

MURC

MULTIDISCIPLINARY
UNDERGRADUATE
RESEARCH
CONFERENCE

2021 PROGRAM GUIDE



THE UNIVERSITY OF BRITISH COLUMBIA

Centre for Student Involvement & Careers



TABLE OF CONTENTS

4	What is MURC?
5	Presentation Themes
6	Schedule
8	Planning Committee
9	Keynote Speaker
10	Health & Wellness Panel
12	Education & Technology Panel
14	Applying to Graduate School Workshop
15	Ask Me Anything Sessions
17	Featured Programming
18	Presentation Winners
19	Acknowledgements
21	Wave 1 Oral Presentation List
24	Wave 1 Oral Presentation Abstracts
41	Wave 1 Poster Presentation List
43	Wave 1 Poster Presentation Abstracts
62	Wave 2 Oral Presentation List
65	Wave 2 Oral Presentation Abstracts
84	Wave 2 Poster Presentation List
86	Wave 2 Poster Presentation Abstracts
105	Wave 3 Oral Presentation List
108	Wave 3 Oral Presentation Abstracts
125	Wave 3 Poster Presentation List
127	Wave 3 Poster Presentation Abstracts



TABLE OF CONTENTS

145	Wave 4 Oral Presentation List
148	Wave 4 Oral Presentation Abstracts
167	Wave 4 Poster Presentation List
169	Wave 4 Poster Presentation Abstracts
189	Wave 5 Oral Presentation List
192	Wave 5 Oral Presentation Abstracts
204	Wave 5 Poster Presentation List
206	Wave 5 Poster Presentation Abstracts
223	Wave 6 Oral Presentation List
226	Wave 6 Oral Presentation Abstracts
245	Wave 6 Poster Presentation List
247	Wave 6 Poster Presentation Abstracts
266	Wave 7 Oral Presentation List
269	Wave 7 Oral Presentation Abstracts
286	Wave 7 Poster Presentation List
288	Wave 7 Poster Presentation Abstracts
305	Wave 8 Oral Presentation List
308	Wave 8 Oral Presentation Abstracts
323	Wave 8 Poster Presentation List
325	Wave 8 Poster Presentation Abstracts

WHAT IS MURC?

The Multidisciplinary Undergraduate Research Conference (MURC) is an annual celebration of undergraduate research happening on the UBC campus. 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.

This year, the theme for MURC is 'Moments Unbounded - through Resilience and Compassion.' As researchers, we face moments of uncertainty all the time, pushing the boundaries of what we know. This can be frightening, especially while living through a pandemic. Despite this, our drive to explore the unknown remains unbounded and we are able to approach these uncertainties with resilience and compassion for ourselves and for others.

MURC 2021 is excited to feature 521 presenters from 12 different schools and faculties.



PRESENTATION THEMES

Research presentations fall under four (4) themes.

Health and Wellness

- Addressing social determinants of health and how these affect health outcomes across different populations and communities
- Engaging with wellbeing in its various dimensions, including but not limited to traditional biomedical measurements and interventions

Innovation and Technology

- Creating and/or applying novel technologies to develop enhanced solutions that contribute to society
- Identifying the social and ethical impacts of different innovations

Sustainability and Conservation

- Addressing global challenges in the areas of food security, biodiversity, demand for energy and water, and prevention of environmental degradation to fight climate change
- Aiming to achieve a better and sustainable future for the world through social and ecological interventions

Individual, Community and Society

- Addressing social challenges on local and/or global scales, and advocating for social and ecological justice
- Working towards building a society in which the dignity of all people is respected and equity and inclusion are embedded socially and culturally
- Engaging with communities and/or organizations to explore and address relevant issues related to social, political, and/or economic challenges

SCHEDULE

March 20, 2021



9:00 AM - 10:00 AM

OPENING KEYNOTE

10:30 AM - 11:45 AM

FIRST WAVE

ORAL PRESENTATIONS
POSTER PRESENTATIONS

12:30 PM - 1:30 PM

HEALTH AND WELLNESS PANEL

2:00 PM - 3:15 PM

SECOND WAVE

ORAL PRESENTATIONS
POSTER PRESENTATIONS

3:30 PM - 4:00 PM

ASK ME ANYTHING SESSION:

BREAKING INTO RESEARCH

4:30 PM - 5:45 PM

THIRD WAVE

ORAL PRESENTATIONS
POSTER PRESENTATIONS

6:00 PM - 6:30 PM

ASK ME ANYTHING SESSION:

RESEARCH & POST-GRAD OPPORTUNITIES

7:00 PM - 8:15 PM

FOURTH WAVE

ORAL PRESENTATIONS
POSTER PRESENTATIONS

SCHEDULE

March 21, 2021



7:00 AM - 8:15 AM

FIFTH WAVE

ORAL PRESENTATIONS
POSTER PRESENTATIONS

8:30 AM - 9:00 AM

ASK ME ANYTHING SESSION:

RESEARCH & REAL-WORLD IMPACT

9:30 AM - 10:30 AM

EDUCATION & TECHNOLOGY PANEL

11:00 AM - 12:15 PM

SIXTH WAVE

ORAL PRESENTATIONS
POSTER PRESENTATIONS

12:30 PM - 1:30 PM

MURC 2021 RESEARCH TRIVIA

2:00 PM - 3:15 PM

SEVENTH WAVE

ORAL PRESENTATIONS
POSTER PRESENTATIONS

3:30 PM - 4:00 PM

ASK ME ANYTHING SESSION:

RESEARCH & INTO THE FUTURE

4:15 PM - 5:15 PM

APPLYING TO GRADUATE SCHOOL WORKSHOP

5:30 PM - 6:45 PM

EIGHTH WAVE

ORAL PRESENTATIONS
POSTER PRESENTATIONS



PLANNING COMMITTEE

STAFF ADVISORS AT THE CENTRE FOR STUDENT INVOLVEMENT AND CAREERS

Irene Chou

Nick Thornton

Selynn Yeap

CO-CHAIRS

Vanessa Kim

Amelia Tjoa

WORKSHOPS & PRESENTATIONS DIRECTORS

Syed Rafid Haq

Sonali Sharma

LOGISTICS DIRECTORS

Catherine Gai

Emmanuel Garrovillas

VOLUNTEERS DIRECTORS

Sahar Allen

Sarah Jiang

COMMUNICATIONS & PROMOTIONS DIRECTORS

Naeema Al-Mridha

Rachel Lee

KEYNOTE SPEAKER

Dr. Kai Chan

Kai Chan is a professor at the Institute for Resources, Environment and Sustainability at the University of British Columbia. Kai is an interdisciplinary, problem-oriented sustainability scientist, trained in ecology, policy, and ethics from Princeton and Stanford Universities. He strives to understand how social-ecological systems can be transformed to be both better and wilder.

Kai leads CHANS lab (Connecting Human and Natural Systems), and is co-founder of CoSphere (a Community of Small-Planet Heroes). He is a UBC Killam Research Fellow; a member of Canada's Clean16 and Clean50 for 2020; a Leopold Leadership Program fellow; senior fellow of the Global Young Academy and of the Environmental Leadership Program; a member of the Royal Society of Canada's College of New Scholars, Artists and Scientists; Lead Editor of the new British Ecological Society journal *People and Nature*; a coordinating lead author for the IPBES Global Assessment; and (in 2012) the Fulbright Canada Visiting Research Chair at the University of California, Santa Barbara.



HEALTH & WELLNESS PANEL

The Health and Wellness panel features researchers from diverse disciplines who are dedicated to improving the health and well-being of different populations and communities



Courtney van Ballegooie

PhD Candidate

Courtney van Ballegooie is a fourth year PhD student in the Department of Medicine at the BC Cancer Research Institute. Her research focuses on how external energy sources in the clinic, such as X-rays, can be used to trigger localized drug release in nanoparticle based cancer treatments. Outside of the lab, Courtney is involved in student advocacy and well-being in her roles as the Faculty of Medicine and Interdisciplinary Oncology Program Graduate Representative, and Graduate Student and Post Doctoral Society Wellness Coordinator.

Theresa Pauly

PhD

Dr. Theresa Pauly is a postdoctoral fellow at the University of Zurich. Her doctoral studies were completed at UBC in 2020. Her research focuses on social health science across the adult life span and she is particularly interested in finding answers to the question how social relationships get under the skin. To do so, she uses an interdisciplinary approach focusing on health behaviours and health biomarkers (e.g., cortisol). She combines intensive longitudinal methods with the analysis of longer-term trajectories to better understand social determinants of health and well-being in adulthood and old age.



HEALTH & WELLNESS PANEL



Avery Newman-Simmons

MSc Candidate

Avery is Anishinaabe and his family is from the Antoine First Nation in the Algonquin Territory. He has a BSc with Honours in Biomedical Biology from Laurentian University and he is in the process of completing his MSc in Medical Genetics at UBC. At UBC, he joined the Precision Medicine Activity 2 Team on the National Silent Genomes Project and is working on investigating the genomic contributions to familial intracranial aneurysms in a large multigenerational First Nation family from the Canadian West Coast. Outside of his academic work, Avery is passionate about enhancing ethical research, building capacity, and ensuring reciprocity in research with Indigenous communities.

MODERATOR

Katherine Cheng

PhD Candidate

Katherine Cheng is a PhD student in Philosophy at UBC. She is also a WorkLearn Graduate Career Development Coordinator at the Centre for Student Involvement and Careers. Katherine will moderate the Education & Technology panel and the Health & Wellness Panel.



EDUCATION & TECHNOLOGY PANEL

The Education and Technology panel features researchers from a variety of disciplines, highlighting the intersection between education and technology, and the associated social impacts.



Haley Seven Deers

MA Candidate

Haley is a first year Master of Arts student in the Department of History at UBC. Her research concentrates on modern histories of medicine, science and gender. She previously worked on a project that digitally mapped global negative heritage sites and investigated digital technologies as a conservation strategy for cultural heritage.

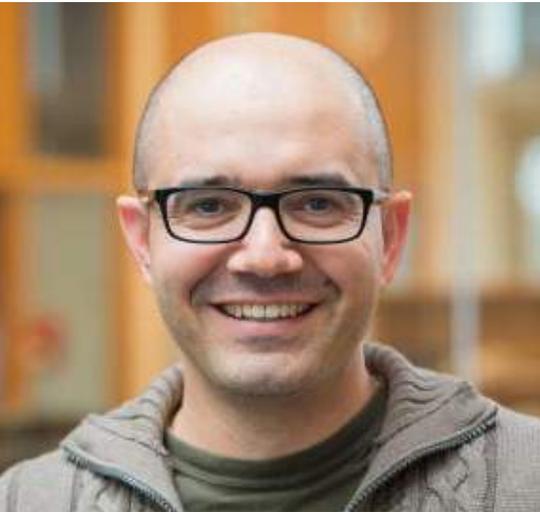
Jordan Wadden

PhD Candidate

Jordan is a Ph.D candidate in the Department of Philosophy at UBC and is a clinical ethics fellow for the Provincial Health Service Authority. His research interests are in biomedical ethics, clinical ethics, and technology ethics. His SSHRC funded research focuses on determining ethically permissible applications of artificial intelligence in healthcare settings, particularly regarding the potential benefits and harms of autonomous AI decision-makers.



EDUCATION & TECHNOLOGY PANEL



Farshid Agharebparast

Associate Professor

Farshid Agharebparast is an Associate Professor of Teaching in the Department of Electrical and Computer Engineering at UBC. Dr. Agharebparast's teaching interests include computer networking and Internet, computing systems and programming. His current research interests are in the areas of learning technologies, machine learning and engineering education.

Cinda Heeren

Professor & Associate Head

Cinda Heeren is an Associate Professor and Associate Head for Undergraduate Affairs in the Department of Computer Science at UBC. She usually teaches CPSC 221 — data structures, and has recently created CPSC 203, a new algorithms course for non-CS majors. In her teaching, she recognizes, unequivocally, that diverse voices are the seed of innovation, and she works hard to create learning environments where everyone is heard.



APPLYING TO GRADUATE SCHOOL WORKSHOP

Interested in applying to graduate or professional programs? This workshop will cover some of the major aspects of the graduate school application process, including identifying a program and finding a supervisor, asking for reference letters, and putting together a statement of intent.



Danielle Barkley

Graduate Career Educator

This workshop will be facilitated by Danielle Barkley, PhD. Danielle is a Graduate Career Educator who works with the Centre for Student Involvement and Careers to support graduate students at UBC. She completed her PhD in English literature at McGill University and has previous experience as a university instructor and writing consultant.

ASK ME ANYTHING SESSIONS

What burning questions do you have about research? Whether it's about breaking into research or post-grad opportunities, get them answered at one of MURC 2021's four Ask Me Anything sessions. A Graduate Student Representative will be available at each session to share their research journeys and insights!



Denitza Dramkin

Breaking into Research

Denitza (Denny) is a third year PhD student in Developmental Psychology at UBC. Her work primarily focuses on understanding how we link language to our rich perceptual representations, including how children attach number words to their intuitive perception of quantity. Her work integrates perspectives from developmental and cognitive psychology, vision sciences, and computational methods to explore the puzzle how language shapes and enriches our abilities to reason about the information within our complex world.

Nathan Seef

Research & Post-graduate Opportunities

Nathan graduated from UBC in 2018 with a Masters in Public Policy and Global Affairs. Following graduation, he worked with Natural Resources Canada as a policy analyst specialising in trade and investment in Canada's clean energy sector. Nathan is now a Policy Advisor with the Treasury Board of Canada Secretariat supporting the Federal government's implementation of policies and programs related to Canada's new Climate Plan.



ASK ME ANYTHING SESSIONS



Laura Stankiewicz

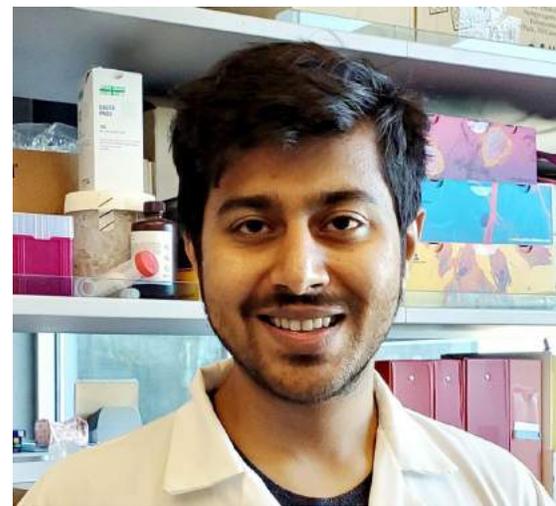
Research & Real-world Impact

Laura graduated from Chemical Engineering at Queen's University in 2019 and is currently working on her PhD in Biomedical Engineering at UBC. Her research focuses on learning how immune cells are trained during their development, and how we can use this information to make immune cells in the lab that can be engineered to kill cancer cells. In her spare time you can find Laura outdoors chasing sunlight on mountain hikes and morning rows.

Maunish Barvalia

Research & Into the Future

Maunish Barvalia obtained a B.Tech (Hons.) in Biotechnology from the Indian Institute of Technology Madras in 2015 and is currently a PhD candidate at UBC. For his PhD thesis, Maunish is using systems immunology approaches such as mass cytometry (CyTOF), single cell RNA-sequencing and CITE-seq to comprehensively profile the myeloid compartment under homeostasis and in various disease contexts. Using this approach, he has found marked heterogeneity in myeloid cells and identified novel perturbation states in Lyn deficiency and colorectal cancer. Building up on his training in single cell biology, Maunish plans to use cutting edge technologies and develop a career in the realm of precision medicine.



FEATURED PROGRAMMING

Scavenger Hunt

Take part in MURC's online scavenger hunt while navigating through the different events and presentations this year. Those that complete half of the objectives will be entered into a raffle for one of six \$25 e-gift cards, while those that complete all objectives will have a chance to win a \$50 e-gift card! The scavenger hunt will be hosted on Canvas and is open to current UBC students.

MURC 2021 Research Trivia

Take a break from presentations and join us for our MURC 2021 Research Trivia session! Test your knowledge on categories ranging from research methods and prominent researchers, to social issues and big discoveries in different fields of research. The winner will receive a \$25 e-gift card!



PRESENTATION WINNERS

Oral Presentation Winners

First Place | Kevin An

Influence of Nucleic Acid Modifications on Lipid Nanoparticle Morphology and Efficacy

Second Place | Charu Sankaran

Improving the Persistence of CAR T-cells with Telomerase

Third Place | Emilia Chen, Janella Schwab, Kimia Rostin, Sarah Ng

Modeling the trajectory of SARS-CoV-2 spike protein evolution in continuous latent space using a neural network and Gaussian process

Poster Presentation Winners

First Place | Favour Omobhude

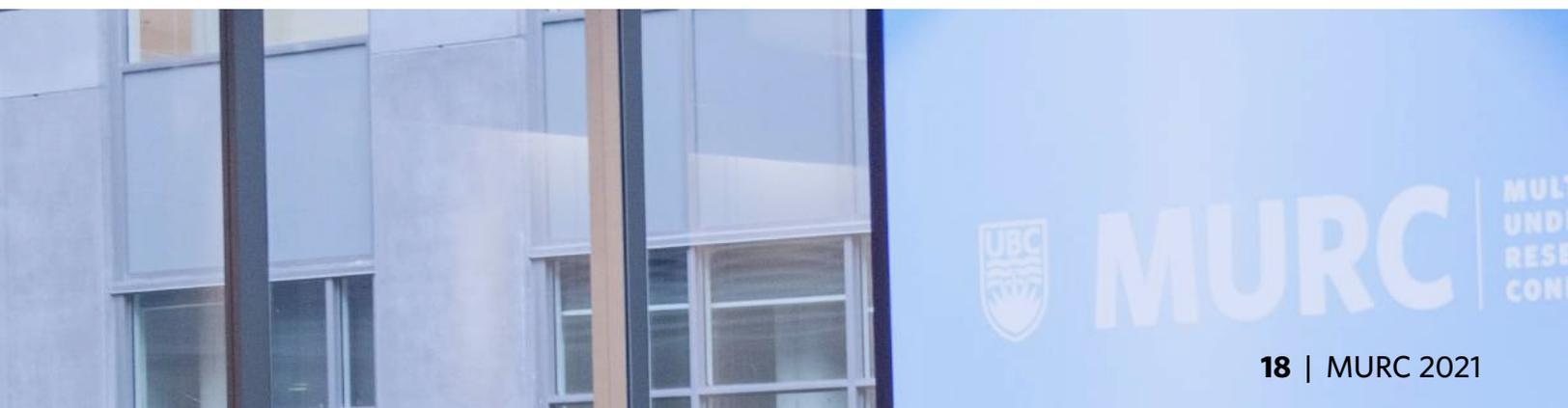
Do as we say, not as we do: A critical discourse analysis of anti-racism statements released by medical schools and academic medical organizations in 2020

Second Place | Norbert Banyl

Impact of Sharing Laboratory Test Costs and Required Blood Volumes on Resident Test Ordering

Third Place | Kiana Rahnama

Development, Implementation, and Evaluation of a Clinical Tool Kit for the Care of Patients Receiving Clozapine in Acute Psychiatry



ACKNOWLEDGEMENTS

Review Committee

Andis Klegeris
Andrew Owen
Ashley Welsh
Carolina Tropini
Cole Burton
Cornelia Laule
Dan Weary
Dave Michelson
Edward Conway
Frederic Menard
Gabriel Potvin
Harish Krishnan
Jane Buxton
Jason Read
Jonathan Graves
Juan Abello
Kristen Walker
Leonard Foster
Letitia Henville
Luisa Canuto
Michelle Tseng
Molly Babel
Neil Guppy
Pamela Kalas
Silvia Bartolic
Tamara Cohen
Tom Scholte

Event Volunteers

Aimee Koristka
Alina Charissa
Aly Khan
Amuna Ma
Anna Zhu
Ariel Rosen
Bianca Marginean
Bryant Hartono
Caroline Francis
Caroline Klyncypar
Ching Lam Man
Christine Seo
Cindy Shih
Cindy Wang
Cissy Zhang
Clara Tjoa
Daemon Cline
Danielle Matlie
Dayle Balmes
Deep Parekh
Divine Reyes
Elizabeth Chan
Emma Heath
Emma Karlsen
Emma Le
Gabriella Wiraputra
Gary Yen
Gurleen Gill
Gurleen Litt
Hannah Illing
Hui Wong
Imogen Porter
Janice Suhardja
Jenna Faykosh
Jeyah Cruz
Joshua Chen
Kaede Ito
Kaila Villarey
Katherine Cheng
Kenny Go
Kensley Leung
Keren Chen
Lin Shen
Lulu Wang
Marium Ahmed
Mary Zhou
Mashenka De Silva
Matt Major
Melody Cheng
Nicole Katz
Nishi Parmar
Ramit Seth
Rebecca Storey
Rosemary Vayalikulnel
Samantha Ma
Serena Chai
Shayda Taheri
Sherry Khoddami
Sofya Babak
Stephanie Quon
Tanaya Parakh
Terry Chen
Tony Jiang
Tricia Lee
Vanessa Banasiak
Vanessa Quon
Waris Bhatia
Wendy Cheung
Wendy Ma
Wilson Tu
Yolanda Masacha
Yunxi Wang

Adjudicators

Adam Doelman	Iyoma Edache	Mo Shahsavari
Ademola Itiola	Jayden Lloyd	Mohamed Hendy
Alanna Shwed	Jennifer Nagel	Mohit Pandey
Alex Leatherdale	Jessica Hancock	Naiying Xue
Alvionne Karpinski	Jessica Kowalski	Nathan Schuck
Ami Truong	Jimmy Lopez	Negar Khodarahmi
Amir Bahreyni	Jinelle Panton	Neha Bhattacharya
Andrew Wu	Joana Pico Carbajo	Nejat Hassen
Andy An	Jocelyn Begin	Nicole Bailey
Andy Stock	Joe Janssen	Nicole Wang
Anna Leonova	John Kim	Nisha Marshall
Anthony Pearce	Joyce Zhang	Noah Weninger
Anurag Krishna	Judith Nuhu	Punit Virk
Arman Hejazi	Juhee Oh	Puthykol Sengkeo
Austin Shaw	Junbum Im	Qing Zhang
Bahareh Kardeh	Justin Turner	Rajan Bola
Bea Rost-Komiya	Kaela Cranston	Ricky Tsang
Bianca Fukakusa	Karen Sherwood	Riley Petillion
Bimbola Olure	Kate Huang	Ritwik Bhattacharjee
Brianne Newman	Katherine White	Rodrigo Vallejos
Carrie Krekoski	Katie Florko	Sam Mar
Cates Bayabay	Katie Koralesky	Samuel Griffin
Cecilia Jalabert	Kattie Sepehri	Sarah Dickson-Hoyle
Cesar Monjaras Avila	Khushbu Patel	Sarah Woodward
Che-Min Lee	Laura Meleady	Sean Harrigan
Christina Michalski	Laurabelle Kakulu	Sean Ritter
Claudius Soodeen	Lauren Erland	Shabnam Hossein Khalaj
Collince Achar	Lauren St-Germain	Shaghayegh Nouruzi
Courtney van Ballegoie	Lexis Ly	Shahid Abrar-ul-Hassan
Daniel Luo	Liam Golding	Shahrzad Elmi
David Cohn	Linnea Kalchos	Shayan Shakeraneh
Debanjana Kundu	Liz Meshel	Sibyl Drissler
Durjoy Baidya	Lorenzo Lindo	Siobhan Schenk
Eli Haynes	Lourdes Gonzalez Arreola	Sofia Gray
Emel Islamzada	Maddie Eghtesad	Svetlana Zdero
Emily Kamma	Madeline Lauener	Tala Maragha
Erika Balcombe	Madison Earhart	Tan Le
Fang Fang Li	Mai EL Najjar	Teesha Luehr
Fatima Afshar Ghahremani	Manish Toofany	Thea Brain
Fiana Kawane	Maria-Elizabeth Baeva	Theodore Lam
Forouh Kalantari	Marjan Zare	Tianna Sihota
Harshit Srivastava	Martin Dehn	Vaishnavi Sridhar
Heather Burt	Maryam Tayyab	Vanessa White
Henry John	Matt Luzentales-Simpson	Vicky Li
Ianna Folkes	Melvin Chan	Zainab Kehinde
Iraj Dehghan Hamani	Michelle Gagnon	Zara Vali
Issraa Shoucair	Michelle Pewarchuk	

WAVE 1 ORAL & POSTER PRESENTATIONS



WAVE 1 ORAL PRESENTATIONS

March 20, 10:30 AM - 11:45 AM

Room 1

Investigating the Role of Protein Palmitoylation in Learning and Memory	Kira Tosefsky
The Contribution of Epigenetic Factors to the Susceptibility and Pathogenesis of Parkinson's Disease	Jade Li Christy Truong Sila Rogan
Modeling anti-cancer T cell function against cancer cells	Jared Dutra
Investigating the Role of Neural Transcription Factor BRN2 in Neuroendocrine Bladder Cancer	Ariel Qi

Room 2

Investigating the role of pten phosphatase in the PI3K/AKT pathway in regulatory T cells using genome editing	Prakruti Uday
Developing tools to improve parent health literacy in nephrotic syndrome	Ella Chan
The effects of age on depression in individuals with traumatic brain injury: a mixed-methods study	RJ Kang Kimia Nouhi Joyce He Caris Tin
Access of Professional Health Information and Related Barriers in Urban, Suburban, and Rural Populations in British Columbia	Kawami Cao Diana Lee

Room 3

Application of filtered pulse light processing on beer decontamination	Andrew Suwardi
PACER Project - Pharmacy Cases Development for a Simulated Electronic Medical Records Database	Jenny He Katie Bishop

How to Beat Random Forest Regression: Choosing XGBoost Hyperparameters for Hydrological Datasets

Divya Bilolikar
Aishwarya More

In-situ methane production on Mars

Omer Shinnawy

Investigating the Effect of Midazolam on Mouse Aversion to Isoflurane in a Place Conditioning Paradigm

Alex San Pedro

Room 4

Phylogenetics of *Carex diana* Steud., a sedge endemic to St Helena

Cassandra Bradshaw

Co-localization of cellulose synthases and xylan in Golgi-independent compartments during plant secondary cell wall construction

Samuel King

Spatio-temporal distribution and habitat preference of Western toadlets at Frederick Lake

Mahy Saleh

Adapting to a warming world: the effect of temperature on heart rate throughout killifish embryonic development

Ariel Shatsky

WAVE 1

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Investigating the Role of Protein Palmitoylation in Learning and Memory

Presenter(s): Kira Tosefsky

Abstract:

Synaptic plasticity refers to the activity-dependent tuning of the strength or efficacy of synaptic transmission and represents the cellular basis of learning and memory. Post-translational protein modifications play a central role in synaptic plasticity, with the reversible lipid modification, protein palmitoylation, emerging as a key contributor to this process. However, the mechanisms by which activity-dependent changes in protein palmitoylation may mediate synaptic plasticity remain unclear. To investigate this question, the Bamji Lab conducted a proteomic assay to identify hippocampal proteins that were differentially palmitoylated in response to contextual fear conditioning in mice, from which 121 such proteins were identified. The goal of my project was to characterize these proteins with respect to their subcellular locations, biological functions and disease associations. I found that these 121 proteins were enriched for protein-protein interactions, with 46% of these proteins constituting synaptic proteins involved in neurotransmission and plasticity, and the remaining 54% constituting non-synaptic proteins implicated in metabolic processes. Our protein list was enriched for associations with a range of neurological and psychiatric diseases involving impairments in synaptic plasticity, and contained proteins previously shown to be differentially expressed, phosphorylated, myristoylated or trafficked in response to synaptic activity. These results suggest that activity-dependent palmitoylation may help regulate both short-term activity-dependent changes in synaptic transmission and longer-term activity-dependent changes in neuronal metabolism through two distinct clusters of proteins. These findings will help to clarify the role of dynamic protein palmitoylation in synaptic plasticity and learning, and the role of dysregulated palmitoylation in brain disease.

WAVE 1

ORAL ABSTRACTS

Theme: Health and Wellness

Title: The Contribution of Epigenetic Factors to the Susceptibility and Pathogenesis of Parkinson's Disease

Presenter(s): Jade Li, Christy Truong, Sila Rogan

Abstract:

Parkinson's disease (PD) is a devastating neurodegenerative disorder involving a progressive loss of control of movement, and is currently incurable. While it is known that PD is caused by the loss of dopamine secreting neurons, the mechanisms underlying this loss are complicated and not fully understood. Potential causes include changes to the physical structure of the DNA of the dopamine secreting neurons (broadly known as epigenetic processes), such as post-translational histone modifications and DNA methylation, that alter the physiological properties of the dopamine-secreting neurons without changing their DNA sequence. Dysregulation of epigenetic processes in dopamine-secreting neurons have been implicated in several PD-specific cellular abnormalities including the accumulation of α -synuclein proteins or Lewy bodies or the destruction of mitochondria.

The purpose of this study was to create a model that highlights the most important epigenetic mechanisms involved in PD and focus on a novel exploration of how they are integrated to contribute to the susceptibility and pathogenesis of PD. We examined the various proposed causative epigenetic mechanisms underlying PD by using recent primary articles to articulate and hypothesize how these mechanisms might interact with each other and ultimately lead to the development of PD. Overall, this study contributes to the deeper understanding of the epigenetic regulation of PD pathways which may offer diagnosis options of early-stages of PD, development of more effective treatment, and novel employment of epigenetic modulators as neuroprotective therapies.

WAVE 1 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Modeling anti-cancer T cell function against cancer cells

Presenter(s): Jared Dutra

Abstract:

Recent research has focused on harnessing the cancer-fighting capabilities of the immune system in order to utilize immune cells such as T cells as anti-cancer therapeutics. T cells are able to travel throughout the body to locate and kill cancer cells, but to do so they must express a receptor that recognizes a protein produced by cancer cells (antigen) and become activated. Most T cell-based immunotherapies try to achieve the strongest possible activation of T cells. However, recent studies have shown that in vivo anti-cancer function is improved with weaker T cell activation. Thus, we hypothesize that using antigens that lead to weaker T cell activation may in fact improve T cell anti-cancer activity and clearance of cancer cells. To investigate this, we generated several mouse cancer cell lines expressing chicken ovalbumin (a model antigen). By performing co-cultures with ovalbumin-targeting mouse T cells, their cancer cell killing ability can be readily assessed. Anti-cancer T cell activity indicated by pro-inflammatory signalling molecule production and cancer cell death was quantified with flow cytometry-based assays. Our preliminary data suggests that T cells activated with lower affinity ovalbumin mutants show enhanced activity against wild-type ovalbumin, resulting in improved cancer cell killing. In the context of human cancer therapy, the use of lower affinity activation might also maintain anti-cancer activity when high-affinity targets are lost or mutated. This study provides further insight into improved methods for the activation of T cell products for immunotherapies, aimed to improve tumor clearance and increased patient survival rates.

WAVE 1

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Investigating the Role of Neural Transcription Factor BRN2 in Neuroendocrine Bladder Cancer

Presenter(s): Ariel Qi

Abstract:

Neuroendocrine (NE) cancers contain specialized cells that resemble nerve and hormone-producing cells in the body. Neuroendocrine bladder cancer (NEBC) is a rare disease, representing only 1% of bladder cancer (BC) cases. Prognosis of NEBC is poor compared to other BC variants, and its therapeutic management has been based on clinical experience in NE lung cancer. Due to its rarity, the mechanisms controlling the origin and progression of NEBC remains largely elusive, and there is no consensus on standard treatment. Existing literature shows that BRN2, a neural transcription factor protein (encoded by POU3F2 gene), has been found to be a key driver of NE prostate cancer. Further, based on the analysis of patient data in The Cancer Genome Atlas, BC patients with high BRN2 expression show a neuronal subtype in 64% of the cases. With this groundwork, the current study aims to investigate the role of BRN2 in driving NE differentiation in BC. Our approach is to overexpress BRN2 in urothelial BC cell lines; and we hypothesize that this will drive the cell lines to acquire a NE phenotype. We will examine the effect of BRN2 on the expression of NE markers and downstream markers indicative of BRN2 activity, both at the mRNA and protein levels. Further, we will investigate how BRN2 overexpression may influence cell proliferation, migration and invasion in vitro, which are indicative of aggressive tumor behaviour. Understanding the role of BRN2 in lethal NEBC may uncover a potential therapeutic target for the treatment and prevention of NEBC.

WAVE 1

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Investigating the role of pten phosphatase in the PI3K/AKT pathway in regulatory T cells using genome editing

Presenter(s): Prakruti Uday

Abstract:

Regulatory T cells (Tregs) are a subset of immune cells that suppress excessive immune responses. Dysregulation of Treg function results in autoimmune diseases like type 1 diabetes. Tregs administered to patients as immunotherapies for the treatment of autoimmunity and organ transplant issues must remain stable and not aggravate existing health issues. Phosphatase and tensin homolog (PTEN) is an enzyme implicated in maintaining Treg stability. It is highly expressed in Tregs and negatively regulates the activity of other enzymes like PI3K and Akt in intracellular signalling pathways. PTEN deficiency in mouse models and humans results in autoimmunity and cancer. However, while mouse PTEN-deficient Tregs lose expression of key Treg proteins and become unstable, their human counterparts are similar to healthy Tregs. To address the discrepancies between these findings, we studied the effect of PTEN deletion on human Treg function, expression of Treg proteins, and activation state of proteins in signalling pathways. We isolated human Tregs from human blood, generated PTEN-deficient Tregs using genome editing, then probed the function and protein expression profile of Tregs using flow cytometry. We found that PTEN-deficient Tregs had enhanced growth and higher signalling activity compared to unedited cells. In addition, human PTEN-deficient Tregs exhibited largely unchanged expression of Treg proteins and superior suppressive ability compared to unedited cells. Our results suggest that alternative mechanisms may control Treg function in the absence of PTEN. This research can help elucidate the molecular mechanisms by which Tregs remain stable and functional, with clinical impacts for the use of Tregs as immunotherapies.

WAVE 1

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Developing tools to improve parent health literacy in nephrotic syndrome

Presenter(s): Ella Chan

Abstract:

Purpose of Study: With prior research demonstrating that parent health literacy test scores impact health outcomes in pediatric cases of nephrotic syndrome, the project aimed to develop online lesson-plans that support parent health literacy by teaching immunology topics and condition-specific topics.

Methods Used: Lesson-plans were developed through research into effective online facilitation techniques and important aspects of nephrotic syndrome from a family and patient care perspective. The selected activities were then developed into lesson-plans, integrating parent and child engagement in each activity. All lessons were run over Zoom, allowing for continued engagement in a socially and geographically distanced format.

Summary of Results: Three lesson-plans were developed as hands-on activities that utilized accessible materials families could find in their kitchen. These lessons were facilitated through three sessions to 8 families who were surveyed on their knowledge confidence pre- and post-lesson. Highlights of the lesson plan include the "Innate Immune System Layered-Liquid Tower," the "Active Immune System Annotation Game," and the "Coffee Filter Nephrotic Syndrome Demonstration."

Conclusions: Parent feedback, while preliminary, suggested an increase in parental confidence in the discussed immunology and nephrotic syndrome topics. The creation of the lessons was successful, with three accessible online-facilitation based lesson-plans created to address three aspects of the condition. Research into the impact of lesson-plans on specific health literacy metrics is ongoing.

WAVE 1

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The effects of age on depression in individuals with traumatic brain injury: a mixed-methods study

Presenter(s): RJ Kang, Kimia Nouhi, Joyce He, Caris Tin

Abstract:

Background: Individuals who have sustained a traumatic brain injury (TBI) often develop a depressive disorder that can cause constant feelings of sadness, hopelessness, or anhedonia which affects their daily life and overall behavioural function. Current literature suggests that without a brain injury, young adults experience higher levels of depression compared to younger and older age groups due to struggles with societal expectations and the transition to adulthood. While previous research has explored the effects of depression within specific age groups, the connection between the age of individuals with TBI and the severity of depression is still unknown.

Objectives: This study investigates the effects of age on the severity of depression in individuals with moderate TBI (scoring 9-12 on the Glasgow Coma Scale) using a mixed-methods design.

Methods: Approximately 20-30 participants consisting of adolescents (10-17 years old), young adults (18-25), and elders (60-67) with moderate TBI will be recruited through purposive sampling. The Patient Health Questionnaire-9 will be administered to obtain quantitative data for levels of depression, and analyzed using descriptive statistics. Interviews will be conducted to obtain qualitative data, and themes generated using thematic analysis.

Conclusion: We expect the young adult age group with TBI to experience more severe forms of depression. Understanding the role of depression in different age groups has the potential to improve early detection and diagnosis of depression in individuals who have experienced TBI. The findings of this study will also help facilitate future psychological and rehabilitation research.

WAVE 1 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Access of Professional Health Information and Related Barriers in Urban, Suburban, and Rural Populations in British Columbia

Presenter(s): Kawami Cao, Diana Lee

Abstract:

Background: Facilitating access to reliable evidence-based health information is an essential component of healthcare delivery. With this regard, communities and individuals might experience various barriers. Studies exploring the access of urban, suburban, and rural populations to health information provided by healthcare professionals have been mainly conducted in the United States. This knowledge is lacking in British Columbia (BC), a province with unique regional diversity. Furthermore, many studies focus on external barriers rather than internal processes within individuals.

Purpose: The purpose of this study is to explore and compare: (1) access of professional health information; (2) related individual, sociocultural, and clinical barriers; and (3) utilized sources of health information in urban, suburban, and rural populations in Lower Mainland, BC.

Methods: The proposed study consists of a survey followed by an interview. Approximately 400 residents in the area will be randomly surveyed over a 2-week period. The data will be analyzed to determine factors of access to health information. Subsequently, interviews will provide insight into individual experiences of participants.

Expected Results: We expect to find that rural communities in BC experience a lower level of access to professional health information. Barriers that may be experienced disproportionately by rural populations include internal processes, such as negative attitudes to healthcare providers, as well as external factors. Suburban communities may experience similar levels of access and barriers as urban communities.

Conclusions: This study can provide valuable insights to inform policy change, training of healthcare providers, and implementation of social programs to ultimately improve healthcare delivery.

WAVE 1

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Application of filtered pulse light processing on beer decontamination

Presenter(s): Andrew Suwardi

Abstract:

Beer spoilage by bacterial contamination is a common problem the beer production industry continuously faces. Spoilage may lead to turbidity, acidification, and the production of compounds with undesirable odour such as diacetyl and hydrogen sulfide. Although beers naturally have microbial hurdles, including the presence of iso- α -acids as antimicrobial agents, 70% of all beer spoilage incidents have been attributed to lactic acid bacteria. Commercial breweries have employed pasteurization or microfiltration to eliminate bacteria, but each has its drawbacks. Pulsed light (PL) processing is a novel technology that flashes UV-Vis and IR electromagnetic pulses to decontaminate foods through a continuous process. The challenge of exposing UV wavelengths to beer is the photodegradation of iso- α -acids that form 3-methylbut-2-ene-1-thiol (3-MBT). 3-MBT is an undesirable volatile compound with one of the lowest sensory thresholds of 4 ppt in beer. The usage of optical polycarbonate sheets to filter out wavelengths lower than 400 nm and its effect on *Lactobacillus brevis* reduction and 3-MBT formation were studied. Blonde and red ales were exposed for 18.65 s, 28.53 s, and 155.11 s at 3 flashes per second. Beers were treated with clear and bronze-colored polycarbonate sheet filters and with no filter as controls. *L. brevis* reductions were determined by plating on 3M LAB Petri-films. 3-MBT in pre-treated and post-treated beers were quantified through HS-SPME-GC-MS method. Physicochemical properties such as pH, color, Brix, and bitterness unit, were also examined. Findings of this research have not been concluded fully as the researchers are in the process of collecting data.

WAVE 1

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: PACER Project - Pharmacy Cases Development for a Simulated Electronic Medical Records Database

Presenter(s): Katie Bishop, Jenny He

Abstract:

The Electronic Medical Record (EMR) is a computer-based patient record utilized by pharmacists and other healthcare professionals to access patient information in various healthcare settings. In order to provide effective patient care, pharmacists need to be proficient in using an EMR. Currently, within the Entry-to-Practice Doctor of Pharmacy (E2P PharmD) program, students are exposed to EMRs through didactic learning and do not receive any hands-on practice using this tool. Without this practical training, we suspect pharmacy students are finding it challenging to gather patient information and apply clinical knowledge when they encounter EMR systems during their clinical rotations. The PACER project (Pharmacy Cases Development for a Simulated Electronic Medical Records Database) is currently being piloted during the first three years of the E2P PharmD program. Students are provided with access to a simulated EMR database and use it to practice locating relevant patient information, which is then applied to simulated patient cases. The PACER project's effectiveness will initially be evaluated through pre- and post-EMR activity surveys circulated to students and instructors. We expect students to report improved ability to navigate an EMR database and greater confidence in providing patient care. Furthermore, instructors will report improved student performance in assessing patients and making impactful recommendations to patients' drug therapy. Should the implementation of the PACER project at UBC result in successful outcomes, we hope other pharmacy faculties across Canada will expand on our findings and offer similar opportunities for their students in the near future.

WAVE 1

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: How to Beat Random Forest Regression: Choosing XGBoost Hyperparameters for Hydrological Datasets

Presenter(s): Divya Bilolikar, Aishwarya More

Abstract:

Predictions are a central part of water resources research. Historically, physically-based models have been preferred; however, they have largely failed at modeling hydrological processes at a catchment scale and there are some important prediction problems that cannot be modeled physically. As such, machine learning (ML) models have been seen as a valid alternative in recent years. In spite of their availability, well-optimized state-of-the-art ML strategies are not being widely used in water resources research. This is because using state-of-the-art ML models and optimizing hyperparameters requires expert mathematical and statistical knowledge. To leverage data and use it effectively to drive scientific advances in the field, it is essential to make ML models accessible to subject matter experts by improving automated machine learning resources. ML models such as XGBoost have been recently shown to outperform random forest (RF) models which are traditionally used in water resources research. In this study, based on over 150 water-related datasets, we compare XGBoost and RF and show strong evidence, both in efficiency and effectiveness, for the efficacy of XGBoost. This study provides water scientists with an R package (BeatRF) that will give them access to quick user-friendly XGBoost model training. The R package incorporates both a state-of-the-art HPO algorithm and meta-learning such that fully optimized XGBoost models can be used in water resources research with ease.

WAVE 1

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: In-situ methane production on Mars

Presenter(s): Omer Shinnawy

Abstract:

Methane, the simplest yet important organic molecule, that can be produced from the electroreduction of carbon have many applications. One of its application is using methox s propellant as a substitution to hydrogen ox fuel. The production of rocket propellant on Mars can drastically reduce the cost and size of mission. This is mainly due to the significant reduction on the quantity of hydrogen required to be supplied.

There have been proposals for methane to be produced on Mars using water electrolysis, Sabatier and water gas shift reactor. These reactors can be substituted by a solid oxide electrolyzer cell (SOEC) which works on the co-electrolysis of carbon dioxide and water as well as water-gas shift and methanation reaction. Using ideal conditions for the tested tubular SOEC, CO₂-to-CH₄ conversion ratio of 98.7% with an electrical efficiency of 94.5% can be achieved. The objective of the project is to find out which impurities present in martian atmosphere affect CO₂-to-CH₄ conversion ratio, faradaic efficiency, and electrical efficiency. The CO₂-to-CH₄ conversion ratio can be calculated by using gas-chromatography. In addition, we want to find out what is the threshold limit of each impurity.

The impurities used are N₂(0-5.20%), O₂(0-0.348%), CO(0-0.149%) and SO₂(0-200ppb). The percentage of impurities in the inlet streams can reach twice their percentage in Martian atmosphere. This is will allow us to improve our SOEC, if needed, and make it more resilient. It is expected that O₂ will not affect the performance of SOEC as it is one of the products produced. However, CO will shift the equilibrium of the water-gas shift and methanation reaction. N₂ impurities will react with O₂ to produce unwanted NO_x. SO₂ poses the greatest threat. This is because reaction of SO₂ or produced SO₃ with O₂ is highly incompatible due to it being an explosive exothermic reaction and other results. Further analysis of the SOEC will decide whether it is applicable or not for use on Mars and how to proceed with the project.

WAVE 1

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Investigating the Effect of Midazolam on Mouse Aversion to Isoflurane in a Place Conditioning Paradigm

Presenter(s): Alex San Pedro

Abstract:

In the past decade, mice have remained as one of the most used research animals in Canada; as such, it is of great interest to provide mice with a humane death. The following euthanization method is commonly employed: mice are exposed to isoflurane (an inhalant anesthetic) prior to being euthanized via carbon dioxide inhalation. However, rodents exhibit learned aversion to isoflurane, which adds unnecessary distress associated to euthanasia. Midazolam is an anxiolytic drug used in conjunction with anesthesia in humans and has been linked to positive valence effects. In this study, it was hypothesized that using midazolam would reduce the learned aversion that mice express towards isoflurane. Mice were tested in a place conditioning paradigm after being allocated to one of three experimental groups: (1) mice were exposed either to isoflurane or oxygen, (2) mice were given either midazolam or only the vehicle, and (3) mice were given midazolam and exposed to isoflurane or only given midazolam. No significant effect of treatment was found for mice in each experimental group. Furthermore, it was found that mice showed a preference for a specific side of the testing apparatus after conditioning. Due to the nature of isoflurane aversion in mice, the place conditioning paradigm was limited to only one conditioned exposure per treatment. In addition, the small sample size may have exacerbated this paradigm's limitations. Although these results are descriptive because of this study's limitations, it may indicate that midazolam is not an effective intervention for reducing isoflurane aversion.

WAVE 1

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Phylogenetics of *Carex diana* Steud., a sedge endemic to St Helena

Presenter(s): Cassandra Bradshaw

Abstract:

Carex diana Steud. is an endemic sedge species from the island of St Helena. Morphology-based taxonomy for *Carex* is problematic and has led to a push for taxonomic re-arrangement using molecular methods. Previous molecular studies investigating the genus *Carex* have elected not to sequence *C. diana*. This leaves questions about its evolutionary history unresolved, and its phylogenetic placement unconfirmed. Additionally, it is unknown what genetic variation exists within *C. diana*. Our aim was to test the hypothesis that *C. diana* is a member of *Carex* section *Spirostachyae*, which is the current placement based on morphology. We also hypothesized that *C. diana* would show little genetic variation. We sequenced the *matK*, *trnK*, ITS (internal transcribed spacer) and ETS (external transcribed spacer) gene regions of several *C. diana* individuals. Phylogenies were generated with additional species' sequences from GenBank. Concatenated sequences of the most variable gene regions, ITS and ETS, show that *C. diana* is placed within *Carex* sect. *Spirostachyae*, and is sister to a clade that is ancestrally South African. The results estimate *Carex diana*'s ancestor likely dispersed to Saint Helena from South Africa 4.16 million years ago. Within *C. diana*, the chloroplast genes (*trnK* and *matK*) clustered into two distinct groups and the nuclear genes (ITS and ETS) clustered into three. These results elucidate a section of the phylogenetic tree of *Carex*, and knowledge of the genetic variation within *C. diana* will inform conservation efforts. Future research may investigate if this genetic variation warrants description of *C. diana* as multiple species.

WAVE 1

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Co-localization of cellulose synthases and xylan in Golgi-independent compartments during plant secondary cell wall construction

Presenter(s): Samuel King

Abstract:

The plant secondary cell wall is one of the most ubiquitous biocomposites of the natural world, with its components cellulose and xylan being the first- and third-most abundant organic polymers on the planet, respectively. Secondary cell wall construction involves highly regulated coordination of intracellular vesicle trafficking from the Golgi to the plasma membrane; however, it is unknown whether many cell wall materials are trafficked together or separately. We used transmission electron microscopy (TEM) to localize cellulose synthases (CESAs) and xylan in Golgi-independent compartments en route to the plasma membrane. Specifically, we used immunogold TEM, which involved tagging CESAs and xylan with antibodies that carry electron-dense gold particles that appear starkly under TEM. Reprogrammed secondary cell wall-synthesizing cells of *Arabidopsis thaliana* were used for a more effective visualization of CESAs and xylan. Here we aim to describe for the first time, the localization of secondary cell wall CESAs under immunogold TEM, and the potential co-localization of CESAs in transit with xylan. The elucidation of their cooperative transport mechanisms will shed light on the coordination across organelles during cell wall development, and is critical for understanding how to manipulate the composition of secondary cell walls for sustainable biomaterials.

WAVE 1

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Spatio-temporal distribution and habitat preference of Western toadlets at Frederick Lake

Presenter(s): Mahy Saleh

Abstract:

Road mortality and trampling due to recreational activities negatively impact wildlife populations. Many amphibians have a biphasic life cycle involving aquatic eggs and larvae that metamorphose into terrestrial or semiaquatic juveniles and adults. Species with a biphasic life cycle are particularly vulnerable. In this study, we surveyed *Anaxyrus boreas*, western toadlets at Frederick Lake to understand if their interaction with a previously installed barrier to keep the toadlets off the driveway at the lake was more harmful than beneficial and to determine other possible mitigation strategies. We surveyed five beaches during the day and at night over two weeks. We measured daily patterns of toadlet abundance up the shore into the forest, toadlet habitat preference, and detectability of tadpoles and toadlets along the shore's length. Toadlet abundance was highest close to the shore during the day, while at night, all toads were found within 10 meters of the shoreline. Toadlets showed a preference for rocky and grassy habitats and larger cover rocks. Detectability of tadpoles and toadlets was below 50% for both day and night but lowest at night. Since toadlets did not show diel migration patterns away from the shore, we concluded that the barrier is not doing any harm. We also recommend closing off public access to the driveway altogether, as well as imitating the preferred habitat along the sides of the driveway to minimize the trampling of toadlets.

WAVE 1

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Adapting to a warming world: the effect of temperature on heart rate throughout killifish embryonic development

Presenter(s): Ariel Shatsky

Abstract:

Warming oceans are a distinguished marker of climate change expected to influence an organism's entire physiology. Arguably the most essential physiological system, the cardiovascular system's performance is heavily influenced by the temperature of its environment. *Fundulus heteroclitus*, or Atlantic killifish, is used in this study to analyze the effect of temperature on heart rate throughout embryonic development. This will be probed further through a molecular analysis of cardiac genes and their activity throughout development. Temperature is known to produce an effect on heart rate in adult killifish but its impact on heart rate throughout embryonic development is unknown.

We hypothesize that heart rate will increase over development and exposure to higher temperatures will increase heart rate. Embryos were reared in conditions representing a low, middle and high temperature within their normal range: 21°C, 24°C, and 30°C until hatch. Videos of embryos were taken using video microscopy on a temperature-controlled microscope stage to collect heart beats per minute. To assess acute temperature exposure, embryos reared at 30°C were exposed to 21°C and 24°C treatments. Embryos reared at 24°C were exposed to 21°C and 24°C, and embryos reared at 21°C were exposed to 24°C and 30°C.

Heart rate was found to increase over development. In higher temperature conditions (24°C and 30°C) heart rate was significantly faster than the same development point in the low temperature condition (21°C). This research offers applications to the likelihood of survival and stress responses of fish exposed to increased environmental temperatures as a result of climate change.

WAVE 1 POSTER PRESENTATIONS

March 20, 10:30 AM - 11:45 AM

Room 1

Epidural stimulation restores meaningful function after spinal cord injury: A systematic review	Risa Fox
Coral Restoration: Difference in growth rates between two types of fragments in the Staghorn coral <i>Acropora cervicornis</i>	Ashley U
Exploiting splice-variant drug responses in order to drive personalized treatment of breast cancer in the clinic	Harleen Dhaliwal Brian Mgbiri Jason Chen Jina Lee Tseng Leung Rachel Wang
A Novel miRNA Expression-Based Classification of Breast Cancer Tumours	Wayne Fan Tanmay Thakral Dongkyu Lee
Investigating the most prominent meteorological factor on COVID-19 transmission rates in the highest impacted Canadian health regions using machine learning	Vanessa Chow Megan Wong Isaac Chung

Room 2

Heat Therapy as Additional Treatment for Rheumatoid Arthritis	Rosemary Vayalikulnel Pollen Haque Natalie Hope Aeman Sandhu
Interaction of estrogen and leptin via the STAT3 pathway in neurons co-expressing their receptors to modulate energy metabolism	Amrit Pal Bhela Priya Leghari Joshua Shin Angela Zhang Ceci Yang

Cognitive Control on Reward-Seeking Behavior

Aanandi Sidharth

Investigating the Role of Genetics in Cisplatin-Induced Ototoxicity in Pediatric Cancer Patients

Peter Tiu
Sam Nalliah
Ayesha Mushtaq

Room 3

Reminders of God and Risk Taking Behaviours

Chloe Dean

The effect of mianzi on mental health stigmatization and PLMI recovery in Hong Kong

Samantha Pang

Residual Stone Fragments Management After Percutaneous Nephrolithotomy

Tianshuang Zhong

Beyond the Resumé: Purity Homophily and Its Impacts on Social Affiliations at the Workplace

Sahana Babu

The Impact of Blue Space on the Mental Health of Metro Vancouver Residents

Kerri Jesson
Alisha Temirova
Christopher Demirel
Timothy Wong

Room 4

Differences In Organic Matter Removal Treatments Do Not Influence Soil Microbial Diversity in British Columbia Managed Forests

Adam Dorner
Chris Breden
David Liang
Juan Camilo Burckhardt

Impact of Arbuscular Mycorrhizal Fungi and Varying Levels of Fertilizer on Field Pea Yield

Maddie Lilly

The relationship between pelagic larval duration and latitudinal range shifts of coastal invertebrates

Alexandra Reinhardt

Development of Metacognitive Training for Substance Use Disorder

Marisha Boyd
Kate Phillips

Environmental-Friendly Face Masks for Efficient Viral Filtration Effects

Emily Chiao
Sandy Dutta
Jasmine Lee
Bessie Wei

WAVE 1 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Epidural stimulation restores meaningful function after spinal cord injury: A systematic review

Presenter(s): Risa Fox

Abstract:

Introduction.

Epidural spinal cord stimulation is a neuromodulation technique that can evoke sensorimotor responses below the level of lesion in spinal cord injury. However, due to the invasive nature of this procedure and the low number of SCI research participants, there have yet to be many studies examining the effects of epidural stimulation on spinal cord injury populations. This review aims to assess the efficacy of epidural stimulation in restoring meaningful function after SCI, particularly in the areas of bladder, circulatory, motor, respiratory, spasticity, and non-traumatic spinal cord lesion.

Methods.

A search for relevant studies was conducted electronically through the following databases: EMBASE, MEDLINE, CINAHL, and PsycINFO. The search was carried out from June 2019 to July 2020, identifying studies published between 1976-2020 that investigated the use of epidural stimulation following SCI. The search terms used were a combination of terms used to describe "epidural stimulation" and "spinal cord injury".

Results.

The search initially resulted in 2928 papers, of which 17 studies and 4 systematic reviews were included in the systematic review. The total SCI sample size comprised of 126 persons. All studies applied stimulation from the lower cervical to upper thoracic levels, most commonly in a 16-electrode array. Epidural stimulation was reported to provide positive effects in treating bladder, circulatory, motor, respiratory, spasticity, pain, and non-traumatic spinal cord lesion. Some adverse effects were reported.

Conclusions.

Epidural stimulation has been reported to improve outcomes in some participants' function in bladder, movement, spasticity, and pain. However, more research should be conducted to further evaluate the efficacy of this treatment, particularly in areas not related to motor function, to further understand its applicability in a clinical setting.

WAVE 1

POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Coral Restoration: Difference in growth rates between two types of fragments in the Staghorn coral *Acropora cervicornis*

Presenter(s): Ashley U

Abstract:

A commonly used coral restoration method is coral gardening, where coral fragments collected from parent colonies are raised in nurseries prior to outplanting. Recent efforts have been made to enhance the success of restoration techniques, as populations of Staghorn corals have been rapidly decreasing due to multiple natural and anthropogenic stressors. Studies have shown that fragmentation can lead to enhanced growth in coral fragments, a phenomenon known as pruning vigor. To determine whether fragments sourced from different positions on the same colony showed evidence of pruning vigor, we compared growth rates of apical and proximal fragments in the Staghorn coral, *Acropora cervicornis*. Coral colonies representing 10 coral host genotypes from a nearshore coral nursery in Fort Lauderdale, Florida were fragmented ($n = 367$), and measurements of total linear extension made 27 and 61 days after fragmenting were used to calculate growth rates. Fragments were classified as either apical (obtained from branch tips) or proximal (obtained midbranch). Growth rates of proximal fragments were significantly greater than that of apical fragments at 61 days, while no difference in growth rates were found between fragment types at 27 days. This suggests that fragments were likely still healing after 27 days, and higher growth rates in proximal fragments at 61 days may be attributed to enhanced pruning vigor. Understanding how pruning vigor affects growth of different fragment types may help restoration practitioners better estimate nursery productivity.

WAVE 1 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Exploiting splice-variant drug responses in order to drive personalized treatment of breast cancer in the clinic

Presenter(s): Jason Chen, Harleen Dhaliwal, Brian Mgbiri, Jina Lee, Tseng, Leung, Rachel Wang

Abstract:

A commonly used coral restoration method is coral gardening, where coral fragments collected from parent colonies are raised in nurseries prior to outplanting. Recent efforts have been made to enhance the success of restoration techniques, as populations of Staghorn corals have been rapidly decreasing due to multiple natural and anthropogenic stressors. Studies have shown that fragmentation can lead to enhanced growth in coral fragments, a phenomenon known as pruning vigor. To determine whether fragments sourced from different positions on the same colony showed evidence of pruning vigor, we compared growth rates of apical and proximal fragments in the Staghorn coral, *Acropora cervicornis*. Coral colonies representing 10 coral host genotypes from a nearshore coral nursery in Fort Lauderdale, Florida were fragmented (n = 367), and measurements of total linear extension made 27 and 61 days after fragmenting were used to calculate growth rates. Fragments were classified as either apical (obtained from branch tips) or proximal (obtained midbranch). Growth rates of proximal fragments were significantly greater than that of apical fragments at 61 days, while no difference in growth rates were found between fragment types at 27 days. This suggests that fragments were likely still healing after 27 days, and higher growth rates in proximal fragments at 61 days may be attributed to enhanced pruning vigor. Understanding how pruning vigor affects growth of different fragment types may help restoration practitioners better estimate nursery productivity.

