MURC
MAR 21, 2020
MULTIDISCIPLINARY UNDERGRADUATE RESEARCH CONFERENCE
PROGRAM GUIDE
STUDENTS.UBC.CA/MURC
THE IMPACT OF COVID-19

In light of the coronavirus (COVID-19) pandemic, the 2020 Multidisciplinary Undergraduate Research Conference (MURC) was transitioned to an online platform.

Despite the unfortunate in-person conference cancellation, we wanted to provide students the opportunity to showcase their research. Presenters shared their poster or oral presentation during the conference period from April 22 - 30, 2020 through Canvas. The online conference featured 140 presentations by 207 presenters, with 67 adjudicators participating in the process. Conference programming, including the keynote speaker, panelists, workshops, and 3MT presentations were offered through the platform. Additionally, the top three oral and poster presentations were recognized for their achievement.

We want to extend our gratitude to everyone involved for their flexibility and support in making this virtual conference possible.

Within the program guide, you can find a list of the poster and oral presenters who decided to participate in the online platform. We have also included the presentations that would have been showcased at the in-person conference to recognize the hard work put into preparing for these presentations.
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WHAT IS MURC?

Celebrating exciting and innovative undergraduate research at UBC

The Multidisciplinary Undergraduate Research Conference 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.

MURC 2020 is our largest conference to date, featuring over 324 presentations hosted by 533 presenters, and over 140 adjudicators comprised of graduate students and faculty members. Sixteen (16) Faculties and Schools at UBC are represented in our conference.

Additionally, this year’s conference theme is curiosity, a drive to explore the unknown, expand our knowledge of the world, and create new experiences.
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**

8:00 AM - 8:45 AM  **Presenter Registration**  
Ponderosa Commons: Oak House (PCOH) Foyer; West Mall Swing Space (SWNG)

**Delegate Registration**  
Centre for Interactive Research on Sustainability (CIRS) Foyer

9:00 AM - 9:45 AM  **Opening Remarks & Keynote**  
Dr. Grace Lee  
CIRS Rm. 1250

10:00 AM - 11:10 AM  **First Wave**  
Poster Presentations  
Oral Presentations  
PCOH Ballroom & Rm. 1002  
SWNG 210, 205, 206, 207, 208, PCOH 1001

11:20 AM - 12:30 PM  **Second Wave**  
Poster Presentations  
Oral Presentations  
PCOH Ballroom & Rm. 1002  
SWNG 210, 205, 206, 207, 208, PCOH 1001

12:30 PM - 2:00 PM  **Lunch**  
Panel  
Get Into Research Workshop  
PCOH 1003  
PCOH 1001

2:00 PM - 3:10 PM  **Third Wave**  
Poster Presentations  
Oral Presentations  
PCOH Ballroom & Rm. 1002  
SWNG 210, 205, 206, 207, 208, PCOH 1001

3:20 PM - 4:30 PM  **Fourth Wave**  
Poster Presentations  
Oral Presentations  
PCOH Ballroom & Rm. 1002  
SWNG 210, 205, 206, 207, 208, PCOH 1001

4:30 PM - 5:00 PM  **Photobooth & Prize Draw**  
PCOH Foyer

5:00 PM - 6:00 PM  **Awards Reception**  
PCOH Ballroom
Dr. Grace Lee is a neuroscience expert and global educator best known for being the founder of Mastery Insights, a global coaching and education company dedicated to empowering heart-driven professionals to maximize their impact, their income, and reach their highest potential in their business or career.

Dr. Lee is on a mission to redefine modern education, teaching men and women how to unlock true vocational confidence and master their professional destinies. Her mentorship, training, and coaching are rooted in proven principles of neuroscience and business development. To this end, she created a global movement called Career Revisionist – a movement of professionals who are creating an inspired, purposeful, and abundant life.

With a 10-year background helping professionals reinvent their careers, Dr. Grace has deep empathy for those from very humble beginnings. Her personal journey from being orphaned and then homeless at the age of 9 provided the backdrop for her to develop resilience and resourcefulness to survive. After a serendipitous meeting with an older couple who would later become her adoptive parents, Dr. Grace found that her story was resonating, especially how she leveraged education as her “ticket to freedom.”

“NO MATTER WHAT YOUR EDUCATIONAL OR VOCATIONAL BACKGROUND, BEHIND EVERY SUCCESS THERE IS A MOUNTAIN OF OBSTACLES AND AN OCEAN OF UNFAVORABLE ODDS. EVERYTHING LOOKS LIKE A FAILURE HALFWAY THROUGH. PROGRESS OFTEN DISGUISES ITSELF AS PROBLEMS WHEN IN FACT IT IS EVIDENCE OF GROWTH AND IMPROVEMENT.”

students.ubc.ca/murc | #UBC MURC
Jemma Dash  
*Masters Candidate*  

Jemma is a second year MA Cinema and Media Studies student at the University of British Columbia. Her SSHRC funded research focuses on film promotion and social media, particularly the changing form and function of platform-circulated teaser texts. She is currently Editor-in-Chief of UBC’s scholarly film journal, Cinephile.

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Evan Gibbards  
*Masters Candidate*  

Evan is a first year Master of Science student in the Department of Medical Genetics at UBC. He currently researches ovarian cancer using mini models of the fallopian tube called organoids. In the past, he has worked on projects studying epigenetics, synthetic biology, cancer-killing viruses, pathogenic fungi, neurobiology, amphibian conservation, and plant ecology.

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Stefanie Mak  
*Ph.D*  

At UBC’s Centre for Blood Research (CBR), Stefanie develops and delivers education programs that enhance the training, research experience, and career development for the Centre’s 150+ scientists. Prior to her current position, Stefanie was trained as a biochemist and microbiologist, completing her B.Sc. at UBC and Ph.D at the University of Toronto.
Drake Levere
Ph.D Candidate

Drake Levere is a second year Ph.D student in the Health Psychology area. His research focuses on how romantic couples cope and support each other in times of stress. Drake began his research career focusing on sexuality and relationships at the University of Ottawa as an undergraduate student and maintains interest in several areas related to sexuality, relationships, and stress.

Ethan White
Ph.D Candidate

Ethan White is a first year mathematics doctoral student, primarily interested in combinatorics, geometry, and number theory. He is the recipient of the 2019-20 Donald N. Byers Memorial Prize.

Hilal Kina
Ph.D Candidate

Hilal is a PhD student in Anthropology at UBC. Hilal's research deals with the legacy of a multi-ethnic past of Turkey, focusing on contested identities and historical memory in the Black Sea Region. She explores how current inhabitants of the region articulate their understandings of self and belonging in relation to nation-state formation and minority groups.
3MT FINALISTS

Katie
Undergraduate Finalist

Katie is an aspiring astrophysicist who graduated in December from the UBC Department of Physics and Astronomy. She is currently working for the Laser Interferometer Gravitational-Wave Observatory (LIGO) doing data quality studies at UBC. Her Three Minute Thesis research focuses on the importance of safe and sustainable satellite practices.

Riley Louie
Graduate Finalist

Riley is a PhD candidate in Rehabilitation Sciences. With his background as a physical therapist, Riley is interested in advancing the clinical treatment of stroke. Specifically, Riley is currently researching whether the use of a robotic exoskeleton, a device that automates standing and walking, can enhance recovery after stroke.

Laura Stankiewicz
Graduate Finalist

Laura is currently a first year PhD student in Biomedical Engineering. She is interested in understanding how our immune system learns which cells in our body are our own healthy cells and which cells are sick, or invaders. Her thesis research works to understand how our immune cells are trained during their development, and how we can use this knowledge to make immune cells in the lab that can be engineered to kill cancer cells.
PRESENTATION WINNERS

Oral Presentation Winners

First Place | JESSICA BO
Detection of Wheelchairs Using Laser Scanning Sensors for Mobile Robotics

Second Place | CHARUL MAHESHKA
The interaction between perception and language: How we reason about quantities

Third Place | TAMILA KALIMULLINA
A Non-invasive Neuroprosthesis for Cardiovascular Recovery after Spinal Cord Injury

Poster Presentation Winners

First Place | SARA KOWALSKI & JENNIFER WONG
Curcumin Prevents the Anti-inflammatory Agent, Triptolide, from Inducing Liver Damage

Second Place | AYSHA ALLARD BROWN
Evaluating the Congruency Between Intraparenchymal and Subdural Intraspinal Pressure in a Porcine Model of Acute Spinal Cord Injury

Second Place | ABIGAIL YUEN
Are some careers worth higher pay? Communion, collectivism, and occupational prestige across cultures

Third Place | LIAM FOULGER
Effects of Gaze Direction on the Three-Dimensional Vestibulo-Ocular Reflex Evoked by Electrical Vestibular Stimulation

Interdisciplinary Award

LARISSA CHIU
The influence of an acute bout of exercise on sensorimotor integration
ACKNOWLEDGEMENT

Event Volunteers

Dayle Balmes
Guramrit Bamrah
Francesca Berthiaume
Navneet Bhangu
Joshua Chen
Michelle Chen
Eric Chung
Lea Farah
Aanisah Golam
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Elis Kang
Vismai Khanderao
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Grace Lee
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Review Committee

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Dr. Yvonne Lamers
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Dr. Dave Michelson
Dr. Gabriel Potvin
Dr. Jason Read
Dr. Liang Song
Dr. Kristen Walker
Dr. Ashley Welsh

Presenter Workshops

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Che-Min Lee
Zujia Yang
Aaron Zhuo

Centre for Writing & Scholarly Communication

Dr. Patty Kelly
Liam Monaghan

Day of Programming

Dr. David Oliver
Freddy Francis

Special thanks to Dr. Sharon Stein
## Adjudicators

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<tr>
<th>Name</th>
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<td>Shahid Abrar ul Hassan</td>
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<td>Zhiyin Zheng</td>
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PLANNING COMMITTEE

Meet the team

STAFF ADVISORS AT THE CENTRE FOR STUDENT INVOLVEMENT AND CAREERS
Irene Chou
Sandra Wan
Selynn Yeap

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Amelia Tjoa
Amy Li

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LOGISTICS DIRECTORS
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Catherine Gai

VOLUNTEERS DIRECTORS
Syed Rafid Haq
Ho-Young Jung

COMMUNICATIONS & PROMOTIONS DIRECTORS
Vanessa Kim
Sarah Jiang
The Influence of an Acute Bout of Exercise on Sensorimotor Integration

Larissa Chiu

A Systematic Review and Meta-Analysis of Patient’s Knowledge of Oral Antithrombotics

Jinny Choi
Elaine Hu
William Shen
Amelia Choy


Taewoong Chae

Anhedonia and Depression Severity in Adolescent Women

Sabrina Ge

Omega 3 Fatty Acid Modulation of E. coli-induced Inflammatory Responses in Human Blood

Sara Kowalski
Jennifer Wong

Does Protein Supplementation Attenuate Myonuclear Loss During Disuse-Induced Muscular Atrophy?

Jaspreet Khaira

The Epigenetic Impact of Dietary Polyphenols on the Responsiveness of Leukemia Cells to an Anti-Cancer Demethylating Agent, Decitabine

Cayla Boycott

Sweet Dreams: Sleep Concordance and Hemoglobin A1C in Post-Stroke Individuals and Their Partners

Alexandra Yam

The Outcomes for Patients Accessing Addiction Care (OPAC) Study: Preliminary Findings From a Hospital-Based Cohort Study of Individuals With a Substance Use Disorder

Piper Dickhout

Sub-Inhibitory Treatment of Gentamicin in Escherichia coli Decreases T7 Bacteriophage Infectivity and Cell Lysis

Mahta Amanian

The Effect of the Enzyme, DHHC6, on the Growth and Function of Hippocampal Neurons

Ashleigh Nazareth

Reimagining Obstetric Violence: An Ethnography of Legitimacy, Access, and Collaboration in Rural Chiapas, Mexico

Dominique Bowden
The Divide in Narratives Among Newspapers – Understanding Identities in Hong Kong

Wing Huen Candice Chan

The Interaction Between Perception and Language: How We Reason About Quantities

Charul Maheshka

Leadership Gender Disparity Within Research-Intensive Medical Schools

Jeffrey Ding

Lack of Gender Differences Among Administrative Leaders of Canadian Health Authorities

Jeffrey Ding

How Well One Can Identify Emotions Is Impacted by Perceived Socioeconomic Status and Economic Inequality

Lydia Guengerich

Indigenous Methodologies: Toward Telediabetes and Obesity Care for Urban Indigenous Communities

Aidan O’Callahan

Measuring the Emergence of Metacognition in Early Childhood

Nicholas Fai

How Does Social Status Affect Prosocial Giving Behaviour?

Xiong-Jie Aaron Zhuo

Who Should We Trust: Does Subjective Certainty Influence Children’s Learning?

Eliscia Sinclair

Closing the Gap: Partisan Divides in Support for Gender Pay Equity Policies

Jennifer Vincent

The Referential Scope of Bilingual Infants’ Early Words: Effects of Language Experience

Ana Ivkov

The Effect of Blindness on Imaginativeness

David Shifflett

Investigating the Effects of a High-Fat, High-Sugar Diet on Cue-Enhanced Risky Decision Making in Rats

Andrew Li

Loot Box Opening-A Surprising Result

Chung-Hui Huang
Calvin Ho
Rachel Hueller
Ian Daly
Gabrielle Landry
Conditioned Incentive of Alcohol and Cannabis Cues in Relation with Level of Substance Use
Kaylene Scheil

Latent Space Exploration of Generative Art
Megha Singhania

Camera System for Monitoring Sapsucker Offspring in Cavity Nests
Jamie Clarke

Cost-Benefit Analysis on New Methods in the Prevention of DNA Induced Corrosion in Silicon Photonic Biosensors
Maggie Chong Patricia Dayao Rafaela Zamataro

Detection of Wheelchairs Using Laser Scanning Sensors for Mobile Robotics
Jessica Bo

Optical and Optomechanical Methods of Testing Gravity
Hrishikesh Patel

A Non-invasive Neuroprosthesis for Cardiovascular Recovery After Spinal Cord Injury
Tamila Kalimullina

Maximizing Utilization of Electric Vehicle Charging Infrastructure in Surrey, BC Using a Data-Driven Model
Laura Greenstreet Yujing Lai

Paying the Piper: A Triple Layer Core Annular Flow Study
Ethan Elliot Rajkumar

Neuroimaging Evidence of Predementia Brain Changes in Genetic Frontotemporal Dementia: A Review of C9orf72 Genetic Mutation Carriers
Soo Yeon Kwon Bertina Lee Christopher Mok Hannah Ro

CNx as a Possible Heterogeneous Catalyst for Photoredox Reactions
Quinn Krahn

Investigating the Role of Cerebrospinal Fluid in Head Impact Biomechanics Through Physical Experimentation
Yi Yi Du

Cryopreservation of Human Umbilical Vein Endothelial Cells Using a Novel Biocompatible Polymer
Vriti Bhagat

Applications of Neural Networks in the Study of Partial Differential Equations
Hrishikesh Patel

X-ray Vision: Seeing Radiation From Medical Procedures
Reece Walsh Joan Brewer Andrew Nicholson
Personal Exposure Assessment of Particulate Matter: A Comparison Between Wearables and Fixed-Site Sensors
Ho Yin Andy Hung
Cole Plater

Using Transcranial Direct-Current Stimulation to Improve Motor Skill Learning in Children with Developmental Coordination Disorder: A Randomized Controlled Trial Protocol
Elena Klimova

What Lessons Can India Learn From China in Increasing the Adoption of New Energy Vehicles?
Deyvika Srinivasa
Jiayi Du
Mohammad Ahmed

Detectability and Quantitative Analysis for PSMA PET Scans Using an Anthropomorphic Phantom and Heterogeneous Radioactive Epoxy Spheres
Roberto Fedrigo

Rapid Retrieval of the T2 Spectrum in Myelin Water Imaging Data Using a Deep Learning Approach
Lorna Tu

Measuring the Entropy of a Quantum Multi-State System
Owen Sheekey

Bite or Flight: Antipredator Responses as a Function of Web Architecture
Jessica Schmidt
Yi Lin Zhou

Rubisco’s Evolution, Inherent Limitations, and Challenges in the Face of Rising Crop Demands and Climate Change
Farshad Felfelian

Morphological Differentiation of Cryptic Coralline Algae
Jade Shivak

Green Exercise: Flourishing in Nature
Otis Geddes

The Role of Epigenetics in Female Honeybee Caste Differentiation
Madina Kagieva
Chantane Yeung
Elias Pohl Martinez

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Norbert Banyi
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Aysha Allard Brown

Investigating the Relationship Between trf-1 Gene on mig-15 in Nervous System Patterning  
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Curcumin Prevents the Anti-inflammatory Agent, Triptolide, from Inducing Liver Damage  
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Sara Kowalski

Uncharted Waters: Insights from a 100-Subject Myelin Water Imaging Atlas  
Taylor Swift-LaPointe

Determinants of Urosepsis Following Treatment of Struvite Stones  
Elizabeth Schjelderup

Huntington’s Disease: Altered Striatal Neural Activity and Behavioural Deficits in YAC128 Mouse Model  
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Faiza Khan  
Trachint Lail  
Shawn Badesha

Investigating the Association of Herpesvirus Infection on the Development of Alzheimer’s Disease  
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Implementation of a Myocardial Injury After Non-Cardiac Surgery Surveillance Protocol on Surgical Patients at St. Paul’s Hospital  
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Using Crispr Genome Editing to Understand the Role of K-Ras Gene G12 Mutations On Pancreatic Adenocarcinomas  
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Comparing Neuropsychological Tests of Planning Deficits in Hoarding  
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Do Individuals With Colorectal Cancer Identify With the Meaning of “Cancer Survivor”
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The Longitudinal Association of Adolescent Self-Perceived Body Dissatisfaction With Future Incidence of Anxiety
Tracy Wang
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Awareness of Oral Dysplasia in Newly Diagnosed Patients
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Children’s Ability to Detect Confidence and Emotion From People’s Paralinguistic Cues
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The Impact of Culture on Body Dissatisfaction in Aesthetically-Focused Sports: An Examination of Eastern and Western Cultural Backgrounds
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The 24-hour Urine Collection Has a Limited Role in the Prevention of Kidney Stone Recurrence

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Nucleoporin 62 Cleavage Promotes Coxsackievirus B3 Replication

Sana Aghakeshmiri

Is Dichotomous Scoring of Bleeding With a Standard Periodontal Probe Reliable in Assessing Peri-Implant Inflammation?

Ashley Chicote

Anode Design for Electrochemical Advanced Oxidation Process (eAOP): To What Extent Are Boron-doped Diamond Paste Electrodes (BDDPEs) Suitable for the Treatment of Organics in Water?

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Simulation of Neural Crest Cell Migration in Embryonic Development of the Nervous System

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Analyzing How Students Process Questions on Exams

Alyssa Gutierrez

Investigating the Role of Silver Nanoparticles (AgNPs) and Hydrophobic Coating as a Surface Additive to Reduce Bacterial Contamination on Novel 3D-Printed Medical Devices

Atishay Jay

fMRI Analysis of Functional Brain Networks Involved in Three Memory Tasks in Healthy Individuals

Han Hsiao

Investigating the Prevalence of Needlestick Injuries in Non-Clinical Settings in British Columbia and Examining the Effect of Safety Engineered Devices in Minimizing Needlestick Injuries

Aahana Kanyal

The Effects of Virtual Reality on Depressive Symptoms and Sedentary Behaviour in Inpatient Stroke Survivors: A Pilot Randomized Controlled Trial

Nicole Ketter Lydia Wood
Advancement in the Optical Electronics Industry: Controlling the Chain Length of Polythiophenes

Yao Zhang

Effects of Gaze Direction on the Three-Dimensional Vestibulo-Ocular Reflex Evoked by Electrical Vestibular Stimulation

Liam Foulger

A New Technological Paradigm for Low-Cost, Decentralized Vaccine Manufacture at Point-of-Use

Kenechukwu Ene

Joshua Pak

The Impact on Rat Pup Development When Dams Are Able to Spend Time Away

Alexandra San Pedro

Manipulation of the Immune Microenvironment in Bone Marrow to Increase Susceptibility of CAR T-Cell Treatment.

Ria Bhatt


Kristine Lin

Nature vs Nurture: A Cellular Pathway for the Developmental Fate of Female Honeybees

Oi Ting Kwok

Golzar Eijadi

Applications of Molecular Dynamics Simulations in Chemistry

Sam Cheng

Automation Home Using EEG and EEG Acquisition System

Han Nguyen

Kalen Forrester

Public Perceptions Regarding Cow-Calf Rearing Systems within the Dairy Industry

Kenny Go

Adaptive Divergence and the Evolution of Dominance and Segregation Variance in Stickleback

Avneet Chhina

Exploring the Impact of Range Expansion on Traits Related to Fitness and Adaptation

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Local Glucocorticoid Synthesis in the Brain and Immune Organs

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The Effect of Copper Sulfate on the Swimming Speed of Wild Type CC-1690 Chlamydomonas reinhardtii

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Christina Melo

Emily Chorpita

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Relating Earthworm Biomass to Length and Land Use on the UBC Farm
Savitri Raghuraman
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Christie Crews
Samadhee Kaluarchchi
Tristan Kozyniak
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Temporal Trends in Hydroclimatology of Canadian Catchments
Megan Blackwell
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The Plight of the Piping Plover: An Analysis of the Effectiveness of Environmental Assessments in Species Protection
Louisa Hsu
Can Wen

The Effects of Climate Change on River Geomorphology
Xinyue Liang
Alvin To
Negah Rahmaty
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West Mall Swing Space: 2175 West Mall, Vancouver, BC V6T 1Z4
Ponderosa Commons: Oak House, 6445 University Boulevard

PCOH 1001
The Relationship Between Post-Stroke Couples’ Eating Habits and Their Health Outcomes  Emma Gangbar
A Quality Improvement Initiative: Assessing Patient Satisfaction in the Spinal Cord Clinic (SCC) Using a Modified PSQ-18 Survey  Taewoong Chae, Catherine Binda
Reconstruction of Constructed Languages: Personalizing Mar’osha Words to Facilitate Individual Mental Wellbeing  Shaniya Anand
Testing the Efficacy of a Goal-Setting Intervention to Enhance Students’ Meaning in Life  Michael Hunter
Physical Activity Experience of International Students at UBC Vancouver campus  Ruimiao Yang

SWNG 205
Anhedonia and Depression Severity in Adolescent Women  Sabrina Ge
Omega 3 Fatty Acid Modulation of E. coli-induced Inflammatory Responses in Human Blood  Sara Kowalski, Jennifer Wong
The Community Maternal Danger Score: A 7-Domain Risk Assessment Instrument  Rajan Bola
How does returning to sport after sustaining multiple injuries influence a student athlete’s psychological well-being?  Sitong Zhang, Ivana Abrigo
The Association between Choroidal Thickness and History of Cerebrovascular and Cardiovascular Disease  Mehar Singh
**SWNG 208**

Stress Response Terminology in Vertebrate and Invertebrate Research Papers: A Corpus Study
Laura Griffin  
Jesse Hawker  
Mira Macnair

The Divide in Narratives among Newspapers – Understanding Identities in Hong Kong
Wing Huen  
Candice Chan

Leadership Gender Disparity Within Research-Intensive Medical Schools
Jeffrey Ding

Measuring the Emergence of Metacognition in Early Childhood
Nicholas Fai

**SWNG 207**

Investigation of Sea Ice Adhesion for Developing Passive Ice Mitigation Surfaces
Wenting Luo

Latent Space Exploration of Generative Art
Megha Singhania

Camera system for monitoring sapsucker offspring in cavity nests
Jamie Clarke

Cost-Benefit Analysis on New Methods in the Prevention of DNA Induced Corrosion in Silicon Photonic Biosensors
Maggie Chong  
Patricia Dayao  
Rafaela Zamataro

Machine Learning in Particle Physics
Alex Wen

**SWNG 210**

Detection of Wheelchairs Using Laser Scanning Sensors for Mobile Robotics
Jessica Bo

Optical and Optomechanical Methods of Testing Gravity
Hrishikesh Patel

CNx as a possible heterogeneous catalyst for PhotoRedox reactions.
Quinn Krahn

X-ray Vision: Seeing Radiation from Medical Procedures
Reece Walsh  
Joan Brewer  
Andrew Nicholson

Measuring the entropy of a quantum multi-state system
Owen Sheekey
SWNG 206

Affect of genetic architecture on speciation
Asli Munzur

Trace metal interactions: Bumble bee exposure to trace metals in anthropogenic environments
Jennifer Lipka

Green Exercise: Flourishing in Nature
Otis Geddes

Negative Heritage & the Anthropocene: A Case Study of Tropical Rainforest Heritage of Sumatra
Camille Morissette

Paper straws: an investigation into surface modification of cellulose
Norbert Banyi
Jordan Hassett
**WAVE 1 | POSTER PRESENTATIONS**

**LIST | 10:00AM - 11:10AM**
Ballroom & PCOH 1002
Ponderosa Commons: Oak House, 6445 University Boulevard

**Theme: Health and Wellness**

- Evaluating the Congruency Between Intraparenchymal and Subdural Intraspinal Pressure in a Porcine Model of Acute Spinal Cord Injury
  - Aysha Allard Brown

- Investigating the relationship between trf-1 gene on mig-15 in nervous system patterning
  - Kanwarpreet Dhaliwal

- HPA Axis and Serotonin (5-HT) 1A Receptor Responses to Repeated Restraint Stress in Male and Female Rats
  - Maya Koblanski

- Generation of human TAP1 and UBE2O knockout cells with CRISPR/Cas9
  - John Kim

- A systematic review and meta-analysis of patient’s knowledge of oral antithrombotics
  - Jinny Choi, Elaine Hu, William Shen, Amelia Choy

- Huntington’s Disease: Altered Striatal Neural Activity and Behavioural Deficits in YAC128 Mouse Model
  - Judy Cheng, Faiza Khan, Rory Kelly, Shawn Badesha

- Granzyme B in the Retinal Pigmented Epithelium of the Mouse Eye
  - Jacob Ng, Miranda Tsuyuki

- The osmotic environment influences Escherichia coli adaptation to T4 infection
  - Derrick Chong

- Endometriosis is Associated with Central Sensitization
  - Gilbert Lee, Jessica Hebert
Diverse S24-7 Responses to Osmotic Perturbation
Sarah Popple

Pregnancy Outcomes among Women with Rheumatic Mitral Valve Stenosis
Sherry Sandhu

Transcriptome and DNA methylation dissection of Non-small-cell lung cancer
Ali Hosseinzadeh
Bahar Ahmadi
Masih Sarafan
Jennifer Cheung

Smoke-free Dads: A game-changer for better health
Angela Leung

Maternal Genotype and Ethanol-Induced Cell Death in the Mouse Embryo: A Model to Study Fetal Alcohol Spectrum Disorder
Constance de Schaetzen
Chris Chen
Cheryl Tan

Characterizing the Influence of Chronic E-Cigarette use on Lung Cancer
Syed Zaidi
Annabel Chen
Marina Toma

Invadopodia-Master Regulators of Tumor Cell Dissemination
Layla Bleibel
Shanzeh Chaudhry
Angeleet Dhanda

**Theme: Individual, Community and Society**

New to Vancouver: Residential Mobility and Cardiovascular Disease Risk
Rachel Karasenty Saltoun

Major Depressive Disorder (MDD): Patient Journey to Better Health Outcomes
Yuet Ting Ma

Creating a Research Ethics Vetting Guide for Pedagogical Research in Pharmacy Education
Franklin Hu

Assessing the correlation between weather conditions and pedestrian collisions with motorized vehicles
Jennifer Park
Anmol Sangha

An Evaluation of Physical Assessment Teaching in Entry-to Practice PharmD Programs in Faculties of Pharmacy Across Canada
Serena Quan

Support care needs among individuals with colorectal cancer: A qualitative study
Liz Huang

Substance Use Memory Associations in Adolescents
Camille Roney
Do individuals with colorectal cancer identify with the meaning of “cancer survivor”  

Myles Wee

The longitudinal association of adolescent self-perceived body dissatisfaction with future incidence of anxiety  

Tracy Wang  
Tina Huynh  
Leanne Hui  
Hoa Jae Chew

Affording Orphan Medications in Canada  

Matthew Cheng

The effects of video games on students academic performance  

Benjamin Li

Awareness of Oral Dysplasia in Newly Diagnosed Patients  

Natyra Haxhiavdija

How Sleep Quality Vary Between International and Native Asian-Canadian University Students: A Look into How Psychosocial Factors Play a Role in Sleep  

Stefanie Ng  
Alan Wang  
Joyce Xie

The Galiano Food Program  

Thao Hoang  
Kamila Gabitova

Context Effects on Affective Forecasting  

Arathi Mohanachandran

Adolescents & Vaping Advertisements  

Donelle Pavey

Theme: Innovation and Technology

The 24-hour Urine Collection has a Limited Role in the Prevention of Kidney Stone Recurrence  

Ruixuan Yang

Is Dichotomous Scoring of Bleeding with a Standard Periodontal Probe Reliable in Assessing Peri-Implant Inflammation?  

Ashley Chicote

Investigating the prevalence of needlestick injuries in non-clinical settings in British Columbia and examining the effect of safety engineered devices in minimizing needlestick injuries.  

Aahana Kanyal

Spatiotemporal and Structural Analysis of the G-Protein-Coupled Receptor/14-3-3 Protein-Protein Interactions Using Proximity Labeling  

Fardad Asghari Zadeh

The relative contribution of the upper face and lower face to the recognition of dynamic faces  

Sena Youn
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Ponderosa Commons: Oak House, 6445 University Boulevard

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The influence of an acute bout of exercise on sensorimotor integration  Larissa Chiu

Effects of alcohol on functional brain networks using fMRI data  Neall Struwig

Pharmacological inactivation prior to set-shifting shows prelimbic cortex involvement in some forms of behavioural flexibility  Angela Chuang

SWNG 205
Influence of Serotonin on non-associative learning in C. Elegans  Eden Dubchak

Does Protein Supplementation Attenuate Myonuclear Loss During Disuse-Induced Muscular Atrophy?  Jaspreet Khaira

Capacity and Consent in Pediatrics: Examining Cases of Mature Minors  Stephanie Quon
  Dana Lao
  Chu Chien Lin Ryan Lazenby
  Vlada Asadulaeva

The Outcomes for Patients Accessing Addiction Care (OPAC) Study: preliminary findings from a hospital-based cohort study of individuals with a substance use disorder  Piper Dickhout
**SWNG 208**

The interaction between perception and language: How we reason about quantities  
Charul Maheshka

How well one can identify emotions is impacted by perceived socioeconomic status and economic inequality  
Lydia Guengerich

Homogenization of Indigenous Peoples through Pipelines  
Kritika Joshi

Bias in the Legal System: How Race and Confessions Impact a Verdict  
Keeley Lainchbury

Conditioned Incentive of Alcohol and Cannabis Cues in Relation with Level of Substance Use  
Kaylene Scheil

**SWNG 207**

Rapid Step Detection in Biophysical Data  
Ryan Karimi

Neuroimaging evidence of predementia brain changes in genetic Frontotemporal Dementia : A review of C9orf72 genetic mutation carriers  
Soo Yeon Kwon, Bertina Lee, Christopher Mok, Hannah Ro

Human facial expression as a measure of emotional response toward farm animal management procedures  
Lexis Ly

Investigating the role of cerebrospinal fluid in head impact biomechanics through physical experimentation  
Yi Yi Du

Cryopreservation of Human Umbilical Vein Endothelial Cells using a Novel Biocompatible Polymer  
Vriti Bhagat

**SWNG 210**

A Non-invasive Neuroprosthesis for Cardiovascular Recovery after Spinal Cord Injury  
Tamila Kalimullina

Generating a Rapid Growing Mycobacterium Mutant Library for the Pre-Clinical Screening of Potential Anti-Mycobacterial Compounds  
Sara Dalkilic
Maximizing Utilization of Electric Vehicle Charging Infrastructure in Surrey, BC using a Data-Driven Model
Laura Greenstreet
Yujing Lai

Water Treatment Innovation: UV-LED’s in water disinfection for small communities
Jelena Radovanovic
Jingyi Wang

Paying the Piper: A Triple Layer Core Annular Flow Study
Ethan Elliot Rajkumar

SWNG 206
“Can Imagining the Future Increase Pro-Environmental Tendencies?”
Hayley Carolan

Rubisco’s Evolution, Inherent Limitations, and Challenges in the Face of Rising Crop Demands and Climate Change
Farshad Felfelian

A meta-analysis on aerobic and anaerobic capacities of fish
Bog E So
Jennifer Mak

The Role of Mannan in More Efficient Industrial Processing of Plant Biomass
Radmanesh Khalili

Transient Killer Whale Presence in the Salish Sea from 2017 to 2018
Taryn Scarff
WAVE 2 | POSTER PRESENTATIONS

LIST | 11:20AM – 12:30PM
Ballroom & PCOH 1002
Ponderosa Commons: Oak House, 6445 University Boulevard

**Theme: Health and Wellness**

Implementation of a myocardial injury after non-cardiac surgery surveillance protocol on surgical patients at St. Paul’s Hospital

Monica Hsieh

Developing a Transdermal Drug Delivery System for Improved Delivery of Antidepressants: Validating Bioavailability with Novel Formulations and Patch Materials in In Vivo Model

Daisy Ye

Saccadic eye movement as a biomarker of Parkinson’s Disease

Phoenix Au-Yeung

The Association between Pre-eclampsia and Parity: A Review

Lutfiyya Devji

The Use of Genome Instability to Improve Immunotherapy Treatments Against Glioblastoma

Megan Pan

Characterization of influenza A virus mutants with mutations on nuclear localization signals

Crystal Ma

Identifying the Genetic Source of Variation in Caenorhabditis elegans Male Mating Success

Taylor Reilly

Uncharted Waters: Insights from a 100-Subject Myelin Water Imaging Atlas

Taylor Swift-LaPointe

Exploring Novel Genes for Obesity in Mice

Lauren Eggenberger

Determinants of Urosepsis Following Treatment of Struvite Stones

Elizabeth Schjelderup

Investigating the Association of Herpesvirus Infection on the Development of Alzheimer’s Disease

Guadalein Tanunliong
Production of Extracellular Matrix as a Highly Deregulated Process in HPV-positive Oropharyngeal Tumors

Maria-Fernanda Arcila
Anna Malikovskaia
Jasmine Singh
Nazia Nadir

Treatment of Multiple Sclerosis with TGF-β

Ethan Lee
Brenda Ma
Ryanne Uy

The Effects of DYRK1A Gene on Neuronal Morphology and Synapse Formation in Hippocampal and Dorsal Root Ganglion Cells

Minseon Jung
Arman Mojtabavi

Exploring the role of ILK-mediated chemoresistance in highgrade osteosarcoma

Bea Liston
Haley Biggin
Serena Zhang
Shuren Batkhuu

**Theme: Individual, Community and Society**

Substance Use Perceptions Amongst Canadian Youth Post-Cannabis Legalization

Connie Ku

Ayurveda and Mental Illness

Laura Jones

Towards a national implementation of Trauma Team Training in Kenya

Rajan Bola

Assessing Pharmacy Student Performance on Practicum Using a Dreyfus Model of Skill Acquisition Framework: An Evaluation of Student, Practice Educator and Faculty Perceptions

Karen Li

Diabetes: Journey to Better Health Outcomes

Lara Donison

Influence of Defendant Emotional Expressions on Jury Decision Making

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Karyn Huang
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Linguistic Diversity: Children’s Perceptions of Homogeneous and Heterogeneous Linguistic Groups

Golzar Ejadi
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Developing a Transdermal Drug Delivery System for Improved Delivery of Antidepressants: Synthesizing a Liposomal Formulation and its In vitro and In vivo Assessment

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Ponderosa Commons: Oak House, 6445 University Boulevard

**PCOH 1001**
Sweet Dreams: Sleep Concordance and Hemoglobin A1C in Post-Stroke Individuals and their Partners  
Alexandra Yam

Association of Pre-Operative Diuretic Use with Risk of Acute Kidney Injury in Infants following Cardiac Surgery  
Adrija Chakrabarti

Physical Activity Participation among South-Asian immigrant women  
Ritika Saraswat  
Anjali Gandhi

**SWNG 205**
Evaluating Visuomotor Coordination in Children with Amblyopia  
Sabrina Hou  
Yu Yan Zhang

Resisted Exercise Initiative: Use of resisted exercise by physiotherapists for older adults in BC (RExI)  
Amber Chan

The statistics of the head movements experienced during natural self motion  
Ali Afshar Zanjani

Pelvic floor muscle activation during targeted maneuvers, walking and running  
Maya Sato-Klemm

The epigenetic impact of dietary polyphenols on the responsiveness of leukemia cells to an anti-cancer demethylating agent, decitabine  
Cayla Boycott

**SWNG 207**
Lack of Gender Differences Among Administrative Leaders of Canadian Health Authorities  
Jeffrey Ding
The Effect of Animal Shelter Operations on Activity Level and Hiding Behaviour of Cats

Hannah Spitzer

Indigenous Methodologies: Toward telediabetes and obesity care for urban Indigenous communities

Aidan O’Callahan

Sense in Numbers: The Approximate Number System’s Impact on Error Detection and Symbolic Math Performance in Children

Anna Gao

How does social status affect prosocial giving behaviour?

Xiong-Jie Aaron Zhuo

SWNG 208

Who should we trust: Does subjective certainty influence children’s learning?

Eliscia Sinclair

Across domain certainty in children

Tanya Pardiwala

Gender Performativity in Rhythmic Gymnastics: Denormalizing Body Regulation

Anastasiya Mozolevych

Closing the Gap: Partisan Divides in Support for Gender Pay Equity Policies

Jennifer Vincent

Canadian Family Court Decisions Regarding Parental Cannabis Use

Tyler Arnold

SWNG 210

The Gravity of Machine Learning: Using Linear Regression to Infer Stellar Surface Gravity

Maryum Sayeed

Applications of Neural Networks in the Study of Partial Differential Equations

Hrishikesh Patel

A Clew into Improving Targeted Drug Delivery through pH-dependent DNA Origami

Kendrew Wong

Xiao Yu Yan

Immanuel Abdi

Janelle Cheung

Retrospective Analysis of Dental Implantability of Mandibular Reconstructions Using In-House Surgical Guides

Khanh Linh Tran
Personal exposure assessment of particulate matter: a comparison between wearables and fixed-site sensors

Ho Yin Andy Hung
Cole Plater

**SWNG 206**

Seasonal copper speciation in the Strait of Georgia: Implications for copper toxicity in the aquatic food web

Lori-jon Waugh

Morphological Differentiation of Cryptic Coralline Algae

Jade Shivak

The combined effects of temperature, ocean acidification and food stress on green sea urchins

Adrienne Holland

The Effect of Environmental Quality on Evolution: Towards a Quantitative Understanding

David Bromley

The role of epigenetics in female honeybee caste differentiation

Madina Kagieva
Chantane Yeung
Elias Pohl Martinez
LIST | 2:00PM – 3:10PM
Ballroom & PCOH 1002
Ponderosa Commons: Oak House, 6445 University Boulevard

Theme: Health and Wellness

Comparing Neuropsychological Tests of Planning Deficits in Hoarding  
Anh Duong Phan

Peer mentoring for children with ASD  
Jingya Huang

Biological Deformity Based Red Blood Cell Separation with Deterministic Lateral Displacement Devices  
Chengzhe Li

Studying the evolution of the N-terminal of TATA-binding protein in eukaryotic species  
Li Ju

Curcumin Prevents the Anti-inflammatory Agent, Triptolide, from Inducing Liver Damage  
Jennifer Wong

Identifying the Primary Signal in Mitochondrial Outer Membrane Permeabilization Induced Apoptosis  
Zhuo Yao Liang

Sub-Inhibitory Treatment of Gentamicin in Escherichia coli Decreases T7 Bacteriophage Infectivity and Cell Lysis  
Mahta Amanian

Autocrine Angiopoietin-1/Tie2 signaling in cardiac fibro/adipogenic progenitors helps to control heart function at homeostasis  
Lucas Rempel

Using CRISPR Genome Editing to Understand the Role of K-RAS Gene G12 Mutations on Pancreatic Adenocarcinomas  
Xindi Wang

Immune response regulation in neonatal monocytes by mTOR inhibitor DDIT4L  
Emma Ackermann
Determining the Characteristics of Dexamethasone and Lenalidomide Resistance through Transcript Analysis of Multiple Myeloma

Jenny Lee

Binding Affinity Analysis of Treg Receptor Variants to Improve Transplantation Efficacy

Kevin Salim

Determining the effects of extracted cinnamon polyphenols on glucose uptake in insulin-resistant cells

Laveniya Kugathasan
Andrea Olaizola
Novia Chao
Rana Ahmed Barghout
Jessica Yamamoto
Bianca Kirsh
Meriem Satra
Olivia Kim

Exploring the effects of urease activity on Proteus mirabilis adhesion and invasion in kidney epithelial cells

Ashley Tong
Hana Kim
MJ Herrin
Patricia Balmes

Investigating the Mechanisms of Human Skin Aging

Fatemeh Moradkhan
Kimberley Hu
Amitis Ebrahimi
Meghan Jefferies
Zhuohui Lin

**Theme: Individual, Community and Society**

ZooMS Collagen Analysis Reveals Origins of 16th Century Human Anatomy Book

Curtis Logan

Factors Associated with Cessation or Reduction of Methamphetamine Use among Gay, Bisexual and other Men who have Sex with Men (gbMSM) in Vancouver, Canada

Brooke Cheng


Christa Yeung

Differentiating between Trait and State Measures of Purpose in Life and their Relationships to Physical Activity

Armina Rahimisoureh
Mental Health Outcomes in New Fathers and the Impact of Mindfulness-Based Intervention

Manreet Bhullar

Barriers and Facilitators to Inclusive Aquatics Programming for Children with Mental and/or Developmental Challenges

Kathy Xie

Best Practices, Strategies, and Interventions to Improve Road Safety in Indigenous Communities: A Scoping Review

Rebecka Lee

Anticipated Reactions to Perspective-Taking

Dong Wook Kim

Agency and Illness: Examining Social Roles in Clinical Papers

Anne Hayward

Exploring children’s estimation abilities across number, length and area

Emily Borrell

Functional Brain Networks Involved in Hypersalience of Evidence-Hypothesis Matches in Patients with Delusions and Schizophrenia

Linda Chen

Sustenance Festival: Amplifying Underrepresented Voices

Rebecca Suen
Kelly Bateson

The Association between Pre-eclampsia and Placental Malaria: A Review

Zamara Chisti
Manat Bains

What are the social perceptions of ethics of synthetic meat and willingness to pay for it?

Shirui Wang
Turni Saha

“My Parents Can Never Find Out”: Exploring the Double Lives of South Asian Young Adults

Sherry Sandhu
Baneet Parmar

**Theme: Innovation and Technology**

Effects of Gaze Direction on the Three-Dimensional Vestibulo-Ocular Reflex Evoked by Electrical Vestibular Stimulation

Liam Foulger

Spatiotemporal histopathological patterns of the porcine spinal cord after SCI

Ryan Chan

UV Photolysis of Dichloromethane Isolated in Solid Parahydrogen Matrix

Alexandra McKinnon

Effects of a novel drug - chondroitin sulfate proteoglycan reduction peptide in the porcine model of spinal cord injury

Xinyue Zhao
Simulation of Neural Crest Cell Migration in Embryonic Development of the Nervous System

Sandhya Selvakumar
Kevin Wong
Congzhen Shi

On-Chip Electronic Nose for the Detection of Viable Bacteria

Kaden Workun

Analyzing How Students Process Questions on Exams

Alyssa Gutierrez

An image analysis algorithm for tooth detection in dentition imprints

Alexander Fraser

Investigating the Role of Silver Nanoparticles (AgNPs) and Hydrophobic Coating as a Surface Additive to Reduce Bacterial Contamination on Novel 3D-Printed Medical Devices

Atishay Jay

The potential role of Lactobacilli in treatment of colorectal cancer

Tran Hoang Anh Le
Tiffany Wai

Development of an Ultra-Sensitive Method to Measure Estrogens in the Blood and Brain

Maria Shock

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

Han Hsiao

Investigating the role of robotics education on young children’s emerging math abilities

Grace Tu

Investigating the effects of Interferon β on Protein Expression by Mass Spectrometry

Charley Cai

Determination of the Sensitivity of a Hepatitis C NS5B Region Sequencing Assay

Fang Fang Li

**Theme: Sustainability and Conservation**

On-Chip Electronic Nose for the Detection of Viable Bacteria

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WAVE 4 | ORAL PRESENTATIONS

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Ponderosa Commons: Oak House, 6445 University Boulevard

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Substance Use-Related Stigma Measures: A Rapid Review of the Literature
Fides Dei Macaspac

The Role of Bcl-xL in Normal β-cell Physiology and Under Conditions of Nutrient Excess
Yaathavan Suresh

The effect of the enzyme, DHHC6, on the growth and function of hippocampal neurons
Ashleigh Nazareth

Reimagining Obstetric Violence: An Ethnography of Legitimacy, Access, and Collaboration in Rural Chiapas, Mexico
Dominique Bowden

Elucidating the degree of contribution by the shunting mechanism in decreasing nociception in the peripheral nervous system
Tim Le

SWNG 206
End of life discussions following the legalization of Medical Assistance in Dying (MAiD)
Christopher Ng

Canadian Federal Election Tracking Map
Liam Ponzini
Meg Seckel
Allison Barn
Bridget Berner
Jesneet Nanner

The Phonetic Properties of Lengthening and Reduplication in Child-Directed American Sign Language
Paris Gappmayr
**SWNG 207**

Challenges Early Childhood Educators Face in Promoting Children’s Outdoor Play  
Xin Yi Cheng

To what extent has the European Migrant Crisis 2015 affected citizens of the European Union’s trust in national and EU institutions?  
Natascha Schoepl

The Adulterated Truth About War: Virginia Woolf, American Imperialism, and News Media  
Braedon Pauzé

Loot Box Opening-A Surprising Result  
Chung-Hui Huang
Calvin Ho
Rachel Hueller
Ian Daly
Gabrielle Landry

Assessing Quality of Maternal Health Services in Haiti  
Karina Ontaneda

**SWNG 208**

Healing Through Music: Recontextualizing Trauma and Hope in Cambodia  
Jacqueline Sarvini

The referential scope of bilingual infants’ early words: Effects of language experience  
Ana Ivkov

Farmer Participation in Agricultural Planning in the Township of Langley  
Meryn Corkery

Applications and Innovations in Typeface Design for North American Indigenous Languages  
Julia Schillo

Investigating the effects of a high-fat, high-sugar diet on cue-enhanced risky decision making in rats  
Andrew Li
Chloe Chernoff

**SWNG 210**

Using Transcranial Direct-Current Stimulation to Improve Motor Skill Learning in Children with Developmental Coordination Disorder: A Randomized Controlled Trial Protocol  
Elena Klimova

What lessons can India learn from China in increasing the adoption of new energy vehicles?  
Deyvika Srinivasa
Jiayi Du
Mohammad Ahmed
Detectability and Quantitative Analysis for PSMA PET Scans using an Anthropomorphic Phantom and Heterogeneous Radioactive Epoxy Spheres

Roberto Fedrigo

Rapid Retrieval of the T2 Spectrum in Myelin Water Imaging Data using a Deep Learning Approach

Lorna Tu

Can Intelligent Control be used to have multiple UAVs transport a heavy load?

Dhrumil Gogri
Lachlan Reynolds
Jack Patchell

SWNG 206
Bite or Flight: Antipredator Responses as a Function of Web Architecture

Jessica Schmidt
Yi Lin Zhou

The effect of rising temperature on the metabolism across fish species.

Jiayu Chen
Ji Ai
Yanjie Zhu
### Theme: Health and Wellness

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Angela Man

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Amit Sharma

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Sahar Bonakdarsakhi
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Theme: Individual, Community and Society

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Isaac Chung

Crossing the Language Boundary: Syllable fusion in Cantonese English Code-Mixing Speech
Ivan Fong

Impact of Employment on Recovery Among Individuals who are Homeless with Severe Mental Illness
Sara Samani

Stillbirth Rate of Otukpo Local Government Area, Benue State, Nigeria
Rajan Bola

Age of first Parity and its Effect on Maternal Behaviour
Harleen Hans

Impact and lessons learned from a novel science-focused public lecture series at the Vancouver Public Library: Curiosities of the Natural World
Trachint Lail

Cortisol and Pain Association and Moderators in Older Couples
Melody Shayanfar
Are some careers worth higher pay? Communion, collectivism, and occupational prestige across cultures

Abigail Yuen

A Proposed Study of the Cause and Effect of the Negative Social Media influence on University Students’ Mental Health

Zhaoyu Chen
Dominic Cupidon

The comparison of different insect repellent screening methods

Madison Dirks

The Impact of Culture on Body Dissatisfaction in Aesthetically Focused Sports: An Examination of Eastern and Western Cultural Backgrounds

Angelica Joy Calapiz
Taylor Kristmanson
Natascha Lam
Lauren Platz

Do Children Always Trust Confident Individuals? Not When it Comes to Moral Dilemmas and Subjective Opinions

Aksh Aggarwal
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Everything Causes Cancer: The Association of Social Media Use and Beliefs in an American Nationally Representative Survey

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Calvin Chang

Tooth Replacement Patterns in Leopard Geckos

Lauren Holzman
Luna Liu

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Golzar Eijadi  
Abby Holden  
Bayan Noureddine

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Sam Cheng

Material and Structural Analysis of Cardiac Stents  
Praven Kamalanathan  
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Jose Miguel Dimayacyac  
Daywell Qiu

Automation Home Using EEG and EEG Acquisition System  
Han Nguyen  
Kalen Forrester

**Theme: Sustainability and Conservation**

Examining the Impact of Post-Dispersal Seed Predation Across an Elevational Gradient  
Rylan McCallum

The Effects of Copper Concentration on the Growth Rate of Tetrahymena thermophila  
Maria-Fernanda Arcila

The Effect of Salinity on the Growth Rate of Tetrahymena thermophila  
Je Eun Hwang  
Srijan Subedi
Investigating biodiversity in parks and human health with citizen science data: A Vancouver case study

Justin Angsana
Salwa Nimir
Harleen Dhami

Sustainable Agriculture: The Importance of Alternatives to The Slash and Burn Technique

Jeanette The
Kelly Milana Widjaja

Bitter taste adaptation in Drosophila

Eleanor Hsiun
Nataly El-Bittar
Anson Tang

The Effects of Climate Change on River Geomorphology

Xinyue Liang
Alvin To
Negah Rahmaty
WAVE 1
ORAL PRESENTATION
ABSTRACTS
WAVE 1 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: The Relationship Between Post-Stroke Couples’ Eating Habits and Their Health Outcomes

Presenter(s): Emma Gangbar

Abstract
Both individual and social factors play a role in shaping health behaviours. In particular, marriage has the potential to lead to the exchange of positive and negative health behaviours between partners, including diet. Social processes such as these can support or hinder healthy lifestyle choices and play a particularly important role in couples living with disease, including those involving a stroke-recovery individual. This study aims to investigate how a joint food system may influence health, meaning couples that consume the same food in a meal. Fifteen post-stroke couples (M age = 67) documented their food intake over fourteen-days, self-reported their health status, and provided a blood sample to measure blood sugar levels. Each meal was evaluated to determine whether it met Canada’s 2019 Food-Based Dietary Guidelines (FBDG), and whether it was a joint meal, and eaten at the same time/location. Data using 992 photos (M = 33 pictures per individual) showed that an average of 72% of meals met Canada’s FBDG, 63% of meals were joint, 75% of meals were eaten at the same time, and 69% of meals were eaten at the same location. It was found that those eating the same food in a meal are more likely to meet the FBDG among stroke survivors ($r = 0.481$, $p < 0.01$, $n = 15$) as well as non-stroke individuals ($r = 0.436$, $p < 0.05$, $n = 15$). Moreover, couples eating at the same time ($r = 0.661$, $p < 0.01$, $n = 15$) or at the same location ($r = 0.645$, $p < 0.01$) also correlated with higher FBDG adherence. This brings attention to the social context of eating. Rather than emphasizing portion control, limiting added sugar and salt, and emphasizing vegetables and fruit - although very important - it is also crucial to redirect the importance of eating with one another at the same time and in the same place for optimal dietary health.
Theme: Health and Wellness

Title: A Quality Improvement Initiative: Assessing Patient Satisfaction in the Spinal Cord Clinic (SCC) Using a Modified PSQ-18 Survey

Presenter(s): Taewoong Chae, Catherine Binda

Abstract
Background: The Spinal Cord Clinic at BC Children’s Hospital provides multidisciplinary care for patients with spinal cord injuries and neural tube defects. A recent Quality Improvement project revealed that 26% of the Spinal Cord Clinic families live below the poverty line, and that 28% of these families have less than four people to turn to in a time of crisis. Given the significant socioeconomic vulnerabilities of this population, it is important to evaluate patient satisfaction to ensure we meet the needs of these families.

Objectives: This study aims to evaluate satisfaction among patients and their families, and to identify ways to enhance the care quality received in clinic.

Methods: The validated Patient Satisfaction Questionnaire (PSQ)-18 survey aims to evaluate patient satisfaction within seven themes. Consecutive families visiting the clinic were asked to complete a modified PSQ-18 survey from June to October, 2019. Data from Likert-scale questions were grouped into seven themes analysed using the statistics software R.

Results: In total, 80 of 81 families invited to participate chose to complete the survey. Most participants reported they were satisfied with the interpersonal manner (91%) and communication (90%) received in the clinic. Fewer participants reported satisfaction with the accessibility and convenience (69%) and satisfaction with the financial aspects of their child’s treatment (71%).

Conclusion: While the families surveyed were generally satisfied with their interactions with clinic staff, patient satisfaction could be improved by creating financial resource guides. We hope to implement the modified PSQ-18 survey in other BC Children’s Hospital clinics.
Abstract
Introduction: This study aims to further the current understanding of depression in adolescent women by focusing on anhedonia, a cardinal symptom of depression that has been historically neglected in research. Anhedonia has two components: consummatory anhedonia, resulting from the lack of enjoyment of a reward, and anticipatory anhedonia, resulting from the lack of motivation to obtain a reward. Preliminary research in adults suggests that those living with depression primarily exhibit anticipatory anhedonia, rather than consummatory anhedonia. However, despite the high incidence of depression in adolescent females, and its implications for various health-related outcomes in young women, no research thus far has investigated the association between anhedonia and depression severity in adolescent females. The aim of this study is to determine how the two facets of anhedonia relate to depression severity in female adolescents. We hypothesize that higher levels of anticipatory anhedonia, and not consummatory anhedonia, will predict more severe depressive symptoms.

Methods: We have recruited a sample of 13 to 15 year old female adolescents, and have assessed the two aspects of anhedonia and depression severity using the Dimensional Anhedonia Ratings Scale, and the Children’s Depression Inventory, respectively.

Planned analysis: A multiple regression analysis will be conducted to test our hypothesis, with both aspects of anhedonia entered as the predictor variables, and depression severity entered as the outcome variable.

