptomatic individuals). The recommendations were organised into seven cases for practical use: starting a social media page, handling misinformation, addressing stigma, managing difficult interactions online, communicating new research to the public, study recruitment, and writing social media posts. These recommendations can provide guidance for ethical social media use in dementia prevention research. Further work will involve creating an evaluation tool and disseminating the recommendations.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Kayla Heiman, Jessica Chi

Presentation Title: Nudibranch (*Flabellina trilineata*) Nematocyst Acquisition from Cnidarian Polyps and Diet Preference Under Different Thermal Regimes

Abstract:

All organisms require energy to live, and most ectotherms such as fishes and amphibians require more energy at higher temperatures. The breakdown of nutrients allows them to carry out basic life functions such as growing and reproducing. Many organisms have evolved specialized diets that target specific types of prey to satisfy their nutrient requirements and benefit their survival. One such example are nudibranchs, which are shell-less ocean-dwelling mollusks commonly referred to as 'sea slugs' that feed on Cnidarian polyps and have unique stinging organs called nematocysts. These nudibranchs are known to consume and sequester these nematocysts into their skin and use it as a primary defense mechanism, demonstrating their diet to be highly beneficial towards survival. We aim to quantify the nematocysts acquired by the three-lined aeolid nudibranch, *Flabellina trilineata*, when fed varied single-organism diets of Cnidarian polyps. We predict that there is a limit to the amount of nematocysts that *F. trilineata* is able to sequester in the presence of abundant prey due to the toxic nature of nematocysts. Predicted findings concerning further investigation on the relationship between temperature and nematocyst sequestration suggest that increased temperatures will lead to a decreased threshold of nematocyst consumption to limit their toxic effects. Through feeding custom diets of *Eudendrium californicum*, *Tubularia regalis*, and *Tubularia indivisa* to our nudibranchs, the preferred prey of *F. trilineata* will be estimated and quantified for its sequestering efficiency. Small changes in diet combined with increased water temperature could drastically affect the survival of this unique aquatic species.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Kayly Choy

Presentation Title: Exploring the Association Between Discharge Destination on Stroke Patient Outcomes

Abstract:

Stroke is the leading cause of adult disability in Canada and the issue of overcrowding and understaffing in emergency departments plays a significant role in how and where stroke patients are discharged. This study aims to identify how different discharge destinations following stroke hospitalization, negatively or positively impact patient health outcomes. Using the International Stroke Trial: Version 2 dataset, we compared baseline characteristics and performed an initial Kaplan Meier analysis to estimate the trends in survival probabilities. For statistical analysis, we identified the predicted 6 month mortality of ischaemic stroke patients in different discharge destinations through Cox proportional hazards regression analysis. In doing so, we were able to adjust for confounders, handle administratively censored data, and generate hazard ratios that quantify the risk of each discharge destination. Due to the varying degrees of care offered at different discharge destinations, we hypothesized that the destinations with consistent quality of care and support will be associated with better health outcomes.

The average age of our cohort (n=9,569) was 69.9 years (± 11.8). Results from our Cox regression indicate nursing home discharges increase the risk of 6 month mortality by 105% (HR:2.054 [1.848-2.259]) and other hospital departments discharges increase the risk of 6 month mortality by 101% (HR:2.012 [1.849-2.174]). These findings suggest the need for further research into informed decision-making around stroke care plans and improvements in resource allocation and quality of care for proper prevention, care, and rehabilitation of stroke patients.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Kendle Speers

Presentation Title: Exploring the relationship between social stress and gut microbiome diversity in tree swallows

Abstract:

The gut microbiome plays important roles in avian physiology, with benefits such as preventing the invasion of pathogens and increasing digestive capacity. However, little is known about what factors impact avian gut microbiomes in early life. This project aims to study the connections between early-life social stressors, gut microbiome diversity, and nestling health, utilizing the tree swallow (*Tachycineta bicolor*) as a model system. We hypothesize that tree swallow nestlings experiencing heightened social stress, indicated by more nestmates, will exhibit less diverse gut microbiomes compared to those with fewer nestmates. To test this, we collected adult and nestling fecal samples from 24 nests in a Michigan population, with three samples per nestling tracked from birth to fledge. Supplementary data on nestling body size, fledgling outcomes, and behaviour will enable us to explore potential correlations between gut microbiome diversity, social stress, and nestling health metrics. The microbiome 16S sequences are currently being processed using a custom DADA2 pipeline, followed by descriptive statistics and visualizations employing the phyloseq-based microbiome R package. The subsequent phase involves running a statistical analysis using a linear mixed model. We anticipate observing a correlation wherein increased social stress aligns with decreased diversity in nestling gut microbiomes, accompanied by smaller body size. These anticipated results offer the potential to enhance our understanding of avian gut microbiomes and lay the groundwork for future investigations into the complex relationship between microbiomes and stress.

NOTE: Co-authors are Dr. Laura Grieneisen, Dr. Kelly Hallinger, and Dr. Jennifer Houtz.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Kyla Terenzek

Presentation Title: No species-level evidence of *Mytilus edulis* species complex thermophilization in the Pasley Island Archipelago after the 2021 Pacific Northwest Heat Dome

Abstract:

The 2021 Pacific Northwest Heat Dome (PNWHD) led to catastrophic mortality of blue mussels. A predicted consequence of climate change is the “thermophilization”- the increased dominance of warm-adapted species and extirpation of cool-adapted species in marine communities at the microhabitat scale. *Mytilus trossulus*, a cool-adapted species of the *Mytilus edulis* species complex, is indigenous to the Pacific Northwest while *Mytilus edulis* and *Mytilus galloprovincialis* are warm-adapted invasive species. There is a gap in knowledge about the species identities and genotype frequencies of *Mytilus* recruiting to the disturbed intertidal habitats after the PNWHD. The hypothesis that after the PNWHD, thermophilic and non-indigenous *Mytilus* spp. genotypes would invade disturbed microclimates approaching solar optimum, and aspects south>west>east>north more frequently was tested. Samples (n=160) were collected from north, east, south, and west-facing microhabitats with slopes of 20°-40° in the Pasley Island Archipelago. DNA isolation and PCR was used to identify the individual cryptic mussels to the species-level to compare genotype frequencies among slope-aspects. Slope-aspect of microclimates did not affect the frequency of non-indigenous species. Indigenous *Mytilus trossulus* genotypes were found at a frequency of 100%. Unexpectedly, the results of this study revealed a relationship between canopy forming algae cover and mantle pigmentation ($p < 0.0001$), and between habitat aspect and shell length/height ratio ($p = 0.0023$). Thermophilization at the microhabitat scale was not observed, however species-level responses to climate change often experience a lag. Both pigmentation and shell length/height ratio are proposed indicators of species responses to environmental conditions and may reflect adaptive conditions in the study area.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Laura Joyce

Presentation Title: Is perspective-taking a precursor to prosociality? Exploring longitudinal associations between implicit Theory of Mind and helpfulness in toddlers.

Abstract:

Theory of Mind (ToM), the ability to represent the contents of another person's mind, is associated with children's helpfulness; however, most studies have used explicit (ie., verbal) ToM measures with young children, well past the age at which prosociality first emerges. Implicit ToM (non-verbal measures) is evidenced among toddlers; however, it remains unclear whether it also relates to early prosocial behaviours. We examined associations between toddlers' implicit ToM (both affective and cognitive) and their prosociality. At Time 1 (T1; MAge= 24 months) toddlers watched role plays in which one actor harmed another (e.g., stealing belongings), but the victim demonstrated no emotion. Longer looks to victims indicated greater affective ToM. At Time 2 (T2; MAge= 30 months), toddlers were read an illustrated false belief story. Longer looks to belief-consistent images demonstrated greater cognitive ToM. At T2, toddlers were also given opportunities to help clean up (instrumental helping), respond to an "injured" experimenter (comforting) and react after "breaking" a toy (guilt). Linear regression analyses (n = 39; 41% female) indicated that affective ToM (T1) explained 25.08% of the variance in helping scores (T2, $p = .001$) but did not predict comforting or guilt scores. Implicit cognitive ToM (T2) was not associated with prosociality. Comforting and instrumental helping scores (T2) were moderately, positively associated ($r = .36$, $p = .02$). These results suggest that implicit affective (versus cognitive) ToM could facilitate instrumental helping in toddlerhood; perhaps because helpful behaviour requires an orientation to others' emotional states rather than their knowledge/belief states.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Lynn Choi, Vania Amani, Renee Chai

Presentation Title: Unraveling the ZDHHC21 enigma in neuronal physiology and Alzheimer's disease

Abstract

Protein palmitoylation is a common and reversible post-translational lipid modification that involves the addition of palmitic acid to a cysteine residue on a substrate protein. It is mediated by a family of 23 palmitoyl acyl transferases (PATs) known as the ZDHHC enzymes; the ZDHHCs have a conserved DHHC (Asp-His-His-Cys) motif. Amongst all the PATs, there is growing evidence showing that dysregulation of palmitoylation and specifically ZDHHC21 may contribute to Alzheimer's disease (AD) pathophysiology and progression, as AD is associated with the formation of senile plaques and neurofibrillary tangles. It is characterized by the deterioration of functional and cognitive abilities, along with the possibility of aberrant synaptic plasticity and synaptic function, and disruptions in Ca²⁺ homeostasis. The goal is to determine the function of ZDHHC21 in neuronal physiology and the formation of amyloid beta deposits in AD by generating different mutations using exome sequencing and CRISPR/Cas9 followed by immunocytochemistry to visualize the synapses after performing overexpression and knockdown of ZDHHC21. Electrophysiology will be used to monitor the field excitatory postsynaptic potentials in mice with mutated ZDHHC21 compared to the control in order to examine the impacts of ZDHHC21 on synaptic plasticity. Understanding how ZDHHC21 contributes to the pathology of Alzheimer's disease could open the door to considering it as a potential therapeutic target and ultimately identify drugs that can normalize ZDHHC21's effects.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Macy Chen

Presentation Title: The Impact of Heat Stress on Red Raspberry Seed Oil Content and Fatty Acid Profile

Abstract:

Rubus idaeus L. (red raspberry) seeds are a by-product of fruit processing that can be used to produce raspberry seed oil (RSO). RSO contains valuable bioactive compounds such as fatty acids and phytochemicals beneficial to human health and, therefore incorporated into cosmetics and pharmaceutical products. Warmer temperatures are a stress factor impacting raspberry reproductive biology and fruit quality. With temperatures predicted to increase, the effects of heat stress on RSO are unknown. This study aims to investigate how heat stress impacts RSO content and fatty acid (FA) composition. Twenty-seven rooted cuttings of red raspberry cv. 'Tulameen' will be sourced from nurseries and transferred to plant growth chambers inside a greenhouse. The plants will be grown at controlled ambient temperatures until the start of flower formation. Different plant groups will be subjected to three temperature regimes of 20/18°C, 26/18°C, and 32/18°C during flowering and fruit-set (3 treatments x 3 reps x 3 plants = 27 plants). The RSO will be extracted using the Soxhlet extraction method, and gas chromatography-mass spectrometry (GC-MS) analysis will be conducted to determine the FA profile. We expect that heat stress in red raspberry plants will decrease the RSO content and quality and the ratio of fatty acids to vary due to the inhibition of transcription factors that regulate fatty acid synthesis. This research will offer insight into the impact of heat stress on RSO yield and composition, which will be valuable in developing adaptation strategies for raspberry growers and RSO manufacturers.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Madeleine Soegiarto

Presentation Title: Reciprocating Agitation – Thermal Processing (RA-TP) Sterilization Effects on the Physicochemical Properties of Dairy Milk

Abstract:

The demand for food and beverage products that emphasise convenience is increasing, specifically Ultra High Temperature (UHT) sterilization or shelf-stable dairy milk since refrigeration is not needed. Moreover, the consumption of UHT dairy milk is safe since all bacteria, including their spores, are being killed during the sterilization treatment. As years passed by, there are more health-conscious individuals. Such individuals are highly concerned regarding the physicochemical properties as compared to pasteurized or raw dairy milk due to the more severe treatment that UHT processing had. In color analysis, the L, a, and b values were altered by 14% - 35%. SFA decreased with UHT, but MUFA & PUFA increased with UHT. Soluble protein was increased by 5%. There was no significant difference ($p > 0.05$) for amount of Vitamin D. Another alternative to UHT processing for sterilization would be retort, in which some physicochemical properties of milk are altered. Thus, a further improved method called Reciprocating Agitation - Thermal Processing (RA-TP) on a retort is being done to observe what such modified treatment has on the physicochemical properties of dairy milk. Dairy milk of 0% and 2% M.F. will be subjected to three different agitation speeds at 0, 45, and 90 shakes per minute. Then, each of the RA-TP-treated dairy milk at varying agitation speeds will be compared to UHT dairy milk by observing the color properties, saturated and unsaturated fat, soluble and insoluble protein, and Vitamin D contents. Due to the emphasis of RA-TP on using agitation and heat treatment, the physicochemical properties of dairy milk will be better than UHT-processed.

Key words: reciprocating agitation - thermal processing, dairy milk, protein analysis, fat analysis, color measurement, vitamin d, sterilization

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Antonina Ozynska, Namita Giri, Maddie Trotter

Presentation Title: How Do Weather Patterns Affect Human–Black Bear Interactions on Vancouver Island?

Abstract:

Climate change is a recognized cause of the increase in human-wildlife interactions (HWIs). More frequent negative HWIs have raised many concerns over human safety and wildlife conservation. One area of particular concern is Vancouver Island, where human-bear interactions (HBIs) with black bears increased by 100% in the summer of 2023 compared to previous years. We hypothesize that variations in weather patterns such as temperature, precipitation, and seasonal length alter the timing of bear behaviors such as hibernation and denning and thus increase the frequency of HBIs. To test this hypothesis, we will analyze data on bear behavior gathered through the frequency of calls to the Government of British Columbia's Report All Poachers and Polluters program and data on weather patterns collected by Environment and Climate Change Canada over the past decade. Generalized linear models will be employed to establish correlations between bear behavior and weather conditions and provide insight into how climate conditions affect HBIs. We expect to find that extreme temperatures, precipitation, and changes in seasonal length are associated with more frequent HBIs. Improving our understanding of weather's effect on HBIs would allow us to develop region-specific management strategies in the context of climate change's effect on wildlife. We could also allocate resources more effectively, focusing on prevention through educational programs on waste management. This targeted approach aims to mitigate negative interactions, particularly in areas prone to extreme weather, ultimately enhancing safety for both humans and bears.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Mahnoor Faisal

Presentation Title: Optimizing the Management of Pain and Irritability in Children with Severe Neurological Impairment

Abstract:

This study focuses on serving children with severe neurological impairment (SNI) who are typically non-verbal, non-mobile, and cognitively impaired. These children often experience pain and irritability daily, yet the source of their discomfort is difficult to identify. Many primary caregivers instead rely on behavioural observations such as grimacing or vocalizations to assess their child's pain. The lack of a standardized approach for investigating and managing pain and irritability of unknown origin (PIUO) may contribute to the persistence of pain in this population. To address this issue, this study uses a systematic approach for assessing the treatment of pain and irritability called the PIUO Pathway. The Pathway consists of tests and treatments that first look at the patient's history, a physical exam and screening tests, and then treatment of the pain using pharmacology.

This study tested children aged 6 months to 18 years with SNI and who have PIUO, to assess the effectiveness of the PIUO Pathway. The Pathway produced 30% of resolved or identified pain. It may streamline pain management for this population and improve the well-being of children and their families. In cases where pain persists beyond the Pathway, we know that the participants and their families still benefited from the relationship they built with our team of nurses and doctors. At this stage, this study is shifting to Phase II where we will implement our findings in community settings using implementation science principles. We want to produce a guideline for pediatricians that can be implemented across BC.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Maiya Callister

Presentation Title: Characterizing and Evaluating the Porphyry Fertility of the Telegraph Property Plutonic Rocks Using Petrography and Geochemistry

Abstract:

The Telegraph property is located within the Stikine terrane of Northwestern BC's Golden Triangle and is hosted by the volcanoclastic and sedimentary volcanic rocks of the Hazelton and Stuhini formations. This paper presents optical and geochemical studies used to characterize and evaluate the fertility of supergene plutonic rocks at Dok Ridge, which displays porphyry-style alteration and mineralization. Detailed petrographic analysis suggests the presence of multiple intrusions. Four major geochemical groupings were identified, which indicates that intrusions may have been emplaced over multiple differently evolved phases.

Parental magmas to Cu porphyry deposits are typically water-rich and have undergone crystal fractionation of amphibole. Sc, V, Cr, and Ni vs SiO₂ plots were used to emphasize the overall fractional trend, which decreases as SiO₂ increases. Sr/Y and V/Sc ratios were used as geochemical proxies for fertility. Early crystallization of hornblende relative to plagioclase is interpreted to result in high Sr/Y (>35). Monzodioritic rocks are typically hornblende-bearing, with high Sr/Y and V/Sc ratios relative to other suites. From monzodioritic to monzonitic samples, there is a decreasing trend in Sr/Y as SiO₂ wt % increases. Variable amounts of resistate porphyry indicator minerals including apatite, titanite and zircon are present in most samples, generally with modal abundances <3%. Ca-P elemental maps from μ XRF analysis support petrographic observations of magmatic apatite.

MURC 2024

Presentation Format: Poster Presentation (Wave 3 - Ponderosa Ballroom)

Presenter Name(s): Malika Kahlon

Presentation Title: Mental Health Policies in Medical Education

Abstract:

The prevalence of mental health challenges is widespread among all students, with medical students facing a particularly heightened risk due to the intense academic demands associated with their rigorous program. Few studies analyze the mental health policies of Canadian medical schools and to our knowledge, none compare the availability of mental health specialists and the range of leave options. The aim of this study is to evaluate and compare these policies at 15 Canadian medical schools, focusing on the specialist availability and the range of leave options. Data collection included policies regarding mental health specialists and leave options such as bereavement and medical issues. While a high prevalence of mental health policies indicates institutional recognition, the absence of dedicated support staff suggests a gap in direct support. Although comprehensive leave policies demonstrate a commitment to diverse needs, variability and absent options in some schools highlight areas for policy enhancement.



Wave 4

POSTER AND ORAL
PRESENTATIONS

WAVE 4

ORAL PRESENTATIONS

SWNG 106

Associations between Attention Deficit/Hyperactivity Disorder symptoms and sexual function and sexual distress

Orli Hellerstein

How can the brain networks that are elicited from the paired associates task in terms of episodic memory explain individuals' cognitive decline with aging?

Paniz Tofigh, Noel Wai, Waleed Bari

Low serum saturated fatty acid levels positively associate with microbiota diversity and metabolic pathways in Parkinson's disease patients

Parsa Khatami, Jordan Si, Ali Tavakoli Hedayatpour, Josh Zhang

Doppelgängers and Deceptive Fantasies: A Theoretical Approach to Situate Deepfake Pornography in the Spectrum of Sexual Violation

Pearl Kimberly

Endogenous Retrovirus Modulation of Innate Immune Cell Activation

Phoebe McNair-Luxon

SWNG 107

Sex-Specific Analysis of Alzheimer's Disease Treatment Using Calcium Channel Blockers Sex differences in Alzheimer's treatment

Anisha Biswas, Yanuo Yu, Justin Hong

DNA Origami-Mediated Immunotherapy: Targeting Prostate Cancer with AND Logic

Karina Akhmedova, Aaron Tieu, Abteen Arab, Maya Ansu-Kyeremeh

Improving Introductory Economics Courses: A Qualitative and Quantitative Study

Katherine K.

Local Identity, Global Core: Motivations of Chinese International Students amid Rising Nationalism

Kelly Ho

Metabolic Adaptations and Mitochondrial Fuel Dynamics in Atlantic Salmon (*Salmo salar*): A Comparative Study of Muscle Physiology During Freshwater to Seawater Transition

Kia Bahari

WAVE 4

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WAVE 4

ORAL PRESENTATIONS

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WAVE 4

ORAL PRESENTATIONS

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Problematizing the Social Organization of Experiential Education	Naomi Hudson, Assem Zhaksybay, Valeria Pérez
When Westerners listen to the stories of the Tuvan Taiga: a conversation with learners of Khoomei in the West	Naruhito Kruschen
Investigating the Role of Tenascin-C in Wet Age-Related Macular Degeneration	Natalie Ma

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WAVE 4

POSTER PRESENTATIONS

Ponderosa Ballroom

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Mapping potential transcription start sites of the brkA gene on pDO6935 in Escherichia coli using the ARF-TSS method	Gurpreet Sidhu, Sana Alayoubi, Alissa Gama
'Dizzy Susan' for Vestibular Perception: A Reliability and Validity Study	Lisa Liu
Feasibility of liquid biopsies for diagnostic purposes on mesothelioma	Manpreet Kaur, Anali Delshadi, Sharon Zhang
Development of an SNP-based fingerprinting platform for black raspberry	Maria Cheema, Nisha Devavarapu
Peel to Seal: Using oranges and bacteria to grow food packaging	Maria Lauren, Talia Feng, Mittal Bagul
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Investigating the Influence of Various Receptor Organizations on Filamentous Influenza A Motility Under the Presence of Antibodies	Marusia Shevchuk
Head and Lower Limb Kinematics of Walking and Natural Walking Perturbations	Matt Galassi
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WAVE 4

POSTER PRESENTATIONS

Exploring mental health resource needs of families of pediatric solid organ transplant recipients

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Identification of Site-Specific Transposable Element Activities in Early Cancer Cells

Melanie Chan

Advancing Polymer Synthesis: Green Approaches to Primary Amine Functionalization for Diverse Applications

Melika Javanmardi

A BIOMODular Enzyme Delivery Vehicle to Target Biofilms

Miguel Tsai, Victoria
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Exploring Rural Pharmacy: A Needs Assessment for a New Elective Course Focused on Rural Pharmacy Practice

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The Lower-Extremity Unobtrusive Athletic Research (LUNAR) System

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Different levels of stand density in lodgepole pine incite dissimilar resilience to drought and mountain pine beetle attacks.

Muhammad Jayadi,
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Human Islet Gene Expression in Obese Donors

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Intranasal Delivery of Protein Therapeutics with Cell-Penetrating Platforms

Natalie Jones

Wood frog's (*L. sylvaticus*) immunity adaptation to elevated temperatures against chytridiomycosis

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WAVE 4

POSTER PRESENTATIONS

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The Interaction between Menarche and Oral Contraceptive Use in Female Depression Risk	Nicolas Zhu
Modelling the impact of enforcement actions against industrial facilities on air quality and environmental justice in Canada	Nika Martinussen
A Comparative Study on Evolving Spinal Cord Injury (SCI) Recovery Priorities among individuals with SCI, Researchers and Clinicians in North America.	Omer Faraz
Discovering Novel Interactions Between Thrombosis, Diabetes and Obesity	Paniz Ghavimi
Functional characterization of the divergent role of androgen receptor in ER+ and ER- breast cancer	Parla Pourahmad, Mirren Buchanan, Gursahil Purba
Demand Forecasting for UBC Buildings using Artificial Neural Network and Multivariate Time Series Regression	Peter Kim, Ezekiel Camacho, Bowen Tian
Identifying Novel Biomarkers and Dysregulated Biological Pathways in Drug-Tolerant Persister Cells Using Proteomics to Develop Treatment Options and Prevent Relapse of Non-Small Cell Lung Cancer.	Prithisha Gill, Gina Zhang, Hope Hogenboom, Uzair Hussain
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WAVE 4

POSTER PRESENTATIONS

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An Investigation into the Effect of Domino Spacing on Wave Propagation Speed	Raphael Kelly, Jacob Arnold
The Cognitive-Affective Response to a Subsequently Induced Psychosocial Stressor	Ria Gill
Motivators of Alcohol Consumption in University Students: Programming to Reduce Alcohol Consumption in UBC Students	Ridhi Walia, Aishwarya Manish
Optimizing Vancomycin Therapeutic Drug Monitoring in Pediatric Patients: A Simulation-Based Comparative Analysis	Rimsha Faisal

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 106)

Presenter Name(s): Orli Hellerstein

Presentation Title: Associations between Attention Deficit/Hyperactivity Disorder symptoms and sexual function and sexual distress

Abstract:

Poor sexual function—sexual desire, sexual arousal, and orgasmic difficulties—has been linked with mental health difficulties, such as Attention Deficit/Hyperactivity Disorder (ADHD). Despite the association between poorer sexual function and ADHD, no research has examined links between ADHD and sexual distress, despite sexual distress being necessary for sexual dysfunction. Within individuals diagnosed with ADHD, little is known regarding the roles of subtype (e.g., primarily inattentive, primarily hyperactive/impulsive, combined), gender, and stimulant medication use on sexual function and sexual distress. This study examined associations between ADHD symptoms, sexual function, and sexual distress. Amongst those with an ADHD diagnosis, we also examined the roles of ADHD subtype, gender, and stimulant medication usage on sexual function and sexual distress. We found that more frequent ADHD symptoms were significantly associated with greater sexual distress but not worse sexual function. Sexual function and sexual distress did not differ as a function of ADHD subtype. Relative to men and gender diverse people, women with ADHD reported poorer sexual function, but not sexual distress. Relative to individuals not using stimulant medication, individuals with ADHD using stimulant medication reported better sexual function but no difference in sexual distress. Taken together, associations between ADHD symptoms, sexual function, and sexual distress are complex and future research is needed to better understand these relationships.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 106)

Presenter Name(s): Paniz Tofigh, Noel Wai, Waleed Bari

Presentation Title: How can the brain networks that are elicited from the paired associates task in terms of episodic memory explain individuals' cognitive decline with aging?

Abstract:

Functional magnetic resonance imaging (fMRI) is a non-invasive neuroimaging technique that detects changes in brain activity relative to blood-oxygen levels. Its usage has become prominent in the field of cognitive neuroscience as it can detect the activation of brain networks during task performance to provide insights for disease diagnoses. The episodic memory domain involves the ability to learn, store, and retrieve information from one's experiences. In analyzing fMRI data, particularly in elderly individuals, the activities of brain networks involved in episodic memory can be characterized to facilitate treatments for slowing episodic memory decline. Deactivation of Focus on Visual Features network is expected to decrease activities of Sustained Attention and Initiation networks. Conversely, activating Sustained Attention and Initiation networks is predicted to enhance activities of Focus on Visual Features. Raw fMRI data was obtained from the paired associates task in the Reference Ability Neural Network open science source study, in which participants were tasked with remembering six word pairs shown sequentially on screen. 375 healthy adult participants (ages 20-80) had to choose the originally paired word from four options when presented with a probe word. Episodic memory is assessed through one's accuracy in recalling the original paired words. Constrained Principal Component Analysis for fMRI generates images of functional networks using the decomposition of blood-oxygen level-dependent (BOLD) signal time series; with the application of a classification algorithm which determines networks elicited by the task over peristimulus time points. Additionally, the interactions between different functional networks will be statistically assessed by repeated-measures ANOVA.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 106)

Presenter Name(s): Parsa Khatami, Ali Tavakoli Hedayatpour, Jordan Si, Josh Zhang

Presentation Title: Low serum saturated fatty acid levels positively associate with microbiota diversity and metabolic pathways in Parkinson's disease patients

Abstract:

Parkinson's disease is the fastest-growing neurodegenerative disease worldwide. Specific gut microbiome changes can precede the onset of Parkinson's disease by 20 years. The ketogenic diet which has low carbohydrates and high fats has shown to be beneficial as an intervention in the treatment and modulation of the microbiome in Parkinson's disease. While the ketogenic diet improves Parkinson's disease symptoms, it increases the serum levels of fatty acids including the saturated, mono-unsaturated, and poly-unsaturated fatty acids. The literature indicates conflicting results about the increase in intake and serum levels of fatty acids and their effect on the gut microbiome in Parkinson's disease. To present a clear picture about the increase in serum fatty acids and the gut microbiome, we analyzed the data of 197 Parkinson's disease patients and 103 healthy patients. Our results indicated that saturated fatty acids are significantly associated with the diversity of gut microbiome in Parkinson's disease subjects. Mono-unsaturated and poly-unsaturated fatty acids were not significantly associated with the microbiome diversity. We identified low saturated fatty acids to associate with four bacterial genera in the microbiome, with implications in Parkinson's disease progression, gut microbe dysfunction, and other neurological diseases such as schizophrenia. However, our analysis also suggests that low levels of saturated fatty acids positively associate with metabolic pathways that are beneficial for Parkinson's disease. Together, our study points to low levels of serum saturated fatty acids to associate with genus changes and pathways implicated in Parkinson's disease.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 106)

Presenter Name(s): Pearl Kimberly

Presentation Title: Doppelgängers and Deceptive Fantasies: A Theoretical Approach to Situate Deepfake Pornography in the Spectrum of Sexual Violation

Abstract:

Deepfake pornography refers to artificially generated media that involves superimposing an individual's face onto sexually explicit content. Cis women have historically been immediate targets for hostile adaptations of evolving technologies and I expect that current trends will indicate that deepfake pornography is no anomaly. This paper aims to apply Linda Alcoff's concept of sexual subjectivity and Michel Foucault's work on constructive discursive practices as a framework to explore discourses that have justified the existence and perpetuation of deepfake pornography as a form of gendered sexual violence. By looking into specific prominent online discourses, my main concern is to discover who does the speaking, what positions are being spoken, and how these discourses shape individual modes of desire. My aim for this paper is to offer a critical perspective as to how we can navigate the complexities of deepfake pornography.

