MURC | MULTIDISCIPLINARY UNDERGRADUATE RESEARCH CONFERENCE

Program Guide

Saturday March 21st, 2015

9.30am-4pm

UBC Vancouver

students.ubc.ca/career/murc

#UBCMURC

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA
Centre for Student Involvement and Careers

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Take a look at what's inside.

Be Social

We are excited to be live-streaming any digital conversations that take place throughout the day during the opening and closing keynote sessions. If you want to join the conversation online, use #UBCMURC.

Share the highlight of your day, something new you learned, or even share photos!

Prizes

We have some great door prizes for anyone registered at MURC. We have gift certificates that have been generously donated by UBC Food Services to give away.

In your nametag is a raffle number. During the closing keynote, session numbers will be drawn and the winners will be selected. Please be advised that you must be in attendance to win the raffle.

Schedule

Get an overview of the day.

9:30 am-10.00am	Check in	*Old Auditorium - 6344 Memorial Road*
10:00 am-10.45am	Opening Session	*Old Auditorium*
11.10 am-12.10pm	Morning Oral Presentation (Session 1)	*Buchanan Building - 1855 Main Mall* *IKBLC - 1961 East Mall*
12.10 pm-1.00pm	Lunchtime	*IKBLC 302 (Dodson Room)*
1.00 pm-1.45pm	Poster Display Presentations	*IKBLC Golden Jubilee Room (fourth floor)*
2.00 pm-3.00pm	Afternoon Oral Presentations (Session 2)	*Buchanan Building* *IKBLC*
3.15 pm-4.00pm	Closing Session	*Old Auditorium*

What is MURC?

Celebrating exciting and innovative undergraduate research at UBC.

MURC 2015

The Multidisciplinary Undergraduate Research Conference is an annual celebration of undergraduate research happening at the UBC Vancouver and UBC Okanagan campuses. Student researchers showcase their research in either oral or poster presentation format.

MURC presenters are any UBC undergraduate student who is participating in, or has completed their own Faculty-supervised research project. All Faculties and Schools are welcome. This year's Conference features 200 research projects hosted by over 290 presenters.

MURC finalists have the opportunity to apply to present at the annual Universitas 21 Conference, taking place in Auckland in the summer of 2015

Opening Keynote

Get inspired by a former undergraduate researcher

Ashley Whillans

MA, PhD Student

Ashley Whillans is a recent graduate of the MA program and is currently completing a PhD in Social Psychology. During her undergraduate studies at UBC, Ashley received more than a dozen awards for excellence in academics, service, and leadership including the Wesbrook Scholar designation. Since starting graduate studies in 2012, Ashley has won 17 merit-based scholarships and awards to fund her studies and research totaling $200,000+. Ashley works with Dr. Elizabeth Dunn and Dr. Frances Chen to study factors that improve the student experience and that can help people use their time and money in happier and healthier ways.

Closing Keynote

Three Minutes Thesis

Zoe Wai-Man Lam (Winner)

Perception of Lexical Tones by Heritage Speakers of Cantonese

Born and raised in Hong Kong, Zoe is a PhD candidate in Linguistics. Her research focuses on the phonology of tone languages, the interface between phonetics and phonology, tonal perception and tonal processing. Her secondary research interests include pragmatics and syntax. She has presented works on Cantonese, Nata (an endangered language in Tanzania) and Canadian English at various academic conferences in Canada, the United States, Hungary, Taiwan and Hong Kong.

Being a social activist, she is an active member in the Cantonese community in Vancouver. Concerned about the preservation of Cantonese language and culture, she was a collaborator of the art exhibition "Transgression/ Cantosphere" in Vancouver Chinatown, and was interviewed by Mingpao and OMNI news. She was also invited to speak about language and politics in Hong Kong at a recent panel discussion on the Umbrella Revolution at UBC.

Miranda Meents (Finalist)

Sorting out the Cell's Sorting Centre

Originally from Calgary AB, Miranda received a BSc in Biological Sciences in 2009 from University of Lethbridge. While there, she completed an undergraduate honour's thesis project studying plant development. She worked as a lab technician at the University of Alberta 2009-2012, working and tree defence against Mountain Pine Beetle. Co-supervised by Dr. Lacey Samuels (Department of Botany, Faculty of Science) and Dr. Shawn Mansfield (Department of Wood Science, Faculty of Forestry), she started her MSc at UBC in the Department of Botany in 2012, and transferred into PhD program in 2014.

Ana Elia Ramón Hidalgo (Finalist)

Forest communities, stay connected! Linking Empowerment Social Capital and Gender in Community Ecotourism

Ana Elia was born in Barcelona, Spain where she studied agriculture engineering and forest engineering. After working for the Department of Natural Areas of Barcelona Province promoting community forestry in the province, in 2008, she moved to Canada to do her masters at UBC on Management of outdoor recreation conflict in Squamish. Ana Elia is currently a PhD student at the Faculty of Forestry at UBC and a creative facilitator in training with PYE-global. Her current research interests revolve around issues of gender equity, rural development of forest-dependent communities and social capital and social networks.

Pardis Lakzadeh (Finalist)

Economic Evaluation of homestead food production in rural Cambodia.

Pardis Lakzadeh is a Master of Science student in Population and Public health in the Health economics option. She holds a bachelor's degree in Integrated Sciences in the area of Human Nutrition and Immunology from UBC. Her research interests involves understanding the economic impact of large-scale interventions at the household level as well as the Economic Evaluation of nutrition programs aimed at reducing maternal and child under nutrition to inform resource allocation and implications for program scale-up.

Lunchtime Booths

Informative booths happening during the lunchtime session

UBC Library

Do you have an opinion about study space on campus? Want to share your ideas about how to make things better? Come visit the Library booth, and write your ideas on our feedback board. Inspired to start a big research project? With more than a dozen branches in Vancouver and in the Okanagan, UBC Library offers a vast array of research and collections resources. Come talk to a Librarian about how to tackle your next research project, and make the most of the resources available to you.

Undergraduate Research Opportunities (URO)

Undergraduate Research Opportunities – Enquire. Equip. Engage. Empower.
This AMS student run club is at the leading edge of undergraduate research at UBC.
Events: hold information booths at a wide array of events.
Workshops: invite and coordinating with UBC Faculty as guest speakers that are specialists in the subject matter of the workshop.
Programs: URO's flagship program - the Research EXpereince (REX) - is the largest undergraduate research program at UBC.
MUCH MUCH More: inquire at the lunch booth.
Undergraduate Research Opportunities – Enquire. Equip. Engage. Empower.
uro.ubc@gmail.com | uro.ubc.ca | FB.com/uro.ubc | Twitter & InstaG @ URO_UBC

Go Global

Go away, and make it count! UBC students have the opportunity to take courses and do research at over 180 partner universities around the world. Learn more about Go Global exchange, summer study and undergraduate research abroad opportunities at http://students.ubc.ca/career/international-experiences. Eligible students can receive up toe $1500 per term in funding for programs abroad. See a Go Global advisor soon, or stay tuned for our Global Experiences Fair coming in October 2015.

Acknowledgements

A big thank-you

Thank-you to all listed below for your support in organising MURC 2015. We appreciate your time and dedication in making the celebration of undergraduate research at UBC a success.

Adjudicators

Ahn (Annie) Lee
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Workshops & Speakers

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Michael Lisonbee
Mimi Wei
Shiv Mittal
Teri Grant

Morning Oral Presentation List

11.10am-12.10pm

Biological Sciences - IKBLC 155

Using Insecticides to treat Alzheimer's Disease: Identification of a Novel Modulator of Apolipoprotein E in Astrocytes
Zareyan, Shahab

Confirming the findings that slo-1 is involved in the alcohol pathway and affects habituation using the backcrossing method
Park, Ji Yun (Christine)

Cytochrome c: Neurotoxic Signaling Molecule
Bajwa, Ekta

The Ability for Oak, Maple, and Cedar Trees to act as Carbon Sinks on UBC Vancouver Campus
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Birds Like Variety: Heterogenous Landscapes Promote Bird Diversity on Farms
Tsun, Fiona

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Shih, James

Effect of habitat size on species richness
Liederbach, Annegret

Biological Sciences, Medicine & Pharmacology - IKBLC 261

Are Lewis's Woodpeckers under attack at nesting sites in the Okanagan?
Chelick, Carmen

Locomotion and Breathing Kinematics in Cetaceans
Carlyle, Cody

Severe pressure ulcer following an acute depressive episode in a patient with spinal cord injury
Ip, Alvin

Role of Trust in the Patient-Physician Relationship when Discussing Stem Cells for Spinal Cord Injury
Lo, Cody

Cultural, Social & Historical - BUCH A102

A World of Words

Av-Shalom, Na'ama

The Sikh Diaspora in the South Okanagan- Similkameen Valley: The role of the Gurdwara in Community Belonging and Wellbeing

Gill, Navjot (Nav)

A Sea Change - The Role of Transnationalism in Altering Attitudes towards Same-sex Marriage

Wang, Skyler

Economics & Industry - BUCH B209

Involvement: How Business school culture is reproduced through student's use of social media

Lin, Brent

The relationship between investor dividends and employee salaries in the top 100 NASDAQ firms

Srivatsan, Varun

Natural Gas Use in British Columbia's Transport Industry

Henry, Jessica (Kiyomi)

Engineering & Technology - BUCH B210

Measurement of the Temporal Coherence Length of Laser Diodes for Biomedical Applications

Louie, Daniel

Characterizing Superconductors through Vortices

Lee, Darrick

A comparison of conventional and open channel hydraulic fracturing and the importance of imaging to optimize the fracturing process

Rassas, Mohamed Mouayed (MD)

Study of effect of PID controller parameters on the performance of an inverted-pendulum control system

Tan, Andrew; Chen, Chen & Fan, Boyuan (Theodore)

Environmental Science & Applied Biology - BUCH B211

Human-animal interactions between community dogs and community members in Campo Largo, Brazil
Kwok, Y.K. Eugenia (Eugenia)

Seismic performance evaluation of reinforced concrete structure strengthened by TRM and FRP
Lo, Grace; Zhang, Helen; Ji, Lun & Biswas, Tanmoy

To dock or not, that is the question: Tail docking and other medically unnecessary surgeries in companion animals
Mills, Katelyn (Katie)

Acceptability of Home Fortification with Micronutrient Powders in Sierra Leone
Chayama, Koharu (Loulou)

Environmental Science & Applied Biology - BUCH B213

Putting the matter in organic matter: A citizen-science approach to study the impacts of urbanization on organic matter
Haines, Morgan

Are young dairy calves able to sort a total mixed ration?
Adderley, Nicola

The Effects of Chronic Adolescent Cannabinoid Exposure on the Sexual Behaviour of Male Rats
Rigby, Richard & Lee, Amanda

Utilization of a benchmarking program to address dairy calf management issues
Jung, Samantha

Environmental Science & Applied Biology - BUCH B215

Feeding and Social Behaviours of Dairy Cows Change Prior to Diagnosis of Metritis
Gill, Tanjot

Influence of temperature on the fertility of the marine copepod Tigriopus californicus
Boisvert-Plante, Virginie

Time spent eating solid feed predicts intake of TMR in milk fed dairy calves
Yavari, Yasamin (Yasmine)

Role of Trust in the Patient-Physician Relationship when Discussing Stem Cells for Spinal Cord Injury
Lo, Cody

Psychology - BUCH B208

The effects of a novel motor task on changes in white matter tract volume

Villamayor, Anica

D1 /D2 receptor modulation of risk/reward decision-making in prefrontal-subcortical circuits

Jenni, Nicole

Are faces processed differently as they become more schematized?

Raffaelli, Quentin

"The Stranger" as an anti-existentialist work

Dogan, Tunç Berk (Tunç)

Morning Oral Presentation Abstracts

11.10am-12.10pm

Biological Sciences

Identification of a Novel Modulator of Apolipoprotein E in Astrocytes

Presenter: Zareyan, Shahab

Faculty Sponsor: Dr. Cheryl Wellington

Apolipoprotein E (apoE) is the most abundant apolipoprotein in the brain, where it is synthesized by astrocytes and mediates cholesterol transport in the central nervous system. As the APOE gene is the most highly associated genetic risk factor for Alzheimer's disease, modulating apoE levels or function is of therapeutic interest. To identify compounds that increase apoE secretion, we performed a high throughput screen using a library of 104,000 compounds in human CCF-STTG1 astrocytoma cells. A hit compound, CD82, belonging to the pyrethroid class of insecticides, was confirmed to increase both expressed and secreted apoE up to 7-fold starting at a concentration of 10μM. Upregulation of apoE was concomitant with an increase in the levels of proteins that are regulated by liver x receptor (LXR) transcription factors, including LXR-μ itself, and an upregulation of the lipid transporter ABCA1 (9-fold at 30μm). As apoE is also regulated though the LXR pathway,(6) we evaluated the requirement of LXRs for the observed effects using mouse embryonic fibroblast deficient in LXR-μ or both LXR-μ and -μ. Induction of both ABCA1 and apoE mRNA expression by CD82 required LXR activity. Importantly, CD82 shows minimal upregulation of LXR target genes in HepG2 liver carcinoma cells. This is important because many of the LXR agonists have failed to enter clinical trials due to the undesirable activation of the transcription factor SREBP1c in hepatocytes, which causes hypertriglyceridemia and liver steatosis in vivo. Thus, CD82 increases apoE levels without inducing upregulation of harmful LXR target genes in liver cells. Ongoing work is focused on evaluating the mechanisms by which CD82 mediates apoE upregulation and the functional outcomes.

Biological Sciences

Confirming the findings that slo-1 is involved in the alcohol pathway and affects habituation using the backcrossing method

Presenter: Park, Ji Yun (Christine)

Faculty Sponsor: Catharine Rankin

Alcohol intoxication alters learning. However, the mechanism through which this takes effect is not well understood. Our lab uses a model organism Caenorhabditis elegans to study a type of non-associative learning, habituation, in which an animal learns to ignore repeated stimuli. Our lab previously found that under alcohol intoxication, wildtype C. elegans habituated more deeply than worms in the sober condition. In addition, we found that C. elegans carrying a mutation in the slo-1 gene had faster habituation when they are exposed to alcohol, in comparison to wild-type strains on ethanol. However, the mutagenesis methods used to create these mutant other background mutations other than slo-1 might be responsible for alcohol's effect on habituation, this goal of this project was to reduce the background mutations using a method called backcrossing. Backcrossing will reduce background mutations by crossing the mutants back to wildtype several times, thus the backcrossed slo-1 mutants should have considerably fewer background mutations compared to the original mutant strains. Our hypothesis is that if the slo-1 mutation is the main reason for the change in the alcohol's effect on habituation, the backcrossed slo-1 strain should show the same phenotype as the original slo-1 strain. However, if the backcrossed strain showed the same effect of alcohol on habituation as we see in wild-type worms that suggest mutations other than the slo-1 gene was responsible for alcohol's effect on habituation.

Biological Sciences

Cytochrome c: Neurotoxic Signaling Molecule

Presenter: Bajwa, Ekta

Faculty Sponsor: Andis Klegeris

Cytochrome c is a protein found within cells, where it plays an important role in energy production. In addition, cytochrome c may be released from damaged neurons and serve as a damage-associated molecular pattern (DAMP). Recognition of DAMPs by the resident immune cells of the brain, the microglia, induces the release of toxins that are capable of initiating further damage to neurons. Therefore, cytochrome c may contribute to the neuronal death in Alzheimer's disease and other neurodegenerative disorders. This study tested the ability of cytochrome c to cause the secretion of neurotoxic nitric oxide (NO) from microglia. Murine-derived microglia were exposed to cytochrome c and the Griess assay was used to detect NO secretion. Cytochrome c was found to induce the release of NO from microglia in a concentration-dependent manner. The ability of cytochrome c to stimulate the release of microparticles (MPs) from microglia was also observed. Cytochrome c was added to human-derived microglia-like cells and a process of differential centrifugation was performed to isolate released MPs, which were detected using flow cytometry. These findings demonstrate that cytochrome c can act as a DAMP by inducing the release of NO and MPs from microglia. The neurotoxic nature of the immune response induced by cytochrome c indicates a pathological role for this physiologically important protein in the progression of neurodegenerative disorders. By elucidating the mechanism triggered by cytochrome c and other DAMPs, new targets may be identified for the development of therapeutic strategies against Alzheimer's and other neurodegenerative diseases.

Biological Sciences

The Ability for Oak, Maple, and Cedar Trees to act as Carbon Sinks on UBC Vancouver Campus

Presenter: Moses, Elgan

Faculty Sponsor: Dr. Santokh Singh

A more sustainable approach to land development at UBC: an analysis of the relative ability for oak, maple, and cedar trees to act as carbon sinks

Elevated levels of atmospheric greenhouse gases, especially carbon dioxide, have many impacts for life on Earth. Exploiting plants ability to act as a carbon sink presents itself as a reasonable way to help mitigate climate change. Plants fix carbon dioxide into carbohydrates through a set of reactions that utilizes sunlight energy and water in a process known as photosynthesis. The focus of this study is two-fold, first to observe oak, cedar, and maple trees on UBC's Vancouver campus and to compare the relative photosynthetic rate between each species. Secondly, we will be comparing the relative photosynthetic rate throughout the seasons within each tree species. The extent to which a tree acts as a carbon sink is influenced by many abiotic factors (e.g. temperature, humidity, etc.) and numerous biotic factors (e.g. leaf age, chlorophyll content, etc.). Photosynthetic rates will be measured on a weekly basis using a hand held photosynthesis meter. Data collected so far show that while oak and maple tree leaves exhibit greater relative photosynthetic rates during the summer months, they lose their leaves through a process known as programmed leaf senescence during late fall and do not undergo photosynthesis until leaves regrow the following spring. While cedars have a relatively lower photosynthetic rate through the summer, they do not lose their leaves and continue to undergo photosynthesis throughout the winter. Information gathered in this study will influence decisions in future landscape development to adopt a more ecological and sustainable perspective to land development.

Biological Sciences

Birds Like Variety: Heterogenous Landscapes Promote Bird Diversity on Farms

Presenter: Tsun, Fiona

Faculty Sponsor: Sean Smukler

Farms have replaced woodlands, grasslands and other natural landscapes, forcing birds to find suitable habitat and foraging areas within them. Studies in the UK have shown that increasing farm landscape heterogeneity has a positive effect on the diversity of birds. While the management of farms for breeding birds is well-documented, little is known about birds during the non-breeding seasons. Furthermore, most studies on farmland birds have been limited to Europe. As the number of bird species spending the entire year in Canada is increasing, it is important to have agricultural-environmental schemes that are beneficial to both the breeding and non-breeding populations. The aim of this study was to investigate landscape management practices at the UBC Farm in Vancouver, Canada and their impact on bird diversity during the non-breeding season. From November to February, bird surveys were conducted on woodlands, hedgerows, wetlands and croplands within the farm using the point-count method. Results suggest that all non-crop habitats support significantly higher bird species diversity, with woodlands and wetlands being the most effective while croplands were generally avoided by birds in the winter. These results may help in developing farm management practices that promote bird diversity in areas with similar biogeoclimatic zones.

Biological Sciences

An Apple a Day and IgA

Presenter: Siu, Jacqueline

Faculty Sponsor: Dr. Jorg Fritz

An apple a day may keep doctors away, but how does our immune system defend against disease-causing agents? White blood cells produce Y-shaped proteins called antibodies that recognize and bind foreign objects. There are different varieties that differ in function and binding specificity. The most abundant antibody is IgA, which binds to foreign objects and prevents other cells from being infected in the gut's mucosal regions. In fact, the gut lining harbours the largest population of antibody-producing cells, called plasma B cells, that produce several grams of IgA daily. However, before these cells can produce IgA, their DNA must be altered. The signals for this DNA alteration originate either from foreign object recognition or from other white blood cells. Previously, we showed that cells deficient in two proteins, iNOS and TNFa, have impaired IgA production. To ascertain why these proteins are important, mutant B cells without iNOS and TNFa were given the typical signals these cells receive to start IgA production. The abilities of these B cells to grow, survive, and produce antibodies were later analyzed. From these experiments, we hope to determine how IgA-inducing signals change iNOS and TNFa levels in order to piece together the intricate signaling process of producing IgA. We found the following signals have an effect on mutant plasma B cells and their ability to produce IgA: CD40, TGFB1, and vitamin A acid.

Biological Sciences

Characterizing histone methylation as a putative mechanism of Alcohol Tolerance in C. elegans

Presenter: Shih, James

Faculty Sponsor: Catharine Rankin

A key risk factor to the development of alcoholism is the genetic predisposition to faster or higher alcohol tolerance. Tolerance, as defined in DSM-IV, refers to a "markedly diminished effect with continued use of the same amount of alcohol". However, the mechanism underlying alcohol tolerance is poorly understood. Post-mortem studies of alcoholic brains has shown widescale change in gene expression patterns, suggesting chronic alcohol consumption might result in lasting changes in the regulation of gene expression. One mechanism underlying such epigenetic changes involves the methylation of lysine residues on histones via enzymes known as histone methyltransferases (HMTs). To determine whether HMTs play a role in alcohol tolerance, based on the definition of tolerance in the DSM-IV, we first designed a behavioural model of tolerance in the nematode C. elegans. We then characterised the tolerance phenotypes of two HMT mutants: the first was defective in SET-2, a HMT transcriptional activator; the second mutant defective in SET-11, a HMT transcriptional repressor. We pre-exposed animals to 0mM or 200mM ethanol for 24 hours; then, after a 2 hour recovery period, we examined the behavioural responses response to 0mM or 200mM ethanol. In wildtype, animals pre-exposed to ethanol showed less behavioural response to ethanol compared to animals that did not have prior experience on ethanol. This suggests that prior exposure to ethanol increased tolerance in wildtype worms. On the other hand, prior exposure to ethanol did not increase tolerance in set-2 and set-11 mutants. This suggests that both types of HMTs, activators and depressors, are involved in the development of tolerance.

Biological Sciences

Effect of habitat size on species richness

Presenter: Liederbach, Annegret

Faculty Sponsor: Sarah Amundrud

The Single Large or Several Small (SLOSS) debate, originated in the 1970s, aims to find sizes of ecological reserves most effective in preserving biodiversity. This discussion is critical to conservation biology, especially in a time when species loss is occurring at an unprecedented rate. Many conservation biologists lean towards the "single large" argument due to the Theory of Island Biogeography (IBG), proposed by Robert H. MacArthur and E. O. Wilson in the 1960s. This theory states that a habitat's species richness increases with area and proximity to a species source– larger areas decrease extinction rates by reducing competition and habitat fragmentation, while shorter distances to other habitats encourages colonization. However, a firm conclusion is yet to be drawn. This study investigates the relationship between habitat size and species diversity, and we predicted larger habitats to have more species based on the IBG. Surveys were conducted on Costa Rican bromeliads, plants whose leaves accumulate water to create natural mesocosms– ecosystems that allow replicable, ecologically realistic experimentation. The data on bromeliad capacities and species richness was analyzed to simulate "several small" and "single large" habitats by standardizing habitat sizes to the same 200ml. While the survey indicated that species diversity increases with area, the analysis suggested multiple small habitats contain more species than few large habitats. Nevertheless, this relationship may not always be true in other ecosystems, and reserves should have habitat-specific conservation strategies. We conclude that the SLOSS debate cannot be resolved as one simple answer.

Biological Sciences

Are Lewis's Woodpeckers under attack at nesting sites in the Okanagan?

Presenter: Chelick, Carmen

Faculty Sponsor: Dr. Karen Hodges

The Okanagan valley in British Columbia is home to over 200 species of breeding birds, the highest total for any area of a similar size in Canada. This is, in part, due to the tremendous diversity of habitats found in this region; however, the disappearance of these habitats is threatening the persistence of at-risk species such as the Lewis' Woodpecker (Melanerpes lewis). Globally, Lewis' Woodpecker populations have declined by over 60% since the 1960s, with most remaining Canadian breeding pairs of Lewis' Woodpeckers occurring in the Okanagan. Although habitat loss is the main cause for their decline, competition for nesting sites is another potential threat. The goal of my research was to determine the intensity of competition between Lewis' Woodpeckers and three cavity-nesting competitors present in the Okanagan; the European Starling, Northern Flicker, and American Kestrel. Of the 59 previous nesting sites of the Lewis' Woodpecker that were visited, 15% were occupied by the competitors. During 130 hours of observation, only 61 interactions were observed between Lewis' Woodpeckers and cavity-nesting competitors at sites where they were nesting in the same tree or in close proximity to each other. However, none of these interactions involved attacks on Lewis' Woodpeckers by European Starlings. Instead American Kestrels exhibited the most aggressive behavior towards the Lewis' Woodpeckers. These findings suggest that European Starling competition by itself may not be a large threat to the Lewis's Woodpecker populations in the Okanagan, but competition with several species might be a factor in their decline.

Biological Sciences

Locomotion and Breathing Kinematics in Cetaceans

Presenter: Carlyle, Cody

Faculty Sponsor: Robert Shadwick

This study aims to show how swimming muscles are paired with the process of ventilation in cetaceans. All cetaceans are breath-hold divers with a brief time spent at the surface for respiration. In most exercising mammals, inspiration is primarily powered by the slow moving diaphragm muscle, but some cetaceans have a surfacing event that is too rapid for a full breath to be completed by just the slow moving diaphragm muscle. Previous work has shown that certain swimming muscles in fast surfacing dolphins (Tursiops truncatus) have the potential to assist in breathing and that these respiratory muscles are predominantly fast twitch muscle fibres that have the potential to contract quickly enough to complete a breath during a short surfacing event. High-speed videos of two Pacific white-sided dolphins (Lagenorynchus obliquidens) swimming and breathing were analyzed to infer which swimming muscles were recruited in quick breaths for a fast surfacing cetacean. Similar videos of two Belugas (Delphinapterus leucas) to see if these same mechanisms are present or necessary in a slower breathing and surfacing cetacean. Videos were analyzed to identify a mechanism that allows for swimming muscles to induce a breath while surfacing, but does not induce ventilation while swimming on a breath-hold. This interaction between breathing and swimming becomes very important as respiratory illnesses or respiratory muscle fatigue may have a drastic effect on swimming and breathing ability in cetaceans and could severely alter the normal function of this surfacing event.

Medicine & Pharmacology

Severe pressure ulcer following an acute depressive episode in a patient with spinal cord injury

Presenter: Ip, Alvin

Faculty Sponsor: Dr. Brad E. Dicianno

Study design: Case report. Objective: To present a case of a patient with spinal cord injury (SCI) presenting with severe pressure ulcer following an acute depressive episode. Setting: Assistive technology clinic in the community. Results: A 39-year-old community-dwelling man with cervical SCI, spasticity, and bipolar disorder presented to an outpatient assistive technology clinic for mobility device evaluation. Upon screening, the patient divulged that he had developed wounds on his hips. Additional history revealed that he was not taking his medication for bipolar disorder, was depressed, and had spent significant time lying in bed not taking care of himself. On physical examination, a Stage IV 1x1x2 cm ulcer was noted over the left greater trochanter with exposed bone, active drainage of pus, and surrounding redness. The patient was sent to the Emergency Department for treatment. He was seen by plastic surgery and surgical removal of dead tissue was required. Conclusion: In this case, it appears that the development of a severe pressure ulcer was caused by an acute depressive episode during which self-care was neglected and significant time was spent in bed. This actual patient case is used to highlight a previously proposed conceptual model of depression and pressure ulcers, and a brief literature review on the topic is presented. Routine SCI care should include a formal risk assessment, and level of risk should take into consideration concurrent psychiatric conditions.

Medicine & Pharmacology

Role of Trust in the Patient-Physician Relationship when Discussing Stem Cells for Spinal Cord Injury

Presenter: Lo, Cody

Faculty Sponsor: Judy Illes

Spinal cord injury (SCI) is a chronic condition that can result in incurable paralysis. Many for-profit centres around the world offer unregulated and unproven stem cell interventions for SCI that are not available in North America. These interventions often have limited data of preclinical and clinical safety or efficacy, and yet, are often marketed as bona fide treatments. Patients often receive conflicting information regarding stem cell interventions from sources such as their clinicians, their family and the media. Our study aims to investigate how patients situate their trust when deciding whether or not to pursue these interventions. We conducted semi-structured interviews with patients (n=18) and physicians (n=12), exploring perspectives about the patient-physician trust relationship specifically. Interviews were transcribed verbatim and analyzed using a grounded theoretical approach. Analysis reveals that reluctance of physicians to communicate about stem cells and perceived lack of physician knowledge by patients pose challenges to the patient-physician trust relationship from a patient's perspective. Physicians stressed the importance of transparency and understanding the patient's perspective to enhance trust in the patient-physician dyad. Both physicians and patients expressed concern over the difficulty of identifying reputable sources about stem cells. Our findings suggest that transparency should be privileged over silence in discussions about this topic. We hope to use our results to provide better tools for communication between physicians and patients about rapidly evolving biotechnologies and for their interactions about stem cells.

Cultural, Social & Historical

A World of Words

Presenter: Av-Shalom, Na'ama

Faculty Sponsor: Mark Turin

There are over 6000 living languages today, and there have been many more in the past. They come with rich artifacts, from beautiful and ornate texts to carvings preserved for thousands of years, to writing on day-to-day objects, such as soda bottles and street signs. From Latin to Klingon and C++, living, extinct, endangered, and used by humans and the machines we create, language forms a richness which envelops our lives. How can these rich collections of languages and the materials they have stemmed be classified, and how can we weed through them to decide on just a few – 60-80 – which will comprise an introductory world-language book suitable for any with an upturned eyebrow and a questioning eye? In this research we are looking at precisely these questions. In the preparation for a book, we are creating classification methods and finding materials which attempt to encompass the breadth that comes with the vastness of language over time and space. In this talk I'll be discussing what methods we have been using for this, and what we have decided upon at that point, as well as visualisations we have used to make this information accessible to readers. Additionally, there are plans for an online companion to this book, and I will be discussing the differences in approach we are using for these different media, and the implications for information dissemination that are involved therein.

Cultural, Social & Historical

The Sikh Diaspora in the South Okanagan-Similkameen Valley: The role of the Gurdwara in Community Belonging and Wellbeing

Presenter: Gill, Navjot (Nav)

Faculty Sponsor: David Geary

Rural communities in Canada face unique health challenges in promoting wellbeing. In recent years, researchers have explored how wellbeing is influenced by ones sense of community belonging and access to strong social supports. Less research, however has explored rural cross-cultural understandings of belonging and wellbeing. Although formal and informal organizations offer support networks in rural communities, there is a lack of cross-cultural colloboration and understanding. This is a significant issue in the South Okanagan-Similkameen Valley, in Interior British Columbia, given that the region represents one of the most diverse rural areas in the Okanagan. In specific, over the past forty years, there has been an increase in Punjabi-Sikh immigration to the region, yet there has been little analysis done on their collective, family, and individual experiences. The purpose of this research was to understand how the process of international migration from Punjab, India to the Okanagan-Similkameen Valley affects notions of community, belonging, and identity. In specific, what role does the Sikh Gurdwara (temple) play in creating community connectedness in rural British Columbian communities? Data collection included qualitative semi-structured life history interviews, participant observation, and on-going outreach with the Penticton Sikh Temple committee. Preliminary results indicate that the Gurdwara is the primary community gathering place for the Punjabi-Sikh population. This is significant to building community capacity because for many, the Gurdwara is the only on-going support network available in the region. This project will enable future successfull community-wide collaborations to improve the health and wellbeing of rural communities in British Columiba and Western Canada.

Cultural, Social & Historical

A Sea Change - The Role of Transnationalism in Altering Attitudes towards Same-sex Marriage

Presenter: Wang, Skyler

Faculty Sponsor: Wendy Roth

Most works that bring sexuality into migration and transnational studies focus their attention to the beliefs and experiences of sexually oppressed groups (Manalansan 2006). These studies use sexual minorities, including gays, lesbians, transgenders and sex workers, to advance the idea that the transnational movements of people around the world have brought divergent sexual ideologies and identities into sharp relief. While literature on such discourses is abundant, there are few studies examining how attitudes and norms pertaining to sexuality influence the views of the dominant, heterosexual group of migrants. This study investigates how 100 heterosexual international students, who moved from Singapore (a city-state that bans same-sex marriage) to Vancouver (a city with a prominent LGBTQ community), confront and act upon the stark differences between how same-sex sexuality is constituted and understood in their country of origin and country of settlement. Drawing on data from an online survey and semi-structured follow-up interviews with 12 respondents, the results obtained from the study show that despite having a variety of opinions prior to arriving in Vancouver, the majority of students studied display an increased understanding towards same-sex marriage after their relocation. Furthermore, many of those studied send these new conceptions as social remittances back to the communities they come from. Such transmissions of ideas pave way for social change and have the potential to alter local Singaporeans' view of non-heterosexual unions, resulting in real implications for the queer community back in the country.

Economics & Industry

Involvement: How Business school culture is reproduced through student's use of social media

Presenter: Lin, Brent

Faculty Sponsor: Moura Quayle

As the public increasingly turns a scrutinizing eye at the ethics of businesses and their practitioners in the aftermath of the Great Recession, a similar critique is mounting from business professors themselves: business schools are not doing enough to educate ethical students. (Mintzberg 2005; Bennis 2005; Grey 2004; Anteby 2014) How does this happen in practice? To address this question, I analyze the role played by extracurriculars activities and social media--specifically Facebook and LinkedIn--in the production and reproduction of culture at an undergraduate business program. Drawing on 6 months of anthropological and sociological fieldwork by a senior Sauder student, this study uses a combination of a Foucauldian disciplinary framework and Actor-Network Theory to better understand the human and technological network that (re)produces culture at Sauder. Students' behaviour on social media creates a system of decentralized, mutual surveillance (Marwick 2013) that works in conjunction with other institutional actors in the undergraduate program to interest and enrol students in extracurricular activities. Those engaging in clubs and their activities spawn and create further instances of such activity on social media, creating a feedback loop that translates the reach of these activities beyond traditional notions of space and time, blurs the boundaries between school and life, and tightly couples students' social identities within the business school to their extracurricular activities. Through this process, some students are "branded", and some others are excluded, while many dissent and resist. The implications for organizational control and ethics in business education are discussed.

Economics & Industry

The relationship between investor dividends and employee salaries in the top 100 NASDAQ firms

Presenter: Srivatsan, Varun

Faculty Sponsor: Enda Tan

Investor dividends and employee salaries form the two basic indicators for investor returns and employee returns respectively. Questions of fairness arise when people allocate optimal distributions towards investors and employees. Studying the actual discrepancies between investment-returns and labour-returns would yield useful results on how the free market decides upon these levels of "fairness", and whether equity is indeed a very large problem in the current capitalist system. The top 100 NASDAQ firms is the sample through which these comparisons are made. The mean salary and mean dividend value per stock will be aggregated for all the firms. The mean values for dividends and salaries for each company will be compared with the aggregated dividends and salaries for all companies (to derive a z-score). The z-score for each company, for dividend payments and mean salaries, will then be compared. To account for investor and labour contributions, these z-scores will then be categorized according to the amount of investment, and the amount of hours put in by employees. Companies with higher-than-aggregate levels of labour hours will be classified labour-heavy, higher-than-aggregate investment amounts as investor-heavy, and those with roughly equal contributions as equal-contribution. With these classifications, one can determine how investors and employees are remunerated, according to the contribution they put into the company. It is expected, in a "fair" world, that in a labour-heavy contribution scenario, employees have a higher z-score (are paid much more than the mean levels, in comparison to the investor-returns), with the opposite case for investor-heavy contribution scenarios

Economics & Industry

Natural Gas Use in British Columbia's Transport Industry

Presenter: Henry, Jessica (Kiyomi)

Faculty Sponsor: David Brownstein

Natural gas (NG) is an abundant resource in British Columbia. Currently, the B.C. Liberal government is promoting NG as an export industry, however, the domestic market for NG has not been fully developed. The transport sector uses significantly less NG than other major economic sectors of Canada, and it contributes over 30% of CO2 emissions to B.C.'s total emissions. Being recognized as a cleaner fossil fuel than petroleum-based fuels, wider deployment of NG as a transport fuel could make for a greener B.C. This makes NG an attractive short-term alternative fuel, while clean and renewable energy fuel technologies continue to be explored and developed for longer-term reliance. In this research, I will be assessing the feasibility of using NG as a widely deployed transportation fuel in B.C. The investigation will include a consultation of literature on the NG market, economic analysis of NG transportation fuel applications, and available technologies. Additionally, expert interviews will be conducted to find the most recent and relevant information. I predict that I will find that it is technologically and economically feasible to use NG as a transition fuel in the transport sector. However, addressing barriers will be important in determining the success of a transition from gasoline and diesel fuels to NG.

Engineering & Technology

Measurement of the Temporal Coherence Length of Laser Diodes for Biomedical Applications

Presenter: Louie, Daniel

Faculty Sponsor: Tim Lee

Laser diodes are used extensively in biomedical applications. Optical Coherence Tomography and Speckle Contrast Imaging are two examples of laser imaging techniques that can non-invasively image a variety of phenomena from skin lesions to blood flow. However, the resolutions of the images created depend largely on a property of the laser called its temporal coherence length. This project aimed to measure the coherence lengths of red and blue laser diodes accurately, and with minimal equipment. Typically, laser diodes have a complicated coherence function that requires specialized equipment to measure. A novel method to measure coherence lengths was created; using a rudimentary Michaelson Interferometer constructed from an optical cage system with a simple photodiode as a detector. This simplified the process by eliminating the usual need for a reference laser, long path lengths, and 2D fringe pattern analysis. The results obtained by this method matched the results found by a specialized Fourier Spectrometer. This indicated that coherence lengths can be measured accurately in a simple laboratory setting, and decreases the. A relationship between the influence of heat on the laser diode's spectrum over time, and the effect of this on the laser diode's coherence length was discovered incidentally during this project, and has interesting implications that may affect the implementation of laser diodes in biomedical designs. The economical measurement method created for this project can be replicated to facilitate the testing and use of laser diodes for future study in biomedical optics.

Engineering & Technology

Characterizing Superconductors through Vortices

Presenter: Lee, Darrick

Faculty Sponsor: Andreas Schnyder

Classification of materials is ubiquitous in science, from classifying atoms and their constituents to characterizing more complex crystals and materials based on their properties. An exciting class of materials is superconductors, metals that conduct electricity perfectly. Superconductors have their own classification scheme, the development of which is an ongoing research initiative.