WAVE 1 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: A Novel miRNA Expression-Based Classification of Breast Cancer Tumours

Presenter(s): Wayne Fan, Dongkyu Lee, Tanmay Thakral

Abstract:

Background: Recent studies suggest using differentially expressed microRNAs, called miRNA signatures, as both a diagnostic and prognostic tool in the context of breast cancer. Protein expression is regulated by miRNAs, which are short, non-coding RNA strands that bind to their complementary sequences on DNA strands. While bioinformatic studies have investigated differential miRNA expression within molecular subtypes, a well-established breast cancer tumour classification system, fewer studies have focused on alternative methods of classifying breast cancer tumours. Our study focuses on using miRNA expression profiles from breast cancer patients to generate a novel classification system.

Methods: First, we collected breast cancer patient miRNA expression profiles from The Cancer Genome Atlas (TCGA) database. Then, unsupervised hierarchical clustering was used to generate clusters of breast cancer tumours based on miRNA expression levels. We used a chi-squared test to test for correlations between our clusters and molecular subtypes. Kaplan Meier survival analysis and log-rank tests were conducted to compare the prognostic outcomes of patients between clusters.

Results: From 1100 miRNAs expressed in 1202 patients, we discovered 3 significant tumour clusters based on differential miRNA expression. These tumour clusters were not found to be significantly associated with molecular subtyping (p-value: 0.43). Through subsequent survival analysis, these 3 clusters were determined to have similar survival outcomes (p-values: 0.81, 0.53, 0.85).

Conclusion: The novelty of this miRNA expression-based classification method is supported by the lack of intersection with molecular subtypes. A future direction for this study is to identify a correlation between this classification system and a specific clinical outcome in hopes to allow doctors to predict the clinical outcome of a patient in the early stages of breast cancer.

WAVE 1 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Investigating the most prominent meteorological factor on COVID-19 transmission rates in the highest impacted Canadian health regions using machine learning

Presenter(s): Vanessa Chow, Isaac Chung, Megan Wong

Abstract:

The emergence of the COVID-19 global pandemic originated in Wuhan, China in December of 2019 from SARS-CoV-2. Severe acute respiratory syndrome, more commonly known as SARS, is a respiratory illness caused by coronavirus. Approximately one year later, the world has observed over 98 million cases globally. While the scientific community focuses primarily on the direct transmission of COVID-19, it is of equal importance to consider the indirect means by which this respiratory virus can be spread. Studies have demonstrated that meteorological factors such as wind speed, and precipitation, are correlated to the indirect transmission of COVID-19; specifically when the virus is viable either in the air, or on surfaces. As certain regions have observed higher transmission rates, this project aims to investigate how meteorological factors act as potential mediators of COVID-19 transmissibility, and identify the most prominent factor. Specifically, this study examines the Canadian regions with the greatest cumulative number of COVID-19 cases since the beginning of the pandemic. Utilizing machine learning and statistical models, this project explores the impacts of meteorological factors on COVID-19 transmission rates. The study integrates linear regression, regression trees and random forest models to analyze the relationship between meteorological trends within Canadian Health Regions and COVID-19 transmissions rates. A 2020 study published in *The Lancet Microbe*, a peer-reviewed journal, found that in environments beyond 70°C, the virus cannot survive for longer than 5 minutes. As such, we hypothesize that temperature is the most prominent meteorological factor that influences COVID-19 transmissibility.

WAVE 1 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Heat Therapy as Additional Treatment for Rheumatoid Arthritis

Presenter(s): Rosemary Vayalikulnel, Pollen Haque, Natalie Hope, Aeman Sandhu

Abstract:

Introduction:

Rheumatoid arthritis (RA) is an autoimmune disease, affecting mostly women and the elderly, characterized by joint inflammation resulting in stiffness, pain, and joint damage. Common treatments of RA include medication, physiotherapy and physical activity. Heat therapy has been researched as a potential effective and inexpensive treatment when used in combination with exercise. The primary objective for this research is to examine if heat therapy has an additional impact on pain reduction for RA patients who are currently engaged in physical activity.

Methods:

This study follows a pre-post study design. A group of 100 people with RA were randomly assigned to either the intervention group (n = 50), prescribing heat therapy and physical activity, or the control group (n = 50) with only physical activity. The groups participated in cardiovascular activity for 30 minutes at 65% of maximum heart rate (HRmax). The intervention group additionally received a microwavable heat pack for two 10-minute intervals with a 20-minute break in between following physical activity. Pain levels were evaluated on a scale of 0 to 10 prior to and after the intervention(s). A t-test was used to determine the statistical significance of the intervention ($p < 0.05$).

Conclusion:

It is hypothesized that applying heat therapy to patients with RA after physical activity that is 65% HRmax will result in a more significant decrease in pain compared to the group that did not use heat therapy. If a significant difference is found between the two groups, it can be recommended that heat therapy be used as treatment in addition to physical activity.

WAVE 1

POSTER ABSTRACTS

Theme: Health and Wellness

Title: Interaction of estrogen and leptin via the STAT3 pathway in neurons co-expressing their receptors to modulate energy metabolism

Presenter(s): Amrit Pal Bhela, Priya Leghari, Joshua Shin, Angela Zhang, Ceci Yang

Abstract:

Imbalances in energy metabolism can lead to obesity and comorbidities such as Type 2 Diabetes and cancers, straining healthcare systems worldwide. Leptin is a key hormone for maintaining energy homeostasis and regulating body weight through the activation of the Signal Transducer and Activator of Transcription-3 (STAT3) pathway. Therefore, leptin has gained significant attention as a therapeutic target. Estrogen's role in energy metabolism has similarly garnered attention due to its ability to enhance leptin's activation of the STAT3 pathway in the arcuate nucleus of the hypothalamus, though the mechanism and physiological significance are unclear. We hypothesize that activation of leptin receptors in hypothalamic neurons that also express estrogen receptors sensitizes the STAT3 pathway and thus modulates energy metabolism. To establish a suitable model for testing this hypothesis, we will cross estrogen receptor Cre (ER-Cre) mice with Leptin receptor flox (ObR-flox) mice, generating mice without leptin receptor expression in estrogen receptor-expressing neurons. We will then measure and compare STAT3 activation levels between mice with intact leptin signalling (ObR-flox, ER-wildtype) and mice without leptin signalling (ObR-flox, ER-Cre) in estrogen receptor-expressing neurons. We expect lowered hypothalamic STAT3 activation, and therefore, increased feeding and body weight in mice lacking leptin receptors in estrogen-targeted hypothalamic neurons compared to controls. This study will better characterize the relationship between estrogen and leptin, which will inform better management of gestational diabetes, provide insight on energy homeostasis in post-menopausal women, and serve as the foundation for further scientific inquiry into the metabolic intricacies of estrogen and leptin signaling.

WAVE 1 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Cognitive Control on Reward-Seeking Behavior

Presenter(s): Aanandi Sidharth

Abstract:

The possibility of reward naturally and automatically triggers positive behaviors, such as working hard in a competition to win an award (Ikemoto and Panksepp, 1999). Humans aim to perform active or inhibitory reward-seeking behaviors, i.e. they either perform or suppress an action in order to receive a reward (studying more or not staying out too late so they can get into their favorite school). Capuzzo and Floresco (2020) found that in rats, inhibitory reward-seeking - but not active reward-seeking - was an action against their automatic process. While this suggested a difference in cognitive control between the two mechanisms in animals, it is important to understand the phenomenon in humans. Our research question focuses on finding differences in cognitive control between active and inhibitory reward-seeking.

In the present study, we aim for 56 student participants from UBC. Participants will perform an action (press a key repeatedly) in an active trial or withhold an action (not press the key at all) in an inhibitory trial. They will be rewarded points each time they correctly follow instructions. Based on the results of studies on rats, I predict that participants will have greater accuracy on the active reward-seeking trials compared to the inhibitory reward-seeking trials.

This research is motivated by the fact that depressed individuals typically have reduced engagement with reward-seeking behaviors (Bishop and Gagne, 2018). If there is a difference in accuracy between active and inhibitory reward-seeking behaviors, one might improve depressed individuals' engagement with reward-seeking behaviors by focusing on active reward-seeking.

References

- Bishop, S. J., & Gagne, C. (2018). Anxiety, depression, and decision making: A computational perspective. *Annual Review of Neuroscience*, 41(1), 371-388. doi:10.1146/annurev-neuro-080317-062007
- Capuzzo, G., & Floresco, S. B. (2020). Prelimbic and infralimbic prefrontal regulation of active and inhibitory avoidance and reward-seeking. *The Journal of Neuroscience*, 40(24), 4773-4787. doi:10.1523/JNEUROSCI.0414-20.2020
- Ikemoto, S., & Panksepp, J. (1999). The role of nucleus accumbens dopamine in motivated behavior: A unifying interpretation with special reference to reward-seeking. *Brain Research Reviews*, 31(1), 6-41. doi:10.1016/s0165-0173(99)00023-5

WAVE 1 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Investigating the Role of Genetics in Cisplatin-Induced Ototoxicity in Pediatric Cancer Patients

Presenter(s): Peter Tiu, Sam Nalliah, Ayesha Mushtaq

Abstract:

Cisplatin is a chemotherapeutic drug that commonly causes hearing-loss (ototoxicity) among children. This can have a profound effect on their language and social development. Our research aims to examine the relationship between genetics and the negative effects of cisplatin, specifically cisplatin-induced ototoxicity (COT). We aim to recruit and genotype 2,150 Canadian pediatric cancer patients taking cisplatin (<18 year of age).

We will perform a candidate-gene study, exploring the role of 13 genetic variants in COT chosen based on previously published associations. Assuming an additive genetic-model, we will use logistic regression to determine the association between the candidate-genetic variants and COT. Clinical and demographic variables will also be collected and tested for independent association with COT in order to isolate the effects of genetics on cisplatin-induced hearing-loss.

Genetic variants that associate successfully with COT in our cohort will be further studied to determine their functional role in hearing-loss. Using cell-lines carrying these genetic variants, we will determine whether cell death occurred or any cell function was compromised after cisplatin treatment. A live Guinea pig model will also be used to observe any altered hearing responses in the brain or microscopic changes in the ear.

This study will be one of few with such high statistical power to detect genetic associations in COT. Functional evidence will help us to further understand the role of genetics in COT. These findings may guide medical professionals towards adopting the use of genetic screening to reduce the hearing-related consequences of cisplatin in children with cancer.

WAVE 1 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Reminders of God and Risk Taking Behaviours

Presenter(s): Chloe Dean

Abstract:

For many religious individuals, God acts as a protector. When individuals think of God, they may be reminded of feelings of safety, implying that individuals who are reminded of God may be willing to take more risks. Past research has found that reminders of God may encourage individuals to take more risks; however, other research has found that reminders of God reduce risk taking behaviours. Therefore, this study aimed to clarify how reminders of God influence individuals' attitudes on risk-taking, using more reliable methods than in previous research. Participants (N = 171) completed an online survey. Participants were assigned to receive either an implicit or explicit reminder of God. In the implicit condition, participants completed a scrambled sentence task which contained words relevant to religion (e.g. God, spirit); in the explicit condition, participants were asked explicitly to think of God while making decisions about risk taking behaviour. Participants were also randomly assigned to one of two dependent measures: they reported a risk they had considered taking in the past, or they completed the DOSPERT, a self-report assessment of various risk taking behaviours. Participants' scores on these measures were assessed before the reminder of God manipulation and after. We hypothesized that reminders of God would increase self-reported nonmoral risk taking behaviours. We found that explicit reminders of God decreased risk taking behaviours for both dependent measures of risk-taking (particularly the health subcategory of the DOSPERT). We found no significant effects on either measure of risk-taking in the implicit condition.

WAVE 1 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: The effect of mianzi on mental health stigmatization and PLMI recovery in Hong Kong

Presenter(s): Samantha Pang

Abstract:

Hong Kong and many other Asian cultures desire mianzi, a concept of social perception and one's status in society. Mianzi is an important social construct and most collectivist societies often strive to maintain mianzi as it reflects social acceptance and inclusion within the society. Hong Kong continually and consistently has a prominent stigma around mental illness. Hong Kong families often neglect relatives that have mental health issues to preserve mianzi within the society. Consistent exposure to stigmatization can heavily affect the recovery of people living with mental illness (PLMI). This study aims to determine the relationship between social desire for mianzi and the recurring stigmatization around mental health. The data were collected by interviewing patients with mental illness and their families using the Face Gain/Loss measure. The Face Gain measure quantifies the desire one has for gaining mianzi and the Face Loss measure quantifies the fear one has for losing mianzi. It was determined that there is a positive correlation between high Face Gain scores and increased stigmatization towards mental health. There was also a slight positive correlation in the Face Gain score and the family's negligence of family relatives with mental health issues. Through the results of this study, the correlation between the social desire of mianzi and stigmatization of mental health can better inform future steps of reducing stigmatization. This study suggests that treatments for PLMI can be greatly improved by minimizing stigmatization in Hong Kong.

WAVE 1 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Residual Stone Fragments Management After Percutaneous Nephrolithotomy

Presenter(s): Tianshuang Zhong

Abstract:

Introduction: Current American Urological Association guidelines recommend that Percutaneous nephrolithotomy (PCNL) as the first-line management of renal stones >20 mm. However, the management of post-PCNL residual fragments (RFs) is not well documented. The purpose of this study was to define predictors of post-PCNL stone-related events (re-interventions and complications).

Patients and Methods: The retrospective study included patients undergoing PCNL between 2008 to 2020 at Vancouver General Hospital. Data were collected from patients with fragments of any size on postoperative day 1 computed tomography of the kidney, ureter, and bladder radiograph (CT-KUB), through operative note and chart review. To assess the RFs growth or passage, subgroup analysis was performed on subjects with CT-plain X-ray.

Results: Of 603 patients undergoing PCNL with subsequent CT scan within 1 day, a total of 334 patients (55%) who had postoperative imaging showed residual stone fragments measuring ≤ 1 mm. From this, 293 patients without planned secondary PCNL intervention were included in the study. A multivariate logistic regression analysis was conducted and identified that previous history of renal stones ($p = 0.031$) and size of fragment ($p = 0.001$) were the predictors for stone stone-related events. The size of fragments (4 mm cut-off) was not a significant predictor for the RF growth and re-intervention rate ($p = 0.606$ and 0.657).

Conclusions: The PCNL procedure offered a 42% true stone-free rate. However, a total of 67% of patients were stone free or had RFs ≤ 4 mm. Higher rates of stone-related events were associated with larger RFs. The RF size was not predictive for the postoperative RF growth. Our study suggests that achieving stone-free status appears to be important for post-PCNL patients.

WAVE 1 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Beyond the Resumé: Purity Homophily and Its Impacts on Social Affiliations at the Workplace

Presenter(s): Sahana Babu

Abstract:

Workplace discrimination and the effects it have on people has been widely studied. However, individual behaviours stemming from implicit beliefs and underlying mechanisms of the tendency to distance oneself from others, translate to enabling large-scale institutionalized discrimination are often overlooked.

This study aims to understand the effects that an individual's moral values, specifically on the purity dimension, have on how closely they decide to socialize with others within an official context. This is examined through the following conditions: (i) preferred level of affiliation with others they perceive to have a high morality score vs those who have a low morality score, regardless of high skills and competencies. (ii) preferred level of affiliation when the moral position of others comparative to their own. (iii) whether those on one end of the moral spectrum are preferred over others. The study is currently in the process of obtaining ethics approval and data has not yet been collected. It is predicted that the degree of preferred social affiliation will be positively associated with perceived morality. We also predict a skewed relationship when the participant's relative position is highlighted, where a high difference of scores, regardless of the direction, will predict low affiliation.

We hope that understanding the effects of moral judgements on social affiliations can provide insight into how we implicitly perpetuate prejudices at institutional levels. This would serve to better understand the intersectionality of individual beliefs and organizational practices, and how that might affect people from different social strata.

WAVE 1 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: The Impact of Blue Space on the Mental Health of Metro Vancouver Residents

Presenter(s): Kerri Jesson, Alisha Temirova, Christopher Demirel, Timothy Wong

Abstract:

Blue space is a term that refers to aquatic environments, natural or man-made, including coastal waters, lakes, and canals¹. Urban blue space has become an increasingly important role for sustainability, and overall population satisfaction^{4,5}. Previous literature reports that the presence of blue space may be associated with both mental and physical health implications². More specifically, within Metro Vancouver, existing research has found a connection between blue space exposure and perceived mental and physical health outcomes in residents³. It has also been determined that individuals living within urban centres in Metro Vancouver lack adequate access to natural spaces, creating implications for future urban planning⁴. However, there remains knowledge gaps regarding how proximity to blue spaces, and the size and type of these blue spaces, may impact the mental well being of those from different socioeconomic backgrounds, ages, and ethnicities in Metro Vancouver³. Moreover, mental illness also has an impact on productivity, subsequently resulting in an economic cost for municipalities⁵. Therefore, the conservation and location of urban blue space may become a more important consideration for policy makers. In the interest of fostering a functional, healthy and productive population, we aim to investigate the association between blue space exposure and accessibility, to the mental health outcomes of Metro Vancouver residents from diverse demographics.

¹White M. P., Elliott L. R., Gascon M., Roberts B., Fleming L. E. (2020). Blue space, health and well-being: A narrative overview and synthesis of potential benefits. *Environmental Research*, 191, 110169. <https://doi.org/10.1016/j.envres.2020.110169>

²Pasanen, T. P., White, M. P., Wheeler, B. W., Garrett, J. K., & Elliott, L. R. (2019). Neighbourhood blue space, health, and wellbeing: The mediating role of different types of physical activity. *Environment International*, 131, 105016. <https://doi.org/10.1016/j.envint.2019.105016>

³Finlay, J., Franke, T., McKay, H., & Sims-Gould, J. (2015). Therapeutic landscapes and wellbeing in later life: Impacts of blue and green spaces for older adults. *Health & Place*, 34, 97-106. <https://doi.org/10.1016/j.healthplace.2015.05.001>

⁴Jarvis, I., Gergel, S., Koehoorn, M., & van den Bosch, M. (2020). Greenspace access does not correspond to nature exposure: Measures of urban natural space with implications for health research. *Landscape and Urban Planning*, 194, 103686. <https://doi.org/10.1016/j.landurbplan.2019.103686>

⁵Bubonya, M., Cobb-Clark, D. A., & Wooden, M. (2017). Mental health and productivity at work: Does what you do matter? *Labour Economics*, 46, 150-165. <https://doi.org/10.1016/j.labeco.2017.05.001>

WAVE 1 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Differences In Organic Matter Removal Treatments Do Not Influence Soil Microbial Diversity in British Columbia Managed Forests

Presenter(s): Adam Dorner, Chris Breden, David Liang, Juan Camilo Burckhardt

Abstract:

Microbial diversity is essential to the wellbeing of a given soil ecosystem as this leads to many biological processes being possible in the environment. Organic matter removal treatments are logging practices that involve removing organic matter such as trees, branches and leaves, from a certain area. Furthermore, soil heterogeneity between layers has been linked to overall microbial diversity. Organic matter removal treatments not only have the potential to impact microbial systems, but they may also influence soil heterogeneity as well. The effects of organic matter removal treatments on soil microbial diversity and soil heterogeneity have not been extensively explored. We hypothesized that more invasive organic matter removal treatments would result in a reduction of soil heterogeneity, and by extension, microbial diversity. Using the QIIME2 pipeline, a microbiome bioinformatics software, we analyzed 16s rRNA sequencing data collected from British Columbia managed forests sites that had undergone various organic matter removal treatments. Alpha and beta diversity analysis was performed to look at microbial diversity between different organic matter removal treatment sites and compare the diversity between soil layers within each organic matter removal treatment site, respectively. We found that changes in microbial diversity were not correlated to organic matter removal treatment methods or soil heterogeneity even when confounding variables were controlled for with a logistic regression model. Nevertheless, organic matter removal treatments seem to have an effect in the abundance of certain microbial taxa. These results show that organic matter removal treatments do not appear to play a role in microbial diversity. However, other abiotic factors potentially influence soil microbial diversity and further analyses should be explored further to investigate this conclusion.

WAVE 1

POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Impact of Arbuscular Mycorrhizal Fungi and Varying Levels of Fertilizer on Field Pea Yield

Presenter(s): Maddie Lilly

Abstract:

Phosphorus (P) is an essential nutrient for crop growth, but easily accessible sources of P are limited with rapidly diminishing supply. P is also difficult for crops to use because P reserves in soil are often in a form that is inaccessible to plants. Striving to increase yields can result in large quantities of P application, often beyond crop needs, which leads to long-term soil P-surplus. This can result in nutrient pollution. In order to balance environmental protection and crop production requirements, increased P use efficiency is necessary. One option is inoculation with arbuscular mycorrhizae fungi (AMF), which can make crops more efficient with P uptake due to AMF extending the crop root area, allowing for increased nutrient availability for plants. The objective of this study is to evaluate the impacts of AMF on field pea yield response to varying levels of P fertilizer application (0x, 1x, and 2x recommended rate). This will be determined using a fully crossed experimental design with two factors: AMF inoculation, and amount of fertilizer applied. Anticipated results are that AMF inoculation will increase crop yield and AMF colonization for crops that received 0x and 1x the recommended amount of P fertilizer, because AMF increases plant nutrient uptake efficiency. Further, the crops that received 2x the recommended amount of P fertilizer and were inoculated with AMF will have large AMF networks but won't show as great an increase in yield. This is due to the AMF becoming parasitic.

WAVE 1

POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: The relationship between pelagic larval duration and latitudinal range shifts of coastal invertebrates

Presenter(s): Alexandra Reinhardt

Abstract:

If or how marine benthic organisms adapt to warming oceans is currently a large centre of focus in marine ecology. Some species distributions have shifted poleward, allowing them to stay within their temperature tolerance range and adapt to warming temperatures. Studies on benthic organisms with pelagic larva, known as meroplankton, have indicated that the length of a species pelagic larval duration (PLD) affects their distribution range. Species with larger PLDs tend to disperse farther and thus have larger geographic distributions. The role of PLD variation in influencing range shifts in response to ocean warming has not been studied. We predict that species with longer PLDs would have larger poleward shifts. We curated and downloaded distribution and PLD data for different meroplankton in the Pacific North West from the Ocean Biodiversity Information System database. Warm and cold range edges of different species were calculated and compared over time. These changes in range edges were then compared with latitudinal temperature isotherm shifts. We expect to see that as PLD increases, the distance that a species range edge has shifted also increases. This research is significant because the survival of a species depends on whether it can adapt to a warming ocean. Our results may give insight into whether species with short PLDs can shift their distributions as quickly as species with longer PLDs.

WAVE 1 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Development of Metacognitive Training for Substance Use Disorder

Presenter(s): Marisha Boyd, Kate Phillips

Abstract:

Metacognitive Training (MCT) is a therapeutic approach that aims to provide insight on dysfunctional thought patterns and coping strategies for various psychiatric disorders, and engages individuals through media and activities to find more realistic alternatives. These programs have successfully reduced symptoms in people with pathological gambling, schizophrenia, depression and psychosis. MCT is often administered in a group format, but has been proven to reduce symptoms and be engaging individually.

People with substance use disorders (SUD) often present with concurrent psychiatric disorders and can experience similar cognitive distortions as other psychiatric disorders. However, the unique cognitions and life experiences faced by people with SUD have not been addressed by a current MCT program. The present work focuses on developing an MCT guide for Substance Use Disorder. This guide is being created based on the existing MCT frameworks for other populations and literature reviews. The majority of content is being based on MCT for Pathological Gambling, as these two populations have similar diagnostic features, difficulty in controlling their thoughts, and some altered executive functions. Unique experiences to SUDs are addressed through techniques derived from existing literature. Future work will focus on adapting the MCT for SUD program to online formats and conducting studies on its efficacy in reducing symptoms of SUD. The creation of an online MCT for SUD will increase access to effective management tools for complex, and often concurrent, disorders for vulnerable populations.

WAVE 1 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Environmental-Friendly Face Masks for Efficient Viral Filtration Effects

Presenter(s): Emily Chiao, Sandy Dutta, Jasmine Lee, Bessie Wei

Abstract:

In light of the recent COVID-19 pandemic, interests in producing face masks against viruses have drastically increased. At the same time, there are growing concerns about the environmental impact of the unprecedented amount of face masks abandoned. Thus, it is important to develop environmentally-friendly face masks that are biodegradable with low toxicity while maintaining high filtration efficiency. Here, in this review, we first discuss the most recent findings related to water and air filtration methods that use biodegradable nanocellulose materials for virus retention purposes. Separation mechanisms and water flux — the rate at which water permeates a filtration membrane — are factors we consider when investigating nanocellulose properties in water treatment. The aerosol filtration efficiency can be improved considerably by increasing the density of nanocellulose fibrils. Oxidize-based cellulose nanofibril filters hold great filtration efficiency for a given pressure drop across the filter and they can be produced using two methods. Second, we discuss the major classifications of functional nanoparticles that form antiviral and virucidal coatings. We also propose a hybrid coating composed of graphene oxide with copper nanoparticles (GO-CuNPs) for higher filtration efficiency. Third, we will provide possible production procedures for eco-friendly and virucidal face masks suitable for both enveloped and non-enveloped viruses. We also suggest various testing methods for examining the permeability of nanocellulose filters under different water fluxes, the optimal pore size of the nanocellulose filters for retaining bioaerosols, and the antiviral activities of functional nanoparticles.

WAVE 2 ORAL & POSTER PRESENTATIONS



WAVE 2 ORAL PRESENTATIONS

March 20, 2:00 PM - 3:15 PM

Room 1

Understanding the Etiology of Cerebral Palsy and the Influence of Genetic Etiology on Hip Displacement	Caitlyn Siu
Computational Modelling of Macrophage Assisted Cancer Metastasis	Siddhant Sharma Chantelle So
Regulation of immune responses in newborns via the protein DDIT4L	Claire Cheung
Elucidating the mechanisms of Wnt-dependent neurite pruning in <i>C. elegans</i>	Maria Koh

Room 2

Creating virtual cell biology lessons for senior learners	Polina Petlitsyna
When epistemic issues become moral matters: The Phenomena of Public Distrust & Systemic Failures of Big Pharma	Zahin Rahman
A Guide for Hoarding in Social Housing	Priyam Joshi
The Allyship Network LIVE Study: Encouraging gender equity through virtual messaging	Em Mittertreiner
Analyzing the Discourse Feature of Authorial Self Mention Within Political Science Research Articles	Felicia Slogoski

Room 3

Development and Characterization of the Edible Packaging Films Incorporated with Blueberry Pomace	Yixin Gu
The Production of Micro-algae Biofuels	Utkarsh Dixit Tessa Price Prateeksha Aggarwal Keanna Yu

What drives sensorimotor adaptation? Corrections to online error vs. terminal error.

Sabrina Hou

Application and Validation of an Algorithm for Matching Foods and Beverages in a Canadian Branded Consumer Product Database with the Canadian Nutrient File Database

Julia Chen
Negar Karami
Jesman Punian

Testing variants of angiotensin-converting enzyme 2 (ACE2), the human receptor for SARS-CoV-2, to understand the diversity of COVID19 disease expression

Ryan Hong

Room 4

Shark by-catch in British Columbia commercial Pacific salmon and groundfish fisheries

Karlee Orvis

Characterization of the Assembly Kinetics of Legume Protein Nanofibrils

Charlotte Shi

Investigation into the extent of salmon mislabelling in Vancouver, BC (2018-Present)

Imogen Porter

The Fast And The Frugal (Fashion): Literacy on the Impact of Sustainable Consumerism

Samarth Srivastava
Anna Mylvaganam
Quyanna Whittaker
Sahana Babu
Clayton Hutt

The complex dynamical behaviour of Q-balls in collisions

Natalie Ho
Vismai Khanderao

WAVE 2

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Understanding the Etiology of Cerebral Palsy and the Influence of Genetic Etiology on Hip Displacement

Presenter(s): Caitlyn Siu

Abstract:

Introduction

The etiological diagnosis of cerebral palsy (CP) is defined as the pathophysiological cause that produces the clinical manifestation of CP. With advances in genetic sequencing, it is now estimated that an underlying genetic etiology may be identified in up to 30% of individuals with CP. For children with CP, the risk for hip displacement has been directly related to level of motor function, however, it is unclear whether children with a genetic etiology are at higher, equal, or lower risk for hip displacement than children with aetiologies such as prematurity and peri-natal infection. A child's risk for hip displacement will likely influence the choice of management method.

Methods

The Child Health BC Hip Surveillance Program for Children with Cerebral Palsy database monitors the hips of children with CP throughout the province. Children can be enrolled in the program with a confirmed or suspected diagnosis of CP, or a CP-like condition. Clinical exam data, radiographic data, and surgical data will be collected from each enrolled child. For children with a confirmed diagnosis of CP, clinical exam data will be reviewed to see if an etiology for the child's CP was ever provided. For children enrolled as "possible CP" or "other", and do not have a confirmed CP diagnosis, a list of underlying genetic abnormalities and other conditions will be compiled. A survey containing these aetiologies will be distributed to a small group of experts (geneticists, neurologists, developmental pediatricians) to determine if consensus can be gained on whether the etiology is consistent with the definition of CP when the clinical criteria for CP are met. Once the etiology and diagnosis of CP are confirmed, the risk of hip displacement will be reviewed.

WAVE 2 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Computational Modelling of Macrophage Assisted Cancer Metastasis

Presenter(s): Siddhant Sharma, Chantelle So

Abstract:

Tumour growth and spread is the main driver of mortality in cancer patients. Interestingly, various studies show that the immune system plays a key role in helping cancer cells to metastasize (break away from tumor), by invading the circulatory system and spreading to the rest of the body. The most important function of macrophages (immune cells) are to defend the body against pathogens. However, they behave differently when coming in contact with tumours, becoming tumour-associated macrophages (TAMs), which facilitate cancer cell entrance into blood vessels. Researchers are still unsure what key mechanisms are at play. Our project investigates which specific aspects of interactions between tumour cells and macrophages enable their invasion into the circulatory system. We utilize computational modeling to examine the roles of Cell-Cell Adhesion, Chemical Secretions, and Chemotaxis in this invasive process. The open-source software, Morpheus, allows us to simulate the system, investigate different hypotheses, and visualize cell behaviour and interplay. We present our findings, highlighting which interactions are key to tumour metastasis by TAMs, to improve TAM-focused therapeutic strategies in clinical cancer treatment.

“

“

WAVE 2 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Regulation of immune responses in newborns via the protein DDIT4L

Presenter(s): Claire Cheung

Abstract:

Infants born prematurely have a high risk of developing severe infections in early life. Monocytes are a type of immune cell that are essential in fighting infections, and those isolated from preterm cord blood have been found to be less responsive to bacterial stimulation.

Previously, we found increased expression of the protein DNA-Damage-Inducible-Transcript-4-Like (DDIT4L) in preterm monocytes. Considering that DDIT4L limits energy-intensive cell activity, we hypothesized that DDIT4L inhibits monocyte responsiveness to bacteria during early fetal development.

To create a model where we could assess the impact of high DDIT4L expression, we infected a monocyte cell line with a virus that would either insert an empty (EV) or a DDIT4L-expressing segment of DNA into their genetic code. Using this system, production of the DDIT4L protein can be induced through addition of the antibiotic doxycycline. We then incubated six EV and 12 DDIT4L clones with DMSO (negative control), rapamycin (positive control), and doxycycline, and assessed the following: levels of DDIT4L expression, cell count, size, and viability. We also assessed how DDIT4L overexpression affected production of cytokines, which are signalling molecules produced by immune cells that play a role in shaping the entire immune response.

We found that high levels of DDIT4L decreased cell count and size, but did not affect viability. We also found that the production of the proinflammatory cytokine IL-8 was significantly reduced upon DDIT4L overexpression. Together, these results support our hypothesis, and offer a mechanism behind the altered regulation of immune response observed in monocytes from premature infants.

WAVE 2 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Elucidating the mechanisms of Wnt-dependent neurite pruning in *C. elegans*

Presenter(s): Maria Koh

Abstract:

Wnt proteins, a highly conserved family of secreted glycoproteins, regulate several aspects of animal cellular development, such as cell proliferation, determination and migration. Wnt signaling also plays a profound role in the development and function of the nervous system. By studying the Wnt signaling pathway in the genetic model organism, *Caenorhabditis elegans*, we discovered that Wnt restricts the length of neuronal processes through a mechanism called neurite pruning. Wnt proteins act through Frizzled-family of transmembrane-receptors, which execute several distinct intracellular signaling pathways. However, the downstream signaling cascades of Wnt-dependent neurite pruning are not known. We wish to uncover these mechanisms by examining Wnt-dependent neurite pruning in *C. elegans*.

To understand the genetic and molecular mechanisms of Wnt-dependent neurite pruning, we conduct candidate genetic screening by looking for mutants with neurite pruning defects. We identified EEL-1, an E3 ubiquitin ligase required for protein degradation, and GOA-1, a guanine nucleotide-binding protein G(o) subunit alpha, as promising novel downstream effectors of Wnt-dependent neurite pruning. Loss-of-function mutants of *eel-1* and *goa-1* exhibit defective neurite pruning similar to the mutants of *wnt* and *frizzled*.

These results will improve our knowledge of the mechanisms of Wnt signaling in neurodevelopment and allow us to apply our findings from this simple model organism to more complex organisms such as humans and other mammals.

WAVE 2 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Creating virtual cell biology lessons for senior learners

Presenter(s): Polina Petlitsyna

Abstract:

While lifelong learning programming for senior (55+) learners is not a novel concept, the potential of offering specialized science programs has been underexplored. In this project, a specialized science program - a cell biology program- was developed for senior learners, with the broader aim of improving their trust in scientists and medical professionals amid COVID-19 misinformation. Three lesson plans were developed, three one-hour Zoom sessions were coordinated, and two Qualtrics surveys were distributed to a five-person cohort. Both surveys aimed to gauge the extent of the participants' cell biology knowledge as well as their trust in scientists and doctors. The first survey was distributed after the first Zoom session, the second was sent at the end of the program. The participants' survey responses combined with their feedback during Zoom discussions appeared to show an overall improvement in their scientific trust over the course of the program. While the cohort size was small, the significant shift in the seniors' responses after only three sessions demonstrates the necessity to continue supporting such programs in the future.

..

WAVE 2

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: When epistemic issues become moral matters: The Phenomena of Public Distrust & Systemic Failures of Big Pharma

Presenter(s): Zahin Rahman

Abstract:

Beyond its primary function of discovering, developing, and distributing medications, the pharmaceutical industry often has other intentions, which have become controversial – both in academic debates and public discourse. And while many can ultimately agree that the knowledge these pharmaceutical companies possess is critical to the fields of health and medicine, conflicts of interest – chiefly those concerning the privatization of science and knowledge – have caused a notable increase in public distrust, despite any validity pharmaceutical companies' claims may have. Some further investigation into this distrust – and, in particular, a case study of a scenario in which a company was easily able to put their customers at risk – reveals the coupled ethical-epistemic (and consequently moral) issues the pharmaceutical industry faces, which are rooted in institutional mis-arrangements – as in, the policies, systems, and processes by which the industry regulates itself. The objective of this study is to illustrate how companies may (1) mischaracterize both the current state of knowledge of a particular disease or drug and (2) adjust the interpretation and/or presentation of data to boost profitability. The primary method used is a presenting the case study and demonstrating this through interpretative tools (e.g. examining systems/processes by which the industry self-regulates). The conclusion is that these are systemic epistemic failures that hinder public trust in the pharmaceutical industry and consequently prevent the industry from helping to fulfill the overarching goal of the healthcare sector: to sustain and better the health of citizens. These epistemic issues therefore have ethical implications, and the latter cannot be understood or addressed separately from the former.

WAVE 2

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: A Guide for Hoarding in Social Housing

Presenter(s): Priyam Joshi

Abstract:

Hoarding disorder is characterized by difficulty discarding and intentional saving of possessions regardless of their objective value. Hoarding is a complex issue that occurs in an estimated 2.5% of the population and affects people across age, gender, socioeconomic, and racial lines. Hoarding is a growing public health problem as it can lead to significant health and safety risks to the individual and nearby community. Severe hoarding can even lead to property being declared unfit for human habitation. Hoarding can be an especially challenging issue for the social housing sector because of the risk of homelessness. There is an unmet need for a clear guide that outlines appropriate resources and strategies for stakeholders, such as property managers or code enforcement officials. The current project develops such a guide, highlighting strategies for stakeholders to work with hoarding clients to bring a living unit into compliance with health and safety standards. Data will be used from a scoping review of published and grey literature (e.g., community reports, housing protocols) on community interventions for hoarding. The most valuable resources will be highlighted, and the knowledge gaps within these resources will be identified. This information will inform the development of a guide for social housing providers to address problems related to tenants' hoarding behavior and minimize risks to the resident and neighbours. Stakeholders will be involved in the final revisions of the guide, after which it will be circulated to the Centre of Collaborative Research on Hoarding's community partners and will be posted on <https://hoarding.psych.ubc.ca/>.

WAVE 2

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The Allyship Network LIVE Study: Encouraging gender equity through virtual messaging

Presenter(s): Em Mittertreiner

Abstract:

In workplace settings, women are asked to engage in unvalued or volunteer labour more often than men. This gender norm pressures women to sacrifice personal time and resources, thus reducing their capacity for more promotable work. Women who decline volunteer requests or defer them to male colleagues risk hostility or resistance. This study asks whether incentivization combined with education on gender equity can encourage individuals to advocate for gender-equal volunteering on teams. Building on findings that majority group members are perceived by the mainstream as more effective advocates than minority group members, we hypothesize that men may feel more social license than women to challenge group norms.

We will examine group text messages exchanged during an online collaborative task where one person per round must make a monetary sacrifice to enable their teammates to receive a larger bonus. Participants will be randomly assigned to the Control condition or one of two Ally conditions. While most participants read only the task's basic instructions, approximately 20% of men and women in the Male and Female Ally conditions, respectively, will learn about a team-wide bonus that can be earned if the number of male volunteers is at least proportional to the number of men on their teams. Compared to Control participants, we predict that both Ally conditions will ask men to volunteer more and women to volunteer less, with Male Allies showing the largest effect. These findings will provide insight on how men can use their privilege to empower women in the workplace.

WAVE 2

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Analyzing the Discourse Feature of Authorial Self Mention Within Political Science Research Articles

Presenter(s): Felicia Slogoski

Abstract:

Self mention is the use of first-person pronouns and possessive adjectives to present information (Hyland 2001, as cited in Hyland, 2011, p. 200). When an author utilizes the stance marker of self mention, they use their own name and credibility to strengthen their arguments (Hyland 1999, p. 342). When researching self mention, notable academic studies (including Hyland 2009, 2011, and Hyland and Jiang (2016)) fail to include political science within the soft disciplines data. To understand this lack of information specifically for political science, my study asks: how is authorial self mention utilized within political science compared to the soft disciplines identified by the literature? My data collection is based on a corpus comprised of twenty-four research articles from academic journals in the field of political science. Importantly, my findings add more accurate disciplinary knowledge while acknowledging that every discipline is unique. I explore the use of singular authorial self mention in contrast to multiple authored use of self mention. Markedly, I find that self mention can leave the realm of a stance marker and be used rhetorically as it becomes a reader-orientated interaction when there are multiple authors. I exclude instances of self mention that reflect reader pronouns from my dataset, however this does raise interesting questions for future research in addressing the use of reader pronouns and authorial self mention together as a rhetorical move. My research also raises questions about disciplinary variations of authorial self-mention especially within disciplines excluded from current research which would greatly benefit those within the neglected disciplines.

References

- Hyland, K. (1999). Academic Attribution: Citation and the Construction of Disciplinary Knowledge. *Applied Linguistics* 20(3), 341-367.
- Hyland, K. (2001). Humble servants of the discipline? Self-mention in research articles. *English for Specific Purposes*, 20, 207-226.
- Hyland, K. (2011). Disciplines and discourses: Social interactions in the construction of knowledge. In D. Starke-Meyerring, A. Paré, N. Artemeva, M. Horne, and L. Yousoubva (Eds.), *Writing in knowledge societies* (pp-193-214). West Lafayette, IN: The WAC Clearinghouse.
- Hyland, K. & Jiang. (2016). Change of attitude? A diachronic study of stance. *Written Communication* 33(3), 251-274. doi:10.1177/0741088316650399.

WAVE 2

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Development and Characterization of the Edible Packaging Films Incorporated with Blueberry Pomace

Presenter(s): Yixin Gu

Abstract:

Finding alternatives to plastic packaging is crucial for reducing its usage. This work focused on the development and characterization of edible starch-based packaging films with the incorporation of blueberry pomace (BP). BP is the by-product of blueberry juice processing, contains skins and seeds with abundant polyphenols that have antioxidant properties. There were three variables - starch type (corn, potato, green bean, sweet potato, tapioca), concentrations of starch (2%, 4%) and BP (0%, 0.4%, 0.8%), hence 30 films were made. Their optical, mechanical, thermal, physical and physicochemical properties were subsequently tested to compare their consumer-concerned characters. The results showed that film colours were significantly affected by all variables, which might change perceived food colour. Total UV absorption of all the films showed their potential to work against oxidative rancidity. The 4% starch films were generally more transparent than 2% ones, and high transparency is preferred by customers. Corn starch films had the lowest gloss on both sides, which is desired for applying printing ink and heat sealing. No large difference was found between the tensile strength of all samples. Hence, they had similar abilities to handle stress. Except for potato starch films, all the 4% starch films were noticeably thicker than 2% ones, whereas pomace level did not importantly impact the thickness. The differential scanning calorimetry parameters, water vapor transmission rate, and solubility did not vary noticeably between films. In conclusion, BP addition did not largely impact most film characters, and tested films showed their feasibility for future applications.

WAVE 2

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: The Production of Micro-algae Biofuels

Presenter(s): Utkarsh Dixit, Tessa Price, Prateeksha Aggarwal, Keanna Yu

Abstract:

Microalgae have the potential to be a future renewable energy source. This project focuses on the growth of *Chlorella vulgaris* to improve the lipid yield, produce biodiesel and bioethanol, and treat the wastewater where growth takes place. *C. vulgaris* is grown in a photobioreactor, harvested through microfiltration, and extracted by hydrothermal liquefaction (HTL). The photobioreactor uses wastewater and Bold's Basal Medium (BBM) under continuous illumination to mimic ideal growth conditions, resulting in a high lipid content. Microfiltration separates the microalgae biomass from solution using a Polyvinylidene Fluoride (PVDF) based membrane. HTL is then used to extract biofuel from the biomass under high temperature and pressure conditions. This helps break down the natural polymers into their liquid components to produce a less dense biofuel. Information about these methods and parameters were obtained through extensive research and analysis using a weighted decision matrix. Research was compiled from October to December 2020. To complement algae growth, monitoring the different properties of the growth medium is essential for enhancing biofuel yield. To monitor these process variables, a bench-top incubator that tracks the temperature and pH of the growth medium using an Arduino and sensors is being designed. This incubator provides live updates and process control mechanisms to ensure maximum biofuel yield. Through environmental sustainability concepts and life cycle analysis software, such as GHGenius, environmental impacts of this process will be defined and minimized through feasible adjustments.

WAVE 2

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: What drives sensorimotor adaptation? Corrections to online error vs. terminal error.

Presenter(s): Sabrina Hou

Abstract:

In the acquisition of novel motor skills and mastery of existing ones, our sensorimotor system continually refines and adapts our actions. This process is driven largely by discrepancies between the predicted sensory consequences of the system's motor commands and the actual outcome. Error signals from this comparison can be used to modify future movements. Past studies have shown that sensorimotor adaptation can be induced in reaching tasks by both errors introduced during the reach (online error) and at reach termination (terminal error) independently, but few have examined the relative strengths of each error type in driving adaptation. Our aim was to compare the sensorimotor system's response to online vs. terminal error information by introducing counteracting perturbations that produced both types of errors within the same action. Participants performed a look-and-reach task, where each trial required them to look and reach without visual feedback of their hand to a visual target that appeared in their right periphery. During a reach, either online error (via further imperceptible displacements of the target during eye and hand movement), terminal error (via additional offset of hand position feedback), or a combination of both would be introduced. We examined how participants responded and adapted to these error signals. Reaching movements were monitored using 3D motion capture and eye movements were tracked using electro-oculography. Preliminary results indicate that our sensorimotor system tends to suppress corrections to online error when faced with counteracting terminal error information, suggesting that terminal error may be a stronger driver for sensorimotor adaptation.

WAVE 2

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Application and Validation of an Algorithm for Matching Foods and Beverages in a Canadian Branded Consumer Product Database with the Canadian Nutrient File Database.

Presenter(s): Julia Chen, Negar Karami, Jesman Punian

Abstract:

Introduction: An algorithm was developed to link a branded consumer product database (Euromonitor) to the Canadian Nutrient File (CNF) for ease of later linkage to the Canadian Community Health Survey (CCHS) for public health nutrition research. Based on food groups, nutritional composition, and product names, the algorithm identified the “best matched” CNF item for each Euromonitor food as well as listing all potential matches, if there was more than one. The aim of our project was to validate the algorithm’s matches and confirm the best CNF match for each Euromonitor item.

Methodology: Recently, Euromonitor items (n=181) with a single CNF match were isolated and validated. Among multiple-match items (n=902), the best CNF option was manually chosen. Euromonitor items with no accurate algorithm-generated matches were manually paired with the most appropriate CNF food.

Results: Algorithm-proposed matches were chosen 53% of the time among the first 62 multiple-matched Euromonitor items assessed by our team. We expect each Euromonitor item will be accurately matched to its closest CNF equivalent. Notably, our manual matching is limited by subjectivity but is nevertheless reliable due to its high inter-rater reliability amongst four team members.

Conclusion: We plan to assess variations in nutrient profiles among similar foods in the linked database after the validation and to systematically rank foods by nutritional quality. This database will then be linked to CCHS data to examine the impact of nutritional quality on health outcomes. This project identifies numerous opportunities for improving the methodology for studying the food supply.

WAVE 2 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Testing variants of angiotensin-converting enzyme 2 (ACE2), the human receptor for SARS-CoV-2, to understand the diversity of COVID19 disease expression

Presenter(s): Ryan Hong

Abstract:

A confounding feature of COVID-19 is the wide diversity in disease expression ranging from asymptomatic to severe, life-threatening pneumonia as well as the varying disease susceptibility at the individual and population level across different regional and ethnic groups. This is supported by studies that show a large number of single-nucleotide variants of the angiotensin-converting enzyme 2 (ACE2), the human receptor for the SARS-CoV-2 virus underlying COVID-19, which may affect ACE2 protein structure and function. We hypothesized that genetic variants of ACE2 may ultimately affect COVID-19 disease susceptibility and expression.

To test this, I helped create an ACE2 variant library, using literature and online bioinformatics such as gnomad and ClinVar databases, to investigate how genetic variants of ACE2 affect protein structure and function. Currently, I am employing site-directed mutagenesis to make up to 200 variants throughout the gene. In the upcoming weeks, I am hoping to finish characterizing ~10 ACE2 mutants and continue with experiments where I will express ACE2 variants in HEK293 cells and screen the impact of genetic variation by performing stability, surface expression, ACE2:S1 binding, and Angiotensin II catalytic assays. By employing a deep mutagenesis approach to characterize ACE2 variants expressed on human cells, we hope to identify mutations that increase ACE2:S1 affinity.

Furthermore, we hope to produce findings that will help us understand why individuals respond dramatically differently to COVID-19. Results will also aid development of novel therapeutics to combat COVID19 based on soluble ACE2 to bind and inactivate the virus.

WAVE 2 ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Shark by-catch in British Columbia commercial Pacific salmon and groundfish fisheries

Presenter(s): Karlee Orvis

Abstract:

Marine ecosystems exhibit some of the highest losses of biodiversity on the globe. One of the largest contributors to this loss are commercial fishing methods that lead to high levels of by-catch of non-target species such as sharks and other cartilaginous fishes. Sharks are highly mobile and migratory marine species that are of great concern because of their historic lack of management and low priority for conservation associated with low commercial economic value. While sharks are important apex predators, keystone species, and prey, poor information on baseline population levels and often unreported levels of commercial by-catch make the impacts of by-catch relatively unknown. A nineteen-year dataset (2000-2019) of commercial harvest in Pacific salmon and groundfish fisheries, on 43 marine management units in British Columbia obtained from Fisheries and Oceans Canada, was examined for shark by-catch. I will further analyze and present the amount of by-catch, represented by a catch-per-unit-effort (CPUE), within each of the fisheries. The groundfish fishery is hypothesized to have a higher CPUE when compared to the salmon troll fishery due to the use of less species-specific gear types. Furthermore, it is expected to have a lower proportion of pelagic shark species than the salmon troll fishery because of its focus on bottom-dwelling, demersal target species. The results of these analyses will be the first to generate a baseline perspective of shark by-catch in western Canada and will reveal trends over time.

WAVE 2

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Characterization of the Assembly Kinetics of Legume Protein Nanofibrils

Presenter(s): Charlotte Shi

Abstract:

Plant proteins are becoming more important in food as sustainable and healthy alternatives to animal proteins. Legumes (soybean, lentil, pea) are great sources of protein and have already been used in developing meat alternatives such as Beyond Beef. However, the texture of these plant-based meat products has lower consumer acceptability due to the inferior functionalities (gelling, stabilizing emulsions, foams) of plant proteins. One promising strategy to overcome this limitation is by inducing protein molecules, under appropriate conditions, to unfold and self-assemble into long, thin strands called “nanofibrils”. The unique structural characteristics and physical properties of protein nanofibrils can enable plant proteins to demonstrate better functionalities in food. Research on protein nanofibrils has, so far, focused on animal proteins and little is known in this regard about legume proteins. This research aims to investigate the assembly kinetics and influencing factors of protein nanofibrils from one commonly consumed legume, lentil. Various lentil protein extracts were prepared (e.g., with or without hulls, under alkaline or acidic conditions) and incubated at low pH, high temperature, and with agitation. Thioflavin T fluorescence assays, gel electrophoresis, and transmission electron microscopy were used to characterize the fibril formation and protein hydrolysis kinetics, and the fibril structure. It was found that lentil protein could form long fibrils when extracted from dehulled lentil under acidic condition. This finding provided fundamental knowledge of fibril formation in legume proteins, which can lead to more research on practical application and development of novel protein ingredients as meat alternatives for the food industry.

WAVE 2

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Investigation into the extent of salmon mislabelling in Vancouver, BC (2018-Present)

Presenter(s): Imogen Porter

Abstract:

Seafood mislabelling is hugely prevalent: recent studies indicate 44% of seafood in major Canadian cities is mislabelled in some way, with improved legislation and outreach both necessary for genuine change. Purchase and consumption of mislabelled fish may lead to overpaying for poor quality fish, as well as exposure to unexpected toxins and allergens. From an environmental standpoint mislabelling is often an indication of unsustainable or even illegal fishing practices, as it may mask the fishing of at-risk or protected species.

British Columbia (BC) currently suffers from a large-scale depletion of its salmon populations, making sustainable practices an ongoing concern for the fisheries department. This study compiles data collected by the UBC Science One programme with the aim of identifying and analysing patterns in salmon mislabelling.

Samples of salmon sold in Vancouver restaurants and grocery stores were collected to determine whether their label correctly indicated their species. Students extracted DNA from their samples and amplified it using PCR to produce suitable quantities for testing. The samples were then digested with restriction enzymes *NlaIII* and *Bsp143I* to produce small fragments separated using gel electrophoresis. The sizes of DNA fragments produced act as unique 'fingerprints', used to identify the actual species of each sample.

Preliminary analysis indicates 20% of samples from 2019 (n=20) were mislabelled, compared to 50% of samples from 2018 (n=16) suggesting mislabelling practices have been reduced. Further analysis is still to be completed regarding the most commonly mislabelled fish species.

WAVE 2 ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: The Fast And The Frugal (Fashion): Literacy on the Impact of Sustainable Consumerism

Presenter(s): Samarth Srivastava, Anna Mylvaganam, Quyanna Whittaker, Sahana Babu, Clayton Hutt

Abstract:

In collaboration with the Social Ecological Economic Development Studies (SEEDS) program at UBC, this research contributes to a more nuanced understanding of climate literacy. There is very little literature that considers participants' perception of their own climate knowledge when assessing their sustainable actions. We examined the factors that contribute to increased self-perceived climate literacy of students to investigate whether higher literacy of sustainable consumerism is associated with higher communication of those ideas. A convenience sample of UBC undergraduates was questioned about their personal sustainability practices, familiarity with sustainability as a norm in Canada, sources of information, number of conversations held by them around these topics, and self-perceived literacy through a survey administered online. We further calculated participants' actual literacy about sustainable clothing consumption. Results from a multiple regression analysis revealed that, as predicted, personal sustainability practices and a higher amount of critically selected information sources were positively related to self-perceived literacy. On the other hand, actual literacy and familiarity with sustainability norms negatively related to self-perceived literacy. There was also a correlation between self-perceived literacy and the number of conversations about sustainable clothing consumption, suggesting that participants' perception of their own knowledge is related to their willingness to translate intention into action. When participants believed their knowledge was accurate, they were more willing to share it with others. The practical implications of these findings stem from identifying a gap between perceived and actual sustainability literacy, which can inform future educational interventions.

WAVE 2 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: The complex dynamical behaviour of Q-balls in collisions

Presenter(s): Natalie Ho, Vismai Khanderao

Abstract:

Despite decades of experimental searches, and the observations of its gravitational effects on stars and galaxies, the nature of dark matter is not well understood. Dark matter candidates are difficult to detect and this has motivated the development of alternative theories and frameworks to solve this problem. One such theory is the existence of Q-balls, localized clumps of matter created in the early universe that remain stable and unchanging over time.

The equations describing the behaviour of Q-balls are difficult to solve analytically due to their non-linear nature and therefore we solve them numerically through computational methods. We simulate collision scenarios starting from different initial conditions to investigate Q-ball interactions with each other. We find that the system exhibits novel and complex dynamical behaviour such as fission, fusion, and right-angle scattering. Our results suggest that the outcome of a Q-ball collision depends strongly on the collision velocity and the impact parameter. This research could guide future experimental efforts to detect Q-balls and lead to a better understanding of the dark matter problem.

WAVE 2 POSTER PRESENTATIONS

March 20, 2:00 PM - 3:15 PM

Room 1

The Benefits of Utilizing Comparative Tasks in Childhood Metacognitive Research

Aimee Lutrin

Investigating the Potential of SARS-CoV-2 Infection to Trigger Novel Autoimmunity

Saina Nemati
Samantha Allum
Parsa Alizadeh
Erica Won

Effect of the luminosity of a dataset on the estimation of the mass of Subatomic particles

Keshav Gopinath
Sebastian Gonzalez

Majorana Fermions

Andre Mello
Steven Hsueh
Bob Kim

Investigating the mechanism of RdRp inhibition and TLR7 agonists for the SARS-CoV-2 virus to determine building blocks for hybrid drug synthesis.

Boaz Li
Sharisse Chan
Eliza Berman

Room 2

“I Can’t Focus When You Fidget”: Effects of Misokinesia on Attention

Avi Mehrotra

Impact of Tauopathy on Hippocampal Spine Density

Sue Baek

Graph Theory Analysis of fMRI Data in Pediatric OCD

Hallee Shearer

Active and inhibitory avoidance performance is associated with individual differences in trait anxiety.

ishya Ravikumar

Botulinum toxin Type A as a treatment for myofascial pelvic pain in endometriosis

Vanessa Diamond
Myah Sisson
Carissa Chan

Room 3

Novel and Stable Self Polymerization of DNA Origami Hinges

Stephanie Nguyen
Charlie Sushams
Nathan Louie
Ryan Yeung

Using immuno-PCR and monoclonal antibodies to better understand Common Variable Immunodeficiency (CVID)

Faith Pan
Vittoria Baht
Fateme Moradkhan

Analysis of Historical Tailings Dam Failures for Application to the Development of Numerical and Empirical Runout Modelling Methods

Lucy Myrol

Huawei 5G: A Case Study on the US-China Power Shift and the Western European Response

Alan Phuong
Winta Alazar
Natalia Kearney Fang
Ellen Li

Development of a PET Imaging Pattern to Differentiate Chronic Traumatic Encephalopathy from other Neurodegenerative Disorders

Gabriella Wohlgemuth
Gavin Carmichael

Room 4

Household income, financial stress, and the impact of the COVID-19 pandemic on family mental health in Canada

Sana Alayoubi
Falencia Annette
Ivy Liu
Pei Liu

Banking and Economic Development: Solving the Mystery of Urban Poverty in Latin America

Semeion Wong
Sam Tong
Kari Ontaneda
Alvin To

Dietary guidelines specific for and involving Indigenous populations in the United States & Canada: a scoping review protocol

Seamus Damstrom
Ashley Li

The Effect of Leader Humility in Times of Crises as Perceived by Followers

Subah Sehgal

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: The Benefits of Utilizing Comparative Tasks in Childhood Metacognitive Research

Presenter(s): Aimee Lutrin

Abstract:

The human ability to doubt one's own knowledge, also known as metacognition, has been a multi-disciplinary topic of interest for centuries (Descartes, 1637). Most research in developmental psychology argues that metacognition is a late milestone for children, not emerging until 8-9 years of age (e.g., Piaget, 1953). However, the paradigms used to measure metacognition in children could be responsible for these findings. The most commonly used "absolute" tasks, in which children are presented with a trial (e.g., decide which of two shapes is larger) and then asked to pinpoint their confidence on a scale, rely upon processes additional to and separate from metacognition, such as vocabulary understanding. These may, in turn, be hindering our abilities as researchers to isolate and measure childhood metacognition. We hypothesize that implementing an alternative "relative"/ "comparative" task of metacognition, in which children are presented with two trials and then identify which one they feel more confident about, will reveal earlier emergence of metacognitive abilities in young children. In our study, 3-8-year-old children did both an absolute and a comparative metacognitive task in a counterbalanced order. We find that comparative tasks confirm an earlier emergence of such abilities. Our study has implications for understanding the origin of metacognitive thought, and we believe curricula strategy and design could build upon these findings in order to best capture childhood metacognitive skills and maximize learning acquisition in children.