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MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 106)

Presenter Name(s): Phoebe McNair-Luxon

Presentation Title: Endogenous Retrovirus Modulation of Innate Immune Cell Activation

Abstract:

Endogenous Retroviruses (ERVs) are viral elements within the genomes of modern-day organisms that originate from ancient exogenous retroviral infections. These infections became fixed in the genome through stable inheritance, accounting for 8% of the modern human genome (four times that of protein coding regions). ERVs are known to affect the immune system by inducing proinflammatory cytokines and activating innate sensors. However, the mechanism by which ERVs modulate innate immune responses remains unclear. Based on evidence of ERVs as proinflammatory agents, we hypothesized that they predispose innate cells to greater activation upon stimulation. To test this, we established bone marrow-derived macrophage (BMDM) cultures using four genotypes of mice with varying ERV levels. We then stimulated each genotype with Lipopolysaccharide (LPS), a TLR4 ligand. To determine macrophage activation levels, we stained BMDMs for activation markers and used flow cytometry for analysis. We found that ERV levels did not impact baseline activation state, but that upon LPS stimulation, BMDMs with higher ERV levels were more activated. These results demonstrate that ERVs enhance macrophage activation upon stimulation, revealing novel associations between ERVs and innate cell receptor signaling pathways. Future research may lead to therapeutic strategies targeting ERVs in disease pathogenesis or autoimmunity related to macrophage activation.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 107)

Presenter Name(s): Justin Hong, Anisha Biswas, Yanuo Yu

Presentation Title: Sex-Specific Analysis of Alzheimer's Disease Treatment Using Calcium Channel Blockers Sex differences in Alzheimer's treatment

Abstract:

Alzheimer's disease (AD) is a prevalent form of neurodegenerative dementia. It is characterised by memory loss and the accumulation of beta-amyloid, which mediates AD progression by forming excessive calcium channels in the brain. Previous research showed that females represent two-thirds of diagnosed AD cases, and exhibit elevated beta-amyloid levels compared to males. However, there is a lack of research on the impact of beta-amyloid reduction treatments on different sexes. This study aims to evaluate the effectiveness of calcium channel blocker (CCB) treatment as a beta-amyloid suppressor in male and female mice. Two experimental cohorts of 24-month-old female and male mice will be used. Each cohort will undergo localised administration of 3 mg/kg of memantine (type of CCB) in the hippocampus. Cognitive assessments of learning and spatial memory will be conducted with a water maze before and after treatment, along with microdialysis to measure beta-plaque accumulation. The treatment is hypothesised to have a greater effect on females, who typically exhibit greater plaque buildup. Therefore, a more substantial reduction in AD behaviour is expected in the female group. This use of a mouse model to explore the effects of calcium channel blockers across sexes introduces a promising application for therapeutic treatments. Future investigations may extend the scope of this research to assess the potential of these findings for humans, with a specific focus on its viability as a pretreatment strategy for individuals predisposed to AD. In addition, this variability across sex could be incorporated into the development of precision medicine.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 107)

Presenter Name(s): Karina Akhmedova, Aaron Tieu, Abteen Arab, Maya Ansu-Kyeremeh

Presentation Title: DNA Origami-Mediated Immunotherapy: Targeting Prostate Cancer with AND Logic

Abstract:

Prostate cancer, with an estimated 300,000 new cases in the US in 2023, presents significant therapeutic challenges. Leading conventional immunotherapies face obstacles related to off-target effects, and the current method of making specific, targeted therapies such as CAR T Cells is quite expensive, often exceeding USD 100,000. We propose a low-cost delivery system that uses DNA origami technology to specifically deliver immune engagers to a tumor site, which would mitigate the off-target effects that may arise from this form of immunotherapy. In this approach, a DNA nanostructure acts as a capsule carrying an immune engager. The capsule opens with an AND logic lock system, which employs PSMA and NTSR1 aptamers that bind to overexpressed surface proteins on prostate cancer cells. This triggers the opening of the box only after both aptamers bind to the cell and expose an anti-CD3 antibody, the immune engager, and elicits an immune response to kill cancer cells. By improving the specificity of the therapy through DNA nanostructures, we expect to reduce the amount of drug needed up to 80% leading to cost-savings. After manufacturing this box, we will test its efficacy in vitro by analyzing the levels of T-cell activation and cancer cell death using ELISA and flow cytometry. After cancer-specific targeting is achieved, in vivo studies will test the structure's viability as a stand-alone treatment to eradicate the tumor. The modular components can be easily exchanged for other aptamers and payloads, allowing this research to apply to numerous cancer treatments.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 107)

Presenter Name(s): Katherine K.

Presentation Title: Improving Introductory Economics Courses: A Qualitative and Quantitative Study

Abstract:

Introductory-level economics courses are taken by thousands of UBC students every year, either via elective or mandatory selection. These courses are important for establishing basic economic literacy for a general audience, a foundation for future specialized knowledge, and an opportunity for early undergraduate students to explore a potential career in economics or related fields. This study is focused on improving these courses in terms of relevance and student experience, metrics measured with quantitative and qualitative methods, respectively. Data gathered from B.C.'s Student Outcomes survey will be analyzed to identify valued skill sets and career pathways from university graduates, in addition to some direct feedback on course performance with a student satisfaction survey. This can then indicate how potential changes in curriculum could better prepare students for their future-whether they be economic students or not. Interviews with students who took introductory economics courses will be qualitatively coded for common themes. A mixed methods approach will provide a more comprehensive and thorough understanding of the current state of introductory economics courses at UBC. Given the action research nature of this project, we expect to see a number of avenues for improvement especially with regards to reforming the structure of courses and their learning outcomes. These findings can be considered by the faculty and administrators at the Vancouver School of Economics. General implications for introductory economics courses can also be of interest for educational institutions more broadly.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 107)

Presenter Name(s): Kelly Ho

Presentation Title: Local Identity, Global Core: Motivations of Chinese International Students amid Rising Nationalism

Abstract:

This presentation is based upon a research paper which explores the incongruity between increasing rates of Chinese students studying abroad in the United States and rising nationalism and xenophobia in both countries, especially post-COVID-19. After summarizing China's current social, political, and educational landscape and reviewing previous frameworks that understand Chinese students' educational motivations as being primarily economic, we propose an updated framework that considers two categories of drivers: 1. opposition to corruption within China's political and economic landscape, and 2. the desire to see China adopt Western structural models in areas such as economics, governance and education, while preserving core traditional Chinese culture and philosophical ideals. This perspective offers actionable insights for practitioners and policy makers in higher education as well as future U.S.-China diplomatic relations to more effectively address and support an increasingly prevalent exchange of scholars between China and the U.S. especially in a post-COVID-19 world.

The presentation seeks to extend this line of research to include additional empirical studies of advertisements in popular media and state media as a lens for investigating Chinese students' motivations for studying abroad.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 107)

Presenter Name(s): Kia Bahari

Presentation Title: Metabolic Adaptations and Mitochondrial Fuel Dynamics in Atlantic Salmon (*Salmo salar*): A Comparative Study of Muscle Physiology During Freshwater to Seawater Transition

Abstract:

Atlantic salmon are significant in British Columbia aquaculture industry, and notable for their unique life history. The transition from freshwater to seawater is a critical phase in their lifecycle and requires a complete rearrangement of their physiology. The changes in the gill are well-studied, though corresponding changes in muscle physiology during saltwater transition are less understood. Salmon have plastic skeletal muscles that play essential roles in swimming and energy metabolism during migration. Thus, I aimed to investigate potential changes in the mitochondria of these muscles across the freshwater to saltwater transition. Specifically, I tested fuel preference (carbohydrates and fatty acids) for energy production in mitochondrial respiration and impacts on efficiency during this transition in the red and white muscle of salmon. I used permeabilized muscle tissue from salmon exposed to an environmental light signal in freshwater and after acclimation to saltwater to analyze mitochondria respiration. I found a consistent preference for carbohydrates over fatty acids in both muscle types, across fresh and saltwater. White muscle demonstrated higher state 3 respiration and mitochondrial leak than red muscle. After saltwater transition, red muscle exhibited a decrease in Complex IV respiration, indicative of a potential energy conservation strategy. A key observation was the variation in efficiency with fatty acid metabolism showing higher efficiency in dependent on the muscle types and salinity condition. This study provides insights to our understanding into mechanisms of salmon muscle physiology and how they achieve this remarkable transition.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 108)

Presenter Name(s): Kimia Ghorbani Abdehghah

Presentation Title: Sensemaking in the kitchen: A sentiment analysis of shared affective resonance through food

Abstract:

According to the enactive view in cognitive science, an individual creates meaning, or engages in *sensemaking*, through interactions with other individuals or the environment based on what is important to them. According to this view, past experiences, especially emotionally-relevant ones, affect which aspects of the environment we attend to and how we act. Our study used cooking to explore how personal histories of emotional and cultural significance may contribute to how we make sense of our interactive experiences and, subsequently, behavior. We asked three home cooks to share a recipe that is personally significant to them. In their own kitchens, they were asked to prepare their own and two other participants' recipes knowing and without knowing their significance, across different sessions. At the end of each session, a semi-structured interview was conducted to understand whether knowing the significance of a recipe (one's own or another's), influenced their subjective experience of familiar actions in cooking. Interview transcripts were analyzed using sentiment analysis, which allows researchers to gain insight into the emotional valence of a text by applying computational methods to textual data. Sentiment analysis of the data compared the three conditions to see whether affective valence was influenced by awareness of a recipe's significance. We expect positive valence to increase as awareness increases. The results will aid in understanding how shared history through communication of culturally or personally meaningful information influences affective resonance and how emotion is embodied in everyday actions, with the potential to inform policy involving culturally diverse communities.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 108)

Presenter Name(s): Kira Swinth, Ellie Saplywy

Presentation Title: Exploring motivations for attendance and fanship of UBC women's sports

Abstract:

At the University of British Columbia, there are noticeably fewer people in attendance at varsity women's sport games than at varsity men's games. This is despite increases in sport participation by women and increased media coverage of women's sport. Drawing on the sociology of sport and feminist sport studies, this study aims to understand the motivations and experiences of attendees and fans of women's sports at UBC. Understanding why some people do choose to attend UBC varsity women's games and the meanings they give to their support for women's sport is an important step in growing the fan base. This study includes survey and interview components. Surveys were distributed at UBC varsity women's sport games to gather data on the motivations of attendees. Semi-structured interviews were also conducted with individuals who identify as fans of UBC varsity women's teams. Survey data will be analyzed using descriptive statistics, and interviews will be analyzed through a reflexive thematic analysis. Findings will address the reasons people attend and otherwise support UBC women's sport including why they attend games, their experiences at the games, and what supporting women's sport means to them. This research will provide a foundation for strategies to enhance fan engagement and potentially contribute to initiatives addressing the attendance gap between men's and women's sports.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 108)

Presenter Name(s): Krisha Mistry

Presentation Title: Mommy Issues: Exploring the Intersections Between Motherhood and Womanhood
Admst Chronic Illness.

Abstract:

While the relationship between motherhood and womanhood has long been researched in the field of sociology, such work somewhat neglects how chronic illness diagnoses may impact the formation of these identities. In my research, I explore how individuals understand and navigate the motherhood identity within the context of womanhood, with attention to how the diagnosis of a chronic illness impacts these intersecting identities. The data is based on two semi-structured qualitative interviews with at least three participants. The first interview focuses on how women relate to the experiences of womanhood and motherhood, and the second focuses on how these women navigate these identities with a chronic illness. Through these interviews, it was found that cultural background and expectations strongly influenced the decision to become a mother, and despite having a chronic illness, the desire to become a mother overcame the challenges associated with it. Despite this, one finding that arose is that it is foundational to understand that having a chronic illness diagnosis related to feelings of unworthiness and unfulfillment with participants' associations to both the womanhood and motherhood identity. Through this study, one can understand the variety of challenges women face with the decision to become a mother. Moreover, to understand the ways in which a chronic illness can cause not only physical health barriers but mental health barriers to which a woman navigates motherhood.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 108)

Presenter Name(s): Kristen Hardy

Presentation Title: Burning Up: Optimization and Characterization of a Novel Woodsmoke Exposure System

Abstract:

Climate change has led to record-breaking heat and droughts around the world including British Columbia, and an increase in forest fires and woodsmoke (WS) pollution. WS contains polycyclic aromatic hydrocarbons (PAHs), inorganic metals, gasses, and particulate matter (PM), which can aggravate the lungs, particularly among populations with pre-existing health conditions. PM, specifically PM $2.5\mu\text{m}$ and smaller ($\text{PM}_{2.5}$) is of particular concern, as particles this size can travel deeply into the lungs and cause deleterious effects. Human studies have shown that WS induces inflammatory responses and oxidative stress. However, the exact physiochemical characteristics of WS which induce these responses remain somewhat elusive. The goal of this project was twofold: first, to optimize a novel WS generator to generate consistent $\text{PM}_{2.5}$ concentrations, and second, to elucidate the physical and chemical characteristics of WS. WS was generated by combusting lodgepole pine woodchips, and WS $\text{PM}_{2.5}$ levels ($\mu\text{g}/\text{m}^3$) were monitored using a tapered element oscillating microbalance and a 5030i SHARP, which combines nephelometry and beta attenuation to detect $\text{PM}_{2.5}$ concentrations. $\text{PM}_{2.5}$ levels were controlled by adjusting wood concentration, dilution air, and wood moisture. Next, $\text{PM}_{2.5}$ was captured from the WS generator on quartz filters, and the samples were analyzed with transmission electron microscopy and inductively coupled plasma mass spectrometry to characterize and determine the structure of $\text{PM}_{2.5}$. Understanding the physical and chemical properties of WS produced by the generator will create the framework for designing human exposures to better understand the acute effects of WS exposure on health.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 108)

Presenter Name(s): Kseniia Voronkova

Presentation Title: The association of maternal autoimmune disease during pregnancy and autism spectrum disorder in children

Abstract:

Despite consistent increases in the prevalence of autism spectrum disorder (ASD), its exact biological mechanisms are unknown. Growing research evidence determines maternal autoimmune disease as a potential risk factor for neurodevelopmental disorders, including ASD. Maternal autoimmune diseases involve inflammatory responses that, if present during gestation, could impact the developing fetal brain. Therefore, understanding the association between maternal autoimmune diseases during pregnancy and ASD in offspring can provide valuable insights into possible biological mechanisms of ASD and has the potential to help guide preventative efforts aimed at identifying children at risk of ASD and facilitating early intervention.

This literature review examines the results from the current body of research investigating the association between maternal autoimmune diseases during pregnancy and ASD in offspring. The search of the Medline health research database for publications between 1946 and December 07, 2023, was conducted with predetermined keywords based on the fuller inclusion criteria: studies were primary source literature, focused on the impact of having one or more autoimmune diseases during pregnancy, and assessed for ASD diagnosis in children.

Findings from this literature review show a positive association between maternal autoimmune disease and ASD in offspring, with maternal type 1 diabetes and rheumatoid arthritis most commonly associated with ASD. Overall, studies suggest that maternal autoimmune disease is likely to be an independent risk factor of ASD, which warrants further investigation. There is a gap in examining potential interactions between multiple sources of maternal immune activation and childhood ASD, which we intend to address in future work.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 109)

Presenter Name(s): Kyle Ma

Presentation Title: Expression of cytokines in the anterior cingulate cortex in the pathophysiology of major depressive disorder, psychosis, and suicide

Abstract:

Major depressive disorder (MDD) has a lifetime prevalence of around 11%. Symptoms include sadness, lack of pleasure, and increased risk of suicide, with some individuals also experiencing psychosis, a disconnect from reality. While this disorder results from biological, social, and psychological factors, the exact etiology and pathophysiology is unknown. A growing body of literature implicates the immune system and inflammation in MDD, suicide and psychosis. One way to investigate whether inflammation is occurring is to measure the expression of cytokines. Post-mortem studies have reported increased levels of pro-inflammatory cytokine mRNA in frontal cortex in MDD and in those who died by suicide. However, whether cytokine expression is similarly altered in the anterior cingulate cortex (ACC), another brain region relevant in mood dysregulation, is unclear. We hypothesize that pro-inflammatory cytokine expression is upregulated in the ACC in MDD, and to a greater degree in those who also experienced psychotic symptoms or died by suicide. We obtained post-mortem brain samples from 24 individuals with MDD and 12 controls, obtained from Stanley Medical Research Institute. We quantified mRNA levels of three pro-inflammatory cytokines, interleukin (IL)-8, IL-18, and IL-33 using real time-polymerase chain reaction. This study will illuminate the inflammatory characterization of the ACC in MDD, psychosis, and suicide. This may contribute to the development of novel anti-inflammatory therapies for MDD and psychosis which has demonstrated in clinical trials an ability to reduce depressive symptoms in MDD patients with high inflammation.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 109)

Presenter Name(s): Laura Joyce

Presentation Title: The School Experiences of Children with ADHD Symptoms: What Teacher Characteristics Predict Positive Classroom Climates for At-Risk Children?

Abstract:

Children with ADHD symptoms often have negative school experiences, including poor relationships with peers and teachers. Though research has established that children's ADHD symptoms can contribute to these problems, few studies have considered the influence of other classroom characteristics. This study will investigate the effect of teacher stress and attributions about ADHD on children with ADHD symptoms' student-teacher relationships, peer relationships, and interpersonal classroom skills. We expect greater teacher stress and internal/controllable attributions about ADHD to each predict poorer classroom outcomes. Thirty-four teachers (grades K-5; 86% White; 91% female) and 131 students with ADHD symptoms (50% White; 24% female) were drawn from the MOSAIC study. Before school started, teachers completed the Teacher Attributions Measure. One month later, they completed the Teacher Stress Inventory and each selected 3-5 students with elevated ADHD-5 Rating Scale scores and peer challenges. At the school year's start and end, children and teachers completed measures of student-teacher relationships (Classroom Life Measure [CLM]; Student-Teacher Relationship Scale), peer relationships (sociometric status; Social Experiences Questionnaire; CLM) and interpersonal classroom skills (Academic Competence Evaluation Scale). Hierarchical Linear Modelling analyses will be conducted, with teacher attributions and stress entered as predictors in two separate models. Year-end measures of classroom experiences will be entered as outcomes, after adjusting for start-of-year scores. This study will elucidate the influence of teacher characteristics on children with ADHD symptoms. It may support the need for intervention models that target teacher characteristics (i.e. stress and attributions about ADHD) to create more positive classroom experiences for these children.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 109)

Presenter Name(s): Leona Yu

Presentation Title: The Role of Active Learning to Help Students Learn Coding in an Econometrics Setting

Abstract:

Programming is a highly cognitive activity and it is not fully understood why one student in an introductory programming course can learn to program better and more quickly than another. It is established in prior literature that some factors influence the success of learning to code such as self-efficacy, the level of established computational thinking (CT) and the ability to create effective mental models, although the methods to increase the proficiency of these factors are not well-studied. As most of the studies on the topic are based on programming in the computer science field, the significance of learning programming in an econometrics setting has not been sufficiently investigated. The objective of this research would be to test methods of learning programming in an environment that is not lecture-based, as most econometrics classes are. This presentation will detail an experimental intervention, where the data results will be scaled up to model classroom learning. A Likert scale will be used to measure self-efficacy and the performance of participants will be evaluated by how efficiently they can collect information from a geographic information system, which most undergraduate economics students would not be exposed to. The research will establish the role that active learning has in learning programming and effective methods of achieving proficiency in programming.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 109)

Presenter Name(s): Lillie Goodson

Presentation Title: Out in the Outdoors: Negotiation One's LGBTQ+ Identity in Outdoor Communities

Abstract:

Inclusivity has been a hot topic in various outdoor communities over the past decade. Despite this, research and discussion about the experiences of LGBTQ+ people in the outdoors are lacking. To fill this gap, this study uses qualitative research methods to explore the ways that LGBTQ+ people negotiate their LGBTQ+ identities while participating in outdoor activities and outdoor communities. Twenty-one LGBTQ+ people were interviewed about their experiences in these spaces. Initial thematic analyses indicate that LGBTQ+ people were less likely to disclose their sexuality or gender identity when they were participating in outdoor activities with people who do not identify as LGBTQ+. Some respondents shared that this was because they felt as though it would jeopardize the trust between them, and thus, compromise the safety of all involved parties. Analyses also found that participants often used the word "indifferent" to describe the attitudes of cisgender heterosexual people in outdoors communities towards LGBTQ+ people. When asked to describe what they meant by this, some participants indicated that this indifference did not necessarily make these spaces feel inclusive and that, rather, "there's no neutral position to hold within [a structure with a history of exclusion]". These are just a few of many themes in this study that point towards the urgent need to reconsider what it means for an outdoor space to be inclusive to LGBTQ+ people. The goal of this analysis is to contribute to the conversation about how these attitudes influence when LGBTQ+ people feel safe and welcome in the outdoors and when they do not. The findings of this study could be used as a resource to inform outdoor groups and organizations of the experiences of LGBTQ+ people in the outdoors so that they can effectively implement programs, systems, and policies that contribute to the inclusion and support of LGBTQ+ people in these spaces.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 109)

Presenter Name(s): Lilly Shoemaker

Presentation Title: Erotica Consumption and Attitudes Towards Sex and Relationships

Abstract:

Erotic literature is any form of text that includes a description of sexually explicit material (e.g., novels). However, recently the most popular form has become online sources (e.g., Wattpad, AO3, Literotica, etc.). Previous research on erotic literature was primarily conducted in the 1970s and 1980s and does not account for online sources of erotic literature. The present study was completed in two parts (i.e., survey and interviews). Participants (N = 930) were asked to fill out a survey that examined the relationship between the consumption of erotic literature and individuals' attitudes towards erotic literature, sex, and relationships. There was a significant positive association between the frequency of erotic literature consumption and positive views toward sex and relationships. There was also a significant positive association between time since the first erotic literature consumption and more positive attitudes towards sex and relationships. These findings demonstrate that consumption of erotic literature may create more positive views about erotic literature, sex, and relationships. Interested participants (N = 20) from the survey were then contacted to participate in a short interview via Zoom. Participants were asked to speak about their experiences with erotic literature and how it has shaped their views on sex and relationships. The transcripts will be subjected to a thematic analysis where three trained coders will determine narrative themes across participant interviews. Understanding how individuals experience erotic literature is important because the consumption of this material has been viewed as particularly negative in past research.



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MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 110)

Presenter Name(s): Linkai Liu

Presentation Title: A Historical Study of the Woodlands School's Institutional Policies in Relation to Their Influences on Current Pediatric Mental Health Intervention in British Columbia

Abstract:

Woodlands School in New Westminster, BC, functioned as a psychiatric hospital (1878-1949) and subsequently as a facility for children with developmental disorders, runaways, and wards of the state until its closure in 1996. It stands as a pivotal case for examining the history of pediatric mental health policies in British Columbia because it embodies a form of institutionalization characterized by complete control over the children's lives. While prior studies have analyzed the policies and treatments at Woodlands School, few studies considered the influence of the school's policies on contemporary pediatric mental health interventions in British Columbia. The Woodlands School's policies and events likely influenced the province's health policy shift from institutionalization to community-based interventions, mediated by deinstitutionalization trends and advocacy efforts. This study will assess the Woodlands School's historical role, policy impact, and the evolution of pediatric mental health policies in British Columbia over the preceding decades. Analysis of written, digital and oral records at different timepoints will help scrutinize the school's contributions to the shaping of provincial initiatives such as the 2003 Child and Youth Mental Health Plan, emphasizing the development and rationale of mental health interventions for children. The study expects heightened advocacy and research efforts as having contributed to the contemporary integrated approach evident in BC's Child & Youth Mental Health Service Framework. This research can contribute to the ongoing discussion on the evolution of mental health policies for children in BC, by informing contemporary policy development and enhancing public discourse amidst the current mental health crisis.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 110)

Presenter Name(s): Mahala English

Presentation Title: Self-disclosure about dementia on social media: toward evidence-informed guidance

Abstract:

Social media platforms are increasingly used by people living with dementia and their caregivers to seek information and advice, share personal stories, raise awareness, and offer support to others. Often engagement with social media is accompanied by a personal disclosure of a dementia diagnosis or identification as a caregiver, but the impact of this disclosure remains unknown. Social media engagement can be beneficial by facilitating peer-interactions and social support, however experts have raised concerns about the potential for exposure to misinformation and stigma as a result of self-disclosure. Balancing these risks and benefits is critical to promote healthy and safe social media use for people living with dementia and their caregivers. As a first step toward creating evidence-informed social media use guidance for the dementia community, the current project aims to identify the motivations and impact of self-disclosure on social media. Posts related to self-disclosure were retrieved from Facebook groups and pages over a six-month period for analysis. Automated and manual sentiment- and model-based interaction analyses were carried out on the data to characterize posts based on their 1) primary motivation for self-disclosure, 2) polarity, 3) bids for action, and 4) anonymity of the poster. Preliminary findings reveal information- and support-seeking as the most common motivations for self-disclosure, highlighting the importance of guidance on identifying misinformation and engaging in healthy peer support. This work will help the dementia community access support and information safely in the increasingly popular social media spaces.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 110)

Presenter Name(s): Karen Gill, Brooke Evans, Christina Zeng

Presentation Title: Association between maternal obsessive-compulsive disorder and perinatal and neonatal outcomes: A systematic review

Abstract:

Background: Obsessive-compulsive disorder is more common among pregnant women compared to the general population. Research suggests that maternal obsessive-compulsive disorder may be associated with adverse pregnancy and neonatal outcomes; however, no summary of these studies exists.

Objective: We conducted a systematic review to summarize literature examining the association between maternal obsessive-compulsive disorder or symptomatology and adverse pregnancy and neonatal outcomes.

Methods: We searched several databases (Medline, Embase, CINAHL, and PsycInfo) from inception until March 2024. All types of observational study designs using quantitative methods and published in English which examined the association between maternal obsessive-disorder and prespecified pregnancy and neonatal outcomes (miscarriage, hypertensive disorders of pregnancy, gestational diabetes, placental disorders, cerebrovascular disease, heart attack, embolism, cesarean delivery, stillbirth, small for gestational age, low birth weight, preterm birth, severe neonatal morbidity, maternal/infant mortality) were eligible for inclusion. For each study meeting the inclusion criteria, two co-authors independently carried out the study selection, data extraction, and quality assessment process. Discrepancies were resolved through discussion, or by a third author. We conducted a narrative synthesis of eligible studies.

Results: Results are forthcoming and will be available in March 2024. **Conclusion:** Conclusion will be available in March 2024.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 110)

Presenter Name(s): Manon Melkonyan, Howard Chen, Nada Kauphanichanon

Presentation Title: Vampire Love and Victimization: A Critical Analysis of Emotional Abuse in Twilight and its Implications for Adolescent Girls' Self-Worth

Abstract:

Published in 2008, Stephenie Meyer's Young Adult novel Twilight has captivated teenage girls worldwide with its supernatural romance between human heroine Bella Swan and the vampire lead, Edward Cullen. However, critique of Edward's romanticized emotional abuse of Bella (Brown, 2016; Collins & Carmody, 2011), coupled with research on media shaping adolescent relationship expectations (Jacobstein's, 2016; Parke & Wilson, 2011; Kokesh & Sternadori, 2015), raises serious questions about Twilight's psychosocial impact on adolescent girls' self-worth, given their identification with the female lead (Kokesh & Sternadori, 2015). In this paper, we employ a Jamesian model of self-worth, in which self-worth is impacted by achievements, personal experiences and social interactions (Adler & James, 1990). We use a phenomenological approach to identify implications of romantically framed emotional abuse in Twilight on the self-worth of adolescent girls, aged 14 to 21. To do this, we will electronically administer a qualitative survey to participants in the demographic, recruited from Wattpad's Twilight community, and gather anonymous text responses. Upon developing a coding framework, we will perform content analysis of the answers and discuss the extent to which Bella's endured emotional abuse impacts participants' romantic perceptions and, consequently, their self-worth. Utilizing a feminist perspective, we anticipate that the results will underscore the importance of teaching media literacy to girls, where gendered power dynamics are so often fictionally reinforced and internalized. Considering that media, particularly young adult media, is a vehicle for socialization (Neiman, 2003), the covert impact of fictional misogyny on adolescent girls' identities must be thoughtfully interrogated.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 110)

Presenter Name(s): Mariana De Morais Souza, Khushman Kaur Jawandha

Presentation Title: Collective Action as an Effective Way to Address Eco-anxiety: A Cross-Sectional Study of Environmental Activist's Media Engagement to Analyze Subjective Uncertainty Reduction Theory and Terror Management Theory.