This project investigates the characterization of superconductors by an experimentally observable property: the electron density around a superconducting vortex. As a rough definition, the electron density is a measure of how tightly packed electrons are around certain location. A vortex is a defect that occurs in some superconductors when there is a large external magnetic field. A similar defect is the antivortex, which occurs when the magnetic field is reversed in direction.

The Bogoliubov-de Gennes (BdG) equations are a set of equations that describe the behavior of electrons in a superconducting system. My research included solving these equations numerically to find the electron density for a certain type of superconductor, called chiral d-wave. What we found was that the electron density around the vortex is different than the density around the antivortex - a property that can be experimentally measured. Additionally, the BdG equations were solved analytically under a set of approximations resulting in the same asymmetry between the vortex and antivortex. Experimentalists can now use these results to help determine the classification of real superconductors.

Engineering & Technology

A comparison of conventional and open channel hydraulic fracturing and the importance of imaging to optimize the fracturing process

Presenter: Rassas, Mohamed Mouayed (MD)

Faculty Sponsor: Lindsey Heagy

The past decade or so has seen the vast increase in the drilling of wells in unconventional reservoirs of oil and gas. This new and previously unusable resource has changed the energy landscape of North America and affected the oil and gas markets. This is possible due to hydraulic fracture treatments along horizontal wells that helped create flow paths from the naturally impermeable reservoir to the wellbore. These pathways are created by pumping fluid under high pressure to fracture the reservoir rock. Following the fluid, proppant (sand or ceramic particles) are injected to keep those pathways open. Imaging, such as microseismic, has been crucial in optimizing the hydraulic fracturing and making drilling economically viable.

In this presentation, we will discuss the differences in intended outcomes and procedures for two widely applied techniques for placing proppant within the reservoir: 1) homogeneous proppant placement, where the aim is to uniformly distribute the proppant, and 2) channel fracturing, where the proppant is injected to form patches, as well as discuss how imaging can help improve our understanding of the physical processes occurring within the reservoir and thus optimize fracture operations.

Specifically, we use numerical modeling to examine how to "see" the difference in the distribution of proppant for either fracture using electromagnetic imaging, and discuss the different parameter/techniques, such as different pumping schedules, proppant type/size/conductivity, etc. that go into creating either fracture. Using the simulations, we aim to demonstrate the usefulness of electromagnetic imaging in understanding and optimizing these fractures.

Engineering & Technology

Study of effect of PID controller parameters on the performance of an inverted-pendulum control system

Presenters: Tan, Andrew; Chen, Chen & Fan, Boyuan (Theodore)

Mentor: Pan Zhao

Control systems are ubiquitous in our daily life and industry, they can be found in mechanisms such as robotics, autos, washing machines and aircraft. In most of the cases, a control system is a feedback structure, and generally consists of a controller, sensors, actuators and a plant to be controlled. It is a combination of electrical, mechanical, thermal or hydraulic devices which adjusts the actual system performance to desired performance specifications. One of the most common controllers used in industry is the PID controller, which uses mathematical proportional (P), integral (I) and derivative (D) functions to control the outputs of a system based on the difference between the reference and actual output. Therefore, it is important for engineers to learn the basics of automatic control theory and PID control in the context of an industrial application. Although there are existing theories on how each parameter of a PID controller affects the performance of control systems, tuning a controller to achieve its optimal performance is still challenging, especially in systems with multiple variables. Our study aims to verify these theories by demonstrating how each parameter of a PID controller impacts the performance of an inverted pendulum control system. By constructing a mathematical model in the form of transfer function for an inverted pendulum system and simulating it in MATLAB/SIMULINK, the performance of this closed-loop system controlled by a PID controller is evaluated based on the time-domain response. Specifically, rise time, overshoot, settling time and steady-state error are compared among simulations with different P, I, or D parameter values. Based on our simulations, we confirmed that the effect of varying PID parameters on the performance of an inverted pendulum control system is consistent with the established theories of PID parameters.

Environmental Science & Applied Biology

Human-animal interactions between community dogs and community members in Campo Largo, Brazil

Presenter: Kwok, Y.K. Eugenia (Eugenia)

Faculty Sponsor: Marina von Keyserlingk

Free-roaming, ownerless dogs comprise a considerable portion of Brazil's dog population. To address animal welfare concerns, the Brazilian town of Campo Largo established the 'community dog program', where free-roaming dogs are cared for by self-appointed community members, known as maintainers. The objective of this study was to describe the types of human-animal interactions observed between community dogs and community members in Campo Largo. Dog subjects (n=7), selected by the municipality based on accessibility and community approval, were of mixed breeds and averaged 4.0±4.16 years old, ranging from 1 to 10 years old. Over a 19-day period, each dog was observed through continuous focal sampling for 6 consecutive hours on 3 separate days, with the exception of one dog that disappeared after one observation day. Interactions were presented in frequency and grouped as dog-initiated or human-initiated. Of the 529 total interactions, 362 were initiated by dogs and 167 by humans. On average, each dog interacted with humans 17.2±10.31 times /6 h period (ranging from 9 to 36 times). Dogs initiated play on average 1.42±1.10 times /6 h period, most frequently with maintainers. Chasing (0.67±0.88 times/6 h), avoiding (1.19±1.45 times/6 h) and barking (1.95±2.16 times/6 h) were also observed, but directed most often towards individuals who had no known previous contact with the dogs. While humans petted, hugged and kissed dogs, they were also seen to kick, scold and startle them. This descriptive study is the first documentation of the range of interactions between community dogs and community members in Campo Largo.

Environmental Science & Applied Biology

Seismic performance evaluation of reinforced concrete structure strengthened by TRM and FRP

Presenters: Lo, Grace; Zhang, Helen; Ji, Lun & Biswas, Tanmoy

Faculty Sponsor: PKM Moniruzzaman

Textile reinforced mortar (TRM) is a new material that maintains all advantages of fibre reinforced polymer (FRP) material while eliminates its drawbacks. To apply this system in practice, its seismic performance should be perused. In addition, a comparative evaluation with respect to FRP is necessary to employ TRM as an effective retrofitting material. In this purpose, a numerical study is invoked to serve as an alternative platform of expensive and time consuming experimental testing. Thereby, a finite element (FE) archteype model is developed and calibrated with design code. This study examines the seismic behaviour of a reinforced concrete (RC) structure under 9 different ground motion (GM) records through incremental dynamic analysis (IDA). Moreoever, the developed FE models are used to investigate the behaviour of RC structure externally strengthened in flexure with FRP and TRM systems considering different parameters such as location of a strengthening system, height of building and different FRP or TRM properties. The results are reported in terms of energy dissipation capacity, inter-storey drift and ductility behaviours. Results showed that the TRM system is as effective as the FRP system in seismic retrofitting.

Environmental Science & Applied Biology

To dock or not, that is the question: Tail docking and other medically unnecessary surgeries in companion animals

Presenter: Mills, Katelyn (Katie)

Faculty Sponsor: Marina von Keyserlingk

Tail-docking and ear-cropping in dogs were first introduced during Roman times in response to the belief that it would prevent disease and injury. While this is now known to be untrue, a variety of medically unnecessary veterinary surgeries are still prevalent in modern societies. These surgeries are used both to improve animal aesthetics, as promoted by breed standards, and as a solution to common behavioral problems such as scratching in cats and barking in dogs. The physical alteration of an animal's anatomy for cosmetic and convenience reasons has been criticized based on concerns for animal welfare, and this has resulted in some countries banning certain procedures. However, these procedures are still available and commonly performed in most regions in the United States and Canada. To promote further discussion on this important topic a review of the peer-reviewed scientific literature available on the following medically unnecessary veterinary surgeries: tail docking, declawing, ear cropping, devocalization and dewclaw removal was performed. Examples are given of how different countries have dealt with this controversial topic, and discussed in relation to the North American breed associations' and veterinary associations' position statements. Finally, a discussion on the public perspective of these types of medically unnecessary surgeries in companion animals is presented. The review concludes by calling for work on understanding societal values on this controversial topic, to ensure that practices such as these are in harmony with public expectations.

Environmental Science & Applied Biology

Acceptability of Home Fortification with Micronutrient Powders in Sierra Leone

Presenter: Chayama, Koharu (Loulou)

Faculty Sponsor: Dr. Judy McLean

Poor nutritional status is widespread in Sierra Leone and under-five mortality is among the highest in the world. Home fortification with Micronutrient Powders (MNP) has been very effective at combatting micronutrient deficiencies in young children in over 40 countries. However, the success of the intervention is largely dependent on the acceptability and adherence of caregivers. For the development of a national home fortification program with MNP for children 6-23 months of age in Sierra Leone, a formative research was conducted to assess the acceptability and utilization of MNP. The aim was to identify a culturally acceptable and appropriate intervention and recognize potential opportunities and barriers. 25-day trial of MNP among 80 caregiver-child pairs was conducted; each caregiver was provided with one box (30 single-serving sachets) of MNP to add to the child's food following training on how to properly use MNP. Caregivers were interviewed at 3 points in time: baseline, Day 10 and Day 25, to assess knowledge retained 10 and 25 days after training to evaluate communication and training materials on MNP as well as to assess experiences with MNP. There was a positive response from caregivers, healthcare providers and community leaders regarding the concept of home fortification with MNP. Almost all said they would be in support of MNP being added to children's food, as it was beneficial for their health. The result of this research makes the future of home fortification in Sierra Leone promising.

Environmental Science & Applied Biology

Putting the matter in organic matter: A citizen-science approach to study the impacts of urbanization on organic matter

Presenter: Haines, Morgan

Faculty Sponsor: Ashlee Jollymore

Organic matter are carbon-based chemicals that originate from the breakdown of plants, animals, and their waste products. A key component of the global carbon cycle, organic matter plays an important role in aquatic ecosystems by blocking incoming light and providing a food source for bacteria. High levels of organic matter in drinking water, however, can have serious negative consequences. In British Columbia and most of Canada, chlorine is added to drinking water as an inexpensive way to kill bacteria and other disease-causing microorganisms. Despite these benefits, chlorination of water with high levels of organic matter can produce disinfection byproducts – chemicals that have been linked to several different types of cancers. Urbanization and land-use change, such as agriculture and deforestation, changes the amount and types of organic matter exported into fresh-water ecosystems. Our team at UBC, composed of myself and Ashlee Jollymore (a PhD Candidate from the Ecohydrology Group led by Dr. Mark Johnson), created 'Waterlogged', a citizen science based project. The aim of this project is to better understand how human activities affect natural processes, as well as to engage local communities with science. Through this, we provided volunteers with a water-sample kit and instructions on how to collect water samples from local rivers and streams which we then analyzed at our lab at UBC. We discuss the preliminary findings of our project, and how citizen-science is an important tool towards empowering communities to become more involved with environmental monitoring.

Environmental Science & Applied Biology

Are young dairy calves able to sort a total mixed ration?

Presenter: Adderley, Nicola

Faculty Sponsor: Marina von Keyserlingk

Dairy cattle must consume a balanced diet to maximize milk productivity while maintaining a healthy rumen environment. Sorting behaviour, during which cows selectively consume fractions of a diet, can lead to digestive disorders that threaten welfare and productivity. How sorting behavior develops is poorly understood, especially in dairy calves. This project attempts to comprehend the incidence and motivation of sorting among calves (n=18) by assessing this behaviour before and after a diet change. Sorting was assessed at 65 days, when calves had access to concentrate and a total mixed ration (TMR), and at 70 days when concentrate was removed. Sorting was measured by comparing TMR before feeding with orts after 24 hours of feed access. Particle fractions were measured using the Penn State Particle Separator with 3 screens (19, 8, and 1.18 mm) and a bottom pan to separate the TMR into long, medium, short, and fine fractions respectively. When able to access concentrate, calves sorted for long particles (133 ± 9%) and against small particles (92 ± 3%), with no differences for the remaining fractions (99 ± 5% for medium; 107 ± 5% for fine). When calves no longer had access to concentrate these preferences reversed; calves preferentially selected fine particles (113 ± 4%), with no selection for the other fractions (101 ± 11% for long; 99 ± 6 for medium; 97 ± 4 for short). These results indicate that young dairy calves are capable of sorting TMR and adjust their behaviour in response to changes in feed offered.

Environmental Science & Applied Biology

The Effects of Chronic Adolescent Cannabinoid Exposure on the Sexual Behaviour of Male Rats

Presenters: Rigby, Richard & Lee, Amanda

Faculty Sponsor: Dr. Boris Gorzalka

Marijuana consumption has been hotly debated, particularly when teenagers are concerned. This widely used substance affects perception, motivation and sexual functioning in humans via the endocannabinoid system and its cannabinoid 1 receptors (CB1-R) in the central nervous system. Adolescence is a particularly sensitive developmental period in the endocannabinoid system, and perturbation during this time produces long-lasting changes in adult behaviours. However, little research has been conducted on the effects of adolescent chronic exposure, least of all sexual behaviour. Inhibition of sexual behaviour due to both chronic and acute adult administration of cannabinoid agonists (chemicals that activate the receptor in order to replicate the effects of marijuana) has been well documented in rodent models. When exposure occures in adolescence, many non-sexual behavioural patterns undergo opposite trends from those seen in rats given adult exposure. Therefore, we hypothesized that sexual behaviour would increase upon chronic adolescent injections of synthetic CB1-R agonists, and that CB1-R antagonists, which typically prevent the effects of cannabinoids, would decrease sexual behaviour. We tested this by chronically injecting HU-210 (a CB1-R agonist), AM-251 (a CB1-R antagonist) or a vehicle solution for 10 days during adolescence, followed by testing sexual behaviour in adulthood. Our results suggest that, chronic adolescent antagonism of the CB1-R by AM-251 generally decreases adult male sexual behaviour, while sexual behaviour is increased by chronic activation of the CB1-R via HU-210. This study provides greater comprehension of how adolescent disturbances in the developing endocannabinoid system via cannabis consumption may contribute to altered adult sexual functioning.

Environmental Science & Applied Biology

Utilization of a benchmarking program to address dairy calf management issues

Presenter: Jung, Samantha

Faculty Sponsor: Dax Atkinson

Benchmarking is a useful tool to objectively compare one's own performance with competitors. In the dairy industry, calves are often overlooked in terms of welfare and management practices. The primary aim of this study is to investigate the effectiveness of benchmarking passive transfer of immunity testing and growth in motivating engagement on calf issues leading to effective changes on farms. 24 dairy farms in BC's Fraser Valley will be recruited in collaboration with a local veterinary clinic. Farms will be randomly assigned into 3 staggered groups of 8, controlling for herd size. Regular on-site data will be collected for 6 weeks, followed by a report for each farm. A survey of calf management practices will be conducted with the primary calf caregiver within a week of enrolment. Blood samples will be collected weekly from all calves between 1-7 days old. Serum total protein (STP), which is highly correlated with serum ImmunoglobulinG (IgG), will be measured to assess the state of passive transfer in each calf. A minimum of 12 calves will be tested per farm between each report. Pre-weaned calves will have their body weights estimated from heart-girth measurements taken biweekly. Results will be benchmarked in terms of mean STP, proportion of animals with FPT, and estimated growth rates. Reports will be discussed with the farm manager and primary calf caregiver alongside their primary veterinarian. Follow-up questions will be conducted at the midpoint and end of the project to identify management changes.

Environmental Science & Applied Biology

Feeding and Social Behaviours of Dairy Cows Change Prior to Diagnosis of Metritis

Presenter: Gill, Tanjot

Faculty Sponsor: Heather Neave

One of the most common diseases in dairy cattle following calving is metritis, the inflammation of the uterus, which compromises the welfare of the animal and is costly for the farmer. Therefore attention should be placed on preventative measures such as early detection of metritis. Previous research has shown changes in feeding and social behaviours prior to calving can predict those at risk for illness but other behavioural measures have yet to be explored using an automated monitoring system. Twenty-one primiparous cows (first time calving) and 12 multiparous cows (calved multiple times) were diagnosed with metritis on their 6th day post calving and were compared with equal numbers of healthy cows. An electronic feed system was used to monitor feeding activities. In the 5 days leading to diagnosis primiparous-metritic cows ate less (metritic: 25±1; healthy: 28±1 kg) and had fewer visits to the feed bunk (metritic: 60±3; healthy: 70±4) compared to primiparous-healthy cows. Metritic and healthy cows did not differ in time spent feeding, feeding rate, number of meals per day or exploratory sampling (number of feed bins visited within a meal). Metritic cows were more likely to be removed from the feed-bins by another cow (metritic: 0.21±0.010; healthy: 0.18±0.010 removals/visit). Cows that become metritic can be identified by changes in feeding and social behaviour leading up to diagnosis; this study illustrates how automatic collection of behaviour can be used as an on-farm tool for early identification of disease.

Environmental Science & Applied Biology

Influence of temperature on the fertility of the marine copepod Tigriopus californicus

Presenter: Boisvert-Plante, Virginie

Faculty Sponsor: Mary O'Connor

Understanding how environmental temperature affects the long-term persistence and resilience of animal populations is a major challenge in ecological research. Lethal temperatures can cause mortality and extinction, but it is less clear how non-lethal thermal stress affects population growth and persistence. Increasing temperature increases the metabolic activity in an organism. Therefore, organisms are predicted to be more productive on average at higher temperatures until the temperature becomes stressful and reduces tolerance. The hypothesis that temperature increases fertility, a key demographic vital rate in the marine copepod Tigriopus californicus was tested. Females grown at warmer temperatures were predicted to produce an egg sac faster at the potential cost of producing fewer offspring compared to females grown at cooler temperatures. To test for this, six to ten clasping male/female pairs were isolated in a well from a well-plate at each tested temperature of 18˚, 22˚, and 26˚. Fertilized females were closely monitored to record the day on which they produced their first egg sac. Later the number of offspring produced was also recorded. After the first egg sac was produced, females were monitored for two weeks to check for the production of subsequent clutches. These results will be integrated into a collaborator's demographic model to forecast how temperature affects T. californicus population dynamics. This will help in evaluating how different temperature conditions affect population persistence and how sensitive persistence is to temperature-dependent fertility.

Environmental Science & Applied Biology

Time spent eating solid feed predicts intake of TMR in milk fed dairy calves.

Presenter: Yavari, Yasamin (Yasmine)

Faculty Sponsor: Joao Costa

The objective of this study was to compare daily feeding time with intake of solid feed in milk fed dairy calves, and to determine if the correlation between feeding time varies with feed type (TMR or calf starter). Single-housed dairy calves (n=18) were observed between the ages of 18 and 46 days old. In addition to their standard milk rations, calves were provided ad libitum access to two solid feeds: calf starter and total mixed ration (TMR). Continuous time-lapsed video was used to determine feeding time of the solid feeds, and individual feeding bouts were summed to determine total daily feeding time. Intake was measured as daily consumption (g/d) and compared to total daily feeding time 9s/d). On average, calves consumed 57 ± 20 g/day of starter (1) and 295 ± 80 g/day of TMR. The number of feeding bouts averaged 45 ± 9 bouts/day for starter and 46 ± 12 bout/day for TMR and feeding bout duration was 25 ± 4 s/bout and 29 ± 5 s/bout respectively. Feeding behaviour data obtained from video was strongly correlated with starter intakes (R^2 = 0.11, P=0.19). In conclusion, these results show that meal frequency and meal duration are similar for both solid feed types. However, continuous time-lapse videos can provide, between the ages of 2.5 and 6 weeks, reasonable estimates of TMR intake, but not of calf starter intake.

Psychology

The effects of a novel motor task on changes in white matter tract volume

Presenter: Villamayor, Anica

Faculty Sponsor: Dr. Lara Boyd

Past research examined how experience and training changes the gray matter in our brain but there is limited research on experience-dependent changes in the white matter. The gray matter and white matter are generally differentiated by the presence of myelin in the white matter, a fatty substance that supports and increases the speed of communication among cells in the brain. In this study, we investigated the effects of a visuomotor task on the white matter of 16 healthy participants throughout a four week period in which they practiced a novel motor skill. The motor task was based on a virtual reality game that required participants to perform large movements with their dominant right arm. The study examined areas of the brain including the posterior limb of the internal capsule, the intraparietal sulcus, and the parieto-occipital sulcus. These areas are important for attention and coordination during visually guided movement. These areas were studied using Diffusion Tensor Imaging, a brain imaging technique that relies on measurements of movement of water as reflection of the amount of white matter in our brain. The results of this experiment show that there is a significant increase of white matter that corresponds to the areas that are important for the task. Examining white matter changes allows researchers to gain valuable insight regarding the brain and its interaction with the environment as well as to explore possible rehabilitation techniques for people with white matter damage.

Psychology

D1 /D2 receptor modulation of risk/reward decision-making in prefrontal-subcortical circuits

Presenter: Jenni, Nicole

Faculty Sponsor: Stan Floresco

We routinely face decisions that require weighing the relative costs and benefits associated with rewards in order to select better courses of action. Nodes within mesocorticolimbic dopamine circuits interact in situations of reward uncertainty to guide decisions. Work has shown that D1/D2 receptor modulation within the prefrontal cortex (PFC) increases or reduces preference for large/risky options in opposing ways. There appears to be different populations of prefrontal neurons that exclusively express either D1 or D2 receptors. We investigated whether prefrontal D1 or D2 expressing neurons may differentially modulate risk/reward decisions, via distinct subcortical output pathways.

Decision-making was assessed using a probabilistic discounting task. Rats were well-trained to choose between levers for small/certain or large/uncertain rewards—the odds of which decreased across 4 blocks of trials (100% -12.5%). We used asymmetrical unilateral infusions of a D1 or D2 antagonist into the PFC, and inactivation of the contralateral nucleus accumbens (NAc) or basolateral amygdala (BLA) to selectively disrupt D1 or D2 communication between the PFC and these output regions. Disrupting D1 modulation of PFC-NAc circuits (but not PFC-BLA projections) reduced preference for the large/risky option. In contrast, disrupting PFC D2 communication with the BLA increased preference for the large/risky option. This suggests PFC dopamine, acting through different receptors, may differentially bias risk/reward decisions by modulating pathways to separate subcortical regions. Abnormal decision-making is prominent in disorders characterized by perturbations of the dopamine system, such as schizophrenia. Understanding the neurological underpinnings of these behaviours may provide insight into the pathophysiology underlying these disorders.

Psychology

Are faces processed differently as they become more schematized?

Presenter: Raffaelli, Quentin

Faculty Sponsor: Rebecca Todd

In research examining the perception of emotion, it is common to use schematic faces in lieu of real faces for stimuli because they can be more precisely controlled. However, recent research suggests that schematic faces may differ from photographs substantially in how they are processed. For instance, autistic patients display some aptitude in detecting emotion in cartoon faces despite their well-known inability to process emotion in actual faces. This could be problematic as it would call into question whether research based on schematic faces is truly generalizable to real faces. The present study aimed at determining whether faces are processed differently as they become more schematized. Participants were asked to determine the emotion displayed by faces at five different levels of schematization, ranging from photographs to full cartoons. The presentation time (17, 33, 50, or 60 ms) was varied randomly across trials. At the shortest presentation times, accuracy significantly increased with level of schematization. Results suggest that processing facial emotion is easier and faster in more schematic faces.

Psychology

"The Stranger" as an anti-existentialist work

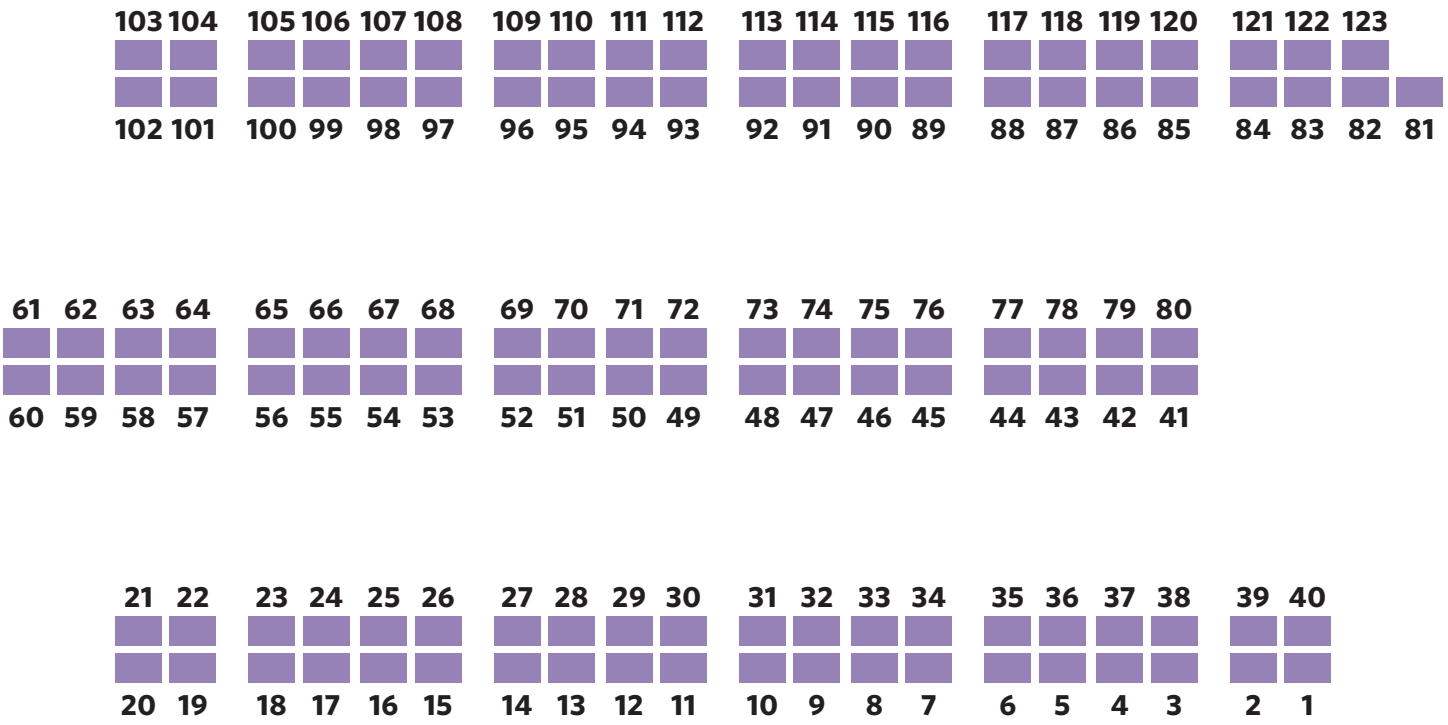
Presenter: Dogan, Tunç Berk (Tunç)

Faculty Sponsor: Stephanie Dreier

Albert Camus is one of the paradigmatic figures of the French literary-philosophical movement "existentialism". *L'etranger* [The Stranger] by Albert Camus is one of the most well-known existentialist works. The area of my focus are psychoanalytic readings of the text, which mainly come from a Freudian perspective. I, however, examine the text from the perspective of Jacques Lacan, a psychoanalytic theorist who had increasing influence on French intelligentsia starting from the 1950s. I argue that, despite Lacan's anti-existentialism, the Lacanian perspective nonetheless is in line with the commonplace reading of the text which asserts that the work is one that affirms "existential freedom". Furthermore, I argue that this is done through the protagonist's enacting the Lacanian gesture of "traversing the phantasy", a hardy concept which I explain through *L'etranger*. The findings show that a specifically anti-existentialist theory of mind can redeem a work with clear existentialist intentions.

Poster Session

Map of Posters in Irving K. Barber Learning Centre, Golden Jubilee Room, Floor 4



Themes

1-41
Biological Sciences

42-51
Chemistry & Physics

52-56
Engineering & Technology

57-66
Environmental Science & Applied Biology

67-69
Kinesiology

70-100
Medicine & Pharmacology

101-105
Politics, Culture & Sociology

106-123
Psychology

Poster Presentation List

1.00pm-1.45pm

Biological Sciences

1. **Asymmetric competition and resource availability alter adaptive potential and coexistence of species in changing environments**
   Van Den Elzen, Courtney
2. **Impact of unilateral cerebellar haemorrhage combined with early systemic inflammation on the development of the neonatal mouse cerebellum**
   Richter, Lindsay
3. **Soma-Germline Interactions in Spermatogenesis**
   Casal, Lorenzo Luis (Enzo)
4. **Assessment of Chemosensory Dysfunction in Caenorhabditis elegans (C. elegans) with Mutations in Alzheimer's disease related gene**
   Parvand, Mahraz
5. **Molecular Phylogeny of Mobilid and Sessilid Ciliates Symbiotic in Eastern Pacific Limpets**
   Irwin, Nicholas
6. **Why parents underestimate the safety benefits of booster seats**
   Mohr, Nicola
7. **Transport and inheritance of lipid droplets in Saccharomyces cerevisiae**
   Alyateem, Noor
8. **Scar Healing**
   Yuen, Richard
9. **Advantages of Confocal Microscopy and Raman Spectroscopy in Diagnosing Cutaneous Vasculitis**
   Goyal, Rohini
10. **Cost-effective LTBI screening decisions in high risk populations are vital. What is the present breadth and quality of the literature surrounding this emerging topic?**
    Sasitharan, Thenuga
11. **Cisplatin Resistance Pathway in Non-Small Cell Lung Cancer Cells by KRAS and p53 Mutants**
    Fitton, Vincent
12. **What is RHAMM's role during cancer cell division and migration?**
    Sheergar, Aamir & Chih, Tiffany

Biological Sciences

13. **Effects of individual, paired and parental housing on calf behavior in response to novel situations**
    Zubiria Perez, Alejandra (Ale) & Wong, Catherine
14. **The mechanisms of nonspecific immune protection against sepsis by BCG vaccine in newborn mice.**
    Fung, Alex Ka Chun (Alex); Marcelo, Jovy; Greening, Kendall; Sutton, Caroline & Zhang, Isabella
15. **The Incredible ULK1 Mutation and Its Role in The Development of Schizophrenia**
    Yee, Belinda; Zhu, Mayanne & Ng, Nicole
16. **EBNA 3B's role in suppression of EBV related tumors**
    Hardman, Blair; Tyshchenko, Kateryna (Kate) & Madero, Angel
17. **Classification of the onset of attention deficits from single-electrode EEG data**
    Xie, Cheng Cheng; Demoullin, Francois & Coote Tasha
18. **Genome Sequencing's Potential to Revolutionize Traditional Epidemiological Public Health Efforts**
    Ho, Cheng Ching (May); Laino, Giulio & Juma, Orach
19. **Multiple Sclerosis and the Blood Brain Barrier**
    Tan, Cheryl; Li, Yi Tao (Olivia) & Fazeli Attar, Seyedeh Saba (Saba)
20. **The effects of increased LINE presence on the ability of genes to escape X chromosome inactivation in females**
    Crichlow, Cindy-Lee (Cindy) & Yang, Xiaodan (Erin)
21. **SHIP-Deficient Mice as a Suitable Model for Crohn's Disease**
    Jen, Gregory; Mirahmadi, Mehran & Landas, Julius
22. **Discovering Host Specific Adaptive Mutations in Pathogenic Organisms**
    Chow, Kevin; Tsai, MengChi; Yeo, Sarah & Schuster, Luke
23. **Structural model of the Ebola virus L protein**
    Nguyen, Le Tam Nhan (Julian) & Wu, Leon
24. **Liposomal Mimics of Neural Exosomes to Facilitate Sequestration of Amyloid β-protein**
    Dordevic, Matthew (Matt) & Shan, Christine
25. **The Effects of Exercise on the Quality of Life of Children with Neurocognitive Disabilities**
    Sidhu, Rawel & Yeung, Chantane

Biological Sciences

26. **How does maternal obesity affect the development of childhood obesity?**
Singh, Sarah; Akhavan, Dina & Malekafzali, Leilynaz

27. **Creating a model for how various factors affect the change in length of a braid**
Hong, Sarah & Kim, Eugenia

28. **Effect of Alcohol Consumption and Tobacco Smoking on Male Infertility**
Cheng, Ting-An & Yip, Annie

29. **Effects of Physical Exercise on Telomere Length**
Tsang, Vivian & Moghadam. Bita Sabet (Bita)

30. **Effectiveness of Demethylating Agent DAC (Decitabine) in Treating Acute Myeloid Leukemia Patients of Different Ages**
Wu, Yunchen (Cheryl) & Chang, Tung (Doris)

31. **Computational analysis of the role of miR-125b in Acute Myeloid Leukemia**
Ekmekci, Zeki & Ingeniero, Natasha

32. **Gene co-expression in transcription factor and protein-protein interactions**
Liu, Zichun (Iris) & Vira, Tariq

33. **Knockdown of MEF2 affects visually driven structural and functional neuroplasticity**
Martiquet, Jacques

34. **The effects of a novel neuropeptide receptor gene npr-26 on arousal level in C. elegans**
Yu, Alex

35. **Red colour discrimination in jumping spiders**
Cheng, Alexander (Alex)

36. **Elucidating the mechanisms by which cell-ECm adhesion regulates haemocyte migration in Drosophila**
Yan, Jinsong (Tony)

37. **Recruitment of Chromatin-Modifying Complexes in the DNA Damage Response**
Embuscado, Joseliya (Josel)

38. **Adaptive Introgression Genes in P. trichocarpa in Response to Late Frost Events**
Wu, Judy

Biological Sciences

39. **Pulmonary mechanics of high-altitude waterfowl**
York, Julia

40. **The Integration of Taste and Olfaction in the Drosophila Brain**
van Baardwijk, Julie

41. **Effects of Prenatal Alcohol Exposure and Chronic Mild Stress on Depressive-Like Behaviour**
Takeuchi, Lily

Chemistry & Physics

42. **Optimization of Fed-Batch Reactor Processes for Chinese Hamster Ovary Cells Using Design of Experiments**
Pang, Miriam

43. **Optimizing the Geometry of a Magnetic Resonance Coil**
Bains, Manpreet

44. **Combining cationic and anionic exchange membranes to improve the efficiency of vanadium redox flow batteries**
Quinlan, Cameron

45. **The evolutionary origin of chemical weaponry in an invasive sunflower**
Poon, Anita & Borkowski, Kelly

46. **3D Visualization of Ions in a Precision Mass Spectrometer**
Fullerton, Dilyn & Stone, Michael

47. **The Role of the Receptor CD47 in Cell Adhesion Mediated Drug Resistance of Leukemia**
Lu, Kelly

48. **Does the loss of specific PP2A complexes affect cell cycle progression and mitosis in cancer?**
Zhou, Jmaes; Anismal, Rachel & Huang, Vivian

49. **The Role of Coxsackievirus B4 in the onset of insulin-dependent diabetes type 1**
Caballero, Guillermo & Arshad, Omair

50. **Probing New Physics Using the Standard Model Gauge Couplings and the Large Hadron Collider**
Krakan, Karlo; &Li, Yifan

51. **Chemical warfare in the plant world: the effect of allelopathy on the invasive potential of a sunflower species**
MacDonald, Kate & Li, Stella

Engineering & Technology

52. **Invasion Fronts and Tissue Dynamics**
    Bhaskar, Dhananjay

53. **Effect of loading rate on response of vertebral bodies under compressive loading**
    Merry, Kohle

54. **The effect of temperature and salinity on electrical resistivity for SAGD steam chambers**
    Wong, Mychelle

55. **The Effect of Cognitive Load on Learning Digital Maps**
    Marozoff, Shelby; Gooderham, Geoffrey; Tse, Sheila & Ho, Simon

56. **Using Resonance Ionization to Improve Laser Spectroscopy Measurement Sensitivity to Exotic Isotopes**
    Branch, Timothy & Yao, Dickson

Environmental Science & Applied Biology

57. **Changes in stable isotopes of carbon dioxide along a rural-urban transect in response to fuel emissions**
    Semmens, Caitlin

58. **The Impact of Salinity and Dispersal on Microbial Communities**
    Chen, Melissa

59. **Zebrafish hiding behaviour in large, enriched laboratory tanks**
    Mehrtash, Morvarid

60. **Sustainable biofuel from household organic waste: Degrading resistant lignin with fungal enzymes to enhance production.**
    Tannason Ng, Steuart

61. **Climate and flowering times of Magnolia taxa at the UBC Botanical Garden**
    Mitchell, Taisha

62. **Strategies for effective conservation: an investigation on the effect of habitat size on functional richness**
    Pagowski, Veronica

63. **How does climate change affect rice production in Bulacan province, Philippines**
    Hao , Teresa

Environmental Science & Applied Biology

64. Deep Eutectic Solvents in Vanadium Redox Flow Batteries
Ahmed, Ashley; Krishnan, Akhil & Smith, Rodney D. L.

65. Study of Bird Strikes at Selected UBC Buildings
Leung, Carmen

66. Three Key Challenges to Understanding Climate-Volcanoes Feedbacks
Clyne, Margot; Quainoo, Adjoa & Hatcher, Kimberly

Kinesiology

67. Correlation between lower limb proprioceptive sense and skilled locomotor performance
Qaiser, Taha

68. The dynamics of standing balance modulates the vestibular control of lower limb muscles
Francisco, Bea

69. Balancing in Pairs
Dhillon, Jaspreet

Medicine & Pharmacology

70. Effects of an Age-dependent Decrease of Autophagy on Retinal Pigment Epithelium Homeostasis
Fong, Alison

71. Regulating Asthmatic Airway Smooth Muscle (ASM) Proliferation by Reducing Calreticulin
Tam, Andrew

72. Longitudinal Evaluation of Treatment of Hep-C Infection in Active Drug Users
Alimohammadi, Arshia

73. The Effectiveness of Serum C-Reactive Protein to Monitor Treatment Response in Cystic Fibrosis Pulmonary Exacerbations
Sharma, Ashutosh

74. T-Cell Receptor Cross-linking Downregulates Gp130
Zhao, Billy

Medicine & Pharmacology

75. **Long and short term outcome following renal transplantation: the predictive value of perioperative variables in a pediatric population**
Zheng, Boyuan

76. **Schizophrenia and Delusions- Investigating the Hypersalience Network**
Hunt, Camille

77. **Refining the assessment of surface glutamate receptor distribution in co-cultured neurons**
Li, Edward H.Y.; Wang, Liang & Raymond, Lynn A.