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Investigating the Potential of SARS-CoV-2 Infection to Trigger Novel Autoimmunity

Presenter(s): Saina Nemati, Samantha Allum, Parsa Alizadeh, Erica Won

Abstract:

COVID-19 is an illness caused by the SARS-CoV-2 virus, characterized by severe acute respiratory syndrome. People with mild COVID-19 display strong, but appropriately targeted immune responses; however, those with severe COVID-19 experience widespread tissue damage and multi-organ failure due to huge amounts of inflammation. This inflammation could break immune tolerance by triggering bystander-activation, wherein the immune response loses its specificity for infected cells and begins to destroy healthy tissue, or via molecular-mimicry, in which immune cells kill healthy human cells instead of infected cells, due to peptide similarities. In addition, the suppressive immune cells, known as regulatory-T-cells (Tregs), appear to be destabilized in patients with severe SARS-CoV-2 infection. Considering these factors, we hypothesize that SARS-CoV-2 infection increases the incidence of autoimmune disease development. Our primary goal is to determine if the incidence of new autoimmune disease is increased in patients that were infected with SARS-CoV-2 relative to healthy controls. We will collect clinical data, and cryopreserve blood leukocytes and serum from healthy controls and patients that test positive by PCR for SARS-CoV-2 at multiple critical-points. We will then administer multiple follow-up surveys concerning the development of autoimmune disease and collect blood from all study participants within one year of recruitment. In our secondary outcomes, we will test serum for autoantibodies, assess Treg phenotype and killer-T-cells suppression, and measure autoantigen-specific T-cells based on predicted shared peptides with autoimmune targets. Our novel work will determine SARS-CoV-2's long-lasting immune complications and provide insight into how to combat long-term effects of future coronavirus infections.

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Effect of the luminosity of a dataset on the estimation of the mass of Subatomic particles

Presenter(s): Keshav Gopinath, Sebastian Gonzalez

Abstract:

Using high-energy particle collision data recorded by the ATLAS experiment at the Large Hadron Collider, an analysis workflow was written in Python based on scripts available on the ATLAS GitHub repository. This analysis performs an event selection and calculates the invariant mass for Z Boson candidate objects in real and simulated data. Additionally, various models are used to measure the rest mass of this fundamental particle by fitting statistical models onto the data distribution. The quality of the fit and the constraints on the fitting parameters are studied by varying the type of model and the luminosity of the input dataset.

This analysis suggests that the distribution of the Z Boson mass is not completely gaussian and that it could be better modelled by functions that account for the presence of a tail or asymmetry in the distribution. One suggested cause for this deviation and a potential topic for further research, is the photon-emission by the final-state leptons that would decrease the energy of the observed leptons and thus produce a downward shift in the calculated invariant mass.

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Majorana Fermions

Presenter(s): Andre Mello, Steven Hsueh, Bob Kim

Abstract:

A Majorana Fermion is a particle of spin $1/2$ that is its own antiparticle. The interest in Majorana Fermions has been revived by the potential use in quantum computers and the recent realization of Majorana modes in condensed matter systems. Another interesting aspect of these particles is that systems of them can sometimes display supersymmetry, also known as SUSY. SUSY is a conjecture that states each Fermion, particles with half integer spin, have a Bosonic superpartner of integer spin and vice-versa. SUSY is also a potential solution for major problems in gauge theory. Modelling these particle interactions mathematically has proven to be difficult. Therefore, the purpose of this paper is to familiarize the students with these particles by simulating a simple model of Majorana Fermions lying on a 2D grid using periodic boundary conditions. We will attempt to investigate whether or not a case of supersymmetry can be found in the 2D system of Majorana, comparing this system with the 1D chain system.

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Investigating the mechanism of RdRp inhibition and TLR7 agonists for the SARS-CoV-2 virus to determine building blocks for hybrid drug synthesis.

Presenter(s): Boaz Li, Sharisse Chan, Eliza Berman

Abstract:

COVID-19 is a disease that emerged in late 2019. This is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which descended from the coronaviridae family. This single-stranded RNA (ssRNA) virus has since infected over 112 million individuals and caused more than 2.5 million deaths (as of February 25, 2021). Here, we investigate the mechanism of RdRp inhibition and TLR7 activation for the SARS-CoV-2 virus to lay a foundation for potential drug synthesis that can be truly effective.

Toll-like receptor 7 (TLR7) is a protein that plays a key role in the innate immune system. By recognizing certain regions in single-stranded viral RNA, TLR-7 can detect the presence of viruses in the human body and activate signaling pathways to trigger an immune response. TLR-7 agonists, namely imidazoquinolines, are chemicals capable of binding to and activating the receptor. They have been hypothesized to prevent the onset of severe cases of COVID-19 through the enhancement of innate and adaptive immunity. Previous research has demonstrated its ability to improve the effectiveness of vaccination and treatment for the avian influenza virus. This provides grounds for proposing our hypothesis.

Although TLR7 has significant effects combating the virus, it may not be sufficient to account for the virus' impact on the human body. Particularly, there may be a need for a first line of defense to inhibit the virus' initial spread. These compounds would allow for an interplay with TLR-agonists by preventing RNA transcription.

One type of such molecules are RNA-dependent RNA polymerase (RdRp) inhibitors. These inhibit RNA production which in turn stops viral protein production and eventually replication. Here, we propose that RdRp inhibitors could be used to prevent RNA transcription and stop the spread of the virus. However, for viruses that may have been replicated, TLR-7 agonists could be used to enhance the body's immune response, strengthening its response against COVID-19. Preclinical trials using immunodeficient mice transplanted with human immune cells are proposed to test the effectiveness of various cotreatments of RdRp inhibitors and TLR agonists. If proven effective, clinical trials may then be used to determine discrepancies with human models.

WAVE 2 POSTER ABSTRACTS

Theme: Health and Wellness

Title: "I Can't Focus When You Fidget ": Effects of Misokinesia on Attention

Presenter(s): Avi Mehrotra

Abstract:

Misokinesia is characterized by strong emotional distress at the sight of another person's small and repetitive movements. Unlike its aural counterpart misophonia, - emotional distress to specific sounds, no research exists that examines misokinesia on a cognitive and behavioral level. This study uses verbal working memory as a quantitative measure of verbal comprehension to inform on how misokinesia affects attention; specifically, we investigate whether comprehension of verbal information is impacted in the presence of a small repetitive visual distraction in individuals self-reporting high incidence of misokinesia sensitivity as measured by the misokinesia symptom assessment scale. We hypothesize that the participants rating higher on the misokinesia assessment scale will be more distracted by the fidgeting in the video and score lower on the memory questionnaire following each video than their counterparts. To test the effects of misokinesia on attention, participants are shown two videos in which the instructor fidgets and does not fidget, i.e., in one video the instructor noticeably fidgets with a pen; while in the other video, he does not. Following each video, participants answer a ten-point memory questionnaire on the contents of the video watched and then complete self-reported misokinesia and misophonia assessment questionnaires. If misokinesia is associated with heightened attention to fidgeting behaviors in others, it predicts that those individuals reporting misokinesia symptoms would perform worse on the memory test, owing to a reduction in attention to the video content. These findings would lay the groundwork for future research on misokinesia and its effects on attention.

WAVE 2 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Impact of Tauopathy on Hippocampal Spine Density

Presenter(s): Sue Baek

Abstract:

Alzheimer's disease (AD), one of the leading causes of death in North America, is a neurodegenerative disease and does not show symptoms of cognitive decline until irreversible damage has been done. These cognitive deficits have been crucially linked to synaptic loss throughout the brain. Compensatory mechanisms play an important role in delaying the onset of AD symptoms and slowing AD progression. This study investigates the effect of tau pathology on hippocampal synaptic density and the possible mechanisms that may play a role in dealing with synapse loss. Previous tau animal models exhibited widespread tau pathology and didn't resemble the specific patterns of tau expression in human AD patients, however, in this study, a tau model was created to follow these patterns by restricting tau expression at the entorhinal cortex (EC), the region in which tau appears first in AD. The results of the study showed an increase in synaptic density and decreased mushroom spine density in the presence of tau relative to controls. This suggests adult-born dentate gyrus (DG) neurons exhibit a compensatory strategy of creating more synapses in response to tau but may not be very functional as it lacks mushroom spines, synapses important for long-term learning. Therefore, it can be hypothesized that tau is altering synapses early on in AD and could be a possible target in mitigating AD symptoms and/or delaying the progression of AD.

WAVE 2 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Graph Theory Analysis of fMRI Data in Pediatric OCD

Presenter(s): Hallee Shearer

Abstract:

Pediatric Obsessive-Compulsive Disorder (OCD) is a debilitating condition characterized by intrusive obsessions and time-consuming behavioral compulsions. Functional Magnetic Resonance Imaging (fMRI) provides a way to investigate the neural underpinnings of OCD. A novel fMRI approach is to use graph theory to study the brain as a network. One such study in adult OCD showed that a measure called “node degree” is lower in OCD, indicating that nodes in key regions of the network are less connected. Node degree has not yet been investigated in pediatric OCD so it is unclear if these differences are a cause or a consequence of the disorder.

Here, we use fMRI data from resting state, a cognitive task, and a symptom-provocation task from children with OCD (n=27, 15 female) and healthy controls (n=26, 17 female) to compare node degree across groups and conditions. We hypothesized that we would replicate the finding of lower node degree in OCD, and our focus was on the cortico-striatal thalamic circuit which has been repeatedly implicated in OCD. We found differences in node degree in the insula during rest, the posterior cingulate cortex during the cognitive task, and the anterior cingulate cortex during symptom provocation. These differences did not reach statistical significance after correcting for multiple comparisons.

Next, we plan to analyze the modularity and efficiency of the brain networks using global graph theory measures. This line of research could add to our understanding of the neural basis of OCD and eventually help develop new diagnostic tools and treatments.

WAVE 2 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Active and inhibitory avoidance performance is associated with individual differences in trait anxiety.

Presenter(s): Tishya Ravikumar

Abstract:

Research Domain Criteria (RDoC) is a framework that attempts to reclassify psychiatric disorders in terms of its pathophysiology within neural circuits. Identifying behavioural constructs that are regulated by well-defined neural circuits can help elucidate the heterogeneity in pathophysiology that may exist in a disorder such as anxiety. One behavioural construct that may be useful to understanding the heterogeneity in anxiety disorders is the promotion and inhibition of action to avoid neutral vs. aversive stimuli. The present study investigates how individual differences in trait anxiety may be associated with the tendency to adopt an active versus inhibitory avoidance strategy in healthy undergraduate students. Undergraduate students at the University of British Columbia were assessed for trait anxiety and tested on an active/inhibitory (Go/NoGo) avoidance task. Task trials were intermixed using a 2x2 design, assessing valence (Neutral/Aversive) and avoidance strategy (Go/NoGo). We hypothesize that task performance in participants with low trait anxiety will be facilitated by valence (higher accuracy on aversive vs neutral trials), whereas participants with high trait anxiety will show valence generalization (similar accuracy on aversive vs neutral trials). The results of the current study may be useful for elucidating the heterogeneity of pathophysiology in future studies that assess the promotion and inhibition of action in clinical population of anxiety.

WAVE 2 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Botulinum toxin Type A as a treatment for myofascial pelvic pain in endometriosis

Presenter(s): Vanessa Diamond, Myah Sisson, Carissa Chan

Abstract:

Endometriosis occurs when endometrial tissue grows outside of the uterus, and is commonly comorbid with myofascial pelvic pain. Myofascial pelvic pain is characterized by hypercontracted skeletal muscle resulting in trigger point(s) and tender pelvic floor muscle(s). Botulinum toxin Type A blocks the acetylcholine release from peripheral nerves and results in muscle paralysis. This study evaluated if Botulinum toxin Type A, compared to placebo, can mitigate myofascial pelvic pain in endometriosis. We performed a double-blind, randomized, placebo-controlled trial on 100 women. Inclusion criteria was age 18-65 years old, surgical and histopathological diagnosis of endometriosis and myofascial pelvic pain diagnosed by palpation of 1 or more pelvic myofascial trigger point and a pain rating from 1-10 on an 11 point numeric rating scale. Fifty participants were randomly assigned to receive an injection of Botulinum toxin Type A into the pelvic floor muscle and 50 assigned the placebo saline of equal volume). Significant differences in pelvic pain scores between placebo and treatment groups was determined by a T-test. Botulinum toxin Type A has been used to treat myofascial pain associated with muscle spasms and hypertonicity by relaxing the pelvic floor muscles through muscle paralysis. Botulinum toxin Type A may be a clinically practical method to reduce myofascial pelvic pain in people with endometriosis, which ultimately may improve quality of life.

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Novel and Stable Self Polymerization of DNA Origami Hinges

Presenter(s): Stephanie Nguyen, Charlie Sushams, Nathan Louie, Ryan Yeung

Abstract:

DNA nanotechnology is an innovative field that has many applications in fields involving nanoscale precision and selectivity. The design of self-assembling DNA strands of varying sequences and lengths, termed DNA origami, has received significant attention towards the scope it offers in creating myriad targeted nanostructures. We looked to UBC BIOMOD used DNA origami, to create a scalable and modular nanostructure consisting of two arm 'bricks' attached to a connecting hinge that could be remotely controlled to alter hinge angle and exert force. CadNano and CanDo, a DNA nanostructure design program, was used to design a scaffold strand that would form the base of the structure and multiple staple strands that would fold the scaffold strand into the desired bricks and hinge conformation. The designed strands were analyzed and confirmed for structural stability using the CanDo program. The final design had inbuilt attachment sites for biotinylation to a surface and the addition of a superparamagnetic bead to the top brick for magnetic actuation of the structure. After the strands were ordered, they were verified for proper folding through experimental techniques including gel electrophoresis and TEM imaging indicating expected function. Upon finishing the structure, our 'accordion' could be used for real-time control over intra or extracellular components such as organelles or connective matrix. Modular extension of the structure could be done to create a size-selective DNA mesh to act as a fluid nanofilter.

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Using immuno-PCR and monoclonal antibodies to better understand Common Variable Immunodeficiency (CVID)

Presenter(s): Faith Pan, Vittoria Baht, Fatemeh Moradkhan

Abstract:

The immune system functions as a multi-component network to maintain host tissues, facilitate healing, and clear the body of cancerous cells or infection; malfunctions in this system can have serious consequences for our health. Common variable immune deficiency (CVID) is a broad class of primary immunodeficiency characterized by a low level of antibodies in the blood. These decreased levels of circulating antibodies, often IgG, can severely impair the body's capacity to fight and prevent infection. Affecting 1 in 10,000 Canadians, CVID is difficult to diagnose and treat because the disease etiology remains largely unknown. Current treatment options are limited to immunoglobulin replacement therapy (IRT), which is burdensome for patients as the treatment is short-lived and required for the duration of the patient's life. This research aims to suggest methods to improve the characterization, diagnosis, and treatment of CVID. We propose that immuno-polymerase chain reaction (iPCR)-based technology could be used to better characterize and diagnose CVID. The iPCR method combines the high sensitivity of polymerase chain reaction (PCR) and the elevated specificity of immunological assays, to improve the limit of detection of relevant biomarkers. Additionally, we will discuss possible improvements to the treatment of CVID using monoclonal antibodies. The findings of our work highlight new methods that may be used to better characterize and potentially treat CVID. The information presented may be used by clinicians to improve the diagnosis, treatment, and outcome for patients with CVID.

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Analysis of Historical Tailings Dam Failures for Application to the Development of Numerical and Empirical Runout Modelling Methods

Presenter(s): Lucy Myrol

Abstract:

In recent years, the devastating and far-reaching effects of tailings dam failures have gripped the mining industry. These failures involve the catastrophic release of waste from mineral processing, which can cause irreparable damage to the environment and devastate local communities. With several major failures in recent years, a clear need to develop a better understanding of these events has arisen. One way to do so is through the development of better numerical and empirical runout modelling methods. Tailings-flows are problematic to model due to the complex nature of the material. As a first step towards solving this issue, we performed a comprehensive literature review and compiled detailed information for five historical tailings dam breaches: 1985 Stava, Italy; 1994 Merriespruit, South Africa; 2011 Kayakari, Japan; 2014 Mount Polley, Canada; and 2019 Feijão, Brazil. The results of this study show knowledge gaps in the current literature, of which there are several. To name a few: failures are often unexpected and therefore poorly documented, little information exists on the rheological properties of tailings, and there is both large uncertainty and a lack of consistency in reported data. This study also provides a baseline and a reference point for future research and numerical modelling.

WAVE 2 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Huawei 5G: A Case Study on the US-China Power Shift and the Western European Response

Presenter(s): Alan Phuong, Winta Alazar, Natalia Kearney Fang, Ellen Li

Abstract:

US-China tensions have heightened in recent years, with US' animosity towards China exemplified in Trump's statement on National Security & Defence last May: "China raided our factories, offshored our jobs, gutted our industries, stole our intellectual property, and violated their commitments under the World Trade Organization." With western European nations now choosing their alliances within a quickly changing bipolar international system, we need to examine the causes behind normally US-aligned European nations' fractured response over the issue of Huawei 5G modems.

This study uses the Huawei 5G modem issue as a case study to examine whether or not Chinese tech firms are decreasing US economic influence. Using a process tracing analysis of policy articles, political research journals, and the rhetoric from state leaders within western European nations, the US, and China, this paper identifies both key and ancillary factors which are propelling bipolarization between the US and China. Factors identified include international trade agreements, security concerns and considerations, the economic shifts, and intellectual property. Our findings suggest that economic considerations, especially in the context of the EU-China bilateral trade agreement, as well as security concerns, mainly raised by US officials, were most influential in the discourse over Huawei 5G. These findings are expected to reveal important implications on the direct influence of Chinese technology firms, as well as bilateral economic considerations, on the continuing trend of decreased US economic influence.

WAVE 2

POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Development of a PET Imaging Pattern to Differentiate Chronic Traumatic Encephalopathy from other Neurodegenerative Disorders

Presenter(s): Gabriella Wohlgemuth, Gavin Carmichael

Abstract:

Background

Chronic traumatic encephalopathy (CTE) is a neurodegenerative disorder associated with repeated mild traumatic brain injuries (mTBIs). CTE includes symptoms such as mood changes and memory loss that overlap with Alzheimer's disease (AD) and frontotemporal dementia (FTD), making it easy to misdiagnose. It can only be definitively diagnosed through post-mortem brain tissue analysis, which shows the characteristic buildup of phosphorylated-tau protein (p-tau). Positron emission tomography (PET) is a useful imaging technique that allows for the antemortem visualization of brain tissue damage and p-tau.

Objective

Our objective is to use PET imaging to identify a pattern that can be used to differentiate CTE from FTD and AD to aid future diagnosis.

Methods

Participants will include individuals with probable CTE, AD, FTD, individuals with mTBIs but no signs of CTE and cognitively intact individuals (n=10, per group). F-Fluorodeoxyglucose positron emission tomography (FDG-PET) will be used to visualize brain damage and its distribution. A tracer for p-tau (FDDNP) will highlight p-tau distribution throughout the brain to establish a clear pattern of p-tau aggression to differentiate CTE from AD and FTD.

Anticipated Results

We expect damaged brain tissue to increase in the frontal (outside), parietal (central), and temporal (sides) brain regions in CTE. We expect p-tau to accumulate in the thalamus. Visualizing these differences in p-tau and brain tissue damage will allow for the identification of trends common in CTE, which will inform future investigations for antemortem diagnosis.

WAVE 2 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Household income, financial stress, and the impact of the COVID-19 pandemic on family mental health in Canada

Presenter(s): Sana Alayoubi, Falencia Annette, Ivy Liu, Pei Liu

Abstract:

Objectives

Approaches adopted worldwide to limit the spread of COVID-19 such as lockdowns and reducing in-person interactions can lead to social isolation, which can impact mental health. Employment instability and financial insecurity may also adversely impact the mental health of families raising children. This study investigates whether the impact of the COVID-19 pandemic on the mental health of parents and their children is associated with parent-reported financial stress or household income.

Methods

A parent subsample (N = 804) from a nationally representative, cross-sectional survey of 3027 adults residing in Canada was analyzed. Parents reported on changes in their own and their children's mental health relative to before the pandemic and identified whether they were stressed about financial concerns because of the pandemic. The pandemic's impact on the mental health of parents and their children was compared between income categories and between financially and non-financially stressed households.

Results

47.3% of parents raising children were financially stressed due to the pandemic. A statistically significant association between worse mental health and financial stress among both parents and their children was observed. No association between household income and mental health was observed. The relationship between household income and mental health was not dependent on the number of children in a household.

Conclusion

Financial stress induced by the pandemic is associated with poorer mental health in families. Supports are needed to mitigate the impacts of the pandemic on mental health of parents and their children, especially for families facing financial stress.

WAVE 2 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Banking and Economic Development: Solving the Mystery of Urban Poverty in Latin America

Presenter(s): Semeion Wong, Sam Tong, Kari Ontaneda, Alvin To

Abstract:

Urbanization trends are positively correlated to income per capita and total factor productivity (TFP) measures, according to the BBVA (2017, p. 2). Despite such reports, Latin America has evidenced high urbanization rates but with low income and TFP growth levels (BBVA, 2017, p. 2). As a response to rising urban trends and low economic growth, the policy has shifted towards economic factors that can match urbanization trends. Enhanced access to these services can help people improve their economic conditions, decrease overall poverty levels, and increase overall economic growth (Banerjee & Duflo, 2007; Burgess & Pande, 2005). Regardless of such benefits, socio-economic barriers such as lack of formal income documentation and concentration of banks (usually outside of low-income neighborhoods) tamper with such benefits (Solo, 2008, p. 48).

As a result, focusing on improving access to financial services can lead to rising living standards and reducing poverty that manifests in greater financial inclusion (Omar & Inaba, 2020), which also fosters urbanization (Heblich and Trew, 2019). We aim to understand the extent of the relationship between banking and urban growth via GIS (geographic information systems) mapping to compare banking locations and urbanization rates, with other urban socio-economic indicators. We will hopefully identify the role of uneven banking access in Latin America's differential response to urbanization with respect to other geographical regions. This relationship has implications for local and regional policy to address urban poverty and educating the population of the benefits of banking.

WAVE 2 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Dietary guidelines specific for and involving Indigenous populations in the United States & Canada: a scoping review protocol

Presenter(s): Seamus Damstrom, Ashley Li

Abstract:

Introduction: Current dietary guidelines in North America largely uphold a Western model that fails to account fully for the traditional and cultural foods of Indigenous Peoples. Federal, provincial, and municipal government bodies' dietary recommendations thus often do not meet Indigenous communities' needs. This, alongside postcolonial and intergenerational trauma effects, contributes to food insecurity and malnutrition in Indigenous peoples. We conducted a systematic synthesis of literature to identify and evaluate dietary guidelines specific for and involving Indigenous populations in the United States and Canada.

Methodology: We are searching databases (MEDLINE/Ovid and Scopus) for peer-reviewed articles and public web search engines for grey literature. Two reviewers will then employ eligibility criteria to screen records: (1) study population includes Indigenous peoples, (2) study setting of the U.S. and/or Canada, and (3) topical focus of food and nutrition with specific discussion of recommendations/guidelines. Emergent themes among included records will be analyzed.

Results: Preliminary results of our search strategy have uncovered few peer-reviewed articles eligible for inclusion in our analysis. As we prepare to execute our final searches, we anticipate a continued such dearth.

Conclusion: This review underscores the need for increased awareness and inclusion of Indigenous Peoples in the development and validation of dietary guidelines in the U.S. and Canada. Our project will provide future scholars with a record of Indigenous representation in the literature and encourage government bodies and policymakers to seek meaningful consultation and relationships with Indigenous Peoples when forming and revising community-specific food and nutrition guidelines.

WAVE 2 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: The Effect of Leader Humility in Times of Crises as Perceived by Followers

Presenter(s): Subah Sehgal, Young Ji Tuen

Abstract:

As made evident by the COVID-19 pandemic, people look to their leaders in times of crisis. However, little research examines whether leader characteristics affect how they are evaluated by their subordinates during different types of crises. In this study we explore the role that leader humility plays during crises that are either more technical or more adaptive in nature. Technical crises (e.g., a breakdown of an important machine) are easy to identify and can be solved with a pre-existing knowledge base whereas adaptive crises (e.g., a machine can no longer be used due to new regulations) are more complex, ambiguous, and require new information and a collective pool of knowledge to be solved. We argue that leader humility (compared to leader hubris) is perceived as more effective in adaptive crises than technical ones because humility demonstrates the leader's understanding of the scope of the problem and willingness to leverage the collective expertise of the team to address it. To test this model, we developed an online experimental protocol that employs vignettes to manipulate leadership (humble versus hubristic) and the nature of the crisis (no crisis, adaptive, or technical) and measures the perceived effectiveness of the leader by the followers. This has important implications for leadership during times of crisis, such as the COVID-19 crisis, where leaders have to gain the confidence of their followers in order to be influential and succeed.

WAVE 3

ORAL & POSTER PRESENTATIONS



WAVE 3 ORAL PRESENTATIONS

March 20, 4:30 PM - 5:45 PM

Room 1

Evaluating Social Intelligence in NLP Models with Theory of Mind Stories (ToMS): A New Challenging Benchmark

Yifu Chen

Intergenerational differences in attitudes towards integration: A within household analysis of the first-generation immigrants and their second-generation children

Monorme Chaudhury

The Accumulation of Methyl Mercury on Higher Trophic Levels and its Impacts on Indigenous Communities Within the North

Elodie Hu
Gurleen Dhani

Room 2

Restricted Access: An exploration into the social support of Southeast Asian UBC Students during COVID-19 pandemic.

Nichole Goh

The Intersection of Race and the Healthy Immigrant Paradox: Does Racial Background Affect Mental Health Among Immigrants In Canada?

Kyara Liu

Asian Canadian Teens' Perceptions of Masculine Gender Norms in a Multicultural Context

Yingxi Li
Leo Duan
Emma Yao
Amy Xu

Gender and Sexuality Performativity in Rhythmic Gymnastics: Denormalizing Cultures of Abuse

Nastya Mozolevych

Room 3

Effect of Pulse Light Processing on Escherichia coli ATCC® 29055TM inoculated Malbec Grapes

Hannah Phua

Synthesis of Nitrogenous Amine-Containing Polymers for Composite Materials

Michael Limmena

Determining a Highly Sensitive PET Image Processing Method to Accurately Detect Changes of Dopamine Release in the Brain

Kamryn Diehl
Gabriella Guerra
Jordyn Faiczak

Photogrammetry in Super-K and Future Water Cherenkov Neutrino Detectors

Michael Sekatchev

Purity of High Entropy Oxides as a function of Reaction Temperature

Jack Pitcher
Beiqi Ding
Daniella McArthur

Room 4

Impact Detection Bias Introduced by Linear Acceleration Thresholding in Head Impact Sensors

Timothy Wang

Social Integration and Well-Being Project

Gorkem Atilla
Clarinne Tham
Elizabeth Krampitz
Kien Nguyen

Investigation of the Dietary Needs of Immune Cells: Relating Food to Function for CD8+ Memory T cells

Erin Tanaka

In silico Analysis of Type VI Secretion Systems in Commensal E. coli

Chloe House
Margaret Javier
David Qi

Investigating the Targets of Differentially Expressed miRNAs in Renal Cell Carcinoma

Brian Low
Arell Bryski
Francesca Ferraresso

WAVE 3

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: The Evaluating Social Intelligence in NLP Models with Theory of Mind Stories (ToMS): A New Challenging Benchmark

Presenter(s): Yifu Chen

Abstract:

Neural natural language processing (NLP) models, mostly Transformers, recently achieved higher-than-human level performance on multiple tasks such as reading comprehension and translation. However, the existing NLP benchmarks rarely test for social reasoning, which is a significant facet of human abilities. To quantify the level of social intelligence in NLP models, we adapted and expanded psychology batteries to construct the Theory of Mind Stories (ToMS) benchmark. In contrast to normal reading comprehension, ToMS poses a unique challenge of inferring the unobservable mental state in humans. We evaluated several state-of-the-art NLP models and reported results. We also made this benchmark open-source with the hope to assist future research and development of human-centric NLP models.

WAVE 3

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Intergenerational differences in attitudes towards integration: A within household analysis of the first-generation immigrants and their second-generation children

Presenter(s): Monorme Chaudhury

Abstract:

This study focuses on the intergenerational family dynamics between the first and the second-generation within the South Asian Canadian diaspora. Scholarly research in the field of migration and transnationalism have examined the assimilation processes of the second generation across different ethnicities and nationalities, that are impacted by the experiences of their first-generation parents. While the second-generation South Asian young adults adopt selective acculturation, a strategy that allows them to uphold their ethnic identity while adapting to normative practices within the Western culture; few studies have examined the impact of generational beliefs in resolving mutual conflicts that aid integration experiences. Therefore, I argue that intergenerational family dynamics within the South Asian immigrant community are characterized by negotiation strategies, whereby parents and children engage in mutual communication to navigate Western and Eastern cultural norms.

Through a qualitative approach, structured interviews were conducted with three first-generation parents and their second-generation young adults within the same family. Consolidating the findings from this study, a thematic analysis demonstrated the importance of individual perspectives that facilitated positive communication experiences. While the second-generation appreciated their ethnic ties and parental sacrifices, the first-generation acknowledged their children's individual perspectives, which allowed intergenerational adaptation to diverse cultural contexts. This study exemplified the importance of negotiation of values to foster mutual understanding in the parent-child relationship. Analyzing the experiences of the second-generation demonstrated the significance of reinforcing the true value of multiculturalism, through policy initiatives that strive to increase awareness about the diverse experiences of South Asian migrant families in Canada.

WAVE 3 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The Accumulation of Methyl Mercury on Higher Trophic Levels and its Impacts on Indigenous Communities Within the North

Presenter(s): Elodie Hu, Gurleen Dhami

Abstract:

Methylmercury (MeHg) is a potent neurotoxin that bioaccumulates and biomagnifies through food webs. For Northern communities, whose traditional diet is made up of higher trophic organisms, the Hg they consume is higher than the Health Canada regulations. While many regulations guide the intake of Hg, we still have little understanding of MeHg in food sources as it's assumed that almost all of Hg in tissues is MeHg, which is not necessarily true. This research aims to model the local food web structure and find how MeHg accumulates through the food webs within 25 different Nunavut communities. Then, the food web structure is related to consumption patterns in local communities. Firstly, the MeHg, THg, $\delta^{15}\text{N}$, and $\delta^{12}\text{C}$ will be measured in a wide variety of plants and animals found in coastal marine ecosystems. MeHg will be measured by cold-vapour atomic fluorescence spectroscopy, and THg will be analyzed with a direct mercury analyzer. Then, the food web will be constructed for the different regions using stable isotopes. Next, the bioaccumulation factor for MeHg will be calculated within the food webs. In the end, a food frequency survey will be provided to local communities to link consumption to food webs. We will present our tentative plans for this project, including examples of Arctic food webs and analyses of existing grey literature that will inform this work. This project highlights the impact of MeHg and will improve our understanding of how the accumulation of MeHg through the food web will eventually influence human health.

WAVE 3

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Restricted Access: An exploration into the social support of Southeast Asian UBC Students during COVID-19 pandemic.

Presenter(s): Nichole Goh

Abstract:

The intense spread of the global COVID-19 pandemic resulted in travel bans, closures of restaurants, etc. in hopes of flattening the curve in COVID-19 cases. In exemplifying the role of social relationships during difficult times, previous research has thus far explored the role of social support amongst families experiencing serious paediatric illnesses. To advance prior research while providing timely insights during this unprecedented time, the current study explores how the COVID-19 pandemic has affected the relationship that Southeast Asian students had with the people closest to them. Particularly, this study centres around the social support system of twelve undergraduate students from the University of British Columbia to illuminate the ways in which close friends, family and even institutions provided (or failed to provide) support during times of need. The interviews demonstrated the importance of presence as a source of comfort. In addition, constant communication with their core social support system (which included close friends and family) played an important role in helping students cope with various changes such as the switch to online classes and the obscure future state of the pandemic. Lastly, institutional support from the university was instrumental in helping students navigate online classes and obtain information while still abroad. These findings highlight the dynamic nature of the social support system in times of crisis by demonstrating that the effectiveness of social support is derived from its ability to adapt to various social climates.

WAVE 3

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The Intersection of Race and the Healthy Immigrant Paradox: Does Racial Background Affect Mental Health Among Immigrants In Canada?

Presenter(s): Kyara Liu

Abstract:

The “Healthy Immigrant Effect” is a concept that claims immigrants are healthier than those who are born in their country of residence, due to the selection process favouring immigrants of better health and higher education. However, this has been increasingly debunked in recent literature with the “Healthy Immigrant Paradox,” which positions immigrants at a worse level of health as the years pass due to the unique challenges that marginalize this group. Researchers are now evaluating the long-term health of the large number of immigrants who have resided in Canada for decades. In this study, I implement ordered logistic regression and divide the immigrant sample into two groups, those with and without visible minority status, in order to compare psychosocial determinants of the mental health of the two groups. Yang (2020) found that mental distress in immigrants increased with the number of years since migration. The preliminary findings of my study suggest that visible minority immigrants have higher levels of mental distress than those who do not identify as a visible minority immigrant. This difference predicted is thought to be attributed to factors associated with stressors associated with migration, including health care barriers associated with accessibility, work-related stress and social integration, which are further exacerbated by experiences of racism and discrimination.

WAVE 3

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Asian Canadian Teens' Perceptions of Masculine Gender Norms in a Multicultural Context

Presenter(s): Yingxi Li, Leo Duan, Emma Yao, Amy Xu

Abstract:

Western masculine gender norms are a set of socially-prescribed, idealized norms governing traits and behaviours deemed appropriate for Western males: Dominance, physical prowess, and avoidance of femininity are examples of such gender norms. Asian diasporans in the West have reportedly been simultaneously pressed to fulfill Asian masculine norms endorsed by their heritage culture (that emphasize personal achievement and consideration for the family), as well as mainstream Western norms. While previous studies have investigated Asian diasporic struggles with Western masculine norms, little research has focused on how these norms affect the lived experiences of Asian youth in the West. Teenage boys are appropriately the focus of such study, as adolescence is a time for increased awareness of societal expectations and pressures. The current study recruits Asian-Canadian adolescents in a multicultural British Columbian city to discuss in Zoomed focus groups how both mainstream and heritage cultural masculine norms affect their everyday lives. Using an Emergent Fit analysis (Wuest, 2000), discussions are compared with our previously developed Grounded Theory of boys' gendered experiences. Preliminary findings reveal influences of Western masculine norms, emphasizing emotional restraint and physical prowess – most of which stem from peers – but expectations of Asian masculine standards were not identified by these teens. One explanation the boys gave when queried during Member Checking is that their parents exert minimal pressure to conform to Asian norms, preferring their sons to succeed in the mainstream culture, potentially contradicting evidence in the literature. More data from a wider spectrum of participants will be examined in coming months.

WAVE 3

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Gender and Sexuality Performativity in Rhythmic Gymnastics: Denormalizing Cultures of Abuse

Presenter(s): Nastya Mozolevych

Abstract:

Rhythmic gymnastics is only one of two “women-only” sports at the Olympic Games. This allowance for only certain bodies to compete suggests that there are specific assumptions made about gender and how it should be expressed. Research on rhythmic gymnastics has largely come from the fields of sports science, kinetics, and psychology. It mostly focuses on injuries and effects of exercises on the body. While some research explores the presence of gender stereotypes and norms, Judith Butler’s theory of gender performativity has not been applied to analyze rhythmic gymnastics. Gender performativity refers to the view that gender is socially constructed through the repetition of citational practices, which are everyday acts that may be unconscious, naturalized, and normalized onto bodies. This paper applies Butler’s theory of gender performativity, also extending it onto sexuality, to deconstruct the cycle of abuse that is sustained by the citational practices of weight management and body shaming. I examine how these practices contribute to the construction of an ideal expression of “femininity” and imposition of heteronormativity in rhythmic gymnastics in Post-Soviet countries. I engage with Butler’s concept through an auto-ethnography and discourse analysis of the “Winner Takes It All: Pain and Gain of Russian Rhythmic Gymnasts” documentary. This research is significant because it attempts to denormalize violent practices that can lead to injuries, body image issues, and eating disorders. These practices reproduce inequities and contribute to the violent erasure of non-binary people, enforcement of heteronormativity, and creation of obedience.

WAVE 3

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Effect of Pulse Light Processing on Escherichia coli ATCC® 29055™ inoculated Malbec Grapes

Presenter(s): Hannah Phua

Abstract:

E.coli, a species of bacteria, often associated with outbreaks worldwide is one of the most notorious pathogens in the food industry. Hardy in nature, E.coli have been found to be able to withstand large variations in temperature, oxygen levels, pH, even surviving in nutrient scarce environments such as water and stainless steel, making it difficult to eradicate E.coli contamination. Pulse light processing is a non-thermal novel technology which uses high intensity light pulses to provide surface decontamination with microbial inactivation attributed to the destruction of microbial DNA. This study aims to understand the effect of pulse light treatment on the inactivation of E.coli ATCC® 29055™ inoculated Malbec grapes. Malbec grapes were first surface inoculated with E.coli ATCC® 29055™ before being subjected to varying degrees of pulse light treatments. Treated grapes would then be plated at 0, 1 and 2 weeks intervals to observe for change in microbial loads over time. Changes in bacteria structure due to pulse light processing and storage would also be examined using a scanning electron microscope. Application of pulse light processing showed a significant decrease in E.coli ATCC® 29055™ counts. Significant decreases in E.coli ATCC® 29055™ counts were also observed at 12.0J/cm² compared to other treatments. Pulse light processing also showed impeded growth of E.coli ATCC® 29055™ after 1 week of storage but no significant decrease when stored for 2 weeks. The surface membrane of E.coli ATCC® 29055™ is also estimated to be disrupted post pulse light processing. Understanding the effect pulse light processing can have on removal of microbes can be vital in production of safer food for the masses.

WAVE 3

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Synthesis of Nitrogenous Amine-Containing Polymers for Composite Materials

Presenter(s): Michael Limmena

Abstract:

Polymers, such as polyethylene and polyesters, are long-chained molecules that are widely used in various applications, such as packaging, clothing, and automobile parts, due to their durability and high chemical stability. Consequently, it is very difficult to change the properties of these materials. However, by combining these polymers with others, such as ones containing nitrogenous amine side groups, this may yield composite materials with desirable and modifiable properties (e.g.: self-healing). Previous studies have reported that their polymerization cannot be precisely controlled due to the numerous side reactions between the polymerization catalyst and the amine groups. This investigation seeks to synthesize and study the properties of end-functionalized polymers with nitrogenous amine side groups from starting materials such as amine-containing norbornene (ACN) and amine-containing cyclooctene (ACC). When polymer terminating agents called chain transfer agents (CTAs) are used, the existing and amine-containing polymers can be readily combined to afford materials with new desirable properties.

Despite the presence of various CTAs, polymerization with amine-containing starting materials is far more complicated than previously thought; poor control of the polymers' molecular weights was observed using highly strained ACN while better control was observed with the less strained ACC. Polymers with low but highly variable molecular weights were, nevertheless, synthesized. Contrary to previous research, the use of CTAs to produce amine-containing polymers for composite materials is far more complex than expected. Future research using a greater diversity of CTAs is needed to gain a more nuanced and concrete understanding of the polymerization of amine-containing starting materials.

WAVE 3

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Determining a Highly Sensitive PET Image Processing Method to Accurately Detect Changes of Dopamine Release in the Brain

Presenter(s): Kamryn Diehl, Gabriella Guerra, Jordyn Faiczak

Abstract:

Positron Emission Tomography (PET) is an in vivo imaging technique that captures internal functional processes and allows researchers and clinicians to study neurodegenerative diseases. PET imaging estimates activity in tiny regions of the brain and maps it to a three-dimensional pixel called a voxel. PET images are inherently noisy due to the Partial Volume Effect, which occurs because of statistical and spatial limitations. This study investigated whether applying two processing algorithms, Highly constrained back-PRojection (HYPR) and iterative deconvolution (IDM) to PET image processing helps improve the detection sensitivity of dopamine release. We hypothesize that denoising images with HYPR before and after using IDM (HYPR-IDM-HYPR) will result in a higher sensitivity than solely employing HYPR. Furthermore, we hypothesize both methods will have lower sensitivity in neurodegenerative brain images than healthy brain images because of less radiotracer binding, which makes detecting changes in the amount of radiotracer more difficult. To compare these methods, we simulated brain images with four clusters of dopamine release: two simulating releases in a healthy brain and two simulating releases in a neurodegenerative brain. The images were processed using both HYPR and HYPR-IDM-HYPR and the average sensitivity of each cluster was calculated. We found that both methods were more sensitive in the healthy clusters than the neurodegenerative clusters. Moreover, we found higher sensitivity in all clusters, especially in neurodegenerative clusters after processing with HYPR-IDM-HYPR rather than HYPR alone. This shows HYPR-IDM-HYPR processing can be used as a highly sensitive method to monitor initiation and progression of neurodegenerative diseases.

WAVE 3 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Photogrammetry in Super-K and Future Water Cherenkov Neutrino Detectors

Presenter(s): Michael Sekatchev

Abstract:

Super-Kamiokande (Super-K) is a water Cherenkov detector located in Kamioka, Japan, used to detect neutrino oscillations, changes in neutrino flavor. A new detector, Hyper-K, is being designed as Super-K's successor. These water Cherenkov detectors use large water tanks surrounded by thousands of photomultiplier tubes (PMTs) to detect neutrinos through Cherenkov light emanating from the products of their interactions with water. The detected light produces images with patterns from which information about interacting neutrinos can be extracted. TRIUMF's Hyper-K group is working on reducing uncertainties in measurements of neutrino oscillation parameters. For precision measurements of neutrino interactions, reducing the position uncertainty on the photomultiplier tubes (PMTs) and calibration sources is necessary. This can be achieved with the photogrammetry technique. Images of PMTs lining the walls of the detectors are used to create a 3D reconstruction of their positions. 2D PMT positions are obtained in each image via image processing and machine learning methods. These positions, in combination with camera calibration parameters, are used to determine the location and orientation of the camera and reconstruct a 3D position for each PMT.

This talk describes use of photogrammetry in water Cherenkov detectors: It describes the photogrammetry efforts in Super-K, using an underwater drone survey to obtain images of all PMTs, as well as future applications to the Hyper-K and its intermediate water Cherenkov detector (IWCD) via built-in camera and lighting systems.

WAVE 3 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Purity of High Entropy Oxides as a function of Reaction Temperature

Presenter(s): Jack Pitcher, Beiqi Ding, Daniella McArthur

Abstract:

Entropy stabilized alloys have been a field of study since the 1970's. However, it was not until 2015 that Rost et al. found that the same principle applies to oxide compounds, giving rise to high entropy oxides (HEOs), which has raised a furor among quantum materials scientists in the ensuing years. HEO's are comprised of five metal cations sharing an atomic site in an ordered oxygen sublattice, and they interesting for several reasons: their thermal conductivity approaches the theoretical minimum for solids; the chemical disorder from various cations sharing an atomic site does not destroy magnetic order, allowing for long-range antiferromagnetism to emerge even when the cations are not antiferromagnetic themselves; and their high dielectric constant suits them to industrial applica- tion. This last property allows HEO's to potentially be better replacements to lithium ion batteries, and has been a property that has undergone much re- search in the last few years to find how to synthesize the highest quality HEO crystals. In this experiment, we examine how reaction temperature correlates with the purity of the crystalline phase of a sample when a HEO is synthesized through solid state synthesis. This method of synthesis involves mixing oxides of the constituent elements, then subjecting the mixture to high temperatures allowing the diffusion of the cations into the required high entropy structure. We will be using using Fullprof software to analyze x-ray powder diffraction data via Rietveld refinement. To do this, a known crystal structure will be used to generate a simulated x-ray diffraction pattern, to which our experimental results will be compared using chi-squared minimization, thus allowing us to refine our crystal parameters and gauge the purity of the crystalline phase in the HEO.

WAVE 3

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Impact Detection Bias Introduced by Linear Acceleration Thresholding in Head Impact Sensors

Presenter(s): Timothy Wang

Abstract:

Contact sports players may sustain up to thousands of head impacts per season [1,2]. Studies have shown that cumulative neurological injury has been associated with exposure to repetitive head impacts [3]. While an increasing number of studies are utilizing head impact sensors to measure and analyze impact exposure [4-6], uncertainty arises from potential triggering biases due to variations in linear acceleration across the head during 6 degree-of-freedom head motion. This study aims to evaluate this potential bias through an analytical investigation.

We evaluated the linear acceleration thresholding-based impact detection for a head impact sensor mounted on the upper dentition (e.g. mouthguards). A test matrix of impacts was derived from previously published American football data [4,5] to simulate 15, 20 and 30g impacts projected across the head to verify if they would pass a 10g linear acceleration threshold in the any of the orthogonal sensor axes.

We observed variations in the 3 magnitudes of impacts that were tested due to the contribution of the angular kinematics in the projected linear accelerations as anticipated. This was evident with impacts to the front-top locations of the head, as we saw low triggering rates due to the angular contribution being applied in the opposite directions of the CG linear accelerations.

We showed that using a linear acceleration threshold for head impact triggering, substantial percentages of above-threshold impacts are missed, and the trigger rate depends on impact direction. Such biases could lead to skewed estimates of impact directions and low representation of certain impact directions.

References: [1] Crisco, J. J. J Athl Train, 2010, 45, 549-559 [2] Wilcox, B. J. J Biomech, 2014, 47, 109- 114 [3] Bailes, J. E. M.D. JNS, 2013, 119, 1235-1245 [4] Wu, L.C. Sci Rep, 2017, 8, [5] Hernandez, F, 2014, ABME, 43, 1918-1934 [6] Crisco, J. J. J Biomech, 2011, 44, 2673-2678 [7] King, D, 2016, Sports Med, 46, 151-169

WAVE 3

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Social Integration and Well-Being Project

Presenter(s): Gorkem Atilla, Clarinne Tham, Elizabeth Krampitz, Kien Nguyen

Abstract:

Past research reported significant mental and physical health challenges for LGBTQ+ individuals compared to their non-LGBTQ+ counterparts. The minority stress model suggests that these challenges may be attributed to distal (external events) and proximal (internal processes) stressors that threaten domains of self-integrity. Recent intervention efforts to reduce minority stressors have shown evidence for efficacy, yet they are time and resource intensive. Hence, developing an accessible and resource-conscious intervention is needed. Self-affirmation theory posits that reinforcing someone's values and beliefs in unthreatened domains (e.g., academic performance) may in turn repair threatened domains of self-integrity (e.g., stigmatized same-sex sexuality). Prescreened first-year LGBTQ+ undergraduate students (N = 296) attended Time 1 and Time 2 (6 weeks apart) online lab sessions. They were randomly assigned to either the self-affirming password or the control condition. In both conditions, participants wrote a short paragraph about a chosen value (e.g., athletics) that was either important to them (self-affirming condition), or important to others (control condition), and changed their laptop password to a phrase that summarized this paragraph (e.g., iLovetennis9 for self-affirmation, heLovessoccer1 for control). We also assessed participants' levels of internalized homophobia, homonegativity, social integration, and psychological well-being during both time points. We hypothesize that the LGBTQ+ students in the self-affirming password condition will report reduced homonegative attitudes and increased psychological well-being over the 6-week period, compared to those in the control condition. This research will help the development of a widely applicable, easily administered, and cost-effective intervention that boosts LGBTQ+ individuals' mental health.

WAVE 3

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Investigation of the Dietary Needs of Immune Cells: Relating Food to Function for CD8+ Memory T cells

Presenter(s): Erin Tanaka

Abstract:

The immune system is essential for our health by providing protection against pathogens and harmful cells in our own bodies, but its function is heavily reliant on the nutrients the immune cells consume. As with different people, different types of immune cells rely on various nutrients to sustain their proper activities, but the energy sources and their impact on human CD8+ memory T cells (T_m), a subset of immune cells that help remember and fight previously encountered pathogens, remains incompletely understood. Here, we hypothesize that like murine T_m, human T_m utilize fatty acid oxidation (FAO) to maintain quiescence and longevity, and facilitate fast immune reactions to reinfection. This is achieved by upregulation of genes and enzymes that contribute to mitochondrial FAO. Through isolation, expansion, and differentiation of primary human T_m combined with detailed immuno-profiling and metabolic assays, we show that T_m display higher propensity for FAO through defined changes in their metabolic profiles and higher expression of FAO enzymes. These results expand our understanding of the nutrient requirements of these immune cells, which will be used to assess immune cell function and ultimately improve immune function in individuals with FAO enzyme deficiencies which are previously linked to recurring infections.

WAVE 3 ORAL ABSTRACTS

Theme: Health and Wellness

Title: In silico Analysis of Type VI Secretion Systems in Commensal *E. coli*

Presenter(s): Chloe House, Margaret Javier, David Qi

Abstract:

Bacteria use multiple mechanisms to overcome microbial competitors. One sophisticated strategy used is the Type VI Secretion System (T6SS), a molecular syringe that directly injects toxins into nearby cells, causing cell death. Although the T6SS has been widely implicated in the ability of pathogens to colonize the gut and cause disease, its role in non-pathogenic bacteria has been largely unexplored. We aim to identify T6SS components and novel antibacterial proteins in the commensal *Escherichia coli* strain Mt1B1. This non-pathogenic bacterium has been found to counteract *Salmonella enterica* serovar Typhimurium infection in a mouse model.

Using the SecReT6 database, we identified two gene clusters within the *E. coli* Mt1B1 genome containing the required structural components to produce two independent T6SSs, as well as an auxiliary cluster. Additionally, several proteins with potential antibacterial activity were discovered within the T6SS clusters using web-based bioinformatics tools. These potential toxins were further analyzed against experimentally validated T6SS toxins using sequence alignment tools to hypothesize about their effects on target cells. Probable antibacterial toxins identified include a potential phospholipase effector, which hydrolyzes cell membrane lipids, and a DNase, which degrades bacterial DNA.

Our findings suggest that commensal bacterial species, including *E. coli* Mt1B1, might employ the T6SS against bacterial competitors such as invading pathogens. This poses the possibility that contact-dependent inhibition systems may play a critical role in commensal bacteria's survival in the gut. A deeper understanding of how bacteria use their T6SS is the first step toward using this sophisticated nanomachine as a prophylactic treatment.

WAVE 3 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Investigating the Targets of Differentially Expressed miRNAs in Renal Cell Carcinoma

Presenter(s): Brian Low, Arell Bryski, Francesca Ferrareso

Abstract:

Background:

In 2020, more than 73,000 people in the United States were diagnosed with Renal Cell Carcinoma (RCC). RCC is often asymptomatic in the early stages, allowing for the undetected progression of cancer. The deregulation of miRNAs is involved in cancer, however the linkage between miRNAs and target genes in RCC is underdeveloped. To begin to fill this gap, we identified novel targets of deregulated miRNAs in RCC.

Methods:

MiRNA quantification files from paired kidney samples were downloaded from The Cancer Genome Atlas (TCGA), and a paired t-test was performed to determine differentially expressed miRNAs between normal and tumor samples (Benjamini-Hochberg adjusted $p < 0.05$). We identified survival-associated miRNAs by applying a log-rank test using clinical data collected from TCGA. Candidate mRNA targets of the miRNAs were determined using mirDIP and a Pearson correlation analysis (BH $p < 0.05$, $r < 0$).

Results:

After comparing tumour and non-malignant samples, 210 differentially expressed miRNAs were found, of which 29 were significantly associated with patient survival. Each miRNA was found to have about 100 candidate mRNA targets. We analyzed the targets of the following miRNAs: miR-130b-3p, miR-204-5p, and miR-146b-5p, and identified their potential oncogenes and tumour suppressors.

Conclusions:

This study paves the way for further studies of miRNAs and their targets that affect RCC patient survival outcomes. Candidate targets could be solidified by manipulating miRNA expression in cell lines using lentiviral transfections, followed by RNA sequencing. These targets may serve as novel biomarkers, representing new avenues for RCC diagnosis and treatment.

WAVE 3 POSTER PRESENTATIONS

March 20, 4:30 PM - 5:45 PM

Room 1

The effect of claudin-5 degradation on cognition in a mouse model for chronic traumatic encephalopathy

Kateryna Voznyuk
Nathaniel Franco

UBC food initiative proposal: A long term solution to aid UBC's food insecure students

Marianna Tutor
Vivien Liu
Zamara Chisti

Rate of Perceived Stability as a Measure of Balance Exercise Intensity in People Living with Stroke

Aishwarya Shenoy
Towela Tembo

Subjective Experience of Cognition and Well-Being

Soo Kim
Anusha Jain
Keith Cheng

Impacts of Politics and Health Policy on COVID-19 Cases: A Comparative Study of Finland and Sweden

Trishleen Mahant
Yuna Sato

Room 2

Factors that Predict Overcorrection in Vertebral Body Tethering for Adolescent Idiopathic Scoliosis Patients

Sachini Jayasinghe
Garshana Rajkumar

Evaluating Racial Diversity in Neuroimaging Studies for Pain

Georgia Grenier

Unravelling the Varying Effects of Necroptosis on Cancer Development

Logan van de Wetering
Jean Louise

When penetrative sex is terrifying: Ideal treatment outcomes and patients' anxiety, stress, and desire for control

Coleen Tolentino
Shahrazad Amin
Megan Pan

Is Early, Short-term Exposure to Cow's Milk-based Infant Formula Associated With the Development of Immunoglobulin E-mediated Cow's Milk Allergy In Breastfed Infants? A Study Protocol

Raymond Hsia
Aiman Atif
Devika Pillai
Noshin Khan

Room 3

Cum Gladio et Scientia: A Proposed Methodology on Non-Destructive Techniques for the Metallurgical Characterization of the Ancient Roman Gladius Maggie Chong

Microbe Dining Etiquette - Identification and Characterization of Novel Glycosidases Chloe Zhang

Optimizing surface roughness and corrosion properties of 3D printed titanium implants Sajida Chowdhury
Auritro Roy

Room 4

The transfer of negative valence in episodic memory Young Ji Tuen

Giftedness Beyond High School Rachel Dupras

Pandemic & 'Moral' Panic: A Thematic Analysis of the UK's Top News Articles on Covid-19 Vivian Truong

Ensuring no one is left behind, exploring the supply chain improvement measures required for access to Covid-19 vaccine in low- and middle-income countries. Jack Cheng
Tracy Ngo
Diksha Chaudhury

Comparing Children's Confidence in Memory and Perceptual Decision-Making Isabella Schoettler

WAVE 3 POSTER ABSTRACTS

Theme: Health and Wellness

Title: The effect of claudin-5 degradation on cognition in a mouse model for chronic traumatic encephalopathy

Presenter(s): Kateryna Voznyuk, Nathaniel Franco

Abstract:

Claudin-5, the most abundant tight junction protein of the blood brain barrier (BBB), is vital to the selectively-permeable BBB's maintenance of brain homeostasis². Claudin-5's dysfunction has been implicated in the progression of chronic neurodegenerative disorders such as Alzheimer's disease and multiple sclerosis. Despite the increased study of multiple traumatic brain injuries (mTBI) and its role in the development of chronic traumatic encephalopathy (CTE), there has been limited research investigating the degradation of claudin-5 in these neurodegenerative diseases².

This study aims to address the effect of claudin-5 in a model for mTBI-induced CTE using mice (n = 66 total) which will be assessed by Morris Water Maze, immunofluorescence microscopy of sectioned BBB tissue, and Western Blot of homogenized BBB tissue^{4,5,6}.

Using Western Blot analysis, claudin-5 fragmentation will be determined; it is expected in the BBB tissue of mTBI-induced mice as a result of tight junction degeneration^{4,5}. Immunofluorescence microscopy will be used to visualize the differences in claudin-5 abundance and localization in the BBB between mTBI-induced and control mouse brain, with claudin-5 degeneration and tight junction fragmentation observed in the CTE brain^{8,9}. Given cognitive decline is a marked symptom of CTE, mouse cognition will be analyzed using the Morris Water Maze in correlation with claudin-5 degradation; mTBI-induced mice are anticipated to have lower memory retention and impaired learning in comparison to control^{6,7}. Further investigations will expand on the potential involvement of claudin-5 in human mTBI-induced CTE.

WAVE 3 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: UBC food initiative proposal: A long term solution to aid UBC's food insecure students

Presenter(s): Marianna Tutor, Vivien Liu, Zamara Chisti

Abstract:

Food security consists of availability, accessibility, stability, and utilization. There is an increasing population of post-secondary students experiencing food insecurity due to financial strain coming from tuition fees, high-cost of living, transportation, and food prices. This is a growing concern as food insecurity is known to negatively impact mental and physical health, consequently affecting students' academic performance. To address this issue, post-secondary institutions have developed initiatives to alleviate the stress that food insecure students face through meal plans, food banks and pantries. However, there have been many critiques that these initiatives are not long-term solutions and some only aid students at their most desperate times. As 37% of UBC Vancouver's population is food insecure the university has various methods of reducing this burden on their population including a food bank, various subsidized cafes, and emergency financial funding. Although UBC presents many options to their students, these options lack utility and accessibility. Therefore, we suggest UBC implement a cash transfer program as a long-term solution to help students reach food security. Our paper will determine how all four aspects of food security will be achieved through this initiative.

WAVE 3 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Rate of Perceived Stability as a Measure of Balance Exercise Intensity in People Living with Stroke

Presenter(s): Aishwarya Shenoy, Towela Tembo

Abstract:

Background: Functional walking exercises are the main interventions used to regain independent walking after a stroke. Currently, stroke rehabilitation lacks a method to inform balance exercise intensity prescription. To address this gap, the Rate of Perceived Stability (RPS) scale was developed for patient-rating of stability while performing tasks that challenge standing balance.

Objectives: This study aims to look at the reliability and validity of the RPS in the stroke population.

Methods: Thirty participants with chronic-stroke were assessed on two separate days. Participants rated their RPS and rate of perceived challenge (RPC) on the following clinical measurements for walking balance and mobility 1) Community Balance and Mobility Scale (CB&M), 2) 6-minute walk test (6MWT), and 3) self-paced gait speed. Test-retest reliability of the RPS was calculated using intraclass correlations (ICCs). Spearman rank correlations (r_s) quantified relationships between RPS, and RPC, and performance on the CB&M tasks, 6MWT, and self-paced gait speed.

Results: The ICC ranged from 0.46 to 0.93 across tasks with 12/19 tasks resulting in ICCs above 0.75, indicative of good test-retest reliability. Participants showed good-to-excellent relationship between RPS and RPC (r_s ranged from 0.78-.94, $p < 0.01$). Higher RPS ratings (indicative of feeling less stable) were associated with lower balance performance scores on tasks of the CB&M. These negative relationships were of fair to moderate-to-good strength in 10/16 tasks.