Discussion: This study is expected to elucidate the role of anhedonia in depression severity in female adolescents and inform future interventions for the prevention and treatment of depression in young women.
Theme: Health and Wellness

Title: Omega 3 Fatty Acid Modulation of E. coli-induced Inflammatory Responses in Human Blood

Presenter(s): Sara Kowalski, Jennifer Wong

Abstract
The omega 3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are reported in the literature to be potent anti-inflammatory compounds. However, the model systems used to test these omega 3 fatty acids are typically in vitro assays utilizing cell lines or isolated cells cultured in fetal calf serum (FCS) containing media which may not mimic in vivo conditions. Our laboratory recently developed a novel human whole blood assay (WBA) to identify potential immunomodulators ex-vivo. Using this WBA, we evaluated the effect of fatty acids typically present in our diet (i.e., palmitic acid, oleic acid, arachidonic acid, EPA and DHA) on Escherichia coli (E. coli)-induced inflammatory responses. While EPA and DHA are reported to reduce inflammation, we found EPA and DHA promoted E. coli-induced pro-inflammatory cytokines IL-6 and TNFα levels in the WBA. However, when tested with peripheral blood mononuclear cells (PBMCs) cultured in FCS-supplemented media, EPA and DHA were indeed effective in lowering E.coli-induced IL-6 and TNFα levels. Surprisingly, this anti-inflammatory effect of EPA and DHA is less potent or ineffective when the FCS was replaced with human plasma or serum. We are currently investigating the reason for this difference between FCS and human serum/plasma.
WAVE 1 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: The Community Maternal Danger Score: A 7-Domain Risk Assessment Instrument

Presenter(s): Rajan Bola

Abstract
The presence of skilled birth attendants (SBAs) during childbirth is the most critical intervention for safe motherhood in Nigeria and elsewhere in African regions. In practical terms, access to SBAs is a necessary first step and critical healthcare index as it can effectively impact maternal and infant mortality and morbidity rates in any given region. However, it is not known whether evidence-based risk-analysis tools are effective in mobilizing women to seek SBAs. We hypothesize that by developing a tool targeting risk factors during pregnancy, the Community Maternal Danger Score (CMDS), and implementing it before labour, Community Health workers in Benue State, Nigeria would better assess pregnant women's risk and encourage childbirth with SBAs present. The CMDS uses evidence-based factors in 7 domains to predict the need to seek SBA. These factors are prenatal: age, parity, patient size and obstetrical history, and perinatal: fetal size, signs and symptoms of pre-eclampsia and coexisting medical conditions. The CMDS will enable caretakers to effectively assess and triage pregnant women before labour using the determined prenatal and perinatal risk scores out of 5 each. We will test this tool prospectively to 600 pregnant women, 300 each at 2 healthcare centres (the Federal Medical Centre and FSP Clinic; all in Makurdi, the Benue State capital). The need for SBAs, including outcomes and interventions, will be compared to their CDMS Score. Overall, this tool may enable caregivers to mobilize at-risk women in areas of Nigeria where SBA seeking behaviour is low, thus reducing maternal and neonatal mortality.
WAVE 1 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: Reconstruction of Constructed Languages: Personalizing Mar’osha Words to Facilitate Individual Mental Wellbeing

Presenter(s): Shaniya Anand

Abstract
My research examines how a constructed language, Mar’osha, can be used as a personalized resource in self-healing, community-building, and therapeutic contexts. I created Mar’osha to efficiently convey trauma and anxiety related experiences while mitigating feelings of stigma and shame associated with English words related to mental illness. For my research, I conducted an anonymous online survey in the summer of 2019 that was targeted at individuals above 18 who self-identified as having experienced anxiety. Participants provided basic demographic information and examined the usefulness of a list of Mar’osha words expressing concepts related to trauma and anxiety. This list included some words that communicate concepts that are difficult to express in English due to stigmatization or complexity. Other words were included that could potentially facilitate healing for speakers by acknowledging, normalizing, and validating the concepts that they express. The results from this survey indicated that not only are Mar’osha words beneficial to individuals living with trauma and/or anxiety, but also that members of other marginalized communities, including LGBTQ+ members, also strongly identified with the language and repurposed it for themselves. For example, one participant described using a Mar’osha word, kvilé (a first-person plural pronoun meaning not-we, the speaker feels disconnected from the group and not a part of them), and stated that this word better described his experiences as a transgender man. While more research needs to be conducted in this field, my research provides valuable insight into how a constructed language can be personalized to facilitate better mental wellbeing.
WAVE 1 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: Testing the Efficacy of a Goal-Setting Intervention to Enhance Students’ Meaning in Life

Presenter(s): Michael Hunter

Abstract
Experiencing life as meaningful is essential for healthy human functioning (see review Steger, 2012). Developing and validating practical interventions that augment meaning in life are, thus, important. Principles grounding effective goal-setting practices (a type of self-authoring exercise) align with the theoretical and empirical investigations of what constitutes meaning in life. Yet, while goal-setting interventions have been shown to increase well-being (MacLeod, Cootes, & Hetherton 2008), no research, to date, has tested the effects of goal-setting interventions on meaning in life specifically. Our (currently running) study aims to help remedy this research gap by administering a previously validated goal-setting intervention (Schipper, Scheeper, & Peterson; 2015) to participants, and subsequently examining its influence on all three sub-components of meaning in life (i.e., purpose, coherence, significance/mattering). We hypothesize that participants who complete the goal-setting intervention will report significantly increased meaning in life, self-competency, and well-being compared to those in the control condition. We are also exploring whether participants’ preference to engage in activities which promote personal growth will moderate the effect of the goal-setting exercise. In this 3-part study, participants are randomly assigned to either the goal-setting intervention or to an active placebo-control condition. Measures of meaning in life and well-being are administered one week prior to and one week after the intervention. This research is of particular relevance to university students, given that greater academic achievement is associated with both effective goal-setting strategies (Duckworth et al. 2013) and with high levels of meaning in life (Shin & Steger, 2016).
Theme: Health and Wellness

Title: Physical Activity Experience of International Students at UBC Vancouver campus

Presenter(s): Ruimiao Yang

Abstract
Culturally sensitive practices are lacking under the Western biomedical model of health in the literature, which can have an impact on the health and well-being of UBC students. In the context of UBC as an academic institution, currently prescribed physical activity programs have been ineffective to many, including international Asian students. Since over 28% of UBC students (at Vancouver campus) are international, it is important to recognize and incorporate the cross-cultural nuances into practice. With little research into students’ experience and how this may contribute to barriers when engaging in physical activity, this study seeks to explore the gap between the physical activity opportunities students desire and the ones UBC offers on campus. Moreover, the study intends to gain insight into International Asian female students’ perceived ideas of well-being, health, and physical activity. The study will target East-Asian international female students who are currently attending UBC, across all year-levels and among a variety of disciplines, since East-Asian students are the most representative of international populations at UBC (China, Korea, and Japan). The study will combine a literature review with semi-structured interviews. Content analysis will be employed for the literature review and thematic analysis for the interviews. Interviews will ask participants about their physical activity experience at home, compared to at UBC, their activity while in and outside of school, and suggestions for UBC to improve their health and well-being.
WAVE 1 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: Stress Response Terminology in Vertebrate and Invertebrate Research Papers: A Corpus Study

Presenter(s): Laura Griffin, Jesse Hawker, Mira Macnair

Abstract
Invertebrates are not afforded the same protections in research as vertebrates and are often positioned in a way that distances them from humans. While there are strict regulations for how “animals” must be treated in research, the definition of animals does not encompass invertebrates. Academic papers on stress in vertebrates, invertebrates and humans were analysed to see if they could confirm our hypothesis that stress/emotion-related words would be used less frequently in invertebrate papers rather than vertebrate and human papers. While “stress” was used at a similar rate for all papers, emotion-related words and stress hormones were used more for vertebrate and human papers. Invertebrate papers had the lowest amount of stress hormones and emotion-related words, but the highest amount of negatively charged words. In addition, while invertebrates were more commonly referred to by their scientific names, vertebrates were typically referred to by their common names. This project raises questions about the use of language in academia and when it is used to manipulate rather than inform, as the words that appeared in papers on invertebrates showed more negative implications and lack of concern for welfare. This research highlights how the imbalance in ethical considerations between invertebrates and vertebrates is reflected in the language used to describe them, and offers a new perspective about what it means to be an “animal.”
WAVE 1 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: The Divide in Narratives among Newspapers - Understanding Identities in Hong Kong

Presenter(s): Wing Huen Candice Chan

Abstract
In the summer of 2019, all eyes turned to Hong Kong as the city entered the longest series of demonstrations she has seen since her decolonisation in 1997. The demonstrations started off as a protest against the Fugitive Offenders Amendment Bill introduced by the government and has quickly turned into a series of demonstrations that address issues beyond the bill. From those who are die hard supporters or even participants of the demonstrations, to those who actively go against the demonstrations in support of the police force, the stances of citizens reflect the different ways Hong Kong people identify themselves as well as how they situate Hong Kong vis-a-vis China. However, current literature is lacking in explaining the division. I will explore the emerging and conflicting identities that came out of the demonstrations using the conflicting narratives found in 6 local newspapers. Newspapers are not a neutral mean of communication especially in democracies, where narratives can vary greatly from the official narrative and are often reflective of ideological biases of their readers. Using corpus analysis and critical discourse analysis, together with social identity theory, I explore the complexity of identities in Hong Kong using the newspaper articles published from June 2019 to October 2019. I have hypothesized the different identities that emerged are based on political factors, as opposed to socio-economic factors. I hope to unpack the multitude that are identities in Hong Kong and explore the city’s relationship with China and how this relationship may revolve in the near future. This research project may act as the first step in analysing the changing relationship between Hong Kong and China, foreshadowing what may be in the year of 2047 as a flawed democracy turns sovereignty over to an authoritarian regime.
WAVE 1 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: Leadership Gender Disparity Within Research-Intensive Medical Schools

Presenter(s): Jeffrey Ding

Abstract
The underrepresentation of women in senior leadership positions of academic medicine continues to prevail despite the ongoing efforts to advance gender parity. Our aim was to compare the extent of gender imbalance in the leadership of the top 100 medical schools and to critically analyze the contributing factors through a comprehensive theoretical framework. We adopted the theoretical framework of the Systems and Career Influences Model. The leadership was classified into four tiers of leadership hierarchy (deans, vice deans, department heads, and directors). Variables of interest included gender, h-index, number of documents published, total number of citations, and number of years in active research. A total of 2448 (77.59%) men and 707 (22.41%) women met the inclusion criteria. Male majority was found in all regions with a significant difference in all levels of leadership (chi-square = 91.66; P-value = .001). Women had a lower mean h-index across all positions in all regions, and when we adjusted for the number of years invested, M Index for women was still significantly lower than men (T-test = 6.52; P-value = .02). Organizational and individual influences are transcontinental within the top 100 medical school leadership hierarchy. Those factors were critically assessed through an in-depth analysis of the Systems and Career Influences Model. Evidence-driven actionable recommendations to remedy those influences were outlined.
**Theme:** Individual, Community and Society

**Title:** Measuring the Emergence of Metacognition in Early Childhood

**Presenter(s):** Nicholas Fai

**Abstract**

The awareness and evaluation of one’s own thoughts, known as metacognition, is a key attribute of consciousness. However, the existence of metacognition throughout childhood has seen considerable debate, because preschool-aged children classically struggle to demonstrate an ability to report their subjective certainty. The majority of past research has tested this ability via verbal/pictorial scales that ask children to state how “sure” they are of an answer or identify facial expressions corresponding to confidence levels (an absolute measure). These tasks stand to confuse the development of metacognition with the development of language, inhibitory control, or changes in how children interpret the confidence scale itself. Recently, we have developed a new, relative way of assessing metacognition in children that avoids these issues. In our task, children have to judge which of two questions they are more sure of having answered correctly, rather than providing an “absolute” confidence judgement. In the current experiment, 3-9 year-olds completed both the absolute and relative task to further validate our method and add to the growing body of evidence for the presence of metacognition in young children. We have found that children’s metacognitive performance on both tasks exceeded chance levels (p < .001) and were correlated with each other, r(83) = 0.26, p = .018, indicating that both tasks were successful in capturing metacognition. We believe that this new method may be adapted for use in both younger children and non-verbal animal populations, allowing for further explorations of consciousness into previously unexplored areas.
Theme: Innovation and Technology

Title: Investigation of Sea Ice Adhesion for Developing Passive Ice Mitigation Surfaces

Presenter(s): Wenting Luo

Abstract
In Canadian North, ice accretion caused by freezing sea water is a common occurrence often accompanied by structural damage to vessels and gas exploration infrastructure. In the research, the adhesion of saline ice to various surfaces was studied. A dramatic decrease in ice adhesion was observed for saline ice above -21°C. Saline ice adhesion decreased with increasing salinity between -5°C and -21°C. The low saline ice adhesion measured above -21°C was due to the presence of brine. Higher salinity favored the brine phase which consequently lowered the saline ice adhesion. Below -21°C, higher saline ice adhesion was observed compared to pure ice. Salinity did not affect the saline ice adhesion below -21°C because brine is not thermodynamically favorable at this temperature. Characteristics of different surfaces were also investigated. Smooth and hydrophobic surfaces exhibited lower saline ice adhesion in the presence of brine above -21°C than with fully frozen ice below -21°C.
WAVE 1 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Latent Space Exploration of Generative Art

Presenter(s): Megha Singhania

Abstract
Generative Adversarial Networks (GANs) are a class of machine learning techniques that use a competitive dynamic between two simultaneously trained neural network models: one (the Generator) trained to generate fake data, and the other (the Discriminator) trained to discern the fake data from real examples. The training dataset is a set of real world examples that we want the Generator to learn to emulate. A part of the Generator model encodes the input data into a lower dimensional representation called the latent vector. The space of all latent vectors is called the latent space. While there is no constraint set for the type of input provided to GANs, large sets of images are a popular choice. GANs are increasingly being used to generate fake photorealistic images. Though there has been a steady increase in the popularity of GANs in the field of art, their reception is largely limited to people who are able to understand the complex underlying details of these neural networks and are able to modify the GAN models to suit their interests. With this project, we propose the idea of parameterization of the latent space of the generator part of GANs. We believe that exposing aspects of AI that are traditionally hidden from the artists will contribute to their understanding of the latent space while also allowing them to have more control over their work and can potentially result in a wider reception of GANs in the field of visual art.
Theme: Innovation and Technology

Title: Camera system for monitoring sapsucker offspring in cavity nests

Presenter(s): Jamie Clarke

Abstract
Assessing reproductive success in cavity-nesting bird species can be difficult and invasive. Nests tend to be high above the ground, with very small openings – often only centimeters in diameter. In the past, cavity nest monitoring has involved scaling trees with ropes or ladders and sawing into nests to observe offspring. Camera monitoring systems are much safer for both birds and researchers, but can be costly, difficult to assemble and limited in their applications. As a result, little is known about reproductive success in cavity-nesting bird species, particularly among sapsuckers. The aim of this project was to design an inexpensive, modifiable camera system to fill this knowledge gap. A 12 m telescoping lineman's pole and a plumbing camera were used to record video of red-breasted sapsucker nestlings in cavity nests. Using the system, we successfully observed offspring in three different nests. Despite the telescoping pole’s reach, however, 70% of nests found were too high for our camera system. Of the 30% of nests that were within reach, we successfully recorded video in only half; threading the camera into cavities was not feasible when nests were higher than 11 m off the ground and the angle of the camera was difficult to control inside the nest. We must therefore continue to develop and improve the camera system. A refined version of this prototype would be useful in understanding post-mating barriers in a three-species sapsucker hybrid zone in the Prince George area.
WAVE 1 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Cost-Benefit Analysis on New Methods in the Prevention of DNA Induced Corrosion in Silicon Photonic Biosensors

Presenter(s): Maggie Chong, Patricia Dayao, Rafaela Zamataro

Abstract
Recent developments in nano-biosensors, including higher selectivity, allows healthcare professionals the portability and cost-effectiveness to rapidly diagnose deadly diseases such as cancer. It is well known that both increased DNA probe density and increased target DNA concentration enhance the corrosion process on the silicon body of the biosensor, leading to an overall blueshift (lengthening) of the wave guide resonance, and adversely affecting detection reliability. Thus, biosensors require corrosion detection to particularly high levels of precision and accuracy.

The first method to prevent corrosion in biosensors as proposed by Zhao et al. (Effect of DNA-Induced Corrosion on Passivated Porous Silicon Biosensors, 2014) is to replace the DNA analyte with charge-neutral peptide nucleic acid (PNA) molecules. PNA is an artificially synthesized polymer similar to DNA. A second proposed method is the introduction of Mg2+ ions from a 2 M solution of magnesium chloride hexahydrate (MgCl2·6H2O) to shield negative charge from the ionization of the phosphate backbone of DNA. However, not much research has been done in determining which technique is more suited for large-scale health care applications.

Through engineering cost-benefit analysis and computer simulation, the costs and benefits of the two techniques proposed by Zhao et al. will be analyzed against the traditional technique of passivating the silicon surface (which serves as a physical barrier against corrosion). The analysis will be done with respect to stakeholder needs in the dimensions of economic and technical requirements using data obtained from five silicon wafer samples of 650 μm to 700μm for each of the three techniques. From preliminary calculations and excel stimulation, the qualitative portion of the study was formulated based on the standard model of surface passivisation. Criteria such as stability and rate of corrosion were used. The preliminary data strongly suggests that the usage of PNA is the most effective solution. The study may lead to an overall improvement in the quality and resistance to corrosion in silicon biosensors.
Theme: Innovation and Technology

Title: Machine Learning in Particle Physics

Presenter(s): Alex Wen

Abstract
The ATLAS particle detector in Geneva, Switzerland weighs as much as the Eiffel Tower, has 100 million electronic channels, and is connected by 3000 km of cables. Protons collide inside at over 99% the speed of light, producing a billion interactions per second. Studying any particle physics process or reaction of interest requires the extraction of only the interesting events from a gigantic volume of information. This is a task that is hopelessly large for human classification, and utterly complex for traditional algorithmic approaches to classifying events. The solution, among other things, is machine learning.

I will present an overview of particle physics at ATLAS and its perplexing experimental data, and how machine learning is critical in helping with analysis. I will conclude with some prospects for the exciting and growing intersection between physics and machine learning.
**Theme:** Innovation and Technology

**Title:** Detection of Wheelchairs Using Laser Scanning Sensors for Mobile Robotics

**Presenter(s):** Jessica Bo

**Abstract**

Background: To address emerging trends in introducing mobile robots to human-populated environments, ensuring safe and intuitive interaction between the robots and humans is becoming a growing need. While many previous studies have explored interactions with upright pedestrians, far fewer have investigated that for wheelchair users, who already face higher safety risks in public environments. Since the dynamic behaviour of wheelchairs is also atypical to that of foot pedestrians, accurate detection of wheelchairs is crucial to improve interactions and avoid collisions. Furthermore, extracting the orientation of wheelchairs can aid in predicting their direction and trajectory of travel, which has never been attempted before in prior literature. Mobile robots are further required to respond to dynamic obstacles with minimal latency, therefore any onboard algorithms should operate in real-time. The objective of this research will be to develop a real-time wheelchair detection and orientation classification algorithm using 2D scanners, a common sensor equipped on mobile robots.

Methodology: The range data from the laser sensor is pre-processed using a density-based clustering technique to identify clusters of data points that represent “object candidates”. A machine learning classifier is trained to recognize objects as wheelchairs at different orientations. Labelled ground truth data is collected through experimentation for the purpose of evaluating the performance (computation time and accuracy) of the algorithm.

Implications: This research will establish basis for a real-time perception of wheelchairs users and influence control schemes that promote safer interactions between robots and wheelchair users.
**Title:** Optical and Optomechanical Methods of Testing Gravity

**Presenter(s):** Hrishikesh Patel

**Abstract**
Since Einstein’s formulation of General Relativity, many attempts have been made to test/verify Einstein’s formulation of gravity. However, experimental testing of gravity has turned out to be an elusive challenge. We have tested gravity at long distances and have discovered massive anomalies in our theoretical framework of gravity. In order to understand these large scale anomalies in gravity, we look for gravitational anomalies at short distances. It is known that due to the weak nature of gravity, General Relativity has only been verified up to about 50 micrometers. Much of the experimental verification down to this scale has been done by design modifications to the famous Cavendish Torsion Balance experiment. However, much less has been done to use an alternative design. In our work we propose to use extremely precise optomechanical and optical systems to probe gravity in the submillimeter-micrometer range. We analyze the motion of a particle in a gravitational field at the submillimeter-micrometer scale to quantitatively test the Newtonian gravitational law.

In our study of experimental gravity, the primary detection systems that we have proposed are Nanoelectromechanical systems (NEMS) which are a class of optomechanical devices. We have also proposed optical setups in the field of ultrafast photonics to probe gravity using temporal imaging systems which can record transient events at a frame rate of 10 trillion frames per second.
Theme: Innovation and Technology

Title: CNx as a possible heterogeneous catalyst for PhotoRedox reactions.

Presenter(s): Quinn Krahn

Abstract
Following the principles of Green Chemistry, light driven reduction-oxidation reactions have become increasingly popular in organic synthesis as light can provide both spatial and temporal control over these reactions and because they can be performed under generally mild conditions. Of the available photocatalyst, transition metal complexes have been most readily used for these transformations but have issues of high toxicity and low abundance. Alternatively, organic dyes have recently been given more attention for their ability to catalyze similar reactions. However, most of these are derived from fossil fuels, necessitating an alternative material that is less dependent on this industry to become sustainable. Carbon nitride has the potential to replace transition metals and organic dyes as green photochemical catalysts as it can be made from cheap, readily available chemicals, and has low toxicity. Carbon nitride is also favorable as a heterogeneous catalyst, in contrast to both transition metal and organic dye systems that consist almost exclusively of homogenous systems. Uniquely, the aromaticity of carbon nitride may allow for pi-pi interactions between it and reacting organic molecules increasing the proximity and charge transfer efficiency in these reactions. In an attempt to gain understanding about the photoredox capabilities of carbon nitride a series of Aza Henry reactions, a benchmark reaction in the field, are to be performed comparing carbon nitride against well-established organic dyes as catalysts. The lighting conditions were controlled by preforming each reaction in a photoreactor in order to optimize the light harvesting for each catalyst used.
Abstract
Purpose: Some minimally invasive surgical procedures use X-rays to image inside the body during an operation, reducing both surgical harm and recovery time. X-ray scatter is a workplace hazard for medical professionals involved in the procedure. In this project, an X-ray camera is developed to visualize and characterize these hazards.

Methods: This work brings together the concepts of pinhole cameras and tomographic reconstruction (TR) to make a TR camera. TR is a technique that creates an image from radial projections of objects, and is commonly used to create cross-sectional images in CT scans. The TR and X-ray pinhole camera were built, and proof-of-concept measurements were carried out using surgical X-ray equipment and a torso replica.

Results: The TR camera created a clearer image of X-ray scatter after 4 minutes of continuous X-rays, compared to an X-ray pinhole camera that required 40 minutes of X-ray exposure to the torso replica.

Conclusion: Preliminary results show that images are much improved when using the TR camera versus an X-ray pinhole camera. Further refinement of the TR camera and image reconstruction methods are underway. Images of scatter obtained with the TR camera will allow identification of scatter sources, which will help staff and physicians to minimize their exposure.
Theme: Innovation and Technology

Title: Measuring the entropy of a quantum multi-state system

Presenter(s): Owen Sheekey

Abstract
Entropy is probably a word many people have heard in relation to thermodynamics. It is often referred to as a measure of the ‘disorder’ of a system but in fact, it relates much more closely to the number of possible configurations that a given system can occupy. A number of different techniques have been used to measure entropy on a macroscopic scale, but here I will present a technique we have used to measure entropy on a microscopic scale where the number of possible energy states that a given electron can occupy is known. Specifically, I will discuss direct measurements of the entropy of the spin of a single electron and applications of the same technique to measurements of more complicated multi-state microscopic systems. Measuring entropy at a microscopic level proves very useful in characterizing novel states and quasiparticles, especially when more standard electron transport measurements do not provide adequate information.

To measure entropy, we leverage a Maxwell relation that allows us to determine the change in entropy by measuring the change in chemical potential as we change temperature. It has been shown that this technique can be used to measure the entropy of the spin of a single electron to within 5% of the expected value of entropy, being . In this talk, I will discuss some of those results as well as a new experiment we are working on to measure the entropy of a multi-state system by coupling it to a device containing a number of simple single electron wells.
WAVE 1 | ORAL PRESENTATIONS

Theme: Sustainability and Conservation

Title: Affect of genetic architecture on speciation

Presenter(s): Asli Munzur

Abstract
Adaptation in nature may proceed from standing variation or via de novo mutations, and it is a spectrum ranging from parallel to divergent. Even though most of the genes important for adaptation are dominant, effect of dominance on rate of speciation and fitness on this range is unclear. Nor is it clear whether the availability of standing variation improves progress toward speciation. We conducted a theoretical study evaluating these questions and have two major findings. First, when parental populations evolve under similar environmental pressures towards the same phenotypic optimum, acquired dominant genes significantly decrease the F1 hybrid fitness. This decline happens because fixing dominant alleles causes hybrid populations to acquire extreme phenotypes. Such extreme phenotypes cause hybrid populations to overshoot the parental phenotypic optimum. As a result, hybrids have lower fitness since they can’t survive in either parental environment. Second, when populations evolve towards the same phenotypic optimum by fixing the same beneficial alleles, negative effect of dominant alleles is diminished significantly. This can be explained by prevention of extreme phenotypes through parallel evolution. When parental population evolve under significantly different conditions, observing extreme phenotypes in hybrid populations is more likely since populations no longer fix alleles with similar functions. In future studies, effect of gene flow on hybrid fitness as two populations evolve can be explored to further understand the effects of dominant alleles.
**Theme:** Sustainability and Conservation

**Title:** Trace metal interactions: Bumble bee exposure to trace metals in anthropogenic environments

**Presenter(s):** Jennifer Lipka

**Abstract**

Although honey bees are widely used for the commercial pollination of some of our most important agricultural crops, native pollinators like bumble bees are vital for supplementing pollination to ensure sufficient crop yields. To conserve pollinator services provided by bumble bees, it is important to understand how bumble bees are exposed to anthropogenic pollutants, like trace metals such as lead (Pb).

As insect pollinators forage for resources, they interact with the environment, thereby actively and passively collecting trace metals. Variable land-use activities across the landscape introduce trace metals into our environment. For a heavy metal like lead (Pb), this is of great concern because of its toxicity and persistence in the soil. Since bumble bees nest in the ground, it is worth investigating their exposure to trace metals in various land-use settings.

This research investigated the concentration of select trace metals within bumble bee bodies as compared to honey bees. The sites covered various land-use types (e.g. urban, agricultural) to examine how proximity to anthropogenic activities affected bumble bee trace metal concentrations. I collected bumble bee specimens and floral nectar. Current research at UBC’s Pacific Centre for Isotopic and Geochemical Research will provide existing data on soil and honey bee trace metal concentrations.

This interdisciplinary research was carried out in collaboration with two UBC researchers: Dr. Juli Carrillo and Dr. Dominique Weis in the Faculty of Land and Food Systems and the Department of Earth, Ocean and Atmospheric Sciences, respectively. Furthermore, my project included collaboration with two community organizations: Hives for Humanity and Bumble Bee Watch.
**Theme:** Sustainability and Conservation

**Title:** Green Exercise: Flourishing in Nature

**Presenter(s):** Otis Geddes

**Abstract**
Green Exercise—physical activity in “green” or natural surroundings—brings with it a host of benefits. Nonetheless, access to green space and willingness to participate in physical activity are dwindling resources. Current trends of sedentary, consumer lifestyles combined with rapid urbanization and environmental destruction are putting stress on the human-nature relationship. Green Exercise is one way to address both of these issues. Of course, it is by no means a new idea to suggest that individually, getting outside and getting active, are good for human health. However, research suggests that these two activities yield benefits to well-being greater than the sum of their individual parts. This talk provides an overview of our recent comprehensive literature review and book chapter on this topic. Included in this presentation is a discussion of potential mechanisms for the unique effects of green exercise, the research evidence regarding benefits from Green Exercise, along with suggestions and recommendations for future research. Evidence will also be presented to support a call for green exercise to be integrated into the field of medicine. In essence, this presentation discusses how Green Exercise can facilitate a movement towards a health system which emphasizes flourishing, as well as a more positive relationship with the natural world.
WAVE 1 | ORAL PRESENTATIONS

**Theme:** Sustainability and Conservation

**Title:** Negative Heritage & the Anthropocene: A Case Study of Tropical Rainforest Heritage of Sumatra

**Presenter(s):** Camille Morissette

**Abstract**
Heritage is the “legacy that we receive from the past, that we experience in the present and that we will pass on to future generations” (UNESCO 1972). While heritage is often discussed in terms of positive cultural aspects and experiences, it can take an ominous turn when examining the negative heritage paradigm. Negative heritage refers to a site that has been a place of conflict, trauma, or disaster and consequently holds a negative connotation in the minds of those who know it. This presentation is conducted under the umbrella of the negative heritage project (NHP). The NHP aims at researching “documenting negative heritage sites from around the world with the goal of creating a comprehensive catalogue”.

The focus for this presentation will be the case study of Tropical Rainforest Heritage of Sumatra, inscribed on the UNESCO World Heritage List in 2004. More specifically, conducting an assessment of the effects of the Anthropocene on the site. For instance, analyzing the roles of poaching and encroachment. The analysis was conducted by drawing on interdisciplinary anthropology, digital humanities, and, heritage studies, alongside the archival research I have conducted. In an effort to protect the site, several corrective and protective measures have been put in place to ensure the longevity of the island. The damage done appears irreparable but efforts to preserve the sites are still being put forth. The future is not certain when it comes to the survival of the Sumatra Rain Forest and this is a time dependent issue.
Abstract
In order to improve the utility of paper straws, experiments involving the addition of hydrophobic groups to paper, in a silylation reaction with chloro(dimethyl)octadecylsilane using various solvents were conducted. The ImageJ program was used to quantify hydrophobicity by calculating the contact angle between a water droplet and a small piece of paper, which we compared between treatment groups and with untreated paper and plastic straws. Samples were exposed to a variety of liquids in one hour periods for a total of six hours. After each hour, contact angle measurements were taken. Analysis of results suggests that hydrophobicity declines with time due to leaching of silanol from the treated paper. Contact angles between water droplets and the treated paper were shown to remain significantly larger than that of untreated paper straws throughout testing, indicating higher hydrophobicity. Furthermore, samples that were silylated using dioxane as a solvent were significantly better at maintaining hydrophobicity than samples silylated using toluene as a solvent. Single variable Anova tests were used. Making paper hydrophobic using a silylation reaction may extend the efficacy of paper straws.
WAVE 1
POSTER PRESENTATION ABSTRACTS
Theme: Health and Wellness

Title: A systematic review and meta-analysis of patient's knowledge of oral antithrombotics

Presenter(s): Jinny Choi, Elaine Hu, William Shen, Amelia Choy

Abstract
Background: Patient knowledge gaps have been identified as an important barrier to medication adherence. Our objective was to synthesize the evidence on patients’ knowledge of antithrombotic drugs to identify their knowledge gaps and misconceptions. Methods: Following PRISMA guidelines, we searched PubMed, CINAHL, and PsychINFO from inception to November 2018 for studies that assessed patients’ knowledge of antithrombotics. The proportion of participants who correctly answered questions about their medications were extracted from quantitative studies. We grouped data for similar questions into knowledge domains and conducted a random-effects meta-analysis for each knowledge domain to pool the results. Any domains for which the pooled mean proportion of knowledgeable participants was \( \leq 50\% \) was deemed a knowledge gap, irrespective of the confidence interval. Qualitative data were summarized narratively. Results: A total of 54 studies (n=11930 participants) were included. Studies were mostly published after 2010, conducted in North America or Europe, and focused on warfarin knowledge. Knowledge domains identified as knowledge gaps were: drug-drug interactions, drug-food interactions, know what may happen with underdosing, know any factors that may affect INR levels, side effects of antithrombotics, antithrombotics increase the risk of bleeding, what to do in case of an overdosage, what to do on the day of prothrombin time/international normalized (PT/INR) ratio test, how to reduce side effects, what to do if a dose was missed, what to do if in possession of both generic and brand warfarin. Conclusion: Patients taking antithrombotics are likely to have knowledge gaps in clinically significant areas which can potentially contribute to nonadherence and poor therapeutic outcomes.
Theme: Health and Wellness

Title: Evaluating the Congruency Between Intraparenchymal and Subdural Intraspinal Pressure in a Porcine Model of Acute Spinal Cord Injury

Presenter(s): Aysha Allard Brown

Abstract
After a spinal cord injury (SCI), some major concerns that may hinder recovery are a drop in blood pressure and poor blood flow to the spinal cord. For decades, clinical practice guidelines for hemodynamic management have focused upon augmenting the mean arterial pressure (MAP) to improve blood flow following SCI. Recently, however, clinical evidence has shown that the spinal cord perfusion pressure (SCPP), calculated as the difference between the MAP and the intraspinal pressure (ISP), is a better measure of blood flow and is more closely associated with neurologic outcome than MAP. To fully capitalize upon the approach of SCPP monitoring, we must first understand the factors influencing the measurement of ISP. We explored the method by which ISP is measured (e.g. within the injured cord or within the subdural space), how the relationship between these two measurements evolved with time (8 hours post-SCI), and how relative location from the injury influenced ISP measurements, using a pig model of a contusion-compression SCI. At each location (2-mm rostral and 2-mm caudal from the injury site), one pressor sensor was inserted inside the spinal cord (intraparenchymal pressure) and another within the subdural space (subdural pressure). Pressure measurements were continuously recorded for up to 8 hours post-SCI, and ultrasound images were captured to track cord swelling. Our data revealed that when the spinal cord swelled to fill the dural sac, subdural pressure reflected intraparenchymal pressure rostral to the injury site, but not caudally. These findings could ultimately guide clinicians on where and when to measure subdural pressure for hemodynamic management.
Theme: Health and Wellness

Title: Investigating the relationship between trf-1 gene on mig-15 in nervous system patterning

Presenter(s): Kanwarpreet Dhaliwal

Abstract
Synaptopathies are a class of diseases localized in the central nervous system or peripheral nervous system due to the dysfunction of synapses. Proper functioning synapses are imperative for healthy neural development; when impaired in humans, they result in neurodegenerative diseases such as Alzheimer’s disease. This research focused on a gene that has been implicated or expressed in neurodegenerative diseases: trf-1. Caenorhabditis elegans, commonly referred to as C. elegans, have been used as a model system because similar fundamental processes are conserved from C. elegans to humans. TRAF2 and NCK-interacting protein kinase, also referred to as TNIK, is fundamental for regulating neuronal development and is a genetic risk factor for schizophrenia. Previous research has shown that the trf-1 gene genetically interacts with TNIK. However, it was unknown if trf-1 interacts to govern synapse formation. Mig-15 is the C. elegans ortholog of TNIK and this study determined how mig-15 functioned to aid synapse formation and how trf-1 genetically interacted with mig-15 in synapse formation. C. elegans animals lacking the trf-1 gene were used to determine the role of trf-1 in synapse formation. Furthermore, animals with null mutations in these genes as well as mig-15 were used to determine if mig-15 interacted with trf-1 during synapse development. Using Polymerase Chain Reaction to amplify the DNA, the mutations were verified, and microscopy was used to study the phenotypic changes in synapses. By identifying the relationship between the genes, it may be able to serve as a template for drug therapy for neurodegenerative diseases.
Theme: Health and Wellness

Title: HPA Axis and Serotonin (5-HT) 1A Receptor Responses to Repeated Restraint Stress in Male and Female Rats

Presenter(s): Maya Koblanski

Abstract
Most research on the neural consequences of stress has been conducted only in male subjects, despite sex differences in mood related disorders. Our previous findings demonstrate that stress habituation results in sexually dimorphic modulations of the serotonin (5-HT) system. Considering that presynaptically, the 5-HT 1A auto-receptor of the dorsal raphe nucleus (DRN) negatively regulates 5-HT levels to the rest of the brain and that agonists of the post-synaptic 5-HT 1A receptor stimulates hypothalamic-pituitary-adrenal (HPA) axis activity, we hypothesized that male and female rats would show differential changes in 5-HT 1A receptor levels, coupling to secondary messengers and function following exposure to one (Single) or five (Repeat) daily episodes of 2h restraint compared to naïve control. Both male and female rats exhibited a decline in corticosterone levels between the first and last bout of restraint (45 and 40% respectively). Corticosterone responses to 8-OH DPAT were potentiated in both males and females exposed to restraint. However, an increase in 5-HT 1A receptor levels and coupling was only identified in the female hippocampus and a decrease in the female zona incerta (ZI). Only males showed an increase in 8-OH-DPAT induced hypothermia, associated with an increase in 5-HT 1A receptor levels and coupling in the DRN. These findings corroborate our previous data to suggest that male and female rats use different mechanisms to habituate to stress.
WAVE 1 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Huntington’s Disease: Altered Striatal Neural Activity and Behavioural Deficits in YAC128 Mouse Model

Presenter(s): Judy Cheng, Faiza Khan, Rory Kelly, Shawn Badesha

Abstract
Our research focuses on Huntington’s Disease (HD), a neurodegenerative disorder characterized by motor and cognitive deficits linked to neuronal atrophy within the striatum, a brain region responsible for refining and modulating motor behavior. The YAC128 mice model, containing the mutated HD gene, was used to model the neural and behavioral changes in the human HD disease. The current study examines striatal neural activity and open field behavior in YAC128 HD mice as compared to wild-type. The open field test tracks the mouse’s locomotion and specific movements within a confined box. More time spent in the periphery and less overall activity indicates higher stress and anxiety levels. Fiber photometry was used to analyze GCaMP levels, a neural activity indicator, in the striatum of wild-type and YAC128 mice. This technique involves a fiber-optic probe inserted inside the striatum to measure GCaMP activation. These methods attempt to provide more evidence of the striatum’s role in the behavioral defects of individuals with HD. Based on previous research, we expect YAC128 mice to show decreased habituation in the open-field test and decreased striatal neural activity as compared to wild-type. Other studies have also shown that dopamine signaling differs at various stages of the disease, reflected in a distinct change in symptoms for both rodents and humans, suggesting that future studies on dopamine signaling in YAC128 mice may be beneficial in determining possible interventions that could enhance dopamine signaling in HD patients.
Theme: Health and Wellness

Title: Granzyme B in the Retinal Pigmented Epithelium of the Mouse Eye

Presenter(s): Jacob Ng, Miranda Tsuyuki

Abstract
Granzyme B (GzmB) is an enzyme which uses the amino acid serine to cleave peptide bonds in proteins. GzmB is found in tissues during aging and in cases of chronic inflammation and is important in the abnormal degradation of the extracellular matrix (ECM) which normally provides structural and biochemical support to surrounding cells. While GzmB has been shown to cleave cell-cell adhesion and basement membrane proteins, there is little information of its effects in the eye. This study attempts to elucidate the role of GzmB in reorganizing Bruch's Membrane underneath the retinal pigmented epithelium (RPE) and the breakdown of the blood-retinal barrier in mice. Methods: Mice with knock-outs of Apolipoprotein E (ApoE-KO), GzmB (KO), or both (DKO) were kept on high-fat diets for 9 months, euthanized, and had eyes processed for immunofluorescence staining against GzmB on paraffin sections. Samples were then imaged using Z-stack confocal microscopy at four different areas of the RPE. Image processing by ImageJ followed by densitometric analysis was performed to evaluate differences in fluorescence levels between each group including a wild-type (WT) negative control. Results: GzmB fluorescence was present in high amounts in Bruch’s Membrane of the WT and ApoE-KO samples compared to the KO and DKO samples. When imaged at a higher power, the fluorescence was shown to be present in the space between RPE cells but further investigation will need to be undertaken in order to elucidate the exact location of the GzmB in the extracellular space.
WAVE 1 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Generation of human TAP1 and UBE2O knockout cells with CRISPR/Cas9

Presenter(s): John Kim

Abstract
The ubiquitin-proteasome system (UPS) represents one of the major cellular pathways by which protein balance is maintained. This intracellular process involves proteasomal degradation of ubiquitinated proteins. The resulting peptides are translocated to endoplasmic reticulum where they are loaded on major histocompatibility complex class I (MHC-I), later presented on cell surface to cytotoxic T cells. The focus of this project is to generate knockouts (KOs) of genes involved in MHC-I antigen presentation using CRISPR/Cas9 to assess the difference in MHC-I cell surface expression between wild-type and mutants. Two genes in the endogenous pathway were targeted: TAP1 and UBE2O, which encode transporter associated with antigen processing and E2 ubiquitin-conjugating enzyme, respectively. We hypothesize that abolishing their protein expression will reduce MHC-I expression. TAP1 and UBE2O KOs were generated by transfection of two single-guide RNA with the pU6-Cas9-Venus expression vector into HEK293T cells. Positive KO cells were validated by PCR and western blot and stained for MHC-I expression by flow cytometry. TAP1 has low basal expression in HEK293T cells that cannot be detected by western blot in cells without interferon-gamma (IFN-γ) treatment. Therefore, IFN-γ was used to validate TAP1 protein deletion, and MHC-I expression in TAP1 KOs was significantly reduced. Furthermore, UBE2O KOs that had deleted exons 1 and 14 individually resulted in silenced protein expression but no significant change in MHC-I expression. In conclusion, we report a simple CRISPR/Cas9-based approach to establish KO cells that can be used to characterize the change in immunopeptidome via mass spectrometry and guide tumour immunotherapy development.
WAVE 1 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: The osmotic environment influences Escherichia coli adaptation to T4 infection

Presenter(s): Derrick Chong

Abstract
Research into the human gut microbiome has largely been focused on bacteria, but has neglected viruses, the most abundant biological agent on earth. Specifically, bacteriophages are viruses that infect bacteria and use their cells as replicative hosts. Consequently, they play a role in determining bacterial dynamics in the gut, ultimately affecting human health and disease. We aim to investigate how bacteria-phage interactions are shaped by gut perturbations, such as osmotic disturbances that occur due to inflammatory bowel diseases or laxative use. Interestingly, osmotic regulator proteins such as OmpC in the commensal gut bacterium Escherichia coli respond to the osmotic environment, but are also receptors for bacteriophage T4 adherence. This indicates that bacteriophage infection may be influenced by the osmotic environment. The interaction between E. coli and T4 is an excellent model of adaptation and competition in vitro, where the predatory T4 infects E. coli, however, within hours, growth of resistant mutants occurs. In preliminary data, we infected E. coli with T4 in varying osmolality by adjusting salt concentrations. Interestingly, we observed that in low osmolality conditions, T4 resistant mutants do not arise. We hypothesize that the relationship between T4, E. coli and the osmotic environment may help E. coli adapt to T4 infection. We continue to investigate this hypothesis using imaging and molecular genetics by looking for genes that may influence both infection and osmotic adaptation in E. coli. Our research is elucidating the drivers of microbiota dynamics during gut disturbances, and paves the way to creating reliable microbiota therapies.
Abstract
Endometriosis is a pelvic pain disorder characterized by endometrium-like tissue growing outside the uterus. Central Sensitization (CS), the hyperexcitability of the nervous system, may contribute to endometriosis-associated pain. The current theoretical study examined the association between endometriosis and CS characteristics, including lower cortisol, lower pain thresholds and lower volume of grey matter in pain processing brain areas. Heat and saline injection pain threshold tests were used to evaluate sensitization quantitatively, and magnetic resonance imaging (MRI) was used to determine patterns in volume of pain processing brain areas across groups. Serum cortisol levels were determined by blood test. Participants in this study were recruited from the University of British Columbia and divided into three groups: healthy controls, those with histopathological diagnoses of endometriosis (group 1), and those with fibromyalgia without endometriosis (group 2). Subjects with fibromyalgia were used to model high CS, since fibromyalgia is a CS syndrome. We hypothesized that group 1 will have similar brain area volume patterns, serum cortisol levels, and pain thresholds as group 2. We also hypothesized that groups 1 and 2 will have lower pain thresholds, lower serum cortisol, and different brain area volume patterns than controls. In addition to providing a new perspective for future research, classifying endometriosis as a CS syndrome may improve diagnostic criteria, broaden treatment options, and improve quality of life for individuals with endometriosis.
WAVE 1 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Diverse S24-7 Responses to Osmotic Perturbation

Presenter(s): Sarah Popple

Abstract
The host microbiome has been established as critical to host physiology. Despite recent advances, many members of the gut microbiome remain uncharacterized. Therefore, it remains difficult to determine their contributions to gut function, as well as overall host health. S24-7 is a key, yet understudied, family of bacteria prevalent in the mammalian microbiome. Different isolates have as much as 25% divergence in average nucleotide identity providing an important level of diversity to explore. This project aims to characterize divergent abilities observed between different isolates of S24-7 in response to osmotic stress using in vitro and in vivo modelling. Through in vitro modelling, I have been able to quantify the growth rate for numerous isolates, and observed differential growth of isolates with increased osmolality. Additionally, we have determined that unique isolates display differential growth rates from each other, indicating that divergence in average nucleotide identity may play a role in this altered growth rate. Live imaging in microfluidic chambers is currently been performed on specific isolates, and patterns quantified into single cell growth profiles in order to determine physical differences in growth. Comparative genomics of the isolates of interest is also being done in order to ascertain specific genes which may have a role in differential growth, coupled with transcriptomics to evaluate gene expression.
Theme: Health and Wellness

Title: Pregnancy Outcomes among Women with Rheumatic Mitral Valve Stenosis

Presenter(s): Sherry Sandhu

Abstract
Background: Rheumatic Mitral Valve Stenosis (MS) continues to be the most common lesion contributing to cardiac maternal morbidity in developing countries. This study sought to determine maternal cardiac outcomes of pregnancy in women with Rheumatic MS.

Methods: Consecutive pregnant women from the CARPREG registry with Rheumatic MS seen at St. Paul's Hospital were included. Cardiac assessments, including electrocardiographic and endocardiographic variables, were recorded at baseline and followed periodically throughout pregnancy until 6-months postpartum. Maternal cardiac event was defined as maternal cardiac death, cardiac arrest, other cardiac hospitalization and/or cardiac intervention. Pregnancies were categorically analyzed according to severity of MS.

Results: Fifty-five pregnancies with primary mitral stenosis were included, 24% of which were severe mitral stenosis. The cardiac event rate was 25% (n=14): 10 mild heart failure requiring bed rest, fluid restriction and beta blocker restriction, 2 atrial fibrillation requiring anticoagulation and escalation of beta-blocker therapy and 2 requiring mitral valvuloplasty in pregnancy. There were no maternal deaths. Ten of these complications occurred in pregnancies complicated by severe mitral stenosis.

Conclusions: There is a notable occurrence of cardiac outcomes in this population, albeit manageable complications. Women with MS need appropriate pre-conception counseling and in select cases may benefit from intervention pre-pregnancy to minimize the risk of adverse cardiac outcomes. Careful care throughout pregnancy can minimize the risk of major adverse outcomes.
Theme: Health and Wellness

Title: Transcriptome and DNA methylation dissection of Non-small-cell lung cancer

Presenter(s): Ali Hosseinzadeh, Bahar Ahmadi, Masih Sarafan, Jennifer Cheung

Abstract
Introduction: Non-small-cell lung cancer (NSCLC) accounts for 84% of lung cancer diagnosis and it is the leading cause of cancer death. Despite extensive studies on NSCLC, further studies are needed to establish translatable knowledge regarding the genes and pathways involved in NSCLC to develop potential targeted therapies.

Purpose: To detect critical genes and pathways in lung adenocarcinoma progression, as well as to investigate the role of DNA methylation on gene expression in NSCLC.

Methodology: Gene expression and methylation NSCLC data were obtained from Gene Expression Omnibus (GEO) and The Cancer Genome Atlas (TCGA) databases. All analyses including differential expression (DE), differential methylation (DM), and correlation analysis were performed in R. Pathway and gene ontology analysis for the lists of DE and DM genes were done in DAVID.

Results: Through DE analysis, 242 up- and 538 down-regulated genes were detected. Up-regulated genes were enriched in cell cycle and division processes, while down-regulated genes enriched in cell adhesion, migration, and immune response processes. Through DM analysis, 653 hyper and 136 hypo-methylated probes were identified which enriched in significant pathways in cancer such as cell junctions and cell proliferation signaling. No significant correlation was detected between gene expression and methylation. However, expressions of FTL, TMSB10, ACTB, and S100A6 were high while they showed very low levels of promoter methylation.

Conclusion: Findings highlight the importance of cell cycle, adhesion, and immune related processes in NSCLC. Drugs targeting these processes could be effective for treatment. High expression of FTL, TMSB10, ACTB, and S100A6 genes given their low methylation may indicate their expression control through DNA methylation, however further studies are needed to establish this relationship.
**Title:** Smoke-free Dads: A game-changer for better health

**Presenter(s):** Angela Leung

**Abstract**

Background: Fathers’ desire to be healthy role models for their children strengthens motivation to quit smoking, but parental cessation resources often focus on mothers. Thus, there is a need for such resources to be father-specific. While men’s response to a smoking cessation group-based program, Dads in Gear (DIG) (http://dadsingear.ok.ubc.ca/), has been overwhelmingly positive, its reach is inherently limited. With recent research suggesting the use of game techniques as a potentially powerful tool for health behaviour change, this project explores how mobile technologies could extend the reach of DIG, developing prototypes for a smartphone app that helps fathers quit smoking, engage in fathering, and other positive health behaviours.

Methods: Evidence-based strategies to support smoking cessation and previous research with fathers participating in DIG were drawn upon to guide the development of features for the smartphone app. In addition, current literature was reviewed regarding gamification strategies and health-related apps. Fathers who currently smoke or previously quit are being recruited to participate in consultation group discussions to provide feedback on the prototypes. Data gathered will be content analyzed and summarized.

Conclusion: The DIG smartphone app has the potential to be a widely accessible, valuable addition to existing smoking cessation resources. Unlike other resources, it is aimed at empowering fathers to be involved, healthy and smoke-free by providing both general and personalized support that can be accessed just by reaching into their pockets. Through the app, fathers will embark on their journey to quit smoking and become the dads they want to be.
Theme: Health and Wellness

Title: Maternal Genotype and Ethanol-Induced Cell Death in the Mouse Embryo: A Model to Study Fetal Alcohol Spectrum Disorder

Presenter(s): Constance de Schaetzen, Chris Chen, Cheryl Tan

Abstract
Fetal Alcohol Spectrum Disorder (FASD) is one of the most common preventable neurodevelopmental disorders, and can lead to physiological, developmental, and cognitive abnormalities. The type and severity of ethanol-induced teratogenesis is influenced by many factors, including genetics.

In previous studies, BXD mouse strains were categorized based on the level of cell death in neural tube regions following in utero ethanol exposure. Evidence also suggests the effect of the embryonic and maternal genotypes on cell death, but the contribution of each genome is currently unknown.

Using BXD strains, this study investigates the impact of the mother's genome on cell death in embryonic neural tube development. Mice strains were crossed and mothers were treated with either ethanol (treatment) or isocaloric maltose-dextrin (control). Embryos were collected, sectioned, and stained to assess levels of cell death in the developing neural tube. Crossing parent strains confirmed the influence of both the maternal environment and the embryo's genotype on the level of cell death observed. The results of this study allow for a better understanding of the interplay between genetics and environmental perturbations (ethanol exposure).

The overall goal of the project is to be able to identify genes/genotypes more susceptible to the detrimental effects of ethanol, and those that would best respond to therapeutic interventions. Discerning the genetic component of FASD could lead to earlier diagnosis and improved treatments. Information on the genetic component of FASD would allow practitioners to better understand the variation in phenotype and implement therapies earlier.
WAVE 1 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Characterizing the Influence of Chronic E-Cigarette use on Lung Cancer

Presenter(s): Syed Zaidi, Annabel Chen, Marina Toma

Abstract
Lung cancer is the leading cause of cancer-related death worldwide, characterized by uncontrolled cell growth in tissues of the lung. This paper will focus on the effect of DNA damage caused by chronic e-cigarette (ECS) on the proliferative capacity of cancer cells. Despite the increasing use of ECS, there is little research made regarding the damage they can do to DNA. However, growing evidence suggests that EC-smoking harms the lung significantly, promoting cell proliferation and leading to tumour formation. We hypothesized that EC will enhance tumor growth through the mutations of vital genes such as p53, NACHR, and Rb in smokers. In this study, we measured the effect of EC use by culturing normal human bronchial epithelial (NHBE) cells at an air-liquid interface using a Vitroell smoke exposure robot, while using NHBE that were not exposed to nicotine-containing EC as a control. We found that only inhalation of nicotine-containing EC promoted airway smooth muscle proliferation and contraction, which impacted airway hyper-reactivity and caused lung cell apoptosis. NHBE cells showed impaired ciliary beat frequency, airway surface liquid volume, cystic fibrosis transmembrane regulator and ATP-stimulated K+ ion conductance. Thus, nicotine could be a key factor in suppressing apoptosis in lung tumours and driving the onset and progression of lung disease. We observed the deregulation of critically important genes and associated molecular pathways in NHBE, indicating the danger of nicotine inhalation during EC use. Future efforts should be taken and EC should not be advertised as a healthier alternative compared to traditional cigarettes.
Theme: Health and Wellness

Title: Invadopodia-Master Regulators of Tumor Cell Dissemination

Presenter(s): Layla Bleibel, Shanzeh Chaudhry, Angeeleet Dhanda

Abstract
Background: Metastasis remains the leading cause of patient related deaths, due to organ damage caused by the growing tumors at the distant site. Local cancer cell invasion at the primary tumor and dissemination throughout the body is mediated, in part, via forming feet-like structures called invadopodia. Invadopodia are finger like projections that allow cancer cell to breach the nano-pores of basement membrane during tumor invasion via physical force and protein digesting enzymes. Despite their importance during tumor dissemination, our understanding of the comprehensive role of invadopodia within living organisms (in vivo) is limited.

Methods: The current research project aim to conduct a literature review on the formation of invadopodia in in vivo settings. The review combines the research studies that have explored key steps in invadopodia initiation, assembly and maturation in living models to increase our understanding of invadopodia formation.

Results: The literature review demonstrated several factors that stimulate the initiation of invadopodia like hypoxia, endothelial growth factors, and Gamma aminobutyric acid. After initiation, the actin polymerization occur via cortactin, Arp2/3 complex, cofilin, Mena, talin etc. Finally, invadopodia maturation occur through recruitment of Tyrosine kinase substrate with 5 SH3 domains (Tks5) and matrix metalloproteases (MMPs) to degrade the protective barriers.

Conclusion: The review adds towards our current understanding of the growing field of invadopodia in living organisms. It will also direct researchers to focus on key mediators that are verified in vivo to develop anti-invadopodia therapy as preeminent approach to inhibit metastasis.
Theme: Individual, Community and Society

Title: New to Vancouver: Residential Mobility and Cardiovascular Disease Risk

Presenter(s): Rachel Karasenty Saltoun

Abstract
Moving has become an integral part of many people’s lives. This research explores whether relocating to a new city is associated with an increase in loneliness and cardiovascular disease risk, and if this increased risk diminishes with continued residency. To test this, various psychosocial variables and three cardiovascular disease risk markers (C-reactive protein, albumin, blood pressure) were assessed on two groups of individuals: those who have moved to Vancouver, Canada in the previous 6 weeks (‘Movers’) and those who have lived in Vancouver for at least five years (‘Non-Movers’). It is hypothesized that individuals who have recently relocated have heightened levels of loneliness, blood pressure (BP), albumin, and C-reactive protein (CRP) compared to those who have not recently relocated. Length of residency could potentially moderate these effects, such that after a few months, loneliness levels and cardiovascular disease risk will decrease among those who have recently relocated. In this longitudinal correlational study, it is expected that ‘Movers’ will display increased cardiovascular disease risk and higher loneliness levels due to the recent relocation, compared to ‘Non-Movers’. It is also expected that these levels will decrease over time, depending on the Mover’s success at social integration. As Vancouver’s immigration rates continue to grow, this study has important implications regarding the social support resources offered to new immigrants, as well as bringing awareness at the healthcare level of the potential increase in cardiovascular disease risk among those who have recently relocated.
WAVE 1 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Major Depressive Disorder (MDD): Patient Journey to Better Health Outcomes

Presenter(s): Yuet Ting Ma

Abstract
Major Depressive Disorder (MDD) is a common disorder which leads to poor quality of life and impaired role functioning. The depression patient’s journey is a largely variable one; however, many similarities exist amongst different patients journeys that can be highlighted. In Canada, access to mental health services is a significant issue impacting Canadians living with mental illness. There are currently many barriers to accessing services. Patients require timely access to these services for effective treatment. Barriers to service access include stigma, poverty, lack of integration between mental health and health services and shortage of mental health professionals. Additionally, some community based services essential for recovery (e.g. prescription medications, psychotherapy services) are not publicly funded. The patient journey is the foundation for all patient engagement activities. It provides context required to visualize the connection between patients and health care professional (HCP) patterns. This directed study focuses on the investigation of depression patients’ experience with the health care system and key motivators depression patients have to achieve better health outcomes. The findings of this paper confirm the urgent need in improving the healthcare system to make sure those who needs services and support are able to access the help they require to improve their quality of life and health outcomes. The results of this research further calls for change by having a new legislation that addresses mental health promotion, mental illness prevention and ending stigma by public education.
WAVE 1 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Creating a Research Ethics Vetting Guide for Pedagogical Research in Pharmacy Education

Presenter(s): Franklin Hu

Abstract
As pedagogical research gains traction and legitimacy in academic pharmacy, ensuring ethical research practices where human subjects are involved is imperative. Although Canada’s Tri-council Policy Statement outlines ethical conduct of research involving humans, at UBC, the Behavioural Research Ethics Board (BREB) is responsible for safeguarding the conduct of pedagogical research through formal ethics application and review. However, due to the low-risk nature of much pedagogical research, the BREB does not require formal ethics review for all projects, and despite the availability of guidance notes, there remains uncertainty and confusion about whether a formal BREB application and review is warranted. To address this issue, an ethics vetting guide was created to help pharmacy educators better understand the criteria and necessity for formal BREB review. The guide was developed by reviewing relevant ethics guidance notes and scholarly literature along with input from UBC’s Office of Research Ethics (ORE), Centre for Health Education Scholarship and pharmacy educators. The end product includes: 1) a four-step decision-making process delineating the need for formal ethics application and review; 2) a descriptive narrative and Tri-council definitions outlining the difference between research and quality assurance/improvement studies as a crucial step in the decision-making process; 3) a review of key principles required for ethical conduct of pedagogical research, and; 4) an appendix of examples showing how the guide can be applied. This ethics review vetting guide is anticipated to streamline and clarify the pedagogical research ethics process and has now been included amongst ORE’s ethics guides for pedagogical research.
WAVE 1 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Assessing the correlation between weather conditions and pedestrian collisions with motorized vehicles

Presenter(s): Jennifer Park, Anmol Sangha

Abstract
With the development of motor vehicles, there comes a significant risk associated with the automobiles for both drivers, passengers, and pedestrians. Factors, such as the driver’s skill, age, and experience, influence the chance of crash with pedestrians. However, driver’s intrinsic traits are not the only possible factor in collisions with pedestrians. Many external factors play a part. Our study aims to deduce whether external weather conditions play a role in the number of pedestrian collisions with motor vehicles in areas in Vancouver. Through this study, we propose that there will be a positive correlation between pedestrian collision levels and the amount of precipitation we see in Vancouver because rain or snow can reduce pedestrians’ and drivers’ visibility, leading to unpredictable/unwanted accidents, i.e. pedestrian collisions. In addition, we propose that there will be a negative correlation between pedestrian collisions and the average monthly temperature. As for temperature, Vancouver weather has historically correlated lower temperature with increased amounts of precipitation, so this negative correlation with pedestrians struck would not be unexpected. Our data analysis shows that a moderate correlation (R² = 0.5) was established between total monthly precipitation and pedestrian collision frequency from 2008-2018 in Vancouver. No significant correlation was found between average monthly temperature and pedestrian collision frequency during the same time period in Vancouver. Focusing to increase public knowledge with road safety campaigns advising increased vigilance during the months of high precipitation would be a recommended strategy to lower pedestrian collision in the future.
Theme: Individual, Community and Society

Title: An Evaluation of Physical Assessment Teaching in Entry-to-Practice PharmD Programs in Faculties of Pharmacy Across Canada

Presenter(s): Serena Quan

Abstract
Background: The Association of Faculties of Pharmacy of Canada (AFPC) recommends that Entry-to-Practice (E2P) PharmD Programs should emphasize skills that enhance the pharmacist’s role to optimize patient outcomes. To achieve this and accommodate the pharmacists’ expanding scope of practice, it is necessary for training of E2P PharmD pharmacists to include developing advanced physical assessment skills.

Objective: To survey the current physical assessment curriculum among Canadian pharmacy schools with the intent of sharing resources to further develop physical assessment teaching.

Methods: An environmental scan identified the Canadian pharmacy schools and faculty members involved in physical assessment teaching. A literature search was conducted to gather information on physical assessment teaching in North America. A twelve-question survey was created and sent to each Canadian pharmacy school to gather information about their physical assessment courses, teaching modalities, and assessment.

Results: Nine of the ten Canadian pharmacy schools responded to the survey (response rate = 90%; 8 complete, 1 partial response). Eight schools teach physical assessment in both lectures and skills lab. Most schools teach physical assessment in year 2 and/or 3. Vital signs measurement, psychiatric, respiratory, and pain assessment are the most commonly taught topics. These skills are assessed mainly via written tests and/or practical examination of technique.

Conclusions: This survey of physical assessment teaching in Canadian pharmacy schools is important as there’s limited published Canadian data. As the needs of each pharmacy program are likely similar, it’s advantageous for Canadian schools to combine their resources and experiences to better address this growing need.
**Theme:** Individual, Community and Society

**Title:** Support care needs among individuals with colorectal cancer: A qualitative study

**Presenter(s):** Liz Huang

**Abstract**

Background: Colorectal cancer (CRC) is the third most commonly diagnosed cancer in Canada. Despite being one of the leading cancers, there is limited qualitative research discussing the support networks these individuals utilize.

Objective: To explore the supportive care needs of individuals with young-onset colorectal cancer (yCRC) and average age-onset colorectal cancer (aCRC) receive.

Methods: We conducted semi-structured, open-ended telephone interviews (recorded and transcribed) with participants who were: 1) 18 years of age or older; 2) were diagnosed with CRC under the age of 50 (yCRC) or above the age of 50 (aCRC); 3) reside in Canada; and 4) were able to complete the interview in English or French. The participants were purposively sampled on age, diagnosis, sex, and province using convenience sampling from a pool of participants from a previous survey on health information needs in CRC conducted by the research team. An interview guide was created with open-ended questions to help the research team lead the participants to sharing their experiences with CRC. Data was analyzed using the thematic approach and the software NVivo.

Results: A total of 14 participants with yCRC and 20 participants with aCRC were interviewed. 42.9% of patients with yCRC were diagnosed with Stage III cancer (n=6), whereas 40% of patients with aCRC were diagnosed with Stage II cancer (n=8). Thematic analyses of the text led to the creation of five themes: 1) family and friends; 2) self-reliance; 3) support groups; 4) health care professionals; and 5) support gaps.
WAVE 1 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Substance Use Memory Associations in Adolescents

Presenter(s): Camille Roney

Abstract
Background: The Preventure program is a substance use prevention effort that explicitly targets adolescents with one of four high-risk personality styles that put them at risk for early substance use. A brief survey was created to assess the program’s success by examining implicit memory associations, being one’s ability to form memories between unrelated items, which use hypothetical scenarios tailored to each risky personality type to teach healthy decision-making skills. The intervention results from adolescents scoring high on one or more personality risk factors will inform further development of cognitive-behavioural prevention approaches. This study will measure the Preventure program’s success by identifying memory associations with coping behaviours for several personality-targeted scenarios.

Objectives: The purpose of this study will be to explore the mediation of the Preventure program by memory associations on substance use.

Hypothesis: We hypothesize that participation in the Preventure program will successfully impact substance use of adolescents via changes in memory associations with coping behaviours, use of alcohol, and other drugs following participation. Students scoring high on one of the high-risk personality styles will have specific substance use related behavioural patterns. Identifying these high-risk personality types in adolescence can allow for substance use prevention education that tailors to those personality types, decreasing use later on in life.

Method: Participants are recruited from the various schools in the same city in Western Canada. Data is collected from grade 8-11 students using an online questionnaire asking about their thoughts, emotions, and behaviours, including substance use. This survey requires both open and closed-ended responses. Only grade 8 students complete a self-report scale measuring the high-risk personality styles. Substance use is measured by asking students about their frequency of use in the last 30 days.

