London Health Research Day is presented in partnership by the Lawson Health Research Institute and Schulich School of Medicine & Dentistry. This unique research event showcases the outstanding research from students, trainees and postdoctoral scholars from across the city of London.

OUR PARTNERS INCLUDE

- London Health Sciences Centre
- St. Joseph's Health Care London
- Robarts Research
- Western
WELCOME TO LONDON HEALTH RESEARCH DAY

Now in its fourth year, London Health Research Day continues to serve as the region’s premier research showcase highlighting the groundbreaking work of graduate students, trainees, clinical fellows, and postgraduate and postdoctoral scholars from Lawson Health Research Institute and the Schulich School of Medicine & Dentistry.

This year, we have organized what we believe will be the most comprehensive and engaging event to date.

We have also made changes to the event format this year. Only the top 80 abstracts have been entered into the poster presentation competition; however, all remaining abstracts (beyond the top 80 selected) will be eligible for one of four Student Choice Awards.

In addition to our poster and platform presentations, we are hosting a series of workshops featuring a panel of expert industry leaders and faculty members offering insight and advice on a variety of topics. The two workshops being presented today include: “Blazing Your Own Trail for an Academic Career... and Landing that Faculty Position” and two sessions of “Non-Academic Career Perspectives” that will feature discussion from industry and academic professionals.

The Lucille and Norton Wolf Health Research Lecture Series will take centre stage during lunch. Our keynote lecturer this year is “virus hunter” Nathan Wolfe, the Lorry I. Lokey Business Wire Consulting Professor in Human Biology at Stanford University; the Founder and CEO of Metabiota; and the Chairman of Global Viral.

Wolfe rethinks pandemic control for our globalized world. He will be presenting a talk entitled, Before it Strikes: Viral Forecasting for Pandemic Prevention. We are grateful to The Bernard and Norton Wolf Family Foundation for their sponsorship of this event, and their commitment to medical research.

We are also grateful to the family for giving us the opportunity to present the first Lucille & Norton Wolf London Health Research Day Trainee Publication Awards. The awards will be provided to the top three trainee peer-reviewed publications that have appeared in press between May 1, 2014 and April 1, 2015 that are participating at London Health Research Day.

The event will be capped off with a Wine and Cheese Awards Reception. We look forward to presenting all our awards to the trainees during the reception beginning at 5:00 p.m. Be sure to join us in the Main Ballroom to acknowledge the day’s top presenters, and to celebrate the work done by all the presenters from the day.

We extend a special thank you to our corporate sponsors, judges, volunteers and dedicated faculty, all of whom contributed to the success of this day.

London Health Research Day brings together our young researchers from across the city, providing us with the opportunity to share and celebrate the research being undertaken. Enjoy the event and the tremendous offerings by our trainees.

David J. Hill, DPhil, FCAHS
Scientific Director, Lawson Health Research Institute
Integrated Vice President, Research
London Health Sciences Centre and St. Joseph’s Health Care London

Michael J. Strong, MD, FRCPC(C), FAAN, FCAHS
Dean, Schulich School of Medicine & Dentistry
Distinguished University Professor, Western University
LONDON HEALTH RESEARCH DAY 2015 AGENDA

7:30 a.m.  Registration Opens
            Main Lobby
            *Registration will remain open throughout the day

8:30 - 10:15 a.m.  Poster Presentations – Morning Session
                    Ballrooms 4 and 5
                    *Morning posters must be removed by 11:00 a.m.

10:15 - 10:30 a.m.  Refreshment Break
                    Upstairs Foyer

10:30 - 11:30 a.m.  Feature Platform Presentations – Morning Session
                    Salons A, B, C and Theatre

11:30 - 1:00 p.m.  Lunch
                    Main Ballroom
                    Lucille and Norton Wolf Health Research Lecture Series – Nathan Wolfe
                    “Before it Strikes: Viral Forecasting for Pandemic Prevention”
                    Main Ballroom

1:00 - 2:45 p.m.  Poster Presentations – Afternoon Session
                    Ballrooms 4 and 5
                    *Afternoon posters must be removed by 3:30 p.m.

2:45 - 3:45 p.m.  Feature Platform Presentations – Afternoon Session
                    Salons A, B, C and Theatre

3:45 - 4:00 p.m.  Refreshment Break
                    Upstairs Foyer

4:00 - 5:00 p.m.  Career/Industry Workshop Presentations
                    “Blazing Your Own Trail for an Academic Career... and Landing that Faculty Position”
                    Salon A
                    “Non-Academic Career Perspectives – Session One”
                    Salon B
                    “Non-Academic Career Perspectives – Session Two”
                    Theatre

5:00 - 6:00 p.m.  Wine and Cheese Awards Reception
                    Main Ballroom
# TABLE OF CONTENTS

6  ABOUT THE LUCILLE AND NORTON WOLF HEALTH RESEARCH LECTURE SERIES

7  POSTER PRESENTATIONS – MORNING SESSION

8  Endocrinology and Metabolism, Population Health, Education, Fetal-Maternal, Family, Development and Aging

9  Circulatory and Respiratory Health, Musculoskeletal and Rehabilitation

12  Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies

17  FEATURE PLATFORM PRESENTATIONS – MORNING SESSION

18  10:30 - 10:45 a.m. presentations – Salons A, B, C and Theatre

22  10:45 - 11:00 a.m. presentations – Salons A, B, C and Theatre

26  11:00 - 11:15 a.m. presentations – Salons A, B, C and Theatre

30  11:15 - 11:30 a.m. presentations – Salons A, B, C and Theatre

34  POSTER PRESENTATIONS – AFTERNOON SESSION

35  Cellular and Cancer Biology

37  Molecular, Infection, Immunity

40  Neuroscience and Mental Health

45  FEATURE PLATFORM PRESENTATIONS – AFTERNOON SESSION

46  2:45 - 3:00 p.m. presentations – Salons A, B, C and Theatre

50  3:00 - 3:15 p.m. presentations – Salons A, B, C and Theatre

54  3:15 - 3:30 p.m. presentations – Salons A, B, C and Theatre

58  3:30 - 3:45 p.m. presentations – Salons A, B, C and Theatre

62  CAREER/INDUSTRY WORKSHOPS

63  “Blazing Your Own Trail for an Academic Career... and Landing that Faculty Position” – Salon A

64  “Non-Academic Career Perspectives – Session One” – Salon B

64  “Non-Academic Career Perspectives – Session Two” – Theatre
The Lucille and Norton Wolf Health Research Lecture Series is the presented keynote lecture during the luncheon at London Health Research Day. The Series has been established thanks to the generosity of the Bernard & Norton Wolf Family Foundation.

The Bernard and Norton Wolf Family Foundation

With a commitment to philanthropy, Norton Wolf created The Bernard and Norton Wolf Family Foundation which supports education, the arts, medical research and treatment. In London, the Foundation has contributed to such projects as the Wolf Performance Hall; the Museum London Sculpture Garden; Robarts Research Institute; Western University; St. Joseph’s Hospital’s Breast Care Centre; University Hospital Pre- and Peri-Operative Clinics; and the Wolf Orthopedic BioMechanical Lab.

Norton Wolf passed away in March of 2015. The family foundation he established continues to give shape to his personal vision of philanthropy and community support.

Nathan Wolfe
Keynote Speaker
Lucille and Norton Wolf Health Research Lecture Series

“Virus Hunter” Nathan Wolfe rethinks pandemic control for our globalized world. By concentrating on how epidemic diseases — such as HIV, SARS, and West Nile — all stem from human contact with infected animals, he is able to discover new threatening viruses where they first emerge. According to Wired magazine, “Wolfe’s brand of globe-trotting echoes an almost Victorian scientific ethic, an expedition to catalog the unseen menagerie of the world.” His debut book, *The Viral Storm*, is an “engrossing and fast-paced chronicle of medical exploration and discovery” (Publisher’s Weekly) that take readers from the jungles of Africa to Wolfe’s state-of-the-art labs, shedding light on the often overlooked but ultimately critical field of microbiology. It was published in six languages and shortlisted for the Royal Society’s Winton Prize.

Wolfe is the Lorry I. Lokey Business Wire Consulting Professor in Human Biology at Stanford University; the Founder and CEO of Metabiota, a company that specializes in microbiological research, products, and services; and the Chairman of Global Viral, a non-profit that promotes understanding, exploration, and stewardship of the microbial world. Wolfe was named a Rolling Stone “100 Agents of Change,” a National Geographic Emerging Explorer, and a World Economic Forum Young Global Leader. He is also the winner of the NIH Director’s Pioneer Award. Wolfe has received over $60 million in grants and contracts from Google, the National Institutes of Health, the National Science Foundation, the Bill & Melinda Gates Foundation, the U.S. Department of Defense, among others — making him a man poised to eradicate pandemics before they even happen.

New - The Lucille & Norton Wolf LHRD Trainee Publication Awards

With thanks to the generosity of The Bernard and Norton Wolf Family Foundation, and the personal interest of Lucille and Norton Wolf, we are pleased to present the inaugural Lucille & Norton Wolf London Health Research Day Trainee Publication Awards. These awards will be presented at the Awards Reception.

The awards will be provided to the top three trainee peer-reviewed publications that have appeared in press between May 1, 2014 to April 1, 2015 that are participating at London Health Research Day.
<table>
<thead>
<tr>
<th>Category</th>
<th>Poster Number</th>
<th>Page Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endocrinology and Metabolism, Population Health, Education, Fetal-Maternal, Family, Development and Aging</td>
<td>1 - 29</td>
<td>8 - 9</td>
</tr>
<tr>
<td>Circulatory and Respiratory Health, Musculoskeletal and Rehabilitation</td>
<td>30 - 73</td>
<td>9 - 12</td>
</tr>
<tr>
<td>Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies</td>
<td>74 - 151</td>
<td>12 - 16</td>
</tr>
</tbody>
</table>
**ENDOCRINOLOGY AND METABOLISM, POPULATION HEALTH, EDUCATION, FETAL-MATERNAL, FAMILY DEVELOPMENT AND AGING**

**Poster Number: 1**
Name: Tavis Apramian  
Abstract Title: Thresholds of Principles and Preference: Exploring Procedural Variation in Postgraduate Surgical Education  
Supervisor(s): Drs. Lorelei Lingard and Sayra Cristancho

**Poster Number: 2**
Name: Srinitya Gannavarapu  
Abstract Title: Biotinidase deficiency: Spectrum of Molecular, Enzymatic and Clinical Information from Newborn Screening Ontario, Canada  
Supervisor(s): Dr. Chitra Prasad

**Poster Number: 3**
Name: Jordan Glicksman  
Abstract Title: A prospective study of caffeine intake and risk of incident tinnitus  
Supervisor(s): Dr. Gary Curhan (Harvard University)

**Poster Number: 4**
Name: Alexandra Hetherington  
Abstract Title: The marine depsipeptide, Didemnin B, improves characteristics of hepatic lipotoxicity in obese mice  
Supervisor(s): Dr. Nica Borradaile

**Poster Number: 5**
Name: Andrew Kucey  
Abstract Title: AST-120 and hepatic transport in chronic kidney disease  
Supervisor(s): Dr. Bradley Urquhart

**Poster Number: 6**
Name: Mariya Kuk  
Abstract Title: Injury Patterns Sustained in Motor Vehicle Collisions with Driver’s Third Generation Airbag Deployment  
Supervisor(s): Dr. Michael Shkrum

**Poster Number: 7**
Name: Christopher Langley  
Abstract Title: A Review of Emergency Department Visits by WRCC Haematology Patients  
Supervisor(s): Dr. Caroline Hamm

**Poster Number: 8**
Name: Katherine Lee  
Abstract Title: Altered metabolism in RGS2 knockout mice  
Supervisor(s): Drs. Peter Chidiac and Qingping Feng

**Poster Number: 9**
Name: Rachel Man  
Abstract Title: Maternal Fat Intake During Pregnancy and Breastfeeding Initiation and Duration  
Supervisor(s): Dr. Karen Campbell

**Poster Number: 10**
Name: Sarah Meyer  
Abstract Title: Tissue plasminogen activator therapy for acute ischemic stroke with chronic kidney disease  
Supervisor(s): Dr. Amit Garg

**Poster Number: 11**
Name: Kathryn Nicholson  
Abstract Title: The Methodological Challenges of Identifying Multimorbidity in a Pan-Canadian Electronic Medical Record Database  
Supervisor(s): Drs. Amardeep Thind and Amanda Terry

**Poster Number: 12**
Name: Rhythm Shah  
Abstract Title: Type II Diabetes Mellitus Care for patients with Limited English Proficiency: Assessment of patient outcomes and barriers to optimum care  
Supervisor(s): Dr. Natalie Lovesey

**Poster Number: 13**
Name: Priya Sharma  
Abstract Title: Work-Related Stress Among Canadian Resident Trainees  
Supervisor(s): Dr. Shabbir Amanullah

**Poster Number: 14**
Name: Daniel Stojanovic  
Abstract Title: Psychosocial Workplace Dynamics and Chronic Health Conditions: A Cross-Sectional Study of a Random Sample of the working Canadian Population  
Supervisor(s): N/A

**Poster Number: 15**
Name: Bashiar Thejeel  
Abstract Title: Long-Term Outcomes of Thrombotic Microangiopathy Treated with Plasma Exchange: A Systematic Review  
Supervisor(s): Drs. Ainslie Hildebrand and Amit Garg

**Poster Number: 16**
Name: Sera Thomas  
Abstract Title: A Cost-Effectiveness Analysis of Telemedicine for Glaucoma Screening  
Supervisor(s): Dr. Monali Malvankar-Mehta

**Poster Number: 17**
Name: Thomas Velenosi  
Abstract Title: The effect of Gut-Derived Uremic Toxins on the Expression of Hepatic Drug Metabolizing Enzymes in Chronic Kidney Disease  
Supervisor(s): Dr. Bradley Urquhart

* Indicates a top 80 abstract that will be judged in the poster competition
Poster Number: 18
Name: Martin Woo
Abstract Title: Diabetic ketoacidosis alters plasma levels of matrix metalloproteinases and their inhibitors in children
Supervisor(s): Drs. Douglas D. Fraser and Gediminas Cepinskas

Poster Number: 19
Name: Liangyi Zhou
Abstract Title: Determination of the mechanisms by which the pancreatic beta-cell insulin receptor regulates beta-cell growth, function and survival
Supervisor(s): Dr. Rennian Wang

Poster Number: 20
Name: Laura Allen
Abstract Title: Assessing the Economic Impact of Southwestern Ontario’s Community Stroke Rehabilitation Teams: An Economic Analysis
Supervisor(s): Drs. Mark Speechley and Robert Teasell

Poster Number: 21
Name: Andreea Bente
Abstract Title: The Influence of Satisfaction with Pre and Postnatal Healthcare Encounters on Postpartum Weight Retention
Supervisor(s): Drs. Karen Campbell and Neil Klar

Poster Number: 22
Name: Nicole Edwards
Abstract Title: Characterizing the oxidative stress adaptor protein p66Shc during mouse preimplantation development
Supervisor(s): Drs. Dean Betts and Andrew Watson

Poster Number: 23
Name: Anish Engineer
Abstract Title: The Effects of Tetrahydrobiopterin (BH4) on Congenital Heart Defects Induced by Pregestational Diabetes
Supervisor(s): Dr. Qingping Feng

Poster Number: 24
Name: Niyati Malkani
Abstract Title: IGFBP-1 hyperphosphorylation in response to leucine deprivation is mediated by the AAR pathway
Supervisor(s): Dr. Madhulika B. Gupta

Poster Number: 25
Name: Pinki Nandi
Abstract Title: Possible role of decorin over-expression by decidual cells in pre-eclampsia
Supervisor(s): Dr. P. K. Lala

Poster Number: 26
Name: Amanda Oakie
Abstract Title: Characterization of cells with high ALDH activity in the human fetal pancreas
Supervisor(s): Dr. Rennian Wang

Poster Number: 27
Name: Anna O'Connor
Abstract Title: Falls in Elderly Patients: Assessment and Management in the Emergency Department
Supervisor(s): Dr. Lisa-Ann Fraser

Poster Number: 28
Name: Katherine Rabicki
Abstract Title: The CTCF Chromatin Organizer is Required for Hindlimb Development
Supervisor(s): Drs. Frank Beier and Nathalie Berube

CIRCULATORY AND RESPIRATORY HEALTH, MUSCULOSKELETAL HEALTH AND REHABILITATION

Poster Number: 29
Name: Megan Rowland
Abstract Title: Investigating the role of ATRX in the developing anterior pituitary
Supervisor(s): Drs. Nathalie Berube and Frank Beier

Poster Number: 30
Name: Valerie Arpino
Abstract Title: Septic Murine Pulmonary Microvascular Endothelial Barrier Dysfunction is Regulated by TIMP3
Supervisor(s): Dr. Sean E. Gill

Poster Number: 31
Name: Jessica Blom
Abstract Title: Enhancing the healing power of the myocardium
Supervisor(s): Dr. Qingping Feng

Poster Number: 32
Name: Emma Bluemke
Abstract Title: Relationship of Ventilation Heterogeneity in the Conducting and Acinar Airway Zones with 3He MRI in Elderly Never-Smokers
Supervisor(s): Dr. Grace Parraga