Conclusion: Our findings suggest that the RPS is a reliable and valid measure of balance intensity in people with chronic-stroke and may address the gap of measuring balance intensity during rehabilitation.

WAVE 3 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Subjective Experience of Cognition and Well-Being

Presenter(s): Soo Kim, Anusha Jain, Keith Cheng

Abstract:

Engagement in physical activity (PA) is associated with enhanced cognitive performance and greater self-reported psychological wellbeing. Research has consistently demonstrated positive psychological effects of PA in developing and aging populations; however, there remains a lack of consensus regarding cognitive benefits in young adults. Specifically, it is not well understood why, following PA, young adults report increased wellbeing but show inconsistent improvement in objective cognitive performance. The aim of the present study was to investigate whether self-reported assessments of one's own cognitive performance may be sensitive to PA interventions and provide the interface between wellbeing and cognitive functioning. We hypothesized that greater cumulative PA would be associated with higher subjective ratings of cognitive performance. Across two studies, 2057 young adults ($M = 20.7$, $SD = 2.42$) completed self-report measures of PA, and the covariates of stress, sleep, and diet, in addition to questionnaires measuring executive control, attention, and memory function. Analysis revealed that PA was not consistently associated with subjective cognitive function. However, stress and sleep habits were significantly predictive of executive function, attention, and memory performance, while diet was linked to executive control and some aspects of memory performance. These findings provide novel evidence that engagement in health behaviours for young adults is positively associated with self-reported perceptions of cognitive functioning and suggests that subjective experiences of cognition are susceptible to interventions targeting health behaviours. PA is yet to be proven a significant mediator or moderator of the observed relationships and is an avenue for future research.

WAVE 3 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Impacts of Politics and Health Policy on COVID-19 Cases: A Comparative Study of Finland and Sweden

Presenter(s): Trishleen Mahant, Yuna Sato

Abstract:

Despite sharing similar political systems, levels of economic development, and geographies, Finland and Sweden have handled the COVID-19 pandemic in contrasting manners, resulting in significantly more cases and deaths in Sweden than Finland. Finland swiftly implemented a 2 month lockdown, compared to Sweden which opted for a herd immunity approach in response to the pandemic. Scholarly literature on responses to pandemics and other health crises have suggested two mechanisms for predicting success of government policy: crisis leadership and responsiveness of healthcare systems. This paper examines the factors that caused these countries to take such different approaches when handling the pandemic, in spite of their similarities. Through an analysis of policies, speeches by the country leaders, and official government reports, we argue that Sweden's ineffective crisis leadership and inadequate healthcare provision led to poorer management of the pandemic response compared to Finland. Our findings reveal that Swedish officials did not choose an appropriate response strategy and failed to comply with their own advice that they gave to the public. Furthermore, Sweden reduced their healthcare budget which led to reduction of beds in hospitals and understaffing of medical officials.

WAVE 3 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Factors that Predict Overcorrection in Vertebral Body Tethering for Adolescent Idiopathic Scoliosis Patients

Presenter(s): Sachini Jayasinghe, Garshana Rajkumar

Abstract:

Adolescent idiopathic scoliosis (AIS) is defined as a coronal curvature of the spine with an unknown cause that appears in adolescents (Age 13-18). Currently, the most common way to treat AIS is with a posterior spinal instrumented fusion (PSIF) procedure. Another, more recent treatment, which has been growing in popularity is vertebral body tethering (VBT). PSIF and VBT have both shown equivalent patient reported outcomes, with the biggest advantage of VBT being that it preserves motion. However, VBT is associated with a higher re-operation rate than PSIF. Overcorrection of the patient's curve after VBT is a leading cause of re-operation. Overcorrection occurs when the spine begins to curve in the opposite direction of the initial curve. The purpose of this study is to determine pre-operative risk factors that predict overcorrection in AIS patients who have undergone VBT. 301 patients over a 9 year time period were analyzed from the Harms Study Group (HSG) VBT database. Patients were enrolled based on the criteria outlined by the HARMS study group. Pre-operative factors such as type of curve and curve magnitude, growth factors that indicate skeletal maturity, and flexibility were evaluated using statistical analysis. 13 patients were identified as having overcorrection post VBT treatment. The following risk factors are predicted to be statistically significant in predisposing a patient to overcorrection: pre-op curve magnitude, type of curve, and growth factors such as menarche status and Risser score. Better understanding these risk factors can lead to the prevention of overcorrection and improved surgical outcomes for patients.

WAVE 3 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Evaluating Racial Diversity in Neuroimaging Studies for Pain

Presenter(s): Georgia Grenier

Abstract:

Clinicians make decisions for treatment and urgency depending on the level of pain a patient is experiencing. However, some patients are unable to respond or express their pain for various reasons. This raises the significance of constructing a tool like the Neurologic Pain Signature which objectively measures pain based on brain activity. But whose brain does the Neurologic Pain Signature represent? Often in pain research the participant groups are predominantly Caucasian, which is potentially problematic because there is evidence towards a psychosocial difference in experienced pain among racial groups. Failing to account for psychosocial experiences that influence pain, and poor racial representation, may result in furthering health disparities and oversights. This project aims to evaluate the racial representation of the control brain for pain research studies. We conducted a systematic review of 516 articles for “pain” in the Neurosynth database. The preliminary data suggests an underrepresentation of African American participants in pain related studies in the United States of America. This raises the concern that the Neurologic Pain Signature could potentially overlook an aspect of the pain experience in African American individuals. This project raises the importance of considering psychosocial aspects of pain, and it contributes to the notion of a well representative sample to ensure that all individuals who experience pain are properly assessed.

WAVE 3 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Unravelling the Varying Effects of Necroptosis on Cancer Development

Presenter(s): Logan van de Wetering, Jean Louise

Abstract:

Many cancers share the characteristics of evading cell death and attempting to harness the immune system to promote tumour development and protection. In recent years, research has shifted to cancer's relationship with a type of programmed cell death called necroptosis, characterised by cell membrane destruction and the generation of an inflammatory immune response. However, attempts to uncover the effects of necroptosis on cancer development have yielded contradictory results. While many cancers attempt to suppress the expression of necroptosis associated proteins, others encourage their expression. Experimental induction of necroptosis has also been found to help some cancers and harm others. The cause of these differences between types of cancer is currently uncertain. In this study, we will examine pancreatic, lung, and breast cancer tumours to analyse the effects of necroptosis on different cancers. Using genetically engineered mouse models, we will inhibit necroptosis by using CRISPR to knockout RIPK3 (a protein critical for necroptosis) and observe effects on cancer progression. We will then perform mass spectrometry based proteomic analysis (a technique used to determine the types and quantity of proteins present in a sample) of tumour and tumour microenvironment samples to determine the molecular basis for tumour development differences. We expect inhibition of necroptosis to disrupt tumour development in pancreatic cancer and aid tumour development in lung and breast cancer. Furthermore, we expect these differences to be correlated with differences in the tumour microenvironment. These findings could lead to better informed decisions on designing and utilizing anti-cancer drugs that interact with necroptosis.

WAVE 3 POSTER ABSTRACTS

Theme: Health and Wellness

Title: When penetrative sex is terrifying: Ideal treatment outcomes and patients' anxiety, stress, and desire for control

Presenter(s): Coleen Tolentino, Shahrazad Amin, Megan Pan

Abstract:

Vaginismus is a sexual disorder prevalent in cisgender women, characterized by a fear of vaginal penetration, sexual avoidance, and difficulties with vaginal intercourse. While studies from Eastern countries report 'conception' as a primary treatment goal, little is known about desired treatment outcomes in Western countries (Zulfikaroglu, 2020; Safak Öztürk & Arkar, 2017). There is limited research regarding the relationship between anxiety, stress, and desire for control within sexual contexts, compared to daily situations, though studies mark the importance of examining how negative reactions extend beyond non-penetrative sexual interactions (Cherner & Reissing, 2013). We aim to address the lack of empirical findings in two parts by: 1) identifying treatment goals of women with vaginismus in Western countries, and 2) determining whether there is a link between anxiety, stress, and desire for control in daily life vs. sexual contexts. Participants will be recruited from sexual medical clinics and Vancouver residents via online and transit advertisements. Vaginismus symptoms will be assessed by sexual-health clinicians through telephone interviews. An online questionnaire will be administered to assess the primary motivations of Vaginismus treatment and connections between anxiety, stress, and desire for control. Correlational analyses will be conducted. We expect to find a positive correlation in anxiety, stress levels, and desire for control between daily life and sexual contexts. These results will reveal 1) the primary motivations of Western women seeking Vaginismus treatment, and 2) the links between their anxiety, stress, and desire control in daily life and sexual contexts, helping clinicians tailor goals for intervention.

To address the feedback: (This is to provide further information regarding our research topic)

- Most of the research on vaginismus has been done on cis women as it requires having vagina, so we have indicated that this disorder is prevalent in women. It is possible that non-binary individuals and trans men can be affected by this condition, however not enough research has been done and that would be a great direction for future research.
- Regarding studying the relationship between daily and sexually specific anxiety and desire for control, there is data from other sexual dysfunctions however, not a substantial amount in vaginismus. We have cited a study as a reference.
- Desire for control has also been researched in other disorders, specifically OCD, but not in vaginismus.

WAVE 3 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Is Early, Short-term Exposure to Cow's Milk-based Infant Formula Associated With the Development of Immunoglobulin E-mediated Cow's Milk Allergy In Breastfed Infants? A Study Protocol

Presenter(s): Raymond Hsia, Aiman Atif, Devika Pillai, Noshin Khan

Abstract:

Background: In Canada, cow's milk allergy (CMA) is the most common food allergy affecting nearly 2% of children. Immunoglobulin-E mediated CMA is one of two allergy pathways with a more severe impact on organs, diminishing the quality of life. The risk of developing allergies correlates to both the frequency and the age of first exposure in an infant's diet. While some research indicates that early exposure to cow's milk formula (CMF) leads to developing CMA, recent experiments suggest otherwise. However, these recent trials only used short intervention periods in early infancy. The proposed study explores the risk of developing CMA at 6 months of age after exposure to CMF for differing intervention periods compared to the avoidance of CMF.

Methods: In this experiment, we will recruit 600 infants born in British Columbia within 5 days of birth. For the first month of life, all infants will breastfeed with CMF. A screening oral food challenge (OFCs) will be used to select for nonallergic infants and to assign them into: (i) ingestion group (breastfed + CMF for 2 months), (ii) avoidance group (breastfed +/- soy for 5 months), (iii) prolonged ingestion (breastfed + CMF for 5 months). At 6 months, OFCs will be performed again with CMF to diagnose CMA. **Significance:** Controversy remains on whether early exposure to cow's milk is associated with the risk of developing CMA. This experiment will clarify whether CMA can be prevented by introducing CMF for a short-term, long-term, or by avoiding it altogether.

WAVE 3 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Cum Gladio et Scientia: A Proposed Methodology on Non-Destructive Techniques for the Metallurgical Characterization of the Ancient Roman Gladius

Presenter(s): Maggie Chong

Abstract:

One of the weapons famously associated with the ancient Roman infantry is the short sword or Gladius. The Gladius is an exceedingly rare archeological find. This project aims to find a non-destructive method to determine the chemical composition and manufacturing process of the Roman Gladius.

The metallurgical characterization of the Gladius, as proposed by Lang, involves making two wedge-shaped cuts into a fragile and corroded steel blade. While this method permits the determination of microstructural characteristics through a Scanning Electron Microscope (SEM), the damage done to these invaluable artifacts risks irreparable damage. The destructive SEM analysis only confirmed there was a non-uniform microstructure. The fraction of surviving swords is too small of a database to draw statistically significant results.

Through a combination of handheld X-ray Fluorescence and traditional radiography techniques, it is possible to determine information regarding the manufacturing technique, such as hammer striking patterns and corrosion progression, in addition to precise elemental analysis. The technique would be applied to existing metal blades in any museum collection. Digital radiography will be applied for 0.5 to 5 minutes, and a ~50 Kv x-ray tube will be used for XRF. The study may lead to an overall better understanding of ferrous metals in ancient Rome and conditions that are best for the continued preservation of these priceless artifacts.

WAVE 3 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Microbe Dining Etiquette - Identification and Characterization of Novel Glycosidases

Presenter(s): Chloe Zhang

Abstract:

Carbohydrates constitute one of the major components of our food, yet we lack the digestive enzymes to directly metabolize all of them. A significant portion of dietary fibre becomes available for human absorption only after being processed by our gut bacteria. These microorganisms aid in the uptake of indigestible nutrients and act as a barrier against harmful pathogens. Therefore, it is important to uncover the underlying enzymatic functions present in the gut microbiome.

Objectives

In this ongoing study, we aim to identify novel enzyme systems belonging to the class of glycosidases and further characterize the mechanism they employ to break down the dietary carbohydrates.

Methods

Microbial DNA extracted from the human gut were constructed into a small insert library and screened against specific substrates to isolate potential carbohydrate-metabolizing genes. *E. coli* carrying reconstructed plasmids were induced to express desired proteins. Using fluorogenic substrates, these proteins were explored for kinetics and co-factor studies. Additional analyses using LC-MS and NMR will further elucidate the individual roles of cooperating enzymes and their detailed mechanisms.

Conclusion

It is recently reported (Liou, C. et.al, 2020) that an operon in the bacterial species *B. thetaiotaomicron* is responsible for the metabolism of glucosinolates, a compound commonly found in Brassica vegetables. Our studies have revealed enzymes from this operon coordinate their activities to hydrolyze substrates in a metal-dependent manner, and similar gene clusters are conserved across many bacteria genera with different substrate specificities. Continuing research will further clarify the exact mechanism of these unique, multi-enzyme systems.

WAVE 3 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Optimizing surface roughness and corrosion properties of 3D printed titanium implants

Presenter(s): Sajida Chowdhury, Auritro Roy

Abstract:

Metallic implants can be used as engineered replacements that restore the form and function of diseased or lost biological parts in the body to improve the quality and length of human life. New manufacturing methods, such as additive manufacturing (AM) or 3D printing, can be used to produce these implants as opposed to conventional manufacturing methods. Electron Beam Melting (EBM) is a subset of AM and is becoming increasingly popular. Although AM methods are optimal for creating complex parts, some challenges still exist. One of the challenges EBM-produced implants face is surface roughness. A high roughness value increases the corrosion rate of an implant. Corrosion is an undesirable process because it leads to the release of metallic ions, which can have short- or long-term adverse effects on the body.

To increase an implant's resistance to corrosion, surface roughness should be decreased. However, some level of roughness is desirable for proper tissue growth and adherence to implant-surrounding surfaces. This research intends to analyze the effects of mechanical polishing on surface roughness and corrosion properties of EBM-manufactured grade 5 titanium (Ti-6Al-4V) implants. For this purpose, surface and microstructural characterization can be performed using optical microscopy (OM), scanning electron microscopy (SEM) and X-ray diffraction (XRD). Corrosion resistance can be assessed through open circuit potential (OCP), potentiodynamic polarization (PDP) and immersion tests in a physiological body solution. The ion release content can also be measured through inductively coupled plasma optical emission spectroscopy (ICP-OES). Through these methods of analysis and experimentation, we expect to find an optimum level of mechanical polishing and surface roughness in which an implant will have the least amount of corrosion and the most surface adherence to adjacent tissues.

WAVE 3 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: The transfer of negative valence in episodic memory

Presenter(s): Young Ji Tuen

Abstract:

Emotion plays a fundamental role in the shaping of our attitudes and preferences. Indeed, prior work has shown that pairing a negative stimulus (e.g., a snake) with a neutral one (e.g., a bucket) can reduce one's preference for that neutral stimulus later on – a 'transfer of valence' effect. In other words, the intrinsic averseness of the snake can spread to the bucket. Importantly, we may or may not be explicitly aware of the emotional mechanisms behind our shifting attitudes. For example, research has shown that negative emotion impairs memory for the pairing of stimuli, or associative memory. Thus, the goal of this study is to (1) replicate the transfer of valence effect and its boundary conditions and (2) explore whether transfer of valence is accompanied by explicit memory for prior pairings. Across three experiments, we demonstrate that negative emotion can (1) reduce preference for originally neutral objects, confirming the 'transfer of valence' effect and (2) worsen associative memory for pairings of negative images and neutral objects. Critically, our results show that even when memory for the details of negative images, or episodic memory, fails, transfer of valence still occurs. These findings emphasize the complex relationship between emotion and memory.

WAVE 3 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Giftedness Beyond High School

Presenter(s): Rachel Dupras

Abstract:

Gifted education experienced significant paradigm shifts over the last century as a result of the evolving theoretical understanding of giftedness. Although early models of gifted education were mainly concerned with identification and acceleration, contemporary approaches emphasize differentiation and the transacting potentials in all students. Transactional approaches recognize that students are valuable in their own unique niches and have different needs, and speaks to school affordabilities of diverse experiences matching learners' needs, abilities and interests. Despite these changes, gifted education has remained constrained to K-12 education, leaving little known about gifted students beyond high school.

The current research aims to (1) broaden the scope of gifted education to incorporate post-secondary perspectives, (2) address the gap in the literature about giftedness in higher education, and (3) provide future directions for educators to overcome limitations of current post-secondary education curricula. This project conducted thematic analysis using social media posts pertaining to higher education experiences. Our analysis revealed themes concerning issues of self-knowledge and self-advocacy, concerns with the cognitive content and learning environment of post-secondary education, the affective curriculum of gifted programs and university education, counselling and support, as well as recommendations for future directions. Findings highlight the critical importance of post-secondary education experiences on gifted students' self-concept, mental health, self-advocacy and decision-making for career development. Further investigation on giftedness in higher education is imperative for gifted education to successfully lead to the expression of students' potential.

WAVE 3 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Pandemic & 'Moral' Panic: A Thematic Analysis of the UK's Top News Articles on Covid-19

Presenter(s): Vivian Truong

Abstract:

The COVID-19 pandemic has disrupted social life globally. During the days leading up to the World Health Organization's declaration of COVID-19 as a pandemic, most countries initiated lockdowns to curtail spread. The United Kingdom (UK), however, took a business-as-usual, herd immunity approach. Although previous research on media framing demonstrates it can influence public perceptions, research has yet to address how media framing took form in the UK leading up to the COVID-19 pandemic. Through Cohen's (2002) theory on the creation of 'moral panics' in news framing, this study examines the dominant discourses on COVID-19 in British news media. Analyzing 165 news articles from the Guardian, BBC News & DailyMail, between March 1st, 2020 and March 11th, 2020, I utilized an inductive qualitative thematic analysis to assess the textual content of these articles. Preliminary findings reveal the central theme dominating news media was the deviance and irresponsibility of government and expert bodies. This theme was present in framing 1) government intervention as a disruption to normalcy, 2) the ongoing questioning of government competency, 3) the rise of social deviance due to a lack of government regulation, and 4) the cause of unnecessary deaths. This study hopes to demonstrate how framing in news media during the period leading up to the pandemic worked to shape public understandings of government interventions and expert bodies. Future research should address issues of social trust and cohesion in the UK following the conclusion of the pandemic.

WAVE 3 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Ensuring no one is left behind, exploring the supply chain improvement measures required for access to Covid-19 vaccine in low- and middle-income countries.

Presenter(s): Jack Cheng, Tracy Ngo, Diksha Chaudhury

Abstract:

In response to the COVID-19 pandemic, initiatives such as COVAX are working towards equitable distribution of COVID-19 vaccines. However, there are concerns about the immunization supply chain systems' ability in low- and middle-income countries (LMICs) to effectively manage end-to-end vaccine delivery without compromising vaccine potency. We aim to generate evidence that will help address this challenge by conducting a study with objectives that include (1) To describe ongoing efforts to ensure access to COVID-19 vaccines in LMICs. (2) Determine supply chain professionals' perception about the readiness of supply chains in LMICs for effective delivery of COVID-19 vaccine. (3) To identify major supply chain challenges that may impede access to COVID-19 vaccines in LMICs (4) To identify key supply chain improvement measures required to ensure equitable access to COVID-19 vaccines. This study will be a descriptive study mixed-methods study. The study's qualitative component will involve semi-structured interviews with twelve purposively selected supply chain stakeholders from key global health organizations. On the other hand, the study's quantitative component will involve administering a structured questionnaire to a diverse pool of stakeholders with supply chain-related job functions. The transcribed interviews will be analyzed following a thematic content analysis approach while frequency counts and percentages of responses will be presented for the study's quantitative component. Our findings will help global policymakers, and decision-makers in LMICs understand the supply chain system challenges that may impede access to COVID-19 vaccines and help them take the necessary steps.

WAVE 3 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Comparing Children's Confidence in Memory and Perceptual Decision-Making

Presenter(s): Isabella Schoettler

Abstract:

In making decisions, how certain are you that you've made the right choices? When it comes to making decisions, confidence plays a key role in how we evaluate our reasoning and preference for particular choices. Our awareness of the decisions we make and the certainty with which we make them can have lasting impacts in our lives. Previous research has shown that adults' level of confidence in their decision-making appears to be similar and correlated across several cognitive domains, such as in memory and perception. However, it's unknown whether children's confidence is correlated or independent between perception and memory. The present study seeks to discover how similar children's memory confidence is compared to their perceptual confidence. In our study, 4-7-year-olds complete two tasks: a memory confidence task and a perception task. In the memory task, children are shown a series of images and then must choose one of two pictures offered that they remember seeing before. In the perception task, children must compare yellow and blue shapes to determine which shapes is bigger than the other. Children then choose between which of the two trials they felt most confident in their answers. On half the trials, children evaluate their confidence within-domains (e.g., perception versus perception), and, critically, on the other half, between-domains (e.g., perception versus memory). We predict that children, like adults, will also display similar levels of confidence in perception and memory decision-making tasks independent of trial type, suggesting that confidence can be compared across domains early in life.

WAVE 4 ORAL & POSTER PRESENTATIONS



WAVE 4 ORAL PRESENTATIONS

March 20, 7:00 PM - 8:15 PM

Room 1

Kinesiology Beyond the Western Norm: Chinese-Canadian Women's Experiences of Kinesiology at UBC

Queena Cheong
Candace Chau

The relationship between food security and prevalence of gestational diabetes mellitus among self-identifying Indigenous women from Squamish Nation territory

Francine Flores
Kayla Kim
Minaho Sugimori (Chiew)

Social Skills Training: Preparation of Post-secondary STEM Students for Diverse and Inclusive Workplaces

Cici Liu

Mental Health and Inequalities: Indigenous experiences in Canada

Sarah Marvi
Katheryn Duan
Nina LI

Visualizing the Effects of Motor Learning on the Aging Brain using Connectomics

Larissa Chiu

Room 2

Controlling the quality of the weld cladding process with two color temperature measurements based on high-speed camera images

Andy Zong

Neuroimaging evidence of predementia brain changes in genetic Frontotemporal Dementia: A review of C9orf72 genetic mutation carriers

Chris Mok
Tina Lee
Hannah Ro

Modeling the trajectory of SARS-CoV-2 spike protein evolution in continuous latent space using a neural network and Gaussian process

Emilia Chen
Janella Schwab
Kimia Rostin
Sarah Ng

Cell Phone: Building Smartphone-Based Point-of-Care Diagnostics

Sahil Kanani

Modeling of Sensorimotor Noise Contributions to the Variability of Human Standing Balance

Jarrett Lee

Room 3

Motherhood and APOE ϵ 4 genotype are associated with inefficient search strategies in middle age: Implications for aging and Alzheimer's Disease	Mel Cevizci
Examining the Impact of Whole Dietary Approaches on Type 2 Diabetes Remission: A Systematic Review Protocol	Rana Madani Civi Clover Lee
The effects of CRISPR Cas9 knock-in and knockout of LINC01787 breast cancer promoting RNA	Eric Gu
An artificial intelligence framework to learn standing balance	Candy Liu
Dopaminergic Treatment of Depression	Andrea Wong Koo Jack Ducharme Melody Hall Zoha Saeed

Room 4

Modelling the Impact of Increasing Global Temperatures due to Climate Change on the Spread of Vector-Borne Disease: A Study of Dengue in Veracruz, Mexico	Lauren Moody Salma Said
To oviposit or no-oviposit: strong preference of Aedes aegypti females to textured oviposition substrates	Aleksandra Anoshina
MELODI: A Musical Interface for the Art of Speech Sciences	Kathleen Zaragosa
Greenspace Availability and Early Development Instrument Vulnerability in B.C Children	Jen Chen Steffi Lau

WAVE 4

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Kinesiology Beyond the Western Norm: Chinese-Canadian Women's Experiences of Kinesiology at UBC

Presenter(s): Queena Cheong, Candace Chau

Abstract:

Over the past two decades, Kinesiology programs have become an increasingly popular destination for undergraduate students at Canadian universities. With this growth in popularity, there has been increased attention on what content is covered in kinesiology curricula and, perhaps more significantly, what is not covered. Recently, the Faculty of Kinesiology and Physical Education at the University of Toronto released a report suggesting that both their own curriculum, as well as kinesiology curricula across the country, is embedded in a Eurocentric approach to health, exercise and the body. This is especially problematic for kinesiology programs housed in large urban centers, such as Vancouver Canada, whose student body is racially and ethnically diverse. Notwithstanding preliminary commentaries on kinesiology programs, there is relatively little research examining how racially and ethnically diverse students experience kinesiology curricula. This project goes some way to addressing this gap in the research by conducting 10 semi-structured interviews with second-generation Chinese-Canadian women who are enrolled in the undergraduate program in the School of Kinesiology at the University of British Columbia. With this research, we sought to address the broad research question: how do Chinese-Canadian women enrolled in kinesiology at UBC negotiate the different—and sometimes competing—messages about health, exercise and the body received in their kinesiology classes with those of their Chinese backgrounds? In this presentation, we present the preliminary findings emerging from this study. We are hopeful that the research emerging from this study will not only address a gap in the literature, but may inform the revitalization of UBC kinesiology curriculum to appropriately reflect the diversity of students in the program in a culturally relevant and responsive manner.

WAVE 4

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The relationship between food security and prevalence of gestational diabetes mellitus among self-identifying Indigenous women from Squamish Nation territory

Presenter(s): Francine Flores, Kayla Kim, Minaho Sugimori (Chiew)

Abstract:

Gestational diabetes mellitus (GDM), a condition characterized by glucose intolerance during pregnancy, is associated with adverse pregnancy outcomes such as premature delivery and stillbirth. Studies have shown a lower prevalence of GDM in women with food security than women without food security. Food security is defined as having access to sufficient, safe, and nutritious food that suits one's dietary requirements and preferences. Indigenous women face increased barriers to food security due to ongoing land loss, negatively affecting their access to traditional foods. In Canada, there is a higher prevalence of GDM among Indigenous women compared to non-Indigenous women. We hypothesize that having food security is inversely related to GDM among women from Squamish Nation, a self-governing Coast Salish Nation with complex rules controlling economic and social relations. We will conduct a community-based retrospective observational study using mixed-methods with 100 women over a 1-year period. Using semi-structured interviews, we will analyze quantitative and qualitative data using descriptive statistics and thematic content analysis, respectively. Our primary objective is to examine the impact of food security on GDM prevalence among self-identifying Squamish women who are 15-44 years old. The principles of self-determination in research for First Nations, Ownership, Control, Access, and Possession (OCAP®), will be employed. We expect to better understand the relationship between food security and GDM among Indigenous women. To our knowledge, this is the first study on this topic and results will provide evidence for the need for culturally-safe community programs for food security among Indigenous women of reproductive age.

WAVE 4

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Social Skills Training: Preparation of Post-secondary STEM Students for Diverse and Inclusive Workplaces

Presenter(s): Cici Liu

Abstract:

In recent decades, educators have begun to investigate the teaching practices that enable post-secondary students in Science, Technology, Engineering and Maths (STEM) programs to thrive in their future careers. The structure of the STEM curricula demonstrates that the focus tends to be on the training of core (hard) skills. In the workplace, however, communication skills, emotional intelligence skills and intercultural skills are also required. In response to the UN Sustainable Development Goals (SDGs), the STEM disciplines seek to address the issue of equity, diversity, and inclusion (EDI) by constructing more inclusive, diverse environments in the classroom that reflect modern workplaces. Through a scoping literature review, we will investigate whether and to which extent those skills are being taught and, if so, how they are being taught in post-secondary classrooms. This review will examine to what extent and with what effect social skills and empathy in classrooms are being promoted to prepare STEM students to meet the increasing requirements of inclusive, diverse teams and environments. This investigation will provide a clearer picture of how or if STEM students are being holistically prepared for the 21st century workplace, as well as guide the next stage of the research by revealing gaps in the literature, stressing current practices that need further empirical investigation, and highlighting practices that merit implementation in the classroom. This research will help post-secondary STEM programs provide critical skills for students' academic and professional success by preparing them to adapt to ongoing changes in both STEM and workplace.

WAVE 4

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Mental Health and Inequalities: Indigenous experiences in Canada

Presenter(s): Sarah Marvi, Katheryn Duan, Nina LI

Abstract:

The purpose of our research project is to explore how inequalities pervade Canada's mental health system and how this disproportionately affects Indigenous communities to access proper mental healthcare services. There are continuous disparities between Indigenous and non-Indigenous rates of mental health experiences and service usage, stemming from displacement, socio-economic issues, and healthcare policies and legislation resulting from a continuing colonial legacy. In other words, the history of colonization still manifests in Canada's contemporary economic, political, and social structures, such as the health care system. In 2014, the City of Vancouver organized a task force and created a report detailing their innovative plans to address the city's mental health crisis. In response, Carnegie Community Action Project produced their own report that outlined specific problems plaguing the Downtown Eastside, while centering voices from the community itself. Our research compares the reports through a critical policy analysis approach and notes discrepancies between what the community wants and what the government wants. While organizing workshops to have conversations surrounding stigma, training staff, and increasing emergency response teams are all beneficial priority actions, this paper will suggest that health care policies might benefit from taking into account Canada's colonial history and its particular effects on Indigenous communities' experience with the healthcare system. Moreover, we suggest that the government cannot organize and take action regarding vital policies without having proper community representation to inform their decisions. Therefore, we argue that more attention needs to be paid in enhancing the reciprocal relationship between government decision-making and Indigenous groups' participation. This can be done by direct community involvement in the construction and distribution of essential resources to mitigate the mental health crisis accurately.

WAVE 4

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Visualizing the Effects of Motor Learning on the Aging Brain using Connectomics

Presenter(s): Larissa Chiu

Abstract:

The aging population is increasing due to the rising life expectancy and reducing fertility rates. It is paramount that we promote healthy living to this growing representation of our world's population. One of the most important thing amongst aging individuals is maintaining autonomy, and with that one's movement, from gross to fine motor control. The purpose of this study is to relate motor learning behavioral changes could inform potential changes to the brain's structure and function. In particular, how functional connectivity of the brain adapts to support experience-dependent neuroplasticity using resting state functional MRI (rsfMRI). Healthy participants, 24 older adults (mean age of 64) and 13 younger adults (mean age of 20), participated in 10 thirty-minute sessions of an upper-limb tasked-based motor learning intervention that consist of 1000 movements per session. Game difficulty increased as participants became more proficient at the task, which was using their non-dominant arm to intercept a moving object and throw it towards a target. Each participant received a fMRI scan at baseline and after their 10th session. The default mode, sensorimotor, fronto-parietal, visual, dorsal attention, and cerebellar networks were compared between and within groups to explore the coherence and connectivity between regions of interest. This shows if particular regions of the brain correlated and anti-correlated activity shown in the rsfMRI data to suggest the efficiency of information travelling though the brain. These results can be used to guide future studies in understanding any changes to white matter microstructure to relate functional changes to structural morphology. Ultimately, this study expands the knowledge surrounding neuroplastic changes in cortical grey matter to include functional activity of the brain by uniquely using rsfMRI.

WAVE 4

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Controlling the quality of the weld cladding process with two color temperature measurements based on high-speed camera images

Presenter(s): Andy Zong

Abstract:

Weld cladding is a surface treatment process in which a relatively thick layer of weld metal is overlaid to the base material surface in order to extend its service life. An accurate way of monitoring the quality of the weld cladding process is necessary to ensure the strength and durability of the overlay. Some methods of accomplishing this include analyzing acoustic signals or thermal camera images. In order to oversee the temperature of the weld, the combination of a high-speed camera setup and a MATLAB image processing program will be employed. The color gradient on the monochrome high-speed camera images will be fed to the image processing software to create a temperature calibration scale. Every color can then be assigned a corresponding temperature. Since the material properties of the joining material is directly related to the weld temperature, we can analyze the data ensure the quality of the result.

WAVE 4

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Neuroimaging evidence of predementia brain changes in genetic Frontotemporal Dementia: A review of C9orf72 genetic mutation carriers

Presenter(s): Chris Mok, Tina Lee, Hannah Ro

Abstract:

Background: Mutations in the chromosome 9 open reading frame 72 (C9orf72) gene are a major cause of FTD, accounting for around 5-10% of all FTD cases. Early brain changes, detectable using neuroimaging scans, may be potential biomarkers for FTD development.

Purpose: Studying changes in neuroimaging biomarkers in C9orf72 mutation carriers will allow for better understanding of the early phases of FTD development. This will help with earlier identification of FTD indicators in C9orf72 mutation carriers prior to their symptoms onset.

Knowledge gap: Neuroimaging changes associated with C9orf72 mutation in the early stages of FTD before symptom manifestation are not well understood.

Methods: We performed a search for studies according to specific inclusion/exclusion criteria, then compared and identified preclinical neuroimaging changes associated with C9orf72 mutation.

Expected results: We expect to observe characteristic structural and functional neuroimaging changes in C9orf72 mutation carriers before FTD symptoms manifestation.

Implications of findings: Our study will encapsulate the current knowledge of neuroimaging changes associated with C9orf72 mutations prior to FTD symptoms onset. These findings may assist in the development of future studies, serving as a concise reference for formulating focused hypotheses regarding the disease progression in C9orf72 carriers.

WAVE 4

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Modeling the trajectory of SARS-CoV-2 spike protein evolution in continuous latent space using a neural network and Gaussian process

Presenter(s): Emilia Chen, Janella Schwab, Kimia Rostin, Sarah Ng

Abstract:

Vaccines lose their efficacy over time as viral genomes rapidly mutate and evolve, costing lives and resources. Developments in predictive vaccinology using deep learning (a subset of machine learning) intend a future of pandemic preparedness; however, there are currently few bioinformatic platforms that reliably inform pre-emptive vaccine development, and even fewer have questioned whether evolution may be better modeled in continuous latent space, rather than in a discrete context. We designed the Viral Predictor for mRNA Evolution (VPRE), an open-source software tool that learns from how viruses mutate and models the statistical trajectory of genetic mutations in viral proteins. We used a type of deep neural network called a variational autoencoder trained with real-time SARS-CoV-2 data to encode discrete viral spike protein sequences into three continuous variables. To simulate evolution on a phylogenetic path, we inputted the numerical variables into a Gaussian process to project the SARS-CoV-2 spike protein in Australia up to 5 months into the future. Our Gaussian process predictions mapped primarily to two sequences that showed significant similarity with reported spike proteins that occurred before and after our training cut-off date, suggesting the utility of continuous latent spaces for modeling evolution. The simple modularity of VPRE's framework can be readily adapted to chart the evolution of viruses other than SARS-CoV-2, in temporal, geographic, and lineage-specific pathways. We propose VPRE as an insightful investigation of the usefulness for deep learning and continuous latent space in applied evolutionary biology.

WAVE 4

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Cell Phone: Building Smartphone-Based Point-of-Care Diagnostics

Presenter(s): Sahil Kanani

Abstract:

The importance of rapid diagnosis in the management and treatment of disease has been highlighted during the ongoing SARS-CoV-2 (COVID-19) pandemic. Unfortunately, inequitable investment in diagnostic tools across different geographical regions has disproportionately increased the burden of disease in resource-limited settings¹. Such areas are likely to have limited access to medical equipment, skilled personnel and/or infrastructure such as a stable electricity supply. Patients living in such areas must travel to access diagnostic services, incurring a time and financial cost. The economic cost of delayed disease identification and prescription of incorrect treatments is even greater². Point-of-Care (POC) devices are portable, easy-to-use, resource-minimal instruments that can be utilized as diagnostic tools outside a conventional clinical laboratory. Smartphone-based POC devices have been developed for immunoassays quantifying proteins involved in blood clotting³ and response to infection⁴. However, imaging of complex biological samples such as blood and urine is challenging due to high levels of noise from extraneous components. Sophisticated, lab-based instruments overcome this by utilizing time-delayed measurement techniques. In this work, I construct a smartphone-based imaging device that incorporates a similar functionality using a pulsed light source and camera shutter controlled by an inexpensive logic controller board. Such a device would enable more sensitive quantification of analytes in complex samples with fewer pre-processing steps. This technology could further be extended for other field-testing applications such as water quality determination and food safety inspection.

References

- (1) Urdea, M.; Penny, L. A.; Olmsted, S. S.; Giovanni, M. Y.; Kaspar, P.; Shepherd, A.; Wilson, P.; Dahl, C. A.; Buchsbaum, S.; Moeller, G.; Hay Burgess, D. C. Requirements for High Impact Diagnostics in the Developing World. *Nature* 2006, 444 Suppl, 73-79.
- (2) Jordan, B.; Mitchell, C.; Anderson, A.; Farkas, N.; Batrla, R. The Clinical and Health Economic Value of Clinical Laboratory Diagnostics. *J. Int. Fed. Clin. Chem. Lab. Med.* 2015, 26 (1), 47-62.
- (3) Petryayeva, E.; Russ Algar, W. Analyst Single-Step Bioassays in Serum and Whole Blood with a Smartphone, Quantum Dots and Paper-in-PDMS Chips. *Analyst* 2015, 140, 4037.
- (4) Lu, Y.; Shi, W.; Qin, J.; Lin, B. Low Cost, Portable Detection of Gold Nanoparticle-Labeled Microfluidic Immunoassay with Camera Cell Phone. *Electrophoresis* 2009, 30 (4), 579-582.

WAVE 4

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Modeling of Sensorimotor Noise Contributions to the Variability of Human Standing Balance

Presenter(s): Jarrett Lee

Abstract:

Noise is ubiquitous in biological systems. When standing upright, sensory cues and motor commands are affected by various sources of noise disturbing the control of balance. While physiological factors contributing to sensory and motor noise have been proposed, the relative contribution of both, as well as their relationship with each other for the control of standing, are poorly understood. Using computer simulations, we will investigate how sensory and motor noise affects the variability of ankle torque and angular displacement distributions when standing. The control of balance will be modelled via an artificial intelligence framework learning to stand on its own through trial-and-error and rewards for successful results. The model will initially learn to balance under varied parameter values for sensory (angle and angular velocity) noise, motor (torque) noise, and metabolic cost. These parameters will be adjusted for each computer simulation, and the resulting torque and body angle distribution characteristics of the model will be analyzed and compared to data from existing standing balance literature.

The distributions of the torque and body angles generated from successful simulations are expected to resemble existing distributions within human standing balance literature; this can allude to the parameters set for these simulations quantitatively describing human sensorimotor processes present in this literature. Our findings will enable further understanding of the sensory and motor system processes involved in the control of standing balance in humans. The model can lead to quantitative hypotheses for standing balance which can be further tested through bipedal robots mimicking human sensorimotor function.

WAVE 4

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Motherhood and APOE ϵ 4 genotype are associated with inefficient search strategies in middle age: Implications for aging and Alzheimer's Disease

Presenter(s): Mel Cevizci

Abstract:

Females with Alzheimer's disease (AD) show greater neuropathology and cognitive decline compared to males. These differences are further exacerbated with possession of APOE 4 alleles, the greatest genetic risk factor for sporadic AD. Pregnancy and motherhood (parity) are further associated with a greater AD risk, greater neuropathology, and an earlier age of AD onset. Previous parity also influences cognition and brain aging in both middle-aged humans and rodents. Increased parity is associated with increased neuroinflammation and reduced neurogenesis in the hippocampus in the late postpartum in rodents - both of which are also observed in AD. This study investigated whether APOE 4 and parity interact to influence spatial working memory and AD neuropathology in middle-aged female rats.

Age-matched wildtype rats and rats with the humanized (h) form of APOE ϵ 4 were either nulliparous (no previous reproductive experience) or primiparous (one previous reproductive experience). At middle-age, rats were tested on the delayed win-shift version of the radial arm maze, in which performance depends on the integrity of the hippocampus and frontal cortex. . hAPOE ϵ 4 rats made more errors and more arm entries in the maze than wildtype rats. Primiparous rats made more omission errors than nulliparous rats. hAPOE ϵ 4 primiparous rats employed the most inefficient search strategy compared to other groups by entering adjacent arms to find food rewards. Analyses of hippocampal neuroinflammation and neurogenesis from collected brain tissues and plasma samples are ongoing. This research has implications for the importance of the influence of the reproductive history and genotype of females at risk for AD.

WAVE 4

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Examining the Impact of Whole Dietary Approaches on Type 2 Diabetes Remission: A Systematic Review Protocol

Presenter(s): Rana Madani Civi, Clover Lee

Abstract:

Background: Dietary changes are an essential component of diabetes management and several studies have indicated that whole-diet/food-based approaches could sufficiently reduce blood glucose so as to lead to remission, or even reversal of type 2 diabetes (T2D).

Method: A systematic search was conducted in Medline/Ovid between September 2020 and February 2021, supplemented by hand-searches, and was restricted to human studies published in 4 languages (English, French, Chinese, and Persian). Original studies were eligible when prospectively investigating whole-diet as a function of T2D remission. ADA guidelines define partial remission as sub-diabetic hyperglycemia for at least 12 months without pharmacotherapy; and complete or prolonged as normoglycemia for at least 12 and 60 months, without pharmacotherapy. Records were imported to a Mendeley library for screening of titles and abstracts, and relevant full-texts were retrieved. Standardised characteristics were extracted from full-texts of included studies and the Cochrane risk-of-bias tool (RoB 2) is being used for quality appraisal. Finally, analysis and interpretation of included studies will be through a narrative approach.

Expected results: Our search resulted in 4,239 records. Screening of 4,237 eligible records, after duplicate removal, resulted in 111 full-texts retrieved for full screening and 24 randomized clinical trial (RCT) studies identified as eligible for inclusion in our review. Most included studies did not observe remission, but some studies suggest remission may occur with certain whole-diet or food-based approaches. Ongoing quality appraisal shows some concern for bias in this evidence.

Expected conclusions: Limited good quality evidence exists to suggest specific dietary approaches may reverse T2D.

WAVE 4

ORAL ABSTRACTS

Theme: Health and Wellness

Title: The effects of CRISPR Cas9 knock-in and knockout of LINC01787 breast cancer promoting RNA

Presenter(s): Eric Gu

Abstract:

Repression or mutation of long noncoding RNA product LINC01787 transcription serves as a well-established fundamental method to repress breast cancer cell proliferation and maturation. A vital tumor suppressing agent for breast cancer revolves around miRNA-125b which is inhibited from maturation due to upregulation of LINC01787 in breast cancer patients. Without viable mature miRNA-125b, breast cancer causing genes KIAA1522, SNAI1 and ETS1 become upregulated giving rise to MDA-MB-231 cell line proliferation. Previous research displayed how a functional mutation or inhibition of LINC01787 expression in breast cancer patient improve survival rates and prognosis due to uninhibited miRNA-125b tumor suppressing RNA product. We conducted CRISPR Cas9 LINC01787 transcriptional repressor gene knock-in and direct knockout experiments upon vitro MDA-MB-231 cell lines. The knock-in experiment involves splicing a non-coding genomic loci and a donor vector coding for a transcriptional repressor for LINC01787's promoter. Meanwhile, the knockout experiment involves a nucleotide sequence alteration for LINC01787's genomic locus. Both CRISPR Cas9 LINC01787 repressor gene knock-in and direct LINC01787 mutation knockout assays on MDA-MB-231 resulted in significantly decreased cell proliferation in the cell proliferation MTT assay, alongside a higher concentration of cells displayed as dead cells in the Annexin V FACS assay. The MTT and FACS assays respectively display how a mutation or downregulation of LINC01787 addresses molecular level modification potential to mitigate breast cancer proliferation and progression. Rather solely rely on various chemical therapies for treatment, a CRISPR Cas9 treatment can be paired with various current therapies to maximize MDA-MB-231 cell death while minimizing breast cancer reoccurrence.

WAVE 4

ORAL ABSTRACTS

Theme: Health and Wellness

Title: An artificial intelligence framework to learn standing balance

Presenter(s): Candy Liu

Abstract:

Balancing upright seems to be an easy task for most individuals until a pathology impairs this complex process. When this happens, one must re-learn how to stand. Although many mathematical models have been used to conceptualize the control of standing balance, few can predict how humans adapt in novel environments. Reinforcement learning (RL) is an artificial intelligence framework that characterizes how learning occurs based on interactions with the environment. It proposes a trade-off between exploration of new behaviours and exploitation of learned actions occurs while learning and controlling motor tasks. However, it is not clear how predictions from RL relate to the physiological processes underlying standing balance. For the present study, we will use the Markov Decision Process model as the framework to explore the effects of sensory (angle, angular velocity) and motor noise, and metabolic cost on the control of standing balance. Each set of variables will yield an optimal pairing between actions and whole-body states that predicts how humans are maintaining upright stance. The results will be compared to known patterns of standing to determine which model best represents the control of standing balance in humans. We predict that an increase in the sensory noise will positively skew the low-frequency distribution of body angle and increase the ratio of low-frequency power in simulations, replicating critical aspects of standing balance. The results will establish a foundational model that replicates key features of human learn to maintain balance. The parameters of the optimal model will also help us understand how the brain might calibrate the sensory and motor noise. In future simulations, we will model whole-body motion cues to explore how these may play a role in human standing balance.

WAVE 4

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Dopaminergic Treatment of Depression

Presenter(s): Andrea Wong Koo, Jack Ducharme, Melody Hall, Zoha Saeed

Abstract:

Although serotonin has been the primary target for research in depression, many people are unresponsive to serotonergic treatments. Current research suggests that dopamine (DA) is implicated in motivation. Thus, it is a potential target for alleviating amotivational deficits - a prevalent and undertreated symptom of depression. The purpose of this hypothetical study is to determine if the DA system is a better target than the serotonin system for pharmacological treatment of amotivational symptoms of depression. Since Flinders sensitive line (FSL) rats are genetically predisposed to depressive-like symptoms, they will serve as our model of depression. Our control group will consist of Sprague-Dawley rats, a breed that does not have the predisposition to depression. Using a progressive ratio task, motivation will be operationalized in terms of total number of lever presses. In this task, a rat presses a lever once to receive an initial reward. Each subsequent reward will require additional lever presses. The point at which rats stop pressing the lever will indicate their motivation. Drugs that will be used include the serotonin reuptake inhibitor citalopram and the dopamine reuptake inhibitor GBR-12909 which will increase serotonin and dopamine, respectively. We predict that FSL rats will exhibit less motivational behaviour than the Sprague-Dawley control rats. Additionally, we expect the GBR-12909 drug to increase motivation more than citalopram or saline. Here, we present simulated results that will illustrate how this study could enhance understanding of the neural mechanisms and potential treatment targets of depression.

WAVE 4

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Modelling the Impact of Increasing Global Temperatures due to Climate Change on the Spread of Vector-Borne Disease: A Study of Dengue in Veracruz, Mexico

Presenter(s): Lauren Moody, Salma Said

Abstract:

Increasing temperatures result in a more suitable climate for vectors of disease; as a result, it is expected that climate change will increase the spread of vector-borne diseases as temperatures rise. A model was created to examine how increasing global temperatures due to climate change affect the spread of dengue - a vector-borne disease primarily spread by the mosquito *Aedes aegypti* - in Veracruz, Mexico. In the compartmental model, mosquitoes and humans moved through compartments labelled "susceptible" (vulnerable to infection), "infected" (carrying the virus but unable to transmit it), "infectious," (able to transmit the virus), and "removed" (died from or recovered from the virus). Temperature-dependent parameters, such as bite rate, probability of transmission, incubation period, mortality rate, and development rate, influenced the rate of movement through these compartments. The model integrated these parameters to depict how dengue transmission by *Aedes aegypti*, was influenced by increasing temperatures. The model, fitted using case numbers from Veracruz, Mexico, predicted how various greenhouse gas emission scenarios - and their predicted temperature increases - would affect the number of reported cases of dengue in Veracruz. Case numbers were hypothesized to increase with temperature due to the elevated bite, transmission, and survival rates of *Aedes aegypti* at higher temperatures. Instead, while the model did predict significant increases in the number of reported cases of dengue under lower emission scenarios, it predicted fewer cases of dengue under the highest emission scenarios.

WAVE 4

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: To oviposit or no-oviposit: strong preference of *Aedes aegypti* females to textured oviposition substrates

Presenter(s): Aleksandra Anoshina

Abstract:

Hundreds of thousands of people die every year as a result of diseases transmitted by female mosquitoes as they feed on blood in order to develop eggs. The success of these disease vectors lies in its ability to propagate from one generation to the other by egg-laying (oviposition). The selection of an oviposition site that guarantees larval survival is a crucial step in the reproductive process. Amongst many other cues, gravid female mosquitoes rely on substrate texture in evaluating an oviposition site. To date, no study has attempted to quantify texture preference in *Aedes aegypti* females, a prominent vector of diseases like yellow fever, dengue, and Zika. Here, I investigate the preference for different textures using two-choice oviposition assays with agarose substrates of variable known grit. I show that *A. aegypti* females have a strong and dose-dependent preference for rough substrates with particle diameter ranging from 30.2 to 425 micrometers. In addition, I demonstrate that eggs are distributed differently on different substrates, as they are deposited as clumps on finer textures and singly on rougher textures. To better understand the molecular basis of this behavioural preference, I am examining texture discrimination in mosquitoes deficient in *Ir76b* and *Ir25a*, genes that encode broadly-expressed co-receptors for a class of sensory receptors (IRs, or ionotropic receptors). These findings will improve the development of better oviposition traps that are texturally more attractive than the surrounding environment and aid in vector control.

WAVE 4

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: MELODI: A Musical Interface for the Art of Speech Sciences

Presenter(s): Kathleen Zaragosa

Abstract:

The backbone of theoretical linguistics research is to regard language and the human voice in a scientific, analytical light. Empirical findings from these fields are notably insightful, shedding light on a uniquely human trait, yet academic jargon can make this knowledge inaccessible or difficult to interpret for broader audiences. This situation presents a lost opportunity, especially in phonetics and speech sciences; the voice is not only a channel for communication but a mode of creative expression. MELODI (Musical Expression of Linguistic Oral Data Interface) is a music technology interface designed for the electroacoustic performance of speech data. The current model is a direct extension of the DRAWL (Determining Regional Accents With Literature) project, a collaborative BC English dialect study between UBC's Linguistics department and the School of Music (DRAWL, 2017). The software program, created and coded on Max/MSP, is based on an existing synthesis system that uses spectral analysis to segment and organize audio samples in real-time (Schwarz et al., 2006). The instrument consists of ultrasonic sensors to control the software through hand gestures, essentially using sound itself to manipulate and perform sound. This capstone project exclusively utilizes an elicitation sample set based on real data collected for the DRAWL project as the audio and visual material for performance pieces. The aim is to bridge the innovation of art with the study of speech sciences, to demonstrate language research findings and celebrate stories of place and identity through voice and performance.

References

DRAWL (2017, June 28). DRAWL: Determining Regional Accents With Literature, A UBC Linguistics and UBC School of Music project. Retrieved January 24, 2021, from <https://blogs.ubc.ca/drawl/2017/06/28/drawl/>

Schwarz, D., Beller, G., Verbrugghe, B., & Britton, S. (2006, September). Real-time corpus-based concatenative synthesis with CataRT. In 9th International Conference on Digital Audio Effects (DAFx), pp. 279-282.

WAVE 4 ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Greenspace Availability and Early Development Instrument Vulnerability in B.C Children

Presenter(s): Jen Chen, Steffi Lau

Abstract:

In light of recent findings in Canada and the UK that time children spend in nature has decreased while screen-time has increased, this study investigates how early child development is affected by these changes. Multiple studies have recognized the relationship between more frequent greenspace use and better early child development outcomes in the social, cognitive, emotional and physical domains. Similar findings have been acknowledged in urban planning efforts, such as PlanH, British Columbia's health program facilitating planning for healthier communities, by the Ministry of Health of British Columbia, Canada.

This study will make use of the Early Development Instrument - which measures the proportion of developmentally vulnerable children at the neighbourhood level - in order to investigate the relationship between greenspace availability and early child development in BC, specifically exploring the relationship between the area of available public greenspace per young child and the aggregate Early Development Instrument vulnerability.

Using Geographic Information System software, we will determine the area of greenspace per neighbourhood. We will carry out a correlational analysis using the area of greenspace and the most recent wave of Early Development Instrument vulnerability data publicly available from the Human Early Learning Partnership. It is hypothesized that there will be a negative relationship between greenspace availability and the proportion of vulnerable children, based on previous literature.

It is hoped that the proposed study will aid in educational and urban planning advances pertaining to the relationship between the area of greenspace in neighbourhoods and the Early Development Instrument vulnerability of young children.

WAVE 4 POSTER PRESENTATIONS

March 20, 7:00 PM - 8:15 PM

Room 1

fMRI analysis of functional brain networks involved in three memory tasks in healthy individuals

Helen Hsiao

Effect of Surface Charge on Heterogeneous Ice Nucleation

Julia Sawitsky

Uncovering the mechanism for salt taste modulation based on salt need/internal salt state

Stephanie Jung
Ziwen Zhang
Belen de Schutter

A Comparison of CO₂ Utilization Strategies

Mieke Fowles

Incorporation of Metal Nanoparticles into Polymeric Materials with Anti-COVID Properties.

Susan Zhang
Karl Tsang
Madeleine Amanda Soegiarto
Michelle Chen

Room 2

Screening regulators for *Pseudomonas aeruginosa* bacterial biofilm formation

Li Jing Sheaves

Parent-Infant Olfactory Communication: Will Mom and Dad's Scent Make Babies Sleep Tight?

Reina Imai

The Relationship between Post-Weaning Isolation and Prenatal Malnutrition in Developing Schizophrenia-like Cognitive Inflexibility

Payton Mackwood
Ella Davidson
Zoe Dong
Raylene Bokenfohr

Establishing pure lung cancer organoids: A meta-analysis

Asana Imanpour
Khushi Dabla
Myles Osenton
Roy Hung
Sean He

Predicting the fatality of COVID-19 using machine learning models

Yi Shan
Daniel Choi
Ngoc Bui

Room 3

Evaluation of Pneumococcal Vaccination Coverage in Adults with Comorbid Conditions

Franklin Hu

Measuring Mental Health Literacy Among University Students

Maureen Luo
Ria Gill
Lily Xu
Cherise Kwok

Prosocial Activities in the Time of COVID-19

Sohrab Ghassemieh

COVID-19 risk in parents with children attending in-person vs remote schooling: A British Columbian case-control study

Martina Francisco
Juliette Wong

Examining the burden of COVID-19 on international vs domestic students at UBC

Joyce Xie
Alice Wang

Room 4

Impact of Sharing Laboratory Test Costs and Required Blood Volumes on Resident Test Ordering

Norbert Banyl

Do as we say, not as we do: A critical discourse analysis of anti-racism statements released by medical schools and academic medical organizations in 2020

Favour Omobhude

Equity, Diversity & Inclusion: An Actionable Knowledge Dissemination Initiative

Sahil Chawla
Negarin Shahtalebi
Jasprabhjot Kang
Hala Murad

Intersecting Identities: Assessing Transgender, BIPOC and Transgender BIPOC Patient Satisfaction with Genetic Counselling Services in Canada

Irene Yu
Tyler Williamson
Maya Bird
Joelle Rivera

Dragon Depictions in the Eastern and Western Worlds

Bridget Woods

WAVE 4 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: fMRI analysis of functional brain networks involved in three memory tasks in healthy individuals

Presenter(s): Helen Hsiao

Abstract:

Studies have shown that certain processes tend to be specialized to one side of the human brain or the other. However, many of these studies are limited to measurements of cerebral lateralization for a single task, and only examine specific regions in the brain, as opposed to the entire brain. We investigate task-based brain networks and patterns in whole-brain activation in the fMRI Midnight Scanning Club dataset. We hypothesized that brain networks involved in scene and face memory will demonstrate right hemisphere dominance, and networks involved in language memory will demonstrate left hemisphere dominance.

10 healthy subjects completed three tasks: Memory faces, Memory scenes, and Memory words. In faces, subjects indicated whether the face presented was male or female. For scenes, subjects indicated whether an indoor or outdoor picture was presented. For words, subjects judged whether the word presented was an abstract or concrete noun.

Constrained Principal Component Analysis for fMRI (fMRI-CPCA) was used to determine functional brain networks and associated hemodynamic responses engaged in the memory tasks. Statistical significance was determined with ANOVAs. The four-component hrfmax rotation solution will be classified to brain networks based on differences in estimated HDR, location of anatomical peaks and cluster shapes, and comparison to networks in literature for similar tasks.

This study will improve our understanding of the lateralization of functional brain networks, and contribute to the future use of neuromodulation to increase or decrease activation of brain networks as an intervention to treat brain disorders affecting a certain hemisphere of the brain.

WAVE 4 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Effect of Surface Charge on Heterogeneous Ice Nucleation

Presenter(s): Julia Sawitsky

Abstract:

Heterogeneous ice nucleation (HIN), the predominant process in which liquid water becomes ice, has various applications in the field of atmospheric science, food preservation and nanotechnology. Silver iodide (AgI) is one of the best ice nuclei known to date, which can nucleate ice heterogeneously as warm as -3°C . Experiments and simulations have revealed that the close lattice match of AgI to the ice and its hexagonal surface morphology are the key factors promoting its HIN ability. However, the critical role of AgI surface charges in tuning its HIN behaviour has not been completely understood yet. The present study deals with varying the surface charges of AgI to directly observe the change in the balance between surface-water and water-water interactions. We use large scale molecular dynamics (MD) simulations with the TIP4P/Ice water model to quantify HIN behaviour of AgI. MD simulations, often referred to as a “virtual microscope”, are computer simulations used to study the energetics and interactions between molecules at an atomistic level. We conclude that changing the surface charge alters the orientation of surface water protons, which could promote or inhibit the HIN capability of AgI.