78. **Drug-Drug Interactions – Methodologies and Significance**
Wu, Fiona

79. **A survey-based assessment of the association between the perceived accessibility of health information with cancer knowledge and risk perception**
Cua, Georgine

80. **Effects of training inspiratory muscles in patients with chronic obstructive pulmonary disease (COPD)**
Raza, Haider

81. **The effect of surgical delay of hip fracture patients on in-hospital deaths**
Gu, Jenny

82. **ECT: Evaluating Seizure Quality**
Green, Katherine

83. **Blockage of pro-inflammatory cytokine IL-1decreases blood brain barrier permeability in multiple sclerosis.**
Shahbahrami, Katiana

84. **100 Top Cited Articles in Clinical Near Infrared Spectroscopy**
Cubbon, Marcia

85. **Grading Practices of Pharmacy Programs in Canada**
Lee, Mathew

86. **Changes from the DSM IV to the DSM V and the Opinions of the Psychiatric Community: a Meta-Analysis.**
Salterio, Nicholas

87. **Intravenous Immunoglobulin Skews Human Macrophages to a Regulatory Phenotype In Vitro**
Zhao, Tony

Medicine & Pharmacology

88. **Advantages and Ways to Tackle the Problems of Reflectance Confocal Microscopy Regarding Clinic Diagnoses of Skin Cancers**
    Zhou, Zihe

89. **Treatment of Degenerative Eye Disease with Gene Therapy RdCVF and RdCVFL**
    Ho, Brian

90. **A systematic review on Levetiracetam on tremors in MS Patients.**
    Wong, Jeffrey & Kooner, Aman

91. **How do (medical) students learn best?**
    Ku, Jerry; Hung, Wayne & Ip, Alvin

92. **The role of the immune system during the progression of amyotrophic lateral sclerosis (ALS**
    Tran, Jordan & Van de Voorde, Kurt

93. **The Effect of Adoptively Transferring Deficient Treg Subpopulations Identified from T1DM Patients in an NOD Mouse Model**
    Le, Michelle & Mysuria, Shivani

94. **A Novel Approach for HIV Treatment (AKT inhibitor MK2206 as a candidate for anti-HIV therapy)**
    Samadyan, Negar; Antepyan- Ruckenstein, Jeremy; Zhang, Yanru (Jessie) & Danial Mojaab

95. **The Effect of Imetelstat on Cancer Cells**
    Toh, Samantha

96. **8-iso-PGF2β Biomarker as Possible MS Diagnostic Tool for Disease Progression**
    Tang, Shannon; Kim, Kelly & Sempere, Mila

97. **Heat shock protein 27 regulates tumor vessel formation by affecting multiple factors**
    Samra, Simranjit

98. **Comparison of influenza A protein compositions of vaccines and annual predominant strains**
    Chen, Sunny & Kashino, Lana

99. **Boosting the Expression of CXCR3 Chemokine Receptors on T-regulatory Cells in Cultures with Interferon-β and CXCL9-11Boosting the expression of CXCR-3 chemokine receptors on T-regulatory Cells to combat graft-versus-host disease.**
    Li, Vivian & Wang, Sheila

Medicine & Pharmacology

100. Detection of the pathogenicity factor PtpA in Mycobacterium bovis BCG
Zhou, Jason

Politics, Culture & Sociology

101. Native Northwest Coast Art?
Obidi, Sara

102. Does Instructor Gender Matter? Evaluating the effect of gender on course evaluation scores
Lee, Michelle

103. Learning and Analysing: Using Visualisation to Reveal Patterns in Arts Student Data
Av- Shalom, Na'ama

104. Connecting Linguistics to Language Learners: a Lesson Plan for Gitksan
Pine, Aidan

105. Dialectal variation in vowel quality in Gitksan
Borland-Walker, Kyra

Psychology

106. The Effects of Hemianopic Visual Disorder on Experimental Studies of Alexia – a Reading Disorder
Bao, Carol

107. Sleep-Language Development in Children with Down Syndrome – Preparations for a Prospective Study
Chan, Melvin

108. Moved by compassion: The influence of relative clarity on empathy
Lin, Rachel; Lenkic, Peter & Enns, James T.

109. Pain and meaning violations: an increase in meaning affirmation
Lai, Rina

110. Comparing the efficacy of maternal fluoxetine and exercise in a rodent model of postpartum depression
Richardson, Robin

Psychology

111. The Effect of Pain Medication on Anxious Uncertainty
Jamali, Shahrzad

112. Quality and content of online advice for the prevention of Alzheimer disease
Feng, Tanya

113. The effect of dominant and prestigious leadership styles on subordinate well-being
De Silva, Tashya

114. New cultures & connections: Friendship formation and social connection among UBC's international students
Gong, Yimiao

115. Hidden Frontier: Investigating Effective Methods for Accessing Hard-to-Reach Populations in Substance Use Research
Mak, Lily & Ho, Kiki

116. When covert becomes overt: The birth of remote goal-derived movements
Rothwell, Austin

117. Go Ahead, Change My Mind: Trait Receptiveness, Stress, and Health Outcomes
Coopersmith, Catherine (Katie)

118. Is anxiety related to an attentional bias towards threatening/hostile stimuli in childhood.
De Groot, Chris

119. Explorations of Strategies to Promote Exercise Adherence
Liu, Desmond

120. Judged by the status of your social network: How high status connections impact first impressions
Peters, Ewurabena (Bena)

121. Is Pinocchio a Real Boy? People's Emotional Responses for Cartoon and Real-Life Pictures
Chao, Grace

122. The Effect of Short-Term Musical Training on the Executive Functions of Children from 6 to 8 Years Old
Li, Jenny

123. Sleep Quality and Marital Tension in Paramedics and Their Spouses: A Daily Process Model
Dmyterko, Juliane

Poster Presentation Abstracts

1.00pm-1.45pm

Biological Sciences

Asymmetric competition and resource availability alter adaptive potential and coexistence of species in changing environments

Presenter: Van Den Elzen, Courtney

Faculty Sponsor: Sarah Otto

Species within the same ecosystem often compete for resources, which can affect their ability to survive and reproduce. Many different organisms compete for resources, but competition affects the livelihood of different organisms to varying extents. For some, competition may cause extinction or otherwise affect species' evolutionary trajectory. Previous work suggests that competition may impede species' ability to adapt to changes in the environment. Currently the factors that influence this, and the effects of competition under different scenarios, are not entirely known. In order to investigate this we can use mathematical models to figure out when we expect competition to act in certain ways. Here we have built upon previous modelling work. With our model we have shown that in a changing environment: (1) when a species is more abundant (in numbers of individuals) than its competitor, it can avoid extinction for longer; (2) when environmental change favours the less abundant competitor, competing species coexist for longer; and (3) in some cases, one competitor species can evolve in the wrong direction relative to the environmental change, caused by release from competition over time. Our work builds on current understanding of how competition may affect the fate of species in changing environments. We are currently exploring how asymmetries in competition strength change the results..

Biological Sciences

Impact of unilateral cerebellar haemorrhage combined with early systemic inflammation on the development of the neonatal mouse cerebellum

Presenter: Richter, Lindsay

Faculty Sponsor: Daniel Goldowitz

Background: Neurological complications in preterm infants are a major health concern, especially in the extremely low birth weight population. This population is highly vulnerable and is exposed to multiple stressors during their postnatal development. Two major risk factors for neurodevelopmental impairments are perinatal cerebellar haemorrhage (CBH) and post natal infection. How these two risk factors may interact is currently unknown.

Objectives: To measure altered cerebellar genesis and neurobehavior of isolated or combined cerebellar insults induced perinatally in a mouse model.

Methods: Unilateral CBH was induced by using local injection of bacterial collagenase (0.15U) at postnatal day 1 (P1) combined with intraperitoneal lipopolysaccharide (LPS) injection (300µg/kg) concomitantly. The C57BL/6J mice were behaviourally tested on a modified mouse neurological exam every day until P15. Cerebellar tissues were collected at P2 and P15 for neurohistology.

Results: CBH induced at P1 significantly delays forelimb grasp acquisition in neonatal mouse pups if combined or not with an early inflammatory state (EIS). EIS leads to comparable delay in forelimb grasp acquisition followed by a significant decrease in grip strength and reduction in global muscular strength by P15. EIS preliminary histological data show a trend in cerebellar volume reduction at P15.

Conclusions: Early insults in the developing neonatal brain alter juvenile motor milestones in a mouse model of CBH combined with EIS. This new model will allow us to test neuroprotective strategies to improve preterm infant neurodevelopmental outcomes.

Biological Sciences

Soma-Germline Interactions in Spermatogenesis

Presenter: Casal, Lorenzo Luis (Enzo)

Faculty Sponsor: Guy Tanentzapf

Morphogenesis is the process wherein uniform populations of cells rearrange themselves to form intricate three-dimensional body plans. This requires complex changes in the cytoskeleton to alter cell shape and adhesion capabilities to regulate interactions between cells. An example of this is seen in spermatogenesis where the interactions between soma and germline are crucial to proceed in development. In the fruit fly Drosophila melanogaster testis, two somatic cells wrap around the developing germline, insulating it from the rest of the organism and creating the microenvironment necessary for proper germline differentiation. We hypothesize that occluding junctions form between the two wrapping somatic cells, and that disrupting these junctions will interrupt germline development resulting in sterility. Using a tissue specific genetic manipulation technique called RNAi-mediated knockdown, we both identified specific junctional proteins required for fertility, as well as the cell type and stage at which they are required during spermatogenesis. This genetic screen found that a specific subset of junction proteins, when knocked down in somatic cells early or late in development, resulted in sterility. Further investigation of these knockdowns using immunocytochemistry and fluorescence microscopy reveal morphological and cellular abnormalities in the testis. Our results suggest that the occluding junction proteins are required in the soma for the germline to progress through spermatogenesis. Interestingly, the interaction we observed is analogous to the Blood-Testis Barrier seen in vertebrates and further research on the formation of this barrier in the fly can ultimately aid in understanding the barriers' function.

Biological Sciences

Assessment of Chemosensory Dysfunction in Caenorhabditis elegans (C. elegans) with Mutations in Alzheimer's disease related gene

Presenter: Parvand, Mahraz

Faculty Sponsor: Dr. Catharine Rankin

Most cases of Familial Alzheimer's Disease (FAD), an uncommon form of Alzheimer's Disease (AD) that usually occurs earlier in life, are linked to mutations of the presenilin1 (PS1) gene. This gene has significant sequence overlap with sel-12 gene of the Caenorhabditis elegans (C.elegans), a transparent roundworm. The biological function of the PS1 protein is unknown. However, the sequence similarity of this gene to the sel-12 gene of C.elegans shows a functional conservation of these proteins. Further, genetic studies on simple organisms such as C.elegans offer a powerful approach to understanding the role of PS1 genes. Many patients of AD report a decrease in their ability to detect smell and taste. The etiology of this reduction in chemosensation sensitivity is difficult to ascertain. This study aims to determine if the loss of the sel-12 function, the analog of PS1 gene in humans, results in the deterioration of chemosensation in C.elegans. The results of this study are valuable as they provide preliminary insight if PS1 mutations could affect cellular pathways involved in chemosensation. C.elegans are innately attracted to the taste of sodium acetate salt. This salt was dissolved in agar in a specific region of a petri dish in which worms were tested. The number of mutant and wildtype C.elegans at the region of salt presence was determined. Sel-12 mutants displayed decrements in their attraction towards sodium acetate, whereas wildtype C.elegans displayed recognition of the salt's presence. C.elegan PS1 and sel-12 rescue strains both partially recovered their chemosensation, exhibiting behaviors similar to the wildtype strain.

Biological Sciences

Molecular Phylogeny of Mobilid and Sessilid Ciliates Symbiotic in Eastern Pacific Limpets

Presenter: Irwin, Nicholas

Faculty Sponsor: Denis Lynn

The phylogenetic relationships of the ciliate subclass Peritrichia, composed of the orders Mobilida and Sessilida, have recently come under debate as morphological and molecular analyses have struck contrasting conclusions as to the monophyly of the group. We provide additional molecular data to assess the monophyly of the Peritrichia by sequencing the small subunit ribosomal RNA genes of two symbiotic peritrichs, Urceolaria korschelti and Scyphidia ubiquita, found inhabiting the mantle cavity of limpets. Although phylogenetic analyses indicated a non-monophyletic Peritrichia, approximately unbiased tests revealed that the monophyletic hypothesis could not be rejected. With regard to the Mobilida, our analysis showed divergence within the family Trichodinidae related to host taxa – a molluscan clade and a fish clade. For the Sessilida, the family Scyphidiidae was sister to the Astylozoidae. In our sampling of U. korschelti and S. ubiquita, both species showed significant genetic divergence amongst geographically isolated, yet morphologically indistinguishable populations. Preliminary results following investigations of U. korshelti sampled from chiton hosts isolated from the type locality of Helogland, Germany, have revealed further genetic divergence despite morphological similarity. Hence we hypothesize that cryptic speciation has produced these morphologically identical species and argue that more extensive genomic analyses are required to fully assess the monophyly, biogeography, and ultimately biodiversity of the peritrichs.

Biological Sciences

Why parents underestimate the safety benefits of booster seats

Presenter: Mohr, Nicola

Faculty Sponsor: Takuro Ishikawa

Child safety seats (CSS) provide essential protection from injury during a crash. Research suggests that, in Canada, over 90% of children less than 4 years of age are restrained in a CSS. However, booster seats are only used by half of the children that require them. Our study aims to understand why booster seats are not used at the same rate as other CSS. Booster seats are needed to ensure that seatbelts fit properly on a child in order to redirect crash forces to the strongest parts of the body (hips and chest). Using a health behaviour model called fuzzy-trace theory, we hypothesized that a misconception exists around booster seats and their purpose: people believe that booster seats are primarily meant to prevent ejection. Since seatbelts can also prevent ejection, people do not see the additional safety benefit of booster seats. Certified child seat technicians were asked to estimate how much seatbelts and booster seats reduce the risk of injury along with questions related to their knowledge about CSS and their purpose. The aim of this survey was to determine if this misconception exists amongst experts and whether it exists independent of factual knowledge about CSS. If successful, the next step will be to survey parents in order to determine if this misconception exists amongst them. We aim to understand why booster seats are not used as often as they should be, in order to implement appropriate methods and means to educate and change this misconception.

Biological Sciences

Transport and inheritance of lipid droplets in Saccharomyces cerevisiae

Presenter: Alyateem, Noor

Faculty Sponsor: Analise Hofmann

During cell division it is essential organelles are properly segregated between the two dividing cells. In Saccharomyces cerevisiae, cells divide asymmetrically. Studying how S. cerevisiae are able to divide asymmetrically yet inherit organelles properly may inform us on how other cells such as sperm, ciliated cells and neurons maintain polarity. Recently it was discovered that lipid droplets (LD) are true organelles (Knoblach and Rachubinski 2014). Much like other organelles, LD are inherited by myosin-2 (Myo2), a motor protein that is involved with actin-based transport. However it is not known exactly what protein tethers LD to Myo2. To find out what protein is responsible for this, I have done preliminary bioinformatics analysis on possible genes that could be associated to both LD and Myo2. Based on this list, a high-throughput microscopy screen (HTM) can be conducted to see if gene deletions of said protiens cause mislocalization of LD. A protein pull down assay can be completed to confirm that the proteins that caused mislocalization when deleted in the HTM screen bind to Myo2. After distinguishing what the protein is, the possibility of a human homologue for the protein can be explored.

Biological Sciences

Scar Healing

Presenter: Yuen, Richard

Faculty Sponsor: Kelly Sakaki

Scars are physiological features that often have structural and psychological implications. To this day, the mechanisms behind scar formation and wound healing are still not fully understood (especially in the cases of fetal scarless wound healing in first and second trimester mammal fetuses and in scarless healing in adult oral mucosa). Advancements in these areas would greatly accelerate scar treatment research. Past experiments that make attempts to emulate the amniotic environment (to induce fetal-like scarless healing) have shown promise, but not enough to produce treatments that pass clinical trials; the majority of these experiments involved topical application of (a) cytokine(s) which helped diminish scar appearance, but tensile strength and skin integrity is not fully restored. Recent research has shown that a focus on replicating the amniotic environment may not necessarily be the right direction, and instead, a focus on other fully developed adult regenerative system may produce better results (like the oral mucosa model or in nude athymic mice). Novel techniques have shown that injections of cytokines similar to the ones found in the oral mucosa and in athymic mice can improve wound regeneration. Injections of mesenchymal and adipose derived stem cells also show signs of merit.

Biological Sciences

Advantages of Confocal Microscopy and Raman Spectroscopy in Diagnosing Cutaneous Vasculitis

Presenter: Goyal, Rohini

Faculty Sponsor: Wenbo Wang

Cutaneous Vasculitis is a general term given to a form of rare skin conditions that are associated with the inflammation of blood vessel walls and normally presents itself as a rash. Usually, a biopsy needs to be performed in order to determine whether inflammation is present and then diagnose the condition. To assist in the diagnostic process, possibly even avoid an invasive approach all together, Confocal Microscopy can be used to visualize blood vessels in the skin. The microscope would be able to take live images of the skin and its underlying layers. Raman spectroscopy would be used to provide a more detailed analysis of the current state of the blood vessels and the biological components that make up the blood vessels. These results would be compared to previously documented skin samples. Based on the results obtained from both imaging techniques, a diagnosis can be made regarding the specific type of cutaneous vasculitis present.

Biological Sciences

Cost-effective LTBI screening decisions in high risk populations are vital. What is the present breadth and quality of the literature surrounding this emerging topic?

Presenter: Sasitharan, Thenuga

Faculty Sponsor: Jonathon Campbell

Background: Tuberculosis (TB) is a bacterial infection caused by M. Tuberculosis, infecting an estimated 9 million people per year. Latent tuberculosis infection (LTBI) is the inactive form of TB, and while not contagious, it is estimated that nearly one-third of the world is infected with this form of TB. In low incidence countries such as Canada, TB rates have steadied and the rapid declines seen previously are no longer occurring. Up to 10% of those infected with LTBI experience reactivation to active TB, with risk of reactivation highest in immunocompromised populations. In low incidence countries, TB rates are highest in immigrants from high TB incidence countries, likely due to LTBI reactivation. This systematic review aims to evaluate research studies that have investigated LTBI screening of high-risk populations using QALYS as an effectiveness measure.

Methods: A systematic literature search was performed using multiple electronic databases. Medical Subject Headings including "cost-effectiveness analysis", "latent tuberculosis infection" and "mass screening" were used to identify relevant citations. The quality of the studies was evaluated using the 24 criteria listed in the CHEERS checklist, which lists key reporting items for economic analyses.

Results: Using the headings, 330 studies were identified. After removing duplicates, 160 citations were remaining; 50 citations were removed after scanning of the title/abstract. A further 102 studies were removed after full text scanning as they did not pertain to cost-effectiveness or screening, did not use QALYS as an effectiveness measure, and were not written in English. Ultimately, 8 studies were identified and included for examination. Three studies passed ≥ 23 criteria and 5 studies passed between 21 and 22 criteria signifying very high and high quality studies, respectively, in terms of reporting.

Discussion and Conclusion: While the quality of literature is generally high, the lack of available studies in this topic area is alarming. Further studies are required to improve screening decisions in populations at high risk for LTBI reactivation.

Biological Sciences

Cisplatin Resistance Pathway in Non-Small Cell Lung Cancer Cells by KRAS and p53 Mutants

Presenter: Fitton, Vincent

Faculty Sponsor: Gunjan Kumar

Lung cancers, including non-small cell lung cancers (NSCLC), account for the highest rates of cancer related mortality in the United States with five year survival rates averaging 10% in late stages. Mutations in KRAS and p53 tumor suppressor gene are found in 25% and 70% of NSCLC patients respectively and research into these gene mutants' relation to drug resistance is well documented. While KRAS and p53 mutants have been linked to chemoresistance by NF-kB activation, the mechanism of drug resistance remains unclear. Effective treatments can developed if chemoresistance can be better understood at the molecular and genetic level in NSCLC cells. We plan to examine literature linking p53 and KRAS mutations with cisplatin resistance in NSCLC cells to propose a mechanism for chemoresistance involving NF-μB activation, KRAS, and p53 mutants. We hypothesize that p53 and KRAS gene mutations promote chemoresistance in NSCLC cells by activating NF-μB, transcribing proteins that reduce cisplatin sensitivity. NF-kB influence on cell cycle was examined using electrophoretic mobility shift assay (EMSA) on cells with active and inactive NF-μB to examine extent of NF-μB binding to DNA. Western blotting was used for cells with functional and inhibited NF-μB, using antibodies for IkBμ, IkBμm, Cyclins A, B, and D1, Cdks 2, 4, and 6, p21, pRB. p53 and KRAS influence on NF-μB nuclear translocation was evaluated using EMSA on silenced or wild type p53 cells and mutant or wild type KRAS. Cell components were labelled using MT μ-actin, TFIIB, and antibodies to p53. Influence of KRAS on NRF-2 transcription was examined using KRAS vectors containing luciferase reporter gene. NRF-2 promoter fragments were incorporated into the vector. Degree of cell death was measured using FACS, labelling functional and inhibited NRF-2 cells with propidium iodide and Annexin V. Both NRF-2 and NF-μB activation by KRAS were found to promote chemoresistance.

Biological Sciences

What is RHAMM's role during cancer cell division and migration?

Presenters: Sheergar, Aamir & Chih, Tiffany

Faculty Sponsor: Helen Chen

Increased cell division and motility are two hallmarks of cancer. Hyaluronan-mediated motility receptor (RHAMM) is a microtubule associated protein. RHAMM is highly expressed in multiple myeloma and malignant peripheral nerve sheath tumors. It is also an important contributor to the low survival rate of these cancers. RHAMM is located at the centrosome, an organelle that regulates cell division and migration. RHAMM forms a protein complex with the oncogenic heterodimer AURKA-TPX2 during cell division and migration, highlighting RHAMM's importance during these processes. However, we do not know the exact role RHAMM plays during cell division and migration. In this project, we aimed to determine the location of RHAMM and to better understand the role it plays during cancer cell division and migration. Our findings from our immunofluorescence experiments that tracked RHAMM and the centrosome in HeLa (cancer) cell lines during cell division, indicates that RHAMM localizes at the centrosome during mitosis but not during interphase. RHAMM western blot data reveals increased levels of RHAMM expression during mitosis. We also found that the deletion of RHAMM resulted in abnormal mitotic division which has the potential to trigger carcinoma formation. In contrast, increased RHAMM expression in multiple myeloma carcinomas is believed to influence metastasis due to RHAMM's role in assisting cell motility.These data provides us with valuable preliminary insights into RHAMM's functions during cell division and in cancer which may be useful for developing cancer treatments.

Biological Sciences

Effects of individual, paired and parental housing on calf behavior in response to novel situations

Presenters: Zubiria Perez, Alejandra (Ale) & Wong, Catherine

Faculty Sponsor: João Henrique Cardoso Costa

Millions of dairy cows are raised in Canada per year with beef and dairy production contribute over $26 billion to the Canadian economy. Animal welfare is an area of rising social concern in North America as ensuring adequate welfare levels provide animals with the necessary conditions to meet their needs. Dairy calves are housed individually in many farms until weaning after which they are transferred to different enclosures which expose them to a novel situation that can act as a potential stressor. Paired housing has been suggested to increase the ability of calves to adapt to new environments and feed types in comparison to individual housing. The aim of this study is to explore the effects of paired versus individual calf housing on movement to new environments and new feed types. Calves will be randomly placed into either paired or individual housing; after weaning they will be transferred to a novel area and the following day they will be introduced to a new feed type. The latency to explore the novel environment and to consume the new feed will be measured using time lapse video recordings and will be used as an indication of adaptability of dairy calves. We expect that calves raised in pairs will have much shorter latencies in both novelty tests and hence a higher adaptability to novel situations. We predict that social housing will impact their later ability to adapt to new situations, providing a basis for future research on improved management techniques.

Biological Sciences

The mechanisms of nonspecific immune protection against sepsis by BCG vaccine in newborn mice.

Presenters: Fung, Alex Ka Chun (Alex); Marcelo, Jovy; Greening, Kendall; Sutton, Caroline & Zhang, Isabella

Faculty Sponsor: Nelly Amenyogbe

The Bacillus Calmette-Guérin (BCG) vaccine against Mycobacterium-tuberculosis (MTB), when given at birth, can reduce all-cause mortality by 50% in the neonatal period irrespective of its impact on MTB. This decrease is attributed to nonspecific protection (NSP). However, the nonspecific pathogens and underlying immunological mechanisms behind NSP remain unknown. As sepsis is a leading cause of infant mortality, our goal is to characterise BCG-mediated NSP in a mouse model of newborn sepsis. Prior research shows that administering BCG to newborn mice can rescue two-thirds of immunized animals from infectious morbidity only three days after immunization compared to naïve controls. Immunized mice also had a significantly reduced bacterial burden one day after challenge. Due to the immediacy of the NSP effect, we aim to further elucidate on how the BCG vaccine alters innate cell populations in the spleens and blood of immunized and naïve mice using flow cytometry. To address our aim, litters of four to six day old mice were randomized to immunization with BCG or diluent (control), with blood and spleen samples collected three and fourteen days post-immunization. Innate cell populations in the samples of whole blood and splenoctyes were assessed using flow cytometry. Results show that splenic PMN populations doubled in vaccinated neonates and blood PMN populations displayed altered Ly6G expression, compared to naïve controls. However, these effects dissipated after fourteen days post-immunization, possibly indicating a limited window of opportunity for BCG mediated NSP effects. By elucidating on the mechanism of nonspecific BCG protection, the administration and research advancement of the vaccine may be enhanced to decrease infant death rates around the world.

Biological Sciences

The Incredible ULK1 Mutation and Its Role in The Development of Schizophrenia

Presenters: Yee, Belinda; Zhu, Mayanne & Ng, Nicole

Faculty Sponsor: Dr. Kurt Haas

Understanding the biological mechanisms underlying schizophrenia is important for the identification of potential therapeutic targets for treating this disorder. Mutations in genes such as DISC1 and ErbB4 have been associated with abnormal neuronal growth observed in both schizophrenic mice and humans. Our gene of interest, ULK1, regulates autophagy activation via the mTOR signalling pathway and has not been studied extensively in schizophrenia research. The aim of our project is to design a theoretical protocol to determine if ULK1 mutations play a role in the abnormal neuronal growth patterns associated with schizophrenia.

Transgenic ULK1- μ mice with a fluorescent GCaMP5 tag on hippocampal pyramidal neurons will have their pyramidal neurons imaged using two photon microscopy to examine neuron morphology. As spatial learning defects characteristic of schizophrenia are associated with the hippocampus, a behavioural assay will compare the time and ability of ULK1- μ mice in navigating a radial arm maze correctly to control mice.

We hypothesize that the loss of ULK1 in ULK1-μ mice will result in increased mistakes in navigating the radial arm maze and increased dendritic abnormal branching. Further studies could explore the implications of an ULK1 deficit on other symptoms of schizophrenia with direct connection to schizophrenic patients to provide further insight on the relationship between ULK1 and schizophrenia.

Biological Sciences

EBNA 3B's role in suppression of EBV related tumors

Presenters: Hardman, Blair; Tyshchenko, Kateryna (Kate) & Madero, Angel

Faculty Sponsor: Thomas Dixon-McDougall

Epstein Barr (EBV) is a ubiquitous human gamma herpes virus that infects around 90% of the global adult population. EBV has been linked to multiple B cell cancers including Hodgkin's and Burkitt's lymphomas. These cancers have been found to be associated with specific latency proteins including 6 nuclear antigens and 3 latent membrane proteins. The absence of one nuclear antigen (EBNA 3B) has been found to correlate with increased oncogenesis in patients. In this experiment the regulation of viral genes by EBNA 3B to supress tumorigenesis will be studied through CRISPR mediated knockout of EBNA 3B (EBNA 3BKO). Gene expression of EBNA 3A (Epstein Barr Nuclear Antigen 3A), LMP1 (Latent Membrane Protein 1), cytokines CXCL9 and CXCL10 (attract T-cells to kill cancer cells), and adhesion molecule E-Cadherin (tumor suppressor linked to invasiveness) between wild type and EBNA 3BKO infected cell lines will be compared using quantitative PCR (qPCR). Based on literature an increased expression of EBNA 3A and LMP1 is expected to be observed via fluorescence qPCR in the knock out strain accompanied by decreased expression of CXCL9/10 and E-Cadherin. The epigenetic marks on these genes, such as DNA and histone methylation, will be measured using bisulfite sequencing and chromatin immunoprecipitation respectively; decreased methylation will be expected on the CpG promoter islands of both EBNA 3A and LMP1 while increased methylation is expected on the other genes. To identify a mechanism by which EBNA 3B exerts this effect co-immunoprecipitiation of EBNA-3:RBP-Jk will be used to examine competition between 3A and 3B for RBP-Jk binding. It is known that the EBNA 3 family binds RBP-Jk but competion and effects of 3B binding are unknown. These results will provide a possible explanation for increased oncogenesis, as erronious RBP-Jk activity is known to affect methylation patterns and has also been linked in development of cancers. This study will elucidate a novel mechanism of virally encoded tumor suppression through previously unstudied effects of 3B on expression of other viral genes and cellular pathways.

Biological Sciences

Classification of the onset of attention deficits from single-electrode EEG data

Presenters: Xie, Cheng Cheng; Demoullin, Francois & Coote Tasha

Faculty Sponsor: Chendi Wang

Recent advances in Brain-Computer Interfacing has led to the development of inexpensive and commercially available EEG headsets that are simple to use and can be easily connected to different devices. Despite this great advance in the hardware, few attempts have been made to create meaningful applications for these devices. In this project, a method for attention deficit onset prediction from single-electrode EEG data is developed. The ability to predict or track a person's loss of focus can be a powerful tool for creating and improving software applications that aim to improve one's performance and focus. In developing this method, a standardized procedure for determining the attentiveness of a subject is proposed. An experiment for collecting EEG signal data has been designed. Different machine learning algorithms and possible features are evaluated for their application to classifying the collected data.

Biological Sciences

Genome Sequencing's Potential to Revolutionize Traditional Epidemiological Public Health Efforts

Presenters: Ho, Cheng Ching (May); Laino, Giulio & Juma, Orach

Faculty Sponsor: Jennifer Gardy

The current increase in drug-resistant infections and emerging pathogens has seen public health organizations look to build upon traditional epidemiology for surveillance and contact tracing in an attempt to improve current disease control through novel approaches. At the forefront of this transition has been whole-genome sequencing (WGS) – a genotyping technique that analyzes the complete DNA sequence of an organism's genome. This technique, traditionally used as a research tool by evolutionary biologists, enables epidemiologists to identify genome mutations, infection clusters, and to create epidemiological links which can then be used for more effective targeted surveillance and preventative measures. While the implementation of whole-genome sequencing has begun to gain hold in places such as the United Kingdom, its usage in Canada is more limited. There are many challenges to establishing WGS for routine use; however it has the potential to revolutionize surveillance, outbreak detection, contact tracing and ultimately disease prevention. These challenges and WGS's potential to change traditional epidemiological public health efforts in Canada will be explored through a systematic review of current literature.

Biological Sciences

Multiple Sclerosis and the Blood Brain Barrier

Presenters: Tan, Cheryl; Li, Yi Tao (Olivia) & Fazeli Attar, Seyedeh Saba (Saba)

Faculty Sponsor: Tissa Rahim

Multiple sclerosis (MS) is an autoimmune disease in which demyelination occurs in the CNS via immune cells. This infiltration is possible due to a weakened blood brain barrier (BBB), which normally is highly selective. Studies show that inflammation caused by release of cytokines relates to the permeability of BBB. Therefore, studying the effects of cytokines on human brain microvessel endothelial cells (HBMECs) may help in the understanding of immune cell infiltration via BBB to demyelinate nerve cells.

This experiment studied the effects of immune cells treated with cytokines on HBMECs, which model BBB. HBMECs and naive T-cells were purified and cultured. T-cells were separated into four groups and incubated with only INF-μ (pro-inflammatory cytokine), only IFN-μ (anti-inflammatory cytokine), both INF-μ and IFN-μ, or neither cytokines. T-cells from each culture were then combined with HBMECs to form co-cultures. The co-culture incubated with only INF-μ contained inflamed and weakened HBMECs. These results suggest that IFN-μ counters the effects of INF-μ, which resulted in relatively strengthened HMBECs. Transendothelial electrical resistance (TEER) measurements of the co-cultures were also taken. The measurements showed that the HBMECs of the co-culture containing only INF-μ treated T-cells were significantly weaker than the HBMECs of the other co-cultures. This suggests a higher permeability in HBMECs than other co-cultures. While more experimental tests are needed to determine the definitive cause(s) of MS, it is recommended to further investigate the potential benefits of utilizing anti-inflammatory cytokines to counteract the pro-inflammatory cytokines when treating MS patients.

Biological Sciences

The effects of increased LINE presence on the ability of genes to escape X chromosome inactivation in females

Presenters: Crichlow, Cindy-Lee (Cindy) & Yang, Xiaodan (Erin)

Faculty Sponsor: Samantha Peeters

X Chromosome Inactivation (XCI) is the random inactivation of X chromosomes in females, leaving only one active, to mediate the dosage of gene products as compared to XY males. XCI involves many mechanisms, most of which are not well understood and are areas of intensive research. During XCI, the X to be inactivated produces a long non-coding RNA called X inactivation specific transcript (XIST) that coats and helps to condense the chromosome, effectively silencing it. Long Interspersed Nuclear Elements (LINEs) are sections of repetitive DNA sequences that are present on both X chromosomes and autosomes, but especially enriched on the X. LINEs have been suggested to play a role in facilitating XCI by encouraging the efficient spread of silencing initiated by XIST. Despite chromosome-wide inactivation, specific genes have been found to escape XCI and remain active. These 'escape genes' have been found in chromosomal regions low in LINE composition. We will test the hypothesis that a deliberate increase in LINE content near escape genes will decrease their escape ability. This will be done by inserting LINE sequences near escape genes on the X chromosome, inactivating the chromosome and comparing the levels of escape gene RNA to a control with normal LINE content. This research is basic and aims to increase current knowledge of the conditions necessary for XCI, but could also provide a means of gene therapy for people with polyX karyotypes, where escape genes result in negative phenotypic effects such as mental impairment and growth defects.

Biological Sciences

SHIP-Deficient Mice as a Suitable Model for Crohn's Disease

Presenters: Jen, Gregory; Mirahmadi, Mehran & Landas, Julius

Faculty Sponsor: Young Lo

Auto-inflammatory diseases, in particular in the area of the GI tract, like Crohn's Disease and other Inflammatory Bowel Diseases (IBD), is a chronic condition that has no effective cure in the present. While research is going into how to treat IBD, there is no suitable model to cover all aspects of this complex disease. For our research, the approach to finding a suitable model to work on is investigating the PI3K pathway responsible for inflammation and the cytokines (proteins that our cells use in order to signal the activation of other cells) it produces. The effect of SHIP, a negative regulator of PI3K, will be investigated by looking at the levels of cytokines in murine (mouse) models that have normal SHIP function which will be the control, comparing them to murine models that are deficient in SHIP regulatory functions, and seeing them in relation to a murine model without PI3K nor SHIP. The different levels of cytokines in each model will be compared to see if they are similar to ones seen in real cases of IBD. Alongside, the cytokine levels will also be compared to those found in ulcerative colitis patients, a close relative of Crohn's disease. If certain cytokine levels are sufficiently different, this relationship may solidify SHIP deficient mice as a suitable model specifically for Crohn's disease.

Biological Sciences

Discovering Host Specific Adaptive Mutations in Pathogenic Organisms

Presenters: Chow, Kevin; Tsai, MengChi; Yeo, Sarah & Schuster, Luke

Faculty Sponsor: Justin Chu

Mutations in pathogens could increase its biological fitness within a specific host. Due to the nature of RNA viruses, there is a significantly higher chance of mutations occurring, resulting in a frequent necessity to re-analyze the genome of the virus. The Ebola virus is one such virus, responsible for the 2014 outbreak in West Africa. This strain's pathogenicity and fitness in humans could be due to these acquired mutations. As such, it is essential to develop tools that can quickly analyze the virus' adaptations due to the biological environment of the host species. In this project, we present an analysis pipeline that, given a set of genomic reads isolated from a pathogen, is capable of identifying these mutations and ranking them by their potential biological significance. We will evaluate the pipeline using the Ebola genome dataset collected from the 2014 outbreak in Sierra Leone by comparing strains, calling variants, and calculating mutational significance via statistical tests. We hope this pipeline can facilitate the discovery of significant mutations that can be used in further examination and provide an insight into the mechanism of viral replication, immune evasion, and potential antiviral treatment.

Biological Sciences

Structural model of the Ebola virus L protein

Presenters: Nguyen, Le Tam Nhan (Julian) & Wu, Leon

Faculty Sponsor: Matt Solomonson

The 2013 Ebola virus outbreak has devastated West Africa for the past year, and new therapeutics are urgently needed. The Ebola virus genome encodes 7 proteins that could be targeted by new drugs, one of which is a predicted RNA-dependent RNA polymerase called the L protein. This protein plays a crucial role in the virus' transcriptional process, and knowledge of this protein's structure will promote further understanding of how Ebolavirus replicates and set the stage for rational drug design. Here, we propose to model the molecular structure of the Ebola virus L protein. In order to obtain the best possible model, we will use several protein structure prediction algorithms and evaluate their agreement and chemical plausibility. We will analyze the final ensemble of models, discussing the implications of the structure as well as conceivable methods of disrupting the protein's function. Having a structural model for this essential protein may open up new possibilities for targeted drug treatments, which would reduce the overall efficiency of Ebola replication and propagation.

Biological Sciences

Liposomal Mimics of Neural Exosomes to Facilitate Sequestration of Amyloid β-protein

Presenters: Dordevic, Matthew (Matt) & Shan, Christine

Faculty Sponsor: Mina Ordobadi

Alzheimer's disease is a neurodegenerative condition that affects the lives of thousands of Canadians. One of the characteristics of Alzheimer's disease is an accumulation of Amyloid-μ protein which forms masses in the brain called plaques. The body has a natural mechanism for clearing these plaques by using small vesicles called exosomes which are produced by neurons in the brain. These exosomes have proteins on their surface that can bind to Amyloid-μ, preventing the build-up of plaques. The exosomes also have a unique membrane composition to signal to the brain's resident immune cells, microglia, so that the exosomes (along with the Amyloid-μ) are engulfed. Once taken in, the microglia can properly dispose the Amyloid-μ. We hypothesize that man-made nanovesicles can mimic these exosomes, leading to a novel treatment for Alzheimer's disease.

