UBC Multidisciplinary Undergraduate Research Conference 2012

The Multidisciplinary Undergraduate Research Conference celebrates the contributions of undergraduate scholarly inquiry and research at UBC. All members of the UBC community are welcome and encouraged to attend this annual celebration of undergraduate scholarly work.

Schedule of the Day

Saturday, March 24, 2012 – Irving K. Barber Learning Centre

Registration - (10:00-10:30)	Main Foyer
Opening Session – (10:30-11:00)	IKBLC 182
Oral Presentation Session 1 - (11:10-12:20)	Various (IKBLC)
Poster Session & Lunch – (12:20-1:40)	Main Foyer
Oral Presentation Session 2 – (1:50-3:00)	Various (IKBLC)
Mentorship Meet-and-Greet – (3:10-3:40)	Main Foyer
Closing Session – (3:50-4:30)	IKBLC 182

Opening and Closing Sessions

Opening Keynote: Ashley Whillans

Ashley Whillans is a fourth-year psychology student at the University of British Columbia. For the last two years she has studied happiness, prosocial behavior and well-being under the guidance of Dr. Elizabeth Dunn. She has also been extensively involved in the Psychology Department, assisting in the development and implementation of UBC's Chapter of Psi Chi (an international honours society in psychology), the UBC Undergraduate Journal of Psychology and the *Psyched* student newsletter. Ashley has received numerous awards for excellence in academics, service and leadership including two Arts Undergraduate Research Awards, the Russ Patrick Award for Undergraduate Research Writing, and the Wesbrook Scholar Designation. She will graduate (BA Honours) in May, and intends to pursue a masters degree in Social Psychology at UBC in Sept. 2012.

Closing Keynote: Natalie Sopinka

Our closing keynote speaker, Natalie Sopinka, is the winner of this year's 3-minute thesis competition. Natalie completed her BSc and MSc degrees at McMaster University in the Department of Psychology, Neuroscience and Behaviour under the supervision of Dr. Sigal Balshine. Natalie's undergraduate and masters research explored how exposure to aquatic pollution impacts aggressive behaviours and sperm quality in wild-caught round goby, an invasive fish to the Laurentian Great Lakes. She is now a PhD candidate in the Department of Forest Sciences here at UBC. With Dr. Scott Hinch, Natalie is studying the transgenerational effects of stress in sockeye salmon populations. Natalie will be sharing highlights of her research journey from undergrad to graduate scientist.

Oral Presentation Session 1

A Contemporary Discourse on Literature and Linguistics **IKBLC 182**

Justin Yang: Laurence Sterne's *Tristram Shandy* and the problems of keeping (up with) time

Laurel Rogers: Appropriating the Ancients: Discourses of Appropriation and Repudiation in *Stargate: Atlantis*

Natalia Easton: Philip Roth's Nonfiction: Shuttling "Between the Written and the Unwritten World"

Rebecca Laturnus: /r/ to /R/ in Montreal French: A Cross-Generational Priming Experiment

Sophia Walters, Elizabeth Murphy: Attractiveness and Typicality in Imitation

Nathanael Vass: Talk Zombie to Me: Navigating Linguistic Theory in *Pontypool*

BioChemical Exposure and Toxic Effects to Living Species **IKBLC 157**

Ken Ke-Chih Huang: Effects of Developmental Ethanol Exposure on Motor Neurons in *Caenorhabditis Elegans*

Jennifer Peverelle: Abnormal Grain Growth in Magnesium

Emma Strazhnik: Aversion to Isoflurane and Sevoflurane in Rats and Implications for Humane Euthanasia

Erin Greene: Humane Methods of Euthanasia in Zebrafish (*Danio rerio)*: A Comparison of Tricaine Methanesulfonate (TMS) and Clove Oil

Genetics and Beyond: Investigating the biological factors in human disease and development **IKBLC 158**

Ada Kim: Role of heme oxygenase-1 in breast cancer metastasis

Hala Sharma: SOX9, a potential activator of *Wasf1* and *Cby1*

Natalie Firmino: The in vivo effect of cycloxygenase-2 (COX-2) inhibition on tumor growth and tumor associated macrophage function

Amelia Rajala: The genetics of sport behaviours: the role of DRD4 variants in sensation seeking

Genevieve Leduc-Robert: Chiasma localization as a constraint to chromosome fusions in *Habronattus* jumping spiders (Araneae: Salticidae)

Mental Health and Clinical Implications — **Lillooet Room**

Samara Mayer: An Analysis of Continuity of Care for Children with Complex Chronic Conditions

Houman Rashidian: Perceived threat of infectious disease and its implications for conformist attitudes and behaviour

Jennifer Kluftinger: Investigating the Lateralization of Anxiety and Depression

Evan I Wen Chen: Spinal Cord Injury: Effects of myelin damage on tissue microstructure and MRI phase

Darren S.T. Wong: Brain Injury Patterns in Hypoglycemia in Neonatal Encephalopathy

Biological factors in Mammals: Promoting longevity, health, and nutrition — **IKBLC 260**

Belinda To: Intraspecific Meta-analysis of Maintenance Nitrogen Requirements in Mammals

Nancy (Shao-Tzu) Chen: Assessing Stress in Translocated Stephens' Kangaroo Rats Using Fecal Cortisol Concentration

Daniella DeCoffe: The Effects of Polyunsaturated Fatty Acid Diets on Intestinal Immunity in Mice

Liam Polsky: Pedometers as an effective method for estrus detection in dairy cattle.

Melody Wang: Repression of *Salmonella* Virulence: The Isolation and Characterization of Small Molecules with Inhibitory Activity

Footprints: The Human Impact on Animal Ecosystems — **Dodson Room**

Cathy El-Hinn: The importance of record keeping: an evaluation of wildlife records in non-specialized veterinary clinics

Erin Crockett: Modeling Cumulative Human Impacts on an Ecosystem Service of Coastal British Columbia

Kathleen Ma: Do Indoor-Housed Dairy Cows Have a Preference for a Calving Site?

Sarah Amundrud: The relative importance of predation and eutrophication on eelgrass benthic food webs in British Columbia

Ryan Trenholm: Reducing water usage in civic parks using adaptive irrigation

A Contemporary Discourse on Literature and Linguistics (IKBLC 182)

Laurence Sterne's *Tristram Shandy* and the problems of keeping (up with) time

Justin Yang (Faculty Sponsor: Dr. Scott MacKenzie)

Studies in the history of novel by figures such as Ian Watt, Michael McKeon, and Nancy Armstrong, have historically drawn upon formalist, Marxist, and feminist critiques. More recent work, however, by scholars such as Franco Moretti, for instance, have sought to provide more holistic, non-traditional, approaches to understanding the novel, its history and ascendancy. One such approach, exemplified by Stuart Sherman in his book, *Telling Time*, draws upon a material history of timekeeping in order to track the ways in which the Huygensian "horological revolution" provides an intellectual and cultural milieu in which writers of prose fiction engage with technological advancements in machinery and clockwork in order to produce new forms of fiction. One author whose engagement with contemporaneous discourses of time and machinery has been understudied is Laurence Sterne. My presentation therefore addresses the ways in which Sterne's novel, *The Life and Opinions of Tristram Shandy, Gentleman*, engages with contemporaneous discussions about time and mechanism, as in the work of Julien Offray de la Mettrie, for instance. I want to draw attention towards some formal features of the novel that highlight the ways in which Sterne works both within and against prevailing discourses of time and machinery and, by doing so, challenging the cultural hegemony of clock-time and problematizing a teleological, potentially anachronistic understanding of time and timekeeping as in E.P. Thompson's seminal essay on the history of timekeeping, "Time, Work-Discipline, and Industrial Capitalism."

Appropriating the Ancients: Discourses of Appropriation and Repudiation in *Stargate: Atlantis*

Laurel Rogers (Faculty Sponsor: Dr. Catherine Nelson-McDermott)

Stargate: Atlantis, a popular American science fiction television show that ran from 2004-2009 and a sister series of the longer-running 1997-2007 *Stargate SG-1*, is in many ways a traditionally colonial science fiction story. As a mass-market series arising from the American Western genre and produced for a specifically American audience, the show employs many colonial stereotypes in a sort of propagation of a neocolonial American agenda. Yet, upon closer examination, *Stargate: Atlantis* does not always fully support the so-called "American Dream" of expansionism into space, occasionally subverting the neocolonial discourse expected of it. These incidents of destabilization are not necessarily overt, and are not necessarily viewed by the audience as such, but they, nevertheless, create a space in this popular science fiction work where the dissonance between colonial discourse and postcolonial challenges to that discourse can be explored. By examining an episode from the first season for both evidence and repudiation of the colonial discourse trope of appropriation, I hope to illustrate one of the subtle ways in which a neocolonial discourse is articulated, but also disputed, in *Stargate: Atlantis*.

Philip Roth's Nonfiction: Shuttling "Between the Written and the Unwritten World"

Natalia Easton (Faculty Sponsor: Dr. Ira Nadel)

Known as the United States' great novelist, the prolific writer Philip Roth has also published a considerable number of essays, interviews, and film and book reviews. Though much critical attention is paid to his fiction, Roth's nonfiction has bearing on his writing career, and also requires attention, particularly in relation to his fictional works. Roth himself was responsible for collecting many of his nonfiction works in *Reading Myself and Others*, in which he describes nonfiction as a response to the fame sparked by his early novels: he "felt called upon both to assert a literary position and to defend my moral flank" (*Reading* xi). After establishing himself as a literary celebrity, he began to invest in the "unwritten world" (*Reading* xi) (that is, the world outside of his novels) as well, exploring the themes he is known so well to cover in his fiction—Jewish American ethnicity, the American dream, and the family to name a few—in the light of current events. Expanding on the critical works of Darren Hughes, Murray Baumgarten and Barbara Gottfried, this paper will attempt to reveal the importance of Roth's nonfiction in his growth as a fiction writer through analysis of three different works: an early film review, a book review, and an interview with a contemporary writer. In these examples, Roth's "continuing preoccupation with the relationship between the written and the unwritten world" (*Reading* xi) is exemplified.

/r/ to /R/ in Montreal French: A Cross-Generational Priming Experiment

Rebecca Laturnus (Faculty Sponsor: Dr. Molly Babel)

Starting in the 1960s, a rapid sound change spread through the French-speaking community of Montreal, Quebec. The way <r> sounds are produced changed from an apical trill [r], articulated with the tongue tip, to a dorsal [R], articulated in the back of the throat (Santerre, 1978; Clermont & Cedergren, 1979). Sankoff and Blondeau (2007) found that for young people in 1984, [r] had become associated with older generations. The current study investigates this language change's progress. Following Sumner and Samuel (2009), our methodology consists of a primed lexical decision task, in which participants classify the second sequence in each pair of auditory stimuli as a word or non-word. Faster reaction times are expected when the second word in a pair is recognized as a repeat of the first; this is called a priming effect. By pairing an [r]-word with its [R]-word counterpart, we can determine whether the former effectively primes the latter for our participant population of Montreal francophones under 30.The stimuli were recorded by an older speaker (over 55 years old) and a younger speaker (under 25 years old). Should priming effects be observed, this design allows us to explore whether [r] is a more effective prime when it is produced by an older speaker, considering this is the singular context under which we expect our participants to have been exposed to the sound. This study explores (1) how variability in lexical representations are processed and stored, and (2) how socially meaningful categories, such as age, are indexed in the lexicon.

Attractiveness and Typicality in Imitation

Sophia Walters and Elizabeth Murphy (Faculty Sponsor: Dr. Molly Babel)

Phonetic imitation is the unconscious, spontaneous acquisition of speech characteristics of another talker. Past studies have shown that imitation strongly correlates with social preference and positive associations with specific vocal attributes (Babel 2010). Earlier work, however, predicts that novel

vocal characteristics also encourage imitation (Goldinger 1997). Albeit a highly variable phenomenon, imitation seems to play a large role in shaping spoken language. In this paper we investigate Goldinger's prediction that novel vocal characteristics encourage imitation. To explore this question we selected eight model talkers previously rated as attractive, unattractive, typical, and atypical for each gender (Babel et al., in prep.). The models produced fifteen monosyllabic words. Subjects were recorded producing baseline productions of those words and then listened to randomized blocks of the eight models and repeated the words aloud. We predicted that participants would exhibit increased imitation in the shadowed (post-exposure) productions. To measure phonetic imitation we used an AXB perception task (n = 145). An AXB task randomly sequences baseline and shadowed productions into triplets with productions from the models. Participants determined which production, baseline or shadowed, sounded more like the model. We found that females imitated more than men and that their degree of imitation was subject to the model. As Goldlinger predicts, atypical voices are imitated, especially the Least Typical Male model. Women imitated the Most Attractive Female, yet men did not imitate the Most Attractive Male. The results suggest that phonetic imitation is guided both by social preferences and novel information.

Talk Zombie to Me: Navigating Linguistic Theory in *Pontypool*

Nathanael Vass (Faculty Sponsor: Dr. Brian McIlroy)

The problem with *Pontypool* (Canadian director Bruce McDonald's 2008 film) is a linguistic one. It may seem a stretch to pair a zombie film with cutting-edge linguistic theory, but this is what McDonald and screenwriter Tony Burgess (based on his 1998 novel *Pontypool Changes Everything*) have done. When dealing in linguistics, it's nearly impossible not to discuss Noam Chomsky's theory of universal grammar. But the interesting thing about this film is that, where universal grammar theory is present, so is one of its primary detractors, the theory of linguistic relativity. The purpose of this paper will be to explore how, through the film, Burgess and McDonald are able to navigate these two opposing linguistic theories. It will be my argument that *Pontypool*'s linguistics reside in the liminal space between universalism and relativity, almost serving as a bridge between the two. *Pontypool* anticipates the hybridization of universalism and relativity that is gradually becoming a more popular school of thought in linguistics.

BioChemical Exposure and Toxic Effects to Living Species (IKBLC 157)

Effects of Developmental Ethanol Exposure on Motor Neurons in *Caenorhabditis Elegans*

Ken Ke-Chih Huang (Faculty Sponsor: Dr. Catharine Rankin)

Individuals affected with Fetal Alcohol Spectrum Disorder have abnormalities in the brain which lead to behavioral problems such as learning difficulties. This could result from alcohol damaging on the developing neurons. Due to technical challenges in examining individual neurons in live mammals, little is known about the molecular mechanisms underlying these neurological problems. Therefore, we used the model organism *Caenorhabditis elegans* to investigate for the effects of ethanol exposure on neuronal development. We found that the two vulval motor neurons were abnormal in > 95% *C. elegans* exposed to ethanol. The neurites of these neurons appeared to make detours and mistakes in the alcohol environment. In addition, the neuron anterior to the vulval slit has lower gene expression in 77% of the ethanol exposed worms, and the neurons posterior has excessive gene expression in 86% of the exposed animals. This suggests that ethanol exposure may alter gene expression levels differentially in the two neurons flanking the vulval slit. Together, these findings indicate that larval ethanol exposure can alter neurite development and gene expression levels in *C. elegans* and validates this model as a useful tool to screen for molecular mechanisms underlying ethanol-induced neurological defects.

Abnormal Grain Growth in Magnesium

Jennifer Peverelle (Faculty Sponsor: Dr. Chad Sinclair)

Abnormal grain growth is a common and well-known phenomenon in magnesium. During annealing, some grains may grow many times larger than surrounding grains, causing a severe heterogeneity in the microstructure and poor resulting mechanical properties. Little is currently known about the causes and evolution of abnormal grains. It is important to track the progression of abnormal grain growth so that the underlying microstructural mechanisms may be known, allowing abnormal growth to be better controlled. In this set of experiments, 2 mm thick hot rolled commercially pure magnesium sheet was cut and annealed at various times and temperatures. Mechanical polishing and electropolishing methods were then used to reveal grains for optical microscopy. Samples annealed at 300 C and 400 C for one hour showed no abnormal growth, while 400 C at longer times of four and nine hours displayed abnormal grains. In samples where abnormal growth was observed, there were also significant numbers of large grains on the outer edges of the samples. Further work is needed to determine what effect, if any, various degrees of deformation play on the development of abnormal grains in the microstructure.