Poster Number: 33
Name: Kwame Boakye-Ansah
Abstract Title: Angiotensin II-induced FTO upregulation in cardiomyocyte hypertrophy
Supervisor(s): Dr. Morris Karmazyn

Poster Number: 34
Name: Sara Bober
Abstract Title: Atrial Substrates and Enhanced Arrhythmia Susceptibility in a Rat Intermittent Hypoxia Model of Obstructive Sleep Apnea
Supervisor(s): Dr. Douglas L. Jones
<table>
<thead>
<tr>
<th>Poster Number</th>
<th>Name</th>
<th>Abstract Title</th>
<th>Supervisor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>Tyler Cooper</td>
<td>Maintenance of Vascular Regenerative Function Through Inhibition of Retinoic Acid Signaling Pathway During Expansion of Hematopoietic Progenitor Cells</td>
<td>Dr. David A. Hess</td>
</tr>
<tr>
<td>36</td>
<td>Mouhamed Dakroub</td>
<td>Cardioprotective role of the cholinergic system</td>
<td>Dr. Robert Gros</td>
</tr>
<tr>
<td>37</td>
<td>Christopher Davis</td>
<td>Ventilation Heterogeneity in Older Never-Smokers and GOLD stage I-IV COPD: Poorly Communicating Fraction and MRI Ventilation defects in the TINCan Cohort</td>
<td>Drs. Grace Parraga and David G. McCormack</td>
</tr>
<tr>
<td>38</td>
<td>Julianna Decuzzi</td>
<td>Effect of combined host defense peptide and surfactant therapy on LPS-induced model of lung inflammation</td>
<td>Dr. Cory Yamashita</td>
</tr>
<tr>
<td>39</td>
<td>Sina Ghoreishi</td>
<td>NAD+ and Vascular Aging</td>
<td>Dr. J. Geoffrey Pickering</td>
</tr>
<tr>
<td>40</td>
<td>Le Gui</td>
<td>S-Nitrosylation of stromal interaction molecule-1 (STIM1) protects against ventricular arrhythmia after myocardial infarction</td>
<td>Dr. Qingping Feng</td>
</tr>
<tr>
<td>41</td>
<td>Markus Gulilat</td>
<td>Intercellular variation in observed plasma level of new oral anticoagulants rivaroxaban and apixaban</td>
<td>Dr. Richard B. Kim</td>
</tr>
<tr>
<td>42</td>
<td>Krista Hawrylyshyn</td>
<td>Managing Oxidative Stress with NAD+ Precursors</td>
<td>Dr. J. Geoffrey Pickering</td>
</tr>
<tr>
<td>43</td>
<td>Kourosh Karimi-Shahri</td>
<td>Reduction of isoproterenol-induced hypertrophy and cardiac dysfunction by North American ginseng (Panax quinquefolius)</td>
<td>Dr. Morris Karmazyn</td>
</tr>
<tr>
<td>44</td>
<td>Sharon Leung</td>
<td>Role of Sirtuin 6 in Mouse Vasculature</td>
<td>Dr. J. Geoffrey Pickering</td>
</tr>
<tr>
<td>45</td>
<td>Carmen Leung</td>
<td>Second heart field Rac1 is critical to outflow tract development</td>
<td>Dr. Qingping Feng</td>
</tr>
<tr>
<td>46</td>
<td>Meng Fei Li</td>
<td>Hospital Heart Failure Toolkits Improve Standard of Care: the Heart Failure Quality Improvement Initiative</td>
<td>Dr. Neville Suskin</td>
</tr>
<tr>
<td>47</td>
<td>Cheynne McLean</td>
<td>Evaluation of food effects on the oral pharmacokinetics of rosvastatin</td>
<td>Dr. Richard Kim</td>
</tr>
<tr>
<td>48</td>
<td>Rui Ni</td>
<td>Administration of mitochondrial targeted anti-oxidants reduces cardiomyopathy and improves function in diabetic mice</td>
<td>Dr. Tianqing Peng</td>
</tr>
<tr>
<td>50</td>
<td>Dan Secor</td>
<td>Activation of ERK5 promotes myocardial TNFα expression during sepsis</td>
<td>Dr. Qingping Feng</td>
</tr>
<tr>
<td>51</td>
<td>Sarah Svenningsen</td>
<td>Functional MRI Ventilation Discriminates Well-controlled Asthmatic and Healthy Subjects: Sensitivity, Specificity and Comparison with FEV1</td>
<td>Dr. Grace Parraga</td>
</tr>
<tr>
<td>52</td>
<td>Xilan Tang</td>
<td>Reduction of isoproterenol-induced hypertrophy and cardiac dysfunction by North American ginseng (Panax quinquefolius)</td>
<td>Dr. Morris Karmazyn</td>
</tr>
</tbody>
</table>

* Indicates a top 80 abstract that will be judged in the poster competition
Poster Number: 53
Name: Wei Wang
Abstract Title: Prevalence and Characteristics of Lymphedema
Supervisor(s): Dr. David Keast

Poster Number: 54
Name: Willy Ye
Abstract Title: Atrial fibrillation-linked connexin40 mutants showed an increased hemichannel function
Supervisor(s): Dr. Donglin Bai

Poster Number: 55
Name: Julia Abitbol
Abstract Title: The Role of Pannexin 3 in Auditory Ossicles and Hearing
Supervisor(s): Dr. Dale Laird

Poster Number: 56
Name: Yousif Atwan
Abstract Title: Survivorship of Varus-Valgus Constrained Prostheses in Revision Total Knee Arthroplasty and the Young Patient
Supervisor(s): Dr. James Howard

Poster Number: 57
Name: Aurelia Bihari
Abstract Title: Carbon monoxide releasing molecule-3 (CORM-3) diminishes the oxidative stress and leukocyte migration across human endothelium in an in vitro model of compartment syndrome
Supervisor(s): Dr. Gedimins Cepinskas

Poster Number: 58
WITHDRAWN

Poster Number: 59
Name: Erin Donohoe
Abstract Title: Systemic TNF-α Release Contributes to Microvascular Dysfunction and Tissue Injury in Compartment Syndrome
Supervisor(s): Dr. Abdel-Rahman Lawendy

Poster Number: 60
Name: Mathias Fricot
Abstract Title: Evaluating the outcomes of Birmingham Hip Resurfacing vs Total Hip Arthroplasty as measured by the Forgotten Joint Score
Supervisor(s): Dr. James Howard

Poster Number: 61
Name: Mehul Garach
Abstract Title: Factors Affecting Late Diagnosis of Developmental Dysplasia of the Hip
Supervisor(s): Drs. Megan Cashin, Debra Bartley, Timothy Carey and Abdel Lawendy

Poster Number: 62
Name: Kelly Gutpell
Abstract Title: Enhancing the hostile microenvironment in a murine model of Duchenne muscular dystrophy using an angiogenic approach
Supervisor(s): Dr. Lisa Hoffman

Poster Number: 63
Name: Raneem Haddara
Abstract Title: Patient Data Collection and Analysis for Mechatronics-Enabled Wearable Smart Brace
Supervisor(s): Dr. Ana Luisa Trejos

Poster Number: 64
Name: Moustafa Haddara
Abstract Title: Cytoprotective Role of Hydrogen Sulfide in Rat Model of Compartment Syndrome
Supervisor(s): Dr. Abdel-Rahman Lawendy

Poster Number: 65
WITHDRAWN

Poster Number: 66
Name: Jason Lee
Abstract Title: Does Methotrexate Lower Serum Uric Acid Levels? Data from the CATCH Cohort
Supervisor(s): Drs. Janet Pope and George Dresser

Poster Number: 67
WITHDRAWN

Poster Number: 68
Name: Amanda McIntyre
Abstract Title: The Use of Repetitive Transcranial Magnetic Stimulation for Spasticity Post Stroke
Supervisor(s): N/A

Poster Number: 69
Name: Paxton Moon
Abstract Title: Pannexin 3: A New Channel into the Mechanisms of Osteoarthritis
Supervisor(s): Dr. Frank Beier

Poster Number: 70
Name: Margaret Man-Ger Sun
Abstract Title: The role of the Liver X Receptor in chondrocyte differentiation and osteoarthritis
Supervisor(s): Dr. Frank Beier

Poster Number: 71
Name: Neil Tenn
Abstract Title: Investigating the link between adenosine transport and ectopic mineralization of spinal tissues
Supervisor(s): Drs. Cheryle Séguin and S. Jeffrey Dixon
Poster Number: 72
Name: Spencer Thompson
Abstract Title: Long-term Management of Lower Extremity Dysfunction after Stroke
Supervisor(s): Dr. Robert W. Teasell

Poster Number: 73
Name: Matthew Veras
Abstract Title: Investigating the effect of notochord-specific Ccn2 knockout on gene expression in the intervertebral disc
Supervisor(s): Dr. Cheryle Séguin

MEDICAL PHYSICS, ENGINEERING, IMAGING, TRANSPLANTATION, BIOMEDICAL DEVICES, SURGICAL AND CLINICAL STUDIES

Poster Number: 74
Name: Ahmed Abbas
Abstract Title: PET Imaging of Beta Cell ER Stress using 5-(2-18F-Fluoroethoxy)-L-Tryptophan
Supervisor(s): Dr. Savita Dhanvantari

Poster Number: 75
Name: Androu Abdalmalak
Abstract Title: Assessing the feasibility of fNIRS in detecting brain activation during a motor task
Supervisor(s): Dr. Keith St. Lawrence

Poster Number: 76
Name: Hassaan Ahmed
Abstract Title: Quantitative Evaluation of Blood-Tumor-Barrier Response Following Focused Ultrasound and Microbubble Treatment in the Context of Improving Drug Delivery in a C6 rat Glioma model
Supervisor(s): Dr. Ting-Yim Lee

Poster Number: 77
Name: Alicia Allen
Abstract Title: Power Frequency Magnetic Field Threshold for an Acute Effect on the Human Vestibular System
Supervisor(s): Dr. Alexandre Legros

Poster Number: 78
Name: Golafson Ameri
Abstract Title: The effect of phantom material on accuracy in ultrasound calibration
Supervisor(s): Dr. Terry Peters

Poster Number: 79
Name: Yonathan Araya
Abstract Title: In Vivo Spin-Lattice Relaxation Dispersion at 1.5 Tesla using Delta Relaxation Magnetic Resonance (dreMR)
Supervisor(s): Dr. Timothy Scholl

Poster Number: 80
Name: Ryan Armstrong
Abstract Title: Developing a model to predict ventriculostomy risk using a surgical simulator
Supervisor(s): Drs. Roy Eagleson and Sandrine de Ribauipierre

Poster Number: 81
Name: John Baxter
Abstract Title: A Supervised Algorithm for Optimal Parameter Selection in Max-Flow Image Segmentation
Supervisor(s): Dr. Terry Peters

Poster Number: 82
Name: Jean-Guy Belliveau
Abstract Title: High Field MRI of Damage to Brain Parenchyma and Vasculature following External Beam Radiotherapy in a Rodent Model
Supervisor(s): Drs. Ravi Menon and Glenn Bauman

Poster Number: 83
Name: Christiane Sarah Burton
Abstract Title: Energy-subtraction angiography for dynamic vascular imaging: Comparison of image quality with conventional methods
Supervisor(s): Dr. Ian A. Cunningham

Poster Number: 84
Name: Dante Capaldi
Abstract Title: Pulmonary Magnetic Resonance Imaging and CT Parametric Response Map Phenotypes in Ex-smokers with and without Chronic Obstructive Pulmonary Disease
Supervisor(s): Dr. Grace Parraga

Poster Number: 85
Name: Kurtis Dekker
Abstract Title: Optical CT scanning for skeletal imaging in an optically cleared mouse
Supervisor(s): Drs. Jerry Battista and Kevin Jordan

Poster Number: 86
Name: Kaiyue Diao
Abstract Title: Validation of automated bundle extraction in DTI tractography
Supervisor(s): Dr. Terry Peters

Poster Number: 87
Name: Esmaeil Enjilela
Abstract Title: Dynamic Computed Tomography Perfusion Imaging with Sparse-view Compressed Sensing Based Image Reconstruction
Supervisor(s): Dr. Ting-Yim Lee

Poster Number: 88
Name: Matthew Gravett
Abstract Title: Mechatronic Image Guided Needle Manipulation System for Small Animals in 9.4T Bore
Supervisor(s): Dr. Aaron Fenster

* Indicates a top 80 abstract that will be judged in the poster competition
Poster Number: 89
Name: Fumin Guo
Abstract Title: Relationship of Plethysmography Lung volumes with 1H Magnetic Resonance Imaging Measurements
Supervisor(s): Dr. Grace Parraga

Poster Number: 90
Name: Yara Hosein
Abstract Title: An In Vitro Investigation Comparing Mechanical Measures Used to Assess Orthodontic Mini-Implant Stability
Supervisor(s): Drs. Ali Tassi, S. Jeffrey Dixon and Amin Rizkalla

Poster Number: 91
Name: Zahra Hosseini
Abstract Title: Generation of high contrast single-slice susceptibility weighted images at 7T
Supervisor(s): Dr. Maria Drangova

Poster Number: 92
Name: Tom Hrinivich
Abstract Title: 3D trans-rectal ultrasound for high-dose-rate prostate brachytherapy: a comparison of 3D image volumes with intra-operative 2D imaging
Supervisor(s): Drs. Eugene Wong and Aaron Fenster

Poster Number: 93
Name: Jing Jin
Abstract Title: Brain-skull Development Simulation Utilizing Hybrid Models
Supervisor(s): Dr. Roy Eagleson

Poster Number: 94
Name: Patricia Johnson
Abstract Title: Three Dimensional Retrospective Motion Correction of Magnetic Resonance Images Using Spherical Navigators
Supervisor(s): Dr. Maria Drangova

Poster Number: 95
Name: David Johnston
Abstract Title: The spread of injectate during ultrasound guided quadratus lumborum block: a cadaver study
Supervisor(s): Drs. Rakesh Sondekoppam and Sugantha Ganapathy

Poster Number: 96
Name: Jessica Kishimoto
Abstract Title: To tap or not to tap: A comparison of 3D ultrasound to 2D ultrasound in extremely preterm neonates with post-hemorrhagic ventricle dilation to predict the necessity of interventional ventricular tap
Supervisor(s): Drs. Keith St. Lawrence and Sandrine de Ribaupierre

Poster Number: 97
Name: Fiona Li
Abstract Title: Improving the compartment model parameter estimation using linearized approach
Supervisor(s): Dr. Ting-Yim Lee

Poster Number: 98
Name: Saeed M. Bakhshmand
Abstract Title: Analysis and visualization of brain fMRI signal variability in the grey matter
Supervisor(s): Drs. Sandrine de Ribaupierre and Roy Eagleson

Poster Number: 99
Name: Jill Majernik
Abstract Title: Benefits of Targeted Ultrasound in the Pelvis
Supervisor(s): Dr. Mousumi Bhaduri

Poster Number: 100
Name: Kamini Marathe
Abstract Title: Topiramate Induced Intracellular Acidification in Brain Tumors
Supervisor(s): Dr. Robert Bartha

Poster Number: 101
Name: Peter Martin
Abstract Title: Optimizing MRI-targeted fusion prostate biopsy: the effect of systematic error and anisotropy on tumour sampling
Supervisor(s): Dr. Aaron Ward

Poster Number: 102
Name: Patrick McCunn
Abstract Title: The Role of Hyperphosphorylated Tau in the Development of Frontal Temporal Syndromes of Amyotrophic Lateral Sclerosis Patients
Supervisor(s): Dr. Robert Bartha

Poster Number: 103
Name: Peter McLachlan
Abstract Title: The Pitfalls of Cerebral Oxygenation Monitoring in the Presence of Ventricular Dilatation
Supervisor(s): Drs. Sandrine de Ribaupierre and Keith St. Lawrence

Poster Number: 104
Name: Hadi Moghadas Dastjerdi
Abstract Title: A Novel Adaptive Segmentation Method for Lung Air Volume Estimation in CT Images
Supervisor(s): Dr. Abbas Samani

Poster Number: 105
Name: Anish Naidu
Abstract Title: Sensors for Accurately and Safely Localizing Tumours in Robotic Minimally Invasive Surgery
Supervisor(s): Drs. Michael Naish and Rajni Patel
Poster Number: 106
Name: Craig Olmstead
Abstract Title: Assessment of Fetal Fat Distribution with Water-Fat MRI
Supervisor(s): Drs. Charles McKenzie and Barbra de Vrijer

Poster Number: 107
Name: Onaizah Onaizah
Abstract Title: Effects of Obstructive and Sclerotic Changes within the carotid artery on blood supply to the brain
Supervisor(s): Drs. Mair Zamir and Tamie L. Poepping

Poster Number: 108
Name: John Patrick
Abstract Title: Construction of a PET/CT/MRI Compatible Tumour Motion Phantom
Supervisor(s): Dr. Stewart Gaede

Poster Number: 109
Name: Damien Pike
Abstract Title: Differences in Pulmonary Ventilation in COPD Ex-smokers After Three years: Longitudinal Results of the TINCan Cohort
Supervisor(s): Dr. Grace Parraga