Abstract:

In a world grappling with environmental injustices and natural disasters, an increase in eco-anxiety is unsurprising. Eco-anxiety is characterized by overwhelming and habitual worrying about the impacts of climate change on one's life, fostering feelings of existential dread, hopelessness, and fatalistic thinking that impede psychological well-being. Despite extensive scholarly research on eco-anxiety, its underlying causes and effective solutions remain inadequately explored. Two social psychological phenomena—Subjective Uncertainty Reduction Theory (SUT), suggesting that individuals are motivated to reduce uncertainty in unpredictable future situations, and Terror Management Theory (TMT), highlighting that concerns about inevitable mortality can cause terrifying anxiety; both emphasize the importance of association with a social group with similar concerns for support. We hypothesized that SUT and TMT can explain the underlying causes of eco-anxiety, i.e., uncertainty about the future and existential threat, and that the adoption of collective action, i.e., participating in an environmental movement with an ingroup, can effectively mitigate this anxiety. Employing a cross-sectional study, we coded information from participants, including environmental activists like Elly Hanson, Clover Hogan, and Caroline Hickman. Our qualitative primary sources included publicly available testimonials and podcast episodes produced by these activists, that we meticulously coded to identify three things: symptoms of eco-anxiety, types of actions taken, and outcomes. We concluded that uncertainty about the future and existential threat were core causes of eco-anxiety, and that collective action can effectively mitigate it. These results corroborate the importance of engaging in environmental movements to address the real and presently most pressing climate change issues.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 207)

Presenter Name(s): Reilly J Perovich

Presentation Title: The Effects of Prenatal Alcohol Exposure on the Gut-Brain-Immune Axis: A Cacophony of Disruptions Mediated by Gut Microbiota, Differentiated Across Sexes, and Over Time.

Abstract:

Prenatal Alcohol Exposure (PAE) is a complex and multifactorial set of interactions that results in neurodevelopmental issues and a lifelong disease state known as Fetal Alcohol Spectrum Disorder (FASD). FASD affects all aspects of life including cognition, executive function, social behaviour, sensory and motor function, and endocrine and immune function. An estimated ~5% of the population in developed nations has FASD; however, this is likely a gross underestimate due to under/misdiagnosis. Currently, there are no diagnostic markers to distinguish between FASD and other neurodevelopmental disorders such as Autism Spectrum Disorder, apart from maternal admission to drinking during pregnancy or cranial malformations in the most severe cases. My objectives are to find markers that can provide novel diagnostic criteria in PAE and to use these markers during key developmental periods to differentiate FASD from other neurodevelopmental disorders. My research is focused mainly on PAE's effects on the gut microbiome and how alterations in the gut microbiota interact with the immune system to affect neurodevelopment. Using a model rat system, cytokines (immune signalling molecules), short-chain fatty acids (SCFAs) (functional markers of the microbiome) and microbial data were collected at post-natal days 8 (inflammatory bias period), 22 (weaning), and 38 (~adolescence). Through multiple analyses, male PAE, particularly early in development, differentiated from control both in terms of cytokines and microbiota. Female PAE showed lower microbial α -diversity compared to Male PAE and controls, indicating a female-specific effect. Our data suggests that biomarkers of PAE exist and that larger-scale studies are warranted.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 207)

Presenter Name(s): Ria B. Raut

Presentation Title: Understanding Global Variation in Plant Photosynthetic Temperature Dependence

Abstract:

Global warming is mitigated by plants, which absorb ~33% of human-released CO₂. Carbon assimilation rate is temperature dependent and declines at very high or low temperatures. This temperature dependence is called an 'assimilation-temperature (AT) curve' and varies between species. Species have different optimal assimilation temperatures (T_{opt}), maximum assimilation rates (A_{opt}), or wider temperatures over which they are photosynthetically active (i.e. wider AT breadth). We do not know what drives this variation. To address this knowledge gap, we tested 2 hypotheses: Janzen's and the Jack-of-all-Temperatures ('JoAT') hypothesis. Janzen's states that plants at higher latitudes will have wider AT breadths, and JoAT states that plants with wider AT breadths will have a lower A_{opt}. To test these, we compiled 862 AT curves and modelled them. There was no significant trade-off between A_{opt} and AT breadth. Plants in higher latitudes showed wider AT breadths, supporting Janzen's hypothesis. By determining the predictors of AT response characteristics, we can predict how a plant's – and ecosystem's – carbon intake can change over a range of temperatures, which is useful for climate models.

MURC 2024

Presentation Format: Oral Presentaton (Wave 4 - SWNG 207)

Presenter Name(s): Riya Gandhi

Presentation Title: The role of ZDHHC8 EV and IV isoforms in neuron morphology

Abstract:

Protein palmitoylation is a common post-translational lipid modification catalyzed by palmitoyltransferases with a conserved DHHC amino acid sequence (referred to as zDDHC enzymes). Di George's syndrome, or 22q11.2 deletion syndrome, results in deletion of the gene encoding the zDDHC8 enzyme. zDHHC8 has two distinct isoforms – an excitatory variant (EV) and an inhibitory variant (IV) – that are comparatively expressed more in their corresponding neuron type. A EV isoform mutant (EM), implicated in schizophrenia, is found in almost a third of individuals with Di George's syndrome experiencing a co-occurrence of these disorders.

This project examines the unique impact of zDHHC8's EV, IV and EM variants on axonal branching, synaptic punctate formation, and dendrite morphology. Excitatory and inhibitory hippocampal neurons were identified using adeno-associated viruses expressing DLX-GFP and mCherry. Cre recombinase was used to knockout zDHHC8, and the recovered zDHHC8 IV, EV and EM enzymes were each tagged with V5 to demonstrate rescue. Gephyrin and GAD2 were used to mark the formation of inhibitory and excitatory synapses, respectively. Axon lengths, dendritic morphology and synaptic puncta were all subsequently measured and analyzed.

We predict that removing zDDHC8 from hippocampal neurons differentially influences excitatory and inhibitory neuron morphology and may also impact the formation of excitatory and inhibitory synapses onto zDDHC8 knockout cells. We also anticipate that reintroducing zDDHC8 EV, IV and EM in hippocampal neurons will result in distinct phenotypes in excitatory and inhibitory neurons. The findings may provide insight into the molecular dysfunctions that contribute to the onset of schizophrenia.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 208)

Presenter Name(s): Minh Nguyen

Presentation Title: Assessing the impact of elexacaftor/tezacaftor /ivacaftor on anxiety & depression symptom scores in adults with cystic fibrosis following 6- and 12-months of treatment

Abstract:

Elexacaftor/Tezacaftor/Ivacaftor (ETI), a cystic fibrosis medication, is highly effective in improving the physical health of CF patients. However, its impact on mental health is still uncertain with limited published studies. This study aims to further understand the impact of ETI on anxiety and depression in a cohort of adult CF patients following 6 and 12 months of treatment. Self-reported Generalized Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9) screening scores collected between July 2021 and September 2023 as part of routine clinical care were extracted from the St. Paul's Hospital Adult CF Clinic mental health screening database. Scores at 6 and 12-months post-ETI were compared with those at baseline. Friedman and Wilcoxon signed-rank tests were used to compare the median difference. McNemar's test was used to compare the proportion difference in severity groups, defined by specific cut-off values. Demographic and clinical characteristics of patients with improved, no change and worsened scores were also assessed. PHQ-9 scores significantly improved at 6 and 12-months post-ETI, while changes in GAD-7 scores were no longer significant after adjustment with the Bonferroni correction for both timepoints. A greater proportion of patients experienced improvements (vs worsening) in GAD-7 and PHQ-9 scores based on changes in severity groups and minimal clinical importance differences (MCID) set at 4. These results are important to evaluate the effects on mental health of this life-changing medication. However, further research with a larger sample and longer study period is needed to be conclusive about its psychiatric implications for CF patients.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 208)

Presenter Name(s): Mira Sehgal, Jasmine Lam

Presentation Title: Impact of Marital Status Changes on Protein Intake in Aging Adults: A Systematic Review

Abstract:

Background:

A balanced diet is essential for promoting longevity in seniors, and social factors are known to influence an older person's healthy eating habits. We aimed to assess whether changes in social factors such as marital transitions impact protein intake among older ageing adults with a gender perspective.

Methods:

We systematically searched Medline, Embase, Scopus, CINAHL published until 22nd December 2023. Longitudinal studies that assessed changes in marital status and changes protein intake were eligible. We omitted studies that involved age ranges beyond middle and older age, as well as those that assessed exposure or outcome at only a single time point. The reasons for excluding these papers have been documented.

Results:

Our search resulted in 4572 potential studies, with 1503 duplicates removed. This left us with 3069 eligible titles and abstracts for screening. In our preliminary screening of CINAHL (166 titles), we identified 10 eligible full-texts, none of which met our inclusion criteria.

Discussion:

Previous research indicates that social factors, including marital status, exert a notable influence on mortality and various health-related factors among older adults. Nevertheless, there appears to be a scarcity of longitudinal investigations into the impact of changes in marital status on protein intake. Consequently, additional scrutiny of the remaining databases is necessary to arrive at a conclusive outcome.

Keywords: ageing, dietary protein, gender, social factors

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 208)

Presenter Name(s): Naomi Hudson, Valeria Pérez, Assem Zhaksybay

Presentation Title: Problematizing the Social Organization of Experiential Education

Abstract:

Experiential Education (EE) is a pedagogical approach based on the premise that certain knowledge can be acquired more effectively through experience rather than didactic classroom content. Despite the well-documented benefits of experiential education across all levels of higher education, existing literature often focuses on small upper-year university courses. In an "Advancing Education Renewal" project with a 'students as partners' approach, the student research assistant team identified and analyzed key facilitators, motivations, and barriers of incorporating EE in large first-year courses and demonstrated how EE in first-year can better prepare students for upper-year EE. A qualitative research methodology was employed. The student authors of this study conducted 13 interviews with instructors who incorporate EE in large and/or first year courses in the Faculty of Arts at UBCV. For instructors, EE in first-year often represented a stepping stone to larger, more immersive, and substantial EE opportunities in upper-year courses. Exposing students to EE as early as possible was important to build the strong foundations necessary to take full advantage of the more extensive hands-on educational opportunities that students may encounter in the upper years of their undergraduate degrees. The implementation of EE was also often perceived as more memorable and more inclusive to different learning styles. However, institutional, and equity-related barriers and the lack of a strong support network among instructors still hinder the implementation of EE in first-year, large courses. From identifying these barriers, the study makes recommendations to promote EE at UBCV and helps to better inform future initiatives.

MURC 2024

Presentation Format: Oral presentation (Wave 4 - SWNG 208)

Presenter Name(s): Naruhito Kruschen

Presentation Title: When Westerners listen to the stories of the Tuvan Taiga: a conversation with learners of Khoomei in the West

Abstract:

Growing interest for non- Western art styles has led to Tuvan Throat singing, *Khoomei* (Хөөмөй), recently gaining popularity in the West. Due to its importance to the Tuvan people, *Khoomei* has become a symbol to many Tuvans for their culture and ethnic identity. Thus, it is one way that many Westerners become interested in the Republic of Tuva. Likewise, most research into *Khoomei* understands it quoi an exclusive practice of the Tuvan people. However, Westerners' interest in *Khoomei* has existed for close to a century, and many continue seeking to learn. Thus, this study aims to gain a greater understanding of why Westerns learn *Khoomei*, focusing on self- identified learners in the Anglophone world. Data was collected through interviews with self-identified *Khoomei* learners above the age of 18, most located in Canada and the United States. The interview questions concerned participants' journeys in learning *Khoomei* and interest in Tuva and revealed that many participants acquired an interest in Tuva through learning *Khoomei*. This brought in questions of appropriation, to which most participants acknowledged their place as non- Tuvans practicing a Tuvan tradition, through the incorporation of *Khoomei* into their own music rather than replicating traditional Tuvan compositions. I hope that through this study, future research into *Khoomei* will be reminded of the wider impact of *Khoomei* to global audiences.

MURC 2024

Presentation Format: Oral presentation (Wave 4 - SWNG 208)

Presenter Name(s): Natalie Ma

Presentation Title: Investigating the Role of Tenascin-C in Wet Age-Related Macular Degeneration

Abstract:

Wet Age-related Macular Degeneration [nAMD] is the leading cause of central vision loss in adults 55 and older. nAMD progresses in two stages; choroidal neovascularization [CNV] and subretinal fibrosis. CNV describes the abnormal blood vessel growth that damages photoreceptors, however, therapies targeting CNV are not effective in restoring vision long-term due to scarring in a process termed subretinal fibrosis. Tenascin-C, an extracellular matrix glycoprotein, promotes CNV and fibrosis in various organs. However, it has not yet been studied in the context of subretinal fibrosis. We hypothesize that Tenascin-C is involved in promoting subretinal fibrosis in the nAMD retina. We will use laser mouse models to simulate the pathological conditions during subretinal fibrosis. We will use immunofluorescence and quantify Tenascin-C expression using pixel analysis to determine whether there is an upregulation of Tenascin-C in the retina relative to healthy mice. We expect to observe that Tenascin-C will be upregulated in subretinal fibrotic lesions. These results will elucidate the fibrotic role of Tenascin-C in the outer retina underlying pathogenesis of nAMD which may provide novel insights regarding cellular mechanisms in nAMD. Future research may lead to therapeutic strategies targeting the Tenascin-C during subretinal fibrosis.

MURC 2024

Presentation Format: Oral presentation (Wave 4 - SWNG 210)

Presenter Name(s): Maryam Saffarzadeh

Presentation Title: Assessing the Viability of Translocations for Amphibian and Reptile Conservation

Abstract:

Translocation is a rehoming method used for the conservation of at-risk species. Amphibians and reptiles (herpetofauna) have been overlooked in review studies in the past two decades. We have conducted a review on the results of herpetofauna translocation projects published between 2006 and 2023 building on the works of Germano et al. (2009).

We searched academic databases such as Google Scholar, JSTOR, Web of Science, Science Direct, Connected Papers, and UBC Library Open Athens using 'translocation,' 'mitigation,' 'amphibians,' 'reptiles,' and related terms to find primary studies. Retrieved papers were organized in an Excel spreadsheet, categorizing details such as species, location, translocation type, number of individuals, and success criteria. Currently, we've identified 50 studies, with a focused analysis conducted on 20 projects. From this subset, our initial observations reveal that 12 demonstrated success, 5 showed uncertainty, and 2 resulted in failure. As we expand our dataset, incorporating a larger sample size, we anticipate refining these percentages to offer a more comprehensive evaluation of translocation outcomes and influencing factors.

Promising initial results underscored by varied success rates indicate the presence of multifaceted factors influencing translocation effectiveness. Further analysis is essential to draw definitive conclusions, which can offer valuable insights for global herpetofauna conservation decisions impacting practitioners, researchers, and policymakers alike.

MURC 2024

Presentation Format: Oral presentation (Wave 4 - SWNG 210)

Presenter Name(s): Mathew Graham

Presentation Title: Removing the gbMSM Demographic From Blood Donation Screening: Analysing News Coverage on Canada's Shift to Individualised Sexual Behaviour Screening

Abstract:

In 2021, Canada amended its blood donation laws to screen every potential donor's sexual history rather than screen only gay and bisexual men who have sex with men (gbMSM). While scholars and LGBTQ+ community members have called on the Canadian and international governments to adjust this blood law for years, a research gap persists regarding how the general Canadian public and media view this policy change. Thus, this paper determines how Canadian newspapers portray the policy change leading up to, as well as following, the amendment. Additionally, this paper uses post-gay theory to investigate the level of gay-acceptance in Canadian society. The data is based on an analysis of Canadian newspapers (n=109) consisting of national, provincial, and local newspapers, and omitting non-Canadian reports on the matter. Canadian views on gbMSM have been increasingly positive overtime, and Canadian blood legislation has eased its deferral periods with little backlash in the past decade.

Combining these factors, this study expects to find that most newspaper articles will first validate the amendment by highlighting blood science approving the change, and subsequently highlight the positive effect the amendment will have on the overall Canadian blood supply. Thus, this research expects to find Canadian news sources positively reporting on the change. This research will contribute to the growing literature on post-gay theory, but in a Canadian context.

Furthermore demonstrating the current level of acceptance regarding gbMSM in Canada.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 210)

Presenter Name(s): Max Gray

Presentation Title: A third case of transposon-associated asexuality in the sunflower family

Abstract:

Many productive crops are hybrids which are produced each year by crossing the parent strains in order to maintain their elite genotypes. This process is costly, but apomixis, the asexual formation of a seed, has the potential to address this; if genetically engineered into crops, seeds could be produced clonally, avoiding the need for laborious breeding each year. However, the genetics underlying apomixis are poorly understood. In 2022, a gene for parthenogenesis (PAR), one of the molecular “steps” of apomixis, was mapped in dandelion and hawkweed. In apomictics of both species, the PAR gene promoter was disturbed by a transposon which was absent from all sexuals. This case of parallel evolution suggests that transposon insertion may induce apomixis, but the evidence is limited to just these two species. I hypothesize that, in the apomictic group *Crepis*, a transposon in the PAR promoter is also responsible for apomixis. Alignments of the PAR gene in apomicts and sexuals from across the *Crepis* genus reveal a single transposon inserted into the same spot in apomicts only. This supports the parallel evolution of apomixis through this genetic mechanism and points to the PAR gene as a target for future genetic engineering efforts.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 210)

Presenter Name(s): Melinda Ren

Presentation Title: Extract Vitamin B12 From Seaweed Using Retort Agitation Thermal Processing

Abstract:

Vitamin B12 is essential for brain function and various chemical processes in the body. Seaweed is considered a valuable plant-based source of vitamin B12, particularly beneficial for vegetarians with limited animal-based diets. However, information on efficiently extracting vitamin B12 from seaweed is limited. In this study, retort agitation thermal processing is used to maximize vitamin B12 extraction from *Mazzaella splendens*, a red seaweed. High-performance liquid chromatography (HPLC) is used to measure vitamin B12 content. Retort parameters, including temperature (232, 250, 268 F), cook time (5, 15, 25 min), and agitation speed (0, 1, 2 Hz), are optimized using a response surface methodology. Additionally, sodium, potassium, magnesium, and calcium content from the extract is measured using Inductively Coupled Plasma Optical Emission spectroscopy (ICP-OES), as seaweed is rich in these essential minerals. This study aims to provide an eco-friendly method for extracting water-soluble nutrients from seaweed without the use of harmful chemicals. The results could contribute to food fortification and pharmaceutical production, promoting the use of seaweed as a sustainable source of essential nutrients for vegetarians and the general population.

MURC 2024

Presentation Format: Oral Presentation (Wave 4 - SWNG 210)

Presenter Name(s): Tania Cheng, Yewon Hong

Presentation Title: Cultural Variations in Rhythmic Perception: A Comparative Study of English and Cantonese Native Speakers

Abstract:

This study explores a factor that may perceive rhythmic complexity, which prior research has demonstrated is heavily influenced by rhythmic density and syncopation. Focusing on English and Cantonese native speakers, our study investigates whether spoken native language is correlated with identified disparities in perceptions of rhythmic complexity. In this study, English- and Cantonese-speaking participants used a Likert scale from 1-6 to rate the perceived complexity of 12 distinct rhythmic stimuli, varying in rhythmic density, syncopation, and variability, presented at four different tempos and either with or without a metrical context. Participants also completed a demographic survey and a measure of musical sophistication using the Goldsmith Musical Sophistication Index (GMSI). Results confirm that density predominantly influenced complexity ratings, but in different ways across languages, rhythms as more complex, while Cantonese speakers found higher-density rhythms more intricate – intersecting at a density level of 6.5. When the rhythmic context was absent, English speakers rated stimuli more complex, while the reverse trend appeared when contextual cues were given. Moreover, the overall musical sophistication score of the two groups appears to have an effect, as English speakers exhibited significantly higher mean musical sophistication scores than Cantonese speakers. These outcomes replicate some prior research and suggest a weak correlation between the rhythmic properties of language and perceived rhythmic complexity, as well as invite further study of this phenomenon under a more controlled setting.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Coralie Tcheune, Kalen Lacroix

Presentation Title: Contrast-Enhanced Magnetic Resonance for Triple-Negative Breast Cancer Screening

Abstract:

As of 2020, 7.3 million people worldwide suffer from breast cancer, with an annual mortality rate of 685 000. Up to 10% of breast cancer cases originate from inherited mutations predominantly in the breast cancer 1 (BRCA1) and breast cancer 2 (BRCA2) genes. These genes are responsible for creating proteins that participate in DNA repair and help regulate the cell cycle. Mutations in these genes cause abnormal and rapid cell growth which may lead to cancer. The most aggressive form of hereditary breast cancer is triple-negative breast cancer (TNBC) as it spreads quicker, is difficult to detect early, and has fewer treatment options. TNBC is characterised by cancerous cells that lack estrogen and progesterone receptors and produce too many or too few of the human epidermal growth factor 1 (HER1) protein.

Given the high prevalence of breast cancer and the severity of TNBC, technological advancements to combat its rise have produced three primary diagnostic methods for generalised breast cancer: mammography, ultrasound imaging and MRI imaging. In recent years, MRI research has proven to be the most effective imaging technology to diagnose breast cancer. Within this field of MR imaging, an emerging technology has been innovated for higher accuracy detection and recurrence: Contrast-Enhanced Magnetic Resonance Imaging (CE-MRI). Our research has found compelling evidence to support the efficacy of CE-MRI in diagnosing TNBC. In addition to providing higher quality service for general breast cancer, CE-MRI provides better pathological diagnosis for TNBC, making it an alluring alternative to pre-existing medical technologies.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Gurpreet Sidhu, Sana Alayoubi, Alissa Gama

Presentation Title: Mapping potential transcription start sites of the *brkA* gene on pDO6935 in *Escherichia coli* using the ARF-TSS method

Abstract:

Autotransporters are membrane proteins expressed on the outer membrane in gram-negative bacteria. BrkA is an autotransporter in the whooping cough-causing bacterium *Bordetella pertussis*. It acts as a virulence factor by inhibiting our immune system from killing the bacterium. Previous studies aimed at characterizing the autotransporter BrkA have used *Escherichia coli* (*E. coli*) cells expressing a plasmid called pDO6935 which contains the *brkA* gene; however, the promoter driving *brkA* gene expression in these cells remains unknown. Our study aims to determine the transcription start site (TSS) of the *brkA* gene in pDO6935 in *E. coli* (DH5 α). Identification of the TSS will allow us to better characterize the promoter region. In order to map the TSS, we implemented the ARF-TSS method, which involves reverse transcribing *brkA* mRNA into cDNA using a 5'-phosphorylated primer, circularizing the cDNA, amplifying the cDNA with PCR, and inserting the amplified fragments into a vector, before sending them for sequencing to determine the TSS. We were able to more precisely map the region of the plasmid in which the transcription start site driving the expression of the *brkA* gene in pDO6935 is located: a region more than 270 bp upstream of the *brkA* translation start site. Finding the transcription start site aids in locating the promoter and contributes to our understanding of gene expression and regulation. This knowledge can help improve future studies aimed at characterizing BrkA autotransporter using pDO6935-expressing *E. coli* cells.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Lisa Liu

Presentation Title: 'Dizzy Susan' for Vestibular Perception: A Reliability and Validity Study

Abstract:

Rotations of the head stimulate organs in our inner ears that allow us to perceive and feel these rotations independent of other sensory cues; this is called vestibular perception. Sensory information picked up by vestibular organs travels through pathways that give rise to various processes, from ocular reflexes to conscious awareness of rotation. Persistent Postural Perceptual Dizziness (PPPD) is the most common vestibular disorder among the middle-aged population, with symptoms including chronic dizziness and vertigo, yet the pathologic mechanism remains unknown. Moreover, one-third of patients with dizziness or imbalance present normal findings of current gold standard vestibular assessments that rely on ocular reflex testing. A novel apparatus – 'Dizzy Susan' – was created in-house to assess vestibular perception, where a subject stands on a turntable platform that administers pre-programmed rotations and attempts to match rotations in real-time using a handheld dial. This study aims to research the reliability and validity of this apparatus by comparing gain, phase, and coherence measures between trials and over retests within and between subjects for a young healthy population. It is hypothesized that these individuals will exhibit high coherence and produce consistent results. Clinical use of the 'Dizzy Susan', given that it is reliable and valid, can shed light on the pathophysiology of PPPD when used in conjunction with a vestibular reflex test. Since the former relies on vestibular perception informed by central pathways while the latter depends on peripheral pathways, combined results may, in the future, help discern whether PPPD is a central or peripheral pathology.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Manpreet Kaur, Anali Delshadi, Sharon Zhang

Presentation Title: Feasibility of liquid biopsies for diagnostic purposes on mesothelioma

Abstract:

Mesothelioma is a rare and aggressive form of cancer that usually affects the pleural (lungs) lining, although it can also occur in the peritoneal lining (abdomen) or heart. It is primarily caused by exposure to asbestos fibres, which can be inhaled or ingested and become embedded in the tissues of the body. Individuals diagnosed with mesothelioma have a life expectancy ranging from 4 to 18 months. Recent studies indicate that 10% of patients have been able to survive 5 years post-diagnosis. Most individuals worldwide who are affected by mesothelioma show high rate of exposure to asbestos. Diagnosing this condition poses a significant challenge due to its infrequent incidence and the lack of distinct symptoms, often resembling those of other cardiac or respiratory disorders. Typically, confirmation of this diagnosis relies on biopsy procedures in conjunction with MRI and CT scans. Currently, the analysis of biological fluids such as plasma, serum, urine, cerebrospinal fluid, pleural fluid, ascites, etc., commonly referred to as "liquid biopsy," is gaining prominence as an effective method for non-invasive diagnosis of various cancers, screening, and prognosis. Hence, conducting various tests to validate the efficacy of liquid biopsies as a viable method for early mesothelioma diagnosis could represent a significant achievement in the realm of scientific research. Additionally, in cancer patients, there is often an elevated level of ctDNA (Circulating-Tumour-DNA), and a portion of circulating cfDNA (cell-free-DNA) which carries tumor-specific mutations is frequently observed. Identifying ctDNA variants in patients shows potential as a biomarker for diagnosing and stratifying mesothelioma.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Maria Cheema, Nisha Devavarapu

Presentation Title: Development of an SNP-based fingerprinting platform for black raspberry

Abstract:

Black raspberry (*Rubus occidentalis* L.) is a niche fruit crop grown in the Pacific Northwest of the USA. Black raspberry fruits contain anthocyanins, chemical compounds that have been shown to possess anti-inflammatory properties. DNA fingerprinting databases are valuable for plant breeding programs and nurseries, as they allow for the identification of plant genotypes. To date, there are no DNA fingerprinting databases for black raspberries created using single nucleotide polymorphism (SNP) markers. SNPs are ideal for fingerprinting, as they review thousands of genotypes at once, making it faster and affordable compared to other marker technologies. SNPs have a lower mutation rate, increasing the likelihood of creating a reproducible fingerprinting system. We aim to design an SNP-based fingerprinting database to identify distinct cultivars of black raspberries. We will extract DNA from black raspberry leaf tissues and conduct whole-genome sequencing using Illumina technology. We will use the Fastp software to filter out bad reads and the Genome Analysis Toolkit software to identify SNP markers. We expect to find SNP markers on the genome sequence of black raspberries that will allow for the construction of a novel fingerprinting database for black raspberries. The results of this experiment will allow for the creation of a reproducible, cost-effective SNP fingerprinting system that can be applied to identify black raspberry cultivars.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Maria Lauren, Mittal Bagul, Talia Feng

Presentation Title: Peel to Seal: Using oranges and bacteria to grow food packaging

Abstract:

Bacterial cellulose is a biodegradable alternative to single-use plastics that can be grown from food waste. With single-use plastics being found on 64% of products in Canadian grocery stores [1], and nearly 20% of Canadian food being wasted due to preventable food losses [2], bacterial cellulose provides a solution to major sustainability issues. Being proven to slow food spoilage by up to six days at room temperature [3], bacterial cellulose can replace plastic packaging like bags or cling wrap. Using food scraps to grow bacterial cellulose cuts down on food waste further by utilizing an otherwise wasted organic material. Orange peels and other acidic fruit scraps can be used as growth mediums by acting as a food source while creating the ideal pH range of 4-7 needed for cellulose synthesis [4]. *Komagataeibacter medellinensis* was the chosen bacterial strain in this experiment as it naturally occurs on acidic fruits. After being cultivated, the cellulose was thickened through mercerization and a 1% addition of glycerol and carboxymethylcellulose each, increasing the tensile strength. The outcomes of this study indicate that bacterial cellulose produced from orange peels exhibits comparable to that grown in conventional media. Using food scraps in growth mediums is an economical and sustainable way of manufacturing bacterial cellulose. Furthermore, pectins derived from the acid hydrolysis of fruit scraps can be commercially distributed to generate economic returns. From a community perspective, the use of other food scraps to grow packaging offers opportunities for households to reduce food waste.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Marilia Sartorelli de Toledo Piza, Rebecca Alloway

Presentation Title: The fate of Black Carbon in the soil after a wildfire

Abstract:

Black Carbon is a product of the incomplete combustion of plant biomass and is produced by the burning of wildfires and fossil fuels. As Black Carbon can persist in soils after a wildfire, it can be washed by rivers during flooding and ultimately reach the ocean. While there is strong evidence that Black Carbon has impacts on carbon cycling and climate change, there are significant knowledge gaps concerning the impacts of Black Carbon on the environment and global Black Carbon stocks. This study aims to reveal the changes in Black Carbon concentration in soil layers after a wildfire specifically in the Sub-Boreal Spruce Forest of the 2023 Donnie Creek wildfire in Prince George, which was responsible for burning 619,072.5 hectares. We will look at the concentration of Black Carbon in different soil layers from the forest floor, 0-5 cm soil depth, and 5-15 cm soil depth and how it changes annually over 3 years. We hypothesize that Black Carbon will have high accumulation in deeper soil layers over time. The findings of this study will contribute to our understanding of the vertical movement of Black Carbon which will be important for quantifying Black Carbon stocks in soils. This will also provide important information to contribute to our understanding of its possible movement to water bodies through erosion and filtration. In turn, this research will contribute to the knowledge gap of how Black Carbon influences the Carbon cycle and will give a background for future research in this topic.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Marusia Shevchuk

Presentation Title: Investigating the Influence of Various Receptor Organizations on Filamentous Influenza A Motility Under the Presence of Antibodies

Abstract:

This study examines the multifaceted interactions of the glycan-binding surface proteins of the Influenza A virus (IAV), illuminating the fundamental factors shaping its motility and consequential infectivity. It explores the interactions between IAV's viral surface proteins, neuraminidase (NA), and hemagglutinin (HA), and how they influence virus motility. HA binds to sialic acid (SA) on the cell surface. These bonds form and break off randomly, leading to viral motility. NA cleaves SA along its path. This creates self-avoiding, random walks on the cell surface. This motility gives IAV an advantage in crossing the mucus barrier and infecting non-ciliated cells.