Aversion to Isoflurane and Sevoflurane in Rats and Implications for Humane Euthanasia

Emma Strazhnik (Faculty Sponsor: Drs. Daniel M. Weary, I. Joanna Makowska, Geoffrey S.S. Nemeth)

Euthanasia is the most common laboratory procedure. For rodents, the most humane inhaled euthanasia agents identified to date are inhalant anesthetics, of which isoflurane has

been shown to be the least aversive. Sevoflurane is a new anesthetic to be used and has shown to be the least aversive inhalant anesthetic agent in humans and dogs; however, it has not yet been tested in rodents. The objective of this study was to compare rat aversion to isoflurane and sevoflurane to determine which agent is least aversive. We used an aversion-avoidance paradigm to test whether albino rats would choose to remain in a preferred dark compartment filling with isoflurane (5%) or sevoflurane (8%) or escape to a bright compartment, illuminated at 1600 lux. We found that 6 of 11 and 8 of 11 rats (P>0.2, Fisher Exact Test) remained in the dark compartment filling with isoflurane and sevoflurane, respectively, long enough to become recumbent during initial exposure. Comparatively, repeat exposure to the agents showed 4 of 12 and 7 of 12 rats (P>0.2, Fisher Exact Test) remained in the dark compartment filling with isoflurane and sevoflurane, respectively. These findings indicate that isoflurane and sevoflurane are both moderately aversive to rats, and that many rats find exposure to these agents to be less aversive than exposure to bright light. Although our results did not show a major difference between the two agents, these findings may provide insight into the aversive qualities of anesthetics as euthanasia agents and possible improvements in national euthanasia guidelines.

Humane Methods of Euthanasia in Zebrafish (*Danio rerio)*: A Comparison of Tricaine Methanesulfonate (TMS) and Clove Oil

Erin Greene (Faculty Sponsor: Devina Wong)

In recent years, the prevalence of fish use in laboratories has increased tremendously, with one of the most common fish species used being the zebrafish (*Danio rerio*). Although large quantities of these fish are being used and euthanized annually, the most humane method of euthanasia has not yet been determined. Tricaine methanesulfonate (TMS) is one of the most prevalent methods of euthanasia within Canada due to its approval for use with fish by the CCAC. Clove oil has been suggested as a natural alternative due to its current use as an analgesic in human dentistry along with the lack of scientific evidence supporting TMS as a stress-free method. The goal of this study was to determine which compound, when used in a concentration causing appropriate anaesthesia as specified by the CCAC, would provide the least amount of stress within zebrafish during anaesthesia. Ten zebrafish were immersed in three concentrations of clove oil (45mg/L, 55mg/L, 65mg/L) and buffered TMS (100mg/L, 150mg/L, 200mg/l). Behavioural indicators of aversion, such as piping and rapid opercular movement, were observed until consciousness was lost and the time was recorded. It was found that at the lowest concentration of TMS, over 90% of the fish regurgitated their food, while this behaviour was absent in the clove oil trials. Paired with other behavioural results, it can be inferred that clove oil causes a less stressful anaesthesia and can be considered a humane euthanasia alternative to TMS.

Genetics and Beyond: Investigating the biological factors in human disease and development (IKBLC 158)

Role of heme oxygenase---1 in breast cancer metastasis

Ada Kim (Faculty Sponsor: Dr. Kevin L. Bennewith)

This project examines the role of a protein called HMOX1 in the spread of cancer cells to distant sites in the body (metastasis), specifically in breast cancer. Poorly oxygenated (hypoxic) tumour cells reduce the effectiveness of cancer therapies and promote the development of metastatic tumours. It has been known that patients with tumours that contain hypoxic cells have increased metastatic disease and poorer prognosis. Preliminary data show that HMOX1 is regulated by a hypoxia-inducible factor called HIF---2α in mouse mammary cancer cells. Therefore we are interested in how HMOX1 affects metastasis. The role of HMOX1 in breast cancer metastasis was assessed by increasing HMOX1 protein levels in three different mouse mammary cancer cell lines that range in their metastatic phenotype using a chemical called hemin. Tissue culture---based methods were used to assess tumour cell migration and invasion through solid matrices. The migration abilities of the cells treated with hemin decreased significantly compared to the control. Furthermore, the cells with the highly aggressive metastatic phenotype invaded less in the hemin treatment compared to the control. This project explores whether HMOX1 represents a rational therapeutic target for the treatment of metastatic breast cancer. Determining the roles of hypoxia---regulated proteins such as HMOX1 in breast tumour cell migration and invasion is crucial to improving our understanding of breast cancer metastasis.

SOX9, a potential activator of *Wasf1* and *Cby1*

Hala Sharma (Faculty Sponsor: Dr. Pamela Hoodless)

SOX9 is a transcription factor that is expressed during embryonic heart development and is crucial in promoting heart valve maturation and growth. Although SOX9 is known to be expressed during heart valve development, there is little known on how it regulates gene development at this stage. Two genes, *Wasf1* and *Cby1* are expressed during embryonic heart valve development. Chibby, a nuclear protein, is expressed by the *Cby1* gene, at all stages of embryonic stem cell development but is particularly important for cardiomyocyte development through the Wnt/β-catenin signaling pathway. Wasp, a protein expressed by *Wasf1,* is involved in signaling pathways from membrane receptors to actin in the cytoskeleton. The objective of this study is to determine if SOX9 regulates the promoters of *Wasf1* and *Cby1* and affects their expression levels. We used the ChIP sequencing data of SOX9 DNA-binding sites at E10.5 of the mouse atrioventricular canal to evaluate the SOX9 peak regions to clone into a luciferase vector. A luciferase assay with HEK293T mammalian cell line will be used to observe the transcriptional regulation of *Wasf1* and *Cby1* with and without over expression of SOX9. We hypothesize that SOX9 will be a positive regulator of *Wasf1* and *Cby1* when bound to the promoter region.. Understanding SOX9 and the genes it targets during heart valve development may further our understanding and ability to create new therapeutic and diagnostic techniques to detect congenital abnormalities in the heart.

The in vivo effect of cycloxygenase-2 (COX-2) inhibition on tumor growth and tumor associated macrophage function

Natalie Firmino (Faculty Sopnsor: Dr. Gerry Krystal)

Macrophages are a subset of phagocytic immune cells and important mediators of tissue homeostasis. These cells have the potential to exert a broad range of functions depending on their activation state. Classically activated, or M1 macrophages, contribute to defense against invading pathogens and secrete factors that support inflammation, whilst alternatively activated or M2 macrophages suppress inflammation and promote wound repair. Solid tumors often harbour a microenvironment that skews macrophages towards an M2 state, causing the cells to contribute to tumor progression; thus, there is considerable interest in identifying ways of controlling macrophage activation. Cycloxygenase-2 (COX-2) is an enzyme that contributes to immune suppression and whose inhibition is known to slow tumor growth; however, the mechanism underlying this effect is not completely understood. This study assessed whether COX-2 inhibition affected the activation status of macrophages resident within the tumor. Mice were implanted with murine lung carcinoma cells and fed either control or COX-2 inhibitor containing chow. Tumor associated macrophages were later isolated and assessed for protein expression levels of known markers of M2 activation, Arg1 and Ym1. Along with significant reduction in tumor growth rate, COX-2 inhibition resulted in decreased Arg1 and Ym1 levels in tumor macrophages, suggesting the treatment suppressed M2 skewing in macrophages which potentially contributed to overall reduction in tumor progression. Current studies are now underway to combine this treatment with factors that may drive M1 activation and enhance the immune response against the tumor.

The genetics of sport behaviours: the role of DRD4 variants in sensation seeking.

Amelia Rajala (Faculty Sponsor: Dr. Jim Rupert)

Sensation seeking is the inclination to take risks for the pursuit of intense novel sensations and experiences. Impulsivity and sensation seeking are personality traits that have been associated with behaviours such as gambling and drug use in addition to high-risk sport participation. High-risk behaviours activate the brain's dopaminergic reward pathway; the release of dopamine causes feelings of excitement and pleasure. Sensation seeking is a heritable trait and we analyzed how common genetic variants may influence this behaviour in sport. Candidate genes for sensation seeking studies include those involved in the brain's dopaminergic system, such as the dopamine-4-receptor gene (DRD4). DRD4 contains many genetic variants. Some variants in the promoter region, including a 120 base pair duplication that we are currently genotyping, have been associated with lower transcriptional activity. Our team has previously analyzed the frequency of different genetic variants and personality scores in a high-risk cohort of skiers and snowboarders. We are now comparing personality trait scores (obtained by questionnaire) for sensation seeking and the frequencies of the DRD4 duplication between a high-risk sport cohort N= 127 (e.g. extreme skiers, skydivers and BASE jumpers) and a lower-risk sport cohort N=127(e.g. runners, rowers, cross country skiers) in both Canadian and French populations. Once genotyping is complete we expect to see a higher frequency of the DRD4 duplication in the high-risk cohort. Our studies aim to contribute to a better understanding of the genetic modulation of high-risk behaviours. This may contribute to the potential applicability of high-risk sport-based drug abuse interventions.

Chiasma localization as a constraint to chromosome fusions in *Habronattus* jumping spiders (Araneae: Salticidae)

Genevieve Leduc-Robert (Faculty Sponsor: Dr. Wayne Maddison)

Chromosome fusions, a common mechanism of karyotype change, can result in the evolution of neo-Y sex chromosomes. While some groups of species have highly conserved karyotypes, others seem predisposed to these fusions for reasons that remain unknown. White (1973) suggested that entelegyne spider karyotypes have remained constrained to an XXO♂/XXXX♀sex chromosome system because they possess chiasmata localized proximally, near the centromere. Proximal chiasmata could create disjunction difficulties at meiosis, and thus reduced fitness, for carriers of the fusion trivalent. Despite interest in the evolutionary forces guiding karyotypic conservatism, White's hypothesis remains untested. Some species of *Habronattus* jumping spiders possess 22+XXXY or 24+XXY systems, thus being an exception to karyotypic conservation in entelegyne spiders. Do these species show distalized chiasmata, as would be predicted from White's hypothesis? This study tested for a correlation between distalized chiasmata and the evolution of neo-Y chromosomes in *Habronattus*. We determined karyotypes of 72 *Habronattus* species by observing meiotic chromosomes from males. Chiasma localization was measured from photographs of chromosomes for 47 species. Using known molecular phylogenetic trees, we applied comparative methods to test for the correlation. We found a significant correlation between distalized chiasmata and XXY or XXXY systems, supporting the hypothesis that proximal chiasmata can act as a constraint in karyotype evolution. The distalization is stronger in species with a XXXY system than those with XXY, which we suggest might be an intermediate state between XXO and XXXY. [Reference: White M.J.D (1973) Animal cytology and evolution. Cambridge University Press, Cambridge]

Mental Health and Clinical Implications (Lillooet Room)

An Analysis of Continuity of Care for Children with Complex Chronic Conditions

Samara Mayer (Faculty Sponsor: Dr. William McKellin)

An increasing number of children in Canada have complex chronic conditions and receive care from a variety of sources, however efficiently connecting these methods of care has become increasingly difficult and is of concern in the current healthcare system. The concept of "continuity of care" has become a key component in the effective management of complex and chronic conditions. There have been few studies that focus on the concept from a pediatric care setting and few combine both practitioner and patient perspectives on the topic. The objective of this study is to synthesize parental and practitioner viewpoints and to provide quantitative analysis of patient charts to investigate how continuity affects the effective management of chronic pediatric conditions. The data collected for this study is drawn from a pediatric specialist clinic at Sunnyhill Children's Hospital in Vancouver where many of the clients have chronic conditions. Initially the clinical reports were analyzed to provide quantitative background data on the patients. Afterwards, a detailed analysis of five patient charts from the clinic was undertaken in order to track the formal clinical reporting process amongst practitioners. Semi-structured interviews were also conducted with a sample of parents of children who attend the clinic. I expect that the results of this study will provide an integrated perspective on continuity of care in pediatrics. These findings are relevant for current initiatives to improve the management of conditions for children with unique health care needs and suggest a need for new collaborative care models.

Perceived threat of infectious disease and its implications for conformist attitudes and behaviour

Houman Rashidian (Faculty Sponsor: Dr. Mark Schaller)

Threat has been linked to conformity, but little is known about the specific effects of different kinds of threat. The current study hypothesizes that the perceived threat of disease exerts a unique and perhaps especially potent influence on conformist attitudes and behaviour. Previous research reveals that regions with higher levels of pathogen prevalence are associated with populations that exhibit increased levels of conformity. These results, however, can be explained via mechanisms unrelated to individual psychological processes (e.g. genetic or cultural evolution). The current study assessed the perceived threat of disease using two approaches. One approach involved participants self-reporting their levels of chronic concern about infectious disease. The second approach randomly assigned each participant to one of three conditions. One made the threat of disease salient, one made non-disease threat salient, and one was unrelated to threat. Conformist tendencies were then evaluated using four different measures. These included self-report procedures (e.g. degree of liking for people with conformist traits) and behavioural tests of conformity (e.g. inclination to vote with majority). Correlational results supported the hypothesis; greater

chronic concerns about disease predicted significantly stronger conformity attitudes across two of the measures. These effects persisted when controlling for individual differences in other types of threat. The experimental manipulation also provided support as. participants in the disease salient condition displayed significantly enhanced conformity responses on two measures compared to control participants. Additional results suggest that these effects may be pronounced in specific instances of normative behaviour that are more strongly linked to pathogen transmission.

Investigating the Lateralization of Anxiety and Depression

Jennifer Kluftinger (Faculty Sponsor: Dr. Barbara Rutherford)

Depression and anxiety, together and separately, have a considerable impact on modern society. The current study centers on the lateralization of depression and anxiety, and will serve to increase our understanding of the development of these complex and multi-factorial thought processes. A leading theory in the field of laterality research, the valence model postulates that the right hemisphere of the brain is more competent at recognizing and interpreting negative emotions, while the left hemisphere is specialized for the recognition and interpretation of positive emotions. Under this interpretation, the assumption would be that both anxiety and depression (as negative emotions) would be best represented in the right brain hemisphere. However, recent evidence from studies conducted on post-stroke patients suggests that anxiety may not be lateralized. In this study, the lateralization of anxiety and depression between the brain's hemispheres was investigated. 60 undergraduate students viewed four categories of images from the International Affective Picture System: those normed for a depressive valence, a happy valence, a neutral valence, and an anxiety-inducing valence. A distracter was presented with each picture to allow a hemisphere to interpret the picture without the influence of the other, and participants' response time and number of errors made was measured. It was predicted that this experiment would show that depression is lateralized in favour of the right brain hemisphere, while anxiety is not lateralized. Preliminary results, however, showed the opposite pattern. Findings will be discussed within the context of the current literature, and future directions will be posed.

Spinal Cord Injury: Effects of myelin damage on tissue microstructure and MRI phase

Evan I Wen Chen (Faculty Sponsor: Dr. Alexander Rauscher)

One of the safest and most effective non-invasive methods for imaging biological tissue is Magnetic Resonance Imaging (MRI), which allows for techniques capable of assessing damage in the nervous system, including the brain and spinal cord. Much work has been done focusing on spinal cord injury (SCI). Approximately 86,000 people in Canada are currently living with SCI, and an estimated 4,300 new cases arise every year. Our study seeks to develop new methods of detecting and tracking SCI with the goal of discovering and treating SCI damage effectively. MRI signals are complex (magnitude and phase), and represent amplitude and frequency, respectively, of the measured response wave. While both data sets are collected together during a scan, clinical MRI applications mostly focus on magnitude data in favor over phase data. Studies in recent years have shown that phase can provide superior image contrast between tissue types in the central nervous system, especially between white and gray matter. The source of this contrast is believed to be related to tissue structure. In white

matter, axons are myelinated and organized into linear bundles, whereas gray matter is distributed in multiple directions. This study focuses on using MRI Phase techniques to study spinal cord damage in rat SCI models, and compares these results with a Myelin-related MRI technique: the Myelin Water Fraction (MWF). Injured cords are measured using high-field (7 Tesla) MRI and compared to healthy controls. Results indicate phase data is able to measure myelin damage up to 8 weeks after injury at high resolution and low noise. These results show good correlation with MWF and will be compared with histology. With over $3.6 billion in SCI-related costs annually in Canada, our goal is the ongoing evaluation of using phase to measure damage resulting from SCI, and to develop these techniques for clinical applications.