Poster Number: 110
Name: Behnaz Poursartip
Abstract Title: Comparison of a low-cost and commercial FBG interrogator for a force sensing arthroscopic grasper
Supervisor(s): Drs. Ana Luisa Trejos, Michael D. Naish and Rajni V. Patel

Poster Number: 111
Name: Qi Qi
Abstract Title: Evaluation of CT Perfusion as an Imaging Biomarker of Tumour Hypoxia
Supervisor(s): Dr. Slav Yartsev

Poster Number: 112
Name: James Robert Roos
Abstract Title: Etiology of Motor Vehicle Collision Fatalities
Supervisor(s): Dr. Michael Shkrum

Poster Number: 113
Name: Kayla Ryan
Abstract Title: Activation of Ipsilateral Non Primary Motor Areas in Cervical Spondylotic Myelopathy following Spinal Decompression Surgery
Supervisor(s): Drs. Robert Bartha and Neil Duggal

Poster Number: 114
Name: Maysam Shahedi
Abstract Title: Inter-operator variability of 3D prostate magnetic resonance image segmentation using manual and semi-automated approaches
Supervisor(s): Drs. Aaron Ward and Aaron Fenster

Poster Number: 115
Name: Arefin Shamsil
Abstract Title: Tumour Localization via Tactile Image Fusion
Supervisor(s): Drs. Rajni V. Patel and Michael D. Naish

Poster Number: 116
Name: Nisha Sharma
Abstract Title: Effect of different dosage of ion implantation on electrospin collagen fibers to improve aqueous stability
Supervisor(s): Drs. Wankei Wan and Derek Boughner

Poster Number: 117
Name: Khadija Sheikh
Abstract Title: How do Exercise Responses Relate to 3He Magnetic Resonance Imaging Apparent Diffusion Coefficients in Older Never-Smokers?
Supervisor(s): Dr. Grace Parraga

Poster Number: 118
Name: Kevin Sinclair
Abstract Title: Magnetic resonance imaging of growth restricted fetal guinea pigs due to placental insufficiency
Supervisor(s): Dr. Charles McKenzie

Poster Number: 119
Name: Jonatan Snir
Abstract Title: In-Vivo Near-Infrared Imaging of a Cathepsin D Targeted Contrast Agent for Early Detection of Alzheimer’s Disease
Supervisor(s): Drs. Robert Bartha and Stephen Pasternak

Poster Number: 120
Name: Tracy Ssali
Abstract Title: Feasibility of Arterial Spin Labeling for Detection of Longitudinal Cerebral Blood Flow Changes
Supervisor(s): Dr. Keith St. Lawrence

Poster Number: 121
Name: Audrey Thouvenot
Abstract Title: Acoustic characterization of various tissue mimicking materials for medical ultrasound
Supervisor(s): Dr. Terry Peters

Poster Number: 122
Name: Justin Tse
Abstract Title: A production method of customized in-bore epoxy resin filters for gantry-based micro-CT scanners
Supervisor(s): Dr. David Holdsworth

* Indicates a top 80 abstract that will be judged in the poster competition
Poster Number: 124
Name: Jason Vickress
Abstract Title: Data inventory for cancer patients receiving radiotherapy for outcome analysis and decision support
Supervisor(s): Drs. Slav Yartsev and Rob Barnett

Poster Number: 125
Name: Eric Wright
Abstract Title: Determination of ischemia-time dependent CBF threshold for infarction using CT Perfusion and 18F-FFMZ PET imaging
Supervisor(s): Dr. Ting-Yim Lee

Poster Number: 126
Name: Ilma Xhaferllari
Abstract Title: Comprehensive Dosimetric Planning Comparison for Early Stage Non-Small Cell Lung Cancer with SABR: Fixed-Beam IMRT versus VMAT versus Tomotherapy
Supervisor(s): Dr. Stewart Gaede

Poster Number: 127
Name: Yiwen Xu
Abstract Title: Automated segmentation of whole-slide histology for vessel morphology comparison
Supervisor(s): Drs. Aaron Ward and Geoffrey Pickering

Poster Number: 128
Name: Qingliang Yang
Abstract Title: Applying a novel dry powder coating technology to pharmaceutical solid dosage forms
Supervisor(s): Dr. Jesse Zhu

Poster Number: 129
Name: Timothy Pok Chi Yeung
Abstract Title: Using Magnetic Resonance Imaging Radiomics Signatures for Personalized Brain Metastases Treatment
Supervisor(s): Drs. Aaron Ward and George Rodrigues

Poster Number: 130
Name: Nanxi Zha
Abstract Title: Principal Component Analysis of the CT Density Histogram to Generate Parametric Response Maps of COPD
Supervisor(s): Dr. Grace Parraga

Poster Number: 131
Name: Saad Ansari
Abstract Title: Oral corticosteroid prescribing habits of Canadian head and neck surgeons
Supervisor(s): Dr. Leigh Swerby

Poster Number: 132
Name: Anurag Bhalla
Abstract Title: Neuropathy and Urinary Retention: a rare case of Autoimmune Syndrome Associated with Adjuvant
Supervisor(s): Dr. Wassim Saad

Poster Number: 133
Name: Michael Blaszak
Abstract Title: Comparison of survival in pancreatic ductal adenocarcinoma patients treated with various modalities based on stage of disease: a single-centre study.
Supervisor(s): Drs. K. Hirmiz, J. Matthews and A. Ghafoor

Poster Number: 134
Name: Harpreet Chahal
Abstract Title: ICD activity sensors overestimate activity at time of ICD shocks
Supervisor(s): Drs. Lorne Gula and Mark Speechley

Poster Number: 135
Name: Katelyn Cousteils
Abstract Title: Effect of High Molecular Mass Hyaluronan on UVB-Induced Transformation
Supervisor(s): Dr. Eva Turley

Poster Number: 136
Name: Azhar Hosein Faraz
Abstract Title: Automatic Real-Time Intra-Operative 2D Biplane Ultrasound Calibration During In Situ Minimal Invasive Heart Surgery
Supervisor(s): Dr. Terry Peters

Poster Number: 137
Name: Mohammad Fazel
Abstract Title: Comparison of Selective Brain Cooling in Newborn Piglets and Rabbits Using a Novel Nasopharyngeal Cooling Method
Supervisor(s): Dr. Ting-Yim Lee

Poster Number: 138
Name: Dan Gillett
Abstract Title: A retrospective comparison of high dose rate brachytherapy and external beam radiotherapy in the treatment of high risk clinically localized prostate cancer at the Windsor regional hospital during 2001-2014
Supervisor(s): Dr. Junaid Yousuf

Poster Number: 139
Name: Nicholas Hou
Abstract Title: Ultrafine-particle enhanced biocompatible/osteo-inductive dental implants
Supervisor(s): Drs. Jesse Zhu and Hiran Perinpanayagam

Poster Number: 140
Name: Jessica Kent
Abstract Title: Risk Management and the Autopsy; The Autopsy Checklist
Supervisor(s): Dr. Michael Shkrum
Poster Number: 141
Name: Cecilia Kwok
Abstract Title: RIPK3 deficiency does not protect microvascular endothelial cells from CD4+ T cell-mediated chronic rejection in cardiac allograft transplantation.
Supervisor(s): Drs. Zhu-Xu Zhang and Anthony Jevnikar

Poster Number: 142
Name: Adrian Levine
Abstract Title: Successful Long-term Spinal Nerve Root Stimulation for Chronic Neuropathic Pain
Supervisor(s): Dr. Keith MacDougall

Poster Number: 143
Name: Natalie Montwiill
Abstract Title: Iron-dependent ferroptosis mediates microvascular endothelial cell survival following cardiac allograft transplantation
Supervisor(s): Drs. Zhu-Xu Zhang and Anthony Jevnikar

Poster Number: 144
Name: Mahmoud Mosli
Abstract Title: Biomarkers For Assessment of Disease Activity In Patients with Symptoms of Active Inflammatory Bowel Disease: A Systematic Review And Meta-Analysis
Supervisor(s): Dr. Brian Feagan

Poster Number: 145
Name: Abdullah Nasser
Abstract Title: Why do breast cancer patients visit the emergency department?
Supervisor(s): Dr. Swati Kulkarni

Poster Number: 146
Name: Daniel Prawira
Abstract Title: A Clinical Trial In the Treatment of Carcinoma of the Oropharynx Patients
Supervisor(s): Dr. Yunhee Choi

Poster Number: 147
Name: Baekjun Sung
Abstract Title: Loss of RIPK3 and Caspase-8 enhance intrinsic apoptosis in tubular epithelial cell (TEC) death and contributes to kidney ischemia reperfusion injury (IRI)
Supervisor(s): Drs. Anthony Jevnikar and Zhu-Xu Zhang

Poster Number: 148
Name: Desiree Sutton
Abstract Title: Evidence Reversal: When New Evidence Contradicts Established Practices
Supervisor(s): Dr. Janet Martin

Poster Number: 149
Name: Matthew Valdis
Abstract Title: Randomized Controlled Evaluation of Robotic Cardiac Surgery Training Modalities
Supervisor(s): Drs. B. Kiaii, C. Schlachta and M. Chu

Poster Number: 150
Name: Aze Wilson
Abstract Title: Trimethylamine-N-oxide and Inflammatory Bowel Disease: the differential role of the intestinal microbiome
Supervisor(s): Dr. Richard B. Kim

Poster Number: 151
Name: Xusheng Zhang
Abstract Title: Prolongation of Cardiac Allograft Survival through Targeted Silencing of TLR Adaptor Genes using Mannose Liposome
Supervisor(s): Dr. Weiping Min

* Indicates a top 80 abstract that will be judged in the poster competition
# Feature Platform Presentations

**Morning Session**

10:30 - 11:30 a.m.
Salons A, B, C and Theatre

<table>
<thead>
<tr>
<th>TIME</th>
<th>SALON A</th>
<th>SALON B</th>
<th>SALON C</th>
<th>THEATRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 - 10:45 A.M.</td>
<td>Amy Burke</td>
<td>Adam Rabalski</td>
<td>Michael Wong</td>
<td>Cason King</td>
</tr>
<tr>
<td>10:45 - 11:00 A.M.</td>
<td>Bart Kolendowski</td>
<td>Noelle Ochotny</td>
<td>Nicole Pinto</td>
<td>Adam Paish</td>
</tr>
<tr>
<td>11:00 - 11:15 A.M.</td>
<td>Kevin Blackney</td>
<td>Matthew Lowerison</td>
<td>Aaron Johnson</td>
<td>Mohammad Tavallaei</td>
</tr>
<tr>
<td>11:15 - 11:30 A.M.</td>
<td>Sayyed Mohammad</td>
<td>Ian Lobb</td>
<td>Michael Loureiro</td>
<td>Talal Masood</td>
</tr>
<tr>
<td></td>
<td>Hassan Haddad</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INTERVENTION WITH NARINGENIN ENHANCES WEIGHT LOSS, POTENTIATES IMPROVEMENTS IN METABOLIC DYSREGULATION AND HALTS PROGRESSION OF ATHEROSCLEROSIS INDUCED BY A HIGH-FAT DIET IN LDLr-/- MICE

AMY BURKE

Research Area:
Endocrinology and Metabolism, Population Health, Education, Fetal-Maternal, Family, Development and Aging

Supervisor(s):
Dr. Murray W. Huff

Supervisory Committee:
Drs. J. Geoffrey Pickering and Gabriel E. DiMattia

First Author:
Amy Burke

Additional Authors:
Brian G. Sutherland, Julia M. Assini and Murray W. Huff

Abstract:
Introduction: Previous studies demonstrated that addition of the flavonoid naringenin to a high-fat diet prevented disorders of the metabolic syndrome and atherosclerosis in LDLr-/- mice. In intervention studies, addition of naringenin to a high-fat, high-cholesterol (HFHC) diet reversed pre-established obesity, hyperlipidemia, insulin resistance and improved atherosclerosis pathology, but not lesion size.

Hypothesis: In the present intervention study, we tested the hypothesis that addition of naringenin to a low-fat chow diet would further improve pre-established metabolic dysregulation and attenuate atherosclerotic lesion development, compared to chow alone.

Materials and Methods: LDLr-/- mice were fed a HFHC diet for 12 weeks to induce metabolic dysregulation and atherosclerosis. Subsequently, mice received one of 3 diets for another 12 weeks: 1) the HFHC diet, 2) isoflavone-free chow or 3) isoflavone-free chow plus 3% naringenin. Weight was measured weekly throughout the study and experimental endpoints were assessed at the end of the 12 week HFHC-induction and after 12 weeks of intervention. Adiposity was assessed by determination of epididymal fat pad weight. Plasma lipids and the distribution of cholesterol (C) among very low density lipoproteins (VLDL) and low density lipoproteins (LDL), following separation of plasma by FPLC, were measured enzymatically. Insulin resistance was determined using insulin and glucose tolerance tests, in which plasma glucose was measured following an intraperitoneal injection of insulin or glucose, respectively. Atherosclerotic lesions were assessed histologically in sections from the aortic sinus, the location of significant lesion development in mice. Lesions were identified by staining with Oil Red-O (lipids) and Hematoxylin and Eosin (nuclei and cell structures), and lesion size was quantitated using AxioVision software.

Results: At 12 weeks, the HFHC diet induced significant weight gain and adiposity. Intervention with chow alone reversed weight gain by 22% and adiposity by 24%, whereas chow plus naringenin reversed weight gain by 71%, and adiposity by 76% (P<0.05). The HFHC diet increased VLDL-C (20-fold) and LDL-C (5-fold), which were reduced by intervention with chow (>60%) and chow plus naringenin (>80%)(P<0.05). The HFHC diet induced insulin resistance and glucose intolerance, which were improved by naringenin 38% and 58%, respectively (P<0.05). HFHC-feeding induced atherosclerotic lesion development. Chow-intervention attenuated lesion progression by 65%. Naringenin plus chow slowed lesion progression by 90% (P<0.05).
INVESTIGATION OF THE CK2-DEPENDENT PHOSPHOPROTEOME USING MASS SPECTROMETRY

ADAM RABALSKI

Abstract:
Introduction: The regulation of protein phosphorylation by kinases is critical for cellular regulation. CK2 is a constitutively active serine/threonine kinase that is overexpressed in several cancers. Global proteomics studies of phosphoproteomes perturbed by radiomimetic drugs or ionizing reveal dynamic regulation of CK2 motifs, implicating CK2 in the DNA Damage Response (DDR).

Hypothesis: Pharmacological inhibition of CK2 in the context of DNA damage will reveal direct and indirect targets of CK2 phosphorylation. Using quantitative phosphoproteomics by mass spectrometry the main objectives are to identify dynamic indicators of CK2 inhibition using CK2 inhibitors followed by investigation of CK2-dependent phosphorylation sites required for DDR execution.

Materials and Methods: Using stable isotope labeling of amino acids in cell culture (SILAC), HeLa cells were labeled with heavy or light forms or arginine and lysine supplemented media. Labeling was confirmed above 95% incorporation. Heavy labeled cells were treated with 20 uM CX-4945 inhibitor for 1 hour with light label cells treated with vehicle. Following this both populations of cells were treated with 20 ng/mL neocarzinostatin (NCS) for 75 minutes to induce DNA double-stranded breaks. This experiment was also performed in reverse to identify any labeling dependent changes. Additional experiments using only CX-4945 inhibitor were performed at time points corresponding to 1, 12, and 24 hours. Following treatment, cell extracts were processed, digested by trypsin and prepared using solid phase extraction cartridges followed by enrichment for phosphopeptides using titanium dioxide. Phosphopeptides were further fractionated by strong cation exchange chromatography. Fractions were analyzed by LC-MS/MS using a Q-Exactive mass spectrometer in data-dependent mode over an 83 minute gradient. Raw data was searched and quantified using MaxQuant v1.5.0.30 software. Statistical testing using a two-sided t test was performed in Perseus v1.5.0.15 software. Phosphorylation sites changing +/- 0.75 Log2 fold were analyzed using KinomeXplorer to identify putative phosphorylation sites and associated kinases.

Results: Analysis of the phosphoproteome across different treatments revealed over 3700 quantified sites. 1300 changed significantly (p < 0.05). Predicted kinases for phosphorylation sites that decreased in response to CK2 inhibition mapped to kinases such as CK2, PAK1, GSK-3, and PKC. Sites increasing contained serine-proline motifs, and many of these sites were predicted to be CDK1-dependent. CK2 phosphorylation sites that decreased mapped to proteins involved in the DDR such as ubiquitin-ligase HUWE1 as well as proteins involved in RNA processing and translation.
CHARACTERIZATION OF THE ENDOPLASMIC RETICULUM STRESS RESPONSE IN NICOTINE-INDUCED PLACENTAL INSUFFICIENCY IN VIVO AND IN VITRO

MICHAEL WONG

Research Area:
Endocrinology and Metabolism, Population Health, Education, Fetal-Maternal, Family, Development and Aging

Supervisor(s):
Dr. Daniel B. Hardy

Supervisory Committee:
Drs. John Ciriello, Andy Babwah and Rommel Tirona

First Author:
Michael K. Wong

Additional Authors:
Catherine J. Nicholson, Alison Holloway and Daniel B. Hardy

Abstract:
Introduction: Approximately 10-28% of Canadian women reported to smoke cigarettes during pregnancy. While nicotine replacement therapies and e-cigarettes are considered safer alternatives, nicotine alone has been found to impair placental development. Endoplasmic reticulum (ER) stress is known to precede compromised placentation; however, its role in nicotine-induced placental insufficiency remains elusive.