Through a Monte Carlo simulation, this study renders filamentous IAVs with various HA/NA organizations and simulates their motion in the presence of HA/NA-targeting antibodies. The findings reveal that virions with NA polarization exhibit the strongest persistent directional motion and disabled HA/NA result in significantly weaker directional motion, implying the potential treatment of IAV through HA/NA inhibitors. Overall, this research provides insight into the fundamental factors governing IAV motility and creates a strong foundation for more advanced models.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Matt Galassi

Presentation Title: Head and Lower Limb Kinematics of Walking and Natural Walking Perturbations

Abstract:

Taking in visual information and making locomotor adjustments enable us to smoothly move through our daily lives. When our planning doesn't match the environment, the error in locomotor adjustment can result in a stumble. Laboratory studies typically deliver various forms of perturbations on a split treadmill but subjects do not receive normal visual feedback of an actual walking route, which reduces the cues used for foot clearance. Inertial measurement units (IMUs) provide a portable means of capturing kinematic data and locomotor responses in a natural environment — beyond the confines of motion-capture lab conditions. The purpose of this study was to identify the frequency of natural locomotor stumbles in a small population. This data could then be used to quantify the number of participants needed for a future study designed to generate a larger dataset of stumbles on different surfaces. IMUs were fixed to the participant's feet, legs, trunk, and head. A lab member walked behind participants to identify and record instances of stumbling over a 6 km course. Video was used to capture the environmental conditions that caused stumbles. We quantified head/body segment orientations and flat-ground walking data were segmented by strides from heel-strike to heel-strike. Over five participants, there were two stumbles, and three unexpected shifts from a loose stone. The stair-climbing data will be segmented in the future and the frequency components of the accelerations during stumbles will be calculated to provide insight into how the vestibular system encodes such events.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Max Bailey

Presentation Title: Diet metabarcoding of Northern saw-whet owls (*Aegolius acadicus*) in the Okanagan Valley, BC: Sex and age factors on diet

Abstract:

Northern saw-whet owls (*Aegolius acadicus*; NSWOW) are key predators in ecosystems across North America. Research on NSWOW diet is historically based on morphological pellet analyses, which undercounts the dietary contribution of un-pelleted food items such as soft-bodied invertebrates and limits the possibility of linking NSWOW life-history traits to foraging behaviour.

To address this gap, we are taking a novel approach to NSWOW diet analysis by using environmental DNA (eDNA) signatures of cloacal, beak, and talon samples. We hypothesize that, consistent with predictions in sexual size dimorphism and niche partitioning, females will have a more mammal dominant diet and males will have more birds and invertebrates present. There will be no difference in diet as predicted by age, as owls of different age groups do not differ in body size. To collect data, minimally invasive cloacal and surface swabs were taken from 15 individuals from one site. The paired cloacal and surface swabs were extracted for sequencing using general invertebrate (COI) and vertebrate (12S) primers, and dietary composition between owls was calculated using a Jaccard index.

We expect to see owls differentiating in diet composition by sex, but not by age, based on a PERMANOVA analysis. Visually, samples taken from the same sex will cluster in a Principal Coordinate Analysis (PCoA) based on the composition of the diet.

Overall, the results will help to better understand ecological questions as they correspond to individual characteristics, as well as to inform conservation monitoring methods that can be applied across owl species.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Max Yang

Presentation Title: Sash1 Signaling in Driving the Generation of Hematopoietic Stem Cells

Abstract:

Hematopoietic stem cells (HSCs) are the source of all terminally differentiated blood cells. Thus, HSC transplant is a mainstay treatment for many serious hematological disorders. Unfortunately, a paucity, and lack of ethnically diverse donors means many patients cannot find a match. Therefore, there is a need to develop a comprehensive understanding of HSC development to inform protocols generating compatible HSCs *ex vivo*.

Our lab has previously demonstrated that Sash1 is an extrinsic regulator of endothelial-to-hematopoietic transition (EHT), the process of HSC generation during embryogenesis. During EHT, hemogenic endothelial cells bulge into the dorsal aorta and proliferate, creating intra-aortic hematopoietic clusters (IAHC) composed of heterogeneous cell populations at intermediary stages of transdifferentiation towards HSC fate. Our preliminary work indicates that Sash1-knockout (KO) embryos have an accumulation of quiescent early HSC precursors. We therefore hypothesized that Sash1 loss impairs cell cycle activation in early IAHC cells, limiting HSC generation. In this study we aimed to quantify the number, size & proliferation status of IAHCs and cluster-initiating cells within Sash1-KO and wild-type (WT) embryos. We developed an immunohistochemistry protocol to identify the dorsal aorta, hematopoietic, and dividing vs quiescent cells, and examined cluster composition within serial sections of Sash1-KO and WT embryos. Interestingly, during our initial work we found multiple large IAHC within Sash1-KO embryos. Coupled with our previous data this suggests that these IAHC may be composed of immature/stalled precursors. In future work we will examine the identity & maturity of these IAHC cells and investigate how Sash1 promotes HSC precursor maturation.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Meg Sheehan, Kaatyaayani Singh, Subin Mun, Yvette Sin

Presentation Title: Exploring mental health resource needs of families of pediatric solid organ transplant recipients

Abstract:

Although solid organ transplantation (SOT) is considered the gold-standard procedure for children experiencing end-stage organ failure, it has been shown to exacerbate anxiety and chronic stress in families, as well as reduce their psychosocial functioning. This presents a principal concern in the care of pediatric SOT patients, as recovery post-transplant and adherence to medication essential to preserving the transplanted organ has been strongly associated with family functioning. Despite this, little is known about the mental health resource needs of the families of pediatric SOT recipients. We hypothesize that these families will express a need for the development of well-tailored and family-centered mental health resources. We will recruit approximately 20 immediate family members (parents and siblings) of pediatric SOT patients from the Multi-Organ Transplant Program at BC Children's Hospital. Semi-structured interviews will be conducted with participants using the Consolidated Criteria for Reporting Qualitative Research, a 32-item checklist to guide patient interviews and qualitative data reporting. The interview guide will explore the following topics: 1) mental health resource needs, 2) barriers and facilitators to accessing current resources, and 3) perceptions of family-centered mental health care. Interviews will be transcribed, and thematic analysis using inductive and deductive methods will be performed using NVivo. Findings from this study will guide recommendations on the development of accessible mental health resources for families of pediatric SOT patients, as well as inform the comprehensive care of these families by healthcare professionals.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Melanie Chan

Presentation Title: Identification of Site-Specific Transposable Element Activities in Early Cancer Cells

Abstract:

Transposable elements (TEs) are repeated DNA sequences in eukaryotic genomes that have the ability to relocate within the genome. TE expression and transposition activities often disrupt gene functions and threaten host genome integrity. On the other hand, TEs have been adapted by hosts to gain evolutionary advantages through influencing host gene regulation. In humans, TEs are heavily repressed by regulatory mechanisms, whereas TE de-repression can lead to severe genomic instability diseases and is often observed in cancer. Previous studies assume uniform activities among all intact TE copies. However, recent research suggests that TEs of identical sequences may vary in their activities. Therefore, assessing individual TE activity can help provide a better understanding of the impact of TEs in cancer development. Given that TEs have the ability to act as alternate promoters, their de-repression may affect nearby transcription activities, and subsequently lead to significant alterations in gene expression in cancer. We chose breast cancer as our model to compare with normal cells and screened for adjacent TEs that may contribute to deregulated genes. We also analyzed DNA sequence characteristics that may be affected by nearby TE activities. We anticipate our study will provide supporting evidence of the differential activities among individual transposable elements. The results of this study suggest localized impact of individual TEs, as well as suggesting that the differential impacts of TEs of the same sequence may work in concert in cancer development.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Melika Javanmardi

Presentation Title: Advancing Polymer Synthesis: Green Approaches to Primary Amine Functionalization for Diverse Applications

Abstract:

The synthesis of primary amine-functionalized polymers poses a significant challenge due to the inherent reactivity and polarity of the amine moiety, making them less common than other functional groups. To overcome this, an emerging polymer modification method called hydroaminoalkylation can be applied using state-of-the-art transition metal catalysts, adding amines to commodity polymers. Here, a silyl-protected benzyl amine is implemented for the first time in hydroaminoalkylation polymer modification. This enables a single-step synthesis to primary amine functionalized polymers by removal of the silyl group under mildly acidic conditions.

This approach is guided by green chemistry principles, using an earth-abundant transition metal catalyst, is atom efficient, and produces nontoxic waste products. Additionally, the modified polymers are water soluble, making them potentially useful in various applications such as blend compatibilizers, drug delivery systems, adhesives, coatings, CO₂ capture, and membranes. This work not only solves a long-standing problem in primary amine-functionalized polymer production, but also provides a practical method to access valuable functional materials.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Miguel Tsai, Victoria Chong, Talia Feng, Zoe Ng

Presentation Title: A BIOMODular Enzyme Delivery Vehicle to Target Biofilms

Abstract:

Biofilms are layers of bacterial communities that can adhere to one another within a self-produced matrix. They can attach to a variety of surfaces including human tissue, causing severe healthcare and environmental issues. Traditional strategies for combating biofilms include the use of antibiotics and interference of bacterial layer formation. However, removing biofilms using these methods can be challenging due to antibiotic resistance and unexpected pathogenic features arising from interference strategies. To address this issue, we aim to create a modular enzyme delivery vehicle. This structure consists of a DNA-templated liposome, conjugated with variable enzymes, referred to as an “enzymosome”. By forming our liposomes around DNA-origami structures, which can be altered to modify their size and shape, we can create a customizable platform. Among the DNA structures developed – a trigonal bipyramid, pentagonal bipyramid, and octahedron – all three demonstrated high stability in CanDo®. Future investigations include testing enzyme synergy with liposomes and validation of the platform in vitro. The modularity of the enzymosome can address biofilms present in various environments such as in cystic fibrosis patients, food facilities, and water systems. By changing the cargo type and liposome size, this delivery vehicle provides potential to be used across a wide range of applications.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Mimi Nguyen

Presentation Title: Exploring Rural Pharmacy: A Needs Assessment for a New Elective Course Focused on Rural Pharmacy Practice

Abstract:

Pharmacists play a crucial role in the provision of care in rural and remote communities, often serving as one of the only healthcare providers available, particularly in the presence of a primary care provider shortage. As the Entry-to-Practice (E2P) PharmD program at UBC is the sole pharmacy program in the province, the Faculty of Pharmaceutical Sciences has a role in ensuring that future pharmacists are trained to provide care to patients from all communities and backgrounds. Currently, the E2P PharmD program provides limited didactic exposure to pharmacy practice in rural and remote communities.

This study explored student perspectives on current rural pharmacy education within the E2P PharmD program to determine interest and need for integrating a new elective surrounding this topic. We conducted a needs assessment survey on current Year 1 to 3 pharmacy students to solicit opinions on current rural content and gaps, and interest in developing a new elective. Survey results were analyzed quantitatively (multiple-choice, select-all, Likert scale) and qualitatively (open-ended answer) to generate key themes.

The overall response rate was 13.5% (n=81 out of 600). 61% of respondents indicate inadequate representation of rural pharmacy practice in the program, and 78% express a desire to take an elective course to explore the unique healthcare considerations of rural practice in contrast to urban settings. These findings indicate notable student interest for an elective course focusing on rural pharmacy practice and the need for more representation to address current gaps in the E2P PharmD program pertaining to rural healthcare knowledge.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Mona Behrouzian, Mona Pei

Presentation Title: The Lower-Extremity Unobtrusive Athletic Research (LUNAR) System

Abstract:

Anterior Cruciate Ligament (ACL) injuries are a serious knee injury that are increasing in pediatric soccer athletes, with over 2 million ACL injuries occurring annually worldwide. These severe injuries have permanent physical and psychosocial costs. Currently, there are no standardized biomechanical metrics that characterize ACL injury risk factors on-field, and most research is conducted in the lab, post-injury. This means that researchers miss out on a lot of data including how athletes move pre-injury, what athletes did that caused the injury, and how that translates to their movement post-injury. To address this problem, our team has created a wearable, sensor-based device capable of measuring knee kinematics on-field. Our device is designed to capture the natural, unrestricted movement of pediatric soccer athletes and communicates that data to researchers. The device, which is entirely embedded within typical soccer equipment and logs the motion. The device prioritizes athlete safety, and ensures athlete performance is unimpeded, all while collecting valuable data.

This study is still in progress, but our next steps are to continue to develop this tool and conduct further research to investigate the accuracy of the knee mechanics measurements compared to traditional marker-based motion capture. The significance of this research device is that it can help researchers use the on-field kinematics to better understand knee injury mechanisms and create standardized metrics of ACL injury risk factors. Our findings can impact youth injury prevention strategies and programs. In the future, our device can be scaled-up to youth soccer teams for longitudinal monitoring.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Muhammad Ihsan Jayadi, Vincent Huang

Presentation Title: Differing levels of stand density in lodgepole pine incite dissimilar resilience to drought and mountain pine beetle attacks

Abstract:

Amid increasing climate change, an imperative focus lies in determining factors influencing stand resilience. Research has predicted that lodgepole pine stress in its historical range will increase due to climate change. Biotic stressors of lodgepole pine have also been rampant, with severe mountain pine beetle outbreaks appearing in areas where their substantial presence is unexpected. It implies that the ecological range of mountain pine beetle species is expanding, increasing potential beetle attacks on lodgepole pine. This study aims to assess the effect of varying levels of stand density on stand resilience to beetle attacks and climate-induced disturbance. Stand density is a quantitative measurement describing the number of trees within an area. Partial removal of trees, otherwise known as thinning, reduces stand density and is known to increase lodgepole pine resilience to drought as it reduces competition between individual trees in a stand. Stand density has been shown to play a role in managing irruptive mountain pine beetle outbreaks, as the mountain pine beetle displays density-dependent behavior. We selected four mature lodgepole pine stands in southern British Columbia. Three stands have differing basal areas with a history of beetle attacks, and the resilience of the stands against beetle attacks and drought will be a point of comparison with one control stand. We expect resilience to increase as stand density decreases. The results of this study will enhance our understanding of how stand density affects stand resilience, providing us with valuable information on stand management in stressed environments.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Nastaran Davilu, QingRu Kong, Andrew Tran, Harley Song

Presentation Title: Human Islet Gene Expression in Obese Donors

Abstract:

Obesity is a predominant risk factor for developing Type 2 diabetes (T2D) and >80% of people living with T2D are obese. Pancreatic islets – comprising various endocrine cell types such as insulin-producing beta cells, as well as neuronal, immune, endothelial, and mesenchymal cells – regulate glucose homeostasis. When their function is compromised, due to beta stress and dysfunction, controlling blood sugar levels becomes difficult, leading to T2D. With the increase in obesity, we are witnessing a parallel rise in T2D; yet, more needs to be understood about how obesity affects pancreatic islets to better resolve T2D pathogenesis. To gain deeper insights into the effects of obesity on various pancreatic islet cell types, we analyze single-cell RNA data generated at UBC from human islets and data obtained from the University of Alberta. We hypothesize that genes related to inflammation and metabolic dysfunction are unregulated in the obese donor population compared to the lean donor samples. As expected, we found genes from different cell types showing inflammatory signatures. Interestingly, we also found genes with compensatory mechanisms that might be counteracting said inflammation. Therefore, the development of T2D may be due to the inability of compensatory mechanisms adopted in obese donor islets to mitigate T2D pathogenesis, rather than having an intrinsic connection to obesity. Our findings revealed genes of interest that should be further studied and characterized concerning their relevance in obesity and T2D. These would lead to the discovery of new target genes for therapeutic targets in further T2D and obesity treatments.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Natalie Jones

Presentation Title: Intranasal Delivery of Protein Therapeutics with Cell-Penetrating Platforms

Abstract:

Despite their increasing relevance in treating many diseases, protein therapeutics such as insulin and antibodies face significant challenges in their delivery. Oral formulations of these drugs are hindered by their instability, degradation, and low uptake in the gastrointestinal tract, leaving patients with injections as the only feasible route of administration. To combat this, we have developed a cell-penetrating platform (CPP) to help protein therapeutics reach the bloodstream by crossing tissues in the eyes, nose, or mouth without needing to be injected. In particular, intranasal formulations of these drugs offer many benefits for easy, painless administration to patients, thus providing a promising alternative route of administration. This study explored the efficacy of our CPP formulations in facilitating the uptake of various protein therapeutics after intranasal administration to mice. Specifically, formulations including insulin were tested for their efficacy in controlling blood glucose in a diabetes model, which showed changes comparable to subcutaneously delivered insulin at the same dose. Additionally, the distribution of fluorophore-labelled model proteins throughout the body was observed at several timepoints in order to investigate further applications of the CPP formulations, including potential use in delivering therapeutics to the brain. Ultimately, our formulations showed promise in advancing the needle-free delivery of protein therapies, which has exciting implications for the treatment of a vast array of diseases.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Vy Tran, Ekjaap Athwal

Presentation Title: Wood frog's (*L. sylvaticus*) immunity adaptation to elevated temperatures against chytridiomycosis

Abstract:

Environmental temperature increases can have large impacts on the properties and activities of fungal pathogens. An example of a deadly fungal pathogen is Chytridiomycosis which has killed over 500 amphibian species worldwide since 1938 and is predicted to become more lethal as environmental temperatures increase. We propose to investigate and quantify the adaptive immune response of Wood Frog (*Lithobates sylvaticus*) to Chytridiomycosis at a variety of environmental temperatures to understand the impact of this fungal pathogen on an ecologically important amphibian species. We plan to expose 2 groups of Wood Frogs to Chytridiomycosis and place each group into different temperature regimes, one with temperatures resembling the present day, and one in a raised temperature environment according to predicted levels of environmental warming given IPCC's business as usual models for year 2100. We will be measuring survivability, infectivity, immune cell counts and plasma ion levels. We hypothesize that Wood Frogs adaptive immune system will perform better against Chytridiomycosis infection during elevated temperatures, as studies have shown positive correlation between temperature increment and immunity. We propose that results will be in line with the hypothesis based on the survivability-infectivity model studied and the underlying adaptive immune response that they show. Our results could raise concerns about Wood Frog survivability given the combination of environmental temperature increase and fungal pathogen toxicity and raise awareness about the threats to a keystone species in many ecosystems within Canada.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Nicola Wray

Presentation Title: The Biomarker Potential of Neurofilament Light and Heavy in Preclinical Models of Multiple Sclerosis

Abstract:

Multiple sclerosis (MS) is an autoimmune disease characterized by the demyelination of neurons, leading to axonal injury and loss in the central nervous system. This neurodegeneration releases two distinct cytoskeletal proteins into the blood: neurofilament light (NfL) and heavy (NfH). While NfL and NfH show promise as biomarkers for monitoring MS disease activity and onset in humans, their utility in preclinical models used for therapeutic research is unclear. To investigate NfL and NfH in a preclinical model mimicking MS pathology, we immunized mice to induce experimental autoimmune encephalomyelitis (EAE). We measured serum NfL and NfH using MesoScale assays at acute (day 17-20) and chronic (day 62) stages post-immunization, alongside daily clinical assessments of EAE disease severity. NfL and NfH levels in non-EAE mice were low or negligible ($278 \pm 57, 0.62 \pm 0.02 \text{ pg/mL}$), while levels were elevated in acute EAE mice ($17516 \pm 1153, 63 \pm 5.90 \text{ pg/mL}$). Later, NfH levels in chronic EAE mice ($1.50 \pm 1.69 \text{ pg/mL}$) were comparable to non-EAE mice, whereas NfL levels ($1384 \pm 334 \text{ pg/mL}$) were higher than non-EAE mice and lower than acute EAE mice. After symptom onset, NfL and NfH levels tended to increase, peak at 6 days, and subsequently decrease. For acute EAE mice, cumulative disease severity scores moderately correlated with NfL and NfH levels ($p=0.0008; p=0.0007$) as NfL and NfH levels strongly correlated with each other ($p<0.0001$). This study elucidates the reliability of NfL and NfH as biomarkers of neurodegeneration in preclinical EAE models. These findings may inform future preclinical investigations on the monitoring efficacy of novel or repurposed MS therapeutics.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Nicolas Zhu

Presentation Title: The Interaction between Menarche and Oral Contraceptive Use in Female Depression Risk

Abstract:

Depression is almost twice as common in women than men. A large body of research suggests that differences in men's and women's hormonal profiles likely contribute to this difference. Substantial hormonal changes within females occur during menarche, marking the onset of the first menstrual period, and may also result from the use of oral contraceptives (OC). Past studies have found that females who start using OCs in adolescence are at greater risk for future depression compared to females who start using OCs in adulthood. Additionally, early menarche has been linked to increased depression risk. This study aims to explore the interaction between the age of menarche and the age of OC initiation on depression risk for women. We analyzed data from the UK Biobank, a large-scale biomedical database of over half a million participants collected since 2006. We examined 68,741 females who provided data on their past OC use, age of menarche, and depression symptoms. A logistic regression revealed significant main effects of both OC use and menarche, with OC use exerting a larger effect than menarche on increasing depression risk. Importantly, we found a significant interaction effect where among females who experienced early menarche, early OC use predicted a comparatively greater depression risk. We further observed that females who experienced late menarche were comparatively less sensitive to the heightened depression risk from early OC use onset. Our results imply that OC administration should consider a female's age of menarche, especially if administering to adolescents.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Nika Martinussen

Presentation Title: Modelling the impact of enforcement actions against industrial facilities on air quality and environmental justice in Canada

Abstract:

Canadian jurisdictions have implemented environmental regulations to reduce air pollution emissions and their effects; yet, recent estimates by Health Canada suggest that outdoor air pollution exposure resulted in 15,300 premature deaths and costed \$120 billion in 2016. Further, environmental injustices in air pollution exposure on lower socioeconomic, Indigenous, and racialized groups, persist. A recent study identified industrial offenders - Canadian industrial facilities who have violated environmental regulations - but, the air pollution emissions and exposure burdens of industrial offenders are still unknown. There are indications that a few large industrial facilities in Canada contribute an excess amount of air pollution, while also exposing historically, persistently, or systemically marginalized (HPSM) groups to unjust exposures. In this study, I examine the air pollution emissions of industrial offenders to determine whether a pattern of disproportionality exists, both in emissions quantity and exposure. Using emissions data from the National Pollutant Release Inventory (NPRI), I calculate statistical metrics on air pollutant data from industrial offenders and use the reduced-complexity air pollution model, Global InMAP, to determine the annual air pollution contribution and the associated annual exposures produced by industrial offenders. In preliminary results, I find that industrial offenders emit on average, more criteria air contaminants (CACs) than a typical NPRI-reporting facility, and contribute to emissions of CACs at a disproportionate rate to their representation among NPRI-reporting facilities. These results expand our understanding on environmental justice and emissions disproportionalities in Canada, and illuminate whether enhanced enforcement regulations may be effective in reducing emissions and unjust exposures.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Omer Faraz

Presentation Title: A Comparative Study on Evolving Spinal Cord Injury (SCI) Recovery Priorities among individuals with SCI, Researchers and Clinicians in North America.

Abstract:

Spinal cord injury (SCI) is a complex and debilitating condition that results in not only paralysis but several other health-related dysfunctions, including heart, bladder, bowel, and sexual dysfunctions. Poorer health, decreased quality of life, and increased mortality risk after SCI are typical consequences of these dysfunctions. The restoration of these functions have been rated as the highest priorities for recovery in individuals following SCI. Numerous advancements in SCI treatment have been established since, potentially affecting how patients perceive the urgency of specific SCI-related conditions. Our project aims to update the understanding of the latest priorities for recovery among people with SCI, and to compare priorities for recovery between individuals with SCI, clinicians, and researchers within North America. These data are being collected using surveys created following expert guidance and international collaboration. Surveys have been distributed online using Qualtrics software. Over 600 responses across six countries from participants. Preliminary analysis of survey responses suggest that SCI priorities for recovery among individuals with SCI are similar to outcomes found in prior research, who rank Arm/Hand function and Bladder/Bowel function highly, whereas clinicians highly rate mental health as a recovery priority. The results from this project will foster awareness of the primary health concerns faced by individuals with lived SCI experience, guide researchers to conduct relevant research, and help clinicians better understand what patients need and want for their recovery so that treatment can focus on these preferences, ultimately contributing to improvements in quality of life of individuals with SCI.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Paniz Ghavimi

Presentation Title: Discovering Novel Interactions between Thrombosis, Diabetes, and Obesity

Abstract:

Patients with obesity and diabetes experience increased blood clots, the cause of which remains unclear. Recently, our research group discovered that high levels of CD248, a type of protein expressed in some cell membranes, are correlated with obesity, type 2 diabetes and increased blood clot formation. CD248 binds to the insulin receptor (IR) on the cell membrane and interferes with insulin-signalling pathways, leading to insulin resistance. In the coagulation system, CD248 interacts with tissue factor protein (TF), the major initiator of the clotting cascade, and increases TF activity. We therefore hypothesize that CD248 connects insulin-signalling and coagulation. This project aims to test whether TF alters insulin-signaling via the IR and whether insulin-signaling via the IR affects TF's role in blood clotting. I performed experiments using in vitro systems in which cells variably express TF, IR, and CD248. By performing a proximity ligation assay, I showed that IR and TF are distantly close on the cell membrane, which suggests a functional relationship. I verified by Western blots that cells without TF show stronger insulin-induced AKT phosphorylation compared to cells with TF. I further examined the effects of TF on insulin-triggered uptake of glucose into those cells using confocal microscopy. Currently, I am evaluating the role of insulin and IR on TF-mediated coagulation by using cells that express low and normal levels of IR. Overall, we hope by understanding the interaction between blood clotting and insulin- signalling pathways, strategies could be developed to prevent thrombotic complications in individuals with insulin resistance and obesity.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Gursahil Purba, Parla Pourahmed, Mirren Buchanan

Presentation Title: Functional Characterization of the Divergent Role of Androgen Receptor in ER+ and ER- Breast Cancer

Abstract:

Breast cancer (BCa) is a leading cause of cancer related deaths in women worldwide. Given that the cancer is typically driven by the steroid hormone receptors estrogen receptor (ER) and progesterone receptor (PR), BCa is often treated with hormone-directed therapies. While these treatments are initially effective, the cancer often recurs with a more aggressive receptor-negative phenotype. Interestingly, another steroid hormone receptor, androgen receptor (AR), has been implicated in the progression of advanced BCa. However, the mechanism by which this occurs is unknown, and paradoxically, AR expression has actually been shown to be beneficial in ER+ tumours. To elucidate the differences in the functional role of the AR in ER+ and ER- BCa, we propose to study how the binding sites and interacting proteins for AR change between disease stages. By identifying both the AR-regulated genes differentially expressed in different subtypes, as well as genetic and epigenetic elements regulating these alterations, we hope to shed new light on the mechanism of differential AR function in ER+ and ER- BCa and ultimately to identify novel therapeutic opportunities for improving treatments for advanced BCa.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Bowen Tian, Ezekiel Camacho, Peter Kim

Presentation Title: Demand Forecasting for UBC Buildings using Artificial Neural Network and Multivariate Time Series Regression

Abstract:

With growing concerns on climate change and fossil fuel depletion, the University of British Columbia (UBC) faces the challenge of balancing growth with environmental stewardship. This study presents a data-driven approach to forecasting energy usage in existing buildings through multivariate time series regression and artificial neural network using 10 years of energy data from 107 buildings at UBC. Exploratory data analysis revealed that buildings constructed after the establishment of the 1970 National Building Code of Canada exhibited a reduction in average Energy Use Intensity (EUI) and its variability. A total of 69 buildings were selected after pre-processing to generate forecasting plots, which showed high predictability, except during the pandemic lockdown, where energy use in larger buildings was consistently overpredicted. Regular energy use patterns had R-squared values up to 0.9, while irregular spikes led to lower predictability. Despite their strengths in capturing key variables, the regression methods demonstrated lower predictability compared to the ANN, which, when implemented with building features, yielded an R-squared value of 0.62 and MSE of 0.070, showcasing its effectiveness in prediction. Key factors influencing EUI include temperature, day of the week, and time of the year. Further examination allowed for the identification of potential optimization strategies and usage patterns under changing weather conditions. Identification of energy usage patterns in different building types not only helps future construction projects at UBC, but also provides an opportunity for similar institutions to strive toward reducing their environmental footprint while continuing to uphold innovation in a responsible manner.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Prithisha Gill, Hope Hogenboom, Gina Zhang, Uzair Hussain

Presentation Title: Identifying Novel Biomarkers and Dysregulated Biological Pathways in Drug-Tolerant Persister Cells Using Proteomics to Develop Treatment Options and Prevent Relapse of Non-Small Cell Lung Cancer.