To produce these exosome-mimetic nanovesicles, we chose a special cell type called macrophages. Macrophages are a type of immune cell with the desired surface proteins and membrane composition that are key to the function of the neuronal exosomes. Since we are administering the exosomes via a tail vessel in the mice, they need a protein tag that directs it past the blood-brain barrier and into the brain. The macrophages can be genetically engineered to express a peptide derived from the Rabies virus called RVG that is highly effective for targeting to the brain. As a result, we expect these nanovesicles to sequester and transport Amyloid-μ for destruction like the neuronal exosomes.

Biological Sciences

The Effects of Exercise on the Quality of Life of Children with Neurocognitive Disabilities

Presenters: Sidhu, Rawel & Yeung, Chantane

Faculty Sponsor: Mojgan Gitimoghaddam

Background: Children with neurocognitive disabilities display a variety of deficiencies in numerous domains of life. Not only are their social, cognitive, and physical abilities impaired, but numerous studies have also shown that their quality of life is often much lower compared to their peers without cognitive disabilities. Previous literatures have also suggested that active participation in exercise can have a positive effect on the quality of life of children without disabilities, so this study seeks to test whether these findings can be extended to children with neurocognitive disabilities. Method: A cohort study was carried out. We selected 126 children with neurocognitive disabilities all aged 8-10 years old from 2 elementary schools. A control group (n=63) and treatment group (n=63) were set up. The treatment group attended an exercise program designed by a professional instructor three times a week for the duration of 6 months. Their quality of life before and after the treatment was assessed using the Pediatric Quality Of Life (PedsQL™) version 4.0 generic core module. The results were compared using a T-test to determine its potential significance. Results: From the literatures, it has been shown that children with neurocognitive disabilities experienced a statistically significant improvement in their fitness, behavior, and academic performance. Applying these results to our PedsQL™ module, we can expect to see a statistically significant increase in the quality of life of children in the treatment group. Discussion: These findings may find potential health applications in the treatment plan of children with neurocognitive disabilities.

Biological Sciences

How does maternal obesity affect the development of childhood obesity?

Presenters: Singh, Sarah; Akhavan, Dina & Malekafzali, Leilynaz

Faculty Sponsor: Vivian Ukah

Obesity rates in North America are rising without showing any signs of slowing down. With all the associated health risk factors obesity brings, this poses a large problem for the North American population. By investigating the effects of maternal obesity on childhood obesity, we hope to be able to find a way to control this issue and prevent this trend from continuing in upcoming generations. In terms of maternal obesity, we hypothesized that if obesity in mothers does play a role in subsequent childhood obesity, then pre-pregnancy obesity should have a larger impact as compared to gestational obesity. In order to further investigate the relationship between maternal obesity and development of childhood obesity we reviewed six papers. In the analysis of all six papers, we found that although gestational obesity does play a large role in subsequent childhood obesity, pre-pregnancy obesity has a greater effect. In future studies, it will be important to look at other consequences of maternal obesity in the child. These may range from asthma, cardiovascular disease, and hypertension, to social anxiety and depression along with other psychological effects.

Biological Sciences

Creating a model for how various factors affect the change in length of a braid

Presenters: Hong, Sarah & Kim, Eugenia

Faculty Sponsor: Kalle Karu

When we braid our hair, it becomes shorter than the original length of our hair. The goal of our research project is to measure the change in hair length before and after braiding it, and to come up with a model that relates the different factors that go into changing its end length. This research is important because although our project addresses a model that refers to the change in hair length, it can be applied to many other things. For example, whether it is for aesthetic reasons or to add in the extra strength a braided string provides, these intrinsic patterns can be seen in our daily lives, not only on hair, but on various products. Such examples include braiding patterns in carpets, baskets, and ropes. For our experiment, the factors varied are the thickness of each strand and the number of strands. After conducting our experiment, we used our data to create a model that relates the different factors that go into changing the end length of the braided hair. By doing this, a more accurate evaluation can be given as to the length of the hair, string, or rope necessary to create a certain type of braid.

Biological Sciences

Effect of Alcohol Consumption and Tobacco Smoking on Male Infertility

Presenters: Cheng, Ting-An & Yip, Annie

Faculty Sponsor: Aida Eslami

This study investigated on the effect of different levels of alcohol consumption and tobacco smoking on male infertility by analyzing the data of 100 semen samples of case and control from young healthy volunteers, between the age of 18-36, from UCI Machine Learning Repository (Gil, 2012). Odds ratio was being computed, by free user-friendly software R, to quantify the association. The odds ratio showed that those who drink weekly has two folds higher chance of becoming infertile and those who smoke daily have a 1.296 higher chance of becoming infertile. However, the range of 95% confidence interval and p-value indicate that the association between these two factors and infertility are not statistically significant. In addition, a large range of 95% confidence interval was computed, indicating low precision of the odds ratio in the study.

Biological Sciences

Effects of Physical Exercise on Telomere Length

Presenters: Tsang, Vivian & Moghadam. Bita Sabet (Bita)

Faculty Sponsor: Sarah Neil -Sztramko

Objectives: Telomere length decreases with cell replication and this process has been shown to have correlations with aging. Physical activity, as noted by many publications, has numerous health benefits and may slow the aging process. The purpose of this review is to determine when physical activity have increased or decreased telomere length and the differences between these papers and the ones which do not show such correlations.

Methods: Databases were searched for papers published concerning telomere lengths in the healthy adult population. Data were extracted from each study's methods and research constraints as well as their results to analyze associations between physical exercise and telomere length.

Results: Of 773 studies identified, 15 met the inclusion criteria. The type of observations and interventions reported and the application of physical exercise varied greatly across studies. Other variables investigated in publications created challenges in isolating physical exercise as a sole determinant of telomere length. However, general associations between telomere length and physical exercise can be drawn.

Conclusion: The varied methods of physical exercise limits the ability to draw conclusive results on the method of intervention best suited to reduce telomere shortening. Future studies are needed to isolate physical exercise as the sole investigation variable in order to draw conclusive ties to telomere length.

Biological Sciences

Effectiveness of Demethylating Agent DAC (Decitabine) in Treating Acute Myeloid Leukemia Patients of Different Ages

Presenters: Wu, Yunchen (Cheryl) & Chang, Tung (Doris)

Faculty Sponsor: Tony Hui

Epigenetics is the study of how chemical changes surrounding DNA can alter gene expression without actually changing the DNA code. One type of epigenetic modification is methylation—addition of CH3 groups to certain DNA bases. Acute myeloid leukemia (AML), a type of cancer of bone marrow cells, is often caused by hypermethylation (excessive addition of CH3) at certain locations, resulting in silencing of genes needed to prevent cancer. Thus, demethylating drugs have been proposed to treat AML, as they should reduce methylation of cancer suppressing genes and reactivate their functions. Past studies have examined the effectiveness of demethylating agents in halting AML progression, but none have examined how patient age may affect the outcome of treatment. Since changes in DNA methylation patterns occur as a normal part of aging, AML patients of different ages likely have different epigenetic states to begin with, and may therefore require different treatments. This project attempts to examine how two demethylating drugs, DAC and AraC, compare when given to patients of different ages. Existing epigenetic data on treatment of adult AML was sorted into three groups by the ages of the patients: <50, 50 to 65, and >65 years of age, and reanalyzed to compare DAC vs. AraC effectiveness between age groups. No significant age-related switchovers were found for DAC vs. AraC when examining the average methylation states across over 480000 sites on DNA. However, with better analytical software, we may be able to examine whether differences exist for specific genes of interest.

Biological Sciences

Computational analysis of the role of miR-125b in Acute Myeloid Leukemia

Presenters: Ekmekci, Zeki & Ingeniero, Natasha

Faculty Sponsor: Scott Brown

Mouse miR-125b is a microRNA that has been shown to have increased abundance in blood disorders. MicroRNAs are a small RNA molecule which functions to regulate gene expression by marking their RNA transcripts for degredation. Acute Myeloid Leukaemia (AML) is a type of leukaemia occurring in the myeloid line of blood cells found in the bone marrow. It has been shown that when miR-125b is produced in increased concentrations in the blood cells of the bone marrow, it is responsible for AML in mice. Chaudhry et al. explain this mechanism and show that miR-125b targets an Interferon Regulatory Factor 4 (IRF4) and this induces AML. We wanted to further investigate these results to determine if this extends to human tumors using data from The Cancer Genome Atlas (TCGA). First, we will conduct a statistical analysis to compare miR-125b expression across different types of cancers, including AML, hepatocellular carcinoma, breast cancer and lung cancer. Previous findings suggested different roles and production levels of miR-125b in different tumors. Then we will look for evidence of miR-125b induced repression of IRF4 by testing for a negative relationship between the expression of these two molecules. Also, we will perform a survival analysis on AML subjects, by stratifying at miR-125b expression to determine if miR-125b has any significant prediction on the prognostic effect. Finally, to further investigate the role of miR-125b in AML, we will test for any significant correlation with miRNA-125b and the expression of protein coding genes to determine if any other pathways has any other direct or indirect targets.

Biological Sciences

Gene co-expression in transcription factor and protein-protein interactions

Presenters: Liu, Zichun (Iris) & Vira, Tariq

Faculty Sponsor: Eric Yang Zhao

Gene expression quantifies how much each gene is "turned on or off" within a tissue. It can be measured using techniques which quantify messenger RNA such as quantitative polymerase chain reaction, microarrays, or whole transcriptome sequencing. Effective gene expression analysis is key to understanding many disease processes. Genes act together in pathways made up of gene-gene interactions (GGI). Pathway analysis can help to group relevant changes, enabling more confident prediction of the functional effects of gene expression changes. Genes can interact by transcription factor (TF) mechanisms whereby a protein directly affects gene expression or by protein-protein interaction (PPI). In this study, we partition the GGIs in known pathways from the Kyoto Encyclopedia of Genes and Genomes into TF and PPI mechanisms. We then determine the correlative co-expression of the two genes in each GGI across publically available gene expression data from the Gene Expression Omnibus. Gene set enrichment analysis (GSEA) of co-expression data is then performed to identify functional clusters over-represented by highly and lowly correlated gene pairs. We hypothesize (1) that gene pairs exhibiting a TF mediated relationship will display better correlated expression than those exhibiting PPIs, (2) that GSEA will identify functional clusters related to DNA-binding proteins in highly correlated gene pairs, and (3) that these effects will be more pronounced when using higher accuracy techniques. This would identify the mechanisms of GGI which act most directly on gene expression. This work may improve understanding of pathway analysis and offer a benchmarking metric for expression quantification methods.

Biological Sciences

Knockdown of MEF2 affects visually driven structural and functional neuroplasticity

Presenter: Martiquet, Jacques

Faculty Sponsor: Kurt Haas

Myocyte-enhancer-factor 2 (MEF2) belongs to a family of proteins that regulate gene expression by binding to DNA, called transcription factors. Specifically, MEF2 factors regulate genes involved in developmental neuroplasticity2. Neuroplasticity is the variability inherent to neuron circuits in the brain and essential for normal nervous system development. The importance of the MEF2 family in this role is illustrated by MEF2-associated mutations implicated in neurological disorders, namely autism7. It has been demonstrated in Xenopus laevis tadpoles that intracellular levels of MEF2 fine tune the plasticity response induced by patterns of visual stimuli, including spaced training (ST), and invariant light (IL). One pattern of visual stimuli called white noise (WN) was shown to cause losses in MEF2 through the BAD-BAX-caspase-3 cascade, a pathway commonly associated with mitochondria-mediated cell death2. Mitochondria are components of the cell that produce energy. The loss of MEF2 has been associated with a subsequent change in the plasticity response to ST or IV2. This phenomenon, whereby previous neuron activity influences subsequent plasticity responses, is called metaplasticity, and MEF2 is believed to be a central mediator1. However, the dynamics of mitochondrial MEF2 activity and its relation to metaplasticity have not been explored. This project will test whether mitochondrial MEF2 transcriptional activity correlates with MEF2-induced metaplasticity. We will measure MT-ND6 expression in neurons exposed to WN through the use of quantitative real-time polymerase chain reaction, a common laboratory technique. MT-ND6 is a MEF2-targeted mitochondrial gene involved in cellular respiration1. Based on the degradation of MEF2 during WN through the BAD-BAX-caspase-3 cascade, we hypothesize a reduction in mitochondrial MEF2 transcriptional activity following WN, reflected by a decrease in MT-ND6 mRNA expression.

Biological Sciences

The effects of a novel neuropeptide receptor gene npr-26 on arousal level in C. elegans

Presenter: Yu, Alex

Faculty Sponsor: Catharine Rankin

Animal's behaviour is largely governed by the "talk" between neurotransmitters and receptors at the synaptic level. On top of binding activities, interactions between different neurotransmitter systems further modify and regulate the internal states and behavioural outputs. In C. elegans, a mutation that targets on an AMDA ionotropic glutamate receptor, glr-1, is known to disrupt ASH-mediated habituation. Habituation is a form of non-associative learning, the deficits of which have been associated with many psychiatric disorders. ASH sensory neurons detect lethal stimuli in the natural environment, such as osmotic pressure and chemical repellents that can potential harm or kill the worm. Therefore, normal functioning of these neurons is essential for the animal's survival. Recent studies (Ardiel et al., 2013, unpublished data) from our lab found that the defective behavioural phenotype in ASH-mediated habituation caused by glr-1 can be suppressed by egl-3 mutation. Knowing that egl-3 knocks out almost all of the neuropeptide synthesis, we are interested in further exploring the effects of each individual component in the worm's neuropeptide system on suppressing glr-1 behavioural phenotype. To investigate that, we conducted systemic RNAi screening with 57 candidate genes, each encoding one neuropeptide receptor, to test the animal's behavioural phenotypes. We identified npr-26, which encodes an ortholog of human urotensin-II receptor, as one of genes of interest. We then tested the behaviour in C. elegans with allele of this mutation, and found that npr-26 mutation lowers the animal's arousal level, observed as slower speed and less time spent on moving, and the interaction between npr-26 and glr-1 mutations appears to have additive effects on lowering arousal level. This unexpected finding may possibly lead us to scrutinize the role of neurotransmitters in arousal level, and locate potential therapeutic intervention targets in human.

Biological Sciences

Red colour discrimination in jumping spiders

Presenter: Cheng, Alexander (Alex)

Faculty Sponsor: Genevieve Leduc-Robert

Jumping spiders (Salticidae) are among the few members of the class Arachnida with very keen eyesight. They are heavily reliant on visual stimulus, especially during hunting and courtship. Jumping spiders occur in broad ranges of colours and are known to possess different degrees of colour vision. In the present study, selected spiders will be examined for their ability to discriminate colour, specifically the colour red (wavelengths of 640nm-700nm), using heat-avoidance learning. It is hypothesised that species possessing red body parts will have this ability; hence, species were selected for the presence or absence of this trait. The experiment will be conducted inside an enclosed arena divided in two. Each side of the arena will be independently heated and illuminated at a particular wavelength. After randomly assigning a wavelength of red to be associated with heat, the spiders are trained to avoid this heated wavelength and are tested against unheated ones upon completing training trials. The spider's movement inside the testing arena will then be recorded. It is predicted that spiders possessing the ability to discriminate shades of red will spend the majority of their time on the shade that is not heat associated. The ability to discriminate red colour would suggest that red sensitive cells exist in jumping spiders. The discovery of such cells would clarify the structure of the jumping spider visual system and indicate possible opsin gene duplication in some jumping spider lineages. Such a discovery would help clarify species relationships in the Salticidae phylogeny.

Biological Sciences

Elucidating the mechanisms by which cell-ECm adhesion regulates haemocyte migration in Drosophila

Presenter: Yan, Jinsong (Tony)

Faculty Sponsor: Pablo Lopez

Haemocytes are the phagocytes in invertebrates and serve as the primary mechanism for defense against infections and tissue remodeling. To achieve adequate localization at infection sites, haemocytes must migrate to the injured or diseased tissue. It is well established that in order to migrate within the body, haemocytes must establish adhesive contacts with the extracellular matrix (ECM). Integrins are transmembrane proteins that serve as the main family of adhesion receptors that mediate cell-ECM adhesion. It has been shown that the absence of integrins in the cell surface causes severe disruptions in haemocyte migration during Drosophila development. The presence of integrins plays a crucial role in haemocyte migration; however, the mechanisms by which cell-ECM adhesion regulates haemocyte migration still remain understood. We are interested in how the integrin mediated adhesion plays a vital role in regulating haemocyte migration. To investigate this, we will perform imaging in several mutants of the integrin adhesion complex that disrupt the normal function of cell-ECM adhesion. We hypothesize that cell-ECM adhesion is a necessary mechanism for haemocyte locomotion due to the importance of integrins as both a sensory and stabilizing protein in cells during development. The results will demonstrate the role of cell-ECM adhesion in regulating haemocyte migration and localization during morphogenesis. Our work provides insight on how cell-ECM adhesion plays a role in facilitating haemocyte (macrophage) recruitment during inflammation and defense against infectious diseases in the animal and human model.

Biological Sciences

Recruitment of Chromatin-Modifying Complexes in the DNA Damage Response

Presenter: Embuscado, Joseliya (Josel)

Faculty Sponsor: Dr. Michael S. Kobor

Cancer cells contain a number of genomic abnormalities ranging from point mutations to large DNA rearrangements which are often due to a failure to repair DNA damage. In order to understand cancer progression, it is important to study the molecular mechanisms that stabilize and repair the genome. These mechanisms are referred to as the DNA damage response (DDR). Conserved from yeast to humans, the DDR plays a key role in cancer development. In budding yeast, Saccharomyces cerevisiae, two chromatin-modifying complexes, SWR1-C and NuA4, play an important part in the DDR and are able to recognize double stranded breaks (DSB) in DNA. Studies show these two complexes initiate chromatin remodelling and assist in DNA repair protein assembly at sites of DSBs. Furthermore, these two chromatin-modifying complexes share a subunit, Yaf9, which is critical to their function. We hypothesize that Yaf9 is required for recruiting the remodelers, NuA4 and SWR1-C, and to stabilize and repair DSBs in the genome. By using chromatin immunoprecipitation (ChIP), we can examine the contribution of Yaf9 to the recruitment of remodelers in DNA damage. We detected decreased recruitment of remodelers in the absence of Yaf9. Moreover, we are currently testing the importance of Yaf9 for NuA4 and SWR1-C recruitment to an induced single DSB. This research has further potential to identify which region of Yaf9 is vital in recruitment of chromatin modifiers during DDR and determine if similar regions are mutated in human cancer cells that cease DNA repair.

Biological Sciences

Adaptive Introgression Genes in P. trichocarpa in Response to Late Frost Events

Presenter: Wu, Judy

Faculty Sponsor: Adriana Suarez-Gonzalez

Late spring frosts, a detrimental consequence of climate change, reduce survival rates in natural plant populations and crops. Early spring growth initiated by increasing average winter temperature speeds up associated phenological patterns, increasing plant susceptibility to sporadic frost events (Inouye 2008). By exploring natural poplar populations, I aim to identify freeze event resistant genotypes during the growing season. Populus trichocarpa (black cottonwood), found in western North America, is an ecologically important species sensitive to frost damage. P. trichocarpa hybridizes extensively with closely related Populus balsamifera, resulting in admixed P. trichocarpa genotypes (Pointeau & Guy 2014). P. balsamifera is found at higher latitudes and may withstand lower temperatures than those found across P. trichocarpa' range (Menon 2014). To determine if admixed individuals have higher survival after late frosts compared to pure P. trichocarpa genotypes, frost damage among pure P. trichocarpa (10), pure P. balsamifera (10), and admixed P. trichocarpa genotypes (10) will be compared. The latter are individuals with three introgressed P. balsamifera genomic regions previously identified. Clippings will be collected from Totem field at the University of British Columbia and grown for three weeks. To simulate frost conditions, genotypes will be transferred to a cold room (below 0°C) for three consecutive nights with treatments (0°C, -3°C, -6°C, and -11°C) simulating slight to severe frost conditions. Finally, ANOVA will be implemented to determine if admixed P. trichocarpa genotypes have lower cellular frost damage compared to pure P. trichocarpa individuals. My results will provide evidence for adaptive introgression and candidate genes to study frost resistance in poplar trees and crop species.

Biological Sciences

Pulmonary mechanics of high-altitude waterfowl

Presenter: York, Julia

Faculty Sponsor: Julia York

Previous work has found that both low and high-altitude adapted species of waterfowl increase lung ventilation in response to low oxygen, but they do it in very different ways. High-altitude geese primarily increase breath volume whereas low-altitude geese increase breathing frequency (Scott et al., 2007). Thus, we hypothesized that high-altitude species should have higher compliance of their respiratory systems when compared to low-altitude species to reduce the cost of breathing deeper. We measured dynamic and static compliance of the total system in five Andean species of ducks resident at Lake Titicaca, Peru and compared them to the low-altitude migratory barnacle goose and the high-altitude migratory bar-headed goose. Static compliance was significantly higher in the high-altitude ducks than the barnacle geese. Among the high-altitude ducks the compliance was highest in the species that has spent the most evolutionary time at high-altitude, while the lowest compliance was found in the one species of diving duck studied. Thus high-altitude species breathe with a more effective breathing pattern, reducing dead space without incurring an increased cost of overcoming elastic recoil forces, by increasing compliance of their respiratory system.

Biological Sciences

The Integration of Taste and Olfaction in the Drosophila Brain

Presenter: van Baardwijk, Julie

Faculty Sponsor: Dr. Michael Gordon

The two chemosensory systems, taste and olfaction, are often studied separately; however, they both play important roles in the identification of edible food. The two systems are peripherally separate but may integrate in the central nervous system to contribute to feeding behaviour. At this point in time, the mechanism of integration and the location in the brain where it occurs is not yet known. In Drosophila melanogaster, odors are interpreted by combinations of olfactory receptor neurons (ORNs), each of which project to a separate glomerulus. At each glomerulus, ORNs form synapses with projection neurons, which send axons to other parts of the brain. Previously, activation and inhibition of individual glomeruli has been shown to be sufficient to mediate attraction and aversion to certain odours although an effect on taste and feeding has not been demonstrated. I am conducting a behavioural screen where I systematically activate individual glomeruli using a heat-activated ion channel, and then measure the impact on a specific feeding behaviour. Through the identification of flies that differ in their response compared to the controls, I am investigating whether olfaction can modulate taste behaviour and determining if the activation of a single ORN is sufficient to alter flies attraction to sugar.

Biological Sciences

Effects of Prenatal Alcohol Exposure and Chronic Mild Stress on Depressive-Like Behaviour

Presenter: Takeuchi, Lily

Faculty Sponsor: Dr. Joanne Weinberg

Fetal Alcohol Spectrum Disorder (FASD) describes the wide range of adverse effects of prenatal alcohol exposure (PAE) on the offspring. Some of the effects of this teratogen are increased risk for mental health disorders - in particular, depression. The hypothalamic-pituitary-adrenal (HPA) axis is a neuroendocrine system that plays a large role in responding to stress and maintaining homeostasis, and it has been implicated to play a role in depression. Interestingly, alterations in HPA axis activity similar to those in depression have been seen following PAE. Thus, we hypothesized that HPA dysregulation by PAE may increase sensitivity to the adverse effects of stress and result in increased depressive-like behavior. This study used a rat model to investigate how PAE may interact with chronic mild stress (CMS) experienced in later life to affect depressive-like behavior. Pregnant females were assigned to three diet groups: PAE, pair-fed and control. In adulthood, the male and female offspring were either exposed to CMS or left undisturbed. Behavioural testing began 24-hr or 14 days after CMS to test the immediate and delayed behavioural response to stressors. Behavioural despair was assessed using the Porsolt Forced Swim Test (FST). Results indicate that depressive-like behaviours decreased in males but increased in females following CMS. This increase persisted, and even augmented, after two weeks, but only in PAE females. Overall, the findings suggest that PAE alters behavioural responses to stress in a sexually-dimorphic and time-dependent manner.

Chemistry & Physics

Optimization of Fed-Batch Reactor Processes for Chinese Hamster Ovary Cells Using Design of Experiments

Presenter: Pang, Man Hang (Miriam)

Faculty Sponsor: Navid Ghaffari

Chinese hamster ovary (CHO) cells are the most commonly used cell line for production of recombinant proteins. CHO cells have been adapted to grow in suspension which makes them ideal for scale-up and production in large bioreactors. In addition, CHO cells have the ability to perform post-translational modifications to complex protein such as monoclonal antibodies. Fed-batch process is the common CHO cells culturing methodology where necessary nutrients are added over time to prevent depletion of essential nutrients. The feed is a complex mixture of amino acids, vitamins, growth factors, and carbohydrates for growth and productivity of the cells. Currently, pharmaceutical companies investigate genetic manipulation of cell lines and media design to enhance protein processing capacity. To investigate multivariable interactions systematically, design of experiment (DoE) and statistical analysis is utilized to test the effect of several variables in an efficient, costing-saving manner without neglecting interactions among them. In this study, essential amino acids, non-essential amino acids, vitamins, growth factors, and lipids were identified as factors with potential significant influence on cell growth process. Initially, these factors were screened through a fractional factorial design and the significance of each factor and potential interactions between them were detected. Significant factors were then selected for optimization through a central composite design which provided a graphical presentation of local and global maxima and minima of the variables in a 3 dimensional space. Results of these experiments provide valuable information for designing an optimized feed for improvement of CHO cell productivity.

Chemistry & Physics

Optimizing the Geometry of a Magnetic Resonance Coil

Presenter: Bains, Manpreet

Faculty Sponsor: David Cortie

The aim of this research is to determine an ideal magnetic resonance coil geometry for μSR (Muon Spin Spectrometry) and μ-NMR (beta-Nuclear Magnetic Resonance), processes in which a beam of radioactive nuclei is first applied to a small amount of a material. A magnetic resonance coil is then used to detect the resulting spin of the nuclei, which is indicative of the material's electromagnetic properties. μ-NMR and μSR have application to studying magnetism and superconductivity, especially important today as material sciences gain prominence. To design a coil geometry, one must not only must take into account the physics of effectively detecting a signal and minimizing noise, but the logistics of creating a functional piece of equipment that can be operated in the real world, which presents many challenges and limitations with regards to coil design.

Chemistry & Physics

Combining cationic and anionic exchange membranes to improve the efficiency of vanadium redox flow batteries

Presenter: Quinlan, Cameron

Faculty Sponsor: Rodney Smith

The unpredictable nature of renewable energy sources impedes the global transition towards a sustainable energy economy. Large scale storage of renewable energy enables an operator to store excess energy at peak production times. One promising energy storage solution is the all-vanadium redox flow battery (VRFB). Unlike common commercial batteries that store electrical charge on the electrode surface, VRFBs store electrical charge in aqueous solutions by oxidizing (positive electrolyte) and reducing (negative electrolyte) solvated vanadium ions. The positive and negative electrolyte solutions in a VRFB are separated by a membrane that hinders the mixing of the oxidized/reduced vanadium cations in the solutions, yet allows the necessary transfer of protons. Previous studies have explored the use of a variety of membranes, including cation exchange membranes (CEM) and anion exchange membranes (AEM). Each of these membranes has benefits and drawbacks. CEMs often facilitate proton transport, maximizing the voltage efficiency of the VRFB, but allow vanadium ion crossover that lowers coulombic efficiency. In contrast AEMs often do a better job at inhibiting vanadium ion crossover, maximizing coulombic efficiency. However this also impedes proton transport, lowering the voltage efficiency. This study will attempt to combine an AEM with a CEM to provide maximized overall efficiency. Material properties including layer thicknesses will be optimized to determine whether this approach can generate a membrane with all the benefits of the two different membrane systems.

Chemistry & Physics

The evolutionary origin of chemical weaponry in an invasive sunflower

Presenters: Poon, Anita & Borkowski, Kelly

Faculty Sponsor: Celine Caseys

Allelopathy has been proposed as a key mechanism of plant defense, invasion, and adaptation in which a species releases chemicals that can inhibit the growth and germination of neighboring plants. We study Helianthus tuberosus, an invasive sunflower species of both ecological and agricultural interest thought to have formed by hybridization of H. hirsutus and H. grosseserratus. The allelopathy and chemical diversity in this species is suspected to origin from hybridization, or by post-speciation lineage evolution. We propose to test these hypotheses by performing phytochemical liquid chromatography and mass spectrometry (LC-MS) to compare the chemical profiles of the three species. Origin by hybridization will be evaluated by comparing multiple samples across different natural populations of H. tuberosus and its two parental species. Origin by evolution will be determined by comparing naturally occurring H. tuberosus with synthetic polyploids obtained in the greenhouse. From these synthetic polyploids we will be able to observe traits that occur immediately after hybridization; in contrast, polyploids from each existing population are expected to have modified chemical profiles due to unique environmental influences. In these analyses we expect to find chemical similarities between species by inheritance as well as new phytochemicals emerged from hybridization and evolution. Overall, we aim to determine the origin of allelopathy in H. tuberosus and how its novel chemical traits came to be. This project will advance our knowledge of evolutionary mechanisms that generate novel plant chemistry as well as allow for better management, prediction, and prevention in the invasiveness of non-native species.

Chemistry & Physics

3D Visualization of Ions in a Precision Mass Spectrometer

Presenters: Fullerton, Dilyn & Stone, Michael

Faculty Sponsor: Brian Kootte

Penning Traps, such as the Measurement Penning Trap (MPET) in TRIUMF's Ion Trap for Atomic and Nuclear Science (TITAN), are useful for making highly precise mass measurements in incredibly short periods of time. This makes them particularly valuable for measuring the masses of short-lived ions produced in the Isotope Separator and Accelerator (ISAC) facility.

These measurements provide a means of testing the nuclear shell model and astrophysical nucleosynthesis of elements heavier than iron. In a Penning trap, the given ion is trapped by a superimposed axial magnetic field and quadrupole electric potential. This combination induces a trajectory known as an epitrochoid (a spiraling motion). Of interest in this project is creating a three-dimensional visualization of an ion following such a trajectory, in accordance with the specifications of MPET.

Using python and the visual python libraries, we have written a program that animates these trajectories according to given initial conditions (position, velocity, ion, penning trap specifications) and the parametric equations describing the motion of an ion in an ideal Penning trap. It is customizable and fully functional, approximately reproducing actual frequency measurements taken from the MPET in TITAN.

Chemistry & Physics

The Role of the Receptor CD47 in Cell Adhesion Mediated Drug Resistance of Leukemia

Presenter: Lu, Fei Yuan (Kelly)

Faculty Sponsor: Chi-Chao (Jack) Liu

CD47 is a plasma membrane protein that is expressed on most cells and plays a large role in regulating cell adhesion, which in turn has an effect on intercellular adhesion. This protein is often over-stimulated on tumour cells which prevents other cells such as macrophages from eating the tumour cell and thus serve as a protection for the cell. Based on the functions of CD47, it can be speculated that overexpressing CD47 will lead to cell adhesion mediated drug resistance in leukemia.

Chemistry & Physics

Does the loss of specific PP2A complexes affect cell cycle progression and mitosis in cancer?

Presenters: Zhou, Guang Hao (James); Anismal, Rachel, Huang, Vivian & Leung, Camy

Faculty Sponsor: Dominik Sommerfeld

In cell division, the equal distribution of genetic material into daughter cells during mitosis is essential to cellular health. Mitosis is largely regulated by protein phosphorylation. One important dephosphorylating enzyme is protein phosphatase 2A (PP2A), a heterotrimeric holoenzyme composed of three subunits: the scaffolding (A), catalytic (C) and regulatory (B) subunits. The B subunit is variable in PP2A holoenzymes and regulates its activity, function and subcellular localization. Genomic sequencing of cancers has revealed genetic alterations of various PP2A subunits, including deletions of the B55 regulatory subunit. Our goal is to determine whether loss of the B55 subunit may cause defective regulation of mitotic events (including chromosome distribution), and thereby contributes to cancer development. Using HeLa cells, we simulated the loss of the B55 subunit by using small-interfering RNA to knockdown expression of the B55 subunit in one cell population. As a control, another population was treated with non-targeting siRNA to retain expression of the B55 subunit. To study the effects on mitotic progression, we synchronized the cell cycle of both populations using the double thymidine blocking method, and examined progression using Flow Cytometry and Western Blotting. To investigate the effects of B55 subunit loss on chromosome distribution, we observed the division process using live-cell imaging of HeLa cells expressing fluorescently labeled histone and microtubule proteins. Our results demonstrate alterations in the kinetics of mitotic progression and unequal chromosome distribution, indicating that loss of PP2A-B55 may contribute to cancer development due to its role as an important regulator of mitotic progression and proper chromosome distribution.

Chemistry & Physics

The Role of Coxsackievirus B4 in the onset of insulin-dependent diabetes type 1

Presenters: Caballero, Guillermo & Arshad, Omair

Faculty Sponsor: Jeff Dong

Coxsackievirus B4 (CVB4) has been linked to insulin-dependent diabetes type I (IDD1) in mouse models (Horwitz et al. 1998). Previous studies have shown that in Non-obese diabetic (NOD) mice that are genetically predisposed to IDD1, CVB4 infection exacerbate autoimmunity by mimicking host immune molecules (Von Herrath & Oldstone, 1995; Von Herrath & Filippi, 2008). Molecular mimicry involves the expression of viral proteins similar in size and structure to host proteins, allowing the virus to modulate the host immune response and aiding viral evasion (Von Herrath & Oldstone, 1995). However, if an immune response is mounted towards a viral molecule similar to host molecules, damage to the self may occur, as the exposure to the protein is constant a immune memory is established (Von Herrath & Oldstone, 1995). The detrimental role of CVB4 in IDD1 is demonstrated through the collateral damage of pancreatic µ-cells which has been observed to be a target of bystander mechanism induced by CVB4 ultimately causing caused by the anti-viral immune response, (Von Herrath & Filippi, 2008).Despite this observation, the contribution of CVB4infection to the genetic predisposition of IDD1remains unclear. Our hypothesis is that genetic predisposition will show a higher tendency of acquiring IDD1 upon infection with CVB4 rather than without infection. As well infection of CVB4 by itself will not be sufficient to induce IDD1 in mice that are not predisposed to the disease. We propose to characterize the inductive role of CVB4 in the onset of IDD1 in mouse models by controlling for genetic predisposition to IDD1to determine the degree of vulnerability and propensity to acquire IDD1. Four groups of mice will be used: two (NOD) that are genetically predisposed to IDD1, and two wild-type; one group of predisposed and one group of wild type mice will be infected with CVB4 and the onset of IDD1 will be observed.

Chemistry & Physics

Probing New Physics Using the Standard Model Gauge Couplings and the Large Hadron Collider

Presenters: Krakan, Karlo & Li, Yifan

Faculty Sponsor: Alejandro de la Puente

We investigate an extension to the Standard Model (SM) ofparticle physics proposed by Ohmer and Perez. This model predicts the unification of the SM gauge couplings at low energy scales, which is not predicted by the SM alone. The unification of the SM gauge couplings is a long sought after result in theoretical particle physics as it results in a merging of the three out of four of the fundamental forces of physics, namely the electromagnetic, weak and strong forces. This would show that the forces of nature we are accustomed to are simply different manifestations of the same phenomenon. It may be possible to probe this extension of the SM at the LHC particle accelerator in Switzerland, beginning this summer. We study, through simulations of proton-proton collisions at an energy of 13 TeV, whether a statistically significant difference between this new model and the Standard.

Model can be inferred. This analysis will allow us, upon comparison with data recorded by the LHC, to determine whether or not this new model of particle physics is a viable extension to the Standard Model. Furthermore, this analysis will give us a better understanding about the class of theories that can realize low scale gauge unification.

Chemistry & Physics

Chemical warfare in the plant world: the effect of allelopathy on the invasive potential of a sunflower species

Presenters: MacDonald, Kathleen (Kate) & Li, Stella

Faculty Sponsor: Dan Bock

Invasive species have extensive ecological and economic impacts. Although control of these species has long been recognized as a priority, our understanding of invasion success is still limited. Allelopathy, a biological phenomenon wherein an organism produces chemicals that impact the fitness of nearby organisms, has been proposed to contribute to plant invasive success. Through processes such as leaching, allelopathic plants can decrease local biodiversity.

Sunflower species (Helianthus) which produce chemical compounds with potentially allelopathic effects, are ideal systems for testing this scenario. Our aim for this project is to determine whether Helianthus tuberosus, a minor crop species that has become invasive in Europe, exhibits allelopathic effects.

HA: European and North American species will exhibit different rates of germination when grown around invasive and non-invasive species.

H0: European and North American species will not exhibit different rates of germination when grown around invasive and non-invasive species.

Our experimental setup will consist of a combination of bioassays and LC-MS (liquid chromatography and mass spectrometry) analyses. The bioassays are designed to test the effect on seed germination of species found in this sunflower's native and invasive ranges. LC-MS is used in an attempt to isolate allelopathic compounds.

We expect all test species to react to the allelopathic effects of both ecotypes, but due to their co-evolutionary history with H. tuberosus, plants from the native range should exhibit more consistent germination. This project will advance our understanding of mechanisms of invasion success, and will set the stage for targeted management of a widespread invader.

Engineering & Technology

Invasion Fronts and Tissue Dynamics

Presenter: Bhaskar, Dhananjay

Faculty Sponsor: Dr. Leah Edelstein-Keshet

Solid tumors are thought to arise from single, motile cells which have experienced loss of cell polarity and cell-cell adhesion to become stromal stem cells that can differentiate into a variety of cell types; a process known as epithelial-to-mesenchymal transformation. The malignant tissue remains densely packed, while a number of isolated cells detach and begin to invade the neighboring spaces. However recent research suggests that collective invasion, wherein cells maintain connections with their neighbors and move together through the extracellular matrix, plays an important role in driving human breast cancer malignancy. We have developed a Cellular Potts model that is calibrated to simulate the experimental setup used to study breast cancer invasion. Each cell evolves according to its internal state (cell cycle, axis of cell division, etc.), external force balance, contact inhibition, homotypic (cell-cell) and heterotypic (cell–extracellular matrix) adhesion. This in silico model allows us to study mechanisms involved in tissue invasion by varying adhesive properties of cells, cell motility and rate of proliferation. Based on this work, we are able to suggest new experimental setups for further studies in laboratory. We can understand the emergence of different patterns in scratch wound healing assays that are widely used to study mammalian cell migration and tumor cell motility.