Hypothesis: Given that (1) nicotine induced hypoxia in the rat placenta, and (2) hypoxia and placental insufficiency were associated with poor disulfide bond formation and ER stress, we hypothesized that nicotine exposure would lead to augmented placental ER stress and impaired disulfide bond formation in vivo and in vitro.

Materials and Methods: Female Wistar rats received daily subcutaneous injections of either saline (vehicle) or nicotine bitartrate (1mg/kg) for 14 days prior to mating and during pregnancy. This dose has previously resulted in maternal and neonatal serum cotinine concentrations similar to moderate female smokers and/or low-dose nicotine replacement therapy users. Placentas were harvested on embryonic day (e) 15 for analysis, a time-point during pregnancy when nicotine exposure would lead to structural and morphological aberrations in the rat placenta, without causing any observable fetal growth deficit. Rcho-1 (rat placental cell line) trophoblast giant cells were also treated with nicotine in both dose- (0.1-100μM) and time- (0, 6, 24 hours) response experiments to further understand the mechanism underlying nicotine-induced ER stress. Protein and mRNA expression of markers involved in ER stress (e.g., phosphorylated PERK, phosphorylated eIF2α, Grp78, Atf4, and CHOP), disulfide bond formation (e.g., PDI, QSOX1, VKORC1), hypoxia (Hif1α), and amino acid deprivation (GCN2) were quantified via Western blot and/or Real-time PCR.

Results: Maternal nicotine exposure led to increased expression of Grp78, phosphorylation of PERK and eIF2α, Atf4, and CHOP (p<0.05), demonstrating the presence of augmented ER stress in e15 rat placenta. Decreased expression of PDI, VKORC1, and QSOX1 (p<0.05) reveal an impaired disulfide bond formation pathway, which may underlie nicotine-induced ER stress. Additionally, elevated expression of Hif1α and GCN2 (p<0.05) reveal hypoxia and amino acid starvation in association with nicotine-induced ER stress. Nicotine was also found to increase phosphorylation of PERK and eIF2α in dose-dependent manners in Rcho-1 cells, revealing a direct effect of nicotine on the augmentation of ER stress.
THEATRE

HUMAN ADENOVIRUS E1A PROTEINS UTILIZE FUNCTIONAL AND STRUCTURAL MIMICRY TO USURP CELLULAR MACHINERY AND ENHANCE VIRAL INFECTION

CASON KING

Research Area:
Molecular, Infection, Immunity

Supervisor(s):
Dr. Joe Mymryk

Supervisory Committee:
Drs. Greg Dekaban and Lakshman Gunaratnam

First Author:
Cason King

Additional Authors:
Michael Cohen and Joe Mymryk

Abstract:
Introduction: As an obligate intracellular parasite, human adenovirus must utilize host factors to propagate. Its E1A protein facilitates this by interacting with and modulating numerous cellular proteins during infection. One E1A target, protein kinase A, regulates numerous cellular processes and my project characterizes the interaction and its importance during viral infection.

Hypothesis: I hypothesize that E1A from multiple human adenovirus (HAdV) species bind to and modulate the activity of cellular protein kinase A (PKA) to enhance the viral infection.

Materials and Methods: Endogenous E1A-PKA interactions were verified using co-immunoprecipitation (Co-IP) of A549 cells infected with HAdV. For binding conservation, E1A proteins from 6 different HAdV species were expressed in transfection-based Co-IPs in HT1080 cells. For binding analysis, E1A and PKA were extensively mutated, subcloned in various mammalian expression vectors, and tested in transfection-based Co-IPs. Structural similarity between E1A and A-kinase anchoring proteins (AKAPs) was established using amino acid sequence alignments and structural prediction software (ClusPro). Functional similarity was shown by cloning an AKAP-E1A chimera that could function like a WT AKAP. Competition between E1A and cellular AKAPs was examined using Co-IPs during HAdV infection. Subcellular localization of PKA in A549 cells infected with various HAdV mutants was examined by immunofluorescence and confocal microscopy. HAdV early gene expression was measured by RT-qPCR of A459 cells infected with various HAdV mutants in the presence or absence of specific siRNA-mediated PKA knockdowns. Expression of WT HAdV protein products in the presence of PKA knockdowns was assayed by Western blot using antibodies against numerous viral antigens. Progeny production for various HAdV mutants in the context of PKA knockdowns was detected by harvesting infected lysates and performing plaque assays using 293 cells.

Results: E1A made protein-protein interactions with both the regulatory and catalytic subunits of PKA that were highly conserved across multiple HAdV species. Mechanistically, E1A hijacked PKA by mimicking cellular binding partners of PKA: A-kinase anchoring proteins (AKAPs). E1A utilized an AKAP-like alpha helix in its N-terminus to compete against cellular AKAPs during infection and bind PKA at its established AKAP-docking site. This caused an E1A-mediated relocalization of PKA subunits from the cell cytoplasm into the nucleus. This re-tasking of PKA by E1A enhanced expression of the HAdV early gene products and increases the yield of viral progeny log-fold.
THE ROLE OF THYMINE DNA GLYCOSYLASE IN ESTROGEN DEPENDENT SIGNALLING

BART KOLENDOWSKI

Research Area:
Cellular and Cancer Biology

Supervisor(s):
Dr. Joe Torchia

Supervisory Committee:
Drs. Fred Dick and Mellissa Mann

First Author:
Bart Kolendowski

Additional Authors:
Majdina Isovic and Joe Torchia

Abstract:
Introduction: Recent genome-wide studies have shown that estrogen receptor (ER) binding in breast cancer cells occurs largely within gene-specific enhancer regions in response to the ER agonist β-estradiol, causing a rapid increase in the transcription of noncoding RNA (eRNAs) at these sites which often results in the activation of nearby genes.

Hypothesis: Thymine DNA glycosylase (TDG) is a base excision repair protein and a coactivator that interacts directly with ER. We hypothesize that TDG plays a pivotal role in mediating the transcriptional effects of ER in MCF7 breast cancer cells, in part by regulating DNA methylation patterns and stimulating eRNA production.

Materials and Methods: To define the role of TDG in ER-induced transcription, we performed ChIP-seq using a TDG-specific antibody in unstimulated breast cancer cells and following treatment with β-estradiol. Chromatin immunoprecipitation in combination with knockdown experiments, methylation analysis and a technique known as 3C chromosomal capture which can identify DNA interactions at a distance, is being used to assay the role of TDG in ER-signalling and eRNA production at specific genes in breast cancer to determine how eRNAs facilitate ER signalling. Using bioinformatic approaches we have developed high-resolution maps of the interconnections of specific enhancers of interest with their target genes in MCF-7 cells. This analysis will be extended to other breast cancer cell lines and tissue sections in the hopes of identifying key eRNAs which can be used to manipulate gene expression in breast cancer. The functional consequences of eRNA knockdown will also be ascertained by appropriate secondary assays, e.g., proliferation/metastasis of breast cancer cells.

Results: Our bioinformatic analysis has found that a significant component of TDG and ER co-localize at sites distal to promoters of responsive genes in response to β-estradiol. These sites are often characterized by specific histone marks indicative of bonafide enhancer regions. Furthermore, these enhancers also show an increase in RNA pol II binding and undergo transcription to produce eRNAs which we believe is due to TDGs ability to interact with both the phosphorylated form of RNA pol II.
FLUID FLOW-INDUCED MIGRATION OF OSTEOCLASTS: CRAWLING AGAINST THE TIDE

NOELLE OCHOTNY

Research Area:
Circulatory and Respiratory Health, Musculoskeletal and Rehabilitation

Supervisor(s):
Drs. S. Jeffrey Dixon, Stephen Sims and David Holdsworth

Supervisory Committee:
N/A

First Author:
Noelle Ochotny

Additional Authors:
Brandon Kim, David W. Holdsworth, S. Jeffrey Dixon and Stephen M. Sims

Abstract:
Introduction: Osteoclasts are large multinuclear cells responsible for bone resorption in health and disease. However, it is not clear how osteoclasts are directed to sites of bone remodeling. When bone experiences mechanical loading, fluid flows through its canalicular network. As a result, bone cells are exposed to fluid shear stress.

Hypothesis: We hypothesized that fluid flow directs osteoclast migration. Our goal was to compare in real time osteoclast morphology and migration in the presence and absence of fluid shear stress.

Materials and Methods: Osteoclasts were isolated from the long bones of neonatal Wistar rats. The bones were minced in a culture dish containing medium-199, 15% fetal bovine serum and antibiotics. The media containing the suspended cells was removed and placed into a 35-mm cell culture dish, incubated at 37°C, 5% CO2 for one hour. The medium was removed, the cells washed twice with phosphate-buffered saline, then submerged in fresh medium and used for experiments. The culture dish was placed on a stage warmer (set to 37°C) attached to an optical microscope. Osteoclasts having three or more nuclei were studied. The same culture medium that bathes the cells was applied to individual osteoclasts using continuous pressure ejection (20 psi) from micropipettes (12-15 μm diameter) positioned approximately 200 μm from the cell. The osteoclast responses were recorded in real time using a camera that captured images at 15 sec intervals for 30-60 min. ImagePro Software was used to merge the images into a video for analysis of osteoclast response. Osteoclasts had to move at least 50 μm against the flow (toward the micropipette) to be a response. Movement of control osteoclasts was examined in similar experimental conditions except was no pressure ejection from the micropipette.

Results: Osteoclasts migrated against the direction of fluid flow (toward the micropipette). Out of a total of 34 osteoclasts examined, 25 (74%) moved at least 50 micrometers toward the micropipette tip (against the flow) in response to continuous pressure ejection of culture media. There were 9 unresponsive osteoclasts that either did not move or moved randomly when subjected to the pressure ejection from the micropipette. A total of 13 control osteoclasts were studied in the presence of the micropipette tip without continuous pressure ejection. In the control condition, without continuous pressure ejection, no osteoclasts moved toward the micropipette tip.
HIGHLY EFFECTIVE AGENTS IDENTIFIED USING HIGH-THROUGHPUT SCREENING IN ANAPLASTIC THYROID CANCER CELL LINES

NICOLE PINTO

Research Area:
Cellular and Cancer Biology

Supervisor(s):
Dr. Anthony C. Nichols

Supervisory Committee:
Drs. Jim Koropatnick, Trevor Shepherd, John Barrett and Alison Allan

First Author:
Nicole Pinto

Additional Authors:
Morgan Black, John Yoo, Danielle MacNeil, Kevin Fung, Alessandro Datti, Paul Boutros, John Barrett and Anthony C. Nichols

Abstract:
Introduction: Anaplastic thyroid cancer (ATC) is quite possibly the most lethal human malignancy. Patients’ present dramatic symptoms (rapidly expanding neck mass, airway and esophageal obstruction), frequent distant metastases and a median survival of about 2 months. The objective of this research is to identify new treatment options to improve patient survival.

Hypothesis: Control of ATC can be achieved by coupling Next-Generation Sequencing techniques with high-throughput robotic screening to identify potent agents to determine predictive responses dependent on given ATC mutational profiles.

Materials and Methods: A total of 13 ATC cell lines were screened using high-throughput robotic screening (HTS) against a 320-drug kinase inhibitor library, with cell line identity verified through short-tandem repeat profiling. AlamarBlue was used as an indicator of cell viability and absorbance was measured. Drug ‘hits’ were identified using B-scores, which fell 3 standard deviations below the experimental mean of cellular proliferation, indicating cell sensitivity. Dose response curves and half-maximal inhibitory concentrations (IC50 in μM) were generated for all 13-cell lines to establish the most effective kinase inhibitors. Concurrent with HTS, we analyzed our 13 ATC cell lines using whole-exome sequencing, copy number analysis and RNA expression assays to determine the genetic landscape to attempt to correlate mutational status with drug response.

Results: Of the 320 compounds from the screened library, a total of 18 drugs were found to exhibit an inhibitory effect on ATC cell proliferation. These top compounds fell into 6 mechanistic categories: (1) receptor tyrosine kinase inhibitors; (2) immune modulators; (3) PI3K/Akt/mTOR inhibitors; (4) Wnt signaling inhibitors; (5) cell cycle inhibitors; and (6) adenosine kinase inhibitors.
THEATRE

IMAGE-BASED DESIGN OF A RAT HIP PROSTHESIS

ADAM PAISH

Research Area:
Circulatory and Respiratory Health, Musculoskeletal and Rehabilitation

Supervisor(s):
Dr. David Holdsworth

Supervisory Committee:
Drs. Ian Welch, Douglas Naudie and Matthew Teeter

First Author:
Adam Paish

Additional Authors:
Hristo N. Nikolov, Ian Welch and Dr. David Holdsworth

Abstract:
Introduction: Traditionally, large and companion animal models have been used to study joint replacement components in vivo. However, these studies are costly, requiring that animals be housed in special facilities, not available at all institutions. A small animal model, such as the rat, would be ideal the early stages of research.

Hypothesis: Our objective for this project is as follows: To create a novel rat hip replacement system based on micro-CT derived anatomical measurements that will allow in vivo testing of functional implant properties in a traditional basic sciences laboratory setting.

Materials and Methods: First, a proof of concept was done to evaluate the feasibility of printing miniature metal hip implants. Several copies of a scaled down human femoral hip prosthesis along with several rat prototypes were 3D printed in 316L stainless steel. SLM was successful in producing multiple copies of each implant model. Next, a database of n=25 previously acquired micro-CT image volumes of male Sprague-Dawley rats (390-610g) were analyzed to ascertain the spatial relationship of several key features of the proximal rat femora. Mean measurements of the medullary cavity and femoral neck and head were used to create a novel rat-hip implant in 4 different sizes: mean*0.85 (small), mean*0.9 (medium), mean*1.0 (large) and mean*1.1 (extra-large). Implants were cleaned and polished using a custom-created polishing jig. Final prototype components were then sterilized and installed into n=2 live rats (900g and 500g). Micro-CT imaging and x-ray fluoroscopy were performed post-operatively at 1 day, 3 weeks and 12 weeks to evaluate the position of each component and observe rodent gait.

Results: Installation of components was successful and both animals were recovered from surgery. Analysis of micro-CT imaging at day 1 revealed that each implant was situated within the medullary cavity of the femur, with no evidence of fracture or luxation. Fluoroscopy at day 1 post-operatively showed that both rodents were ambulating on their affected limbs, with implants articulating within the acetabulum. The same observations were made at 3 weeks and 12 weeks for rat 1. However, rat 2 showed evidence of implant migration at week 3 leading to disarticulation of the implant and the acetabulum.
IDENTIFICATION OF SIGNATURE BIOMARKERS IN ADULT FEMALE ATHLETES FOLLOWING MILD TRAUMATIC BRAIN INJURY

KEVIN BLACKNEY

Research Area:
Molecular, Infection, Immunity

Supervisor(s):
Dr. Gregory Dekaban

Supervisory Committee:
Drs. Arthur Brown and Steven Kerfoot

First Author:
Kevin Blackney

Additional Authors:
L. Fischer, T. Jevremovic, A. Brown and G. Dekaban

Abstract:
Introduction: There is currently no universally recognized diagnostic technique for a mild traumatic brain injury (mTBI), also known as a concussion, and many of the current methods used for diagnosis are problematic. This leaves patients without proper treatment and at enhanced risk of more severe damage from a subsequent head trauma.

Hypothesis: The signature temporal response of biomarkers of inflammation in systemic circulation will provide an objective concussion diagnostic that will not be seen in healthy individuals. This panel of biomarkers will also be able to track patient recovery.

Materials and Methods: The Western University women’s rugby team was the selected cohort for this study, and is currently in their third season of evaluation. Participants underwent a set schedule of pre-season and post-season baseline evaluations including the Sport Concussion Assessment Tool (SCAT), Immediate Post-Concussion Assessment and Cognitive Test (ImPACT), magnetic resonance imaging, blood analysis, and a physical examination. Concussed players underwent repeat evaluations at 24-72 hours, 1 week, 1 month, and 3 months post-concussion. As each player undergoes a baseline assessment they are able to act as their own control in the experiment. Currently accepted concussion diagnostics, the SCAT and ImPACT, are collected and analyzed for reported symptom, physical, and neurocognitive alterations. From blood samples collected a portion was sent to the London Health Sciences Centre to determine the hematology profile. The remaining blood was separated into WBC, plasma, and serum. The WBC was further analyzed via flow cytometry to determine monocyte and lymphocyte subsets. Plasma samples were analyzed for cytokine levels, as well as the neurotrauma marker glial fibrillary acidic protein (GFAP), and inflammatory marker c-reactive protein (CRP) by immunoassays using ELISA or Luminex methodology.