WAVE 4

POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Uncovering the mechanism for salt taste modulation based on salt need/internal salt state

Presenter(s): Stephanie Jung, Ziwen Zhang, Belen de Schutter

Abstract:

Salt, essential to organisms, plays a vital role regulating fluids in the body. In the fruit fly (*Drosophila*), sodium salt concentrations above 100mM become less edible. *Drosophila* detect high salt conditions through their bitter-sensing and glutamatergic gustatory receptor neurons (GRNs), which express a type of sodium channel called Pickpocket 23 (Ppk23glut neurons). Activating Ppk23glut neurons with light causes feeding avoidance. However, when flies are placed on a diet lacking salt, light activation of these neurons no longer causes avoidance. This lack of aversion indicates that the salt responses are altered downstream of Ppk23glut neurons. However, identification of the neurons altered by internal salt-state and its mechanism remains unknown. To uncover this, we will use trans-Tango to trace up from Ppk23glut neurons and identify the salt gustatory projection neurons (GPNs), then employ trans-Tango (activity) to visualize their calcium responses to salt. In salt deprived states, we expect to see reduced calcium responses of salt GPNs when compared to salt fed flies. To uncover the neuromodulator responsible for this, we will use Short Neuropeptide F mutants to assess its effect on internal salt-state dependent GPN responses and avoidance behavior. Understanding the general principles of salt taste modulation in *Drosophila* could have broad implications for other organisms such as humans in which dietary salt is linked to many life-threatening cardiovascular diseases.

WAVE 4 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: A Comparison of CO₂ Utilization Strategies

Presenter(s): Mieke Fowles

Abstract:

In this research project, we compare two possible methods of carbon dioxide (CO₂) utilization (CCU) that may be able to provide a sustainable path to decreasing atmospheric levels of CO₂. The first method is the use of CO₂ in the production of biodiesel. The second method is the injection of CO₂ into concrete. A dynamic Life Cycle Assessment (LCA) is used in order to evaluate the environmental impact of these two methods. Customarily, a static LCA is typically employed to comprehend the environmental costs and benefits associated with CO₂ utilization processes. However, the scope and extent of the LCA procedure requires careful attention. Although ultimately all of the CO₂ utilized will likely end up in the atmosphere, a comprehensive dynamic LCA needs to be conducted in order to encompass a time scale to represent the time that CO₂ is being displaced by within a proposed CO₂ utilization process.

CO₂ can be effectively used as a bacterial feedstock in the production of biodiesel; however, when the biodiesel is combusted as fuel, the CO₂ is re-released to the atmosphere. Concrete, on the other hand, provides a long term utilization solution as the CO₂ reacts to form a long-lasting product. Thus, concrete retains CO₂ for longer periods of time.

Through the comparison of these short-term and long-term utilization strategies, we hope to see which product will enhance the overall mitigation of CO₂ emissions while accounting for the relative costs associated with each alternative.

WAVE 4 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Incorporation of Metal Nanoparticles into Polymeric Materials with Anti-COVID Properties

Presenter(s): Susan Zhang, Karl Tsang, Madeleine Amanda Soegiarto, Michelle Chen

Abstract:

The COVID-19 pandemic has increased public awareness of pathogen spread through contaminated surfaces, highlighting the need for effective and economical antiviral polymers or surface coatings. Metal nanoparticles are proven to have antiviral properties and can be incorporated into polymeric materials, however these existing antiviral strategies are used in specialized settings, and have yet to be employed against the spread of COVID-19 amongst the general public. We investigate how metal nanoparticles such as silver and copper can be incorporated into 3D printed PLA. We propose to test silver, copper, and zinc oxide nanoparticles with an average size of 50 nm. Nanoparticles will be thermally embedded into 3D printed polylactic acid (PLA) plastic and the same amount will be used per gram of polymer. As well, we proposed to investigate spray coating methods to accomodate a wider array of materials. The same nanoparticles are to be mixed into hydroxypropyl methylcellulose (HPMC) and sodium alginate spray polymer, sprayed onto cloth, then tested for antiviral efficacy. COVID-19, HIV, and Influenza viral suspensions will be used to measure anti-covid efficacy. The viral load will be measured by end-point titration on Vero E6 cells as TCID50, as well as the average killing log-value formula. The results will show which nanoparticle or polymer combination is the most effective anti-COVID coating that maintains the greatest percentage of antiviral properties after manufacturing. These materials are cheap and easily accessible, allowing the general public to use 3D printing and spray-coating technology themselves to combat the spread of the SARS-CoV-2 virus.

WAVE 4 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Screening regulators for *Pseudomonas aeruginosa* bacterial biofilm formation

Presenter(s): Li Jing Sheaves

Abstract:

Background: *Pseudomonas aeruginosa* can cause critical and life-threatening infections in humans by colonizing various human tissues such as the lungs, teeth and skin. Antibiotics often fail to cure *P. aeruginosa* infections due to the formation of highly resistant biofilms. Biofilms are complex bacterial communities embedded in a protective matrix. Although two-thirds of all clinical infections are associated with biofilms, there are no biofilm specific therapies currently available. The objective of this research was to identify and characterize regulatory and metabolic genes that are important for biofilm growth in *P. aeruginosa*.

Methodology: Previous genome-wide screens using transposon insertion sequencing (Tn-seq) were performed to identify *P. aeruginosa* genes important for biofilm growth. Gene candidates for this research were identified from three separate biofilm models, with a focus on regulatory genes. Loss of function mutants were tested in simple in vitro biofilm assays, allowing relative quantification of viable biofilm bacteria and total biofilm biomass. Mutants were also tested in competition with wild type *P. aeruginosa*, comparing the ability to form biofilms in a human skin organoid model, which mimics the architecture and properties of the human skin. A clean deletion of the gene in which the mutant showed a significant biofilm formation defect was then constructed. This clean deletion mutant will be characterized in the future to confirm that the gene is a regulator for biofilm formation.

Implications: Genes important for biofilm growth identified in this research have the potential to become new targets for the design of biofilm-specific drugs to combat bacterial biofilm infections.

References

- Bassetti, M., Vena, A., Croxatto, A., Righi, E., & Guery, B. How to manage *Pseudomonas aeruginosa* infections. *Drugs in Context*, 7, 212527 (2018).
- Choi K-YG, Wu BC, Lee AH-Y, Baquir B, Hancock REW. Utilizing organoid and air-liquid interface models as a screening method in the development of new host defense peptides. *Front Cell Infect Microbiol* [Internet]. 2020 [cited 2021 Jan 10];10.
- Hoiby, N. et al. The clinical impact of bacterial biofilms. *Int J. Oral sci.* 3, 55-65 (2011).
- Liberati NT, Urbach JM, Miyata S, Lee DG, Drenkard E, Wu G, et al. An ordered, nonredundant library of *Pseudomonas aeruginosa* strain PA14 transposon insertion mutants. *Proc Natl Acad Sci.* 2006 Feb 21;103(8):2833-8.
- Pletzer, D. & Hancock, R. E. W. Antibiofilm peptides: potential as broad-spectrum agents. *J. Bacteriol.* 198, 2572-8 (2016).
- Sabaiefard P, Abdi-Ali A, Soudi MR, Dinarvand R. Optimization of tetrazolium salt assay for *Pseudomonas aeruginosa* biofilm using microtiter plate method. *J Microbiol Methods.* 2014 Oct 1;105:134-40.
- Welch K, Cai Y, Strømme M. A method for quantitative determination of biofilm viability. *J Funct Biomater.* 2012 Jun 1;3(2):418-31.
- Wolfmeier, H., Pletzer, D., Mansour, S. C. & Hancock, R. E. W. New perspectives in biofilm eradication. *ACS Infect. Dis.* 4, 93-106 (2018).

WAVE 4 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Parent-Infant Olfactory Communication: Will Mom and Dad's Scent Make Babies Sleep Tight?

Presenter(s): Reina Imai

Abstract:

Poor infant sleep can lead to poor health consequences for both the infant and the parent. Previous studies have explored the role of olfaction on sleep, showing that the scent of a romantic partner can increase sleep efficiency. However, little is known about how the scent of a parent will affect an infant's sleep.

This study aims to explore the effect of parent's scent on infant sleep. Moreover, to explore how an infant's sleep affects the parent's quality of sleep. To delve into our research question, firstly, a scent collection phase was conducted whereby parents wore crib sheets around their torso overnight for five nights. Next, the infant slept on mom's, dad's, and a control sheet for a week each, totaling three weeks. The infant's sleep quality was measured using an Actiwatch device secured to their ankle monitoring movement overnight. Parents also completed short daily questionnaires about their infant's sleep as well as their own sleep. We hypothesize that scent of a parent functions as a cue for comfort and familiarity improving the infant's quality of sleep. We further hypothesize that mother's scents will have a more positive effect than fathers. Finally, we think that improved infant sleep will result in improved parental sleep. We hope this research will help us better understand the complex relationship between scent and sleep, as well as advance accessible evidence-based sleeping methods and techniques for infants.

WAVE 4 POSTER ABSTRACTS

Theme: Health and Wellness

Title: The Relationship between Post-Weaning Isolation and Prenatal Malnutrition in Developing Schizophrenia-like Cognitive Inflexibility

Presenter(s): Payton Mackwood, Ella Davidson, Zoe Dong, Raylene Bokenfohr

Abstract:

Affecting 20 million people worldwide, Schizophrenia is a neuropsychiatric disorder producing positive (i.e., hallucinations) and negative (i.e., emotional withdrawal) symptoms in addition to cognitive inflexibility: the inability to appropriately adjust one's behavior according to changes in the environment. Despite the onset of flexibility deficits in early adulthood, there are developmental risk factors including prenatal malnutrition and social isolation. Although research on rats leads to advancements in human treatments, many models struggle to replicate cognitive symptoms with ecologically valid manipulations. In previous studies, the combination of two models often increases the symptoms produced, providing greater accuracy in simulating the psychological condition. Based on these evidences, we predict modelling combined schizophrenia risk factors will enhance the construct validity of current animal models. We hypothesize that a combination of prenatal malnutrition and post-weaning isolation will model the cognitive deficits associated with schizophrenia better than each model individually due to the increased physiological stresses and ecological validity obtained from the combined model. Our research will compare rats with offspring that are socially isolated, offspring that experience prenatal malnutrition, and offspring that experience a combination of both. To assess the rats' cognitive inflexibility, we will use an attentional set shifting task which will require the rats to learn and shift between different response strategies to obtain food rewards. Our results will improve the quality of animal models which may lead to better translational platforms for basic research, drug discovery, and testing.

WAVE 4 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Establishing pure lung cancer organoids: A meta-analysis

Presenter(s): Asana Imanpour, Khushi Dabla, Myles Osenton, Roy Hung, Sean He

Abstract:

Introduction

Lung cancer is the most prevalent cancer with over two million cases diagnosed globally. It has a five-year survival rate of 56 percent for cancer confined to the lung and 5 percent for metastases. Current treatments include radiation therapy, immunotherapy, chemotherapy, and surgery; however, further research is required for identifying more effective treatments. Organoids allow for the exploration of potential treatments by reducing current research constraints via a direct study of introduced cancer cells in human tissue models. Thus, organoids present an alternative to human-based research and create a microcosm for testing potential treatments. However, organoid-based research contains significant hurdles. Normal epithelial cells overgrow cancer cells in many lung cancer organoid models, reducing their translational validity and prohibiting long-term models. Furthermore, lacking the ability to establish pure lung cancer organoids decreases their clinical application. We will perform a systematic analysis of lung cancer organoid literature to standardize the field and assess optimal methods of testing purity.

Methods

Methods were based on the guidelines for Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Systemic searches of multiple databases were used to catalog both studies with the successful and unsuccessful establishment of pure lung cancer organoids. Methods of both types of studies were compared using established systematic review methods.

Results

This project compares approaches to establishing pure cancer organoids, systematically highlighting advantages and shortcomings.

Conclusion

Our comparison hopes to identify effective methods of pure lung cancer organoid development and assist with future advancements in cancer research and organoid implementation in personalized therapy.

WAVE 4 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Predicting the fatality of COVID-19 using machine learning models

Presenter(s): Yi Shan, Daniel Choi, Ngoc Bui

Abstract:

The sudden spread of COVID-19 has confounded many researchers and the determination of contraction trends with demographic predictors is a topic of interest. The aim of our study was to provide additional insight towards the outcome of patients that contract the virus. This information could contribute to the determination of suitable preventive measures and treatments for those who are predicted to be more susceptible. Previously there have been a number of different models derived from machine learning methods in order to predict the trends in the growth and contraction of the disease. However, less research has been done to predict fatality after contraction of COVID-19 depending on individual characteristics of the patients such as age and gender, which is what our study aims to develop. We used data from Alberta, Ontario, and Japan to predict the fatality of individuals who contracted COVID-19 and determined the accuracy of different prediction models. More specifically, we applied Ridge Regression, Lasso Regression, Logistic Regression, and Support Vector Machine (SVM) Regression to each dataset and subsequently validated the regression models through train test split with 40% of the data. The results showed that SVM performed the best for all three datasets with 92.0% accuracy for Alberta, 85.1% accuracy for Ontario, and 92.2% accuracy for Japan.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Evaluation of Pneumococcal Vaccination Coverage in Adults with Comorbid Conditions

Presenter(s): Franklin Hu

Abstract:

Background: Globally, around 1.6 million people die from pneumococcal diseases each year. *Streptococcus pneumoniae*, a gram-positive bacterium, causes invasive and non-invasive pneumococcal diseases, especially among young children and elderly individuals. Furthermore, adults with chronic health conditions, including cardiorespiratory, liver, or renal disease, are also at increased risk for pneumococcal infections. Canada's National Advisory Committee on Immunization has recommended the 23-valent pneumococcal polysaccharide vaccine (PPV23) for individuals aged 18–64 years old with underlying medical conditions and adults aged U65 years. However, there is currently a lack of up-to-date data for PPV23 coverage in British Columbia.

Methodology: Using administrative healthcare databases from 2000 to 2018, we conducted a retrospective cohort study to determine the uptake of PPV23 vaccine in individuals aged U18 years with chronic medical conditions. Vaccine coverage, by length of follow-up since diagnosis, was evaluated and multivariate analyses were performed to understand factors associated with uptake of vaccination.

Results: From a total of 429,479 adults identified during the nineteen years study period, 12.5% received pneumococcal vaccination in the first year; the proportion increased to 15.4% after 5 years. Pharmacy visits and hospitalization were associated positively with vaccination uptake.

Conclusion: Vaccine coverage among individuals aged U18 years with chronic medical conditions remains well below the recommendation targets in BC, leaving a significant proportion of high-risk adults unprotected against pneumococcal disease.

Implications: These findings exemplify the need for further pneumococcal vaccination promotion in the pharmacy setting in BC, as it is one of most common points of healthcare interaction.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Measuring Mental Health Literacy Among University Students

Presenter(s): Maureen Luo, Ria Gill, Lily Xu, Cherise Kwok

Abstract:

Background:

Mental health services are readily available at most universities; however, many university students are hesitant to seek out resources. Several factors explain low help-seeking behaviours including difficulties recognizing symptoms, self-management, and perceived/personal stigma. Mental health literacy (MHL) encompasses the knowledge, beliefs and abilities that enable the recognition, management and/or prevention of mental health issues. In addition to reducing stigma, MHL provides the skills necessary for university students to recognize mental illness, seek professional support and prevent poor mental health.

Objective/Rational:

Determining MHL among the student body is crucial to identify awareness/knowledge gaps that may impede students' well-being. The objective of this study is to measure MHL amongst UBC Vancouver undergraduate students using a standardized and previously validated questionnaire.

Methods:

Participants are asked to complete a brief demographic questionnaire along with the Mental Health Literacy Questionnaire (MHLq). These questionnaires are anonymous and will be administered via REDCap, an online platform. Primarily, we will conduct a descriptive analysis. We will also compare the mean MHL scores by gender (male/female) and undergraduate program of study.

Implications:

This study aims to measure MHL amongst students at a large-size Canadian post-secondary institution. The results from this study will offer an up-to-date understanding on MHL in the undergraduate population. In addition, it will provide a greater understanding of outstanding MHL needs amongst this population and potentially identify sub-groups that may benefit from supportive and educational interventions.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Prosocial Activities in the Time of COVID-19

Presenter(s): Sohrab Ghassemieh

Abstract:

Background and Objectives: Compelling evidence has suggested that divergent patterns of behavioural responsiveness to stress might exist between men and women. Particularly, the tend-and-befriend hypothesis suggests women are more likely than men to engage in affiliative behaviours (e.g., seek social support) when stressed. However, few studies investigated men's and women's behavioural responses under naturally occurring conditions. The current analysis used online daily diary data collected from a study about coping with the COVID-19 outbreak to investigate whether the association between stress and engaging in prosocial behaviour is moderated by gender.

Research Design and Methods: 1189 adults (1042 women and 147 men) between 18 and 91 years of age from Canada and the U.S. participated in this daily diary study. Participants completed surveys for seven consecutive days about their daily experiences of COVID-19-related prosocial activities and daily stressors they have experienced during this period. Furthermore, participants' perceived threat of COVID-19 to various life domains was assessed in the baseline questionnaire. Analyses were conducted using multiple linear regression and accounted for covariates, including age and education.

Hypothesis: Given that the novel coronavirus disease 2019 (COVID-19) has provided a unique situation under which individuals are dealing with the same naturally occurring stressor, it is essential to investigate men's and women's behavioural stress patterns. We hypothesized that women with high stress would engage in more prosocial activities than men with high stress. Furthermore, we hypothesized that men with no or low stress are more likely to engage in prosocial behaviours compared to women.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: COVID-19 risk in parents with children attending in-person vs remote schooling: A British Columbian case-control study

Presenter(s): Martina Francisco, Juliette Wong

Abstract:

Background:

Although children remain under-represented amongst total BC COVID-19 cases, multiple school outbreaks have occurred. Additional risk of COVID-19 for parents of children attending in-person compared to remote alternatives is unknown.

Objectives:

The aim of this study was to determine whether having children attend in-person school increases risk of COVID-19 in BC parents/caregivers.

Methods:

This study utilizes a case-control design with 1,000 cases and controls, respectively. The study population consisted of parents/caregivers aged 30-60, residing in BC. Exposure is defined as having children attend in-person school as opposed to other remote alternatives (ie. online, homeschool). Cases are defined as those who test positive for COVID-19 during the 2020-2021 academic school year. Antibody tests will be administered to confirm control participants are COVID negative. Risk will be assessed using logistic regression. Odds ratios (ORs) and 95% confidence intervals will be presented, adjusting for key confounding variables, including school schedule, health authority, age, and occupation type. Stratified analyses will be conducted for children attending elementary, middle, and highschool. Adults who have received a COVID-19 vaccination are to be excluded.

Predicted Results:

The overall OR is predicted to be >1 , signifying a non-significant increased risk of COVID-19 for adults with children attending in-person school. Stratified analyses may find significant increase in risk for parents with children attending in-person highschool compared to remote counterparts.

Conclusion:

Keeping in-person schools open remains a high priority. However, the risk that families face needs to be better understood. Further research in highschool children is warranted to thoroughly evaluate effectiveness of current COVID-19 safety protocols in BC schools and subsequent risk to families.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Examining the burden of COVID-19 on international vs domestic students at UBC

Presenter(s): Joyce Xie, Alice Wang

Abstract:

COVID-19 is a respiratory virus that was first identified in 2019 in Wuhan, China. As of 2020, it has developed into a pandemic--prevalent across the world and a major health concern. The virus has affected many aspects of general life, but this study will focus on the impact of COVID-19 to university students and if there are direct linkages to higher stress levels as a result of lower academic performance, memory deficits, and greater emotional reactions towards daily stressors. Previous research suggests that COVID-19 had a direct negative impact on the health outcomes for university students (Changwon Son et Al., 2020), however few research studies to date have examined the health outcomes between international and domestic university students. We believe international students may be more susceptible to experiencing higher negative health outcomes due to time zone differences and a lowered social support network. Our sample will consist of 1000 international and domestic undergraduate students without pre-existing health problems. Participants will be asked to complete an online survey that will be posted on the UBC 2023 Facebook group. The survey will consist of questions asking about students' well-being from March of 2020 to January of 2021 where many students have become accustomed to new online learning. Additionally, participants will complete the 7-item Generalized Anxiety Disorder Scale (GAD-7) to assess perceptions of social support as well as their current levels of stress, respectively. We hypothesize that international students living abroad will experience more negative health outcomes compared to international students living in Canada and to domestic students. This study seeks to provide insight of the impact of COVID-19 on both domestic and international students attending The University of British Columbia.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Impact of Sharing Laboratory Test Costs and Required Blood Volumes on Resident Test Ordering

Presenter(s): Norbert Banyi

Abstract:

A significant proportion of inpatient laboratory testing is unwarranted and can lower quality of care, increase healthcare expenditures, and contribute to unnecessary investigations with their attendant comorbidities. This study investigates the relationship between providing information about costs and patient impact of laboratory testing and resident ordering habits.

Two independent four-week internal medicine resident blocks were studied. After two weeks, cost and blood volume information for the 32 most commonly ordered tests were distributed through physical and digital pamphlets to residents during a 10-minute intervention. Resident surveys measuring importance, influence, and knowledge of the intervention information were conducted prior to the interventions and following the resident block. The number of tests and blood collections ordered each day, normalized to patient volumes, were compared before and after intervention using an interrupted time series analysis

There was no significant effect of the intervention on resident test ordering. Despite this, 74% (N=34) and 63% (N=29) of pre-intervention responses predicted that cost and blood volume information, respectively would impact their ordering. All post-intervention responses (N=46) stated that these factors had influenced their ordering. Residents were unaware of the intervention information beforehand and demonstrated limited retention.

This study design illustrates a disparity between observed resident test ordering habits and their belief that the intervention altered their ordering practices. Education on cost and blood volumes, by distribution of pamphlets, did cause any notable influence on resident test ordering. Our results in light of previous studies suggest that interventions to reduce non-specific test ordering seem to require reiterative emphasis on the importance of specific test ordering and additional systems in place to periodically prompt or keep residents accountable.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Do as we say, not as we do: A critical discourse analysis of anti-racism statements released by medical schools and academic medical organizations in 2020

Presenter(s): Favour Omobhude

Abstract:

Background: In response to the murder of George Floyd and subsequent demonstrations, numerous organizations across the United States and Canada released public statements, including medical schools. While the responses were well-intentioned, more meaningful explorations of anti-racist discourse may be beneficial to understand.

Methodology: We used critical discourse analysis (Fairclough, 2013) methods to examine 45 statements released by medical schools and organizations in Canada and the United States.

Results: The quality and breadth of discourse varied across geographic and organizational contexts. Most statements acknowledged anti-Black racism and racial inequality as a systemic issue in society that includes healthcare and medical education, yet few outlined concrete measures to promote racial justice within their own institution. Commonly, statements would outline previous efforts and initiatives in combating inequalities rather than articulate concrete steps for the future. Conflicting messages were noted as the discourse discussed racism as an issue that required urgent, systemic change, while outlining actions to be taken exclusively at the individual level, such as self-education and personal reflection. A common phrase was “we’re listening and learning”- yet no mechanisms were provided for individuals to be heard. Similarly, some statements acknowledged the trauma and distress that racialized members at their institution may be experiencing but failed to offer resources or means of support to those individuals.

Conclusion: Despite the encouraging sentiment, a predominant number of public statements released by the medical institutions lacked critical introspection and a clear institutional commitment to combat racism in medicine. Findings suggest the need for concern regarding the potentially performative nature of these statements.

Reference: Fairclough, N. (2013). *Critical discourse analysis: The critical study of language*. Routledge.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Equity, Diversity & Inclusion: An Actionable Knowledge Dissemination Initiative

Presenter(s): Sahil Chawla, Negarin Shahtalebi, Jasprabhjot Kang, Hala Murad

Abstract:

Background

Gender disparity is prevalent in numerous medical specialties and females have historically been underrepresented in academic medicine. This study compares gender disparity among academic medical school faculty and their respective university faculty. It also examines research productivity and its correlation with the academic ranks of academic faculty.

Methods

In this cross-sectional study, we searched the 2020 Accreditation Council for Graduate Medical Education (ACGME) accredited programs to compile a list of Canadian medical schools. Data was collected on demographics, additional qualifications, academic rank, and research output using the Doximity, LinkedIn and Scopus databases. Data analysis was done with a Mann-Whitney U test and a Kruskal-Wallis test.

Results

Data collection is still taking place.

Conclusions

Data collection is still taking place.

WAVE 4 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Intersecting Identities: Assessing Transgender, BIPOC and Transgender BIPOC Patient Satisfaction with Genetic Counselling Services in Canada

Presenter(s): Irene Yu, Tyler Williamson, Maya Bird, Joelle Rivera

Abstract:

Underserved populations can face significant health disparities, discrimination, and barriers to accessing quality healthcare. The theory of intersectionality posits that intersecting social identities, such as ethnicity, sexual orientation, and gender create overlapping and interdependent systems of privilege and discrimination. In recent years, genetic counselling (GC) research has begun to explore the experiences of patients belonging to transgender, black, indigenous, and people of color (BIPOC) populations. However, little research exists on the impact of intersecting social identities on the experiences and satisfaction in GC services. Our study aims to explore GC experiences and patient satisfaction of BIPOC, transgender BIPOC (TBIPOC) and white transgender patients. Semi-structured, interviews designed to explore experiences and satisfaction with GC will be conducted with individuals who self-identify as transgender, BIPOC, or TBIPOC, and have accessed GC services in Canada from 2016-2021. To identify and recruit eligible participants, we aim to contact past and current patients through GC clinics in British Columbia, Alberta, Ontario, and Quebec. Responses will be analyzed and interpreted using framework analysis, a qualitative method used to identify themes and commonalities in interview data. We expect to observe the lowest GC patient satisfaction in TBIPOC and the highest satisfaction in white transgender patients, likely representing the confluence of racial and sexual discrimination. We hope that this study will provide insight into the unique experiences of TBIPOC accessing GC services and inform clinical practice for this underserved population.

WAVE 4

POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Dragon Depictions in the Eastern and Western Worlds

Presenter(s): Bridget Woods

Abstract:

Dragons can be found in almost all mythologies around the world. In fact, research on dragons has increased in recent years. However, there has been a focus on the origins of these legendary creatures rather than an analysis of the variations in their attributes and the culture around them. The preliminary research conducted for this study consolidated primary and secondary sources related to the descriptions of dragons in medieval and ancient literature and made note of the common themes in these sources. This research has shown a significant difference in the types of stories that surround dragons based on the story's geographical origin. Stories from Western Europe often have the dragon posed as an obstacle for the hero to defeat and are associated with villainous intent or the devil. In contrast, the dragon in many Asian cultures has been worn into battle on armor and in some countries made into a deity or displayed in temples. Future research will investigate literature and artwork from Britain, Germany, and China along with original myths from these countries as the most well-known versions of dragons originate in these cultures. The primary focus will be literature from the medieval and ancient time periods investigating the stories that surround dragons from these periods to analyze the cultural attitudes toward them and how they have since influenced classical literature.

WAVE 5 ORAL & POSTER PRESENTATIONS



WAVE 5 ORAL PRESENTATIONS

March 21, 7:00 AM - 8:15 AM

Room 1

Depletion of a novel gene, BRUNOL5, remodels gene expression profiles and exerts anti-cancer effects in liver cancer cells	Tony Yang
The Role of Empathy in COVID-19 stressors	Spencer Pratt
Investigating the effect of Baf53b mutations observed in Autism Spectrum Disorder using a mouse primary neuronal culture system	Michelle Lu Tess Osborne
Comparing Recovery Performance of Hydrogel and Full Thickness Skin Grafts on 3rd Degree Burns	Brianna Thompson Migs Dimayacyac
Avoiding the Collapse of Nature Through Mindful Diets: Why Biodiversity Should be at the Core of Sustainable Land Food Systems?	Justin Angsana

Room 2

The effects of reminders of the past on political preferences: Meaning associations and the black and white image	Mike Mask
Bisexual-specific Health Disparities Among Adolescent and Adult Canadians	Jennifer Vincent
Physical Distance and Social Solidarity in the Discourse of COVID-19	Danielle Lee Kevin Wong

Room 3

Sequence-Aware Query Recommendation Using Deep Learning	Eugenie Lai
The Rise of TikTok and the Perils of Promotion	Vita Dau

An Economic and Environmental Impact Analysis of Implementing a
Grenova TipNovus Pipette Tip Washer into UBC Laboratories

Dua Naqvi
Coryn Topham
Dina Shehata
Sandhya Selvakumar

Interactive Installation: Creating Immersive Audiovisual Experience

Julia Zhu

WAVE 5

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Depletion of a novel gene, BRUNOL5, remodels gene expression profiles and exerts anti-cancer effects in liver cancer cells

Presenter(s): Tony Yang

Abstract:

Primary liver cancer has the highest rising incidence rate in both sexes across North America and only a 18% 5-year survival rate. In the Stefanska lab, it was discovered that in a population with liver cirrhosis, the patients that eventually develop primary liver cancer show decreased promotor methylation of a novel gene, BRUNOL5, compared to the patients that do not develop liver cancer within the same timeframe. Decreased promoter methylation is associated with increased BRUNOL5 expression which suggests an oncogenic role of BRUNOL5 in liver cancer. Indeed, siRNA-mediated knockdown of BRUNOL5 in HepG2 liver cancer cells led to decreased cell growth and migratory properties in our pilot study. However, the mechanisms underlying those effects remain to be elucidated. In the present study, we performed RNA-sequencing in HepG2 cells upon BRUNOL5 depletion to establish gene targets regulated by BRUNOL5. We found 4,406 genes significantly differentially expressed in response to BRUNOL5 knockdown. Interestingly, top downregulated genes included cancer-promoting genes such as FAIM2, AMOTL1, and MMP2, whereas tumor suppressor genes such as MT1G, CADH1, and ALDH1L1 were among genes with the highest increase in expression. Since BRUNOL5 belongs to the CELF family that regulates gene expression through mRNA processing, we hypothesize that BRUNOL5 regulates expression of the target genes through mRNA processing-dependent mechanisms. We currently explore this hypothesis using real-time qPCR and methylated RNA immunoprecipitation. The results will characterize the mechanisms of BRUNOL5 in liver cancer pathogenesis, which may provide novel molecular targets for development of therapeutics against primary liver cancer.

WAVE 5 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The Role of Empathy in COVID-19 stressors

Presenter(s): Spencer Pratt

Abstract:

Background: Psychological well-being is deteriorating in the general population as higher levels of stress, anxiety, and depression have resulted from the COVID-19 pandemic. While individuals, families, and communities are attempting to engage in adaptive health behaviours, multiple regions are consistently experiencing elevated levels of depression compared to before the disease outbreak (Pierce et al. 2020; Salari et al. 2020; Vindegaard and Eriksen-Berros, 2020). Recent longitudinal findings have demonstrated a likely pathway in which depression manifests during COVID-19. Here, COVID-related stressors are directly and independently associated with subsequent depressive symptoms (Morstead et al. 2020). Thus, the present study was prompted by the following question. How can we reduce the effects of pandemic-related stressors on depressive symptoms? While empathy is understood to be generally beneficial to the provider, few studies have looked at the possible stress-buffering effect of empathy. Further, no study to date has looked at this response over time within the context of the COVID-19 pandemic.

Objective: The current study explores how empathic responding may function as part of a stress-buffering response during the COVID-19 pandemic.

Method: A sample of 2463 residents from the US and Canada completed both the baseline and follow-up survey during the data collection period between March and May 2020.

WAVE 5 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Investigating the effect of Baf53b mutations observed in Autism Spectrum Disorder using a mouse primary neuronal culture system

Presenter(s): Michelle Lu, Tess Osborne

Abstract:

Autism Spectrum Disorder (ASD) is one of the fastest growing neurodevelopmental disorders characterized by impairments in social communication and cognitive function, such as the presence of restricted interests and repetitive behaviours. The BAF (Brg1 Associated Factor) chromatin remodeling complex, which is key for chromatin packaging, contributes to regulating gene expression by modifying DNA accessibility. The neuron specific nBAF complex has been implicated in memory functions like long term potentiation (LTP) and consolidation. Previous research has demonstrated that Baf53b deletions alter dendritic spine morphology and dynamics, affecting LTP consolidation. Mutations in the Baf53b subunit of nBAF have been identified in various intellectual disorders including ASD. This project will investigate mutations in subdomain 2 of Baf53b, as this region provides functional specificity in neurons. As well, a dominant mutation of a key amino acid at the Baf53b binding interface. To investigate the effect of these Baf53b mutations on neuronal growth, mutant Baf53b plasmids will be introduced to mouse primary Baf53b^{fl/fl} neurons using nucleofection. As synapse formation plays an important role in establishing neuronal circuits which are essential for functions like memory formation, cells will be analyzed to determine if Baf53b mutations cause abnormal synapse formation, dendritic branching or synapse morphology. Mutant neurons will be visualized through immunostaining and high resolution microscopy. Morphology will be further quantified by Sholl Analysis and compared to wild-type Baf53b neurons. This project will help elucidate how Baf53b mutations could impair and alter neuronal growth which may lead to ASD and open possibilities to future therapeutic targets.

WAVE 5 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Comparing Recovery Performance of Hydrogel and Full Thickness Skin Grafts on 3rd Degree Burns

Presenter(s): Brianna Thompson, Migs Dimayacyac

Abstract:

Burn wound victims often experience immense pain, reduced skin function, and extended hospital stays. Full Thickness Skin Grafts (FTSG) are the current standard of treatment for 3rd degree burns, however they do have limitations such as having limited donor sites. The emerging use of hydrogels, a synthetic polymeric material that holds similar physical properties to natural skin, bypasses such limitations and makes it a potential treatment for third degree burns. Up to this point, the use of hydrogels on third degree burns has only been experimented on mouse models but not within clinical trials. In this study, we will determine if hydrogel is capable of successfully treating third degree burns and compare its performance of physical recovery and patient comfort with FTSGs. For physical recovery, we will measure inflammation intensity and rejection rate as metrics. For patient comfort, we will measure length of hospital stay and patient recovery as metrics. 110 patients will be recruited for this study, with eligibility determined by factors such as recency of admission, location of burn, presence of a 3rd degree burn, and age (18-65). Current methods of application standard in the field and in prior research of both hydrogel and FTSGs will be used for treatment. We expect to see hydrogel becoming an established method that could replace FTSGs for third degree burn wound recovery, as it holds the potential for successful patient recovery without some of the limitations that are posed by FTSGs.

WAVE 5

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Avoiding the Collapse of Nature Through Mindful Diets: Why Biodiversity Should be at the Core of Sustainable Land Food Systems?

Presenter(s): Justin Angsana

Abstract:

Our research focuses on the impacts of food biodiversity loss on human health. We highlight connections between biodiversity loss and human nutrition, health and well-being. Recent research and grey literature connecting these areas suggest the simplification of diets and plant foods is affecting nutrition in several biodiversity hotspots. Prioritizing the accessibility to affordable foods over nutritional security and the conservation of all plant foods is bringing biodiverse landscapes to a tipping point. Thus, urgent change in consumer's behaviour and regulations are needed to recover biodiverse landscapes and diets. In this white paper we conduct an in-depth and authoritative review as well as a comparative analysis of possible solutions to minimize the loss of biodiversity in food with particular emphasis on new technologies and nature-based solutions. We conclude that using traditional and novel food can be the key solution to promote both sustainable and diverse diets.

WAVE 5

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The effects of reminders of the past on political preferences: Meaning associations and the black and white image

Presenter(s): Mike Mask

Abstract:

The present study investigated whether reminders of the past, in the form of the black and white image, have an effect on people's political preferences. My team conducted a repeated measures experiment in which participants (n = 42) were primed with a colour photograph of a grassy field (the control condition) and the same image in black and white (the experimental condition). After viewing each image, participants completed a series of questionnaire items which measured their political preferences. Participants responded more progressively after viewing the black and white image as compared to the colour image. Our study adds to the literature on the psychological effects of black and white imagery and suggests that reminders of the past may play a role in increasing political polarization.

WAVE 5 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Bisexual-specific Health Disparities Among Adolescent and Adult Canadians

Presenter(s): Jennifer Vincent

Abstract:

Throughout the progression of sexual minorities' acceptance into broader society, the various areas in which members of the LGBTQ community in Canada face discrimination have been well documented. More recently, as the concept of the social determinants of health has emerged, so too have inquiries into the impacts of sexuality on health and health outcomes. In the form of government reports and academic literature, the approach to sexual minority health has largely been homogenous, grouping all non-heterosexual individuals together. However, this approach is limited in that it fails to capture the differences experienced by different sexual minorities. The present research seeks to address this shortcoming and develop a more nuanced approach to understanding sexual minority health through examining the variation in health outcomes between bisexual and homosexual individuals. Through a series of logistic regression models using 2015-16 Canadian Community Health Survey data, this research examines how one's sexual orientation affects their likelihood of being in poor health, with a particular focus on the differences between homo- and bi-sexual individuals and with an attention to gender-based variations therein. By differing from the past work on sexual minority health in Canada that health policy has heretofore been relied upon, this research has the potential to prompt refinement of future health policy initiatives and inquiries addressing the health of sexual minorities.

WAVE 5 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Physical Distance and Social Solidarity in the Discourse of COVID-19

Presenter(s): Danielle Lee, Kevin Wong

Abstract:

One of the most dramatic changes of life during the pandemic has been the need to maintain physical distance, the limiting of face-to-face contact, and the disruption of ordinary interaction patterns. For businesses, typical commercial goals and expectations have changed drastically, balancing the need to attract customers after stagnant months against public safety guidelines mandating separation.

This change was reflected in signage, which businesses used in an attempt to bridge communication gaps while creating illusions of contact on a personal level. We examined over 200 linguistic and text+image artifacts primarily from retail signs found during summer 2020, just as stores in BC began reopening. In these examples, recurrent linguistic features include overly familiar forms of address; a higher-than-usual number of imperative forms, expressing desired outcomes, not directives; a reliance on fictive context, wherein the author of the sign appears to be 'speaking' to an idealized addressee in absence of a shared deictic 'here' and 'now'; and a reliance on metaphor to present a renewed appeal of a store.

What these features share is a communicative phenomenon specific to the pandemic: replacing physical proximity with messages of emotional intimacy and social solidarity. Jointly, such forms of COVID-19 communication are characterized by unique re-construal of the communicative context to create the effect of emotional closeness in absence of a shared spatial and temporal ground. The overall effect of COVID-19 is the emergence of linguistic and multimodal forms that bridge the required physical distance with discourse construal of emotional proximity.

WAVE 5 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Sequence-Aware Query Recommendation Using Deep Learning

Presenter(s): Eugenie Lai

Abstract:

With the explosion of our virtual interaction, studies estimate that over 2.5 quintillion bytes of data are created every day, leading to an increasing need to leverage its value. Databases provide a vital infrastructure to store and manage high volumes of data in many fields, from the stock market to healthcare to astronomy. Users often interact with databases by writing sequences of SQL queries, which are questions but in Structured Query Language (SQL). However, users outside of computer science such as students and domain experts may not have the required database expertise to express their questions in SQL.

Query recommendation is an approach to help database users write SQL queries. Our work presents a novel sequence-aware approach to this problem by leveraging query sequences, which encode important information such as user intent and thought process. Previous methods make recommendations based on query similarity or popularity and oversee that sequence. In this project, we model query recommendation as a next query prediction task and use deep learning models trained on historical query sequences to make recommendations. We thoroughly analyze query sequences in a real-world query workload collected from the Sloan Digital Sky Survey (SDSS), a large scientific database in astronomy. Empirical results show that the sequence-aware, deep-learning approach outperforms methods that do not consider sequence information.

WAVE 5 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: The Rise of TikTok and the Perils of Promotion

Presenter(s): Vita Dau

Abstract:

Existing models of advertising often treat humans as rational beings whose buying decisions depend upon access to information, focusing upon the potential of advertising and sponsorship to increase awareness and provide necessary information about a product. In this presentation, we examine the relationship between sponsorship and audience engagement, analyzing a sample of 18,159 TikTok social media posts to answer the following question: does engagement with TikTok influencer posts decrease for paid promotions, identified by the mention of sponsorship in the video caption, compared with engagement for unsponsored posts? The main method of analysis is regression, focusing on likes as the simplest, lowest-commitment form of audience engagement; this is later extended to include fixed effects and to analyze the marginal effects of sponsorship by size of influencer. We also examine alternative measures of engagement to better understand the robustness of the findings. The results indicate that sponsorship is often associated with a decrease in engagement, with a stronger negative effect for larger influencers. This is significant on academic and non-academic levels: it highlights the relevance of behavioural economics and real human behaviour to models of advertising – a currently underexplored area – and it provides practical information to influencers, who depend upon their relationships with audiences and must precariously balance this with income-generating partnerships.

WAVE 5 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: An Economic and Environmental Impact Analysis of Implementing a Grenova TipNovus Pipette Tip Washer into UBC Laboratories

Presenter(s): Dua Naqvi, Coryn Topham, Dina Shehata, Sandhya Selvakumar

Abstract:

Plastic micropipette tips are not recycled at the University of British Columbia due to health concerns. UBC uses about 3.3 million pipette tips annually which are incinerated after use. The Grenova TipNovus allows laboratories to sterilize pipette tips for reuse 22 times. This paper determines whether the implementation of the TipNovus is a profitable and sustainable way to reduce pipette plastic waste in UBC laboratories. Implementing a TipNovus into a UBC laboratory was compared to using pipette tips only once through a life cycle analysis using cost, energy usage, plastic waste, and greenhouse gas emissions as impact parameters. It is found that a minimum of 5,140 pipette tips need to be used every month for five years to pay back the investment cost of \$125,000 for the purchase of the TipNovus. The results show that the TipNovus reduced monthly costs (not including investment costs) by 95%, energy usage by 64%, greenhouse gas emissions by 94%, and plastic waste by 95%. The system boundary did not include the manufacturing of the TipNovus due to non-disclosure agreements. Further research is currently being conducted on the manufacturing stage so more precise results may be derived on energy usage and greenhouse gas emissions. In conclusion, the implementation of the TipNovus can be a cost-effective way to reduce plastic waste, energy usage, and GHG emissions for any UBC laboratory using more than 5,140 pipette tips per month, and aligns with UBC's 20-Year Sustainability Strategy to create "net positive outcomes in environmental, social and economic terms".

WAVE 5

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Interactive Installation: Creating Immersive Audiovisual Experience

Presenter(s): Julia Zhu

Abstract:

We constantly encounter different sensory stimuli that evoke a multitude of perceptual experiences. An interactive installation (re)creates these stimuli and allows the spectator to actively engage with the spatial environment and digital content through the incorporation of responsive technology. This project integrates elements of visual and acoustical experiences through a unique interpretation of a series of original photographs taken at Times Square New York, emphasizing the incorporation of personal perception and sensation rather than an attempt to create a realistic depiction. The installation creates an immersive audiovisual experience that captures the multisensory interaction at Times Square. It takes a highly commercial tourist locale and shares the personal reaction as a universal experience, providing a tactile experience that creates an omniscient viewpoint. The project utilizes programming software such as Arduino and Max/MSP to create the acoustical soundscape, and modeling software such as SolidWorks is used in collaboration with 3D printing technology to portray the visual cityscape. The acoustic component involves the arrangement of pre-recorded sound samples, and the visual component imitates the dynamic billboards of Times Square through the use of OLED (Organic light-emitting diode) screens and the traffic lights through different colours and alternation of LEDs. Different combinations of the visual and acoustic elements portray different settings of the environment (i.e., time of day, weather, etc.) and can be initiated and manipulated by the audience. Composed of various elements originating from my own perceptual experience, the installation will allow the user to obtain both structural and temporal control of their audiovisual interaction with the space. By doing this, viewers are able to form their own associations and judgements in response to the lighting, sounds, and interactions that are so important to the particular locale.

WAVE 5 POSTER PRESENTATIONS

March 21, 7:00 AM - 8:15 AM

Room 1

Investigating the relationship between step counts, standing time, and functional outcomes during stroke rehabilitation	Gita Manhas
Exploring the Association between Socioeconomic Status and Children's Writing: a Study Using Machine Learning	Karyn Huang
The effect of early life stress and changes to the epigenome to PTSD development.	Manisha Batra Prabhleen Sandhu Karin Kn Jenna Langlois
CD47-mediated apoptosis in T-acute Lymphoblastic Leukemia	Madina Kagieva

Room 2

An analysis of the effects of alpine glacier wastage on agricultural water resources throughout the Canadian Portion of the Columbia Basin	Madi Brown
A Proposal to Assess the Effects of Microplastic Shape on Ingestion and Gut Retention Rates in <i>Calanus pacificus</i>	Rachel Guo Sveta Zamaeva
Perceptual Differences Among the Various Types of Crossmodal Correspondences	Miha Zaheer
Literature Review on possibilities of immunotherapy drugs on Epithelial ovarian cancer	Tiffany Wai Sabrina Rai Christianah Soneye
The contributions of parasympathetic versus sympathetic cardiac control in experimental high-thoracic spinal cord injury	Ria Bhatt Tanya Wu Kai Leong

Room 3

Development of a Smartphone App for Video-Based Diagnostic Tools for Infants	Stephanie Quon
Are online physical assessment simulations a viable tool for pharmacy education?	Lauren Siemers
Leukemic Stem Cell Homing and Engraftment	Sam Tretjakov
Modeling Commensal and Pathogenic Bacterial Influence on the Colonic Mucous Membrane	Sam Salitra
Target the untargetable: genes for EGFR-inhibitors resistance in Triple negative breast cancer	Amelia Choy Rainbow Charoensuk

Room 4

Exploration of Abundance and Co-occurrence of Bryophytes and Lichen on Tree Stumps in Pacific Spirit Park	Isabel Wilson Tahlia Read
Economic or Planetary Security: Differing Perceptions of Threat Motivate Prejudice Towards Political Outgroup	Adrienne Hicks Sushmita Mahadani Maddelin Maddelin McCol D. Iles
Tooth Replacement Models in Leopard Geckos	Lauren Holzman

WAVE 5 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Investigating the relationship between step counts, standing time, and functional outcomes during stroke rehabilitation

Presenter(s): Gita Manhas

Abstract:

Background: Many individuals recovering from a stroke experience residual movement impairment; most commonly, limited walking ability. While the greatest opportunity for neurologic and functional recovery post-stroke is during the first six weeks of rehabilitation, it can be challenging to mobilize a patient during this time.

Purpose: We investigated the physical activity patterns of adults recovering from stroke during their inpatient rehabilitation physiotherapy sessions. Specifically, we examined how mobility patterns during physical therapy relate to walking ability recovery.

Methods: This study used data previously collected from a clinical trial investigating the efficacy of an exoskeleton-based physical therapy program during inpatient rehabilitation; 36 adults with subacute stroke were randomized to receive either exoskeleton-based gait rehabilitation, utilizing a wearable robotic frame as an assistive device, or usual physiotherapy care. During physiotherapy sessions, mobility data was collected (activPAL3 micro), measuring step counts and time spent in sedentary and upright postures. Functional outcome data was collected at baseline and post-intervention. Pearson correlation and linear regression were used to determine relationships between mobility patterns and functional outcomes.

Results: Average step counts in therapy was significantly and moderately correlated with initial and post-intervention balance function, as well as post-intervention walking ability. Average upright time in therapy was only significantly correlated with average step counts. Taking into account initial walking ability, average step count in therapy remained a predictor of post-intervention walking and balance ability.

Significance: This study highlighted the efficacy of current physiotherapy practices in achieving physical activity recommendations, and whether this allowed individuals post-stroke to make meaningful advances in walking ability.

WAVE 5 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Exploring the Association between Socioeconomic Status and Children's Writing: a Study Using Machine Learning

Presenter(s): Karyn Huang

Abstract:

"Imagine you are now 25 years old. Write about the life you are leading, your interests, your home life and your work at the age of 25". In 1969, as a part of a longitudinal study, over 10,000 11-year-old children were asked to write an essay given instruction above and their families' demographic information, including financial status and paternal occupation, was recorded. This research aims to understand the relationship between children's socioeconomic status (SES) and their imagined future as reflected by essays' topics. We adopt Structural Topic Model - a data-driven, machine learning based topic modelling technique that can incorporate covariate information - to extract topics and measure associations, which potentially overcomes the drawbacks of quantitative coding (e.g., subjectivity, labour-intensiveness, small sample size). Ten out of twelve identified topics are significantly associated with SES, with seven topics associated with the financial status and ten topics associated with the paternal occupation. Findings of this study are consistent with and contribute to the existing knowledge about SES's impact on children's education, cognitive development and motivation. This research also fills the knowledge gap in understanding the impact of SES on the content of one's writing. Moreover, it serves as a demonstration of how to employ machine learning techniques to analyze textual data in psychology research.

WAVE 5 POSTER ABSTRACTS

Theme: Health and Wellness

Title: The effect of early life stress and changes to the epigenome to PTSD development.

Presenter(s): Manisha Batra, Prabhleen Sandhu, Karin Kn, Jenna Langlois

Abstract:

Early life stress (ELS) from adverse experiences during childhood is a contributing factor in the development of psychiatric disorders (Cruceanu et al., 2017). ELS can be linked to epigenetic modifications (Provençal & Binder, 2015) and understanding these modifications has implications in decreasing the risk of psychiatric disorders. This paper explores how ELS changes the genome and subsequent comorbidities and whether these changes can be altered to reduce the chance of comorbidities. While there are ethical considerations when using animal models, their use is justified as rodent models are necessary to help with understanding PTSD in humans. Animal models are important for learning how PTSD develops, and for developing effective treatment methods for humans (Verbitsky et al., 2020). The current study will manipulate maternal separation in rats to produce a rodent model of early life stress (ELS). Studies have shown that maternal separation in rats increases anxiety- and depressive-like behaviours in adulthood (Masrour et al., 2018). The model has construct validity as behaviours exhibited by the rodents are similar to behaviours exhibited in humans with disorders resulting from neglect (Carlyle et al., 2012). Chromatin immunoprecipitation (ChIP) techniques will be utilized to probe epigenetic effectors at specific regions of interest in the genome. The ChIP method uses antibodies to immunoprecipitate a protein of interest, and will allow us to determine the impacts of ELS on the epigenome by analyzing the DNA via PCR. This will allow us to better understand the genetic mechanisms affected by ELS and give us insight into potential ways to mitigate it. Psychiatric disorders are very common worldwide among all walks of life and can have adverse effects on communities when left untreated. Understanding ways to alter the impact of ELS can help greatly reduce the number of people suffering from extreme anxiety, depression and other psychiatric disorders in adulthood.

References

- Carlyle, B. C., Duque, A., Kitchen, R. R., Bordner, K. A., Coman, D., Doolittle, E., ... & Simen, A. A. (2012). Maternal separation with early weaning: a rodent model providing novel insights into neglect associated developmental deficits. *Development and psychopathology*, 24(4), 1401.
- Cruceanu, C., Matosin, N., & Binder, E. B. (2017). Interactions of early-life stress with the genome and epigenome: from prenatal stress to psychiatric disorders. *Current Opinion in Behavioral Sciences*, 14, 167-171.

WAVE 5 POSTER ABSTRACTS

Theme: Health and Wellness

Title: CD47-mediated apoptosis in T-acute Lymphoblastic Leukemia

Presenter(s): Madina Kagieva

Abstract:

Acute lymphoblastic leukemia (ALL) is a type of cancer characterized by unregulated proliferation of white blood cells. ALL is the most common childhood malignancy, accounting for more than 30% of pediatric cancers cases. Current treatment regimen includes high-dose chemotherapy, which is accompanied by a plethora of long-term side effects including cardiotoxicity, neurocognitive deficits and secondary neoplasms. Cell surface receptor CD47 provides a “do not eat me” signal for macrophages, so that innate immune system does not attack host cells. By virtue of its “anti-engulfment” properties, CD47 is overexpressed on cancer cells in their attempt to escape immune surveillance, which makes it a common target for oncologic treatment. Monoclonal antibodies are widely used to block CD47, which triggers destruction of cancer cells by the innate immune system. Another important consequence of targeting this receptor is the direct induction of tumor cell death through non-classical, or caspase-independent, pathway. Currently, B6H12 remains the most studied commercially available monoclonal antibody that promotes the induction of cell death through CD47 ligation. The use of this antibody in a clinical setting was precarious, as it required the immobilization of cells for successful apoptosis propagation. In this study, a novel commercially available monoclonal antibody, CC2C6, was used to successfully induce cell death in T-cell ALL cells in soluble form, which does not require immobilization. Moreover, CC2C6 was shown to synergize with low dose chemotherapeutics to trigger classic apoptosis, which provides promise to reduce the long-term side effects of high dose chemotherapy in childhood ALL.

WAVE 5 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: An analysis of the effects of alpine glacier wastage on agricultural water resources throughout the Canadian Portion of the Columbia Basin

Presenter(s): Madi Brown

Abstract:

The intensification of climate change-caused glacier wastage has become an increasingly critical issue. Current studies indicate that as glacier area decreases, glacially fed streams are unable to hit their peak flow levels in summer months. This can have severe consequences for the communities and industries dependent on high summer flows. Previous studies in the Columbia Basin region, located in South Eastern BC, have indicated that glacier-melt contributions to streamflow have already passed their peak in the Columbia river headwaters, and streamflow in the summer will likely follow a declining trend. However, little is known about the vulnerability of water resources in the region. The purpose of this study was to assess the vulnerability of agricultural water licenses in the Columbia Basin. Vulnerability was determined by calculating each license's catchment overlap with glaciated areas using a variety of R geospatial packages. At risk licenses were identified and potential remediation procedures were recommended.

WAVE 5 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: A Proposal to Assess the Effects of Microplastic Shape on Ingestion and Gut Retention Rates in *Calanus pacificus*

Presenter(s): Rachel Guo, Sveta Zamaeva

Abstract:

Microplastics (MPs) are small pollutants made of various types of plastics that are becoming a widespread hazard. The prevalence of MPs in numerous ecosystems raises the concern of MP ingestion and its potential for bioaccumulation. In nearly all studies, MPs have been found in the gastrointestinal tract of aquatic organisms and shape selectivity for MPs has also been observed amongst different species of zooplankton due to differences in feeding behavior. However, most MPs are subsequently egested with feces, and despite the recent increase in research on MP ingestion by zooplankton, gut retention time and realistic factors that influence ingestion rate remain largely understudied areas despite their importance for understanding how MPs affect zooplankton. We will use adult female *Calanus pacificus*, a highly abundant copepod species in the Pacific Ocean, to study retention time and ingestion rates of copepods in four experimental groups exposed to either fresh or artificially-aged nylon fibers or fragments. We will then determine ingestion and retention rates by noting the change in MP concentration in the water and copepods over time, respectively. We hypothesize that the ingestion rate of aged MPs will be higher than that of fresh MPs due to similarities with those found in the environment. Furthermore, it is expected that shapes will vary ingestion rates. This study will help to reveal whether the types of microplastics found in zooplankton are due to differences in species feeding behaviour, gut retention time or differences in natural abundance in the environment.

WAVE 5 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Perceptual Differences Among the Various Types of Crossmodal Correspondences

Presenter(s): Miha Zaheer

Abstract:

Multisensory perception refers to the integration of information from various senses by the nervous system. Crossmodal correspondences refer to the associations between two features from different senses, which help the brain identify or locate incoming information, and form a holistic perspective of the world. There are three types of crossmodal correspondences, based on different kinds of information: structural (appearance-based), statistical (frequency-based) and semantic (meaning-based) correspondences. Understanding the differences between these correspondences can be beneficial for product design, helping us create more appealing and ergonomic designs. The differences between these correspondences will be examined using the paradigm developed by Parise & Spence (2009). Participants will be presented with four combinations of auditory and visual stimuli, wherein two will be congruent combinations and two will be incongruent combinations, against the innate correspondence. Each of the two stimuli will be presented within a short time interval. The participants' judgements of which stimuli was presented first will be measured. I expect that there will be a difference in response accuracy and speed based on whether the combination is congruent or incongruent. The difference in response between the two conditions and the magnitude of these associations will be quantified and compared between the three correspondences. I expect that there will be no correlation between the different magnitudes of associations, as each correspondence utilises a different level of processing and consciousness. This analysis of crossmodal differences can be applied to form personalized sensory substitution devices, allowing us to more accurately and specifically translate inaccessible sensory information.

WAVE 5 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Literature Review on possibilities of immunotherapy drugs on Epithelial ovarian cancer

Presenter(s): Tiffany Wai, Sabrina Rai, Christianah Soneye

Abstract:

Epithelial ovarian cancer (EOC) has been the seventh most commonly diagnosed cancer among females with a less than 50% 5-year survival rate after the diagnosis. Most ovarian cancer patients have delayed diagnostics such as the lack of disease specific symptoms.

Immunotherapy treatments work to prompt a patient's immune system into a response to a disease. Immunotherapy drugs are often featured as monoclonal antibodies and CAR T cell therapies that aim to interact within the immune system to inhibit ongoing mechanisms that are hijacked by cancer. Many current immunotherapeutic drugs act on inhibiting the checkpoint proteins on immune cells such as PD-1 and PD-L1. The drugs work by binding checkpoint proteins with high affinity and stopping the interactions amongst immune checkpoint participants. This results in enhancing the anti-tumor responses, delaying tumor growth and promoting tumor rejection.

Understanding the action of the drugs Catumaxomab, Bevacizumab and Pembrolizumab provides insight on possible immunotherapeutic approaches to improve the efficiency of treating ovarian cancer. By reviewing the literature, we addressed different immunotherapy cancer drugs that could potentially be used to treat EOC by comparing the drug's immunological mechanism and the involvement of the immune system in EOC. In our review, we focused on two current monoclonal antibody cancer drugs. This included Ipilimumab which is a current skin cancer drug acting as a CTLA-4 blockade. The other drug we evaluated is Nivolumab which is an antibody blocking interactions of T cells and tumor cells and has been widely applied in lung cancer and melanoma.