Results: Survey results will provide insight and direction for future research and improvements to the Preventure program to decrease substance use in adolescents.

Discussion: Using cognitive-behavioural memory associations is incredibly valuable in deciphering whether adolescent’s responses are related to substance use, providing insight to guide substance use efforts to fit the needs of students best.

Conclusion: The anticipated results of this study may encourage further development of cognitive-behavioural memory association approaches based on the Preventure program, identifying substance use behaviours in at-risk adolescents.
WAVE 1 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Do individuals with colorectal cancer identify with the meaning of “cancer survivor”

Presenter(s): Myles Wee

Abstract
Background: There are growing controversies regarding the term “cancer survivor”, particularly from the perspective of cancer patients. While a study by Berry et al. showed that women with breast cancer have negative views and feelings towards this term, there are no similar studies among individuals with colorectal cancer (CRC), which is the second most common cancer in Canada, constituting 13% of all cancer cases.

Objective: Determine what the term, “cancer survivor” means to patients diagnosed with CRC. We aim to 1) analyze the participant’s perception of the term, “cancer survivor”, 2) determine alternative terms that individuals with CRC prefer, and 3) determine differences in health status according to preferred terms by individuals with CRC.

Methods: This study is comprised of a cross sectional internet based survey. Participants are eligible if they: 1) are 18 years or older, 2) have received a diagnosis for CRC and 3) can communicate in English. Participant recruitment for the online health survey will be conducted through CRC online groups, social media, and invitations to individuals from prior studies. The survey will comprise of four parts: 1) demographic information, 2) quality of life, 3) CRC diagnosis and history and 4) perceptions of the word, “cancer survivor.” Data from the survey will be analyzed using SAS to determine the means and standard deviations for continuous variables and the proportions.
Theme: Individual, Community and Society

Title: The longitudinal association of adolescent self-perceived body dissatisfaction with future incidence of anxiety

Presenter(s): Tracy Wang, Tina Huynh, Leanne Hui, Hoa Jae Chew

Abstract
Negative self-perceptions of body image in adolescence has been associated with a range of self-reported psychological harms. The present study sought to explore the relationship between self-perceived body dissatisfaction in early adolescence and future incidence of anxiety through the unique utilization of population-based longitudinal data including physician-visit records. A dataset of 12,139 British Columbia children born between 1990-2006 was utilized in the present study. The linked dataset from Population Data BC was comprised of a self-report survey, the Middle Years Development Instrument (MDI), Medical Services Plan (MSP) data, as well as migration and demographics data from Immigration, Refugees, and Citizenship Canada (IRCC). The outcome, anxiety-related physician visits, was obtained from medical insurance billing (MSP). The selected covariates of gender, socioeconomic status, immigrant generation status, self-perceived bodyweight, self-perceived health, perceived peer support, perceived adult support, and sleep, were adjusted for in a multivariate logistic regression. Preliminary logistic regression analysis revealed that participants’ odds of having an anxiety-related physician visit between ages 13-18 was 56% higher for those who reported high self-perceived body dissatisfaction at grade 7 in comparison to those who did not report high body dissatisfaction in grade 7 (adjusted odds ratio = 1.56, 95% CI: 1.14-2.12). Male participants also had 57% lower odds of having an anxiety-related physician visit in comparison to female participants (adjusted odds ratio = 0.43, 95% CI: 0.34-0.55). Immigrant generation status did not appear to significantly associate with anxiety-related physician visits. The present study reinforces the association of body dissatisfaction on incidence of anxiety.
Theme: Individual, Community and Society

Title: The effects of video games on students academic performance

Presenter(s): Benjamin Li

Abstract
Historically, video games were typically viewed as a negative influence on academic performance. However, new evidence has challenged this view as scholars are now interested in the effects of video games on success in the educational system. This research asks: How can video games be utilized to improve school performance? School performance will be measured using student’s grade point averages (GPA) and standardized test scores. GPA’s will be calculated by taking the aggregate percentage of all courses taken in a particular year for each student. The Foundation Skills Assessment (Government of British Columbia, 2020) – which tests reading, writing and numeracy – will be used to measure students standardized test scores. Video game playing will be measured using diaries that invite participants to document their daily video game playing (e.g., Which video game(s) did you play today? How long did you play this game?). Correlational Analysis will be used to analyze all collected data. We anticipate results to demonstrate a positive relationship between video game playing and school performance. The discussion will suggest that video games are a useful tool to enhance school performance using a more competitive and fun learning environment.
Title: Awareness of Oral Dysplasia in Newly Diagnosed Patients

Presenter(s): Natyra Haxhiavdija

Abstract

Objectives: Early detection of oral dysplasia is critical as it provides better outcomes in prognosis. However, patient awareness and risk factor reduction for malignant transformation are dependent on patient compliance and understanding. This study investigated the referral process to the NextGen Oral Dysplasia Clinic (NG) and aimed to determine the patients' awareness surrounding oral cancer and precancer.

Methods: Audio-recorded, structured interviews were conducted on 14 patients referred to NG with biopsy-confirmed dysplasia. The information gathered included: who first identified the lesion, the referral time, the patient’s knowledge of dysplasia and oral cancer at the time of referral to the NG, the source of where the patient had obtained the knowledge, and the patient’s level of concern.

Results: None of the participants were aware of their lesions prior to being identified by the dental professional, despite 64% experiencing symptom(s). In 57% of the cases, the dental hygienist identified the oral abnormality. 57% knew smoking and or drinking is a risk factor for oral cancer; the remaining patients could not identify any risk factors. 50% reported inadequate information from the referring clinician and had to use the internet to further their understanding of their diagnosis. Despite this, all participants were able to identify the location of their oral lesions after diagnosis. 64% were able to obtain a referral or biopsy in less than six weeks, while 14% experienced referral delays due to the limited schedule of NG.

Conclusions: Although the majority of participants reported minimal wait times for biopsies and referrals, many were unable to recall risk factors for oral cancer and required the internet to supplement their understanding of their disease. Increased awareness in patients with newly diagnosed oral dysplasia, further investigation into communicating lesion and risk habit information to patients is required at the initial referral level.
Theme: Individual, Community and Society

Title: How Sleep Quality Vary Between International and Native Asian-Canadian University Students: A Look into How Psychosocial Factors Play a Role in Sleep

Presenter(s): Stefanie Ng, Alan Wang, Joyce Xie

Abstract
Previous research has repeatedly demonstrated the importance of sleep on maintaining one’s health and wellbeing. Its restorative and beneficial properties are particularly critical to university students who often experience high stress levels as a result of balancing academics as well as social engagements. Indeed, poor sleep has been linked to lower academic performance, memory deficits, and greater emotional reactions towards daily stressors. Previous research suggests that ethnic minorities or those with immigrant status may be more susceptible to experiencing poorer sleep, however less research has examined differences between international and native Asian university students. International students may be more susceptible to experiencing poor sleep due to absence of a strong social support network. Our sample will consist of 200 international and native undergraduate Asian students without pre-existing sleep problems. Participants will be asked to wear a sleep actigraphy watch for two weeks to measure objective aspects of sleep (e.g. sleep duration) as well as complete daily self reports surveys assessing subjective sleep quality. Additionally, participants will complete the Multidimensional Perceived Support Scale and Perceived Stress Scale to assess perceptions of social support as well as their current levels of stress, respectively. We hypothesize that International Asian students will experience shorter sleep duration, as well as report poorer sleep quality, less perceived support, and greater perceived stress. This study seeks to provide insight into an understudied population group in Canada and highlight the impact of integrating into a new culture and environment.
WAVE 1 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: The Galiano Food Program

Presenter(s): Thao Hoang, Kamila Gabitova

Abstract
Our LFS 350 group helped to create meal cards for the Galiano Food Program, which is located on Galiano Island. Majority of people living on the Galiano Island are of a lower socioeconomic status and are diabetic and pre-diabetic seniors who struggle to make informed dietary decisions. The meal cards and the fact sheet we have created helped to explain what foods offered by the Galiano Food Program should be consumed more often and what foods should be consumed less when living with diabetes. Before creating the final version of the meal cards and the fact sheet, we have travelled to the Galiano Island to conducted semi-structured interviews on their clarity, and made changes based on the feedback we received.

Overall, we hope that our project helped our community partner effectively communicate nutritional information to Galiano Food Club members and encourage discussion and engagement with healthy eating. In long-term, we hope that the organizers of Galiano Food Program can work towards their goal of community food security and community resiliency for the Galiano Island population.
Abstract
Affective forecasting is defined as the ability to predict one’s emotional response to future events. Forecasting errors are errors in the predictions of one’s emotional responses. Varying environmental (Wilson et al., 2000) and cognitive factors (Meyvis et al., 2010) can affect an individual's forecasting ability. The current study looked into context effects on forecasting and forecasting errors in relation to alcohol and cannabis use. We looked into five affects (i.e. fun, relaxation, excitement, feeling sexy, and happiness). Our sample consisted of n=100 participants with an average age of 21.77 years old (SD= 4.75). Students forecasted the intensity of their emotions prior to using substances and reported the context in which they would be using (i.e. social events, at home, etc.). Participants then used substances over the following weekend and reported the actual intensity of their experienced emotions. We considered five categories of for the contexts (i.e. 1- individuals that consumed substances without mentioning location, 2- individuals consuming substances at social events, etc.). The results showed variance for forecasting intensity in relation to context in relaxation, fun and excitement (i.e. Relaxation, f= (4, 88) =3.83, p= 0.006), participants expected to feel more relaxed when at home (M= 76.75, SD=28.48) when compared to being in social situations (M=51.87, SD= 30.46). However, the results revealed no significant observations of context effects on forecasting errors.
WAVE 1 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Adolescents & Vaping Advertisements

Presenter(s): Donelle Pavey

Abstract
Background: The current research explored the impact of vaping advertisement exposure on adolescents and their vaping habits. Hypothesis: Increased exposure to vaping advertisements will influence adolescents’ perceptions about vaping and in turn, lead to a greater likelihood of use. Methods: Several studies were examined that assess the ways in which adolescents, ages ranging from approximately 14 to 25 years of age, are exposed to vape advertisements and the frequency of this exposure. Additional studies highlighting the significance of flavoured vape juice and their allure on adolescent use were included. Results: Research suggests the most popular type of exposure to vaping advertisements were storefronts and online platforms. More frequent exposure to vaping advertisements was associated with a greater use of vapes. Discussion: Adolescent exposure to vape advertisements needs to be regulated in an attempt to decrease adolescent participation. Laws and regulations are subject to change and because vaping is a relatively new method of nicotine use, research is still in its infancy. Research examining the trends of adolescent vape use, including the factors that influence initiation and maintained use should be key research targets.
Theme: Innovation and Technology

Title: The 24-hour Urine Collection has a Limited Role in the Prevention of Kidney Stone Recurrence

Presenter(s): Ruixuan Yang

Abstract
Current guidelines recommend metabolic workup with 24-hour urine collection to identify modifiable risk factors for secondary prevention of urinary stone disease. However, evidence for 24-hour urine’s accuracy in predicting recurrence or treatment response is limited. This study aimed to evaluate whether targeted medical therapy based on 24-hour urine collections versus general dietary recommendations can affect repeat 24-hour urine parameters and stone recurrence.

Identifying patients with urolithiasis at our institution from 2013-2015, ninety-five underwent a metabolic workup including 24-hour urine at two or more time points. Change in 24-hour urine parameters after receiving general dietary advice versus selective medical therapy was evaluated and stone recurrence after undergoing metabolic evaluation was investigated.

Forty-nine patients received general dietary advice; 46 were prescribed selective medical therapy based on 24-hour urine results. Twenty patients (43.5%) who received targeted advice versus 13 (26.5%) who received general advice had recurrent stones (p= 0.08). On repeat 24-hour urine analysis, 29/46 = 63.0% of targeted advice patients versus 21/49 = 42.9% of general advice patients had normalization of at least one parameter (p = 0.05).

In conclusion, patients with targeted advice had a higher rate of improvement in their 24-hour urine risk profiles compared to those given general advice, but still had comparable rates of stone recurrence. This suggests that 24-hour urines may have a limited role in long-term management of stone prevention. Future studies randomizing targeted advice to general advice would help determine if 24-hour urine tests and targeted therapy are helpful in stone prevention.
Theme: Innovation and Technology

Title: The relative contribution of the upper face and lower face to the recognition of dynamic faces

Presenter(s): Shanna Yeung, Sena Youn,

Abstract
Background: Facial recognition has long interested law enforcement for criminal recognition and physicians treating patients with prosopagnosia (the inability to recognize faces) but has expanded into a hot field now that tech giants such as Facebook and Google, mobile applications, and marketing/retail are investing into facial recognition training and artificial intelligence software. Studies with static faces find that upper face halves are more easily recognized than lower face halves – an upper face advantage. However, faces are usually encountered as dynamic stimuli, and there is evidence that facial motion contributes to face identity recognition. Given that the lower face is more mobile than the upper, this raises the question of whether dynamic faces also show an upper-face advantage. We determined whether familiarity for recently learned faces was more accurate for the upper or lower face, and whether this depended upon whether the face was static or dynamic.

Methods: In Experiment 1, 64 healthy subjects with mean age of 24 years (SD = 5.70; range: 18-44) learned a total of 12 faces – 6 static images and 6 dynamic video-clips of actors in silent conversation. In experiment 2, 39 subjects with mean age of 25.5 years (SD = 8.49; range: 18-50) learned 12 faces, all dynamic video-clips. During the retrieval phase of Experiments 1 and 2, subjects were asked to recognize upper or lower face halves from either static images or dynamic clips for 96 trials in Experiment 1 and 72 trials in Experiment 2.

Results: Both Experiments 1 and 2 did not find an advantage of dynamic stimuli in learning condition or retrieval condition and did not find an upper face advantage regardless of whether faces were static or dynamic stimuli at retrieval. When facial structure is readily available, dynamic information does not significantly improve learning or recognition, especially in comparison to a multiple-static image condition. There is no upper face advantage in dynamic stimuli. Perhaps dynamic stimuli provide a re-distribution of facial identity information across faces halves, and our attention gets to drawn to the mouth for social and emotional cues. Our findings has implications for how we should train facial recognition in prosopagosisic patients and law enforcement professionals, and facial recognition software.
Abstract
Exosomes are nano-sized extracellular vesicles (~30-100nm) shed by all cell types when late endosomes fuse to the cellular limiting membrane. They are formed following the invagination of the endosomal membrane at which point they take on the physiological signature of the parent cell. Because of the exosome’s ability to acted as targeted delivery vessels, these structures can function semi-analogously to viruses and hormones effecting changes in their recipient cells. Unfortunately, exosomes have yet to be isolated in a pure fraction as they overlap in all known physical properties with microvesicles, another class of extracellular vesicles that are shed directly from the cell membrane. As such, it is unknown which of these extracellular structures has the diagnostic potential for diseases such as cancer, diabetes, and neurodegeneration that is often reported in the literature. To combat this, we have set out to isolate a pure exosome sample so that its biological function may be tested without the confounding variable of the microvesicle.

To do this, we are attempting a two-pronged approach. With microfluidic technologies based on acoustophoresis, a method that uses standing acoustic waves, we are able to separate spherical objects of various sizes into distinct outlets. And, with fluorescence microscopy we can detect structures containing Green Fluorescent Protein genetically coupled to CD63, a suspected exosomal marker, and adhere such structures to an imaging surface with relative specificity. As these two approaches provide methods for separating extracellular vesicles from crude samples, we are confident that more precise methods than those currently employed in the field can be developed to lead to specific exosome isolation.
Theme: Innovation and Technology

Title: Is Dichotomous Scoring of Bleeding with a Standard Periodontal Probe Reliable in Assessing Peri-Implant Inflammation?

Presenter(s): Ashley Chicote

Abstract
Background: Bleeding on probing (BOP) remains the most widely used clinical parameter to assess the peri-implant mucosal health of an implant. Although the absence of bleeding, along with other indicators of inflammation, is correlated with mucosal health, the presence of BOP may offer varied information. Factors that may influence bleeding tendencies may be site-specific, patient-related, iatrogenic, and perhaps the instrument used to obtain the assessment. Objectives: To determine the false-positive rates of bleeding on probing and the diagnosis of peri-implant diseases using a standard periodontal probe at the University of British Columbia (UBC) Nobel Biocare Oral Health Center. Methods: A retrospective study of patients with osseointegrated implants at the UBC dental clinic from 2012-2019. An evaluation of 750 implant cases resulted in 111 cases meeting the criteria. Data was collected on the implant and/or abutment system, pocket depths, BOP, suppuration, plaque index or oral hygiene index, recare interval, keratinized tissue levels, and bone levels at baseline, one, three, and five-years post-operation. Results: The periodontal probe was reliable in producing a dichotomous score, but resulted in underestimating the predictive value of BOP. The presence of in this population led to higher odds of healthy peri-mucosal, which may have resulted in underdiagnosing peri-implant inflammation. Conclusion: Diagnoses were inconsistent with BOP findings and suggested that dichotomous scoring lack descriptors in identifying peri-implant infection. Adjunctive methods or indices for accurately assessing and diagnosing peri-implant gingival inflammation are needed and should be explored.
Wave 1 | Poster Presentations

Theme: Innovation and Technology

Title: Investigating People’s Attitude Towards Utilizing The Emerging Autonomous Vehicles Technology

Presenter(s): Yi Fu Chen, Zi Cong Nicholas Teh, Manvis Xia, Passant Reyad

Abstract

Technological initiatives are influencing the way we live. A wide range of benefits is expected from Autonomous vehicles (AVs) technology in terms of traffic safety. Also, it can significantly improve the mobility of individuals who are not able to drive, such as children, the elderly and the disabled. As suggested by survey analysis in previous recent studies, the early AVs adopters are likely to be the young, students, educated individuals who spend longer time in vehicles. In this study, a questionnaire of twenty-eight questions was crafted to measure user preference regarding AVs and how likely this technology would be popularly accepted in a short time. Survey questions were distributed electronically to young adults, most of whom live in Canada or Singapore. Sixty individuals were willing to participate in this research. The obtained responses were then analyzed and visualized using Python and Tableau platforms. Based on this, quantitative observations were done by calculating the correlation score between each opinion. Results demonstrated that individuals who: 1) are more receptive to new products and technologies, 2) prefer not to drive, or 3) have a greater understanding of AVs, are more likely to demonstrate a pro-AVs attitude. It was also observed that young people are willing to utilize AVs to park or get groceries for them. On the other hand, respondents showed a lack of trust in AVs in terms of safety. The majority of participants believe AVs will be safe enough within the next ten years. Finally, future improvements are presented.
Theme: Innovation and Technology

Title: Investigating the prevalence of needlestick injuries in non-clinical settings in British Columbia and examining the effect of safety engineered devices in minimizing needlestick injuries.

Presenter(s): Aahana Kanyal

Abstract
Needlestick injuries (NSIs) have been shown to increase the clinical and economic burden on healthcare workers (HWCs), however, there is a paucity of data available about its effects on those who work in institutional, veterinary and laboratory settings. NSIs have been closely related to an increased risk of disease transmission in HWCs due to poor handling and disposal of sharps. Previous research has demonstrated that a large proportion of NSIs occur during uncapping and recapping of needles, and such risk can be reduced by introducing safety-engineered devices (SEDs) into the workplace. Additionally, lack of properly-outlined safety protocols involving needles, lack of proper training, or lack of adherence to safety protocols have been shown to contribute to NSIs. This investigative study will focus on the occurrence of NSIs in non-clinical environments in British Columbia. Qualitative and quantitative data from existing literature as well as surveys conducted with researchers, technicians, and veterinary staff from institutions around the Lower Mainland will be used to quantify the prevalence of NSIs and examine the need for SEDs to minimize NSIs in the workplace. Analyzing needlestick prevalence in these settings by evaluating the safety habits and opinions towards needles of students, researchers, veterinarians, and other staff will help explore the underlying causes of emotional, economic and ergonomic strain due to NSIs. Further examination of attitudes towards NSIs and frequency of reporting sharps injuries before and after the implementation of SEDs will help clarify the role of SEDs in reducing NSIs at facilities around BC.
WAVE 1 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Spatiotemporal and Structural Analysis of the G-Protein-Coupled Receptor/14-3-3 Protein-Protein Interactions Using Proximity Labeling

Presenter(s): Fardad Asghari Zadeh

Abstract

G-protein-coupled receptors (GPCRs) are the largest family of membrane proteins as well as the largest family of therapeutic targets for clinically used drugs. GPCRs are involved in crucial signaling pathways such as responses to hormones and neurotransmitters as well as many pathologies like neurodegenerative disorders and carcinomas, which are regulated by GPCRs’ interactions with other proteins. 14-3-3 proteins are abundantly expressed adaptor proteins that regulate both GPCR signaling and receptor trafficking. However, due to a lack of ability to assess specific 14-3-3 signaling, the GPCR/14-3-3 interaction is not well understood or recognized. This project will explore the spatiotemporal dynamics of the protein-protein interaction (PPI) between GPCR and 14-3-3, the structure of the GPCR/14-3-3 complex, and the 14-3-3 binding site in GPCRs. Modified ascorbate peroxidase (APEX2) proximity labeling will be used to biotinylate the GPCR protein networks followed by a two-step mass spectrometry (MS) workflow. First, all biotin-labeled proteins are identified, then, targeted proteomics will deconvolve the complex proximity profile of the biotin-labeled proteins into its constituent parts. The GPCR/14-3-3 complex will be isolated using peptidisc in a detergent-free manner. Cryogenic electron microscopy (Cryo-EM) will be performed on this complex to determine its structure with high-resolution. The spatiotemporal context for the PPI between GPCR and 14-3-3, which most likely takes place after receptor desensitization and internalization, along with the structural analysis of their complex will provide new insights for drug development through molecular modelling of hypothetical ligands.
WAVE 1 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Using a yeast model to understand the role of a viral protein in the inhibition of stress granule assembly.

Presenter(s): Roy Ru Yi Zhao

Abstract
Stress granules are aggregates of RNA and proteins that form during cellular stress and are implicated with certain viral infections and neurodegenerative diseases. Many viruses have evolved ways to inhibit stress granule assembly, but the mechanism underlying this and its physiological relevance are not fully understood. The Cricket Paralysis Virus 1A protein is a multifunctional protein that modulates multiple host pathways, including the inhibition of stress granule assembly in both insect and human cells. We hypothesize that the 1A protein can also inhibit stress granule assembly in yeast (S. cerevisiae) using a conserved mechanism, allowing the use of yeast as a model organism to identify related host factors. Yeast is a powerful genetic model organism, as it shares homologous genes with many other organisms and possesses a deletion library containing mutants for nearly all yeast genes. Through an expression system, we demonstrated that 1A protein expression inhibits yeast growth, making it a feasible system to study the mechanisms of 1A function. Mutations that are known to inhibit 1A’s ability to block stress granule function do not affect yeast growth. Subsequently, we will express the 1A protein in a yeast deletion library containing non-essential deletions. Through the deletion library, we expect to identify genes involved in cellular stress response, including genes involved in stress granule assembly that have yet to be characterized. These results could elucidate the mechanism and significance of stress granule assembly, providing the foundation for future clinical applications regarding viral infections and neurodegenerative diseases.
Abstract
Approximately 44 million people have Alzheimer’s Disease (AD) or another form of dementia worldwide. AD is a progressive neurodegenerative disease resulting from the formation of amyloid and fibre clusters, and is characterized by significant cognitive deficits including memory loss, confusion and vision impairment. Currently, there is no cure for these symptoms; however, some medications help control symptom severity. Evidence of a connection between glucose metabolism and AD progression has recently been identified, and the discovery of abnormal glycolytic processes in patients indicates that glucose is a factor in AD progression. Furthermore, vitamin C, D, and E have been found to help control symptoms; however, no comprehensive diet plans have been assessed to date. We hypothesize that by restricting carbohydrate intake and substituting in ketogenic foods enriched with vitamin C, D, and E, ketones will become the primary fuel source and, combined with the vitamins, may alleviate the progression of AD symptoms. We conducted a review of clinical evidence on AD and glucose metabolism as well as the relationship between AD and vitamins from 2005-2019, which included 5 trials involving 735 participants. Notably, one trial indicated that the glucose deficit may recover by exposure to ketone bodies, and another trial suggested that vitamin E reduces the rate of cognitive impairment in patients with AD. Therefore, we propose a comprehensive diet plan consisting of low carbohydrate foods enriched with vitamins, expecting to see reduced symptom severity. Future research may generate personalized diet plans that may alleviate AD symptoms to a greater extent.
WAVE 1 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Potential Mobility Benefits of Connected Autonomous Vehicles (CAV)

Presenter(s): Chanyi Kim, Johanan Agarwal, ZeSheng Sun

Abstract
With the emergence of Connected Autonomous Vehicles (CAVs), which uses technology to communicate with others CAVs, like the internet of things, and have the varying ability to drive without human input, traffic with CAVs may be different from that with human drivers before. This results in questions on what mobility benefits may result from the introduction of CAVs in the future. In this paper, we present a systematic review and meta-analysis of recent studies relevant to the effect of the CAVs technology on the mobility of the transportation system. This includes the expected reduction in traffic delays due to the advanced CAVs traffic management and control applications as well as the possible increase in the transportation demand due to the fact that CAVs may encourage people to further use vehicles generating additional trips on the transportation system. The meta-analysis combines and compares results of the existing research related to the application of the CAVs technology into several road facilities with various traffic conditions. The meta-analysis results show that the CAVs technology can have significant mobility benefits to transportation networks in terms of reducing traffic delays, increasing traffic capacity, decreasing traffic queues, and alleviating traffic congestion. However, the results also indicate that several drawbacks and unintended consequences may happen unless the transportation system is properly managed. Overall, the paper concludes that the mobility benefits of CAVs are significant.
**Abstract**

We created a highly customizable interface for subjects to design strategies in a repeated game experiment. The effects of the interface on strategy complexity, performance, and cooperation rates will be studied. Since the interface models abstracted programming logic, subjects without programming knowledge may feel intimidated or hampered by the technical representations of these blocks. The performance and complexity of strategies will be compared with the subject’s level of programming experience.

Strategy specification methods in previous repeated game experiments do not reflect how subjects naturally think about strategies. These experimental interfaces can favor memory-one strategies (i.e. only condition on the previous game period’s result).

The proposed interface, designed using a block-based coding interface from Google’s Blockly, provides greater flexibility. Previous setups are rigid in terms of what logical comparisons can be made between the actions and payoffs in the game history. Since the interface’s blocks directly translate to JavaScript code, students can construct a wider range of strategies by taking advantage of blocks representing logical structures and control-flows. As the design abstracts programming logic from subjects, no prior programming experience is required. Subjects also have complete control their strategy’s complexity, as all strategies start from a clean workspace and subjects choose their own combinations of blocks. Our interface also allows subjects to freely test their strategies and provides instantaneous, intuitive graphical feedback. With a more flexible interface, we want to observe if subjects would branch out to different or more complex strategies, and how these strategies perform compared to memory-one strategies.
WAVE 1 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: The effects of virtual reality on depressive symptoms and sedentary behaviour in inpatient stroke survivors: A pilot randomized controlled trial

Presenter(s): Nicole Ketter, Lydia Wood

Abstract
Depressive symptoms and sedentary behaviours are common after stroke, and are associated with suboptimal recovery. Virtual Reality (VR) has garnered attention as a cost-effective treatment for physical stroke rehabilitation. However, use of VR to improve depression in stroke rehabilitation has yet to be studied. We hypothesize that the VR program will improve measures of depressive symptoms and sedentary behaviour. Forty-eight patients receiving rehabilitation with an expected length of stay of at least fourteen days (no maximum) will be enrolled in this single-blinded pilot randomized controlled trial (RCT). Half of the participants are randomly assigned to a usual care control group while the other half are assigned to the VR-gaming program. Exclusion criteria include planned surgical procedures, not medically stable, and severe aphasia. The VR-gaming program is comprised of relaxation, leisure, and activity games. Participants undergo three, 15-30 minute VR sessions per week for the duration of their rehabilitation. At each session, patients self-select a game and work with a trained clinician administering the VR program. Data such as recruitment/retention rate, perceived benefit, and treatment fidelity will be collected to inform on feasibility. Depressive symptoms and sedentary behaviour are assessed at baseline, post-intervention, and 3-weeks post discharge, using the Hospital Anxiety and Depression Scale and the Measure of Older Adults’ Sedentary Time, respectively. We anticipate the protocol will demonstrate sufficient feasibility to support the development of a multisite RCT. In addition, improvements in depressive symptoms and sedentary behaviour may lead to better engagement in rehabilitation and thus enhanced recovery following stroke.
Theme: Innovation and Technology

Title: Characterizing the Interactome of MTNR1A using BioID

Presenter(s): Jiaxi Zhang, Yuxin Zhang, Fanjin Liu

Abstract
Melatonin is a signaling molecule commonly used to regulate the sleep-wake cycle and promote sleeping quality, which effectively assists to adjust jet lag and mediate insomnia. A receptor protein, melatonin receptor MTNR1A detects the presence of melatonin and binds to it to initiate the signal transduction pathway.

This process is crucial and is achieved by cooperation with other proteins. In order to have a better understanding of how the melatonin receptor interacts with other proteins, in this research, a new technique BioID (proximity-dependent biotin identification) is used to detect the interactome of the protein of interest, melatonin receptor MTNR1A. The result found that there are at least 10 proteins (Pro-neuropeptide Y, Guanine nucleotide-binding protein G subunit beta-1/2/3, Pro-opiomelanocortin, MTNR1B, Transmembrane domain containing protein, Guanine nucleotide-binding protein G subunit alpha-1/2/3) to be biotinylated and detected on the SDS-PAGE, which showed that MTNR1A is able to have a interaction with at least 10 proteins.
Theme: Innovation and Technology

Title: Advancement in the Optical Electronics Industry: Controlling the Chain Length of Polythiophenes

Presenter(s): Yao Zhang

Abstract
There are large industrial demands for synthesizing polythiophenes due to their exceptional optical and electronic properties with applications in electrochromic windows, solar cells, batteries, and other solid-state devices. Catalyst transfer polymerization (CTP) is the most mature and efficient method known to produce these π-conjugated polymers; however, control over polymer length and structure is crucial to achieve specific electronical properties. This includes the materials’ chemical functionality and reproducible properties. We have the first experimental evidence that the length of the thiophene polymers could be stoichiometrically controlled in CTPs. This will drastically increase the efficiency of these electronic devices. All characterization was performed through 31P{1H} and 1H NMR to verify the identity of the molecule synthesized but also to demonstrate that chain length could be accurately controlled with reproducibility. The polymers were also end-capped with an unreactive species to stop the polymerization process and to fix the polymer length. The ability to synthesize these desirable conjugated aromatic polymers while controlling chain length and maintaining precise molecular weights can drastically increase the market demand for these new materials.
Innovation and Technology

A New Technological Paradigm for Low-Cost, Decentralized Vaccine Manufacture at Point-of-Use

Kenechukwu Ene, Joshua Pak

Introduction: Vaccines are a key piece of the preventative healthcare system in the developing world. However, their manufacturing is largely concentrated in select locations in the developed world. As a consequence, transporting vaccines to remote locations typically necessitates the use of cold-chain logistical solutions which comprise roughly half the cost of a vaccine dose.

Purpose: This project seeks to save costs for healthcare systems in the developing world by developing a de-centralized, low-cost platform for the manufacture of vaccines at or closer to their point-of-use. The cell-free protein synthesis of an antigenic component from pathogenic gram-negative bacteria has been achieved; the first of the project’s five objectives and the focus of this discussion.

Methodology: The production of a marker protein, Green Fluorescent Protein (GFP) was used to simulate system protein production. BL21 E. coli bacteria was grown in 2XYTPG culture media and lysed to make cell-extract. GFP plasmids under the control of a T7 promoter were inserted into the lysate and their expression was optimized by investigating the effect of reaction components such as maltodextrin (primary metabolite), potassium and glutamate. Upon achieving optimal GFP expression, experiments were repeated to express an antigen derived from a pathogenic bacterial strain at 200 ug/ml, a 10-fold increase from the 20 ug/ml yields obtained from in-vivo production.

Implications: We have developed a low-cost formulation for in-vitro synthesis and expressed our product of interest, research is ongoing to achieve remaining project goals and subsequently develop a disposable bioreactor prototype.
Theme: Innovation and Technology

Title: An Analysis of Current Trends in Multimedia Platform Usage and Surgery

Presenter(s): Haaris Khan, Farhad Udwadia

Abstract
Social media (SM) has revolutionized the way medical information is disseminated and consumed. The past decade has witnessed a significant rise in SM use amongst surgeons/surgical trainees across several subspecialties. In this study, we investigated the implications of widespread SM use in surgical settings and assessed whether the benefits outweigh the risks. Upon reviewing the literature, we established that overall SM can positively impact the field as it serves to further surgical education by increasing knowledge, enhancing information dissemination and improve surgical training. Furthermore, it can be used to uphold important professional objectives such as gender and racial diversity. That being said, physicians and educators must be aware of the shortcomings it poses as well. These include threats to professionalism, privacy, and quality of information. As such, in our study we provide a balanced approach to help surgeons effectively use SM while mitigating the potential for pitfalls.
Title: The Effect of Iron Concentration of Euglena Gracilis Growth Rate

Presenter(s): Tenanye Haglund, Daniela Yanez, Guan Zhuo Chen

Abstract
Euglena gracilis is a multi-flagellate microalgae found in most freshwater systems that forms the basis of the system's food web (Maier & Simenstad, 2009). Increased industrialization has led to more iron leaching into the water systems which can affect E. gracilis growth positively or negatively depending on the concentration (Olaveson, & Nalewajko, 2000). We tested how iron concentration would affect the growth rate of E. gracilis, hypothesizing that increasing the concentration would increase the growth rate. We grew E. gracilis samples in growth media with 3 different concentrations of iron added: 7.5 μM, 15 μM, and 30 μM for two weeks. We calculated the number of cells in each flask after each day using a haemocytometer. After analyzing our data using a one way ANOVA test at a 95% confidence level, we obtained a P-value of 0.28 indicating that we do not have enough evidence to reject the null hypothesis which states that there is no difference in growth rate between iron concentrations. The growth rates did not show significant differences between iron concentrations. These findings offer a starting point for more comprehensive investigations into the effect iron concentrations have on how E. gracilis change morphologically and how their interactions with other primary producers change.
Theme: Sustainability and Conservation

Title: Survey of microplastics in a saltwater and freshwater ecosystem

Presenter(s): Geoffrey Lau, Mohammad Fadaie, Bushra Durrani

Abstract
Plastic production and consumption have increased over the past 50 years, with almost 300 million tons of plastic produced in 2013 (Gourmelon, 2015). This has resulted in a large amount of plastic pollution in aquatic systems, which break down into microplastics (<5mm) (Anderson et al., 2016; Dikavera & Simon, 2019). Recent research has found that microplastics have inhibit the hunting behaviours of fish, and damage internal organs (Desforges et al, 2015). The objective of our study was to quantify the abundance of microplastics across a salmon migration gradient, using a freshwater and seawater site as proxies for the habitats that salmon encounter along their migration route. Three 190L water samples were filtered using a plankton net at two different sites in the city of Vancouver: the mouth of Salish Creek, and the waters off Jericho Beach. Samples were treated by dissolving the organic materials and microplastics were visually identified using compound microscopes. An unpaired two-tailed t-test returned t=2.4010 and p=0.0743. Although the results are not statistically significant, we did find a trend showing that the ocean samples contained a larger quantity of microplastic fragments. The presence of microplastic fragments in both the freshwater and ocean water samples is an alarming find since microplastics have been known to inflict negative effects on fish physiology and behaviour. This is especially alarming for conservation groups restoring habitats for Pacific salmonids as microplastics in the freshwater streams may harm juveniles and returning spawners.
Abstract
Research on public perceptions of cow-calf rearing systems may help bridge the gap between farmers and consumers regarding animal welfare principles in the dairy industry. More and more consumers demand food products sourced with high animal welfare standards, but they may not know how these standards would be adopted in practice. Animal welfare is important in ensuring sustainability within food systems, as the priority shifts to the wellbeing of the animals being farmed rather than their production outputs. Given the lack of concise criteria for such sustainable initiatives within the local dairy industry, exploration in finding how the public perceives animal welfare within four different cow-calf rearing systems was conducted using an online survey. The survey was shared online through a crowdsourcing website and targeted Canadians at least 18 years old. The questions measure whether the different rearing systems were appropriate based on a scale of 1 to 7, from strongly disagree to strongly agree, respectively. With over 300 respondents, the results suggest that rearing systems in which the calves retain physical bonds to their mothers are perceived more positively. It is important to note that there are influential socioeconomic factors, such as education level and dairy consumption that help sway respondents' perceptions. However, the dairy industry and public need to engage in a clear and concise dialogue between each other to develop a more accommodating dairy industry for everyone. As customers are “always right”, engaging with their beliefs will sustain the dairy industry for the future.
WAVE 1 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Effect of salinity on food vacuole formation in T. thermophila

Presenter(s): Sumeet Saini, Tanner Carnegie, Kathryn Donohoe, Mirkka Puente

Abstract
Tetrahymena thermophila are ciliated protozoans found in freshwater ecosystems. Their primary method for food consumption is phagocytosis, which results in the formation of food vacuoles. The objective of this study was to determine if increasing salinity affects the formation of food vacuoles in wildtype T. thermophila and a mutant variant T. thermophila with low rate of phagocytosis (low-vac). Wildtype and mutant cultures were introduced to three treatment groups of varying NaCl concentrations (0mM, 2mM and 50mM). The formation of food vacuoles was followed in ten-minute intervals for a total of 60 minutes. Every ten minutes, a sample of the treatment group was removed and fixed. Food vacuoles of five, randomly selected cells were counted using a compound microscope at 400X magnification. A mixed-effects two-way ANOVA test was performed, significance was found between food vacuole formation and the genotype of the organism (p-value=0.0003). It was concluded that the mutant T. thermophila has lower food vacuole formation than the wildtype. No significance was found between salinity level and food vacuole formation. Additionally, no interaction was found between genotype and salinity that affected food vacuole formation. This implies T. thermophila has the ability to withstand some changes in environmental salinity levels. This may be important as climate and anthropogenic changes continue to affect freshwater ecosystems by increasing their salinity. Understanding the extent of this ability may help us to predict the degree to which T. thermophila can continue to thrive alongside these changes to enhance freshwater ecosystems and support salmon.
**Theme:** Sustainability and Conservation

**Title:** Freeze Tolerance in the Bay Mussel, Mytilus trossulus

**Presenter(s):** Jessica Kennedy

**Abstract**
Only a select few animals can survive being frozen. One such animal is the intertidal mussel, Mytilus trossulus, which is found along the west coast of North America. Freezing is an extreme stress to live cells, and so freeze tolerant animals often accumulate protective molecules in their cells (termed cryoprotectants) to protect against the cellular damage caused by freezing. However, the cryoprotectants that are used by intertidal invertebrates are not well understood. I am investigating which cryoprotectants are found in mussel tissues, and I will correlate the concentrations of these cryoprotectants to whole animal freeze tolerance. If cryoprotectants modulate freeze tolerance in mussels, then I expect that higher cryoprotectant concentrations will correspond with increases in freeze tolerance. In particular, since mussels accumulate osmolytes in their tissues in high salinity conditions to balance osmotic pressure, if osmolytes are important cryoprotectants, then I expect that mussels acclimated to high salinity will be more freeze tolerant. Also, I am investigating how plastic mussel freeze tolerance is. If mussel freeze tolerance is plastic, then I predict that freeze tolerance will increase during the winter, and in mussels from higher shore positions (which would experience longer exposures to freezing temperatures during the winter). This research is significant since M. trossulus is an important species both ecologically and economically, and understanding how animals deal with extreme environments is a critical area of study, especially in a rapidly changing climate with increasingly unpredictable and extreme weather patterns.
WAVE 1 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Adaptive divergence and the evolution of dominance and segregation variance in stickleback

Presenter(s): Avneet Chhina

Abstract
The three-spine stickleback (Gasterosteus aculeatus) pairs endemic to British Columbia are an integral part of Canada's biodiversity. The freshwater sticklebacks found in southern British Columbia are one of the youngest species as the ancestral anadromous population independently colonized multiple freshwater habitats. However, little is known about how hybrid phenotypes vary among traits, populations, and over the course of adaptive divergence. In this study, we use three-spine stickleback to examine how phenotypic divergence among populations influences the evolution of dominance and phenotypic variance in hybrids. We ask whether dominance differs among traits and populations and whether it evolves with adaptive divergence. We find that dominance coefficients can vary among traits and populations explaining the mismatched phenotype of F1 hybrids. We find that dominance levels evolve with adaptive divergence which is evident as the F1 hybrid phenotype for lateral armour plates becomes more derived (freshwater-like) with higher parent trait divergence and the F1 hybrid phenotype for pelvic spine length becomes more ancestral (anadromous-like) with higher parent trait divergence. Our results indicate that dominance can undergo rapid and deterministic evolution for some traits. Some traits also show a statistically significant relationship between segregation variance (phenotypic variance among F2 and F1 hybrids) and phenotypic adaptive divergence providing insight into the number of genes and the size of its effects contributing to populations diverging to different optimums. Understanding the evolution of dominance and segregation variance can provide insight into inter-specific and intra-specific phenotypic variation and help understand speciation and adaptive radiation in stickleback.
WAVE 1 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Environmental variability and the evolution of bet-hedging strategies

Presenter(s): Kelley Slimon

Abstract
Bet-hedging strategies, such as dispersal and dormancy, are predicted to evolve in varying and uncertain environments and are critical to ecological models of biodiversity maintenance. Theories of the specific ecological scenarios that favor the evolution of dispersal, dormancy, or their covariance are rarely tested, particularly for naturally-evolved populations that experience complex patterns of spatiotemporal environmental variation. We grew 23 populations of Vulpia microstachys, an annual grass native to California, in a greenhouse, and on the offspring generation measured seed dispersal ability and dormancy rates. We hypothesized that seed dormancy rates and dispersal abilities would be highest in populations from more productive, temporally variable sites, causing them to covary positively. Contrary to our hypothesis, our data suggest that both dispersal and dormancy evolve to combat different axes and scales of spatial heterogeneity, and are underlain by different seed traits, allowing them to evolve independently. Dormancy appears to have evolved as a strategy for overcoming microgeographic heterogeneity rather than temporal climate fluctuations, an outcome that to our knowledge has not been considered by theory. In sum, we provide much needed empirical data on the evolution of bet hedging, as well as a new perspective on the ecological function dormancy provides in heterogeneous landscapes.
WAVE 1 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: The Effect of Temperature on the Phototactic Mobility of Euglena gracilis

Presenter(s): Vanessa Lee, Elle MacLennan, Yasaman Yaghoub, Japnit Bhatia

Abstract

Euglena gracilis is a mixotrophic algae that can gain energy through photosynthesis and phagocytosis. Previous research has extensively studied the relationship between temperature and motility; however, much of the effect of temperature on positive phototaxis is still unclear. Therefore, the objective of our study is to investigate the effect of temperature on the phototactic mobility of E. gracilis towards light (positive phototaxis). 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). Thus, the null hypothesis was not rejected.
WAVE 2
ORAL PRESENTATION
ABSTRACTS
Abstract
Both acute and chronic exercise have been shown to enhance neuroplasticity, improve cognitive and motor function. Specifically, acute leg cycling exercise has shown to modulate motor cortical excitability of the non-exercised upper-limb by reducing inhibitory neural signals within the primary motor cortex. However, investigations into the transfer of incoming afferent information from the primary somatosensory cortex to motor cortex, are still lacking. This study addresses the gap in knowledge using acute cycling exercise as the intervention to assess these effects on sensorimotor integration, the interaction between sensory inputs and motor outputs, in two experimental sessions. In the first session, exercise-induced changes in somatosensory and motor excitability were tested by assessing somatosensory (SEPs) and motor evoked potentials (MEPs). In the second session, exploration of the effects of acute cycling exercise on short- (SAI) and long-latency afferent inhibition (LAI), and afferent facilitation (AF) by suppressing or facilitating the MEPs elicited by transcranial magnetic stimulation over the primary motor cortex. To quantify associated neurophysiological changes, measures were recorded from the non-exercised dominant hand at two baseline time-points and two time-points after a 25-minute bout of moderate-intensity cycling. Current data shows no exercise-induced changes to SEP or MEP amplitudes, but an increase in LAI, without modulation of SAI or AF. Together, these results suggest that acute cycling exercise has independent effects on sensorimotor integration, which are not accompanied by concurrent changes in somatosensory cortical nor corticospinal excitability. Clinical implications from these results suggest lower-limb exercises may benefit upper-limb motor skill acquisition through neural adaptions.
WAVE 2 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: Effects of alcohol on functional brain networks using fMRI data

Presenter(s): Neall Struwig

Abstract
Functional Magnetic Resonance Imaging (fMRI) is an apparatus that will be used to detect functional brain networks in humans. Three brain networks will be looked at using fMRI while participants are under the influence of alcohol and compared to normal controls. Any participant’s data will be removed from analysis if the experiment could not be completed to it’s full. Furthermore, the data will be corrected and normalized using Statistical Parameter mapping 12 (SPM12). Analysis of this data will be done using fMRI Constrained Principal Analysis (fMRI-CPCA) to produce fMRI images and hemodynamic response plots. Lastly, SPSS will be used to run ANOVA to test the hemodynamic response plots for any statistical significance. Participant’s data will Success of this experiment may be useful in determining where and how the brain functions under the influence of alcohol. This could further lead to treatments for people with alcohol use disorders.
Abstract
Behavioural flexibility is a fundamental executive function that may be impaired in clinical populations such as schizophrenia, Alzheimer’s disease, or drug addiction. To understand how the brain might promote behavioural flexibility in normal vs. abnormal functioning, rodent studies use a set-shifting task measuring a complex form of behavioural flexibility where animals learn to switch between two rules (e.g. always choose the left/right lever or always follow choose the lever under the light). Set shifting has previously been shown to involve the prelimbic cortex (PL) based on pharmacological inactivation and lesion studies. However, with the development of varying versions of the set-shifting task, inconsistencies in literature concerning PL involvement is apparent. In this study, we aimed to further clarify the role of the PL in mediating behavioural flexibility. This project involved using pharmacological inactivations on two different operant-based set-shifting tasks. In the first experiment, rats learned to switch repeatedly between two rules across days. It was determined that after ten days of training, when animals have extensive shifting experience, the PL is not necessary for optimal performance. In experiment two, cognitive demand was increased by measuring PL involvement without prior shifting experience. In addition, twenty reminder trials were presented prior to a rule change, increasing the difficulty of the switch even further. Preliminary results suggest PL is involved in this more cognitively demanding situation. These data further clarify the set-shifting circumstances under which the PL is recruited.
Abstract
Non-associative learning is the simplest form of learning wherein animals modulate their behavior in response to stimuli presented in a particular pattern, with no reinforcement required. In non-associative learning, sensitization and dishabituation both increase behavior in response to a strong stimulus, while habituation decrease a behavior in response to repeated stimulation. The neuromodulator serotonin (5-HT) has been implicated in all forms of non-associative learning. While 5-HT-mediated cellular and molecular mechanisms of sensitization have been previously described, how 5-HT influences other forms of non-associative learning is less understood. The aim of the present study was to further elucidate the function of 5-HT in non-associative learning. Using Caenorhabditis elegans as a model for its well-established genetic manipulation techniques, mutant strains that are deficient in 5-HT signaling components were tested in non-associative learning assays. Sensitization, habituation, and dishabituation of a nociceptive reflex, the ASH response, were characterized using a high-throughput machine vision-based behavioral tracking system. My results demonstrate that 5-HT is not necessary for sensitization of the ASH response, pointing to alternative sensitization mechanisms independent from 5-HT signaling. Interestingly, disruption of 5-HT synthesis or re-uptake both increased sensitization of the duration of the response. Mutant worms that lack endogenous 5-HT also showed limited alteration in habituation of ASH response, while knockout of the 5-HT re-uptake transporter gene drastically alters habituation of ASH response probability. Currently, I am trying to identify which 5-HT receptors are involved in ASH response plasticities. Further experimentation is needed to elucidate 5-HT’s influence on non-associative learning of ASH response.
Theme: Health and Wellness

Title: Does Protein Supplementation Attenuate Myonuclear Loss During Disuse-Induced Muscular Atrophy?

Presenter(s): Jaspreet Khaira

Abstract

Periods of muscle disuse result in muscle atrophy. Whether muscle atrophy is associated with myonuclear loss remains controversial. The area of a cell controlled by a nucleus is relatively constant, therefore, when muscle atrophies excessive myonuclei may undergo cell death. Since myonuclei regulate gene expression and DNA replication of myofibers, their loss may hinder recovery. Protein supplementation is known to increase muscle protein synthesis, but its effect on myonuclei is unknown. This project aims to determine if protein supplementation can attenuate myonuclear loss during limb immobilization. A total of 30 men with a mean age of 49.9 ± 0.6y underwent 14 days of unilateral leg immobilization via a knee brace, followed by 14 days of ambulatory recovery and six resistance training (RT) sessions over another 14 days. Participants were randomized to receive an additional 20g of dairy protein per day or an isocaloric carbohydrate placebo over the 7-week intervention. Biopsies of the vastus lateralis were collected and stained at familiarization, baseline, post-immobilization, post-healthy living, and RT. Myonuclear enumeration from the biopsies is forthcoming, where type I and type II fibers are stained for between-fiber differences and the myonuclear domain is being analyzed to determine if alterations occur with muscle atrophy or RT. Myonuclear loss during disuse dictates subsequent satellite cell activation, a group of cells required for myonuclear synthesis, during recovery. This implies the need for therapeutic interventions to target satellite cell activation. If an attenuating effect with protein supplementation is observed, however, it can serve as an alternative intervention.
Abstract
Evaluating decision-making capacity is often difficult, especially in pediatric situations. This means the lines demarcating true informed consent can be uncomfortably blurry. Generally, in cases of pediatric medicine, physicians should advocate for their patients and make treatment decisions not only based on caretakers’ wishes, but also based on what is in the child’s best interest. However, there can be an exception with so-called “mature minors” – children who are deemed mature enough or who have had experience with illness in the past and can make their own decisions without parents’ involvement. Our paper seeks to examine this “mature minor” agent. Our research interest reflects a broader intellectual movement towards recognizing the experiences of minorities, as examined in Disability, Mad and Childhood Studies. We claim that traditional conceptualizations of consent fail to account for the lived experiences of children themselves and also prevents children from developing their social agency. Instead, our research aims at reassessment of the notion of consent in light of understanding childhood as a social phenomenon. As capacity to consent is so variable among the population of pediatrics, there will be a wide variety of ramifications resulting from patient involvement in decision-making. This opens up the possibility for patients to make more harmful choices than if it were solely decided by the physicians or guardians. On the other hand, dominant conceptions of shared decision-making fail to fully account for the lived experiences of the child themselves. Even when patients are involved in decision-making, the emphasis is on medical considerations rather than on the immediate experiences and beliefs of the child. We argue that when patients are deemed competent enough to make their own medical decisions, doctors must decide what options they should present in a way that best maximizes the child’s developing autonomy. We believe that a healthy medium would promote the child’s autonomy, and their best interest, even if that means omitting some options.
Abstract
Individuals with a substance use disorder frequently present to hospital for medical assessment and treatment. Accordingly, hospitals can provide an optimal setting for intervention for substance use care. To date however, the impact of hospital-based specialized addiction care on long-term health and treatment outcomes remains largely unknown. To address this, the Outcomes for Patients Accessing Addiction Care (OPAC) Study will develop a hospital-based cohort of individuals accessing addiction care to evaluate health and treatment outcomes following discharge from a hospital setting. Between January 2018 and January 2019, 233 participants were enrolled in the study. 58% were recruited from an inpatient setting. Reported daily substance use over the preceding six months revealed: 82.0% tobacco; 51% any illicit opioids; 42% injection opioids; 25% cannabis; 19% injection methamphetamine; and 12.0% alcohol.

These preliminary enrolment results from the OPAC Study provide an early description of a subset of patients accessing specialized addiction care at St. Paul’s hospital. Characterization and description are important initial steps to address the current gap in evidence detailing the demographics of this patient population. Demographic information and substance use patterns provide insight that can contribute to developing evidence-based treatments tailored to specific subgroups.

Furthermore, the initial data also provide the foundation for subsequent objectives of the OPAC Study such as identifying the demographic factors and substance use patterns that are associated with negative health and treatment outcomes following hospital discharge. Associated long-term health and treatment outcomes following the receipt specialized addiction care will be determined over a subsequent follow-up period.
WAVE 2 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: The interaction between perception and language: How we reason about quantities

Presenter(s): Charul Maheshka

Abstract

We reason about quantities all the time. With just a glance, we can make rapid judgments about the relative number, length and area of objects. However, a cost to this readily-available system of quantity discrimination is imprecision, and the closer two quantities are, the harder it is to tell them apart (Dehaene, 2011). Yet, we get around this perceptual limitation with language, allowing us to precisely distinguish between quantities (Le Corre & Carey, 2007). While previous work has focused on how we reason about number using language (via number words), little research has explored language mapped to other, different domains of quantity, like length and area.

In the quantity Discrimination task, we examined the precision of participants’ quantity representations (visually distinguishing between amounts, via perception, without language), when judging which side has more dots (for number), which line is longer (for length), or which blob is bigger (for area). In the Estimation task, we explored how well they mapped language to these representations when asked to judge the number of dots, length of a line, or area of a blob.

We found that participants were much better at discriminating in length and area, compared to number, but conversely, were far more accurate when estimating in number, as compared to either length or area. This novel comparison suggests that our perceptual abilities do not necessarily predict our ability to reason about these representations using language across domains – a finding that has large-scale implications for our social understanding of language and number.
Theme: Individual, Community and Society

Title: How well one can identify emotions is impacted by perceived socioeconomic status and economic inequality

Presenter(s): Lydia Guengerich

Abstract
The purpose of this study was to replicate and expand on previous research findings that individuals of higher socio-economic status (SES) are worse at identifying the emotions of others, or have lower empathic accuracy, than individuals from lower SES. However, it was previously unexplored if this difference depends on the amount of perceived economic inequality in one’s society. Participants (n = 252) were asked to complete the Reading the Eyes in the Mind of Others, a test designed to measure empathic accuracy. Their perceived socio-economic status and their perceptions of economic inequality were also measured. Individuals of higher SES performed worse on a task of empathic accuracy than individuals of lower SES (β = -1.95, p < .001), replicating previous research. Additionally, as hypothesized, this effect was exacerbated when higher SES individuals perceived more inequality in their society (β = -2.94, p < .001 at +1SD of perceived inequality) compared to when they perceived less inequality (β = -0.95, p = .147 at -1SD of perceived inequality). This effect therefore has differential implications for social engagement, empathic responses, and sense of agency in societies based on the perceived level of economic inequality. Further research is needed to determine the mechanisms behind this effect, as these individual differences accumulate to have large-scale effects on class structure.
**Theme:** Individual, Community and Society

**Title:** Homogenization of Indigenous Peoples through Pipelines

**Presenter(s):** Kritika Joshi

**Abstract**

Past research on Indigenous nations has been exploitative and resulted in the representation of their history, culture and values as inferior and primitive. Such western settler colonialist perspectives have transcended over the decades and are emblematic now in media representations of Indigeneity. Furthermore, critical infrastructures of invasion such as oil and gas pipelines are symbolic of neo-settler colonialism by the state on Indigenous peoples (Anne Spice, 2018). Non-Indigenous people and institutions such as governments often view Indigenous nations as homogeneous. This research seeks to understand the differences within Indigenous peoples’ opinions regarding the Trans Mountain pipeline and Coastal GasLink pipeline and combat the assumption of Indigenous nations as being uniform. A review of news and media articles will be conducted through a decolonizing methodological approach; a dynamic relationship with Indigenous nations as active participants rather than objects of research (Linda Tuhiwai Smith, 2012). The discourse analysis will include mainstream news outlets such as CBC, The Globe and Mail (which focus on Indigenous activism against, inadvertently suppressing Indigenous nations in support), and alternative Indigenous owned news outlets. After a screening of the articles, recurrent concepts will be coded and a thematic analysis supported by past scholarly research will be implemented. The findings of this research will give a better understanding of the conflicts and Indigenous struggles around the pipeline. Moreover, by viewing how Indigenous voices are represented in media, we will be able to disrupt this monolithic view of Indigenous peoples and instead adopt an outlook that acknowledges the uniqueness and plethora of perspectives within these communities.

Title: Bias in the Legal System: How Race and Confessions Impact a Verdict

Presenter(s): Keeley Lainchbury

Abstract
While a jury is presumed to apply justice correctly, often the assumption of innocence is violated before the trial simply due to biased jurors, or unfavourable evidence. Juries are vital components of the judicial system, which highlights why research into how and why guilt decisions are made is critical to ensuring fair and just criminal proceedings. This research explored the relationship between offender race, confession evidence, and verdicts rendered with an undergraduate university sample. Participants identified when a confession appeared coerced, evidenced by lower ratings of guilt than for voluntary confessions. We can interpret this as participants understanding what a false confession is and taking that understanding and applying it when making guilt decisions. This result is hopeful, as it portrays a shift away from the ambiguous nature of false confessions. Results further indicated that White offenders received higher ratings of guilt than Aboriginal offenders for the same crime. As such, this research highlights how race is perceived in a criminal context. Criminal court cases are something that will continue within the legal system, as well as the use of juries to determine guilt. As this occurrence is commonplace, studies examining elements of what impacts jury deliberations are crucial to ensuring those who are accused of a crime receive a fair trial and are not predetermined as guilty due to physical characteristics or unfavourable evidence. The findings of this study overall can inform legal proceedings to ensure fair trials for those accused.
**WAVE 2 | ORAL PRESENTATIONS**

**Theme:** Individual, Community and Society

**Title:** Conditioned Incentive of Alcohol and Cannabis Cues in Relation with Level of Substance Use

**Presenter(s):** Kaylene Scheil

**Abstract**

Introduction: Conditioned incentive theories of addiction explain substance use through conscious and unconscious cognitive motives to seek pleasure rewards. Automatic cognitive processes are developed through implicit associative learning by pairing alcohol and drug-related cues to elicit a craving response. This type of classical conditioning pairs substance cues with incentive salience which creates compulsive drug-seeking and drug-taking behaviour.

Adolescence through young adulthood is an age-group particularly vulnerable to addiction and high levels of sensitivity to incentive salience stimuli. During this time, the developing brain exhibits high neuroplasticity as the nucleus accumbens in the reward circuit matures first. This creates exaggerated reward sensitivity while higher-order functions such as executive functioning mature later. Increased activity in the dopaminergic mesolimbic circuit, particularly in the nucleus accumbens, is associated with riskier choices and more impulsive judgements.

Methods: The recent legalization of cannabis in Canada has sparked the need for research surrounding the individual and societal impact of these legislative changes. Participants (N = 200) are undergraduate students from the University of British Columbia in Okanagan who have registered for psychology research participation credits under SONA systems. The present study is examining the concurrent predictive validity of the affective reaction to cannabis and alcohol pictures in university students. Students will fill out a questionnaire measuring attractiveness and liking responses to alcohol and cannabis conditioned incentive cues. These cues will be categorized as goal-directed (both proximal and distal) and signal-directed. Ratings are then compared with responses on personality questionnaires while considering the interaction with alcohol and cannabis use frequency, quantity, and problems. It is hypothesized that greater frequency of alcohol and cannabis use will be associated with a greater rating of liking and attraction across proximal and distal goal-directed as well as signal-directed measures.