Results: At a preliminary stage of data collection, we showed that currently accepted concussion assessments failed to make an objective diagnosis. Pairwise analysis of players’ hematology profiles from baseline to post-concussion show acute (1-5 days), and sub-acute (8-15 days) increases in systemic total WBC and neutrophil populations. These immune cell increases match symptom trends reported by concussed individuals. No signature changes were detected for the cytokine, GFAP, or CRP concentrations analyzed in the plasma of the concussion participants compared to their uninjured baseline level.
ULTRASONIC EVALUATION OF ANTIANGIOGENIC THERAPY ON PATIENT-DERIVED RENAL CELL CARCINOMA XENOGRAFT TUMORS IN THE CHICKEN EMBRYO MODEL

MATTHEW LOWERISON

Research Area:
Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies

Supervisor(s):
Drs. James C. Lacefield and Ann F. Chambers

Supervisory Committee:
Drs. Robert Bartha and Dan Goldman

First Author:
Matthew Lowerison

Additional Authors:
Chantalle J. Willie, Siddika Pardhan, Nicholas E. Power, Ann F. Chambers, Hon S. Leong and James C. Lacefield

Abstract:
Introduction: Assessing patient-specific drug resistance to antiangiogenic agents is a promising application of the patient-derived xenograft model in the chicken embryo. However, conventional methods of monitoring, such as tumor-take rates, light microscopy, and histology either do not provide sufficient vascular detail for in-depth therapy evaluation, or are reserved for end-point analysis.

Hypothesis: Ultrasonic monitoring permits non-destructive longitudinal evaluation of tumor growth and progression in the chorioallantoic membrane (CAM) xenograft ex ovo model. Antiangiogenic treatment response will be apparent in perfusion parameters estimated using contrast-enhanced ultrasound imaging.

Materials and Methods: A subset of tumor stem cells (RCC243) was isolated from a patient-derived parental renal carcinoma cell line (RCC22). Cells were grown to confluence, pelleted, and combined with an equal volume of Matrigel. On the ninth day of embryonic development (EDD-9), the CAM surface of 8 animals was pierced, and 10 μL of the cell-Matrigel mix was deposited into the opening. Half of the embryos were treated every two days with 10 μL of TAK-441, a Hedgehog inhibitor with hypothesized antiangiogenic effects.

Three-dimensional anatomical (B-mode) and contrast-enhanced images were acquired using a Vevo 2100 ultrasound system (VisualSonics Inc.) equipped with a 20 MHz linear array transducer. On EDD-18, tumor volumes were assessed using the B-mode images. The CAM vasculature was then cannulated with a glass capillary needle, and a 50 μL solution of Vevo MicroMarker™ (VisualSonics Inc.) microbubble contrast agent (2 x 10⁹ microbubbles/mL) was injected. Perfusion imaging was performed using a destruction-reperfusion protocol after the contrast agent had reached a steady-state concentration. Digital radio-frequency contrast images were exported, tumor volumes manually segmented, and the time-kinetics of the contrast agent wash-in was assessed using MATLAB (The MathWorks Inc., Natick, MA) to determine blood perfusion metrics (blood volume, velocity, and flow).

Results: Hedgehog inhibition of RCC243 tumors via TAK-441 therapy produced significant decreases in mean tumor volume (vehicle: 187.68 ± 69.55 mm³ vs. treatment: 78.94 ± 52.35 mm³; p = 0.047) and blood flow (vehicle: 645.7 ± 261.5 mm³/min vs. treatment: 190.8 ± 133.4 mm³/min; p = 0.049). There were non-significant trends of reduced blood volume (vehicle: 97.0 ± 64.7 mm³ vs. treatment: 33.7 ± 23.8 mm³; p = 0.12) and flow velocity (vehicle: 6.34 ± 1.07 mm/s vs. treatment: 5.52 ± 1.18 mm/s; p = 0.34) in the treated tumors.
SUBTYPE SPECIFIC DIFFERENCES IN DOWNREGULATION OF MHC I, CD28 AND CD4 BY THE HIV-1 ACCESSORY PROTEIN Nef

AARON JOHNSON

Research Area:
Molecular, Infection, Immunity

Supervisor(s):
Dr. Jimmy Dikeakos

Supervisory Committee:
Drs. Eric Arts and Mansour Haeryfar

First Author:
Aaron Johnson

Additional Authors:
Rajesh A. Jacob, S.M. Mansour Haeryfar and Jimmy D. Dikeakos

Abstract:
Introduction: The HIV-1 accessory protein Nef is essential for HIV-1 pathogenesis and progression to AIDS. By hijacking the cellular trafficking machinery, Nef is able to alter T cell activation, increase viral replication and permit viral immune evasion via downregulation of the cell-surface receptors CD28, CD4 and MHC-I, respectively.

Hypothesis: This proposal aims to investigate how the high degree of HIV-1 genetic diversity impacts Nef function. I hypothesize that differences in disease progression observed between patients infected with various HIV-1 subtypes will be reflected in differences in Nef-mediated downregulation of CD28, CD4 and MHC-I.

Materials and Methods: An HIV-1 based lentiviral expression system was used to express Nef proteins from 10 group M subtypes (A1, A2, B, C, F1, F2, G, H, J and K) in the context of a viral infection. T cell lines were infected with pseudoviruses encoding Nef proteins and analyzed for surface levels of CD28 and MHC-I using fluorescent antibody staining and flow cytometry. Alternatively, CD4 cell surface levels were measured by transfecting CD4+ HeLa cells with expression plasmids encoding Nef-GFP fusion proteins followed by fluorescent antibody staining and flow cytometry. Nef expression was determined by a combination of western blot analysis and flow cytometry to measure fluorophore-fused Nef proteins.

Results: Our results demonstrate that MHC I, CD28 and CD4 are differentially downregulated between subtypes. Subtype B, which is the subtype most commonly detected in North America, consistently downregulated all three cell surface receptors most efficiently. Whereas, subtype C, the most common subtype globally, was significantly less efficient at downregulating MHC I and CD28. Differences in downregulation efficiency for all three receptors were attributed to variations in Nef protein expression.
THEATRE

DESIGN, DEVELOPMENT AND IN VIVO EVALUATION OF A REMOTE CATHETER NAVIGATION SYSTEM WITH 3-DEGREES-OF-FREEDOM

MOHAMMAD TAVALLAEI

Research Area:
Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies

 Supervisor(s):
Dr. Maria Drangova

Supervisory Committee:
Drs. Aaron Fenster, Allan Skanes and David Holdsworth

First Author:
Mohammad Tavallaei

Additional Authors:
D. Gelman, M. K. Lavdas, A. Skanes, D. L. Jones and M. Drangova

Abstract:
Introduction: Percutaneous transluminal catheter procedures are used for the management of many cardiac and vascular diseases and rely on fluoroscopic x-ray imaging for guiding the catheterization procedure. However, fluoroscopic imaging is a source of irradiation that exposes the interventionalists and staff to scattered radiation on a daily basis.

Hypothesis: We hypothesize that it is safe and feasibly to remotely navigate a conventional steerable catheter, in vivo, with 3-degrees-of-freedom with a tele-robotic catheter navigation system.

Materials and Methods: The master-slave robotic system measures the motions imparted by the user on a conventional catheter in a master unit and relays them to a slave robot, replicating this motion on a patient catheter. The slave comprises a catheter manipulator (CM) and a catheter handle manipulator. A versatile mount allows the CM to be positioned and orientated arbitrarily at the catheter point of entry. Components of the CM that come in contact with the catheter can be easily disconnected for replacement/sterilization. The presented robot was evaluated in vivo by an interventionalist, using 3 male swine models. To evaluate the efficacy of navigation, 4 leads were placed at: the right atrial appendage (RAA), the right ventricle lateral wall (RV-LW), the right atrium lower septum (RA-LS) and the right ventricle outflow track (RV-OT). For each target, 4 navigation attempts were made with both the manually operated catheter (MOC) and the robotically operated catheter (ROC) guided with fluoroscopic images. Navigation time of each mode to each target was recorded. To evaluate the feasibility of remote ablation, using the ROC, 50-watts (60 s) was delivered at 5 anatomical targets: high lateral right atrium (HL-RA), RAA, RV-LW, coronary sinus (CS) and right atrial septum (RAS).

Results: All 4 targets were successfully reached with both the MOC and the ROC in all trials. A successful navigation was confirmed based on orthogonal fluoroscopic images, that both showed the catheter tip in contact with the target lead. Statistical evaluations (2-way ANOVA) showed that the method of navigation had no significant effect on navigation time (p=0.705). Large ablation lesions were clearly visible directly after excising the heart in the HL-RA, RAA, RV-LW and RAS. The lesion placed at the CS was not clearly visible.
A NOVEL MECHANICAL MODEL OF THE LEFT VENTRICLE FOR CARDIAC CONTRACTION FORCE RECONSTRUCTION APPLICATIONS

SEYYED MOHAMMAD HASSAN HADDAD

Research Area:
Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies

Supervisor(s):
Dr. Abbas Samani

Supervisory Committee:
Drs. Maria Drangova and James A. White

First Author:
Seyyed M. H. Haddad

Additional Authors:
Maria Drangova, James A. White and Abbas Samani

Abstract:
Introduction: Regional viability assessment of the myocardium is critical for assessing reversibility of ischemic injuries. While viability assessment of cardiac tissue can be achieved through a number of imaging techniques, none of them provide information pertaining to the tissue mechanical efficiency.

Hypothesis: We hypothesized that regional cardiac contraction forces provide an appropriate mechanical measure for evaluating functionality of the cardiac ischemic injuries. As such, contraction forces can be utilized to determine the reversibility of the ischemic damages as well as to predict the outcome of the revascularisation therapies with higher accuracy.

Materials and Methods: We are developing a technique for imaging myocardial contraction forces. This technique involves a reconstruction method which inputs the myocardial displacement data acquired using imaging techniques and outputs the myofibers contraction forces through an optimization procedure. This forward model must be run iteratively within the optimization algorithm to determine the contraction forces. Hence, a computationally cost-effective cardiac mechanics model is required which was developed in our laboratory and is delineated in the presentation.

In typical myocardial mechanical models, hyperelasticity, anisotropy, and active response of the cardiac tissue leads to intricate nonlinear Finite Element (FE) formulations which are not fully incorporated in commercial FE solvers. As such, custom-developed FE solvers are required which are cumbersome to develop, and may have sub-optimal performance and convergence issues. Moreover, these models can not be easily adapted for simulating diverse cardiac pathologies. To tackle these issue, we propose a new left ventricle (LV) mechanical model which considers all cardiac mechanics aspects while implementable using off-the-shelf FE software. The novelty of the model lies in modelling of the myofibers and their contraction forces. This model treats the myocardial tissue as a composite material including a background tissue through which microscopic reinforcement bars (fibers) are distributed.

Results: We applied our mechanical modeling approach to an in silico geometry of a canine LV which was discretized into a number of finite elements. The fibers were simulated as bars aligned in layers in each element, occupying about 60% of its volume. The rest of each element’s volume was considered as non-fibrous part or background tissue in which the fibers were distributed. Our model was applied to the normal and infarcted LV and stress, strain, and displacement fields are compared with the available measurements of the LV contractile function.
HYDROGEN SULFIDE TREATMENT MITIGATES EARLY RENAL ALLOGRAFT INJURY AND PROMOTES A REGENERATIVE PHENOTYPE DURING ALLOGENEIC RENAL TRANSPLANTATION

IAN LOBB

Research Area:
Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies

Supervisor(s):
Dr. Alp Sener

Supervisory Committee:
Drs. Anthony Jevnikar, Mansour Haeryfar and Gediminas Cepinskas

First Author:
Ian Lobb

Additional Authors:
Weihua Liu, David Carter, Zhu Lan and Alp Sener

Abstract:
Introduction: Organ procurement is inherently associated with ischemia-reperfusion injury (IRI), resulting from loss and subsequent restoration of blood flow, which is detrimental to short- and long-term graft function and survival. Treatment of donor organs with small molecules such as hydrogen sulfide (H2S) is a novel method of mitigating IRI during transplantation.

Hypothesis: We postulated that H2S treatment during cold storage could mitigate IRI-induced renal allograft injury following allogeneic renal transplantation (RTx).

Materials and Methods: Following bilateral native nephrectomy, recipient Lewis rats underwent RTx with kidneys obtained from Brown Norway donor rats that were flushed with either cold (4°C) University of Wisconsin preservation solution (UW group) or UW + 150 μM NaHS (H2S group) and stored for 6 hours at 4°C in the same solution. Renal grafts were obtained at post-operative (PO) day 2 for histological and RNA microarray analysis. Allografts were stained with Haematoxylin and Eosin (H&E) and terminal deoxynucleotide transferase dUTP nick end labeling (TUNEL) to determine tissue levels of necrosis and apoptosis, respectively. Immunohistochemical staining using a primary antibody against renal injury biomarker kidney injury molecule 1 (KIM-1) was also performed. Acute tubular necrosis (ATN) scores were assigned to H&E sections by a blinded transplant pathologist (scores out of 5: 0 = 0% graft ATN, 1 = <10% graft ATN, 2 = 11-25% graft ATN, 3 = 26-45% graft ATN, 4 = 46-75% graft ATN, 5 = >75% graft ATN). TUNEL and KIM-1 staining was quantified using Image J (NIH) in a blinded fashion.

Results: Upon histological analysis H2S treated allografts exhibited significantly decreased (p<0.05) levels of ATN, apoptosis and KIM-1 expression compared to UW at PO day 2. Immunohistochemical staining revealed. Upon microarray analysis the most highly upregulated genes in H2S treated allografts were those involved in cellular proliferation, many of which were significantly increased (p<0.05) compared to UW. The most highly upregulated genes in UW treated allografts were those involved in cellular response to stress and injury, many of which were significantly increased (p<0.05) compared to H2S.
CANNABINOID TRANSMISSION IN THE HIPPOCAMPUS INFLUENCES CONTEXT-DEPENDENT MEMORY FORMATION THROUGH EXCITATORY NEUROTRANSMISSION IN THE NUCLEUS ACCUMBENS

MICHAEL LOUREIRO

Research Area:
Neuroscience and Mental Health

Supervisor(s):
Dr. Steven R. Laviolette

Supervisory Committee:
N/A

First Author:
Michael Loureiro

Additional Authors:
Justine Renard

Abstract:
Introduction: Cannabis use is a primary risk factor for schizophrenia and given that marijuana use is expected to increase as its legalization spreads (now legal in 20 states in United States), we urgently need to better understand the neurobiological mechanisms underlying the effects of cannabinoids on emotional processes and memory.

Hypothesis: The hippocampus provides contextual information to the nucleus accumbens through a direct excitatory neuroanatomical connection. Given that cannabinoids increase the neuronal activity of hippocampal principal neurons, we hypothesized that intra-vHipp activation of cannabinoid receptors would increase NAc neuronal activity and potentiate context-dependent memory formation.

Materials and Methods: By using an integrative combination of in vivo electrophysiological recordings, intra-cerebral pharmacological treatment and behavioral evaluation in rats, we tested whether activation of cannabinoid type 1 receptors in the hippocampus would (1) modulate the activity of nucleus accumbens neurons, (2) potentiate a rewarding or aversive context-dependent memory formation and (3) impact rats’ social recognition.

Results: Our results show that activation of vHipp CB1r: (1) significantly increases neuronal activity in the nucleus accumbens (2) potentiates the formation of a context-dependent aversive memory, (3) as well as rewarding classical conditioning to morphine, and (4) abolishes rats’ natural social recognition. Finally, we demonstrate that these behavioral effects are completely prevented when the excitatory transmission in the NAc is blocked.
Abstract:
Introduction: The Cambridge Neuropsychological Test Automated Battery (CANTAB) provides a set of computerized methods used to assess cognitive dysfunction in human neurodegenerative disorders such as Alzheimer’s disease (AD). A touchscreen system has been developed for mice based on the CANTAB making behavioural cognitive tests more standardized, increasing translational potential of research.

Hypothesis: There are several cognitive dysfunctions that occur due to AD including deficits in attention that can be modelled in mice and tested using the touchscreen tasks in order to accelerate drug screening.

Materials and Methods: In this study, we tested two separate mouse models of familial AD (5xFAD and 3xTG) with mutations that lead to an accelerated rate of amyloidosis. In addition, the 3xTG mice also have a mutation in TAU that leads to deposition of tau neurofibrillary tangles. Both male and female mice were tested in this study to determine whether there are any differences between sexes. Mice were tested as they aged (3, 7, 10 months old) in order to establish when cognitive symptoms first appear and behavioural deficits in response to increased AD-like pathology progresses with age. In order to investigate deficits in sustained attention we used the 5-Choice Serial Reaction Time Task (5-CSRTT). In addition, in order to test for reproducibility of results, we performed similar experiments at two separate locations, the University of Western Ontario and the University of Guelph.

Results: Deficits in sustained attention were observed in the two mouse lines using the 5-CSRTT. Both the male and female 5xFAD mice showed deficits starting at 7 months of age compared to age-matched control mice and these deficits were more significant at 10 months. Male and female 3xTG mice showed deficits in attention during the first probe trials at 3 months of age. They continued to show greater deficits compared to controls as they aged (7 and 10 months).
## POSTER PRESENTATIONS

### AFTERNOON SESSION

1:00 - 2:45 p.m.