Abstract:

Non-small cell lung cancer (NSCLC) is one of the most common forms of lung cancer that often results in relapse after treatment. Therapy of NSCLC consistently includes chemotherapy regimens to target cancer cell metastasis and prevent fatal lung damage. The complexity of NSCLC poses difficulty in cancer eradication, as a common treatment circumvention by the abnormal cells involves the development of DTP (drug-tolerant persister) cells, which are subset cells that display temporary tolerance to therapeutic treatments. This newly discovered class of cells has been observed in several forms of cancers including acute myeloid leukaemia, breast cancer, prostate cancer, colon cancer and more. However, the proteomic methods used to detect irregular biomarkers regarding these DTP cells are currently underexplored. We hypothesize that DTP cells of NSCLC tumors will display abnormal gene expression and exhibit dysregulated biological pathways. Using laboratory mice models inoculated with patient-derived xenografts, we will cultivate primary NSCLC and DTP cells and examine the non-targeted differences in biomarker expression in tumor tissue by analyzing protein data using LC-MS/MS proteomics. To visualize and localize the expression of biomarkers in NSCLC, we will use Western Blotting and MALDI molecular imaging to confirm our findings. We expect to see atypical phenotypes in DTP cell proteins compared to primary NSCLC and in healthy individuals. These results will provide a profile of novel biomarker expression on DTP cells which may generate insight into the high recurrence rate of NSCLC cells after complete disease remission. Future applied studies must be conducted to help synthesize novel therapeutic treatments targeting evasive drug-tolerant cells.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Priya Bains

Presentation Title: British Columbia Community Pharmacy During COVID-19: Identifying Provider Challenges and Opportunities through Google Reviews

Abstract:

The COVID-19 pandemic impacted community pharmacies as they faced unprecedented challenges in providing patient care. Online reviews have been one way in which patients can comment on their satisfaction with the services offered from their local pharmacies. Our objective was to analyze Google Reviews collected in the rapidly changing pharmacy landscape before and after the COVID-19 restrictions in BC to better understand opportunities and challenges for community pharmacy teams. Google Reviews were scraped via Outscraper and two researchers independently analyzed each review. We found that 75% of patients who left a Google Review had a positive experience before the COVID-19 restrictions compared to 69% after the COVID-19 restrictions. In both before and after COVID-19 periods, counter-side manners were the most frequent discussion meaning reviewers found counter-side manners as the most noticeable aspect of their pharmacy experience. Less than 2% of all comments included pharmacist scope of practice meaning reviewers did not use this service or find the service noteworthy. This research can guide pharmacy practice to improve counter-side training provided to pharmacy staff and focus on the opportunity to advertise and better utilize our expanded scope. Furthermore, we found 75% of comments regarding COVID-19 prevention measures, vaccine and testing were positive. Negative reviewers commented on vaccine related issues (31%), testing availability (24%) and prevention measures (12%). This research highlighted the positive impact community pharmacies made in providing supplies and vaccinations and that reviewers had a negative experience when they were unable to access these services at their local pharmacy.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name: Puloma Gupta

Presentation Title: Resilience of Healthy Neuroticism during COVID-19: Associations with Autonomy, Social Distancing and Alcohol Consumption

Abstract:

Neuroticism, a personality trait characterized by heightened vulnerability to distress and threat detection, is known to have negative health consequences, like the risk of mortality. In contrast, conscientiousness, another personality trait, which encompasses being disciplined and organized, is associated with positive health consequences, like reduced smoking. A growing body of literature points to the importance of considering the interaction between high neuroticism and high conscientiousness, namely healthy neuroticism. Extant research indicates that healthy neuroticism can be associated with engagement in healthier behaviours, but it remains uncertain whether this association persists in the face of a chronic stressor like the COVID-19 pandemic. The pandemic has brought about chronic stressors and disrupted daily routines, which may have an impact on the relationship between personality traits and health behaviours. This study seeks to further explore the concept of healthy neuroticism and its implications on psychological well-being (i.e., autonomy) and health behaviour (i.e., social distancing and alcohol consumption). The data were collected as part of a longitudinal, online study during the COVID-19 pandemic with participants who were 18-84 years of age and living in Canada. Regression analyses will be conducted to analyze the relationships of healthy neuroticism with autonomy and then with alcohol consumption. Although healthy neuroticism was not significantly associated with autonomy, social distancing and alcohol consumption, this study extended previous research to a context where the interplay between healthy neuroticism and health behaviours was examined due to the unique stressors posed by the pandemic.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Rachel Vaz

Presentation Title: Assessing the effects of age, sex, and geographic distribution on Northern Saw-whet Owl gut microbiomes over fall migration

Abstract:

Northern Saw-whet Owls (*Aegolius acadicus*) pass through Kelowna, British Columbia during their fall migration. No studies to date have sequenced the microbiome of this species of owl, despite their importance as predators in the local ecosystem. Migration, age, and sex are known to influence animal microbiomes, but the effect of these factors on Northern Saw-whet Owls is unknown. We hypothesized that we would see differences in alpha and beta diversity among owls of different ages and sexes. We also hypothesized that there would be no difference in microbiome composition between owls captured at two separate locations because these owls are migrating and likely have similar diets in each site. Younger owls were hypothesized to have more diverse gut microbiomes. Nets were set up at two sites in British Columbia (Postill Lake and Tatlayoko) during fall migration (mid-September to mid-October of 2023). Northern Saw-whet Owls were captured, their sex and age were determined, and cloacal and fecal samples were collected for microbiome analysis. We performed DNA extractions and sent the samples for 16S rRNA sequencing. No significant differences in bacterial species richness were found between owls of different sexes, ages, or owls captured at different sites. This research will allow us to characterize the Northern Saw-whet Owl gut microbiome for the first time, providing a foundation for linking microbial composition to predator migration ecology, and for developing methods for microbiome migration monitoring that will allow researchers to better monitor and conserve owls.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Rachma Ulwani

Presentation Title: Electricity Production of Microbial Fuel Cells by using *Pseudomonas Putida* as a Chrome-reducing Bacteria

Abstract:

Pseudomonas Putida, a well-studied bacterium with potent pollutant degradation capabilities and versatility in chemical production, presents a promising candidate for microbial fuel cell (MFC) applications due to its adaptability to varying environmental conditions. Numerous studies investigated the conversion mechanisms of hexavalent chromium into reduced forms. This study aims to enhance extracellular electron transfer (EET) mechanisms in MFCs by employing *Pseudomonas Putida* as a chromium-reducing agent, coupled with a Vanadium nitride-decorated carbon felt (VN@CF) anode to improve electricity conversion efficiency. Experimental procedures involved the preparation of VN@CF anodes and the construction of MFCs with *Pseudomonas Putida* and glucose as carbon sources. Measurements of output voltages, power density, and polarization curves will be conducted to assess electricity generation efficiency. Expected results include the reduction of hexavalent chromium by *Pseudomonas Putida*, with potential limitations observed at high chromium concentrations due to toxicity effects on bacterial growth. Successful outcomes could contribute to bioremediation efforts, mitigating heavy metal pollution while advancing sustainable energy production practices.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Ragul Loganathan

Presentation Title: The Effects of Resistance Training and Balance-and-Toning Exercises on White Matter Hyperintensities Observed in Older Adults

Abstract:

White matter hyperintensities (WMH) are brain lesions that increase in prevalence with age, particularly affecting individuals over 55 years old. They are linked to cognitive decline and an elevated risk of stroke and dementia. While exercise has demonstrated positive effects on cognitive function, its impact on reducing WMH volume remains uncertain. Structural MRI scans are commonly employed to assess WMH volume, offering both qualitative and quantitative insights into the shape, size, and integrity of grey and white matter in the brain. In this study, we propose that resistance training may lead to a more significant reduction in WMH volume compared to balance-and-toning exercises, such as yoga.

Our sample comprises 200 participants aged over 60, all affected by cerebral small vessel disease. The study is conducted in Vancouver, BC, with participants divided into two groups. One group engages in resistance training, while the other participates in balance and toning exercises. Prior to random assignment, all participants undergo a structural MRI T1 scan to establish baseline WMH volume, measured in cm^3/ml . Another MRI scan is conducted at the study's conclusion to assess changes in WMH volume.

We anticipate observing a more pronounced reduction in WMH volume in the resistance training group compared to the balance-and-toning group. This investigation aims to contribute to our understanding of the connection between resistance training and cognitive well-being in older adults, with the ultimate goal of promoting successful aging and preventing cognitive impairments.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Raphael Kelly, Jacob Arnold

Presentation Title: An Investigation into the Effect of Domino Spacing on Wave Propagation Speed

Abstract:

The falling of a set of vertically oriented dominoes placed in a line is both an entertaining and interesting phenomenon for physical analysis. Although only elementary physical forces are involved in the interaction itself, the resulting effect involves several complicating factors which make exact analysis difficult, especially regarding the effect of spacing on the speed at which dominoes fall. It was hypothesized that, for a given range of spacings between dominoes, the smallest spacing would result in a higher terminal velocity relative to the largest spacing, and there would be a decreasing trend throughout the range. Multiple trials were performed whereby the falling of a set of dominoes at eleven various spacings between 0.004 and 0.044 m was recorded digitally and analyzed to determine the terminal velocities of the fall of the dominoes (upon which they reach a steady state). Collected evidence suggested a refutation of the hypothesis and it was inferred that no strong conclusion may be drawn without further research.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Ria Gill

Presentation Title: The Cognitive-Affective Response to a Subsequently Induced Psychosocial Stressor

Abstract:

Engaging in physical activity and exercise has been found to reduce daily stress levels and promote a healthy lifestyle. Depending on the activity that is being performed, different levels of energy are required, which results in the production of various chemicals in order to provide the body with energy to sustain that movement. However, it is unclear which intensity level modifies the effects of exercise on the cognitive-affective response to a psychosocial stressor. The current study aimed to examine how exercise that is performed at different intensities influences the way people think and feel in response to a subsequently induced psychosocial stressor. Throughout the study, a total of 84 participants (N=42F; N=42M) between the ages of 18-35 were recruited and assessed over a two-day study period. On Day 1, participants participated in the Ramp Max CEPT Test to determine their maximal oxygen consumption and power output. On Day 2, participants were assigned to either a low, moderate or vigorous exercise intensity category, which was based on their maximal oxygen and power output from the first day. Following the exercise test, participants completed a psychological stress task, which was the Trier Social Stress Task. It is expected that participants in the moderate intensity exercise category experience the least amount of stress to the psychosocial stimulus. This research offers insight to how people can best manage their stress levels.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Ridhi Walia, Aishwarya Manish

Presentaton Title: Motivators of Alcohol Consumption in University Students: Programming to Reduce Alcohol Consumption in UBC Students

Abstract:

Excessive alcohol consumption has been evident in university student populations. Our review focuses on two questions: a) What specifically motivates undergraduate students to consume alcohol? b) How the University of British Columbia Vancouver (UBC-V) and University of British Columbia Okanagan (UBC-O) develop programs to reduce alcohol consumption in their student bodies? We extract and integrate findings across research articles that investigate undergraduate drinking behavior. These articles include research from the United Kingdom, Canada, and Australia for a more comprehensive understanding of what motivates students to consume alcohol. Based on our review, we categorize social, psychological and physiological motivations to consume alcohol. Social motivators for alcohol consumption include perceived social norms, social norm theory and socializing offline and online. Psychological motivations include the use of alcohol to enhance one's mood or cope with stress. Physiological motivators include the genetic propensity for alcohol craving and addiction. We integrate theory about these motivators with programming that is either currently present at UBC-O/UBC-V or could be considered by UBCO/UBC-V to more comprehensively address all specific motivations for drinking in university students.

MURC 2024

Presentation Format: Poster Presentation (Wave 4 - Ponderosa Ballroom)

Presenter Name(s): Rimsha Faisal

Presentation Title: Optimizing Vancomycin Therapeutic Drug Monitoring in Pediatric Patients: A Simulation-Based Comparative Analysis

Abstract:

Optimal antibiotic dosing is crucial for treating infections and ensuring patient safety. Therapeutic drug monitoring (TDM) helps tailor antibiotic doses to individual needs. While vancomycin TDM in adults is well-researched, studies on pediatric populations are lacking. This study aims to establish evidence-based practices for estimating daily antibiotic exposure (AUC_{24h}) in children on vancomycin therapy. By doing so, it aims to enhance TDM guidelines specifically tailored to children's pharmacokinetic (PK) parameters. The study evaluates the accuracy of two approaches – linear PK and Bayesian - in estimating AUC_{24h} in children. It also compares various AUC_{24h}-based monitoring strategies to effectively classify patients as therapeutic. Using a simulation-based design, the study generated 1000 virtual patients and applied a limited sampling scheme to estimate AUC_{24h}, utilizing R Software and NONMEM®. Results indicate that Bayesian analysis, including both one- and two-sample approaches, demonstrates negligible difference between each other, but overall, the Bayesian approach outperforms linear PK. Both Bayesian and linear PK approaches are more accurate for therapeutic classification than using trough concentrations of 10 to 15 mg/L. In conclusion, Bayesian analysis is promising for accurate vancomycin AUC_{24h} estimation in pediatric patients early in therapy; however, at later stages, both approaches are effective.



Wave 5

POSTER AND ORAL
PRESENTATIONS

WAVE 5

ORAL PRESENTATIONS

SWNG 106

What does it mean to be Mexican?: Colonial Hegemony, Identity, and Resistance.	Yeslie Lizarraga Leyva
The Spatial Archaeology of Yinxu (ca. 1250-1046 BC)	Ying Zeng
Reality of American Dream: Uncovering the American Dream for Asian Immigrants, South Koreans, Amidst Historical Stereotypes and Rising Hate Crimes.	Lily Yoo
Exploring Physical Activity Among Young Ukrainian Newcomer Women	Yuliia Lytvynenko

SWNG 107

Suanming or Tarot? A Study on Contemporary Fortune-Telling Practices in China and Government Suppression	Ruier Yang
Characterizing mitochondrial alanine transport: a possible therapeutic	Sadie Gale
Evaluating Riffusion: Advancements in Diffusion-Based Music Generation	Sami Nourji, Hazel Chen

SWNG 108

Nobody's Perfect: How Variable are Your Deadlift Reps?	Sam Hillen
Evaluating the durability of magnesium oxychloride cement boards	Sarah Chan, Divy Singh, Ilenna Wen, Don Salongsongan
Kinetics of Microwave Pyrolysis of Textile Waste from Thermogravimetric Analysis	Sarah Chen
Decoding Prostate Cancer: Exploring the Function of Lysine-Rich Nucleolar Protein 1 (KNOP1) in the Nucleolus	Sarina Saffarian

WAVE 5

ORAL PRESENTATIONS

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Anergia and Corticotropin Releasing Hormone in the Prefrontal Cortex	Sepehr Mirzaei
Analyzing the effects of different synthesis and processing methods on circular RNA protein expression and impurity removal: a comparative study	Steve Wang
Making Muscle: Evaluating The Use of Differentiated Human Pluripotent Stem Cells as a Potential Therapeutic for Volumetric Muscle Loss Injuries	Shivani Mehta

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The Role of the Dorsal Hippocampus in Probabilistic Reversal Learning	Si-ah Choi
The Effect of Urban Land Use on Greater Vancouver Stream Ecosystem Health	Sienna Muller, Julie Sieg
Intimacy Transcends Flesh: Queerness in Walt Whitman's Song of Myself	Kurt Coleman
Enhancing the identification and understanding of fungal genus <i>Pluteus</i> by barcoding UBC herbarium collections	Sophie Hoye Pacholek

SWNG 207

Attaching a Photoacidic Group to an Iron Porphyrin for Photoelectrochemical CO ₂ Reduction	Stephanie Ganz
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Early lexical comprehension: Children's assumptions about the grammatical classes of their first words	Angel Tung, Olivia Cunningham, Camille Savalli

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ORAL PRESENTATIONS

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| How do precision agriculture technologies influence farmer willingness to adopt new Best Management Practices (BMPs)? Exploring research methodologies for eliciting farmer perspectives and experience as part of the Ontario Living Lab. | Wenwen Wang |
| Investigating the Spread of Sensory Activity in Brains of Huntington Disease Mice | William Rees-Jones |

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| In Silico Exploration of Telomeric Length Heterogeneity in Cancer: A Single-Cell Genomic Approach | David Lin |
| Is Home-based Medicine the Future of Assessment and Treatment of Parkinson's Disease? | Grace Yip, Paul Chen, Evan Wong, Minh Nguyen |
| Assessing the Utility of a Library of Standalone Operative Videos for Surgical Education | Trevor Fowler |
| Development of Gas Chromatography-Olfactometry/Mass Spectrometry (GC-O/MS) methodologies for the determination of aroma-active compounds in blueberries | Vania Kwan |

WAVE 5

POSTER PRESENTATIONS

Ponderosa Ballroom

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The Effect of Dose-Dependent Alcohol and Folic Acid Consumption by Pregnant Mice on Newborn Telomere Length and Subtelomeric Methylation	Ria Goel, Payton Mackwood
Investigating the efficacy of a novel in-house virtual surgical planning system for advanced oncologic mandible reconstruction - a case series	Rohan Birk
Refining lab mice euthanasia	Ryann McCready
Understanding individual differences in longitudinal tACS neurostimulation protocols	Sage Hunka
Sustainable Horizons: A Deep Dive into Environmental Policies and Practices in the Philippines	Graciela Licardo, Sanjana Karthik, Sahib Singh
The curious case of Jennifer Thompson: How Personal Nostalgia can affect long-term recall in witness testimonies, and does it affect cold case investigations?	Sandhya Parangimalai Madan Kumar
Effect of exercise on microglial activation in rats treated with olanzapine	Sarah Lim
Suppression of murine colitis and ileitis by Tr1 cells via IL-10-mediated inhibition of inflammatory macrophages.	Sarah Lim
Streamlining Pre-Biologic Tuberculosis Screening in Pediatric IBD Patients	Seerit Boparai, Hannah Kullmann
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Changing the Immune Microenvironment of Colorectal Cancer with Liposomal Resiquimod	Shawna Lu

WAVE 5

POSTER PRESENTATIONS

The role of the gut microbiota in early-life microglial gene expression	Shreya Gandhi
Exploring Serum Creatinine Factors Associated with AKI Progression and Hospital-Related Outcomes	Simon Busemeyer, Josh Chen
Distinct Effects of Brain Activation Using tDCS and Observational Practice: Implications for Motor Rehabilitation	Simrut Kurry, Miku Wake
The potential of location-based mobile data in understanding visitation of regional parks in Vancouver, British Columbia, Canada	Sophia Collins
Trust and Community: How Does Culture Affect Whom We Trust?	Tanisha Chawla
Can Boiled Barnacles Have Good Babies: Impacts of Heat Waves on Intertidal Ecosystems	Xinyue (Annie) Wang, Tejaswi Patel, Tirpat Sekhon
An Investigation of Regional Cerebral Venous Oxygenation in Preterm Neonates Using Quantitative Susceptibility Mapping	Gavin Carmichael
Optimization of a Jurkat reporter cell line to measure TGF- β 1 secretion by regulatory T cells	Tiffany Wai
Integration of Machine Learning (ML) into Tapestry Tool	Victoria Lim, Sophia Yang
The Impact of Microplastics on Zooplankton	Vivien Jia, Subin Lee
Production of Human Insulin Precursors Using <i>Komagataella Pastoris</i>	Vladislav Korolev
Effect of Pitch-altered Background Music on Cantonese Tone Production	Wilfred Tang

WAVE 5

POSTER PRESENTATIONS

Graph Similarity Search Using Metric Search Tree	Wenqi Guo
Intelligent Responsive Peptide-Based Hydrogel System for Oral Drug Delivery	Chloe Wang
Evaluating Transit-to-Park Initiatives in British Columbia and Alberta: Unveiling the Need for Systemic Plan and Legislation Support	Xiutong Tony Jiang
Will Objective Cultural Distance Predict Immigrants' Acculturation Success and Well-being?	Frankie Yaying Zhong
Exploring the Relationship between Theory of Mind and Metacognitive Confidence Judgments in Children	Eddie Kim
Investigating the effects of transcranial alternating current stimulation (tACS) on electrophysiological signals during a task	Yvette Ni
The effect of agricultural practices on carbon in soil fractions	Doris Li, Callie Phelps
Whether Weather Weathers Lichens	Yomna Bedaiwy
Differential Expression of Diet-Induced Leptin and Insulin in the Hypothalamic Arcuate: Implications for the Development of Metabolic Dysfunctions	Vincy Huang, Lucy Peng, Charvi Saboo, Sabrina Ye, Nethkini Liyanage
E-Cadherin and N-Cadherin: How Cell-Cell Adhesion Proteins Enable and Maintain the Collective Migration of Metastatic Triple-Negative Breast Cancer	Erin Kang, Preet Lally, Leyla Chartrand
Long Short-Term Memory-Based Rainfall-Runoff Modeling: Advancing Insights into Catchments Functional Complexity in North America	Zhanerke Zhumash, Lihao Xue
A Comparative Study on the Relationship between Rhythmic Characteristics and Perception	CC Liang

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 106)

Presenter Name(s): Yeslie Lizarraga Leyva

Presentation Title: What does it mean to be Mexican?: Colonial Hegemony, Identity, and Resistance.

Abstract:

Most accounts of contemporary Mexican national identity suggest it is largely rooted in and reaffirmed through the narrative of *mestizaje*, which embodies a shared history, experiences, and attributes of the Mexican people based on a common and unifying origin through cultural and racial mixing between European and Indigenous ancestors. While *mestizaje* presents itself as a promise towards inclusion and equality, scholars have pointed at the hierarchies of power, resources, and privilege that *mestizaje* 'as a project and ideology' has cemented on Mexican society. Existing sociological literature has identified logics of whiteness and assimilation as part of the *mestizaje* project. However, the conceptual tool of colonial hegemony is not commonly applied to frame and understand the dynamics that sustain colonial logics and the permanency of inequality, especially within people's experiences. Thus, I situate and explore colonial hegemony in the evolution of contemporary Mexican identity as understood by people on the ground to offer a critical revision of the narratives of Mexican identity. Using qualitative data from semi-structured interviews with young Mexican adults, I examine people's engagement with popular narratives and how they make sense of the complexities and contradictions embodied in meanings of 'being Mexican'. Following others' examination of their own lived realities in a neocolonial world, I come to this research from a standpoint of critical race theory, postcolonialism and feminist epistemologies, and position this research in service of solidarity with justice movements that require us to take responsibility to question, unlearn, and challenge the systems that make struggle necessary.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 106)

Presenter Name(s): Ying Zeng

Presentation Title: The Spatial Archaeology of Yinxu (ca. 1250-1046 BC)

Abstract:

The Shang Dynasty (ca. 1600-1046 BC) is the earliest dynasty in China confirmed by written records. The state established its last capital, Yinxu (ca. 1250-1046BC), located in contemporary Anyang, Henan. The site was initially uncovered through the discovery of inscribed used for divination during late Shang period. Systematic survey began in 1928 revealed a highly stratified and organized political center at Yinxu. These efforts have yielded abundant archaeological data, enabling in-depth study of late Shang culture and settlement patterning. The spatial organization and settlement patterns at Yinxu also offer critical insights into the political and kinship systems of the late Shang period. In 2022, the Anyang Field Team initiated a new series of systematic surveys, with a particular focus on the planning of the royal cemetery at Yinxu. The discovery of two new moat structures encircling the royal cemetery led to further excavations in 2023. This latest discovery has provided new data for studying the urban planning of the settlement. This project aims to employ Geographical Information System (GIS) to analyze the spatial distribution of the major constructions at the site to study the settlement pattern of Yinxu. The spatial analysis of Yinxu will provide valuable insight into the Shang Dynasty's political and kinship systems, as well as enhance our understanding of spatial segregation and urban planning of the site.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 106)

Presenter Name(s): Lily Yoo

Presentation Title: Reality of American Dream: Uncovering the American Dream for Asian Immigrants, South Koreans, Amidst Historical Stereotypes and Rising Hate Crimes.

Abstract:

Historically, the American political system exploited Asian immigrants, particularly Chinese immigrants, to suppress Black Americans fighting for citizenship. Motivated by the allure of the American Dream, immigrants, including South Koreans, embarked on new lives, settling in impoverished areas alongside Black communities, fostering a complex rivalry. Deep-seated biases rooted in the Gold Rush era, especially against Chinese immigrants, contributed to enduring stereotypes of Asians causing job displacements, persisting beyond the Cold War to the present day. The COVID-19 pandemic has exacerbated hate crimes against Asians.