Findings, implications and summary: Incentive sensitization demonstrates that repeated exposure to potentially addictive drugs can induce a psychological sensitivity by continuously rendering cognitive processes hypersensitive to drug-related stimuli and actions. This research will provide information on conditioned incentive of use following cannabis legalization paired with alcohol-related cue stimuli. While this study is currently still in progression, analysis of initial findings will be presented.
Abstract
The public often perceives motor paralysis as the major consequence of spinal cord injury (SCI). However, among SCI survivors, devastating cardiovascular impairments [e.g. blood pressure (BP) dysregulation] are among the leading causes of disability and death. Without surprise, the individuals with SCI rank autonomic recovery at a much higher priority than being able to walk again. While majority of SCI research is focused on more overt consequences of SCI (e.g. motor recovery), the invisible cardiovascular impairments are unfortunately understudied.

The individuals with upper-thoracic or cervical SCI suffer from highly unstable BP. Systolic BP can drop even below 50mmHg while transitioning into an upright posture (a condition called orthostatic hypotension), which could lead to cognitive decline or ischemic stroke. Astonishingly, in the same individual within same day, systolic BP can abruptly rise up to 300mmHg in response to daily stimuli (e.g. full bladder or bowel routine) This condition, termed as autonomic dysreflexia can lead to cerebral hemorrhage, seizures and even death. Because these BP fluctuations are rapid, current pharmacological options to manage BP are undesirable as they are slow-acting and exert prolonged effects.

We developed a fast-acting, non-invasive and clinically-relevant therapy to manipulate BP in a rat SCI model. Using electrical stimulation, delivered transcutaneously via conventional electrodes, we were able to prevent as well as treat autonomic dysreflexia in rats with upper-thoracic complete SCI. Our results suggest that transcutaneous spinal cord stimulation is arguably a reliable, noninvasive, immediately-acting and clinically-adaptable therapy for potentially fatal cardiovascular consequences of SCI.
WAVE 2 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Generating a Rapid Growing Mycobacterium Mutant Library for the Pre-Clinical Screening of Potential Anti-Mycobacterial Compounds

Presenter(s): Sara Dalkilic

Abstract
Non-tuberculous mycobacteria (NTM), members of the genus Mycobacterium are opportunistic pathogens targeting vulnerable populations including cystic fibrosis (CF) patients. The rapidly-growing mycobacterium M. abscessus (M.abs.) is one of the most frequently detected NTM, threatening CF patients due to its virulence among this population, the severity and persistence of pulmonary infections, and its resistance to antibiotics, rendering many current first-line antimycobacterials inactive. M.abs. infection can be fatal, and recurrent infections limit therapies accessible to CF patients including life-saving lung transplants. Thus, there is need for alternative therapeutics against this pathogen.

This project creates transposon mutant libraries for M.abs. and the model mycobacterium M. smegmatis, as a high-throughput tool to identify targets of putative drug candidates. Transposon mutagenesis generates individual clones, each with a single rapidly-identifiable mutation. Mycobacteria were infected with the phasmid φMycoMarT7 containing a Kanamycin-resistance cassette, selected on high-concentration Kanamycin plates, and mutant clones were isolated and sorted. To validate our strategy, mutants will be grown in media containing another antibiotic, gentamycin. Mutants that are resistant to this antibiotic will have the transposon insertion site identified via PCR-mediated sequencing; it is hypothesized that the transposon in these resistant mutants will have inserted into and interrupted genes associated with susceptibility to gentamycin. The use of transposon mutagenesis provides a promising strategy for the identification of disease relevant genes associated with drug candidates and will accelerate drug discovery against this notorious CF pathogen.
WAVE 2 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Maximizing Utilization of Electric Vehicle Charging Infrastructure in Surrey, BC using a Data-Driven Model

Presenter(s): Laura Greenstreet, Yujing Lai

Abstract
Electric vehicles face a chicken-and-egg problem where consumers do not want to purchase vehicles without existing charging infrastructure and businesses do not want to invest in charging infrastructure without existing customers. Governments can help address this problem by investing in initial infrastructure and, unlike private businesses, can place sites in areas that are not initially profitable to facilitate electric vehicle adoption. As only a limited number of charging sites can be built, city planners are interested in where to place sites to maximize usage and encourage electric vehicle adoption. Working with the City of Surrey, we developed a model to identify potential curb-side charging site locations and ranked them using objectives which maximized the amount of traffic to the site and balanced placing charging sites in high traffic areas with providing access to underserved areas. Unlike previous models which assumed consumers travel to the closest location, our model uses traffic data from the Greater Vancouver Regional Travel Model to capture actual traffic patterns. Our model initially placed chargers at flagship locations such as shopping centres, hospitals, and sports arenas, before finding locations that could be easily missed by a human planner where several high-traffic businesses could utilize a single charger. Additionally, our objectives capture the utility of adding additional sites, helping answer the question of how much infrastructure should be developed. The results of our model were used to select twenty locations for curb-side chargers for a national funding application.
WAVE 2 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Water Treatment Innovation: UV-LED’s in water disinfection for small communities

Presenter(s): Jelena Radovanovic, Jingyi Wang

Abstract
Contamination of daily-used water sources in small communities due to the rapid expansion of industry has drawn the public’s attention to the development of harmless water disinfectants. Smaller communities may have a slower response time to modernizing compared to larger areas, therefore the need for different water treatments have become necessary. UV-induced photocatalytic degradation of pollutants has been studied widely as an alternative to chlorine in disinfecting wastewater for its low toxicity, low by-products generation and low chemical residue. This research has conducted a literature review on the role of LEDs in UV disinfection of water sources in small communities. UV-induced advanced oxidation processes (AOPs) will be compared with chlorine in terms of by-products generation and chemical residue concentration. UV-LEDs will be compared with UV-mercury lamps in terms of composition and water disinfection efficiency. This research also studies the combination of UV-LEDs with conventional water disinfectants to optimize the effectiveness of water disinfection; meanwhile, it ensures that the residents of small communities will have the access to clean water at a reasonable price. However, an extensive application of UV-LEDs is limited due to its relatively low energy conversion efficiency. To achieve an optimal photocatalytic efficiency, LED irradiation reactors must be designed to minimize the leakage of UV light while remain being compact. Further progress needs to be made on UV-LED technique to ensure its role in photocatalytic degradation of water pollutants. However, through our research we have made conclusions that rural communities would greatly benefit from this change in sanitation.
Theme: Innovation and Technology

Title: Paying the Piper: A Triple Layer Core Annular Flow Study

Presenter(s): Ethan Elliot Rajkumar

Abstract
The transportation of crude and heavy oils have been crucial in the pipelining industry for the past 20 years. Driven by the need for transportation, new technologies such as lubricated transport or the use of liquid to reduce friction during transport have made the pipeline industry the first of its kind. Lubricated transport uses core-annular flow in which a low viscous fluid such as water flows near the the pipe wall and encircles the heavy crude oil. The double layer core-annular flow utilized the densities and viscosities of oil and water to create an eccentric oil core, reducing the pressure drop by flowing low viscous fluids near the pipe wall. However, the method is limited because of instabilities due to density and high viscosity mismatches between two fluids appearing on the interface. These interfacial instabilities make it hard to control friction and ensure continued flow. In 2017, Samradi et. al., introduced a novel method involving oil, water and viscoplastic fluids. A viscoplastic fluid behaves as a solid when subject to a small force (smaller than its yield stress) but otherwise flows as a liquid. In this study, we investigate a preliminary experimental setup design to test the method. By using Carbopol, a viscoplastic fluid that is a water soluble polymer capable changing the viscosity of water and a positive displacement screw pump (PDSP), I was able to design an apparatus that demonstrates the properties of Samrad et. al’s concept of triple layer core-annular flow.
Theme: Innovation and Technology

Title: Rapid Step Detection in Biophysical Data

Presenter(s): Ryan Karimi

Abstract
Abrupt changes in an instrument’s signal intensity over a short time, termed steps, occur in various measurements. The frequency of occurrence and relative magnitude of steps in a signal often contains useful information about the observed process. For example, detecting contours and edges in digital images underpins the navigation of self-driving cars, and this detection relies on resolving regions of sudden change in pixel colour intensity.

Step detection is of particular importance in biophysical chemistry, where the general state of a molecule can be represented as a signal of constant intensity. Detecting transitions from one state to another by identifying steps in a signal enables more sophisticated analyses of the molecule under scrutiny. For example, one can determine the number of states a molecule occupies, the time for which a state is occupied on average, and the probability of transitions between states. However, automated detection of a step from noise remains a significant analytical and statistical problem.

We developed a low time-complexity step detection algorithm for resolving steps of variable length, magnitude, and quantity in piecewise constant signals with noise. The algorithm’s utility is demonstrated by investigating the self-assembly of DNA nanoframe structures in solution. Nanoframe structures are DNA strands designed with complementary regions that hybridize to form geometric structures. We also demonstrate that the runtime of our algorithm increases linearly with input size, whereas the runtimes of other published algorithms are proportional to the square of input size or higher. The algorithm should be a useful tool in biophysical chemistry and beyond.
Theme: Innovation and Technology

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

Presenter(s): Soo Yeon Kwon, Bertina Lee, Christopher Mok, Hannah Ro

Abstract
Background: Mutations in the C9orf72 gene is one of the major causes of familial frontotemporal dementia (FTD).
Purpose: The ability to identify brain changes specific to C9orf72 mutation would help better identify the mutation carriers who are likely to develop FTD in the future.
Knowledge gap: The specific clinically-presymptomatic brain changes associated with C9orf72 mutation are not known to a sufficient degree of detail.
Methods: We performed a systematic search for studies according to specific inclusion/exclusion criteria. A review article was created upon compiling appropriate evidence.
Expected results: We expect to observe characteristic indications specific to clinically-presymptomatic C9orf72 mutation carriers in their neuroimaging scans.
Implications of findings: Our study will aid in more rapid identification of predementia individuals who are likely to develop FTD later. This information will be crucial for initiating early treatment for these individuals.
WAVE 2 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Human facial expression as a measure of emotional response toward farm animal management procedures

Presenter(s): Lexis Ly

Abstract
People in urban areas report having limited knowledge regarding painful management procedures commonly performed on animals used for food production. Empathy toward animals is commonly measured using self-reported values in surveys regarding animal welfare. Self-reported scores of empathy are often biased, which is absent when using physiological assessment. Viewing other humans in pain has shown to elicit negative facial expressions indicative of empathy, but this research has yet to be extended to human-animal empathy. We investigate whether facial expression can be used to reliably measure emotional response when humans watch videos of animals undergoing painful procedures. We conducted interviews wherein participants (n = 30) were recorded while watching publicly sourced video clips of cows and pigs undergoing common management procedures (e.g. disbudding, castration, tail docking) and control videos (e.g. being lightly restrained, standing). Following each video, participants were asked to rate the intensity of 5 “negative” emotions (pain, sadness, anger, fear, disgust) and 2 other emotions (happiness, surprise) on an 11-point Likert scale. Videos of the participants watching the animal video clips were scored for intensity of unpleasantness on an 11-point Likert scale. Participants showed more intense facial expression response to procedural videos (2.41 ± 0.08) compared to control (0.56 ± 0.17). 28 out of 30 participants showed positively correlated scores of intensity of facial expression and self-reported negative emotion (r = 0.53 ± 0.06). For future research, facial expression could be a useful technique to investigate human-animal empathy behaviourally, rather than through self-report.
**WAVE 2 | ORAL PRESENTATIONS**

**Theme:** Innovation and Technology

**Title:** Investigating the role of cerebrospinal fluid in head impact biomechanics through physical experimentation

**Presenter(s):** Yi Yi Du

**Abstract**

**Purpose:** In sports like football, concussion is a predominant injury causing neurological and neurocognitive problems. However, concussion mechanisms are not fully characterized. One of the research gaps is the gross approximations and exclusions of the cerebrospinal fluid (CSF) in physical experiments and finite-element head models. Such approximations may lead to boundary condition errors for impact-induced brain tissue deformations.

**Problem:** This research aims to examine the strain pattern and magnitudes of brain tissue surrounded by CSF during high rotational acceleration. By comparing models with and without CSF, effects of CSF presence on brain deformations will be quantified.

**Methodology:** In the study, we induce single-axis 4000-5000 rads2/s rotational accelerations on a brain-CSF-skull model comprised of a cylindrical silicone brain surrogate (cast with Sylgard 527) immersed in a water-based CSF surrogate. The surrogate deformation is extrapolated with Ncorr, a digital image correlation software that visually tracks dyed silicone particle patterns embedded at the surrogate’s midplane.

**Results:** The presentation will present the impact apparatus, image/data collection protocols and preliminary experimental results. We observed strain propagating radially inward after impact and average strain magnitudes of ~0.1 at the half-scale surrogate boundary without CSF during 4000 rads2/s accelerations. From T-tests on 11 samples, shear strain (Exy) proves to be smaller than normal strains. Maximum strain occurs ~23 ms after impact; prominent radial inward propagation subsides after ~40ms with strain decrease to ~0.03.

**Implications:** The findings of this study will improve the understanding of brain-CSF-skull interactions’ contributions to brain deformation during concussions.
WAVE 2 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Cryopreservation of Human Umbilical Vein Endothelial Cells using a Novel Biocompatible Polymer

Presenter(s): Vriti Bhagat

Abstract
Human umbilical vein endothelial cells (HUVECs) have been vastly used to study diseases pertaining to blood vessels and tissue engineering. Comparisons between healthy HUVECs and damaged endothelial cells have provided insights into clot formation and the generation of new blood vessels. Due to their wide use in basic and clinical research, HUVECs are preserved for long periods of time by freezing, called cryopreservation. HUVECs are typically cryopreserved in a solution called freezing media, containing 10% dimethyl sulfoxide (DMSO) or more recently, a combination of 5% DMSO and 6% hydroxyethyl starch (HES). However, exposure of cells to DMSO for long periods of time can result in death of the cells by lysing. Furthermore, HES is a sugar with a high molecular weight that increases its viscosity, making it difficult to completely wash away before introducing the cells into patients. This remaining HES has been linked to renal dysfunction and inability of blood to form clots. This study provides an alternative method for cryopreservation of HUVECs by using a novel biocompatible polymer (BP) with a low molecular weight and intrinsic viscosity. We found that 5% DMSO combined with either 4% BP or 6% BP gave cyroprotection comparable to freezing media that is commercially available. Freezing media containing a novel polymer with low molecular weight and lower concentration of DMSO has decreased toxicity compared to commercially available freezing media. This new cryopreservation technique may also be applied to other cell lines in the future, providing a safer means to freeze cells.
WAVE 2 | ORAL PRESENTATIONS

Theme: Sustainability and Conservation

Title: “Can Imagining the Future Increase Pro-Environmental Tendencies?”

Presenter(s): Hayley Carolan

Abstract
Currently, public support is insufficient for the large-scale changes required to mitigate the effects of climate change. One technique that could help change this is Episodic Future Thought (EFT), a cognition which involves “pre-experiencing” a future event by imagining it in the mind’s eye. Using specialized imagination tasks and questionnaires, we first examined if EFT increases pro-environmental tendencies, and secondly, if it does so by making the future feel closer to the present. We found that EFT does increase pro-environmental tendencies, but that contrary to our prediction, it does not do so by making the future feel closer to the present. We propose that EFT may increase pro-environmental tendencies via an emotional mechanism.
WAVE 2 | ORAL PRESENTATIONS

**Theme:** Sustainability and Conservation

**Title:** Rubisco’s Evolution, Inherent Limitations, and Challenges in the Face of Rising Crop Demands and Climate Change

**Presenter(s):** Farshad Felfelian

**Abstract**
Rubisco is nature’s predominant CO2 fixing process in terrestrial systems. Practically speaking, Rubisco is the enzyme that feeds the world, being responsible for the overwhelming majority of the inorganic carbon that is fixed globally, thus its role in agricultural productivity is critical. However, despite eons of evolutionary history through all three domains of life, Rubisco remains in many ways peculiar in its design and function. Through presenting biochemical, structural, physiological, microbiological, as well as phylogenetic data, this paper will attempt to shed light on Rubisco’s evolution. From hypotheses on its emergence before the first great oxygenation to the integration of the calvin cycle, and further evolution into the current Rubiscosome enzyme complex we will attempt to speculate on Rubisco’s response to future climate conditions. This is relevant because with the course of climate change and increasing demand for higher crop yields, a faster and more efficient carbon fixing process is required. Can Rubisco be forced to evolve further, or will an entirely new process emerge? A synopsis of different approaches to this problem is also provided in this paper.
WAVE 2 | ORAL PRESENTATIONS

Theme: Sustainability and Conservation

Title: A meta-analysis on aerobic and anaerobic capacities of fish

Presenter(s): Bog E So, Jennifer Mak

Abstract
Aerobic metabolism sustainably produces ATP while anaerobic metabolism temporally produces metabolic demands by converting glucose to lactic acid. Previous research often studied the two processes independently and did not consider them together. Hence, the goal of the current project is to understand the relationship between aerobic and anaerobic capacity and exploring the underlying metabolic machinery. Here, we ask two research questions: 1) whether or not the costs of metabolic machinery affect aerobic and anaerobic capacities; 2) whether or not the aerobic is correlated with anaerobic capacities. We conduct a meta-analysis using the data collected by Yangfan Zhang. The aerobic and anaerobic indices were calculated following the equations provided in the Integrated Respiratory Assessment Paradigm (IRAP; Zhang et al., 2017). The data is currently being analyzed using correlation (Pearson and Spearman) and linear regression analysis. Based on the preliminary analysis, we predict that higher minimum maintenance metabolic rate relates to a higher aerobic scope because the larger metabolic machinery can sustain a higher maximum oxygen flux. Additionally, we predict that the two capacities would be correlated because both processes share the same metabolic machinery in terms of cardiorespiratory and metabolic organs.
Abstract
Lignocellulosic biomass is routinely used for the production of a wide range of materials including, but not limited to textiles, wood derivatives (e.g. paper, hygiene products, building materials, and specialty chemicals), and plant-derived chemicals like ethanol. One of the major barriers to producing these commodity and specialty products is the efficiency of the deconstruction of the plant cell wall. The biopolymer lignin is required by the plant as it confers rigidity to the cell wall, but it is also inevitably connected to the deconstruction of the plant material, as its removal away from the vast carbohydrates inherent to the plant wall is essential for industrial processing. Although recent research has largely focused on modifying the lignin composition of plants, an alternative strategy is to target the hemicellulose fraction. Specifically, I will investigate the largely neglected role of mannan in cell wall attributes which, based on previous knowledge of other hemicelluloses could potentially affect the stability of plant cell wall.
Theme: Sustainability and Conservation

Title: Transient Killer Whale Presence in the Salish Sea from 2017 to 2018

Presenter(s): Taryn Scarff

Abstract
Transient killer whales (Orcinus orca) feed on other marine mammals and range between California and Alaska. They are seen with increasing frequency in near shore waters such as the Salish Sea, and have been increasing in population since seals and sea lions were protected from culling in the 1970s. However, there is a renewed call to remove half of all seals and sea lions in British Columbia, which may impact transient killer whales. Unfortunately, baseline data on transient killer whales is missing to determine the consequences of culling. Using sighting reports of transient killer whales from whale watching companies, researchers and conservation organizations made in 2017 and 2018, the distribution and abundance of transient killer whales in the Salish Sea will be determined. Sighting records of transient killer whales will be analyzed to determine yearly and seasonal changes in the number of individuals present and to determine what proportion of the entire transient killer whale population is found in the Salish Sea. The data will also determine if new individuals or matrilines (a female and her non-dispersed offspring) have visited the Salish Sea. A continued increase of transient killer whale presence in the Salish Sea is expected to be observed, with new individuals and matrilines visiting the area each year. This study will document transient killer whale distribution and abundance in the Salish Sea and provide critical baseline data to assess the impact that culling seals and sea lions may have on transient killer whales.
WAVE 2
POSTER PRESENTATION
ABSTRACTS
Theme: Health and Wellness

Title: Identifying the Genetic Source of Variation in Caenorhabditis elegans Male Mating Success

Presenter(s): Taylor Reilly

Abstract
Previous research has established that strain PD1074 (designated wildtype) of the free living nematode Caenorhabditis elegans exhibits an average mating success of approximately 60% in single male single hermaphrodite twenty-four-hour mating crosses. Multiple wild isolate strains were tested using the same mating scheme, and results identified four wild isolates with significantly lower mating success than PD1074, and four with significantly higher mating success (J. Rivera and N. Khosravi, 2019). The low mating strains are JU258, JU533, JU361, and CB4853, with the average mating success across these four strains being 11%. The high mating strains are JU322, JU360, JU397, and JU1400, with an average mating success of 92%. A causative genetic basis for these observed discrepancies has yet to be identified. The aim of this research is to identify which chromosome is associated with the high mating phenotype observed within a wild C. elegans isolate. This was accomplished through traditional linkage mapping using the JU1400 strain. Autosomes two and five were identified as candidate chromosomes for linkage with the genetic source of the high mating phenotype observed within this wild isolate. Further work will include discrete testing of each candidate, and if a sole chromosome can be identified as linked, higher resolution mapping could locate candidate single nucleotide variations. SNV’s are hypothesized to potentially be located in genes coding for sex-specific neurons, of which human homologs may exist.
Abstract
Glioblastoma (GBM) is an aggressive cancer that forms in glial cells in the brain. GBM patients are often diagnosed at a late stage of the disease resulting in poor prognosis and overall survival. Current treatments for GBM include radiation, surgery, and conventional chemotherapies, however there remains a crucial need for targeted treatments to improve therapeutics. Recent research has demonstrated the potential for immunotherapy in the targeted treatment of various cancers, though this has yet to be the case for GBM. Genome instability is the phenotype whereby cells accumulate more DNA damage over the course of a cell cycle. Researchers have shown that genome instability can improve the response to immunotherapies via the generation of neo-epitopes that can be recognized by the immune system. We hypothesize that inducing genome instability in GBM using chemotherapy will improve the effectiveness of immunotherapy. To address this hypothesis, we plan on assessing genome instability and DNA damage accumulation in GBM cell lines using immunofluorescence and comet assays. Moreover, we plan to assess the DNA damage response activation in GBM cells using standard molecular biology assays. Using tumour killing assays, we plan on assessing if genome instability potentiates cancer cell killing by immune cells. We will also explore if combining antibody based immunotherapy with genome instability-inducing agents can improve the elimination of GBM cells by immune cells. Ultimately, this project will deliver new knowledge on the combination of genome instability-inducing chemotherapy and immunotherapy in the treatment of glioblastoma.
Abstract
Myelin sheaths in our central nervous system ensure that neural signals transmit effectively. Myelin water imaging is a quantitative magnetic resonance imaging (MRI) technique that can assess myelin content by distinguishing signal from water trapped within myelin lipid bilayers by its characteristically short T2 relaxation time. The myelin water fraction (MWF) metric is the ratio of signal contribution from myelin water to total signal and varies between different brain regions and between healthy individuals. The purpose of this study was to investigate (1) the strength of age as an explanatory variable for MWF variation between subjects, and (2) whether the ranking of MWF between brain regions is consistent across age groups. Data was collected retrospectively from 100 healthy volunteers scanned at 3.0T and was used to create a MWF atlas. Pearson correlations with both age and sex were calculated in 19 regions of interest (ROI). Mean MWF demonstrated clear ranking between brain structures for different age groups, indicating that relative metric values are generally consistent between ROIs. Excluding subjects aged less than 25 eliminated correlations between age and MWF, suggesting a rapid increase of MWF in the second decade of life, followed by a non-linear relationship; myelin content plateaus then decreases in later decades. There were no significant correlations between MWF and sex. This atlas provides a template for MWF, useful for monitoring normal myelin evolution. By characterizing this relationship, these results also improve understanding of MWF in the context of pathology, especially for demyelinating diseases such as multiple sclerosis.
WAVE 2 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Characterization of influenza A virus mutants with mutations on nuclear localization signals

Presenter(s): Crystal Ma

Abstract
An influenza A viral infection only occurs if viral genome is imported into host cell nuclei for replication, which is made possible by the viral nucleoprotein (NP). Nuclear localization signals (NLSs), NLS1 and NLS2, are encoded in this protein. The purpose of this project was to determine whether mutant NLS1 (NLS1 MT) affect any stage of the life cycle compared to the wild type (WT), and to characterize this mutant. Wild type and NLS1 MT viruses were used to infect A549 cells through a time course. WT and mutant cell lysate were then collected at various time points post-infection and analyzed on western blot to compare the level of viral NP and matrix (M1) protein expression relative to cellular actin, at different stages of the viral life cycle. It was determined that the NLS1 MT virus was delayed in production of NP and M1 at early post-infection times. The supernatant of samples collected at late post-infection time points, 24 hours and 48 hours, were also analyzed on plaque assay to determine the infectivity of NLS1 MT viruses, and to examine whether production of mutant viruses is attenuated or inhibited. Results indicate that NLS1 mutant viruses produced 3.6 times fewer infectious viral progeny than the wild type at 24 hours and 7.8 times fewer infectious viruses at 48 hours post-infection. In conclusion, NLS1 is involved in early viral life cycle stages, and a mutation in this NLS resulted in defective nuclear entry of the viral ribonucleoprotein (vRNP), and delayed viral production.
Theme: Health and Wellness

Title: Exploring Novel Genes for Obesity in Mice

Presenter(s): Lauren Eggenberger

Abstract
Obesity is an epidemic that many countries around the world are currently facing. In the near future obesity is expected to become the most common preventable cause of death in Canada. Despite its prevalence there is no clear cause or treatment that is universally effective. Recent research has focused on finding new drug targets to treat obesity, two potential targets include integrin alpha 6 (ITGA6) and pyruvate dehydrogenase kinase 1 (PDK1). Copies of these genes when swapped from traditionally lighter mice (B6) into heavier mice (BTBR) have been able to decrease their body weight significantly when housed at certain animal care facilities. This research aims to examine gene expression of these genes and determine if it is correlated with body weight differences at various animal care facilities around UBC.

This project examined gene expression of the ITGA6 and PDK1 genes in liver, heart, brain and adipose tissue of PDK1 knockout mice and BTBR mice with select B6 alleles housed at three animal care facilities at UBC. Their gene expression was compared to their body weight to determine if any correlation was present.

Findings from this study will provide information on the viability of these genes usage in treating obesity by helping to understand why their effects on body weight differed between facilities. This research is imperative as current obesity treatments are not sufficient and new treatments are necessary to inhibit this growing epidemic.
Theme: Health and Wellness

Title: Determinants of Urosepsis Following Treatment of Struvite Stones

Presenter(s): Elizabeth Schjelderup

Abstract
Lizzie Schjelderup, Justin YH. Chan, Victor KF.Wong, Kymora B. Scotland, Ben H.Chow
Struvite stones consist of approximately 10-15% of all urinary calculi and are commonly associated
with urease-splitting bacteria. Due to their associate with bacteria, struvite patients are at risk of
developing life-threatening complications of urosepsis. Our study aims to identify predictor variables
and risk factors for urosepsis in patients that have undergone surgical treatment for struvite stones.
A retrospective chart review was performed on 96 patients who received surgical treatment for
struvite stones. The Quick Sequential Organ Failure Assessment (qSOFA) and Systemic inflammatory
response syndrome (SIRS) criteria were used to identify patients with suspected infection, which
would put the patients into an increased risk for urosepsis.
Post-operatively, 38 patients were SIRS positive and 11 were considered high-risk patients for in-
hospital mortality with suspected infection as defined by qSOFA. Prior kidney stone procedures,
stenting, elevated white blood cell count, and longer operative times increased the risk of struvite
stone patients being SIRS positive. With the qSOFA criteria, patients who had other medical
comorbidities, a blood transfusion, a longer operation, lengthier post-operative hospitalization, and
received antibiotics within 3 months prior to stone surgery were more likely to have a positive qSOFA
score.
Consequently, it is vital to carefully monitor these patients as they may have an increased risk of
developing urosepsis, and ensure all steps are taken to prevent the onset of urosepsis.
Title: Investigating the Association of Herpesvirus Infection on the Development of Alzheimer's Disease

Presenter(s): Guadalein Tanunliong

Abstract
Alzheimer's disease (AD) is a common neurodegenerative disorder that affects over 50 million people worldwide, with numbers continuing to increase as the population ages. AD is clinically characterized by a progressive decline in cognitive and behavioural functions; moreover, is pathologically associated with extensive aggregation of b-amyloid plaques and neurofibrillary t-tangles in the brain. Previous RNA sequencing and in vivo mice studies have demonstrated correlations between various Human Herpesvirus (HHV) infection in the brain with increasing inflammation and degeneration of neurons, both of which are neuropathological symptoms of AD. Other studies suggested that these aggregates may be protective in nature against pathogens. We aim to evaluate the relationships between various HHV infections of human brain tissue in individuals clinically afflicted with AD. DNA was initially extracted from multiple post-mortem brain regions of healthy and AD human patients. A quantitative PCR (qPCR) assay was designed and optimized to ensure high sensitivity in detecting low viral copy numbers, which will then be utilized to directly quantify the HHV DNA extracted from brain tissues. Analysis of specific DNA regions from individual HHVs will allow us to elucidate the relationships between the viral load in each subject and brain area. We expect to measure significantly higher HHV DNA concentrations in brain tissues of AD patients, compared to healthy patients. Understanding the correlations between HHV infection and AD onset may reveal a regulatory role that viral mechanisms play in AD pathogenesis. Furthermore, this could promote potential viral therapeutics as a means of AD prevention.
**WAVE 2 | POSTER PRESENTATIONS**

**Theme:** Health and Wellness

**Title:** Implementation of a myocardial injury after non-cardiac surgery surveillance protocol on surgical patients at St. Paul’s Hospital

**Presenter(s):** Monica Hsieh

**Abstract**
Myocardial injury after non-cardiac surgery (MINS) is defined as a postoperative troponin elevation associated with an increased 30-day risk of major vascular events and mortality. Once MINS is diagnosed, anti-platelet and statin therapies should be initiated to improve cardiovascular outcomes. The objective of this study is to evaluate the quality and impact of the MINS pathway at St. Paul’s Hospital.

MINS surveillance was undertaken in patients over 65 years or age 45-64 years with significant cardiovascular disease. Surgical lists were screened to include patients who underwent non-cardiac surgery with a positive NT-proBNP. A preoperative NT-proBNP >300mg/L, a marker for cardiovascular disease, warranted postoperative troponin screening. Medical records were reviewed to identify pathway compliance, MINS occurrences and outcomes. Patients were phoned 30 days post-surgery to evaluate MINS complications and the quality of patient education.

209 patients were included in the registry study. Compliance rate to the MINS protocol was 84.7% with a MINS incidence of 38.8%. However, among the patients diagnosed, only 53.8% were consulted by specialists and 26.2% were started on medications. 72.2% of the patients completed the 30-day follow-up and only 7.5% of the patients diagnosed were aware that they suffered a MINS event. The all-cause mortality rate was 8.6% among those diagnosed with MINS and the incidence of myocardial infarction and stroke was 3.7%.

The MINS protocol at St. Paul’s Hospital has been implemented with a high compliance rate. However, the management of MINS would benefit from a higher adherence to guideline recommendations. Communication with patients regarding MINS diagnosis could be improved to encourage adequate post-discharge follow-up.
Abstract
Paroxetine is one of the most potent antidepressants belonging to a class called selective serotonin reuptake inhibitors (SSRIs). It increases the serotonin concentration in the brain, thereby reducing depression and anxiety disorders. However, with its high potency, it is also associated with many side effects. In this research project, a skin-friendly transdermal Paroxetine patch was developed with appropriate application sites and increased bioavailability compared to marketed Paroxetine tablets. Inactive ingredients used in the patch were selected on the basis of FDA approved oral PAX and EMSAM antidepressant transdermal patches with the least permeation of inactive ingredients possible. An in vivo study with healthy New Zealand rabbits was implemented to test skin sensitivity to different adhesive materials. Lastly, increased bioavailability was validated by comparing the pharmacokinetic parameters: Cmax, Tmax and AUC of transdermal delivery against Paroxetine tablets. Cmax of PAX and K PAX liposomal transdermal patch, was found to be 92.53 ng/ml and 120 ng/ml at Tmax of 12 h respectively, compared to Cmax of oral tablets 172.4 ng/ml at Tmax of 6 h. The AUC0-48 for PAX transdermal patch (2377 ng h/ml) was found to be higher than the AUC0-48 for oral delivery (2056 ng h/ml), whereas modified K-PAX transdermal patch (final formulation) showed the highest AUC0-48 (3600 ng h/ml). Thus, this study reveals that by using a transdermal patch and modifying the chemical structure, the bioavailability of PAX can be improved by 42% compared to marketed oral formulations.
WAVE 2 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Saccadic eye movement as a biomarker of Parkinson’s Disease

Presenter(s): Phoenix Au-Yeung

Abstract
Parkinson’s Disease is a common neurodegenerative disease characterized by deteriorating motor control. There has been a number of research studying the oculomotor abnormalities in Parkisonian patients through saccades, the smooth, rapid shift of gaze to a target. It was observed that the target is often overshot, and several short saccades are required for the fixation of gaze. PD patients are less able to inhibit saccades, and have longer reaction times in the anti-saccade task. However, little is known about the changes in saccadic movement with disease progression. Abnormal eye movements could be a biomarker for PD for two reasons: first, increased Basal Ganglia output is part of the disease’s pathophysiology. The excessively inhibited output of the superior colliculus then produces abnormal visually-guided saccades. Moreover, saccadic eye movement can be easily and accurately measured with eye trackers, thus providing quantified information on the degree of neurodegeneration. We intend to measure the velocity, error rate, and latency in pro-saccades and antisaccades performed by Parkinsonian patients in early, middle, and late stages, as categorized by Unified Parkinson’s Disease Rating Scale (UPDRS) motor scores. The participant will be asked to look toward the target for pro-saccades, and to the opposite, for antisaccades. We expect that the further the disease has progressed, the longer the latency period and higher the error rate of anti-saccades performed, while pro-saccades will be more rapid. This could provide further insight into the effectiveness of abnormal saccadic eye movement as a biomarker of Parkinson’s Disease.
Abstract
Background: Approximately 800 women die every day from pregnancy or child-birth related complications. Of these complications, pre-eclampsia is the second leading cause of maternal deaths. It is identified by the onset of high blood pressure and proteinuria after 20 weeks of gestation. Pre-eclampsia poses a threat to both developed and developing countries. There are many factors, both pregnancy-specific and maternal-related, that are risk factors for PE. One pregnancy-specific factor of interest is parity, defined as the number of births a woman has had that occurred after the 20-week gestation mark.

Objective: The objective of this research is to investigate the relationship between PE and parity.

Method: A literature review was conducted on Google Scholar, PubMed, UBC library and Medline. A table was then constructed to summarize the papers, their key findings and important numerical values. Multiple types of studies were reviewed, including a case control study, a retrospective cohort study, a literature review and an experimental study.

Results: We found ten studies that examined the relationship between pre-eclampsia and parity. Of these, seven papers indicated that nulliparity, defined as never having completed a pregnancy beyond the 20-week gestation period, is associated with pre-eclampsia. These papers found the association to have an odds ratio ranging from 2.91 to 7.90. The association between multiparity and pre-eclampsia was inconclusive.

Conclusion: Further research should aim to investigate the underlying mechanism of pre-eclampsia. This will hopefully allow for the development of better diagnostic tools and make treatment more effective, especially for nulliparous women.
WAVE 2 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Production of Extracellular Matrix as a Highly Deregulated Process in HPV-positive Oropharyngeal Tumors

Presenter(s): Maria-Fernanda Arcila, Anna Malikovskaia, Jasmine Singh, Nazia Nadir

Abstract
The incidence of tobacco and alcohol-driven cancers of the oral cavity are decreasing; however, human papillomavirus-driven oropharyngeal cancer has been steadily on the rise for the past three decades. In order to develop novel diagnostic biomarker and therapeutics, it is essential to improve our understanding of the molecular factors driving the disease. We performed gene expression analysis of patient-matched normal and tumor tissue collected from surgical biopsies of patients with HPV-positive oropharyngeal tumors using RNA sequencing. Differential expression analysis was performed using Wald’s test and genes with a Benjamini-Hochberg-corrected p-value of <0.001 were considered significant. We identified 805 genes that are significantly upregulated, and 531 genes that are significantly downregulated in HPV-positive oropharyngeal tumors compared to normal controls. Unsupervised hierarchical clustering found that tumors fell into two major groups based on their gene expression profiles. Pathway analysis of the significant genes identified production of the extracellular matrix, particularly pertaining to collagen, as a highly deregulated process. Our study suggests that targeting the identified genes that regulate the production of extracellular matrix may lead to the development of novel therapeutics for HPV-positive oropharyngeal tumors.
Theme: Health and Wellness

Title: Treatment of Multiple Sclerosis with TGF-β

Presenter(s): Ethan Lee, Brenda Ma, Ryanne Uy

Abstract
Neuroprotection is essential to mitigate and slow down the progression of neurodegenerative disease, such as Multiple sclerosis (MS). MS involves the inflammation and subsequent destruction of the myelin sheaths which assist the transmission of nerve impulses across the body. In this study, “Neural”, a compound comprised around the cytokine Transforming Growth Factor Beta (TGF-β), was seen to be a useful molecule in upregulating the production of TGF-β during an inflammatory response, thus affecting the immune response of MS. The efficacy of “Neural” was determined through animal testing, specifically in mice. Despite TGF-β demonstrating wide, multifunctional purposes in varying cell types, “Neural” isolates its interactions to neural signalling as to not interact with other systems and processes of the mice.

The data assessed using the Experimental Autoimmune Encephalomyelitis (EAE) model in 12 mice per group over 23 days found that “Neural” reduced EAE scores by two fold. Through RNA-sequencing of M1 and M2 Macrophages isolated from the brain and spinal cord, it was determined that anti-inflammatory modulators were upregulated in “Neural” treated animals compared to untreated ones and had a similar profile as healthy controls. Furthermore, the percentage of demyelination of neurons was decreased by 65% in treated mice compared to untreated controls. As a clinical approach, “Neural” serves as an effective measure to target macrophages and prevent further damage to myelin sheaths and nerve fibers. With a bioavailability of 72% following a 500mg oral dosage, “Neural” is a more accessible medication than other orally available options.
WAVE 2 | POSTER PRESENTATIONS

**Theme:** Health and Wellness

**Title:** The Effects of DYRK1A Gene on Neuronal Morphology and Synapse Formation in Hippocampal and Dorsal Root Ganglion Cells

**Presenter(s):** Minseon Jung, Arman Mojtabavi

**Abstract**

Autism Spectrum Disorder (ASD) is a condition related to brain development that is characterized by repetitive behaviors and impairments in social interactions. Although ASD is a prevalent disorder, there is no known cause, gene variant, cure, prevention strategy, or treatment. Since deficits in neuronal outgrowth and proper synaptic balance are believed to significantly impact ASD pathologies, our research is central to identifying variants that lead to the pathophysiology observed in patients of ASD.

One gene from a list of candidate ASD genes is Dual specificity tyrosine-phosphorylation-regulated kinase 1A (DYRK1A) which has been shown to play a critical role in the central nervous system during development. Our project aims to functionalize DYRK1A gene variants identified in patients with ASD. We have examined the effects of DYRK1A gene on neuronal morphology, synaptic density, and excitatory and inhibitory (E/I) balance in mouse neurons. We predicted that overexpression of DYRK1A gene will reduce neuronal outgrowth, decrease synaptic density and alter the E/I balance.

We transfected hippocampal and dorsal root ganglion cells to express wildtype DYRK1A or a variant. After five days of expression, the neurons were fixed and immunolabeled for synaptic markers. The neurons were imaged using a confocal microscope for analysis.

Neurons expressing DYRK1A decreased in outgrowth and had a reduction in spine density, suggesting it’s crucial role in ASD pathologies. We expect to see a reduction of synaptogenesis and disruption of E/I balance. To further investigate this topic, we will use calcium imaging to analyze neural signalling and activity.
Theme: Health and Wellness

Title: Exploring the role of ILK-mediated chemoresistance in high-grade osteosarcoma

Presenter(s): Bea Liston, Haley Biggin, Serena Zhang, Shuren Batkhuu

Abstract
Osteosarcoma (OS) is a subtype of bone cancer typically found in the long bones of patients, with a higher prevalence in young men. High-grade OS is chemoresistant in 35-45% of diagnosed cases, resulting in the development of metastatic disease. It has been previously shown that integrin-linked kinase (ILK) plays a role in OS-mediated invasion and death-evasion, both of which are important in resistance. We aim to investigate whether ILK plays a role in promoting resistance in high-grade OS. Using high and low-grade OS human cell lines, a candidate targeted approach will be utilized in order to establish a link to chemoresistance. Protein and RNA expression analysis will be performed to establish a difference between high and low-grade OS cell lines. Additionally, genetic tools will be used in order to overexpress and knockout ILK expression. Furthermore, a drug inhibitor, QLT-0267, will also be used to suppress ILK activity. Next, cell viability and migration assays will be performed in order to measure changes in drug sensitivity and cell migration. Clinically relevant chemotherapy will be used in order to assess drug sensitivity. Additionally, cell death will be measured by evaluating the expression of key markers. Finally, if ILK has been found to play a key role in chemoresistance, we will look to identify a potential mechanism by employing an RNA screen looking at global regulators not previously linked to both ILK and resistance. This research looks to demonstrate a potential role for ILK, which will hopefully lead to the improvement of relevant therapies.
WAVE 2 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Substance Use Perceptions Amongst Canadian Youth Post-Cannabis Legalization

Presenter(s): Connie Ku

Abstract
On October 17th, 2018, The Cannabis Act was passed in Canada to regulate the use of cannabis nation-wide. Canadian research on the post-legalization substance use amongst adolescents and young adults is limited. This study aims to consolidate extensive research on the perceive ease of access and perceived safety of cannabis use; and examine the relationships between grade, sex, recency of substance use, and social norms in cannabis use. Longitudinal data was collected and analyzed via SPSS from Vernon School District 22. The relationship between the perceived ease of access and perceived safety of cannabis use were strongly and linearly related ($r = .57, p < .001$), which further supports the significance of using both perceptions of substance use to aid predictions of prospective substance use. Grade and sex had weaker correlations, less statistical significance, and lower odds ratios than factors of recency of cannabis use, mother’s approval of cannabis use, friends’ cannabis use, and friends’ approval of cannabis use. The results highlighted the most important factors for further youth cannabis research. Further survey implementation will be required to further explore the long-term effects of the perceived biases and norms regarding the consumption of cannabis post-legalization. Ultimately, understanding these perceptions will help predict the trends in future youth substance use and evaluate the effectiveness of the Cannabis Act.
Theme: Individual, Community and Society

Title: Ayurveda and Mental Illness

Presenter(s): Laura Jones

Abstract
Ayurveda is an ancient Indian medicinal (Vaidyakam) system that is being interpreted on the global stage for use in psychiatric treatment. Ayurveda is a way of life that is said to lead to greater wellbeing and longevity for the entire human: mind, body, and soul. This is in part due to its affiliation with Hindu society and its beliefs of preparing the body to attain mokṣa, the end of the cycle of rebirth. As a medicinal system, Ayurveda offers psychological, physical and herbal treatments for maladies. This study aimed to determine if Ayurveda would complement the more reactive, modern psychiatric approach to mental illness. A comparison was made between the Ayurvedic texts Carakasaṃhitā, Suśrutasaṃhitā, Mādhavanidāna, and the Śārngadharasaṃhitā, against the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders 5. It was determined that though the two systems recognize many of the same symptoms and cluster them together into particular disorders, the end goals of treatment are in direct opposition. Ayurveda wishes to reinstate a sense of unity between the individual and society, whereas psychiatry wishes to reinstate a sense of a unique, individual self. Though Ayurvedic therapy techniques have been successfully used in conjunction with psychiatric practice to address psycho-social functioning and management of symptoms, this study concludes that the reason for treatment in each system is too divergent to be fully integrated with one another.
Abstract
Background: The Trauma Team Training (TTT) Course was developed in 1997 to address the trauma burden in low-to-middle-income-countries. TTT is comprised of a Provider’s and Instructor’s curriculum focusing on a team-based approach to trauma care. TTT has become an effective, low-cost resource to teach multidisciplinary trauma teams in under-resourced centres and has been important to trauma system development in Ethiopia, Guyana, Tanzania, and Uganda. Therefore, we propose a model to implement the TTT Course throughout Kenya’s 47 counties.

Methods: A needs-based assessment was performed with Kenyan stakeholders and Canadian partners. The Kenyan Health Ministry and Red Cross piloted the course and provided equipment, with funding from WHO, University of Alberta, and McGill University. CNIS and the Injury Control Center in Tanzania provided instructional expertise. A three-day Provider’s course trained local workers in developing effective trauma management in resource-limited settings. At a later date, an Instructor’s course was offered to guide teachers in training Providers. A subsequent Providers’ course was then conducted where the Kenyan Instructors were given the opportunity to practice their skills.

Results: Two Provider Courses in 2 counties and one Instructor course were held, with 47 providers and 22 instructors trained. Individuals from 4 counties (Kericho, Uasin Gichu, Nakuru, Nairobi) and 10 facilities participated in the Provider courses, while the Instructor course had participants from 4 counties (Nairobi, Kiambu, Machakos, Makueni) and 15 facilities.

Conclusion: TTT saw significant change through its engagement of local stakeholders and has potential to build domestic capacity for trauma care in Kenya.
WAVE 2 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: The Quantitative Impact of the UBC IP MedRec Event to Collaborate and Complete a MedRec

Presenter(s): Kamalpreet Parhar

Abstract
Background: Every year, Canadians experience thousands of adverse drug events (ADE). These events are more likely to occur during transitions of care and lead to negative outcomes for patients. Formal training in MedRec is shown to improve patient safety; therefore, UBC has implemented an interprofessional educational program to formally train medicine, nursing and pharmacy professions.

Objective: To perform a quantitative analysis on students’ perceptions to collaborate and complete a MedRec.

Study Design: Quantitative Analysis

Methods: A quantitative analysis was used to evaluate participation in the program from 2013-2019 and post-session survey results from 2015-2019. Survey results were analyzed as means for students who “strongly agreed” or “agreed” to the questions addressing collaboration, completion of a MedRec, and patient safety.

Results: A total of 4125 pharmacy, medicine and nursing participants were recruited between 2013-2019. Students’ year of study when entering the program varied by profession and ranged from 1st to 4th year. Survey results by year for 2015-2019 demonstrated ≥74% of participants strongly agreed or agreed to gaining knowledge and skills in collaborating and completing a MedRec. Additionally, ≥76% gained understanding of MedRec’s importance in patient safety. Survey results by profession for 2019 highlighted that nursing’s perception on knowledge and skills obtained during the program was higher compared to pharmacy and medicine.

Conclusions: The UBC IP MedRec education program has enabled 4125 participants to gain knowledge and skills in working collaboratively to complete a MedRec and gain understanding of its importance towards patient safety.
Theme: Individual, Community and Society

Title: Assessing Pharmacy Student Performance on Practicum Using a Dreyfus Model of Skill Acquisition Framework: An Evaluation of Student, Practice Educator and Faculty Perceptions

Presenter(s): Karen Li

Abstract
The assessment of student performance and achieving key competencies outlined by the Association of Faculties of Pharmacy of Canada (AFPC) Educational Outcomes is an important component in preparing students for future pharmacy practice. Prior to May 2018, the assessment rubric for direct patient care practicums employed a Likert scale which resulted in a lack of clarity in expectations and challenges with assessor subjectivity.

To address these issues, a new rubric using the Dreyfus Model of Skill Acquisition framework was implemented. The Dreyfus Model categorizes learners into five stages based on principles of skill development. Now, after a full academic year of use, this study sets out to evaluate student, practice educator and faculty perceptions and experiences with this new assessment rubric.

A literature review and environment scan of experiential education assessment practices across Canadian pharmacy schools was completed. Data collection was conducted through audio-recorded focus groups and semi-structured interviews with three study groups - students, practice educators (PEs) and faculty members. Participants were asked for their perceptions around the rubrics clarity of expectations, relevance, usefulness and challenges.

Transcripts were de-identified and coded through NVivo to identify major themes and repeated ideas expressed within cohorts. Major themes identified across study groups include improved clarity of expectations but redundancy of some elements, subjectivity of descriptor keywords and difficulty navigating the rubric itself. Students expressed more challenges with the format and design of the rubric whereas community-based PEs expressed more positive sentiment toward the new assessment rubric compared to those within hospital practice.
WAVE 2 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Predicting the impact of pH alterations on physical parameters of bacterial communities

Presenter(s): Hans Ghezzi

Abstract
The human gut is a lively location inhabited by a diverse community of microorganisms, including bacteria and viruses, which make up the so-called microbiota. The gut microbiota plays a crucial role in human health, as studies keep establishing new links to various conditions such as asthma, diabetes and gastrointestinal disorders like inflammatory bowel disease. Maintaining a balanced microbiota is crucial to ensure the greatest benefit from the extremely varied communities of organisms that inhabit our intestines. However, nowadays it seems harder and harder as important factors like diet and lifestyle can quickly and drastically impact the composition of the microbiome. Specifically, these factors can induce physical perturbations to the gut environment like changes in pH, temperature, oxygen and salt concentration. While these may seem irrelevant at a macroscopic level, they can have a huge impact at a microscopic level, greatly altering the composition of the microbiota. Because the intestine is not visible, such changes can often go unseen for a long time resulting in long term perturbations. Considering the importance of the microbiota in human health it is crucial to understand the effect of physical perturbations on bacterial communities. Specifically, my research focuses on studying the biological parameters of individual species at various pHs and predicting how changing these parameters impacts larger communities. Being able to predict how individual species affect larger communities under different pH conditions could open doors for therapeutic applications where new species can be introduced into the gut microbiota to restore balance.
Theme: Individual, Community and Society

Title: How to Talk About Slavery: Familial Terminology as Justification for Slavery in Comparative Literature

Presenter(s): Noah Cohen-Vogel, Jenny Li, Chris Englezos, Haoyue Zhao

Abstract
In this comparative paper, we examine the use of familial titles given to enslaved characters in literature, selecting short, illustrative scenes that depict how slaves interact with their owners in sources from different time periods. The slave characters studied include the tutor-slave Presbus in Ion (5th c. BCE), a tragedy by Euripides, ‘Granny’ Moll in The Valley of Shenandoah; or, Memoirs of the Graysons (1824) by George Tucker, ‘Aunt’ Dilsy in The Planter’s Northern Bride (1854) by Caroline Lee Hentz, and ‘Lola’ Eudocia Tomas Pulido in “My Family’s Slave” (2017), an autobiographical article written for The Atlantic by Alex Tizon. Although the literature selected has a gap of thousands of years, they all use the same kind of familial language to express special emotion to these slaves. We show that the way in which slaveholding authors refer to these enslaved characters as members of their families serves as a propagandistic tool used to justify the cruelty of slavery in each source’s time period. We aim to demonstrate that as 19th-century slave stereotypes – ‘Mammy’ and ‘Uncle Tom’ – were artificially aged compared to their real-life inspirations in order to play on audiences’ sentimentality, so too were the enslaved characters in Euripides’ and Tizon’s work. To support these readings, we incorporate analyses from bell hooks’ Ain’t I a Woman (1981) and Deborah White’s Ar’n’t I a Woman? (1985). The practical goal of our project is to educate people on how to talk about slavery without falling into pro-slavery tropes, even unconsciously, as we show to be the case in Tizon’s article.
WAVE 2 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Children's ability to detect confidence and emotion from people's paralinguistic cues

Presenter(s): Gurvir Dhutt, Nicolle Cai, Charlotte Stewardson, Siba Ghrear

Abstract
Learning is a vital part of human development as it shapes our understanding of the world, and choosing who to learn from is an important aspect of learning. This study aims to determine whether children between the ages of 3-5 distinguish between and use paralinguistic cues of confidence (e.g. speech intonation and rate) when choosing who to learn from. Participants were first shown four pairs of novel objects and audio recordings of a confident and a hesitant speaker, each providing a different answer when labeling novel objects. Participants were asked whether the answer provided by the confident or hesitant speaker was correct. Participants were then presented with four additional novel objects and asked which of the two previous speakers (confident or hesitant) they would choose to label each object. Then, participants were explicitly asked which speaker was confident and to match their voice to visual cues of confidence (eg. relaxed vs scrunched eyebrows). Lastly, participants were asked to match paralinguistic cues of happiness versus sadness with positive or negative images (e.g. intact or broken phone). We hypothesize that children will prefer to learn from more confident sources, that their sensitivity to affect cues (eg. cues dictating the speakers’ emotion, eg. happy vs. sad) will predate their sensitivity to confidence cues, and that older children will show a greater ability to detect vocal cues to confidence than younger children. This data will identify the youngest age at which children are sensitive to paralinguistic cues to confidence.
Theme: Individual, Community and Society

Title: Perfectionistic Self-Presentation in Individuals of Asian and European Descent

Presenter(s): Hira Peracha, Sabrina Ge

Abstract
Background: Perfectionism is a maladaptive and multidimensional personality trait that involves the need to be or appear perfect. Although perfectionism involves both a trait and a self-presentation component, ethnic differences in perfectionistic self-presentation styles have been disproportionately understudied. Studies investigating differences in perfectionism traits, which are personality constructs that motivate an individual’s perfectionism, suggest that socially prescribed perfectionism is more prevalent in individuals of Asian descent than in those of European descent. However, it is currently unclear how individuals’ perfectionistic self-presentation styles differ depending on ethnicity. Perfectionistic self-presentation styles are dynamic interpersonal behaviours that reflect the individual’s desire to: display their perfection (perfectionistic self-promotion), behaviourally conceal their imperfection (non-display of imperfection) or verbally conceal their imperfection (non-disclosure of imperfection).

Aim: Investigate how perfectionistic self-presentation styles differ among ethnic and age groups.

Hypothesis: Perfectionistic self-promotion, non-display of perfectionism, and non-disclosure of perfectionism is higher in children and adults of Asian descent compared with those of European descent.

Method: Perfectionistic self-presentation will be measured using the validated Perfectionistic Self-Presentation Scale (PSPS) for adults and the PSPS-Jr for children. A one-way analysis of variance will then be conducted within each age group to detect differences in ethnicity, which will be self-reported.

Implications: By furthering the current understanding of perfectionistic behaviours, this study has the potential to further elucidate the underlying mechanisms behind perfectionism and improve treatment tools.
WAVE 2 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Diabetes: Journey to Better Health Outcomes

Presenter(s): Lara Donison

Abstract
The challenges and barriers faced by type 2 diabetic patients and their family physicians were identified based upon individual interviews conducted with 10 patients and 2 family physicians. A patient journey map was created based on these interviews. The results revealed significant knowledge gaps amongst patients in three key areas: diabetes disease information, diet/exercise, and medications. Interestingly, patients tended to blame their physicians for their difficulty managing their diabetes. Moreover, physicians tended to feel frustrated with patients who seem to lack motivation to pursue better health. Although a variety of practitioners are involved in providing care and education for diabetic patients, their knowledge of each other’s roles is limited. These results highlight the need to empower patients through education with regards to diagnosis, medications, and lifestyle modifications. Additionally, there are needs for improved interprofessional communication and collaboration in order to have a more robust approach to patient care.
WAVE 2 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: The Effect of Blindness on Imaginativeness

Presenter(s): David Shifflett

Abstract
The current research investigated whether imaginativeness and the presence of blindness were associated in the context of a simple stimulus. The blind and the blindfolded participants felt and the sighted participants viewed the same three-dimensional square. All of the participants answered the same question: “what does this figure represent?” A scale categorized each response as tangible or ambiguous. Although tangible responses had concrete referents in the real world, ambiguous responses did not have concrete referents in the real world. For instance, a building, a television, and a truck were examples of tangible responses. On the other hand, a box, a rectangle, and a square were examples of ambiguous responses. The percentage of tangible responses out of all of a group’s responses was compared to the other groups’ percentages. The blind participants gave tangible responses more often than the blindfolded participants and more often than the sighted participants. As a result, the blind participants might have been more imaginative than the sighted participants in the context of a simple stimulus. Additionally, the blind participants might have shown a greater natural tendency to extract pictorial material from a simple shape in comparison to the sighted and the blindfolded. However, previous research has shown that blind people are subject to stereotypes about their limitations and discrimination on that basis. For that reason, the current findings might help correct misunderstandings about the abilities of blind people.
Abstract
The relationship between emotional characteristics shown by defendants and juror’s perceptions of defendants’ credibility and culpability is of interest to those in the judicial system and the general public. In a study looking at levels of defendant emotionality and sentencing, Heath & Grannemann (2004) found that defendants displaying less emotionality are perceived as guilty than those showing greater emotionality. Further, more emotionally distressed defendants are perceived as more credible (Landstrom, Ask, & Sommer, 2004). Moreover, defendants who display more remorse tend to receive shorter sentences, compared to defendants that display anger (Maclin, Down, and Caspers, 2009; Rumsey, 1976). However, less is known about how other emotions displayed by defendants (e.g. sadness and affect; Hodgson, 2013) influence jury decision-making and sentencing decisions. This study proposal aims to examine the influence of negative emotions (i.e. nervousness, sadness, affect, and aggression) displayed by defendants on jury decision-making. Participants will be assigned to one of two conditions: defendants displaying negative emotions through facial expressions or defendants with reduced emotional expressions (e.g., calm appearance and flat affect). After watching a mock trial video of a defendant with either negative emotions or limited emotions, participants will be asked to render a sentencing decision (i.e. sentence type and length) and describe their reasoning. It is hypothesized that when defendants display negative emotions, mock jurors will render harsher sentences. The implications of this study are important, as very little is known about the influence of emotional expression, specifically negative emotions, on jury decision-making.
Theme: Individual, Community and Society

Title: Linguistic Diversity: Children's Perceptions of Homogeneous and Heterogeneous Linguistic Groups

Presenter(s): Golzar Ejadi

Abstract
North American communities are diversifying rapidly, resulting in the creation of diverse environments in schools, workplaces, and society. Diversity in group settings has many benefits, including increasing overall group performance (Homan et al., 2007) and group creativity (Hoever et al., 2012). This study employs the use of linguistic diversity to explore children's beliefs about groups of speakers that are either linguistically diverse or homogeneous (i.e., speak with different or the same accents, respectively). Accent is manipulated because past research shows that children's social judgments are sensitive to a speaker's accent (Kinzler et al., 2007; Weatherhead et al., 2018). In this study, children (5-10 years old) are recruited from a local community science centre and are presented with pairs of photographs of two ethnically-similar looking groups along with voice recordings. Recordings either depict group members speaking in the same or in a different accent as one another. Immediately after, a series of questions that examine children's beliefs about each group's prosocial behaviours, interpersonal relationships, similarities within the group, and their assessments of the group are presented (e.g. “which group is better at solving problems together?”). In Study 1, the linguistically homogeneous group's accent was one native to Vancouver, however, in Study 2, the linguistically homogeneous group's accent was an accent non-native to Vancouver, allowing for in-group bias control. Once data collection is complete, the responses will be analyzed, reported, and implications will be discussed. This study aims to shed light on children's values and preferences of linguistically homogeneous and heterogeneous groups.
WAVE 2 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: The Effect of the Availability of Big Data on Cybervictimization and Privacy Concerns

Presenter(s): Khushi Aggarwal

Abstract
Cyberbullying is a relatively new phenomenon. It can emotionally damage the victims with severe consequences. Students with cyberbullying experiences often use computers, cellphones, or other devices to humiliate, or make fun of people by misusing their information available on social media. Social networking sites provide a platform for bullying outside the school boundaries further violating the privacy of the victims. The ease of availability of data on social media is another factor that makes cyberbullying a popular form of bullying among students who bully the other people online. This study tests if increased availability to big data results in higher engagement in cybervictimization and greater privacy concerns among students with cybervictimization experiences. The study will probably use 300 UBC undergraduate student accounts on Twitter and will apply content analysis to analyze the data. The result of the study may suggest that the students with cybervictimization experiences have greater privacy concerns.
WAVE 2 | POSTER PRESENTATIONS

**Theme:** Individual, Community and Society

**Title:** How does Nadar’s photography on male sensuality created a change in 1910s French fashion, but also enhances France’s position as a world’s fashion capital?