Engineering & Technology

Effect of loading rate on response of vertebral bodies under compressive loading

Presenter: Merry, Kohle

Faculty Sponsor: Dr. Peter Cripton

Spinal cord injuries often occur as the result of a traumatic event; however, current research is primarily conducted at much lower speeds leading to a disconnect between research outcomes and real life. By conducting research at speeds similar to those in injurious impacts, we can realistically characterize human spinal injury. Previous studies have shown that loading rate has an effect on the mechanical properties of vertebrae, and failure types observed at different loading speeds are different in severity and location of fracture initiation. The current study aims to measure the surface deformation of human cadaveric vertebrae at both slow and fast loading rates to evaluate how loading rate influences bone deformation. To do this, a device was built to attach to a drop rail in order to load the vertebrae in compression. The surface deformation of the bone during loading will be determined through an optical measurement technique called digital image correlation. Due to the rate-dependent properties of the bone, we hypothesize that higher impact velocities will lead to less overall specimen deformation on the vertebral surface. This study will allow for measurement of vertebral surface deformation, data not previously quantified, and will provide a better understanding of vertebral injuries at speeds representative of real life trauma.

Engineering & Technology

The effect of temperature and salinity on electrical resistivity for SAGD steam chambers

Presenter: Wong, Mychelle

Faculty Sponsor: Sarah Devriese

Steam Assisted Gravity Drainage (SAGD) is a technique used to extract heavy oil from the oil sands. It is important to monitor SAGD processes over time to know the extent and location of the steam chamber. This can be done using DC resistivity, which is sensitive to contrasts in electrical resistivity, because the steam changes the resistivity of the heavy oil reservoir. The resistivityof a SAGD steam chamber can be increased by varying factors such as temperature and salinity of the steam. We create resistivity models using Archie's law with varying temperature and salinity values. Using these models, DC resistivity data are numerically calculated. We analyse the DC responsel to determine if the steam chamber can be detected. As a result of increasing the temperature, it is observed that the steam chamber resistivity decreases and the secondary voltage potential increases, meaning that there is a greater DC resistivity response when the steam chamber resistivity is low compared to the heavy oil reservoir resistivity. We observed similar results by increasing the salinity. This work can aid in determining how to better monitor SAGD steam chambers as well as understand what influences conductivity changes in heavy oil reservoirs.

Engineering & Technology

The Effect of Cognitive Load on Learning Digital Maps

Presenters: Marozoff, Shelby; Gooderham, Geoffrey; Tse, Sheila & Ho, Simon

Faculty Sponsor: Todd Handy

Computers are an important part of our daily lives and we have an increasing reliance on mapping software, however, it is important to understand how cognitive processing might impact their effectiveness. The current study explored how cognitive load can affect route and landmark learning. Previous studies have shown that high cognitive load reduces the size of the attentional window from which individuals can retrieve information - performance deteriorates when learning large visual areas. Given that landmarks are typically spread out and cover a larger area than routes, we predicted that high cognitive load will shrink the attentional field resulting in diminished landmark, but not route, memory accuracy. Participants (N=64, 50% female) were put into a state of low/high cognitive load using a number task at the beginning of each trial. During the trial they learnt unfamiliar maps of the U.S. and were later asked to recall the location of landmarks and route turning points. Analysis indicates that memory for landmarks is poorest under high cognitive load, but this is only true in the male population. Our findings highlight the importance of considering end-user cognition when designing mapping software, as it may impact the efficacy of the system in unexpected ways.

Engineering & Technology

Using Resonance Ionization to Improve Laser Spectroscopy Measurement Sensitivity to Exotic Isotopes

Presenters: Branch, Timothy (Tim) & Yao, Dickson

Faculty Sponsor: Thomas Proctor

Laser spectroscopy is used to examine the properties, such as size and shape, of exotic isotopes by precisely measuring the energies of their electron orbitals. This provides valuable data for nuclear physicists to refine our understanding of subatomic particles. This technique is used by TRIUMF's Collinear Fast-Beam Laser Spectroscopy (CFBS) experiment. TRIUMF's Isotope Separator and Accelerator (ISAC) uses the facility's cyclotron to generate isotopes, which are then ionized and separated by mass. The desired isotopes are then grouped into clusters and overlapped with a counter-propagating laser, where they excite and emit photons, allowing the spectral lines to be measured. These spectral lines provide great insight into the properties of the nuclei.

Unfortunately, background noise, and contaminants in the isotope beam, taint the spectral readings, making more exotic and short-lived isotopes impossible to analyse. This study considers a novel approach, employing the TRIUMF Resonant Ionization Laser Ion Source (TRILIS), which uses regular laser bursts to generate ion clusters. The study verified, with ion sensors, that the clusters generated by TRILIS have a well defined time structure. It is anticipated that by using this knowledge in conjunction with an ion sensor, researchers will be able to accurately determine when ion clusters pass the photomultiplier. They can subsequently ignore a large portion of noise, improving sensitivity to previously unnoticable isotopes. This new method, once perfected, will permit researchers to measure a wider range of isotopes, equipping theoretical physicists with the information they need to advance theories such as the Standard Model of particle physics

Environmental Science & Applied Biology

Changes in stable isotopes of carbon dioxide along a rural-urban transect in response to fuel emissions

Presenter: Semmens, Caitlin

Faculty Sponsor: Andreas Christen

Although import statistics and inventories provide information on total greenhouse gas (GHG) emissions on national or provincial scales, the geographic distribution and timing of GHG emissions within cities are not well monitored. Here, we explore whether the isotopic signature of carbon-dioxide (CO2) allows us to separate CO2 emitted from different sources and fuel types directly in the atmosphere over a city. First, the isotopic composition of CO2 (µ13C and µ18O) was determined for vehicle exhaust and natural gas. Exhaust samples were gathered from a number of different vehicles in Metro Vancouver, BC, Canada, and analyzed using a laser spectrometer. Natural gas was collected over the course of the study via an open torch connected to the city's supply network. Secondly, in-situ air samples taken along an urban-rural traverse in Metro Vancouver were analyzed and attributed to sources using a linear mixing model to remove background influences. It was determined that CO2 from fossil fuel emission sources can be identified using the isotopic signatures of µ13C and µ18O. The total mixing ratio of CO2 from the traverse allowed for the detection of areas enriched with atmospheric CO2, and it was possible to infer likely fossil fuel emission sources of CO2 by combining geospatial knowledge with the determined isotopic signatures from the in-situ samples

Environmental Science & Applied Biology

The Impact of Salinity and Dispersal on Microbial Communities

Presenter: Chen, Melissa

Faculty Sponsor: Laura Parfrey

In this project, we investigated the relative impact of salinity and dispersal on microbial communities by conducting an environmental transplant study. Although previous studies have shown that microbial community composition strongly correlates with various abiotic factors—of which the strongest is salinity— few studies have experimentally demonstrated this. Furthermore, it is unclear whether microbial communities are formed through deterministic forces such as salinity, or if the dispersal of micro-organisms also acts as a significance barrier in determining community composition. Thus, we conducted a whole-community transplant across a natural salinity gradient to help tease apart the relative effects of salinity and dispersal across local distances. This was done by transplanting microbial 'cages' holding aquatic microbial communities across salinity gradients along the Vancouver coast. Next generation sequencing was used to characterize and analyze microbial communities before and after the transplants. Considering the many biotic and abiotic roles microbes play in an ecosystem (biogeochemical cycling, symbiotic relationships, food source), understanding what factors are important to microbial community assembly can help us understand the dynamics of the entire ecosystem as a whole. It is our hope that the results of this project will allow further investigations on the forces behind community structure, both micro- and macro-scopically.

Environmental Science & Applied Biology

Zebrafish hiding behaviour in large, enriched laboratory tanks

Presenter: Mehrtash, Morvarid (Mory)

Faculty Sponsor: Becca Franks

Zebrafish have become increasingly popular in laboratory research within the past few decades. They are generally kept in small tanks that may not be optimal for their welfare and there is minimal knowledge about zebrafish behavior in large, enriched tanks. This research is focused on zebrafish hiding behavior in large, enriched tanks depending on the time of the day and the number of people in the room. This study is important because previous research has shown that laboratory routines and humans can stress animals out therefore we might expect animals to hide in the presence of humans. Natural experiment was used for this study in that during the week people were present in the room and on the weekends people were not present in the room. There were a total of 6 tanks positioned in one of two orientations on three shelves. Each tank was 29 gallons with plants, a gravel slope, and approximately 15 zebrafish (male:female 50:50) per tank. Swann infrared security cameras were installed and filmed each tank for 14 hours per day. Several times per day, for each tank, 100 seconds of the footage were coded and analyzed for space use including hiding behavior. We found that tank orientation did not affect visibility of zebrafish, fish are out and most active about 7 hours after the lights turn on, and that zebrafish in these tanks do not appear to hide in response to human presence. Future research could investigate whether enriched housing causes zebrafish to be less fearful of human presence.

Environmental Science & Applied Biology

Sustainable biofuel from household organic waste: Degrading resistant lignin with fungal enzymes to enhance production.

Presenter: Tannason Ng, Steuart

Faculty Sponsor: Timo van der Zwan

Biofuel can serve as a sustainable alternative to the current non-renewable fossil fuel energy sources. Conversion of household organic waste to biofuel through anaerobic digestion is promising, but the lignocellulose of which it is composed is naturally resistant to microbial degradation due to lignin that covers and wraps around cellulose and hemicellulose. Some white-rot fungi, such as Phanerochaete chrysosporium, produce enzymes that can degrade lignin, improving access to cellulose and hemicellulose; the sugar polymers that serve as the carbon source for the production of biogas. In this work, household organic waste was pre-treated with lignin peroxidases, manganese peroxidases and laccases extracted from P. chrysosporium. Pre-treated samples then were anaerobically digested and the volume of produced biogas and the composition of biopolymers were determined. Accessibility of cellulose to hydrolytic enzyme was also studied, to examine the changes to enzyme–substrate interaction. With an optimized mix of these fungal enzymes, lignin degradation was 30% greater than the untreated sample, which increased accessibility of the hydrolytic enzymes to the cellulose, and improved cellulose conversion. Consequently, biogas peak productivity increased by 30% and occurred 4 days earlier in comparison to non-treated organic waste.

Environmental Science & Applied Biology

Climate and flowering times of Magnolia taxa at the UBC Botanical Garden

Presenter: Mitchell, Taisha

Faculty Sponsor: Dr. Andrew Riseman

Phenology is the study of life-cycle events (phenophases) as influenced by the environment. In long-lived plants, life-cycle events may include the breaking of dormancy, flowering, fruit formation, and abscission of leaves in the fall. Shifts in the timing of phenophases can provide insights into how plant species and ecosystems are influenced by rising temperatures and global climate change. Climate change can have major impacts on plant growth, development, productivity, reproductive success, competition between species, as well as interactions between organisms. Woody plant species, due to their longevity and limited dispersal rates, may be particularly vulnerable to rapid changes in climate. This is particularly important for making appropriate choices for landscape management and garden design. In this study, the change of phenological events over time in several Magnolia species and cultivars was considered, along with what climatic factors may best explain the timing of such events. To do so, phenological records of flowering times for 18 Magnolia accessions from the UBC Botanical Garden and Centre for Plant Research were examined and associated with climate data from the UBC Climatological Station. It was found that the date of flowering is occurring later in spring, and is best explained by the accumulation of heat units—or growing degree-days—and aerial temperature. Precipitation, irradiance, and soil temperature were also considered. Knowledge of the relationship between climate and flowering allows for better pest, production, and ornamental display management.

Environmental Science & Applied Biology

Strategies for effective conservation: an investigation on the effect of habitat size on functional richness

Presenter: Pagowski, Veronica

Faculty Sponsor: Sarah Amundrud

There is an ongoing debate about whether a single large or several small (SLOSS) habitats of the same total size should be preserved in order to maximize the effectiveness of conservation measures. It is widely accepted that large habitats harbor a greater species richness compared to smaller habitat fragments, according to the island biogeography theory. Species richness frequently correlates with functional richness, defined as the number of trophic levels in an ecosystem. Thus, functional richness should also increase with area. This study investigates biodiversity in a bromeliad ecosystem as measured by functional richness per unit volume and compares functional richness in collections of varying sizes of bromeliads with the same total habitat volume. Studying the dynamics of large ecosystems can be difficult since these habitats may have ambiguously defined boundaries and require long-term study, as occupying species generally have longer life-spans and may migrate in or out of the habitat. Bromeliads house diverse ecosystems consisting of aquatic insect larvae of several functional feeding groups. Thus, bromeliad food webs provide an opportunity to observe ecosystem dynamics over short time-periods and with distinct habitat boundaries. To investigate the effect of habitat size on functional richness, insects larger than 1 mm were surveyed in 68 bromeliads over several years in Costa Rica. Our results indicate that functional richness per unit volume did not depend on bromeliad size, suggesting that it may be more effective to conserve a diversity of habitat sizes as resident species may be variably adapted to conditions in large or small habitats.

Environmental Science & Applied Biology

How does climate change affect rice production in Bulacan province, Philippines

Presenter: Hao , Teresa

Faculty Sponsor: Sameer Shah

The Philippines is vulnerable to the adverse effects of climate change due to its geographical location and climatology. Agricultural production is often strongly affected by changes in climate and abnormal weather events. In the Philippines, rice is the staple food that is water intensive and dependent on particular climatic conditions. Compared to other produce, fluctuation or decline in rice output poses a high risk to the population and economy of the Philippines because rice is important for food security and trade. This study examines possible effects of climate change on rice production in Bulacan Province. This research effort aims to synthesize qualitative and quantitative data on climate, and how climate change affects rice production in Philippines to provide insight for this particular context. Climatological data and government issued reports will be collected and summarized. The findings hope to provide evidence and insight for provincial agricultural decision- and policy-makers, and highlight areas for further research.

Environmental Science & Applied Biology

Deep Eutectic Solvents in Vanadium Redox Flow Batteries

Presenters: Ahmed, Ashley; Krishnan, Akhil & Smith, Rodney D. L.

Faculty Sponsor: Rodney D. L. Smith

The chemistry of vanadium is seeing an increase in research as the demand for greener more renewable energy is heavily sought after. Vanadium redox flow batteries (VRB) are an example of an electrochemical system that can efficiently convert electrical energy to chemical energy, then back to electrical energy on demand. These batteries have the benefit of scalability, being capable of storing multi-megawatt-hours. VRBs store energy by alternately oxidizing and reducing vanadium to different oxidation states; with a V2+/V3+ conversion occurring at one electrode and a V4+/V3+ conversion at a second electrode. Based on a solvated ion in an aqueous electrolyte solution, vanadium redox flow batteries exhibit an extraordinarily long life span. Presently, the energy density of a VRB is 0.1 W/cm.

Although used commercially, the low solubility of vanadium ions in aqueous solution results in relatively low energy density, and thermal precipitation may occur if the temperature exceeds optimal operating temperatures. This study will explore the use of deep eutectic solvents (DESs): fluids that are formed from two constituents that interact through hydrogen bonds and have a freezing point lower than each individual component. The three DESs to be explored are based on an amide, an alcohol and an acid. These solvents will replace water as the electrolyte solution in VRBs. It is anticipated that the increased ionic charge density of such solvents will increase the solubility of vanadium, increasing energy density, and reduce the risk of thermal precipitation.

Environmental Science & Applied Biology

Study of Bird Strikes at Selected UBC Buildings

Presenter: Leung, Carmen

Faculty Sponsor: Dr. Tara Ivanochko

Collision with building windows is one of the main causes of direct human-related bird deaths in North America, particularly during migration seasons. Because The University of British Columbia Vancouver is in the route of many migratory birds, occupants on campus were interested in finding out whether bird collisions is a significant problem in the area. As a result, for a period of eight months, four Environmental Sciences students, partnering up with The UBC SEEDS program, UBC campus and Community Planning, UBC Building Operation and Environment Canada, compiled and analyzed bird-collision data on the UBC campus. The project mainly focuses on the problem of bird-building collisions and the severity of the situation. Ten buildings, which are known to have high percentage of glass cover and are suspected to be the most problematic, were chosen for the study. The number of bird collisions at each selected building were then recorded and examined with the help of various tools. Considering that the dataset from this study was the very first dataset in possession of UBC, the work carried out would become the foundation of any related studies to come in the future and would hopefully be used in coming up with bird-friendly building guidelines for the University – and possibly for Vancouver as a whole.

Environmental Science & Applied Biology

Three Key Challenges to Understanding Climate-Volcanoes Feedbacks

Presenters: Clyne, Margot; Quainoo, Adjoa & Hatcher, Kimberly

Faculty Sponsor: Andrew Jellinek

Explosive volcanic eruptions and extreme climate events are both major sources of hazards to our environment. These phenomena are interdependent; inputs from volcanic eruptions drive climate variability, while atmospheric conditions determine the nature of rise of volcanic plumes. Ozone depletion is a leading cause of observed changes in the Southern Hemisphere's climate circulation. Volcanic eruptions can destroy ozone by increasing Stratospheric Sulfate Aerosols. Ozone sensitivity to volcanic eruptions increases with high atmospheric abundance of ozone-depleting substances. When simulating natural processes of ozone depletion, most climate models simulations only use data from a handful of large eruptions, if any. In this research, observed ozone metrics are compared with additional significant volcanic eruptions. Further research may find that model variability can be feasibly reduced by the inclusion of additional volcanic events. Changes in climate, driven by human activity, may have a significant impact on the dynamics of volcanic eruptions. We use a combination of observations and climate models simulations to assess future changes in wind and temperature profiles over six of the world's most active volcanic regions. Wind significantly influences volcanic plume dynamics. Laboratory experiments have provided an understanding of the impacts of wind on eruptions, though they are limited by their use of uniform wind, which does not model the strong atmospheric wind gradients. We have designed an innovative experimental setup to overcome this gap by integrating non-uniform wind mechanisms, and present our results from the calibration and pre-testing phase.

Kinesiology

Correlation between lower limb proprioceptive sense and skilled locomotor performance

Presenter: Qaiser, Taha

Faculty Sponsor: Dr. Tania Lam

It has been demonstrated that neural connections between the sensory and motor brain areas are essential for controlling movement and learning new motor tasks in humans. Likewise, proprioception, is our ability to sense limb position and movement, which is critical for learning skilled walking tasks. The aim of this project was to understand how lower limb proprioceptive sense contributes to the variability between subjects in the acquisition of a skilled walking task. We assessed lower limb joint position sense and movement detection threshold in human subjects using the Lokomat; a robotic lower limb exoskeleton. Subjects also walked on a treadmill to perform a skilled motor task where they were challenged to match their foot height to the height of a virtual obstacle displayed on a monitor in front of them. Subjects were given visual feedback on their error relative to the obstacle height after it was crossed. After 200 randomly generated obstacles, the average error of the last 20 steps was determined as their end-performance while its 95% confidence interval indicated their learning rate. When both performance and the learning rate were correlated to proprioceptive score, the relationship was found to be positive. Preliminary results of this study suggest that learning a new locomotor skill is highly influenced by a person's proprioceptive ability. The findings from this study can aid in developing new rehabilitative interventions for individuals with neurological conditions that not only take into account their level of motor paralysis, but also their degree of sensory capabilities.

Kinesiology

The dynamics of standing balance modulates the vestibular control of lower limb muscles

Presenter: Francisco, Bea

Faculty Sponsor: Dr. Jean-Sebastien Blouin

The integration of cues from the vestibular, visual and somatosensory systems contributes to human standing balance. Previous work has shown that galvanic vestibular stimulation evokes vestibular reflexes in appendicular muscles when the activity of these muscles contributes to standing balance, but not during non-postural tasks (e.g. while sitting). In this pilot study, we seek to further understand the properties of standing postural control that influence the vestibular control of balance and govern this task dependency. Our aim was to determine whether changing the dynamic properties of standing balance modifies the presence of vestibular reflexes in lower limb muscles. Using a robotic balance simulator, we altered the torque-body motion (i.e. velocity) relationship by increasing the damping properties of standing balance relative to normal conditions. Healthy subjects maintained balance on the robotic balance simulator while the damping term (ie. viscoscity) for ankle torque increased. Our results showed that increased damping decreased the evoked vestibular reflexes and whole-body sway, but vestibular reflexes remained present even at the highest damping values. In addition, the decrease of the vestibular reflex with increasing damping correlated strongly to the velocity of whole-body sway. These results suggest that vestibular control of standing balance is tuned to the system dynamics and depends strongly on the velocity of whole-body motion. The insight provided by this study may be beneficial to clinical applications with patient populations suffering from balance disorders.

Kinesiology

Balancing in Pairs

Presenter: Dhillon, Jaspreet

Faculty Sponsor: Nicola Hodges

It has been well documented in the motor learning literature that task relevant interference or effort in practice aids in long-term retention of the skill. What we aim to investigate is how practicing in a social context could potentially introduce this task-relevant interference into practice facilitating learning a skill over the longer term. Little is known about how people learn together, even though there is some evidence that this type of dyad practice is better than practice alone. Participants are tasked with balancing on a platform, either alone or with a partner, keeping it as level as possible during each practice trial (60s trials, 12 trials in total). Deviations from the horizontal positions are measured. We expect that learners in pairs will make more errors in practice than people performing alone, but importantly, that they will retain the skill better than individuals who practice alone (when assessed 24 hours after practice). Additionally, a secondary aim is to determine if the partner's orientation affects performance in practice and ultimately learning. The paired learners will either face their partner or face their partner's back. There is some evidence that the "mirrored" view leads to imitation, whereas facing someone's back leads to compensation. Our findings would add to our understanding of the potential learning benefits to be gained from social practice and how a partner influences the errors or accuracy of their partner (based on orientation) during actual balance performance.

Medicine & Pharmacology

Effects of an Age-dependent Decrease of Autophagy on Retinal Pigment Epithelium Homeostasis

Presenter: Fong, Alison

Faculty Sponsor: Jiangyuan Gao

Age-related macular degeneration (AMD) is an irreversible, neurodegenerative disease that causes vision loss in the elderly over 60 years old of age, especially in industrialized countries. AMD occurs to the retinal pigment epithelium (RPE), a group of specialized, nourishing cells in the back of eye, which takes up the cellular debris from light sensing photoreceptors and thereby maintains vision. Accumulating evidence has suggested that autophagy, an intracellular self-cleaning process, is critical to RPE homeostasis and that its age-dependent dysfunction may be associated with the pathogenesis of AMD. However, the exact mechanism is still unknown. In this study, we hypothesize that an age-dependent decrease in autophagy efficiency affects RPE phagocytosis capacity, lipofuscin degradation and ultimately leads to cell death. To test it, the RPE cell line, ARPE-19, will be exposed to an autophagy inhibitor, 3-Methyladenine (3-MA) and the autophagy process will be measured using quantitative real time polymerase chain reaction, western blot, and immunofluorescence. Results will undergo rigorous statistical analysis by one-way analysis of variance (ANOVA). Given RPE's vital role in retinal function, understanding its response to age-related changes is essential to uncovering ways to prevent, if not cure, not only AMD, but also other age-related vision changes in the elderly population.

Medicine & Pharmacology

Regulating Asthmatic Airway Smooth Muscle (ASM) Proliferation by Reducing Calreticulin

Presenter: Tam, Andrew

Faculty Sponsor: Nicholas Swyngedouw

Asthma is a common respiratory disease affecting over 300 million people worldwide. Symptoms of asthma include wheezing or shortness of breath due to airway narrowing and inflammation in the airways. Narrowing is caused in part by increased amounts of airway smooth muscle (ASM) cells, which eventually changes the airway structure. C/EBPμ is a protein known to control cell growth including the proliferation of ASM cells. Previous research has reported that asthmatics also have increased amounts of calreticulin, a protein that inhibits the production of C/EBPμ, allowing for increased ASM proliferation. Currently, it is unknown if reducing the amount of calreticulin would lead to a reduction of ASM cells. This investigation would determine whether or not increasing C/EBPμ by inhibiting calreticulin would decrease ASM proliferation. This investigation will use small interfering RNA(siRNA), which interferes with the expression of specific genes to reduce calreticulin. C/EBPμ levels in asthmatic ASM cells will be compared to non-treated asthmatic ASM cells and non-asthmatic ASM cells controls. Additionally, we will incorporated [3H] – thymidine to compare the proliferation of ASM cells from each cell line. It is anticipated that results will demonstrate that siRNA treated asthmatic cells have reduced ASM proliferation compared to non-treated controls and equivalent growth levels compared to healthy controls. This suggests that siRNA knock-down of calreticulin restores C/EBPμ levels in ASM cells to normal and restores normal ASM proliferation. These findings provide a potential therapeutic target for treating asthma. Furthermore, this could be of significant interest in other pathological or cancer research where C/EBPμ has been linked to uncontrolled cell growth.

Medicine & Pharmacology

Longitudinal Evaluation of Treatment of Hep-C Infection in Active Drug Users

Presenter: Alimohammadi, Arshia

Faculty Sponsor: Dr. Brian Conway

In Canada, there are almost 245,000 individuals that are living with chronic hepatitis C (HCV). Of this population, the most vulnerable are illicit drug users (IDUs) where almost 70% of IDUs are infected. The effective treatment of HCV in IDUs is important in the fight to reduce the general population's risk of becoming infected. It has been shown in previous studies that current HCV antiviral treatments are quite effective at suppressing and even eliminating the virus from the body (63% cure-rate) but the aim here is to assess the efficacy of these same drugs on a marginalized population such as IDUs. To achieve this, we looked at various methods of treating HCV, including in the setting of HIV co-infection (HIV+/HCV+), using a comprehensive model of care established in inner city Vancouver. Study participants included HCV positive patients receiving treatment from January 2003 to July 2013. Medications included Ribavirin (RBV) with various forms of pegylated interferon (PEG-IFN) (RBV and PEG-IFN are antiviral drugs). Interferon was injected, and Ribavirin was dispensed in pill form with the endpoint of the study being classified as sustained virologic response (aviremia 24 weeks after completion of antiviral therapy) after 24 or 48 weeks of treatment. It was found that HCV infection could be treated successfully in IDUs. Almost 60% of patients are cured and there was a lack of any effect of HIV co-infection on response rates to HCV treatment, showing that current treatment methods for non-IDU patients are just as effective on IDUs.

Medicine & Pharmacology

The Effectiveness of Serum C-Reactive Protein to Monitor Treatment Response in Cystic Fibrosis Pulmonary Exacerbations

Presenter: Sharma, Ashutosh (Ash)

Faculty Sponsor: Dr. Bradley S. Quon

Cystic fibrosis (CF) is a genetic disease that is characterized by the build-up of abnormally thick mucous in the lungs. This facilitates the growth of bacteria, which cause inflammation in the lungs, and can further lead to pulmonary exacerbations (PEx), the acute worsening of lung disease symptoms. It has been shown that one in four CF patients receiving treatment for a PEx will fail to recover their prior baseline lung function despite experiencing symptomatic improvement. This suggests that current PEx management and/or monitoring of treatment response is sub-optimal. This study was a retrospective chart review of 40 CF patients admitted to St. Paul's Hospital for treatment for a PEx between March 2013 and March 2015, and aimed to determine whether the levels of C-reactive protein (CRP), a blood protein reflective of inflammation, can be used to predict exacerbation-related outcomes. We hypothesized that a lack of a significant decrease in CRP levels from day 1 to 5 of PEx treatment will predict treatment failure. Our results indicate that if CRP levels decreased less than 50% from day 1 to 5, patients were more likely to fail treatment ($p=0.01$). An elevation in CRP was also found to be more sensitive than white blood cell count, the conventional indicator of infection, at the onset of a PEx.

Medicine & Pharmacology

T-Cell Receptor Cross-linking Downregulates Gp130

Presenter: Zhao, Billy

Faculty Sponsor: Georgia Perona-Wright

The immune system is essential for our protection against foreign invaders at the molecular scale. However, when an immune response is too strong, complications that are harmful, or even fatal, can arise. An optimal immune response is one that can protect us against pathogens while causing the least amount of harm as a consequence. This balance is achieved through careful regulation of cytokines, messenger molecules of the immune system that can either strengthen or weaken an immune response. Cytokines are produced by many different cells and can potentially target all other cells of the immune system. One type of cell central to cytokine regulation, and thus largely control an immune response is T-helper cells, also known as CD4 T-cells. CD4 T-cells are targeted by many different cytokines, which in turn causes CD4 T-cell differentiation, proliferation, or production of other cytokines. In this study, we investigated how activation of CD4 T-cells influences many of their surface molecule expression. GP130, IL-6Rμ and IL-27Rμ, which are all receptors on the cell surface, were also found to be downregulated upon activation and remained at a lower level of expression in resting phase and secondary response. The downregulation of these receptors could potentially affect the cytokines produced in response to IL-6 and IL-27 after T-cell activation. One example of altered cytokine production is IL-10. During a primary response, IL-10 production depends on IL-27 while in the secondary response; IL-27 does not influence IL-10 production.

Medicine & Pharmacology

Long and short term outcome following renal transplantation: the predictive value of perioperative variables in a pediatric population

Presenter: Zheng, Boyuan

Faculty Sponsor: Erick Carreras

It is well recognized that many medical conditions in the kidneys among children, such as birth defect, and systemic disease, sometime require long-lasting treatments. These chronic kidney diseases (CKD) often lead to kidney failure. Estimated glomerular filtration rate (eGFR) can be used to define kidney failure, whereas smaller filtration rates indicate more severe conditions. Renal transplant is the gold standard treatment for end-stage CKD. Its perioperative variables that associate with short- and long-term have been well studied by previous research; however, no predictive equations have yet been determined. Thus, the goal of this study is to determine predictive equations for graft outcomes in both short- and long- term effect. A retrospective chart review for renal transplant is conducted with a sample size of 140 children. This study included all the pediatric patients (≤18 yrs) who had their first and or only renal transplant between Jan 30th, 1995-2015. The interested perioperative variables were used to study our primary outcome, renal graft failure within 1 year, and between 1-10 years apart from operation. We carried out statistical analyses including logistical, linear, and non-linear regression analysis as means to develop predictive equations for renal graft outcomes. As results, we predict variables including central venous pressure (CVP) and age of transplant will have strong correlations with both short- and long- term renal graft failure. These results suggests that there is a method to delineate a predictive formula for renal graft outcome in terms of eGFR, however, further investigation needs to be conducted.

Medicine & Pharmacology

Schizophrenia and Delusions- Investigating the Hypersalience Network

Presenter: Hunt, Camille

Faculty Sponsor: Todd Woodward

Delusions are one of the most prevalent and intriguing symptoms of schizophrenia, and although there have been successful treatments altering the severity of delusions, the underlying functional brain network being affected is not yet fully defined. This study focuses on the tendency of individuals who have delusions, to jump to conclusions on evidence matching tasks. The underlying cognitive occurrence that leads to this behaviour, known as hypersalience, causes the brain to make a decision based on very little evidence. Patients with schizophrenia (delusions and no delusions) and healthy controls completed the same evidence matching task while their brain activity was recorded using functional magnetic resonance imaging (fMRI). The objective of this being to create a more comprehensive network associated with hypersalience. It is hypothesized that there will be higher brain activity in the hypersalience network in schizophrenia patients with delusions than those that do not have delusions. It is also predicted that the brain networks activated in healthy controls will be different to schizophrenia patients that don't currently present with delusions, demonstrating the effect that schizophrenia has on neural connections in the brain. *Note to the MURC Review Committee: Data analysis is currently underway. Results will be determined by the end of February.

Medicine & Pharmacology

Refining the assessment of surface glutamate receptor distribution in co-cultured neurons

Presenters: Li, Edward H.Y.; Wang, Liang & Raymond, Lynn A.

Faculty Sponsor: Lynn Raymond

Distribution of NMDA receptor (NMDAR) in striatal neurons plays a critical role on determining its excitotoxicity in Huntington's disease (HD). However, the mechanism of NMDAR trafficking remains unknown. Palmitoylation, a posttranslational modification, regulates NMDAR surface expression. Notably, a palmitoyl acyl transferase (PAT) enzyme, HIP14, interacts with the protein mutated in HD (huntingtin). The role for palmitoylation and HIP14 in regulating GluN2A-NMDAR surface distribution has never been examined. To address this issue, we used antisense oligos to knock down HIP14 level in corticostriatal co-culture and investigated its effect on the surface/internal ratio of GluN2A-NMDAR. We first refined our method focusing on two factors: 1) the region of interest (ROI) regarding to the distance from the soma within which we perform the measurement; and 2) the optimal threshold balancing between filtering out the background noise yet preserving the valid signals from the receptors. Biologically, NMDAR as a type of excitatory receptor tends to distribute towards distal dendrites away from the soma; as well, some diffusely distributed receptors, especially the extra-synaptic ones that are found to contribute to early HD pathophysiology, may not deliver the same level of signals as clustered ones usually found at the synapses. We found that the ideal parameters are: 1) ROI outside 40 μm of the soma and 2) the threshold of two standard deviation above average background noise. We then further investigated the interaction of HIP14 and GluN2A-NMDAR. The pilot data will be presented. Funded by the Canadian Institutes of Health Research.

Medicine & Pharmacology

Drug-Drug Interactions – Methodologies and Significance

Presenter: Wu, Fiona

Faculty Sponsor: Devinder Sharma

Background: Drug-drug interactions (DDI) occur when certain substances affect the pharmacokinetics and/or pharmacodynamics of a drug. While pharmacokinetic DDI may affect drug absorption, distribution, metabolism and/or excretion, DDI at pharmacodynamic level could lead to potentiation, synergism, or antagonism of drug effect. For better understanding, this project was focused on DDI caused due to changes in metabolism, in particular, due to inhibition and induction of Cytochrome P450 (CYP) enzymes, an important class of enzymes which is responsible for metabolism of ~75% of the prescription drugs. Methodologies: Potential DDI of candidate drugs due to enzyme inhibition could be predicted by determining the IC50 and other kinetic parameters using tools such as recombinant CYPs and liver microsomes. Similarly, DDIs due to enzyme induction can be investigated using cell-based reporter gene, gene expression, and enzyme activity assays, both in vitro and in vivo. Significance: With the ultimate goal of making safer and efficacious drugs for human use, pharmaceutical companies screen drug candidates for their DDI-potential very early in the discovery phase. Candidates with favourable pharmacokinetics are selected for further development. In the clinical context, DDI often occur due to accidental misuse and/or poor understanding of drug properties. Further, factors like age, polypharmacy, genetics, and disease may predispose patients to potentially harmful DDI. By close monitoring of patients' history and better knowledge of drugs, harmful DDI can be prevented or identified in time. By preventing DDI related hospitalisations, associated economic burden can be reduced and resources can be allocated on other medical issues.

Medicine & Pharmacology

A survey-based assessment of the association between the perceived accessibility of health information with cancer knowledge and risk perception

Presenter: Cua, Georgine

Faculty Sponsor: Leo Chen

Evidence-based decision making for is important and more effective for implementation of for cancer prevention programs. Previous research has found that participation in early cancer detection programs can lead to improved patient outcomes. In addition, a population's knowledge and risk perception of cancer is intricately associated with its participation in potentially life-saving cancer screening programs. Despite this, few studies have assessed the association between accessibility of cancer information with cancer knowledge and risk perception. This study uses data from the Health Information National Trends Survey, Cycle 3. To understand how accessible cancer information is, we assessed survey responses to four key characteristics: 1) perception of effort when searching for information, 2) whether they felt frustration during their search for information, 3) if they were concerned about the quality of the information, and 4) if they found the information hard to understand. Logistic regression models were used to analyze the effects of these questions on cancer knowledge and risk perception outcomes such as: 1) perceiving that the chances for cancer cannot be lowered, 2) worrying about getting cancer, 3) belief that everything causes cancer, and 4) belief that they will get cancer in their lifetime. The data shows that perception of effort when searching for cancer information is positively associated with their belief in getting cancer (OR=1.359, 95%CI 1.014-1.823) and the belief that chances for cancer cannot be lowered (OR=1.727, 95%CI 1.339-2.227). If people felt concerned with the quality of information, they are also more likely to worry about cancer (OR= 1.390, 95%CI 1.127-1.714) and more likely to believe that everything causes cancer (OR=1.251, 95%CI 1.029-1.520). The data also suggests that if the population believe that the information found from cancer information was difficult to understand, they are more likely to perceive that there is not much they can do to lower their chances of getting cancer (OR=1.507, 95%CI 1.178-1.928). Hence, having easy access to cancer information may be important in improving the knowledge and risk perception of the population.

Medicine & Pharmacology

Effects of training inspiratory muscles in patients with chronic obstructive pulmonary disease (COPD)

Presenter: Raza, Haider

Faculty Sponsor: Andrew Ramsook

In patients who suffer from chronic obstructive pulmonary disease (COPD), emphysematous changes in the lungs cause the alveolar sacs within the lungs to become damaged. The destruction of this elastic tissue leads to an increase in lung compliance, which contributes to a decrease in lung elastic recoil, so that at any given lung volume a lesser recoil pressure than in a healthy lung is established (Ferguson, 2006). With increased lung compliance, lungs lose their ability to produce greater pressure, consequently altering the equilibrium of the opposing recoil pressures of the chest wall and the lungs and hence the ability to completely exhale out. In patients with COPD this effect increases at high intensity exercises, into a phenomenon called dynamic hyperinflation. Dynamic hyperinflation occurs when patients begin to inhale before full exhalation has been achieved in a respiratory cycle. The purpose of this study is to determine if inspiratory muscle training (IMT) can increase the exercise capacity and reduces the sensation of dyspnea in COPD patients during intense exercise, as these patients' struggle to fully expire during a respiratory cycle (Ferguson, 2006). In order to compensate for the obstructed airways in COPD patients, it is hypothesized that IMT should allow the respiratory system of patients with COPD to work more easily at high lung volumes during intense exercise. After performing exercise, patients' inspiratory load and exercise capacity are measured. Results from various IMT studies have shown that inspiratory muscle training at high intensities leads to an improvement in inspiratory muscles strength and endurance, reduced dyspnea and improved exercise capacity. (Charususin et.al, 2013. Presently, IMT can be considered additional therapy to reduce dynamic hyperinflation at most, as there exists insufficient evidence to prove that it can also improve the quality of life (Gagnon et al., 2014).