WAVE 5 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: The contributions of parasympathetic versus sympathetic cardiac control in experimental high-thoracic spinal cord injury

Presenter(s): Ria Bhatt, Tanya Wu, Kai Leong

Abstract:

Patients with high-thoracic spinal cord injuries (SCI) have autonomic dysfunction, largely due to a loss of descending sympathetic input to the cardiovascular system. This abnormal cardiovascular control increases risk for cardiovascular disease, which is a leading cause of morbidity and mortality in individuals with SCI. While the loss of sympathetic control has been documented, uncertainty remains surrounding the parasympathetic regulation of cardiac function following spinal cord injury. As such, the current study aimed to evaluate the contributions of parasympathetic and sympathetic control on cardiac function in large animals with high thoracic spinal cord injury. In a longitudinal prospective study, Yucatan mini pigs (n=8) were assessed before and 1 month following a T2 contusion SCI. At both time points, animals received infusions of esmolol (beta-adrenergic block) and atropine (muscarinic block), and measures of left ventricular (LV) contractility (E_{es}) were obtained via invasive LV pressure-volume catheterization. At baseline (pre-SCI), there were larger changes to E_{es} during esmolol infusion ($\Delta -0.63 \pm 0.44$ mmHg/ml) than with atropine (0.21 ± 0.19 mmHg/ml; $p=0.0047$). However, at 4 weeks post-SCI, E_{es} was altered to a greater extent during atropine infusion (0.33 ± 0.21 mmHg/ml) as compared to esmolol (-0.11 ± 0.11 mmHg/ml; $p=0.019$). Importantly, at post-SCI, the effect of esmolol was blunted compared to baseline ($p=0.0063$) though the impact of atropine was not significantly altered ($p=0.25$). These findings suggest that the autonomic regulation of cardiac function shifts from sympathetic dominance to parasympathetic dominance chronically following high-thoracic SCI, yet this shift likely results from the loss of descending sympathetic control rather than an enhancement of parasympathetic input per se.

WAVE 5 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Development of a Smartphone App for Video-Based Diagnostic Tools for Infants

Presenter(s): Stephanie Quon

Abstract:

Background: Each year, about 2.5 million infants die of severe illnesses in their first month. Recognizing early warning signs can be difficult, especially in low-resource settings lacking monitoring technology. Therefore, we need accessible and low-cost devices to help identify sick infants.

In a previous study, videos were taken of infants at Kamuzu Central Hospital in Malawi, East Africa using the VidOx app. These videos were used to develop a respiratory rate tracking algorithm. Reaching a high level of accuracy with this algorithm was challenging as the recorded videos varied in shakiness and lighting. Therefore, this project explores the development of new features for the VidOx app.

Objective: The objective of this project was to develop three app features: haptic feedback for handheld shakiness, collection of accelerometer data, and region-of-interest selection. These features were added to the existing VidOx application, to reduce instability and make it easier to find tracking points on the videos.

Methods: The app was built using the LambdaNative development environment. Before this part of the project, the VidOx app was preliminarily built. In addition, the features to be implemented existed as similar modules in the LambdaNative libraries. Therefore, the project primarily consisted of merging the new modules into the previous app files.

Preliminary Results: The development of the app is ongoing. In the future, the app could be used to record videos of infants to further develop video-based diagnostic tools.

WAVE 5 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Are online physical assessment simulations a viable tool for pharmacy education?

Presenter(s): Lauren Siemers

Abstract:

In order to provide high quality patient care, physical assessment (PA) is an essential aspect of pharmacists' repertoire. PA is a key competency in the Entry-to-Practice Doctor of Pharmacy (E2P PharmD) curriculum at the UBC Faculty of Pharmaceutical Sciences. During COVID-19, online education hinders in-person PA education. PA touch curriculum is also time and resource intensive. We aimed to determine the feasibility of online PA simulations to replace in-person PA education during COVID-19, and to enhance in-person PA education once resumed. We conducted a literature search of articles in MEDLINE, Embase, and CINAHL databases published between June 1, 1985 to October 14, 2020. Of 121 identified studies, 4 were included. These studies were required to be conducted in pharmacy students and assess online clinical simulations that involved PA. Generally, these studies concluded that online PA simulations were useful, realistic, and efficacious in improving student confidence and objective PA skills. Two studies utilized software that we reviewed and deemed suitable for the E2P PharmD program. The included studies were not conducted in Canada which hampers generalizability to Canadian pharmacy education due to differences in pharmacy practice. Online PA simulations also introduce an added cost to students or the E2P PharmD program. Online PA simulations may be a suitable alternative to in-person PA education to prevent a prolonged interruption in PA curriculum and further negative impact on PA proficiency. However, they cannot completely replace touch curriculum. Once resumed, in-person PA education will be enriched if used in tandem with online PA simulations.

WAVE 5 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Leukemic Stem Cell Homing and Engraftment

Presenter(s): Sam Tretjakov

Abstract:

Acute Myeloid Leukemia (AML) is a hematological malignancy characterized by the aggressive production of immature blood cells. Treatment for this disease, and 5-year survival in Canada remains to be 21%. A large cause of treatment resistance and relapse in AML is leukemic stem cells (LSCs), which are primitive, treatment resistant AML cells that can give rise to new AML populations. Recent evidence shows that vascular cell adhesion molecule 1 (VCAM1), an adhesion molecule on the surface of cells lining blood vessels, is tied to treatment evasion in LSCs. As such, we wish to study the interaction between VCAM1 and LSCs and inhibit VCAM1 to analyze LSC behavior. LSC analyses were done with MLL-AF9 mouse models, which are mice with bone marrow expressing MLL-AF9, a gene that commonly leads to AML if expressed. After AML is onset, we sorted for LSCs in the bone marrow using fluorescence activated cell sorting (FACS). These sorted LSCs were then transplanted into secondary mice treated with VCAM1 inhibitors. LSC localization was observed with bone cross-sections and LSC clonogenicity was observed by collecting LSCs from the secondary mice and injecting them in uninduced tertiary mice and analyzing disease onset and survival. Results show that the LSCs were unable to induce AML in the tertiary mice. In cross-section we see that the LSCs remain in the stroma and not near vascular sites. This provides evidence that VCAM 1 promotes LSC engraftment and VCAM1 inhibitors can significantly reduce chances of relapse post-treatment.

WAVE 5 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Modeling Commensal and Pathogenic Bacterial Influence on the Colonic Mucous Membrane

Presenter(s): Sam Salitra

Abstract:

The human microbiome remains one of the most poorly understood systems within health science, consisting of trillions of microbial cells that influence each other and their environment, precipitating higher order interactions that have far-reaching consequences throughout the body. Likewise, developing a rigorous understanding of this system will involve a variety of approaches, including in-vitro experimentation and in-silico computer simulation. Currently, few models exist that investigate colonic health.

This project attempts to create a simple working model of the mucous-bacterial interactions occurring in the human colonic compartment in order to investigate the experimental question: how do the relative proportions of commensal and pathogenic bacteria affect the stability of the mucin layer?

Intestinal bacterial are grouped into two categories within the model, commensal and pathogenic (Paone P & Cani PD, 2020). Bacteria were then modelled as secreting a protein that either hampered or increased the rate of production of mucin depending on their status as pathogenic or commensal respectively. Attachment of pathogenic bacteria to the intestinal wall was considered a sufficient threshold for cellular infection.

The proportions of commensal and pathogenic bacteria were varied, and its impact upon the rate of mucin production, amount of mucin present, and number of infected intestinal cells were recorded for use as a biomarker of stability of the mucous membrane. It is the intention of this project to identify points of stability, identify thresholds of unsustainable mucous degradation, and provide a sound base from which more complex model of the colon can be developed.

WAVE 5 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Target the untargetable: genes for EGFR-inhibitors resistance in Triple negative breast cancer

Presenter(s): Amelia Choy, Rainbow Charoensuk

Abstract:

It is estimated that 1 in 10 women will develop breast cancer in their lifetime and of those, 15-20% will have triple negative breast cancer (TNBC). TNBC is a subtype of breast cancer that is particularly invasive, malignant, and untargetable. Epidermal growth factor receptor (EGFR) has been reported to be expressed and overexpressed in as many as 89% of TNBCs. EGFR is targeted by inhibitors, such as tyrosine kinase inhibitors (TKI), to treat lung cancer and colorectal cancer. As such, EGFR presents a potential therapeutic target to treat TNBC. However, studies report that only 1.7-38.7% of TNBC patients with the overexpression of EGFR had some clinical benefit after EGFR targeted therapy. The mechanism of the resistance to EGFR treatment in most patients is yet unknown and presents a research avenue to develop more effective treatment strategies for TNBC patients. We aim to identify a subset of candidate genes that are involved in the resistance to gefitinib, a common TKI or an EGFR inhibitor used for treatment in TNBC patients. Groups of patient-derived xenografts (PDXs) in vivo will be screened and compared to identify TNBC patient tumours with significant resistance to gefitinib. RNA sequencing and downstream assays (e.g. CRISPR/CAS9) will be used for the analyses of the potential gefitinib-resistant genes. The suggested specific gefitinib-resistant genes found in TNBC patients should then be investigated to provide a further understanding of the mechanism of EGFR inhibitor resistance.

WAVE 5 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Exploration of Abundance and Co-occurrence of Bryophytes and Lichen on Tree Stumps in Pacific Spirit Park

Presenter(s): Isabel Wilson, Tahlia Read

Abstract:

Scattered through Pacific Spirit Park in south-west British Columbia are stumps of the old-growth western red cedar and Douglas fir felled when the forest was clearcut in the late 1800s. Charred by wildfires and decayed to expose smooth or soil-like wood, these stumps, some of which are over four meters tall and six meters around, are typically covered with lichen and bryophytes (small, non-vascular plants, like mosses). This study is the first to explore the abundance, distribution, and biodiversity of bryophytes and lichen on old-growth tree stumps in south-west Pacific Spirit Park. We measured the percent cover of 11 bryophyte species and total percent cover of lichen on the north, east, south, and west sides of stumps. Although we did not observe a relationship between total bryophyte cover and lichen cover, we found a moderate positive correlation between bryophyte diversity and lichen cover. Total bryophyte cover was significantly greater on the north side of stumps than on the south; however, among individual bryophyte species, only the most common, *Leptidozia reptans*, was more abundant on the north than on the south. The abundance of each bryophyte species on old-growth stumps differed from that on living trees. Notably, while a previous survey found no *P. elegans* on living trees in the region, *P. elegans* ranked among the most abundant bryophytes on stumps. This study establishes old-growth stumps as a unique and important bryophyte habitat in Pacific Spirit Park and also provides data for future comparative studies, among other future research.

WAVE 5 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Economic or Planetary Security: Differing Perceptions of Threat Motivate Prejudice Towards Political Outgroup

Presenter(s): Adrienne Hicks, Sushmita Mahadani, Maddelin Maddelin, McCol D. Iles

Abstract:

To address the current ecological crisis, urgent co-partisan action is required. Unfortunately, climate change remains a politicized issue making cooperation difficult. We suggest that prejudice is one barrier to cooperation between liberals and conservatives on climate issues and this prejudice may be motivated by differing perceptions of threat. Using a 3x2 experimental design, we will look at the impact of video priming of three different threats (planetary versus economic, control: health threat) on explicit prejudice towards political outgroup members. We will also measure participants' political identity (liberal versus conservative) as a moderating variable. We hypothesize an interaction between types of threat and political identity such that in liberals the threat of planetary security would increase prejudice towards conservatives and in conservatives the threat of economic security would increase prejudice towards liberals. This research will help to identify some of the psychological mechanisms of partisan prejudice which may interfere with successful implementation of environmental policies. Future research can examine interventions to mitigate the impact of these mechanisms.

WAVE 5 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Tooth Replacement Models in Leopard Geckos

Presenter(s): Lauren Holzman

Abstract:

Background: In most vertebrates other than mammals, teeth are continually replaced. In leopard geckos, this replacement takes place on a monthly cycle. Experimental research suggests two main methods of tooth replacement in geckos, where control of tooth initiation in the dental lamina is either systemic or localized. Research conducted in the lab of Professor Joy Richman at UBC favours the localized control hypothesis, however, the exact mechanism is not yet known.

Problem: Based on the uncertainties surrounding patterns in tooth replacement, this research aims to use mathematical modeling to determine whether the presence of a tooth results in a zone of local inhibition and if this local inhibition accounts for developmental patterns seen in geckos.

Methodology: We consider both a diffusion model and a constant radius model to predict and simulate the development and replacement patterns of teeth through the dental lamina. Following this, we compare the simulated data of new tooth formation locations over time to experimental data provided by the Richman and Brink labs to evaluate the accuracy of the models. Here, we develop a mathematical test for accuracy to further improve the model or disprove the hypothesis. In assessing accuracy, we optimize the parameters in the model to minimize the difference between the simulated and experimental data.

Implications: The results of the study will aim to inform experimental researchers of the validity of proposed theories of tooth replacement in geckos.

WAVE 6 ORAL & POSTER PRESENTATIONS



WAVE 6

ORAL PRESENTATIONS

March 21, 11:00 AM - 12:15 PM

Room 1

Comparing bi-exponential and non-negative least square fitting in detecting prostate cancer with Luminal Water Imaging

Monica Luo

Prescribing patterns and prophylactic antibiotic use for recurrent urinary tract infections, in British Columbian outpatient care.

Daniel Yoo

Effects of Calorie Reduction on Body Weight

Romina Mahinpei

Improving the Persistence of CAR T-cells with Telomerase

Charu Sankaran

Biodegradable Scaffolds for Axonal Regeneration in the Spinal Cord

Brenda Ma
Enda Cakmak
Yoshi Inomata

Room 2

Russian to Canada: The preservation of Russian values in immigrants

Meghan Little

Unforgetting: The Roma and Sinti Holocaust

Charlotte Gibbs

Comments tell the story: A thematic analysis examining comment sections in media coverage of the overdose crisis in British Columbia between 2016 - 2020

Prableen Sandhu
Azlina Tima
Karambir Singh Dhaunsi
Kelly Zhang

Body Image Self-Consciousness During Sex and Sexual Function Problems in Pregnant Couples

Lara Radovic

Correlation Between Mask-Wearing and Agreeableness During the COVID-19 Pandemic

Jacob Sawatzky

Room 3

Heterostructure Fabrication: A Nanoscale Approach to Enhanced Device Performance

Vedanshi Vala
Teri Siu

Is Using UV-LEDs Teeth Whitening Kits Safe and Effective or Not? Farbod Alirezaee

Chronic unpredictable stress increases fearful responses but does not increase negative cognitive bias in male and female rats Surat Singh

Fractal Analysis of Movie Watching vs. Eyes-Open Resting State Reveals Differences in Signal Processing Olivia Campbell

Role of omega-3 fatty acids in intestinal inflammation in SHIP-deficient mice Aygun Ibrahimova
Olivia Wong
Parneet Sekhon
Jaskiran Dhani

Room 4

Habitat Selection as a Function of Web Type and Forest Succession Level in Spiders Robin Glover

Genetic Correlates of Hypoxia Tolerance in Hybrid Rainbow Trout Jennifer Fisher

Competitive Fish and the Issue of Bycatch Bryce Dyck

Influence of Embryonic Environment on the Thermal Stress Response of Atlantic Killifish Myra Thapar

WAVE 6

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Comparing bi-exponential and non-negative least square fitting in detecting prostate cancer with Luminal Water Imaging

Presenter(s): Monica Luo

Abstract:

The objective of this study was to compare two techniques for processing multi-echo Magnetic Resonance Imaging (MRI) data, for the detection of prostate cancer. MR Images were acquired from forty patients with biopsy-proven prostate cancer. T2 distributions for each patient were generated using bi-exponential fitting and a non-negative least squares (NNLS) algorithm from MRI data. The bi-exponential model assumes a sum of two exponential decays while the NNLS model allows for a sum of any number of exponentials that minimizes the χ^2 value of the fit. Parametric maps were generated for all slices across the entire prostate to determine the distribution of average values for each fit parameter, as well as the luminal water fraction. Cancerous and non-cancerous regions were identified and used to calculate the average values of each parameter. Diagnostic accuracy in each region was assessed and compared between the bi-exponential and NNLS models. Luminal water fraction, which measures the fractional volume of lumen in tissue, was used as the primary parameter for assessing diagnostic accuracy. The diagnostic accuracy based on comparing the luminal water fraction was similar between the two fitting methods in all regions of the prostate. The results of this study demonstrated that bi-exponential fitting is as accurate as NNLS in distinguishing between cancerous and non-cancerous regions in the Peripheral and Transition zones of the prostate. This suggests that the bi-exponential model, which is a simpler and more accessible method than NNLS, may be useful in clinical applications to facilitate MRI image analysis in diagnosing prostate cancer without the need for biopsy.

WAVE 6

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Prescribing patterns and prophylactic antibiotic use for recurrent urinary tract infections, in British Columbian outpatient care.

Presenter(s): Daniel Yoo

Abstract:

Objectives

Urinary tract infections (UTI) are frequently recurring and debilitating bacterial infections. UTI is recurrent if there are 3 individual episodes within 12 months. In British Columbia, the burden of disease for recurrent UTI (rUTI) remains unknown. Antimicrobial stewardship efforts, a systematic approach in using the best antibiotics to minimize resistance, have been enforced over time. The objective was to examine the prevalence of rUTI and the quality of associated antibiotic prescribing, in the presence of stewardship efforts.

Methods

Data for outpatient rUTI in adult women were examined from January 1, 2008 to December 31, 2018. A provincial prescription database, physician billing system and a consolidation file were utilized to combine antibiotic, diagnostic and patient demographic data. Rates of rUTI cases and prescriptions were examined per 1000 population, and trends of antibiotics were separated by major anatomical therapeutic chemical classes.

Results

From 2008-2018, 2,234,903 rUTI-associated prescriptions were dispensed for 674,785 rUTI cases. Over the study period, the prevalence of rUTI cases declined by 59% and antibiotic prescribing decreased by 73%. The greatest decrease in use was observed in the quinolone (J01M) class of antibiotics (87%). Nitrofurantoin was the most common antibiotic dispensed, accounting for 42% of all rUTI-associated prescriptions.

Conclusions

Antimicrobial stewardship efforts are likely to have contributed to the decrease in antibiotic prescribing. As suggested in guidelines, Nitrofurantoin is the most frequently prescribed rUTI antibiotic for its E. coli susceptibility. This study highlights the positive impact of stewardship efforts over time, in optimizing the judicious use of antibiotics.

WAVE 6

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Effects of Calorie Reduction on Body Weight

Presenter(s): Romina Mahinpei

Abstract:

In recent years, social pressure has led many Canadians to attempt losing weight. A popular weight loss attempt has been calorie reduction, which is often believed to guarantee weight loss. To test the validity of this perception, I investigated the effects of calorie reduction on the body weights of healthy adults by running simulation models. Assuming a 25% calorie reduction over a 500-day interval and low to moderate levels of exercise, the most recent model of weight loss, referred to as the Thomas model in literature, was tested against a simulated population. The simulated population consisted of male and female subjects of 20, 30, 40, 50, and 60 years of age with an approximate initial weight of 60 kg. From the model projections, an initial decline in body weight was observed with a rate of decline that slowed down to zero as a new stable weight was achieved. Research has linked this observation to the possibility that the human body reduces its resting metabolic rate to compensate for the reduction in energy intake and restores a new energy balance. These findings and recent research imply that calorie reduction leads to a decelerating, non-linear decline in body weight. Nonetheless, it is important to note that these results are limited to by the model's assumptions and choices of parameter values. As a consequence, the simulated trends may vary from actual weight-loss results. Further research on details of the model assumptions and validation against larger datasets is recommended.

WAVE 6

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Improving the Persistence of CAR T-cells with Telomerase

Presenter(s): Charu Sankaran

Abstract:

Chimeric antigen receptor (CAR) T-cells are a living drug that has greatly increased survival for hard-to-treat cancers, such as acute lymphoblastic leukemia (ALL). They are produced using lentiviral vectors, which are a modified inert virus, allowing for the integration of the CAR gene into the T cell genome. The CAR allows for the targeting and killing of cancer cells. However, some patients relapse which has been associated with a loss of the CAR T-cells. Thus, improving the longevity, or persistence, of CAR T-cells may be critical to maintaining remission. One pathway that may play a role is senescence, which is the aging of cells resulting in dormancy. This can be caused by critical shortening of the telomeres, which are terminal repeats at the ends of chromosomes. Telomeres are maintained by the enzyme telomerase, so an increased expression of telomerase may prevent CAR T-cell senescence. Telomerase will be overexpressed in CAR T-cells using a second lentiviral vector, which will allow for control of telomerase expression using an antibiotic drug. The effectiveness of these CAR T-cells will be tested in vitro and in vivo, to see if they increase persistence and when the expression is required. To investigate this in vitro, cell culture models will be used to determine if telomerase expression impacts function. We hypothesize that the expression of telomerase will increase CAR T-cell persistence, while not impacting killing ability. Ultimately, the goal of this project is to develop improved CAR T-cells to prevent patient relapse.

WAVE 6

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Biodegradable Scaffolds for Axonal Regeneration in the Spinal Cord

Presenter(s): Brenda Ma, Enda Cakmak, Yoshi Inomata

Abstract:

Currently, tissue engineering plays a critical role in regenerative medicine by providing a basis for diverse avenues of research in alternative applications, including biosensors, cell carrier drug delivery systems, nanotechnology, and improvement upon current stem cell therapies. The premise of spinal cord tissue engineering is to more effectively promote cell proliferation and regeneration in the spinal cord, while minimizing adverse health effects following cell damage and death caused by severe injuries. Researchers in this field seek to design and develop biomaterials and constructs that will best address cytotoxicity effects and incompatibility of engineered scaffolds in the transected spinal cord. The aim of this literature review is to discuss the critical issue of cytotoxicity in lumbar injuries, and the implications of currently existing polymer scaffolds. There will be an emphasis on biodegradable scaffolds in vivo, and the success of their integration in animal models, whose results can be extrapolated for regenerative applications in the human musculoskeletal system. Furthermore, this review will extend this discussion to a comparative review of various studies of promising scaffold designs by assessing their underlying embedded cell delivery systems, polymeric material chemistry, and viscoelastic properties in their contribution to cytotoxic effects. By considering the severity of such effects, a conclusion as to which design best supports axonal regeneration will be drawn.

WAVE 6

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Russian to Canada: The preservation of Russian values in immigrants

Presenter(s): Meghan Little

Abstract:

Analyzing the value preferences of individuals may help scholars understand the impacts of immigration. Schwartz (2012) identifies ten basic cross-cultural values. In my research, I examine the preservation of traditional Russian values in immigrants specifically by looking at four of Schwartz's basic values: self-direction, benevolence, tradition, and achievement. How have Russian values endured or changed in Russian immigrants that fled to China during the Russian civil war? To answer this question, I record, transcribe, and code interview conversations with my Russian relatives Tania Little and Nicholas Galichenko. The primary dataset to answer the question comes from natural conversations with my relatives. I compare this data to the wider research on Russian cultural values. While many scholars have written about Russian immigrants during post-war or post-soviet periods (Golovkin, 2017; Mirsky, 2009; Tepavcivic, 2017), there is a lack of discussion, however, on Russian immigrants holding pre-revolutionary Russian values. My great-grandparents, Vladimir and Lidia Galichenko, fled Russia as infants during the Russian Revolution to Harbin, China. Vladimir and Lidia raised their children, Tania and Nicholas, in Shanghai, China before immigrating to Canada in 1952. This paper finds that traditional Russian values endure in my relatives despite never having lived in Russia. I find a greater preservation in my family of the value of benevolence than the other three values discussed. In fact, this paper argues that all of my family's value preferences- tradition, achievement, and self-direction- ultimately fall into the overarching value of benevolence. These findings suggest broader implications in the study of Russian immigrants, namely, that certain values may persist more than others across generations and geography.

References

Schwartz, S. H. (2012). An Overview of the Schwartz Theory of Basic Values. Online Readings in Psychology and Culture, 2(1). <https://doi.org/10.9707/2307-0919.1116>

WAVE 6

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Unforgetting: The Roma and Sinti Holocaust

Presenter(s): Charlotte Gibbs

Abstract:

The Roma and Sinti were targeted, persecuted, and murdered by the Nazis and their collaborators during the Second World War. Current estimates suppose that over 250 000 Roma were murdered, however their experiences went understudied and Roma survivors struggled for compensation for decades. Holocaust Studies has slowly been studying the Roma and Sinti persecution and have designated it as the "Forgotten Holocaust," however connections have rarely been made explicitly linking the experiences of the Roma and Sinti during and after the Holocaust. Thus, this study explored why and how National Socialism targeted the Roma populations of the German Third Reich and its occupied territories. This study was informed through literary and oral testimony from Roma survivors of the Holocaust. Analysis of the experiences of Roma and Sinti allowed this study to demonstrate why ongoing "anti-Gypsyism" negatively affected the fight for compensation, as well as brings into question the responsibility of scholars to wholly and accurately present the experiences of non-Jewish victims of the Holocaust.

WAVE 6

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Comments tell the story: A thematic analysis examining comment sections in media coverage of the overdose crisis in British Columbia between 2016 - 2020

Presenter(s): Prableen Sandhu, Azlina Tima, Karambir Singh Dhaunsi, Kelly Zhang

Abstract:

In 2016, British Columbia declared the overdose crisis a public health emergency. Combined with the effects of the COVID-19 pandemic, overdose deaths peaked in 2020. It is crucial to understand the stigma and discrimination experienced by people who use drugs (PWUD), and the media's role in shaping such attitudes. This project uses thematic analysis to explore how media coverage, and public perception, of the overdose crisis has changed between 2016-2020. Forty-eight news stories on traditional media platforms that covered the overdose crisis between 2016 to 2020 were reviewed. Thematic analysis was used to analyse comment sections, including those on social media platforms, to identify the common themes which were then compared across the time period. Preliminary analysis shows a general decline in public empathy towards the overdose crisis between 2016-2020. As cases peaked in 2018, there was significantly more discourse on approaches to tackling the crisis, along with criticisms of insufficient government response. While 2019 saw a slight decrease in overdoses, public comments suggest increasing frustration and compassion fatigue. Negative tones continued into 2020, as public concern shifted away from the overdose crisis to the COVID-19 pandemic despite record overdose deaths. Our project, to the best of our knowledge, is the first of its kind to explore public perceptions of the overdose crisis in BC through public comments on traditional and social media platforms. Our findings capture public sentiment on the overdose crisis, which can then be used to inform targeted public education and anti-stigma campaigns both provincially and nationally.

WAVE 6

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Body Image Self-Consciousness During Sex and Sexual Function Problems in Pregnant Couples

Presenter(s): Lara Radovic

Abstract:

Background: Many couples experience problems with sexual function in pregnancy. Outside of pregnancy, negative body image is associated with poor sexual function. Since bodies change in pregnancy, a person's self-consciousness about these changes may contribute to sexual function problems. Research has found links between body image dissatisfaction and lower sexual satisfaction in pregnant individuals. However, associations between body image concerns during sex and other aspects of sexual function have not been examined in individuals or couples, despite the interpersonal nature of the sexual relationship.

Objective: To investigate how an individual's body image self-consciousness during sex is linked with their own and their partner's sexual function in pregnancy. We hypothesized that higher body image self-consciousness would be associated with poorer sexual function for both partners.
Methods: We sampled first-time parent couples at 20-weeks gestation (N = 64). Both members of the couple completed validated measures of sexual function and body image self-consciousness. Analyses were informed by the Actor-Partner Interdependence Model.

Results: There were no significant links between an individual's body image self-consciousness and their own sexual function (i.e., actor effects). Pregnant individuals with higher body image self-consciousness had partners with poorer sexual function ($p = 0.02$). No other significant partner effects were observed.

Conclusions: It is possible that pregnant individuals who are more self-conscious about their changing bodies may be less willing or comfortable engaging in their usual sexual activities, which in turn leads to their partner's having lower sexual function (e.g., problems with arousal, reduced sexual satisfaction).

WAVE 6

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Correlation Between Mask-Wearing and Agreeableness During the COVID-19 Pandemic

Presenter(s): Jacob Sawatzky

Abstract:

In efforts to prevent the spread of COVID-19, wearing a mask in public indoor environments has become mandatory in British Columbia, however not everyone complies with these mask mandates. Public health officials who make advertisements and messages about COVID-19 could benefit from understanding which personality traits correlate with a reduced tendency to wear masks, since messages are more persuasive when tailored to the personality trait of the recipient.

This study uses a survey with the aim to find a correlation between agreeableness and mask-wearing. It was found that agreeableness and mask-wearing were weakly positively correlated, which suggests that people who are less concerned with social harmony are less likely to wear a mask in public places. With this information, public health officials can tailor their messages in ways that resonate more with people who are less agreeable.

A recent study has shown that low levels of empathy correlate with reduced compliance to COVID-19 containment measures. Since there is a strong association between empathy and agreeableness, the prediction that low agreeableness correlates with a reduced tendency to wear masks during COVID-19 is consistent with previous research.

WAVE 6

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Heterostructure Fabrication: A Nanoscale Approach to Enhanced Device Performance

Presenter(s): Vedanshi Vala, Teri Siu

Abstract:

The Ye Research Group at the Stewart Blusson Quantum Matter Institute studies the optical properties of two-dimensional materials, which are at most several nanometers thick and micrometers wide, such as graphene and transition-metal-dichalcogenides (TMDs). These materials can improve the performance of medical imaging and optical telecommunications where light signals are converted into electrical signals through photodetectors. Existing devices rely on micron-sized semiconductors and external voltage to generate electrical signals. However, the presence of 2D materials can amplify the transmitted electrical signals while also allowing a spontaneous generation of photocurrent without an external source, achieving the scalability of materials. The fabrication process must be extremely precise to ensure high efficiency and enhanced output signals. This leads to our project, where we focus on stacking 2-dimensional flakes of graphene, molybdenum disulphide (MoS₂), and hexagonal boron nitride (hBN) to create a photodetector with enhanced efficiency and output electrical signals. Device performance was strongly correlated with its method of fabrication, where quality was hindered by factors like defects and air bubbles introduced from material preparation and the stacking process. Results demonstrated that different preparation methods, such as high temperature annealing and slow transfer of the flakes onto substrates, gave higher yields of flakes. Adopting a slow-and-steady approach for heterostructure stacking can successfully limit the dirt and air bubbles trapped between layers of flakes. A significant reduction of defects was evident, improving photocurrent generation efficiency. This project's results provide an elevated insight of low dimensional materials in photodetectors, ultimately contributing to the advancement of technology.

WAVE 6

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Is Using UV-LEDs Teeth Whitening Kits Safe and Effective or Not?

Presenter(s): Farbod Alirezaee

Abstract:

This work investigated the effectiveness and safety of the ultraviolet light-emitting diode (UV-LED)-based teeth whitening kits by conducting a thorough literature review and one purposeful methodology. The methodology of the current research was a combination from two of the previously reported articles. In our method, UV-LED teeth whitening kit, tooth brush, and normal toothpaste were used. The sample consisted of one hundred and twenty-six people and the recorded parameters were the colour change of the examinees, pulpal temperature, and enamel morphological. Half of the group used the whitening kit, while the other half used the toothbrush and the toothpaste. Both groups were examined after one day of using what they have already been given, and another examination after using them for one week. The results were unexpected, as it was in contrast with the common belief of UV-LED teeth whitening kits being harmful and would weaken the strength of the teeth. However, merely the group that used the UV-LED teeth whitening kit exhibited noticeable differences ($p < 0.005$) in colour change of their teeth when compared with the other group. Moreover, the scanning electron microscopy technique showed no evidence of degradation of enamel. Hence, based on the increase in pulpal temperature, it can be safely concluded that teeth whitening methods are safe, yet not as effective.

WAVE 6

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Chronic unpredictable stress increases fearful responses but does not increase negative cognitive bias in male and female rats

Presenter(s): Surat Singh

Abstract:

Major depressive disorder (MDD) is more common in women than in men, and women have more severe symptoms of MDD. Cognitive symptoms of MDD include negative cognitive bias. Negative cognitive bias is an increased perception of neutral situations or objects as negative. MDD can be modelled in rodents using a chronic unpredictable stress (CUS) paradigm. We examined whether there were sex differences in cognitive bias after CUS. Adult male and female Sprague-Dawley rats underwent either 2 weeks of CUS or no stress. Two days later, all rats began a fear-based cognitive bias task. For the cognitive bias task, rats were trained for 16 days to distinguish between two contexts: a context paired with foot-shock and a context paired with no foot-shock. Two days after initial training (day 18), rats were placed in an ambiguous context and coded for positive (low freezing/fear) or negative (high freezing/fear) cognitive bias. On day 1 of cognitive bias training, male and female rats that underwent CUS displayed a more fearful response than did no-stress rats to the no-shock context after all rats received a foot-shock for the very first time in the shock-paired context. By the end of cognitive bias training (day 16), rats exposed to CUS displayed a potentiated fear response in all contexts compared to non-stressed rats, and males displayed a greater fear response than did females. However, there was no difference in cognitive bias between groups. These findings indicate that CUS potentiates fear responses to a neutral context regardless of sex.

WAVE 6

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Fractal Analysis of Movie Watching vs. Eyes-Open Resting State Reveals Differences in Signal Processing

Presenter(s): Olivia Campbell

Abstract:

The conventional functional magnetic resonance imaging (fMRI) resting-state condition uses fixed-cross hairs as a stimulus to capture the intrinsic activity of the brain. However, it has been suggested that a continuous and more ecologically valid stimulus, such as a movie, may reflect richer and more reliable natural brain states. We wanted to explore the underlying brain dynamics that occur while processing both stimuli using fractal analysis, a technique that quantifies brain signal dynamics. The Hurst exponent (H) is a measure of the fractal behaviour in the signal, where higher H (more fractal) values reflect more self-similar or temporally redundant patterns. We compared the H values of 55 subjects (data from Human Connectome Project (<https://www.humanconnectome.org/>)) with eyes fixed on a cross-hair ("Rest") and while viewing a short film ("Movie") using a Paired Student's T-Test in three regions-of-interest: grey matter, visual network, and the default mode network (DMN.) Compared to Rest, Movie evoked more persistent fractal behaviour in all three regions analyzed: grey matter (adj_p.=0.014, Cohen's_D=0.34), DMN (adj_p.= 2.55×10^{-8} , Cohen's_D=0.90), and visual network (adj_p.= 6.44×10^{-10} , Cohen's_D=1.05). This finding highlights the ability of fractal analysis to differentiate brain dynamics across states and networks and provides evidence that movie-watching expresses unique and robust signal behaviour. Taken together, this proposed technique of performing fractal analysis on movie-watching fMRI data may be used to reliably quantify intrinsic brain activity. This may be extremely valuable in experimental and clinical settings, where deviations in H values from an individual's innate state can be used to predict enhanced or impaired functioning.

WAVE 6

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Role of omega-3 fatty acids in intestinal inflammation in SHIP-deficient mice

Presenter(s): Aygun Ibrahimova, Olivia Wong, Parneet Sekhon, Jaskiran Dhani

Abstract:

Inflammatory bowel disease (IBD) is a group of disorders involving inflammation of the digestive tract lining. The two main forms of IBD are ulcerative colitis (UC) and Crohn's disease (CD). While UC presents as chronic inflammation of the colon and rectum, CD is associated with transmural ulceration anywhere along the digestive tract. The causes of either are not well understood; however, diet may be a factor in IBD pathogenesis. Previous studies using murine models reported that omega-3 polyunsaturated fatty acids (PUFA) can reduce inflammation. SH2 domain-containing inositol 5'-phosphatase (SHIP) is a negative regulator of the phosphatidylinositol-3-kinase pathway, which promotes cell activity, growth, and immune activation. SHIP-deficient (SHIP^{-/-}) mice develop spontaneous ileal inflammation that resembles human CD and thus act as a mouse model for IBD. We compared disease activity scores between SHIP^{-/-} mice fed regular diets to those fed an omega-3-enriched diet to determine the role of omega-3 in ileal inflammation. SHIP^{-/-} and wild-type controls aged 4 weeks old were fed a regular chow diet without supplemental omega-3 fatty acids or a diet with fish oil enriched with omega-3 PUFA. The mice were monitored daily until ilea were harvested at 8 weeks of age. Examination of the SHIP^{-/-} mice on diets enriched with omega-3 revealed decreased histological damage, rectal bleeding, stool consistency, and ileal inflammation. These findings suggest that omega-3 PUFA rich diets ameliorates inflammation in a mouse model of IBD. Incorporating omega-3 into the diets of individuals with SHIP deficiency may similarly help reduce IBD severity.

WAVE 6

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Habitat Selection as a Function of Web Type and Forest Succession Level in Spiders

Presenter(s): Robin Glover

Abstract:

Behaviours associated with habitat selection greatly influence organismal fitness because they determine the environmental pressures an organism is exposed to. Due to the costs of web relocation, choosing an initial habitat is especially important for web-building spiders, which may remain stationary for extended periods of time. Spider webs can be separated into three categories based on their geometry: orb, tangle, and sheet-and-tangle. Since each web architecture is associated with a unique set of trade-offs, spiders with certain web types may favor environments with particular vegetation structure. While different habitat selection strategies have been observed in spiders with various web types, factors that influence a spider's choice in web-site location are still largely unknown.

In this study, I aimed to determine how forest succession stage influences communities of web-building spiders in terms of the proportion of different web types. In order to address this, I investigated whether the proportion of different web geometries changes along a gradient of succession levels in Pacific Spirit Regional Park (PSRP). I collected web and vegetation data across ten sites in PSRP throughout the summer of 2020. Preliminary results have determined the two vegetation variables that correlated with succession level: size of gaps in otherwise continuous vegetation and understory density. Further analysis will determine the effect of these two vegetation variables on the probability of each web type occurring in a site.

WAVE 6

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Genetic Correlates of Hypoxia Tolerance in Hybrid Rainbow Trout

Presenter(s): Jennifer Fisher

Abstract:

Rainbow trout are a popular target for recreational sport fishing in Canada which contributes a large amount to the Canadian economy each year. To prevent the decline of wild populations due to this heavy fishing pressure, hatcheries are often used to rear rainbow trout for release. However, early rearing conditions in hatcheries have been shown to cause differences in behaviours, phenotypes, and even gene expression. Moreover, hatchery-reared fish have been shown to have lower fitness than wild-born fish following release into the wild. These differences create concern about how hatchery-raised fish will impact wild populations, especially if hatchery fish mate with wild individuals. This study uses second generation hybrid rainbow trout from a domestic and wild cross to investigate how they respond to a common stressor. One struggle commonly faced by fish in the wild is low oxygen levels. Low oxygen levels, termed 'hypoxia', can result due to numerous environmental variables including algal blooms, lake turnover, and warming events. Here I investigate brain gene expression in relation to hypoxia tolerance for hybrid rainbow trout to see if hypoxia performance is correlated with the expression of genes that are involved in the brain stress response. Results of this study provide information about the underlying genetic mechanisms of hypoxia tolerance and will inform to future studies of domestication in rainbow trout. Gene expression will be discussed with relation to body weight, length, and relative performance in hypoxic conditions.

WAVE 6

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Competitive Fish and the Issue of Bycatch

Presenter(s): Bryce Dyck

Abstract:

Industrial fisheries primarily aim to maximize the total amount of fish caught, as well as the profits from harvesting the material. However, the future of the fisheries system also holds great value to the fisher in the form of future profits, but also many other stakeholders such as environmentalists, nature enthusiasts, and indigenous groups. Extraction must therefore take place at a sustainable rate. In fisheries, the maximum harvest that can be extracted without jeopardizing future harvests is called the Maximum Sustainable Yield (MSY), which determines the optimum rate at which fish may be removed from a region. However, traditional MSY models typically do not consider interspecies dynamics, incidental catch, or other factors that influence the sustainability of the fishing effort.

Here, we investigate a two-species fisheries model, where one species is the target of a fishery, while the second is caught incidentally by the same fishery as bycatch. The stability of this system was analyzed for three separate initial population dynamics: when the bycatch species is rare, when the target species is rare, and when both populations are healthy. Fishing at MSY often drives the non-target species to extinction. This model helps determine when this may happen. Occasionally, increasing fishing effort may save a failing non-target population, by driving down competitor numbers. This analysis may better inform policy makers on how best to protect at risk stocks and how to set catch limits when the limiting factor may be a species that is not targeted.

WAVE 6

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Influence of Embryonic Environment on the Thermal Stress Response of Atlantic Killifish

Presenter(s): Myra Thapar

Abstract:

Climate change is correlated with a shift in biogeographic ranges for fishes due to increasing water temperatures, resulting in the loss of specifically adapted species. The embryonic temperature tolerance range is the most limited when compared to other life stages in teleost fishes. Identifying the mechanisms that underlie the thermal stress response (TSR) during embryogenesis and potential persistent phenotypic changes is imperative to understanding adaptive processes of developing fish in the changing climate. The Atlantic Killifish's (*Fundulus heteroclitus*) habitat has daily and seasonal fluctuations, making it a great species for understanding the TSR; however, little is known about this in developmental stages. A common TSR includes the expression of heat shock proteins (HSPs). I hypothesized that individuals exposed to stressful incubation environments are better prepared for stressful environments later in life. In this study, to better understand the response to stressful developmental environments during embryogenesis and after hatch, we exposed Atlantic Killifish embryos to four different incubation treatments of different temperatures (26°C & 20°C) and salinities (3PPT & 20PPT) until hatch when all individuals were moved to 20°C and 20PPT. We measured mRNA expression of HSPs throughout embryonic and juvenile stages to understand the phenotypic changes during development. Further, critical thermal maximum (CTmax) was conducted on juveniles post-embryonic acclimation. Currently, data collection and analysis is underway. Preliminary results indicate a higher mortality rate and longer hatch time in individuals of the 20°C and 3 ppt treatment ($P < 0.05$). No significant differences were found in CTmax amongst different treatment groups.

WAVE 6 POSTER PRESENTATIONS

March 21, 11:00 AM - 12:15 PM

Room 1

- | | |
|---|-------------------------------------|
| Rising temperatures affect wing morphology and flight performance in the cabbage white butterfly, <i>Pieris rapae</i> | Erez Buyukyilmaz |
| Coral Memory: Effects of Prior Nursery Structures on Growth Rate of Staghorn Coral | Christine Yang |
| Monitoring the Growth of Mealworms Using Different Types of Diet | Michelle Lim |
| A reverse-genetics approach for the identification of genes in common wheat (<i>Triticum aestivum</i>) that play a dual role in drought tolerance and <i>Fusarium</i> head blight resistance. | Jennifer Wu
Mirkka Puente Madrid |
| A comprehensive review of barriers leading to the global cataract backlog | Haaris Khan
Faran Rashid |

Room 2

- | | |
|--|--|
| Risks and Outcomes of COVID-19 in British Columbians with Immunosuppression: A Population-base Case-control Study. | Jessie Kwan |
| The effects of regulating BRCA1 expression on cisplatin chemotherapy treatment. | Edward Li
Vivian Mo
Stephanie Spencer
Malena Anderson |
| Using Stacked Hourglass Figures to Detect Eye Corners in the Da Vinci Surgical Robot | Priyanshu Mahey
Matthew Tang
Edward Chen
Lara Radovic |
| Economic Losses Due to Air Pollution | Fabiola Grace |
| Exploring a Novel modulator of Glutamate (N-Methyl D-aspartic acid) Receptor Called YG155 Which May Be Used to Treat Major Depressive Disorder | Cayley Clark
Aaryan Dwivedi
Navneet Rai |

Room 3

Investigating Emotional Memory Using Naturalistic Stimuli	Deea Dev
S. aureus Infection Induces Conduit Expansion and Enhances Secondary Neutrophil Response	Lucy Song
Development, Implementation, and Evaluation of a Clinical Tool Kit for the Care of Patients Receiving Clozapine in Acute Psychiatry	Kiana Rahnama
The Role of Innate Immune Cells in Muscle Regeneration	Reece Long

Room 4

Relation of topoisomerase II to glioblastoma	Nikki Kashani Katerina Lin
Urban Beardsmen in the Field of Production: Hipster Enterprise as Defensive Class Formation	Ethan Shapiro
The Role of Intraoperative Vancomycin Powder Use in Reducing Postoperative Surgical Site Infections for Adolescent Idiopathic Scoliosis Patients	Garshana Rajkumar Sachini Jayasinghe
Proposed fluid biomarker profile for the diagnosis of chronic traumatic encephalopathy	Aanisah Golam Virginia Wu
Literature Review on Juvenile Disk Disorder and Congenital Disc Diseases	Johnny Zhao Umar Ali

WAVE 6

POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Rising temperatures affect wing morphology and flight performance in the cabbage white butterfly, *Pieris rapae*

Presenter(s): Erez Buyukyilmaz

Abstract:

Background: Global temperatures have been rising steadily over the last century, causing massive shifts in the climate. In response to changing temperature norms, ectothermic species in multiple taxa have responded in reducing their body size. However, the ecological consequences (e.g. dispersal) of the reduction in body size is unknown. *Pieris rapae*, also known as the Cabbage White Butterfly, is a globally distributed pest of cruciferous plants. As a pest and a pollinator its dispersal capabilities have many ecological consequences. Therefore, it is important to understand how increasing global temperatures will affect an ecologically important organism.

Objectives: This study aims to bridge the knowledge gap between the effect of temperature has on organisms and the subsequent ecological consequences.

Methods: This project uses temperature and humidity controlled incubators to rear large numbers (N = 206) of *Pieris rapae* larva to adulthood, combined with a purpose-built rotary flight mill to measure flight metrics of adults. The data from the flight mill and other morphometric measurements collected during development were analysed in the statistics software R.

Results: Increased temperatures caused a statistically significant decrease in the body size of adults (wing area was used as a proxy to body size). Adults with smaller wings were also shown to have, on average, 16% slower flight velocities than adults with larger wings.

Conclusion: Temperature plays a role in determining the ecological characteristics to some extent. However, more research is required to determine how strong this effect is.

WAVE 6 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Coral Memory: Effects of Prior Nursery Structures on Growth Rate of Staghorn Coral

Presenter(s): Christine Yang

Abstract:

To mitigate coral reef degradation, ecosystem restoration efforts commonly involve the propagation of corals in ocean-based nurseries. A better understanding of the factors that affect coral growth rate can improve propagation efforts. Evidence has shown that more shallow propagation platforms can lead to increased growth rates. However, it is unclear whether the type of nursery structure has a lasting effect on coral growth, after corals are moved to a common structure. We investigated the effect of prior nursery structure on growth rates of the Staghorn coral, *Acropora cervicornis*. In South Florida, coral colonies were previously grown on nursery structures with varying depths (coral trees, modules or PVC arrays) before being fragmented and moved to a common PVC array. Corals were measured 27 and 61 days after fragmenting to detect changes in growth rate. There was a statistically significant increase in growth rate for corals measured at the later timepoint, suggesting that a recovery period was required after fragmentation. Despite fragments coming from colonies on different nursery structures, this had no significant effect on growth rate when they were moved to the same structure. These findings could mean that coral scientists do not need to consider the type of nursery structures used before fragmentation, potentially saving resources. Understanding the influence of nursery structure on growth rates is important to ensuring the successful propagation of this endangered species in nurseries.

WAVE 6

POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Monitoring the Growth of Mealworms Using Different Types of Diet

Presenter(s): Michelle Lim

Abstract:

Food insecurity is a worldwide problem. Entomophagy, the eating of insects is one way to reduce food insecurity. Insects are more digestible and they have a higher nutritional content than other conventional livestock like cows and chickens. They are sustainable as they produce less carbon emission than other livestock. Mealworms are able to degrade polystyrene and their frass (excrement of insects) can be used as biochar (charcoal used for soil conditioning). Some research has been carried out to monitor the growth of mealworms by feeding them a variety of diets as their diets may affect their survival rate and body weight. However, additional research is still needed for mealworms. The aim of this study is to assess how different diets affect the growth of mealworms. In this experiment, mealworms were divided into 3 groups and each group was fed a different type of diet: i) Oat Bran, ii) Oat Bran and Wheat Bran and iii) Wheat Bran. It is hypothesized that diets that have both higher protein and starch content produce mealworms with heavier weights and higher survival rates. The diet containing wheat bran produced a heavier weight gain in mealworms and a higher survival rate due to a more balanced ratio of protein and carbohydrate. Overall, providing mealworms with diets that result in superior growth and higher survival rates allow these insects to be comparable with other sources that are high in protein. These findings may aid in optimizing the diet formulation for the production of mealworms.

WAVE 6

POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: A reverse-genetics approach for the identification of genes in common wheat (*Triticum aestivum*) that play a dual role in drought tolerance and Fusarium head blight resistance.

Presenter(s): Jennifer Wu, Mirkka Puente Madrid

Abstract:

Common wheat (*Triticum aestivum*), a universally significant staple food crop, has become increasingly vulnerable to drought and pathogen stressors due to increasing temperatures caused by global climate change. *Fusarium graminearum*, the fungal causative agent of Fusarium head blight (FHB) disease in wheat, is of particular concern as one of the major diseases to plague cereal crops, promoting worldwide outbreaks that cause severe grain yield and quality loss. Significant crosstalk between different wheat phytohormone pathways from past studies suggest potential overlaps between drought- and FHB-induced gene expression, whereby both drought tolerance and FHB resistance can be positively regulated by a subset of relevant genes. However, due to its highly multigenic nature and recalcitrance to traditional genomic modifications, the genetic mechanisms underlying simultaneous FHB resistance and drought tolerance in wheat remain, to date, poorly understood. While wheat genes such as TaSSI2 (a carrier protein shown to enhance both drought tolerance and FHB resistance) have been previously reported, more wide-spread searches for wheat gene candidates involved in both conditions should be employed to reveal where future research efforts need to be directed. Our study aims to elucidate whether some candidate wheat genes compiled from our literature review, and beyond, could play a positive, simultaneous role in FHB resistance and drought tolerance. We utilize a reverse-genetics approach by comparing the differential gene expression patterns of our candidate genes in publicly available RNA-sequencing datasets, obtained from several independent experiments of drought and FHB-treated wheat plants. We hypothesize that the gene candidates which are upregulated in both conditions are worth further exploration, and we also infer possible roles of these gene candidates based on any available bioinformatics data.

WAVE 6

POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: A comprehensive review of barriers leading to the global cataract backlog

Presenter(s): Haaris Khan, Faran Rashid

Abstract:

Issue/Objective: Cataract is the leading cause of blindness in the world and remains a large issue for developing countries. With an aging and growing population, the number of individuals affected by cataracts is steadily increasing. Consequently, there is an ever-increasing backlog of untreated cataracts, particularly in developing countries, leaving millions of people blind. In order to address such a complex global health issue, our goal was to further investigate this problem using a multifaceted approach.

Methodology: Review of literature around the topic.

Results: In our review, we discuss major barriers such as cost, transportation, lack of trained medical personnel, lack of infrastructure, and gaps in training. We also discuss strategies that can help reduce the backlog such as utilizing cost-effective surgical techniques, increasing awareness, risk factor reduction, unique payment strategies, as well as highlighting models that have worked in the past.

Conclusion: Addressing the cataract backlog is of paramount importance. Our study highlights the barriers that currently exist while discussing new and innovative strategies. Our goal is to help raise awareness and further educate people on the topic. We believe with the right approach and support, millions of people can have their vision restored.

WAVE 6 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Risks and Outcomes of COVID-19 in British Columbians with Immunosuppression: A Population-base Case-control Study.

Presenter(s): Jessie Kwan

Abstract:

Individuals with immunosuppression, whether due to disease or medications, may be at increased risk of COVID-19 infection or more serious outcomes than individuals without immunosuppression. This study assesses the risk of COVID-19 individuals with immunosuppression from different groups: 1) autoimmune mediated diseases (e.g., rheumatoid arthritis), 2) cancer, 3) transplants, or 4) disease-induced immunosuppression (dialysis). Using administrative health data, we conducted a population-based case-control study in the province of British Columbia. All positive COVID-19 cases from March 2020 to January 2021 were matched by age, sex and health authority to two controls groups: 1) individuals who tested negative for SARS-Cov-2 and; 2) individuals randomly selected from the general population who were not tested for SARS-Cov-2. To assess risk behaviours for infection, a sample of the study populations will be recruited to complete a survey to capture variables not covered by administrative data (e.g., COVID-19 preventive behaviours, lifestyle factors and health beliefs). A conditional logistic regression model will be used to assess the risk of COVID-19 associated among individuals with immunosuppression. We identified 54,273 positive COVID-19 cases, 1,085,252 negative COVID-19 controls, and 1,085,084 untested COVID-19 controls. We expect to find a higher risk of COVID-19 infection among the immunosuppressed patient groups compared to controls. Within the immunocompromised patient groups, we expect that the infection risk will vary by characteristics, e.g., sex, age, rurality. The results from this study could help inform clinical decision-making related to priority testing and vaccinations.

WAVE 6 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: The effects of regulating BRCA1 expression on cisplatin chemotherapy treatment.

Presenter(s): Edward Li, Vivian Mo, Stephanie Spencer, Malena Anderson

Abstract:

Regarded as a leading cause of cancer death, lung adenocarcinoma, a type of non small cell lung cancer (NSCLC) has threatened millions of lives. With a 5-year average survival rate of 19%, there can be no doubt that NSCLC is an aggressive and unforgiving disease. In lung adenocarcinoma, BRCA1, ataxia telangiectasia mutated (ATM), and ataxia telangiectasia and RAD3 related protein (ATR) are commonly mutated tumour suppressors, specifically involved in DNA repair. When these tumour suppressors become mutated it leads to a decrease in genome stability. In the literature it has been found that low levels of BRCA1 lead to a greater susceptibility to cisplatin chemotherapy. We will explore the combinatorial effects of manipulating BRCA1 expression in an adenocarcinoma cell line deficient in ATM and ATR on cisplatin treatment to observe whether the absence of ATM/ATR can increase the effects of cisplatin by compounding its effects on tumor cell death. Additionally we will observe cisplatin treatment at different cancer stages. We will use mutant H-1385 cell lines deficient in both ATM and ATR as our baseline cell type. Two experimental groups will be established, one where BRCA1 is overexpressed using a lentiviral expression system and one where BRCA1 is underexpressed using VEGFR3 inhibitors. To distinguish the early and late stages of the cell line, we will use a hanging drop method to establish H-1385 3D cell formations and observe their size under the microscope, regarding smaller size formation as early-stage and larger size formations as the late stage. We will then treat the 3D formations in both stages with cisplatin chemotherapy in vitro. After this experiment, we will introduce either underexpressed or overexpressed BRCA1 H-1385 cells to live NRG mice and treat them with cisplatin in order to mimic and observe the microenvironment of live cancer tumors. We hypothesize that the cell lines in which BRCA1 is underexpressed will be more sensitive to cisplatin and that the 3D tumor formations in the late stage will be more responsive to the cisplatin. These results could shed light on future research of adjuvant therapies within small cell lung cancer treatment.

WAVE 6

POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Using Stacked Hourglass Figures to Detect Eye Corners in the Da Vinci Surgical Robot

Presenter(s): Priyanshu Mahey, Matthew Tang, Edward Chen

Abstract:

Eye corners, the point of crossing between the upper eyelid and lower eyelid can serve as phenomenal landmarks for facial recognition as they are invariant to face sizes and eye closures. Eye corner detection using computer vision has huge potential in surgery, biometrics and driving assistance. Previous works have integrated augmented reality interfaces to the Da Vinci surgical robot to visualize tumours, and this has shown some success. In this study, we focus on real-time eye corner detection using the stacked hourglass model. The stacked-hourglass model is a convolutional neural network and has proven itself in past studies on human-pose estimation and facial landmark detection. In this study, we focus on adapting previously developed models for our dataset. The focus is on examining the precision and inference time of the stacked hourglass network to detect real-time eye corners. This will be further used for head motion compensation. We used data obtained from an IR camera attached to the Da Vinci Surgical Console in the Robotics and Control Lab of UBC, obtaining a total of around 1000 images. Each image has been labelled with 2 eye corner points, and the hourglass network was modified to detect these. We expect this hourglass model to work and correctly identify the eye corners. This study will be utilized further for head motion compensation and applied in tandem with other surgical techniques and implemented with future technology.

WAVE 6 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Economic Losses Due to Air Pollution

Presenter(s): Fabiola Grace

Abstract:

Air pollution is a rising global health concern. These health concerns, particularly mortality and morbidity, can be linked to economic losses. With an estimated 5.5 million lives lost in 2013 to diseases associated with outdoor and household air pollution, the global economy loss is more than US\$5 trillion in welfare losses (World Bank, 2016). Although there are currently numerous methods used to quantify this economic cost, there has been no general consensus regarding this issue. We will use PM_{2.5}, which are tiny particles smaller than 2.5 microns suspended in the air, as the indicator of ambient pollution since it has the strongest association with disease burden and mortality (Liu et al., 2019). Then we will discuss the approaches used to quantify the effect of air pollution. These approaches will include a welfare-based approach, which monetizes the fatality risk from air pollution using the willingness to pay method, an income-based approach which equates financial cost of premature death with the expected stream of future labor income (World Bank, 2016), and a linear regression approach on building a model of economic losses based on medical cost and premature death. This paper will discuss these current approaches as well as their hindrances. We expect to observe that all methods produce a strong positive correlation between air pollution and economic losses and the welfare-based approach is more advantageous for its widespread applicability. These findings will help us better understand the true scope of the impact of air pollution, not only the environmental effect, but also our economy and quality of life.

References

Liu, C., M.S., Chen, R., Ph.D., Sera, F., Ph.D., Vicedo-Cabrera, A. M., Ph.D., Guo, Y., Ph.D., Tong, S., Ph.D., . . . Kan, H., Ph.D. (2019). Ambient Particulate Air Pollution and Daily Mortality in 652 Cities. *The New England Journal of Medicine*, 381, 705-715. doi:10.1056/NEJMoa1817364
World Bank, The World Bank and Institute for Health Metrics and Evaluation (2016). *The Cost of Air Pollution Strengthening the Economic Case for Action*. <https://openknowledge.worldbank.org/handle/10986/25013>.

WAVE 6 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Exploring a Novel modulator of Glutamate (N-Methyl D-aspartic acid) Receptor Called YG155 Which May Be Used to Treat Major Depressive Disorder

Presenter(s): Cayley Clark, Aaryan Dwivedi, Navneet Rai

Abstract:

In 2020, the World Health Organization deemed Major Depressive Disorder the second leading illness contributing to chronic disability worldwide. The purpose of this experiment is to determine if YG155, a modulator of N-Methyl D-aspartic acid receptor, will produce antidepressant effects in an artificially genetically engineered mouse model of depression. This experiment will be testing two behavioural tests, a forced swim test and a sucrose preference test. It is hypothesized that rats treated with YG155 will show longer periods of mobility during the forced swim test and a higher preference for sucrose than rats treated with control. These findings may provide a new pathway for treating Major Depressive Disorder effectively and safely.