**Presenter(s):** Bernice Chau

**Abstract**
Nadar’s professional skills in photography have occupied an important part of the artistic and cultural space in France. This particularly applies to his focus on male fashion portraits in the 1900s to 1910s, a period when the French fashion industry began to change abundantly and ended up a fashion capital by the start of the 1910s. People still remember how the portraits of Debussy and Zola were rarely accessorized and put more emphasis on the simplicity of the clothing. These successful collaborations of fashion and photography remain as some of the most memorable representations of the Belle Epoque male portraits. These artistic instances of male portraits from the 1900s have become an important inspiration to both impressionist visual arts and photography that remind French citizens of their unique view of aesthetics and fashion. In this brief essay, I will examine how Nadar’s photography on male sensuality created an inspiration in 1910s French fashion, but also brought France into the position of being a world’s fashion capital.
WAVE 2 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Shifting the Story: Contrasting Media Portrayals of Tent Cities with the Lived Experience of Tent City Residents

Presenter(s): Kiren Aujla, Hannah Bauer, Ashi Mann

Abstract
Background: Recent estimates suggest that one in 18 people in the Downtown Eastside (DTES) of Vancouver are homeless. A lack of affordable housing in addition to a variety of social, economic and political issues are exacerbating housing insecurity across BC. Tent cities are a notable manifestation of this crisis. While tent cities have received significant media attention recently, stories rarely include the perspectives of the people who live in them. This qualitative study focuses on the Oppenheimer Park tent city in the DTES to better understand the experiences of its residents.

Methods: This project uses the Community Based Research Practices (CBRP) approach. Partnering with community organizations, peers assist with longitudinal interview recruitment and provide input designing the study. We conducted a critical discourse analysis of news stories on the tent city through three media outlets. Twenty media stories were identified as representative of public discourse. In-depth, qualitative interviews were conducted with 20 people living in Oppenheimer Park, and 100 hours of ethnographic observation were undertaken at the study site.

Results: Themes discovered from the critical media analysis can be characterized into four groups: concerns about violence, improper sanitation, community stakeholders concerns, and fire hazards. Results from complementary studies on homelessness and marginalization show comparable spaces provide safety, community and belonging. We anticipate similar themes within our longitudinal interviews.

Conclusion: It is the intention of this project to understand within a particular place and time the dialogue that is occurring about Oppenheimer tent city, in comparison to within Oppenheimer tent city.
Theme: Innovation and Technology

Title: Biorefining and Machine Learning

Presenter(s): Riley Ballachay

Abstract
Hemicellulose has diverse applications in the industry. Industrial use of hemicellulose often requires that the polymer be hydrolyzed into constituent oligomers and monomers. Models exist to predict sugar yield during hydrolysis, but none can be applied to varied feedstock and operating conditions. Machine learning is used to develop a universal model to predict xylose yield. Two models (ordinary least squares regression and artificial neural networks) are assessed and compared to a simplified kinetic model. In total, 2048 data points were mined from the literature and used to create the models. The machine learning models are shown to perform better than the kinetic model.
WAVE 2 | POSTER PRESENTATIONS

**Theme:** Innovation and Technology

**Title:** Nucleoporin 62 Cleavage Promotes Coxsackievirus B3 Replication

**Presenter(s):** Sana Aghakeshmiri

**Abstract**

The nuclear pore complex (NPC) is a large channel located within the nuclear envelop and is responsible for controlling the exchange of macromolecules between the nucleus and cytoplasm. The NPC is composed of proteins referred to as nucleoporins (Nups). Nup62 in particular, is located centrally within the NPC and plays an important role in nucleo-cytoplasmic trafficking. Coxsackievirus B3 (CVB3) is a member of Enterovirus genus and is the most frequent cause of human viral myocarditis, particularly in children and adolescent. Viral myocarditis may proceed to chronic dilated cardiomyopathy, heart failure or sudden death.

Previous work has shown that Enteroviruses hijack the NPC through cleaving the central Nups, thus disrupting the nucleocytoplasmic transport which consequently benefits viral replication. However, the mechanism by which CVB3 hijacks the NPC, especially the significance of Nup62 cleavage, remains elusive. To elucidate the relationship between CVB3-mediate cleavage of Nup62 and viral replication, we induced overexpression or knockdown of Nup62 in HeLa cells, followed by CVB3 or mock infection. Levels of Nup62 and VP1 proteins, an indicator for CVB3 replication, were detected by western blot analysis. Preliminary findings indicated that overexpression of Nup62 protein resulted in a downregulation of VP1 levels while knockdown of Nup62 had the opposite effect. This could imply a role for Nup62 as a possible anti-viral protein. Currently there are no known medications for the treatment of CVB3 induced viral myocarditis. Therefore, understanding the mechanism of CVB3 pathogenesis, including how it regulates the NPC, may lead to the development of novel therapeutics.
Theme: Innovation and Technology

Title: Developing an in-vitro Chronic Infection Model with Pseudomonas and Human Bronchial Epithelial Cells

Presenter(s): Pavneet Kalsi

Abstract
Pseudomonas aeruginosa is one of the antibiotic-resistant priority 1 (critical) pathogens on the World Health Organization (WHO) list because of its increasing ability to escape wide range of therapies. It predominantly colonizes the respiratory tract of immunocompromised patients and destroys the barrier function of lung epithelium in short periods of time. Previous groups have used acute Pseudomonas aeruginosa infection models (6-8 hours infection) to emulate the infection in-vitro. However, it is known that chronic Pseudomonas aeruginosa infection contributes to pulmonary deterioration, excessive inflammation, difficulty in breathing, which can ultimately lead to death. Thus, as long-term in-vitro infection with live bacteria has yet to be established, we focused on developing a chronic infection model with Human Bronchial Epithelial (HBE) cells using clinical isolates of Pseudomonas aeruginosa called the Liverpool Epidemic Strain (LESB). We compared two LESB strains (LESB58 and LESB65) by assessing bacterial growth and maximum inhibitory concentration (MIC) of different antibiotics in various media. We also evaluated LESB58 and LESB65 mediated cellular cytotoxicity using HBE cells, and showed that after 18hrs of infection, LESB65 did not mediate cytotoxicity to the host cells while LESB58 did mediate host cell death. We further attempted to characterize the motility of the LESB strains as it is one of many traits that are relevant to chronic infection. Overall, the implication of this model is the potential use as a novel drug screening tool for lung infections before progressing to more complex and expensive models.
Theme: Innovation and Technology

Title: Anode Design for Electrochemical Advanced Oxidation Process (eAOP):
To what extent are Boron-doped Diamond Paste Electrodes (BDDPEs) suitable for the Treatment of Organics in Water?

Presenter(s): Zhouhang Dai

Abstract
Electrochemical oxidation process (eAOP) offers potential for a more eco-friendly and efficient alternative for the treatment of organics in water. It does not require the addition of chemicals, can tolerate turbidity, and is effective against persistent organics, but there is yet to be a suitable anode design. The current state-of-the-art design uses freestanding boron-doped diamond (BDD), selected for its high overpotential for water oxidation and high stability; on the other hand, it is not cost nor energy efficient for commercial applications yet, due to the high cost of BDD production and the limitations of its planar geometry.

To address these challenges, we have designed BDD paste electrodes (BDDPEs) with the goals of reducing the amount of BDD required per unit surface area and improving mass transport. We have created BDDPEs by mechanically grinding freestanding BDD into powder, combining it with paraffin wax at a 2:1 weight ratio, and depositing it onto a glassy carbon substrate at different loadings. These electrodes are then characterized electrochemically using cyclic voltammetry for their redox behaviour. We observed high overpotentials for water oxidation as expected; however, undesirable substrate features were present, and the electrodes have high resistance. With further investigation, we inferred that the high overpotential is likely due to the reduced electroactive area created by the wax, and that the film is too porous. While the BDDPEs we designed decrease material cost by over 95%, their electrochemical properties at this point render them unsuitable for viable water treatment applications and additional research is required.
WAVE 2 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Synergistic effects of AMG 510 and anti-PD1 antibodies on cancer

Presenter(s): Hafsa Choudhary, Justin Yap, Janet Zhang

Abstract
Mutations in KRAS gene produce an abnormal protein that is always active and causes cell proliferation. AMG 510, an inhibitor for KRAS mutations, and anti-PD1 antibody, a blocker of a pathway that shields tumour cells from immune system, are discovered for treating cancers. AMG 510 alone can drive anti-tumour activity. The objective of this study is to examine the synergistic effects of using both AMG 510 and anti-PD1 therapy together on tumour growth at lungs of rats. Various doses of AMG 510 are given to different cell cultures to produce a dose-response curve and to find the dose that can halt KRAS mutation. To understand the effects of AMG 510 and anti-PD1 antibodies together on tumours, tumour dimensions were assessed once a week. The results are expected to demonstrate that combining AMG 510 and anti-PD1 together can not only cease tumour growth, but also enhance the elimination of tumour cells for all three cell lines.
Theme: Innovation and Technology

Title: Investigating the Primary Beam Shape of CHIME

Presenter(s): Katherine Rink

Abstract
The Canadian Hydrogen Intensity Mapping Experiment (CHIME), led here at UBC, is a radio telescope originally designed to measure the speed at which the Universe is expanding. Because CHIME measures radio waves, it can also see pulsars. Pulsars are fast rotating neutron stars (extremely dense remnants of a dead star) about the size of a large city and with the mass of our sun. Because they are rotating so quickly, we see a pulse of light from the jets (beams) at their poles about once every second (on average). To measure how sensitive CHIME is at every point in the sky (what I mean by “the primary beam shape”), I had the telescope track many different pulsars across their entire transit (the pulsars “sunrise” to “sunset”) and developed a code to extract the information we want out of the data and map the sensitivity of the telescope at every point in the sky.
Theme: Innovation and Technology

Title: Perceptual Differences Among the Various Types of Crossmodal Correspondences

Presenter(s): Miha Zaheer

Abstract
Multisensory perception is the study of the integration of information from various sensory modalities by the nervous system. Crossmodal correspondences refer to the associations between two sensory features from different sensory modalities, in order to form a holistic perspective of the world. These associations are formed to help the brain identify or locate incoming stimuli. There are three principal types of crossmodal correspondences: structural, statistical and semantic correspondences. The differences between the correspondences will be examined using the paradigm developed by Parise & Spence. Participants will be presented with four combinations of auditory and visual stimuli, wherein two will be congruent stimuli and two will be incongruent stimuli, which go against the correspondence. Each of the two stimuli will be presented within a short time interval. The participants’ judgements of which stimuli was presented first is measured. I expect that there will be a difference in response accuracy and speed based on whether the stimuli is congruent or incongruent. The difference in response between the two conditions will be quantified, and the magnitude of these differences will be compared between the three types of correspondences (DV). Overall, I expect that there will be no correlation between the different magnitudes, as each correspondence utilises a different level of processing and consciousness. Understanding crossmodal correspondences can be especially beneficial for design and innovation, in order to create more appealing and ergonomic designs. Furthermore, crossmodal correspondences are used in sensory substitution devices to help people with disabilities better perceive and navigate their surroundings.
**WAVE 2 | POSTER PRESENTATIONS**

**Theme:** Innovation and Technology

**Title:** Analysis of the Grb10 Gene using an Unbiased Proteomic Approach

**Presenter(s):** Kevin Zhang, Jeehan Le

**Abstract**

Growth-factor receptor bound protein 10 (GRB10) is an adaptor protein that plays a role in the regulation of many signalling pathways through its interactions with receptor tyrosine kinases. GRB10 is a candidate gene in Silver-Russell syndrome, which is characterized by growth retardation. In addition to its medical relevance in growth regulation, GRB10 has been shown to be important to the regulation of insulin signaling and normal social behaviour in mice models. The functions of GRB10 are tissue, and isoform-specific. Although 4 GRB10 protein isoforms have been identified thus far, their disparate functions have not been characterized. To identify novel or differential protein-protein interactions of the various GRB10 isoforms, an unbiased proteomics approach will be used. Wild-type and mutant constructs of GRB10 will be FLAG-tagged, and transfected into mouse embryonic stem cells (ESCs) by CRISPR Cas-9. The ESCs will be differentiated into cortical neurons to investigate the role of GRB10 in neural biology. Proteins interacting with GRB10 will be isolated by immunoprecipitation and analyzed by mass spectrophotometry (MS). Mass spectra will be analyzed, and searched against a concatenated database using Mascot. The identification of GRB10 protein partners will aid in the understanding of the role of GRB10 in signalling pathways, and may impact the management of Silver-Russell syndrome.
Theme: Innovation and Technology

Title: Comparing a set of intraoral stent material candidates for the reduction of radiation therapy side effects in head and neck cancer patients

Presenter(s): Sebastian Sabry, James Fowler, Mathias Labonte

Abstract

Head and neck cancer (HNC) patients who undergo radiation therapy (RT) experience side effects such as dry mouth, tooth decay and loss of taste due to damaged salivary glands, changes in the composition of saliva and oral microbiota, and damage caused by backscattered ionizing radiation from dental implants. By implementing protective intraoral stents we can prevent RT-related side effects and limit post-therapy complications and morbidity. Currently, the optimal material for these stents remains unclear and no clinical trials or systematic studies have assessed and compared the commonly used multifunctional stent materials. The mandate of our project, as the first stage of a UBC/BC Cancer Agency joint research effort, is to design a novel personalized protective intraoral stent for HNC treatment with minimal side effects. We compared and tested a variety of polymers (n=10) and assessed their mechanical and molecular properties pre- and post-exposure to artificial saliva. Results demonstrated that post-artificial saliva exposure, some mechanical properties such as elastic modulus of ethylene-vinyl acetate decreased on average by 20% but their molecular structure (assessed using Raman spectroscopy) remained unchanged. In the subsequent phase, post-RT and saliva exposure, we aim to assess the materials’ mechanical degradation, ability to attenuate backscatter radiation, and toxicity release. These results will be the building blocks to move toward the design of novel and personalized protective stents, developed and tested clinically, to mitigate the side effects of RT treatment for HNC patients and thus improve their quality of life and satisfaction post-treatment.
WAVE 2 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Generating and optimizing the chemical gradients in a hydrogel-based microfluidic devices for chemotaxis

Presenter(s): Nina Hamard, Yicong Ma, Hyun Ku Chae, Tahiya Khan

Abstract
The migration of cancer cells via chemotaxis is a fundamentally important capability for cancer cells during invasion and metastasis. While existing in vitro migration assays (e.g. transwell assays), have improved our understanding of cell migration, these approaches are limited in that they produce an unstable chemical gradient over time and only allow for the analysis of one condition at a time. To overcome these challenges, the method of microfluidics-based cell migration assay can be utilized to examine the uniformity and stability of chemical gradients generated. We developed a method to generate uniform and stable chemical gradients for chemotaxis assays by initially generating a gradient in polyethylene glycol diacrylate (PEGDA) polymer by diffusion, and then stabilizing this gradient by photo-polymerization. The rhodamine B dye was used to measure gradient uniformity and stability in the microfluidic device under the fluorescent microscope. The resulting gradient on the microchannel is highly linear and stable for >24 hours, indicating that a uniform gradient was generated regardless of its position in the device. When the cell sample is added on top of the hydrogel where a consistent and stable gradient is continuously maintained by effusions from the hydrogel, cell migration can be observed under the microscope. In conclusion, we developed the microfluidic-based cell migration assay with highly uniform and stable chemical gradient using photo-polymerized hydrogel. This assay can be used to observe the chemotaxis of cancer cells under drug treatment, demonstrating its potential for evaluation of the migratory capacity of tumor-cells in response to therapy.
Theme: Innovation and Technology

Title: A critical look at deep-learning models for emoji sentiment analyses

Presenter(s): Manu Mahadevan Koipallil, Tarang Mahapatra, Lovira Putri, Veronica Chen

Abstract
As emojis become an integral part of language today to express the user’s feelings, sentiment analyses of emoji use through natural language processing networks have become more prevalent. Through these emoji-word networks, algorithms map emojis to words with which they are found to coincide. It is interesting to note that the actual use of emojis strays from the intended use. People are shown to use emojis in contexts that do not match the “Unicode standard” definitions of emojis. Research on emoji sentiment analysis is growing, even though the number of research is not as abundant as those of non-emoji sentences. Moreover, the practice of meta-analysis on sentiment analyses has not yet been done within this literature. This research aims to provide a critical analysis of two existing models: BERT and Deepmoji.

Deepmoji is an open-source model trained to predict an emoji relevant to a sentence provided. Training the model on a more diverse set of labels allows it to learn a richer representation of emotional context in the text provided, enabling the model to perform better in detecting sentiment, emotions and sarcasm.

BERT is a language model that has achieved state-of-the-art results on a wide variety of NLP tasks. Therefore, it should be compared to specialized models like Deepmoji. It is also similar to Deepmoji as both are pre-trained on large datasets with millions of examples. Furthermore, we compare our results on the VADER baseline for sentiment analysis.
Theme: Innovation and Technology

Title: Agent-Based Model Enlightens the Collective Cell Migration.

Presenter(s): Yihan Zhu, Donghwa Han

Abstract
Collective cell migration is a crucial process in areas such as developmental biology, wound healing, and cancer metastasis. Our work is motivated by the collective migration observed during the development of the sympathetic nervous system. During such processes, cells adapt their states such as size, contractility and mobility depending on environmental conditions (e.g. chemical cues). While biological experiments provide many insights, it has remained poorly understood what role cell adaptations play in collective cell migration. Here we use mathematical modelling to elucidate collective cell migration. In particular, we propose a novel agent-based model, (a model in which each cell is individually represented and tracked), designed to provide mechanistic insight into how varying cell composition, cell-cell interactions, and environmental cues affect collective cell migration. Our agent-based model considers pairwise forces (both repulsive and attractive) between cells, and forces resulting from environmental cues.
WAVE 2 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Parameters and assumptions that affect the performance of a building under seismic loads

Presenter(s): Ricardo Suarez Morales, Charles Barrett

Abstract
This study outlines the different modelling parameters and assumptions that affect the performance of a building under seismic loads such as mass, geometry, damping and material. These parameters will be tested on a model using OpenSees, with the programming language Python. Additionally, the analysis will be separated into local and global configuration using different assumptions and modelling techniques. The following results will lead to further discussion to determine the assumptions that have a significant impact on the model.
Abstract
Background: According to the WHO (2019), currently over 264 million people suffer from depression worldwide. To manage symptoms, selective serotonin reuptake inhibitors (SSRIs) are the first-line treatment. Of these, paroxetine (PAX) is the most potent due to its high affinity for the serotonin reuptake transporter, effectively increasing serotonin concentration in the synaptic cleft. However, several adverse drug reactions (ADRs), such as nausea and withdrawal symptoms, are associated with its use. Previous studies have shown that the number of PAX-associated ADRs can be reduced using controlled-release formulations. Thus, this study seeks to develop a controlled-release transdermal drug delivery system (TDDS) as an alternative to oral administration in order to reduce the required dosage and negative side effects.

Methods: To evaluate suitable compounds for use, a comprehensive literature review will be performed. Synthesis of a liposome encapsulating PAX will be achieved using reverse-phase evaporation and commercially-available lipids. Effectiveness will be evaluated in vitro by measuring the percentage of PAX that can permeate a synthetic epithelium in a Franz diffusion cell. In vivo distribution of the DDS will subsequently be studied by tracing radiolabeled PAX via SPECT/CT imaging. Pharmacokinetics and pharmacodynamic profile of PAX will be obtained by quantifying PAX in serum and serotonin in rat brain extracts.

Implications: By developing a novel TDDS, we are able to increase the circulation time of PAX, its bioavailability, and potentially reduce toxic side effects compared to existing oral formulations. These results might open new avenues for SSRI drug delivery and the treatment of depression.
Theme: Innovation and Technology

Title: Developing a Transdermal Drug Delivery System for Improved Delivery of Antidepressants: Investigating Paroxetine Binding in the Serotonin Transporter and its Breakdown in the Body

Presenter(s): Kristine Lin

Abstract

Background: According to the Public Health Agency of Canada, 11.3% of adults experience depression at some point in their lives. Selective serotonin reuptake inhibitors (SSRIs) are a class of antidepressants frequently prescribed to combat depression. Paroxetine, in particular, has been shown to possess the highest potency and selectivity amongst the currently available SSRIs. However, out of the SSRIs, paroxetine has been associated with higher occurrences of side effects such as weight gain and withdrawal syndrome. Therefore, one goal of this study is to enhance paroxetine’s efficacy in binding to its target receptor, the serotonin transporter (SERT), through modifications to its chemical structure. The study also aims to improve paroxetine’s stability in systemic circulation when administered transdermally.

Methods: A literature review will be conducted to understand the elements involved in paroxetine binding to SERT. Alterations will be made to the functional groups within the drug’s chemical structure to determine how these changes will affect the drug’s interaction with its binding site in SERT. In the next aim, paroxetine will be tested against various enzymatic and non-enzymatic physiological parameters to identify which of these contribute significantly to the drug’s breakdown. After modifications to paroxetine, the mechanism of action and biodistribution of the improved drug will be studied in rat brain cells and live rat models, respectively.

Implications: Accomplishing these objectives can better paroxetine’s binding profile and extend its circulation time, thus reducing the required drug dosage and associated side effects. In turn, these changes would greatly improve patient compliance with antidepressants.
WAVE 2 | POSTER PRESENTATIONS

**Theme:** Innovation and Technology

**Title:** Using Fourier Transforms to Improve Analysis of Sound Waves in Crystals

**Presenter(s):** Vakshan Varatharajah, Samantha Allum, Vinicius Santos, Arthur Blouin

**Abstract**
Signal processing is an important part of many modern technologies and is used to send large amounts of data in the form of waves. Possible applications of signal processing include radio signals, sonar, and seismology. Within these signals, we want to reduce the external noise and produce cleaner measurements. We also want to be able to encode as much information as possible. Using the concepts of Fourier Series and Fourier Transforms, a wave can be broken up into its respective frequencies from its harmonics and fundamentals, in order to better understand the information from the signal. In our research, we will apply Fourier Transformations (FFT) to various waves in order to break them down into their various components. We will code in programs such as excel and matlab to apply an FFT algorithm to different wave functions. In particular, we will be analysing the functions, \( f(x) = 1/(1+x^2) \), \( f(x) = \sin(x) \), and \( f(x) = e^{-(-x^2)} \). We will also apply this program to wave functions developed through Fourier Series. The expected outcome for our project is that as a result of our program, we will be able to calculate frequencies of different wave functions. From this information we will be able to mathematically determine whether certain wave functions will be able to pass through certain crystals with specific bandwidths. This will allow us to better understand how waves, in particular sound waves, travel through crystals, the limitations of certain materials, and why these limitations arise.
**WAVE 2 | POSTER PRESENTATIONS**

**Theme:** Sustainability and Conservation

**Title:** Exploring the impact of range expansion on traits related to fitness and adaptation

**Presenter(s):** Olivia Rahn

**Abstract**

All species on Earth occupy a limited geographic range, and the processes which determine these ranges have yet to be fully understood. One way we can work towards understanding what limits a species’ distribution is to analyze differences between populations of a species located at the core of a geographical range and populations that exist at the edge of a range. Populations at the range edge experience different habitat, climate and constraints on genetic variation than populations at the range core, and these factors may influence the relative fitness of edge populations. Understanding these interactions is crucial for predicting future population trends as species’ ranges shift poleward in latitude and upwards in elevation due to climate warming. In this study, we analyzed a subset of plant traits to determine if evidence of differences in fitness and adaptation exist for populations of pink monkeyflower (Mimulus lewisii) expanding along an elevational gradient. Additionally, a generation of M. lewisii seeds collected in the field were germinated in a common garden to separate the effects of genetics and environment on fitness. We found that edge populations did not exhibit differences in fitness or adaptation when compared to populations at the range core in their natural habitat, but the relative importance of being from the core or the edge varied with sampling location when plants were grown in a common environment. This suggests that interactions between local habitat, the underlying environmental gradient and genetics may result in variable fitness consequences for different expanding populations.
Abstract
Glucocorticoids (GCs) are steroid hormones essential for nervous and immune system development. Upon activation of the systemic stress response, the adrenals release GCs into the bloodstream where they are passively delivered throughout the body. However, during early development in mice, adrenal GC production is dampened. This is thought to be protective, as chronic, high levels of GCs in early-life can be harmful to certain organs. Therefore, the brain and immune organs require specific levels of GCs for proper development. Recent research excitedly suggests GCs can be locally synthesized in these organs, perhaps compensating for the low bloodstream levels in early-life. Preliminary studies also suggested their ability to produce local “stress responses” through mediators similar to the systemic stress response. Here, we wanted to answer whether these organs produce GCs like the systemic stress response, and if expression changes after an immunological challenge. Subjects were neonatal (post-natal day 5) and adult (post-natal day 90) C57BL/6J mice that received a vehicle control or an immunological stressor. We collected blood, microdissected brain regions (prefrontal cortex, hippocampus, hypothalamus), and immune tissues (thymus, spleen, and bone marrow) 4-hours post-treatment. A panel of GCs was measured via liquid chromatography-tandem mass spectrometry (LC-MS/ MS), a tool that can measure low amounts of GCs with sensitivity, precision and accuracy. Gene expression of the stress response mediators was measured via qPCR. This study will provide further evidence into local GC production in the brain and immune organs during development and adulthood, and their adaptations after immunological challenges.
Abstract
Watersheds are small areas of land that drain water into lakes, rivers, or streams. Climate change and land-use alterations have long impacted the environments within watersheds negatively across Canada, creating a deficit in information available to understand how material transport and reaction processes within watersheds are affected by land alterations. Research of a related nature has been conducted in the United States, but has yet to be conducted in Canada. One stage of the research being conducted by UBC’s HydroGeoScience for Watershed Management research group aims to address this deficit by presenting a new data set of hydro-climatic signatures for 1600 watersheds located across Canada. To generate this information, climate and hydrology data – obtained over the duration of 40 years, were linked together to synthesize data sets that describe six climate signatures: aridity index, base-flow, precipitation, snow-fraction, and flow duration curve slopes. This poster will display the spatial variations of these signatures through a series of maps. The results of this study will be linked to catchments’ physical attributes including soil, land cover, and topography, to allow for better-informed watershed management planning and explore the extent to which catchments are sensitive to climate and land-use changes. This study relies on the most recent data available, with climate stations located across the country, making it well-suited for large-scale climate and hydrology studies. With the data presented in this poster, we will be able to determine areas where forestry and agricultural practices can be conducted with minimal impacts on water quality.
Theme: Sustainability and Conservation

Title: Fire Disturbance effects in the North Cascades National Park

Presenter(s): Natalie Maslowski

Abstract
Global climate change has resulted in increased global temperatures. This increasing warming of annual temperatures can mean earlier spring melt, less precipitation in already dry climate regions, and longer hot summers (Westerling and Bryant 2008). These conditions are ideal for wildfires to spark in times of lightning storms or human interference. Fire frequency can increase if these dry conditions continue to persist and worsen over time, resulting in more wildfires in regions where we expect drier climate conditions (Wang et al. 2015). Increasing temperatures will mean changing elevational climate conditions where increasingly higher elevations will receive more precipitation and soil moisture and maintain cooler temperatures than at lower elevations. Engelmann spruce prefers to grow in high elevations, moist soil conditions (Kueppers et al. 2017). We can expect that fire disturbance which kick starts seedling growth, Engelmann spruce seedlings will grow in abundance at the edge of their elevation range in these favorable conditions found now at higher elevations.
WAVE 2 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Effect of Wavelength on the Photosynthetic Oxygen Production of Freshwater Algae

Presenter(s): Milan Tiwana, Basima Spindari, Jasleen Jassal, Sabrina Cheema

Abstract
Algae, which can be either freshwater or marine, are the base of the aquatic food web, and produce roughly half of the oxygen we breathe. Our experiment was conducted on an algae known as Euglena gracilis which forms the basis of the freshwater food web. We wanted to look at the oxygen production of Euglena gracilis under different light treatments. Before incubating the E. gracilis, initial O2 concentration measurements were taken and a cell count was conducted. These vials were then placed under 4 different light treatments: red, green, or white light (positive control). Each vial was surrounded with black plastic around the sides and then covered with different coloured acetate paper (red, green, and clear) on top. Final O2 concentration measurements were subtracted from initial O2 concentration measurements to test oxygen concentration and final cell counts were then subtracted from initial cell counts to measure cell count. There was a statistically significant effect of light treatment on O2 concentration which means we can conclude that the productivity of E. gracilis does differ between different light treatment groups. The oxygen production in the green light was the highest whereas the oxygen production in the red light treatment was lower than all other treatments. Greenlight is commonly found near the surface of the ocean. Therefore, the amount of oxygen production of E. gracilis allowed us to determine where in the environment, E. gracilis is producing the most oxygen, which was near the surface of the ocean. Overall, it is crucial to understand the metabolic processes that E. gracilis undergoes and the role it plays in its environment because it is a key organism that affects organisms in a bottom-up trophic cascade.
Theme: Sustainability and Conservation

Title: The Effect of Copper Sulfate on the Swimming Speed of Wild Type CC-1690 Chlamydomonas reinhardtii

Presenter(s): Khaola Maher, Christina Melo, Emily Chorpita, Kimty Chowdhury

Abstract
Since the Industrial Revolution, aquatic copper concentrations have increased due to natural and anthropogenic processes. Salmon is also in decline globally, with a growing concern in British Columbia due to its integral role in the aquatic ecosystem as a keystone species. The association between salmon and Chlamydomonas reinhardtii (C. reinhardtii) is significant because C. reinhardtii is a single-celled primary producer that is a food source to salmon. Harmful bioaccumulation of copper in salmon can occur through trophic levels if C. reinhardtii swimming speed is reduced in the presence of copper and they cluster in sizeable groups and are devoured in larger-than-normal quantities.

To test the toxicity of copper sulphate (CuSO4) on the swimming speed of C. reinhardtii, four different concentrations of CuSO4 solution were added to growth media. CuSO4 concentrations of 1 ppm, 3 ppm, and 5 ppm were used, in addition to a control of 0 ppm, consisting solely of cell medium. Cell speed was determined by capturing the organism’s movement using a DinoXcope camera inserted into a compound light microscope eyepiece and analyzing the videos using ImageJ with Fiji plugins software. A one-way ANOVA test returned an F statistic of F(3,32) = 4.5456 and a p-value of 0.0092. Further statistical analysis supported that the swimming speed was significantly reduced from the control to the 1 and 3 ppm groups. The 5-ppm group was not affected, which might be due to antioxidative response mechanisms for protection against heavy metal stress at concentrations lethal to fish directly and via bioaccumulation.
Theme: Sustainability and Conservation

Title: Edible Insects: Utilization and the Effects on Health

Presenter(s): Lei Wu

Abstract
Recent studies on the consumption of insects as food, known as entomophagy, have noted the practice to be sustainable and economical. With the challenges of food insecurity and food sustainability on feeding nine billion people, insects have received attention as an alternative food source. While insects are eaten as daily resources of carbohydrates, proteins, fats, minerals and vitamins by various native ethnic groups in Asia, Africa, South America and Mexico, the consumption of insects is still regarded as disgusting and primitive in Western society. Current research primarily focuses on determining the nutritional composition of various insect species that are commonly eaten. Not much is understood about the long-term effects of incorporating insects into the diet. With the gradual transition towards cultural acceptance on insect consumption in the West, it is significant for researchers to examine the effects of edible insects on human health. This project involves conducting a literature review of the published scientific paper that pertains to the effects of edible insects on human and animal health. Based on the literature reviewed, the findings on the effects of insect consumption will provide a better understanding of entomophagy and address the perceived insect-eating norms that serve as barriers to accepting entomophagy in Western society.
WAVE 2 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Spatial Pattern of Watershed Physical Attributes Across Canada

Presenter(s): Urvee Karve, Mary Kristen

Abstract
The aim of the project is to create spatial maps of watershed physical attributes along 1600 watersheds across Canada. These physical attributes include watersheds’ landcover, watersheds’ shape, area, slope, elevation, and watershed’s soil permeability and thickness. To do this we used available global and national maps of landcover, geology, and topography released by NASA, Natural Resource Canada, and Joint Research Center-European Commission. Spatial analysis was conducted in ArcMap (GIS Software) to derive the outlet points and the corresponding watershed boundaries as well as to obtain the spatial map of the above mentioned physical attributes along each watershed. The results of this project will be linked to hydro-climatolgy data linkage conducted along the same 1600 watersheds to identify the factors that contribute to watershed streamflow sensitivity to climate change and land-use change (e.g., agricultural activity, forestry activity) across Canada. This research will help plan for forest and agricultural management with minimal impact on the environment, which will aid the conservation of watersheds in the long run.
Abstract
Correct protein folding is essential for cell survival. To ensure proper folding, several mechanisms such as the heat shock response are employed by the cell. When activated, the heat shock response releases a number of chaperone proteins to assist with cellular stressors. Hsp70 is an example of an essential family of chaperone proteins contributing to proper protein folding. With the help of a cofactor Hsp40 protein which stimulates its ATPase activity, Hsp70s help refold misfolded proteins. Improper protein folding can lead to the onset of several neurodegenerative diseases, specifically Amyotrophic Lateral Sclerosis (ALS). This disease is fatal, as those diagnosed typically have a lifespan of anywhere between 2-5 years after initial diagnosis. ALS is a complex disease that is driven by several malfunctioning proteins. These malfunctioning proteins aggregate into clusters but fail to be destroyed by the cell, hence why ALS is characterized by the buildup of protein aggregates. Within these aggregates several mutant proteins have been identified including; SOD1, TDP-43, and FUS. In this review, we will focus on the Hsp40 protein family, how these proteins can potentially strengthen the ability of Hsp70 to recognize and refold misfolded proteins, and how their failure might facilitate ALS progression and severity.
WAVE 3
ORAL PRESENTATION
ABSTRACTS
Theme: Health and Wellness

Title: Evaluating Visuomotor Coordination in Children with Amblyopia

Presenter(s): Sabrina Hou, Yu Yan Zhang

Abstract
Amblyopia (lazy eye) is a developmental disorder of the visual cortex characterized by poor vision that cannot be corrected by lenses. Clinically, diagnosis depends on visual acuity differences between the eyes. However, many children with amblyopia also show deficits in a number of other visual facets such as binocular vision, motion perception, and visuomotor coordination. These deficits are not targeted by current treatment and may be responsible for high treatment failure rates. The purpose of this study is to identify the specific kinematic parameters that are the most characteristic of the disrupted visuomotor mechanisms in amblyopia, by using a bead-threading task that has been shown to be sensitive to disrupted binocular vision. Children with amblyopia, aged 6-14 years, and age-matched control children with normal vision were recruited. Each participant completed visual acuity and stereoacuity assessments before completing the bead-threading task under binocular, right eye only, and left eye only viewing conditions. Each trial involved precision-grasping and threading of a bead onto a vertical needle. Hand-movement data were collected using a Leap Motion tracker and then analyzed to extract kinematic parameters of peak velocity, grasp duration, and threading duration. Preliminary analyses suggest that grasp duration is the kinematic parameter that best reveals the visuomotor deficit in children with amblyopia on this bead-threading task. This is consistent with findings from a previous pilot study that examined the same task in adults with amblyopia.
Theme: Health and Wellness

Title: Resisted Exercise Initiative: Use of resisted exercise by physiotherapists for older adults in BC (RExI)

Presenter(s): Amber Chan

Abstract

Background: In British Columbia (BC), physiotherapists (PTs) are responsible for delivering rehabilitation and resistance exercise (REx) to hospitalized patients. REx has been demonstrated to be safe and effective at preventing hospital-related atrophy and its related functional impairments in elderly patients in acute hospital care. However, its current use with these patients is unknown.

Objectives: The purpose of this study was to i) examine the barriers, facilitators, and current practice of REx among BC PTs, and ii) identify knowledge translation (KT) strategies to support PTs to prescribe REx.

Methods: 113 BC PTs (male= 26, age range= 25-65, years of experience=0-40 years, with representation from all BC health authorities) working with elderly patients in acute hospital care completed an online questionnaire based off the Theoretical Domains Framework (TDF), which groups 128 constructs from over 33 behaviour change theories into 14 domains and can be used to inform the most appropriate intervention strategies. A subset of PTs (n=12) participated in semi-structured interviews (recorded and transcribed verbatim) to further explore their REx use.

Planned analysis: Barriers and facilitators will be categorized into the TDF domains. The Theory and Techniques Tool (TTT) can then link the domains to behaviour change techniques that’ve been supported to be effective.

Expected outcomes: These findings will inform us of the current use of REx by BC PTs and the barriers they may face attempting to use REx. KT strategies will be developed to help support the use of REx by PTs for elderly patients in BC hospital acute care.
Theme: Health and Wellness

Title: The statistics of the head movements experienced during natural self motion

Presenter(s): Ali Afshar Zanjani

Abstract
Understanding the encoding of sensory information under natural conditions remains a major goal in neuroscience. Within the inner ear, semicircular canal and otolith afferents encode for angular velocity and linear acceleration, respectively. In daily activities, the power of head angular velocity and linear acceleration is contained mostly between 0 and 20Hz decreases slowly at lower and more rapidly at higher frequencies. Previous studies have reported statistics of head motion for long durations, combining prolonged periods of low-frequency and instants of high-frequency head motions. We aimed to characterize the periods of high frequency head motion associated with foot strikes during walking, running and jumping. We measured head angular velocity linear acceleration with an inertial measurement unit (IMU) mounted on a mouthguard. We hypothesized that high-frequency head motion (>20Hz) would occur during these daily activities around each foot strike. Our results indicate the highest head vertical acceleration typically occurs in the landing phase of jumping (frequency range was 35-45 Hz). Also, the range of head linear acceleration frequency at foot strike during walking was 25 to 30 Hz. Our objective is to describe statistics of natural vestibular stimulus and it can be utilized by future research in the field to interpret coding strategies of brain and outlines vestibular neural processes in natural environment. These results provide important information for future research to understand the encoding of vestibular information during periods of high-frequency head motion and the potential role of this higher frequency information for vestibular responses to stabilize the head and gaze.
Abstract
The pelvic floor muscles (PFM) are important for maintaining urinary continence. For people who experience incontinence, PFM training (PFMT) is effective for reducing the frequency and severity of urine leaks. Typical PFMT programs involve exercises requiring practice of isolated PFM contractions (Kegels). It is unclear if other dynamic activities, such as walking or running, may similarly improve the strength and function of the PFM. The purpose of this study was to characterize and compare PFM activation using surface electromyography (sEMG) while performing selected PFMT maneuvers and locomotion in healthy, continent adults. PFM activity was recorded from 21 subjects. Subjects performed different isometric maneuvers to activate the PFM, including Kegels and trunk flexion. EMG signals were also recorded during five treadmill conditions ranging from slow walk (1 km/h) to running at 10 km/h. The level of activation in the PFM was significantly higher during each of the maneuvers and locomotion trials in comparison to rest. The PFM were phasically active during gait, with peak activation occurring during single leg support, and the magnitude of activation increasing with speed. These results confirm the activation of the PFM during walking and especially running, to a level comparable to that elicited by direct, voluntary activation. Future research should explore the potential benefits of incorporating treadmill exercise as part of a PFMT program.
Abstract
Epigenetics refers to heritable changes in gene expression without changes to the underlying DNA sequence. Aberrant DNA methylation patterns that promote silencing of tumor suppressor genes (TSGs) is a type of epigenetic modification that takes place in cancers such as leukemia. A drug known as decitabine has been shown to be a potent epigenetic anticancer agent which, at low doses, induces reactivation of TSGs in myeloid leukemia cells through DNA demethylation. However, many patients develop resistance to decitabine or are innately unresponsive to the drug. Clinical data show that decitabine treated patients that express low levels of the gene MLL5 have greater resistance to the drug. Although genes that increase resistance to decitabine are known, approaches to overcome this remain to be elucidated. Interestingly, a bioactive compound pterostilbene (PTS), naturally abundantly present in blueberries, can remodel DNA methylation patterns and impact expression of genes in cancer models. In the present study, HL60, an acute myeloid leukemia cell line, was treated with decitabine (200nM) in combination with PTS (1uM). After treatment, cell growth decreased by further 27.4% compared to decitabine alone. Quantitative polymerase chain reaction was used to identify expression of genes and showed a significant increase in expression of MLL5. Following this, epigenetic mechanisms behind MLL5 expression and PTS induced sensitization to decitabine will further be explored. These findings will deliver novel evidence on potential approaches aimed at enhancing responsiveness to decitabine, which may improve survival and prognosis in leukemic patients.
Theme: Health and Wellness

Title: Sweet Dreams: Sleep Concordance and Hemoglobin A1C in Post-Stroke Individuals and their Partners

Presenter(s): Alexandra Yam

Abstract
Most studies have examined sleep and health on an individual level, despite how 61% of the adult population sleeps with a partner. Sharing a bed is a possible link for health risks between partners. Sleep concordance, which occurs when partners’ sleep behaviours and patterns are synchronous, has been found to be associated with decreased risk of cardiovascular disease in healthy couples. This current study investigated a clinical population of stroke survivors and their partners to understand the relationship between sleeping with a partner and diabetes. Stroke survivors and their partners were examined because they are more likely to develop sleep disorders, which is a risk factor for diabetes. Diabetes, in turn, is a significant risk factor for stroke. The study aimed to determine the relationship between sleep concordance and average glucose levels in the bloodstream. A sample of 54 couples, with one post-stroke participant per couple, ranging from 42 to 90 years old (Mean age= 69 years, 85% Caucasian), completed a blood draw and wore commercial activity wrist monitors for 14 days. Sleep concordance was measured using three items: concordance in minutes awake, time in bed, and sleep quality. Results demonstrated significant correlations in all three items for partners. Higher sleep concordance was associated with lower glucose levels in both participants who have experienced stroke and their partner. By suggesting a link between couples’ shared sleeping behaviour and diabetes risk, this study exhibits the importance of creating a more holistic perspective of health that considers both the individual and their partner.
WAVE 3 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: Association of Pre-Operative Diuretic Use with Risk of Acute Kidney Injury in Infants following Cardiac Surgery

Presenter(s): Adrija Chakrabarti

Abstract
Introduction: Diuretics are frequently used to manage symptoms of congestive heart failure for infants with congenital heart disease (CHD), allowing time for growth to optimize surgical outcomes. The contribution of pre-operative diuretics to post-operative acute kidney injury (AKI) in infants following surgery for CHD is currently unknown. Adult population data indicates that pre-operative diuretic use increases the risk of post-operative AKI after cardiac surgery. Our objective is to determine whether pre-operative diuretic use in infants increases the risk of AKI after cardiac surgery.

Methods: A single center retrospective study included 300 patients aged 1-12 months who had undergone cardiac surgery requiring cardiopulmonary bypass (CPB). Patients with pre-existing renal dysfunction, structural abnormalities, single ventricle physiology, and previous exposure to CPB were excluded. Data was obtained from paper and electronic records. AKI was defined according to The Kidney Disease: Improving Global Outcomes guidelines.

Results: 149 (49.7%) patients developed AKI post-operatively (Grade 1: 80 (54%), Grade 2: 57 (38%) Grade 3: 12 (8%)). There is no significant increased risk of AKI with pre-operative diuretic use in patients with hemodynamically significant left to right shunts (n=198, RR 0.94, 95% CI 0.66 - 1.33).

Discussion: There is a high risk of AKI in infants following surgery for CHD requiring CPB, but pre-operative diuretic use does not contribute to the overall risk of post-operative AKI. AKI risk in this population undergoing surgery for any type of CHD requiring CPB is significant. Given the frequency of AKI in this population, AKI severity should be considered during peri-operative care.
WAVE 3 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: Physical Activity Participation among South-Asian immigrant women

Presenter(s): Ritika Saraswat, Anjali Gandhi

Abstract
This study will look at the role of acculturation, self-perception, familial relationships, and cultural norms on physical activity (PA) participation and behaviour among female, international, university students from South Asia (India, Pakistan, Bangladesh, Nepal, Bhutan, Maldives, or Sri Lanka) at UBC. Existing research identifies a downward trend in PA participation among South Asian women for a number of reasons including social role expectations, language barriers, lack of suitable facilities, and lack of motivation. Currently, UBC has the largest number of international students in North America standing at 31% of the total student population. However, UBC only offers 0.36 sq.ft of fitness space per student which is the least recreational space among all Canadian universities. This supports the need for a greater number of accessible, quality fitness facilities.

In this study, 14 self-identified South Asian female students between the ages of 18-24 at UBC will be interviewed semi-formally. It will attempt to fill a research gap because existing work focuses primarily on the PA participation among older, South Asian, immigrant women. The data collected from journal entries, individual interviews and voice memos will be analyzed via thematic analysis. We expect the sample studied to report a higher PA participation than average because of high accessibility to suitable, quality facilities, awareness of the importance of a healthy lifestyle and an overall motivating environment.
WAVE 3 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: Lack of Gender Differences Among Administrative Leaders of Canadian Health Authorities

Presenter(s): Jeffrey Ding

Abstract
Gender distribution within the managing bodies of the Canadian health authorities has not been studied despite their integral role in the healthcare system. The purpose of this study is to quantify gender differences and to craft a geographic-gender analysis of such distribution. Retrospective data collection of all Canadian health authorities at the provincial, territorial, regional, and First Nations levels was conducted. The dependent variable was gender, and other covariates, where applicable, included province/territory, region, leadership position, education (Ph.D. or Master’s), honorary degree, and primary occupation. Any member within the executive managing body or board of directors of a Canadian health authority was included, unless their gender could not be determined, in which case they were excluded. Quantitative analysis of the 67 health authorities revealed 1346 individuals with identifiable gender (710 women; 636 men). Thematic distribution showed no significant difference in gender distribution by provinces/territories (chi-square = 14.248; p-value = 0.28), by leadership position (chi-square = 1.88; p-value = 0.75), by education (chi-square = 1.85; p-value = 0.17), or by primary occupation (chi-square = 1.53; p-value = 0.46). The overall number of females exceeded that of males and there were no gender disparities. A critical analysis of probable causes was discussed. Further studies should be conducted to examine the policies and programs within the Canadian health authorities that successfully tackle the retention, recruitment, and promotion of females.
WAVE 3 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: The Effect of Animal Shelter Operations on Activity Level and Hiding Behaviour of Cats

Presenter(s): Hannah Spitzer

Abstract
Entry into an animal shelter is often a stressful experience for cats, as they are very sensitive to environmental changes. This stress can have a negative impact on their welfare, health, and adoption success. Behaviour, particularly hiding behaviour, is commonly used as an indicator of cats’ stress. It is important to assess cats’ experience during their stay in a shelter in order to understand how aspects of shelter management, design, and daily proceedings impact the cats. This pilot study aims to investigate the daily activity of varied cats in a shelter environment and how cat hiding behaviour relates to noise and daily shelter operations, including cleaning, feeding, public visitation, and volunteer interaction. Behavioural observations of 3 cats were conducted for 8-9 days in May 2019; observations involved 24-hour monitoring of cats using continuous video and time-lapse cameras. Behaviours were coded using a zero-one sampling method with 1-minute intervals. Preliminary results indicate that cats perform hiding behaviour more often during noisy and crowded periods of the day and that individual cats have unique and varied behavioural responses to shelter activities. Understanding how cats experience the shelter will help inform shelter managers about how to run shelters in a way that reduces cats’ stress and improves well-being, ultimately improving cats’ health, mental well-being, and adoption prospects, culminating in a shorter stay in the shelter. This study will be informative for future experimental studies looking directly at how sound and shelter operations impact cat welfare on a larger scale.
**Theme:** Individual, Community and Society

**Title:** Indigenous Methodologies: Toward telediabetes and obesity care for urban Indigenous communities

**Presenter(s):** Aidan O’Callahan

**Abstract**
Background: In British Columbia (B.C.), 78 percent of Indigenous people from First Nation, Métis and Inuit backgrounds are living, studying, and working in urban and off-reserve areas (Government of B.C., 2020). Access to the health and wellness services is limited and often not found on reserve. CIHR and PHAC declared that the combination of higher rates of diabetes, obesity and related complications is one of the four urgent Indigenous health challenges (IPDO, 2018). This project’s goal is to bring together Traditional and Western knowledge to improve access to culturally safe care and improve overall wellness for diabetes and obesity patients in urban Indigenous communities. The research team has established ethical relationships for Indigenous community led interventions over several years and this telehealth project is in response to recommendations from these 6 urban/rural Indigenous communities.

Purpose and Objectives: This project is aimed at providing culturally safe and community responsive diabetes and obesity telehealth for urban or off-reserve Indigenous Peoples. Our telehealth strategy connects a diabetes/obesity specialist with a patient in a different location via video calling software. We are currently working with 6 Indigenous communities throughout the B.C Interior. Elders, community members, Interior Health and clinicians are working together to include Indigenous Knowledge/Practices with current diabetes/obesity guidelines every step of the process.

Specific Research Role: As a MURPH Scholar, my role has been co-developing an obesity/diabetes workshop with Dr. Jones, an associate professor at the Southern Medical Program (endocrinology) and the Director of Student Research, Dr. Aldred (Indigenous family physician) and Dr. Reynolds (Endocrinologist from Victoria, B.C.). This workshop will train Indigenous and non-Indigenous family physicians and nurse practitioners to further their expertise in diabetes and obesity care, especially when using telehealth technology. This training is crucial because it will allow the clinicians to help implement clinics throughout B.C. and will increase access to care for urban Indigenous Peoples. My other responsibility has been crafting our workshop application for the Royal College of Physicians and Surgeons to ensure this training aligns with Continuing Professional Development (CPD) requirements.
Theme: Individual, Community and Society

Title: Sense in Numbers: The Approximate Number System’s Impact on Error Detection and Symbolic Math Performance in Children

Presenter(s): Anna Gao

Abstract
We are all born with an intuitive sense of number, also known as the Approximate Number System (ANS) that we use in everyday life relatively unknowingly, such as when estimating how many items are in our shopping cart. And, in adults, individual differences in their intuitive number sense correlate with formal, symbolic math performance. Recent work has shown that the ANS helps adults with detecting errors in symbolic math: adults with a better ANS are also better able to decide that equations (e.g., 57 + 41 = 105) are incorrectly solved. However, it remains unknown whether this also holds true for children. Here, 5 – 9 year-olds completed two tasks: an ANS task, measuring each child’s number sense, and an error detection task. The ANS task showed children two sets of dots and asked them to indicate which colour has more dots; the error detection task showed children a variety of age-appropriate formal mathematical problems solved by a puppet, and asked them to determine if the puppet is correct or incorrect (e.g., a puppet incorrectly dividing 18 toys into three equal piles). We find a strong correlation between ANS acuity and children’s ability to detect errors even when controlling for age. These results provide convergent evidence showing that the ANS is capable of predicting formal math ability by acting as an individual’s unique “error monitoring” system capable of influencing the variability in formal mathematical performance.
Abstract
Recent work suggests that social status is linked to charitable giving. However, findings are mixed. Previous work suggests that those with the lowest social status gave proportionately more than those with the highest social status (Piff et al., 2010). However, other work suggests that high social status leads to more prosocial behaviour (Korndorfer et al., 2015). Yet other work suggests that the recipient’s social status is more important than the giver’s social status (Doesum et al., 2016). In the current study, we experimentally test how the social status of the giver and the receiver affects giving. Online participants were assigned a scarce or abundant financial budget. Participants were instructed to order food from a menu and were given the option to pass on their extra money to future participants who will have less than, equal to, or more than themselves. We predict that participants will give more to those with less money. Moreover, we predict that high social status individuals will give more than those of low social status. Our results reveal the effects of both the giver’s and receiver’s social status on prosocial giving preferences. The current study uses novel experimental methods to investigate the relationship between social status and prosocial giving behaviour.
Abstract
If your sibling tells you chocolate milk comes from brown cows, do you trust them? Throughout the learning process, children must frequently evaluate their certainty - the sense of how probable an outcome is - to assess new information. Thus, we predict children with more “well-tuned” senses of certainty are better at detecting more accurate informants.

Here, 5 to 7-year-olds completed learning and certainty reasoning tasks. In the learning task, children saw two adults participate in a ‘drawing contest’ where one adult consistently made larger errors than the other. After each trial, children selected which adult they believed was more accurate, and who they would rather ask for help in a future drawing contest. To assess certainty, children made judgments about which of two shapes were bigger, but critically were asked to choose which of two such questions they were more confident in answering.

We found that children selected the ‘correct’ adult (70.83%, p < .001), and easier certainty trial (70%, p < .001) more often than predicted by chance, demonstrating an understanding of both tasks. Children’s learning choices were not related to their certainty reasoning ability (p = .422), even when controlling for age and area perception abilities (p = .847). The current study provides a glimpse into the development of children’s accuracy detection, and has implications for what role certainty plays in the learning process (e.g., determining whether new information sources are trustworthy).
Theme: Individual, Community and Society

Title: Across domain certainty in children

Presenter(s): Tanya Pardiwala

Abstract
The world is filled with uncertainty. Children, just like us, learn about the world by constantly manoeuvring through this uncertainty. Is this pizza slice really bigger than that one? Am I sure that I had a sandwich for lunch yesterday? To answer these questions, we reason about our confidence - the subjective probability of an outcome (Baer et al., 2018). Previous studies with adults suggest there is a domain-general sense of certainty, shared across all sensory and perceptual representations (Rouault, et al. 2018). However, studies with children have found differences in their ability to evaluate certainty across domains (Geurten, et al. 2018). Does this mean that our sense of certainty operates differently as we get older?

Here, we tested 4-7-year-olds to see whether their certainty reasoning correlated between two different tasks: a memory task ("which picture did you see earlier") and an area task ("which blob is bigger"). After making a decision on each trial, children were asked to report their certainty about each answer using a 3-point confidence scale (are you “so sure”, “kind of sure” or “not so sure”).

So far, in 74/132 planned participants, we found that certainty reasoning does not correlate between the two tasks, r(72) =.16, p = .180. These results are consistent with previous correlational studies on children’s metacognitive abilities and support the idea of domain-specificity in children’s sense of certainty between memory and perception. This could imply that our sense of certainty does not necessarily operate differently as we grow older.
WAVE 3 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: Gender Performativity in Rhythmic Gymnastics: Denormalizing Body Regulation

Presenter(s): Anastasiya 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, extending it onto sexuality, to deconstruct the intersectional violence present within the citational practices of weight management and body shaming. I examine how this contributes to the construction of an ideal “femininity” and imposition of heteronormativity in rhythmic gymnastics in Post-Soviet countries. I intend to engage with Butler’s concept through reflecting on my lived experience of doing rhythmic gymnastics in Ukraine and Kazakhstan for eleven years. I also analyze secondary sources showcasing the training of rhythmic gymnasts. This research is significant because it attempts to denaturalize practices that can lead to injuries, body image issues, and eating disorders. These practices also contribute to the violent erasure of non-binary people, justification of violence towards non-conforming gender expression, enforcement of heteronormativity, and creation of obedience.
Abstract
As it stands, women in Canada continue to earn less than their male counterparts. Over the past few decades various forms of legislation have attempted to address this gender pay gap, with varying degrees of success. Currently, Canada and its provinces are in the midst of various legislative transitions in terms of gender pay equity. With a Liberal federal government implementing proactive policies and Conservative governments in major provinces aiming to curtail past pay equity initiatives, the landscape of pay equity policy in Canada is complex. Additionally, past research has found that public support for and perceptions of various forms of social policy have become increasingly bifurcated according to political party ties. In this context, we seek to examine the state of public perception of pay equity policies tracing how public support for pay equity legislation has shifted in recent decades. Using national public opinion data ranging from 1991-2019 we run a series of regression models to examine which characteristics affect individuals perception of pay equity policies. Our analysis has implications for creating pay equity legislation that is both effective and likely to receive popular support and to further understanding of the role of party affiliation in influencing public opinion.
Theme: Individual, Community and Society

Title: Canadian Family Court Decisions Regarding Parental Cannabis Use

Presenter(s): Tyler Arnold

Abstract
The impact of cannabis use on parenting is not well elucidated, however the use of cannabis by one or more parents is often discussed in Canadian family law. A systematic review of the CANLII database was conducted to identify custody cases involving cannabis use by one or more parties since the initial legalization of medical cannabis in Canada on July 30, 2001. Search terms including “cannabis” and related terminology identified 376 cases from 2001 to present. Cases were selected for inclusion if parental cannabis use was found or proposed to have probative value with regard to child custody, visitation or other factors related to parent child relationships. A data extraction tool was constructed to code cases with regard to the nature of cannabis use, rationale for introducing cannabis use in the proceedings, case outcomes and demographic characteristics of all parties. This review identifies issues and patterns pertaining to cannabis use according to parent gender, cannabis only vs. polysubstance use, medical vs recreational use, and differences between provincial courts across the country. Preliminary results suggest that cannabis use is typically brought up as a concern ipso facto, in the absence of specific concerns or problematic outcomes. Implications arise for the rights of medical patients to medicate during parenting time. This is the first study to systematically examine and evaluate when, why and how cannabis use is being raised in Canadian family court proceedings.
WAVE 3 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: The Gravity of Machine Learning: Using Linear Regression to Infer Stellar Surface Gravity

Presenter(s): Maryum Sayeed

Abstract
Over the last decade, we have seen an order of magnitude increase in astronomical observations from ground-based and space-based telescopes. The availability of large datasets has motivated machine learning experts to develop new methods to infer fundamental stellar parameters efficiently and accurately. I will present an application of Local Linear Regression (LLR) to predict stellar surface gravity for 20,000+ stars using brightness variations from the Kepler spacecraft. Stellar variability encodes information about essential properties of stars through pulsations, rotation, and other activity. The stellar surface exhibits a granular appearance, caused by the temperature difference created when hot gas rises and cool gas falls. Using a data-driven approach to measure the granulation signal, we are able to predict surface gravities to within 7%, comparable to or better than results from spectroscopic analysis. Combined with radius, stellar surface gravities can be used to calculate masses for thousands of stars, enabling us to map out the evolution of our galaxy. Furthermore, accurate classification of host stars allows us to better understand the exoplanet population, and helps us narrow down our search for planets in other systems. I will discuss the diversity and accuracy of stellar parameters in our data set, and the applicability of this method for current and future observations from TESS (Transiting Exoplanet Survey Satellite), LSST (Vera C. Rubin Observatory) and other large astrophysical surveys.
WAVE 3 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Applications of Neural Networks in the Study of Partial Differential Equations

Presenter(s): Hrishikesh Patel

Abstract
With advances in scientific academia and industry, classical computer programs have played a leading role in solving computationally heavy and tedious problems. These advances, however, have been tailed off recently due to the limited ability of simple computer programs to address exponentially difficult problems. The issue with these problems is that the number of parameters is unmanageably large. To address this problem, a new class of models called Neural Networks (NN) have been developed. These “Networks” consist layers of neurons which intercommunicate with each other to interpolate data points to extract a pattern in the problem.