Medicine & Pharmacology

The effect of surgical delay of hip fracture patients on in-hospital deaths

Presenter: Gu, Jenny

Faculty Sponsor: Katie Sheehan

Hip fractures are a leading cause of death in older adults. As such, federal, provincial, and regional policy makers recommend a 48 hour benchmark for hip fracture surgery. However, the effect of surgical delay beyond 48 hours on mortality is unclear. OBJECTIVE: To determine the effect of surgical delay of hip fracture patients on in-hospital deaths. METHODS: 75,248 hospitalization records of patients, 65 years or older, admitted to a Canadian hospital from 2009 to 2012 with a non-pathological first hip fracture were included in this study. Patient characteristics and outcomes were described as frequencies and proportions for the total population and by sex. Adjusted binary logistic regression determined the effect of surgical delay beyond 48 hours on in-hospital death. Alpha was set at <0.05. RESULTS: 15,802 (21.0%) of the patients were delayed to surgery beyond 48 hours. Of those delayed, 14,159 (89.6%) suffered an in-hospital death. In comparison, 59,446 (79.0%) of the patients were not delayed, and of those, 6,182 (10.4%) had an in-hospital death. The unadjusted risk of in-hospital mortality was OR = 3.5 (95% CI: 3.4–3.7) for patients who were delayed to hip fracture surgery. The adjusted risk of in-hospital death was OR=1.24 (95% CI: 1.22–1.29). CONCLUSIONS: Surgical delay beyond 48 hours increases the risk of in-hospital death. Further study should address the cause of surgical delay in this vulnerable population.

Medicine & Pharmacology

ECT: Evaluating Seizure Quality

Presenter: Green, Katherine (Katie)

Faculty Sponsor: Fidel Vila-Rodriguez

Electroconvulsive therapy is an effective, standard treatment in the field of mental health, however treatment variables that produce variance in seizure quality and effect patient recovery outcomes are not well documented. This is an initial evaluation of the demographics of patients undergoing ECT treatment at UBC hospital. Eventually, this project looks to investigate connections between EEG seizure patterns during ECT treatments and patient health outcomes, specifically looking at the EEG measurements of Cohesion, Amplitude, Rhythm, Suppression in induced tonic-clonic seizures. A retrospective chart review was performed on charts of 90 inpatients and outpatients who received either index or maintenance courses of electroconvulsive therapy at UBCH between January 2011 and May 2013. Of the 90 charts reviewed, 56 (60%) patients were female and 36 (40%) patients were male. Average age at first treatment was 52.68 years for females and 51.53 years for males. Average number of ECT treatments was 22.47 for females and 16.31 for males. 64.60% of treatments were Bifrontal electrode placement, 20.08% of treatments were Right Unilateral, and 15.32% of treatments were Bitemporal. In females, 48.15% of patients had a diagnosis of depression, 29.63% had a diagnosis of psychosis, 16.67% had a diagnosis of bipolar disorder and 5.56% had a diagnosis of other. In males, 66.67% of patients had a diagnosis of depression, 13.89% had a diagnosis of psychosis, 16.67% had a diagnosis of bipolar disorder and 2.78% had a diagnosis of other. With these initial demographics we can begin to better understand who is being treated with ECT, and move towards evaluation and standardization of seizure quality to improve treatment of mental illness with electroconvulsive therapy.

Medicine & Pharmacology

Blockage of pro-inflammatory cytokine IL-1decreases blood brain barrier permeability in multiple sclerosis.

Presenter: Shahbahrami, Katiana

Faculty Sponsor: Katerina Othonos

Multiple Sclerosis is an immune-mediated disease that leads to demyelination of the central nervous system. Infiltrating leukocytes through the damaged blood brain barrier (BBB) are thought to be the cause of the demyelination, however, whether BBB dysfunction precedes immune cells infiltration or is the consequence of perivascular leukocyte accumulation remains to be established. Proinflammatory cytokines such as interleukin (IL-1) and tumor necrosis factor (TNF) are thought to play a role in alteration of the BBB permeability. We hypothesize using anakinra, an IL-1 receptor antagonist that blocks the normal activity of the IL-1 cytokine, will block luminal exposure of Jam-1, a protein involved in forming tight junctions of endothelial cells, which in turn will deter passage of leukocytes through the BBB. In vitro examination of endothelial cells from mouse induced with EAE was performed and measurements of transendothelial electrical resistance (TEER) taken prior to treatment cells with anakinra were taken. Transwell migration assay was then performed by co-culturing leukocytes and endothelial cells and following an incubation period, the cells were stained to determine the types of cells that migrated to the lower chamber of the transwell as well as immunofluorescence staining of the Jam-1 protein to determine its final location in the cell. Finally, TEER was measured post-treatment to see if resistance had gone up. We expect that TEER in treated endothelial cells increases compared to untreated cells, leukocytes cross the membrane independently in the transwell assay, and Jam-1 is located abluminally.

Medicine & Pharmacology

100 Top Cited Articles in Clinical Near Infrared Spectroscopy

Presenter: Cubbon, Marcia

Faculty Sponsor:

Near Infrared Spectroscopy (NIRS) is an important tool in the clinical field. This analysis will show who the most prominent researchers are in the research area of clinical NIRS, and in what direction the research is currently moving. In this study, we analyzed the top 100 cited articles in clinical NIRS. Through pre-assigned filters on the Web Of Science Database, we first established the top cited articles, and then determined that they were the articles we wanted. We examined their content for information such as whom the articles were written by, where they were published, and what type of research it was. Our findings have not been finalized yet, but we found that there are five people who are major players in the field of NIRS, and about ten major institutions where the work is mainly taking place. The number of citings of each article ranges from about 100 to 700.

Medicine & Pharmacology

Grading Practices of Pharmacy Programs in Canada

Presenter: Lee, Mathew

Faculty Sponsor: George Pachev

Undergraduate curricula of the 10 Canadian pharmacy programs are being revised in alignment with changes in pharmacy practice. Currently four programs offer a 6-year entry-to-practice PharmD degree, while six (including UBC) offer a 5-year BSc(Pharm) degree and are in the process of transitioning to a PharmD degree. Regardless of the degree designation, each program is expected to fulfill nationally-accepted educational outcomes established by the Association of Faculties of Pharmacy of Canada. Grading practices are integral to the success of curriculum revision efforts and achievement of desired outcomes. In support of curriculum revision in the UBC program, we characterized the institutional-, program- and course-level grading systems of all Canadian pharmacy programs with special emphasis on systematic differences between BSc(Pharm) and PharmD programs. Information on the grading practices was collected from university and program websites, academic calendars and student handbooks. Faculty members overseeing assessment in each program were identified and contacted for clarification when necessary. Eight of the 10 programs use program-level grading systems aligned with established institutional grading policies and typically consist of letter grade or numeric scales. Where the university promotion standards are defined, the respective pharmacy programs have stricter criteria for advancement from one year to the next. With respect to course grading practices, six of the 10 programs have stricter course-passing standards than specified by the respective university policies, three follow university course-passing criteria, while no information was available for 1 program. No systematic differences in grading practices were observed between BSc(Pharm) and PharmD programs.

Medicine & Pharmacology

Changes from the DSM IV to the DSM V and the Opinions of the Psychiatric Community: a Meta-Analysis.

Presenter: Salterio, Nicholas

Faculty Sponsor: Erick Carreras

The Diagnostic and Statistical Manual of Mental Disorders (DSM) published by the

American Psychiatry Association offers detailed criteria to be used when diagnosing a

mental disorder. Its first version was published in 1952, with the most current version, the

DSM-V published in May of 2013. Each version of the DSM compiles new research and

the latest methods of diagnoses in order to help professionals be accurate in the ever

changing and relatively new science of psychiatry. That being said, it had been about

twenty years since the last major update to the DSM-IV. Therefore, the DSM-V had

made tremendous amounts of minute changes and several major ones. Now that the

DSM-V has been published for almost two years there is a lot of literature regarding

psychiatric communities opinions on such changes. Thus, a meta-analysis can be

preformed and a general community consensus can be achieved. This meta-analysis was

conducted by using online scientific literature databases including: Pubmed and Medline.

All literature was obtained between January 1st and February 7th, 2015, inclusive. All

papers that discussed the changes, both positive and negative, from the DSM-IV to -V

were included in the study. Descriptive statistics were performed on the data. There were

a total of 70 papers reviewed, with 45 papers being excluded, and 25 meeting the

inclusion criteria. No clear consensus was found on the overall improvement of the DSMV

with only 51% in agreement that there was an improvement from the DSM-IV. More

research needs to be conducted on the reasons behind why there is such a divide in the

opinions of this update to better ensure the next update helps all sectors of psychiatry.

Medicine & Pharmacology

Intravenous Immunoglobulin Skews Human Macrophages to a Regulatory Phenotype In Vitro

Presenter: Zhao, Zheng Yu (Tony)

Faculty Sponsor: Dr. Laura Sly

Inflammatory Bowel Disease (IBD) is a chronic, life-long disease characterized by inflammation along the intestinal tract. Current treatments for IBD rely on non-specific immune suppression. Macrophages are key players in the inflammatory response and contribute to the inflammation present in IBD. It has been suggested that antibody-based biological therapies can be used to treat IBD by skewing macrophages to a regulatory phenotype. Regulatory macrophages (Mregs) are anti-inflammatory. In response to inflammatory stimuli, Mregs produce large amounts of the anti-inflammatory cytokine, IL-10, and very low amounts or no pro-inflammatory cytokines such as IL-12 and IL-6. Mice macrophages can be skewed to a regulatory phenotype through co-stimulation with Intravenous Immunoglobulin (IVIG) and lipopolysaccharide (LPS). IVIG consists of pooled human antibodies (delivered intravenously), and LPS is a component of the gram-negative bacterial cell wall. My overarching hypothesis is that co-stimulating human macrophages with Intravenous Immunoglobulin (IVIG) and lipopolysaccharide (LPS) can skew them to a Mreg phenotype. The experiment had two objectives: measure the cytokines produced by human monocyte derived macrophages (MDMs) co-stimulated with IVIG and LPS, and assess the ability of IVIG to skew MDMs to a Mreg phenotype. Data was collected from 18 healthy participants at the Child and Family Research Institute. Human MDMs when co-stimulated with low dose IVIG and LPS produced high levels of anti-inflammatory IL-10 and low levels of pro-inflammatory IL-12 and IL-6 suggesting skewing to Mreg phenotype was successful.

Medicine & Pharmacology

Advantages and Ways to Tackle the Problems of Reflectance Confocal Microscopy Regarding Clinic Diagnoses of Skin Cancers

Presenter: Zhou, Zihe (Jasper)

Faculty Sponsor: Wenbo Wang

Reflectance confocal microscopy (RCM) is an important method in respect of skin cancer diagnosis. Particularly, RCM reduce the pain of the patients and the artifacts of the detection of melanoma significantly compared to traditional biopsy which causes scarring. Currently, there is no better substitute for RCM because of its high resolution, non-invasive nature, and the possibility of combining other technologies, like multiphoton microscopy (MPM), to conduct comprehensive diagnosis in different levels of the skin. However, this technique has not applied to clinic field widely because of the depth of the imaging is limited due to tissue-induced scattering and aberrations, and the contrast of the image is still in grey-color scale which diminishes the accuracy of the detection. Also, the expensive large-scale instrument causes inconveniences regarding clinic application. Preliminary experiments showed that proper combination of RCM and other techniques can remarkably increase the quality of imaging and reduce the scale of the instruments. By conducting this research, the practicability of RCM may be increased significantly.

Medicine & Pharmacology

Treatment of Degenerative Eye Disease with Gene Therapy RdCVF and RdCVFL

Presenter: Ho, Brian

Faculty Sponsor: Aleeza Tam

This research focuses on treating degenerative eye diseases via gene therapy by using the viral vertox RdCVL and RdCVFL and TatM013 as a way of ensuring retina cod and rod survival. This project will theorize the effectiveness of gene therapy and base it on the two research papers Viral- mediated RdCVF and RdCVFL expression protects cone and rod photoreceptors in retinal degeneration by Leah C. Byrne and her colleges and also Gene Delivery of a Viral Anti- Inflammatory Protein to Combat Ocular Inflammation by Cristhian J. Ildenfonso and her colleges. This project will be exploring what RdCVFL and RdCVF is and how it helps to prevent furthur degeneration of the retina. RdCVF and RDCVFL do this by protecting cone and rod receptors in the retina. Using this theoretical data to figure out how RdCVF and RdCVFL help in the molecular level to prevent degenerative diseases. This projet will use theoretical data from the two published papers listed above. In theory the gene therapy worked and RdCVF helped to ensure cone survival and RdCVFL helped to prolong rod survival.

Medicine & Pharmacology

A systematic review on Levetiracetam on tremors in MS Patients.

Presenters: Wong, Jeffrey & Kooner, Aman

Faculty Sponsor: Dimi Panagiotoglou

Tremors are just one of many debilitating symptoms of Multiple Sclerosis, and can disrupt normal functioning of patients with the disease. There are, however, many treatment options available to decrease the severity of essential tremors, and thus increase the functionality and activities of daily life (ADL) of patients.

These treatments include the anticonvulsants primidone, topirimate, levetiracetam and gabapentin. Our team conducted a systematic review of the studies investigating the efficacy of each of these in treating essential tremors. We restricted our analysis to clinical, randomized, double-blinded studies or case reports investigating anticonvulsants for patients with Multiple Sclerosis. Twenty five studies were originally identified, 10 of which were excluded for poor fit of search terms. The abstracts of the 15 remaining studies were carefully vetted by two reviewers. Five studies were finally selected for detailed review: four studies focusing on levetiracetam and one on primidone. After reading the papers, we narrowed our research focus to whether or nol Levetiracetam is an effective treatment for tremors in Multiple Sclerosis. Two studies reported on patient outcomes using the ADL scoring metrict.

Owing to small sample sizes and the lack of reporting of ADL scores in patients in the placebo group, we cannot definitively comment on the efficacy of levetiracetam treating essential tremors in patients with Multiple Sclerosis.

Medicine & Pharmacology

How do (medical) students learn best?

Presenters: Ku, Jerry; Hung, Wayne & Ip, Alvin

Faculty Sponsor: Dr. Jane Buxton

Medical students at The University of British Columbia participate in a population health course that aims to cultivate social accountability and CanMEDS competencies. To accommodate different learning styles, students select one of three tracks – Self-Directed Project Option (SDPO), Community Service Learning Option (CSLO), or Discussion Group Option (DGO). This setting provides a unique opportunity to assess the effectiveness of different learning methodologies in fulfilling course objectives. However, this has never been attempted. This study evaluates how participation in different learning styles can impact the development of social accountability and CanMEDS competencies in medical students. Expert consultation and literature review were undertaken to develop a 33-item self-report survey, which was distributed to all students enrolled in the course for the past four years. We recruited 168 participants with equal representation from each learning option. Participants of all options agreed that it is important for medical students to be actively engaged in the community and be exposed to new patient populations. However, only CSLO and SDPO students reported feeling more engaged in the community, and only CSLO students agreed that they had been exposed to previously unencountered populations through the course. There were significant differences between the learning options in developing CanMEDS competencies. Whereas DGO students disagreed that their option improved any competencies, CSLO and SDPO students reported that their options helped to make them better communicators, collaborators, managers, health advocates, and professionals. Learning through community service or self-directed research may be more effective in developing social accountability and CanMEDS competencies.

Medicine & Pharmacology

The role of the immune system during the progression of amyotrophic lateral sclerosis (ALS)

Presenters: Tran, Jordan & Van de Voorde, Kurt

Faculty Sponsor: Jess Morrice

Amyotrophic lateral sclerosis(ALS) is a disease caused by the death of motor nerve cells which allow for body movement. This disease inevitably leads to paralysis and death. There is currently no effective treatment and no known cause for ALS. Immune cells in the nervous system, called microglia, switch from a protective to a damaging form as the disease progresses. It is possible that this switchhas devastating effects on the disease progression. Microglia release a protein called interleukin-6 (IL-6) causing inflammation and more damage. The specific role of IL-6 during motor nerve cell death remains unknown. We believe that IL-6 will be located at affected locations in the brain prior to motor nerve cell death and that levels will increase through disease progression.

We will aim to induce ALS-like symptoms in zebrafish embryos by introducing a gene that causes motor nerve degeneration. Using fluorescence microscopy, we will study presymptomatic disease stage, initial disease stage and later disease stages. At each stage, interactions between IL-6, microglia and the dying nerve cells will be observed and analyzed.

We expect that IL-6 and microglia levels will remain high before onset of the disease and during disease progression. We expect that IL-6 will be concentrated around areas of the brain prior to notable motor nerve cell loss. Implications If IL-6 is found to predict areas affected by ALS and have a role in disease progression, targeting this protein may be used to understand how this disease develops and perhaps interrupt disease progression.

Medicine & Pharmacology

The Effect of Adoptively Transferring Deficient Treg Subpopulations Identified from T1DM Patients in an NOD Mouse Model

Presenters: Le, Michelle & Mysuria, Shivani

Faculty Sponsor: Nick Dawson

Type 1 Diabetes Mellitus (T1DM) is an autoimmune disease that is characterized by the destruction of insulin-producing pancreatic beta cells, leading to unmanaged blood glucose levels. An estimated 80,000 people worldwide develop T1DM every year and only insulin-management therapy is readily available. A subset of white blood cells called T effector cells (Teff) are defective in patients, causing beta cells to be recognized as foreign. Another subset of white blood cells, called regulatory T cells (Tregs) are critical for controlling immune responses. Researchers have observed a lower proportion of Tregs in patients, and certain Treg subpopulations have been found to be more effective in suppressing abnormal Teff. However, this has not been fully explored. The focus of this project is to phenotype and identify deficient Treg subpopulations in patients, and observe the effect of an adoptive transfer of this subset isolated from transgenic mice, expressing modified tissue-specific receptors, into a mouse model that spontaneously develops diabetes. Patients will be screened for key Treg markers and compared with a healthy donor cohort using mass cytometry, which identifies immune cell subsets. We will sort Tregs from healthy transgenic mice, expand them in vitro to increase cell numbers, and verify their function via suppression assay. They are then transferred into young non-obese diabetic (NOD) mice that are pre-diabetic. Treatment progress can be monitored by the rate of glucose metabolization following each injection. This project has the potential for further research into a therapeutic approach to suppressing the onset of T1DM in at-risk individuals.

Medicine & Pharmacology

A Novel Approach for HIV Treatment (AKT inhibitor MK2206 as a candidate for anti-HIV therapy)

Presenters: Samadyan, Negar; Antepyan-Ruckenstein, Jeremy; Zhang, Yanru (Jessie) & Danial Mojaab

Faculty Sponsor: Zheng Sonia Lin

More than 35 million people worldwide are living with Human Immunodeficiency Virus (HIV) and although the current antiretroviral therapy (ART) has been effective in controlling the disease, there are fundamental limitations for ART such as toxicity and drug resistance; thus, novel mechanisms are essential in further quelling of this virulent pathogen.

In order to reproduce, HIV relies on a process called alternative splicing, using the host's machinery to produce its viral proteins. SRp40 is one of the crucial regulators for this process and allows for the production of the HIV Tat protein. Previous studies have shown that the activity of SRp40 is regulated by a kinase called AKT-2. MK-2206 is an AKT inhibitor under Phase II clinical trial for cancer treatment. The hypothesis is that MK-2206 will show anti-HIV activity by indirectly disrupting SRp40's activity. By targeting SRp40, a redundant host cell protein, which has a lower rate of mutation than viral proteins, MK-2206 may lead to a more effective antiviral treatment by overcoming drug resistance and minimizing toxicities.

To test this hypothesis, different concentrations of MK-2206 (100nM, 200nM, 300nM, 400nM, 500nM), DMSO, and Zidovudine (AZT) are applied to immortalized HIV infected T cells containing the luciferase reporter gene upstream of the HIV-1 genome. Luciferase is an enzyme that can be quantitatively measured by its bioluminescent activity, which can be directly correlated with the transcriptional activity of HIV Tat protein once cells are lysed after 7 days. The expected results should indicate that cells treated with MK-2206 show the minimal level of HIV Tat expression.

Medicine & Pharmacology

The Effect of Imetelstat on Cancer Cells

Presenter: Toh, Samantha

Faculty Sponsor: Connor Thompson

Telomerase, the ribonucleoprotein reverse transcriptase that catalyzes the synthesis of (TTAGGG)n nucleotide repeats telomeres at the ends of linear chromosomes, is found to be active in 85-90% of cancer cells, allowing them to acquire the immortal phenotype that is a hallmark of malignant transformation. The short-term effects of telomerase inhibition by the drug imetelstat on growth, survival and metastasis of cancer cells is still largely unknown. Previous research has mainly focused on the inhibition of telomerase activity in tumour cells and the long-term effects on telomere length. Since it takes multiple replications to shorten telomere to a critical length, this implies a significant lag time between treatment and therapeutic effect on the cells. This research project has worked to characterize short-term effects of imetelstat treatment on cancer cells, namely, their proliferating ability, metastatic potential, and competence to form colonies both in vitro and in vivo. Various methods including a clonogenic assay, an MTT assay, an invasion assay, as well as a xenograft mice study will be used to quantitatively describe potentially important anti-cancer effects of telomerase inhibition on selected tumour cell lines. This research provides further insight into the properties of imetelstat and its unrealized applications in treating specific kinds of cancer, possibly providing alternative therapeutic strategies in the future.

Medicine & Pharmacology

8-iso-PGF2β Biomarker as Possible MS Diagnostic Tool for Disease Progression

Presenters: Tang, Shannon; Kim, Kelly & Sempere, Mila

Faculty Sponsor: Katerina Maria Othonos

Multiple Sclerosis (MS) is an inflammatory central nervous system disorder that affects approximately 2.5 million people around the world. There are several types of MS, most commonly relapsing-remitting MS (RRMS). The progression of MS is described using the Expanded Disability Status Scale (EDSS), which is based on the level of disability in several functional systems, which include sensory and visual abilities. Oxidative stress has been related to demyelination and neuronal loss in active MS lesions . Biomarkers such as 8-iso-PGF2μ are indicators that reflect the state of a biological condition, in this case, oxidative stress. We propose an analysis of the levels of 8-iso-PGF2μ in various patients of MS in order to create a more objective scale of disease progression and correlate it to the different types of MS. The 8-iso-PGF2μ levels from spinal tap, urine and plasma samples were determined in each subject and analyzed over several years. The experimental population includes 200 patients diagnosed with each type of MS. The control populations include both patients with other types of neurologic disorders as well as healthy subjects. We hypothesize that 8-iso-PGF2μ can be used as a biomarker for disease activity in relapsing patients with RRMS, and that once accumulation of oxidative stress reaches a threshold level, they switch into progressive MS. We aim to extrapolate this data into an objective diagnostic tool to track disease progression and provide appropriate treatment for MS patients.

Medicine & Pharmacology

Heat shock protein 27 regulates tumor vessel formation by affecting multiple factors

Presenter: Samra, Simranjit (Simran)

Faculty Sponsor: Daksh Thaper

Prostate cancer is the most frequently diagnosed cancer in men and the second leading cause of cancer death in North America. Localized prostate cancer is curable but if the disease spreads into other organs (metastasis) the chance of curing it decreases dramatically. The mechanisms of how cells move from the initial tumour site to other locations in the body are not fully understood. However, the development of blood vessels (angiogenesis) is one step which is critical for facilitating this spread of the cancer. The factors which cause angiogenesis appear to require another protein called Hsp27 to be produced. Hsp27 levels are high in metastatic prostate tumours and decreasing Hsp27 reduces angiogenesis. Our goal is to show how Hsp27 regulates tumour vessel formation and what other factors work together with Hsp27 to make tumour cells more aggressive and capable of migrating from their primary location to another location. We aim to show this in both prostate and breast cancer models and identify novel targets for patients at risk of metastasis.

Medicine & Pharmacology

Comparison of influenza A protein compositions of vaccines and annual predominant strains

Presenters: Chen, Xi (Sunny) & Kashino, Lana

Faculty Sponsor: Pamela Kalas

Each year, influenza attacks 5-10% of adults and 20-30% of children worldwide, resulting in 3-5 million severe cases, and 250 000 – 500 000 deaths (WHO, 2014). There are three types of influenza, and influenza A is the most severe, the only found in non-human species, and the one responsible for most epidemics and all pandemics (WebMD, n.d.). There are many influenza A subtypes. Of these, humans are predominantly affected by H1N1 and H3N2 (WHO, 2014). Vaccines are the most effective way of preventing influenza and reducing its severity when they match the circulating viruses, (WHO, 2014). However, they must be updated yearly, as influenza – especially type A – has high mutation and genetic reassortment rates (WHO, 2014). Vaccine compositions are made using predictions of the predominant strains in the coming season, based on predominant strains of the previous year (WHO, n.d.). However, viruses mutate constantly, including while spreading during flu season. Thus, vaccine effectiveness depends on similarity of vaccine and virus. This study uses Protein BLAST to compare the amino acid sequences of circulating influenza A viruses to that of vaccines. These analyses help evaluate and predict the effectiveness of vaccines. Our results found correlations between deaths and similarities to be mostly negative, suggesting that as vaccines become more similar to circulating strains, they become more effective at preventing or reducing the severity of influenza.

Medicine & Pharmacology

Boosting the Expression of CXCR3 Chemokine Receptors on T-regulatory Cells in Cultures with Interferon-βand CXCL9-11Boosting the expression of CXCR-3 chemokine receptors on T-regulatory Cells to combat graft-versus-host disease.

Presenters: Li, Zihui (Vivian) & Wang, Sheila

Faculty Sponsor: Romy Hoeppli

Graft-versus-Host-Disease (GvHD) is a serious complication of bone marrow transplantations, where transplanted T-effector cells (Teffs) recognize the recipient as foreign and mount an often-fatal immune response. T-regulatory cells (Tregs) have the ability to suppress Teff responses and are therefore expanded in vitro for use as a cellular therapy after transplantation. Chemokine receptors are surface proteins important for the homing of immune cells to locations of inflammation, and a small percentage of Tregs express the chemokine receptor CXCR3 allowing their re-location to inflammatory sites dominated by CXCR3+ Th1, a specific Teff strongly implicit in GvHD affecting the liver. However, large amounts of Tregs are needed to sufficiently downregulate Th1 cells. Our main goal was therefore to increase the percentage of Tregs expressing CXCR3 in cell expansion cultures. We will sort naive Tregs from human blood samples using flow cytometry, and culture them ex vivo with anti-CD3/CD28-coated beads, IL-2 and rapamycin. We then investigated different combinations of interferon-μ and chemokines CXCL9-11 to find optimal conditions for inducing CXCR3 expression. After our culture period, we analyzed the expression of CXCR3 by flow cytometry in the resulting cells. By using different combinations of cytokines and chemokines in our Tregs cell cultures, we found a combination that allowed us to obtain a higher concentration of CXCR3+ Tregs, which are known to be very potent suppressors of Th1 immune responses in patients with GvHD.

Medicine & Pharmacology

Detection of the pathogenicity factor PtpA in Mycobacterium bovis BCG

Presenter: Zhou, Jin Sheng (Jason)

Faculty Sponsor: Yossef Av-Gay

Tuberculosis (TB), caused by Mycobacterium tuberculosis (Mtb), remains a global epidemic that killed 1.5 million people in 2013. Current drug treatments for TB are long, complicated and toxic. Despite growing cases of Multidrug-resistance TB, there has only been one new TB drug approved by the FDA (in 2012) in the last 50 years. Understanding whether PtpA is secreted in Mycobacterium bovis BCG (BCG) will help us better understand how TB causes diseases in humans and potentially find a target for drug therapy. Mtb secretes a protein called PtpA that prevents phagosome acidification during macrophage phagocytosis, which allows Mtb to survive and replicate inside human macrophages. However, BCG, an attenuated (weakened) strain of Mycobacterium bovis (causes bovine-type tuberculosis in cows and humans), isn't able to cause disease in humans. It is not fully understood why BCG growth is attenuated in humans. Because BCG lacks the ESX-1 secretory system (present in Mtb), we hypothesize that it doesn't secrete PtpA, and therefore help explain BCG attenuation in humans. To test if BCG is able to secret PtpA, we will grow a recombinant strain of BCG that over-expresses PtpA and use antibodies against PtpA to test whether the protein is present in the cell filtrate or the cell lysate. We expect PtpA to be present in the cell lysate but not in the cell filtrate, therefore confirming that BCG is not able to secrete PtpA. This knowledge will contribute to characterize PtpA as a virulence factor of Mtb, and as a possible drug target.

Politics, Culture & Sociology

Native Northwest Coast Art?

Presenter: Obidi, Sara

Faculty Sponsor: Gloria Bell

Globally, twenty percent of all time spent in this space is related to social media or "webµbased media for social interactions and userµcreated content" (Taylor, 2011, p. 6). In Canada, Statistics Canada data from 2001 indicates that seventy two percent of Indigenous people's living off reserves logged onto such sites several times a week (Taylor, 2011, p. 7). While some have seen this use of social media amongst Indigenous people's as a threat to Indigenous culture, others have utilized it as a tool for cultural preservation, using sites like Flickr to display artwork and question the meaning of Native Northwest Coast Art (Taylor, 2011, p. 9).

Exploring the definition of Native Northwest Coast Art and its interconnection to discourses of power and identity has historically constituted a substantial field of academic inquiry (Berlo and Phillips, 1998; Braun, 2002). As part of this scholarship, the label of "native" has been problematized as implying that an individual is not only from a particular place but is also "incarcerated" spatially and intellectually in that place (Longboan, 2010, p. 6-7). The label "Northwest Coast" has also been critiqued for ignoring the presence of "transcultural exchanges," once again incorrectly attributing a "static" character to such art (Townsend-Gault, 1994, p. 448; Townsend-Gault, 2013, p. 966).

Recently, these definitions have been examined with reference to the development of new technologies like the internet (Claxton, 2013; Townsend-Gault, 2013). Yet, research still needs to be undertaken to better understand the internet's role in complicating the meaning and value of such art. This paper contributes to this scholarship by examining the ways in which Native Northwest Coast Art relates to ideas of "continuity" and "change," as well as addressing the construction and deconstruction of this label in the context of cyberspace (Townsend-Gault, 1994, p. 447). Through a visual analysis of Flickr posts, comparing photographs associated with the tag Native Northwest Coast Art to the work of Kwakwaka'wakw artist Sonny Assu, this paper questions whether, as stated by Lakota scholar and artist Dana Claxton, the web has truely become a place to "present self," a site of "self-liberation and self-desubjugation." (Claxton, 2013, p. 947).

Politics, Culture & Sociology

Does Instructor Gender Matter? Evaluating the effect of gender on course evaluation scores

Presenter: Lee, Michelle

Faculty Sponsor: Leah Macfadyen

In recent years, universities have placed greater focus on teaching quality and student satisfaction by course evaluations of their instructors. Increasingly, student course evaluation scores are playing a role in deciding whether to grant tenure for professors. With this phenomenon, there has been controversy on using course evaluation scores to quantify teaching quality. Recent research has suggested that instructor gender may play a role in influencing students' teaching evaluation scores, but their findings have been greatly disputed.

Our project aimed to evaluate the relationship between student course evaluation scores and other variables of interest, including instructor and student gender, course year level, class size, and department, within the University of British Columbia. Our dataset was based on 54,312 students' teaching evaluation scores on all courses within the UBC Faculty of Arts. Our focus was on one course evaluation question, "Overall, the instructor was an effective teacher," with responses on a Likert scale.

Multilevel generalized linear models and Tukey's HSD were used to parse out the effects of variables of interest on teaching evaluation scores. Overall, the effect of instructor gender was found to be minimal and insignificant. However, there are interesting interaction effects between instructor and student gender, course year level, and department. Course evaluation scores strongly vary between departments, with departments of music and social work receiving the highest scores. Student satisfaction was generally found to increase with more senior-level courses. Instructor and instructor student interaction effects were significant within particular departments, especially within CENE and social work; however, it was not significant at an overall level. In summary, instructor gender alone is not a significant factor in informing course evaluation scores; rather, it must be highly contextualized with other factors, such as department, student gender, and course year level.

Politics, Culture & Sociology

Learning and Analysing: Using Visualisation to Reveal Patterns in Arts Student Data

Presenter: Av- Shalom, Na'ama

Faculty Sponsor: Leah Macfadyen

What can data tell us about education? How can we search for patterns in education-related data, and what can they reveal to us? Over the years, thousands of students have taken a multitude of courses within the Faculty of Arts, and it is becoming increasingly important and possible to understand their patterns of success, as well as their struggles. This is where visual and learning analytics join the picture. These areas allow us to explore the data – are there trends in what students study? How do students improve over time? And how do various measures of success correlate with aspects such as proximity to the university, economic background, or teachers? In the last few years we have seen the building of new facilities, protests about fee increases, and teachers moving to flipped classrooms and more active learning. We have watched the rise of MOOCs, and the implementation of broad-based admissions. Yet, with all these changes, we must still examine basic questions in the data which are needed to best move forward as a university community. In this research we are asking these questions, and walking down the paths that the data reveal. I'll be introducing the relatively new field of learning analytics and how the Faculty of Arts is utilising its capabilities, and highlighting what we have discovered. In particular, I will be discussing what this means for the university and how we can use this as we go forward to best understand and meet student needs.

Politics, Culture & Sociology

Connecting Linguistics to Language Learners: a Lesson Plan for Gitksan

Presenter: Pine, Aidan

Faculty Sponsor: Dr Henry Davis

Indigenous languages in British Columbia are becoming increasingly endangered. As such, there are substantial efforts afoot to learn and revitalize Indigenous languages and to strengthen Indigenous language communities across BC. Using linguistic data obtained through my participation with the Gitksan Research Lab, I discuss an aspect of the Interior Tsimshianic language Gitksan, which is commonly referred to as the connective system. There are three connectives in Gitksan and being able to teach learners which ones to use is a difficult task, especially since there are no real English equivalents ("the", "a" & "an" are perhaps the closest in terms of where they occur in a sentence, but differ greatly in terms of meaning). With the goal of language learning and specifically second-language acquisition in mind, I present a generalizeable example of how insights gained from theoretical linguistic analysis might be translated into a pedagogically effective and accessible format for language learners who are not familiar with the formal study of linguistic structure.

Politics, Culture & Sociology

Dialectal variation in vowel quality in Gitksan

Presenter: Borland-Walker, Kyra

Faculty Sponsor: Henry Davis

Gitksan is an endangered Tsimshianic language, spoken by less than 400 speakers in communities around the Skeena River, in Northern British Columbia. Previous research has observed dialectal variation in groups of Gitksan speakers, typically divided East-West (Rigsby 1986:6; Tarpent 1987:28). This variation extends, but is not limited, to allophonic vowel alternations. These alternations mean that there is a contrast in the pronunciation of certain vowels, but that these contrasts do not create a distinction in word meaning. My research looks at variation in */a/*, which has previously been recorded between the low central vowel [a], as in 'cat, the front mid vowel [µ], as in 'bet', and the slightly more back vowel [µ], as in 'hog', previously identified as an allophonic contrast (Rigsby 1986:196-8; Tarpent 1987:144). Previous research has identified that the vowel [µ] occurs near uvulars, and that other phonological environments, in addition to standard dialectal variation, produce different vowel qualities of */a/* (Rigsby 1986:205-6). */a/* also shows an interaction with vowel length (Rigsby 1986:199) and stress (Rigsby 1986:205) that produce variation. Using translation and storyboard exercises, I will elicit and analyze data from two speakers, of the eastern and western dialects, that will allow for variations of */a/* and the environments in which they occur to be identified. These differences will be illustrated and presented using spectrograms, and other acoustic measurements.

Psychology

The Effects of Hemianopic Visual Disorder on Experimental Studies of Alexia – a Reading Disorder

Presenter: Bao, Jing Ye (Carol)

Faculty Sponsor: Dr. Jason Barton

Pure alexia is a reading impairment following left occipito-temporal damage and is characterized by an increased word-length effect – where the naming latency of a word (the time between word presentation and the subject saying the word aloud) increases dramatically with each additional letter. However, this disorder is usually accompanied by right hemianopia – loss of the right visual field – which itself can cause a mildly increased word-length effect. Some alexic studies have used hemianopic patients with modest word-length effects, however it is not clear a) whether they had pure alexia and b) if not, whether their results could be explained by the loss of the right visual field . Our goal was to determine if impairments in visual processing claimed to be related to alexia could be replicated in hemianopia alone. Twelve healthy subjects performed five experiments used in two prior studies of alexia, under both normal and simulated right hemianopic conditions, using an eye-tracker generated gaze-contingent display. We replicated the increased word-length effect for reading time with simulated hemianopia, and showed a similar effect for a lexical decision task. Hemianopic viewing impaired scanning accuracy for letter or number strings, and slowed the processing of images containing shape configurations. Hemianopia also impaired the identification of words whose letters appeared and disappeared sequentially on the screen, with better performance on a cumulative presentation in which the letters remained on the screen. We conclude that some impairments which have been attributed to alexic processing defects may actually be due to right hemianopia. This underlines the importance of considering the contribution of accompanying low-level visual impairments when studying high-level processes.

Psychology

Sleep-Language Development in Children with Down Syndrome – Preparations for a Prospective Study

Presenter: Chan, Melvin

Faculty Sponsor: Dr. Osman Ipsiroglu

Sleep, as an integral component of cerebral function, is essential for somatic, cognitive and emotional wellbeing. Sleep problems (SPs) tend to start very early in children with Down syndrome (DS) and may negatively impact developmental trajectories. Since language development is indicative of brain development, we developed a hypothetical 'sleep-language model' to investigate the effects of disturbed sleep on development in children with DS. We investigated 16 patients with DS using a comprehensive sleep/wake-behaviour assessment concept including qualitative methodology and structured observations in addition to standard clinical sleep assessments. Clinical presentations were captured in detailed reports, and quality controlled by parents/caregivers (therapeutic emplotment). All patients exhibited clinical signs of non-restorative sleep due to Willis-Ekbom Disease (100%) and sleep disordered breathing (94%); all exhibited impacted daytime behaviours presenting as daytime fatigue, sleepiness and hyperactive-like behaviours. Available expressive/receptive language development information was graphed, showing impacted development.

The next step of our research endeavour is to conduct a province-wide survey to collect available information on SP onset and expressive/receptive language development. Based on the results, we may be able to create the first language development trajectory percentiles.

Psychology

Moved by compassion: The influence of relative clarity on empathy

Presenters: Lin, Rachel; Lenkic, Peter & Enns, James T.

Faculty Sponsor: James Enns

Empathy and compassion are often considered the purview of world news and charitable organizations. In the field of social psychology there is the well-documented finding of "compassion fade" (Slovic, 2007; Markowitz et al., 2013), which refers to a reduction in empathy associated with paying less attention to potential victims. Recent attention research indicates that viewers automatically fixate on relatively clearer regions of a photo and ignore blurry regions (Enns & MacDonald, 2012). The present study asks whether directing attention via photographic clarity will have an influence on empathy. To answer this question participants were asked to study a large photo of three individuals and to find "the best place to stand" while considering their feelings of empathy toward one of the persons. The results showed that lower empathy ratings were correlated with increased distance between the viewer and the photo. In addition, both photographic clarity and distance had an influence on empathy. These results point to dynamic links between attention, empathy, and body action, which have important implications for understanding the human response of charity toward others.