Brain Injury Patterns in Hypoglycemia in Neonatal Encephalopathy

Darren S.T. Wong (Faculty Sponsor: Dr. Emily W.Y. Tam)

Low glucose is often seen in term infants suffering from encephalopathy, yet hypoglycemia's relationship to the pattern of neurologic injury is unclear. The objective is to distinguish the predominant pattern of brain injury that results after neonatal hypoglycemia in the context of suspected hypoxic-ischemic encephalopathy (HIE). From 2004-2010, consecutive term newborns ($\geq$ 36 weeks) with clinically-suspected HIE had MR imaging at 72 hours $\pm$ 12 hours after birth. Patterns of HIE brain injury were assessed, including normal, watershed, basal ganglia, total, and multifocal predominant injury patterns. Selective posterior white matter edema with involvement of the pulvinar and anterior medial nuclei of the thalami was noted, indicating imaging-positive hypoglycemia. Clinical charts were reviewed for hypoglycemia (<46mg/dL) and severe hypoglycemia (<27mg/dL). Of 192 newborns, 179 had MR imaging and glucose data, with a mean of 8.6 glucose readings per subject. Sixty (34%) newborns had clinical hypoglycemia prior to MR studies. Using logistic regression analysis to adjust for 5-minute Agpar scores and umbilical artery pH, laboratory-confirmed hypoglycemia was associated with a 17.6-fold higher odds of identification on MRI (95%CI 5.7-54.2, P<0.001). Normal or watershed brain injury patterns were seen in 68% of subjects with severe hypoglycemia, and 41% of all watershed injuries had severe hypoglycemia. Imaging features of hypoglycemia, including selective posterior white matter edema with involvement of the pulvinar and anterior medial nuclei of the thalami, could be detected in addition to the predominant HIE injury pattern. Severe hypoglycemia was more commonly seen in normal or watershed patterns than in basal ganglia or total injury.

Biological factors in Mammals: Promoting longevity, health, (IKBLC 260) and nutrition

Intraspecific Meta-analysis of Maintenance Nitrogen Requirements in Mammals

Belinda To (Faculty Sponsor: Dr. Darin Bennett)

Until now, animal scientists have been focusing on one or two specific species for a single study, leaving research with recommendations for all mammals undiscovered. Many diets followed by farmers and trainers are made based on guidelines about food nutrition and not on knowledge about a specific animal's dietary needs. Without the needed nutrients in the body, animals will not be able to perform their regular functions to survive. The objective of this study was to analyze available maintenance nitrogen requirement (MNR) data of mammals to fulfill animals' specific nutrient requirements. Intraspecific meta-analysis of maintenance nitrogen requirements for 39 species was done to find intraspecific relationships. For 39 species, MNR was 1.02Mass0.815 ($R^2 = 0.89$, $P<0.00001$). Comparing eutherian (placental mammal) and marsupial (nonplacental mammal) species alone, MNR was 1.10Mass0.854 ($R^2 = 0.97$, $P<0.00001$) for 21 species, and 0.74Mass0.807 ($R^2=0.81$, $P<0.00001$) for 18 species respectively. Data shows a difference in eutherian and marsupial values due to differences between digestive physiologies, diet, and location. Over 100 published studies have been collected, and ongoing data entry as well as data collection is still currently in progress for other species. By looking at all mammals, management of uncommon animals in production will improve with known nitrogen requirements. Intraspecific meta-analyses will also allow for enriched animal management in animals of which we have a limited understanding by looking at relatives or similar species. This will allow for more adequate diets as well as healthy management of the animals.

Assessing Stress in Translocated Stephens' Kangaroo Rats Using Fecal Cortisol Concentration

Nancy (Shao-Tzu) Chen (Faculty Sponsor: Dr. Liv Baker)

Translocation is a popular strategy for conserving endangered species. The success rate of translocation programs, however, has been very low. Recent studies suggest this trend might be due to the intensity of the translocation process. To assess how individuals cope with translocation events, we examined fecal cortisol concentrations in a group of translocated Stephens' kangaroo rats, *Dipodomys stephensi* (N=140), in Riverside County, California. Specifically, for each individual, we recorded levels of fecal cortisol during different translocation stages including capture, captivity, pre-release acclimation and post-release periods. Our results show that cortisol levels in translocated *D. stephensi* increased significantly in captivity compared to wild samples. Females had a higher mean fecal cortisol concentration compared to males and individuals outfitted with radio transmitters had higher fecal cortisol levels. Additionally, source population affected overall fecal cortisol levels. As success rate is closely related to the level of stress animals experienced during translocation, these results might be predictive of post-release dispersal, survival and reproductive success of translocated animals. Conservation agencies would be able to mediate translocation programs through protocol

modifications. Improved handling is believed to generate higher success rates among programmes. The welfare of translocated animals would be enhanced both during and after translocation.

The Effects of Polyunsaturated Fatty Acid Diets on Intestinal Immunity in Mice

Daniella DeCoffe (Faculty Sponsor: Dr. Deanna Gibson)

Inflammatory Bowel Diseases (IBD) are a major concern in the Western Hemisphere. The excessive consumption of n-6 PUFA diets increases the risk of ulcerative colitis by 30%, whereas consumption of DHA (n-3 PUFA) reduces the risk of disease by 77%. Therefore, diets rich in n-6 PUFA may contribute to inflammatory disease, while n-3 PUFA may protect against them. However, some studies have shown n-3 PUFA to be beneficial while others have shown it to exacerbate colitis. In order to determine the effects of PUFAs on intestinal inflammation we fed post- weened mice corn oil (high in n-6 PUFA), corn oil and fish oil (high in n-3 PUFA) and high and low fat controls. We then inspected their intestinal tissues for inflammation both before and during colitis induced by *Citrobacter rodentium*. We used quantitative PCR and immunofluorescence to identify different inflammatory markers. Adiponectin, an anti-inflammatory protein hormone, was significantly decreased in the n-6 PUFA diets. Prostaglandin E2 (PGE2), a marker for inflammation was highly expressed in the n-6 PUFA diet during colitis but was not in the n-3 PUFA diet fed colitic mice. Lastly, Intestinal Alkaline Phosphatase (IAP), an intestinal brush border enzyme was decreased in the n-6 PUFA fed colitic mice compared to the n-3 PUFA fed colitic mice. Overall, our results suggest that diets rich in n-6 PUFA increase intestinal inflammation while n-3 PUFA diets are anti-inflammatory. This research could provide an adaptive approach to altering immune response through dietary lipid intake.

Pedometers as an effective method for estrus detection in dairy cattle

Liam Polsky (Faculty Sponsor: Dr. Ronaldo Cerri)

Selection for higher milk yield in dairy cattle has coincided with declined fertility. One contributing factor to declined fertility is the reduced expression of estrus behavior by cows. Failure to correctly detect estrus has been related to substantial annual losses for the dairy industry and has led to the development of activity monitors for estrus detection. The objective of this study was to determine the endocrine parameters related to physical activity during estrus through the use of a pedometer monitoring system. One-Hundred and fifty lactating Holstein cows from the UBC Dairy Education and Research Centre herd were selected for the study. Cows submitted for artificial insemination were monitored by a pedometer system and values were recorded in 2 hour increments, recovered by the reader twice daily after milking. Seven mL of blood were collected immediately after an increase in activity was detected by the pedometer system of the individual cow. Blood samples were analyzed for hormone content using an enzymatic colorimetric assay. We predict that we will find a decrease in progesterone concentration and an increase in estradiol concentration in blood during high activity periods of estrus, and that rise in concentration of estradiol in plasma will be positively correlated with intensity of activity and further fertility. The information presented by this study will be useful in the field for veterinarians and dairy producers as our information could be used to better understand estrus behavior in dairy cows and improve the efficiency of pedometers for estrus detection.

Repression of *Salmonella* Virulence: The Isolation and Characterization of Small Molecules with Inhibitory Activity

Melody Wang (Faculty Sponsors: Dr. L. Caetano M. Antunes, Dr. B. Brett Finlay)

Salmonella enterica serovar Typhi, a pathogenic serovar of *S. enterica,* is a major source of infection and the causative agent of typhoid fever, a life-threatening disease in humans worldwide. Purifying and characterizing molecules that inhibit *Salmonella* virulence can yield potential therapeutic treatments while also aiding our understanding of the complex signaling cascades involved in its virulence regulation. *Salmonella* virulence can be partially attributed to the PhoP/PhoQ two-component regulatory system, which controls the expression of many proteins vital for its growth and survival. Interestingly, physiological, but not commercial, murine and cow bile has been observed to repress *phoP* expression; this may indicate a previously unknown molecule present in physiological bile with inhibitory properties. Thus, the isolation and characterization of molecules with inhibitory activity is investigated to elucidate the mechanism of *Salmonella* virulence repression by bile. Purification of crude bile was conducted with resin cartridges and high-performance liquid chromatography, which allowed for separation of molecules based on variant chemical properties such as hydrophobicity. Bioactivity of purified fractions was measured through detection of fluorescence from a *Salmonella* reporter strain containing a fusion between the *phoP* promoter and green fluorescent protein (*gfp*). Data obtained from my study allowed for the isolation of a specific subset of small molecules with hydrophobic properties capable of *phoP* repression and I propose that the synergistic activity of multiple molecules is the likely mechanism for inhibition.

Footprints: The Human Impact on Animal Ecosystems (Dodson Room)

The importance of record keeping: an evaluation of wildlife records in non-specialized veterinary clinics

Cathy El-Hinn (Faculty Sponsor: Dr. Sara Dubois)

Each year, thousands of injured and orphaned wild animals are taken to wildlife rehabilitation facilities for treatment. It is essential that non-specialized veterinary clinics keep accurate and comprehensive records when taking care of wildlife temporarily. However, although considerable effort is being put into filling out records, it is not systematically recorded. An analysis is done on the wildlife records of an emergency animal clinic that accepts wild animals temporarily. The role of this hospital is to stabilize or provide humane euthanasia to displaced wildlife, prior to transfer to a rehabilitation facility. Transferred wildlife records are copied and sent to rehabilitation facilities, but records remaining in the clinic have never been analyzed. The aim of this study was to evaluate record keeping performance and the outcomes of the wild animals after receiving treatment. To do this, wildlife records from April 2010 to August 2011 were examined. Time periods over two five-month durations, one calendar year, and two nesting season were compared. Several factors were evaluated, including: treatment time and outcomes (euthanasia or transfer). Results indicate that the mean time for treatment was 1.97 hours while outcome time was 24.52 hours. Approximately 49.9% of animals were euthanized and 39.9% were transferred. However, 33.7% of the data in the records is not adequately recorded. To increase efficiency, a new intake form will be recommended as a result of this research. Efficient record keeping is a key component in managing admitted wildlife. This is especially important when the information is shared with other facilities.

Modeling Cumulative Human Impacts on an Ecosystem Service of Coastal British Columbia

Erin Crockett (Faculty Sponsors: Dr. Rebecca Martone / Kai Chan)

Degradation of coastal ecosystems is intense and increasing. Since many areas are now impacted simultaneously by multiple human activities, coastal managers have begun to adopt ecosystem-based management, an approach which focuses on cumulative impacts of multiple stressors. Ecosystem-based management also strives to maintain healthy and resilient ecosystems which can sustainably provide the ecosystem services that are essential to human well-being. Previous coastal management approaches have often relied on qualitative risk assessments. There has been little research quantitatively studying cumulative human impacts on ecosystem services, or the coastal impacts of land-based human activities. In this modeling study, statistical models from published literature were developed in order to quantify the nitrogen inputs to coastal British Columbia from forestry and sewage discharge. These models were then combined with previously developed models, for agricultural nitrogen runoff and for nitrogen concentrations causing closure of shellfish tenures, to evaluate cumulative human impacts on shellfish provisioning, an important economic and cultural ecosystem service for British Columbia. Applying these models in a geographic information system provided quantitative, spatially explicit information about the relative risks of agriculture, forestry activities, and sewage to shellfish provisioning. Preliminary results suggest that although relative risks vary by location, they trend from lower to higher through: forestry, agriculture, and sewage. Overall, this research shows the relative magnitudes and locations of human impacts,

furthers understanding of cumulative human impacts, exposes uncertainties in current knowledge of these pathways, and will help guide implementation of successful coastal ecosystem-based management.

Do indoor-housed dairy cows have a preference for a calving site?

Kathleen Ma (Faculty Sponsor: Katy Proudfoot)

Wild and free-roaming ungulates will seek isolation from the herd prior to parturition. However, conventional dairy farms do not allow for the expression of this behaviour, possibly posing a welfare issue. The objective of this study is to determine if indoor-housed dairy cows have a preference for complete or no visual cover in their chosen calving location, and if this preference would be influenced by the time of day of calving. Thirty-five Holstein dairy cows were introduced into one of 4 experimental pens at least three days prior to their expected calving date. Each pen contained two sawdust bedded packs; one with no visual cover (open pack), and one with a plywood barrier lining the parameter, with an opening for cows to enter and exit (enclosure). Video cameras were placed above each pen. To determine preference for calving location, comparisons were made between the percentage of cows that calved in the open pack and the enclosure. We found that 60% (21/35) of cows calved in the enclosure. Of these, 62% (13/21) calved in the daytime between 0900 and 2059. In comparison, 79% (11/14) cows calving in the open pack did so in the evening (2100 to 0859). These results indicate that cows have a slight preference for calving with cover. However, this choice may be affected by the time of day of calving, perhaps due to the level of human activity.

The relative importance of predation and eutrophication on eelgrass benthic food webs in British Columbia

Sarah Amundrud (Faculty Sponsor: Dr. Mary O'Connor)

Eelgrass (*Zostera marina*), one of the northern hemisphere's most common marine plant, acts as a crucial habitat provider to animals like waterfowl, fish, and invertebrates, as well as epiphytes (microscopic algae growing on eelgrass blades), which are an important food source for many organisms. Throughout the world, eelgrass is declining at an alarming rate. Coastal eutrophication (the artificial addition of nutrients) and overfishing can both result in increased epiphyte densities, which can become harmful to eelgrass. Eutrophication may directly increase epiphytes by providing them with excess resources (a bottom-up process), while overfishing may indirectly increase epiphytes by causing a change in species composition that leads to a reduction in animals feeding on epiphytes (a top-down process). However, the relative importance of these two factors on the eelgrass food-web structure in British Columbia is poorly understood. In Tsawwassen, BC, we experimentally excluded intermediate predators, like large crustaceans and small fish, and measured the impact on their prey, small invertebrates, including epiphyte grazers. In addition, we determined the effects of nutrient addition, as well as the combined effects of nutrient addition and predator exclusion, on the eelgrass invertebrate community. Intermediate predator exclusion decreased invertebrate abundance and richness, but increased invertebrate diversity. Nutrient addition increased the abundances of the invertebrate community, and had no significant effect on diversity. These results provide insight into the relative importance of two common perturbations to eelgrass communities in British Columbia.