In this study we explore the use of these networks to solve Partial Differential equations. It is known that these equations can become increasingly complicated relatively easily. NN are able address this issue by identifying patterns in the behavior of the equation to numerically estimate the solution over many iterations of pattern identification training. We use a NN framework called the PyDEns in order to study various important differential equations that occur in electrostatic, thermodynamic, oscillatory and fluidic systems. We study the Poisson Equations, Heat Equations, Simple Harmonic systems and the inviscid Burgers Equation using the framework. In our study we also identify various strengths and weaknesses of this framework compared to the contemporary numerical methods.
WAVE 3 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: A Clew into Improving Targeted Drug Delivery through pH-dependent DNA Origami

Presenter(s): Kendrew Wong, Xiao Yu Yan, Immanuel Abdi, Janelle Cheung

Abstract
Hodgkin’s lymphoma (HL) is characterized by abnormal multinucleated B cells that form tumours and spread via the lymphatic system. In response to the serious side-effects caused by conventional therapies, we created a biocompatible nanostructure that specifically targets HL cells and is capable of both chemotherapy and photodynamic therapy. We anticipated that our structure would be able to bind to, enter, and kill HL cells with greater efficacy than control cell lines. Our device consists of three major components - a piece of DNA that selectively binds to HL-specific receptors, a duplex that carries the drug payload, and a spherical delivery vehicle for stability. It is designed to release chemotherapeutics after endocytosis in response to the acidity of the environment. Zinc phthalocyanine, a photosensitizer, would generate reactive oxygen species under laser radiation, to which cancer cells are vulnerable. Thus far, we’ve successfully synthesized our structure, optimized therapeutic loading and execution, confirmed the specificity of our structure, and visualized its endocytosis.
Theme: Innovation and Technology

Title: Retrospective Analysis of Dental Implantability of Mandibular Reconstructions Using In-House Surgical Guides

Presenter(s): Khanh Linh Tran

Abstract
Advanced head and neck tumors often require surgery to resect the diseased bone. The resection leaves behind a defect that needs to be reconstructed, which is typically done with the patient’s fibula. Besides a few techniques that allow for concurrent dental implant placement during surgery, patients normally have the option to receive implants in a separate surgery afterwards. Currently, at Vancouver General Hospital, an in-house virtual surgical planning software is being used for mandibular reconstructive surgeries by approximating the outer contour of the mandible and allowing for the creation of 3D-printed surgical guides. This workflow reduces surgical time, reduces wait times for patients and lowers costs for the British Columbia healthcare system. However, there has not been research into whether our software is optimal for dental implant placements. Our research aims to determine dental implantability of patients who have undergone reconstructive surgery using our in-house surgical guides. Segmented computed tomography (CT) scans are obtained for 25 patients who underwent guided fibula free flap mandible reconstruction surgeries at Vancouver General Hospital from 2018 to 2019. After consultation with an oral surgeon, we will measure the height and lateral distance between the reconstructed fibula segments and maxilla, which will then be correlated to the oral surgeon’s rating on the dental implantability of the reconstruction. This study will rate the performance of our planning software with respect to dental implants and consequently help us come up with improvements to optimize our workflow to incorporate implants.
**Theme:** Innovation and Technology

**Title:** Personal exposure assessment of particulate matter: a comparison between wearables and fixed-site sensors

**Presenter(s):** Ho Yin Andy Hung, Cole Plater

**Abstract**

Air pollution exposure causes approximately 7 million deaths annually. Understanding the health impacts of air pollution requires the accurate estimation of ambient concentrations. Historically, the quantification of air pollution have been dependent on stationary, expensive sensors. While capable of providing quality, long-term data, these sensors fail to capture the spatial transience of air pollution. This is disadvantageous in research as the impact of mobility patterns on personal exposure cannot be adequately determined. The use of wearable, low-cost sensors are thought to overcome this limitation by accounting for changing pollution microenvironments and mobility patterns. The purpose of this study was to assess the agreement between estimated pollution levels when derived from wearable sensors compared to fixed-site sensors. Twenty-nine outdoor exercisers were outfitted with a wearable pollution sensor (Flow, PlumeLabs, Paris, France) for five consecutive days. A companion application was installed on participants’ smartphones to collect geospatial data to determine the closest fixed-site station to participants’ locations. Minutely concentrations of particulate matter with a diameter of 2.5 μg (PM2.5) from days 2-4 were obtained from the wearable sensor and 21 provincial fixed-site sensors. On average, participants were 6.08 (±4.22) km from the closest fixed-site sensor. The average daily PM2.5 concentration was 4.25 (±5.77) μg/m³ and 4.67 (±2.77) μg/m³ for the wearable sensor and closest fixed-site sensor, respectively. Although the mean daily exposure values appear comparable, the 5-minute averages resulted in a correlation of $r = 0.087$, suggesting the use of fixed-site sensors in the estimation of air pollution exposure levels are suboptimal.
Title: Seasonal copper speciation in the Strait of Georgia: implications for copper toxicity in the aquatic food web

Presenter(s): Lori-jon Waugh

Abstract
While copper is assimilated by marine biota to facilitate electron transfer in many biological processes, copper can also become toxic at relatively low concentrations. Elevated copper concentrations have previously been shown to influence marine food webs in ways such as inhibited algae growth, bioaccumulation, biomagnification, and stress responses in certain vertebrates. Copper toxicity is an important topic in coastal regions, like the Strait of Georgia, as anthropogenic copper inputs, from municipal effluents and industry, can elevate local copper concentrations enough to cause toxic effects. Copper toxicity depends largely on its speciation, as organically bound copper is less bioavailable than free hydrated copper, meaning that organic ligand complexation can buffer copper toxicity by greatly decreasing free copper concentrations. In order to investigate the ecological impact of copper in the Strait of Georgia, I am measuring the organic complexation of dissolved copper, across seasons and sampling locations, in depth profiled samples collected during 2017 and 2018. Using adsorptive cathodic stripping voltammetry and the competitive ligand, salicylaldoxime, I can titrate each sample with copper to determine the ambient copper-binding organic ligand concentration, L, and binding constant, K. These parameters allow me to estimate the concentration of free copper; therefore, argue whether copper is toxic to Strait of Georgia biota.
WAVE 3 | ORAL PRESENTATIONS

Theme: Sustainability and Conservation

Title: Morphological Differentiation of Cryptic Coralline Algae

Presenter(s): Jade Shivak

Abstract
Coralline algae are calcified red macroalgae that provide larval settlement cues for marine invertebrates and play a role in coral reef building. Previous studies have shown that coralline species have disparate ecological roles, however, many species are cryptic, meaning that they cannot be reliably identified based on morphology. For example, Corallina arbuscula is a cryptic coralline species found in both Canada and Japan, which could easily be misidentified as Corallina vancouveriensis in Canada and Corallina caespitosa in Japan because of their similar morphologies. Herbarium samples of the three species were identified using DNA barcoding and the samples were measured in order to morphologically differentiate C. arbuscula from C. vancouveriensis and C. caespitiosa. Maximum frond length and width were found to be the most informative characteristics to differentiate C. arbuscula and C. caespitosa in Japan. In contrast, C. arbuscula and C. vancouveriensis (in Canada) had no significant differences in vegetative dimensions, but could be distinguished by minimum and maximum intergenicular width. This information will not only direct future studies towards characteristics that can be used to differentiate coralline species by morphology, but also aid researcher’s field classifications of these species to potentially characterize their different ecological roles.
Theme: Sustainability and Conservation

Title: The combined effects of temperature, ocean acidification and food stress on green sea urchins

Presenter(s): Adrianne Holland

Abstract
Climate change is altering many aspects of marine environments including increasing temperature, and decreased pH. In addition to this many species will face food stress. These impacts do no happen independently and may act in combination to amplify or ameliorate the overall effect of climate change on organisms. This presentation will provide data from my study on how the green sea urchin responds to different combinations of these stressors and what implications this has on our local calcifying species and ecosystems.
Theme: Sustainability and Conservation

Title: The Effect of Environmental Quality on Evolution: Towards a Quantitative Understanding

Presenter(s): David Bromley

Abstract
Evolutionary models often assume symmetric interactions where reproductive success depends exclusively on the organism's strategy and not on any external factors. This assumption proves a useful simplification but fails to address biological realities of asymmetry between organisms induced by such factors. In this talk, asymmetry is introduced through a notion of environmental quality which provides spatial variance independent of strategy to reproductive success. The effect of temporal variance in reproductive success is implemented here as the ability for the environment to change over time. Both of these have previously been investigated in populations of infinite size. We adapt a classic model of evolution in finite populations, in which organisms reproduce and replace each other until only one type remains, to include a notion of environmental heterogeneity as well as implement a finite population variant of the conservation game. In the conservation game, an organism's environment (patch) can degrade or be restored over time depending on the strategy of the organism. This leads to environmental feedback between strategy and patch. The relationship between an organism's evolutionary success and the speed of ecological change was found to be very sensitive, with small changes in speed generating vastly different results. This provides a promising starting point for furthering our quantitative understanding of the evolutionary process.
Abstract
Female larvae of Western honeybees (Apis mellifera) develop into two castes: sterile worker bees and a reproductive queen bee. Though phenotypically distinct, female honeybees share the same genome. Many epigenetic mechanisms, including histone post-translational modifications, miRNAs, and small molecules derived from diet, are implicated in the differential larval development. It is hypothesized that the differential feeding of royal jelly (RJ) and beebread (BB), foods consumed by larvae during early development, act as nutritional cues to drive phenotypic plasticity, inducing changes in gene expression, epigenetics, hormonal and metabolic regulation. However, it is not known how all of these mechanisms drive the phenotypic changes synergistically. We combined existing evidence from the literature to design a model of female honeybee caste differentiation. We expect that active components of RJ and BB will influence the EGFR pathway, altering the honeybee phenotypes. Furthermore, we propose a novel interaction between 10HDA, a fatty acid component of RJ, and EGFR upregulation. We suggest that 10HDA is necessary for proper caste differentiation. To test that, larvae would be reared on different diets, consisting of RJ, BB and RJ without 10 HDA. We predict the bees that are fed with RJ will express queen-like phenotype, as opposed to the groups reared on BB and RJ lacking 10HDA, that will differentiate into bees with worker-like characteristics. With the rapid decline of honeybee populations worldwide, our results will provide a useful genetic network, which can be manipulated to potentially re-establish A. mellifera populations, restoring the ecosystem balance and boosting agricultural output.
WAVE 3
POSTER PRESENTATION
ABSTRACTS
Theme: Health and Wellness

Title: Curcumin Prevents the Anti-inflammatory Agent, Triptolide, from Inducing Liver Damage

Presenter(s): Jennifer Wong, Sara Kowalski

Abstract
Triptolide, a compound extracted from the thunder god vine, Tripterygium wilfordii Hook F, is reportedly a potent anti-inflammatory agent with anti-cancer properties. However, the use of triptolide in a clinical setting is very limited due to its liver toxicity. Curcumin is the yellow pigment in turmeric and is thought to prevent damage to the liver. We therefore hypothesized that combining curcumin with triptolide might reduce triptolide-induced toxicity and thus increase the concentrations that can clinically be used. To test this, we used an ex-vivo human whole blood assay and found that triptolide is indeed a potent anti-inflammatory agent, suppressing Escherichia coli (E.coli)-induced pro-inflammatory cytokines production in the nM range. Using the immortalized human HepG2 cell line as a model system of liver cells, we found that triptolide promoted lactate dehydrogenase (LDH) release from these cells, suggesting liver toxicity. However, when we combined curcumin or turmeric with triptolide, we found a significantly lower LDH release, proposing that curcumin in turmeric is protecting against triptolide-induced liver toxicity. Adding curcumin to triptolide also did not compromise the anti-inflammatory activity of triptolide in the whole blood assay. In conclusion, combining curcumin with triptolide may broaden the therapeutic window of triptolide without affecting its anti-inflammatory activity.
WAVE 3 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Identifying the Primary Signal in Mitochondrial Outer Membrane Permeabilization Induced Apoptosis

Presenter(s): Zhuo Yao Liang, Kayla Reynolds, Brandon Connor, Amy Chen

Abstract
Apoptosis, also commonly referred to as programmed cell death, is a vital process that removes defective and non-defective cells. This response is often triggered by mitochondrial outer membrane permeabilization (MOMP), a mechanism which releases proteins from dysfunctional mitochondria to the rest of the cell and causes damage to DNA, proteins, and other organelles. This study seeks to find all proteins released from a dysfunctional mitochondrion, and categorize these chemical messages by strength of effect leading to cellular apoptosis. We will first use mass spectrometry to determine all protein signals released from the mitochondria during apoptosis. The proteins detected will then be fluorescently-tagged chromosomally using a gene-editing system (CRISPR) to confirm the location of the proteins prior to dysfunction. After identifying the relevant proteins, we will use individual genetic knockouts to prevent the production of a target protein and observe which one causes the lowest cell death in vitro. We will categorize the strength of each protein signal leading to apoptosis and determine the most damaging signal produced by MOMP. Our poster will present anticipated results and data from similar studies presented within peer-reviewed literature. Determining the primary signal for cell death will be significant not only for the development of drugs which can prolong or shorten the lifespan of the cell, but will also result in a deeper understanding of a fundamental mechanism in eukaryotic cells.
Theme: Health and Wellness

Title: Sub-Inhibitory Treatment of Gentamicin in Escherichia coli Decreases T7 Bacteriophage Infectivity and Cell Lysis

Presenter(s): Mahta Amanian

Abstract
Increasing rates of multidrug resistant Escherichia coli infections have become a growing concern worldwide. With our current repertoire of antibiotics becoming less effective against bacterial infections, novel antimicrobial therapies are needed. Bacteriophages have been proposed as an alternative therapy against antibiotic resistant bacteria. Previous literature has proposed that E. coli release outer membrane vesicles that can prevent bacteriophage infection. The presence of gentamicin has been shown to increase the production of outer membrane vesicles (OMVs). To determine if treating E. coli UB1005 with gentamicin decreases infectivity of T7 bacteriophage, we treated E. coli UB1005 with a sub-inhibitory concentration of gentamicin and measured T7 infectivity and the rate of cell lysis. We hypothesized that treating E. coli UB1005 with a sub-inhibitory concentration of gentamicin would result in reduced bacteriophage infectivity and cell lysis. We observed decreased T7 infectivity using both a plaque forming assay and a bacterial growth curve to observe cell lysis, a methodology developed in this study. Additionally, bacterial growth curve results indicate a greater decrease in T7 cell infectivity when E. coli is in exponential phase compared to stationary phase.
**WAVE 3 | POSTER PRESENTATIONS**

**Theme:** Health and Wellness

**Title:** Autocrine Angiopoietin-1/Tie2 signaling in cardiac fibro/adipogenic progenitors helps to control heart function at homeostasis

**Presenter(s):** Lucas Rempel

**Abstract**

Recently, mesenchymal stem cells (MSCs) have emerged as a promising solution for regenerative therapies. Notably, increasing revascularization strategies take advantage of the ability of MSCs to induce angiogenesis, which is the formation of new blood vessels. However, the results of individual trials utilizing MSCs are rarely in agreement because of a poor understanding of their characteristics in terms of cellular identity and activity. With high-throughput RNA sequencing and flow cytometry, in both heart and skeletal muscle tissues, we have identified two populations of perivascular mesenchymal progenitors: fibro/adipogenic progenitors (FAPs) and pericytes. Interestingly, we found that FAPs express pro-angiogenic factors Angiopoietin-1 (Angpt1) and its ligand-receptor, Tie2, which were previously described to be constitutively expressed by pericytes and endothelial cells respectively. As Angpt1 and Tie2 have been previously associated with regulating angiogenesis and vascular quiescence, we addressed the functional role of Angpt1/Tie2 signaling in FAPs by depleting Angpt1 and Tie2 in cardiac FAPs (cFAPs) with inducible knock-out mouse models. We discovered that there was adult heart dysfunction two months after Angpt1 depletion in cFAPs, which was not associated with any impaired vascular phenotype. In addition, we discovered that Angpt1/Tie2 signaling acts in an autocrine manner in cFAPs to regulate their activation and that Angpt1 depletion drastically reduces the production of extracellular matrix-related genes by cFAPs. Our results have revised the identity and activity of perivascular mesenchymal progenitor cells and reveal a novel role of Angpt1/Tie2 signaling in regulating fibro/adipogenic progenitors.
**Theme:** Health and Wellness

**Title:** USING CRISPR GENOME EDITING TO UNDERSTAND THE ROLE OF K-RAS GENE G12 MUTATIONS ON PANCREATIC ADENOCARCINOMAS

**Presenter(s):** Xindi Wang, Janella Schwab, Chi Lan Nguyen Dinh

**Abstract**

Pancreatic ductal adenocarcinoma (PDAC) is the most common type of exocrine pancreatic cancer, constituting more than 90% of pancreatic cancers of which there is 2-9% survival rate over five years. Various studies show that the KRAS proto-oncogene, whose protein regulates cell proliferation, is the most commonly mutated gene in PDACs, predominantly single base substitutions in its codons 12 and 13. Determining which mutations affect the rate of cell proliferation can be essential for their use as a prognostic marker and therefore patient selection for treatment. Conversely, genome editing system CRISPR/Cas9 has been previously used for site-specific mutation corrections such as therapeutically correcting Duchenne muscular dystrophy in mice. We aim to use CRISPR technology to correct G12 KRAS mutations, replace it with a G13 mutation and observe its effect on the cell's proliferation and growth potential. CRISPR will be used to correct a base substitution mutation on KRAS G12 in human cell line Capan-2, then induce a different oncogenic mutation on G13, generating G12-wildtype, G12-mutant and G13-mutant cell lines. The cell proliferation rate of each cell line will then be evaluated over a 72-hour period by measuring with a conventional hemocytometer at 4-hour intervals. We expect that the cell proliferation rate will be lower in G13-mutant compared to G12-mutant cells, suggesting that G12 mutations in the KRAS gene result in stronger oncogenic potentials. In the long term, we expect our results to support the use of G12 mutations as a prognostic marker for pancreatic cancer.
Theme: Health and Wellness

Title: Immune response regulation in neonatal monocytes by mTOR inhibitor DDIT4L

Presenter(s): Emma Ackermann

Abstract
Preterm birth is a major cause of infant mortality. Past research shows that monocytes of preterm babies have lower pro-inflammatory immune responses than those of full-term babies and adults. Expression of the gene DDIT4L, thought to inhibit the mTOR pathway, is significantly higher in preterm than in full-term and adult monocytes. We hypothesise that DDIT4L downregulates the mTOR pathway, inhibiting pro-inflammatory responses of preterm monocytes.

To study the molecular mechanism of DDIT4L, we created THP-1 cell lines with different levels of DDIT4L expression under the control of an inducible promoter. Using these cells, we found that overexpressing DDIT4L leads to reduced cell proliferation, with a reduced proportion of cells in S phase of the cell cycle and corresponding increase in G1/G0, by flow cytometry. However, DDIT4L overexpression did not impair IL-1β nor IL-8 production in THP-1 cells, which may not be as dependent on mTOR for cytokine responses as primary cells. To circumvent this, we recreated our cell lines in U937 cells after confirming that cytokine responses in these cells are mTOR-dependent, as shown by an ELISA of IL-8, IL-1β, and TNF-α using either an mTOR inhibitor (rapamycin) or activator (MHY1485).

In future experiments, we will determine the effect of DDIT4L on translation, mitochondrial metabolism, and cytokine responses both in U937 and primary human neonatal monocytes. These results will illuminate mechanisms underlying the profoundly blunted innate immune responses by fetal myeloid cells. In the long-term, this research may lead to clinical treatments that could improve the health of preterm babies.
Theme: Health and Wellness

Title: Determining the Characteristics of Dexamethasone and Lenalidomide Resistance through Transcript Analysis of Multiple Myeloma

Presenter(s): Jenny Lee

Abstract
Multiple Myeloma (MM) is characterized by the increase in abnormal plasma cells in the bone marrow (BM). This results in the crowding of the BM, causing blood production to become inefficient. Due to the high occurrences of resistance to treatments, MM remains incurable. To cure the patients diagnosed with MM, treatments are commonly administered in combination. One of the most common combination therapies for MM is lenalidomide and dexamethasone, which induces cell apoptosis and subversion of the tumor microenvironment. However, non-responsive patients and incidences of relapse are still common, with little knowledge of resistance characteristics. Therefore, we wished to study the resistance profile of multiple myeloma at the transcript level, following combination therapy of lenalidomide and dexamethasone. Primary MM patient samples were collected and cultivated utilizing SCID-hu mouse models, followed by injections of lenalidomide and dexamethasone. MM cells from both the treatment responsive and unresponsive mice were isolated using Ficoll Hypaque sedimentation, immunomagnetic beads, real time PCR, and RNA-Seq of specific genes were conducted. Results show that resistant MM populations demonstrate increased expression levels of anti-apoptotic transcripts, such as BCL-2 and higher mutational signatures in pro-apoptotic transcripts. This is a characteristic of microenvironment independent extramedullary MM and plasma cell leukemia. Susceptible MM populations had significantly higher expression levels of microenvironment-interacting transcripts, including RANKL, VCAM1, and VEGF. Therefore, we show that dexamethasone and lenalidomide treatment is effective on MM with strong ties to their microenvironment, likely due to their high dependence on pro-survival or growth signals from the neighbouring stromal cells and osteoclasts.
WAVE 3 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Binding Affinity Analysis of Treg Receptor Variants to Improve Transplantation Efficacy

Presenter(s): Kevin Salim

Abstract
After transplantation, the recipient’s survival can potentially be another hurdle to overcome due to the possibility of the donor’s immune cells attacking the recipient's cells; therefore, resulting in GVHD (graft vs host disease). This unwanted immune response is caused by a mismatch between recipient’s and donor’s human leukocyte antigen (HLA), a protein present on majority of human cells. A special immune cell in our body, called Treg cells, can suppress unwanted immune responses upon binding of a certain protein to their receptor. By genetically modifying the recipient Treg cells’ receptor to bind the donor immune cells, these special Tregs can suppress the unwanted immune response post-transplantation. This treatment is a type of chimeric antigen receptor (CAR) T-cell therapy. CAR T-cell therapies in general showed promising results due to its success in treating diseases such as B-cell lymphoma; however, it does not come without challenges. Researchers have hypothesized that the binding affinity between the CAR T-cell receptor and the target-protein may not only contribute to side effects such as inflammation, but also affect the efficacy of the treatment. We will create variants of the Treg receptor and assess their binding affinity to a commonly mismatched HLA in transplantation, called HLA-A2. The promising variants can then be used for in vivo experiments to further test the efficacy of the treatment in a mouse model.
Title: Determining the effects of extracted cinnamon polyphenols on glucose uptake in insulin-resistant cells

Presenter(s): Laveniya Kugathasan, Andrea Olaizola, Novia Chao, Rana Ahmed Barghout, Jessica Yamamoto, Bianca Kirsh, Meriem Satra, Olivia Kim

Abstract

Insulin resistance is a major leading cause of diabetes and obesity, with an alarming increase in prevalence. In healthy individuals, high blood glucose levels trigger insulin secretion to signal glucose uptake by cells. Insulin-resistant individuals, however, exhibit decreased glucose uptake, resulting in hyperglycemia, hyperinsulinemia, culminating in type 2 diabetes.

Researchers have identified alternative pathways to reduce blood glucose levels by promoting insulin sensitivity and increasing glucose uptake; polyphenols have shown to enhance these pathways. The polyphenol content of cinnamon is approximately 92%, demonstrating strong potential as a polyphenol-rich supplement to promote insulin sensitivity and glucose uptake. Although most literature support the use of cinnamon polyphenols, some findings fail to do so. Conflicting results can likely be attributed to inconsistent methods utilized, especially with regards to the precise polyphenol composition used. Therefore, this project aims to quantify individual polyphenols in Cinnamomum cassia and investigate its effect on glucose uptake and insulin sensitivity in a mammalian in vitro model.

This project uses ethanol-based Soxhlet extraction to isolate polyphenols from C. cassia. The polyphenol content will be quantified using UV-Vis spectrophotometry and HPLC for total and individual phenolic content respectively. Wildtype and insulin-resistant 3T3-L1 adipocytes will then be treated with serial dilutions of the concentrated polyphenol extracts to determine dose-dependent effects on glucose uptake. Glucose assay kits will be used for colorimetric quantification of glucose uptake into cells. Future plans include further characterization of the biological effects of individual polyphenols found in C. cassia as well as testing various combinations of the polyphenols.
Abstract
Hoarding disorder is characterized by persistent difficulty with discarding items, regardless of their actual values, due to emotional distress and perceived need to save. Specific cognitive dysfunctions have been attributed to hoarding behavior; in particular, clinical observations suggest the link between impaired planning and the ability to manage and reduce clutter in the home. It is thus surprising that a number of studies have failed to detect differences in performance on well-established neuropsychological tests of planning between people who hoard and others. In response, many have pointed to the structured nature of these tests and advocated for the development of alternatives that better reflect cognitive processes in daily living.

To address this discrepancy, the current study compared performance in the structured D-KEFS Tower Test and a less structured test, the Modified Six Elements Test (MSET) across 149 participants, including healthy control and clinical participants (hoarding and other diagnoses). The Tower Test and MSET were administered to participants during in-lab sessions. In addition, we were interested in whether self-reported hoarding severity could predict performance on the two tests. We predicted that the more open-ended MSET, but not the Tower Test, will demonstrate differences in planning ability between healthy control and hoarding participants, and expected that participants with more severe hoarding impairment would have poorer performance on the MSET.

Further research on neuropsychological measures used in hoarding studies is necessary to determining the cognitive processes that contribute to and maintain this newly classified disorder. Ultimately, an understanding of implicated cognitive factors will serve to enhance diagnosis accuracy and treatment effectiveness.
Title: Exploring the effects of urease activity on Proteus mirabilis adhesion and invasion in kidney epithelial cells

Presenter(s): Ashley Tong, Hana Kim, MJ Herrin, Patricia Balmes

Abstract
Proteus mirabilis is a gram-negative, rod-shaped bacteria from the Enterobacteriaceae family. Known for its high motility and urease activity, it causes urinary tract infections (UTIs), particularly in individuals with long-term urinary catheters. P. mirabilis is urease positive, breaking down urea in urine into ammonia and carbon dioxide. This urease activity mediates virulence by producing urinary stones: it increases local pH and leads to precipitation of calcium and magnesium ions. These stones can then become the focal point for other bacteria to establish UTIs. Furthermore, the precipitated minerals can mix with bacteria adherent to the urinary catheter, forming a crystalline biofilm that can block urine flow in the catheter, leading to further complications.

As urease activity is a critical component of P. mirabilis’s virulence, this study aims to examine the effects of P. mirabilis urease activity on kidney cell adhesion and invasion patterns in order to improve the treatment of P. mirabilis caused UTIs. To observe the effects of P. mirabilis urease activity on kidney cell adhesion patterns, A498 kidney epithelial cells were cultured and exposed to P. mirabilis wildtype (urease positive) and mutant (urease negative) strains. To test adhesion, infected cells at 2 and 24-hour time points were washed with sterile PBS and lysed to obtain CFU count after overnight growth. Similarly, to test invasion patterns, infected cells at 2 and 24-hour time points were washed with sterile PBS, then re-incubated for 3 more hours with 1% Penicillin-Streptomycin before lysing and plating on agar for overnight growth.
Abstract
Skin is the largest organ which covers the surface of the body and protects other organs by forming a barrier between the body and environment. Furthermore, various physiological functions are driven by the skin, highlighting the importance of skin aging research and the underlying mechanisms (Robert, Labat-Robert, & Robert, 2009). According to Tobin (2017), skin aging is impacted by intrinsic and extrinsic processes. Intrinsic (chronological) aging maintains factors such as hormonal and genetic, while extrinsic aging looks into the environmental aspects such as UV radiation (photo-aging), smoking, poor diet, teratogens and other chemicals, etc. (Tobin, 2017).

The aim of this research is to find the general mechanisms of skin aging and compare them in men and women in order to establish preventative measures that can significantly delay skin aging. Using these measures, many artificial, invasive, and expensive anti-aging skin procedures will decrease in necessity. We will use an explanatory mixed methods approach to assess factors affecting skin aging rate. A cross-sectional study using literature will be conducted to compare skin aging in men and women.

The findings in this study will be able to identify the severity of various intrinsic and extrinsic factors on skin aging and could help establish effective preventive measures against skin damage, as well as new methods to deal with age-associated diseases, specifically cancer (Makrantonaki & Zouboulis, 2007). The information from this study can also be used by the general public to improve skin care strategies and maintain health.
Theme: Health and Wellness

Title: Peer mentoring for children with ASD

Presenter(s): Jingya Huang

Abstract
The purpose of this poster is to examine the effectiveness of peer mentoring on improving the social initiation behaviors of children with ASD aged 5-9. My research will be using a between-groups design. A total of (N=20) children with ASD will participate. Group A (experimental group; n=10) will receive peer-mentoring from a volunteer (aged 10-15). Peer mentoring will involve learning to overcome social challenges in a desired manner (e.g., how to handle experiences of being bullied at school). Group B (control group; n=10) will perform a neutral task (e.g., reading or playing a board game). Social initiation behaviours will be measured before and after the experiment (pre-post). Weekly parent and teacher ratings will be used to measure social initiation behaviours with a self report 5-point rating questionnaire. A paired sample t-test will be used to compare the social initiation behaviours of each group before and after the experiment. I anticipate that social initiation behaviours will increase over time in Group A, and remain consistent in Group B. This research is significant as it may surface an ideal alternative to traditional Applied Behaviour Analysis, which has received criticism in the academic literature.
Theme: Health and Wellness

Title: Biological Deformity Based Red Blood Cell Separation with Deterministic Lateral Displacement Devices

Presenter(s): Chengzhe Li

Abstract
In biological and medical fields, cell separation is an essential process used for many preparatory and analytical procedures. Deterministic Lateral Displacement (DLD) is a relatively recent and promising technique for highly accurate and effective microparticle mixture separation using a pillar array arrangement. Currently, much research conducted has on size-based separation of Red Blood Cells (RBC), Circulating Tumor Cells (CTC), and other biomolecules. One area that has not been explored as thoroughly is the separation of cells and macromolecules using rigidity and deformity rather than size. This project examines how DLD devices can be applied to rigidity and deformability-based RBC separation. Preliminary findings are unavailable as tests and analysis are still being conducted at the moment. This project hypothesizes that non-traditional triangle, L or I shaped tilted pillar arrays are better suited for separation based on deformity compared to the conventional cylindrical ones designed for size separation primarily. To investigate and design a novel deformity based DLD apparatus, 2D and 3D numerical simulations of cell flow will be used to analyze and synthesize the optimal pillar shape and arrangement. First, the shape of the pillar is to be determined, then gap size, pillar diameter and other variables will be manipulated to identify the optimal combination for separation by rigidity. Successfully, designing an effective DLD device for deformity based cell separation could have many applications in the medical field. The physiological and physical properties of cells can be used as predictive bioindicators for early diagnosis of many illnesses in many fields.
Theme: Health and Wellness

Title: Studying the evolution of the N-terminal of TATA-binding protein in eukaryotic species

Presenter(s): Li Ju

Abstract
Transcription is the flow of genetic information from DNA to RNA, a fundamental process in all three branches of living organisms, Archaea, Bacteria, and Eukarya. Throughout evolution, eukaryotes have acquired three specialized and non-redundant RNA Polymerases (Pol I, II, III), each responsible for synthesis of a distinct subset of RNA. Despite this diversification, studies have found that the multi-protein complexes for each RNA polymerases in Eukarya have similar structures, suggesting a conserved mechanism for forming transcription initiation complex. An essential part of the RNA polymerase complexes is the TATA-binding protein (TBP), a highly conserved transcription factor that is present throughout Archaea and Eukarya, which binds specifically to a DNA sequence to initiate transcription. In eukaryotes, TBP is also known to have species specific functions. How TBP evolved in eukaryotes remains unclear. TBP contains two distinct domains: a highly conserved DNA binding domain which recognizes promotor sequences, and a divergent N-terminal domain which has species-specific functions. Recent analyses of TBP evolution has only focused on DNA-binding domain. The goal of this project was to perform a finer evolutionary analysis of Eukaryotic species by studying the evolution of the N-terminal and compare it with the DNA-binding domain. A series of McDonald-Krietman test was carried out to measure the amount of adaptive evolution by comparing the amount of variation within a species (polymorphism) to the divergence between species (substitutions) at synonymous and nonsynonymous sites.
Abstract
Purpose in life can be defined as having a set of goals and perceiving life as meaningful. Past research has linked a higher sense of purpose to more time spent on physical activity. Purposefulness might be stable between individuals, but also fluctuating within individuals and that there has been no or little research on fluctuating levels of purposefulness. The goal of the study was to evaluate the relationship between trait and state measures of purpose in life and physical activity. In this pilot study, the physical activity of 19 university students was measured via an accelerometer for one week. Trait purpose was measured at baseline with the Life Engagement Test. State purpose was assessed using ecological momentary assessment (EMA), in which participants were asked to describe how purposeful they felt in each EMA survey (4x/day). The intraclass correlation of the EMA purpose item was 0.61 (95% CI = [.45,.79]), indicating that the majority of the variance in momentary purpose was attributable to between-person differences. The average of daily number of steps was 8953.13 with SD = 3519.48. Yet, a considerable amount of variance in purpose at the within-person level remains to be explained by day-to-day factors. There was no significant association between number of steps and trait purpose (r = .30, p = .22) nor the person-mean of EMA purpose (r = .20, p = .42). These preliminary data indicate that there is great variability in within-person sense of purpose that should be examined in future research.
WAVE 3 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Mental Health Outcomes in New Fathers and the Impact of Mindfulness-Based Intervention

Presenter(s): Manreet Bhullar

Abstract

1 in 5 mothers are diagnosed with postpartum depression and anxiety (PPDA) and much research is focused around finding ways to alleviate the associated symptoms. However, often overlooked in research is the distress faced by fathers during the same time period. Becoming a new parent can lead to stress and anxiety in the father, which can affect a multitude of factors such as couple dynamics. The purpose of this study was to see whether mindfulness practice could alleviate some of the distress faced by fathers during the child’s first year. Participants were recruited from a tertiary mental health clinic. Eligible fathers included those in a relationship with a mother diagnosed with PPDA and had a child within the past year. The fathers completed an 8-week adapted Mindfulness-Based Stress Reduction (MBSR) program, filling out measures before and after the program. Measures used were CSQ-8 (Client Satisfaction Questionnaire), FFMQ-15 (Five Facet Mindfulness Questionnaire), GAD-7 (Generalized Anxiety Disorder), and PHQ-9 (Patient Health Questionnaire). Scores of the GAD-7 and PHQ-9 were compared pre- and post-program in all fathers (N=10). A significant decrease in GAD-7 scores was observed through the program. As well, PHQ-9 scores were shown to decrease, particularly in topics related to feeling down, sleeping issues, and concentration problems. The preliminary findings suggest that mindfulness can potentially be used in fathers whose partners are diagnosed with PPDA, to alleviate the distress felt in this new situation.
Abstract

Rationale: The traditional approach to community aquatics programs for children with mental and/or developmental challenges often involves segregation from typically-developing peers. However, studies show that inclusive education improves children’s quality of life, self-concept, and long term health outcomes. Investigating factors that influence inclusion can thus have important implications in the design and facilitation of aquatics (and other community) programs such that all children - across a spectrum of needs and abilities - may benefit.

Objectives: This study explores barriers and facilitators to inclusive aquatics programming for children aged 0 to 12 with developmental/mental challenges. While the focus is on aquatics programming, in light of emerging literature around the potential health benefits of aquatics therapy, this study will also investigate broader themes that apply to community programs overall.

Methods: This study uses a participatory-action research methodology, as the main researcher and student are both representatives from organizations that provide aquatic services. Semi-structured focus groups and interviews will be used to explore perspectives of sighted students, instructors, and staff. Data will be transcribed and coded thematically.

Practice Implications or Results: By having a deeper understanding of the barriers and facilitators to inclusive aquatics programming in the community, researchers can work with the broader community to facilitate inclusion in children’s community programs. This knowledge transfer may take the form of an infographic or video, or another easily accessible medium.

Conclusions: Expanding inclusive practices may improve the health and wellbeing of the pediatric special needs population, which consistently reports lower levels of participation. These findings may help to identify gaps in existing practices and ways to approach them.
WAVE 3 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Best Practices, Strategies, and Interventions to Improve Road Safety in Indigenous Communities: A Scoping Review

Presenter(s): Rebecka Lee

Abstract
Motor vehicle crashes (MVC) are among the leading causes of injury and death in Indigenous communities globally. This scoping review examined all intervention research published between 1999 – 2019 directed towards reducing and preventing MVC-related harms in Indigenous communities, in an effort to inform future traffic safety program development. A systematic search of all peer-reviewed English-language intervention studies using the electronic public health database MEDLINE (Ovid) was performed. Due to time constraints, a review of the grey literature was not conducted. A total of 10 intervention studies met the review inclusion criteria, including 6 American, 2 Australian, 2 from New Zealand, however none from Canada. Successful intervention targets included, but were not limited to, an increase in child safety seat use, seatbelt use, and a decrease in MVCs and drink-driving rates. From the safe system approaches, this review found that all 10 studies focused on safe road user interventions, yielding a research gap among safe roads, vehicles, and speeds. Culturally appropriate aspects such as local languages were found to be incorporated in most studies; however, appropriate evaluation of such aspects remains limited. In Canada, there is a dearth of intervention research targeting road safety in Indigenous communities. The shortage of efficacy assessments of intervention studies also limited the ability to distinguish their impact in reducing traffic-related harms. Potential strategies for more successful interventions should include addressing issues specific to individual communities in order to address local and cultural-based priorities, implementing follow-up protocols, and developing collaborative relationships between community stakeholders and researchers.
WAVE 3 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Anticipated Reactions to Perspective-Taking

Presenter(s): Dong Wook Kim

Abstract
People like those who seek out opposing political viewpoints even though they frequently avoid opposing views themselves. We suggest pluralistic ignorance is at play, such that most individuals privately dislike perspective-avoiding, but they perceive that other people like perspective-avoiding. In turn, this misperception of others’ beliefs leads people to conform to social pressures and avoid other perspectives, despite their private attitudes. To test this, three studies investigated whether participants personally dislike perspective-avoiding, yet inaccurately expect that others like it. In Study 1, participants anticipated they would receive more positive reactions for seeking, compared to avoiding, opposing perspectives. In Study 2, participants anticipated more dating success for an individual who sought, versus avoided, opposing perspectives. In Study 3, participants anticipated that others are equally likely to be friends with someone who sought (vs. avoided) opposing perspectives whereas they showed a strong preference to not want to be friends with someone who avoided opposing viewpoints. This suggests pluralistic ignorance whereby people refuse to consider opposing perspectives because they overestimate how much others like perspective-avoiding. Future studies will investigate the why people incorrectly infer that others like perspective-avoiding. Based on the findings, interventions can be implemented to decrease perspective-avoiding and improve political relations.
Abstract
Speech-act theory suggests that there may be social implications to how groups are represented in media. Some researchers argue that describing a social actor passively could indicate discursive discrimination (Boréus, 2006; Leeuwen, 1996). This study examines discursive discrimination within clinical psychology over time by comparing how actively or passively experimenters and patients or participants are described in 20 clinical research articles published in 1986 and 2016. As predicted, experimenters were described more actively than patients or participants (72%, 38%, respectively); however contrary to predictions, patients and participants were described less actively in 2016 (26%) compared to in 1986 (51%). Although these findings could suggest that patients and participants face discursive discrimination in clinical research articles, they should be interpreted cautiously. This effect may have been confounded by the genre convention of excluding references to experimenters. Additionally, the validity of these finding depends upon the validity of the role allocation model used, which was not examined.
WAVE 3 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Exploring children’s estimation abilities across number, length and area

Presenter(s): Emily Borrell

Abstract
We reason about quantity in our everyday lives in several distinct ways. We can intuitively judge which checkout line is shortest or precisely count the items in our grocery-cart. Understanding how children are able to convert their intuitive, perceptual number representations into discrete number words has been heavily explored. But much less is understood about how they accomplish this in other domains of quantity. Here, we explore children’s interface between number words and their perceptual representations of number, length, and area. In Experiment 1, 90 5- to-12-years-olds were asked to judge how many items they saw when given novel units (i.e., a single dot for number, a line segment for length, a blob for area). We found children were the best at estimating number, but were – nevertheless – able to give higher estimates for higher values in length and area, as well. In ongoing work with Experiment 2, we find that children’s better abilities with number estimation were not driven by familiarity with single units: even when one unit of number is represented by three dots, children can reliably and instantaneously map number words to this unit. Thus, although children’s interface with number might develop sooner, we show that they are able to flexibly map number words to other unfamiliar domains and units well before they are formally taught to. This suggests that the interface between language and perception is not built in piecemeal. We discuss implications for how we learn – and teach children – to reason about quantity using language.
Abstract
In 1965, with a donation from H.R Macmillan, the UBC Library purchased the rare medical book collection of Hugh Macdonald Sinclair. The collection included a copy of an anatomy book, “Anatomie universelle du Corps humain” [Universal anatomy of the human body] published by the French barber surgeon Ambroise Paré, in 1561 with a note stating that “This copy is bound in human vellum.” Though the practice of binding books in human skin (anthropodermic bibliopegy) is rare, it is not unheard of. To address questions surrounding the possible human origins of the book’s binding, Zooarchaeology by Mass Spectrometry (ZooMS) was employed to analyze Type I collagen peptides isolated from samples retrieved from the book. Collagen was extracted from the leather using a non-destructive, triboelectric method, and analysed via mass spectrometry (MALDI-TOF). The obtained collagen peptide mass fingerprint from the book binding was compared to known peptide markers of humans, as well as those of mammals whose skins were commonly used as book bindings, namely sheep, pig, cow, and goat. Peptide marker evaluation revealed that the book was in fact bound in sheep skin, not human. This revised identification allowed Library staff to correct the book’s collection record as to accurately reflect the history of the book. Further investigation into other books housed in UBC collections could provide additional insight as to the history and manufacture of rare books housed on campus.
WAVE 3 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Factors Associated with Cessation or Reduction of Methamphetamine Use among Gay, Bisexual and other Men who have Sex with Men (gbMSM) in Vancouver, Canada

Presenter(s): Brooke Cheng

Abstract
Prevalence of methamphetamine (MA) use in gay, bisexual and other men who have sex with men (gbMSM) has been estimated to be more than ten times greater than that of the general population. MA is associated with significant negative health outcomes, such as immunosuppression and higher levels of anxiety and depression. Furthermore, MA enhances sexual confidence and likelihood of sexual risk-taking behaviours, contributing to the disproportionate rate of HIV transmission in gbMSM. Present intervention trials are limited by their short duration and focus on individuals already motivated to reduce their MA use. To guide treatment programs for gbMSM, we sought to identify the factors related to reduction of MA use in frequent users (reported use at least weekly) among a community sample of gbMSM. We hypothesized that lower symptomatology of anxiety and depression would be associated with reduction. Between 2012-2018, we studied a cohort of 584 sexually-active gbMSM who completed a survey every 6 months. Of the 67 frequent MA-users, reduced use was less likely for those who spent at least 50% of social time with other gbMSM, gave or received drugs in exchange for sex, injected drugs, or used gamma-hydroxybutyrate. Symptoms of anxiety or depression were not associated with reductions in MA use. These findings support a shift towards an integrated model of social, sexual and substance use services for gbMSM to help limit the epidemics of MA and HIV in the future. Incorporating social networks and polysubstance-related education with MA reduction should be explored to develop efficacious interventions for this population.
Theme: Individual, Community and Society

Title: Seeing Soundscapes: A Study of Audio-Visual Interaction and Restorative Soundscapes on the Main River, Frankfurt

Presenter(s): Christa Yeung

Abstract
Today, city dwellers are bombarded with an incessant stream of noise from traffic which negatively affects our physical and mental health. Research in environmental psychology illuminates how certain soundscapes, meaning the “sonic identity” and characteristics of a landscape, can not only reduce stress, but also boost positive emotions and the mental wellbeing of citizens in urban environments. This exploratory study draws relationships between sound, mental health, and urban design along the Main Riverbank, a popular recreation area in Frankfurt, Germany. I examine how soundscape perception is affected by the visibility of particular elements in urban public space and how these audio-visual interactions may impact the restorative potential of a place. To characterize soundscapes along the riverbank, I combine sound pressure level measurements with survey data that measures pedestrians’ perception of sound and mood in the area. This data is then analyzed alongside the visual elements present in the space to identify trends in audio-visual interactions. Results from the study suggest that the presence of visible vegetation, birds, and fellow pedestrians can facilitate feelings of attention restoration even in areas of medium traffic. Through a sound-conscious approach to design, architects and planners can thus reduce noise pollution and facilitate spaces that improve the mental wellbeing of pedestrians.
Theme: Individual, Community and Society

Title: Sustenance Festival: Amplifying Underrepresented Voices

Presenter(s): Rebecca Suen, Kelly Bateson

Abstract
Introduction: Every year the Vancouver Park Board hosts the Sustenance festival which seeks to address a lack of food justice, community engagement and underrepresentation of marginalized groups in the Vancouver food movement.

Purpose: The objective of this project was to have food stories shared between all ethnicities and to amplify marginalized voices in the Vancouver Food Movement.

Methods: 6 Community events were attended to connect with community food leaders and identify food barriers. Five blog posts detailing personal experiences of the Sustenance festival events were created to increase public awareness and community belonging. In addition, we also generated six interview transcriptions from leaders within the Vancouver food movement. Each transcription included a summary article with highlighted quotes and key concepts to amplify their messages and increase participation in the sustenance festival.

Results: With an increased volume of content highlighting community events and amplifying underrepresented voices, more people will learn about the festival and it's purpose, and attend in future years.

Implications: This will likely cultivate a more diverse and inclusive environment for new perspectives to be heard. These discussions are a catalyst for creating a more representative and inclusive Vancouver food system.
Abstract
Background: The World Health Organization reports 810 women die everyday due to pregnancy complications. Amongst these complications, pre-eclampsia (PE) is the second leading cause of maternal mortality worldwide resulting with 70 000 deaths annually. PE is a pregnancy complication characterized by hypertension and signs of maternal organ failure such as proteinuria. The pathophysiological effects of PE are characterized similarly to the effects of placental malaria (PM), which is classified as Plasmodium falciparum-infected red blood cells in the placenta.

Objective: To elicit if there is an association between PE and PM in sub-Saharan Africa.

Methodology: A literature review was conducted on PubMed, Medline, and UBC Library. We constructed a table to summarize results.

Results: We found 8 studies, including 2 systematic reviews, 4 case-control trials, 1 cohort study, and 1 cross sectional survey in sub-Saharan Africa. The cohort study and cross sectional survey, alongside 2 case-control trials showed an association between PE and PM. However, 2 case-control trials and 2 systematic reviews did not find a significant association.

Conclusion: Based on these studies, we conclude the relationship between PM and PE to be inconclusive. There are other factors to consider such as holoendemic vs. hyperendemic regions, primigravida vs multigravida, the effects of vaccines, the social determinants of health, and existing infections which amplify the inflammatory response leading to pre-eclampsia. More research is needed to investigate these factors to establish an association between placental malaria and the onset of pre-eclampsia.
Theme: Individual, Community and Society

Title: What are the social perceptions of ethics of synthetic meat and willingness to pay for it?

Presenter(s): Shirui Wang, Turni Saha

Abstract
Lab-grown meat, or synthetic meat has been introduced in the last five years as an alternative to traditional meat. While synthetic meat has its merits, people have conflicting ethical perceptions toward this industry, which could also affect the consumer’s willingness to pay for such meat. We plan to create slider scales survey to collect data regarding consumer perspectives surrounding synthetic meat, how ethical consumers deem this industry to become mainstream, as well as how much people would pay for synthetic meat. A diverse sample is expected to be surveyed, which would likely provide a relatively varied perception of the synthetic meat industry. In addition to the conclusions from the survey questions, we would be able to conclude how people’s background affects their attitude towards synthetic meat.
Title: “My Parents Can Never Find Out”: Exploring the Double Lives of South Asian Young Adults

Presenter(s): Sherry Sandhu, Baneet Parmar

Abstract
A double life can be characterized as concealing behaviors, thoughts, and feelings that align with a host culture, but violate and contrast the expectations of their parents and culture of origin. Although previous research has documented how second-generation South Asian young adults approach marriage and dating, there is limited knowledge about the reasons why young adults engage in a double life and the strategies used to manage this within the parent-child relationship. The purpose of this study is to explore what a double life is, the reasons for engagement within it, and the strategies used to conceal it. Data was collected from the comment sections of Reddit threads where users previously started conversations about their experiences managing their double life from their parents. Through qualitative thematic analysis, major themes compatible with living a double life in respondents were identified. The participants engaged through commenting about the various behaviours and emotions endured in preserving aspects of their lives that were not accepted by their parents. These behaviors were an intentional choice that provided freedom and independence while also avoiding parental conflict, disappointment, and hurt feelings. The findings support that young adult South Asians were engaged in concealment strategies that were strategically used to keep their double lives separate from their relationship with their parents. These findings provide insight into how these young adults are trying to manage the feelings and limitations placed by parents while also maintaining agency. Future exploration could lead to a greater understanding within this parent-child demographic.
Theme: Innovation and Technology

Title: Simulation of Neural Crest Cell Migration in Embryonic Development of the Nervous System

Presenter(s): Sandhya Selvakumar, Kevin Wong, Congzhen Shi

Abstract
Cell migration plays a key role in embryo development. Neural crest cells (NCCs), migrate from their origin (neural plate border), travel throughout the embryo, eventually differentiating into vital tissues, including the sympathetic nervous system (network that innervates internal organs) that we model. NCCs migrate both as single cells and as adherent clusters throughout their journey. It is thought that chemical concentration gradients of various chemoattractant guide migratory cells to key sites, through a process called chemotaxis. Our simulations explore this hypothesis.

We model a variety of migratory simulations in Morpheus, a modeling and simulation environment for multi-scale and multicellular systems. We explore how cell properties and interactions affect successful group chemotaxis towards a target (fixed source of attractant).

We investigate how levels of intracellular adhesion, of cell-secreted chemoattractant and the number of cells affect cell group cohesion, mean squared displacement, and time to arrive at the target. Our long-term goal is to understand the role of NCC migration in the development of the sympathetic nervous system (SNS). Data for cell migration are available from the Paul Kulesa lab in the Stower's Institute. We plan to compare our predictions to that data set.
WAVE 3 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: On-Chip Electronic Nose for the Detection of Viable Bacteria

Presenter(s): Kaden Workun

Abstract
The on-chip electronic nose for detection of viable bacteria is a project that aims to develop a device that can be used in food safety, hospitals, field operations, and even bio-terrorism. The chip is designed to use a series of gas sensors, integrated into a 3D-printed microfluidic device, in order to detect volatile organic chemicals (VOC’s). VOC’s are generated naturally by bacteria, and each bacteria generates a unique combination. Through the use of gas chromatography, a method of separating the different compounds within the VOC’s, the sensors on the chip are able to respond to the individual compounds. The variation in response from the sensor to different chemicals produces a pattern. This pattern can be used to determine the present VOC’s, which in turn can be used to identify the bacteria being analyzed.

The key portions of this description will be included on the poster with several images of models of the device to provide a visual understanding of the device.
Theme: Innovation and Technology

Title: Analyzing How Students Process Questions on Exams

Presenter(s): Alyssa Gutierrez

Abstract
The ability to test well in a post-secondary setting involves gathering relevant information from a question and synthesizing that information with the knowledge acquired by the student to respond to the question, under timed conditions. Such an acquired skill particularly affects novices, first- and second-year students, as the lack thereof can create disparity between understanding of tested material and performance on exams. A possible factor that may influence exam performance is how students interact with the questions, as question comprehension and selecting relevant information provided are essential to accurate responses. Given this, understanding how students interact with questions may enable instructors and students alike to gauge discrepancies between what the question demands and student response.

Existing literature provides some meaningful insight, via self-reported thought processes, as to how one may interact with a question in laboratory settings and under non-exam conditions. However, we are interested in how students interact with questions under exam conditions. We hope to elucidate this by analyzing annotations—student-made markings relevant to the question that are not part of their answer.

The study will characterize patterns, if any, between annotations made on the exam and the mark a student received for each question. Past biology exams will be analyzed on a per-question basis, using the R programming language to perform summary statistics. Future implications from this study may impact how instructors design tests and exams and may also gain further insight as to students’ level of understanding.
Theme: Innovation and Technology

Title: An image analysis algorithm for tooth detection in dentition imprints

Presenter(s): Alexander Fraser

Abstract
Tissue development is an important biological process whose mechanisms are complex and not yet fully elucidated. Regulation of the dentition patterning is not yet understood and current theories lack strong theoretical grounding. A model organism, the gecko, is being used to obtain experimental evidence to improve theories of dentition development. Dentition imprints are collected as a time series of tooth development in individual geckos. Here, we present an algorithm used to automate the analysis of jaw imprints. The algorithm uses a convolutional neural network to identify individual teeth in the imprints. The network is trained on a dataset of manually labelled images with bounding boxes around individual teeth. Once the trained network identifies teeth in an image, the centroids are used to generate a best-fit line of the jaw. The centroids and jawline are then used to compute a 1-dimensional array of the dentition pattern at each time-step. Once all time-step arrays are computed, they are collated into a time series for each individual, which will be used to provide empirical foundation for theoretical models.
WAVE 3 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Investigating the Role of Silver Nanoparticles (AgNPs) and Hydrophobic Coating as a Surface Additive to Reduce Bacterial Contamination on Novel 3D-Printed Medical Devices

Presenter(s): Atishay Jay

Abstract
More than 200,000 patients experience secondary hospital or medical-care related infections in Canada each year. Over 8000 of these patients will die due to acquiring an unintended secondary infection. Many of these infections have been attributed to Clostridium difficile and Staphylococcus aureus, whose infection rates have more than tripled since 1997. With the increased use of 3D-printed and injection-molded plastics in healthcare instruments and equipment, it is essential to understand the behavior of potentially dangerous fungi and bacteria on these surfaces. Investigating new additive substances that may prevent bacterial contamination while maintaining functionality of such devices may help prevent unnecessary deaths due to secondary hospital-acquired infections.

The project will examine surface contamination levels of 3D-printed components after exposure to pathogenic and non-pathogenic bacterium using standard bacteriological assays. 3D-printed Poly-Lactic Acid (PLA) surfaces will be modified by the addition of AgNPs encased in a thin layer of lacquer and/or a hydrophobic thin film. The effect of these additive substances on bacterial growth (planktonic or biofilm) will be investigated using immunostaining. AgNPs have demonstrated potent anti-microbial and anti-inflammatory properties essential to preventing biofilm formation on medical and industrial devices while maintaining biocompatibility. This study will investigate the feasibility of AgNP and/or hydrophobic spray usage on novel 3D-printed devices to prevent the spread of pathogenic bacterium in laboratory, sub-clinical, or industrial settings.
Theme: Innovation and Technology

Title: The potential role of Lactobacilli in treatment of colorectal cancer

Presenter(s): Tran Hoang Anh Le, Tiffany Wai

Abstract
Colorectal cancer (CRC) is characterised as highly mutated colon and rectum cells that have become more aggressive that results in modification of bowel habits, gastrointestinal irritation and a reduced life expectancy. With 12% of newly diagnosed cancer cases in 2019 being CRC, research into novel therapeutic methods could save money, resources and lives of patients. A potential method of treatment could be derived from the human gut microbiome, defined by Nobel Laureate and microbiologist Lederberg as the totality of microorganisms and their genetic material presence in the gastrointestinal tract, that plays a major role in regulating the immune system. Lenoir et al. (2016) and other studies have shown a positive correlation between the presence of lactobacilli, a gut-resident group of bacteria, and reduction of cancer cells growth. Therefore, this research aims to investigate how the metabolites and interactions of lactobacilli in the gut may prevent, inhibit and provide precursors for the prevention, diagnosis and therapeutic treatment for CRC. The study will be done by assessing current literature regarding lactobacilli’s role in the gut to uncover the possible intrinsic and extrinsic apoptosis cellular pathways as well as interaction with the immune system to hinder tumour growth. The findings may provide insights to understand the protective ability of lactobacilli against CRC, drawing attention to the nuanced approach of microbiome-focused diagnosis and to optimise future treatment. In addition, understanding lactobacilli’s mechanism in CRC could contribute to the development of adjuvant therapy to achieve maximum efficacy in treatment.
**WAVE 3 | POSTER PRESENTATIONS**

**Theme:** Innovation and Technology

**Title:** Development of an Ultra-Sensitive Method to Measure Estrogens in the Blood and Brain

**Presenter(s):** Maria Shock

**Abstract**

Estrogens are steroid hormones that affect many aspects of brain function, including cognition, social behavior, and neuroprotection. It is well-known that estrogens are synthesized in the ovary, but estrogens are also synthesized in the brain. Estrogens play crucial roles in the brain, even at extremely low levels. Current methods lack the necessary sensitivity and/or specificity to measure brain synthesized estrogens. Furthermore, current methods focus on only 17β-estradiol and disregard other estrogens that are synthesized in the brain and are neuroactive. Here, we developed a method to measure several estrogens simultaneously, with high specificity and high sensitivity. To improve sensitivity, we chemically modified estrogens by adding a readily charged molecule, 1,2-dimethylimidazole-5-sulfonyl-chloride. We used liquid chromatography tandem mass spectrometry, to examine a panel of six estrogens: 17β-estradiol, 17α-estradiol, estriol, estrone, 2-methoxyestradiol, and 4-methoxyestradiol. Our data suggests that the method is extremely sensitive. Moreover, we were able to simultaneously quantify multiple estrogens in small biological samples (1-2 mg of brain). This exciting technique will have wide-ranging applications for basic research and clinical testing, including estrogen measurement in animal models and humans with low estrogen levels, such as men, pre-pubertal children, and post-menopausal women. Our highly sensitive assay is essential for animal models, where estrogen measurement was formerly hindered by the limited amount of sample available. In the song sparrow, an animal model for aggressive behavior with high estrogen production in the brain, future work will utilize this refined method to examine the effects of aggressive encounters and seasonality of estrogens in the brain.
Theme: Innovation and Technology

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

Presenter(s): Han Hsiao

Abstract
Certain processes tend to be specialized to one side of the human brain or the other. The right hemisphere plays a dominant role in interpreting visual information and facial recognition. On the other hand, left hemisphere lateralization is observed in language functions such as grammar and literal meaning. However, many of these studies are limited to measurements of cerebral lateralization for a single task, and only examine specific regions of interest in the brain, as opposed to the entire brain. This project aims to investigate task-based brain networks and patterns in whole-brain activation in the functional MRI (fMRI) Midnight Scanning Club dataset.

10 healthy subjects completed three Incidental Memory tasks: Memory faces, Memory scenes, and Memory words. In Memory faces, subjects indicated whether the face presented was male or female. For Memory scenes, subjects indicated whether an indoor or outdoor picture was presented. For Memory 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 of hemodynamic responses will be determined with repeated measures ANOVAs. Lastly, the correlation between network activity and neuropsychological tests will be assessed.

This study will improve our understanding of the lateralization of functional brain networks. This will contribute to the future use of neuromodulation to increase or decrease activation of brain networks as a possible intervention to treat brain disorders affecting a certain hemisphere of the brain.
WAVE 3 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Investigating the role of robotics education on young children’s emerging math abilities

Presenter(s): Grace Tu

Abstract
With the rapid advancement of modern-day technology, robotics and artificial intelligence have become increasingly prevalent in education. The introduction of robotics and programming courses is thought to potentially aid teaching and enrich learning, especially in STEM (Science, Technology, Engineering, and Mathematics) fields. In BC, the Ministry of education has already recommended the implementation of Robotics in the school curriculum. The current scientific literature suggests evidence for improvements in computational thinking skills in university students from experience with robotics, however, since many of the robotics education programs are still in its infancy, the research on the topic is relatively scarce. Even more underexplored is the impact of robotics training on the many facets of children’s development. In order to address this deficit, our study compares 6 to 8-year-old children involved in Robotics programs with a control group of the same age range to understand the effect of robotics and programming initiatives on children’s intuitive number abilities during their crucial stages of development. In a 2-part study conducted 5-months apart, both groups of children are tested on their numerical intuition, visual-spatial memory, logical reasoning, and their self-confidence in learning robotics. The results of the study can further our understanding of the effectiveness of Robotics programs on cultivating children’s problem-solving skills and confidence in learning, as well as guide policymakers on the future of education in STEM.
Theme: Innovation and Technology

Title: Investigating the effects of Interferon β on Protein Expression by Mass Spectrometry

Presenter(s): Charley Cai

Abstract
As viral diseases such as influenza lead to more than 650,000 deaths annually, the study of host response against viral infection remains a critical aspect of human health research. In vertebrates such as humans, viral infection activates the interferon adaptive immune response. Interferons (IFNs) are a family of cytokines released by fibroblasts, monocytes as well as cytotoxic and helper T cells that play a crucial role in disrupting the viral replication process. Specifically, Type I IFNs such as IFNα, IFNβ, IFNκ, and IFNω bind to cell surface receptors and help trigger cascading antiviral responses in neighbouring cells. Here we studied the effects of IFNβ on protein expression in cultured A549 cells (a human lung epithelial cell line). While several hundred interferon-stimulated genes are known, many of them still have undefined functions and mechanisms. Cells were light-, medium-, and heavy-labelled by stable isotope labelling by amino acids in cell culture (SILAC) to compare the proteomes of cells after a three and six-hour IFNβ stimulation, plus a negative control. Through analysis by liquid chromatography coupled to a high-resolution time-of-flight mass spectrometer, we were able to identify over 2000 proteins, including some related to the IFN response. This study paves the way for further analysis and opens the possibility of novel treatments for viral infections using IFN as a therapeutic technique.
Theme: Innovation and Technology

Title: Determination of the Sensitivity of a Hepatitis C NS5B Region Sequencing Assay

Presenter(s): Fang Fang Li

Abstract
As of 2017, an estimated 170 million people worldwide are infected with Hepatitis C virus (HCV). While some patients are able to clear the initial infection, 50-85% of patients progress to the chronic state, leading to liver disease and subsequent failure. Genotype-dependent direct acting antivirals (DAA) are currently the first line of treatment for HCV patients, with 90-99% of cases reaching a sustained virologic response (SVR). However, resistance-associated substitutions (RAS) have contributed to treatment failure in recent years.