Examining two distinct American Dreams, their attainability, and the challenges faced by South Korean immigrants within the enduring influence of American hegemony, this paper sheds light on the experiences of a highly educated immigrant group. South Koreans, sharing physical attributes with the negatively stereotyped Chinese, become victims of hate crimes. The narrative underscores the urgent need for acknowledgment and rectification to challenge the persistent image of Asians in society. By unraveling these historical threads, this paper aims to contribute to a broader understanding and awareness, fostering dialogue and promoting a more inclusive and equitable future.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 106)

Presenter Name(s): Yuliia Lytvynenko

Presentation Title: Exploring Physical Activity Among Young Ukrainian Newcomer Women

Abstract:

Canada hosts a significant culturally and linguistically diverse (CALD) population, with around 1.36 million people reporting at least one of their ethnic origins as Ukrainian. Since Russia's reinvasion of Ukraine, over 150,000 Ukrainians have arrived in Canada. A recent systematic review found that CALD populations are less likely to be physically active than the host population. Regular physical activity (PA) is proven to help prevent and manage noncommunicable diseases, and it can improve one's mental health, quality of life and well-being. While providing psychological support for newcomers is crucial, PA initiatives may provide additional support for the young Ukrainian women as they navigate the challenges of migration. The proposed project aims to explore perceptions, attitudes, and experiences concerning PA of young Ukrainian newcomer women to assess the need for a culturally informed PA program for this vulnerable population. The data will be collected by interviewing newcomer women from Ukraine ages 18 to 25 currently residing in the Lower Mainland. Interviews will follow a semi-structured interview guide that will focus on themes of (1) current and past PA, (2) perceived barriers and facilitators, and (3) socio-cultural factors, and the data will be analyzed using thematic analysis. We expect the participants to report a need for a tailored PA program. Through the results of this study, we expect to gain understanding on how to develop and implement a PA initiative that will help address the challenges and barriers to PA the young Ukrainian newcomer women may be facing.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 107)

Presenter Name(s): Ruier Yang

Presentation Title: Suanming or Tarot? A Study on Contemporary Fortune-Telling Practices in China and Government Suppression

Abstract:

The traditional Chinese fortune telling (Suanming) has been rooted in Chinese society for thousands of years. Based on the ancient philosophical ideology of Yin and Yang from the Yi Ching, or The Book of Changes, Chinese divination has developed into different methodologies, including Four Pillars, Zi Wei Dou Shu, and Fengshui. Even though Suanming has been considered illegal by the Chinese government, it is still widely practiced in contemporary China. Notably, there has been an observable trend in popularizing Western-style fortune-telling in recent years, especially tarot. Why would diviners choose tarot instead of Suanming? As such, this study will conduct semi-structured interviews with tarot diviners in two major cities in Southern China, Guangzhou and Foshan, and seeks to understand the motivation for Chinese tarot diviners, most of whom were born and raised in China, to adopt tarot, Western-style fortune-telling over traditional Chinese approach. Based on the findings of the Chinese government's selective suppression of different styles of fortune-telling, the study also explores the survival strategy of divination in China within the context of an atheistic authoritarian state.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 107)

Presenter Name(s): Sadie Gale

Presentation Title: Characterizing mitochondrial alanine transport: a possible therapeutic

Abstract:

Pancreatic ductal adenocarcinoma (PDAC) is an aggressive form of pancreatic cancer with a poor 5-year survival of 9% (Parker, 2020). This form of cancer is heavily reliant on the amino acid alanine to fuel mitochondrial metabolism. The transporter responsible for alanine transport into the mitochondria is unknown. Previous literature has shown that inhibiting a cell surface alanine transporter decreases PDAC tumour growth in mice (Parker, 2020). It is hypothesized that identifying this transporter as well as its transport mechanism will allow for the potential development of therapeutics to improve patient prognosis. Here, we set out to develop a highly sensitive fluorescence protein probe. This will be achieved via the use of the HyPer7 system, which is a pH-independent, sensitive tool to measure H₂O₂ concentrations in the cell. Conjugating a mitochondrial localization sequence to the HyPer7 protein will localize the system within the mitochondria. With the development of this system, we will be able to measure amino acid transport into the mitochondria in live cells. This is significant given that this system will allow live amino acid transport to be measured.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 107)

Presenter Name(s): Sami Nourji, Hazel Chen

Presentation Title: Evaluating Riffusion: Advancements in Diffusion-Based Music Generation

Abstract:

In the realm of music generation, deep learning has emerged as a transformative force. This research embarks on the refinement and enhancement of the Riffusion model—a latent text-to-image diffusion model designed to generate intricate spectrogram images from textual inputs. These spectrograms, serving as dynamic representations of musical content, are further translated into immersive audio clips.

The introductory segment provides a succinct overview of deep learning's impact on music generation, highlighting the evolution of models and methodologies. Emphasis is placed on the challenges and possibilities inherent in computational approaches to crafting harmonious musical compositions.

The primary focus of the research is to fine-tune and evaluate the Riffusion model. Leveraging the diffusion-based architecture, the study seeks to examine the correlation between textual input specifications—particularly regarding speed and tempo—and their influence on the generated music's characteristics. This exploration looks to deepen understanding of how prompt nuances can steer the creative output of the Riffusion model.

Additionally, we have implemented clustering techniques to uncover underlying similarities between prompts and music tracks, thereby providing a nuanced understanding of content generation. Preliminary analysis using techniques such as t-SNE visualizations suggests a potentially convergent pattern of content similarity across different prompts, enriching our insight into the model's response dynamics to varied textual inputs.

Through hands-on experimentation and iterative refinement, this research aspires to contribute to the evolving landscape of deep learning in music generation. The integration of text-to-audio synthesis investigations, along with advanced clustering methods, promises to unlock new dimensions in creative audio expression.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 108)

Presenter Name(s): Sam Hillen

Presentation Title: Nobody's Perfect: How Variable are Your Deadlift Reps?

Abstract:

During repeated lifting exercises, low-back exposure to load (LE) has been associated with increased injury risk. While lifting technique may predict the degree of LE, the influence of intra-set technique variability (ISV) on injury risk is less understood, ISV being the amount of change in movement patterns when a movement is repeated. While some have argued that low ISV increases risk, others have demonstrated that during brief, heavy sets of lifts lifters with low ISV have less LE. The present study was designed to investigate and quantify ISV in deadlift movement patterns with and without a creep protocol. 20 healthy, young individuals (10 male, 10 female) with non-competitive deadlifting experience were chosen to complete two sets of five deadlift repetitions at an estimated 80% 1 repetition-maximum load. One set of deadlifts was performed before and one following a lumbar spine creep protocol—with motion capture and force plate data being recorded. Creep was induced when participants bent over a racked barbell at hip level (dead-hanging the upper body for 5-minutes), stretching the passive tissues as a representative of a day of sitting. A principal component analysis (PCA) of all angles and moments about the lumbar spine, hip, knee, and ankle joints during both deadlift sets was run.

Principal components representing 90% of variability were included in the analysis.

Participants' PC scores were not significantly different with creep ($p > 0.05$). Furthermore, the means of each rep's PC loading vector waveform were not significantly different ($p > 0.05$).

These findings do not indicate a lack of ISV or creep induced changes in movement patterns, merely that participants did not display significantly similar changes in movement pattern variability features.

MURC 2024

Presentation Format: Oral presentation (Wave 5 - SWNG 108)

Presenter Name(s): Sarah Chan, Ilenna Wen, Divyeh Singh, Don Salongsongan

Presentation Title: Evaluating the durability of magnesium oxychloride cement boards

Abstract:

Magnesium oxychloride cement (MOC) board is a sustainable alternative to traditional construction material like drywall, with advantages including excellent fire resistance, strength, lightweight, non-toxicity and a reduced carbon footprint. However, concerns arise over the durability of MOC boards in high humidity environments. The presence of soluble chloride ions leads to the formation of water droplets on the board's surface, causing structural damage. Currently, there is no clear consensus on the optimal testing method for, and safe threshold of, soluble chloride content in MOC boards. This study aims to determine a safe threshold of soluble chloride content that preserves board performance and quality. We will evaluate and compare the soluble chloride content in the boards from three test methods: using titrimetric methods, chloride Quantab test strips and chloride ion selective electrode analysis. To examine the phase composition of the boards, we will use X-ray diffraction to characterize the mechanism of deteriorations in different boards. We expect to observe negligible degradation in MOC boards if soluble chloride content is below 3%. This research is expected to contribute to the development of an ASTM standard, which will establish a minimum benchmark of durability performance required when producing MOC boards. The creation of recognized standards would help to distinguish boards which are fit for construction from those which are not.

MURC 2024

Presentation Format: Oral presentation (Wave 5 - SWNG 108)

Presenter Name(s): Sarah Chen

Presentation Title: Kinetics of Microwave Pyrolysis of Textile Waste from Thermogravimetric Analysis

Abstract:

The textile industry faces a significant problem with waste which is only worsening. However, the reutilization of textile waste through thermal decomposition is optimistic in producing biofuels. In order to analyze the thermal behaviours and kinetics of microwave pyrolysis, three different types of fabrics were investigated using thermogravimetric analysis at different heating rates of 5, 10, 20, and 40 °C min⁻¹ under nitrogen conditions. Of the three samples (cotton, polyester, and nylon) the ramie-based textiles were most effective in producing biofuels. Three model-free approaches, namely the Kissinger model, Kissinger–Akahira–Sunose (KAS) model, and Flynn–Wall–Ozawa (FWO) model, along with the Coats–Redfern model-fitting method, were utilized to discern the kinetic triple. The analysis revealed that while the Coats–Redfern method is valuable for determining the kinetic reaction mechanism, the choice of the most probable reaction function (R2 or R3) is best made by considering the activation energy value. Specifically, selecting the reaction function that yields an activation energy closest to the values obtained by the FWO and KAS methods is recommended.

MURC 2024

Presentation Format: Oral presentation (Wave 5 - SWNG 108)

Presenter Name(s): Sarina Saffarian

Presentation Title: Decoding Prostate Cancer: Exploring the Function of Lysine Rich Nucleolar Protein 1 (KNOP1) in the Nucleolus

Abstract:

Prostate cancer (PCa) is the fifth leading cause of cancer-related mortality in the male population. Hence, it is essential to understand the molecular mechanisms driving the pathogenesis of this disease to develop improved treatment strategies. Nucleoli are membraneless condensates within the cell nucleus that play essential roles in various cellular processes. Previous research has shown that nucleoli are heavily involved in the increased ribosome production and protein synthesis required for cancer growth. Enlarged nucleoli are characteristic of castration-resistant prostate cancer (CRPC), a difficult-to-treat and aggressive PCa subtype with a poor survival rate. In this study, we investigate the function of Lysine Rich Nucleolar Protein 1 (KNOP1), which is expressed at higher levels in CRPC patient tissues, using a combination of molecular, cellular, and imaging tools. We hypothesize that KNOP1 plays a crucial role in maintaining nucleolar integrity and regulating protein translation in PCa. We found KNOP1 colocalizing in a specific part of the nucleolus and silencing it in CRPC cells leads to nucleoli fusion. Moreover, the KNOP1-silenced CRPC cells were less proliferative compared to normal prostatic cells. Specific proteins can form droplets through liquid-liquid phase separation (LLPS). LLPS drives interactions between proteins and RNA, supporting the formation of nucleoli. We found that KNOP1 undergoes LLPS, and forms condensed structures in PCa cells, reinforcing its role as a regulator of nucleoli. As a regulator of CRPC nucleolar morphology and function, investigating KNOP1's regulation and role are beneficial to understand the molecular mechanism behind the disease's development and progression.

MURC 2024

Presentation Format: Oral presentation (Wave 5 - SWNG 109)

Presenter Name(s): Sepehr Mirzaei

Presentation Title: Anergia and Corticotropin Releasing Hormone in the Prefrontal Cortex

Abstract:

Past research has shown that the hormone corticotropin-releasing factor (CRF) can lead to a lack of motivation and energy (anergia), a symptom often seen in patients with depression. Anergia has been described as an emotional weight that is placed on people who suffer from depression which can make doing even rudimentary tasks extremely difficult. In our current study, we look at whether CRF in the prefrontal cortex (PFC), a region of the brain associated with decision-making and executive function, is involved in creating this symptom of anergia in rats. Specifically, we look at whether activating CRF1 receptors (a type of receptor activated by CRF) in the PFC of rats has any effect on their performance on effort-related tasks. Performance on our effort-related task is measured by how willing the rats are to work harder for larger rewards, rather than going for easier but smaller rewards. Our results show that activating CRF1 receptors in the PFC does not create the anergia symptom in rats. However, we did see that rats who were given a drug which activated CRF1 receptors in the PFC did show an increase in the speed of their actions taken in pursuit of their goal, namely faster lever pressing. This suggests that perhaps CRF1 receptors in the PFC could increase the energy towards certain tasks, although further research needs to be done to confirm this phenomenon.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 109)

Presenter Name(s): Shao (Steve) Wang

Author(s): Shao (Steve) Wang, Tzuen Yih Saw, Zebin Hong, Kuo Chieh Liao, Haiwei Song, Yue Wan

Presentation Title: Analyzing the effects of different synthesis and processing methods on circular RNA protein expression and impurity removal: a comparative study

Abstract:

Despite the success of Moderna and BioNTech/Pfizer COVID-19 messenger RNA (mRNA) vaccines, mRNA's poor intracellular stability has imposed a major limitation on its drug potency. In contrast, circular RNA (circRNA) is 2 - 5 times more stable, and delivers 1.5 to 3 times higher protein expression over extended period. Due to these advantages, circRNA has been proposed as a promising alternative to mRNA that could provide more potent therapeutic effects. Currently, while several manufacturing workflows have been established to synthesize circRNA, it is unclear whether these workflows yield circRNA with consistent quality, which is crucial for the efficacy and reliability of circRNA-based therapeutics. Therefore, we aim to comprehensively compare circRNA from 3 different workflows by assessing their protein expression and immunogenicity. We began by synthesizing linear precursor RNA and subsequently joining its two ends together to form circRNA. Then, we treated circRNA with enzyme RNase R to remove uncircularized linear RNA species. Finally, we respectively utilized 1) chemical and enzymatic treatment and 2) high-performance liquid chromatography (HPLC) to remove short immunogenic RNA fragments introduced during RNA synthesis and circularization. Furthermore, we also manufactured circRNA through a one-step synthesis and circularization reaction, followed by RNase R treatment and HPLC purification. We observed comparable protein expression of circRNA from these workflows in different mammalian cells. By monitoring cellular immune response, these circRNAs also exhibited minimal immunogenicity. Our results confirm the quality consistency of circRNA from the tested workflows and provide valuable insights for the large-scale manufacturing of circRNA for its therapeutic applications.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 109)

Presenter Name(s): Shivani Mehta

Presentation Title: Making Muscle: Evaluating The Use of Differentiated Human Pluripotent Stem Cells as a Potential Therapeutic for Volumetric Muscle Loss Injuries

Abstract:

Skeletal muscle's remarkable capacity to regenerate is dependent on precisely coordinated biochemical and physical cues. Satellite cells, fibro-adipogenic progenitors, and endothelial cells must carefully orchestrate with inflammatory cells to properly repair muscle after injury. This study aims to evaluate the use of differentiated human induced pluripotent stem cells (iPSCs) as a potential therapy for large-volume muscle loss injuries. The experimental design of this project involves maintaining iPSC cultures and using a series of growth media to trigger their differentiation towards becoming skeletal muscle stem cells called myogenic progenitors. These cells, also called satellite cells or myoblasts, retain stem cell-like properties but are inclined to develop into mature skeletal myofibers. Once these cells have been selected for and expanded, they are injected into a radiated mouse to observe their ability to regenerate skeletal muscle. The radiation kills off all of the existing satellite cells in the mouse which allows us to observe the efficacy of the injected human myogenic progenitor cells alone. We predict that after two months of recovery, the animal model will show signs of healing that indicate differentiated iPSCs can be used as a biotherapeutic for humans who have suffered from similar injuries. The engineering of cells in this form expands our understanding of human development and represents the future of regenerative medicine and transplantation.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 110)

Presenter Name(s): Si-ah Choi

Presentation Title: The Role of the Dorsal Hippocampus in Probabilistic Reversal Learning

Abstract:

Reward is not always guaranteed, therefore one learns from past experiences and makes decisions accordingly to yield a favourable outcome. Learned reward outcomes can also change -- or even reverse -- after some time, requiring cognitive flexibility and adaptation. In the past, such probabilistic outcome associations have been linked with reward-based frontostriatal circuits, including the orbitofrontal cortex, striatum, and amygdala. However, previous work in our lab has discovered that hippocampal neurogenesis is associated with reward feedback sensitivity in rodents; we hypothesized that the hippocampus is involved in probabilistic reversal learning (PRL). In rodents, the hippocampus can be divided into dorsal and ventral regions. It is thought that the hippocampus shifts from externally biased to internally biased encoding of environmental variables along the dorsoventral axis. Yet, it is unclear which regions are recruited for PRL. To investigate whether the dorsal hippocampus (dHPC) is involved, we inactivated the dHPC with Designer Receptors Activated Only by Designer Drugs (DREADDs) then ran the PRL behavioural task. We ran 16 male and 16 female rats through this paradigm, but did not see a significant difference between the inactivated and control groups. However, there was a significant difference in performance between male animals with DREADDs and those without, regardless of the presence of the inactivation drug, suggesting a diffuse effect of DREADD injections into the dHPC. We are currently exploring potential relationships between the expression of DREADDs and PRL through histological techniques.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 110)

Presenter Name(s): Sienna Muller, Julie Sieg

Presentation Title: The Effect of Urban Land Use on Greater Vancouver Stream Ecosystem Health

Abstract:

Urbanization is known to lead to aquatic ecosystem degradation, though the specific interactions between nutrients, urban land use, and invertebrate tolerance levels are unknown. This study explores Seymour River and Still Creek, two streams with historically similar conditions but present-day distinctions due to urbanization. Temperature, pH, dissolved oxygen, turbidity, and conductivity measurements were conducted alongside an analysis of the species diversity and abundance of the ecosystem's bottom-dwelling invertebrates. Through principal component analysis, impervious surfaces — the percentage of surrounding land covered in concrete — were found to be positively correlated with conductivity and temperature and negatively correlated with dissolved oxygen levels. The predominantly wild Seymour River supported a more diverse range of environment-sensitive invertebrates whereas the urban Still Creek hosted a less diverse population of pollution-tolerant organisms. Indicators of stream health were determined to be applicable at both sites, revealing a correlation between less urbanized waterways and healthier aquatic ecosystems. The findings suggest that a stream watershed's percent impervious surface coverage more greatly influences its health than the localized land use around each site. Our study highlights the negative impacts urban land use has on stream ecosystems, so we suggest conservation efforts of streams should focus on restoring or protecting forested regions of watersheds.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 110)

Presenter Name(s): Kurt Coleman

Presentation Title: Intimacy Transcends Flesh: Queerness in Walt Whitman's Song of Myself

Abstract:

Since its finalization in 1891, Walt Whitman's "Song of Myself" has gained a legacy as hallmark 19th century American poetry. It has since frequently been the subject of queer analysis, yet the nature of Whitman's writing style, the historical context and the subject matter often creates uncertain implications in regards to understanding Whitman as a poet. This presentation is an examination of why "Song of Myself" strongly invites a queer reading in the first place, regardless of what the conclusion of that reading is. Drawing on my own analysis with the assistance of external perspectives, I find there are many textual elements which create a queer resonance in "Song of Myself", including the portrayal of interconnectedness between people, the subtle transgressions on what is understood as socially acceptable platonic admiration, and the subversiveness of the eroticism present within the poem. I also believe that though it may be tempting to frame Whitman within the common understanding of a queer poet, this risks twisting his work to fit a preconceived notion of queer writing. Instead, it is perhaps more indicative of Whitman's general philosophy towards humanity and how the self is influenced through others.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 110)

Presenter Name(s): Sophie Hoye Pacholek

Presentation Title: Enhancing the identification and understanding of fungal genus *Pluteus* by barcoding UBC herbarium collections

Abstract:

The UBC Beaty Biodiversity Museum contains over two million specimens of organisms that serve as an important reference database for BC biodiversity. Over 35,000 of the specimens are fungi. My project goal was to produce DNA barcodes in order to update identifications for the Beaty of the fungal specimens in the genus *Pluteus*. *Pluteus cervinus*, commonly known as the 'deer mushroom,' is an example of 20+ BC species and the first species of this genus formally identified. *Pluteus* mushrooms grow on rotting wood, and many have a tan cap and pinkish, spore-producing gills. Through the process of extracting, amplifying, and sequencing DNA from over 100 UBC Herbarium samples of *Pluteus*, I determined sequences of the internal transcribed spacer region of ribosomal DNA. This spacer is the standard barcode region used to distinguish fungal species because the high mutation rate in two non-coding introns on either side of the 5.8s gene leads to quantifiable genetic differences between species. Data was analyzed by comparing results to sequences previously in the NIH GenBank database and by generating phylogenetic trees to examine clade relationships. Original specimen identifications based on morphology proved surprisingly unreliable, and I found that names of over 70 percent of the *Pluteus* specimens required updating. Revised identifications also provided insights into phylogenetic differences between European and North American species. The barcode sequences that I will submit to GenBank and the revised identifications increase the value and reliability of our Beaty reference collections and will support further studies of fungal biodiversity.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 207)

Presenter Name(s): Stephanie Ganz

Presentation Title: Attaching a Photoacidic Group to an Iron Porphyrin for Photoelectrochemical CO₂ Reduction

Abstract:

The consequence of society's reliance on rapidly depleting fossil fuels for energy needs is the accumulation of CO₂ in the atmosphere, which leads to global warming. In addition to the development of CO₂ capture technologies, reactions that convert CO₂ to fuel are an interesting solution. Catalysts are compounds that can facilitate these reactions, and historically, iron porphyrin catalysts specifically have been effective at converting CO₂ into more valuable products when a negative electrical potential is applied. This process goes more quickly when groups that will donate a proton (H⁺), called acidic groups, are present near the catalyst. To-date, these iron porphyrin catalysts have all been investigated with conventional acids that donate a proton without the influence of light. A unique class of molecules, termed photoacids, become much more likely to give up this proton when activated by light. We hypothesize that the presence of a photoacid near the catalyst may dramatically change catalytic performance. Proof-of-concept experiments involving a mixture of the photoacid 2-naphthol and a porphyrin catalyst were promising. As a result, we designed and prepared a new catalyst where the photoacidic group is directly attached to the catalyst. This talk will discuss the preparation of this novel catalyst and studies performed to characterize both its interactions with light and its catalytic behavior. This work provides a basis for future developments in photoelectrocatalyst design.

MURC 2024

Presentation Format: Oral presentation (Wave 5 - SWNG 207)

Presenter Name(s): Xiaoxu Qing (Dirk)

Presentation Title: Multimetallic film electrocatalysts for carbon dioxide reduction

Abstract:

The electrocatalytic reduction of carbon dioxide to carbon fuels can play an important role in global energy supply and the relief of global warming. Among all the catalysts, high entropy intermetallic appears to be one of the most promising candidates. High entropy intermetallics (HEIs) are multi-metallic alloys with five or more elements. Its cocktail effects allow for enhanced strength and catalytic activity at the same time. The majority of HEIs are only theoretically predicted or prepared using energy-intensive processes like melting or cryogrinding. In this work, we explore the use of electrodeposition as a technique to prepare HEI films in a simple and cheap fashion. We hypothesized that certain combinations of metals in the intermetallic film would be more active for electrochemical CO₂ reduction than others. Using a modified literature procedure, the metal film is electrodeposited onto an inert electrode by suspending small amounts of water nanodroplets containing metal ions in large amounts of dichloroethane (DCE) while applying potential on working electrode. This allows the delivery of metal ions directly onto the electrode surface. The nanodroplet emulsion is made by repeated, continuous sonication. Through cyclic voltammetry (CV), increased activity was observed with metal-modified electrode, suggesting potential reactions other than hydrogen evolution reaction (HER) happened. Controlled Potential Electrolysis (CPE), Gas Chromatography (GC), and nuclear magnetic resonance (NMR) also suggested CO₂ reduction products were made, such as ethylene and formic acid with modified electrode. This study offers promising catalysts for carbon dioxide reduction with a potential increase in selectivity, efficiency, and strength.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 207)

Presenter Name(s): Angel Tung, Olivia Cunningham, Camille Savalli

Presentation Title: Early lexical comprehension: Children's assumptions about the grammatical classes of their first words

Abstract:

By 6 months, infants show lexical understanding of individual-scope words (like the word "mommy," which refers to a single individual) and category-scope words (like the word "hand," which encompasses all hands) (Campbell & Hall, 2022). However, previous studies have tested only monolingual infants, who receive consistent input for each word type. The present study aims to replicate and extend Campbell and Hall's (2022) previous findings by investigating whether six-month-old monolingual and bilingual infants acquire word categories through conceptual readiness, or if lexical knowledge is determined by linguistic input. Bilingual infants receive unequal amounts of input for category-scope words (such as "hand" in English, and "mano" in Spanish), but consistent input for individual-scope words (such as the moniker "mommy"). If comprehension is driven by conceptual readiness, bilingual infants should show comprehension of both individual and category-scope words at 6 months, like monolinguals. If conceptual scope understanding is driven by input, they may not yet extend via category scope. Using live audio to repeat the words "hand" and the participant's most frequent moniker for mother (e.g., mommy, mama, mom, etc.), infants are shown two side-by-side photos (e.g. a hand and foot; their mother and a dog) while their looking time is measured. Longer looking to the correct referent indicates scope understanding. This study is one of the first to investigate infants' object word extensions with linguistically and racially diverse infants, thus furthering our understanding of the impact of how differing linguistic experiences contribute to the development of lexical comprehension.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 208)

Presenter Name(s): Valentina Mazzotti

Presentation Title: A First-Principle Investigation of the Stability and Magnetism of Breathing Pyrochlores

Abstract:

Breathing pyrochlores are complex compounds characterized by a unique three-dimensional lattice of corner-sharing tetrahedra, creating a structure reminiscent of classic pyrochlores. However, unlike classical pyrochlores in which all tetrahedra are identical in size, the breathing pyrochlore lattice is composed of alternating large and small tetrahedra, adding complexity to the magnetic interactions. Previous experimental work on a specific breathing pyrochlore, $Li(Ga, In)Cr_4O_8$, revealed that attempts to substitute elements at the metal sites of $Li(Ga, In)Cr_4O_8$ resulted in unsuccessful crystal growths. The reasons for the limited ability of existing Cr -based breathing pyrochlores to accommodate other transition metals within a stable breathing pyrochlore structure are unclear.

Our study aims to perform first-principles calculations to explore the structural, electronic, and magnetic properties of established breathing pyrochlores, like $Li(Ga, In)Cr_4O_8$. We will also conduct ab-initio calculations for compounds where attempts to substitute the magnetic Cr ion with another transition metal have proven unsuccessful. Our primary objective is to carry out a comparative analysis, revealing disparities in electronic and magnetic properties and identifying the factors influencing structural stability. Additionally, we will integrate first-principles calculations with the Cluster Expansion formalism and finite-temperature Monte Carlo simulations. This will help simulate the creation of compounds like $Li(Ga, In)Cr_4O_8$ and shed light on why these compounds crystallize within the breathing pyrochlore network during synthesis, while substitution attempts failed. Ultimately, we aim to address the challenge of limited availability of magnetic compounds involving transition metal ions within breathing pyrochlore networks. Our findings will offer valuable insights to guide future synthesis efforts in this field.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 208)

Presenter Name(s): Wenwen Wang

Presentation Title: How do precision agriculture technologies influence farmer willingness to adopt new Best Management Practices (BMPs)? Exploring research methodologies for eliciting farmer perspectives and experience as part of the Ontario Living Lab.

Abstract:

In response to rising food production demands across the world, the quality of agricultural lands has since deteriorated due to land-use intensification, exacerbated by climate change. Best Management Practices (BMPs) are research-backed and farmer-tested approaches that address many agricultural challenges. The Ontario Living Lab (OLL) has identified profit mapping, a precision farming technology, as a decision-making tool that allows farmers to locate areas of poor productivity at the subfield level where BMP implementation may be suitable. Specifically, BMPs where cropland is converted to alternative land uses such as perennial, wetland or riparian buffers may provide ecosystem services for improved field productivity. Although the environmental and economic benefits of BMPs have been extensively highlighted in the literature, adoption of these strategies has been lacking due to farmer discretion and the inaccessibility of specific precision farming technologies. In this directed studies project, we attempt to understand the barriers to large-scale expansion of BMP adoption and whether better access to precision farming technologies such as profit mapping may influence farmer decision-making during the adoption process. In the context of Ontario grain farmers, we will conduct a literature review identifying socioeconomic and logistical factors influencing BMP adoption and the role of precision farming technologies. We will incorporate findings through the design of a research methodology which includes survey questions and semi-structured interviews that will further elicit farmer attitudes. This result will contribute to the evaluation of climate-ready land management practices and their adoption potential, as part of an ongoing investigation by the OLL.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 208)

Presenter Name(s): William Rees-Jones

Presentation Title: Investigating the Spread of Sensory Activity in Brains of Huntington Disease Mice

Abstract:

Huntington disease is an inherited neurodegenerative disorder that is usually diagnosed at 30 to 50 years of age due to the late onset of symptoms. It is associated with characteristic motor, cognitive and psychiatric symptoms. However, patients with Huntington disease also have sensory perception deficits which are relatively understudied. In Huntington disease mouse models, brain activity provoked by sensory stimulation spreads across a much larger area when compared to responses in wild type (normal) mice. However, the mechanism(s) underlying this aberrant spread of activity are not yet known. In this study, I aim to uncover these mechanism(s) using a pharmacological approach with living brain slices obtained from Huntington disease and wild type mice. While the brain slices receive repetitive electrical stimulation, drugs will be applied to ablate and thus test for different candidate mechanisms underlying the spread of activity seen in Huntington disease mice. The effects of these drugs on brain activity will be observed by both electrical recordings received from an electrode (field recordings) and fluorescent video microscopy. Early results show potential relevance of NMDA receptors, a type of excitatory synaptic receptor, in the mechanism. However, more trials are needed, and other drugs need to be tested to further classify the relevant receptors and probe other potential mechanisms. Knowing the mechanism(s) underlying the spread of sensory activity may help us better understand the deficits of sensory perception experienced by patients with Huntington disease, and may eventually lead to the development of novel treatments for the aforementioned deficits.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 210)

Presenter Name(s): David Lin

Presentation Title: In Silico Exploration of Telomeric Length Heterogeneity in Cancer: A Single-Cell Genomic Approach

Abstract:

Telomeres are structures at the ends of eukaryotic chromosomes. They protect the genetic information that may otherwise be lost during cell replication. Cells possess mechanisms that elongate their telomeres to prolong survival. These mechanisms were shown to be exploited by cancer. Therefore, understanding the relationship between telomeres and cancer development could benefit oncology research.