Reducing water usage in civic parks using adaptive irrigation

Ryan Trenholm: (Faculty Sponsor: Dr. Ramon Lawrence)

It is estimated that between 60% to 70% of municipal water is used for irrigation. Climate change and population growth demand more efficient management over water usage. Current irrigation systems struggle to adapt to site specific variations in climate and soil conditions. An adaptive irrigation control system was developed that incorporates wireless soil moisture sensors and provides real time user feedback. The system was hypothesized to save water by adjusting to current soil conditions and by only irrigating when necessary. The system was deployed on a large scale in a municipal park. The adaptive controller was connected to an existing water budget based controller and the wireless soil sensor network was established in the park. The existing watering behaviours were monitored before the adaptive system was activated. The adaptive controller used the soil moisture readings to irrigate only when necessary. A website was developed to provide real time user feedback. This included the latest soil moisture readings, an overview of the total water savings, and interactive graphs for the history of soil moisture readings and watering events. Significant water savings were realised compared to an accepted water budget model. The total savings were 210,000 litres of water, which was a 47% reduction in water usage. These savings were achieved without introducing unwanted turfgrass stress. Unlike the water budget controller, the adaptive irrigation controller adjusts for seasonal variations in soil water demand and compensates for site specific climate variations.

Poster Presentation Session

Alex Ng: Global Analysis of the Protein Quality Control Pathways that Target Misfolded Proteins for Degradation

Ali Majdzadeh: Demographic Characteristics and Prior Contraception Experience among Women Enrolled in a Trial of Immediate vs. Delayed Insertion of Intrauterine Contraception after Second Trimester Abortion

Amy Tan: Charting the Territory: Feeding Difficulty in Children with Life-Threatening Conditions

Anne Peterson: Marshall Chang and his Jades: A Study of Social Relations as Materialized in Jade Usage of the Shang Dynasty

Arjun Nanda: Yoga as a Complementary Therapy for Bipolar Disorder in Perinatal Women

Catherine Steer: Cycling, Air Pollution and Health: Oxidative stress as a mediator of systemic inflammation

Dorri Mahdaviani: Infiltration of Blood-Derived Monocytes Triggers Disease Progress in Experimental Autoimmune Encephalomyelitis (EAE)

Ian Wong: Simvastatin therapy in a castration-resistant prostate cancer cell line reduces cell viability

Jeremy Caron: Development of a Real-Time Polymerase Chain Reaction Method for the Quantification of Prunus Necrotic Ringspot Virus

John Wu: Towards the Identification of a Novel Obesity-Promoting Gene in BTBR strain mice

Joo Sung (Daniel) Shim: Selection of Marine Compounds That Enhance Immunotherapy towards Cancer

Jordon Lui: The mechanical efficiency of lever-propulsion in wheelchair locomotion

Judy Xu: Mind Wandering and Attenuation of Empathetic Response to Pain

Kristen Chan: Subcellular localization of ELT1, a putative plant lipid trafficking component

Leanne Feichtinger: Mixed Methods: Studying the Impact of Participating in a Pediatric Palliative Care Study

Lisa Fussell: The Effect of Temperature and Humidity on Growth and Development of the Black Soldier fly, *Hermetia illucens* (Diptera: Stratiomyidae:)

Michael Gosselin: Psychoacoustic Metrics for Predicting Subjective Perceptual Quality of Informal Learning Spaces

Sepehr Nassiri: Neural circuit integration: Plasticity between three behaviours with shared circuitry in the nematode C. elegans

Sourash Liaghat: The effect of plant hormones and chemical inhibitors at different concentrations and their interactions on Hypocotyl and cell growth in Lettuce (*Lactuca sativa*) Seedlings

Susana Contreras: In Vitro dynamic lipolysis model: Assessment of the effect of cholesterol absorption inhibitors on the extent of lipolysis of triglyceride

Tess Walker: A passing acquaintance's impact: Interacting with weak social ties affects well-being

Willie Kwok, Albertina Wong: Bioinformatics analysis of gene expression in Fetal Alcohol Spectrum Disorder (FASD) and Autism Spectrum Disorder (ASD)

Yang (Linda) Liu: Correlation between proficiency of eye drop administration and postoperative complications in cataract patients in Ghana

Zhenxinyu (Derek) Zhang: The Power of Feedback in Reducing Stereotype Threat

Global Analysis of the Protein Quality Control Pathways that Target Misfolded Proteins for Degradation

Alex Ng (Faculty Sponsor: Dr. Thibault Mayor)

Many neurodegenerative diseases are characterized by the accumulation of misfolded proteins. These misfolded and aggregation-prone proteins are often ubiquitylated by protein quality control pathways as a signal to be degraded to avoid accumulating in the cell. A major question is: are all misfolded proteins equally detected by ubiquitylation or is a subset of the proteome more readily affected? To answer this, we used quantitative mass spectrometry to identify hundreds of proteins that are ubiquitylated after heat-shock in yeast cells. Using computational methods, we determined whether specific features were enriched among these proteins. We discovered not only thermodynamically unstable proteins, but also a group of intrinsically disordered proteins - proteins without tertiary structure - were susceptible for ubiquitylation. These proteins are tightly regulated and are dispensable for cell viability, hinting they are evolutionarily young proteins in the folding continuum. Subsequent experiments show these proteins also aggregate and have accessible protein-binding regions. Our model suggests that it is these regions that promote ubiquitylation and potentially clearance of protein aggregates: these domains do not form three-dimensional structures, they remain accessible to the protein quality control machinery, while other proteins collapse into an aggregate. These findings reveal novel properties of the protein quality control pathways that target misfolded proteins for destruction: misfolded proteins not only have to be recognized, but also accessible in an aggregate, to be ubiquitylated for degradation. These insights may identify new points of intervention for protein misfolding diseases.

Demographic Characteristics and Prior Contraception Experience among Women Enrolled in a Trial of Immediate vs. Delayed Insertion of Intrauterine Contraception after Second Trimester Abortion

Ali Majdzadeh (Faculty Sponsor: Dr. Wendy Norman)

Women seeking second-trimester abortion are disproportionately from marginalized populations and are at high risk for recurrent unintended pregnancy as 38% have had at least one previous abortion. The most effective contraception is forgettable, requiring no user attention for at least three years. The intrauterine contraception (IUC) is effective, but is inserted 4-6 weeks post-abortion to minimize risk of expulsion. Although the expulsion rate is thought to be nominally greater than for immediate insertion, as few as 26% of women return for delayed insertion. A randomized controlled trial (RCT) has been implemented to assess whether intrauterine contraception placed immediately after a second trimester abortion will result in fewer pregnancies than current recommended practice of intended placement at 4 weeks post-abortion. 716 women are randomized to insertion immediately or 4 weeks post-abortion and choose their preferred IUC between either Levonorgestrel-releasing Intrauterine Contraception (LNG-IUC) or FlexiT380+ Intrauterine Contraception (CuT380-IUC). Through Contraception Satisfaction Questionnaires (CSQ) filled out by participants during enrollment, the contraceptive experiences of these women are registered. CSQ data indicates that participants experienced barriers and difficulties in achieving adequate contraception. Women in the study population tended to have a low level of socio-economic status and educational background, and although nearly all had used prior contraception, most were not using a highly effective method at the time of the current conception. Among women using highly effective methods, such as oral

contraceptives, most reported difficulties in achieving consistent use. IUC users expressed the highest levels of satisfaction with their contraceptives.

Charting the Territory: Feeding Difficulty in Children with Life-Threatening Conditions

Amy Tan (Faculty Sponsor: Dr. Hal Siden)

Charting the Territory is a longitudinal study focusing on children with untreatable life-threatening illnesses. Conditions studied include metabolic disorders, neurodegenerative disorders and chromosomal disorders. Children with these types of life-threatening conditions often suffer from feeding difficulty which could affect growth and development. To describe the number of children with feeding difficulty, distress associated with feeding difficulty, duration of feeding difficulty and the presence of any nutritional interventions at baseline. Feeding difficulty for orally fed and tube fed children were examined. At baseline, parents reported the presence, frequency and distress of feeding difficulties within the last week and when the feeding difficulty first appeared. Health records were used to determine the presence of nutritional interventions at baseline. In total, 180 children (52.2% girls (n=94) and 47.8% boys (n=86)) were included in the analysis. Their average age is 7.4 years old (SD=5.2). At baseline, 45.0% (n=81) of the children experienced feeding difficulty within the last week. Of the children with reported feeding difficulty, 67.9% (n=55) had feeding difficulty most of the time and 39.5% (n=32) experienced a high level of distress as a result of the feeding problems. On average, the children with reported feeding difficulty first experienced the symptom 4.3 years (SD=3.9) prior to baseline. Review of medical health records indicate 55.0% (n= 99) of all children had a gastrostomy or jejunostomy feeding tube at baseline. The preliminary results suggest that children with untreatable life-threatening illnesses often experience feeding difficulties that may cause a high degree of distress. Over half of all the children relied on nutritional support at baseline.

Marshall Chang and his Jades: A Study of Social Relations as Materialized in Jade Usage of the Shang Dynasty

Anne Peterson (Faculty Sponsor: Dr. Zhichun Jing)

This research aims to achieve a better understanding of the role of jade in Late Shang society, a Chinese Bronze Age civilization dating to the late second millennium BC. Jade has held great cultural significance in China for at least 8,000 years. With its distinct material qualities such as toughness, the use of jade embodies unique information about the people and society which it was part of. The artefact jades considered in this research were excavated from tomb M54, one of only two un-looted royal tombs found at Anyang, the royal capital of the late Shang Dynasty. The principal occupant is identified to be "Marshall Chang", the name inscribed on nearly two-thirds of more than 200 bronze vessels and weapons found in the tomb. Among thousands of burial goods are more than 220 jade artefacts, mostly ceremonial objects and ornaments. This is a rare research opportunity, given that both the spatial and historical context of the jade artefacts is known. Methods of study include designing a system of classification for visible traits, taking infrared spectroscopy measurements to analyze mineralogical composition, and making dental mould impressions for the study of drilling techniques and use-wear using scanning electron microscopy. This study discusses the material qualities exhibited by jade artefacts through scientific analysis to address questions of how the stone's properties were perceived, symbolized, and functioned in social relations.

Yoga as a Complementary Therapy for Bipolar Disorder in Perinatal Women

Arjun Nanda (Faculty Sponsor: Dr. Shaila Misri)

Bipolar disorder (BD) in the perinatal period is correlated with increased risk of mood episodes (60-70%) and is often comorbid with other mental health disorders. Multiple treatment approaches are often required to restore functionality. Pharmacotherapy has been proven effective for BD; however, several barriers may present themselves to accessing this treatment. Alternative therapies, often more cost-effective and easier to access, may be recommended by clinicians alongside standard treatment. Patients themselves tend to be receptive to adjunctive therapies, including yoga, which has been correlated with improved functioning in depressed populations. BD spectrum is characterized by fluctuating moods of mania and depression, with those experiencing BD I spending more time in the manic phase and those with BD II experiencing more bipolar depressive episodes. Thus, effective treatment for perinatal unipolar depression may indicate treatment possibilities for BD. Relevant online databases were searched using a combination of words specific to yoga and BD in the perinatal period. 31 articles were reviewed. No articles to date examine yoga therapy for BD in perinatal women. Reviewed articles showed reductions in anxiety and mood disorder symptoms, cortisol levels, and stress after yoga therapy. Yoga was also found to be correlated with lower relapse rates and faster remission times. Possible mechanisms of actions are discussed, and multiple yoga styles are compared specifically for the perinatal period. While current literature suggests yoga as a potential treatment with long-term benefits for BD, more research is required particularly for the perinatal population.

Cycling, Air Pollution and Health: Oxidative stress as a mediator of systemic inflammation

Catherine Steer (Faculty Sponsor: Dr. Michael Brauer)

Cycling is promoted as a healthy active transportation choice, but by sharing roads with automobiles, cyclists may be exposed to elevated levels of air pollution. Investigations of air pollution in traffic-dense areas have linked particulate matter exposures to systemic inflammation, which can lead to cardiovascular morbidity and mortality. It has been hypothesized that this inflammation results from oxidative stress (pulmonary imbalance of reactive oxygen species). The goals of this study were to examine associations between measures of air pollution, oxidative stress and systemic inflammation, to assess potential consequences of increased air pollution exposure amongst healthy cyclists to provide information needed by cities when building cycling infrastructure, and to investigate oxidative stress as a mediator of observed effects. Thirty-eight young healthy cyclists participated in a randomized crossover study in which they cycled for 1 hour along routes with higher and lower traffic intensity in Metro Vancouver. For each ride, systemic inflammatory markers interleukin-6 (IL-6), C-Reactive protein (CRP) and endothelial dysfunction (measured by reactive hyperemia index, RHI); and the oxidative stress marker 8-hydroxy-2′-deoxyguanosine (8-OHdG) were measured. 56% higher levels of mean ultrafine particle levels were seen on the route with more traffic. Route type affected RHI, to a lesser degree IL-6 and 8-OHdG in the hypothesized directions, but did not affect change in CRP. These measurements suggest that cycling in regions of relatively increased particulate air pollution may have an acute adverse effect on endothelial function (a predictor for cardiovascular disease) but whether or not this is mediated through classical pathways of inflammation and oxidative stress remains unclear.

Infiltration of Blood-Derived Monocytes Triggers Disease Progress in Experimental Autoimmune Encephalomyelitis (EAE)

Dorri Mahdaviani (Faculty Sponsor: Dr. Bahareh Ajami)

Microglia, the principal immune cells of the Central Nervous System (CNS), are exquisitely sensitive to CNS injury and disease, fuelling a reactive state called icrogliosis. We have used parabiosis, a surgical procedure that allows the creation of eripheral blood chimeras without transplantation, to show that unlike most other tissue-resident macrophages that rely on circulating blood-borne precursors for their replacement, microglia are capable of self-renewal within the CNS. In contrast, certain inflammatory pathological conditions such as multiple sclerosis and its murine model, experimental autoimmune encephalomyelitis (EAE), are known to lead to the recruitment of inflammatory monocytes to the CNS. Is the entry of these cells, normally excluded from the CNS, a causal factor in disease progression? To address this question we developed a new experimental model, based on parabiosis and differential bone marrow irradiation, which allows the precise distinction between peripheral blood derived monocyte/macrophages and resident microglia, thus enabling us to investigate the kinetics of microglia activation, blood born monocytes entry in the CNS and their differentiation into macrophages during EAE progression. Our data reveals a dynamic interplay between macrophages and microglia and strongly supports a causal link between myelomonocytic cell invasion and disease progression. In summary, our data identifies the invasion of circulating monocytes into the CNS parenchyma as a major adverse event in EAE progression, supporting therapeutic strategies specifically aimed at inhibiting the migration of myelomonocytic cells rather than that of leukocytes in general.

Simvastatin therapy in a castration-resistant prostate cancer cell line reduces cell viability

Ian Wong (Faculty Sponsor: Dr. Kishor Wasan)

Prostate cancer is the second leading cause of cancer-related death in Canadian men. Its development is linked to androgen-receptor activation by androgens. Thereby, hormone therapy is an effective treatment, as it serves to systemically reduce androgens. However, the disease re-emerges as the lethal castration-resistant prostate cancer (CRPC). Cholesterol is a necessary precursor for the synthesis of androgens. HMG-CoA reductase is the rate-limiting enzyme in cholesterol biosynthesis. Statins, a class of HMG-CoA reductase inhibitors, act to decrease cholesterol biosynthesis; however, the relationship between statin therapy and CRPC management has yet to be explored. This study investigated the potential impact of Simvastatin therapy in CRPC, by examining its effects at physiologically relevant concentrations in CRPC cells (C4-2). C4-2 cells, a CRPC cell line, were treated with or without Simvastatin at 10uM or 50uM for 24 hours. Scintillation counting of radiolabelled [^{14}C] cholesterol confirmed decreased cholesterol synthesis post-Simvastatin treatment. LDH cytotoxicity, MTS viability and prostate specific antigen (PSA) assays were conducted to assess the effect of Simvastatin therapy. C4-2 cells treated with Simvastatin for 24 hours, at concentrations of 10uM and 50uM, showed a reduction in cell viability and a trend of decreasing PSA levels, while cytotoxicity was not observed. A significant reduction in C4-2 cell viability and a decreasing trend of PSA levels following Simvastatin treatment may be attributed to insufficient cholesterol for androgen synthesis and highlights the complexity of the C4-2 cell survival mechanisms and the need for further investigation. Statin integration could change the guidelines on prostate cancer treatment.