The BC Centre for Excellence in HIV/AIDS has developed an HCV whole-genome sequencing assay (HCV-WGS) in order to aid clinicians in regime prescription to minimize treatment failures at the molecular level by identifying the genotype and relevant RAS. However, the current limit of detection (LOD) for the HCV-WGS exceeds the cut-off to diagnose 95% of all chronic HCV infections (3.52 log10 IU/mL) by 1.98 log10 IU/mL. Thus, the present study aims to investigate the LOD when selectively sequencing the NS5B region of the genome. While lower in resolution, it is expected to have a higher sensitivity due to its shorter sequence and therefore be able to capture more of the infected population.

A half-log serial dilution will be performed on synthetic RNA of genotypes 1a and 2a. Following cDNA synthesis and nested polymerase chain reaction amplification, the LOD will be determined based on the lowest concentration producing a positive result on an agarose gel. Positive runs will be fluorometrically quantified to determine the effect of the genotype on the LOD.
Theme: Innovation and Technology

Title: Effects of Gaze Direction on the Three-Dimensional Vestibulo-Ocular Reflex Evoked by Electrical Vestibular Stimulation

Presenter(s): Liam Foulger

Abstract
The vestibulo-ocular reflex (VOR) is a reflex that allows humans to stabilize their gaze on an object while their head is rotated. When the axis of eye rotation, which is determined by gaze direction, is parallel to the axis of head rotation, the VOR stabilizes the image by rotating the eye at 40-100% of the head rotation velocity. However, eccentric gaze direction causes the eye rotation axis to diverge from the axis of head rotation, so other components of eye rotation must occur to compensate for this difference. Since many studies use the VOR to predict the brain’s central estimate of head rotation, it is important to consider how gaze direction may affect ocular responses to head motion. Understanding the central estimate of head rotation is crucial to understanding how we perceive signals of self-motion. For the present study, electrical vestibular stimulation (EVS) will be applied to subjects to evoke ocular responses similar to that of a head rotation around an anterior/posterior axis while they maintain superior, inferior, and lateral gaze positions relative to this axis. Three-dimensional eye position tracking will be performed with video recording and analyzed offline using pupil and iris tracking software. We hypothesize that as the gaze shifts the axis of eye rotation away from the axis of rotation stimulus, the VOR responses around the anterior/posterior vector will decrease, while other eye rotation components will increase. These results are critical to predict and correct for the effect of gaze direction on three-dimensional VOR responses for future studies and to allow for stronger predictions of the central estimate of head rotation. The results may also be applied to studies involving EVS in virtual reality environments where subjects’ gaze may be more erratic, causing increased deviations of the axis of eye rotation from the head rotation axis.
Theme: Innovation and Technology

Title: Spatiotemporal histopathological patterns of the porcine spinal cord after SCI

Presenter(s): Ryan Chan

Abstract
Pigs are similar to humans in anatomy, physiology and immunological responses, serving as a useful large animal preclinical model for spinal cord injury (SCI). However, using this model to assess potential cellular or pharmacological treatments requires characterizing cellular and molecular changes to the spinal cord after SCI. We investigated the spatial and temporal histopathological responses of the cord tissue in a porcine contusion model of SCI. Spinal cords 7 days and 12 weeks post-injury, and uninjured control cords, were cryosectioned. Sections from the epicentre of impact and distal sites (5mm and 15mm from the epicentre) were immunostained for myelin, neurons, axons, astrocytes, and chondroitin sulphate proteoglycans (CSPGs). WFA and Eriochrome Cyanine R staining were also used to visualize perineuronal nets and to estimate the spread of white and grey matter sparing, respectively. White and grey matter were disintegrated at and around the center of impact. Visualized at 7 days and 12 weeks post-injury, neurons in the grey matter were lost and the structural integrity of myelin and axons seen in controls decreased with proximity to the epicenter. The CSPG-rich glial scar could be observed at 12 weeks around the lesion. High immunoreactivity for astrocytes and CSPGs, and disruption of the steady state cytoarchitecture of the cord, was observed at upwards of 15mm rostrally of the epicenter – a site typically assumed to remain undamaged. Our findings describe patterns of degeneration in the porcine SCI model, and give translatable insights for assessing potential therapies for recovery following SCI in humans.
Abstract
Matrix isolation is an experimental technique used to stabilize molecules in cryogenic crystals in order to obtain spectral information of various molecules. Crystals of noble gases such as Ar and Ne have been widely used as a matrix. Recently, crystals of parahydrogen were found to be useful for the study of short-lived reactive intermediates produced by in situ photolysis. Parahydrogen is a form of molecular hydrogen, H₂, in which the nuclei of the two hydrogens within the molecule have opposite spin. In this study, we have investigated UV photolysis of dichloromethane (DCM, CH₂Cl₂) embedded in parahydrogen matrices using Fourier Transform Infrared (FTIR) Spectroscopy. DCM is often used as a spray propellant due to its low toxicity compared with other simple chlorohydrocarbons, and its short atmospheric lifetime (therefore considered to be not an ozone depleter). However, its UV photodissociation processes have not been studied, and its role in ozone destruction once it reaches the stratosphere is not well understood. We have investigated the UV photodissociation of DCM by 213 nm irradiation (5th harmonic of a Nd:YAG laser) and by broadband UV irradiation (< 400 nm from a D2 lamp) by parahydrogen matrix FTIR spectroscopy. Upon irradiation, four photoproducts were identified: methane, hydrochloric acid, the methyl radical, and chloromethane, CH₃Cl. The chloromethyl radical was not observed directly after 213 nm irradiation, yet it was observed directly after 190 – 210 nm irradiation. We will discuss the details of the UV photodissociation process of DCM.

WAVE 3 | POSTER PRESENTATIONS

**Theme:** Innovation and Technology

**Title:** Effects of a novel drug - chondroitin sulfate proteoglycan reduction peptide in the porcine model of spinal cord injury

**Presenter(s):** Xinyue Zhao

**Abstract**

Spinal cord injury (SCI) is an irreversible condition that is devastating for families and costly for society. In the ongoing search for a cure, multiple attempts to translate treatment techniques developed in rodent models of SCI to the clinic have been unsuccessful. Large animal models with anatomy, physiology, and immunological responses that are more similar to humans may have advantages for translational research of SCI. For better prospects in clinically-translatable research, we developed a porcine model of SCI. Accumulation of chondroitin sulfate proteoglycans (CSPGs) around the lesion after SCI is one of the reasons of inhibitory environment for axon regeneration. In addition, CSPGs enclose neuronal cell bodies in structures called perineuronal nets which prevent the formation of new synapses and restrict plasticity. Recently, a novel peptide called the CSPG Reduction Peptide (CRP) was developed to digest CSPGs. CRP has shown efficacy reducing CSPGs and improving motor function in rodent SCI models. In the present study, we attempt to translate the success of CRP treatment in rodents to our large animal, porcine model of CSI. We seek to evaluate its biodistribution and effectiveness in decreasing the CSPG levels in the spinal cord after SCI with long-term intrathecal delivery. For this, we evaluate the levels of peptide in the spinal cord and the levels of CSPGs after its delivery in comparison with untreated animals. This study will help to optimize the CRP administration and go to further preclinical evaluation of the efficacy of this treatment.
WAVE 3 | POSTER PRESENTATIONS

**Theme:** Sustainability and Conservation

**Title:** Relating Earthworm Biomass to Length and Land Use on the UBC Farm

**Presenter(s):** Savitri Raghuraman, Marium Ahmed, Christie Crews, Samadhee Kaluarachchi, Tristan Kozyniak, Lindsay Billings

**Abstract**
Earthworm communities are linked to increased plant growth on farms, where their presence is promoted by organic fertilizers. Contrastingly, the expansion of earthworms into Canadian forests may alter the native distribution of fine roots, vegetation, and soil microbe communities. However, differences in earthworm populations between organic farms and surrounding forests are not well studied in Canada. Our research aims to understand differences in earthworm biomass across different land uses at the University of British Columbia (UBC) Farm, an organic farm with adjacent forest, and to determine the relationship between earthworm length and biomass. We will measure the length and biomass of earthworms collected from production fields, forests, hedgerows, field margins, and plantation forests. This data will be used to formulate an allometric equation estimating the relationship between earthworm length and biomass based on the equation by Hale, Reich, and Frelich (2004). We will then measure the length of previously collected earthworms from the same sites to calculate their biomass using our equation and the equation from the aforementioned study. This poster will present anticipated findings regarding differences in earthworm biomass across land use types at the UBC farm. The equation produced by the study will be used to estimate earthworm biomass from length in a long-term biodiversity monitoring program at the UBC farm, and the biomass data can be used for comparison in following years to measure changes in earthworm populations. The results may also inform studies of earthworm populations elsewhere in British Columbia to improve understanding of soil fertility and biodiversity.
WAVE 3 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Small Scale, Low Cost Wind Turbine Sustainability Analysis

Presenter(s): Catherine Brochard-Lalande, Cole Quist, Edward Le

Abstract
Decentralised renewable energy generation devices have the potential to increase the environmental, social and economic sustainability of communities in developing regions worldwide. The impact analysis sub-team of UBC Sustaingineering is working to develop and assess the sustainability of a low-cost and small-scale wind turbine product for home use in the community of El Astillero in Nicaragua. Sustaingineering is a design team focused on creating sustainable energy solutions for communities in developing areas of Central America. Successfully implementing these turbines will bring reliable electricity to residents, introducing safe light sources and providing refrigeration to fishermen who need it to become more economically stable. In order to conduct a formal sustainability assessment report for the wind turbine project, the team created an evaluation framework informed by stakeholder consultations. The framework includes metrics for assessing the impact of numerous aspects of the product, from material accessibility to ease of repair. The mechanical sub-team of Sustaingineering, responsible for the development of the prototypes, uses this framework to guide their design process to ensure stakeholder needs are prioritized across all stages. Using this robust and iterative methodology increases the likelihood that the final turbine product will benefit users’ quality of life, increase their financial means, and contribute to environmental stewardship.
Theme: Sustainability and Conservation

Title: Temporal trends in hydroclimatology of Canadian catchments

Presenter(s): Megan Blackwell, Mohammed Obaid

Abstract

Global water resources and circulation is naturally highly variable. The additional uncertainly of influences on precipitation and temperature from climate change places new challenges on water management. Canada is particularly vulnerable to changes in water quantity & quality and the occurrence of extreme weather events under climate change trends. Such changes have been modelled under different future climate scenarios, yet there is no large-sample analysis of comparative hydrology in relationship to climate in Canada. This study explores the interrelationship among catchment hydrologic signatures and climate indices, and explores the temporal variability of these relations across Canada. Long-term daily time series of different climatic and hydrologic attributes from 1600 catchments in Canada was used to calculate: 1) indices that characterize high precipitation events, dry periods and seasonal precipitation cycles, 2) signatures that characterize low and high flow events, hydrologic base flow and sensitivity of streamflow to precipitation. To spatially compare the magnitude and direction of catchment hydroclimatology temporal changes throughout Canada, we use the Mann-Kendall trend analysis test for each function. We expect to find strong correlation between climate and hydrologic functions. For example, in areas of high aridity, our preliminary analysis showed the majority of precipitation to be evaporated, resulting in low catchment discharge. The results of this study will be used in connection to the ongoing research of variability of catchment vegetation, soil, landcover and topography using GIS, to explore why the extent to which catchments are sensitive to climate and landcover changes vary spatially across Canada.
Theme: Sustainability and Conservation

Title: The Plight of the Piping Plover: An Analysis of the Effectiveness of Environmental Assessments in Species Protection

Presenter(s): Louisa Hsu, Can Wen

Abstract
The piping plover, a migratory shorebird listed under the Canadian Species at Risk Act, has seen ongoing decline from industry and human disturbance despite extensive legal efforts to protect the species. How is the piping plover considered in the Canadian Environmental Assessment Act process, and are projects impacting the species being approved? Our study examines 12 environmental assessments (EA) which affect piping plovers, of which 10 projects stated no impact and two projects stated little to severe impacts. All 12 projects were approved. Results from our study show that projects rely on proponent studies and delimiting the spatial boundaries of impacts to prove that piping plovers will not be affected. For projects that do state impacts to piping plovers, mitigation measures are used to minimize impacts and allow the project to continue. From our findings, we conclude that the EA process fails to protect piping plovers from the detrimental impacts of development. We highlight the conflicting role of the state as a protector of the environment, which provides legislation and regulation over development, but is also deeply intertwined with industry by facilitating project approval through weakened protection of endangered species. By transforming environmental impacts into manageable terms through spatially and temporally truncated baselines, selective science, and adaptive management, we conclude that EAs function to promote economic growth while the possibility of species recovery is deferred.
Theme: Sustainability and Conservation

Title: Extraction of Biofuels from Cultured Chlorella Vulgaris

Presenter(s): Tasnia Anika, Arjun Venkat, Harbir Bajwa

Abstract

Algae is a marketable biological component as it is easy to grow and harvest, incurs low cost, and is sustainable. This project focuses on the use of algae to make biofuel that can be used in other industries. The species of microalgae used is Chlorella vulgaris (C. vulgaris) - optimal for wastewater treatment as well as the production of biofuels. Through growth in Bold’s Basal Media (BBM) over several days under other controlled conditions, microalgae can be used as a treatment to reduce levels of phosphates and nitrates in water bodies. Other algae strains (A. falcatus and S. obliquus) are used to flocculate the C. vulgaris. The method of ionic liquid extraction is used in obtaining biodiesel and bioethanol. The ionic liquids are synthesized in the laboratory using store-bought reagents. This method of extraction is able to efficiently separate the grown algae into lipid-rich and sugar-rich components, providing the opportunity for simultaneous biodiesel and bioethanol production. It is also a low-cost method with notable yields. This technique aligns with the principles of green chemistry since it uses environmentally friendly reagents. Potential byproducts such as glycerol produced during transesterification processes in the production of biodiesel also contribute to increased productivity. These biofuels are valuable in many industries like wastewater treatment systems, cosmetics, pharmaceuticals and nutraceutical production.
WAVE 3 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Going Zero-Waste for Local Businesses

Presenter(s): Emma Gilchrist, Tasfia Ahsan

Abstract
Farmers’ markets and local businesses provide an opportunity for connecting communities with local producers and food systems in a sustainable manner; this is undercut by the waste produced by such markets and businesses. Our team worked with the Artisan Farmers Markets (AFM) to identify the challenges that prevent vendors and small businesses from using compostable and recyclable packaging alternatives, and/or challenges that vendors faced when changing to sustainable packaging materials. Our research methods consisted of two visits to three AFM locations where we photographed current packaging materials and surveyed 29 vendors collecting data in Google Forms, respectively. We found that the main reason that vendors chose their current packaging material was environmental sustainability (65.5%), secondly was the cost of the materials (51.7%). The main barriers that prevented vendors from switching to sustainable packaging were cost (44.8%) and food safety/preservation (24.1%). Our results show the top three reasons for current packaging usage is environmental sustainability, cost, and food safety/preservation. The data suggests that a majority of vendors are environmentally concerned and actively make an effort towards sustainability by using paper-based carrier bags and biodegradable plastic containers. The results show that environmental sustainability is a large deciding factor when choosing product packaging however, is not always attainable because of cost and food safety/preservation issues. Overall, local markets aim to contribute towards environmental sustainability, however, more research is required to find methods to promote local products without negatively contributing plastic waste to the environment.
WAVE 4
ORAL PRESENTATION
ABSTRACTS
Abstract
Background: People who use drugs (PWUD) are vulnerable to a wide array of harms related to drug use (e.g., overdose, infectious disease, soft-tissue skin infections). Of concern, many social-structural barriers to accessing quality health care among PWUD exist, including stigma and discrimination surrounding their drug use. There is a growing body of research that has quantitatively examined stigma among this population; however, little is known about the consistency and validity of substance use-related stigma measures being used in these studies. This rapid review synthesizes the current literature pertaining to substance-use-related stigma measures for PWUD accessing health services.

Methods: Five databases (i.e., EMBASE, PsycInfo, Web of Science, Medline Ovid, and Google Scholar) were searched for relevant primary research articles published between January 2000 and present day. We included articles that discussed or utilized any quantitative substance use-related stigma measures. The titles, abstracts, and full-texts of articles were screened and data from the remaining articles were extracted and analyzed.

Results: In total, this review yielded 39 unique articles and 29 unique stigma measures. The most common types of stigma that were measured included Perceived and Internalized Stigma. Only 12 (31%) articles assessed the psychometric properties of the used substance use-related stigma measures. Many (14; 48%) of the substance use-related stigma measures were adapted from general stigma scales, mental illness related stigma scales, or HIV related stigma scales. Some stigma measures (10; 34%) were derived by adapting specific items from previous stigma scales to fit the context of their study.
Theme: Health and Wellness

Title: The Role of Bcl-xL in Normal β-cell Physiology and Under Conditions Of Nutrient Excess

Presenter(s): Yaathavan Suresh

Abstract
Diabetes affects the lives of nearly nine percent of the global population and its complications can lead to kidney failure or possibly death. Its growing prevalence is partially due to overnutrition, which leads to excess nutrient stress on pancreatic β-cells which secrete insulin to control blood glucose levels. Bcl-x L is an anti-apoptotic protein which means that it prevents programmed cell death. The Luciani lab previously reported that Bcl-x L dampens normal β-cell glucose signaling and mitochondrial activity. Previous experiments revealed that loss of Bcl-x L reduces mitochondrial activity during excess nutrient challenge. This reduction is associated with increased mitochondrial respiration, which may be uncoupled from ATP production, suggesting a proton leak. Previous research done by the Luciani lab showed that another Bcl-2 family member, Bcl-2, regulates β-cell reactive oxygen species (ROS) signaling and a ROS-sensitive proton leak. Increased ROS generation from metabolism during conditions of nutrient excess has a role in β-cell dysfunction and death. Our current project will examine if Bcl-x L has a role in protecting β-cell mitochondria from oxidative damage during periods of excess nutrient stress. We will use MIN6 cells with a Bcl-x L inhibitor and islets from our lab’s unique β-cell specific Bcl-x L knockout mice cultured in high glucose conditions in combination with antioxidants. Confocal microscopy will be used with mitochondrial specific ROS detectors to determine changes in ROS levels. This work will provide novel insights into the role of Bcl-x L in normal β-cell physiology and under conditions of nutrient excess. Furthermore, this will guide future studies to identify pharmacological approaches to limit β-cell dysfunction from chronic overnutrition and maintain glucose homeostasis.
**Abstract**
Newly synthesized proteins in the cell undergo processing to be considered mature and fully functional. This may entail changes to the protein's structure (such as folding, removal of amino acids or addition of other molecules), known as posttranslational modifications (PTM). One type of PTM is palmitoylation, the addition of the fatty acid palmitate. Palmitoylation is catalyzed by enzymes from the DHHC family, which are so named for the amino acids at their active site. Our lab is interested in studying one member of this family in particular, DHHC6. DHHC6 is expressed highly in the brain during development and at lower levels in adulthood, but its function in neurons is not yet known. In order to study this, we used the rat hippocampus as our model. The hippocampus is a region of the mammalian brain that is highly associated with learning and memory. Our lab grew rat hippocampal neurons in dishes to study how DHHC6 regulates neuron growth. We genetically knocked down or increased expression of DHHC6 to decrease or increase its protein levels, respectively. Thus far, our work has shown that DHHC6 is important for neuronal spine development, specifically mature spines, but not neuron size. Spines are tiny protrusions from neurons that form connections with other neurons, allowing for communication. Mature spines form more stable, and long-lasting connections. In the future, it will be important to study the mechanism of DHHC6’s action, as formation of stable connections between neurons is important for neuronal development.
WAVE 4 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: Reimagining Obstetric Violence: An Ethnography of Legitimacy, Access, and Collaboration in Rural Chiapas, Mexico

Presenter(s): Dominique Bowden

Abstract
This study aims to re-examine the anthropological notion of “obstetric violence” to encompass its structural nature and the lived realities of Indigenous women and midwives within rural Chiapas, Mexico. Obstetric violence is defined as any form of violence (structural, verbal, or physical) women may experience when receiving or accessing obstetric care for their pregnancy or birth, which leads to loss of autonomy. Indigenous women, who are structurally marginalized through the convergence of historical, political, and social factors, are disproportionately victims of obstetric violence. Previous research on obstetric violence has primarily focused on its overt manifestations (microaggressions, non-consensual procedures, etc.) within biomedical contexts. However, 60% of women in Chiapas are attended to by midwives in home birth settings, and there has been little empirical research done to examine how obstetric violence affects the autonomy of women who receive traditional methods of obstetric care. This ethnographic study is based on fieldwork involving participant observation and semi-structured interviews with six women and midwives in a rural setting in the Chiapas Highlands. It utilizes the theoretical frameworks of structural and obstetric violence. The analysis illustrates the need to expand the notion of obstetric violence to account for the structurally violent acts of delegitimization of midwifery and culturally inappropriate modes of collaboration and support. The study argues for the legitimization of latent, or hidden, modes of obstetric violence within anthropological scholarship. In indexing structural and latent aspects of the phenomenon as violence, scholars and practitioners can work to improve true collaboration, access, and support for marginalized communities and obstetric practices.
WAVE 4 | ORAL PRESENTATIONS

Theme: Health and Wellness

Title: Elucidating the degree of contribution by the shunting mechanism in decreasing nociception in the peripheral nervous system

Presenter(s): Tim Le

Abstract
Gamma-aminobutyric acid (GABA) has been known to be an inhibitory neurotransmitter because it decreases nerve signals to and from the brain, ultimately decreasing the activity of the nervous system. However, it has been discovered that in the peripheral nervous system (PNS), GABA induces excitatory effects upon binding to its receptor, GABAA. The binding causes an influx of negatively charged chloride ions into the cells due to chloride transporters. By studying its electrophysiology, this concept can be applied to research in nociception (pain). Nociceptors are nerves that detect and send pain stimuli, which is induced through excitatory effects. This is of clinical relevance because research in this field aims to find effective therapeutics in alleviating pain in patients. Recently, a form of neural inhibition called shunting has been studied, which is the leakage of the membrane potential that prevents a depolarization that is enough to achieve an AP. However, the degree of contribution to depolarization inhibition is still unknown. Therefore, to determine the extent to which shunting prevents excitatory effects in the PNS to decrease nociception, a patch-clamp is performed. The patch-clamp method is used to study currents induced by ionic charges by measuring electrical currents of an isolated cell. Therefore, by inducing shunting in various neuronal cell models and testing their currents through the patch-clamp method, we can determine the degree to which shunting causes inhibition in creating an AP.
WAVE 4 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: Challenges Early Childhood Educators Face in Promoting Children's Outdoor Play

Presenter(s): XinYi Cheng

Abstract
Outdoor play (e.g., climbing, running, hiding), and the inherent risk-taking that comes with it, is crucial for children's social, physical, and intellectual development, emotional well-being, self-confidence, and risk management. However, early childhood educators (ECEs) often restrict children's outdoor play in their facilities due to limited understanding of its importance, excessive safety fears, and liability concerns. Recognizing ECEs' vital role in providing and promoting access to and quality of children’s outdoor play, the Early Childhood Outside! study conducted five focus groups with 40 BC ECE professionals. This study focused on understanding the difficulties perceived by ECEs in promoting outdoor play and developing strategies to overcome these challenges. Through qualitative thematic analysis, various internal and external factors that influenced ECEs’ perceived barriers were identified. The ECE's confidence in professional competence was found to be greatly affected by the relationships between ECEs and colleagues, licensing officers, children, and parents. These relationships are seen as the foundations to support unstructured outdoor play successfully. The ECEs also identified the need of supporting resources that could help ECEs to (1) improve the quality of their outdoor play space, (2) gain skills and confidence to address other stakeholders’ (e.g., parents) concerns, and, (3) increase perceptions of young children’s competency. These findings guided the development of a risk reframing intervention tool to provide training to ECEs on the importance of outdoor play, risk-benefit assessment, and managing safety and liability fears; and ultimately guide the development of a plan for changing service delivery.
Theme: Individual, Community and Society

Title: Healing Through Music: Recontextualizing Trauma and Hope in Cambodia

Presenter(s): Jacqueline Sarvini

Abstract
Survivors of the Khmer Rouge in Cambodia continue to be haunted by the threat of violence and death, as their memories of the genocidal conflict act as a reminder of their own personal tragedies. Diagnosed with post-traumatic stress among other mental disorders, professionals from the medical community have identified and categorized their traumas according to Western psychological practices. However, not much research has been done to look beyond this so-called universalized approach to suffering. Therefore, to adopt a greater cultural sensitivity to the legacies of their trauma, I will be looking at the local and contextualized methods of healing for Cambodians, particularly in the form of art and performance. Using existing research done for Indigenous groups in Canada, I will be exploring their traditional cultural activities and arts-based techniques that have been used to support victims of organized violence. In doing so, I will show how these practices may overlap with the resurgence of music in Cambodia as a form of healing from the years of muted silence.
Theme: Individual, Community and Society

Title: The referential scope of bilingual infants' early words: Effects of language experience

Presenter(s): Ana Ivkov

Abstract
In the adult lexicon, nouns can be categorized into classes with differing types of extension. Category terms (common nouns) extend to all examples of a category, whereas individual terms (proper nouns) extend to unique exemplars of a category. At 6-months, infants begin to acquire their first words. Recent evidence suggests that monolingual infants’ comprehension of those words is consistent with how adults understand them. Bilingual-learning infants, exposed to two languages simultaneously, receive less input in each language (compared to monolinguals) and must keep their languages separate. Type of language exposure affects infants’ later word-learning, so differences may also manifest in their early understanding of different noun classes. We used an intermodal preferential looking paradigm to investigate how monolingual and bilingual 6-month-old infants extend the category term for their hand (i.e., “hand”) and the individual term for their mother (e.g., “Mommy”). Word comprehension was assessed on across-category trials (the target matched with an out-of-category item) and noun class comprehension was assessed on within-category trials (the target matched with a within-category exemplar). We predict that both monolingual and bilingual infants will look more to their mother upon hearing her individual name on both types of trial, but we hypothesize that differences may emerge between monolinguals and bilinguals on trials involving the category term “hand,” with infants’ looking behaviour varying in relation to the amount of exposure they have received to each of their languages. This research will reveal how language experience influences aspects of language acquisition in the first year of life.
**Theme:** Individual, Community and Society

**Title:** Farmer Participation in Agricultural Planning in the Township of Langley

**Presenter(s):** Meryn Corkery

**Abstract**
Agricultural planning (including but not limited to agricultural plans, development applications, and consultations) is a means to address disputes involving agricultural development, farmland protection, and decision-making. Planning may also reconcile the competing interests for access and land base use. However, the agricultural sector exhibits a diversity of farm types, practices, markets, and crops, and is simultaneously facing increasing economic, social, and environmental issues. It is unclear what avenues exist for emerging farmers to contribute to this political process. To explain the practices employed in the Township of Langley that influence farmer participation levels, this study addresses the following: What are new and young farmers’ contributions to agricultural planning? What factors influence farmer participation? A case study methodology was employed, utilizing interviews with seven farms, a farm practices survey, and a document review. The analysis will be conducted based on the level of farmer involvement, as well as a classification involving farm size, methods, and ideology. The farmer-identified conflicts will be analyzed to determine what level of participation would be required in the planning process. Preliminary findings suggest that young and new farmers informally engage in the planning process and believe more engagement is necessary. Additionally, increased participation may be an important avenue to food systems change and supporting farmers. The results of this study will contribute to the planning discourse, informing government engagement processes. A policy brief will also be produced for decision-makers to inform planning that supports sustainability, agricultural land preservation, climate resilience, and food security.
WAVE 4 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: Applications and Innovations in Typeface Design for North American Indigenous Languages

Presenter(s): Julia Schillo

Abstract
Throughout the United States and Canada, Indigenous communities are actively engaging in language reclamation and revitalization projects that provide urgently-needed support to restore fluency and transmission of their endangered ancestral and heritage languages. As language revitalization projects engage ever more with digital tools, communities, activists, and scholars are paying increased attention to how technology can support their strategic goals of breathing life into Indigenous languages again. The writing systems used to represent these languages are as diverse as the languages themselves, and entail various typographic requirements that widely used typefaces for majority languages often do not meet. This presentation provides an overview of the various scripts used to write Indigenous languages in North America, with a focus on the processes used to represent them digitally and the consequences when typefaces fail to do so. An investigation of typefaces used by six communities representing different languages with a diverse range of orthographies leads to an in-depth look at design elements of two typefaces serving very different purposes. This research recognizes both enduring challenges for digitally representing these languages, such as cross-platform consistency and rendering, while also drawing attention to exciting innovations.
Theme: Individual, Community and Society

Title: investigating the effects of a high-fat, high-sugar diet on cue-enhanced risky decision making in rats

Presenter(s): Andrew Li

Abstract
Previous research has indicated that individuals with pathological gambling generally have a higher body mass index and are more likely to be obese than healthy controls. In rats, obesity is associated with greater responsivity within dopaminergic reward circuitry, and prolonged exposure to a high-fat, high-sugar diet can alter the functioning of the orbitofrontal cortex leading to impairments in the devaluation of rewards. Accordingly, the present study investigated whether poor diet and obesity influences risk preference in rats, using a rodent model of cue-enhanced risky decision making.

Two cohorts of 32 male Long-Evans rats were trained on the cued version of the rat Gambling Task (rGT), a rodent analogue of the human Iowa Gambling Task. The optimal strategy for earning sugar pellets is to favor options paired with lower per-trial gains, due to a higher probability of winning and shorter time-out penalties. Consistently selecting the high-risk, high-reward options results in longer and more frequent time-out penalties, and therefore less reward overall. Adding win-associated audiovisual cues to the task results in a higher proportion of rats establishing a risky decision-making profile. Following task acquisition, half of the rats were given ad libitum access to junk-food diet for forty days, consisting of hotdogs, Doritos, KitKats, peanut butter, and standard rat chow. Control had ad libitum access to chow only. cRGT performance was then reassessed for a two-week period. Rats that exhibited an optimal decision-making profile prior to diet manipulation were uniquely affected in both conditions, displaying a significantly riskier phenotype following diet exposure.
Theme: Individual, Community and Society

Title: To what extent has the European Migrant Crisis 2015 affected citizens of the European Union’s trust in national and EU institutions?

Presenter(s): Natascha Schoepl

Abstract
The European Union is at a critical point in time, with Brexit on the horizon, extreme nationalism and Euroscepticism rising and the resurgence of global authoritarianism. Especially after the Financial Crisis 2008 and the European Migrant Crisis of 2015 hit the EU, many have been questioning the output legitimacy of EU institutions and their own national institutions. Trust is a major variable of social capital, social cohesion and civic culture that brings the EU together. The aim of the presentation is to demonstrate the impact of the Migrant Crisis on trust in both national and EU institutions. Since citizens of EU member states are governed by a multilevel government system, there are discrepancies in the levels of trust. By analyzing data from the Eurobarometer, European Social Survey and the Eurofound of 28 member states from 2000 to 2019, significant changes in the trust level of both national and EU institutions have been found. In particular, newer member states such as Bulgaria and Lithuania have higher level of trust in the EU rather than national institutions compared to the older member states. The presentation will also discuss the contagion and congruence hypothesis which discuss spillover effects of distrust from national institutions to EU institutions.
Abstract
Virginia Woolf’s influential pacifist essay Three Guineas (1938) considers at various moments the role that media plays in the propagation of imperial and chauvinist thought within a British society. Central in her consideration is the recognition that the facts portrayed by media are essentially adulterated by the material and economic conditions media institutions inhabit within a capitalist society intertwined with imperialism. As such, Woolf places a large emphasis on individual responsibility in response to the influence of adulterated facts presented by print media. I would like to propose a reading of Three Guineas alongside Edward S. Herman and Noam Chomsky’s Manufacturing Consent (1988; 2008) as well as Judith Allen’s Virginia Woolf and the Politics of Language (2010) in order to analyze contemporary media reactions to American interventionist efforts in the Middle East and the extent to which social media and the internet has exacerbated the public’s inability to discern fact from opinion. In order to establish the modern relevancy of Woolf’s ideas, the presentation will briefly touch upon how American media justified the invasion of Iraq (2003) before analyzing the demonization of Qasam Soleimani following his murder in a targeted U.S. drone strike (2020). As will be shown, the response to this event by mainstream media outlets such as CNN was largely militarist, imperialist, and orientalist. Despite differences in time, genre, and systems of capitalism, I will argue that Woolf, Hermann, and Chomsky identify mass media within capitalism as being complicit in the propagation of war and imperialism. Further, I will question the possibilities for individual responsibility, dissent, and opposition within the contemporary structures of mass media.
WAVE 4 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: Loot Box Opening-A Surprising Result

Presenter(s): Chung-Hui Huang, Calvin Ho, Rachel Hueller, Ian Daly, Gabrielle Landry

Abstract
Loot boxes are items in video games that appear randomly or can be purchased with real-world money, and they provide randomized prizes. Similarities between loot boxes and forms of gambling, especially slot machines, have raised concerns that unregulated loot box spending may lead video game users to problem gambling. This study hopes to better understand the increasing problem of loot box spending, specifically impulsivity which has been formally linked to problem gambling. This study examines the effect of impulsivity on the behaviour of loot box spending. The hypothesis is that subjects that are highly impulsive will spend more money on loot boxes compared to subjects with low impulsivity. Subjects are asked to complete the UPPS-P survey as a measure of impulsivity and play a stop-signal task presented as a game that features loot boxes. Loot boxes that provide random prizes, which will help with in-game progression, can be purchased between each block of the task. Subjects are given in-game coins that can be exchanged for raffle tickets to simulate the financial costs of real-world loot box spending. Impulsivity is found to be positively correlated with the amount of money subjects spend on loot boxes. However, this new means of studying spending in video games might not be representative and generalizable to real video games and needs refining before actual implementation. The proposed task presents a novel potential method to expand research in the rising field of gaming and its results offer guidance towards debates on loot box spending regulations.
WAVE 4 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: Assessing Quality of Maternal Health Services in Haiti

Presenter(s): Karina Ontaneda

Abstract
Improving coverage and quality of healthcare are essential to maximize the impact of health systems including better health outcomes. As such, tracking quality of healthcare is vital to see if the expectations set by the government and their health departments are been met across the country. Antenatal care (ANC) has been recognised as part of a larger set of factors that attempts to safeguard women’s lives against maternal mortality/morbidity and to improve pregnancy outcomes. The objective of this study is to assess the quality of ANC and its equity in Haiti. Using the most recent Haiti Demographic and Health Survey, we identified a cohort of women who had at least one live birth in a health facility within the last five years preceding the survey and examined whether they were offered five essential ANC services. We then compared receipt of these services across socioeconomic status and area of residence. The findings will provide insights on quality of care provided to women during ANC visit in Haiti and can contribute to informing strategies to improve maternal and newborn health in the Sustainable Development Goal era and beyond.
WAVE 4 | ORAL PRESENTATIONS

Theme: Individual, Community and Society

Title: End of life discussions following the legalization of Medical Assistance in Dying (MAiD)

Presenter(s): Christopher Ng

Abstract
Medical Assistance in Dying (MAiD) was legalized in Canada on June 6, 2016. This has posed a significant challenge for palliative/hospice healthcare providers (PHCPs) as they strive to help patients navigate end of life (EOL) care, requiring them to manage the various options that patients have at the end of life. Our study analyzed the responses of 26 PHCPs in Greater Vancouver Canada regarding their experiences dealing with MAiD following its legalization. Semi-structured interviews were conducted with all participants and results were qualitatively coded using NVivo. This presentation will focus on the end of life discussion between healthcare providers and patients when discussing MAiD. PHCPs expressed difficulty in interpreting the reasons for patient EOL care decisions and had varying opinions on how much healthcare providers should be exploring patient desires. Many of them also reported the lack of awareness that many patients had regarding the EOL care options that were available to them, as well as the importance of communication between healthcare teams in dealing with a patient’s family and friends. The analysis of our data has yielded important insights on how PHCPs should be navigating the end of life discussions with patients. These suggestions can aid in the development of frameworks to improve the EOL experience for patients in the future.
Abstract
Our project focuses on tackling an area of electoral politics that we perceive to be as somewhat lacking within Canadian discourse. By using the 2019 Canadian federal election campaign as our source material, we sought to highlight the relationship between geography and policy. We began with a small set of research questions: Do party leaders change what their platform is depending on where they are? Where are party leaders unveiling certain policies? Does it matter? Our assumption was that it doesn’t solely matter what party leaders are saying, rather, it’s also absolutely crucial to note where they’re saying it. The purpose of the project was to uncover the relationship between the vote share results of a riding and the policy announcements within that riding.

Following the conclusion of the election, we conducted two different types of qualitative analysis. The first discussed the overall campaign, approach and anticipated policies of each major federal party (Conservative, Liberal, New Democratic, Green, Bloc, as well as the People’s Party) and included how many times a categorized election issue was discussed at campaign stops. The second focused on reviewing our regional findings – namely, which ridings had resulted in the incumbent losing their seat and ridings that were won with a margin of 5%. In both analyses, we worked to keep in-mind factors such as how many times a federal party leader had paid a visit to these ridings, what the salient issues, and historical voting patterns. By comparing real world outcomes to our collected and transcribed data, we found that we could understand not only how policy announcement locations could affect the final voting results, but in-addition how beneficial geographically strategic campaign tactics can be to campaigning federal party leaders.
Theme: Individual, Community and Society

Title: The Phonetic Properties of Lengthening and Reduplication in Child-Directed American Sign Language

Presenter(s): Paris Gappmayr

Abstract
Like child-directed speech, child-directed signing displays consistent properties cross-linguistically, including reduplication (multiple iterations repeated past target production) and lengthening (longer total duration) (e.g. Holzrichter & Meier, 2000; Pizer, Meier & Shaw, 2011). However, it is unclear whether reduplication contributes to the overall lengthening properties (i.e. total sign duration increasing as a by-product of multiple repetitions), or if the repetitions themselves are also taking longer to be produced. This paper analyzes video footage of three signs in American Sign Language (ASL) [BABY, MOTHER, and FATHER] in both child-directed (CDSi) and adult-directed (ADSi) contexts and compared them to online dictionary (Dict) tokens produced by the same signer. The total duration of the sign and the sign’s stroke were measured in milliseconds (ms), and the number of movement repetitions per sign were manually counted. Ultimately, CDSi signs had more repetitions and shorter duration (faster movement) in ms than ADSi and dictionary tokens, contributing to a total longer duration. This indicates that total duration is increased as a result of more numerous repetitions, rather than deliberate slower production of those signs. These shorter, faster repetitions seen in CDSi are proposed to help attract and hold an infant’s attention, as deaf children must visually attend to their interlocuter in order to perceive messages communicated to them (Holzrichter & Meier, 2000). Further analysis of other signs will determine whether this pattern holds across ASL and/or other signed languages.
WAVE 4 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Using Transcranial Direct-Current Stimulation to Improve Motor Skill Learning in Children with Developmental Coordination Disorder: A Randomized Controlled Trial Protocol

Presenter(s): Elena Klimova

Abstract

Developmental Coordination Disorder (DCD) affects a child's ability to learn motor skills. Transcranial direct-current stimulation (tDCS), a non-invasive brain stimulation technique, improves motor learning in typically-developing children, but it is unknown if this approach is effective for children with DCD.

This study aims to: (1) investigate the effectiveness of tDCS combined with handwriting practice on motor skill learning in children with DCD; and (2) determine if the tDCS effect persists 6 weeks later.

Fourteen children with DCD (7-12 years) will participate in this randomized, sham-controlled, doubled-blinded trial. An occupational therapist blinded to group assignment (active or sham stimulation) will assess children using the Purdue Pegboard Test (PPT), Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2), and Evaluation Tool of Children's Handwriting (ETCH). Children will then receive 3 days of tDCS (active or sham) for 30 minutes each day; 10 minutes during PPT training, followed by 20 minutes of handwriting practice using “Printing Like a Pro!”. Children will be re-assessed on the last day of training and at 6 weeks follow-up.

To date, seven children with DCD (3 active and 4 sham) have completed the study. Friedman tests will assess differences between pre, post, and follow-up intervention scores and Mann-Whitney U Tests will compare results between groups.

This is the first study of its kind to investigate the effect of brain stimulation on motor skill learning of children with DCD. Findings may provide evidence for combining tDCS with rehabilitation therapy to improve motor outcomes of children with DCD.
WAVE 4 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: What lessons can India learn from China in increasing the adoption of new energy vehicles?

Presenter(s): Deyvika Srinivasa, Jiayi Du, Mohammad Ahmed

Abstract
Globally about 15% of manmade carbon dioxide comes from cars. To combat this problem China has implemented various policies to increase the adoption of ‘new energy’ transportation (i.e plug-in electric vehicles). In 2018, 1.2 million new energy vehicles were sold in the Chinese market. Given this growth and the success of Chinese new energy firms such as NIO and BYD, China is the perfect example of the potential of electric vehicles to positively impact economies and the environment in developing countries. Much like China, India deals with severe air pollution problems. Thus, it is insightful to consider what lessons India can learn from Chinese policies to promote electric vehicle usage. A comparative case study, consisting of quantitative and qualitative review and an analytical matrix, was used to examine the effectiveness of China’s EV policies and their potential usage in India. It was found that dynamic taxation, strong environmental regulations and a shift from industry incentives to industry obligations were the most valuable practices applicable to the Indian context.
**Theme:** Innovation and Technology

**Title:** Detectability and Quantitative Analysis for PSMA PET Scans using an Anthropomorphic Phantom and Heterogeneous Radioactive Epoxy Spheres

**Presenter(s):** Roberto Fedrigo

**Abstract**

Aim/Introduction: There is significant potential and excitement in imaging of prostate cancer using positron emission tomography (PET) when targeting prostate-specific membrane antigen (PSMA) as expressed by prostate cancer cells. Conventionally, image quality parameters are measured using phantoms (objects that simulate patients) with uniform spheres. This allows for reproducible evaluation of scanner characteristics but does not represent true patient anatomy and does not account for heterogeneities. The aim of the present study is to perform quantitative and detectability analysis using an anthropomorphic (human-resembling) phantom with heterogeneous activity distributions.

Methods/Results: An imaging phantom that realistically models a human PET scan was used. Epoxy with radioactivity ranging from 7 kBq/mL to 60kBq/mL sodium-22 ([22Na]NaCl) were casted (sphere diameters 3mm-16mm). Acrylic beads were added to the Epoxy to establish heterogeneous activity distributions. Twenty-four lesions (i.e. tumours) were localized in clinically-significant locations within the phantom. The background and organs were filled with F-18 activity ratios observed in [F-18]-DCFPyL patient scans. The phantom was scanned using a GE Discovery D690 PET scanner every 30 minutes for a 12-hour period to obtain different lesion-to-background ratios. Experienced readers were asked to select the lesions when shown randomized PET slices. Receiver operating characteristic (ROC) curves is ongoing to quantify lesion detectability for different combinations of scanning times, reconstruction parameters, sphere sizes, and signal-to-background ratios. In addition, noise vs. bias quantitative analyses were performed.

Conclusions: We expect this experiment to provide more thorough understand of PET lesion detectability and quantitation that can lead us to optimize imaging protocols for better and faster diagnosis and assessment of disease.
WAVE 4 | ORAL PRESENTATIONS

Theme: Innovation and Technology

Title: Rapid Retrieval of the T2 Spectrum in Myelin Water Imaging Data using a Deep Learning Approach

Presenter(s): Lorna Tu

Abstract
Myelin water imaging (MWI) is an advanced magnetic resonance imaging technique that quantifies water trapped between myelin bilayers, which insulate nerves in the brain and spinal cord. MWI data may be represented as a spectrum of T2 values, from which a host of useful metrics, including myelin water fraction, mean T2 times of intra/extra-cellular water and cerebral-spinal fluid, may be extracted for each imaging voxel. Due to its specificity, it is especially useful for the study of myelin-related diseases such as multiple sclerosis. Yet it is impractical for clinical use because conventional data analysis methods take several hours to process raw data for one brain and ultimately retrieve its spectrum. To address this, we constructed a deep learning neural network to directly map raw data to its myelin water fraction in only approximately 33 seconds. However, this acceleration was made possible by disregarding the rest of the spectrum and its other informative metrics. In this study, we expand the network so it is capable of extracting all possible metrics. It will be developed using a training dataset comprised of 5 MWI brain scans and corresponding T2 spectral results of the conventional method as the target for learning. To evaluate the model’s performance, a test dataset will be analyzed. Results of the two methods will then be compared by computing correlations, mean absolute error, and absolute and relative differences. With an accurate network to rapidly retrieve the spectrum, all the metrics may be extracted for further scientific inquiry and clinical applications.
**WAVE 4 | ORAL PRESENTATIONS**

**Theme:** Innovation and Technology

**Title:** Can Intelligent Control be used to have multiple UAVs transport a heavy load?

**Presenter(s):** Dhrumil Gogri, Lachlan Reynolds, Jack Patchell

**Abstract**
Accessibility of more advanced sensors, more robust materials and better computing power has enabled the production of UAVs to take place at a much lower cost. Therefore, developing countries that have poor road infrastructure can use UAV technology in disaster relief situations. In low resource and time sensitive environments, it is crucial that UAVs be as efficient and responsive as possible. Previous research focuses on UAVs following a specific trajectory when given a target, however, when presented with random obstructions the drone’s system fails to respond. In Cooperative control of multiple unmanned aerial systems for heavy duty carrying Tan et al. develop an algorithm based on placing drones at the corners of square object, which allows the object to act as a large quadcopter (Tan et al. 2018). In Cooperative load transportation using multiple UAVs Shirani et al. consider a similar problem but the drones are not attached rigidly. They used the Newton-Euler method to model the UAV and the Udwadia-Kalaba method to model the load suspension. We will address the use of intelligent control, to avoid obstacles because previous research involving cooperative control algorithms would not allow the drones to avoid obstacles. We will develop a series of differential equations to model kinematic motion, upward forces and utilise simulations via MATLAB to give instructions to the UAVs. We expect to develop an intelligent control system that allows two UAVs to transport a heavy load while circumventing some of the limitations of control algorithms such as obstacle avoidance.
WAVE 4 | ORAL PRESENTATIONS

Theme: Sustainability and Conservation

Title: Bite or Flight: Antipredator Responses as a Function of Web Architecture

Presenter(s): Jessica Schmidt, Yi Lin Zhou

Abstract
Animals have a variety of strategies that protect them from predation; spiders are no exception. Indeed, spiders can have both morphological and behavioural antipredator strategies. Spiders also have the incredible ability to spin webs. While many studies have examined predation strategies of web-building spiders, and some how the architecture of their webs (2D vs. 3D) may protect them against predators, few, if any, have explored spider antipredator strategies as a function of web type. We hypothesize that spiders with 2D webs and no refuge will be more exposed, and thus have more armour, aposematic coloration, and extreme antipredator behaviour. Conversely, those with 3D webs or refuges will be more protected, and thus neither have armour, nor be aposematic, nor have extreme antipredator behaviour. We collected data on 400 spiders and their webs in three Ecuadorian Amazon field sites. For each spider, we recorded its colour, armour, and response to simulated predator contact, as well as 30 web variables. Preliminary results show 2D web builders tended to be either aposematic and spiny, if no refuge was present, or camouflaged and smooth, if a refuge was present. In contrast, three-dimensional web builders were neither cryptic nor bright or armoured. Also, spiders with more exposed web architectures were less likely to drop out of the web upon simulated predator contact. These results support our hypothesis that antipredator strategies differ as a function of web type and the presence or absence of a refuge, illustrating how behaviour, morphology, and spider web architecture coevolve.
Theme: Sustainability and Conservation

Title: The effect of rising temperature on the metabolism across fish species.

Presenter(s): Jiayu Chen, Ji Ai

Abstract
Temperature is a key factor influencing the metabolism of fish. Knowing its effect has an extraordinary impact on our understanding of how different fish species sustain life. Our studies focus on fish metabolism using the aerobic scope, excess post-exercise oxygen consumption (EPOC) and critical oxygen tension in the hypoxia condition of different fish species across temperatures. Graphical illustrations are made using values from the original papers or retrieved using ImageJ. Data are analyzed using regression analysis. We expect to see a concave curve indicating minimum post-exercise oxygen while a convex curve indicating the change in critical oxygen tension at optimum temperatures. Our findings and predictions would have a great impact on our understanding of how different fish species respond to global climate change.
WAVE 4
POSTER PRESENTATION
ABSTRACTS
**Theme:** Health and Wellness

**Title:** Stakeholder perspectives on adaptive clinical trials: a scoping review

**Presenter(s):** Tina Madani Kia

**Abstract**
Introduction: Adaptive clinical trials (ACTs) represent an emerging approach to trial design where accumulating data is used to make decisions about future conduct. Adaptations can include response adaptive randomization, sample size re-estimation, and efficacy/futility stopping rules. The objective of this scoping review is to assess perspectives of stakeholders about adaptive studies. The term “stakeholders” includes but is not limited to physicians, researchers, statisticians, review board members and patient advocates.

Methods: To identify relevant studies, a computerized search was conducted of library databases. Of the 166 identified articles, 146 were non-duplicate citations. 120 were not given full-text reviews as their titles and abstracts indicated they did not meet the inclusion criteria. 26 articles were carefully examined for relevance and of those, 12 were chosen to be part of the analysis. Following review of articles, the primary findings of each article was coded for study design, purpose, and primary implications.

Results: This review shows major perceived advantages to adaptive designs (AD) such as limiting ineffective treatments and efficiency in answering the research question, as well as many perceived barriers, including insufficient sample size for secondary outcomes, issues of consent, potential for bias, cost and time to adaptively design trials, unclear rationales for using AD’s and most importantly, a lack of education regarding AD’s among stakeholders within the clinical trial community.

Conclusion: Further training, guidelines and toolkits about the proper use of AD’s are needed at all levels to overcome many of these barriers.
WAVE 4 | POSTER PRESENTATIONS

**Theme:** Health and Wellness

**Title:** Comparing Different Drug Delivery Systems Used For Treating Neurodegenerative Diseases

**Presenter(s):** Kshemaka Gunawardena, Aditya Dhariwal, Jovancah Hardo

**Abstract**
Neurodegenerative diseases are characterized by the damage they cause to cells in the central nervous system, an area that is difficult to access. One obstacle includes the presence of the Blood Brain Barrier (BBB), which prevents most drugs from entering the brain, and the degradation of drugs in the extracellular environment of the body. Recent advancements in drug delivery systems (DDS) have shown promising results in overcoming the challenges mentioned above. This literature review focuses on the design and applications of polymeric nanoparticle formulations, liposomes and carbon nanotube DDSs. Polymeric formulations can transport drugs by encapsulating, covalently bonding or absorbing them. Thus, they are able to deliver therapeutic agents or imaging agents to targeted areas of the brain. Polymeric nanoparticles are able to pass through an impaired BBB and so have great potential in treating stroke and neurodegenerative diseases. Moreover, liposomes can be modified to cross the BBB by taking advantage of nutrient carrier and receptor-mediated delivery pathways, making both intravenous and intranasal routes viable options. Carbon-nanotube based DDSs are not yet used for treating neurodegenerative diseases because of insufficient data regarding their toxicity. However, they have demonstrated effectiveness in targeting neuronal lysosomes which could be advantageous in the future. Nonetheless, an issue across all three investigated systems was the lack of economic feasibility in being able to manufacture all the necessary DDS constituents on a large scale. In short, through this systematic literature review, nanosized DDSs showed to be strong candidates in the future treatment of neurodegenerative diseases.
Theme: Health and Wellness

Title: Neural Processes Causally Involved in Cognitive-Behavioural Therapy Based Improvement in Generalized Anxiety Disorder

Presenter(s): Yelizaveta Kopyl, Tiffany Prayitno, Eunkyul Jo, Yu Cheng Lin

Abstract

Generalized Anxiety Disorder (GAD) - characterized by excessive and persistent worry that interferes with daily functioning - is commonly treated with Cognitive Behavioural Therapy (CBT) but many GAD patients do not respond to it. This can be attributed to the limited understanding of the underlying neural mechanisms causally involved in the improvement of GAD using CBT. Few studies have investigated the neural correlates of the effect of CBT on GAD, and a direct causal link between the neural processes and CBT based improvement remains to be shown. We will investigate this link using neurofeedback.

The first stage aims to find neural correlates of the effect of CBT on GAD by conducting CBT on GAD patients, and recording fMRI activity during a facial emotion-processing paradigm prior and post CBT, while collecting self-report measurements to assess symptom changes. The brain regions correlated with the GAD improvement will then be tested for causality using neurofeedback in the second stage. A new cohort of subjects with GAD will undergo neurofeedback training sessions, where they will try to increase the length of a neurofeedback bar to a goal length that corresponds to the level of functioning within the brain regions of GAD patients that responded to CBT in the previous stage.

We hypothesize that the functional activation and connectivity of limbic and prefrontal areas will be correlated with CBT-related improvement in GAD symptoms. Our findings could establish a causal link between fMRI activity and GAD improvement, paving the way for more effective treatments for GAD.
Theme: Health and Wellness

Title: The effect of DNA methylation on the development of prostate cancer

Presenter(s): Catherine Xu, Angeline Wu, Faith Liu, Kishor Sivanesan

Abstract
Purpose: Prostate cancer is one of the most common types of cancer in men, and is the third leading cause of death in Canadian men. Studies have investigated the role of epigenetic modifications on cancer development. In this review, we will summarize the effects of DNA methylation, a commonly studied epigenetic mechanism, on prostate cancer progression. In doing so, we seek to aid the development of epigenetic treatments.

Problem: This research aims to understand the effects of DNA methylation on cancer development and how current treatment methods can be modified accordingly.

Methodology: We will review scientific literature on cancer development and DNA methylation. We also seek to understand existing methods of experimentation on cancer and DNA methylation, including chemicals used for inducing or prohibiting methylation and measuring techniques for the level of methylation in a genome. From this, we will be able to identify characteristics of appropriate treatments. To ensure eligibility, all articles used will be from peer-reviewed sources. Information extracted from the literature will be assessed by all group members through standardized methods. A final poster on how cancer and DNA methylation are connected will be made.

Results: This poster will showcase knowledge on stages in cancer development and how DNA methylation affects cancer growth during these periods. The relationship between the two and how treatments can be applied will be explained based on information from literature.

Implications: The findings of this study will aid in understanding how epigenetic treatments can be improved for prostate cancer.
WAVE 4 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: The protective effect of pneumococcal vaccination on cardiovascular disease in adults: A systematic review and meta-analysis

Presenter(s): Angel Zhang

Abstract
Background: Cardiovascular disease (CVD) affects many people worldwide. Epidemiological studies suggest a link between pneumococcal infection and an adverse cardiovascular outcome such as myocardial infarction or congestive heart failure. Individual studies have evaluated the protective effect of the 23-valent polysaccharide pneumococcal vaccination (PPV23), but results have varied. We conducted a meta-analysis to summarize the available evidence on the impact of PPV23 on cardiovascular disease.

Methods: A comprehensive systematic literature search from January 1946 to September 2019 was conducted in Pubmed, Embase, Medline and Cochrane. Cohort, case-controlled and randomized controlled trial (RCT) studies evaluating whether PPV23 vaccine protected individuals against CVD were included. Two investigators extracted data independently on study characteristics and study quality was examined using the Newcastle-Ottawa Quality Assessment Scale. Risk Ratios (RRs) and 95% confidence intervals were calculated and pooled across studies using random effects models.

Results: 20 studies were included with a total of 770,915 participants, 51.8% were males. Pneumococcal vaccination is associated with decreased risk of cerebrovascular disease (RR 0.84; 95%CI; 0.74-0.96), myocardial infarction (RR 0.91; 95%CI; 0.83 – 0.99) and any cardiovascular event (RR 0.84; 95%CI; 0.74 – 0.96) in those aged 60 years and over.

Conclusions: In this study we found pneumococcal vaccination decreases the risk of cardiovascular events in the older population. It would be highly beneficial to vaccinate this at risk population.
**Theme:** Health and Wellness

**Title:** Investigating the Mechanisms Underlying Controversial Functions of miRNA in Cancer Development

**Presenter(s):** Matthew Chung, Angela Man

**Abstract**

Background: MicroRNAs (miRNAs) are short 20-24 nucleotide non-coding RNA sequences. The main steps in miRNA biosynthesis include transcription and cleavage of pre-miRNA to produce miRNA, and formation of RNA-induced silencing complexes. MiRNAs influence gene expression by targeting the 3’ untranslated region of mRNAs. Since miRNAs target a large number of genes, they can have either oncogenic or tumour suppressive roles in cancer, and some have both in different types of tumours (i.e., controversial functions). While the role of miRNAs is well characterized, understanding the controversial effects of specific miRNAs remains elusive.

Main Objectives: Here we investigate the mechanisms underlying miRNAs’ controversial functions in cancer. We will study the targets of miRNA expression and their contribution to miRNA function.

Methods: 1) We did extensive literature review and determined that miRNAs 21, 23b-3p, 29b-3p, 125b, 181a-5p, 181b, 210-3p, 222, and 409-3p have controversial functions in various cancer types. 2) We will manipulate the expression of each miRNA in different tumour cell lines via CRISPR gene knockdown or lentiviral transduction, and create transcriptome profiles of the target genes of each miRNA via RNA sequencing. 3) We will cluster the pattern of target genes that reflect the controversial function of each miRNA in different tumour models using heat maps. Potential patterns shared by miRNAs might be further explored.