Ballrooms 4 and 5

<table>
<thead>
<tr>
<th>Category</th>
<th>Poster Number</th>
<th>Page Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular and Cancer Biology</td>
<td>1 - 35</td>
<td>35 - 36</td>
</tr>
<tr>
<td>Molecular, Infection, Immunity</td>
<td>36 - 104</td>
<td>37 - 40</td>
</tr>
<tr>
<td>Neuroscience and Mental Health</td>
<td>105 - 165</td>
<td>40 - 44</td>
</tr>
</tbody>
</table>
CELLULAR AND CANCER BIOLOGY

Poster Number: 1
Name: Kyle Biggar
Abstract Title: Harnessing lysine methylation for novel cancer therapy: design and characterization of a SET8 PKMT inhibitor to sensitize breast cancer to chemotherapy
Supervisor(s): Dr. Shawn S. C. Li

Poster Number: 2
Name: Morgan Black
Abstract Title: High-throughput screening for drug discovery in head and neck squamous cell carcinoma
Supervisor(s): Dr. Anthony Nichols

Poster Number: 3
Name: Jack Blackburn
Abstract Title: Elucidating the role and function of CD93 as an apoptotic cell opsonin
Supervisor(s): Dr. Bryan Heit

Poster Number: 4
Name: Alexandra Blake
Abstract Title: Role of KISS1R in Breast Cancer Chemoresistance
Supervisor(s): Dr. Moshmi Bhattacharya

Poster Number: 5
Name: Natasha Caminsky
Abstract Title: A Unified Framework for the Identification and Prioritization of Coding and Non-Coding Variants in Heritable Breast and Ovarian Cancer (HBOC)
Supervisor(s): Dr. Peter Rogan

Poster Number: 6
Name: Mitchell Cooper
Abstract Title: Investigating the potential anti-tumour effect of HSP27 inhibition
Supervisor(s): Drs. Susanne Schmid and Matthew Hebb

Poster Number: 7
Name: Alanna Edge
Abstract Title: Single nucleotide instability with tumorigenesis and metastasis in a RHAMM-/- MMTV-PyMT transgenic mouse model of tumour heterogeneity
Supervisor(s): Dr. Kathleen Hill

Poster Number: 8
Name: Omar El-Sherif
Abstract Title: Protecting the Heart During Left-Sided Breast Cancer Radiation Therapy
Supervisor(s): Dr. Stewart Gaede

Poster Number: 9
Name: Lizhen Guo
Abstract Title: Mutations made by translesion DNA polymerases to 8-oxo-G and Pt-GG
Supervisor(s): Dr. Hong Ling

Poster Number: 10
Name: Asma Hasan
Abstract Title: The role of cytoplasmic polyadenylation element binding protein-2 in breast cancer
Supervisor(s): Dr. Peeyush Lala

Poster Number: 11
Name: Sarah Hoffer
Abstract Title: Characterizing the Function of Helix Five of the Ku70 von Willebrand A Domain in Non-Homologous End Joining
Supervisor(s): Dr. Caroline Schild-Poulter

Poster Number: 12
Name: Mei Huang
Abstract Title: Proteomic analysis of methyllysine modified proteins using tandem enrichment by modular methyl-binding domain
Supervisor(s): Dr. Shawn S. C. Li

Poster Number: 13
Name: Aliakbar Khalili Yazdi
Abstract Title: The role of an unstructured region in regulation of SecA activity
Supervisor(s): Dr. Brian Shilton

Poster Number: 14
Name: Jeffrey Law
Abstract Title: Circulating Tumor Cells in non-metastatic esophageal cancer predict relapse-free survival
Supervisor(s): Dr. Richard Malthaner

Poster Number: 15
Name: Jennifer Leigh
Abstract Title: H2S Availability and its Regulation of Erythropoietin Production
Supervisor(s): Dr. Alp Sener

Poster Number: 16
Name: Sean Leith
Abstract Title: Expression analysis reveals candidate genes involved in highly invasive high-hyaluronan binding subpopulations of prostate cancer cell lines
Supervisor(s): Drs. Eva Turley and Joseph Chin

Poster Number: 17
Name: Xuguang Liu
Abstract Title: Potential Applications of Super-binding SH2s: Detecting Tyrosine Phosphorylation and Treating HER2+ Breast Cancer
Supervisor(s): Dr. Shawn S. C. Li

Poster Number: 18
Name: Lori Lowes
Abstract Title: Role of epithelial-to-mesenchymal (EMT) transition on circulating tumor cell (CTC) generation and metastasis in prostate cancer
Supervisor(s): Drs. Alison Allan and Tracy Sexton

* Indicates a top 80 abstract that will be judged in the poster competition
Poster Number: 19
Name: Bin Luo
Abstract Title: Detection of thundershowers of mutations across a cancer genome can be approached using test statistics that characterize the spatial properties of mutations
Supervisor(s): Drs. Charmaine Dean and Reg Kulperger

Poster Number: 20
Name: Kalan Lynn
Abstract Title: The London Tumour Biobank: A Multidisciplinary Research Resource
Supervisor(s): Dr. Muriel Brackstone

Poster Number: 21
Name: Mousumi Majumder
Abstract Title: COX-2 Elevates Oncogenic miR-526b in Breast Cancer by EP4 Activation and this miRNA is a Promising Biomarker for Monitoring and Personalizing Breast Cancer Therapy
Supervisor(s): Dr. Peeyush K. Lala

Poster Number: 22
Name: Maja Milojevic
Abstract Title: Diversity in genome structure with tumourigenesis and metastasis in a RHAMM-/-, MMTV-PyMT transgenic mouse model of tumour heterogeneity
Supervisor(s): Dr. Kathleen Hill

Poster Number: 23
Name: Stephanie Mok
Abstract Title: Epithelial to mesenchymal transition in the metastatic progression of gastroenteropancreatic neuroendocrine tumours
Supervisor(s): Drs. Christophe J. Howlett and Douglas Quan

Poster Number: 24
Name: Michelle Noonan
Abstract Title: The role of fibulin-3 in triple negative breast cancer
Supervisor(s): Dr. Moshmi Bhattacharya

Poster Number: 25
Name: Matt Piaseczny
Abstract Title: The lung microenvironment influences the metastatic behavior of breast cancer cells in an innovative 3D ex vivo pulmonary metastasis model
Supervisor(s): Dr. Alison Allan

Poster Number: 26
Name: Graciella Pio
Abstract Title: Bone-derived osteopontin mediates the migration and stem-like properties of breast cancer cells
Supervisor(s): Dr. Alison Allan

Poster Number: 27
Name: Samah Rafehi
Abstract Title: Exploring the regulation and function of epithelial-mesenchymal plasticity in ovarian cancer spheroids
Supervisor(s): Dr. Trevor Shepherd

Poster Number: 28
Name: Mauricio Rodriguez
Abstract Title: Breast cancer stem cell markers aldehyde dehydrogenase 1A1 (ALDH1A1) and CD44 are functional mediators of metastatic behaviour in vitro
Supervisor(s): Dr. Alison Allan

Poster Number: 29
Name: Patrick Stockwell
Abstract Title: Cellular Mechanisms Controlling RGS2 Degradation In Vitro
Supervisor(s): Dr. Peter Chidiac

Poster Number: 30
Name: Anu Thomas
Abstract Title: Role of lncRNAs in Diabetic Complications
Supervisor(s): Dr. Subrata Chakrabarti

Poster Number: 31
Name: Cornelia Toelg
Abstract Title: Loss of RHAMM increases mammary gland tumour progression with genomic instability
Supervisor(s): Dr. Eva Turley

Poster Number: 32
Name: Jessica Tong
Abstract Title: Differential oncolytic efficacy of maraba virus is impacted by tumour heterogeneity using a three-dimensional model of ovarian cancer metastasis
Supervisor(s): Dr. Trevor Shepherd

Poster Number: 33
Name: Tahereh Vakili
Abstract Title: An invasive but slow-growing tumor cell subset as a potential new diagnostic and therapeutic target in breast cancer
Supervisor(s): Dr. Eva Turley

Poster Number: 34
Name: Yating Wang
Abstract Title: Idoleamine 2,3-dioxygenase (IDO), a modulator of antitumour immunity, is expressed differentially in human tumour cell lines grown in vitro and as in vivo xenografts
Supervisor(s): Dr. James Koropatnick

Poster Number: 35
Name: Ashley Watson
Abstract Title: The chromatin organizer CTCF prevents p53-dependent apoptosis in neural progenitors
Supervisor(s): Dr. Nathalie Berube

* Indicates a top 80 abstract that will be judged in the poster competition
MOLECULAR, INFECTION, IMMUNITY

**Poster Number:** 36  
**Name:** Jacob Aguirre  
**Abstract Title:** Recoding the E. coli genome for expression & isolation of recombinant phosphoproteins  
**Supervisor(s):** Dr. Gary S. Shaw

**Poster Number:** 37  
**Name:** Hannah Ajoge  
**Abstract Title:** Genomic Non-B DNA is a new host factor that significantly influences integration site targeting of evolutionarily diverse retroviruses  
**Supervisor(s):** Dr. Stephen Barr

**Poster Number:** 38  
**Name:** Heba Alnaseri  
**Abstract Title:** Identification of farR and farE as a regulator and effector of Staphylococcus aureus resistance to antimicrobial fatty acids  
**Supervisor(s):** Dr. Martin McGavin

**Poster Number:** 39  
**Name:** Ryan Baker  
**Abstract Title:** Assessing the role of ATRX in pancreatic ductal adenocarcinoma  
**Supervisor(s):** Dr. Christopher Pin

**Poster Number:** 40  
**Name:** Brandon Banaschewski  
**Abstract Title:** Surfactant supplemented with the cathelicidin peptide CATH-2 reduces bacterial colonization in a mouse model of acute bacterial pneumonia  
**Supervisor(s):** Drs. Ruud Veldhuizen and Cory Yamashita

**Poster Number:** 41  
**Name:** Heba Barnawi  
**Abstract Title:** Structural and catalytic studies of the heptose modifying enzymes that play a role in Campylobacter jejuni virulence  
**Supervisor(s):** Dr. Carole Creuzenet

**Poster Number:** 42  
**Name:** Carolina Batista  
**Abstract Title:** Complementary role ofSpi-B and PU.1 at the pro-B cell to pre-B cell transition  
**Supervisor(s):** Dr. Rodney DeKoter

**Poster Number:** 43  
**Name:** Jeremy Brozyna  
**Abstract Title:** Iron acquisition mechanisms employed by Staphylococcus lugdunensis  
**Supervisor(s):** Dr. David E. Heinrichs

**Poster Number:** 44  
**Name:** Danae Campos-Melo  
**Abstract Title:** NEFL mRNA 3’UTR variants expressed in ALS and control spinal cords have different stability properties  
**Supervisor(s):** Dr. Michael J. Strong

**Poster Number:** 45  
**Name:** Eddie Chan  
**Abstract Title:** Assessing the interaction between acetylenic tricyclic bis-(cyano enone) and cysteine residues of actin to inhibit non-small cell lung cancer cell migration  
**Supervisor(s):** Dr. John Di Guglielmo

**Poster Number:** 46  
**Name:** Kevin Cheung  
**Abstract Title:** Rho Guanine Nucleotide Exchange Factor (RGNEF), an RNA-binding protein discovered in amyotrophic lateral sclerosis, has a protective role in the cellular stress response  
**Supervisor(s):** Dr. Michael J. Strong

**Poster Number:** 47  
**Name:** Yoo Choi  
**Abstract Title:** The effect of neo-glycosylation on the structure and function of the stromal interaction molecule-1 luminal domain  
**Supervisor(s):** Dr. Peter Stathopulos

**Poster Number:** 48  
**Name:** Michael Cohen  
**Abstract Title:** Functional analysis of the C-terminal region of human adenovirus E1A reveals a misidentified nuclear localization signal  
**Supervisor(s):** Dr. Joe Mymryk

**Poster Number:** 49  
**Name:** Jhonna Collins  
**Abstract Title:** A Novel Nutrient Acquisition Pathway in Community-Associated Methicillin-Resistant Staphylococcus aureus USA300  
**Supervisor(s):** Dr. David Heinrichs

**Poster Number:** 50  
**Name:** Tara Condos  
**Abstract Title:** Parkin Activation by Phosphorylated-Ubiquitin  
**Supervisor(s):** Dr. Gary Shaw

**Poster Number:** 51  
**Name:** Justin Cottrell  
**Abstract Title:** Effect of HcpE on maturation of dendritic cells and their cytokine production  
**Supervisor(s):** Drs. Carole Creuzenet and Paul Adams

**Poster Number:** 52  
**Name:** Sonja DiGregorio  
**Abstract Title:** Deciphering the Role of RGNEF in ALS using Yeast  
**Supervisor(s):** Dr. Martin Duennwald
Poster Number: 53
Name: Brennan Dirk
Abstract Title: Examining the role of the PACS-1/AP-1 interaction in HIV-1 Nef mediated MHC-I downregulation by super resolution microscopy
Supervisor(s): Dr. Jimmy Dikeakos

Poster Number: 54
Name: Cristian Droppelmann
Abstract Title: An amino terminal fragment of the ALS–related protein RGNEF forms cytoplasmic aggregates that co-localize with TDP-43 and nucleic acid
Supervisor(s): Dr. Michael J. Strong

Poster Number: 55
Name: Karen Dunkerley
Abstract Title: Characterization of TDP-43 domain interactions
Supervisor(s): Drs. Stanley D. Dunn and Michael J. Strong

Poster Number: 56
Name: Amanda Evans
Abstract Title: Elucidating the signalling pathway of MERTK in efferocytosis and its contribution to atherosclerosis
Supervisor(s): Dr. Bryan Heit

Poster Number: 57
Name: Melissa Fenich
Abstract Title: Regulation of the Calcium Regulator Atp2c2 in Pancreatic Tissue
Supervisor(s): Dr. Chris Pin

Poster Number: 58
Name: Corby Fink
Abstract Title: [19]Fluorine cellular magnetic resonance imaging to monitor in vivo therapeutic cell migration
Supervisor(s): Dr. Gregory Dekaban

Poster Number: 59
Name: Andrew Gordon
Abstract Title: Expression of Malat1 in Diabetes
Supervisor(s): Dr. Chakrabarti

Poster Number: 60
Name: Erica Hoe
Abstract Title: The Validity of Self-reported Penicillin Allergies
Supervisor(s): Dr. Joel Liem

Poster Number: 61
Name: Ken Inoue
Abstract Title: Pretreatment of human polymorphonuclear leukocytes (PMN) with a new carbon monoxide (CO)-releasing molecule (CORM401) inhibits PMN transendothelial migration
Supervisor(s): Dr. Gediminas Cepinskas

Poster Number: 62
Name: Rajiv Jain
Abstract Title: Germinal center collapse and differential fate choices of cells in the anti-myelin autoimmune response
Supervisor(s): Dr. Stephen Kerfoot

Poster Number: 63
Name: Arjewan Jassim
Abstract Title: Vital residues responsible for the interaction of major atrial connexins for the formation of functional Cx40/Cx43 heterotypic gap junction
Supervisor(s): Dr. Donglin Bai

Poster Number: 64
Name: Yuwei Jiang
Abstract Title: Regulation of endoplasmic reticulum stress and ribosome biogenesis in a yeast model of Huntington’s disease
Supervisor(s): Dr. Patrick Lajoie

Poster Number: 65
Name: Julie Kaiser
Abstract Title: Control of growth and virulence of Staphylococcus aureus by branched chain amino acid transporters
Supervisor(s): Dr. David Heinrichs

Poster Number: 66
Name: Levent Karademir
Abstract Title: Investigation of Cx26 E2 mutants and their functional docking with Cx40 and Cx43
Supervisor(s): Dr. Donglin Bai

Poster Number: 67
Name: Maryam Khodai-Kalaki
Abstract Title: Whole genome mapping of AtsR/AtsT regulon in Burkholderia cenocepacia via Next Generation Sequencing
Supervisor(s): Dr. Miguel Valavno

Poster Number: 68
Name: Hinissan Kohio
Abstract Title: Host Genomic Non-B DNA Structures Significantly Influence Integration Site Selection of Latent HIV-1 and Potently Inhibit Gene Expression: Implications for Cure-Focused Antiretrovirals
Supervisor(s): Dr. Stephen D. Barr

Poster Number: 69
Name: Miljan Kuljanin
Abstract Title: Human Bone Marrow Derived Multipotent Stromal Cells Augment Islet Regenerative Capacity through Secretion of Wnt Signaling Proteins
Supervisor(s): Drs. Gilles Lajoie and David Hess

* Indicates a top 80 abstract that will be judged in the poster competition
Poster Number: 70
Name: Jina Kum
Abstract Title: β-adrenergic receptor-dependent and -independent mechanisms of propranolol treatment in infantile hemangioma
Supervisor(s): Dr. Zia A. Khan

Poster Number: 71
Name: Holly Laakso
Abstract Title: Sbnl is a Novel Transcriptional Regulator in Staphylococcus aureus
Supervisor(s): Dr. David Heinrichs

Poster Number: 72
Name: Vanessa Lee
Abstract Title: The Role of Pannexins in Fat Accumulation and Metabolism
Supervisor(s): Dr. Silvia Penuela

Poster Number: 73
Name: Stephen Li
Abstract Title: Print this page Identification of a negative regulatory role for the E26 transformation-specific transcription factor Spi-C in the murine B cell lineage
Supervisor(s): Dr. Rodney P. DeKoter