Psychology

Pain and meaning violations: an increase in meaning affirmation

Presenter: Lai, Rina

Faculty Sponsor: Steven J. Heine

Meaning is important as it connects "people, places, objects, and ideas to one another in expected a predictable ways" (Heine, Proulx, & Vohs, 2006, p. 89). Meaning Maintenance Model (MMM) suggests that people are motivated to maintain a sense of order and certainty to regulate their perceptions of the world in a sensible way (Heine, Proulx, & Vohs, 2006; Bruner and Postman, 1949). When one's meaning framework is disturbed by violation of expectations, ambiguity, and confusing events, the MMM hypothesizes that negative affect will prompt individuals to reaffirm other groups of expectations or unrelated schema to eliminate the distress experienced due to uncertainty, as well as to re-establish a sense of meaning. (Heine, Proulx, & Vohs, 2006). This process is known as compensatory affirmation, which provokes greater support and adherence to personal belief, value, and opinion.

Recently, studies have found that physical pain shares similar neural structures as meaning violation, and that they both facilitate affirmations of previously held beliefs, leading an individual to embrace those beliefs more strongly (Randles et al., 2013). However, whether the effects of pain and meaning violation on belief affirmations are additive or not and to what degree still have not been examined. Moreover, it is still unknown as to what extent pain and meaning violation operate in similar pathway through this study.

This study aims to investigate the interaction between pain and meaning violation individually and collectively, and hypothesizes that not only do they promote belief affirmations individually, such effect is escalated when they are at work collectively. Participants of the study were randomly assigned to one form of each of two experimental (independent) variables: pain and meaning violation. Participants in the pain condition wore inflated pressure cuff (170-180 mmHg) for 120 seconds for the purpose of pain, whereas the control group wore the pressure cuff under normal pressure (30 mmHg) for 30 seconds. Participants in the meaning violation condition watched a surrealistic clip from David Lynch movie, which is described to "disturb, offend or mystify" (Randles et al., 2013; Rodley, 2005, p.245). Whereas the control group watched a clip from the Wizard of Oz. All participants completed several questionnaires that measure the effect of the assigned conditions, which are our dependent variables. One of which is on attitudes towards Islam, and we hypothesize that participants experienced either pain or a meaning violation will demonstrate enhanced belief affirmation. Enhanced affirmation is measured by the form of polarized responses. Furthermore, we hypothesize that participants receiving both experimental conditions will show an even stronger (negative) response on this questionnaire

Psychology

Comparing the efficacy of maternal fluoxetine and exercise in a rodent model of postpartum depression

Presenter: Richardson, Robin

Faculty Sponsor: Liisa Galea

Postpartum depression (PPD) affects approximately 15% of women. It represents a large public health concern as it leads to undesirable consequences for both the mother and her offspring. It represents a large public health concern as it leads to undesirable consequences for both the mother and her offspring. While prescribed antidepressants are the first-choice treatment for PPD, certain antidepressants such as fluoxetine (Prozac) pose health risks for the offspring as they remain active in the breast milk. Therefore, it is imperative that we examine other therapies for PPD, such as exercise. The present study seeks to compare fluoxetine to exercise and combination using a rodent model of PPD developed by our lab. In this study, rats were randomly assigned either to the exercise condition, where they had free access to running wheels, or to a control condition throughout pregnancy and postpartum. Within each condition, rat mothers (dams) were assigned to receive daily postpartum injections of either corticosterone (CORT; to induce a depressive phenotype) or sesame oil (as a control for CORT), and concurrent fluoxetine or saline (as a control for fluoxetine). This resulted in a total of 8 conditions. Maternal depressive-like behaviour was measured using the forced swim test as well as the novelty suppressed feeding test. As well, maternal behaviour toward the pups was measured. Data collection is on-going. We expect that maternal postpartum CORT will diminish quality of maternal care and increase depressive-like behaviour. We also expect that maternal exercise will rescue maternal behaviour and decrease depressive symptomology. This research will contribute a better understanding of how different therapies treat PPD.

Psychology

The Effect of Pain Medication on Anxious Uncertainty

Presenter: Jamali, Shahrzad (Sherry)

Faculty Sponsor: Steven Heine

The dorsal anterior cingulate cortex is the source of the unpleasant arousal associated with uncertainty and violations of expectations. Recent work has found that behavioral reactions to uncertainty can be inhibited by Acetaminophen, presumably because it inhibits activity in this region. In this study, we attempt to replicate this finding, and test whether a variant painkiller (ibuprofen) is able to reduce anxious uncertainty. There were a total of 42 participants in this study to date. Participants were randomly assigned to receive either pain medication or Placebo. After receiving the capsules, they were asked to watch a series of short videos designed to either be unsettling (experimental) or neutral (control) and complete different questionnaires measuring the strength of their attitudes on different important topics. We predicted that participants who experienced a meaning threat after having consumed a placebo would show more polarized opinions on the attitude questionnaire. However, participants who consumed either pain medication (Tylenol or Advil) should fail to detect any increase in arousal in the unsettling video condition, and thus would not show polarized opinions, relative to those who watched the neutral videos. Current results numerically support our hypotheses, but are not significant.

Psychology

Quality and content of online advice for the prevention of Alzheimer disease

Presenter: Feng, Tanya

Faculty Sponsor: Julie Robillard

The number of older adults turning to the Internet to find health information is rapidly increasing. In response to this demand, hundreds of website now offer information about age-associated conditions such as Alzheimer's disease. Our goal was to assess the quality and content of online articles containing information about the prevention of Alzheimer's disease. We retrieved 397 articles related to the prevention of Alzheimer's disease from a location-independent keyword search on Google.com. Content analysis was conducted on a random sample of 102 of these articles to evaluate article features, such as authorship and currency, as well as the informational content of the articles. We found that 76% of the articles included the date the article was written or last reviewed and 60% included an author, both of which are generally indicators of good quality in online resources. Twenty percent of articles included some form of product endorsement, indicators generally associated with poor article quality. Nearly all (95%) of the articles discussed some aspect of nutrition, 77% provided advice related to lifestyle and exercise, and 73% mentioned cognitive engagement. Overall, we found that the quality of websites containing information about the prevention of Alzheimer's disease varies greatly, even though most websites include at least one indicator of quality. However, the quality of a given website does not necessarily translate to good advice. Internet users should ask their health professionals for recommended sources of online health information

Psychology

The effect of dominant and prestigious leadership styles on subordinate well-being

Presenter: De Silva, Tashya

Faculty Sponsor: Joey Cheng

The success of a leader depends on the overall satisfaction of his or her subordinates. Using evolutionary logic, Henrich and Gill-White (2001) proposed that status is acquired through the pathway of Dominance or Prestige. Dominance refers to using methods of aggression and intimidation in order to induce fear and anxiety to gain leadership. Prestige, in contrast, refers to rank attained by individuals who are respected due to their valuable skills and knowledge. In this study, we investigated the effect of Dominance and Prestige on subordinate well-being. 188 undergraduate students were separated into groups of four females or four males, and were asked to complete collaborative tasks (e.g. listing uses for a brick, incomplete words' puzzle) under the leadership of a Dominant or Prestigious individual. Leaders were selected based on group members' ratings of the Dominance and Prestige of each individual. After completion of the tasks, participants were asked to fill out questionnaires rating their overall satisfaction with the group and negative emotions the group work may have caused. Results indicated a significant negative correlation between Dominance and satisfaction, a significant positive correlation between Dominance and negative affect, and a significant positive correlation between Prestige and satisfaction.

Psychology

New cultures & connections: Friendship formation and social connection among UBC's international students

Presenter: Gong, Yimiao

Faculty Sponsor: Frances S. Chen

Previous research suggests that many first year university students report

feeling stressed, lonely, and like they do not fit in at their new universities. Among whom,

international students (i.e., students who have graduated from high school in their home

countries and go abroad to a culturally different country for post-secondary education)

experience even greater loneliness and less belonging than other first year students as

they experience not only high school-university transition, but also cultural transitions.

One effective way of feeling socially connected is making friends. Given the increasing

prevalence of international students and the importance of sense of belonging, the present

study explores how the sense of belonging of international student changes as they gain

more friends, compared with domestic students (i.e., students went to high school in

Canada). To explore this question, 183 first year UBC students who were interested in

completing a study on first year experiences completed self-reported survey measures of

social connection, belonging, and well-being at the beginning of the school year and

again, three months later (domestic students = 152; international students = 31). As we

predicted, while both international and domestic students feel less lonely when they make

more friends at UBC, international students benefit a little more than domestic students.

These findings suggest that programs designed to help students make the transition from

high school to university might be particularly beneficial for international students

Psychology

Hidden Frontier: Investigating Effective Methods for Accessing Hard-to-Reach Populations in Substance Use Research

Presenter: Mak, Lily & Ho, Kiki

Faculty Sponsor: Alissa Greer

Background: An existing knowledge gap in harm reduction research involves accessing a representative saample of harder to reach populations(e.g, drug users disconnected from common recruitment strategies). This challenge limits the generalizability of research findings to programming and policies, which are important for providing services responsive to the needs of these populations.

Objective: This project attempts to fill this knowledge gap by identifying established and innovative approaches to accessing underrepresented populations.

Methodology: A scoping literature review was conducted. Eighty abstracts were assessed for content and 41 articles were fuly reviewed. Drawings from qualitativemethodology, an iiterative thematic analysis of these articles was conducted from an emergent taxonomy of codes. After saturation of codes was acheived, themes were triangulated and synthesized into findings.

Results: Two themes were critical to reaching representative smaples: accessiblility and trust. Sub-themes included location, flexibility, research team characteristics and participant engagement. Research was most effective by adapting to the physical. financial and temporal constraints experienced by target populations. Innovative recruitment practices have been developed to build trust and promote legitimacy with participants. Involving participants throughout the entire research process oftem promoted their commitment to research.

Conclusions: To acheive a representative sample of the target population and produce generalizable results, consideration and integration of these elements into the methodological design are critical to accessing drug-using populations who are often considered harder to reach. Increased generalizability enables public health bodies to make informed policy and program decisions that reflect the true needs of the broader drug-using population.

Psychology

When covert becomes overt: The birth of remote goal-derived movements

Presenter: Rothwell, Austin

Faculty Sponsor: Alan Kingstone

Embodied cognition refers to the concept that human cognition does not occur simply in the head, but is influenced by a complex bi-directional interplay between the brain, body, and environment. Embodied cognition is often examined through investigation of spontaneous body behaviour that arises while performing a cognitive task (e.g., gesturing during communication). Following this approach, spontaneous body behaviour can be systematically observed and used as a window to investigate ongoing cognitive processes. In the present investigation, we applied this embodied approach to better understand the occurrence of spontaneous behaviour that emerges during a teleoperational task.

Teleoperation is the act of remotely controlling an object at a distance in which one is physically disconnected from that object. This form of object-user interaction operates through the use of a local tool as a mechanism to control the remote object. Common examples of teleoperation include remote bomb-diffusing tools, robotic assisted surgical procedures, and video games. During teleoperation, people often display overt spontaneous movements that are directionally consistent with the teleoperational task. Previous work has suggested that this spontaneous behaviour reflects an embodied representation of one's remote intentions. In the present experiment, participants were observed while playing a racing video game in order to gain insight into the factors that may influence these spontaneous behaviors. Camera perspective and vehicle controllability were manipulated to assess the influence of immersion and cognitive demand, respectively. Consistent with previous work, our results revealed that the occurrence of task-related spontaneous behaviour was affected by cognitive demand but not immersion.

Psychology

Go Ahead, Change My Mind: Trait Receptiveness, Stress, and Health Outcomes

Presenter: Coopersmith, Catherine (Katie)

Faculty Sponsor: Dr. Frances Chen

This project seeks to shed light on the relationship between trait receptiveness and health outcomes. Trait receptiveness has been defined as a non-judgmental psychological stance characterized by openness to opposing views and a willingness to engage in contact with holders of those views. It is hypothesized that people who are less dispositionally receptive may regularly become upset and acutely stressed when exposed to opposing opinions, and that this chronic stress may consequently lead to negative health outcomes. In Study 1, participants will complete a questionnaire assessing their general level of receptiveness, and health measures such as resting blood pressure. In Study 2, participants will complete the same receptiveness measure. Next, their heart rates will be monitored while they watch videos of speakers expressing opinions that they agree with and opinions that they do not agree with. Their physiological response to these videos will therefore be recorded, making it possible to test whether trait receptiveness correlates with acute stress reactivity (as determined by heart rate). Together, these two studies will provide greater insight into the potential relationship existing between trait receptiveness and both short-term and long-term health-relevant outcomes.

Psychology

Is anxiety related to an attentional bias towards threatening/hostile stimuli in childhood.

Presenter: De Groot, Christopher (Chris)

Faculty Sponsor: Charlotte Johnston

Various attentional biases toward threat are well documented among adults, which has shown significant implications for anxiety. Similar studies pertaining to children are lacking. Anxiety is the most common psychological disorder among children. Understanding anxiety is an important step in helping children reduce anxiety; research in children must catch up with the adult domain for development of assessment and treatment methods. The attentional biases we studied are facilitation and difficulty with disengagement. Facilitation is an attentional bias, that is increased attention, towards threatening stimuli; facilitation should increase performance on tasks where attention toward hostile stimuli assist in task completion. Difficulty with disengagement is an attentional bias toward threatening stimuli which interferes with task completion. We predict that both difficulty with disengagement and facilitation will be positively correlated with anxiety, and these two biases will each predict unique constructs within anxiety. The participants were 40 boys from the community aged 9-12. Facilitation was measured using the temporal order judgment task: the sequential presentation of two stimuli offset by milliseconds; participants judge which image came first. This task assumes that stimuli which capture attention will be perceived quicker. Difficulty with disengagement uses a visual search for an embedded neutral target among hostile distractor stimuli. Anxiety is measured using the Multidimensional Anxiety Scale for Children. We found a negative correlation of -.357, significant at the .02 level, and no effect for facilitation. Difficulty with disengagement was found to be negatively predicting anxiety, with a beta value of -.476, with .005 significance.

Psychology

Explorations of Strategies to Promote Exercise Adherence

Presenter: Liu, Desmond

Faculty Sponsor: Shimae Soheillipour

It is generally known that exercise reduces the risk of a variety of illnesses and diseases such as obesity, diabetes, stress, depression, cardiovascular health, and some cancers. Despite this, the vast majority of Canadians are failing to complete 150 minutes of physical activity per week as recommended by the Canadian Society for Exercise Physiology (CSEP). Their increasing rate of sedentary behavior is a growing risk factor for many of the problems noted above, which has negative long-term implications about their health. Hence, effective strategies to promote exercise adherence is worth exploring. Physicians are advised help their patients increase their self-efficacy for exercise by offering them cognitive and social strategies (Kennedy and Blair, 2014). Other researchers have shown a positive relationship between age similarly and group physical activity (Dunlop and Beauchamp, 2012). Taking a similar approach done by Agnes Hjalmarson et al. in analyzing physical activity programs in Sweden (1999), this study aims to uncover some of the common strategies that programs in the Vancouver area use to advertise exercise. A number of health sector programs are identified from the Vancouver Coastal Health and Fraser Health websites, and a representative from each program is asked to complete a survey containing about 20 questions via phone call. We hope to find prevalent methods of promoting exercise adherence, which can then be recommended to program administrators. A pilot study was conducted consisting of five programs. We were unable to find adequate data.

Psychology

Judged by the status of your social network: How high status connections impact first impressions

Presenter: Peters, Bena

Faculty Sponsor: Dr. Mark Schaller

First impressions can be made in an instant and often have lasting consequences. Prior research has focused on how impressions are made based on one's appearance and the artifacts we surround ourselves with, but little research has examined how perceptions are made based on who we surround ourselves with -- the company we keep. In this study, participants viewed photos ostensibly from a Facebook profile which pictured a target individual in with either a famous or unrecognizable friend. They then rated their perceptions of this target individual's personality traits as well as how much they would like to socialize or form intimate friendships with the target. The results showed that participants were less likely to perceive themselves socializing and forming intimate relationships with an individual who was pictured with a famous person. Connections to fame also caused participants to rate the target as less conscientious. These findings suggest we should be careful of the images we use to portray ourselves

Psychology

Is Pinocchio a Real Boy? People's Emotional Responses for Cartoon and Real-Life Pictures

Presenter: Chao, Grace

Faculty Sponsor: Peter Graf

The quality of cartoons has increased greatly in recent years and the boundary between real-life (i.e., real) and fantasy (i.e., cartoon) is blurred. Cartoons have been frequently utilized in the media today, and this is partly because of the increase in the quality of graphics. We believe that today's computer software allows us to create cartoons that are more colourful and vivid. We aim to determine if people's emotional responses are similar for cartoons and real-life images. In this study, participants viewed both cartoons and real-life images and rated on pictures' attractiveness. Images were matched according to Lang and Bradley's (1997) International Affective Picture System. Images ranged among three valence (i.e., attractiveness/repulsiveness) levels: low, medium, and high. Participants' ratings of cartoons and real-life images were used as measures of their emotional response to the picture. The results revealed that positive real-life pictures were rated as more attractive than positive cartoon pictures. Negative real-life pictures were rated as more repulsive than negative cartoons. Participants' ratings of the images suggested that real-life images evoked higher emotional responses than cartoon images.

Psychology

The Effect of Short-Term Musical Training on the Executive Functions of Children from 6 to 8 Years Old

Presenters: Li, Jenny & Ling, Daphne

Faculty Sponsor: Daphne Ling

Executive function (EF) involves 3 cognitive processes: inhibitory control, working memory, and cognitive flexibility. EF can be improved through training, and it could be an important contributing mechanism for the higher cognitive abilities that are often observed in musically trained individuals. Studies have linked musical training with improved cognitive abilities, but there is currently insufficient evidence to establish a relationship of causation between musical training and EF specifically. The principle objective of this study is to investigate the effect of short-term musical training on the EF of children from 6 to 8 years old. Children (150 in total) with no prior formal musical training are to be randomly assigned to 3 groups. For 20 weeks, the children in the experimental group are to be given 1-hour long private music lessons (piano and music reading) twice a week, the second group is to participate in music listening without any training provided, and the last group is the no-treatment control group. The children are to be assessed at the beginning of, at the end of, and 6 months after the 20 weeks, using EF assessments such as the Card Sorting Test as well as musical skill assessments. The anticipated results are that the experimental group shows a greater improvement in EF than the other groups, but these effects are not expected to be maintained after 6 months. Findings from this study should further the understanding of the relationship between musical training and the EF of children.

Psychology

Sleep Quality and Marital Tension in Paramedics and Their Spouses: A Daily Process Model

Presenter: Dmyterko, Juliane

Faculty Sponsor: Dr. Anita DeLongis

Research to date has found associations between sleep and relationship functioning within couples (Garde, Albertsen, Persson, Hansen, & Rugulies, 2011; Hasler & Troxel, 2010). Prior research has not yet examined how an individual's particularly good or bad quality sleep on a specific day affects their relationship functioning on that same day.

Further, research has not yet examined how an individual's sleep quality affects their partner. The current study used a daily diary methodology to determine if sleep quality across a one-week period is associated with marital tension during that week. Further, the study examined fluctuations in daily sleep quality as they predict fluctuations in marital tension experienced. Additionally, we examined crossover effects, examining whether individuals' sleep quality predicts their partners' marital tension. Eighty-seven paramedics and their cohabiting romantic partners were followed across a seven-day period. Multilevel analyses revealed significant associations between individuals' sleep quality from the previous sleeping session and subsequent reports of marital tension in both paramedics and their spouses. Spouses' average sleep quality across the week predicted the paramedics' experience of marital tension. Fluctuations in sleep quality were also predictive of marital tension experienced by both paramedics and spouses. On days when spouses slept worse than usual, their experiences of marital tension and the marital tension their paramedic spouse experienced, was greater. Paramedics' sleep quality significantly impacted their spouses' perception of marital tension. These findings indicate that those suffering from sleep disorders or poor quality sleep may inadvertently negatively impact their relationship with their romantic partner.

Afternoon Oral Presentation List

2.00pm-3.00pm

Biological Sciences - IKBLC 155

The effects of white matter injury and inflammatory response in surrounding gray matter
Zhang, Qing (Alice)

Effectiveness of Demethylating Agent DAC (Decitabine) in Treating Acute Myeloid Leukemia Patients of Different Ages
Bu, Yong Jia (Jamie)

Prenatal Alcohol Exposure Alters Expression of Glucocorticoid and Mineralocorticoid Receptor Levels in the Placenta and Fetal Brain at Gestational Day 21
Chiu, Melissa

Impact of environmental microbes on the mammalian gut microbiota
Tasnim, Nishat

Biological Sciences - IKBLC 158

Measuring whole white matter damage in the dorsal spinal cord: a comparison of histology and MRI
Chappell, Rhys

Assessment of Behavioural Phenotypes Resulting from Presenilin 1 Mutations, an Alzheimer's Disease Linked Gene, in Caenorhabditis elegans
Kaviani, Rojin

Does Acid Rain Affect Moss Photosynthesis Following Rehydration
Stratychuk, Ryan

Biological Sciences, Cultural, Social & Historical - IKBLC 261

Effect of SDF-1 Chemokine on Cell Adhesion Mediated Drug Resistance (CAM-DR) in T-Acute Lymphoblastic Leukaemia
Alhowar, Sara

Characterizing Genetic Diversity in Trithuria Using Microsatellite Markers
Montgomery, Sean

Indigenous education—a long lasting issue
Ma, Jingfei (Grace)

Ethics of Pharmaceutical Pricing of Sovaldi
Ho, Harriet

Cultural, Social & Historical - BUCH A102

Measuring Magnitude of Tongue Movement

Allen, Claire; Letawsky, Veronica & Turner, Alannah

From Video Gaming to E-Sports: Symbolic Struggles, Gendered Identities and Technology

Kong, Wing Chung (Justin)

Aricie Caught in the Act: Unmasking the Lover's Role in the Misogynist Hippolytus

Soutif, Lauriane

Cultural, Social & Historical - BUCH B209

Love in Auschwitz-Birkenau

Duranseaud, Lea

Chinese Seniors' Vulnerability in Food-Lines: An Ethnographic Report

Huang, Leanne

Testing the Effects of Intraparty Gender Quotas on the Canadian Party System

Halevy, Lotem

Accents in Vancouver English: Processing Pronunciation Variation

Chan, Michelle & Hui, Jobie

Engineering & Technology - BUCH B210

A Low-Cost Satellite Terminal for Measuring Ka-Band Propagation to Low Earth Orbit using the CASSIOPE Satellite

Jang, HyunChang (Hyun); Hill, Matt; Pownall, David & Sahay, Ishan

Autonomous detection and avoidance of marine obstacles using thermal imaging

Cernek, Paul; Andrews, Josh; Baker, Josh & Sredzki, Arek

Wireless Pacemaker Charger

Ramley, Serena; Daravi, Pooya; Pal, Serene & Husslage, Devin

Molecular simulation of blood flow

Bo, Sihan; Lee, Jordan & Shen, Zhonjie

Engineering & Technology, Environmental Science & Applied Biology - BUCH B211

Fluorescent quantum dots for detecting DNA hybridization
Wang, Jessie

Designing a Weight-Sensitive Car Seat Sensor to Reduce Risk of Whiplash Injury in Driver and Passenger Populations
Yan, Philip

Objective measures of behaviour: Can technology help us gather reliable data to improve efficiency of data collection?
Thompson, Alexander (Alexi)

Animal welfare concerns and values of stakeholders within the dairy industry
Giovanetti, Ana

Environmental Science & Applied Biology, Medicine & Pharmacology - BUCH B213

Feeding and Social Behaviours of Primiparous and Multiparous Dairy Cows During the Transition Period
Behnam-Shabahang, Asadeh (Azy)

Achieving passive transfer of immunity in commercially reared dairy goat kids: A preliminary study
Tan, Bee Li

Effects of prenatal alcohol exposure and early-life stress on the immune response to challenge in adulthood
Mak, David

Medication Adherence in Lupus: A Systematic Review
Panesar, Gurismran

Medicine & Pharmacology - BUCH B215

An analysis of the chemistry of Acorus americanus and its application in traditional Aboriginal medicine
Labine, Nicole

AIDS: More Than Just a Disease
Ng, Kevin

Association of Blood Metabolite Levels With The Late Phase Asthmatic Response
Li, Minghao (Michael)

Parcels of Promise - liposomes as a targeted therapeutic option in malignant glioma treatment
Malhotra, Armaan

Psychology - BUCH B208

Drunk behaviour is more complex than we thought: Different genes modulate distinct aspects of behavioral responses to alcohol

Sunthoram, Ashvini

Does mutual eye contact in persuasive communication increase heart-rate?

Herriot, Heather

The Politics of Mental Health

Peacey, Brianna

Afternoon Oral Presentation Abstracts

2.00pm-3.00pm

Biological Science

The effects of white matter injury and inflammatory response in surrounding gray matter

Presenter: Zhang, Qing (Alice)

Faculty Sponsor: Evan Chen

Magnetic Resonance Imaging (MRI) provides detailed images of tissue, allowing detection of abnormalities in the nervous system. Unlike X-ray and CT-scans, MRI is free of ionizing radiation. The central nervous system (CNS) consists of the brain and spinal cord, responsible for receiving, carrying, and sending of sensory and motor information. Damage to the spinal cord can cause loss of function, which in many cases is highly difficult to recover. Over 86,000 people in Canada are affected by Spinal Cord Injury (SCI), with over 4,300 new cases each year. In this study, we investigate MRI of spinal cord with the goal of creating a method of detecting and tracking SCI. Using a model that severs axons in a white matter (WM) area of the spinal cord, we assessed the effects of WM degeneration on the surrounding local gray matter (GM). To understand our MRI results, we compared them to histology of the same tissue. GM damage is assessed up to 8 weeks after the dorsal column SCI, in both directions away from injury (cranial and caudal), and then compared to healthy GM. We saw trends in histology (increased axon content and increasing macrophage activity) which were matched with increased MRI values in GM, mostly on the cranial side, and less on the caudal side. We conclude that GM is affected by the surrounding degenerating WM. However, more work is being continued to further study different cells in that area to better understand how the GM is affected.

Biological Science

Effects of Decitabine (DAC) on Acute Myelogenous Leukemia Patients of Different Ages

Presenter: Bu, Yong Jia (Jamie)

Faculty Sponsor: Tony Hui

DNA methylation, the addition of CH3 groups to C bases in DNA, is a type of epigenetic modification that alters gene expression without changing the underlying DNA sequence. Acute myelogenous leukemia (AML), a cancer in bone marrow cells, can be related to over-methylation-induced deactivation of genes that would normally prevent cancer. Demethylating agents have been proposed as AML treatments in hopes of reactivating cancer suppressing genes.

Changes in DNA methylation patterns occur as a natural part of aging. Patients of various ages may therefore respond differently to different treatments. Existing methylation data of adult AML treated with demethylating agent DAC and conventional treatment AraC were compared. DAC demethylated the epigenomes of patients in all three age groups (20-50, 50-65, >65) significantly more than AraC. As age increases, the level of demethylation caused by DAC appears to diminish, but the trend remains inconclusive due to small sample size. The protein tyrosine phosphatase gene, PTPRN2, was the most consistently demethylated gene in all adult AML cases. Further comparison of the adult data with paediatric AML data shows that while significant demethylation of PTPRN2 also occurs in DAC-treated paediatric cases, the most frequently demethylated genes in paediatric AML differ from those in adults.

A recent study has suggested that the PTPRN2 gene may in fact be a biomarker—a biological indicator—whose methylation state reflects the presence of AML. Due to inconsistencies in the adult and paediatric data, further research is in order for confirming whether PTPRN2 is truly an AML biomarker.

Biological Science

Prenatal Alcohol Exposure Alters Expression of Glucocorticoid and Mineralocorticoid Receptor Levels in the Placenta and Fetal Brain at Gestation Day 21

Presenter: Chiu, Melissa

Faculty Sponsor: Joanne Weinberg

The hypothalamic-pituitary-adrenal (HPA) axis represents a system that involves the interaction and secretion of a cascade of hormones by the hypothalamic, pituitary, and adrenal glands and plays a key role in the mediation of the stress response. Prenatal alcohol exposure (PAE) can result in a hyperresponsive HPA axis, which could leave an individual vulnerable to stress-related disorders such as depression and anxiety later in life. The activation of the HPA axis causes the secretion of glucocorticoids, which feedback on the stress-responsive neurocircuitry (medial prefrontal cortex, amygdala and hippocampus) via mineralocorticoid receptors (MR) and glucocorticoid receptors (GR). Currently, the mechanism by which PAE results in HPA hyperresponsiveness is not fully understood. Utilizing an animal model, we investigated how PAE may affect the expression level of MR and GR proteins in fetal brains and placentae in both males and females at gestational day 21. The PAE model included the standard PAE, pair-fed (PF, this group controls for the reduced food intake by PAE); and ad-libitum fed control (C) groups. We found that PAE differentially altered the expression of MR and GR proteins compared to C and PF animals. PAE resulted in increased GR protein levels and an increased GR/MR ratio in the medial prefrontal cortex and amygdala, respectively. Furthermore, PAE induced a loss of sexually dimorphic expression of MR in the amygdala and hippocampus, suggesting that PAE may result in a decreased sensitivity to the organizational effects of androgens. Our results indicated that PAE altered important regulatory components of the HPA axis, setting the stage for increased risks for mental and behavioral issues later on in life

Biological Science

Impact of environmental microbes on the mammalian gut microbiota

Presenter: Tasnim, Nishat

Faculty Sponsor: Deanna Gibson

The adult human gut is a natural habitat for 100 trillion microorganisms, collectively called the gut microbiota. Development of the microbiota occurs during the first years of life. Pioneer gut microbes that colonize the gut during infancy play a large part in determining the diversity of the adult gut microbiota, and influence gut health and immunity. Two predominant sources of gut microbes are thought to be the mother and the external environment. Of these two sources, the role of environmental microbes is poorly understood. Some indirect research suggests that external environments high in microbial diversity may promote a stable and diverse gut microbiota but there is little evidence linking specific environmental microbes with changes in gut microbes. My study looks at these changes in male and female infant mice born in three different environments. Mice were born in cages containing forest soil with high microbial diversity, urban soil with low microbial diversity, and no soil with very low microbial diversity. I predicted that infant mice exposed to diverse soil microbes would acquire a more diverse gut microbiota, and hence improved immune functioning. I quantified the presence of gut microbial DNA and found that soil exposure altered abundance of major gut microbes, but male and female mice had different quantities of these microbes. I also quantified key molecular messengers involved in immune functioning and found differences between male and female mice. Interestingly, soil exposure delayed the development of the gut microbiota in both male and female mice.

Biological Science

Measuring whole white matter damage in the dorsal spinal cord: a comparison of histology and MRI

Presenter: Chappell, Rhys

Faculty Sponsor: Evan Chen

More than 86 000 Canadians are currently living with a spinal cord injury (SCI). Imaging of an SCI may be performed using magnetic resonance imaging (MRI) to determine the extent and specifics of the injury without the use of ionizing radiation, but the use of relatively new MRI techniques can sometimes deliver unclear results. Therefore, MRI must be compared to a microscopic imaging technique, histology, to ensure accurate interpretation.

A dorsal column incision was made in rat spinal cords, in order to model a human SCI. MRI data was collected for white matter regions 5mm cranial and caudal to the injury site, pre-injury as well as 3 and 8 weeks post-injury. This MRI data was compared to histology images to understand the changes to damaged white matter over this time period, and how these changes present through the two imaging techniques.

Histology data shows increased white matter staining and macrophage presence in injured samples. When compared to MRI data it is observed that these changes correlate to decreasing image values cranial to the injury over time. Caudal to the injury it was observed that MRI values increase at three weeks, and then decrease after eight weeks. With further study, the correlations between these two imaging techniques may be used to better understand SCIs and more accurately interpret human MRI images of post-injury white matter degeneration.

Biological Science

Assessment of Behavioural Phenotypes Resulting from Presenilin 1 Mutations, an Alzheimer's Disease Linked Gene, in Caenorhabditis elegans

Presenter: Kaviani, Rojin

Faculty Sponsor: Dr. Catherine Rankin

Familial Alzheimer's Disease (FAD) is a rare form of Alzheimer's Disease (AD), characterized by an early onset age below 65. Studies have linked FAD to over 150 mutations on the Presenilin 1 (PS1) gene, which is the catalytic core of the enzyme μ-secretase. Presenilin, as a part of μ- secretase, is critical for the cleavage of more than 60 single-pass transmembrane proteins; however, its main role in the cell still remains unclear. This study aims to assess the behavioural phenotypes of FAD-linked PS1 mutations in the nematode Caenorhabditis elegans. In addition to its short life cycle and hermaphroditic mode of reproduction, C. elegans provides a powerful platform for genetic analysis as it contains the PS1 homolog sel-12. The behavioural phenotypes of habituation and odour detection are examined in a sel-12 knockout strain and trans-genetic strains of human PS1 each containing mutations linked to FAD. The proportions of worms that respond to taps delivered to the plates containing the individual's were measured to determine habituation. Odour detection was assessed via chemotaxis assays using a repellent odour. Results have identified two PS1 mutations that were unable to rescue the sel-12 mutant suggesting that they may have modified normal PS1 function. In contrast, one PS1 mutation successfully rescued the sel-12 mutants suggesting that this mutation may not have affected PS1 function in the tested phenotypes. These phenotypes can be used to investigate the molecular pathways the mutations are involved in within the cell in order to provide further insight on AD pathogenesis.

Biological Science

Does Rehydrating Moss With Acidic Rain Affect Photosynthesis?

Presenter: Stratychuk, Ryan

Faculty Sponsor: Dr. Santokh Singh

Acidic rain is a phenomenon that can reduce the fitness and survival of plants, the major oxygen producers of the world. Mosses, while small, still contribute to the overall oxygen generation of the kingdom Plantae. It has been shown that acidic conditions affect photosynthetic capabilities of certain plants and mosses. In this experiment, we expand upon this research and ask how rehydration by acid rain affect mosses. Dehydrated samples of the moss species, Grimmia pulvinata were reconstituted using different pHs of water for five minutes and placed in an oxygen electrode reaction chamber for 40 minutes. The rate of oxygen generation (net photosynthesis rate) was then measured both before and after maximum CO2 conditions were established using KHCO3 (potassium bicarbonate), in order to observe normal and maximum rates of photosynthesis. The rates of oxygen generation were normalized seperately by the percent water content of the specimen and the dry mass of the specimen and then graphed against the pH of the solution. The data obtained showed no appreciable negative effects of acid rain conditions on the rate of photosynthesis in this moss species. We suggest that the stochastic differences in photosynthetic ability may have been caused by random damages sustained in the chloroplast membrane during desiccation , and not by acid rain treatments as evidenced by the large fluctuations in photosynthetic ability between different pH treatments. The physiological and biochemical basis of the effects of dehydration and acid rain conditions on photosynthesis will be discussed.

Biological Science

Effect of SDF-1 Chemokine on Cell Adhesion Mediated Drug Resistance (CAM-DR) in T-Acute Lymphoblastic Leukaemia

Presenter: Alhowar, Sara

Faculty Sponsor: Chinten James Lim

Acute lymphoblastic leukaemia (ALL) is the most common form of childhood cancer. ALL is a blood cancer consisting of lymphoid stem cells that divide uncontrollably as blasts, where normally they would give rise to essential components of the adaptive immune system. Thus, leukaemia can be detrimental if left untreated. While childhood ALL is highly amenable to treatment by chemotherapy, about 12-15% will relapse giving rise to a chemoresistant form of the original leukaemia. Chemoresistance of tumour cells can be attributed to cell adhesion mediated drug resistance (CAM-DR), where cell attachment to a substrate via integrin receptors promotes drug resistance. Increase in the surface expression of integrins and their activity can lead to increased cell adhesion and hence, CAM-DR. The chemokine SDF-1 is a signal protein that can modify integrin activity on blasts and consequently affect cell adhesion. This raises the question of whether SDF-1 promotes chemoresistance by inducing CAM-DR in leukaemic cells via modifying the adhesive molecules, integrin receptors. Therefore, I investigated the effect of SDF-1 on (1) integrin activation, (2) cell adhesion, and (3) CAM-DR using in vitro tissue culture experiments. Through SDF-1 stimulation of cells, cell adhesion to substrates of interest was measured. Furthermore, integrin activation was also measured with the use of appropriate antibodies. Lastly, cells were also treated with drug of interest and chemoresistance was evaluated upon SDF-1 stimulation. Preliminary findings show that SDF-1 decreases cell adhesion which is consistant with previous findings of SDF-1 inducing cell mobility. Furthermore, SDF-1 stimulation also showed increase in integrin activation which could indicate increase in integrin turnover. Nevertheless, SDF-1 does not affect the chemoresistance observed in CAM-DR indicating that the pathway through which SDF-1 chemokine affect integrins is independent of CAM-DR.

Biological Science

Ready to Launch: Preparation and Preliminary Results of a Microsatellite-Based Population Structure Survey of Trithuria

Presenter: Montgomery, Sean

Faculty Sponsor: Sean Graham

The genus Trithuria is part of the family Hydatellaceae, which has recently been found to be one of the earliest diverging lineages of flowering plants. Species in the Trithuria genus display multiple reproductive systems and reproductive units dissimilar to most flowers. These attributes mark Trithuria for further study into how the most diverse group of land plants, the angiosperms, came to be. However, there is currently a lack of information regarding the genetic diversity of populations of Trithuria. Species boundaries have been lacking strict definition, especially between T. submersa, T. bibracteata, and T. occidentalis. T. submersa is suspected of being comprised of two distinct species, split between populations in southwestern and southeastern Australia. To begin characterizing the diversity of this genus, DNA primers were designed to amplify microsatellites, short sequence repeats that exist as alleles in populations. Once optimized, these primers were used to amplify DNA from 130 samples of Trithuria. The sizes of the amplified DNA fragments were determined, and characterized as alleles within the populations. Bioinformatic analyses were run on the preliminary data, and estimates of genetic structure and diversity were found. Preliminary results indicate gene flow from T. submersa to T. bibracteata, while T. occidentalis is a good species with a high degree of inbreeding. Overall, this project succeeded in developing primers for use in Trithuria, a potential model system for understanding angiosperm evolution. As well, preliminary work was completed on assessing the population structure of T. submersa, and the diversity of T. occidentalis.