Development of a Real-Time Polymerase Chain Reaction Method for the Quantification of Prunus Necrotic Ringspot Virus

Jeremy Caron (Faculty Sponsor: Dr. Chris French)

Prunus Necrotic Ringspot Virus (PNRSV) is a pathogen of sweet cherries (*Prunus avium*) that has an economic impact on the fruit tree industry. The study of PNRSV would be facilitated by developing a sensitive method to measure the virus concentration in a way that is efficient, inclusive of different strains (comprehensive), and exclusive of similar virus species (specific). Current scientific knowledge includes a number of methods for the detection of this virus, but none meet all the requirements above. Real-time polymerase chain reaction (qPCR) is a new technique that can be used to determine the copy number of specific nucleic acid sequences in a sample. It has been commonly used in medical research to determine the concentration of human viruses. The goal of this project is to develop an effective qPCR assay for the quantification of PNRSV in sweet cherry tissues. By aligning known nucleic acid sequences of genetically distinct PNRSV strains, similar regions of the genome can be identified and used to design reaction components that allow for comprehensive detection of PNRSV. The assay is then tested on closely related virus species to demonstrate specificity. Results to date reflect the quantitative nature of several design schemes for this assay, as well as its potential to differentiate between distinct strains of PNRSV. Once the qPCR method has been fully optimized, it will be suitable for publication in the Journal of Virological Methods.

Towards the identification of a novel obesity-promoting gene in BTBR strain mice

John Wu (Faculty Sponsor: Dr. Susanne Clee)

Obesity is a world-wide epidemic and the prevalence of obesity has increased tremendously in the last decades. Currently over half the Canadian population, and greater than 1 billion individuals world-wide, are overweight or obese. Obesity is a major risk factor for many diseases including heart disease, type 2 diabetes, high blood pressure, cancer, sleep apnea, and infertility. Although we have made many advances in understanding the pathways underlying the regulation of food intake and metabolism, the specific defects that cause obesity are largely unknown. Genetic factors play a large role in determining which individuals will develop obesity in the context of lifestyles with diets high in fat and calories and reduced exercise; however, the identities of most of these factors are unknown. My research goal is to identify a novel obesity-promoting gene and to study its function. This gene was mapped in a cross between the BTBR and C57BL/6 inbred mouse strains. The underlying gene causes an approximately 10% increase in body weight in BTBR mice, compared with C57BL/6 mice. By measuring body weights of various recombinants of BTBR and C57BL/6 mouse crosses, the gene locus can be systematically narrowed down. Current evidence has implicated three candidate genes, none of which have previously been identified as obesity-promoting. Current studies involve sequencing these genes to search for mutations, measuring body fat content of the various BTBR and C57BL/6 mouse recombinants, determining gene expression in specific tissues, and understanding the physiological mechanisms by which the gene may affect body weight.

Selection of Marine Compounds That Enhance Immunotherapy towards Cancer

Joo Sung (Daniel) Shim (Faculty Sponsor: Dr. Wilfred Jefferies)

Detection of cancer cells by the immune system is important in cancer treatments. In normal circumstances, tumor-associated antigens bind to major histocompatibility complex class I (MHC

class I) and the antigen-MHC class I complex can be recognized by cytotoxic T cells, resulting in elimination of the cell. In various cancer cells, however, the expression of transporter associated with antigen presentation (TAP)-1 molecule, a key component for appropriate MHC class I processing, is deficient; this leads to suppressed presentation of tumor-specific antigens, resulting in the escape of the abnormal cells from immune system. Previous studies showed that up-regulation of TAP-1 restores the MHC class I presentation and subsequently contributes to the elimination of cancer cells. Currently, there are no reliable medications that restore the expression of TAP-1 and feasible to humans. This study aims to identify compounds that up-regulate the expression of TAP-1 and that could possibly be used in cancer immunotherapy. Cancer cells transfected with a plasmid containing TAP-1 promoter linked to enhanced green fluorescent protein (EGFP) are used in our screening assay in a 96-well plate and subsequently treated with marine invertebrate extracts. The plate is then analyzed via Cellomics Arrayscan automated fluorescence imager to quantify EGFP fluorescence intensity as a measurement of TAP-1 up-regulation. Preliminary experiments with positive control stimulation resulted in increased EGFP fluorescence intensity as expected, which then means restoration of TAP-1 expression. The findings from this study are expected to be significant in biomedical research and may contribute to the development of effective cancer immunotherapies.

The mechanical efficiency of lever propulsion in wheelchair locomotion

Jordon Lui (Faculty Sponsor: Dr. Bonita Sawatzky)

Conventional wheelchairs are designed with hand-rims for manual propulsion. However, this hand-rim propulsion style has been shown by numerous studies to be energetically wasteful. This in part explains the large cardio-pulmonary strains associated with typical wheelchair operation. Along with an individual's injury, a limited physical work capacity and restricted mobility may hinder active participation and rehabilitation efforts due to excessive fatigue or discomfort from conventional wheelchair use. It is therefore important to improve the efficiency and reduce the physical strain of wheelchair ambulation. The wheelchair-user interface can be optimized to reduce power loss by improving ergonomics, or by increasing the effectiveness of power transfer through alternative modes of propulsion. This has led to alternative wheelchair designs that utilize lever-propulsion mechanisms. In such designs, the mechanical advantage afforded by the levers may allow for a more efficient application of force to the wheels. The objective of this study is to evaluate and compare the mechanical efficiencies of lever-propelled wheelchairs versus conventional wheelchairs that utilize hand-rim propulsion. Energy expenditure is measured using indirect calorimetry while subjects perform graded exercise tests with different wheelchair designs. Gross mechanical efficiency is determined by comparing this energy expenditure with the external power of each wheelchair (as determined by an external force transducer). Preliminary data suggest that lever-propelled chairs have higher mechanical efficiencies at all workloads, compared to hand-rim propulsion. Lever-propelled wheelchairs may be a viable option for wheelchair prescription in order to increase the efficiency of wheelchair locomotion and to increase active participation.

Mind Wandering and Attenuation of Empathetic Response to Pain

Judy Xu (Faculty Sponsor: Dr. Todd Handy)

Everyone engages in mind wandering, with some more regularly than others. Mind wandering can be considered as thinking about things other than the task or environment at hand (Smallwood & Schooler, 2006). Previous studies have linked mind wandering with reduced sensory processing in

auditory and visual domains (Braboszcz & Delorme, 2011; Kam, et al., 2011). Moreover, it has been found to reduce cognitive processing of external stimuli, marked by reduced event-related potentials (ERP) amplitudes (Smallwood, et al., 2008). In short, when people mind wander, they become less aware of the external environment. Many questions have yet to be answered about the implications of mind wandering, with one being how emotion and the processing of emotionally-charged stimuli change when mind wandering.To this end, the goal of this proposed research is to examine the interaction between attention state - on-task or mind wandering - and one's empathetic response to pain. Previous research using ERPs have shown increased neural activation when looking at painful versus neutral pictures (Fan & Han, 2008). Additionally, there was increased neural activation or larger ERP amplitudes when participants judged the photos from a first-person perspective versus when they counted the number of hands in the photos. Given these differences in empathetic response due to changes in perspective, along with research supporting the idea that mind wandering leads to diminished cognitive processing (Smallwood, et al., 2008), it is predicted that engaging in mind-wandering will lead to a reduced empathetic response to painful images.

Subcellular localization of ELT1, a putative plant lipid trafficking component

Kristen Chan (Faculty Sponsor: Dr. Lacey Samuels)

All cells are defined by a lipid membrane, and cells of higher organisms (eg. plants & animals) use lipid membranes to compartmentalize different functions. The transport of lipids from their site of synthesis within the endoplasmic reticulum (ER) to their target destinations is crucial for this compartmentalization and therefore proper cell function. There are two mechanisms by which lipids are trafficked between distinct membranes: incorporation into vesicles, or non-vesicular transport via specific proteins (D'Angelo, 2008). When the ER comes into close contact with other membrane-bound compartments, membrane contact sites (MCS) occur which potentially allow for non-vesicular trafficking of lipids (Levine and Loewen, 2006). Recent research has found evidence of a protein complex involved in linking the ER and mitochondria in yeast (Kornmann et al., 2009), possibly for non-vesicular traffic. In the model plant, *Arabidopsis*, mutants in one of these components, ER lipid transfer (ELT)1, display severe growth and developmental phenotypes. However, other experiments suggest distinct functions of plant and yeast ELT1 (McFarlane, unpublished). In order to provide further insight into the role of ELT in plants, I have generated a functional and fluorescently tagged ELT1 protein to complement the *elt1* mutant phenotype. The *ELT1* coding sequence has been cloned into vectors containing various fluorescent proteins and have been transformed into *elt1*, GFP-HDEL (to be used as a ER marker and observed in parallel), and wild-type plants. The localization of these fusion proteins will be determined using confocal microscopy. ELT1 localization can provide important information about the role of ELT1 in plant cells and lead to futher experiments that can be used to determine its function.

Mixed Methods: Studying the Impact of Participating in a Pediatric Palliative Care Study

Leanne Feichtinger (Faculty Sponsor: Dr. Harold Siden)

Charting the Territory is a longitudinal study with sites in 9 cities across North America. Eligible participants are the families of children with rare and progressive life-threatening diseases. Parents answer monthly surveys concerning their affected child's clinical symptoms, as well as various bio-psycho-social measures semi-annually. Participants complete an impact of participating in the study

questionnaire one year after enrolment and again at the conclusion of the study, with respondents answering questions regarding their reasons for involvement and how participation has affected them. While previous studies have similar assessments of participation, it is a fairly small body of research which lacks evaluation of a longitudinal study design. We describe results from 86 parents who completed the participation survey after one year. The responses were overwhelmingly positive, with 0% reporting the study had a negative impact on them. 95% reported considering research in this field valuable, with the majority stating the research was "very valuable". Although some respondents found the study at least somewhat painful (33%), none reported regretting participating and 89% would recommend participating in a similar study to other parents. Responses to an open-ended, qualitative question are also analyzed and classified according to themes. The positive response to participating in studies should be encouraging to researchers in pediatric palliative care, an emerging field with relatively little research. Suggestions made by parents could be taken into consideration when planning future longitudinal studies in this field to minimize negative impact on participants.

The Effect of Temperature and Humidity on Growth and Development of the Black Soldier fly, *Hermetia illucens* (Diptera: Stratiomyidae:)

Lisa Fussell (Faculty Sponsor: Drs. Yasmin Akhtar, Murray Isman)

The objective of this research project was to determine whether the Black Soldier Fly, *Hermetia illucens*, can grow and develop in a much more temperate (lower temperate and humidity) climate than their natural tropical habitat. BSF could become a major player in green research due to their ability to quickly reduce organic matter, with a potential implication being their replacement of composting machinery that currently costs millions of dollars. This project was conducted in Vancouver, British Columbia in Canada and included three trials, with the first taking place in a controlled growth chamber, the second in a controlled insect rearing room and the third within a biopod placed outdoors. In each trial, the amount of food was maintained while the rate of growth and development of *H. illucens* was measured by the number of larvae that pupated. We concluded that *H. illucens* not only survives but prospers in a biopod in a more temperate climate.

Psychoacoustic Metrics for Predicting Subjective Perceptual Quality of Informal Learning Spaces

Michael Gosselin (Faculty Sponsor: Dr. Murray Hodgson)

Adverse sound quality in Informal Learning Spaces (ILS) can prevent positive learning outcomes. In order to design ILSs which have desirable qualities, it is necessary to establish a physical measure that is representative of the acoustical characteristics that determine the perceptual quality of a space. Previous research has investigated the use of acoustic measures commonly used in room acoustics. No correlations were found between the measures and subjective qualities reported by occupants, such as difficulty hearing and fatigue. To address the apparent need for an alternative, the present study applies a different class of acoustic measures known as psychoacoustic measures. Two measures are considered: Loudness and Sharpness, both originally proposed as representative measures of human perception of sounds in general. Values of the two psychoacoustic measures were calculated from audio recordings of 10 ILSs around the UBC campus. Additionally, survey responses on acoustic qualities of the same 10 ILSs were taken from a previous study. Significant correlations between one of the acoustic measures and the results of the surveys were identified. The

outcome of this statistical analysis included two significant correlations: (A) between Loudness and the occupants' reported difficulty talking; and (B) between Loudness and the occupants' perception of the learning space's interference with their activities in general. This result indicates that the Loudness measure may have a promising use in helping predict perceptual quality of learning spaces, as well as other environments.

.

Neural circuit integration: Plasticity between three behaviours with shared circuitry in the nematode C. elegans

Sepehr Nassiri (Faculty Sponsor: Dr. Catharine Rankin)

Animals' behaviours are controlled by neural circuits. No nervous system, however, is comprised of a single circuit; they are networks of many converging and overlapping circuits. Understanding how information flows and integrates through these networks is fundamentally important to our understanding of neuroscience. To tackle this question, this study examined the neural plasticity between three behaviours (nose touch response, chemical avoidance, and tap withdrawal response) using the model organism *Caenorhabditis elegans*. The neural circuits of nose touch response and chemical avoidance overlap while the neural circuitry for nose touch/chemical avoidance and tap response converge on the command interneurons. Habituation, a form of non-associative learning in which repeated exposure to a stimulus leads to decreased responding, is a great measure to test the cross-plasticity in these circuits. Although *C. elegans* habituate to all three behaviours, it is unknown whether habituation generalizes between them. Animals were habituated to one stimulus (nose touch, chemical avoidance, or tap) and subsequently provided a single test stimulus of another type (all combinations were tested) and compared to a 'naïve' group that received a single test stimulus without any previous stimuli. The worms showed no decrement in the tap response after habituation to the nose touch/chemical avoidance and vice versa, but nose touch and chemical avoidance habituation generalized with each other. This suggests the mechanisms for habituation occur upstream of where these two circuits converge, in the sensory neurons, and that overlapping circuits will likely generalize habituation, while converging circuits will discriminate.

The effect of plant hormones and chemical inhibitors at different concentrations and their interactions on Hypocotyl and cell growth in Lettuce (*Lactuca sativa*) Seedlings

Sourash Liaghat (Faculty Sponsor: Dr. Santokh Singh)

In agriculture and food industry, plant hormones are being utilized to affect the growth and development of different plants. The effect of plant hormones and the result of their interactions are important to unfold their roles in the regulation of plant growth and development. In previous studies the effects of different plant hormones and their inhibitors have been investigated but a detailed study that examines the effect of plant hormones at different concentrations and also interactions of hormones at a variety of concentrations is missing. In this study, the effect of different plant hormones, e.g. gibberellic acid, auxins and abscisic acid and an inhibitor of microtubule polymerization, colchicine are investigated at different concentrations to further examine the relation between the endogenous levels and exogenous application of hormones on lettuce (*Lactuca sativa*) hypocotyl length and cell size. Further the interaction of different hormones at a variety of concentrations is studied in order to determine the optimal concentrations of hormones in cell and

hypocotyl growth. In this study, lettuce seeds were transferred onto plates containing different treatments and then were incubated in the dark for 72 hours. The hypocotyl length and width were measured by microscopy. In addition, the length and width of hypocotyl cells were measured by motic image 2.0 program. In summary, gibberellic acid induced an increase in both hypocotyl and cell length. By contrast, colchicine decreased both hypocotyl and cell length. The role of different concentrations of plant hormones and inhibitors and their interactions will be discussed.

In Vitro dynamic lipolysis model: Assessment of the effect of cholesterol absorption inhibitors on the extent of lipolysis of triglyceride.