Poster Number: 74
Name: Neruja Loganathan
Abstract Title: GDF-15 protects the kidney from acute kidney injury
Supervisor(s): Drs. Xiufen Zhemg and Weiping Min

Poster Number: 75
Name: Melissa Loyzer
Abstract Title: Elucidating the molecular mechanism behind the adaptive resistance of Staphylococcus aureus to unsaturated free fatty acids
Supervisor(s): Dr. David E. Heinrichs

Poster Number: 76
Name: Andrew Maciejewski
Abstract Title: Structural Insights into STI1 Inhibition of Amyloid-β Oligomer Toxicity through the Prion Protein
Supervisor(s): Drs. James Choy and Marco Prado

Poster Number: 77
Name: Alexander McCarton
Abstract Title: Employing a Yeast Model to Study the Basic Genetic and Functional Basis of Parkin Dysfunction in Parkinson’s Disease
Supervisor(s): Drs. R. J. Rylett, G. S. Shaw and M. L. Duennwald

Poster Number: 78
Name: William McTavish
Abstract Title: Tumor Targeted Superantigens for Cancer Immunotherapy
Supervisor(s): Dr. John McCormick

Poster Number: 79
Name: Shahab Meshkibaf
Abstract Title: Protective role of G-CSF in dextran sulfate sodium-induced acute colitis through generating gut-homing immune regulatory macrophages
Supervisor(s): Dr. Sung Ouk Kim

Poster Number: 80
Name: Ivor Mohorovic
Abstract Title: Superantigen involvement in Staphylococcus aureus bacteremia patients
Supervisor(s): Dr. John McCormick

Poster Number: 81
Name: Brandon Oickle
Abstract Title: Investigating OmpHP and DsbHP protein glycosylation from Helicobacter pylori
Supervisor(s): Dr. Carole Creuzenet

Poster Number: 82
Name: Ana Pena Diaz
Abstract Title: Protective effect of modified human Fibroblast Growth Factor on Diabetic Nephropathy
Supervisor(s): Dr. Subrata Chakrabarti

Poster Number: 83
Name: Meghan Piccinin
Abstract Title: Diabetic Bone Marrow Adipogenesis Impairs Survival of CD133-positive Stem Cells by Altering the Composition of the Marrow Stem Cell Niche
Supervisor(s): Dr. Zia A. Khan

Poster Number: 84
Name: Jacob Poirier
Abstract Title: Roles of Autocrine GABA Signalling in the Regulation of Alveolar Macrophage Polarization
Supervisor(s): Dr. Wei-Yang Lu

Poster Number: 85
Name: Niamh Richmond
Abstract Title: T-box 2 regulates hematopoietic competency of infantile hemangioma stem cells
Supervisor(s): Dr. Zia A. Khan

Poster Number: 86
Name: Steven Russell
Abstract Title: Toxic Megacolon from Shigella infection: A case report of a 26 year old
Supervisor(s): Drs. Jeffery Shum and John Snider

Poster Number: 87
Name: Saqib Sachani
Abstract Title: The role of nuclear pore complex proteins in regulation of genomic imprinting
Supervisor(s): Dr. Mellissa Mann
Poster Number: 88
Name: Louisa Salemi
Abstract Title: Characterization of RanBPM molecular determinants that control its sub cellular localization
Supervisor(s): Dr. Caroline Schild-Poulter

Poster Number: 89
Name: Samar Sayedyahossein
Abstract Title: Integrin Linked Kinase Modulates Epidermal Integrity and Barrier Function
Supervisor(s): Dr. Lina Dagnino

Poster Number: 90
Name: James Schneider
Abstract Title: Investigating the role and regulation of multiple genes in Staphylococcus aureus survival and growth in unsaturated free fatty acids
Supervisor(s): Drs. McGavin and Heinrichs

Poster Number: 91
Name: Randeep Singh
Abstract Title: Interaction of the E2F1 transcription factor with the DNA repair protein hHR23A
Supervisor(s): Dr. Lina Dagnino

Poster Number: 92
Name: Lauren Solomon
Abstract Title: Genome-wide comparison of PU.1 and Spi-B binding sites in a mouse B lymphoma cell line
Supervisor(s): Dr. Rodney P. DeKoter

Poster Number: 93
Name: Arend Strikwerda
Abstract Title: Short- Incubation- MALDI- TOF Pathogen Identification Leads to Reduction in Antibiotic Change
Supervisor(s): Dr. Johan Delport

Poster Number: 94
Name: Swathy Sudhakar
Abstract Title: The roles of the first extracellular domain of Cx36 in transjunctional-voltage dependent gating and unitary conductance in chimeric/mutant Cx50 gap junction channels
Supervisor(s): Dr. Bai

Poster Number: 95
Name: Elham Sultan
Abstract Title: Reactive oxygen species (ROS) generation and its role in the cytotoxicity of the arylhydroxylamine (HA) metabolites of sulfamethoxazole (SMX)
Supervisor(s): Dr. Michael J. Rieder

Poster Number: 96
Name: Michael Tavolieri
Abstract Title: Elucidating the Role of RGNEF and Binding Partners in Neuronal Development
Supervisor(s): Dr. Michael J. Strong

Poster Number: 97
Name: Tanner Tessier
Abstract Title: Using short linear interaction motifs to uncover novel mechanisms of protein nuclear import
Supervisor(s): Dr. Joseph Mymryk

Poster Number: 98
Name: Mark Trinder
Abstract Title: Direct and host-mediated mechanisms of pesticide detoxification by probiotic lactobacilli
Supervisor(s): Lawson Health Research Institute; Western University

Poster Number: 99
Name: Drew Wallace
Abstract Title: G Protein Signaling Modulator 3 (GPSM3) and its Role in Cell Division
Supervisor(s): Drs. Peter Chidiac and Greg Kelly

Poster Number: 100
Name: Chang-Hui (Jenny) Wang
Abstract Title: Role of regulator of G protein signalling 2 (RGS2) in cellular stress and apoptosis
Supervisor(s): Dr. Peter Chidiac

Poster Number: 101
Name: Ruth Grace Wong
Abstract Title: Characterizing the microbiome of responders and non responders of bariatric surgery as a weight loss intervention
Supervisor(s): Dr. Gregory Gloor

Poster Number: 102
Name: Claire Young
Abstract Title: Activating Transcription Factor 3 protects acinar cells during pancreatitis
Supervisor(s): Dr. Christopher Pin

Poster Number: 103
Name: Najwa Zebian
Abstract Title: The role of Sbe1 in flagellin glycosylation and capsule synthesis
Supervisor(s): Dr. Carole Creuzenet

Poster Number: 104
Name: Dong Zheng
Abstract Title: MiR-195 represses Pim-1 expression and promotes endothelial cell apoptosis in sepsis
Supervisor(s): Dr. Tianqing Peng

Poster Number: 105
Name: Mohammed Al-Onaizi
Abstract Title: Cholinergic regulation of hippocampal-dependent information processing
Supervisor(s): Drs. Vania F. Prado and Marco A. M. Prado

NEUROSCIENCE AND MENTAL HEALTH

* Indicates a top 80 abstract that will be judged in the poster competition
Poster Number: 106
Name: Amanda Arena
Abstract Title: Automatic self-transcending meditation improves heart rate variability in late-life depression
Supervisor(s): Dr. Akshya Vasudev

Poster Number: 107
Name: Jennifer Au
Abstract Title: Development of Alzheimer’s disease related pathologies following endothelin-1 induced striatal infarct in a transgenic rat model
Supervisor(s): Drs. David Cechetto and Shawn Whitehead

Poster Number: 108
Name: Erin Azzopardi
Abstract Title: The Role of the Cholinergic Midbrain in Sensory Filtering and Sensorimotor Gating
Supervisor(s): Dr. Susanne Schmid

Poster Number: 109
Name: Mervin Blair
Abstract Title: Depressive symptoms negatively impact MoCA performance: A memory clinic experience
Supervisor(s): Drs. Elizabeth Finger, Stephen Pasternak and Sarah Morrow

Poster Number: 110
Name: Sarah Caughlin
Abstract Title: Examining the role of ganglioside metabolism in neurodegenerative disease and injury
Supervisor(s): Drs. David Cechetto and Shawn Whitehead

Poster Number: 111
Name: Justin Chiu
Abstract Title: Elucidating the ADP-Ribosylation factor 6 mediated pathway for micropinocytosis of the amyloid precursor protein
Supervisor(s): Drs. Stephen Pasternak and Shawn Whitehead

Poster Number: 112
Name: M. Rebecca Cobb
Abstract Title: Developing a contrast agent for the in vivo detection of apoptosis
Supervisor(s): Drs. Stephen Pasternak and Robert Bartha

Poster Number: 113
Name: Theshani De Silva
Abstract Title: The use of a positive big potassium channel modulator, BMS-204352, to improve cognitive deficits related to sensory filtering in a rat model of autism
Supervisor(s): Dr. Susanne Schmid

Poster Number: 114
Name: Devin Duke
Abstract Title: Human perirhinal cortex supports judgements of recent frequency and cumulative long-term exposure to concepts
Supervisor(s): Dr. Stefan Kohler

Poster Number: 115
Name: Matthew Edwards
Abstract Title: Loss of ATRX results in hypomyelination in the mouse CNS
Supervisor(s): Dr. Nathalie Bérubé

Poster Number: 116
Name: Adrienne Elbert
Abstract Title: CTCF regulates Interneuron Development through Lhx6
Supervisor(s): Dr. Nathalie Bérubé

Poster Number: 117
Name: Sali Farhan
Abstract Title: Tackling neurodegeneration using next-generation sequencing: identifying the genetics of five neurodegenerative disorders
Supervisor(s): Drs. Robert A. Hegele and Michael J. Strong

Poster Number: 118
Name: Chris Fiacconi
Abstract Title: Using Psychophysiological Measures to Understand Delusional Person Misidentification in Neurodegenerative Disease
Supervisor(s): Drs. Stefan Kohler and Adrian Owen

Poster Number: 119
Name: Shane Goodwin
Abstract Title: Is Happiness Everything? The Role of Positive Items in Measuring Emotional Well-being
Supervisor(s): Dr. Kathy Speechley

Poster Number: 120
Name: Jason Gopaul
Abstract Title: Phosphorylated tau at Threonine 175 and its role in ALS with frontotemporal degeneration
Supervisor(s): Drs. Susanne Schmid and Michael J. Strong

Poster Number: 121
Name: Maha Hammad
Abstract Title: The Role of CAL in the Regulation of the trafficking and Signaling of Corticotropin Releasing Factor Receptor1
Supervisor(s): Dr. Stephen Ferguson

Poster Number: 122
Name: Nikoo Hashemi
Abstract Title: The neural correlates of spontaneous BOLD fluctuations: A simultaneous LFP-fMRI investigation in the nonhuman primate
Supervisor(s): Dr. Stefan Everling
Poster Number: 123
Name: Nole Hiebert
Abstract Title: Does dorsal striatum mediate stimulus-response habit learning or decision-making?
Supervisor(s): Drs. Penny MacDonald and Adrian Owen

Poster Number: 124
Name: Hussein Hirjee
Abstract Title: Automatic self transcending meditation improves neuropsychological symptoms in late-life depression
Supervisor(s): Dr. Akshya Vasudev

Poster Number: 125
Name: Muhammad Ishdiaq
Abstract Title: Role of NEFM targeting miRNAs in Amyotrophic lateral sclerosis (ALS)
Supervisor(s): Dr. Michael J. Strong

Poster Number: 126
Name: Nadezda Ivanova
Abstract Title: Interaction between metabolic syndrome and Alzheimer’s disease
Supervisor(s): Dr. David Cechetto

Poster Number: 127
Name: Mallory Jackman
Abstract Title: Use of Comprehensive Upper Extremity Kinematic Assessment to Predict Motor Improvement in Writer’s Cramp Patients Following Botulinum Neurotoxin Injection Therapy
Supervisor(s): Dr. Mandar Jog

Poster Number: 128
Name: Helena Janickova
Abstract Title: Modulation of acetylcholine levels released by striatal cholinergic interneurons increases sensitivity to addictive drugs and impairs specific cognitive functions
Supervisor(s): Drs. Marco Prado and Vania Prado

Poster Number: 129
Name: Homa Javadzadeh
Abstract Title: In vivo 1H-MRS spectroscopy of endogenous brain serine
Supervisor(s): Dr. Jean Théberge

Poster Number: 130
Name: James Kryklywy
Abstract Title: Dissociable neurocognitive systems for emotional intensity encoding and emotion recognition
Supervisor(s): Dr. Derek Mitchell

Poster Number: 131
Name: Olivia Samotus
Abstract Title: Upper limb kinematics guides longitudinal, incobotulinumtoxinA therapy of Parkinson disease tremor
Supervisor(s): Dr. Mandar Jog

Poster Number: 132
Name: Andrea Louttit
Abstract Title: Effect of AM251 on habituation and prepulse inhibition of the acoustic startle response
Supervisor(s): Dr. Susanne Schmid

Poster Number: 133
Name: Sara Matovic
Abstract Title: Synaptic changes in the hypothalamus after chronic stress
Supervisor(s): Dr. Wataru Inoue

Poster Number: 134
Name: Haley McConkey
Abstract Title: The Function of ATRX in astrocytes
Supervisor(s): Dr. Nathalie Berube

Poster Number: 135
Name: Shahin Moallem
Abstract Title: Abnormal hippocampal activation of freely behaving mice deficient for the vesicular acetylcholine transporter
Supervisor(s): Dr. Stan Leung

Poster Number: 136
Name: Alexander Moszczynski
Abstract Title: Thr175- phosphorylated tau induces pathologic fibril formation via GSK3β-mediated hypophosphorylation of Thr231 in vitro
Supervisor(s): Drs. Michael J. Strong and Arthur Brown

Poster Number: 137
Name: Andrew Nicholson
Abstract Title: The Dissociative Subtype of Posttraumatic Stress Disorder: Unique Resting-State Functional Connectivity of Basolateral and Centromedial Amygdala Complexes
Supervisor(s): Dr. Ruth Lanius

Poster Number: 138
Name: Lindsay Oliver
Abstract Title: Is the emotion recognition deficit associated with frontotemporal dementia caused by selective inattention to diagnostic facial features?
Supervisor(s): Drs. Derek Mitchell and Elizabeth Finger

Poster Number: 139
Name: Kyle Pangka
Abstract Title: Exploring the Views of Emergency Department staff on the use of Videoconferencing for Mental Health Emergencies in Southwestern Ontario
Supervisor(s): Dr. R. Chandrasena

* Indicates a top 80 abstract that will be judged in the poster competition
Poster Number: 140
Name: Dae Hee Park
Abstract Title: Electrospray ionization mass spectrometry detects changes in ganglioside expression in neurodegenerating rat primary cortical neurons
Supervisor(s): Drs. Shawn Whitehead and Gilles Lajoie

Poster Number: 141
Name: Jacob Penner
Abstract Title: Neural Circuitry Underlying Major Depression and Marijuana Use: An Emotion Regulation fMRI Task Shows Activation Differences in Dorsolateral and Ventromedial Prefrontal Cortex
Supervisor(s): Drs. Peter Williamson and Elizabeth Osuch

Poster Number: 142
Name: Matthew Quinn
Abstract Title: Enhanced deep grey matter iron accumulation and brain volume loss are associated in early multiple sclerosis
Supervisor(s): Dr. Ravi S. Menon

Poster Number: 143
Name: Daniela Rabellino
Abstract Title: Intrinsic Connectivity Networks in post-traumatic stress disorder during sub- and supraliminal processing of threat-related stimuli
Supervisor(s): Dr. Ruth A. Lanius

Poster Number: 144
Name: Aaron Regis
Abstract Title: Identifying treatable interactions between stroke and Alzheimer’s disease
Supervisor(s): Drs. Shawn Whitehead and Vladimir Hachinski

Poster Number: 145
Name: Justine Renard
Abstract Title: Long-term Effects of Adolescent THC Exposure on Adulthood Psychopathology
Supervisor(s): Dr. Steven R. Laviolette

Poster Number: 146
Name: Brian Robertson
Abstract Title: Dorsal striatum mediates cognitive control, not cognitive effort per se, in decision-making: An event-related fMRI study
Supervisor(s): Drs. Penny A. MacDonald and Adrian M. Owen

Poster Number: 147
Name: Laura Rosen
Abstract Title: Opiate Exposure State alters Dopamine D3 receptor signaling within the Basolateral Amygdala
Supervisor(s): Drs. Steven Laviolette and Walter Rushlow

Poster Number: 148
WITHDRAWN

Poster Number: 149
Name: Ashley Schormans
Abstract Title: Does Noise-Induced Hearing Loss Result in Cortical Plasticity Beyond the Primary Auditory Cortex?
Supervisor(s): Dr. Brian Allman

Poster Number: 150
Name: Patrick Swan
Abstract Title: ATF4-PUMA drives p53-independent neuronal apoptosis in response to hypoxic stress
Supervisor(s): Dr. Sean Cregan

Poster Number: 151
Name: Wafa’a Ta’an
Abstract Title: Nurse-Client Relationships in Jordanian Mental Health Settings: An Ethnographic Study
Supervisor(s): Dr. Cheryl Forchuk