Cultural, Social & Historical

Indigenous education—a long lasting issue

Presenter: Ma, Jingfei (Grace)

Faculty Sponsor: Magdalena Ugarte

Since the passage of the Indian Act in 1876, the Indian Residential Schools (IRS) system, funded by the Canadian federal government and mostly run by the church , was operated to assimilate Indigenous children into Canadian mainstream culture. In 1996, the last residential school, Gordon Residential School, was closed. However, the legacy is exerting lasting effects, and Indigenous education still remains problematic. According to a report from Indian and Northern Affairs Canada (today's Aboriginal Affairs and Northern Development Canada), First Nation peoples rank education as the highest priority issue facing young people on reserves (2004). Despite some governmental measures to tackle the problems, the expected outcome has not been reached and instead "are actually getting worse in relative terms" (Mendelson, 2008). The purpose of this research is to explore the extent to which public policy has shifted since the 1980s towards Indigenous control over education. While identifying the evolution of governmental directions , a comparison is made between the previous situation, particularly focusing on the IRS system, and the current state of Indigenous people's limited rights in their cultural and educational affairs . By showing some of the improvements and weaknesses in the current state of State-led Indigenous educational policy, this research highlights the importance of capacity-building for Indigenous peoples to manage their own education, which has not yet been enhanced. As this is a matter concerning generations of Indigenous peoples, long-term efforts are required to deal with the prolonged negative impacts of government assimilative policies.

Cultural, Social & Historical

Ethics of Pharmaceutical Pricing: Sovaldi

Presenter: Ho, Harriet

Faculty Sponsor: Dr. David Silver

Introduction: Current laws, such as the Orphan Drug Act in the United States, have allowed the US market to set higher prices for drugs that treat rare diseases affecting fewer than 200,000 people (Thamer et al 1998). However, there is a lack of literature that examines the ethical implications of the growing trend of high-priced, blockbuster drugs entering the market. This study explores the moral implications of the pricing model of Sovaldi (sofosbuvir), a drug marketed by Gilead Sciences, Inc. that cures Hepatitis C, and is priced on average at $90,000 for a 12-week treatment. Hepatitis C affects approximately 150 million people worldwide, largely from low-income populations. A pricing model is the structure of how prices are set in a market. The literature presents five pricing models for pharmaceuticals, including breakpoint pricing, which Sovaldi shows evidence of. Breakpoint pricing occurs when there are no regulatory controls and pricing is based on the highest level at which the health insurance system can bear the cost. Methods: From informal and formal literature, opinions and arguments about pricing models were drawn. Empirical data, such as financial statements, were used to find evidence of Sovaldi's pricing model. Philosophical evaluation of the interests of each stakeholder was used to analyze the ethics of the pricing model. Conclusion: The results of the research can help inform regulatory policy on the pricing of current and future drugs. Whether or not price is fair can help in negotiations between Gilead and payers.

Cultural, Social & Historical

Measuring Magnitude of Tongue Movement

Presenters: Allen, Claire; Letawsky, Veronica & Turner, Alannah

Faculty Sponsor: Dr. Kathleen Currie Hall

Measuring language can be a difficult task. The use of modern technology, like that of ultrasound video, allows for the measuring of movement in the oral cavity during speech;in particular, changes in tongue position during vowel production. Recently, Optical Flow Analysis(OFA) software has been introduced as a reliable method of analyzing information about the articulation of speech spounds. There are currently no baseline measures of what's to be expected for values of vowel heights and backness. In this study, the magnitude of tongue movement for volwels extracted from words was analyzed.

OFA performs a frame-by-frame analysis of specified regions of interest on ultrasound video file. We outlined a horizin bar from tongue root to tip and then a vertical bar from above the top of the tongue to the bottom. the movement of the tongue fotr each fram were measured relative to one another. Results from the frame-by-frame analysis measuring the average magnitde of movements of the tongue are intuitive with respect to the vertical position of the togue in the mouth(high or low) during the production of different vowells in different contexts. high vowels(such as those in "bead" and "booned") require less movements to reach their next articulatory target when they are neighboring other high vowels, and how vowels (such as those in "bad" and "bod") require less movement to reach their next articulatory target when their neighbour is also a low vowel.

It is our hope that this innovative baseline analysis will pave way for future research to use Optical Flow Analysis with ultrasound vido further analyze and quantify the articulation of speech sounds, with closer detail on specific areas of the tongue such as the root ans the tip.

Cultural, Social & Historical

From Video Gaming to E-Sports: Symbolic Struggles, Gendered Identities and Technology

Presenter: Kong, Wing Chung (Justin)

Faculty Sponsor: Thomas Kemple

In the recent decades digital/video games have become an increasingly popular medium and form of entertainment which constitute a sixty billion dollar industry with a global reach that occupies increasingly large portions of the lives and time of more and more people. This study seeks to examine an emergent development in video gaming called e-Sports (Electronic Sports), which can be understood as the professionalization and institutionalization of competitive video gaming. Through the notion of 'symbolic struggle' associated with sociologist Pierre Bourdieu, this study explore the ways in which e-Sports represents a legitimization of an historically problematized and stigmatized activity (video gaming) and its associated identities ('the nerd', 'the gaming addict', etc.) through an nominal association with 'sports', a category of broad social acceptance and closely associated with the masculine identity. The contours of this claim is established qualitatively through content analysis of online e-Sports content/websites, eight in-depth interviews with e-Sports enthusiasts, and then quantitatively through survey research conducted at a large e-Sports tournament (n=157). This study contributes to the nascent body of scholarship on e-Sports at a time of rapid expansion: from tournaments that sell out stadiums with prize pools reaching into the millions, to groups like the UBC e-Sports Association which has, in the span of a few years, grown to become one of the largest student clubs on the UBC Campus. As importantly, this study provides an empirical example and entry to theorize on historical transformation and relationship between technological (commercial/industrial) development and gendered identities in North America.

Cultural, Social & Historical

Aricie Caught in the Act: Unmasking the lover's role in the Misogynist Hippolytus

Presenter: Scoutif, Lauriane

Faculty Sponsor: Dr. Sin Yan Hedy Law

The original play Hippolytus by Euripides enjoyed enjoyed much fame in 428 BCE, and has been adapted over time into different versions. In 1677, the French playwrieght Jean Racine created a version, Phedre with a new character named Aricie. This addiction led to the operatic adaptation, Hippolyte et Aricie (1733) by Jean- Philippe Rameau. However, including Aricie in the narrative as Hippolytus's love interest alienates us from the stern misogynistic element found in the original Hippolutus. This paper questions the dramatic function of Aricie, presenting a case-study that challenges the consequences of adaptation. although research has been done in Classical Studies, French literature and Music on the story of Hippolytus, few have focused on Aricie in particular,. A detailed examination of the three versions shows that while Aricie wdid not exist in the original story by Euripides, she is given little stage presence by Racine or Rameau. However, the lyrical style found in the Ancient Greek text during moments of emotional distress in Euripdes's original original suggests musical treatment, which is strikingly similar to the function of operatic arias. The love declaration scence between Hippolyte and Aricie in Act 1 scence 2 of the opera provides an example of how Rameau uses the aria as an emotional outlet for his characters. Hence despite the invention of Arcie causing he loss of Hippolutus's hatred of women, there is a critical link between ancienct Greek tragedy and opera on stylistic grounds.

Cultural, Social & Historical

Love in Auschwitz-Birkenau

Presenter: Duranseaud, Lea

Faculty Sponsor: Bozena Karwowska

My presentation is about romantic, heterosexual love in the Nazi extermination camp Auschwitz-Birkenau, with a focus especially on the story of Mala Zimetbaum and Edek Galinksi. I focus on Mala and Edek's ability to provide hope for millions within the camp, and how their story continues to be of particular focus in the camp. I explore how feelings of romantic love were even possible within the camp and how those feelings were able to flourish between two prisoners. To understand this, I examine the layout of the camp, and the conditions the prisoners lived in, with special attention given to the conditions Mala and Edek lived in. Photos are shown (via powerpoint) to depict conditions and to help the audience understand what prisoners went through in their daily lives. I researched this subject when I went to Poland for a month in May last year with a UBC Go-Global study group. The study group was called Witnessing Auschwitz- Conflicting Stories and Memories. During the trip we studied in Auschwitz for twelve days. Upon returning I was inspired to share what I had learned, which is why I applied to be a presenter.

Cultural, Social & Historical

Chinese Seniors' Vulnerability in Food-Lines: An Ethnographic Report

Presenter: Huang, Leanne

Faculty Sponsor: Dr. Thomas Kemple

In an effort to address issues of Chinese seniors' vulnerability as food-line users at local community organizations, three students from the University of British Columbia's Urban Ethnographic Field School (UEFS or Field School) worked in collaboration with several community partners on a project with the aim of making the meal programs a safer and more welcoming space for the seniors. Over the 6-week duration that the Field School took place in Vancouver, British Columbia, the three students used the qualitative methods of ethnography, focus groups, and in-depth interviews to understand the everyday experiences of the food-line users and staff members. The students began their investigation by meeting with stakeholders to learn about the current state of the food-lines and the insights and information the organizations would like to gain. By standing in the food line-ups beginning at 6am into the day, conversing with the food-line users and staff, and making observations, rapport was built and an understanding of the situation from the perspectives of the food-line users was gathered. From the students' field notes that captured observations, conversations, and feelings, and from the focus group and interview transcripts, the students completed a thematic analysis of the data which resulted in a more thorough and deeper understanding of the usage of meal programs. The students found that overall, fostering intercultural understanding would be most helpful. Concrete recommendations were provided to stakeholders. Future research should follow-up with the involved organizations and reach out to more organizations.

Cultural, Social & Historical

Substantive Female Representation: A cross-party analysis of speaking time in the House of Commons

Presenter: Halevy, Lotem

Faculty Sponsor: Antje Ellermann

Despite making up 50% of the Canadian population, women only constitute 25% of members in the Canadian House of Commons. While this figure has substantially increased in recent years, women continue to be underrepresented in Canadian electoral politics. The academic discourse to date has attempted to understand women's political affiliations, policy preferences (Gidengil et al, 2005; Gidengil, 2005; Flamming, 1997; Shapiro and Mahajan, 1986) and hurdles that hinder their entrance to formal politics (England, 2005; Thomas and Bodet, 2013), yet there has been little work on the substantive impact women have in empirical settings. Combined with the normative approach to the academic literature, Canadian political institutions are rarely subdivided into separate sub-actors within institutions. Through treating each caucus as it's own actor, (ie. as an autonomous cabinet of representatives), I propose an alternative treatment for studying women's electoral representation. I question whether speaking time during question period is proportionate to female representation in the House of Commons and across parties. This treatment creates a microcosm out of question period that translates to broad parliamentary behavior. The findings show that women speak less than their proportional representation in the House of Commons for both parliaments examined. However, each party fairs differently as there is a strong relationship between women who hold leadership positions and their subsequent speaking time. Furthermore, the qualitative findings suggest that women's political behavior is less combative than their male counterparts. The results demonstrate that substantive female representation is not equitable to a seat filler but rather advancement in leadership positions, both in government and in caucus.

Cultural, Social & Historical

Accents in Vancouver English: Processing Pronunciation Variation

Presenters: Chan, Michelle & Hui, Jobie

Faculty Sponsor: Dr. Molly Babel

English in Metro Vancouver is subject to a variety of pronunciation differences due to the many different backgrounds of the people speaking it. We have a harder time understanding foreign accents that we are unfamiliar with. Practically speaking, this can result in misunderstanding and confusion in cross-cultural interactions. Being able to understand an accent requires that listeners perceptually adapt to them. We are interested in seeing how people are able to understand all these accents so efficiently in such a highly variable linguistic environment. Existing literature by Witteman et al. (2013) demonstrated that with more exposure to a particular accent, people are better at processing this accented speech. Based on this finding, we hypothesize that listeners who grew up in Metro Vancouver, a highly multilingual urban area, would have more exposure and experience with foreign-accented English. Thus, Metro Vancouverites would be better at processing foreign-accented English than those who grew up outside of Metro Vancouver (i.e., Northern BC). Using a priming paradigm, our project tests the robustness of processing non-local accents at UBC. Participants were presented with sound files from either a Mandarin-accented English speaker or a local-accented English speaker and instructed to categorize whether the token was a "word" or a "non-word." We found that participants' reaction times to both speakers were very similar; participants were equally primed regardless of their background or experience with the foreign-accented English. These results bode well for the multicultural nature of Vancouver, as it appears that processing foreign-accented speech efficiently may simply stem from being a member of a diverse urban community. We hope to continue to expand our understanding of how Metro Vancouverites process other varieties of foreign-accented English.

Engineering & Technology

A Low-Cost Satellite Terminal for Measuring Ka-Band Propagation to Low Earth Orbit using the CASSIOPE Satellite

Presenters: Jang, HyunChang (Hyun); Hill, Matt; Pownall, David & Sahay, Ishan

Faculty Sponsor: Dr. David Michelson

Although Ka-band links to communication satellites in geostationary orbit have been used for many years, their use in communicating with satellites in low earth orbit is still emerging. Of particular interest is characterization of the rate of fading which is accentuated on links to satellites to LEO by the rapid manner in which the Earth-space path sweeps though rain cells in the vicinity of the Earth station as the satellite passes across the sky. Fade slopes steepen as the orbital altitude of the satellite decreases and as the intensity of individual rain cells increases. The result has important implications for the design of the power control. Only a few satellites in LEO carry Ka-band propagation beacons or receivers suitable for propagation studies and, relatively little measurement data is available. The launch of the CASSIOPE satellite on 29 September 2013 with its Ka-band Cascade communications transponder has provided propagation researchers with another opportunity to characterize Ka-band propagation on Earth-LEO links. However, the complex nature of the uplink and downlink beacons employed by the Ka-band transponder make design of a downlink propagation receiving terminal a complex undertaking. In response, we have devised and implemented an uplink terminal that takes maximum advantage of onboard satellite systems to simplify the design and reduce costs substantially. The success of our approach points the way forward to verifying previous simulation-based work that predicts that fade slope on Ka-band links to LEO are up to several times higher than fade slope on links to GEO.

Engineering & Technology

Autonomous detection and avoidance of marine obstacles using thermal imaging

Presenters: Cernek, Paul; Andrews, Josh; Baker, Josh & Sredzki, Arek

Faculty Sponsor: Jon Mikkelsen

Reliable detection of floating obstacles is crucial to marine safety, as every year boats of all sizes are damaged from collisions with rigid objects on the surface of the water. Long-wave infrared thermal imaging presents a means of detecting floating aquatic obstacles that are too small or too poorly reflective for detection via radar, regardless of external lighting conditions. However, current systems are limited by the need for human oversight for actual detection of obstacles. A collision avoidance system that overcame these limitations would have considerable economic significance.

We present a fully automated, low-powered obstacle detection and avoidance system that can be positioned at the bow of a boat to detect floating objects on the water and modify the course of an autonomous vessel accordingly, in real time, thus avoiding aquatic obstacles without human intervention. The detection system takes into account the boat's orientation relative to the horizon thanks to integration with an Inertial Measurement Unit, permitting high-level segmentation and selective application of downstream image processing. Thermal contrast is used to detect the presence and location of the obstacle within the image. The system works as a closed feedback loop, responding to new information about the obstacles as it is found. Its success rate is evaluated by an intersection-over-union calculation relative to manually-annotated bounding boxes.

The system is being implemented in a working product for the UBC Sailbot Transatlantic Challenge in June of 2015, in which a fully autonomous unmanned robotic sailboat will attempt to cross the Atlantic Ocean.

Engineering & Technology

Wireless Pacemaker Charger

Presenters: Ramley, Serena; Daravi, Pooya; Pal, Serene & Husslage, Devin

Faculty Sponsor: Dr. Noboru Yonemitsu

A pacemaker is an implanted medical device that stabilizes irregular heart rhythms by sending corrective electrical pulses to the heart (Healey et al. 2011) (Gopal, 2013). Pacemaker patients must go for surgery on average every 5 to 10 years because the battery runs out, even if the pacemaker device is otherwise fully functional. There are over 200,000 implanted cardiac pacemaker users in Canada and over 3.25 million worldwide; each surgery is accompanied with a 1 in 50 risk of major complication (Buch et al. 2011), as well as a cost of over $20,000 in the United States. By contrast, recharging the pacemaker across the skin would be non-surgical and non-invasive. Ideally, a rechargeable pacemaker would be more affordable, comfortable, and convenient than a traditional pacemaker, and furthermore last up to a lifetime. We are currently in progress of developing a functional prototype of a transcutaneous charging system for cardiac pacemakers.

Engineering & Technology

Molecular simulation of blood flow

Presenters: Bo, Sihan; Lee, Jordan & Shen, Zhonjie

Faculty Sponsor: Vasiliy Triandafilidi

Blood flow is like a pipe flow that is within a closed conduit. It does not exert atmospheric pressure, but does exert hydraulic pressure on the conduit. Blood delivers necessary substances such as nutrients, oxygen and drugs to the cells and transports metabolic waste products away from those same cells. Proper functioning of blood is critical to human health. However, it is difficult to perform blood flow experiments due to limitations caused by the size of blood vessels. Instead, one can carry out computations for conditions that cannot occur in a laboratory. In molecular dynamics, we are able to track the behavior of every atom in the blood. Knowing the position of every atom, we predict the properties in bulk and then visualize the process of how blood flows through blood vessels. In addition, velocity and conduit shape are directly related to the flow rate and therefore to the effectiveness of the channel. It is a starting point in predicting such properties as drug delivery, as well as transport properties through cell membranes. We change the conditions of the blood vessel by altering its shape, changing the velocity of blood flow, and including obstacles in the pipe. This allows us to visualize how these varying factors affect the flow inside a blood vessel.

Engineering & Technology

Fluorescent quantum dots for detecting DNA hybridization

Presenter: Wang, Jessie

Faculty Sponsor: Dr. Russ Algar

The ability to detect DNA hybridization is essential for disease diagnosis and research because a single hybridization error can result in devastating disease. Molecular tools used for DNA detection, called DNA probes, distinguish between single-stranded (non-hybridized) and double-stranded (hybridized) DNA by generating two measurably different signals. We have demonstrated that fluorescent nanoparticles called quantum dots (QDs) have potential for use as DNA probes. Normally, when light strikes a QD, it absorbs energy from that light and gives off fluorescent light of a different colour. We attached an intercalating dye, which has the ability to distinguish between single-stranded and double-stranded DNA via distinct fluorescence signals, to a QD via a chain of amino acids. Now, when light strikes the QD, some of the absorbed energy is not given off as fluorescence but is transferred to the dye in a process called Fluorescence Resonance Energy Transfer (FRET). If DNA is present, the dye uses the absorbed energy to fluoresce. Thus, the intensity of the two fluorescent colours (e.g. green from QD and yellow from dye) can be measured as a ratio that changes when DNA hybridization occurs. We found a change in the dye-QD ratio of 1.3 when double-stranded DNA was present, compared with no change for single-stranded DNA. This ratiometric detection of DNA hybridization is advantageous in biological applications, such as for live tracking in cells, because it is unaffected by interferences and light source fluctuations. This works constitutes a significant step toward recognizing distinct DNA sequences on a nanoparticle scaffold.

Engineering & Technology

Designing a Weight-Sensitive Car Seat Sensor to Reduce Risk of Whiplash Injury

Presenter: Yan, Philip

Faculty Sponsor: Jean-Sebastien Blouin

According to the Insurance Corporation of British Columbia, whiplash injuries account for approximately 70% of all reported motor vehicle related injuries at an annual cost of over 850 million dollars. Being a serious economic and social burden to society, developing methods to reduce the risk of whiplash injuries is an important area of research. A whiplash injury is defined as soft tissue damage in the neck resulting from sudden movement of the head relative to the torso. Using currently existing anti-whiplash devices such as energy-absorbing car seats, women are approximately 1.5-3 times more likely to suffer from whiplash injuries than men after a collision. This difference may be attributed to the optimization of automobile safety devices for the height and weight of an average male occupant. The objective of this study is to develop an adaptive seat that can utilize weight information of its occupant to actively adjust seatback deformation during a low-speed rear-end collision in order to best protect its occupant. The aim of my project is to design a seat sensor that can reliably measure and classify the weight of an occupant into one of seven categories. The seat sensor will be created by attaching four load sensors onto a seat base and tested by loading the seat with a crash test dummy of varying weights. We hypothesize that the seat sensor, in conjunction with the new seat design, will lower the risk of whiplash injury for occupants of all weights.

Environmental Science & Applied Biology

Validation of automated feeding systems for recording time out of pen in dairy cows

Presenter: Thompson, Alexi

Faculty Sponsor: Marina von Keyserlingk

On free-stall dairy farms cows spend the majority of their time grouped in a home pen where they are free to eat, drink, and lie down, leaving the pen two to three times a day to be milked. Because of the significant amount of time cows spend in their home pen, researchers interested in behaviour often focus on events that occur there. However, a cow that spends an extended period of time out of her pen (without access to food, water, or lying stalls) can exhibit biased behaviour following re-entry. This can confound the cause for a given behaviour, potentially affecting the interpretation of different behaviours. Thus, tracking the time a dairy cow spends out of her pen is an important factor to consider for behavioural research. Traditionally, video recordings have been the accepted standard for recording time out of pen, but reviewing them is time consuming and can be technically challenging. Here, I attempt to validate the use of data collected continuously from an automated feeding system to provide an easy and objective way to track the time out of pen (automated feeding systems continuously record the start and end of feeding events for each cow).

Environmental Science & Applied Biology

Animal welfare concerns and values of stakeholders within the dairy industry

Presenter: Giovanetti, Ana

Faculty Sponsor: Beth Ventura

As societal pressure for ethical dairy practices increases, dairy industry stakeholders have needed to reevaluate their practices to improve animal welfare. What "better animal welfare" means, however, differs greatly between different stakeholders. Limited information is currently known on the values and concerns of people who hold active roles within the dairy industry. Insight into how individuals perceive animal welfare is crucial if stakeholders from separate professions are to come together and increase the efficacy of welfare improvement strategies. Five focus groups (n=7-10) of various stakeholders were held to evaluate participants' perceptions of priority welfare problems within the dairy industry. The discussions were audio-recorded, transcribed verbatim and coded using content analysis to identify key welfare concerns and underlying values for animal welfare. Analysis is ongoing, but preliminary results indicate that lameness, disease and obstetrical interventions are prominent concerns, and pain has figured as a key reason for why these issues are of concern. This finding indicates that there may be shared values between dairy industry stakeholders and broader society, paving the way for better cooperation on policy development to improve cattle welfare. Further analysis will allow insight into how stakeholders interpret their own and others' roles in dairy production, with the aim to identify targeted, specific solutions to dairy cattle welfare concerns for which there is strong consensus among key players in the dairy industry

Environmental Science & Applied Biology

Feeding and Social Behaviours of Primiparous and Multiparous Dairy Cows During the Transition Period

Presenter: Behnam-Shabahang, Asadeh (Azy)

Faculty Sponsor: Heather Neave

The transition period, 3 weeks pre- and post-calving, is a time when dairy cows undergo the difficult transition from pregnancy to lactation. This is often accompanied by other stressful events such as regrouping and diet changes. Consequently 30-50% of dairy cows succumb to disease during this time. Primiparous cows (PRI: first calving) undergoing transition for the first time may be especially vulnerable. As such, our objective was to determine if PRI and multiparous cows (MUL: multiple calvings) differ in feeding and social behaviours throughout this period. Fifty healthy PRI and 98 healthy MUL were housed in mixed-parity groups of 20 with access to electronic feed-bins during the transition period. PRI spent more time feeding pre-calving (PRI: 240.5±5.0; MUL: 209.2±3.6 min/day), visited feed-bins more often pre-calving (PRI: 89.3±2.5; MUL: 72.6±2.0 visits/day) and post-calving (PRI: 66.1±2.2; MUL: 53.9±1.5 visits/day) but had lower feed intake pre-calving (PRI: 13.5±0.2; MUL: 15.7±0.2 DMI/day) and post-calving (PRI: 15.1±0.3; MUL: 18.4±0.3 DMI/day) compared to MUL. This may be explained by their smaller body weights, lower feed rate pre-calving (PRI: 0.065±0.001; MUL: 0.084±0.001 kg/min) and post-calving (PRI: 0.103±0.002; MUL: 0.117±0.002 kg/min) or greater number of removals from the feed-bins by another cow (PRI: 20.4±1.0; MUL: 16.3±0.6 removals/day). Feeding and social behaviours during the transition period differed between healthy PRI and MUL. These behavioural differences suggest PRI may benefit from the alleviation of a novel transition management practice, such as regrouping. Furthermore this research could be useful in detecting changes specific to parity that may be indicative of disease.

Environmental Science & Applied Biology

Achieving passive transfer of immunity in commercially reared dairy goat kids: A preliminary study

Presenter: Tan, Bee Li

Faculty Sponsor: Gosia Zobel

Newborn dairy goat kids must ingest colostrum shortly after birth to ensure successful passive transfer of immunity. On commercial dairy goat farms, newborn goat kids are commonly separated from their mothers and are provided colostrum via a nipple bottle; this is assumed to improve transfer of immunity, however, to our knowledge the efficacy of this practice has not been investigated in goats. We aimed to compare the success of passive transfer of immunity between newborn kids that are separated immediately from their dam versus those that are allowed to nurse. On a commercial farm with a standard practice of leaving male kids with the mothers and immediately removing female kids, 57 does were enrolled; 56 female kids and 52 male kids were born to these does. Blood samples were taken 2.1 ± 1.0 days after birth and blood serum was used to establish successful passive immunity transfer (serum immunoglobulin G ^{3} 12 mg/ml). More male kids acquired passive transfer of immunity compared to female kids (64% vs. 27%; P = 0.01). The odds of females failing to achieve passive immunity transfer were 4.7 times higher than in males. Although sex was a confounding factor in this study, our results provide preliminary evidence that management of newborn kids is a significant source of variation in passive transfer of immunity. Future work should monitor specifics of colostrum feeding in both suckled and bottle fed kids to determine which factor(s) contribute to either the success or failure of passive transfer.

Medicine & Pharmacology

Think before you drink: Baby or Bottle? Effects of prenatal alcohol exposure on offspring immunity

Presenter: Mak, David

Faculty Sponsor: Dr. Joanne Weinberg

Prenatal alcohol exposure (PAE) can cause an array of deficits known as Fetal Alcohol Spectrum Disorders (FASD). This includes abnormalities in immune function, resulting in increase susceptibility and delayed recovery from infection. Normal immune responses involve expression of a regulated network of proteins known as cytokines, which may have pro- or anti-inflammatory effects. However, it is hypothesized that PAE can alter the baseline and response levels of cytokines. Therefore, we studied levels of the pro-inflammatory cytokines TNF-μ and IL-6 with a rat model. To mimic potential challenges faced by individuals with FASD, the offspring of ethanol-fed mothers were subject to a variety of stressors over a 10-day period during adolescence. An immune challenge was then administered to elicit changes in cytokine levels. In this experiment, this immune challenge was adjuvant-induced arthritis (AA), which is analogous to human rheumatoid arthritis. Cytokine levels were examined in plasma and hind paw at the peak of arthritic inflammation and during a recovery phase. Results indicated that in both plasma and hind paw, TNF-μ and IL-6 increased at the peak of inflammation, respectively. However, during the recovery phase, TNF-μ and IL-6 in PAE animals were significantly higher than that of controls. These results suggest that changes in cytokine expression patterns likely play a significant role in the immune abnormalities seen in offspring with FASD. We hope these findings will serve as a starting point for further research to provide insight into the eventual development of immune-based treatments of FASD.

Medicine & Pharmacology

Medication Adherence in Lupus: A Systematic Review

Presenter: Panesar, Gursimran

Faculty Sponsor: Dr. Mary De Vera

The World Health Organization has declared non-adherence to medications an epidemic – only 50% of adults are adherent to treatment. Medication non-adherence is especially important in any chronic systemic rheumatic autoimmune disease (SARD) such as Systematic Lupus Erythematosus (SLE) because patients need to constantly be on Disease Modifying Anti-Rheumatic Drugs (DMARDs) to control their over active immune system. The overactive immune system is not only problematic when trying to control disease activity, but it is also a very strong predictor of other co-morbidities. Therefore maintaining long-term adherence to DMARDs is not only important for controlling disease activity but also in preventing irreversible damage to the patient's body due to inflammation.

To further compound the problem medication adherence in SLE is not nearly as well characterized as compared with other inflammatory arthritis like rheumatoid arthritis (RA) or gout. In an on-going systematic review of the literature on medication adherence in SLE,

a preliminary search led to the identification of eight articles assessing adherence and reporting adherence measures in SLE patients. However, studies were based on small clinical samples (ranging from 32 to 802) (Table 1), and the methods used to measure adherence varied widely between studies. In addition, some of these studies did not specify which SLE medications were assessed. The percentage of adherent patients varied widely from 45-93%. The completion of this systematic review is essential in understanding the landscape of medication adherence research in Lupus so that appropriate steps can be taken to fill in the identified gaps.

Medicine & Pharmacology

An analysis of the chemistry of Acorus americanus and its application in traditional Aboriginal medicine

Presenter: Labine, Nicole

Faculty Sponsor: Paul Shipley

Plants from the genus Acorus have historically been used as a traditional herbal remedy to treat throat and lung infections. This project focused on identifying the chemical differences between two morphotypes of Acorus calamus var. americanus, also known as Ratroot by the Cree people, collected in the Northwest Territories. Aboriginal traditional usage has identified one morphotype for medicinal usage and the other has been identified as poisonous. Under the guidance of a traditional knowledge holder we have collected and prepared these two morphotypes using Aboriginal traditional methods. The rhizomes were extracted with an appropriate solvent, then nuclear magnetic resonance spectrometry was used to investigate the metabolome, or total small molecule chemical profile, of each morphotype. Multivariate statistical analysis allows us to identify specific chemical differences between the morphotypes. Recent results have shown that a significant difference between the morphotypes can be attributed to the stigmastane family of sesquiterpenes, which are known for their antiinflammatory, antimicrobial and antiulcer properties. It is our hypothesis that differences in chemistry between the morphotpes are responsible for the traditionally reported difference in medicinal properties, making the stigmastanes candidate molecules for further study.

Medicine & Pharmacology

AIDS: More Than Just a Disease

Presenter: Ng, Kevin

Faculty Sponsor: Raymond Ng

In the 35 years since it was first observed, AIDS has remained a constant presence in scientific research. While AIDS research has provided some of science's greatest achievements, from the discovery of the HIV virus to the development of effective antiretroviral drugs, the epidemic is far from over, with an estimated 1.5 million AIDS deaths in 2013. It should be no surprise that AIDS remains one of the most highly funded areas in science, with approximately $19 billion USD spent in 2013 for research and treatment in middle to low-income countries alone. However, this research is certainly not free from controversy beyond the bounds of pure science. In a seminal publication in 1998, sociologist Steven Epstein identifies three factors that contribute to the controversy of AIDS research: its relevance to a politicized social issue, the presence of a mobilized related social movement, and often-overlooked social and political aspects of the scientific research world itself. Building upon Epstein's early analyses of such factors in early AIDS research, I have explored more recent controversies in the topic in an attempt to discover how such societal and political factors have evolved with the epidemic. In addition, I have also considered the effect of the scientific community itself on such social and political factors, thus revealing a cycle of influence in AIDS research in which science, society, and politics cannot be separated.

Medicine & Pharmacology

Association of Blood Metabolite Levels With The Late Phase Asthmatic Response

Presenter: Lee, Minghao (Michael)

Faculty Sponsor: Amrit Singh

Asthma is a chronic condition affecting three million Canadians, and remains poorly understood due to its complexity and heterogeneity. Upon allergen exposure, individuals with allergic asthma experience an early asthmatic response (early responders) whereas others develop a late phase asthmatic response (dual responders) in addition to the early response. Molecular mechanisms differentiating early and dual responses are not fully understood. Since metabolomics in asthma has been shown to have some diagnostic potential, our aim is to identify significant metabolite markers that discriminate early and dual asthmatic responders.

14 participants with mild allergic asthma underwent an allergen inhalation challenge. Blood samples are collected prior to the allergen inhalation challenge. Metabolite levels will be quantified using mass spectrometry analysis.

The participants were classified into eight early responders and six dual responders. Nine of the 163 metabolites in the blood samples were significantly overexpressed in the dual responders in comparison to early responders. All nine of the significant metabolites were phosphatidylcholines.

Since phosphatidylcholines serve as precursors to pro-inflammatory molecules, this may explain their overexpression in dual responders in comparison with early responders. Risk alleles for asthma susceptibility have been associated with increased concentrations of various phosphatidylcholines. Replication in a larger cohort is required to validate the findings of this study.

Medicine & Pharmacology

Parcels of Promise - liposomes as a targeted therapeutic option in malignant glioma treatment

Presenter: Malhotra, Armaan

Faculty Sponsor: Marcel Bally

Glioblastoma Multiforme (GBM) is the most common and malignant primary central nervous system neoplasm. This condition is associated with an average survival time of fourteen months with current therapeutic interventions. GBM arises from unregulated growth and replication of cells that are involved in support of brain tissue. Early cases are seldom detected, as many patients remain asymptomatic until the tumour reaches a size large enough to exert mass effects. Surgical resection is often futile due to its infiltrative nature and chemotherapeutic regimes remain stifled by the highly selective blood brain barrier (BBB). The BBB is formed by tight cellular linkages between blood vessel cells, which confer a protective role to the organism by preventing large and potentially toxic molecules from entering the brain. Unfortunately, this natural barrier also makes treatment of brain cancer very difficult as it prevents up to 97% of potential drug candidates from accessing brain tissue. This research presentation will delve into the applications of liposomal drug delivery techniques in the treatment of GBM currently being investigated at the BC Cancer Research Centre. A lipid nano-particle or a liposome is analgous to an artifical phospholipid bilayer cell membrane that can be manipulated to contain a desired drug. Once injected, liposomes exploit 'leaky' tumour vasculature and accumulate in therapeutically relevant sites. By capturing the potential drug candidates into these structures, we have shown more favourable drug absorption through the BBB as well as improved bioavailability in vivo.

Medicine & Pharmacology

Genetics and Fetal Alcohol Spectrum Disorder (FASD): How Does Alcohol Change the Developing Brain?

Presenter: Theberge, Emilie

Faculty Sponsor: Dan Goldowitz

Fetal Alcohol Spectrum Disorder (FASD) is the most prevalent developmental disability among Canadian children (Public Health Agency of Canada, 2012), and encompasses a spectrum of mental disorders associated with prenatal exposure to alcohol. It is understood that alcohol consumed by the mother stunts the fetus' brain development by disrupting the genome, but the genes in question are still unknown. Our study focuses on the BXD region of the genome that is known to be involved in fetal brain development. The aim of our pioneering study is to connect differences in the BXD region with differences in alcohol tolerance using mouse embryo models, in order to determine the genes impacted by alcohol resulting in stunted brain development. Using a generation of mice embryos with variable tolerances to alcohol, we have been able to quantify our results by counting the number of cells that died due to alcohol exposure in the developing brain of the mouse fetus. Preliminary analysis has identified several regions important for development that are affected by alcohol. This research has important implications in future therapeutic approaches to at-risk fetuses that may develop FASD by knowing the genes involved. In addition, once the genes involved in alcohol resistance are identified, we have the potential to better understand a variety of mental disorders that originate in the developing brain.

Psychology

Drunk behaviour is more complex than we thought: Different genes modulate distinct aspects of behavioral responses to alcohol

Presenter: Sunthoram, Ashvini

Faculty Sponsor: Dr. Catharine Rankin

Alcohol produces a wide range of behavioral effects. For example, alcohol consumption can result in hyperexcitation, locomotor inhibition, and changes in body posture. However, whether different behavioral outputs are modulated by distinct or similar mechanisms remain unclear. Using the roundworm C. elegans, we developed a model to investigate genes involved in a wide range of behavioral responses under alcohol intoxication. Using an automated tracker, the animal's posture and locomotor activities were analyzed under 0mM or 400mM ethanol exposure. We investigated two genes previously shown to be involved in behavioural responses to alcohol. Our results showed that mutations in the slo-1 gene encoding a voltage-gated calcium activated potassium channel, reduced the effect of alcohol on both locomotor activity, and posture. On the other hand, a mutation in a neuropeptide receptor gene, npr-1, exaggerated the effects of alcohol on locomotor activity but did not alter alcohol's effects on posture. Our results suggest that one gene may play a role in a specific aspect of behavioral response to alcohol, but another may have a wider role in a concert of behavioral responses to alcohol.

Psychology

Don't Look at Me: The Effect of Direct vs. Averted Eye Gaze on Heart Rate during Persuasive Communication

Presenter: Herriot, Heather

Faculty Sponsor: Dr. Frances Chen

Eye contact between speakers and listeners during persuasive communication influences attitude change in the listener. Less is known about the relationship between eye contact and listeners' physiological reactions to persuasive communication. In the current study, participants' heart rate was monitored as they watched videos where they agreed or disagreed with the opinion presented by a speaker. Participants were randomly assigned to view either speakers displaying direct gaze (mutual eye-contact is easily made) or averted gaze (mutual eye-contact cannot be made). We found a significant interaction between agreement and gaze direction on heart rate. Specifically, those viewing direct gaze had higher heart rates while watching videos they agreed with and lower heart rates while watching videos they disagreed with; those viewing averted gaze showed the opposite pattern in heart rate. Findings suggest that listeners' physiological reactions to information that they agree and disagree with, is influenced by speakers' gaze direction.

Psychology

The Politics of Mental Health

Presenter: Peacey, Brianna

Faculty Sponsor: Dr. Hugo De Burgos

My research seeks to explore the ways in which the concept of mental illness can also be used as a coping mechanism by people who are marginalized in society. Methodologically, I will conduct a comparative analysis of what mental health means to different people in our society i.e. medical professionals, governmental institutions and mainstream society. Furthermore, I want to study the correlation between the current epidemic of mental illness and the presumed increasing social pressures in our society. Finally, I will critically address the role of profits and politics in the creation of medical ideas and treatments and the transformation of normal social behaviour into pathological conditions.