Computational tools that estimate telomeric content and length in sequencing data are present. However, the tools may be optimized with the new complete reference genome available, and they were not designed for data at single-cell level. We hypothesize that existing computational tools can be adapted to telomeric content and length estimation on single-cell whole genome sequencing data and improved by a better reference genome and data normalization. We will apply healthy and cancerous (follicular lymphoma) datasets to the process produced, which may yield additional findings about how the telomere lengths differ across different cancer stages. We expect the malignant samples to demonstrate longer telomeres than healthy samples. The process should set a starting point for single-cell telomeric length estimation that can be applied to different datasets. It should also account for possible factors that can perturbate the estimation in the context of cancer. The significance of this study lies in its potential to advance computational cancer research by exploring telomere length heterogeneity within and between cancer cells. This initiative seeks a nuanced understanding of the role of telomeres in cancer progression, offering possible applications ranging from diagnostics to treatment.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 210)

Presenter Name(s): Grace Yip, Paul Chen, Evan Wong, Minh Nguyen

Presentation Title: Is Home-based Medicine the Future of Assessment and Treatment of Parkinson's Disease?

Abstract:

Parkinson's disease (PD), a neurodegenerative disorder characterized by motor and non-motor symptoms, is the fastest growing neurological disorder in the world, with 12 million people projected to be affected by 2040. With advancement in technologies and artificial intelligence, this paper explores the shift towards home-based medicine as a potential breakthrough in the assessment and treatment of PD. Recent studies in the past three years have shown an increased focus on the integration of Artificial Intelligence (AI) to aid in the diagnosis of PD. Multimodal approaches including movement tracking, speech and language analysis, and others have been tested against machine learning models, with most results suggesting motor symptoms are usually a better signifier of disease progression than non-motor symptoms. Thus, results from the study suggest that as opposed to a focus on speech and language impairment, a more accurate diagnosis of PD would involve motion sensors, possibly enabled through webcam technology, though still in its preliminary stages. Furthermore, novel strategies that integrate evolving technology and specialized care such as the IN-HOME-PD and CARE-PD programs are shown to have positive outcomes in stabilizing the disorder and improving the quality of life of affected individuals. Important components that contribute to the success of these models are identified and noted as core qualities of future management strategies. Home-based rehabilitation and treatments are also discussed as avenues to improve the physical and cognitive outcomes for PD patients.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 210)

Presenter Name(s): Trevor Fowler

Presentation Title: Assessing the Utility of a Library of Standalone Operative Videos for Surgical Education

Abstract:

Launched in May 2019, UBC Reticulum is a virtual network for general surgeons across BC. One key feature of the platform is an expanding library of educational operative videos. With recent trends in surgical residency programs towards reduced hospital hours, operative videos serve as a unique opportunity to supplement trainee education through an extra-clinical setting. A survey was distributed to users of Reticulum, including 52 residents. We aimed to assess 1) How often were videos being viewed; 2) Which design elements of videos were valued; 3) How users believed the library could be improved.

37 responses were initiated (14 residents, 23 practicing surgeons), and 22 (9, 13) were completed. Reported percentages are based on individual question response rate. 70% (n=26) of all respondents indicated utilizing the video library. Most residents considered anatomy identification (78%, n=7) and defined procedural steps (78%, n=7) to be extremely important features, with less value placed by practicing surgeons (62%, n=8 and 54%, n=7 respectively). 100% of residents (n=9) viewed the video library as moderately or more useful, but only 77% (n=13) of practicing surgeons agreed. Both groups indicated a need for a wider range of surgical subspecialty videos and inclusion of commentary to videos.

The results from this survey indicate that both trainees and practicing surgeons welcome video-based educational materials. However, video design elements benefit trainees or experienced surgeons differently. These results will influence further initiatives into expanding the video library and serve as a starting point for additional research on its educational value.

MURC 2024

Presentation Format: Oral Presentation (Wave 5 - SWNG 210)

Presenter Name(s): Vania Kwan

Presentation Title: Development of Gas Chromatography-Olfactometry/Mass Spectrometry (GC-O/MS) methodologies for the determination of aroma-active compounds in blueberries

Abstract:

Combinations of volatile compounds found in fruit matrices form unique aroma profiles, which play an important role in consumer preference. Current fruit studies have focused on appearance and yield maximization, while aroma has not been deeply characterized. The correlation between the concentration of aroma-active volatiles (i.e., intense odor perceived even at low concentrations) and olfactory perception is known to provide insights into consumer preference, a field in which the use of gas chromatography-olfactometry/mass spectrometry (GC-O/MS) is fundamental. This study aims at optimizing GC-O/MS methodologies to determine aroma-active compounds in blueberries through a combination of Dilution to Threshold (DT), Detection Frequency (DF), and Direct Intensity (DI) analyses. Aroma-active compounds were evaluated in five northern highbush blueberry cultivars, including 'Duke', 'Bluecrop', 'Calypso', 'Elliott', and 'Aurora'. For the DT method, it was found that split dilutions at the injector are plausible for replacing traditional solvent extraction of volatiles, as the chromatographic peak area and headspace dilutions were linear ($R^2 > 0.99$). Ethyl-2-methylbutanoate, ethyl isovalerate, hexanal, 2-(E)-hexanal, and linalool were commonly perceived by at least one panellist across all five cultivars during DF trials. 3-(E)-hexen-1-ol was perceived by panellists as the strongest intensity even in low concentration in DI trials. Comparing cultivars, terpenes were perceived with the strongest intensity in 'Duke', esters in 'Elliott' and 'Aurora', and C6 alcohols and aldehydes in 'Bluecrop' and 'Calypso'. Considering DT, DF, and DI, the most aroma-active compounds in northern highbush blueberries are ethyl-2-methylbutanoate, ethyl isovalerate, hexanal, 2-(E)-hexenal, 3-(E)-hexen-1-ol, 3-(Z)-hexen-1-ol, (S)-limonene, linalool and geraniol.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Katelyn Cotterell

Presentation Title: Repeatability of Peak Oxygen Uptake in Hypoxia and Normoxia

Abstract:

While regular exercise is beneficial for health and rehabilitation, exercise prescription often relies on accurate maximal data, underscoring the importance of considering variability. Following a standardized exercise training program, variability in individual response has been observed. Response variability may reflect differences in the ability to adapt to exercise training, measurement error, or within-subject variability. A repeated measurement study design can be used to investigate differences in trainability, allowing for the separation of exercise response variability from other sources of variation. Acute hypoxia, characterized by low oxygen levels (O₂), impairs both aerobic capacity and exercise performance. Despite individual differences in the biological response to hypoxia, quantification of the response variability faces limited exploration. The present study sought to quantitatively assess the individual variability in cardiorespiratory and metabolic responses during an incremental exercise test to exhaustion under hypoxic and room air conditions. We aimed to explore whether the observed hypoxic exercise response exhibits reproducibility across multiple trials. Following a single-blind repeated cross-over design, healthy, young females and males aged 18-40 y completed four cycling tests to exhaustion: two in normoxia (21% O₂) and two in hypoxia (16% O₂), separated by 72 hours at minimum. Preliminary data indicated a mean difference in peak oxygen uptake of 0.171 L/min between the hypoxic trials and 0.201 L/min between the normoxic trials. The present study will improve understanding of individual differences in hypoxic sensitivity during maximal cycling exercise and provide evidence supporting or refuting the existence of interindividual variability in exercise response.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Ria Goel, Payton Mackwood

Presentation Title: The Effect of Dose-Dependent Alcohol and Folic Acid Consumption by Pregnant Mice on Newborn Telomere Length and Subtelomeric Methylation

Abstract:

Alcohol use during pregnancy can lead to developmental deficits including fetal alcohol spectrum disorders which affects 1-5% of first-grade children in the US. Alcohol consumption during pregnancy has been shown to decrease fetal telomere length (TL) and subtelomeric methylation (STm), which can lead to health issues due to the loss of telomeres' protective effects on our genome. However, taking folic acid (FA) during pregnancy is highly recommended because it reduces the risk of fetal neural tube defects and maintains methylation in cells. Currently, there are limited studies investigating the dose-dependent effects of alcohol and FA consumption during pregnancy, and if FA can be used to rescue shortened telomeres in utero. We hypothesize that an increased dose of alcohol will decrease TL and DNA methylation while FA may rescue this effect. Our research will compare pregnant mice undergoing different experimental conditions with varying doses of alcohol and FA. TL will be measured using qPCR and STm will be measured using methylation-specific PCR and pyrosequencing. We expect to see a decreasing trend with alcohol dosage and an increasing trend with FA dosage on the TL and STm. Our study will provide a better understanding of the dose-dependent effects of prenatal exposure to alcohol and FA on the newborn, with a focus on TL and STm. This research could help develop more informed treatments for the ~10% of pregnant women globally who consume alcohol and provide knowledge of FA's contribution to the DNA methylation pathway and its downstream effects on telomeres.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Rohan Birk

Presentation Title: Investigating the efficacy of a novel in-house virtual surgical planning system for advanced oncologic mandible reconstruction – a case series

Abstract:

In head and neck oncology, mandibular reconstruction using fibular or scapular free flaps is an important surgical procedure that aims to restore chewing, breathing, and swallowing functions following a tumor resection. As these procedures are typically done using a free hand surgery (FHS) technique, patient complications may arise. Thus, this case series investigates the effectiveness of a novel in-house virtual surgical planning (VSP) system applied to eight patients undergoing mandibular reconstructions for advanced squamous cell carcinoma (SCC) with either fibular free flap (FFF) or scapular free flap (SFF). Utilizing 3-dimensional (3D) models of the patient, the VSP platform accurately simulates mandible resection and donor segment insertion and produces cutting guides for mandible and donor osteotomies. These guides are then 3D-printed and sterilized for intraoperative use. This study comprises four FFF and four SFF patients undergoing mandibular reconstruction using VSP, recording a combination of clinical variables (surgery time, ischemia time) and mandible morphologic measurements (Sorenson-Dice Coefficient [DICE], Hausdorff-95 [HD-95]). A comparative analysis of patients undergoing the traditional FHS technique is then performed to draw insights on the effectiveness of the VSP system. Results show that the ischemia time is shorter for VSP patients than FHS (50.43 ± 10.81 mins vs. 68.00 ± 22.64 mins, $p=0.049$). Furthermore, results show that VSP patients have increased volume similarity (DICE score) between their preoperative and reconstructed mandibles than FHS (0.6144 ± 0.1051 vs. 0.4921 ± 0.1594 , $p=0.045$). These findings underscore the precision and efficacy of the novel virtual planning approach and demonstrate its potential as a standard-of-care procedure.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Ryann McCreedy

Presentation Title: Refining Lab Mice Euthanasia

Abstract:

Administering isoflurane prior to carbon-dioxide euthanasia is recommended as a refinement for laboratory mice as carbon dioxide can be aversive (unpleasant stimulus eliciting aversion and/or withdrawal responses). However, isoflurane applications are limited by the vaporizers needed. The 'drop' method, where a fixed volume of liquid isoflurane is dropped into and rapidly volatilizes within an induction chamber, can be an alternative to vaporizers. Previous research has demonstrated that mice can be anesthetized using the drop method at a concentration of 5%, though mice find this aversive. Mice can also be anesthetized at lower levels (1.7-3.7%); however, aversion experienced at these concentrations is unknown. We assessed mouse aversion to isoflurane (1.7-3.7%) administered via the drop method. We used a light-dark conditioned-place aversion (CPA) paradigm, based on the innate preference of mice for dark areas. Female C57BL/6J mice (n=28) were randomly allocated to one of three isoflurane conditions (1.7%, 2.7%, 3.7%). All mice were acclimated to a three-chamber light-dark apparatus. Prior to and following dark (+isoflurane) and light chamber conditioning sessions, mice underwent initial and final preference tests: the change in their duration spent within the dark chamber between preference tests was used to calculate CPA scores. We found mean CPA scores decreased from $19.6 \pm 20.1s$ to $-116.9 \pm 30.6s$ as isoflurane increased, demonstrating increased aversion at higher isoflurane concentrations, particularly in the 3.7% treatment. These results suggest that concentrations between 1.7% and 2.7% may be used by researchers to refine euthanasia methods in laboratory mice, especially when lacking the necessary equipment for standard isoflurane administration.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Sage Hunka

Presentation Title: Understanding individual differences in longitudinal tACS neurostimulation protocols.

Other authors: Abhijit Chinchani, Todd S. Woodward and Rafal M. Skiba

Abstract:

Introduction:

Transcranial Alternating Current Stimulation (tACS) is a promising and safe brain stimulation technique with enhanced effects after several sessions, although results vary between individuals. In this study, we aim to verify if individual differences in alpha oscillations and their baseline exist due to recent emotional experiences and general personality traits and how they affect longitudinal neurostimulation. This is vital since alpha oscillations play a crucial role in cognitive functions.

Participants:

We intend to recruit 60 healthy undergraduate students aged 19-65 from the University of British Columbia (UBC), primarily from UBC's Human Subject Pool (HSP).

Method:

Participants will have six tACS sessions to modulate alpha or placebo sham frequency and perform an oddball attention task. In this tACS, participants will be shown an 80% green fixation cross and 20% red cross; they will respond with one hand or the other to each color - the color and hand are counterbalanced. This task occurs before and after the neuromodulation session. Participants' personality traits will be evaluated through self-reports using the Positive and Negative Affect Schedule and the Big Five personality traits.

Results:

Participants with alpha oscillations near 10Hz should show the greatest power increase when stimulated at exactly 10 Hz. Results may be more pronounced in individuals with positive mood and stable personality traits compared to those experiencing high negative moods and dominance of neurotic personality traits.

Implications:

This research could advance our understanding of neurostimulation protocols and allow for their customization to individuals. This could contribute to developing personalized therapies for a wide range of psychiatric conditions.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Graciela Licardo, Sanjana Karthik, Sahib Singh

Presentation Title: Sustainable Horizons: A Deep Dive into Environmental Policies and Practices in the Philippines

Abstract:

The Philippines, like most countries, is increasingly working towards integrating sustainability into governance practices as it faces complex issues regarding environmental conservation, economic development, and cultural preservation. Our research project aims to critically examine the effectiveness and limitations of these efforts, emphasizing the need for inclusive and culturally sensitive approaches that acknowledge the country's post-colonial reality. This study aims to examine the question: How efficient is sustainable policy implementation in the Philippines, and what are the consequences of external factors such as organizational involvement and governance on governmental regulations and initiatives? Furthermore, the study explores the impact of underlying postcolonial structures and frameworks within Philippine policy that contribute to its implementation and outcomes. To understand the efficiency of sustainable development practices in the Philippines, we aim to focus on three main pillars: water sanitation, waste management and energy development. Through the analysis of policy documents and reports by both governmental organizations and NGOs concerning three chosen pillars linked to sustainable development, we can analyze factors that have affected the implementation of said policies. The Philippines has attempted to craft sustainability policies that manage the challenges of environmental conservation and economic incentives. This critique examines the effectiveness and limitations of these efforts, emphasizing the need for effective policies that avoid inefficient implementation. By unraveling the nuances, this paper contributes to a deeper understanding of the challenges and potential avenues for improvement in the country's pursuit of a sustainable future.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Sandhya Parangimalai Madan Kumar

Presentation Title: The curious case of Jennifer Thompson: How Personal Nostalgia can affect long-term recall in witness testimonies and its influence on cold case investigations.

Abstract:

It is generally recognized that a case becomes cold when it is deemed that no further progress can be made, or when all viable leads have been exhausted. When investigating a cold case, one often relies heavily on witness testimonies to solve the case, and thus the memory of the witnesses is very important. However, most times memory distortions can occur, often due to various factors, one of which is personal nostalgia. Personal nostalgia is where a person tends to idealize personally remembered memories. As I will explore in this poster, personal nostalgia commonly causes memory distortions, especially in the victims of legal cases. I will explore this by studying the case of Jennifer Thompson-Canino and how she caused the wrongful conviction of Ronald Cotton. While it is not a cold case, I have taken this case to study because it accurately portrays how a memory can be altered so much by nostalgia that she can confidently accuse the wrong person, even when her actual assailant is standing in front of her. I will hence explore how these unknowingly wrong testimonies can lead to wrong convictions. Finally, I will suggest further avenues to explore and develop to address the fallacies of memory. While Personal Nostalgia can help a victim cope with their trauma, in the legal field, it may cause more harm than good.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Sarah Lim

Presentation Title: Effect of exercise on microglial activation in rats treated with olanzapine

Abstract:

Introduction: Schizophrenia is a severe psychiatric disorder, characterized by hallucinations and delusions, social withdrawal, and cognitive deficits. While the disorder is typically treated using antipsychotic medications, these drugs can exert serious side effects. Microglial cells, a major component of the brain's inflammatory response, are activated upon detection of brain damage or dysfunction. It has been reported that chronic antipsychotic treatment can increase microglial activation. Furthermore, prior evidence has revealed that exercise reduces microglial activation and hippocampal inflammation in rats. The aim of this study was to investigate whether the antipsychotic medication olanzapine activates microglia and if exercise can reduce olanzapine-induced inflammation.

Methods: Rats were administered olanzapine or vehicle, and assigned to running wheel exercise or sedentary conditions for 9 weeks. Rat hippocampal tissue sections were stained for the microglia marker IBA-1. Changes in microglial activation state was determined by analyzing their morphological characteristics using light microscopy.

Results: Microglial morphology will be compared between groups.

Conclusions: Findings from this project will contribute to understanding whether olanzapine treatment increases microglial activation and if neuroinflammation generated via this mechanism can be alleviated by exercise.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Sarah Lim

Presentation Title: Suppression of murine colitis and ileitis by Tr1 cells via IL-10-mediated inhibition of inflammatory macrophages.

Abstract:

Inflammatory bowel disease (IBD) can be characterized by chronic inflammation of the gastrointestinal tract. Existing therapies for IBD are non-specific and fail to reverse fibrosis, leading to greater interest in regulatory T cell therapies as they directly target the source of inflammation. Specifically, type 1 regulatory (Tr1) cells have been identified as a therapeutic candidate due to their high production of anti-inflammatory cytokines such as IL-10. Moreover, macrophage-mediated production of interleukin-1 β (IL-1 β), a key proinflammatory cytokine in IBD development, has been shown to be inhibited through Tr1 cells. This study aims to explore the Tr1-mediated suppression of inflammatory macrophages and elucidate the underlying mechanism. Bone marrow-derived macrophages from an IBD mouse model will be grown and stimulated. Suppressive activity will be assessed by both culturing macrophages in varying ratios of Tr1 supernatant and co-culturing macrophages with Tr1 cells, with changes in IL-1 β production captured using an ELISA. Characterization of these macrophages using flow cytometry will allow us to determine effects on cell viability following growth in Tr1 supernatant. We expect to see a dose-dependent decrease in IL-1 β levels by inflammatory macrophages when exposed to different dilutions of Tr1-conditioned media or to Tr1 cells. Negation of this Tr1-mediated suppressive effect when anti-IL-10 antibodies are present should be observed, indicating IL-10 dependency. This research could prove foundational in the development of a novel Tr1-mediated therapy for IBD. Further, it can shed light on key immunoregulatory mechanisms in inflammation, leading to more effective and comprehensive therapeutics for other autoimmune conditions.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Seerit Boparai, Hannah Kullmann

Presentation Title: Streamlining Pre-Biologic Tuberculosis Screening in Pediatric IBD Patients

Abstract:

This study conducted retroactive chart reviews of 75 Inflammatory Bowel Disease (IBD) patients diagnosed in 2023 aged 2 to 18 and looks to compare whether initiating Tuberculosis (TB) screening at the time of a diagnostic endoscopy procedure significantly decreases the time before a patient can commence biologic therapy, compared to completing TB testing through outpatient community clinics. Biologic therapies are molecules engineered to precisely target and inactivate proteins that promote inflammation to treat IBD. Since biologic medications are immunosuppressants, patients are required to be screened for latent TB infection due to increased risk of reinfection from *Mycobacterium tuberculosis*. At BC Children's Hospital, IBD patients are usually referred to TB screening clinics for outpatient appointments where a tuberculin skin test is implanted, then read 48-72 hours later or blood is drawn for an Interferon Gamma Release Assay. It was found that there were significantly longer delays between the gastroenterologist ordering TB testing, and the patient having the test done in an outpatient setting than hospital settings. There were also significant delays in faxing the results to the gastroenterologist from outpatient clinics. Given the current strain on the healthcare system, many patients experience significant delays in receiving appointment dates, reading or analyzing tests, and faxing those results to their gastroenterologist who can make treatment decisions. As a chronic condition, IBD patients often experience periods of remission and flaring. As such, there is often pressure to start a new biologic medication promptly to manage flaring symptoms.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Setare Maleki Rizi

Presentation Title: NeuroGuardian

Abstract:

NeuroGuardian: enhancing seizure detection with a wireless EEG-based wearable device and deep learning. Seizure detection is a critical component in the management of epilepsy and other neurological disorders. Current technologies, primarily based on scalp electroencephalogram (EEG) recordings, face challenges due to the low signal-to-noise ratio of these signals. We introduce NeuroGuardian, an innovative approach, utilizing a wireless wearable device linked to a single EEG channel, to address these challenges. Our research focuses on overcoming the limitations of traditional seizure detection methods, which often fail to effectively transduce electrical signals into accurate seizure event detection. We have developed a novel deep learning-based system that transforms EEG signals into grayscale images, a technique that uniquely combines both temporal and spatial information. This approach allows us to employ transfer learning, enhancing the system's performance in detecting seizures. The distinctiveness of our method lies in its simplicity and efficiency. By minimizing the need for extensive pre-and post-processing, the system remains computationally lightweight and offers low latency, making it highly suitable for real-time applications, especially in clinical settings where prompt intervention is vital. Currently, our system awaits empirical testing. The next phase of our research will focus on validating the efficacy and accuracy of our approach in clinical trials. We anticipate that this work will not only contribute significantly to the field of clinical neurology but also pave the way for more accessible and effective seizure monitoring technologies.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Shawna Lu

Presentation Title: Changing the Immune Microenvironment of Colorectal Cancer with Liposomal Resiquimod

Abstract:

As the third most diagnosed and second deadliest form of cancer in Canada, colorectal cancer (CRC) affects thousands of Canadians every year, with the majority of deaths resulting from the difficulty of treating metastases. The current standard treatment involves cytotoxic chemotherapies that damage other parts of the body; therefore, targeted therapies that activate the immune system to stimulate tumour clearance may provide an alternative. However, immune evasion hinders this option. CRC tumours suppress the immune system via downregulation of immune activating receptors and upregulation of immunosuppressive cells. Therefore, molecules that counteract immune suppression are promising avenues to explore as treatments for CRC. One such molecule is resiquimod (R848), an agonist for toll-like receptors 7/8 (TLR 7/8). R848 stimulates the transition from an immunosuppressive to immune-active tumor microenvironment, counteracting the changes from CRC. While promising, R848 must be localized to the peritoneal cavity, as systemic administration can result in toxicity.

We hypothesized that a liposomal formulation of R848 incorporating 1,2 stearoyl-3-trimethylammonium-propane chloride (DSTAP) would allow for enhanced tumour clearance in CRC in mice after treatment with oxaliplatin, a common chemotherapy, due to increased immune activation.

After harvesting peritoneal fluid and counting immune cells using flow cytometry, we found significant changes in immune cell populations after treatment with our DSTAP-R848 formulation. Additionally, in these mice, all tumours were completely destroyed. These results taken together suggest that R848 effectively promotes an immune microenvironment that is hostile toward tumours, showing that R848 is a promising candidate for further development in targeted tumour therapy.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Shreya Gandhi

Presentation Title: The role of the gut microbiota in early-life microglial gene expression

Abstract:

Microglia are innate immune cells resident in the central nervous system that phagocytose pathogens and debris, influencing brain maturation and function. Dysfunction in microglial activity is closely linked to the development of many neurological disorders. In addition to local signals in the brain, recent findings suggest that microglia development and function are modulated by signaling from the intestinal microbiome. The intestinal microbiome may modulate microglia through microbiota produced signalling molecules or indirectly by altering the immune and endocrine systems. However, the extent to which microglial gene expression during development is altered through microbiome modulation has yet to be established. In this study, we examined the role of the gut microbiota on gene expression in microglia during early-life development. RNA profiles were extracted and sequenced from microglia in germ-free (no microbiome) and conventional (intact microbiome) male and female C57Bl/6J mouse pups 7-, 14-, and 21-days post-birth. RNA sequencing revealed widespread impacts of sex, age, and microbiome on differentially expressed genes. These data demonstrate that the intestinal microbiome modulates microglial gene expression during early-life, revealing a possible mechanism for how the microbiome regulates microglia and neurological disorder development.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Simon Busemeyer, Josh Chen

Presentation Title: Exploring Serum Creatinine Factors Associated with AKI Progression and Hospital-Related Outcomes

Abstract:

Objective: Acute Kidney Injury (AKI) is a consistent health challenge that affects the geriatric population, especially in a hospital setting. This exploratory study investigates the association between three measures of serum creatinine instability and AKI progression, along with several other patient and hospital-oriented outcomes. The predictive validity of these measures was analyzed to begin developing better prognostic tools for AKI and hospital management.

Methods: Data from the Electronic Alerts for AKI Amelioration 2 (ELAIA-2) trial was analyzed and mutated to form 3 prognostic exploratory metrics: pre-AKI SCr variation (SD), maximum 7-day pre-AKI proportional and 48-hour pre-AKI absolute creatinine changes. Logistic and linear regressions were performed, adjusting for bias in ICU admission, age, sex, and comorbidities and other variables over univariate, multivariate, and admission disposition interaction layers.

Results: The study found significant associations between increased pre-AKI SCr variability (SD) and several adverse clinical outcomes, including AKI progression, death, and the need for dialysis. Notably, absolute SCr changes were also significantly linked to these outcomes in both unadjusted and adjusted analyses. However, 7-day proportional creatinine changes did not demonstrate a significant relationship with any study outcomes. Likewise, AKI duration and number of treating providers were not clinically associated with any selected metrics.

Conclusion: Patients with greater serum creatinine (SCr) instability, measured as pre-AKI creatinine variation and 48-hour absolute change, are associated with progression to a higher AKI stage, death, and dialysis.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Miku Wake, Simrut Kurry

Presentation Title: Distinct Effects of Brain Activation Using tDCS and Observational Practice: Implications for Motor Rehabilitation

Abstract:

The ability to learn a motor skill through observation of others is a fundamental process established in early infancy and maintained throughout life. Transcranial direct-current stimulation on the primary motor cortex (M1-tDCS) also facilitates motor learning. However, the effectiveness and underlying brain connectivity of tDCS and observational practice for bimanual coordination skills lack adequate research. Thirty healthy young adults with no juggling experience were randomly assigned to three different interventions: M1-tDCS, action-observation (AO), and a combined group (M1-tDCS+AO), when acquiring a bimanual two-ball juggling skill. Based on previous research, we hypothesize that experimental groups involving AO will perform significantly better after intervention compared to baseline, but with different brain connectivity patterns. Thirty trials of juggling were performed and scored after the intervention. Resting-state EEG data were collected before and after the intervention. We characterized the brain causal connectivity patterns underlying each condition. Then, information flow rate was applied to EEG source data to measure causal connectivity. Although all groups had differences in resting state connectivity, we found that observational practice, regardless of M1-tDCS, enhances novel skill acquisition via a distinct pattern of information flow, while one session of M1-tDCS without observation did not facilitate skill acquisition. This study provides new results about the distinct network dynamics of priming the brain for skill acquisition using direct or indirect stimulation (ie. action observation). These results provide insights to future research that can support the development of treatment methods for patients needing motor rehabilitation.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Sophia Collins

Presentation Title: The potential of location-based mobile data in understanding visitation of regional parks in Vancouver, BC, Canada

Abstract:

The ability to access reliable and consistent visitor count data is essential to determining the usage patterns of urban parks. While infrared counters are the most common source of visitor count data for the Vancouver parks systems, this technology is prone to malfunction, and is static in position. Location-based data sourced from cell phone applications can provide the relative levels of visitor activity at any place within a park and has the potential to provide a more accurate representation of overall visitor levels in parks. Mapbox is one source of such geospatial location-based data and provides the relative visitor activity level throughout a selected region at the daily level. This project investigates whether Mapbox data demonstrates similar trends in park visitor activity as stationary infrared counters. The correlation between the 2020-2022 Mapbox activity index values and the visitor count data provided by Metro Vancouver counters will be found for 18 different regional parks across Metro Vancouver at the monthly level. Additionally, the correlation between the Mapbox activity density values and the Metro Vancouver counter data will be found for Tynehead Park in Surrey at the daily level for 2022. Based on preliminary results, it is anticipated that the most accurate data set will consist of infrared counter data and location-based data being used in conjunction. The results of this analysis will be valuable to finding answers to usage and equity issues related to park planning, design, and operation.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Tanisha Chawla

Presentation Title: Trust and Community: How Does Culture Affect Whom We Trust?