Susana Contreras (Faculty Sponsor: Dr. Kishor Wasan)

Protonated nanostructured aluminosilicate clay (NSAS) is a novel non-absorbable inhibitor of cholesterol absorption. Previous works found that administration of NSAS to both mice and rats reduced total plasma cholesterol levels without systemic adverse effects. It was found that NSAS redistributes the cholesterol from aqueous to sediment phase in *in-vitro* dynamic lipolysis model. However, the effect of NSAS on the extent of lipolysis of triglyceride is unknown. To assess the effects of NSAS, cholestyramine and the absence of bile acids on the extent of lipolysis of triglyceride in the gastrointestinal tract (GIT). *In-vitro* lipolysis model was used in these studies. Parameters were set out to mimic fasted state conditions within GIT (50mM tris maleate, 150mM NaCl, 5 mM $CaCl_2{\cdot}2H_2O$, 5mM Na taurocholate, 1.25 mM phosphatidylcholine, pH 7.4(maintained by a stat titrator)). Radiolabelled triglyceride ([9,10-^{3}H(N)] Triolein and [carboxyl-^{14}C] Triolein) and cold cholesterol were added prior to the commencement of lipolysis, which was initiated by the incorporation of pancreatic lipase. Experimental groups included the control, no bile acids, cholestyramine (262.5 mg) and protonated NSAS (262.5mg). Samples were ultracentrifuged and separated into an oil, aqueous, and sediment phase. The concentrations of triglyceride or triglyceride lipolysis products in each phase were determined by means of radioactivity. In all groups there was almost identical distribution of [^{14}C] label (glycerol) and [^{3}H] label (fatty acids) across the three phases. With the addition of cholestyramine there was a redistribution of triglyceride/lipolysis products from the aqueous ([H^{3}] 16.5%±5, [C^{14}] 15.7%±4.8) to sediment phase ([H^{3}] 17.6%±8.1, [C^{14}] 18.4%±8.5). In the absence of bile acids triglycerides/lipolysis products were redistributed from aqueous ([H^{3}] 7.1%±0.6, [C^{14}] 6.5%±0.8) into the oil phase ([H^{3}] 92.4%±0.7, [C^{14}] 92.7%±0.8). The incorporation of protonated NSAS redistributed triglyceride and lipolysis products from aqueous ([H^{3}] 6.5%±1.2, [C^{14}] 6.0%±1.5) to oil phase ([H^{3}] 86.9%±1.3, [C^{14}] 87.4%±1.8) without affecting the sediment phase ([H^{3}] 6.5.%±0.3, [C^{14}] 6.6%±0.3). There is no preferential precipitation or micellization of either fatty acids or monoglycerides as indicated by the similar ratios of [^{14}C] label (glycerol) and [^{3}H] label (fatty acids) across the groups. Cholestyramine, a bile acid sequestrant also un-specifically binds triglycerides, fatty acids, and monoglycerides to the same degree. The exclusion of bile acids hinders the functionality of pancreatic lipase thus decreasing the overall extent of lipolysis. NSAS slightly decreases the extent of lipolysis, which may partially contribute to its cholesterol absorption inhibition qualities. The results suggest that binding of NSAS to cholesterol is fairly specific, as NSAS does not bind to triglycerides, fatty acids, or monoglycerides. The funding for these studies was provided by AMCOL International Corporation

A passing acquaintance's impact: Interacting with weak social ties affects well-being

Tess Walker (Faculty Sponsor: Gillian Sandstrom)

Prior research has suggested the insurmountable benefit of high-quality social relationships. A thriving interpersonal life is a key variable in self-reports of happiness. Much research has suggested that "strong" ties (close family members and friends/confidantes) are important to our happiness, but we wondered about the impact of "weak" ties – the acquaintances and passers-by that make our day a little less lonely. To study this effect, we designed a longitudinal study to better observe how changes in weak ties evoke changes in happiness. This study took place across three months: at the beginning of the semester and towards the end. Participants were given two handheld, mechanical clickers to count their social interactions throughout the day. One clicker was assigned to "weak" ties and one to "strong" ties. After every interaction, participants evaluated the strength of the relationship and clicked the respective device. That night, the participants answered some questions on well-being, and tallied up their interactions on a web-based survey. Recording was done on three days in September, and again in November. Unsurprisingly, changes in strong ties over time strongly predict increases in overall affect and well-being and reductions in loneliness. However, the results also demonstrate that changes in weak ties over time strongly predict increases in positive affect and flourishing, and moderately increase a sense of community. Although seemingly insignificant, weak ties may actually play a big role in life satisfaction and overall happiness.

Bioinformatics analysis of gene expression in Fetal Alcohol Spectrum Disorder (FASD) and Autism Spectrum Disorder (ASD)

Willie Kwok, Albertina Wong (Faculty Sponsor: Dr. Paul Pavlidis)

Autism and Fetal Alcohol Spectrum Disorders (ASD/FASD) are neurodevelopmental disorders diagnosed during infancy and early childhood, characterized by the impairment of growth and development of the central nervous system. About 1 in 150 and 2 to 5 in 1000 children are diagnosed with ASD and FASD, respectively. Both disorders have many candidate genes implicated in the effects of varied level of susceptibility and severity in the resulting disease state, thus new approaches are needed to identify a subset of more promising candidates to assist researchers in prioritizing genes for targeted genetic analyses. By looking at multiple experiments using a meta-analytical approach, it is possible to identify a list of candidate genes implicated in the disorders that are common across studies with greater statistical power. Gene expression data as measured by DNA microarrays from published studies of ASD or FASD was collected and analyzed individually. Differential expression analysis was performed for each experiment to identify the genes that showed the most changes in expression level between the control and disease group (ASD/FASD). Statistical meta-analysis was employed to assess the overall significance of these genes and find patterns of expression across all experiments that any individual analysis would not uncover. The resulting lists of significant genes from the two disorders were then looked at from a gene networks perspective to identify common molecular pathways (i.e. synaptic signaling) and aid in prioritization of candidates for further studies.

Correlation between proficiency of eye drop administration and postoperative complications in cataract patients in Ghana

Yang (Linda) Liu (Faculty Sponsor: Dr. Shafik Dharamsi)

Cataract is the leading cause of treatable blindness and a significant global health problem affecting millions of people worldwide. Postoperative care following cataract extractions involves the administration of eye drops to prevent infection and control inflammation. Improper administration of postoperative eye drops can increase the risk of infection, potentially leading to permanent vision loss. There is limited information on the correlation between proficiency in administering eye drops and prevalence and duration of postoperative pain and irritation. The purpose of this study was to evaluate the effect of a postoperative educational session on subjects' proficiency of eye drop instillation, and to determine if proficiency correlated with the prevalence and duration of irritation and pain. This study was conducted at Crystal Eye Clinic in Ghana. Patients were evaluated on their ability to administer eye drops proficiently (based on three criteria points) on postoperative day one (POD #1). If unsuccessful, patients were given an educational session (verbal instructions and an educational video). Both groups (successful and unsuccessful on POD #1) were tested again for proficiency on POD #30. A control group was evaluated only on POD #30. For the patients who received the educational session, 84% exhibited proficiency on POD #30 as compared to 59% in the group that did not receive it. There were fewer reports of pain and irritation in patients who received the educational session. This study supports the efficacy of patient education in improving proficiency in eye drop instillation and in reducing pain and irritation following cataract extraction surgeries.

The Power of Feedback in Reducing Stereotype Threat

Zhenxinyu (Derek) Zhang (Faculty Sponsor: Dr. Toni Schmader)

Previous research on stereotype threat has shown that individuals perceiving the environment as threatening can substantially suffer from performance deterioration on tasks designed for a particular domain. A strong explanation for such a phenomenon maintains that once under threat, individuals' implicit connection—schematicity—with the domain cuts off. Much has been done to investigate how stereotype threat negatively impacts people, yet little has been done to look at how such an undesirable psychological phenomenon could be alleviated. My current study firstly aims to confirm the idea of schematicity as a channel for the threat to have its effect, and secondarily to investigate whether a manipulated (false) positive feedback on certain tasks can help restore people's schematicity. 123 female undergraduate students participated in this study. Their baseline schematicity in the math domain was measured using their reaction time when deciding if various math-related careers are ideal for their future. Later, a bogus computer cognitive task framed to be testing their math aptitude was administered, followed by positive feedback on the task. Afterwards, the same careers were given once again for the participants to indicate whether they could see themselves doing these jobs in the years to come. Math-schematicity at these two different times were analyzed. As our preliminary results found, the effects of feedback given to participants were mixed. However, this study does speculate upon future research to further examine the power of feedback, as well as better techniques to induce stereotype threat and measure schematicity.

Oral Presentation Session 2

URO Alumni: Getting Involved in Research IKBLC 182

Engineering Innovation: Practical Applications of Laboratory Techniques IKBLC 157

Ben MacLeod: Probing sub-nanosecond dynamics at the atomic scale with a Scanning Tunneling Microscope

Nam Amrita Musterer: Verification of a Scattering Rate Equation for Two-Level Atoms in Magnto-Optical Traps

Geoffrey Kwan Ho Lau: A Need for New *in vitro* Methods of Rearing Laboratory Colonies of the Common Bed Bug *Cimex lectularius* (Hemiptera: *Cimicidae*)

Sonal Halai: Charge transfer dynamics in organic solar cell materials by fluorescence lifetime imaging

Roy Nassar: Structure Prediction of Protein Complexes using Computational Methods

Exploring the Interplay of Social Context and Cultural Conceptions Dodson Room

Amanda Cheong: The Search for Belonging: Conceptions of National Identity and Civic Participation Among Stateless Chinese-Bruneian Immigrants in Vancouver

Bard Suen: Cultural Revisions in Chinese Modernist Restaurants

Brian Stephenson: Examining the Foundations of British Columbia's Frontier Communities: The Case of Freemasonry in Kelowna

David Wu: Effects of social context on synchrony

Vivian Kwan: Coping Strategies in Survivors of the 2004 Indian Ocean Tsunami

Dissecting the Human Mind: True Inhibitions revealed **IKBLC 260**

John Michael Wafler: The Muscle Effect: An examination of suspect muscularity and eyewitness identification

Kaitlyn Goldsmith: Sexuality and Romantic Relationships

Sean Riley, Michael Wafler: Understanding the Importance of Individual-level Predictors of Drug Crime Recidivism

Victoria Felkar: Exercising Feminism Behind Bars: Women in Canadian Prisons, their health and physical activity needs

Stephanie Ryn: The Effects of Pre-exam Writing Exercises on Student Exam Anxiety

A Tall Tale about Plants: Lessons from the living laboratory **IKBLC 158**

Ashley Kristen Yip: Exploring the Douglas-fir individuals involved in the formation of *Rhizopogon* tubercles

Blaise Ratcliffe: Genetics of Wood Quality Attributes in Western Larch

Harleen Sekhon, Joy Cheng, Teale Dunsford: The Effects of Environmental and Seasonal changes on the Photosynthesis and Transpiration Rates of the Evergreen and Deciduous species

Takin Kheirandish: Efficacy of some sustainable organic weed control methods using the University of British Columbia as a living laboratory

Kasmira Cockerill: Impacts driving spatial patterns in vegetation composition in a semi-arid Kenyan floodplain

X-files from the Clinic **Lillooet Room**

Charlie Zhang: The Negative Predictive Value of US-Guided 14-Gauge Core Needle Biopsy of Breast Masses: A Validation Study of 339 Cases

Alvin Ip: Applying resistance against the stronger leg to improve walking symmetry in people with stroke: a pilot study

Ada Lo: Quality of Life (QOL) for Operative and Non-operative management of Diverticulitis

Erick Carreras: A Retrospective Review of the Fontan Procedure: how to decrease mortality rates

Howard Yan: Hypercalcemia after kidney transplantation as predictor for patient and kidney outcomes

Getting Involved in Research (IKBLC 182)

Things to try before graduating UBC - why not add RESEARCH experience to the list?

URO Alumni

Are you an undergraduate student debating whether to get started in research activities on campus? Research, isn't (and shouldn't) be about following lab techniques or photocopying academic papers; nor should it be a high-end activity only available to a select few. We are here to convince you of the many research options available to you at UBC, as well as a competitive skill set gained from them that will make you competitive as a UBC graduate. This workshop will also provide you with tips that many students have found successful in obtaining a research opportunity. A Q&A session follows.

Engineering Innovation: Practical Applications of Laboratory (IKBLC 157) Techniques

Probing sub-nanosecond dynamics at the atomic scale with a Scanning Tunneling Microscope

Ben MacLeod (Faculty Sponsor: Dr. Yan Pennec)

Understanding and exploiting the exotic behaviors demonstrated by transition metal oxide materials at the atomic scale may unlock technologies necessary for building faster and more capable electronic devices. For this work, techniques which can probe the spatial and temporal variations in material properties at relevant length and time-scales are essential. Such probes have been pushed to the independent extremes of spatial- and time-resolution: atomic-resolution imaging is regularly achieved using Transmission Electron Microscopy and Scanning Tunneling Microscopy, while the sub-femtosecond dynamics of orbital electrons have been explored using state-of-the-art optical spectroscopy. However, techniques which bridge the gap with combined spatio-temporal resolution sufficient for studying dynamic phenomena with atomic resolution have not advanced as far. To produce and study various materials, including the oxides, a Scanning Tunneling Microscope (STM) combined with a Molecular Beam Epitaxy (MBE) system is being constructed at UBC. This system will provide an ultra-high vacuum, low temperature, high magnetic field environment in which to perform sensitive STM studies on highly pure materials grown in-situ by MBE. At the core of this experiment is a custom-designed STM head which, building on work carried out both at UBC and elsewhere, has been designed to simultaneously achieve atomic spatial resolution and sub-nanosecond temporal resolution through the use of a nascent technique known as pulsed-Scanning Tunneling Spectroscopy (P-STS). In this work we overview the experiment and the design and fabrication of the microscope. Preliminary results from the commissioning of this instrument are given.

Verification of a Scattering Rate Equation for Two-Level Atoms in Magnto-Optical Traps

Nam Amrita Musterer (Faculty Sponsor: Dr. Kirk Madison)

Scattering rates for atoms being held in a magneto-optical trap (MOT) are calculated theoretically using a simple model of two level atoms. The scattering rate is used to calculate the number of atoms being held in the MOT. Accurately knowing the number of atoms trapped is useful for studying loss rates of the MOT as well for creating Bose-Einstein condensates. By comparing measurements with a constant number of atoms, we are able to experimentally verify this equation. We have found there to be a discrepancy between the experimental results and theoretical expectation of the two level model. Our research attempts to resolve and explain this disagreement and to provide experimental technique to rectify the scattering rate equation.

A Need for New *in vitro* Methods of Rearing Laboratory Colonies of the Common Bed Bug *Cimex lectularius* (Hemiptera: *Cimicidae*)

Geoffrey Kwan Ho Lau (Faculty Sponsor : Dr. Yasmin Akhtar)

In recent years, the common bed bug, *Cimex lectularius* (Hemiptera: *Cimicidae*) has seen a resurgence in number of infestations across the globe, particularly in developed countries. As such, interest in *C. lectularius* as a research subject has resurfaced, with focus on discovering more about its biology, behaviour, as well as better methods of detection, monitoring, extermination, and control. In order to do this, efficient rearing methods are required for researchers to keep a colony of *C. lectularius* in the laboratory, and thus ensure a steady supply of specimens. Current literature is scarce and outdated, with the most recent already a decade old; the lack of available resources forces researchers to resort to their own methods, which include either using live, anaesthetized animals as food hosts, or even humans, raising concerns with current research ethics. In order to show the need for better methods of rearing, a simple setup was made using jam jars with filter paper inside to create a rearing container. Feeding was achieved by providing small blood packets of parafilm once per week. Survival rate and feeding rate for such setups were both low, and the week-long interval starved some specimens, but shortening the intervals placed pressure on both efficiency and blood waste. Such a simple setup thus highlights the issues in rearing *C. lectularius* in the laboratory; keeping the blood warm to ensure feeding, separating adults from juveniles, and feeding multiple colonies efficiently. To address these problems, designs for a new setup will be proposed and explained.