WAVE 6 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Investigating Emotional Memory Using Naturalistic Stimuli

Presenter(s): Deea Dev

Abstract:

Emotion plays a pivotal role in influencing memory. The relationship is especially nuanced, considering the complexity of the interactions between different aspects of emotion (e.g., valence, arousal) and components of memory (e.g., item, spatial, temporal memory). While an abundance of studies has revealed that emotion enhances item memory, there is still much to uncover about the relation between emotion and temporal memory. The limited studies that have investigated temporal memory have predominantly utilized duration memory tasks, hence it is less clear how other aspects of temporal memory are affected by emotion, particularly concepts of chronological order. The dearth of studies utilizing a temporal order paradigm necessitates the need to examine this measure of temporal memory. This research aims to investigate the influence of emotional arousal on temporal memory by studying chronological order. The study uses video segments of a movie to approximate the real world, providing a naturalistic paradigm to frame its results. A sample of 276 participants were randomly assigned to watch either a high arousal or a low arousal video. They were then tasked to sort randomly presented scenes in the order that they recollected watching in the video. We hypothesize that the strength of temporal memory for an event would differ for high and low arousal states. Our results show that participants perform better on the order task in the high arousal condition ($p < 0.0001$). That is, participants are more adept at reordering an experience when it is highly arousing, indicating stronger temporal memory. In addition to advancing our basic understanding of emotional memory, a better understanding of the role of temporal memory in reconstructing an emotional event may have clinical relevance, specifically in psychiatric disorders, wherein an impairment in relaying the temporal order of traumatic events may exist.

WAVE 6 POSTER ABSTRACTS

Theme: Health and Wellness

Title: S. aureus Infection Induces Conduit Expansion and Enhances Secondary Neutrophil Response

Presenter(s): Lucy Song

Abstract:

Infectious diseases impact individuals worldwide and are a leading cause of death. This study focuses on Methicillin-resistant Staphylococcus aureus, a gram-positive bacterium that causes hard to treat skin and soft tissue infections (cellulitis) due to its antibiotic-resistant nature. When bacteria breach the physical barriers, skin and mucous membrane, it is able to not only cause an infection at the site but also spread through the bloodstream. Despite the commonality of infections, dissemination is rare. However, this is not true for lymphedema patients, who are greatly affected by cellulitis. Typically, during S. aureus infection, bacteria leave infected tissues through the lymphatics to the lymph node, and neutrophils are recruited through high endothelial venules. The influx of immune cells not only causes the lymph node to expand and undergo structural changes, but also prevents the bacteria from reaching systemic circulation. Significantly, with repeated infection, there is increased recruitment of neutrophils. We hypothesize that infection with S. aureus stimulates conduit expansion, allowing increased recruitment of neutrophils for secondary infection. Using mouse models, results show that conduits are expanded at MRSA day 4, and with the depletion of neutrophils, this expansion is no longer observed. Furthermore, the greater influx of neutrophils to the lymph node during secondary infection consequently promotes bacterial clearance. The results from this project, which will provide a better understanding of pathogenesis, can be extrapolated to develop treatments for lymphedema patients.

WAVE 6 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Development, Implementation, and Evaluation of a Clinical Tool Kit for the Care of Patients Receiving Clozapine in Acute Psychiatry

Presenter(s): Kiana Rahnama

Abstract:

Background: Clozapine is the gold standard pharmacotherapy in management of treatment-resistant schizophrenia. However, its use is limited by serious adverse effects such as low white blood cell count (agranulocytosis) and inflammation of the heart muscle (myocarditis). A clozapine clinical tool kit (CTK) was implemented at a teaching hospital in Canada to ensure standardized monitoring for all inpatients on clozapine. The CTK includes practice guidelines, pre-printed orders, nursing monitoring flowsheet, medication discharge summary, patient handout, and an online course for clinicians.

Objective: To evaluate the impact of the CTK on clozapine care practices at an acute inpatient psychiatry hospital.

Methods: A retrospective chart review of patients who received clozapine on acute psychiatric units in the two years prior to, and one year after CTK implementation is currently underway. Data will be compared across the two time periods to assess the impact of CTK implementation. Clinical endpoints include laboratory and symptom monitoring. Descriptive and inferential statistics will be used to analyze the data.

Results: Pre-CTK implementation, almost 70% of patients did not receive guideline concordant bloodwork monitoring for agranulocytosis and myocarditis, while in more than 90% of cases, monitoring for the associated symptoms was also not completed. Post-CTK data collection is currently underway and full results, including comparison to the pre-CTK data, will be made available at the time of the conference.

Conclusion: Prior to CTK implementation, clozapine laboratory monitoring was not concordant with best practice standards. The post-CTK data will facilitate assessment of the impact of the CTK.

WAVE 6 POSTER ABSTRACTS

Theme: Health and Wellness

Title: The Role of Innate Immune Cells in Muscle Regeneration

Presenter(s): Reece Long

Abstract:

Tissue regeneration is a complex and dynamic process that involves interactions between many different cell types. Diseases involving tissue fibrosis, the common endpoint to dysregulated healing processes or chronic injuries cause nearly 45% of deaths in industrialized nations. More specifically, fibrosis as a result of impairment in muscle regeneration is one of the main outcomes of muscular dystrophy and acute muscle injuries. Although the main components of the muscle regeneration process, including satellite cells, macrophages and fibro/adipogenic progenitors (FAPs) are well characterized, there are many factors whose role remains unknown. Therefore, this research attempts to identify the unknown role of natural killer cells and a unique population of self-renewing skeletal muscle resident macrophages (SRRMs) expressing the LYVE1 surface protein in the muscle regeneration process. Since we found natural killer cells to be the major producers of interferon-gamma in damaged muscle, three mice strains with the interferon-gamma receptor knocked out on either macrophages, satellite cells or FAPs were created. Muscle damage was induced in these mice and muscles were analyzed 15 days following injury to assess for regeneration impairments. A similar analysis was conducted on mice with a LYVE1 knockout. It was found that interferon gamma exerts a role primarily through macrophages and FAPs, but not satellite cells. No significant impairment in muscle regeneration was observed in mice lacking LYVE1, but we found that FAPs act as a niche for SRRMs. Overall, this research deepens our understanding of the cellular interactions occurring during muscle regeneration and may help elucidate future therapeutics.

WAVE 6 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Relation of topoisomerase II to glioblastoma

Presenter(s): Nikki Kashani, Katerina Lin

Abstract:

The increase in glioblastoma mortality rate is due to the resistance of glioblastoma stem cells (GSC) to therapy caused by abnormalities in DNA repair pathways. Considering topoisomerase II is responsible for DNA replication in cell cycle and glioblastoma multiforme (GDM) is a fast growing tumors developed from astrocytes, the over-expression of topoisomerase II in astrocytes could result in the upregulation of NANOG, OCT4, and SOX2 protein synthesis. Thus subsequently causing stemness characteristic in astrocytes resulting in a genotype like NCH421k mutant cells which in turn play a key role in glioma formation. TOP2A and TOP2B overexpression plasmid along with a KO model using ShRNA will be used to evaluate the correlation between the topoisomerase II protein level with the stemness genotype of glioblastoma (NCH421k) cells in comparison with normal astrocytes (DI TNC1) cells. Three different genes will be used as the main markers to evaluate the embryonic-like type regulation (NANOG, OCT4, and SOX2). Cell viability assay, and protein/gene expression levels will be used to quantify the differences between the two groups (MTS, WB, qPCR). We expect that the over-expression of topoisomerase II in astrocytes causes the upregulation of NANOG, OCT4, and SOX2 protein synthesis, which results in the gain of stemness characteristics in astrocytes causing them to become genotypically similar to NCH421k mutant cells that contribute to glioma formation. This finding has a significant impact on the development of gene therapy.

WAVE 6 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Urban Beardsmen in the Field of Production: Hipster Enterprise as Defensive Class Formation

Presenter(s): Ethan Shapiro

Abstract:

Urban Beardsmen in the Field of Production: Hipster Enterprise as Defensive Class Formation
This article presents empirical support for the conception of hipsters as an economically threatened fraction of the middle-class, seeking to salvage their social mobility via entrepreneurship in the creative industries. Connecting Bourdieu's new petite bourgeoisie to contemporary debates on the 'creative class,' I examine Beardbrand, a prominent men's grooming company, using a corpus-based discourse analysis. The analysis reveals five main trends: entrepreneurs embraced the ideals of work ethic and meritocracy, understood their social position through psychologized discourses, narrated their transcendence from the corporate sphere into self-expressive occupations, perceived natural alignments between their personal and professional selves, and expressed their social indeterminacy through discursive rationalizations and uncertainties about their social position. While entrepreneurs rejected and challenged dominant ideas about the organization of work, they also affirmed normative conceptions of meritocracy and individualized responsibility in their pursuits of creative self-employment, rebranding self-exploitation and precarity as personal growth. Future research can expand the study of hipster producers to the proliferation of cultural intermediary professions under neoliberal capitalism.

WAVE 6 POSTER ABSTRACTS

Theme: Health and Wellness

Title: The Role of Intraoperative Vancomycin Powder Use in Reducing Postoperative Surgical Site Infections for Adolescent Idiopathic Scoliosis Patients

Presenter(s): Garshana Rajkumar, Sachini Jayasinghe

Abstract:

Postoperative surgical site infections (SSI) occur at a rate of 2% in orthopedic spine surgeries. More recently, spine surgeons have routinely used intra-wound vancomycin powder in attempt to prevent postoperative SSI. The use of intraoperative vancomycin powder is still highly debated with some studies suggesting a decrease in SSI and others indicating no significant SSI change. The goal of this study is to determine the efficacy of vancomycin on postoperative SSI rates and determine its potential impact on the microbiology of infections. Adolescent idiopathic scoliosis (AIS) patients were analyzed using the Harms Study Group (HSG) database and recruited according to their outlined criteria: 26 years old or younger, diagnosis of AIS with a curve Cobb in the operative range and no prior spine surgery or comorbidities. A retrospective comparative analysis of postoperative infection rates was done between 765 AIS patients that had intraoperative vancomycin powder used and 504 who did not. Additionally, the microbiology specimens of the SSI patients were evaluated to determine if vancomycin powder affected the type of SSI. The results of our analysis showed that the infection rate between the two groups was not statistically significant as the vancomycin group had an infection rate of 0.02% and the no vancomycin group had a similar infection rate of 0.03%. The microbiology analysis showed that the vancomycin group cultured *Staphylococcus aureus*, *Propionibacterium acnes*, and *Serratia*; the no vancomycin group cultured *Proteus mirabilis* and *Propionibacterium acnes*. It is unclear if vancomycin powder has a role on SSI microbiology due to the limited data collected on culture growth. Overall, vancomycin does not contribute significantly to infection prevention and likely does not cause highly resistant infections postoperatively.

WAVE 6 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Proposed fluid biomarker profile for the diagnosis of chronic traumatic encephalopathy

Presenter(s): Aanisah Golam, Virginia Wu

Abstract:

Chronic traumatic encephalopathy (CTE) is a neurodegenerative disorder associated with individuals who have been exposed to repetitive mild traumatic brain injuries. The clinical symptoms of CTE, such as changes in mood, behaviour, and cognition, are not specific to CTE, thus early diagnosis is difficult based solely on clinical representation. Dementias such as Alzheimer's present similarly to CTE, meaning incorrect diagnoses of both diseases can occur; CTE is only definitively diagnosed postmortem through immunohistochemical staining of hyperphosphorylated tau (p-tau) at cortical sulci, axonal varicosities and neuritis of the brain tissue. To address this diagnosis issue, this study investigated measurable proteins, potential biomarkers, found in cerebrospinal fluid (CSF) that are proposed to be involved in the neuropathological development of CTE. The goal is to establish a biomarker profile for differentiating CTE from Alzheimer's at a biochemical level. Forty individuals proposed to have CTE and AD were compared to twenty asymptomatic individuals by collecting CSF and performing multiple reaction monitoring/mass spectrometry to determine the efficacy of our biomarker panel's ability to differentiate between CTE and AD. The resulting biomarker profiles, which included neurofilament light chain (NfL), amyloid-B, sTREM2, s100B, p-tau, GFAP, and t-tau, were analyzed using principal component analysis which demonstrated that the combination of NfL and p-tau proteins, best distinguish CTE from AD. The results of this study can be translated into a larger clinical study to determine the sensitivity and specificity of our proposed fluid biomarker profile and incorporate them into future diagnostic guidelines of CTE.

WAVE 6 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Literature Review on Juvenile Disk Disorder and Congenital Disc Diseases

Presenter(s): Johnny Zhao, Umar Ali

Abstract:

Juvenile disc disorder (JDD) is a congenital degenerative disc disease (DDD) that typically affects youth in their late adolescence. JDD causes degeneration of intervertebral discs which results in herniation and possible paralysis in the most severe cases. Herniation is when a fragment of the intervertebral disc nucleus is pushed out. There is currently no cure for JDD, however current research is being done on using cell based therapy, tissue engineering, and biomechanics for treating DDD. Tissue engineering has been the main focus for treating DDD in severe degeneration, since it has been shown that cellular defects are the underlying etiology for hernias. However, there has been debate as to whether or not tissue engineering is effective in less severe degeneration. More accessible treatment options are biomechanical solutions. A biomechanical device can be used to aid in the alteration of posture to reduce the stress being placed on the discs has been shown to lead to long term improvements and a decrease in deterioration rate. The biomechanical solution is favorable because while tissue engineering has been shown to be promising, the operations are invasive and expensive which could be circumvented in the developmental stages of JDD with biomechanical solutions. The solutions available to JDD patients can help to alleviate the crippling effects of having to live with such a disease. The aim of this literature review is to assess the treatment options for patients with JDD and determine the best treatment depending on severity and progression.

WAVE 7 ORAL & POSTER PRESENTATIONS



WAVE 7 ORAL PRESENTATIONS

March 21, 2:00 PM - 3:15 PM

Room 1

Home Health Monitoring (HHM) for Patients with Heart Failure	Ivjot Samra
Artificial Models of Biological and Cultural Processes	David Shifflett
Sex Chromosomes in <i>Tropheus moorii</i>	Troy Chong Wendy Frankel Erica Yeh Amanda Lee

Room 2

Black Gold or Green Future: What do Oil Sands Workers Have to Say About a Just Transition?	Ella Kim-Marriott
16th century Persian poetry; a look at the Great Sheikh Bahai and his largely overlooked poetry	Farshad Felfelian
Solid Organ Transplant in Undergraduate Pharmacy Education in Canada	Shadi Sadeghipouya Lisa Gao
Impacts of COVID-19 on Student Finance, Health, and Wellbeing: An Examination of the University of British Columbia's Emergency Response Strategies	Vicky Kim Bronwyn Neufeld
Exploring Mechanisms of Phonetic Category Learning Through Perceptual Attunement	Sarvenaz Oloomi

Room 3

Correction for Cupping Artifacts in Dental Cone Beam CT	Maryam Rahbaran
Conversing with Chatbots	Stephanie Yu

Increasing CD8+ T cells' sugar consumption to enhance anti-tumor function

Neeku Amanat

Functional Brain Networks Involved in Hypersalience of Evidence-Hypothesis Matches in Patients with Delusions and Schizophrenia

Linda Chen

Gut Microbiome Changes and Risk of Childhood Asthma Development

Catherine Xu
Daisy Zhang
Parisa Safavi
Flora Liu
Rozhina Sedigh

Room 4

Tracking a Cryptic Invader: The Morphology and Genetics of Vancouver Cattails

Gracy Buckholtz

The relative costs and benefits of the provision of subsidies for the modernisation, renovation and replacement of fishing vessels

Emilie Kaye

Molecular Basis for Mosquito Salt Survival

Ana Parra

Antipredator Strategies as a Function of Spider Web Architecture across a Predation Gradient

Jessica Schmidt

WAVE 7 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Home Health Monitoring (HHM) for Patients with Heart Failure

Presenter(s): Ivjot Samra

Abstract:

Patients with heart failure (HF) suffer from life-limiting symptoms and reduced quality of life. Due to the symptoms associated with HF, patients may find themselves making frequent visits to the emergency department (ED) and being admitted into hospital. Home health monitoring (HHM) has potential as a real world e-health strategy to monitor symptoms, reduce hospital visits, and improve quality of life. Phase 1 of the TEC4Home project determined the feasibility of HHM for patients with HF in BC in preparation for a randomized controlled trial (Phase 2). Patients with HF were recruited and given HHM equipment for 60-days post-discharge. Unscheduled ED revisits of discharged participants or death within 90-days, hospital readmissions, quality of life, end-user experience, and healthcare cost-effectiveness were measured. Recruitment strategy, clinical strategy, evaluation framework, and data collection methods were also evaluated. Results revealed encouraging trends in all of the aforementioned outcomes measured. These results suggested that HHM may be beneficial in supporting patients with HF as suggested by a small sample while allowing for the refinement of protocols to help inform a larger scale randomized controlled trial in a feasible and scalable manner. In Phase 2, which is currently underway, patients were recruited from 22 hospital sites across BC with the support of five health authorities using a stepped-wedge research design while measuring the same outcomes as in Phase 1. Currently, administrative and self-reported data in the form of surveys is being prepared and collected for analysis with final results anticipated in 2021.

WAVE 7

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Artificial Models of Biological and Cultural Processes

Presenter(s): David Shifflett

Abstract:

The current research respectively compares the cultural and biological evolution of ideas and living things through artificial modeling within a computer program. A grid of circles, or sims, represents these ideas and living things and different colors represent their traits. The sims in the society go through a life span. If a sim is fit enough at the end of its life span, it reproduces offspring for the next generation. Some options in the computer program simulate the effects of various processes in the real world, such as generational overlap, which lets one generation transmit cultural traits onto the next. The major improvements to the computer program focus on the coding of the back end, the design of the graphical user interface (GUI), and the implementation of generational overlap. The improvement of the GUI could make the user experience more self-explanatory, user-friendly, and accessible to laypeople. The unique explanation of cultural evolution through the analogous process of biological evolution, which students typically learn about in secondary school, could make cultural evolution more understandable than in earlier research, even though it is difficultly observable in the real world. The current research could help knowledge workers understand how ideas change over time and from the influence of other people. Key takeaways for knowledge workers and other people who regularly depend on creativity and innovation could be especially relevant now that knowledge workers make up a larger percentage of the workforce than at any other point in human history.

WAVE 7 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Sex Chromosomes in *Tropheus moorii*

Presenter(s): Troy Chong, Wendy Frankel, Erica Yeh, Amanda Lee

Abstract:

Sex chromosomes are a vital characteristic of numerous organisms for sex determination. Not all sex chromosomes are the same across taxa or even between closely related species and some systems have evolved recently. Although cichlid species are extremely diverse in their sex determining mechanism, the sex chromosomes are thought to be derived from a common ancestor in the *Tropheus* genus. This has not been confirmed in the blunthead cichlid (*Tropheus moorii*) native to Lake Tanganyika in Africa. We will use the SEX-DEtector pipeline, a program that infers what genes are linked to the sex chromosomes, to identify their sex chromosomes in this species. Furthermore, we will look to see if there are genes associated with the sex chromosome, given that *T. moorii* are sexually dimorphic, differing primarily in the shapes of their heads and males that are more vibrant tend to be bolder. SEX-DEtector. The pipeline requires RNA sequences from known families of *T. moorii*, including both parents (mother, father, and 5 offspring of each sex). We expect that in *T. moorii*, the sex chromosomes will have the most diverged sequences between homologs (X and Y chromosome) homologs and thus we expected them to have the highest single nucleotide polymorphism (SNP) density. This is because the sex chromosomes are expected to undergo divergence in order to keep the sex determination linked to one sex, resulting in suppressed recombination between the homologs and accumulation of SNPs.

Muyle, A., Käfer, J., Zemp, N., Mousset, S., Picard, F., & Marais, G. A. (2016). SEX-DEtector: a probabilistic approach to study sex chromosomes in non-model organisms. *Genome Biology and Evolution*, 8(8), 2530-2543.

Steinwender, B., Koblmüller, S., & Sefc, K. M. (2012). Concordant female mate preferences in the cichlid fish *Tropheus moorii*. *Hydrobiologia*, 682(1), 121-130.

WAVE 7

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Black Gold or Green Future: What do Oil Sands Workers Have to Say About a Just Transition?

Presenter(s): Ella Kim-Marriott

Abstract:

During the research project, surveys were administered and interviews were conducted with 8 oil sands workers in Fort McMurray to try to gain a better understanding of how they problematize the oil and gas industry and climate change in comparison to environmentalists (such as those who created the Pact for a Green New Deal in Canada). More specifically, they were asked what they thought about propositions for a “just transition” for workers, whether or not they thought it was possible, if they agreed or disagreed with moving away from fossil fuels, and what concerns and questions they had on the topic. Many ideas were discussed, including what institutions they felt more protected by (government vs corporate), what they felt their role was in the industry and what their role in a shift to cleaner energy might look like (leading to a discussion of collectivist vs individualized responsibilities), and how they are not just willing to be, but want to be part of the energy transition conversation in Canada. Participants were recruited through a snowball method of recruitment, starting with a base of initial contacts and then acquiring more contacts through the initial ones. Framed through an environmental sociological lens, this project aimed to identify what concerns fossil fuel workers have about a shift towards cleaner energy and where their views might come from. The goal of this research project was to produce data that could contribute to depolarizing the energy conversation in Canada so that environmental policies can come through at the faster pace needed to reach Canada’s Paris Agreement targets, but also to highlight the importance in no workers getting left behind in the process. The analyzed data will be presented at the conference, as well as a discussion about future pathways for a more just and green future in Canada that are more inclusive of fossil fuel workers.

WAVE 7

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: 16th century Persian poetry; a look at the Great Sheikh Bahai and his largely overlooked poetry

Presenter(s): Farshad Felfelian

Abstract:

Sheikh Bahai was a unique thinker. He was both a scientist and an intellectual who wrote on many topics from astronomy and mathematics to mysticism. However, his grandeur in these fields has often overshadowed his poetry. One of his most renowned works is an allegorical *maṭnawī*, named *Nān o ḥalwā*. Bahai's *maṭnawīs* which are modeled after those of the great Rumi, are an expression of his "populist" approach to Sufism. For the purpose of this paper, I will argue why his poetry—specifically chapter seven of *Nān o ḥalwā* (10-11)— is a timeless criticism on the corruption and hypocrisy of 'the church.' The evidence for this claim can be observed in three ways. First, Bahai directly criticizes the amassment of wealth and luxuries by the clergy. Second, he utilizes a nested argument to satirically argue for the demise of faith amongst the clergy, and lastly, Bahai sprinkles in Sufi philosophy through championing modest living and rejection of materialism.

I believe that this analysis of Sheikh Bahai is key for the following reasons. Firstly, close study of Bahai's poetry has been largely neglected by Western scholars and deserves recognition as, arguably, the apogee of Safavid literature. Secondly, as one of the founders of "School of Isfahan" he defied the powerful religious opposition to propel and instill philosophical inquiry in generations of students; therefore, he must be studied as a role model. Lastly, his anti-corruption message has remained timeless; thus, politicians or public intellectuals should study his populist style.

WAVE 7 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Solid Organ Transplant in Undergraduate Pharmacy Education in Canada

Presenter(s): Shadi Sadeghipouya, Lisa Gao

Abstract:

Medical advancements have catalyzed the development of solid organ transplant (SOT) as a viable life-saving intervention for chronic organ dysfunction and end-stage organ failures. Amongst the transplant healthcare team, pharmacists contribute their expertise in pharmacotherapy to enhance patient health outcomes. In fact, pharmacists are one of the only healthcare providers involved in all stages of care for transplant patients. With an increasing demand for SOT, pharmacists are required to be well equipped with the knowledge and skills necessary to provide care to this patient population. In order to ensure the readiness of pharmacists to serve on SOT teams as well as to care for transplant patients in community pharmacies, it is important to evaluate SOT education. Currently, the state of SOT education in Canadian pharmacy programs is unknown. Two surveys were deployed, aiming to inventory SOT education in current Canadian curricula and to identify current SOT training in practice. Study participants include faculty informants from each of the ten Canadian pharmacy programs as well as transplant pharmacists. The responses from the surveys will be aggregated with categorical variables and represented by proportions. The collection of text data from participants will not be formally analyzed, but will be subjectively grouped and discussed. We expect to utilize the responses from both surveys to report on the current state of SOT education. Study results will be utilized to help inform future pharmacy education in SOT.

WAVE 7 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Impacts of COVID-19 on Student Finance, Health, and Wellbeing: An Examination of the University of British Columbia's Emergency Response Strategies

Presenter(s): Vicky Kim, Bronwyn Neufeld

Abstract:

Introduction: The novel coronavirus (COVID-19) pandemic triggered a wave of mass shutdowns across the globe in early 2020, and UBC's Vancouver campus was no exception. As classes moved online and social distancing regulations were implemented, concerns were raised about financial security, health, and wellbeing within the student population. This project aimed to investigate existing gaps in UBC's response to the pandemic—with focus on impacts to students' financial status, as well as physical, mental, and community health and wellbeing—and determine which student groups are most vulnerable in emergencies.

Methods: This study utilized a mixed methods approach involving an online student survey (n=150), in-depth interviews with current students (n=9) and stakeholders within the UBC community (n=9), and a literature review to gain insight into best emergency management practices at other higher education institutions worldwide. Survey and interview responses were analyzed using descriptive statistics and thematic analysis to determine student experiences during the COVID-19 pandemic.

Results: The most vulnerable student groups were identified as international students, students with dependents, low-income students, and immunocompromised students. Several gaps in UBC's response were identified including the lack of accessibility and advertisement of resources, the need for clearer communication with students, and lack of inclusion of students in emergency response in general.

Conclusion: Several areas for potential improvement to UBC's emergency response strategies were identified. Further research to gain deeper insight into the experiences of students in historically vulnerable student groups is warranted, particularly 2SLGBTQA+, Black, and Indigenous students and students with disabilities.

WAVE 7 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Exploring Mechanisms of Phonetic Category Learning Through Perceptual Attunement

Presenter(s): Sarvenaz Oloomi

Abstract:

“Acquired Distinctiveness” (AD) and “Acquired Equivalence” (AE) are perceptual learning mechanisms that either boost (AD) or diminish (AE) the ability to discriminate two similar stimuli by either consistently (in AD) or inconsistently (in AE) pairing them with two easily discriminable stimuli (1; 2). We ask whether the efficacy of AD and AE change with age and whether previous findings reflect the influence of ‘perceptual attunement’ rather than the efficacy of these mechanisms across the first year of life. In this online study, we use a native phonetic contrast (English Ra/La) to compare whether AE can collapse them with inconsistent pairing, and AD can maintain and strengthen, discrimination of them with consistent pairing of the contrast with two distinct novel objects. We are testing 200 infants aged 5- to 12- months using the Preferential Looking Time Paradigm (3) and comparing their looking behaviour based on assignment to consistent versus inconsistent pairing conditions. We are also including monolingual- and bilingual- learners as bilinguals have shown later perceptual attunement and can account for the influence of the amount of linguistic input (4). If AE/AD are domain-general learning mechanisms operating across the lifespan, then infants of all ages will use them to inform their speech discrimination; if their efficacy is age delimited, or influenced by linguistic input, then results will differ systematically across the age and language environments. This study is the first to explore the efficacy of AE on infant phonetic category learning, and also helps to disambiguate prior findings on the efficacy of AD.

References

- Werker, J. F., & Tees, R. C. (1984). Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. *Infant Behavior and Development*, 7, 49-63.
- Honey, R. C., & Hall, G. (1989). Acquired equivalence and distinctiveness of cues. *Journal of Experimental Psychology: Animal Behavior Processes*, 15(4), 338-346. <https://doi.org/10.1037/0097-7403.15.4.338>
- Golinkoff, R. M., Ma, W., Song, L., & Hirsh-Pasek, K. (2013). Twenty-five years using the intermodal preferential looking paradigm to study language acquisition: What have we learned? *Perspectives on Psychological Science*, 8(3), 316-339. <https://doi.org/10.1177/1745691613484936>
- Petitto, L. A., Berens, M. S., Kovelman, I., Dubins, M. H., Jasinska, K., & Shalinsky, M. (2012). The “Perceptual wedge hypothesis” as the basis for bilingual babies’ phonetic processing advantage: New insights from fNIRS brain imaging. *Brain and Language*, 121(2), 130-143. [doi:10.1016/j.bandl.2011.05.003](https://doi.org/10.1016/j.bandl.2011.05.003)

WAVE 7 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Correction for Cupping Artifacts in Dental Cone Beam CT

Presenter(s): Maryam Rahbaran

Abstract:

Background

Dental Cone-beam Computed Tomography (CBCT) is an X-ray imaging modality used for treatment planning in dentistry. Dental CBCT scanners rotate approximately 200° around a patient's head, as opposed to hospital CT scanners which scan a full 360°. The shorter rotation path of the x-ray beam causes the middle of the image to become dimmer with the left side of a patient's dental structure looking much brighter than the right side. This results in a cupping artifact, which is when the attenuation profile for uniform material displays a cupped shape instead of a flat line. The inconsistency in brightness may lead to misdiagnosis for dental patients and inaccurate data for image-based measurements. For example, image accuracy is especially important for treatment planning for dental implants to avoid facial nerves during the procedure.

Objective

The aim of this study was to investigate the nature of the cupping artifact and therefore create a correction that may offset it in any dental CBCT image.

Method

A computer program was written to mathematically model the surface shape of the cupping artifact. A general equation of the gray value differences between the edge and all other points was found, and this surface fit was added to every point of the image to offset the cupping artifact. The program was tested on dental CBCT images of test objects and skull phantoms.

Results

A correction to improve the accuracy of the values of the shades of gray in a CBCT image is proposed, as a surface. We validate this through the comparison of line profiles of the original and corrected images that the correction is able to reasonably increase the brightness of the middle and right side of uniform images to match the left side.

Conclusions/Discussions

Although the correction proposed does not completely eradicate the cupped nature of the images studied, the images show drastic improvement in symmetry and the depth of the cupping artifact. Further study of the application of this correction to patient images is recommended.

WAVE 7

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Conversing with Chatbots

Presenter(s): Stephanie Yu

Abstract:

As chatbots become more sophisticated and interwoven into the fabric of daily life, it becomes increasingly important to understand the psychological impact of human chatbot interactions. However, there is a striking lack of research on the psychological impact of conversing with chatbots. Thus, we conducted a study using a sample of 400 participants to examine whether people derive fewer benefits from conversing with perceived chatbots in comparison with humans, and whether positive perceived chatbot partners are superior to negative human partners. Participants first engaged in an eight-minute text interaction with another supposed participant, who was actually a confederate trained to respond positively (active-constructively) or negatively (active-destructively). Participants were then informed they had either interacted with a chatbot or a research assistant before filling out questionnaires to assess the social and emotional benefits they gleaned from the interaction. We did not find a difference in the psychological benefits people reaped from conversing with a perceived chatbot versus a human. However, we did find that conversing with a positive perceived chatbot was far superior to conversing with a negative human. These results suggest that people may not internalize conversing with chatbots as meaningfully different than conversing with another human, meaning similar to humans, chatbots may provide a meaningful source of connection and belonging. Moreover, the potential benefits chatbots could impart may be especially salient for those who lack supportive human relationships in their lives.

WAVE 7

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Increasing CD8+ T cells' sugar consumption to enhance anti-tumor function

Presenter(s): Neeku Amanat

Abstract:

T cells play a central role in our immune system by activating other immune responses and removing infected cells. CD8+ effector T cells (TE) are a critical subpopulation of T cells responsible for killing cancer and virally infected cells. Our research aims to understand regulatory mechanisms underlying TE function in hopes of improving anti-cancer T cell therapies. TE function requires nutrient availability in the cell's environment. Glucose is a key nutrient for the rapid killing abilities of TE and is transported into cells via glucose transporter proteins. TE activation results in increased glucose use to support anti-cancer functions. Therefore, competition for glucose by tumor cells, can cause restricted glucose availability causing reduced anti-tumor function. However, temporarily restricting glucose availability in vitro, has been shown to enhance TE function in cancer mouse models. While the importance of glucose for TE functions is known, the signals that sense nutrients in the environment and regulate key transporter molecules is not well understood. We aim to better understand the regulation of TE glucose transporter (GLUT1). To investigate this, we used TE exposed to different glucose concentrations. GLUT1 expression levels were quantified by protein and mRNA extraction methods. Reduced glucose led to increase GLUT1 protein expression. This increase was not seen at the mRNA level. GLUT1 upregulation was abolished by glucose re-exposure and is controlled by cellular stress sensing pathways. We are currently investigating biochemical mechanisms underlying this dynamic regulation, hoping to enhance glucose transport for TE function as a potential anti-cancer therapeutic.

WAVE 7

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Functional Brain Networks Involved in Hypersalience of Evidence-Hypothesis Matches in Patients with Delusions and Schizophrenia

Presenter(s): Linda Chen

Abstract:

Schizophrenia patients with delusions make decisions based on less evidence than patients without delusions and healthy controls, an effect referred to as the “jumping to conclusions” (JTC) bias. The JTC bias is explained by the hypersalience of evidence-hypothesis matches (EVH matches) account of delusions, which is a tendency to give too much credence to evidence matching currently held ideas. In this study, consisting of healthy controls (n=41), non-delusional (n=41) and delusional (n=29) patients with schizophrenia, the functional brain networks involved in EVH matches were measured through a probabilistic reasoning task. The task involved presentation of two lakes containing different proportions of black and white fish with a central fish in between, pointing to one of the lakes. Participants determined whether the central fish originated from the lake to which it pointed, and an EVH match condition is when there is a match between the colour of the central fish and the colour of the majority of the fish in the indicated lake. A functional brain network involved in visual attention revealed stronger activation for the weak relative to the strong match condition for healthy controls and non-delusional patients, but for the delusional patients, there was no difference between the weak and strong conditions. This suggests that weak match condition showed hypersalience for the delusional patients as it required the same attentional demands as the strong match condition. Understanding the decision-making biases underlying delusions is important for self-awareness and insight and provides a possible neuromodulation target for treatment of delusions.

WAVE 7

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Gut Microbiome Changes and Risk of Childhood Asthma Development

Presenter(s): Catherine Xu, Daisy Zhang, Parisa Safavi, Flora Liu, Rozhina Sedigh

Abstract:

Background:

Asthma is a rapidly growing chronic disease characterised by airways inflammation. The explicit causes of this disease are unclear; however, there is some growing evidence that gut microbiome disruption in infants has a role in asthma pathogenesis. And its aggravation later in life.

Aim/Knowledge gap:

This mini review aimed to summarize the role of gut microbiome alteration in regulating the immune response and the risk of asthma development during childhood.

Method:

Original research articles were retrieved by searching PubMed from 2013 to 2020 and following search terms were used: gut microbiota, childhood, and asthma. Research on school aged children was not included in this review. Also papers were excluded if they were published before 2013, not in english or did not pertain to the preschool children.

Results:

After applying set inclusion and exclusion criteria, 11 studies were retrieved. These papers were grouped under three categories: asthma diagnosis, exacerbation, and antibiotic use.

Conclusion:

Current studies indicate the significant role of gut microbiota in asthma development. While increased diversity of microbiota in infants lowers the risk of developing asthma, antibiotic exposure in early years of life adversely affects microbiota composition which leads to higher risk of asthma and respiratory infection. Understanding how infant gut microbiota composition affects asthma development can serve as potential novel preventative strategies.

WAVE 7

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Tracking a Cryptic Invader: The Morphology and Genetics of Vancouver Cattails

Presenter(s): Gracy Buckholtz

Abstract:

In the last few decades research has focused on wetlands and the vital ecological services that they provide. Cattails have come to be recognized as iconic species that shape wetland ecology. While native cattails species provide nesting sites for birds, contribute to water filtration, and help prevent erosion, some invasive species decrease biodiversity and habitat functionality. The introduction of invasive cattail species to North America began in the last century and has expanded its range across the east coast of the US and Canada to the Great Lakes regions and, more recently, to the west coast. Wherever they appear, they interbreed with the native species to produce a vigorous ecosystem-changing hybrid. The hybridization has been well documented in other parts of the country. However, no research had been conducted to see if the invader and hybrid were present in Vancouver and what their impact might be. My research has shown, using genetic and morphological data, that the hybrid is present in the Fraser River delta. I used machine learning to analyze morphological measurements and microsatellites to examine genetic variation of samples from three wetland sites around Vancouver. The results showed the native species, the invasive and the hybrid are all present at each site. This “cryptic invasion” by the hybrid is likely to have a major impact on the wetland ecosystems of the Fraser River delta.

WAVE 7 ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: The relative costs and benefits of the provision of subsidies for the modernisation, renovation and replacement of fishing vessels

Presenter(s): Emilie Kaye

Abstract:

According to the World Trade Organisation's (WTO) Agreement on Subsidies and Countervailing Measures, the transfer of funds by a government or any public body to the private sector which confers a benefit is considered a subsidy (Sumaila et al., 2019). Subsidies in the context of fisheries, include funds granted to capital/variable costs, fisheries infrastructure, income insurance, vessel decommissioning, management services and fisheries research (Tipping, 2015). All these subsidies can be classified as either capacity-enhancing, beneficial or ambiguous (Sumaila et al., 2019). While some subsidies can be more easily classified, subsidies for the modernisation, renovation and replacement of fishing vessels, which make up around 17% of total fishery subsidies, are more challenging to classify. This is because some aspects of the subsidies result in benefits while others result in costs. (Skerritt et al., 2020). On one hand, modernizing boats increases fuel efficiency, which supposedly decreases carbon dioxide emission. While on the other hand, the results oppose the subsidies benefits because increasing vessel efficiency allows boats to last longer and go further, potentially resulting in overfishing. This paper will discuss the balance between the relative costs and benefits of vessel renewal and modernization subsidies, as well as propose a policy recommendation of what needs to be monitored to achieve the benefits while avoiding the costs. The WTO is still in negotiation to discipline subsidies that lead to overfishing and overcapacity, which is why the discussion of the costs and benefits of boat renewal subsidies is so important and timely (Sumaila et al., 2019).

References

- Skerritt, D. J., Arthur, R., Ebrahim, N., Le Brenne, V., Le Manach, F., Schuhbauer, A., ... Sumaila, U. R. (2020, September 7). 20-year retrospective on the provision of fisheries subsidies in the European Union. ResearchGate. <https://academic.oup.com/icesjms/article/77/7-8/2741/5902157>.
- Sumaila, U., Ebrahim, N., Schuhbauer, A., Skerritt, D., Li, Y., Kim, H., . . . Pauly, D. (2019, September 26). Updated estimates and analysis of global fisheries subsidies. Retrieved November 21, 2020, from <https://www.sciencedirect.com/science/article/pii/S0308597X19303677>
- Tipping, A. (2015, December 23). Building on progress in fisheries subsidies disciplines. Retrieved November 21, 2020, from <https://www.sciencedirect.com/science/article/pii/S0308597X15003784>

WAVE 7 ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Molecular Basis for Mosquito Salt Survival

Presenter(s): Ana Parra

Abstract:

Aedes aegypti and *Aedes togoi* mosquitos constitute a threat to a large percentage of the world's population. They are responsible for transmitting several devastating diseases, such as but not limited to zika, dengue, and parasitic infections. *Ae. aegypti* larvae develop in freshwater bodies usually associated with human settlement, whereas *Ae. togoi* larvae develop in salt-water pools near the ocean.

Mosquito larvae have proteins called aquaporins, or water channels, that facilitate water transportation between cells. These water channels are essential to balance the salt concentrations of the larvae's body in response to the environment's salinity. Studies have demonstrated that the number of aquaporins produced in *Ae. aegypti* changes depending on the salt concentrations of their surroundings. The exact amount and type of aquaporins in *Ae. togoi* are unknown due to limited genetic research done on the species.

In this project, a de novo transcriptome was developed, which is the set of all RNA copies of genes' DNA sequence at one point in time. With this technique we can compare the production levels of aquaporins between the species and explore the genetic adaptations responsible for their current habitat selection. This is the first-ever project to assemble the transcriptome of *Ae. togoi*. Additionally, this study complements existing data to identify protein level differences between mosquitos living in diverse environments. Understanding the role of aquaporins in mosquito survival can lead to more effective control strategies for mosquito-borne diseases.

WAVE 7

ORAL ABSTRACTS

Theme: Sustainability and Conservation

Title: Antipredator Strategies as a Function of Spider Web Architecture across a Predation Gradient

Presenter(s): Jessica Schmidt

Abstract:

Animals have a variety of strategies that protect them from predation; spiders are no exception. Spider antipredator adaptations may include aposematism, crypsis, or the construction of protective refuges. In addition to two-dimensional orbs, which leave spiders exposed, some spiders build webs with a three-dimensional structure, which may provide predator protection due to their geometry and microhabitat placement. In an earlier study, we examined spiders' antipredator strategies as a function of web type in the lowland tropical rainforest. As predation rate has been shown to decrease with elevation, here we explore how those adaptations change across a predation gradient. We hypothesize that as predation rate decreases, spiders will be less likely to have armour or antipredator coloration, especially in those of the more exposed 2D webs. We also hypothesize that as predation rate decreases, fewer refuges will be found in webs of either geometry. We collected data on web (dimensions, type, microhabitat, presence of refuge) and spider (size, armour, colouration) characteristics at 8 sites on the eastern slopes of the Ecuadorian Andes ranging from 200—4000 m in elevation.

Spiders are here shown to be less likely to have armour or refuges as elevation increases, especially for 3D web builders. No trend has been observed for relative crypsis or aposematism across elevation. By demonstrating how antipredator strategies change along a predation gradient, this study illustrates how the adaptive value of traits changes along with environmental conditions and selective pressures.

WAVE 7 POSTER PRESENTATIONS

March 21, 2:00 PM - 3:15 PM

Room 1

Does this concern you? Situational and relational factors contributing to affective anthropomorphism towards inanimate objects	Samarth Srivastava
Patriarchy Chicken: A Critical Examination of Game Theory Through a Feminist Perspective	Yvonne Liang
Gender Non-Conformity and Bullying in Youth with Autism Spectrum Disorder	Em Mittertreiner
Sense of Belonging Among Undergraduate University Students during the COVID-19 pandemic	Clarence Choy Jasleen Brar Marianna Hsu Sam Alighanadi Samantha Chan

Room 2

Effect Of Environmental Surroundings On Muscle Synergy Postural Control	Asande Gumbe
Exploring Visual-Vestibular Integration and Rehabilitative Potential of Vision-Only Training in Parkinson's Disease Patients	Sarah Zhang Nathan Li Prabhjot Bajwa Natascha Lam Aneesha Mehta
Exploring the Diversity of the Neuroimaged Control Brain in Pain: A Focus on Age and Sex	Laura Mar
The barriers and facilitators of implementing Bubble continuous positive airway pressure (CPAP) and Kangaroo Mother Care (KMC) in Malawi	Inez Verdun Emily Li Renée Rochefort

Room 3

Social Buffering and Dairy Calf Disbudding	Jillian Hendricks
--	-------------------

Improving Navigation in Large Tapestries: User Evaluation of the Tapestry 2.0 Interface	Bitu Jokar Melanie Butt
Advancing Novel Drug Discovery Against SARS-CoV-2 Using Intestinal Organoids	Aaleigha Chin
Protein production using components of Mars' atmosphere and electrolysis	Sarah Qadar Qadar

Room 4

When Mussels Get Cold Feet: The Physiological Impact of Freeze-Thaw Cycles on Mytilus Trossulus	Lauren Gill
Impact Assessment of Solar Pump Monitor for Nicaraguan Smallholder Farmers	Candice Chua Marisha Boyd Brooke Carlisle Cole Quist
Brassica crop root-rhizosphere strategies for phosphorus acquisition with different rates of compost	Hannah Friesen
The daily activities and foraging behaviours of resident killer whales in British Columbia	Tess McRae
Genetic strategies for increasing crop yields: how photorespiration helps plant growth	Cindy Shi

WAVE 7 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Does this concern you? Situational and relational factors contributing to affective anthropomorphism towards inanimate objects

Presenter(s): Samarth Srivastava

Abstract:

This research attempts to understand the factors that contribute to affective anthropomorphism. Affective anthropomorphism is when people feel concern or empathy for an inanimate object. There has been a great deal of research on the cognitive aspects of anthropomorphism, but the affective or emotional side of the concept has been neglected in most previous studies. This research project looks at three different situations that are hypothesized to contribute to affective anthropomorphism, measured using standardized responses to inanimate objects being crushed or destroyed across three different studies. The first study looks at whether people feel more empathy and concern towards objects they own compared to those that they do not own. The second study looks at whether the object being associated with a personal relationship or not affects the participant's level of affective anthropomorphism towards that object. Lastly, we look at whether the affective responses differ between man-made and naturally existing inanimate objects. We expect to see higher empathy and concern for objects that people own and objects that are related to a personal relationship, and for naturally existing inanimate objects. This research gives us insight into additional factors that might affect people's feeling towards inanimate objects. These studies also contribute to a more nuanced understanding of consumer relationship with objects, beyond just monetary value. The nature against man-made objects research is essential for understanding people's attitudes towards nature and, in turn sustainability and conservation, which can inform policy decisions and sustainability actions.

WAVE 7 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Patriarchy Chicken: A Critical Examination of Game Theory Through a Feminist Perspective

Presenter(s): Yvonne Liang

Abstract:

When walking on a crowded sidewalk, I often find myself swerving out of the way from men walking in the opposite direction. According to existing literature, embodied by Patriarchy Chicken, other females exhibit the same behaviour when faced with the same decision. Patriarchy Chicken explains such behaviour and provides for stable predictions within the model of game theory itself. What Patriarchy Chicken does not do is utilize its observations to critique rational choice theory and suggest alternative models for social behaviour.

According to game theory diversion is a losing strategy. This conclusion is predicated on the privilege of the individual's rational capacity to predict outcomes, rank preferences, and act to maximize utility. Accordingly, a woman's choice to divert has two possible interpretations. The first interpretation is that women do not know how to calculate payoffs and are thus irrational actors. The second interpretation is that the payoff structure for women are different than they are for men.

Patriarchy Chicken concludes that there are different payoff structures for men and women. What Patriarchy Chicken does not do is challenge the internal assumptions of game theory itself. This paper analyzes the two interpretations and determines that neither position is accurate. Instead, what this paper concludes is that rational choice theory is incapable of accounting for social interactions in a complex society. In making this conclusion, feminist critiques will be applied to rational choice theory through its most controlled form, game theory.

Under examination from feminist theory, game theory's core assumptions fail. This failure is significant because it highlights assumptions about the uniform rationality of individuals. At the conclusion, this paper will argue that actors who are determined to be irrational through the Western tradition are simply applying more complicated sociological responses. Society must account for socialized responses if it hopes to progress with fair and equal governance, judicial interpretations, and social relationships.

WAVE 7 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Gender Non-Conformity and Bullying in Youth with Autism Spectrum Disorder

Presenter(s): Em Mittertreiner

Abstract:

Children who express themselves in gender-typical ways are generally more accepted by their peers than children who do not conform to gender norms (Carter & McClosky, 1984). Autistic children are more likely than others to perform gender nonconforming behaviors (Nabbijohn et al., 2019), and to experience frequent bullying (Cappadocia et al., 2012), but these factors have not been studied in tandem. This study investigates associations between gender norms, emotions and behaviour, and bullying in a cohort of autistic children at four timepoints in middle childhood.

The first objective is to examine the rate and stability of Item 110 on the Child Behaviour Checklist 6-18 (CBCL 6-18), which asks parents whether their child ever wishes to be the opposite gender. Despite prevalent usage by autism researchers as a gender identity measurement, this item has never been investigated longitudinally. The second objective is to understand whether assigned gender impacts the correlation between gender atypical emotional/behavioural problems and bullying. Gender norms often teach children that boys should externalize their negative emotions (eg. aggression, hyperactivity) while girls should internalize them (eg. withdrawal, anxiety). Using the Olweus Bullying Questionnaire and the CBCL 6-18 Internalizing and Externalizing Problems subscales, we hypothesize that high OBQ scores will be associated with boys who have more internalizing tendencies and girls who have more externalizing tendencies. This study offers a new approach to understanding gender-based bullying by assessing whether measures often used by clinical researchers can also be repurposed to explore gender normativity as a systemic force behind social marginalization.

WAVE 7 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Sense of Belonging Among Undergraduate University Students during the COVID-19 pandemic

Presenter(s): Clarence Choy, Jasleen Brar, Marianna Hsu, Sam Alighanadi, Samantha Chan

Abstract:

Higher education is a crucial period of social development for young people, allowing students to connect with new people, expand their social network, and build a sense of community. Indeed, social support and connections are key contributors to students' well-being and perceived academic success. During the COVID-19 pandemic, the shift to online learning has drastically restricted students' in-person and proximal social interactions. It remains unclear how this shift has subsequently impacted students' social connectedness and interpersonal relationships. Hence, this study will explore undergraduate students' perceptions of their sense of belonging and peer-to-peer interaction in the online learning environment, during the COVID-19 pandemic. We will conduct a virtual, mixed-methods study combining survey and photovoice methodologies. Participants will complete an online questionnaire with demographic items, a validated self-report scale measuring social connectedness, and open-response questions on their social interactions in the learning environment. Students will upload representative images of perceived barriers and promoters to social belonging in the online learning space. Students' open-text responses and images will be coded and interpreted using thematic analysis that identifies high-level themes relating to students' sense of belonging. The findings from this study will provide valuable insights into the impact our current online learning methods are having on students' well-being. Our findings may support educational institutions in designing the online learning space through a student-centred lens, ensuring that it fosters community and students' social and academic needs.

WAVE 7 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Effect Of Environmental Surroundings On Muscle Synergy Postural Control

Presenter(s): Asande Gumbe

Abstract:

Muscle synergies can be described as the coordinated recruitment of a group of muscles by a single neural command signal. Muscle synergies function is thought to be generalized across tasks within and between individuals. For a given motor task, a multitude of muscle synergies can be activated in different proportions based on the mechanical activity to produce a desired functional outcome. However, the majority of studies which aimed to identify and examine muscle synergies were carried out in a controlled laboratory environment where other potential confounding effects such as altered gait kinematics, stability control, or weight support were minimized. This study aims to assess the effect of outdoor versus indoor surroundings on the composition and activation of muscle synergy patterns. Participants will be fitted with a series of bipolar Ag/AgCl surface EMG electrodes on their lower and upper limbs and instructed to perform a series of repetitive tasks such as walking/throwing a ball. We hypothesize that there will be an alteration and possible introduction of new muscle synergy patterns to provide greater stability in the non-uniform out of laboratory outdoor environment. These findings might help researchers understand the involvement of muscle synergies in postural control and help identify when there is a loss or interference in the stabilizing function of a particular group of muscles.

WAVE 7 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Exploring Visual-Vestibular Integration and Rehabilitative Potential of Vision-Only Training in Parkinson's Disease Patients

Presenter(s): Sarah Zhang, Nathan Li, Prabhjot Bajwa, Natascha Lam, Aneesha Mehta

Abstract:

Parkinson's disease (PD) is a neurodegenerative disease associated with balance impairment, leading to increased risk of falls. PD patients demonstrate Bayesian sub-optimal vestibular-visual cue integration by overweighting visual information. This study aims to determine whether suboptimal integration is reflected in the rotational domain and whether vision-based training could improve sensory integration. Perceptual direction recognition thresholds (DRTs) will be measured for vestibular-only and/or visual-only rotations using a Bayesian adaptive procedure in a two-alternative forced-choice task in PD patients (N=18) and age-matched controls (N=18). DRT will be measured before and after vision-only standing balance training, conducted 30 min/day, 3x/week for 8 weeks, using a real-time balance simulator mimicking inverted pendulum dynamics displayed on a virtual reality headset. Thresholds will be statistically compared using a 2x2 ANOVA. Training performance will be compared across sessions using an RM ANOVA. We expect results to reflect previous studies on heading thresholds in PD patients where vision was overweighted, and also expect poorer initial performance in our standing balance task that improves with each training session. Furthermore, sensory integration is expected to improve following our training protocol. Our results would demonstrate that PD patients have impaired self-motion perception driven by central deficits in the rotational domain. Successful results suggest that our training protocol may be implemented into patient treatment to improve balance and reduce fall risk. Further research can focus on analyzing the directional relationship between threshold and vision-based training (sagittal vs. medial-lateral).

WAVE 7 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Exploring the Diversity of the Neuroimaged Control Brain in Pain: A Focus on Age and Sex

Presenter(s): Laura Mar

Abstract:

Chronic pain is a top human health issue, adversely compromising one's health and quality of life, and significantly burdening governments economically. Women and older adults are disproportionately affected by chronic pain; therefore, they should be a focus of pain research. To gain additional understanding of the brain's response to pain, databases, such as NeuroSynth have been utilized, because they define region-of-interest masks of the brain. This has informed discovery, like the neurological signature of pain, which defines an activation pattern observed in the brain in response to noxious stimuli, acting as an objective indicator of physical pain. Although this tool is an advancement in the assessment of pain, it assumes that different brains can be universally modeled by these tools, which is an assumption that is potentially limiting without examining the diversity of the participants sampled to inform its creation. Literature suggests there are significant differences in the structure of brains according to sex and age; therefore, it is important that universal pain signatures encapsulate the diverse representations of those experiencing pain. The objective of this study is to determine the characteristics of control participants in neuroimaging studies within NeuroSynth and to assess how representative they are to those affected by chronic pain. To accomplish this, control participant information was collected from 516 pain, 28 chronic pain and 57 painful neuroimaging studies from NeuroSynth. Preliminary data suggests participants are too young and that males might have been oversampled. This leads to further questions regarding what sex and age differences in the brain may be absent from universal pain signatures, and how this potential limitation translates to the treatment of chronic pain. Exploring the diversity, or lack of, within participant sampling, invites important conversations about psychosocial factors and their intersections within pain research.

WAVE 7 POSTER ABSTRACTS

Theme: Health and Wellness

Title: The barriers and facilitators of implementing Bubble continuous positive airway pressure (CPAP) and Kangaroo Mother Care (KMC) in Malawi

Presenter(s): Inez Verdun, Emily Li, Renée Rochefort

Abstract:

Intro/Background:

While Malawi's under-five mortality rate is on a downward trend, the rate of neonatal deaths remains high because many premature babies develop respiratory distress and hypothermia. This literature review investigates the barriers and facilitators of implementing low-cost treatments, such as Bubble continuous positive airway pressure (CPAP) and Kangaroo Mother Care (KMC).

Bubble CPAP regulates air pressure by submerging the end of an expiration tubing into water, with the depth determining the pressure in the system. It maintains a volume of air in the lungs to support breathing in newborns with respiratory distress.

Method:

A literature review was conducted with eleven research articles selected in order to evaluate barriers and facilitators of implementing bubble CPAP and KMC. The selected articles created a multi-faceted picture of Malawi's healthcare system. Included alongside international perspectives were testimonials from the frontline staff and patients. Annotated bibliographies on the respective articles were made. From our analyses, common points of issue emerged.

Results:

The common barriers of implementation included understaffing, lack of communication, gaps in technical knowledge among staff and lack of infrastructure.

Conclusion:

As there are many present barriers to the implementation of bubble CPAP and KMC in Malawi, changes in the healthcare system and its organization must be made in order to better facilitate optimal use of these treatments. However, this is hard right now as many facilities are understaffed. To fulfill this need, Malawi could invest in healthcare related education. This would lead to lesser workloads, more time for training and thus, better outcomes all around. We hope to conduct more research in other LMICs and connect with those who can make the necessary changes possible.

WAVE 7 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Social Buffering and Dairy Calf Disbudding

Presenter(s): Jillian Hendricks

Abstract:

Disbudding, the destruction of horn-producing cells of the horn bud, is a painful procedure for dairy calves. The presence of a social partner could improve post-operative recovery; a concept called 'social buffering'. The aim of this study was to test if the presence of another calf would alleviate signs of pain when recovering from disbudding, and to determine if variability in the strength of the social relationship between the paired calves influenced the extent of this effect. Within each pair (constituted by age), one calf was disbudded, one bud at a time on separate days. Following each procedure, she was allowed to recover for 6 h either alone or with her social companion. Recovery took place in visually distinctive pens, allowing calves to associate their experience with its place of occurrence. Calves were tested over three sessions (48, 72 and 96 h after disbudding) for conditioned place aversion by measuring where they spent time when provided the choice between the two distinctive pens. Video analysis of spatial proximity and behavioral synchronization between the paired calves in the home pen was used to assess the strength of their relationship. A linear mixed effect model analysis indicated no effect of the treatment or the pair's relationship on the difference in time spent in each treatment pen. Our results do not allow us to conclude that calves in pain can benefit from social buffering when housed with a pen mate, even if the pair has a preferential relationship.

WAVE 7 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Improving Navigation in Large Tapestries: User Evaluation of the Tapestry 2.0 Interface

Presenter(s): Bitu Jokar, Melanie Butt

Abstract:

Tapestry is a collaborative teaching and learning tool that allows for the integration of multimedia content within a non-linear format. Each piece of content (e.g., a PDF file, an interactive widget) is presented as a circular “node”, and these nodes are weaved together to form a “tapestry”. The Tapestry team has conducted multiple user experience studies throughout the tool’s development, to gain insight from students about their experience using the tool. Past user feedback has shown that it is difficult to navigate large amounts of content in Tapestry. Users had trouble deciding which nodes to click on next because while seeing an overview of the content, it was difficult to see the titles of individual nodes. And, even when seeing all content at once, there was no clear hierarchy within the content, making it difficult to interpret relations between nodes.

The present online study focused on improving these issues by introducing combinations of different features that locate the user while they navigate the tool, and aesthetic changes that visually group nodes that share an overarching topic. Participants were shown mockups of the Tapestry interface, with added features such as a minimap, magnifying glass, and zoom function, embedded within varying aesthetic nodal groupings, and were asked to provide qualitative (i.e., short-answer) and quantitative (i.e., questionnaires and preference scores) feedback on them. Results from this study largely informed the development of the next version of Tapestry, which will use map-like qualities and transitions to provide a seamless navigation experience.

WAVE 7 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Advancing Novel Drug Discovery Against SARS-CoV-2 Using Intestinal Organoids

Presenter(s): Aaleigha Chin

Abstract:

Background: Human intestinal organoids (hIO) are self-organizing three-dimensional (3D) tissue cultures that uniquely recapitulate the complexities of human organ structures. Unlike traditional cancer-derived cell lines or animal models, findings using this system are highly translational from benchtop to bedside and show great promise in augmenting drug discovery. The goal of my research is to develop and optimize this 3D cell-based system to model Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection and validate antiviral candidates against SARS-CoV-2.