Abstract:

Trust is a key element in navigating interpersonal relationships. Learning whom to trust is influenced not solely by personal characteristics, but also by cultural experiences. In this context, two major determinants of trust are the veracity (truths or lies) and intentions (kindness or cruelty) of a speaker's words. When these two elements interact, their juxtaposition may lead to confusion for the listener. Thus, a lie told by a kind person would go against cultural beliefs regarding trust, leading to cognitive dissonance. In our study, we interviewed children between the ages of five and 11 from Canada and India to investigate how culture might shape the development of trust, specifically in the context of prosocial and antisocial behavioral acts. The children were read four stories about characters who represented varied levels of veracity and benevolence. After each story, participants were asked whether the character was lying or telling the truth and whether their actions were good or bad. Preliminary analysis revealed that veracity exerted contrasting impacts on Indian and Canadian children when story characters behaved cruelly. For example, Indian children trusted mean lie-telling more while children from Canada trusted mean truth-telling more. These results may be attributed to a higher tolerance for cognitive dissonance in the interdependent culture of India. Such tolerance might encourage harmony maintenance, a crucial component of interdependent cultures. These results aim to fill a cultural gap in our understanding of moral development and provide novel insights regarding the effect of harmony maintenance on trust in different cultures.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Xinyue (Annie) Wang, Tejaswi Patel, Tirpat Sekhon

Presentation Title: Can Boiled Barnacles Have Good Babies: Impacts of Heat Waves on Intertidal Ecosystems

Abstract:

Balanus glandula, a common barnacle species in Vancouver, Canada, is essential in intertidal ecosystems. They serve as an ecosystem engineer that modifies environmental conditions, provide habitat and food to other species, and influence interspecies interactions. The 2021 Pacific Northwest heatwave was detrimental to intertidal species, including barnacles, exposing them to extreme conditions during low tides and pushing their body temperatures to sublethal or even lethal limits. While numerous studies have explored the influence of thermal stress on intertidal organism mortality rates, limited research has been conducted on how it impacts the reproductive success of these organisms. This study examined the effects of thermal history and food availability on the reproductive success of *Balanus glandula* by weighing broods of barnacles from areas with varying solar incidence angles from the previous summer (thermal history) and their relative height on the shore (food availability). We found that the barnacle brood mass a) exhibits a positive correlation with barnacle volume, b) decreases as the brood matures, and c) the weight of the second brood is significantly smaller than that of the first brood. The data also revealed that thermal stress and food availability did not correlate with reproductive output of *Balanus glandula* during the first brooding cycle. These findings are crucial for predicting how *Balanus glandula* populations will respond to rising temperatures. They underscore the necessity of considering various factors in the study of barnacle reproductive biology, offering valuable insights into the potential impacts of climate change on intertidal communities.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Gavin Carmichael

Presentation Title: An Investigation of Regional Cerebral Venous Oxygenation in Preterm Neonates Using Quantitative Susceptibility Mapping

Abstract:

Background:

Quantitative susceptibility mapping (QSM) is an MRI modality proposed to be a viable method of measuring cerebral oxygenation in neonates given its sensitivity to deoxyhemoglobin. Signals from deoxyhemoglobin (i.e., paramagnetic signals), however, can be obscured by myelin and cerebrospinal fluid (i.e., diamagnetic signals). We sought to evaluate the accuracy of the isolated paramagnetic components of QSM images in measuring the oxygenation of major cerebral veins in a cohort of preterm neonates.

Methods:

19 neonates born preterm underwent a susceptibility-weighted imaging sequence at term equivalent age. The acquired imaging data were processed as QSM images to obtain the susceptibility values of the superior sagittal sinus (SSS) and central cerebral veins (CCV). These values were used to calculate the oxygen saturation (SvO₂) of the SSS and CCV. QSM images underwent additional processing to isolate their paramagnetic components. SvO₂ values of the SSS and CCV were calculated again from the paramagnetic components.

Results:

The mean SvO₂ values of the SSS and CCV calculated from QSM images were found to be 72.4% (SD, 3.4%) and 68.7% (SD, 3.5%), respectively. The mean SvO₂ values calculated from paramagnetic components were found to be 58.1% (SD, 7.3%) for the SSS and 57.7% (SD, 7.0%) for the CCV.

Conclusion:

SSS SvO₂ values derived from paramagnetic components agreed well with the existing literature and were closer than the values derived from QSM images alone. Thus, decomposing QSM images into paramagnetic components shows promise as a method for more accurately measuring cortical cerebral oxygenation in neonates.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Tiffany Wai

Presentation Title: Optimization of a Jurkat reporter cell line to measure TGF- β 1 secretion by regulatory T cells

Abstract:

CD4+ regulatory T cells (Tregs), identified by expression of FO P3, CD25, and CTLA-4, have demonstrated effectiveness in suppressing undesirable immune responses. Transforming Growth Factor beta 1 (TGF- β 1) signalling is pivotal for Treg development, and its autocrine or paracrine actions further contribute to immune homeostasis. TGF- β is produced as an inactive protein, requiring further proteolysis of latency-associated peptide (LAP) to release it. However, it is currently challenging to quantify active TGF- β 1. Thus, this study aims to develop a precise method for quantifying TGF- β 1 produced by CD4+ regulatory T cells (Tregs) using a T-cell receptor (TCR) knock-out, triple parameter reporter (TPR) Jurkat cell line as a reporter system. In response to stimulus, TPR Jurkats express eCFP, eGFP, and mCherry via inherent genetic reporter constructs responsive to NF κ B, NFAT, and AP-1 transcription factors. TPR Jurkats were transduced via lentivirus and cells expressing different levels of a Chimeric Antigen Receptor (CAR) specific for active TGF- β 1 were sorted. Utilizing flow cytometry, we confirmed the cells' ability to respond to recombinant active TGF- β 1 by detecting the expression of eCFP, eGFP, and mCherry. The TGF- β 1 reporter Jurkats could also successfully detect active TGF- β 1 produced by Tregs which had been stimulated through TCR. A higher CAR level on Jurkat cells was found to have a more pronounced response to TGF- β 1 and a lower detection limit. These TGF- β 1-detecting TPR Jurkats thus represent a new tool to quantify biologically active TGF- β 1 produced by Tregs and will provide insights on the role of this cytokine in Treg suppression and therapeutic applications.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Victoria Lim, Sophia Yang

Presentation Title: Integration of Machine Learning (ML) into Tapestry Tool

Abstract:

Tapestry Tool is an innovative educational tool that allows users to collaborate in the development of an interactive map of connected nodes (a Tapestry) which represents ideas and encourages a non-linear approach to learning, similar to an interactive visual mind map. Previously, the tool required users to create nodes and tapestries manually, failing to match the pace of recent advancements in other artificial intelligence and machine learning (ML) educational tools. The addition of machine learning not only allows users to automatically generate the Tapestry which increases efficiency, but also provides a starting point for idea generation and learning. This allows users to focus on building and developing ideas rather than spending their time constructing the Tapestry. Design and development of the tool, alongside two user research rounds of testing, was conducted over 16 weeks, resulting in a completed prototype of an ML-integrated Tapestry Tool that allows for automatic node generation based on user input of a topic, prompt, or PDF file. Results of our user research studies show that the average usability score (as defined by the System Usability Scale (SUS), which is the measure of a product's userfriendliness) increased by 17% between the tool's initial and completed prototype. This resulting automatic mind map generation tool, Tapestry Tool ML, allows for increased awareness, development, and integration of machine learning in advancing education within post-secondary institutions such as UBC and beyond.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Vivien Jia, Subin Lee

Presentation Title: The Impact of Microplastics on Zooplankton

Abstract:

Ever since the introduction of plastics in the 20th century, plastics in many ways have impacted both lives on land and in the oceans. With the presence of microplastics (MPs) reported in all habitats, including the remote areas far from human activities, their impacts on organisms inhabiting these habitats, especially the oceans, have been great. Small invertebrates, such as zooplankton, which form an important connection between the primary producer and other organisms in the food chain, have been suspected to be more prone to ingesting MP than other ocean organisms because of MP's size similarity to their natural prey. Therefore, this study investigated the effect of microplastics on indigenous zooplankton from the Pacific Northwest (PNW). We determined how exposure to microplastic would affect zooplankton in their i) food- gathering ability, ii) reproductive capacity, iii) life span, and iv) population growth. Zooplankton were collected from the PNW, left to acclimate for xxx days and exposed to xxx MP for xxx weeks. At the end of the experiment, samples were collected and analysed using existing protocols. Our study showed that exposure to microplastics did not affect zooplankton life span, but affected their reproduction and thus impacted their population growth. In the present study, zooplankton could not differentiate microplastics from their natural prey. This study added to the available literature on the health implication of microplastics on zooplankton.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Vladislav Korolev

Presentation Title: Production of Human Insulin Precursors Using *Komagataella pastoris*

Abstract:

Komagataella pastoris is an emerging microorganism that can be tested as a potential platform to produce human insulin. This non-pathogenic yeast is capable of producing high yields of recombinant proteins with high similarity of glycosylation to mammalian cells, using simple cultivation strategies. Furthermore, *K. pastoris* has the ability to perform post-translational modifications, such as appropriate protein folding using disulfide bridge formation, as well as secreting the proteins into the growth environment of the cell, which streamlines the protein purification process. These properties give *K. pastoris* a competitive advantage over *Saccharomyces cerevisiae*, *Escherichia coli*, and mammalian cells that are currently used to produce most of the world's recombinant human insulin. In this study, a lab protocol was devised for the production of recombinant human insulin precursors using *K. pastoris*, and protein expression was optimized by varying the duration of the methanol-fed fermentation phase. The insulin precursor gene was incorporated into a plasmid vector, which was introduced to the *K. pastoris* yeast strain, followed by the selection of transformants. A two-phase cultivation process was employed, consisting of a glycerol-batch phase to promote rapid multiplication of the yeast, followed by a continuous methanol-fed batch phase to induce expression of the insulin precursor. The insulin precursor will be isolated from the supernatant using a Ni NTA IMAC column and its molecular weight and concentration analyzed using SDS-PAGE and ELISA tests, respectively. Yields of up to 1g/L of insulin precursors are expected to be produced, promising a pathway toward cost-effective insulin production for therapeutic applications.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Wilfred Tang

Presentation Title: Effect of Pitch-altered Background Music on Cantonese Tone Production

Abstract:

Humans are talented at discerning acoustic information (e.g. pitch, loudness etc.) of the environment and synchronizing their speech with these cues. For instance, people naturally speak louder in a noisier environment, and vice versa. This phenomenon is called *acoustic convergence*. This raised a question of how it may affect the production of tone languages, especially when accurate pitch levels (tones) are essential for conveying distinct meanings, but there is limited research conducted on this topic. This project specifically explores the effect of background music in different keys on native Cantonese speakers' tone productions. This study will provide valuable insights into broader conversations on the role of auditory input in tone language speech production. 15 native speakers of Hong Kong Cantonese completed tasks in reading carrier phrases that include the target syllable in 6 Cantonese tones while being exposed to various auditory inputs: music in a higher key, a lower key, silence and an instrumental version of the music. The fundamental frequencies (F0) of their responses are extracted and converted into semitone values for analysis. The preliminary result is counter to what we expected with no significant difference identified. In general, both the Higher Key and Lower Key conditions exhibit slightly higher mean semitones compared to the control condition. For the two lower tones, T3 and T6, the mean semitone values in both the HK and LK conditions are lower than those in the control condition. Future research may focus on expanding the sample size and exploring other tone languages.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Wenqi Guo

Presentation Title: Graph Similarity Search Using Metric Search Tree

Abstract:

Graph Similarity Search (GSS) finds wide applications, particularly in molecular or protein similarity querying. The Graph Edit Distance (GED) is a commonly employed method to assess graph similarity. However, due to its NP-Hard nature (the problem is harder than nondeterministic polynomial time), computing GED is computationally expensive and slow. This paper presents novel approaches to enhance the performance of GSS queries by reducing or eliminating the need for real GED distance evaluations. We propose three methods utilizing a pre-computed tree index: real distance tree search, upper-bounds-lower-bounds (UBLB) tree search, and verification tree search. We evaluate and compare our algorithms against prior work on the standard AIDS dataset and a dataset collected from PubChem. We analyze the scalability of our algorithm in terms of graph size, database size, and query radius on the PubChem dataset. The results demonstrate that the verification tree search could not outperform previous methods in most scenarios, thereby confirming previous conclusions regarding the lack of usefulness of pre-computed indexes.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Chloe Wang

Presentation Title: Intelligent Responsive Peptide-Based Hydrogel System for Oral Drug Delivery

Abstract:

Periodontal disease, caused by bacterial biofilms and their by-products, often leads to tooth loss. Contemporary drug delivery systems for periodontal disease treatment (e.g. mouthrinse, gel, and paste) suffer from short retention time and poor local concentrations at the target site. The increased amount of matrix metalloproteinase-8 (MMP-8) along with microbial biofilm formation is linked to the severity of periodontal disease. Therefore, we hypothesized that an MMP-8-responsive drug delivery system may be useful for on demand oral drug delivery. The aim of this study was to develop an MMP-responsive antimicrobial peptide-based hydrogel system (a water-insoluble 3D network of polymers) and evaluate its controlled degradation and release behaviors in response to MMP activity. The hydrogel was synthesized from polyethylene glycol-norbornene (PEG-NB) and MMP-8-cleavable peptide. The antimicrobial peptide (DJK-5) was incorporated into the hydrogel precursor, and the final hydrogel was generated under UV light-curing for 30 seconds using a photoinitiator. An MMP-8-irresponsive hydrogel was fabricated for comparison. The hydrogels' gelation, ultrastructure, rheology, swelling, and chemical properties were characterized, and their MMP-8-responsive degradation and peptide release were examined. The results showed that the physical, chemical, and mechanical properties of the fabricated hydrogel were maintained after the incorporation of DJK-5. The hydrogels were proven to be controllably degraded with DJK-5 release responding to MMP activity. The findings suggest that the MMP-8-responsive peptide-based hydrogel serves as a promising platform and candidate for on-demand oral localized drug delivery. The development of a responsive release hydrogel system tailored to the disease microenvironment shows promise for periodontitis treatment.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Xiutong Tony Jiang

Presentation Title: Evaluating Transit-to Park Initiatives in British Columbia and Alberta: Unveiling the Need for Systemic Plan and Legislation Support

Abstract:

This project explores transit-to-park initiatives in British Columbia and Alberta, aiming to categorize and analyze the diverse range of initiatives promoting sustainable and equitable transportation to parks. The study identifies five main types: information campaigns, seasonal transit routes, on-demand, permanent transit routes, and legislation. While individual initiatives have been documented, a significant knowledge gap exists in understanding these programs' comprehensive scope and distribution. This exploratory study addresses the need for more systematic information and classification. Using the Google search engine and combinations of key terms, we systematically scanned online sources to identify and analyze transit-to-park initiatives. The findings suggest a dominant presence of seasonal transit routes and permanent transit routes among the initiatives, while systemic plans and legislation are notably scarce, with only one identified legislative initiative in the Sea to Sky region, BC. The prevalence of seasonal and permanent transit routes suggests a growing demand for accessible transportation to parks; however, the lack of a legislative and systematic framework may hinder the establishment of consistent standards, jeopardizing the continuity of these initiatives. This finding emphasizes the critical need for policy interventions and regulatory frameworks to support and sustain the success of transit-to-park initiatives. This research contributes insights for policymakers, planners, and environmental advocates working towards addressing this legislative gap and enhancing regional transit connectivity and sustainability.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Frankie Yaying Zhong

Presentation Title: Will Objective Cultural Distance Predict Immigrants' Acculturation Success and Well-being?

Abstract:

Cultural distance, characterized as the disparity between two cultures, plays a crucial role in predicting the success of acculturation and well-being of immigrants. Previous research indicates that a greater cultural distance between immigrants' heritage culture and the host culture is associated with heightened challenges in adapting to the host culture and diminished well-being. Notably, a significant proportion of these studies relied on measures of perceived and subjective cultural distance instead of utilizing more objective and systematic measures of cultural distance. In this study, we ask: does objective cultural distance predict a similar pattern of acculturation and well-being among immigrants as perceived cultural distance? To address this question, the present study employs the cultural fixation index, a novel measure of objective cultural distance developed by Muthukrishna and colleagues (2020) to replicate and extend the previous research. Participants (n=815) were exclusively recruited through the Prolific Academic platform, targeting immigrants living in the United States. Participants completed a comprehensive online survey assessing their perceived cultural distance, objective cultural distance calculated based on their country of origin and cultural fixation index, alongside various aspects of their acculturation experience. Through comparing the predictive power of objective and perceived cultural distance measures on acculturation success, we aim to gain a nuanced understanding of their respective impacts on immigrants' adaptation and psychological adjustment. This understanding holds promise in informing interventions and policies aimed at facilitating smoother acculturation processes and promoting the well-being of immigrants in their host countries.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Eddie Kim

Presentation Title: Exploring the Relationship between Theory of Mind and Metacognitive Confidence Judgments in Children

Abstracts:

Recognizing that other individuals possess distinct models of knowledge and thoughts – i.e., theory of mind (TOM) -- is fundamental to social interactions. There have been mixed findings on whether development of TOM is independent of metacognition. Longitudinal studies have shown a correlation between early TOM and later meta-memory (Lockl & Schneider, 2007; Kloos et al., 2021), while Bernard et al. (2015) found no relationship between procedural metacognition and TOM. Inconsistency in these findings may be due to how research with metacognitive certainty measures have used scales to rank their certainty (e.g., “sure” vs “not sure”) on a task, because such measures introduce significant variability in what children assume it means to be “sure”. Here, this study aims to answer if theory of mind predicts metacognitive confidence through a “relative” confidence judgment task (a measure of confidence by having children choose the trial they are more certain they got correct) which is independent from individual differences in confidence scale calibration. 4-7 year-old children ($N = 66$) performed a series of TOM tasks, and an area discrimination task where they had to choose which of two blobs is bigger, followed by a relative confidence judgement. Performance on all tasks improved with age, and appropriately varied with difficulty of the task. However, there was no significant predictive relationship between TOM tasks and relative confidence judgment ability. These findings indicate TOM alone does not predict the development of metacognitive processes.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Yvette Ni

Presentation Title: Investigating the effects of transcranial alternating current stimulation (tACS) on electrophysiological signals during a task

Abstracts:

Transcranial Alternating Current Stimulation (tACS) is a non-invasive brain stimulation technique that involves applying a weak electrical current to specific cortical regions through the scalp. Recent conflicting results suggest that the effects of tACS need to be more consistent before considering its therapeutic application. This study aimed to modulate alpha oscillations using tACS to investigate the effect of neurostimulation on human electrophysiology during a task. A double-blind study where participants (n=38) underwent both alpha (10Hz) and gamma (41Hz) tACS sessions on separate days. Participants performed an oddball task that involved responding to color changes on a fixated cross using a keyboard. The color of the cross changed to either red or green, one of which occurred 80% of the time (DEFAULT color change) and the other 20% of the time. The dominant hand in response to the DEFAULT color change is randomized among participants. We found that the enhancement in alpha oscillations is greater with alpha stimulation than gamma stimulation, only in the electrodes contralateral to the dominant hand and not in the ipsilateral electrodes. Additionally, the differences in the enhancement of alpha oscillations were significantly higher in the contralateral electrodes than in the ipsilateral ones. Our results suggest that tACS-induced alpha stimulation can enhance alpha oscillations in a lateralized manner. This implies that the effect is likely driven by the motor planning aspects involved during the task paradigm. Our findings suggest that the effects of tACS on electrophysiological signals depend on the nature of the task being performed.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Doris (Yiduo) Li, Callie Phelps

Presentation Title: The effect of agricultural practices on carbon in soil fractions

Abstract:

The current model of soil carbon content (Tisdall and Oates, 1982) only considers aggregate size concerning carbon concentration, it does not consider the relationship of soil carbon fractions which have contrasting properties (Lavalle, 2019). Our study explores how changing agricultural management techniques could be beneficial for soil carbon sequestration in the two carbon fractions –particulate organic matter (POM), and mineral-associated organic matter (MAOM) – which helps reduce carbon emissions (Stout et al., 2016). We hypothesize that if there is a higher amount of carbon in certain soil fractions in the regenerative treatment as compared to conventional treatment, we can assume that despite the contrasting properties between POM and MAOM in the large aggregates, they respond to the less tillage treatment in the same way which keep carbon better sequestered. We measured aggregate stability on four different treatments in years 2022 and 2023. Then we take carbon analysis samples to study the relationship between tillage, carbon fractions, and the respective soil carbon content. The result confirms that the reduced tillage treatment has more large aggregates compared to the typical and increased tillage treatments. At the same time, the regenerative treatment results in a higher carbon percentage in both POM and MAOM compared to the conventional approach. These results identify how and where the carbon is stored in the soil, which will inform the best agriculture management to mitigate carbon being released into the atmosphere from farming.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Yomna Bedaiwy

Presentation Title: Whether Weather Weathers Lichens

Abstract:

Climate change has impacted the survival of many keystone organisms, including lichens. Lichen bleaching is a growing phenomenon where pigmented lichens develop white patches or lose colour over time. Little is known about the causes of bleaching, or whether fluctuating and extreme climates might be contributors. In this study, we explored how temperature and precipitation frequency influence pigment contents in urban foliose lichens. We randomly assigned lichens into groups and exposed them to varying temperatures and precipitation frequencies for one month. Weekly, we monitored pigment contents in the lichen samples via spectrophotometry at three wavelengths of interest (320, 430, and 662 nm) suspected to be chlorophyll-a and an unidentified UV-screening pigment. We found that the impact of temperature and precipitation frequency on lichen pigment contents depended on the duration and specific combination of microclimatic conditions. Our results suggest that our lichens respond to acute stress by increasing the production of a 320 nm UV-screening pigment during periods of desiccation, and increasing chlorophyll production in saturated, high-temperature environments. Further research on the mechanisms of bleaching in this sensitive holobiont can help us understand the extent of the ecological damage caused by climate change and guide conservation efforts.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Vincy Huang, Lucy Peng, Charvi Saboo, Sabrina Ye, Nethkini Liyanage

Presentation Title: Differential Expression of Diet-Induced Leptin and Insulin in the Hypothalamic Arcuate: Implications for the Development of Metabolic Dysfunctions

Abstract:

The arcuate nucleus (ARC) within the hypothalamus of the brain plays an essential role in regulating energy homeostasis, such as in appetite control and energy expenditure. The ARC houses neurons such as orexigenic AgRP neurons and anorexigenic POMC neurons that receive signals from the hormones leptin and insulin to maintain energy balance. Under obese and diabetic conditions, leptin and insulin actions within ARC can become less responsive. Current research aims to unravel these hormone's impact on the molecular pathways of ARC on satiety, obesity, and diabetes. Deciphering the direct contribution of Leptin-receptor (LEPR)-expressing ARC neurons to glucose homeostasis remains challenging. Insights into gene expression profiles and functional responses may illuminate neural circuits governing energy balance, hinting at potential anti-obesity and anti-diabetes therapies. We hypothesize leptin resistance in high-fat diet feeding is caused by a decrease in leptin and insulin receptors on POMC and AgRP neurons. Using existing arcuate hypothalamic RNA sequencing data from Campell et al. (2017) to conduct differential RNA-sequence analysis, our analysis expects decreased leptin and insulin receptor expressions in POMC neurons and increased expressions of the same receptors in AgRP neurons. As leptin and insulin resistance encompass complex psychophysiological pathways, other gene expression changes may be involved beyond the observed changes captured by the analysis. However, by analyzing the mechanism of leptin and insulin in the ARC, we can gain a renewed understanding of the hormone's roles in the development of diabetes and obesity to better inform therapeutic techniques concerning glucose control.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Preet Lally, Leyla Chartrand, Erin Kang

Presentation Title: E-cadherin and N-cadherin: How They Enable and Maintain the Collective Migration of Metastatic Triple-Negative Breast Cancer

Abstract:

Triple-negative breast cancer (TNBC) is a highly aggressive disease, which when metastasized (i.e. spread to other body regions), patient survival decreases dramatically. While metastasis can occur either as migrating individual cells or as a collective, collective cell migration occurs predominantly in cancer and is associated with worse patient outcomes. TNBC tumours express markers of epithelial-to-mesenchymal transition (EMT) as they acquire the ability to migrate, yet its role in metastasis is not completely understood. EMT is a process that normally occurs during embryogenesis and wound healing, but it also plays an important role in cancer. During EMT, the expression of proteins changes, including E-cadherin and N-cadherin, which are crucial to the cohesion of neighbouring cells. Thus, we hypothesize that cadherin expression is required for the collective migration of metastatic TNBC. We will use collectively migrating metastatic TNBC cells and introduce fluorescence-labelled E-cadherin and N-cadherin. Using live-cell imaging, the migration of these cells will be monitored, observing how changes in cadherin expression in different treatments affect migratory behaviour. We will then determine how these treatments affect the capability of TNBC cells to metastasize by using a chicken embryo model. Finally, we will identify putative pathways that control cadherin expression during collective cell migration via proteomic analysis on the migrating TNBC cells. We anticipate that both E-cadherin and N-cadherin expressions are maintained in migrating groups of cells. Our findings may further our understanding of the function of cadherins in metastatic TNBC and elucidate novel therapeutic targets to prevent and treat metastatic TNBC.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): Zhanerke Zhumash, Lihao Xue

Presentation Title: Long Short-Term Memory-Based Rainfall-Runoff Modeling: Advancing Insights into Catchments Functional Complexity in North America

Abstract:

This study delves into the intricacies of rainfall-runoff modeling, focusing on the interaction between catchment attributes—climate, geology, topography, and land cover—and their influence on the complexity and predictive performance of deep learning models, specifically Long Short-Term Memory (LSTM) networks. Despite the proven efficacy of LSTM models in hydrological tasks (Kratzert et al., 2018), a gap remains in understanding how specific catchment characteristics impact the complexity of streamflow predictions, particularly in North American catchments. To address this, we employ datasets such as CAMELS for USA catchments and EMDNA combined with ERA5-Land for Canadian catchments, focusing on variables like temperature, precipitation, and potential evapotranspiration (PET), alongside 20 static inputs encompassing catchment attributes, soil properties, climatic factors, and seasonal dynamics. Through rigorous data structuring and model training, we evaluate our LSTM model's performance across North American catchments. Our findings highlight a median Nash-Sutcliffe Efficiency (NSE) of 0.74, with a notable spread in performance indicating the significant influence of seasonal hydrological processes and catchment attributes on model accuracy. The study reveals that climatic features predominantly dictate model precision, with non-climatic factors such as mean slope also playing a crucial role. The interplay of catchment attributes introduces variability in predictive accuracy, underscoring the challenge of quantifying their impact due to significant uncertainty in static catchment attributes. Additionally, we discuss the implications of data noise and quality issues on model simulations, offering insights for managing predictive accuracy risks and guiding strategies based on model performance trends. This research advances our understanding of the factors affecting the complexity of hydrological models and their practical applications in water resource management, building on the foundational work of Wu et al. (2021) and others in the field.

MURC 2024

Presentation Format: Poster Presentation (Wave 5 - Ponderosa Ballroom)

Presenter Name(s): CC Liang

Presentation Title: A Comparative Study on the Relationship between Rhythmic Characteristics and Perception

Abstract:

Musical rhythm perception is subject to influence by several rhythmic characteristics. A study run in March 2020 used unfamiliar rhythmic stimuli that manipulated variability (differences in note durations), density (event concentration in time), and syncopation (disturbance in regular rhythmic flow). Participants randomly assigned to a starting tempo as well as a context/no context condition (the presence or absence of four isochronous notes preceding the stimuli) engaged in tasks including tempo manipulation, pulse tapping using the space bar, perceived complexity rating on a scale of 1 to 6, and a musicality assessment using the Goldsmith Musical Sophistication Index (GMSI). A direct replication study was conducted three years later at a different institution, offering a unique opportunity to scrutinize the temporal robustness and generalizability of the results across similar populations. Hypotheses posit similar outcomes between experiments regarding the significant role of certain elements in rhythm perception, with potential for enhanced understanding through combining the datasets. Preliminary results reveal some conflicting or diminished correlations in the more recent experiment, suggesting shifts in rhythmic perception potentially due to sampling variability and/or psychological and social changes stemming from the COVID-19 pandemic. This comparative study contributes insights into rhythm cognition while accounting for temporal effects, unraveling cognitive mechanisms underlying musical experiences. Future research may broaden its scope to encompass a more diverse population and explore the intricate relationship between rhythmic perception and subjective experiences, such as enculturation, emotional responses, and musical proficiency.

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We can't wait to see you next year at MURC 2025!



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