Significance: This study will provide insight into the mechanisms governing the role of miRNAs in cancer development. Systemic transcriptome profiling will reveal the gene pattern underlying the controversial functions of each miRNA in various tumours.
WAVE 4 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: The Impact of Cellular Radio Waves on Epithelial Cell Health

Presenter(s): Amit Sharma

Abstract
Cell phones are known to emit non-ionizing radiation in the form of radio waves during calls. Due to the prevalence of phone usage, studies have attempted to establish relationships between these radio waves and cancer risk, however research is inconclusive. The possibility of radio waves affecting fertility has also been investigated. However, the only recognized effect of radio waves is heating to the area of skin exposed to the cell phone. While this heating is not enough to cause an increase in body temperature, little research has been done on the effect of this heating at the cellular level. The present study attempted to simulate the presence of a cell phone in a call. There were 3 conditions: 3-hour exposure, 1-hour exposure, and a control. Epithelial cells were grown in triplicates (3x3 design) with 3 culture plates. A cell phone was entered into call-mode and placed on top of 1st culture plate. The 2nd plate was placed on top after 2 hours. Exposure was continued for 1 hour and then cells were returned to incubator. Both a cell viability and inflammation test were conducted. After statistical analysis, there was no difference in cell viability between conditions. However, both 1-hour and 3-hour exposure conditions showed significant signs of inflammation. Experimental cells responded to stress by releasing inflammatory markers. Therefore, the presence of radiofrequency radiation has the potential to stimulate epithelial cells; further research is needed as to the effects of long-term exposure.
WAVE 4 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Investigating how chronic stress affects DNA methylome in Parkinson’s disease mouse model with overexpression of alpha synuclein

Presenter(s): Sanjit Bains

Abstract
Parkinson’s disease (PD) is the second most common neurodegenerative disorder; it affects mainly older adults and typically involves loss of motor control. The trademarks of a PD brain include accumulations of the alpha synuclein protein (SNCA), which is involved in synaptic transmission, and damage of the brain’s dopaminergic neurons. PD etiology often includes mutations causing SNCA overexpression or point mutation; however the cause remains elusive because not everyone with a genetic mutation will be affected by PD. Epigenetic mechanisms such as DNA methylation (DNAm), which confer changes to gene expression without affecting the DNA sequence, can be altered by both genetics and the environment. SNCA-driven epigenetic changes may affect one’s risk for PD development and regulation of neuronal health. DNAm at cytosine sites is a well studied epigenetic mechanism associated with PD and is ideal for assessing epigenome-wide changes. Due to the complex interplay of genetics and environmental risk factors for PD, we want to know how chronic stress modulate genome wide changes in DNAm. In this study, we assessed genome-wide DNAm in the hippocampus of wild-type and SNCA overexpressing mice by reduced representation bisulfite sequencing (RRBS). We found that SNCA overexpression in standard environment altered DNAm of genes involved in various intracellular molecular functions. We found that SNCA overexpression in chronic stress altered DNAm of genes involved in stress receptors, inter-neuron receptors, and signalling & metabolic pathways. These results suggest that SNCA induced chromatin disturbances which were exacerbated by the chronic stress exposure.
Theme: Health and Wellness

Title: A proposed mechanism of cardiotoxicity induced by the interaction of the chemotherapeutic medication Etoposide, ICRF-193 and Topoisomerase-2 (TOPO2).

Presenter(s): Christopher Fischer, Joud Touqan, Roy Hung

Abstract
Introduction: Topoisomerase-2 (TOPO2) is an enzyme that controls and alters the topological states of DNA during transcription. A widely used chemotherapy medication called etoposide, also works as a TOP2 inhibitor, preventing the enzyme from repairing broken double strands, and ultimately leading to cardiotoxicity. Previous studies have concluded conflicting opinions on the relationship between etoposide and cardiotoxicity. However, the mechanism by which etoposide works remains unknown. The current research was conducted to investigate this mechanism and elucidate the molecules that are engaged in the process of cardiotoxicity alongside with the signals related to the catalytic inhibitor ICRF-193, which halter the signal pathway decreasing the side effects. Methods: We will evaluate the TOPO2 A and TOPO2 B protein expression levels after treatment with etoposide and ICRF 193 using Weston Blot and real-time PCR. We collected data from the cell viability and cell toxicity by treatment through the separation of the compounds and back together using MTS and LDH. To evaluate the signal pathways, we extracted RNA and sent for sequencing and confirmed our results using Weston blot and qPCR which led to an IPA analysis understanding the signal pathways involved. Results: In conclusion, we expect that after the etoposide treatment, TOPO2 A and B protein expression levels decrease due to lack of enzyme function, in addition to the altered regulation of different pathways including apoptosis and loss of contractility and eventually lead to cardiotoxicity. This will help us target the cardiotoxicity and create new strategies to reduce cardiotoxicity resulting from cancer treatments.
WAVE 4 | POSTER PRESENTATIONS

Theme: Health and Wellness

Title: Genomic variances in acute myeloid leukemia that are tied to increased susceptibility to checkpoint inhibitor treatment, Nivolumab.

Presenter(s): Vy Ngo

Abstract
Acute myeloid leukemia (AML) is a type of blood cancer characterized by the aberrant proliferation of immature blast cells of the myeloid lineage. This results in the accumulation of blasts in the bone marrow, causing defective blood cell production and bone marrow failure. One steadily emerging treatment for AML is checkpoint inhibitor therapy, which persistently activates T cells targeted towards leukemic cells. Nivolumab is a drug that blocks the activity of a protein called PD-1, a repressor of T cell activity. Phase I and II clinical trials of Nivolumab shows differential responses among patients. Thus, we sought to investigate the single nucleotide polymorphism (SNP) profile of AML in patients of varying responses to Nivolumab. AML samples from patients that have undergone clinical trials with Nivolumab were isolated using fluorescence-activated cell sorting (FACS) and separated into groups based on the success of response. A genomics analysis using the Illumina dye sequencing procedure showed that approximately 10% of AML cells had TP53 present as a gene affected by SNPs. Intriguingly, AML samples from patients with the highest response and minimal treatment-based toxicity had mutations present in surface markers characteristic of AML, including CD33 and CLL-1. AML samples of patients showing poor response carried mutations tied to more aggressive phenotypes, including promoter mutations in HIF1α. Results show that poor efficacy of Nivolumab for AML is tied to mutations in TP53 and SNPs inducing more aggressive cancer phenotypes. This provides insight into pre-screening options for predicting treatment response for Nivolumab.
Triple X syndrome, also known as 47 XXX or trisomy X, is a common sex chromosome aneuploidy that occurs in 1 out of 1000 women. It is characterized by the presence of an additional X chromosome in each cell of the affected individual. Prenatal diagnosis can be done by karyotyping, yet it is not suspected at birth. Common developmental delays include lower IQ levels, low self-esteem, learning disabilities, psychotic disorders, and physical abnormalities. Triple X is discussed in this study for its consequences on patients’ brain development and verbal ability. We expect that increased gene expression in XXX individuals may lead to abnormalities in intellectual and verbal phenotypes. Therefore, we propose to perform RNA sequencing on whole blood of XXX individuals, with XX as controls, to compare gene expression with tests of intelligence and verbal ability. Additionally, we will compare the differences in gene expression between XXX individuals with and without abnormalities in their intellectual and verbal phenotypes. We expect to find individuals with Triple X Syndrome to have lower intellectual and verbal capabilities when compared to the XX control group due to gene expression differences. Interesting genes will be followed up by overexpressing them in developing mice to see their effect on brain development and intelligence. We expect to find underdeveloped areas of the brain in the mouse model for genes found differentially expressed in XXX individuals with lower intelligence. This will help further our understanding of triple X syndrome linked intellectual disabilities.
Theme: Health and Wellness

Title: Invadopodia- Potential Targets for Therapeutic Development

Presenter(s): Sahar Bonakdarsakhi, Rebecca Liu, Gurleen Mann, Ailar Yousefi

Abstract

Background: Breast cancer remains the second leading cause of cancer-related death with metastasis accounting around 90% of the total deaths. Specialized subcellular structures termed invadopodia play a critical role in metastasis, aiding tumor cell dissemination to distant sites. Invadopodia provide physical force as well as the protein-digesting enzymes to degrade the protective barriers that hinders tumor spread. Although the role of invadopodia in tumor dissemination is well established, their comprehensive role in the living system (in vivo) is limited.

Methods: The current study aim to summarize the in vivo work in the literature regarding the explicit role of invadopodia during tumor dissemination, the types of living systems used to study invadopodia and the specific inhibitors studied to block the invadopodia formation.

Results: In in vivo system, invadopodia have documented roles in aiding tumor cells movement into (intravasation) and out of (extravasation) the blood vessels. Invadopodia are also explored as chemotactic protrusions that guide tumor cells during their movement. The use of in vivo models such as zebrafish, C. Elegans, mice, and chicken embryos offers great insight into the function and regulation of invadopodia in the progression of metastasis in humans. Several drugs like Astaxanthin, Glucose regulated protein 78, imatinib, and Indolylkojyl methane analogue have been studied to inhibit the formation of invadopodia in living system.

Conclusion: These in vivo studies present a powerful approach to answer pressing questions concerning the role of invadopodia in tumor cell dissemination and for targeting these protrusion as potential anti-metastatic therapies.
**Abstract**

Granzymes (Gzms) are a family of serine proteases that were originally identified in the granules of cytotoxic immune cells. The most-abundant and best-characterized member, GzmB has been recognized to cause programmed cell death (apoptosis) during cancer immunosurveillance. However, recent literature demonstrates that the efficacy of GzmB-mediated apoptosis is limited by irreversible inhibition by Protease Inhibitor 9 (PI-9). PI-9 acts as a regulator of GzmB, preventing unintended apoptosis of cells. Several tumors, including skin, breast, lung and prostate cancers, have been described to upregulate PI-9 in order to evade destruction by GzmB-secreting immune cells. Thus, current research is centered around reducing the effect of PI-9 inhibition in order to improve GzmB’s efficacy as an immunotherapeutic agent. One lesser-known area of research is GzmM, whose ability to inactivate PI-9 via proteolytic cleavage shows promise in increasing the effectiveness of anti-tumoral treatments. However, a lack of understanding in GzmM’s function provides key rationale for further investigation into its physiological function. In the current study, we will examine GzmM’s potential role in vivo as a countermeasure against PI-9-based inactivation of GzmB. A murine model of melanoma will be used, comparing GzmM knockout to wild-type mice. Tumour severity will be assessed macroscopically for pigmentation status. Tumour tissue will be examined histologically for size and GzmM expression. To elucidate a mechanistic role, we will culture melanocytes with GzmM to measure cell viability and proliferation. Understanding of GzmM’s function in the body may lead to future improvements in cancer immunotherapy.
Theme: Health and Wellness

Title: Using Eye Movement as a Diagnostic Tool for Epilepsy in Children

Presenter(s): Caitlyn Chan

Abstract

Early diagnosis in neurobiological disorders such as epilepsy and schizophrenia is essential in effectively treating symptoms. While there are pre-existing methods such as neurological exams and blood tests, they are often invasive, expensive, and unsuitable for people of younger age. However, eye movement tracking proposes a non-invasive alternative to traditional diagnosis strategies. Neurobiological disorders have shown phenotypic characteristics preceding their onset, such as abnormal eye movements in schizophrenia. We hypothesize that eye movement abnormalities can be used to predict epilepsy in children. An experimental longitudinal study was conducted using a video-based eye tracker to measure the eye movements of 100 individuals aged 5 to 15 by asking them to track an object (prosaccade testing) and to look away from an object (antisaccade testing). Three groups of individuals with epilepsy, epilepsy in their genetic history, and a control group will be sorted based on their condition at the time of in-take, and will take an identical test after 5 years. By comparing an individual’s eye movement (error rate, latency, and variability) to a normal range of each group, we expect that those who show lower speed and performance rate in both prosaccade and antisaccade testing at t1 are more likely to be diagnosed with epilepsy at t2, and that the earlier the discovery, the less severe symptoms are at time of reconnaissance. The results will help us evaluate whether eye tracking as a diagnostic tool in predicting epilepsy is valuable as a non-invasive, intuitive process that works with all ages.
WAVE 4 | POSTER PRESENTATIONS

**Theme:** Health and Wellness

**Title:** Increased HIV receptor and co-receptor expression in COPD: Keys to COPD susceptibility in HIV Patients

**Presenter(s):** Tony Guo

**Abstract**
Patients living with human immunodeficiency virus (PLWH) are over two times as likely to develop chronic obstructive pulmonary disease (COPD) compared to the uninfected population. As the canonical HIV receptor (CD4) and co-receptors (CXCR4 and CCR5) are crucial for HIV binding and entry into susceptible cells, characterizing them could uncover interactions between HIV and the epithelium that could predispose PLWH to COPD. Using bronchoscopic cytologic brushings from COPD and non-COPD subjects, bronchial epithelial cell (BEC) samples will be obtained. BEC samples will also be cultured and once confluent, detached for flow cytometry staining and lysed for use in western blot analysis. Immunohistochemical staining will be done on BEC samples that have been differentiated in air-liquid interface cultures which more closely mimic the pseudostratified epithelium in-vitro compared to submerged cultures. From initial western blot and immunohistochemical analyses, there is increased expression of CD4, CXCR4, and CCR5 in COPD compared to non-COPD subjects. The results suggest that there is an increased expression of receptor and co-receptor in airway epithelial cells especially in COPD, which may allow for increased interactions between the epithelium and HIV. These interactions may lead to erroneous injury-repair responses, tissue remodelling, and chronic inflammation within the epithelium. In the long term, these pathologies could lead to an obstructive disease phenotype manifesting within the small airways.
WAVE 4 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Stillbirth Rate of Otukpo Local Government Area, Benue State, Nigeria

Presenter(s): Rajan Bola

Abstract
Background: Stillbirth rates are alarmingly high in low-to-middle income countries (LMICs). Nigeria has some of the highest rates worldwide, sharing 12% of global stillbirths alone. Fortunately, excessive stillbirth rates can be reduced with interventions that promote safe, accessible prenatal and perinatal care. However, Nigeria lacks regional stillbirth data that would otherwise inform the prioritization and allocation of obstetrical resources throughout rural areas. To assist local governments and policy makers with addressing the high rates of stillbirth within Nigeria, we determine stillbirth rates in an area that lacks this data: Otukpo local government area, which is within Benue State.

Methods: Antenatal records from primary healthcare centres in Otukpo were analyzed. Birth outcomes were categorized and separated by year to ascertain differences in stillbirth outcomes over a 5-year period: early 2014 to late 2018.

Results: A total of 1,047 birthing outcomes were recorded in 23 primary healthcare centres. Births were classified as either: positive (live), low-birth-weight, stillbirth, macerated, or premature. Majority of births were positive (91.6%), with stillbirths representing a large proportion of outcomes (7.7%). There was no significant change in the proportion of stillbirths over the 5-year period.

Conclusion: LMICs like Nigeria need better statistics on stillbirth rates to appropriately implement prenatal and perinatal care. As evidenced by the unchanged proportion of stillbirths over the last half decade, Benue State requires better strategies to adequately reduce stillbirths. Local government officials and policy makers should prioritize reliable, detailed collection of antenatal data to identify factors that could reduce the impact of stillbirth.
Theme: Individual, Community and Society

Title: Age of first Parity and its Effect on Maternal Behaviour

Presenter(s): Harleen Hans

Abstract
Motherhood which has been divided into four stages: pregnancy, early postpartum, late postpartum and middle age, is known to be strong enough to induce major changes in the body including brain physiology. The maternal brain undergoes dynamic changes in cognition and neuronal cell production (neurogenesis), in order to establish and maintain maternal caregiving behaviors. These alterations are known to last decades and different stages of motherhood display different variations of change. That being said, it is often neglected that motherhood is a unique female experience which is made unique by underlying factors like the mother’s age and reproductive history (parity). For instance, it has been found that when executive functioning was tested in the postpartum stage of older and teenage mothers, the older mothers outperformed the teenage mothers; suggesting the influence of age. Likewise, when spatial working memory during the middle age was compared among mothers that have had multiple pregnancies (multiparous) verses mothers who have had only one pregnancy (primiparous), it was found that multiparity enhanced memory but, primiparity did not. Studies investigating effects of parity/ the effects of age exist but, there are little studies looking at the two factors together. This is a deficit because if the two factors influence the changes, they must concurrently interact and together influence maternal caregiving behaviours. Therefore, this study proposes to investigate how the age of first parity effects maternal behaviour.
WAVE 4 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Impact and lessons learned from a novel science-focused public-lecture series at the Vancouver Public Library: Curiosities of the Natural World.

Presenter(s): Trachint Lail

Abstract
Curiosities of the Natural World is a novel public science communication lecture series held quarterly at the Vancouver Public Library. Initiated in 2018, the project has reached over 300 members of the Vancouver community in a no-cost, easy-access format (evening lectures at the Vancouver Public Library Central Branch). Seminars are an effective tool to introduce Vancouver residents and students to varying scientific fields, promote scientific thinking, and lower barriers to interacting with scientific professionals. This program is a collaboration between UBC Faculty of Science, UBC Public Scholars Initiative, UBC Let’s Talk Science, and the Vancouver Public Library. We collected data on attendance, subject matter and informal audience feedback throughout the lecture series, and learned lessons about ideal format, audience interest in subject matter, and seminar structure. In the final seminar of 2019, online and paper surveys were distributed to gather quantitative feedback on the impact of the project. Marketing strategies will be employed to analyze and assess these data in order to optimize future seminar series at the Vancouver Public Library. By using promotion methods, demographics, education level, and familiarity with current subject matter, we will suggest changes to future programs to appeal to a wider range of audiences.
Abstract
Although research has demonstrated that the association between pain and stress indicators (e.g., cortisol) may be moderated via pain catastrophizing (i.e., exaggeration of pain expressions) and positive dyadic coping (i.e., an interpersonal communication process in couples), this has not been studied in older adults. The present study examined time-varying associations between subjective experiences of pain and salivary cortisol concentrations as 180 older adults (Mean age = 76 years; 50% women) went about their daily lives, and investigated how pain catastrophizing and positive dyadic coping moderated this association. The participants provided pain ratings 4 times per day, and salivary cortisol samples 5 times per day, for a period of 7 days. They subsequently completed the Dyadic Coping Inventory (DCI) and Pain Catastrophizing Scale (PCS). Total daily cortisol concentrations, defined as area under the curve (daily cortisol concentration vs. time-dependent change), were calculated. Data were analyzed via multilevel models, including control variables (i.e., age, gender, drugs/medicine/nicotine use). It was hypothesized that pain would be positively associated with cortisol concentrations, and higher scores on the DCI and PCS would be related to a weaker and stronger association between cortisol and pain, respectively. Analyses revealed no significant association between cortisol concentrations and pain, and pain catastrophizing did not significantly moderate this association. In line with the hypothesis, positive dyadic coping significantly moderated cortisol-pain associations. These findings suggest that the association between cortisol concentrations and subjective experiences of pain may be weaker when older couples provide support to one another to cope with a stressor.
Theme: Individual, Community and Society

Title: Are some careers worth higher pay? Communion, collectivism, and occupational prestige across cultures

Presenter(s): Abigail Yuen

Abstract
Professionals in healthcare, early education, and domestic (HEED) careers are important for the functioning of society. However, in North America, HEED careers are assigned lower status and paid significantly less than their counterparts in science, technology, engineering, and mathematics (STEM). In a sample of 19,425 students from 48 countries, the current research aims to document and explain cross-national variation in the extent to which people support paying HEED careers as much as STEM careers. We focus specifically on the relationships of both individual and cultural values on people’s attitudes towards STEM and HEED pay differences. On the individual level, communal values describe the personal desire to foster relationships and care for others. On the country level, collectivism refers to a cultural value that focuses on building communities and maintaining harmony. Whereas previous research has found that on the individual level, North American individuals who endorse communal values are more likely to be supportive of higher HEED pay, little research has examined the relationship between cultural values and the perception of HEED pay. We are interested in understanding the extent to which individual and country-level values shape our attitudes towards higher pay for HEED professionals. Our first hypothesis is that individuals who personally endorse communal values will be more likely to think HEED professionals deserve higher pay. We further hypothesized that countries with higher collectivism scores will also be more likely to support higher HEED pay. With this cross-cultural approach, we hope to improve our understanding of pay differences across cultures.
WAVE 4 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: A Proposed Study of the Cause and Effect of the Negative Social Media influence on University Students’ Mental Health

Presenter(s): Zhaoyu Chen, Dominic Cupidon

Abstract
According to previous studies, countless university students today are using or have used social media services like Facebook, Youtube, Twitter and Instagram. However, along with the popularisation of social media services, past studies have also shown university students suffer from many mental health issues like “Facebook Depression.” This study aims to investigate and analyze the cause and effect of negative influences of social media on university students’ mental health. Our proposed study took the form of a survey that is designed to ask about university students’ thoughts about their negative personal experiences when using social media and suffering from mental issues caused by social media. The survey will specifically target university students across Canada. It will include questions that ask the participants to recall their memories and feelings of the time they are having mental health issues caused by social media sites and their personal opinion on the causes of those mental health issues. It is hypothesized that the structure layout, or “design language,” of social media services is a significant factor in causing negative influences on student’s mental health. This study aims to show how social media are “designed” to create mental health issues and how shall social media companies adapt their services to create a safer and healthier social media experience.
**Theme:** Individual, Community and Society

**Title:** The comparison of different insect repellent screening methods

**Presenter(s):** Madison Dirks

**Abstract**
Over half of the world’s population is at risk for diseases carried by mosquito vectors. Diseases such as malaria, dengue fever, chikungunya, and zika result in > 350 million reported clinical cases per year, with direct treatment costs or malaria being > $12 billion USD annually. The costs in lost economic growth are much greater. Personal protection through the use of repellents and insecticides is an important component of any mosquito vector management program. The demand for the development of new mosquito repellent is increasing. This is complicated as numerous methods for the testing of repellents have been reported. However, these testing methods are often reported independently and not validated using alternative measuring techniques. This study compares the current methods used for screening insect repellents. The comparison of different screening methods allows for the most effective bioassay to be determined. A version of the High-Throughput Screening System (HITSS) introduced by Grieco et al. (2005) is used in the current study to verify spatial repellency, contact-irritancy, and toxicity. Our 3D printed modified HITSS chamber provides comparable data to previous published methods. Our modified toxicity chambers are compared to the CDC bottle bioassays, to determine which method delivers higher productivity and relative ease of experimentation. For each design, DEET and Picaridin were tested at various concentrations on the yellow fever mosquito Aedes aegypti. Our study can assist in determining the best methods for testing and reporting of spatial repellency, and toxicity of newly developed insecticides and insect repellents.
Theme: Individual, Community and Society

Title: The Impact of Culture on Body Dissatisfaction in Aesthetically-Focused Sports: An Examination of Eastern and Western Cultural Backgrounds

Presenter(s): Angelica Joy Calapiz, Taylor Kristmanson, Natascha Lam, Lauren Platz

Abstract
Adolescent females are vulnerable to body dissatisfaction as they begin to experience changes associated with their body. Furthermore, research suggests that females participating in aesthetic sports, such as gymnastics and swimming, experience greater body dissatisfaction than females participating in non-aesthetic sports. In addition, societal pressures that stem from an individual's cultural background may impact body dissatisfaction among female athletes. Research indicates that both Eastern and Western cultures have idealized a thin figure as an indicator of beauty, which may create body dissatisfaction if this ideal is not met. However, there may also be differences between how these cultural groups view the body as a result of their collectivistic versus individualistic orientations. The impact of cultural background on body dissatisfaction within sport has not been examined in-depth, therefore the proposed research will explore the influence of Western and Eastern cultural backgrounds on body dissatisfaction among adolescent females participating in an aesthetic sport. A sample of female athletes (13 - 18) who are currently participating in aesthetic sports will complete the Figure Rating Scale and demographics, which will ask them to indicate the cultural background they identify with. Inferential techniques will be utilized to infer correlations and complete an analysis of variance between cultural groups. It is expected that athletes from Eastern cultural backgrounds will experience more body dissatisfaction due to the dynamics of collectivism, (e.g., conformity norms and self-enhancing behaviours). The results of this research will inform future educational and training strategies to promote healthy body image perceptions within female aesthetic sports.
Theme: Individual, Community and Society

Title: Do Children Always Trust Confident Individuals? Not When it Comes to Moral Dilemmas and Subjective Opinions

Presenter(s): Aksh Aggarwal, Allegra Passacantilli

Abstract
Children and adults often view confident individuals as being more credible than hesitant individuals. In adults, cues associated to a person’s confidence level are interpreted differently depending on the context. A person who responds hesitantly to a moral issue may come across as more credible than a person who responds hesitantly to a factual question. When does this context-dependent interpretation of confidence emerge? Eighty-four 6-8 year olds listened to a confident or hesitant speaker answer either factual questions such as ‘Which of these animals is the most intelligent?’, moral based questions ‘Which of these animals should get a prize for being so helpful?’ or subjective questions like ‘Which of these animals is the nicest?’. After hearing the speakers responses, participants answered four questions: 1) How confident is the speaker? 2) Do you like the speaker? 3) Do you think the speaker is smart? 4) Do you agree with the speaker? Results demonstrated that children rated the confident model as more confident in the fact, moral and subjective condition. The fact condition was the only condition where we see the confident model as significantly preferred, rated as smarter and more agreeable. Children prefer to learn from confident sources over hesitant when learning new facts, but do not show this preference when people are providing subjective information or offering their opinion on a moral dilemma. Findings revealed that children interpret confidence cues based on context. This research sheds light on the remarkable level of sophistication with which children evaluate informants.
WAVE 4 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Everything Causes Cancer: The Association of Social Media Use and Beliefs in an American Nationally Representative Survey

Presenter(s): Diana Djaksigulova

Abstract

Introduction: Social media users are bombarded with information and misinformation on a multitude of cancer causes. While it is often stated that “it seems like everything causes cancer”, no studies within our knowledge have quantified the prevalence of this belief or its association with social media use.

Methods: The Health Information and National Trends Survey (HINTS) is a series of surveys collected by the National Cancer Institute. This study used HINTS 5 Cycle 2, which collected responses from 3,504 unique households in 2018. Survey-weighted logistic regression was used to calculate nationally representative estimates of associations between five social-media behaviours and the belief that everything causes cancer. Detailed survey methodology can be found on the HINTS official website.

Results: This study found that nationally, 71.0% of Americans agreed with the statement that “it seems like everything causes cancer”. There was increased prevalence for this belief among respondents who in the last 12 months have: visited social media for health information (OR=1.337, 95%CI: 1.017-1.758, p=0.043); shared health information on social media (OR=1.798, 95%CI: 1.278-2.530, p=0.002); participated in a support group for a similar health issue (OR=1.854, 95%CI: 1.096-3.137, p=0.026); and used YouTube to find health information (OR=1.510, 95%CI: 1.149-1.985, p=0.005). The only social media behaviour evaluated, not to be associated with the belief that everything causes cancer, was blog-writing (OR=0.953, 95%CI: 0.360-2.525, p=0.923).

Conclusion: The belief that “Everything causes cancer” was more prevalent among both individuals who sought health information on social media, and those who shared health information on social media.
WAVE 4 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: The Absence of Bullying Prevention Amongst Youths: Effects on Mental Health

Presenter(s): Anusha Jain, Hanlu Du, Chanpreet Khangura

Abstract
Bullying has become a worldwide issue that needs to be addressed cross-culturally. Further causing a series of psychological issues that influence the cognitive functioning of youths. Financial support is given to handle the issue, however there is still an increasing trend for bullying. Based on this background, the research aims to find how mental health is affected by a lack of bullying prevention. To conduct this research, thirty-five peer reviewed articles were collected on emotional and behavioural difficulties. They were classified through three variables: stress, lack of resources, and mental health to assist with further analysis. All articles suggested that insufficient resources prevent help for bullying and mental health. Subsequently, increased anxiety levels due to this issue. By highlighting the lack of resources in our analysis, a relationship is demonstrated that throughout the world, several adolescents face similar issues in terms of mental health. The research conducted examined youths from different countries, hence the analysis indicated a cross-cultural population. Thus, our research can be generalized towards a large sample of adolescents throughout the globe. Overall, there is further research that can be conducted on trusted support that is the most beneficial towards adolescents. In sum, aid such as parental support, doctors, counselling, and peers have been proven to assist with mental wellness, however they are limited. Resources are essential and can support youths, especially in emergency situations such as suicide attempts.
WAVE 4 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Nasality Contrastiveness in Pirahã

Presenter(s): Isabel Salomon

Abstract

Pirahã is a Brazilian Amazonian language spoken by approximately 700 people (Salles in prep). It has one of the smallest sound inventories in the world, with 8 consonants and 3 vowels (Everett 1979). Working on word list recordings collected in 2013, with 6 speakers, we observed unexpected patterns regarding oral and nasal vowels. According to previous descriptions, nasal and oral vowels are contrastive in Pirahã, which means that they would be, essentially, predictable (Everett 1979, Sandalo and Abaurre 2010, Sandalo 1989). In this research, we propose that the past description of nasality is not consistent with the collected data, suggesting that nasality is not predictable in Pirahã. We acoustically analyzed the speech of six speakers, with approximately 100 tokens per participant, and transcribed nasality based on perception. We observed the environments of oral and nasal vowels and determined that both appear in nearly identical environments, suggesting that nasality is not predictable. A paper by Hall & Hall (2016), discussing the quantification of marginal contrastiveness, would be of use in future steps in determining the specific variety that nasal and oral vowels fall in to, be it separate sounds, in free variation, or marginally contrastive. This research furthers our lacking description of nasality in Pirahã, as well as raising questions on past research done on the subject.
WAVE 4 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Analyzing Instagram’s Impact on Social Comparison and Self-Esteem

Presenter(s): Isaac Chung

Abstract
Social media is a form of online electronic communication where users can create profiles to share personal information online in the form of media and connect with other users exhibiting similar interests. One’s online activity has an impact on the many personal facets in an individual’s physical, emotional and social life. Social media has a direct link to social comparison, where comparisons between individuals online can impact one’s self-worth. In addition, one’s self-esteem, an individual’s evaluation of their own value, is also often associated with social media usage. Furthermore, there is also a relation between social comparison and one’s self-esteem, stemming from online interactions and activity. These associations have driven scientific research which investigates how social media, primarily Instagram, can cause social comparison and impact an individual’s self-esteem. With over 1 billion monthly active users (TechCrunch, 2018), Instagram has cemented itself as one of the largest social networking sites internationally, demonstrating its significance in the lives of adolescents. This study seeks to conduct a systematic review in a manner that synthesizes previous literature to understand the clear associations between Instagram, social comparison, and self-esteem, unlike past studies which have presented conflicting conclusions. While there is a prominent amount of research into other popular social networking sites such as Facebook and Twitter, Instagram’s surging popularity among the youth of this generation, demands its own research beyond the numbered limited studies that have been conducted previously.
Theme: Individual, Community and Society

Title: Crossing the Language Boundary: Syllable fusion in Cantonese-English Code-Mixing Speech

Presenter(s): Ivan Fong

Abstract
Syllable fusion is a fluent speech process that happens in Cantonese and described as the merging of neighbour syllables through lenition, deletion, or vowel reduction of their respective edges. An example of syllable fusion as a continuum can be seen here: /tsiːu55 thɐu21 (tsou35)/ → [tsi:55 ɐu21 (tsou35)] → [tsi:u55+21 (tsou35)]. Syllable fusion is an extremely productive process that can occur in any frequently uttered sequence of morpheme, even crossing word boundaries. This process is also compared with the contraction process in English words like “do not” to “don’t” despite lacking intermediate forms. Although being well studied in Cantonese, no research has been done on the possibility of syllable fusion on non-Sinitic languages. This begs the question, can syllable fusion happen in Cantonese-English mixed coded speech across the words boundary of the two languages? Code-mixing is used productively within bilingual children, it is perhaps not too far-fetched to also ask if a productive Cantonese process can be leaked into English words during code-mixing. Through a bilingual corpus that focuses on natural fluent speech, utterances that contain both English and Cantonese will be examined to see if syllable fusion occurs between Cantonese-English word boundaries. Utterances will first be narrowed down through the native intuition of the first author, followed by spectrographic and possibly acoustic analyses borrowing from previously done research on Cantonese. The initial narrowing down process has given evidence that syllable fusion does indeed happen between English and Cantonese. Further analyses will be needed in order to substantiate this finding.
WAVE 4 | POSTER PRESENTATIONS

Theme: Individual, Community and Society

Title: Impact of Employment on Recovery Among Individuals who are Homeless with Severe Mental Illness

Presenter(s): Sara Samani

Abstract
Recovery from mental illness alone is a challenging state to overcome, but for individuals who are homeless, this can involve a multidimensional and complex process. This study aims to understand the effect of employment on recovery among individuals who were homeless and were diagnosed with severe mental illness using Vancouver at Home (VAH)/Chez Soi study. VAH includes 2 randomized control trials evaluating the effect of housing and support intervention in vulnerable communities. We examined the effects of current employment on recovery using self-report questionnaires at baseline (ie. Service Use History - DHCC), and once during follow-up sessions (ie. Vocational Timeline Follow-Back - VTFLB) every 8 months for the period of 2 years. We assessed recovery once at baseline, and at the 24-month follow-up visit. Our study looked at the association between current employment (ie. at the baseline where they reported to be employed at the time of intake) and recovery at the 24-month visit. This study also looked at the association of cumulative effect of employment over the follow-up and recovery at the 24-month visit. Results showed that recovery at the 24-month visit was associated with a cumulative effect of employment over the follow-up. However, recovery at a 24-month follow-up was not associated with employment at baseline. In conclusion, employment can increase recovery in mental illnesses for individuals that are homeless. Further investigation suggests a longitudinal study to look at the effects of employment on recovery and its patterns of change as a result of the recovery.
WAVE 4 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Tooth Replacement Patterns in Leopard Geckos

Presenter(s): Lauren Holzman, Luna Liu

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 favors 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 a diffusion model to define an inhibition function that we can use to predict and simulate the development and replacement patterns of teeth through the dental lamina. Following this, we compare the simulated data to experimental data provided by the Richman and Brink labs to evaluate the accuracy of the model. Here, we develop a mathematical test for accuracy to further improve the model or disprove the hypothesis.

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

Title: Designing a Measurement Methodology for the Upper Aerodigestive Tract of Phoca vitulina

Presenter(s): Hirad Nourbakhsh

Abstract
In North America, wild harbor seal pups (Phoca vitulina) are among the most common marine mammal admitted to rescue centres. Nutritional support early in admission is typically via oral gavage, followed by oral feeding. In order to adapt these interventions, an in depth understanding of the upper aerodigestive tract (UAT) swallowing anatomy and physiology is required. We sought to design a systematic measurement method to quantify UAT structure size. We photographed specimens of orphaned harbor seal pups during necropsy following their death while in rehabilitation. UAT structures included: tongue, vocal folds, cricoid cartilage, trachea, and epiglottis. We developed a manual operationalizing UAT measurement techniques using ImageJ (NIH, 2010). Following, we summarized measurements with means (standard deviations) and medians (interquartile ranges) as appropriate. We also explored correlations (Pearson's correlation coefficient) between UAT structures and other body measurements. We measured UAT structures of 14 deceased harbor seal pups (age range: 3-60 days). Post-mortem UAT measurements (mm, mean ± SD) included: 1) tongue tip to epiglottis base: 82.7 ± 6.9, 2) vocal fold length: 13.9 ± 2.0, 3) tracheal diameter: 10.3 ± 1.4, and 4) epiglottic length: 20.0 ± 2.8. We did not observe statistically significant correlations between seal body length and UAT dimensions. In conclusion, we developed a systematic method to measure the UAT structures for seal pups. The findings can be used to expand the knowledge base regarding harbor seal macroscopic anatomy and ultimately contribute to the development of a cross-species conceptual swallowing framework between humans and seals.
Title: Using BioID for the validation of the interaction between SNX14 and the 5-HT6 receptor in vivo

Presenter(s): Guneet Multani

Abstract
Serotonin, an endogenous neurotransmitter that plays an important role in cognition, learning and memory, is known to bind to the 5-hydroxytryptamine subtype 6 receptor (5-HT6R), a G protein-coupled receptor. Numerous studies have shed light on the role and involvement of 5-HT6R in various conditions such as obsessive compulsive disorder, Alzheimer’s disease and schizophrenia. Because very little is known about its specific regulation and function, characterizing its interactome is important. Previous studies used co-immunoprecipitation to identify its interactors. Here, we will use a novel protein-protein interaction detection method, BioID, to capture potential interactors in vivo. Along with novel interactors, we also expect to see some that have already been identified before. In our data we found that Sorting Nexin 14 (SNX14), a protein that was previously labelled as an in vitro interactor, was also captured. SNX14 has been shown to play an essential role in neural development as knockdown of this protein results in impaired excitatory and inhibitory synaptic transmission and mutations in SNX14 cause intellectual disability syndrome. Hence, exploring the interactions of SNX14 can help us understand the underlying mechanisms behind these outcomes. Additionally, expanding our knowledge about the interactions of 5-HT6R can also suggest potential candidates for the treatments of 5-HT6R related diseases.
WAVE 4 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: The Impact on Rat Pup Development When Dams Are Able to Spend Time Away

Presenter(s): Alexandra San Pedro

Abstract
Rat dams in laboratories are typically housed in small cages that prevent them from spending time away from their pups. Research on pigs suggests that the quality of maternal care increases in complex environments, resulting in weaned piglets to develop social skills and behaviours faster. The development of rat pups is also significantly affected by the maternal care they receive. This research investigated if pup development was affected when pups were housed in a cage with a loft that was only accessible to the dam. Given that the ability to control contact with pups alters the maternal behaviour of rat dams, we hypothesized that the presence of a get-away loft would affect the development of rat pups’ behaviours and post-weaning growth. At 21 days of age, pups were weighed and tested before being weaned on the elevated plus maze, a standard behavioural test for measuring anxiety-like behaviours in rats (n=16 litters). Average weight gain per litter was calculated one week later (n=10 litters). Preliminary results show that pups housed with lofts (“loft pups”) spent 12.7 ± 1.8% of their time in the open arms of the maze (indicative of lower anxiety), compared to 9.1 ± 1.0% for pups without a loft (“control pups”). Loft pups gained a mean of 51.6 ± 4.6g of weight post-weaning, while control pups gained a mean of 47.0 ± 1.5g. Analysis is ongoing, however descriptive results may indicate that the dam’s voluntary separation does not affect pup behavioural development or growth.
Abstract
Acute Myeloid Leukemia (AML) is a blood cancer that originates in the bone marrow due to the overproduction of immature blood cells known as blasts. These blasts begin to accumulate and begin to obstruct healthy bone marrow cells from functioning. AML remains to be a difficult disease to treat, therefore many different approaches have been designed such as Chimeric Antigen Receptor (CAR) T-cell therapy. However, CAR T-cell treatments often result in detrimental side effects and a large portion of patients remain unresponsive to treatment. Therefore, we wish to investigate how the immune microenvironment can be exploited to increase the efficacy of CAR T-cell treatment to decrease disease relapse and cell dosage. [JI1] To test this, we isolated mouse CD8+ T-cells and virally induced expression of anti-CD33 CARs. Simultaneously, we isolated AML cells from our AML mouse models and knocked out numerous microenvironment-interacting receptors before injecting them into secondary mice. CAR T-cells at different dosages were then injected into the secondary mice for survival to be analyzed. We found that the knockout of CXCR4 and HIF1α resulted in increased survival rates at lower dosages of CAR T-cells, compared with the CRISPR controls. Increasing CAR T-cell dosage past a certain threshold resulted in a drop in survival rates for all knockouts and controls, likely due to treatment-related toxicity. Results show that simultaneous targeting of the microenvironment in addition to CAR T-cell induction is crucial for increasing treatment response and improving the balance between treatment efficacy and toxicity.
WAVE 4 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Influence of Surfactant Type on Liquid Content in Foams

Presenter(s): Melissa Le

Abstract
Foams are ubiquitous in the industry and are commonplace household items or food products, such as shaving cream or meringue. Foams are formed and stabilized by surface active agents, or surfactants, which act at the gas-liquid interface to lower the surface tension. The application of surfactants in the industry is most often based on “trial-and-error” to yield desirable foam properties. While many studies have examined the effect of surfactants on stability, a better understanding of how surfactants influence the foam density is also crucial in its optimization. The Gibbs elasticity of various surfactants was measured by employing a novel force-based method. An instrument called the Cantilevered-Capillary Force Apparatus (CCFA) was used. Measurements of Gibbs elasticity can provide a better understanding of surface dilational forces acting at a gas-air interface. These results encourage further examination of other factors involved in correlating surfactant type and liquid content, which may allow for the characterization of surfactants.
**Abstract**

The Tapestry Tool is a newly-developed online teaching tool that encourages interactive and collaborative course content through a non-linear layout. The Tapestry team has extensively reviewed research on improving student engagement in online learning environments; encouraging interactive behaviours is believed to be one of the most effective ways to do so. While student needs have been central to informing the design of the interface, it is critical that instructors’ needs be considered simultaneously. One of the main pitfalls for instructors in online teaching is anxiety about their expertise in using such technologies. Unless they feel supported in their use of it, the tool will not be widely implemented, and students will not have the opportunity to benefit from the tool.

Thus, the present work focused on improving the authoring tool, the interface allowing instructors to upload content. Previous focus group data were summarized to discern instructors’ principle needs, as well as their concerns about implementing the tool in their classrooms. This in turn informed the methods of usability testing, where participants were asked to complete tasks using a prototype of the tool, to see whether it was being used as envisioned by the designers. It was found that all participants enjoyed the layout and general interface, as well as the concept of the tool, but requested more guidance in the uploading process, custom visibility options, and support with creative features. Future work will focus on creating an interactive walkthrough to guide users through their online course creation.
WAVE 4 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Reduction of CAR T-Cell Treatment Cytotoxicity Through Optimal Antigen Targeting of Chimeric Antigen Receptors

Presenter(s): Zhiyuan Lu

Abstract
Acute Myeloid Leukemia (AML) is a cancer that results in the abnormal production of immature blood cells, called blasts, in bone marrow leading to various hematologic diseases. For nearly four decades, the standard of care has been chemotherapy, highlighting the need for new, precise treatments. One quickly emerging treatment is chimeric antigen receptor (CAR)-T cell therapy; however, effectiveness is limited due to the similarity of extracellular antigens between Leukemic stem cells (LSC) and Hematopoietic cells (HSC). C type lectin molecule 1 (CLL-1) is a potentially favourable CAR target due to its presence in AML cells and LSCs and the lack of expression in HSCs, potentially allowing for preserved hematopoietic function post-treatment. Thus, we wished to explore the efficacy of CAR T-cells targeted towards CLL-1. We designed our chimeric antigen receptor (CAR) through viral transduction for anti-CLL-1, followed by activation with CLL-1 antibody beads. Cells were then injected into our AML mouse models and survival rates were measured and in comparison with current CAR-T cell treatments. Mouse models with the CLL-1 target showed lowered cytotoxicity through cytokine measurements using ELISA as well as longer overall survival. CLL-1 targetted T-cells also showed faster recovery of the bone marrow. Here, we show that the expression of CLL-1, prominent in AML and LSCs but not HSCs, can be used as a favorable target for CAR-T cell targeting, while minimizing host toxicity. These results help guide the selection of CAR-T cell therapy targets for future clinical trials and provide some insight on differential antigen expression.
Theme: Innovation and Technology

Title: Modern Methods of Antibody Discovery

Presenter(s): Anchal Kataria, Christina Yuan, Kyle Fernandez

Abstract
Antibodies are increasingly being exploited for their high specificity as therapeutics and research tools. In fact, five of the top ten selling drugs today comprise these proteins that are crucial to the survival of the immune system, with adalimumab, an antibody used to treat arthritis, holding the highest sales at 20 billion dollars. There exist many ways to isolate antibodies, herein we examine, compare and contrast classical immunization, phage display, and yeast display. Classical immunization, the most common technique used for antibody discovery today, involves the use of hybridoma cells to generate monoclonal antibodies (mAbs). This method is credited for its straightforward method of antibody isolation and the diversity of mAbs it provides. In comparison, phage display is a simplistic yet powerful method to isolate antibodies using bacteriophages. This approach allows for large scale panning of antibodies in a simple and efficient process. Lastly, yeast display is a rather novel technique involving yeast cells that has yet to be used for the development of therapeutic antibodies. However, promising implications lay within the method of yeast display as it provides post-translational modification mechanisms as well as short turnaround times. These techniques are used to yield a variety of antibodies, which are being utilized for therapeutic applications, drug discovery, and research.
WAVE 4 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Nature vs Nurture: A Cellular Pathway for the Developmental Fate of Female Honeybees

Presenter(s): Oi Ting Kwok, Golzar Eijadi, Abby Holden, Bayan Noureddine

Abstract
Nature versus nurture in the process of differentiation of genetically identical cells is highly discussed in today's field of developmental genetics. This debate concerns how genetic vs. environmental factors affect the resulting developmental products. Female western honey bees (Apis mellifera L.) have two distinct developmental trajectories: queen or worker; both developing from embryos with the same genetic makeup. This differentiation happens during early larval stages and the resulting phenotypes exhibit unique morphologies, physiologies, and behaviors. Previous research has explored the influence of both epigenetic (environmental) and genetic factors on cell differentiation and the resulting trajectories. Some studies have proposed mechanisms where epigenetic factors, including chromatin remodeling, DNA methylation, and microRNAs, influence gene expression, while other studies have explored the role of nutrition in differentiation by focusing on diets of royal jelly (a substance consisting of water, sugar and proteins) and beebread (a type of fermented pollen). Other studies have also propositioned that certain gene expression and signalling influence epigenetic factors that contribute to the differentiation, and that epigenetics and genetics have a reciprocal relationship. Although multiple factors have been thoroughly researched separately and linked to differentiation, an all-inclusive model linking these factors together has yet to be produced. We compiled findings from existing literature and created a comprehensive pathway that explains and illustrates the complexity of the relationships between the various factors. We hope this model illustrates the dynamic nature of differentiation, reveals the interconnected relationships between multiple genetic and epigenetic factors, and highlights areas requiring further research.
WAVE 4 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Applications of molecular dynamics simulations in Chemistry

Presenter(s): Xinran Zhou, Yao Zhang, Sam Cheng

Abstract
Computer simulations are applicable to various fields of science including physics, chemistry, biology, and engineering. It is the process of applying mathematical models in computers in order to simulate real life systems. Molecular dynamics (MD) simulations, often referred to as the “virtual microscope”, are computer simulations used to study the energetics and interactions between molecules at an atomic level. The trajectories of the system are calculated using Newtonian mechanics, simulating different chemical and physical properties of the system. Although real life experiments sometimes fail to elaborate the atomistic details involved in physical phenomenon, the simulation of these details can often be produced using MD simulation. The GROMACS simulation package was used to carry out the MD simulations. It is a fast, flexible and open source software able to simulate thousands of particles at once. The current work is focused on applying MD simulation to understand heterogeneous ice nucleation in the atmosphere. Heterogeneous ice nucleation involves the formation of ice from water on a foreign substrate which has importance in atmospheric chemistry. Silver Iodide (AgI), a compound often used as a cloud seeding agent, is chosen as a model foreign substrate to examine the factors responsible for its ability to nucleate ice. It has been well established that a good lattice match to ice and the surface morphology are important criterias for ice nucleation. Hence, we distort the lattice of AgI systematically in order to see the effect that the lattice mismatch had on the nucleation of ice. We conclude that the rate of ice nucleation slows down as we increase the lattice mismatch.
Theme: Innovation and Technology

Title: Material and Structural Analysis of Cardiac Stents

Presenter(s): Praven Kamalanathan, Kit Yiu Choy, Jose Miguel Dimayacyac, Daywell Qiu

Abstract
Restricted blood flow due to prolonged atherosclerotic plaque build-ups in the coronary arteries can lead to coronary heart disease (CHD). CHD can potentially cause damage to heart muscles and can result in a heart attack. Fortunately, percutaneous coronary intervention (PCI) has allowed actions to be taken before such diseases turn fatal. PCI involves installing a small and flexible tubular framework, a stent, into the narrowed blood vessels near the heart. Since the mid-1980s, the medical industry and academia have been focused on stent structure and material in order to optimize stent performance as well as minimize complications such as Restenosis, artery ruptures, and subacute thrombosis. This research team focuses on the research and design for cardiac stents that allow for the best performance. A particular area of interest is in comparing the benefits and consequences between polymer-based and metallic stents. Though polymer-based stents are not as sturdy nor as durable as metallic stents, they are biodegradable and non-toxic. However, emerging developments using magnesium (Mg), iron (Fe), or iron alloys for stents provide a justifiable compromise between desired stent traits like mechanical integrity and degradability. By comparing mechanical properties such as stent material properties as well as performing simulations, our research team aims to design a stent with optimized capabilities for treating cardiovascular diseases. SOLIDWORKS is used for building the geometric CAD model and ANSYS is used for the simulations.
Theme: Innovation and Technology

Title: Constructing a Literature Curated Database of Direct Gene Regulated Experiments Relevant to Neurodevelopment

Presenter(s): Calvin Chang

Abstract
The development of the brain is a complex and highly regulated process controlled by the expression of genes during gestation. Currently, there are no high-quality resources that map out the regulatory relationships that occur between specific endogenous proteins called transcription factors and their downstream targets. We aimed to establish a high confidence database that demonstrates direct transcription factor mediated regulatory relationships for genes critical to brain development. We also aimed to assess the validity of TRRUST, a gene regulation database for its claim of having over 15000 curated gene relationships. We used manual curation to select experimental papers from pre-existing gene regulation databases like TRRUST and triaged large-scale literature databases like Pubmed for papers containing experimental evidence. Papers that utilized gene perturbation techniques, direct binding assays and reporter assays were considered papers with experimental evidence and were curated in detail. We report that we successfully curated over 900 positive gene regulation relationships containing two or more lines of evidence, with many being important brain development genes such as Pax6, Sox2 and Pbx1. Analysis of TRRUST’s gene regulatory relationships showed that over 25% of manually curated papers did not contain any concrete evidence for direct gene regulation. By developing a gold standard database for direct neurodevelopmental gene regulation relationships, we enable future experiments to validate their results and high throughput experiments to compare their findings. Also, a gene regulatory network for brain developmental can be created to trace the complex relationships that occur between multiple transcription factors and single gene targets.
WAVE 4 | POSTER PRESENTATIONS

Theme: Innovation and Technology

Title: Automation Home Using EEG And EEG Acquisition System

Presenter(s): Han Nguyen, Kalen Forrester

Abstract
MINT’s project this year is to make an Android App that allows users to control household devices through Google Home but just using their thoughts (EEG). In order to have data to train our machine learning model for EEG pattern classification, we made our own time-stamped cue videos with 4 different types of cues (raising left/right arm or left/right leg). We chose those cues because motor control thinking leads to very similar EEG patterns to when just imaging those motor controls, yet with higher amplitude, thus, easier to detect and ensure participants are following the cues. After filtering out noises from EEG data (low-pass at 0.1Hz and high-pass at 50Hz and EMG/movement artifacts using EEGLAB), we normalized the data and converted them into spectrograms. Our current machine learning model is convolution neural network. We have trained the model with more than 400 data samples (3 second for each sample) for each cue. The length of the data samples will be reduced in the future to let user control devices after almost instant thought. The model showed promising results. We will continue with more arbitrary thoughts such as turning the light on and have a model that can distinguish at least 10 of these thoughts, which are the goal control commands of our App. We have designed our own EEG Acquisition System with customizable EEG Headset frame to fit all head sizes, semi-dry electrodes with comb-shape to go through hair, spring system for comfort, and imbedded electrolyte tubing system which significantly reduced the skin impedance, and MENTHA 3.0, the 4-channel EEG Board.
WAVE 4 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Examining the Impact of Post-Dispersal Seed Predation Across an Elevational Gradient

Presenter(s): Rylan McCallum

Abstract
Biological interactions between plant and animal species play an important role in determining the distribution and abundance of coexisting populations. Monitoring species interactions contributes to the ongoing conservational study of population, productivity and general biodiversity. It has been suggested that herbivory places vital constraints on the survival and reproduction of seed species, thus regulating ecological and evolutionary processes. Plant species are experiencing range shifts upslope to adapt to warming temperatures, making it important to understand the impact that seed predation has on species ability to expand their range. In this study we systematically measured post-dispersal predation using starch and oil-based seed, across varying elevations, placed throughout hundreds of standardized seed depots. The proportion of seeds removed at each depot were recorded and used as a metric for predation rate. This study was conducted exclusively in the North Cascades mountain range, allowing for an intense focus on an elevational gradient across a diverse ecosystem. The results show that predatory interactions are affected by canopy coverage and seed type, increasing towards lower elevations and warmer ecosystems. This can likely be attributed to previously established gradients in climate and productivity. Our recordings of biotic interaction intensity allow us to extrapolate future trends in community composition due to the interactions overall impact on plant species fitness. Given that we know species are experiencing range shifts due to climate change, our results emphasize the need for extensive research into the role biological interactions play in determining the extent to which plant species can shift their ranges.
Abstract
The growth of Tetrahymena thermophila can be affected by the concentration of heavy metals. The focus of this study was to examine how T. thermophila responds to increasing concentrations of copper. Treatments of T. Thermophila suspended in SSP medium and copper concentrations of 0 ppm, 1 ppm, 3 ppm, and 5 ppm were incubated at 35o C while maintaining all other factors constant. Cell counts for T0 were done before incubating. Cell counts for T1 to T4 were done after incubation in increments of 2.5 hours. T5 was performed 24 hours after initial incubation and the last observation, T6, was 26.5 hours after incubation. Growth rate was slow from T1 to T3 and then growth rate increased until the end of the experiment. The highest average growth rate was found to be in the concentration of 1 ppm with a growth rate of 7293 cells/hour and the lowest average growth rate was found in the treatment at 5 ppm with a growth rate of 6528 cells/hour. After analysis by a one-way ANOVA, the null hypothesis for the effects of copper concentration and growth rate was rejected. Further statistical post-hoc analysis using a Tukey test found there was a significant difference between mean growth rates in the 3 ppm and 5 ppm copper treatments. Further experiments must be performed over a longer period of time, more treatment groups, and more concentrations between 3 ppm and 5 ppm in order to determine the exact copper tolerance level for T. thermophila.
Theme: Sustainability and Conservation

Title: Investigating biodiversity in parks and human health with citizen science data: A Vancouver case study

Presenter(s): Justin Angsana, Salwa Nimir, Harleen Dhami

Abstract
Background: Past studies have shown that increased exposure to natural environments can improve health in adults. However, specific factors, such as biodiversity, are poorly understood. Few studies have assessed the role of biodiversity on human health, possibly due to challenges such as cost and time. Citizen science has been shown to be an alternative to traditional methods of data collection. In this study, we propose using publically available citizen science data to investigate the relationship between biodiversity and human health.

Methods: We will use citizen science data from the Global Biodiversity Information Facility (GBIF) to evaluate species diversity in Vancouver parks. To account for inaccuracies in GPS locations, we will limit observations to within 100m of park boundaries. Using a Shannon index, we will investigate the use of three taxa, birds, plants, and insects, as proxies for biodiversity. Using these proxies we will model the relationship between park biodiversity and human health, as measured by the Canadian Community Health Survey, accounting for relevant confounders.

Results: Our preliminary analyses show GBIF data as an appropriate proxy for biodiversity. Studies have shown small improvements in health with increased diversity of birds, however, results are inconsistent. As such, we expect to find small positive relationships between diversity and human health.

Conclusion: We expect this study to show that citizen science data can be used to model biodiversity for health studies. This work will add to the evidence that supports policies for enhancing urban natural spaces and health.
WAVE 4 | POSTER PRESENTATIONS

Theme: Sustainability and Conservation

Title: Sustainable Agriculture: The Importance of Alternatives to The Slash and Burn Technique

Presenter(s): Jeanette The, Kelly Milana Widjaja

Abstract
Slash and burn refers to the act of burning forests to allocate lands for agriculture, often utilized as the technique is cost-efficient and the product can self fertilize crops. Over the last decades, slash and burn practices became even more prevalent in Asia, Africa, and South America to sustain the ever-growing population. With the rise of awareness around climate change, this technique has raised a global concern despite its popularity. Mainly because of the practice’s impact on biodiversity, especially on immobile species such as plants and the ecosystem by contributing to excessive pollution. This study aims to explore other techniques that can be employed to produce food without risking the ecosystem. This research shows that multiple farming practices exist and provide better benefits, both socially and environmentally. Hydroponic refers to the practice of using water as a growth medium that saves space and maximizes nutrient intake which allows more yield of produce compared to soil-grown harvest. Alley cropping is the practice used on land where crops are grown in between trees, on the “alley”. Similar to hydroponics, this allows maximum use of space. To add, this technique benefits the ecosystem by increasing biodiversity and preventing soil erosion. The population, especially farmers should be more aware of these alternatives which although less convenient, would significantly decrease the damage done to the ecosystem and protect our biodiversity.
WAVE 4 | POSTER PRESENTATIONS

**Theme:** Sustainability and Conservation

**Title:** Bitter taste adaptation in Drosophila

**Presenter(s):** Eleanor Hsiun, Nataly El-Bittar, Anson Tang

**Abstract**
Taste is a crucial survival mechanism that enable animals to differentiate edible nutritious foods from toxic substances. Calorically dense foods that contribute to an organism's survival, for example sucrose, are found to be more inherently appetizing whereas bitter tastants associated with toxic compounds trigger an aversive feeding response. However, it has been found that many animals can adapt feeding behaviour and taste preferences based on past experiences with certain food. Drosophila is a model organism for studying olfactory learning. Attraction towards an appetitive tastant can be quantified by a proboscis extension response (PER) while aversive tastants elicit no PER. Drosophila have shown to be capable of forming preferences or aversions toward certain odours when paired with an unconditioned stimulus (US) like sucrose or shock. This study aims to determine if Drosophila melanogaster (fruit flies) are capable of adapting to a bitter aversive tastant if exposed regularly at early phases of their life. We hypothesize that flies exposed to bitter food since the onset of their life cycle will show reduced aversion towards bitter compounds, since they learn to associate the bitter taste with nutrition and survival. This study will provide insight into the relationship between learning and aversive tastant and provide understanding in how human taste preference can be manipulated with the potential of reducing obesity.
WAVE 4 | POSTER PRESENTATIONS

**Theme:** Sustainability and Conservation

**Title:** The Effects of Climate Change on River Geomorphology

**Presenter(s):** Xinyue Liang, Alvin To, Negah Rahmaty

**Abstract**
We are interested in the effects of climate change on river geomorphology. The area of our study concerns the Mackenzie River delta, beside Aklavik, NWT. Our research will have implications for planning any human activities or settlement within its vicinity. Warming temperatures will increase river discharges as more mountain glaciers or permafrost melt into it, leading to bigger floods and discharges due to the higher flow. To find areas at risk of being submerged by a rising Mackenzie River, we will use ArcMap to analyze the surrounding area’s elevation relative to it and determine how much of a threat heightened flows will pose. If the composition of the surrounding rocks or soil are known, we can also determine more accurately if that area is at risk of being washed away or eroded by rising waters. Based on these factors, we can run criteria models to predict what areas are at high risk of flooding. We deduce that in areas with soft, loose soils, heightened river flows will be more effective in modifying river courses over time than areas with tougher soils. Additionally, rare, extreme weather events such as landslides or flash floods carry the possibility of hastening the process of change to the span of days instead of years. The results of our study will assist developers in choosing suitable areas to build in as well as riparian engineers in where to construct river defences to protect existing settlements.
Theme: Sustainability and Conservation

Title: The Effect of Salinity on the Growth Rate of Tetrahymena thermophila

Presenter(s): Je Eun Hwang, Srijan Subedi

Abstract
The objective of our study was to determine the effect of calcium chloride dihydrate (CaCl2·2H2O) on Tetrahymena thermophila. T. thermophila is a common ciliated protozoan in freshwater and is an important primary producer for many ecosystems. This study measured the growth rate of T. thermophila in 0mM, 2mM, 20mM and 200mM concentrations of CaCl2·2H2O. Cell concentration was measured in each test tube when the organism was first added and again after 2, 4, 7, 9, 25 and 28 hours to find the overall growth rate of the organism. Using ANOVA and Tukey’s post hoc statistical analysis, it was revealed that the 200mM concentration was significantly different than the other three concentrations of 0mM (p=0.0001), 2mM (p=0.0002), and 20mM (p=0.0023) respectively. The other three concentrations were not significantly different from each other. It was evident that increasing the salt concentration had an adverse effect on the growth rate of T. thermophila. T. thermophila influences the food source of juvenile salmon and it is suspected that any changes in the population and growth rate of T. thermophila will ultimately impact the population of salmon, a keystone species. The calcium levels in freshwater systems habitable by juvenile salmon are consistently altered by human activities and such environmental factors compromising their resources for survival requires consideration.
THANK YOU

Thank you to everyone involved for their participation and continued support in making MURC 2020 possible. If you are interested in getting involved with MURC 2021, please visit students.ubc.ca/murc.

We can’t wait to see you next year at MURC 2021!