Charge transfer dynamics in organic solar cell materials by fluorescence lifetime imaging

Sonal Halai (Faculty Sponsor: Sarah Burke)

Improving the efficiency and stability of organic photovoltaic materials has become an important focus in solar energy research with the overall aim to make low-cost, light weight solar cells. However, these materials function differently from conventional silicon solar cells and increasing their efficiency involves investigating the processes involved. Organic polymers such as PFB with F8BT or P3HT with the fullerene PCBM can be spin-coated to form thin films with solar cell potential that contain heterojunction interfaces between the two compounds (electron donor and acceptor). The

absorption of light does not directly form mobile charge carriers (electrons and holes), like in conventional solar cells, but instead an exciton (bound electron-hole pair) is created, which must be spatially separated to create the charge carriers that generate electricity. Efficient exciton diffusion and separation at the heterojunction is highly film dependent and is hindered by recombination resulting in fluorescence. Atomic Force Microscopy (AFM), a surface imaging technique and Fluorescence Lifetime Imaging Microscopy (FLIM) have been used to compare the structure of different polymer blends resulting from various preparation conditions. Due to weak fluorescence and photodegredation of the films, analysis of the spatial distribution of fluorescence lifetimes of charge transfer states is difficult. This study aims to reduce photobleaching by sealing films prepared in an inert environment by using combinations of clear nail varnish, epoxy and mounting media at room temperature or various annealing temperatures. With this approach longer fluorescence lifetimes representing charge transfer states were recorded, however, a consistent reduction of photobleaching was not observed.

Structure Prediction of Protein Complexes using Computational Methods

Roy Nassar (Faculty Sponsor: Dr. Joerg Gsponer)

Interactions between proteins have been observed to be at the heart of some of the most significant cellular pathways that ensure survival and well-being. The structure of a protein indicates how it might interact with DNA, RNA or other proteins in a certain process. Throughout the past few decades, researchers have found a direct link between protein structural deformations and diseases such as neurodegenerative diseases and cancer. A special class of proteins, known as intrinsically disordered proteins or IDPs, are unlike regular globular proteins in that they are characterized by the lack of a stable 3D structure when isolated in solution. Despite their lack of a stable equilibrium conformation, IDPs play an important role in cell signalling, transcription and molecular recognition as they can bind multiple protein partners due to their structural flexibility. Experimental data for protein structures are currently obtained through biophysical methods, mainly nuclear magnetic resonance (NMR) and X-ray crystallography. However, these methods are expensive, time consuming and labor intensive. Consequently, scientists of various backgrounds are combining efforts to develop computational tools for prediction of structures given only the amino acid sequences obtained from genomics databases. The ultimate goal of this project is to develop a computational algorithm to predict the interactions of IDPs with their protein partners. At this early stage, we assess the ability of an existing binding-prediction program, Hex, to predict the binding of 75 protein complexes containing IDP chains obtained from the online protein databank(PDB) of known protein structures. Hex was found to perform better on complexes where the IDP chain consists of exposed alpha helices (simplest structural arrangement) as compared with beta strands or buried IDPs.

Exploring the Interplay of Social Context and Cultural Conceptions (Dodson Room)

The Search for Belonging: Conceptions of National Identity and Civic Participation Among Stateless Chinese-Bruneian Immigrants in Vancouver

Amanda Cheong (Faculty Sponsor: Dr. Jennifer Jihye Chun)

According to the UN, all humans are fundamentally entitled to a nationality. Signifying one's formal membership in a sociopolitical community, citizenship is linked to vital political, civil, and social rights, and furthermore shapes the nature with which individuals both participate in the state and form national identities. While some states have responded to the globalization of human mobility by adopting more universalist, civic definitions of citizenship, others have become increasingly ethnonationalist and exclusionary in orientation. Countries of the latter type serve to exacerbate the crisis of "statelessness," a circumstance faced by 12 million people worldwide who exist beyond the bounds of protection by any government. In Brunei, a large proportion of the Chinese minority population is currently stateless, due to racialized citizenship policies that have been in place since 1984. Unable to access the same opportunities as Bruneian citizens, many have emigrated permanently to Canada. Little research has been conducted, however, on the subjective experiences of stateless individuals, nor have scholars examined the systemic racism faced by Brunei's increasingly mobile minority groups. Using 14 oral history interviews conducted with stateless Chinese-Bruneian immigrants in Vancouver, I compare Brunei's and Canada's divergent policy approaches to managing their ethnically diverse populations, and convey how individuals' interpretations of state-led constructions of citizenship change from one national context to another. I argue that, through the migration and resettlement process, stateless Chinese-Bruneian immigrants' valuations of citizenship and enactments of their perceived roles as civic beings have shifted from an instrumental focus on material entitlements in Brunei, to a greater orientation towards symbolic notions of freedom and democratic participation in Canada.

Cultural Revisions in Chinese Modernist Restaurants

Bard Suen (Faculty Sponsor: Dr. Jennifer Chun)

Tense race-relations in 19th century British Columbia drove new immigrant Chinese into enclaves that served as important centres of economic and cultural reproduction. Known today simply as "Chinatown" in Vancouver, the neighbourhood is now home to many of the Chinese-Canadian community's elderly and lower-income residents and has recently come under public scrutiny as it faces increasing pressures to gentrify. In October of 2011, Vancouver's Chinatown was officially declared a National Historic Site of Canada. Vancouver is also host to one of the most vibrant and critically acclaimed Chinese restaurant industries in the world, and a new kind of Chinese restaurant has emerged uniquely positioning itself in relation to the City of Vancouver, Chinese-Canadian identity, and gastronomy. Self-titled "Chinese modernist restaurants," second and third generation Chinese-Canadian restaurateurs have set up shop in and around Vancouver's historic Chinatown seeking to "update" their ancestral cuisine. An ethnographic approach was taken to see how Chinese-Canadian heritage was being re-imagined through the branding and marketing of Chinese 'modernist' restaurants. Semi-structured interviews were conducted with two restaurateurs and field-notes taken

on-site at restaurants. Document analysis was performed on restaurant artifacts as well as media reviews and accounts of the restaurants. A comparative analysis was carried out between two Chinese 'modernist' restaurants, and results found that restaurants tended to serve small-portioned and higher-priced dishes that often sported trendy 'local' and 'environmentally sustainable' ingredients. Ethnicized notions of 'authenticity' were mediated through the Chinatown space, and commoditized through the marketing and branding of the restaurants. The symbolic 'stigmatization' of certain ingredients on the food menu facilitated a reconfiguring of power relations to legitimize and de-legitimize certain actors and activities in the restaurant space. Findings pose interesting questions about the role of cultural diversity in social movements like the 'alternative food' and sustainability movements.

Examining the Foundations of British Columbia's Frontier Communities: The Case of Freemasonry in Kelowna

Brian Stephenson (Faculty Sponsor: Dr. James Hull)

In the period leading up to the First World War, British Columbia's mainland contained twenty-one incorporated communities. Of these, not a single one lacked a Masonic Lodge. What role did Freemasonry play within British Columbia's pioneering communities that would account for its widespread presence? While the history of Freemasonry in Canada has received only modest attention from academics, in British Columbia such attention is superficial or nonexistent. Furthermore, the social impacts of this fraternal organization in our province have yet to be adequately explored. This study breaks new ground with regards to our understanding of the role of voluntary associations in society, particularly in the British Columbia frontier experience. Using the historical approach of a microhistory I have examined the impact of Freemasonry upon an individual community, that of early Kelowna, and have extrapolated upon my analysis of the specific in order to make statements about the effects of Freemasonry in frontier communities in general. My study operates within a framework emphasizing the value of social capital while offering conclusions based upon primary and secondary sources. Freemasonry in British Columbia acted as an early social network regionally and locally, providing a provincial-wide system of connections while promoting similarly strong ties between individuals within the frontier communities themselves. Acting as force for social order, Masonic Lodges countered disorganization within British Columbia's emerging communities while influencing notions of respectability, masculinity, and civic responsibility.

Effects of social context on synchrony

David Wu (Faculty Sponsor: Dr. Alan Kingstone)

Studies have emerged suggesting synchrony between persons increases various scores on social measures, but little has been done investigating the reciprocal effect - whether social manipulations can influence synchrony. In the current study, we explore the effects of shared space on unintentional coordinated tapping. Participants conducted a synchronization-continuation task in pairs either in the same room, in different rooms, or in different rooms but with the ability hear each other tap. Coordination was measured by comparing mean absolute differences in participant intertap intervals. We found that same room pairs had increased coordination over different room pairs, while pairs that shared audio but were in different rooms showed an intermediate level of coordination. Furthermore, subjects were largely unable to evaluate either their own accuracy or their partner's accuracy, and

evaluations did not correlate with the actual degree of coordination. The present study suggests that social context can influence synchrony below the level of awareness.

Coping Strategies in Survivors of the 2004 Indian Ocean Tsunami

Vivian Kwan (Faculty Sponsor: Dr. Suedfeld)

Understanding how survivors cope with devastation from natural disasters and how these coping strategies may change through time is a fundamentally important step to designing effective rehabilitation and mental health intervention programs. There are two main kinds of coping: emotion-focused and problem-focused. Emotion-focused coping involves making efforts to regulate emotional distress whereas problem-focused coping involves making efforts to change the source that is causing the stress. Current literature has found that survivors of natural disasters who use more emotion-focused than problem-focused coping strategies are associated with higher levels of depression, a lower mood, and a greater likelihood of developing psychological disorders. However, little is known about how time contributes to shaping coping strategies in reflection of new challenges, learning, and personal growth. Insights into how the context of time shapes coping will allow for a more holistic understanding of how coping mechanisms affect people's well being longitudinally, which is ultimately the main goal of stress and coping research. For this study, Thematic Content Analysis is used where publicly available first person documents or recordings such as blogs, video interviews, and diaries are scored for coping strategies used by the author/survivor. This method allows for the conversion of qualitative data into quantitative data that may then be statistically analyzed. Preliminary studies show that there are no significant differences in the coping strategies used at time immediately after the impact of the natural disaster versus time of six or more months after the event.

Dissecting the Human Mind: True Inhibitions revealed (IKBLC 260)

The Muscle Effect: An examination of suspect muscularity and eyewitness identification

John Michael Wafler (Faculty Sponsor: Dr. Stephen Porter)

Bias enters the legal system at various stages, where it directly contradicts the fairness of the legal enterprise. Therefore, it is crucial to identify the origins of this bias so that it may be remedied. Body shape is often overlooked as a basis for discrimination, and has rarely been examined as a source of bias in a criminal context. Our aim was to expand on research regarding stereotypes in psychological-legal contexts by examining the impact of suspect muscularity on eyewitness line-up identification (guilt presumption). In a real-word lineup procedure, a witness to a crime observes a group of potential male suspects in an attempt to identify the true perpetrator. In this study, participants viewed one of two mock-crime video scenarios (i.e., violent or non-violent) and then attempted to identify the perpetrator from a photographic lineup. Unbeknownst to participants the true perpetrator was not present in the lineup, forcing a false identification. Body type was manipulated for each photographic suspect into muscular and obese conditions, from their original (control) body type. It was hypothesized that the more muscular a suspect was, the more likely they would be deemed responsible for an offence despite inadequate evidence, especially when charged with violent offences. Results indicated that regardless of the type of crime, muscular suspects were falsely identified more often than average weight suspects, who were identified more often than obese suspects. Our research draws attention to the many sources of bias that unfairly influence legal decision making, and has the potential to inform legal decision-makers and encourage eyewitness neutrality.

Sexuality and Romantic Relationships

Kaitlyn Goldsmith (Faculty Sponsor: Dr. Boris Gorzalka)

A proliferation of research investigating determinants of effective sexual communication within romantic relationships has emerged in recent years, with Bowlby's (1970) developmental theory of attachment and its application to adult romantic relationships receiving particular attention. The purpose of the present study is to examine adult attachment style differences in sexual communication, sexual satisfaction and gender role adherence. It has been postulated that the manifestation of specific gender roles (i.e. masculine, feminine and androgynous) may be linked to specific styles of attachment (Shaver et al., 1996). Previous research has also indicated that gender role adherence may play a part in sexual communication styles (Blazina & Watkins, 2000). A positive relationship between sexual communication and sexual satisfaction within romantic relationships has been consistently replicated (MacNeil & Byers, 2009), and prior research has demonstrated the mediational role of sexual communication in the relation between insecure attachment and sexual satisfaction (Davis et al., 2006). In light of these research findings, we anticipated that attachment style differences would arise among sexual communication, sexual satisfaction and gender role adherence. The results of this investigation were consistent with these hypotheses. Gender role adherence was found to mediate the relationship between attachment style differences in sexual communication, and sexual communication was found to mediate attachment style differences in sexual satisfaction. The results of this research sheds light on the importance of attachment style in adult romantic

relationships, providing important information on predictors of the high quality sexual and romantic relationships that are paramount to people's happiness and well-being.

Understanding the Importance of Individual-level Predictors of Drug Crime Recidivism

Sean Riley, Michael Wafler (Faculty Sponsor: Dr. Zachary Walsh)

Drug crime has several negative social and economic impacts ranging from gang involvement to over-crowding in prisons. However, despite the substantial costs associated with drug crime, our understanding of individual-level predictors of drug crime is limited. The present study aims to address this lack of empirical information by examining the predictive power of psychopathy for drug related crimes. Although, to our knowledge, no prior studies have examined the predictive power of psychopathy for drug-related crimes, prior research on related constructs guides our predictions. Specifically, antisociality (a component of psychopathy) has been identified as an important predictor of both drug crime and the life-long patterns of antisocial behavior that are, in part, what separates drug users from drug offenders. Moreover, psychopathy has been identified as amongst the most robust predictors of violent crime, which suggests that it may contribute to a general propensity for rule-breaking, and thereby be predictive of drug crime. Based on this literature, we predict that psychopathy will predict arrests for drug related crimes among individuals with substance use disorders. Participants (n= 311) were inmates in a US county jail with histories of substance abuse or dependence, and were followed for a minimum of three years post release from custody. Psychopathy was measured using the PCL-R and substance abuse/dependence using the SCID. Drug related crimes were based on a review of national criminal records. Analyses indicate that the robust association between psychopathy and crime can be extended to include drug-related crimes. Results are further discussed in terms of substance abuse/dependence and other individual-level variables.

Exercising Feminism Behind Bars: Women in Canadian Prisons, their health and physical activity needs

Victoria Felkar (Faculty Sponsor: Dr. Patricia Vertinsky)

Women account for one out of every ten offenders in Canada (Calverly, 2010).Within the inmate population women face inequalities in obtaining gender specific health care services. When paired with the well documented recognizable differences and significant health disparities faced by women, such as those pertaining to maternal health needs and sexual abuse, unique social inequities also exist for female inmates. Since the late 1980s and throughout the 1990s feminist activists and researchers have recognized major challenge in addressing incarcerated women's health needs and have begun to make an impact upon some aspects of prison power structures, rehabilitation and access to health services. Although scholars have proposed exploration of prison health through intersectional analyses, there remains little evidence that women's health care needs are being met. As well a deficiency exists in linking knowledge with practical applications of promoting health and healthcare services for female inmates. Through a comprehensive literature review the purpose of this paper is to focus attention upon the lack of continuity between the 'call for change' in Canadian women's corrections by feminist reforms, the implications this has for women's health and to begin a discussion concerning the implementation of one particular and important health need, physical activity. Using the literature available and guided by critical feminist methodologies it will explore how

physical activity presents a unique platform to attend to specific issues raised by feminist reforms, the rehabilitation needs of corrections, and work to improve health needs of the female inmate.