Methods: Induced pluripotent stem cell (iPSC) derived human colonic organoids are used in this study. Organoids were tested using 24-well plastic plates and 96-well plastic and glass plates (a 96-well format allows for high-throughput screening of treatments). Organoids were maintained by passaging (dissociating and transferring cells into fresh growth medium) every ten days. To capture morphological changes of organoid maturation, photos were taken every day using brightfield microscopy.

Results: iPSC-derived hIOs were successfully propagated in 96-well plastic plates; however, further optimization of protocol technicalities is required. Organoids grown in 96-well glass plates failed to adhere to plate material and could not be propagated. The most successful propagation occurred in 24-well plates and protocols were optimized to this format. After two passages, organoid morphology began recapitulating human intestine structures, such as the villi, crypts and lumen. This was more evident after three passages.

Conclusion: In order to model infection and validate novel antivirals against SARS-CoV-2, my research in developing and optimizing iPSC-derived hIO is critical to ensure robust proper SARS-CoV-2 infection.

WAVE 7 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Protein production using components of Mars' atmosphere and electrolysis

Presenter(s): Sarah Qadar Qadar

Abstract:

How can components in Mars' atmosphere be utilized to feed hydrogen oxidizing bacteria (HOB) to synthesize protein for inhabitants of a self-sustaining Martian colony? Use has already been proposed as a protein source for astronauts during space travel, however it hasn't been explored in regards to the years they'll spend on Mars. Focus must be redirected to establishing independent colonies that take advantage of Mars' resources due to the cost and size of spaceships limiting how many materials are brought from Earth. Electrolysis can employ electricity to split water into H₂ and O₂ gases; since multiple industrial electrolyser variants have neared their theoretical maximum (99.999% purity), this study will not feature heavy focus on them. In a 1L fed batch reactor, HOB will be given 50mL H₂ and 10mL O₂ at 28°C and stirred at 150rpm. A 30mL mixture of 95% CO₂, 2.6% N₂ and 1.9% Ar gases, mimicking Mars' atmospheric composition, will be stirred in at 150rpm then kept at 35°C with the reactor replicating Mars' atmospheric pressure of 0.655kpa. **For experimental purposes, gases will be from a lab supply company. Electrolysis' 1:2 ratio of H₂ to O₂ must be altered to 5:1 to fuel growth and metabolic processes. The HOB can fix CO₂ into cell material and use N₂ to build microbial protein (MP) with an amino acid makeup closely resembling animal protein. Using emission free electrolysis, MP from HOB can sustainably constitute ~10-35% of one's daily intake before reaching toxic blood urea/ammonia levels, causing protein poisoning (rare).

WAVE 7 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: When Mussels Get Cold Feet: The Physiological Impact of Freeze-Thaw Cycles on *Mytilus Trossulus*

Presenter(s): Lauren Gill

Abstract:

The mussel, *Mytilus trossulus*, is one of the few animals that can survive being frozen. Mussels are important sources of food and provide habitat for intertidal species. With the increasing frequency of cold snaps due to climate change, investigating mussel freeze tolerance will be necessary in predicting the future of our coastlines. Previous research has focused solely on the effects of sustained freezing periods. In nature, however, mussels freeze and thaw many times during the winter depending on air and ocean temperatures. The act of crossing the freezing threshold may present physiological or biochemical stressors that have yet to be discovered. This study aims to evaluate the effects of repeated freezing on overall mussel survival.

M. trossulus were collected and repeatedly frozen in controlled conditions, with variation in the length of time spent frozen and the total number of freeze-thaw cycles experienced. Mortality was then compared across the animals. It was found that mussels exposed to freeze-thaw cycles showed increased survival compared to those that were exposed to a single, sustained freeze of the same length of time. However, as the number of freezing events increased, so did mortality. No significant survival difference was found between mussels found higher or lower on the shore. Future work will focus on observing how freeze-thaw cycles affect the proteins within the mussel tissue and will give a greater understanding of the biochemical impacts of repeated freezing.

WAVE 7 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Impact Assessment of Solar Pump Monitor for Nicaraguan Smallholder Farmers

Presenter(s): Candice Chua, Marisha Boyd, Brooke Carlisle, Cole Quist

Abstract:

The influx of decentralized renewable energy technology across the developing world raises concerns of how best to monitor these systems to provide proper maintenance and collect useful data. UBC Sustaingineering, a student-run design team, has developed a system to remotely monitor existing solar powered water pumps on smallholder farms in Nicaragua. Herein, the Sustaingineering Impact Analysis team assessed the social, environmental, and economic sustainability of the developed technology. The assessment was guided by an objective impact assessment guideline developed by the European Commission. The primary strengths of the monitoring system include the reduction of greenhouse gas emissions, shortened delay times between pump failure and response, reduced administrative burdens on farmers, and a reasonable price. Identified weaknesses include the possibility of excess groundwater withdrawal and habitat destruction, a lack of direct communication with farmers, and possible inequality between farmers with and without access to the technology. Team and stakeholder communication dynamics were also assessed, with the conclusion that international projects, especially those presenting language barriers, reduce the efficiency of Sustaingineering's work. The findings of this study inform Sustaingineering's future workflows and provide valuable insight into the primary considerations for others working in a similar space.

WAVE 7 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Brassica crop root-rhizosphere strategies for phosphorus acquisition with different rates of compost

Presenter(s): Hannah Friesen

Abstract:

Phosphorus (P) is essential for crop growth. However, it is often in the soil in forms that crops cannot acquire, notably as organic P (P_{org}). This is especially true in organic farming which relies on organic amendments, such as compost, to meet crop nutrient requirements. Plants can employ multiple strategies that improve uptake of P, including actively modifying conditions in the soil near the root surface - i.e. the rhizosphere - to convert P_{org} into inorganic P (P_i) which can be absorbed by roots. A key enzyme involved in this process is Acid Phosphomonoesterase (APase). This undergraduate thesis investigates APase activity in rhizosphere of crop roots grown on an organic farm. I sampled the roots of three varieties of Brassica oleracea (cabbage: Superstar, cauliflower: Orbit and 26-701) with three compost rates (high compost, low compost and farm-typical) plus a control, replicated in four blocks at UBC Farm. In the laboratory, I extracted rhizosphere soil from roots collected at harvest and analyzed APase activity spectrophotometrically. There was a significant difference in APase activity among varieties and between the control and low compost treatment. APase activity was positively correlated with crop yield for the cabbage and negatively correlated with P_{org} for 26-701 cauliflower, suggesting that APase plays a variety-specific role in improving P uptake. This research provides insight into the role of APase in P acquisition from compost and contributes to improving our understanding of how nutrients can be managed more efficiently on organic farms.

WAVE 7 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: The daily activities and foraging behaviours of resident killer whales in British Columbia

Presenter(s): Tess McRae

Abstract:

Resident killer whales in British Columbian waters are currently facing threats to their survival due to anthropogenic disturbances. Conservation managers are trying to identify biologically significant areas to help protect these whales; however, little is known about their daily activities and foraging behaviours. This study will seek to determine the proportion of time resident killer whales allocate to different behaviours such as feeding, socializing, and resting and how efficient resident killer whales are at feeding. To accomplish this, we used customizable animal tracking solution tags to make behavioural observations on both Southern Resident killer whales and Northern Resident killer whales. The tags were attached to the backs of individual whales to record its activities. The video from the tags was then analyzed using the behavioural analysis software program, BORIS. This behaviour data was used to construct activity budgets to determine the proportion of time resident killer whales devote to foraging, socializing, and resting. It was also used to quantify how efficient resident killer whales are at feeding by observing the number of fish the tagged whale caught against the amount of time spent foraging. We expect to observe males allocating more time to foraging compared to females due to their larger size and greater food requirements to accommodate their higher energy demands. The findings from this study will allow us to better understand the daily lives of resident killer whales which will assist conservation managers to better protect them.

WAVE 7 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Genetic strategies for increasing crop yields: how photorespiration helps plant growth

Presenter(s): Cindy Shi

Abstract:

Photorespiration is a plant physiological process which releases CO₂ fixed by photosynthesis back into the atmosphere. Typically, the rate of CO₂ release from photorespiration is 15-20% of the rate of CO₂ fixation through photosynthesis, making the inhibition of photorespiration a major bioengineering target for improving crop yield and food security. However, while inhibitory at one level, photorespiration may offer other benefits. A body of current literature suggest that photorespiration allows for the reallocation of energy normally reserved for photosynthesis into other costly processes such as Nitrogen acquisition and amino acids production. This reallocation of energy helps plants balance nutrient levels, particularly Carbon and Nitrogen. Hence, suppressing photorespiration may reduce plant growth under certain environmental conditions. To avoid negative side-effects of reduced photorespiration, a better understanding of genes involved in photorespiration is needed. We hypothesize that a transcription factor is required for proper activation of photorespiratory responses. Transcription factors are proteins that differentially activate DNA expression and protein production, allowing the plant to adjust to different environmental conditions. We will test the effect of this transcription factor on plant growth during photorespiration under different Carbon and Nitrogen conditions. We expect that plants lacking the ability to produce this transcription factor will be unable to acquire nutrients under certain Carbon and Nitrogen conditions, resulting in less growth than normal plants. These results will allow us to identify the function and regulation of the transcription factor, which will help future bioengineering projects that manipulate the photorespiratory signaling pathway to improve crop yield.

WAVE 8 ORAL & POSTER PRESENTATIONS



WAVE 8 ORAL PRESENTATIONS

March 21, 5:30 PM - 6:45 PM

Room 1

Anchors Away: Exploring the Anchoring and Adjustment Heuristic in Children Eliscia Sinclair

The relationship between perfectionistic self-presentation styles and narcissism in young adolescents Abigail Yuen

The Strategic Effects of Vertical Mergers William Zheng

The Philosophical Inquiry Into Choice and Abortion: An Intersectional Analysis Michel Liu Chou
Shimuli Olunga
Isla Xiao

Public shaming: implications for future behaviour Surat Singh

Room 2

Machine Learning-Guided Directed Evolution of a Thioglycosidase Ryan Karimi

A Proposal to Establish the Dependence of Social Motility in Myxococcus Xanthus on EPS-sensing Type IV Pili May Jang
Renz Po
Arlene Mirzokhidova
Ellen Ren

Characterization of Chitosan-Based Hybrid Hydrogel Model for Potential Covid-19 Vaccine Administration System Micha Samanta
Tony Peng

Influence of Nucleic Acid Modifications on Lipid Nanoparticle Morphology and Efficacy Kevin An

Towards Photon-Beam-Driven Nuclear Transmutation of Long-Lived Radioactive Waste James Ross

Room 3

Knock Knock. Who is there? A new bioinformatics tool to detect and quantify individual bacteria in a community.

Hans Ghezzi

Characterizing the Mechanism of Actions of Doxorubicin

Rutuja Pattanshetti

Social Media and Self-Esteem: The Impacts of Positive vs. Negative Engagement

Charul Maheshka

Time to fuel up the macrophages in pancreatic islets

Janice Pang

Drug delivery methods targeting the brain via the blood brain barrier

Trushaan Bundhoo
Xin Yin Wang
Grace Wang

WAVE 8

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Anchors Away: Exploring the Anchoring and Adjustment Heuristic in Children

Presenter(s): Eliscia Sinclair

Abstract:

If I was to ask you “how many moons does Jupiter have?”, what would you guess? Your answer would most likely involve the anchoring and adjustment heuristic: you would make an estimation based on an initial value (an ‘anchor’) and adjust from there to make a final estimation. For example, your anchor might be based on the expectation that planets tend to have very few moons (e.g., 2-3), so you may guess Jupiter has between 4 and 6 moons (it actually has 79!). Individuals use anchoring and adjustment to make decisions under uncertainty, and their degree of uncertainty influences the direction and size of their adjustment (Simmons et al., 2010). Little is known, however, about the effect of uncertainty on children’s estimates when using the anchoring and adjustment heuristic.

The current study investigates whether children will accept unlikely anchors when their degree of uncertainty is high. Children are asked to complete a number line task and indicate where they believe a provided number should go on the number line (e.g., “where does 53 go?”). Children will also be provided either a plausible anchor (e.g., midway on the line) or an implausible one (e.g., where 20 should go). Research indicates that 6-to-7-year-old children have a sufficient understanding of numbers between 0-100, but not numbers between 0-1000 (Opfer et al., 2016). Thus, we predict that children will place more emphasis on provided improbable anchors when their degree of uncertainty is high. The current study has implications for children’s development of decision-making strategies.

WAVE 8

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The relationship between perfectionistic self-presentation styles and narcissism in young adolescents

Presenter(s): Abigail Yuen

Abstract:

Perfectionism and narcissism are two personality constructs that have been linked theoretically and empirically across decades of research. Perfectionism is a personality style that manifests through trait dimensions, self-presentation styles, and cognition patterns. Narcissism is also a personality construct that refers to individuals who frequently engage in grandiose fantasies and desire admiration from others. Perfectionism and narcissism are related in terms of expression and development, as theories often identify childhood experience and attachment as key risk factors.

There are three distinct perfectionistic self-presentation styles: perfectionistic self-promotion, nondisplay of imperfection, and nondisclosure of imperfection. Perfectionistic self-promotion, where someone actively inflates their good qualities, has been linked with high levels of narcissism. Nondisplay and nondisclosure of imperfection refers to the refusal to discuss or show any bad qualities, both of which have been negatively correlated with narcissism. However, the majority of previous studies were conducted on adult participants, leaving the correlates between self-presentation styles and narcissism in the developmental periods unexplored. This study examines the relationship between self-reported perfectionism and narcissism in a community adolescent sample (n = 107). Bivariate correlation analyses yielded a range of results. As predicted, narcissistic superiority was negatively correlated with nondisplay and nondisclosure of imperfection. However, narcissistic exploitativeness was positively correlated with nondisclosure of imperfection, while total narcissism had no relationship with any self-presentation style. These results suggest further study into the trajectory of personality development is needed, as there may be a shift in the relationship between perfectionism and narcissism from childhood to adulthood.

WAVE 8

ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The Strategic Effects of Vertical Mergers

Presenter(s): William Zheng

Abstract:

Using a sample of U.S. vertical mergers completed over the period 1997-2018, I show that a firm is more likely to engage in vertical merger following the vertical integration of its industry rivals. I argue that the efficiencies brought by vertical integration can allow a firm to gain a competitive advantage over its rivals, and consequently incentivize those rivals to engage in vertical mergers as well. A second channel in which firms have the incentive to engage in vertical merger following the vertical merger of its competitors is the foreclosure effect, where an acquired firm charge higher prices or refuses to do business with competitors of the acquirer. I document empirical evidence for the effect of foreclosure and show that the vertical integration of industry counterparts influences a firm's costs. These results contribute to literature on the determinant of vertical mergers and merger waves.

WAVE 8 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: The Philosophical Inquiry Into Choice and Abortion: An Intersectional Analysis

Presenter(s): Michel Liu Chou, Shimuli Olunga, Isla Xiao

Abstract:

Throughout history, women have been denied bodily autonomy, and alongside it, the choice of when to terminate a pregnancy or when to start a family. Existing critiques surrounding the issue of abortion include the debate on morality, religion, and the state. Reproductive justice as a social movement, has been able to address multiple, intersecting oppressions that affect women and their ability to choose. Social activism has the ability to be highly representative of women of colour and minorities, but the academic sphere of philosophy has all but ignored women of colour as subjects of inquiry. This paper argues that the existing philosophical discourse on choice and bodily autonomy is not representative of women and women of colour, as the philosophical debates are rooted in patriarchal, colonial, and white supremacist knowledge. This paper suggests that the philosophical debate on choice must be looked at through an intersectional lens. This paper will dive into the knowledge that has been conducive to multiple understandings of choice, such as the woman's right to choose and the regulation of abortion by the state, and the way they have resulted in real life implications on women. We will be focusing primarily on dissecting the broader idea of choice, its conditions and terms, as well as its application to different social groups.

WAVE 8 ORAL ABSTRACTS

Theme: Individual, Community and Society

Title: Public shaming: implications for future behaviour

Presenter(s): Surat Singh

Abstract:

Public shaming refers to the practice of open “condemnation of someone who is in violation of accepted social norms to arouse [the] feeling of guilt in him or her” (Basak, Sural & Ganguly, 2019, p.1). Past research shows that in part, shaming “condemns [an] offender as a bad person, [and in doing so, actually] increases predatory crime” (Ahmed & Braithwaite, 2005, p. 299). Given this, we hypothesize that experiencing public shaming does not promote prosocial behaviour. In contrast, we hypothesize that individuals will attempt to avoid the feeling(s) resulting from being publicly shamed. Consequently, we hypothesize that warning people that they could be publicly shamed does promote prosocial behavior. This project will investigate both of our hypotheses within the context of an economic (public goods) game. Our preliminary results support both of our hypotheses. These results point to public shaming as a potentially useful deterrent but not punishment as well as the complex effects of public shaming on future behaviour.

WAVE 8 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Machine Learning-Guided Directed Evolution of a Thioglycosidase

Presenter(s): Ryan Karimi

Abstract:

GH-1 family myrosinases are among the few naturally-occurring enzymes capable of cleaving thio-linked glycosides (or thioglycosides). In all myrosinases, the normal active site acid/base catalyst of GH-1 enzymes, glutamic acid, is replaced by a glutamine. An ascorbate cofactor acts instead as a proton acceptor in the active site, activating water for nucleophilic attack on the glycosyl-enzyme intermediate.

We have demonstrated that several homologous members of the GH-1 family are weakly capable of thioglycoside hydrolysis by screening a library of naturally-occurring GH-1s. We selected the *Sulfolobus solfataricus* β -glycosidase (SSb) as a target for directed evolution to increase thioglycoside hydrolase activity, with the aim of evolving a cofactor-independent thioglycoside hydrolase. To accomplish this, we employed an active site titrant and fluorogenic substrate in a high-throughput kinetic assay that reliably determines the catalytic efficiency (k_{cat}/K_m) of 96 SSb mutants from crude, expressed lysate.

To accelerate the directed evolution process, we repurposed the previously published UniRep (Alley et al., 2019) recurrent neural network (RNN) architecture and model weights to perform unsupervised deep learning of GH-1 family features from functional sequences collected from the CAZy database (Cantarel et al., 2009). We plan to use the retrained UniRep RNN to generate vector representations of a mutant library of ~100 functionally-characterized SSb mutants, and use these vector representations to generate an implicit mapping between mutant sequence and catalytic efficiency.

This study should generate an alternate evolutionary path toward thioglycoside hydrolase activity, and shed light on the evolutionary path that led nature to the myrosinase enzyme architecture.

Works Cited:

Alley, Ethan C., et al. "Unified rational protein engineering with sequence-based deep representation learning." *Nature methods* 16.12 (2019): 1315-1322.

Cantarel, Brandi L., et al. "The Carbohydrate-Active EnZymes database (CAZy): an expert resource for glycogenomics." *Nucleic acids research* 37.suppl_1 (2009): D233-D238.

WAVE 8

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: A Proposal to Establish the Dependence of Social Motility in *Myxococcus Xanthus* on EPS-sensing Type IV Pili

Presenter(s): May Jang, Renz Po, Arlene Mirzokhidova, Ellen Ren

Abstract:

Bacterial motility is critical to microbial pathogens as it abets the migration, escape, and prevention of immune clearance. *Myxococcus xanthus* (*M. xanthus*), a gram-negative myxobacterium, is a social species that uses Type IV pili (T4P) twitching to perform social motility (S motility). Bacteria secrete exopolysaccharides (EPS), which mediate T4P extension and retraction. As the mechanisms behind which bacterial species sense EPS concentration is yet undetermined, we propose to explore the concept in relation to the coordination of S motility in multicellular *M. xanthus*. We hypothesize that EPS blocks extracellular DNA (eDNA) intake in *M. xanthus* to modulate S motility. We will first observe the dynamics between EPS and T4P in *M. xanthus* by comparing four strains: wild type (WT), EPS⁺⁺, EPS^{-m} (microchannel knockdown), and EPS^{-g} (gene knockout), to contrast colony branching behaviour. Quantifying biofilm formation via SDS-treatment of bacterial colonies will correlate EPS production to S motility. Then, performing RNA-sequencing on each cell line will characterize T4P related genes and pathways with altered activity during EPS production. To elucidate the molecular mechanism behind EPS-induced S motility, we propose to examine and compare two potential interactions: the pili-EPS interaction and the pili-DNA_e (external DNA) interaction to pinpoint the EPS-binding site. Furthermore, isolated knockdown of twenty-one *M. xanthus* methyl-accepting chemotaxis proteins (MCPs) is performed to pinpoint the protein modality responsible for EPS-mediated motility. Further understanding of molecular mechanisms behind social motility in *M. xanthus* opens possibilities for novel ways to control formation and growth of bacterial colonies.

WAVE 8

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Characterization of Chitosan-Based Hybrid Hydrogel Model for Potential Covid-19 Vaccine Administration System

Presenter(s): Micha Samanta, Tony Peng

Abstract:

The COVID-19 Vaccine (Pfizer-BioNTech) is administered in a series of 2 doses of injection given 3 weeks apart (EUA, 2020). The current vaccine uses liposome packages as drug delivery systems which require low-temperature storage to prevent it from degrading and multiple doses to become completely effective. Additionally, the liposome drug delivery system of the current vaccine can induce side effects and allergic reactions. Hydrogels are a particularly appealing type to enhance the optimization of drug administration by reducing toxicity and regulating dosage. Hydrogels can provide spatial and temporal control over the release of various therapeutic agents. The high-water content (typically 70-99%) provides physical similarity to tissues that give them excellent biocompatibility and low risk of toxicity. The chitosan-based hydrogel is the most likely candidate for this project since it has widely used to deliver liposome-encapsulated mRNA, the packages are negatively charged RNA polymer which binds easily to the positive charged particles polymer (chitosan is cationic hydrogel). For this project, the physical and chemical properties of differing concentrations of Chitosan-based hydrogels are measured. The mesh sizes of the hydrogels and modeling results are determined by the measurements and constant parameters using a series of equations implemented with python. The diffusion rate would be determined from the ratio between the radius of the mesh size and the radius of the drug. Behavioral characterization would be modeled using graph, regression, and computational calculations. Additionally, a model of RNA-liposome package will be simulated using anionic dyes to measure the absorbance and analyze its compatibility with the Covid-19 vaccine administration system.

WAVE 8

ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Influence of Nucleic Acid Modifications on Lipid Nanoparticle Morphology and Efficacy

Presenter(s): Kevin An

Abstract:

Lipid nanoparticles (LNPs) containing short interfering RNA (siRNA) and messenger RNA (mRNA) have been clinically shown to be able to treat the root cause of genetic diseases and confer antibody protection in the example of the recent COVID-19 vaccines. Free administration of these nucleic acids, however, are much less effective due to pharmacokinetic barriers including nuclease degradation and clearance by the immune system. Modifications to the nucleic acid backbone confers increased stability in circulation; however, the inherent negative charge of the nucleic acids prevent their easy access into their target cells. LNP encapsulation of these nucleic acids is able to address these issues. While siRNA and mRNA interactions with LNPs have been well characterized, interactions between antisense oligonucleotides (ASOs) and modified ASOs with LNPs are more unclear. Thus, it is paramount to further study modifications to nucleic acids that allow for increased stability in order to induce their effects, but additionally their interactions with LNPs that greatly increase their efficacy. We have found that phosphorothioate modifications interact with lipids during LNP formation in an exothermic, spontaneous manner. In addition, we have determined a stoichiometry of reaction of 33 ionizable cationic lipids to 1 ASO molecule. Further experiments will look at in vitro efficacy and structural analysis through cryo-transmission electron microscopy. Understanding the processes that govern interactions between ionizable lipids and nucleic acids can help guide nucleic acid design, and improve LNP potency. Additionally, these findings could be used to design prodrug modifications to improve retention of difficult-to-entrap small molecule therapeutics.

WAVE 8 ORAL ABSTRACTS

Theme: Innovation and Technology

Title: Towards Photon-Beam-Driven Nuclear Transmutation of Long-Lived Radioactive Waste

Presenter(s): James Ross

Abstract:

Nuclear energy has been one of the major energy sources in many countries for nearly half a century. While the method of energy generation does not produce greenhouse gases, it produces radioactive nuclear waste. Many of the waste products released by nuclear reactors are long-lived and highly radioactive, and are considered high level waste (HLW). An estimated 12,000 tonnes of HLW are added to storage worldwide annually.

To reduce the overall quantity of waste in storage, one previously attempted solution was to transmute these waste products, through various nuclear reactions, into stable isotopes or isotopes with shorter half-lives. However, nuclear transmutation using existing methods is challenging due to a low probability of transmutation occurring. Recently, transmutation using photons (particles of light) has been a topic of investigation as a viable reaction channel.

In this work, we explore the potential nuclear transmutation of HLW using photon beams that are currently under development at the TRIUMF-ARIEL facility on the UBC Vancouver campus. We examine the expected outcomes of this process on waste samples to determine if a significant quantity would be transmuted into isotopes that are stable or have shorter half-lives.

WAVE 8

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Knock Knock. Who is there? A new bioinformatics tool to detect and quantify individual bacteria in a community.

Presenter(s): Hans Ghezzi

Abstract:

The human gut is inhabited by a diverse community of microorganisms, including bacteria, archaea and viruses, which make up the microbiota. Maintaining a healthy gut microbiota is crucial in human health: prior research has established links between our gut microbes and diverse conditions such as asthma, multiple sclerosis and inflammatory bowel disease. Importantly, microbiota maintenance can be challenging, as key factors like diet and lifestyle can rapidly and drastically impact its composition in a human gut. Specifically, these factors can significantly alter the gut environment by inducing physical perturbations like changes in pH, temperature, oxygen or salt concentrations. These changes have profound effects on the growth of individual microbial species. My research focuses on studying the biological response of individual bacterial species to varying gut pH and predicting how changing acidity impacts larger communities. I hypothesise that different bacteria display different sensitivities to pH changes in their environment. To investigate this, I focused on primers, which are short nucleic acid sequences that can be used to amplify DNA regions of interest. Specifically, I developed a bioinformatics tool to design species specific primers by targeting unique DNA regions among bacterial genomes. These primers can be used to quantify individual bacteria within a known community and investigate how each species is affected by the environment. Using this pipeline, I designed primers specific to a representative set of bacteria within a human gut isolate strain library of over 140 species. Being able to understand individual species dynamics within larger communities under different pH conditions could open doors for therapeutic applications to predictably reconstitute a healthy microbiota in patients with a perturbed gut environment.

WAVE 8

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Characterizing the Mechanism of Actions of Doxorubicin

Presenter(s): Rutuja Pattanshetti

Abstract:

A leading cause of mortality around the world is cancer. Although each type of cancer may have different characteristics, they all share an underlying property: aberrant changes in the DNA sequence. Constant efforts are made to improve cancer therapy by increasing their efficacy and decreasing negative side effects. One such therapeutic drug used is doxorubicin from the anthracycline class. With possibilities of cancer cells gaining drug resistance to doxorubicin, it is essential to identify its gene targets. However, there is still a lot of debate on the mechanisms used by as well as the targets of this drug. In *Saccharomyces cerevisiae*, commonly known as yeast, one proposed target is SSL2, a gene responsible for encoding a protein involved in DNA repair and transcription initiation. The study will comprise of using haploid and diploid (one and two sets of chromosomes, respectively) doxorubicin resistant isolates. We hypothesize that mutations in the SSL2 gene allow these yeast isolates to gain resistance and that diploid isolates will show a greater level of resistance than the haploid isolates. These isolates will be exposed to doxorubicin and their phenotypic characteristics: growth curves, doubling rates and percentage inhibition, will be measured using high-throughput robots. Whole genome sequencing will also be performed on these isolates to explain the observed resistance. Upon using these approaches, we expect to find variations in or upstream of the SSL2 gene, more so in the diploid isolates. This study will allow us to study doxorubicin resistance in humans occurring due to variations in ERCC3, the human homolog of SSL2. It will also allow for the designing of an optimum and unique treatment plan for each patient, opening the door to personalized medicine.

WAVE 8 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Social Media and Self-Esteem: The Impacts of Positive vs. Negative Engagement

Presenter(s): Charul Maheshka

Abstract:

With the dramatic increase in social media usage over the past decade, the various impacts of social media have come into question. Research has found that frequent social media usage is correlated with various negative psychological impacts such as lower self-esteem (Jan, Soomro and Ahmad, 2017), lower life satisfaction (Hawi and Samaha, 2016), and higher anxiety and depression (Woods and Scott, 2016). While previous work has focused on correlating frequency of social media usage with factors such as self-esteem, we wanted to investigate the role of the manner in which people engage with social media. Some research indicates that those who engage negatively on social media, through behaviours such as cyberbullying and internet trolling, tend to have lower self-esteem (Zezulka and Seigfried-Spellar, 2018). In response, we hypothesized that those who engage positively with social media would have higher self-esteem than those who engaged negatively.

In our study, participants were assigned to one of two conditions: positive engagement, or negative engagement. They were accordingly asked to make either positive or negative comments on a series of social media posts that were presented to them, and then fill in the Rosenberg Self-Esteem Scale (Rosenberg, 1989). Our results did not support our hypothesis, and we found similar mean self-esteem scores in both conditions, which implies that the link between social media and self-esteem is not influenced by type of engagement. The results have important implications in our understanding of the negative psychological impacts of social media.

Reference List:

Hawi, N. S., & Samaha, M. (2016). The relations among social media addiction, self-esteem, and life satisfaction in university students. *Social Science Computer Review*, 35(5), 576-586. <https://doi.org/10.1177/0894439316660340>

Jan, M., Soomro, S., & Ahmad, N. (2017). Impact of social media on self-esteem. *European Scientific Journal*, 13(23), 329-341. <https://doi.org/10.19044/esj.2017.v13n23p329>

Rosenberg, M. (1989). *Society and the adolescent self-image*. Middletown, CT: Wesleyan University Press.

Woods, H. C., & Scott, H. (2016). #Sleepyteens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem. *Journal of Adolescence*, 51, 41-49. <https://doi.org/10.1016/j.adolescence.2016.05.008>

Zezulka, L. & Seigfried-Spellar, K. (2016). Differentiating cyberbullies and internet trolls by personality characteristics and self-esteem. *Journal of Digital Forensics, Security and Law*, 11, 7-26. <https://doi.org/10.15394/jdfsl.2016.1415>

WAVE 8

ORAL ABSTRACTS

Theme: Health and Wellness

Title: Time to fuel up the macrophages in pancreatic islets

Presenter(s): Janice Pang

Abstract:

Type 2 diabetes (T2D) affects close to 0.5 billion people worldwide and is an immense global health and socioeconomic burden that is linked to obesity, Western diet and sedentary lifestyle. In T2D, loss of insulin production by beta cells in the pancreas has been linked to inflammation in the pancreas, characterized by increased numbers of macrophages, immune cells that play important roles in inflammation and tissue regeneration. Pancreatic islets – clusters of insulin-producing cells within the pancreas– produce a number of peptide hormones and other factors, in addition to insulin, that play important roles in metabolism, and may also influence the function of neighbouring macrophages within the islet. We hypothesize that islet-derived factors directly skew islet macrophages towards either a pro-inflammatory or a reparative phenotype, causing β -cell dysfunction or regeneration, respectively. Bone marrow-derived macrophages (BMDMs) will be treated with islet-secreted factors associated with cellular metabolism (e.g. insulin, glucagon, IAPP) for 20h, and a Seahorse extracellular flux analyzer used to assess glucose and mitochondrial metabolism. BMDM phenotype will be assessed by mRNA expression of pro- and anti-inflammatory genes and cytokine secretion. We expect to observe changes in the bioenergetic profiles of macrophages treated with islet-secreted factors, with increased glucose metabolism and decreased mitochondrial metabolism in macrophages polarized to a proinflammatory phenotype, and increased mitochondrial metabolism in macrophages polarized to a pro-regenerative state. Findings from these studies may lead to a better understanding of pancreatic islet macrophage immunometabolism, potentially enabling the identification of novel therapeutic targets for T2D.

WAVE 8 ORAL ABSTRACTS

Theme: Health and Wellness

Title: Drug delivery methods targeting the brain via the blood brain barrier

Presenter(s): Trushaan Bundhoo, Xin Yin Wang, Grace Wang

Abstract:

The blood brain barrier (BBB) is a very selective barrier that prevents toxins and harmful microorganisms from reaching the central nervous system (CNS). Transport across the BBB is controlled by specialized CNS endothelial cells. These cells create tight matrices around the blood vessels leading to the brain. While this barrier excels in its role in protecting the brain, it can be an obstacle when it comes to administering treatment for diseases in the brain. As the matrix formed by the endothelial cells of the BBB is closely packed, delivering drugs to the brain can be a challenging task. In this project we have focused on three different drug delivery methods: receptor mediated transcytosis (RMT), viral vectors, and microbubble-mediated focused ultrasound.

RMT has shown promising results in transporting drugs across the BBB, by utilizing transport proteins and pre-existing transport pathways to deliver drugs to the brain. Adenovirus vectors are currently in the process of clinical trials for gene therapy for the delivery through the central nervous system. Finally, microbubble-mediated focused ultrasound (FUS) is a non-invasive or minimally invasive method that creates short term and local disturbance on the BBB. The non-invasiveness of this method presents a novel method of drug delivery to the brain. These techniques have shown promising results in delivering drugs past the BBB, and this project will further discuss them in detail.

WAVE 8 POSTER PRESENTATIONS

March 21, 5:30 PM - 6:45 PM

Room 1

Drivers of Dissidence: Vancouver's Road to Ride Hailing	Alec Wilson
The Immediate Effects of Lifestyle Factors on Scholastic Achievement	Miranda Bahng
Cyberbullying Coping Strategies	Isaaca Wang Muthaira Abid
Sex & Gender Bias Persists in Exercise Physiology Literature	Hira Niazi Surat Singh

Room 2

Investigating the Epigenetic Effects of Ethanol Exposure on Hippocampal Development in Mice	Lauren Jennings Emma Kang Julia Hwangbo Shannon Pflueger
Kidney Stone Density and Composition: Effect on PCNL Efficacy	Myles Ng
How does Ewing sarcoma, a pediatric cancer, mimic viruses for growth?	Horton Lai Andy Jia
Evaluation of Chinese Medicinal Plants as Cysteine protease inhibitor sources for the treatment of muscular skeletal and viral diseases.	Jimin Jung

Room 3

A Proposal to Compare Traditional and Automated Methods of Steel and Hardening Material Reinforcement in 3D Concrete Printing	Eren Saydar
Can Physics Labs Meet Learning Goals, And Provide a Meaningful Experience Online?	Mariposa Casida
Lipid Nanoparticles and Polyglycerol Nanogels for the Delivery of CRISPR-Cas9 Components to Primary Human Keratinocytes	Danny Liu

Computational Modelling of the Development of Type I Diabetes

Matthew Chung

Room 4

The Effect of Temperature on Phototactic Mobility of *Euglena Gracilis*

Japnit Bhatia
Elle MacLennan
Yasi Yaghoub

Time series comparison of the role of global warming on the tidewater glacier cycle between two different climatic settings.

Giulio Saibene

The Impacts of Surge Glacier Behaviour on Streamflow

Nicolás Harrington

Mercury methylation microbial environments in Northern Canadian Glaciers

Edward Sun
Jordan Rumscheidt

WAVE 8 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Drivers of Dissidence: Vancouver's Road to Ride Hailing

Presenter(s): Alec Wilson

Abstract:

In 2012, Uber launched their service in BC to a mixed public reception. Initially met with fines by the BC transportation board, ride-hailing was subsequently allowed to run in 2020. During Uber's eight-year road to legality, a lengthy public negotiation in Vancouver took place, pitting the ideals and history of BC's taxi regulations against the purported innovation, efficiency, and customer-utility of Uber. While numerous studies attempt to understand how the public and legislators have debated ride-hailing elsewhere (e.g. Brail 2018, Prassl 2018, & Serafin 2019), in the unique legislative setting of Vancouver, no discourse analysis has yet been undertaken.

My study uses NVivo to analyze key public documents regarding Uber's introduction into Vancouver (2012-2020), pulling from Uber CEO Travis Kalanick's TEDx talk, 107 major media articles and government documents to create a history of Uber's arrival and analyze the frames (terms used to describe Uber, the taxi industry and ride hailing) which supplemented the debate. I found that the framing of taxi regulation as ahistorical in the news allowed for the regulations of the taxi industry to appear unreasonable and contrary to public interest. This was compounded by Uber's contention that they are only a technological platform, not a transportation service. This frame obscured their connection to taxi regulation and in conjunction, the paying public's responsibility to the harm Uber's service posed to the already low-paid, marginalized work of taxi driving.

References

Brail, S. (2018). From renegade to regulated: The digital platform economy, ride-hailing and the case of Toronto. *Canadian Journal of Urban Research*, 27(2), 51-63.

Prassl, Jeremias (2018). Chapter Two: Doublespeak from "Humans as a Service: The Promise and Perils of Work in the Gig Economy". Oxford. Pg 60-73.

Serafin, M. (2019). Contesting the digital economy: Struggles over Uber in Poland. (pp. 187-201) Emerald Publishing Limited. doi:10.1108/S0733-558X20190000063018

WAVE 8 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: The Immediate Effects of Lifestyle Factors on Scholastic Achievement

Presenter(s): Miranda Bahng

Abstract:

Studies have shown the lifestyle factors of physical activity and sleep are critical when it comes to cognitive functioning (i.e. attention, memory, processing) and long-term health benefits. However, the immediate effects of these lifestyle factors in real-life situations, such as on scholastic achievement, are still unclear. Thus, the goal of this study was to investigate the immediate effects of the following lifestyle factors, physical activity, sleep quality, sleep duration, and study duration, on a common situation measuring scholastic achievement in young adults' lives, a final examination. A survey was administered to young-adult students after the completion of a university final exam. The brief survey assessed their levels of physical activity, the duration and quality of their sleep, and the quantity of studying done a day prior to their respective final exams. Exam performance, as obtained from the course instructors, was analyzed as a function of their lifestyle behaviors. Sleep duration and quality, along with hours spent studying were found to positively predict exam performance. Exploratory analyses were also conducted alluding to a mediating relationship between physical activity and exam performance. These findings support the need to promote lifestyle behaviors in young adults based not on its longer-term consequences for improved physical and mental health, but on its more immediate effects (i.e. scholastic achievement).

WAVE 8 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Cyberbullying Coping Strategies

Presenter(s): Isaaca Wang, Muthaira Abid

Abstract:

Cyberbullying is an increasingly prevalent issue amongst youth around the world today. To cope, adolescents caught up in cyber aggression employ various strategies and methods, whether they be bullies, victim-bullies, or victims. Our research investigates the following research questions: 1) How frequent and common are certain strategies, specifically, the usage of adaptive coping strategies in comparison to maladaptive coping strategies? 2) How do the prevalence of certain coping strategies vary across cultures, specifically between East-Asian and non East-Asian cultures? And 3) How do the prevalence of certain coping strategies vary across ages, specifically between adolescents and non-adolescent age groups? We hypothesize that adaptive strategies will be used more frequently than maladaptive strategies, and that adaptive strategies will be used more often in cases of milder cyberbullying whereas maladaptive strategies will be used more often in cases of more severe cyberbullying. We hypothesize that East-Asian cultures will seek help from others less often than in non East-Asian cultures and that adolescents will also seek help from others less often than non-adolescents. Our experimental procedures will involve a questionnaire self-reporting on cyberbullying status, relevant demographics, and coping strategies, and our sample size will be around 60 participants, who we will personally contact. Since our participants are our friends and peers, participation in the research is voluntary. A sample question in our questionnaire is "Which of these coping strategies have you used?" with multiple choice response options such as, "talking to a teacher", "confrontation", and "self-blame". Through our research, we aim to provide a broader understanding of the differences in coping strategies in relation to victimization status and demographics.

WAVE 8 POSTER ABSTRACTS

Theme: Individual, Community and Society

Title: Sex & Gender Bias Persists in Exercise Physiology Literature

Presenter(s): Hira Niazi

Abstract:

The importance of considering sex and gender in research cannot be understated – findings without this consideration cannot be extrapolated to everyone and risks harm if generalized. Over the past few decades, efforts have been made to rectify the historic problem of overrepresentation of male participants in exercise physiology literature. To see if this bias remains, this study describes and quantifies the participant pool in terms of sex/gender. Six of the most relevant journals were searched for exercise physiology articles published in 2018-2020. After filtering through 1485 articles, a total of 613 original research articles with adult human participants were included in the final analysis. Of the 39627 participants across 613 studies, 22994 were described as male and 16633 were described as female. There were 293 male-only studies, 272 mixed studies, and 48 female-only studies. Only 13% of male-only studies indicated this in the title, compared to 83% of female-only studies. There were zero reports of intersex, transgender or nonbinary participants. Participants in recent exercise physiology research do not appropriately represent the general public; therefore, substantial sex and gender bias persists in the examined literature.

WAVE 8 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Investigating the Epigenetic Effects of Ethanol Exposure on Hippocampal Development in Mice

Presenter(s): Lauren Jennings, Emma Kang, Julia Hwangbo, Shannon Pflueger

Abstract:

Fetal exposure to alcohol results in a variety of cognitive, behavioral, and social abnormalities that exist in a spectrum of outcomes and severity. Research into Fetal Alcohol Spectrum Disorder (FASD) has shown that there are numerous epigenetic mechanisms involved. However, no one has yet built a model which envisions the bigger picture of proteins and modifications at play. We compiled findings from primary articles to create a comprehensive model highlighting alcohol-induced epigenetic modifications within the mice hippocampus. Our literature-based research has two main goals: to present previously identified markers that could potentially be used for earlier FASD diagnosis and to facilitate identification of new markers by compiling past findings into one comprehensive model. Ultimately, it is reported that alcohol exposure impedes normal hippocampal development. Alcohol exposure has been found to affect the expression and activity of proteins such as G9a, HDAC and DNMTs which can alter histone methylation and acetylation levels, as well as DNA methylation levels within hippocampal neurons. These epigenetic modifications correspond to changes in gene expression levels, ultimately altering hippocampal development. Moreover, this model effectively shows that the epigenetic modifications caused by alcohol exposure are complex and may have opposing developmental effects on the hippocampus. However, given it is well-established that alcohol exposure during gestation has adverse effects on brain development, we believe it is the net effect of all the epigenetic modifications which promotes alcohol teratogenicity. This model can help guide future FASD research by highlighting the complexity of the epigenetic mechanisms involved in FASD pathogenesis.

WAVE 8 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Kidney Stone Density and Composition: Effect on PCNL Efficacy

Presenter(s): Myles Ng

Abstract:

Percutaneous Nephrolithotomy (PCNL) is a technique used to remove kidney stones that are too large for other treatment options. PCNL is the accepted standard of care for patients with large kidney stones, replacing open operations in most patients. The surgery involves making a small incision in the patient's flank area and placing a tube through for visualization, breakage, and removal of the stone. Other devices such as a laser or a lithotripter may be used to break up the stone before removal if necessary. There are many key factors in determining the efficacy of PCNL operations, including stone density and stone composition, although their exact impact is unknown. We hypothesize that the residual fragment size and number after PCNL depends on stone density and composition. Our study looks at data from PCNL operations between 2009 and 2015, focusing on the patient's stone characteristics of the residual fragments. Stone density will be evaluated by examining the radio density in Hounsfield units (HU) in patient computed tomography (CT) scans. The data is categorized in 200 HU intervals. Stone composition is determined by stone analysis, with focus on calcium oxalate, calcium phosphate, uric acid, struvite, and cystine. The data is also categorized according to stone size. We expect residual fragments outcomes post-PCNL to be influenced by target stone composition and density. These results will elucidate the efficacy of PCNL on target stones of varying density and composition which may provide insights into treatment choice in kidney stones. Future research may lead to the development of treatments specific for each type of stone and their density.

WAVE 8 POSTER ABSTRACTS

Theme: Health and Wellness

Title: How does Ewing sarcoma, a pediatric cancer, mimic viruses for growth?

Presenter(s): Horton Lai, Andy Jia

Abstract:

Ewing Sarcoma (EwS) is a highly metastatic bone and soft tissue cancer in childhood. In Canada, 30% of EwS patients present with metastasis at diagnosis and risk poor prognosis. Extracellular vesicles (EVs) are small membrane-bound particles secreted by cells for intercellular communication by transporting cargo to recipient cells. EVs released from the EwS cells contain high amounts of a special category of non-coding RNAs called retroelement RNAs (RE RNAs). RE RNAs were recently proven to suppress the immune response against cancer cells through a self-propagation mechanism like viral infections, but their molecular mechanism is yet to be elucidated. We hypothesize that the RE RNAs released in EwS EVs achieve the suppression by causing changes at the genomic level in recipient cells. To test this hypothesis, we propose the reduction of EwS-FLI1 and ADAR1, two factors involved in RE RNAs transcription and editing, in EwS cells. We expect the EVs from the EwS cells to cause changes in recipient cells only when they contain high amounts of edited RE RNAs. We plan to use sequencing techniques to confirm the effects of EwS-FLI1 and ADAR1 reduction on EwS EV-triggered changes in recipient cells. This research will help devise novel strategies to block this viral-like transfer of EV-derived RE RNAs from cancer cells to surrounding tissues, to block immune suppression and stop their metastasis. Given the high metastatic rates and aggressiveness of Ewing Sarcoma, this study has the potential to significantly improve survival rates and change the treatment paradigm of this high-risk malignancy.

WAVE 8 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Evaluation of Chinese Medicinal Plants as Cysteine protease inhibitor sources for the treatment of muscular skeletal and viral diseases.

Presenter(s): Jimin Jung

Abstract:

Cathepsin K (CatK) and SARS-CoV-2 3CL Mpro belong to the cysteine protease family. Cysteine proteases are enzymes that degrade proteins using a cysteine residue as the catalyst. CatK is a predominant collagen-degrading protease in bone-degrading cells, and the 3CL Mpro is the main protease of SARS-CoV-2 responsible for the COVID-19 pandemic. I hypothesized that medicinal plants used in Traditional Chinese Medicine are inhibitor sources for both proteases. The aim of the study was to test aqueous and ethanol extracts of ten medicinal plants for the inhibition of both proteases. The anti-collagenase activity of CatK was monitored by SDS-PAGE. The active site-directed activity for CatK was monitored by the Z-FR-MCA assay, and that of the 3CL Mpro by the MCA-AVLQSGFR-Lys(Dnp)-lys-NH₂ activity assay. The ethanol extracts of five plants showed more than 50% inhibition of collagenase and active-site activity of CatK whereas six aqueous extracts revealed more than 50% inhibition in both assays. Five of ethanol and aqueous extracts inhibited more than 90% of 3CL Mpro activity. The concentrations to achieve 90% inhibition were in the range of 0.2-0.4 mg/mL for the ethanol extracts and 0.5-7 ×g/mL for the aqueous extracts. Among ten plants, *Herba Epimedii* and *Cortex Eucommiae* showed the most potent inhibition towards both CatK and 3CL Mpro. This project demonstrated that plant extracts contain potent inhibitory activities against drug targets of muscular skeletal and viral diseases. In future studies, individual compounds of the most potent plant extracts will be investigated for CatK and 3CL Mpro inhibitory activity.

WAVE 8 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: A Proposal to Compare Traditional and Automated Methods of Steel and Hardening Material Reinforcement in 3D Concrete Printing

Presenter(s): Eren Saydar

Abstract:

3D Concrete Printing (3DCP) is a type of additive manufacturing technology used in the construction industry. 3DCP uses automated construction systems to form objects from 3D modeling by extruding cement-based composites layer by layer. This technology is gaining more attention in the industry because of its potential to decrease the time, cost, and workforce necessary, and its ability to manufacture more complex-shaped and better-quality products with a decreased amount of waste. As a result, it has the potential to change the construction industry to make it more sustainable, both environmentally and economically. However, 3DCP is still not mainstream in the industry due to its high initial cost of automation; but more importantly, it requires additional development in structural reinforcement capability to be implemented in more complex construction processes that warrant such an investment.

This research proposal focuses on the comparison between the automated and simultaneous application of tailored steel and hardening material reinforcement during production to traditional addition of reinforcing steel after the concrete structure is printed. Four samples of 3D concrete structures with either traditionally or simultaneously added steel reinforcement and hardening material will be printed and their structural integrity tested using the three-point bending test. The samples produced in the simultaneously reinforced method are anticipated to perform in the same range as those produced using the traditional method; thereby justifying the initial investment in automation given its similar structural integrity and added overall economic and environmental benefits that can revolutionize the construction industry.

WAVE 8 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Can Physics Labs Meet Learning Goals, And Provide a Meaningful Experience Online?

Presenter(s): Mariposa Casida

Abstract:

Structured Quantitative Inquiry Labs (SQLabs) exchange traditional physics labs where students “cook-up” illustrations of phenomena from lectures using recipe-like manuals, for labs that focus on building student autonomy in critical thinking, experimental design and analysis of uncertainty. SQLabs have already been shown to outperform traditional labs in student ability to use tools effectively and productively reflect on their results. This year, SQLabs’ equipment-free learning goals facilitated PHYS119’s online transition. But are the benefits of SQLabs maintained in the virtual environment?

This study focuses on a virtual lab where students determine whether a pendulum’s period is different at amplitudes of 10° vs 20° . Like many SQLabs, this lab is a model-fail; students’ results disagree with their initial expectations, motivating improvements to their experiment and data until reaching a conclusive “discovery”. Students’ data as well as survey responses regarding their experience in the lab were collected and compared to a fully in-person control group that had used the same simulation. Where comparison is not possible, correlations were used to determine how key aspects of the lab such as discovering the model-fail and getting ideas for improvements are affected by environmental features like communication.

Preliminary results suggest that environmental features do not correlate with key aspects of the lab. However, there is evidence that student trust in the simulation versus a physical pendulum is far more affected by the model-fail in the virtual environment than in the control group. We therefore caution instructors in assuming students experience data-driven discovery as they would offline.

WAVE 8 POSTER ABSTRACTS

Theme: Health and Wellness

Title: Lipid Nanoparticles and Polyglycerol Nanogels for the Delivery of CRISPR-Cas9 Components to Primary Human Keratinocytes

Presenter(s): Danny Liu

Abstract:

Autosomal recessive congenital ichthyosis (ARCI) is a severe monogenic skin disease caused by mutations in the transglutaminase 1 (TGM1) gene in developing keratinocytes. This disease is characterized by reduced barrier function of the skin as well as higher water loss through the epidermis which can result in a greatly reduced quality of life and reduced life expectancy. While current treatments focus on managing ARCI symptoms, gene therapy may offer a curative approach.

Gene therapy is the delivery of nucleic acids such as siRNA, mRNA or CRISPR-Cas9 to treat diseases. While it presents a novel and flexible way to treat diseases, gene therapies are hindered by issues such as low stability of nucleic acids when administered in vivo as well as its inability to traverse cell membranes. To overcome these difficulties, the nucleic acid components of a gene therapy are often paired with a delivery system to facilitate topical delivery of these biomacromolecules in an efficient and effective manner.

We aim to investigate the properties of lipid nanoparticle (LNPs) and polyglycerol-based nanogel delivery systems for the delivery of Cas9 + single guide RNA complexes (RNPs) or a mixture of Cas9 mRNA and sgRNA. The delivery system and nucleic acid components will first be conjugated before being applied to primary human keratinocytes where their properties will be observed. These delivery systems will be assessed on their cytotoxicity, DNA editing efficiency, ability to form stable conjugates with their drug payload and how often they cause mismatch cleavages to the DNA.

WAVE 8 POSTER ABSTRACTS

Theme: Innovation and Technology

Title: Computational Modelling of the Development of Type I Diabetes

Presenter(s): Matthew Chung

Abstract:

Background

The pancreas is an organ located behind the stomach whose tissue is composed of exocrine (acinar) cells that secrete digestive enzymes, and islet cells that secrete hormones. There are two main types of islet cells in the pancreas, α and β cells, that are distributed throughout the acinar cells in clusters called islets of Langerhans. In addition to hormone secretion, β cells are responsible for insulin production. In patients with type 1 diabetes, white blood cells called T cells attack β cells, which stops insulin production.

Main Objectives

Here we investigate how the spatial distribution of exocrine cells and α islets in changes when a patient develops type 1 diabetes. We will study the death of β cells when they are attacked by T-cells and how this process affects the distribution of exocrine cells and other islet cells in the pancreas.

Methods

- 1) The first step involved using Morpheus, a software developed for modeling multicellular systems, to create a simulation that modelled the spatial distribution of exocrine cells as well as α - and β islet cells in a healthy human pancreas.
- 2) I will simulate the development of type 1 diabetes by introducing a fourth cell type that will enter the pancreatic tissue and cause β cell death.
- 3) The simulation will allow me to observe the process of cell death that leads to type I diabetes, as well as allowing me to investigate how the distribution of acinar and α cells changes when β cells die.

WAVE 8 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: The Effect of Temperature on Phototactic Mobility of *Euglena Gracilis*

Presenter(s): Japnit Bhatia, Elle MacLennan, Yasi Yaghoub

Abstract:

Euglena gracilis is a mixotrophic algae that can gain energy through photosynthesis and the ingestion of nutrient particles. Previous research has extensively studied the relationship between temperature and motility; however, much of the effect of temperature on the movement of organisms toward the light (positive phototaxis) is still unclear. The relationship between phototaxis and temperature must be investigated in order to strengthen predictions regarding the effect of increasing global temperatures on *E. gracilis* and its respective ecosystems. Therefore, the objective of our study is to investigate the effect of temperature on the positive phototactic mobility of *E. gracilis*. We predicted that an increase in temperature, until out of optimal range, would increase the rate of positive phototaxis. To test this prediction, we exposed *E. gracilis* to different incubation temperatures: 12°C, 17°C, 25°, and 35°C. Our data was analyzed using a one-way ANOVA test. It was found that there is no statistical difference in the mean cell density at different temperatures ($p=0.728$). The one-way ANOVA test returned an F statistic of $F(3,8)=0.445$, which is lower than the F-critical (4.07), indicating that the variance between the mean cell densities of the *E.gracilis* is not significantly different. Thus, the null hypothesis was not rejected.

WAVE 8

POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Time series comparison of the role of global warming on the tidewater glacier cycle between two different climatic settings.

Presenter(s): Giulio Saibene

Abstract:

Glacier change is often used as evidence of climate change. Tidewater glaciers (TWGs) are unique because they discharge into the ocean and have an intrinsic cycle. Tidewater glaciers are affected by both atmospheric and oceanic warming, and are one of the main contributors to sea level rise posing important societal challenges. The TWG cycle involves a gradual advancing phase until a point of instability is reached followed by a rapid retreating phase, and the cycle may cease with climate change. Global warming is most severe near the poles, however, if temperatures are still cold enough then the effect on the TWG cycle will be minimal. So, how does global warming affect the TWG cycle in different climatic settings?

I will study TWGs for both the warmer climate of Patagonia and the colder northern Greenland. For each of these glaciers I will use optical satellite images collected over the past 50 years to map glacier terminus changes using Geographic Information System software. I will then create a timeseries of the terminus position to identify the role of the TWG cycle in a warmer and a cooler climate. I expect to observe more retreating TWGs in the temperate climate of Patagonia compared to northern Greenland. As global warming progresses, it may be possible to use the results to extrapolate the state of TWGs in northern Greenland to a future where its climate will be similar to the climate of Patagonia today.

WAVE 8 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: The Impacts of Surge Glacier Behaviour on Streamflow.

Presenter(s): Nicolás Harrington

Abstract:

Climate change impacts glacial runoff and its contribution to hydrological systems. Many communities depend on glacial runoff for fresh water, and thus we need to understand how glacial retreat will change runoff for different types of glaciers. Surge-type glaciers are glaciers that undergo long periods of relatively slow movement where volume builds up in the glacier and then a several-fold increase in velocity occurs that can lead to rapid advance and buildup down-valley. Little is understood about whether surge-type and non-surge-type glaciers result in differing amounts of streamflow runoff or variability and peak flows. We seek to answer how the behaviour of surge-type glaciers impacts streamflow on a decadal timescale. We will use the Open Global Glacier Model (OGGM), an online open-source numerical glacier flow model, to simulate the runoff and streamflow for both surging and non-surging glaciers. The comparison between surge-type and non-surge-type glaciers across a variety of different initial conditions will indicate the importance of the surging action to glacial runoff. We hypothesize that the increase in volume mass at lower elevations caused by a surge will lead to an increase in the runoff a glacier contributes. The resulting increased runoff could induce a temporary peak water event, which is a peak in streamflow production during an overall glacier retreat. The results of our study are important to explaining how glaciers' meltwater production will change as climate change continues and developing strategies to counteract impacts and protect communities and ecosystems dependent on glacial runoff.

WAVE 8 POSTER ABSTRACTS

Theme: Sustainability and Conservation

Title: Mercury methylation microbial environments in Northern Canadian Glaciers

Presenter(s): Edward Sun, Jordan Rumscheidt

Abstract:

Methylmercury (MeHg) is a bioaccumulative and toxic form of mercury (Hg), and a developmental toxin that is a global concern for human health. The methylation of mercury is primarily facilitated by anaerobic organisms. Glacier cryoconites are water-filled depressions containing microbial communities, and act as ideal environments for these organisms. While studies have recognized the potential for methylation within cryoconites, methylation capacity has never been assessed, limiting our understanding of how they influence the biogeochemical Hg cycle and the production and degradation rates of MeHg. As global warming increases glacial melt, releasing long-sequestered mercury and promoting the formation of cryoconites, it is critical that our understanding of these cryoconite communities develops. The connection of these potential methylating 'hotspots' to communities' water sources downstream in the Arctic further highlights the importance of this research. This presentation aims to examine what chemical profiling of these microbial rich glacial systems can reveal about methyl-mercury accumulation in glacially linked waterways. We plan to do so by quantifying total mercury (THg) and MeHg levels in cryoconite water and sediments from various glaciers in Northern Canada and comparing them to pre-existing ice core records, as well as tracking MeHg production rates using Hg(II)202 stable isotopes and MeHg198 to track degradation rates over time. Further plans for undertaking this project and the key findings that informed our approach will also be highlighted in this presentation. We aim to examine the influence of mercury methylating glacial environments on MeHg cycling and contamination to glacial meltwaters.



THANK YOU

Thank you to everyone involved for their participation and continued support in making MURC 2021 possible. If you are interested in getting involved with MURC 2022, please visit students.ubc.ca/murc.

We can't wait to see you next year at MURC 2022!