The Effects of Pre-exam Writing Exercises on Student Exam Anxiety

Stephanie Ryn (Faculty Sponsor: Jackie Stewart)

Exam anxiety is a growing concern in educational settings due to the importance that is placed on high-stakes exams. It is important to identify strategies that can reduce exam-anxiety in high exam anxiety students, so that they have an equal opportunity to demonstrate their knowledge of the exam subject. There is evidence that writing about personal thoughts and feelings before a high-stakes exam can help to alleviate students' exam anxiety and improve exam performance. Further research will develop this strategy into a viable technique that students can use to reduce feelings of anxiety. The purpose of this study was to observe the effect of introducing a pre-exam exercise to an undergraduate organic chemistry class. We are interested in observing the effects that the pre-exam exercises had on the students. Prior to midterm and final exams students were asked to complete a pre-exam writing exercise which prompted them to either write about their thoughts and feelings about the exam, or about the topics that they thought might be tested on the exam. After every exam students completed surveys regarding perceived exam difficulty and anxiety levels. Pre-exam exercises and survey results were analyzed to obtain information about the effectiveness of the pre-exam exercises. It was found that most students enjoyed completing the pre-exam exercises, and many claimed that these exercises helped to decrease their exam anxiety levels. In summary, when high exam anxiety students have the opportunity to write about an impending exam they will likely experience lower levels of exam anxiety.

A Tall Tale about Plants: Lessons from the living laboratory (IKBLC 158)

Exploring the Douglas-fir individuals involved in the formation of *Rhizopogon* tubercles

Ashley Kristen Yip (Faculty Sponsor: Dr. Daniel Durall)

One of the most common symbiotic relationships in nature is the ectomycorrhizal association, which is formed when a fungus encases the root tip of a vascular plant. These associations create links among trees and create a mycorrhizal network, which allows for the exchange of resources beneath the forest floor. These networks allow for the survival of a forest under environmental stress by allocating resources among the trees. A mycorrhizal fungus may stimulate the repeated branching of a root and encase the cluster in a rind, forming a tubercle. The presence of the rind protects the mycorrhizal connections from disruption by physical forces like insects and small animals in the soil, perhaps making mycorrhizal species that form tubercles more fit for survival. This study explored whether different trees are linked within tubercles. By using DNA analysis on root samples extracted from tubercles, we determined the number of genetically individual tree roots contained within a single tubercle. Half of the tubercles analyzed contained two or more individual tree roots. This finding confirms that mycorrhizal linkages exist among trees, which is an assumption that is made in literature and is often critiqued. Lastly, the findings from this study emphasize the consideration that must be paid to the mycorrhizal network when planning cutting practices in forestry.

Genetics of Wood Quality Attributes in Western Larch

Blaise Ratcliffe (Faculty Sponsor: Dr. Yousry El-Kassaby)

The development of a rapid and accurate approach to measuring wood density of standing trees (i.e., *in situ*) is of great importance to tree breeders and forest managers since current methods, while providing accurate results, are intrusive, costly and time consuming. Wood density is an important characteristic of wood and has numerous effects on all end products of wood, such as strength, hardness, and fibre volume. Rapid indirect wood assessment methods such as those relying on acoustic velocity and resistance drilling have proven to be effective for Douglas-fir and work is in progress to assess their validity in white spruce. We investigated the possibility of extending the testing to include western larch, so the results could be generalized after multiple species testing. Acoustic velocity (Director® ST300) and resistance drilling (Resistograph® F300) data were collected from the British Columbia Ministry of Forests' western larch Tree Breeding sites, and laboratory data using X-ray densitometry was used to assess these methods validity. Both the Director® ST300 and Resistograph® F300 *in situ* tools proved effective at providing good estimates of wood density for western larch. The Resistograph® F300 reliably predicted wood density of western larch trees as indicated by extremely strong and significant genetic and phenotypic correlations with wood density as measured by X-ray densitometry. While the Director® ST300 did not match the reliability of Resistograph® in predicting wood density, the results produced were nevertheless satisfactory since acoustic technology does not directly measure wood density. In combination with the unique wood density profile of western larch, the possibility of improving wood quality through breeding and *in situ* rapid selection programs with these tools while maintaining strong growth attributes appears feasible.

The Effects of Environmental and Seasonal changes on the Photosynthesis and Transpiration Rates of the Evergreen and Deciduous species

Harleen Sekhon, Joy Cheng, Teale Dunsford (Faculty Sponsor: Dr. Santokh Singh)

Photosynthesis (carbon sequestration) and transpiration (water loss) are two major physiological processes in plants which, in addition to regulating plant growth and development, influence the atmospheric carbon dioxide and water vapour levels. In this study, the photosynthesis and transpiration rates of two evergreen species: Western Red Cedar (*Thuja plicata*), Lawson Cypress (*Chamaecyparis lawsoniana*); and two deciduous species: Red Maple (*Acer rubrum*), Red Oak (*Quercus rubra*) were analyzed using Licor Portable Photosynthesis System during May 2011 – March 2012. The leaf samples of these species were also subjected to gel electrophoresis for profiling of photosynthesis proteins. Our protein profile results for all the samples showed significant levels of the protein, Rubisco (ribulose-1,5 bisphosphate carboxylase/oxygenase) and moderate levels of the light-harvesting complex proteins. In the spring/summer, the average photosynthesis rate is highest in the Red Oak (Deciduous) species and typically lowest in the Evergreen species. During the fall season, the Evergreen species photosynthesis levels begin to increase and the Deciduous species photosynthetic levels begin to decrease. In the winter period, the Deciduous species are bare of any leaves and the Evergreen species have a relatively steady photosynthesis rate. In summary, Evergreen species express moderate photosynthesis rates throughout the year, while the Deciduous species express the highest photosynthesis rate only during the active leaf growth period followed by a drastic reduction in photosynthesis rate during leaf senescence. The average transpiration rates are relatively higher consistently throughout the year for the Evergreen species than the Deciduous species.

Efficacy of some sustainable organic weed control methods using the University of British Columbia as a living laboratory

Takin Kheirandish (Faculty Sponsor: Dr. Santokh Singh)

We investigated the effect of two environmentally-friendly organic herbicides, Topgun and Ecoclear in controlling the growth of three weed species, Canadian Thistle, Morning glory, and Horsetail in the University of British Columbia campus. Topgun is a fatty acid-based herbicide and Ecoclear is an acetic acid-based herbicide. These herbicides were tested either singly or in combination at different concentrations. Mixtures of the two herbicides at either 50% and 100% concentration proved to be the best treatment in elimination of the three species. Protein analyses using gel electrophoresis showed that Ecoclear was more effective in denaturing the proteins when applied alone to the leaves and roots of the plants. In addition, Ecoclear disrupted the epidermal membrane of the leaves. On the other hand, Topgun was more effective in dehydrating the leaf tissue. The biochemical and cell biological mechanisms of action of these herbicides will be discussed.

Impacts driving spatial patterns in vegetation composition in a semi-arid Kenyan floodplain

Kasmira Cockerill (Faculty Sponsor: Dr. Wayne Goodey)

Floodplain habitats are areas that cycle through flooding and drying, resulting in very productive habitats for vegetative communities. In Kenya, floodplain systems in semi-arid grasslands are a vital dry seasonal grazing refuge for much of the native fauna as well as local pastoralist economies. These

systems are currently some of the most threatened habitats in Sub-Sahara Africa; mainly by water development project for agricultural purposes and climate change disturbances affecting the predictability of wet seasons and increases in drought periods. Research in riverine ecology has concentrated heavily on flooding regime as the dominant factor indicating vegetation community composition. This study builds from this well understood theory to investigate how including grazing impacts in the system may result in variance from expected community composition. Vegetation sampling was carried out across the floodplain system in southern Kenya during the January-March dry season of 2011. Using this data set multivariate ordination was used to evaluate the similarity between plots and test this against the relative strength of measured variables such as soil, flooding intensity, and grazing pressure. From this data set we were able to identify that spatially, grazing is having the greatest impact on identifying species correlations, and spatial relationship to permanent swamp areas also appear to be playing a significant role. This highlights areas of concern for sustainable use of the area and where future temporal studies in the area should focus on.

X-files from the Clinic (Lillooet Room)

The Negative Predictive Value of US-Guided 14-Gauge Core Needle Biopsy of Breast Masses: A Validation Study of 339 Cases

Charlie Zhang (Faculty Sponsor: Dr. Paula Gordon)

A number of biopsy techniques are available for the diagnosis and management of breast masses, including core needle biopsy, fine needle aspiration biopsy, or open surgical biopsy. With the widespread implementation of screening mammography programs and subsequently the increased number of biopsies performed, continued assessment for safety and accuracy of all biopsy techniques in practice today is of great importance. The goal of our study is to determine the negative predictive value of sonographically-guided 14-gauge core needle biopsy of breast masses. We reviewed all core needle biopsies from March 2005 through April 2011 at our practice. Given a benign finding on the core biopsy, those that had either benign pathology upon surgical excision or at least 2 years of stable follow-up were considered true negatives. Those having malignant histology upon surgical excision were considered false negatives. Of the 339 cases, there were 337 true negatives and 2 false negatives. In both cases, there was no delay in diagnosis because the radiologist recognized discordance between imaging and core biopsy pathology, and recommended surgical excision despite the benign core biopsy pathology. Results from our validation study confirm that US-guided 14-gauge CNB is safe and accurate, and is a time-saving and cost-effective alternative to surgical biopsy. Data from our investigation, in which core biopsies were performed by radiologists with extensive clinical experience in breast imaging and biopsy should provide further confidence to health authorities and patients with regards to the role of this technique in the diagnosis and management of breast masses.

Applying resistance against the stronger leg to improve walking symmetry in people with stroke: a pilot study

Alvin Ip (Faculty Sponsor: Dr. Tania Lam)

There are over 300,000 Canadians living with the effects of stroke. A stroke damages one side of the brain, resulting in motor impairments to the other half of the body. This leads to asymmetrical walking; the weaker leg is used less in propelling and supporting the body compared to the stronger leg. Improving symmetry is important because asymmetrical walking leads to impaired balance, decreased bone strength, and increased falls. However, little research has looked at improving walking symmetry. This study tests whether applying resistance against the stronger leg can improve walking symmetry in people with stroke. To increase the use of the weaker leg, we make the stronger leg harder to use. Six participants were fitted into the Lokomat, a gait therapy device with a treadmill, harness, and leg-cuffs. The Lokomat was programmed to apply resistance, equivalent to 10% of the hip and knee flexors' maximal voluntary contraction, against the stronger leg. Force-sensitive resistors and motion capture cameras were used to respectively measure single-support stance time and stride length, in order to determine the use of each leg during walking. Subjects walked consecutively for 50 strides with no resistance, 50 strides with resistance against the stronger leg, and 50 strides with resistance removed. We found that applying resistance against the stronger leg can improve walking symmetry and increase the use of the weaker leg to propel and support the body during walking. The study demonstrated the feasibility of this intervention and uncovered aspects of the design to be improved upon.

Quality of Life (QOL) for Operative and Non-operative management of Diverticulitis

Ada Lo (Faculty Sponsor: Dr. P. Terry Phang)

Mr. Smith is diagnosed with diverticulitis. Diverticulitis is a bowel disorder that causes fever, belly pain, vomiting and diarrhea. Diverticulitis is an important health concern in the developed world. Over 50% of Canadians above the age of 80 are affected with diverticulitis. There are two classifications of diverticulitis: simple and complicated. Mr. Smith is diagnosed with simple diverticulitis; he does not have a colon blockage or infection in the abdomen. Any of the above symptoms would indicate he has complicated diverticulitis that is treated using surgery. Currently, doctors treat simple diverticulitis patients with a clear liquid diet and oral antibiotics. The doctor prescribes Mr. Smith antibiotics. After several days his condition has improved but mild pain continues to bother him. He is considering having surgery and wants to know if surgery would improve his quality of life. Published literature has not yet provided a firm answer to his question. We aim to answer Mr. Smith's question by determining whether a difference exists in quality of life between these two treatments. For our study of management outcomes for diverticulitis, we enrolled 31 patients of whom 17 had surgery and 14 were managed non-operatively. Patients were asked to complete a validated survey tool that assesses physical and mental health state. In this sample of patients, we found quality of life was the same for patients treated with and without surgery. From these data we would not recommend that surgery would improve the quality of life for Mr. Smith's condition.

A Retrospective Review of the Fontan Procedure: how to decrease mortality rates

Erick Carreras (Faculty Sponsor: Dr. Andrew Campbell)

The Fontan procedure is an open heart surgery used to treat patients with single ventricle physiology. It is part of a three stage process performed in the first two to four years of an infant's life that includes a systemic to pulmonary shunt, a bidirectional cavopulmonary anastomosis (Glenn procedure), followed by the completion of the cavopulmonary shunt via the Fontan procedure. Without these surgical interventions, these conditions are incompatible with life after early infancy. The objective of this investigation is to define any primary physiology, Glenn procedure techniques and or post-operative symptoms that show a correlation with mortality. Included in this retrospective review, are 150 patients from British Columbia's Children's Hospital who underwent a Fontan procedure in the period of 1992 through 2010 regardless of underlying diagnosis. As of now, preliminary results show that post-operative complications, such as IVC thrombosis and severe metabolic acidosis are highly correlated to increases in mortality rates. Consequently, these are areas of the Fontan protocol that could be a focus of change for improved patient care in the future.

Hypercalcemia after kidney transplantation as predictor for patient and kidney outcomes

Howard Yan (Faculty Sponsor: Dr. John S Gill)

Patients with end-stage kidney disease typically develop complications that can limit benefits of transplantation while waiting for organs. Among these complications, little is known about the natural history of elevated blood parathyroid hormone (hyperparathyroidism) and calcium (hypercalcemia). It has been hypothesized that the deleterious effects of hyperparathyroidism are likely due to its actions

in persistently raising blood calcium (hypercalcemia). This study aimed to determine the causes and consequences of hypercalcemia in transplant patients. We conducted a study of n=1352 kidney transplant recipients in Toronto General Hospital and Vancouver St. Paul's Hospital. Research datasets were compiled from patients' laboratory test results and clinical outcomes including survival of patients and their transplanted kidneys (allografts). In the first post-transplant year, a striking 40% of patients developed at least one episode of hypercalcemia (defined as blood calcium ≥2.6 mmol/l), and 12% of patients had mean blood calcium ≥2.6 mmol/l (post-transplant hypercalcemia). In an adjusted regression model, development of post-transplant hypercalcemia was associated with: older age, high pre-transplant serum calcium, elevated pre-transplant parathyroid hormone (iPTH), and pre-transplant dialysis duration >5 years. In another adjusted regression analysis, only elevated pre-transplant iPTH, but not post-transplant hypercalcemia, was associated increased allograft failure. We conclude that pre-transplant clinical and laboratory data can be used to predict post-transplant hypercalcemia. Derangement of parathyroid hormone is associated with an increased allograft failure risk and is not directly dependent on development of hypercalcemia. Prevention and treatment of hyperparathyroidism may be an important strategy to improve transplant outcomes and further studies are warranted.

Acknowledgements

Adjudicators

Adrianna Eyking
Alexander Winardi
Andrea Terpstra
Anita Szakay
Anna Poon
Ashkan Babaie
Brett Kolesnik
Carla Hilario
Christin Xu
Colin Stopper
Emily Gallagher
Faysal Eliyan
Gareth Mercer
Gregory Ross
Heather Bliss
Henry John
Jennifer Abel
Jessica P. Flores
Lindsay Ayelsworth
Linoj Kumar
Masoumeh Bejaei
Michael McAuliffe
Michael Muthukrishna
Mynol Vhuiyan
Nikta Fay
Shayan Shakeraneh
Su Hand
Teagan Quilichini
Trina Stephens
Yuan You

Conference Organizers

Erin Biddlecombe
Kiran Dhillon
Stacey Guo
Joe Young

Photographers

Alyssa (AJ) Koehn
Chris Borchert

Videographer

Jon Chiang

Social Media Coordinator

Matthew Lee

Volunteers

Claire Wu
Helen You
Terralyn Forsyth
Sonia Terhaag
Yuliya Neverova
Annie Zhai
Timothy Birnbaum
Connie Tam
Michelle Tran
Cindy Yu
Lisa Hsu
Sean Ling
Yzah Diane Macalintal
Tasmira Haque
William Huang
Veni Goyal
Marta Mroczek
Maggie Phan
Viet Vu
Flora Ma
Kate Dumbrell
Gabriel Tang
Teresa Matich
Eric Gordon