Poster Number: 152
Name: Renee Tamming
Abstract Title: Mosaic expression of the Atrx intellectual disability gene in the mouse brain causes impaired learning and memory
Supervisor(s): Dr. Nathalie Berube

Poster Number: 153
Name: Tamara Tavares
Abstract Title: An fMRI study of facial expression processing in individuals at-risk for developing frontotemporal dementia
Supervisor(s): Drs. Derek Mitchell and Elizabeth Finger

Poster Number: 154
Name: Reggie Taylor
Abstract Title: Neurometabolic changes observed in the anterior cingulate cortex and thalamus of people with schizophrenia and unipolar mood disorder relative to healthy controls at 7T
Supervisor(s): Drs. Jean Théberge and Peter Williamson

Poster Number: 155
Name: Stephanie Tran
Abstract Title: Effects of Variations in Electrical Parameters on Bradykinesia of Participants after Subthalamic Deep Brain Stimulation
Supervisor(s): Dr. Mandar Jog
Poster Number: 156  
**Name:** Hadi Vafadar  
**Abstract Title:** Kinematic characterization successfully guides onabotulinumtoxinA treatment in cervical dystonia patients  
**Supervisor(s):** Dr. Mandar Jog

Poster Number: 157  
WITHDRAWN

Poster Number: 158  
**Name:** Kai Wang  
**Abstract Title:** A rat model for cognitive biases  
**Supervisor(s):** Drs. Peter Ossenkopp and Martin Kavaliers

Poster Number: 159  
**Name:** Warren Winick-Ng  
**Abstract Title:** 82-kDa choline acetyltransferase interacts with chromatin after acute exposure to β-amyloid  
**Supervisor(s):** Dr. Jane Rylett

Poster Number: 160  
**Name:** Ryan Wong  
**Abstract Title:** Examining the pathological and behavioural effects of rats injected with amyloid beta oligomers  
**Supervisor(s):** Drs. Shawn Whitehead and David Cechetto

Poster Number: 162  
**Name:** Tian Xiao  
**Abstract Title:** Changes in microglial morphology in the hypothalamus after chronic psychological stress  
**Supervisor(s):** Wataru Inoue

Poster Number: 162  
**Name:** Jason Xu  
**Abstract Title:** Mechanisms of neuroprotection induced by stress-inducible phosphoprotein-1 on ischemic insult  
**Supervisor(s):** Drs. Marco Prado and Vania Prado

Poster Number: 163  
**Name:** Alvin Yang  
**Abstract Title:** The Effect of Clomipramine on Sensorimotor Gating in Rats  
**Supervisor(s):** Dr. Susanne Schmid

Poster Number: 164  
**Name:** Taqir Zaman  
**Abstract Title:** Functional Role of BK Channels in Sensory Filtering  
**Supervisor(s):** Dr. Susanne Schmid

Poster Number: 165  
**Name:** Angela Zhang  
**Abstract Title:** Investigating the role of neuroinflammation in secondary damage following stroke in the prefrontal cortex  
**Supervisor(s):** Dr. Shawn Whitehead
### FEATURE PLATFORM PRESENTATIONS

**AFTERNOON SESSION**

2:45 - 3:45 p.m.
Salons A, B, C and Theatre

<table>
<thead>
<tr>
<th>TIME</th>
<th>SALON A</th>
<th>SALON B</th>
<th>SALON C</th>
<th>THEATRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:45 - 3:00 P.M.</td>
<td>Joseph Zeppa</td>
<td>Jason Peart</td>
<td>Emily Pawlak</td>
<td>Rajesh Jacob</td>
</tr>
<tr>
<td>3:00 - 3:15 P.M.</td>
<td>Stephen Sherman</td>
<td>Mateusz Rytelewski</td>
<td>Michael Pest</td>
<td>Anusha Ratneswaran</td>
</tr>
<tr>
<td>3:15 - 3:30 P.M.</td>
<td>Alvin Li</td>
<td>Ivan Kosik</td>
<td>Jonathan McLeod</td>
<td>Sarah Mattonen</td>
</tr>
<tr>
<td>3:30 - 3:45 P.M.</td>
<td>Trevor Morey</td>
<td>Seyed Reza Mousavi</td>
<td>Dorian Murariu</td>
<td>Clayton Law</td>
</tr>
</tbody>
</table>
VACCINE APPROACHES TARGETING COLONIZATION BY STREPTOCOCCUS PYOGENES

JOSEPH ZEPPA

Research Area:
Molecular, Infection, Immunity

Supervisor(s):
Dr. John McCormick

Supervisory Committee:
Drs. Martin McGavin and Mansour Haeryfar

First Author:
Joseph Zeppa

Additional Authors:
Katherine J. Kasper, Delfina M. Mazzuca, S. M. Mansour Haeryfar and John K. McCormick

Abstract:
Introduction: Streptococcus pyogenes can cause a myriad of illnesses from pharyngitis to necrotizing fasciitis and rheumatic heart disease, resulting in over 500,000 deaths annually. Worldwide, it is a top-ten pathogen in terms of human mortality from an infectious agent, and despite decades of effort, a safe, effective vaccine does not exist.

Hypothesis: We hypothesize that vaccination of humanized mice with toxoid virulence factors known as superantigens will prevent S. pyogenes infection through antibody-mediated neutralization. We also postulate that specific T cell subsets are manipulated by S. pyogenes to efficiently infect its host.

Materials and Methods: Humanized mice (conventional C57Bl/6 mice expressing human leukocyte antigens) were used in all experiments. Mice were vaccinated with wild-type or mutant toxoid superantigens three times over 28 days (day 0, 14 and 28). Two weeks after vaccination, blood was taken to assess antibody titres (via enzyme-linked immunosorbent assay [ELISA]). To examine the protective effect of vaccination, twenty-four hours post-bleed, mice were intranasally infected with S. pyogenes for 48 hours and sacrificed and bacteria infecting the nasopharynx were enumerated. To determine the effects that superantigen vaccination had on specific T cell subset ratios, mice were vaccinated as above, however, instead of infection, splenocytes were isolated and either exposed to varying concentration of superantigens (responsiveness assay; interleukin-2 ELISA readout) or stained for flow cytometry (to examine specific T cell subset ratios). To specifically measure antibody-mediated protection, mice were passively immunized with anti-SAg or control rabbit serum twice (-24 and -2 hours) before infection (completed as stated above). To finally assess the roles of CD4 and CD8-T cells in S. pyogenes infection, mice were pretreated with depleting antibodies targeting either CD4 or CD8 subsets, or control antibody, 72 hours prior to infection. Mice were then infected and analyzed as above.

Results: Mice vaccinated with wild-type superantigens streptococcal pyrogenic exotoxin (Spe) A and staphylococcal enterotoxin B (both targeting vβ8 T cells), and mutant SpeAY100A, were protected from infection by S. pyogenes. Sham vaccinated mice were not protected, whereas mice vaccinated with SpeAHexa showed a protective trend. Only mice vaccinated with SpeA mutants showed significant antibody production. Mice vaccinated with wild-type superantigens and SpeAY100A showed impairment in specific T cell subset responsiveness compared to control vaccination. Mice passively immunized with anti-SpeA, but not control serum, were protected from infection. Mice treated with anti-CD8, but not anti-CD4 or control antibody were protected from infection.
THE EFFECT OF β1-INTEGRIN ON PANCREATIC BETA-CELL SURVIVAL AND FUNCTION USING AN INDUCIBLE BETA-CELL SPECIFIC β1-INTEGRIN KNOCKOUT MOUSE MODEL

JASON PEART

Research Area:
Endocrinology and Metabolism, Population Health, Education, Fetal-Maternal, Family, Development and Aging

Supervisor(s):
Dr. Rennian Wang

Supervisory Committee:
Drs. Andrew Leask and Zia Khan

First Author:
Jason Peart

Additional Authors:
Matthew Riopel, Zhi-Chao Feng, Jinming Li and Rennian Wang

Abstract:
Introduction: It has been shown that β1-integrin is essential for pancreatic beta-cell development and maintenance throughout life in rodents and human fetal islets. However, the effects of a temporarily controlled β1-integrin knockout (β1KO) specific to pancreatic beta-cells of mice in vivo remains to be determined.

Hypothesis: We hypothesize that inducing a beta-cell specific β1-integrin knockout in adult male mice will result in impaired beta-cell proliferation, survival and function, resulting in aberrant glucose homeostasis and insulin secretion.

Materials and Methods: We have generated C57BL/6 mice with CreER recombinase specific to the mouse insulin promoter (MIP), allowing us to induce a β1KO upon injection of tamoxifen. Male mice at 3-4 weeks of age received 4mg of tamoxifen per 20g bodyweight via intraperitoneal injection for 3 consecutive days. Metabolic studies were conducted by intraperitoneal injection to examine glucose tolerance, insulin tolerance and glucose stimulated insulin secretion. Immunofluorescence staining was used to examine beta-cell mass, islet size and islet density. Pancreatic islets were isolated and protein levels were determined by western blot.

Results: The protein level of β1-integrin in β1KO mouse islets was reduced (~60%) at 8 weeks post induction compared to littermate controls. β1KO mice showed significantly impaired glucose tolerance and glucose stimulated insulin secretion 8 weeks post induction (p < 0.05), however insulin sensitivity remained unaltered. Islet morphologic analysis of 8 week post induction β1KO mouse pancreatic sections showed a significant reduction in beta-cell mass, islet density, and number of large islets (p < 0.05). We found a significant reduction in Pdx-1, cyclin D1, and c-PARP protein expression, as well as a reduction in p-FAK, p-ERK, and p-AKT (p < 0.05)
A NOVEL PROTEIN INTERACTION BETWEEN THE MEMBRANE TRAFFICKING REGULATOR SNX18 AND THE HIV-1 ACCESSORY PROTEIN Nef

EMILY PAWLAK

Research Area:
Molecular, Infection, Immunity

Supervisor(s):
Dr. Jimmy D. Dikeakos

Supervisory Committee:
Drs. Joe Mymryk and Lakshman Gunaratnam

First Author:
Emily N. Pawlak

Additional Authors:
Jimmy D. Dikeakos

Abstract:
Introduction: The human immunodeficiency virus type 1 (HIV-1) utilizes a single gene product, nef, to evade the immune response. The Nef protein mediates immunoevasion by binding host cellular proteins, including membrane trafficking machinery, to endocytose the cell surface receptor major histocompatibility complex class I (MHC-I) through a pathway not fully elucidated.

Hypothesis: We hypothesize that the endocytic pathway utilized by Nef to downregulate cell surface MHC-I exploits the membrane trafficking regulator protein sorting nexin 18 (SNX18) via a direct interaction with Nef.

Materials and Methods: To determine if Nef interacts directly with SNX18, we produced and affinity purified various epitope tagged variants of wild type or binding domain mutant variants of His6-Nef and GST-tagged sorting nexin isoforms, and subjected them to in vitro protein capture assays. Furthermore, we co-immunoprecipitated epitope tagged Nef and SNX18 from HEK 293T cells. To test for the requirement of SNX18 in Nef-mediated MHC-I downregulation we have silenced SNX18 in SupT1 T-cells using siRNA.

Results: We demonstrated that GST-SNX18 captured His6-Nef, as detected by western blot analysis. Additionally, this interaction was dependent on the SH3 domain of SNX18 and a polyproline motif on Nef. We also observed that Nef co-immunoprecipitates with SNX18, in an SH3 dependent manner.
THEATRE

HIV-1 Nef INDUCED CD4+T CELL DEATH IS ASSOCIATED WITH THE INHIBITION OF PROTEINS ACTIVATING THE Akt PATHWAY

RAJESH JACOB

Research Area:
Molecular, Infection, Immunity

Supervisor(s):
Dr. Jimmy D. Dikeakos

Supervisory Committee:
N/A

First Author:
Rajesh Abraham Jacob

Additional Authors:
Diliana Stratkova, Craig P. Cavanagh, S. M. Mansour Haeryfar and Jimmy D. Dikeakos

Abstract:
Introduction: The majority of the productively HIV-1 infected CD4+T cells undergo programmed cell death. Multiple factors including induction of pro-apoptotic HIV-1 proteins, microbial translocation across the breached gastrointestinal tract and activation induced T cell death drive apoptosis during HIV infections.

Hypothesis: In this study, we investigate the pro-apoptotic role played by the HIV-1 accessory protein Nef and explore the cell signalling pathways hijacked by Nef to modulate cell survival. We hypothesize that the HIV Nef protein induces apoptosis and modulates cell survival by hijacking proteins involved in the cell signalling pathway.

Materials and Methods: Apoptosis was quantified by live cell staining of SupT1 cells infected with the replication incompetent pNL4-3 pseudovirus or the corresponding nef deletion mutant. Phospho-specific flow cytometry was utilized to gain insight into the signalling pathways contributing to Nef-induced apoptosis.

Results: The levels of apoptotic marker expression were 2.3 fold lower in the nef deletion mutant with a two-fold decrease in activated caspase-3/7 activity. We further measured the activation status of the serine/threonine protein kinase Akt using phospho-specific flow cytometry. Strikingly, increased phosphorylation of Akt was noticeable in the absence of Nef. Consistent with this observation, increased phosphorylation of PI3-kinase, the PTEN c-terminal tail and mTOR was noticeable. Mechanistic studies further indicated that the nef deletion mutant maintained increased phosphorylation of the pro-apoptotic protein BAD thereby reducing its mitochondrial accessibility and induced higher expression levels of the anti-apoptotic protein Bcl-xL.
Abstract:
Introduction: Aldehyde dehydrogenase (ALDH) activity, a conserved stem cell function, protects long-lived progenitor cells against oxidative stress. Multipotent stromal cells (MSC) are perivascular-resident progenitor cells that differentially express ALDH during culture expansion. Purification using ALDH-activity may be a useful functional marker to identify MSC subsets with increased vascular regenerative capacity.

Hypothesis: MSC retaining high ALDH activity during ex vivo expansion will promote endothelial cell proliferation and tube formation in vitro and will promote recovery of limb perfusion and revascularization after transplantation into NOD/SCID mice with femoral artery ligation–induced Critical limb ischemia.

Materials and Methods: After culture expansion of bone marrow-derived MSC, we purified MSC progeny based on high versus low ALDH activity by fluorescence activated cell sorting. Affymetrix microarray was performed on purified MSC subsets to compare mRNA expression patterns for secreted cytokines. Protein secretion into conditioned media generated by purified ALDH low versus ALDH high MSC subsets was assayed by MultiPlex ELISA for selected angiogenic factors. Conditioned media from ALDH high and ALDH low MSC subsets was generated for 48 hours before being applied to human microvascular endothelial cells (HMVEC) where the tube forming and proliferative capacity of the HMVEC was measured. HMVEC were also co-cultured with ALDH low and ALDH high MSC subsets in 8-micron pore transwells to assay the effect of soluble factor-mediated cell communication on proliferation and tube forming capacity of the HMVEC. HMVEC proliferation was enumerated after 72 hours by EdU incorporation combined with MSC (CD90) and HMVEC (CD31) markers after direct co-culture with ALDH low and ALDH high MSC subsets. Lastly, the angiogenic capacity of the ALDH low and ALDH high MSC subsets will be tested in vivo using a directed in vivo angiogenesis array (DIVAA) transplanted subcutaneously in NOD/SCID mice.

Results: Although the purified ALDH low and ALDH high MSC subsets demonstrated very similar mRNA expression patterns (n=3), the cytokine array from the ALDH high MSC subset showed increased secretion of Angiogenin, IL-6, IL-8, TIMP-1, and TIMP-2 relative to the ALDH low MSC subset (n=4, p<0.05). HMVEC demonstrated a potent proliferative effect after exposure to conditioned endothelial basal media generated by ALDH high MSC subsets (n=3, p<0.05). Conditioned media generated from ALDH high MSC subsets enhanced tube-forming capacity of HMVEC in Geltrex under serum-free, growth factor-free conditions (n=3, p<0.05).
**SALON B**

**EXPLOITING POSITIVE SELECTION TO PREVENT INNATE AND ACQUIRED DRUG RESISTANCE IN CANCER CELLS**

**MATEUSZ RYTELEWSKI**

**Research Area:**
Cellular and Cancer Biology

**Supervisor(s):**
Dr. James Koropatnick

**Supervisory Committee:**
N/A

**First Author:**
Mateusz Rytelewski

**Additional Authors:**
Larissa Romanow, Peter J. Ferguson, Rene Figueredo, Mark Vincent and James Koropatnick

**Abstract:**
Introduction: It is a mathematical certainty that targeted monotherapy of tumours will fail due to outgrowth of resistant clones. Novel combinations must be designed to counteract this phenomenon. Tumor cells depend on DNA repair to counteract DNA-damaging therapies, and patients with DNA repair mutated tumours respond more favourably to treatment.

Hypothesis: We hypothesized that BRCA2 downregulation would sensitize tumor cells to PARP inhibition. In addition BRCA2 downregulation would select for cells with less reliance on DNA repair, making them susceptible to PARP inhibition. PARP inhibition would select for cells dependent on DNA repair, rendering them susceptible to BRCA2 downregulation.

Materials and Methods: We developed a BRCA2 targeting antisense oligonucleotide (ASO) to test in combination with olaparib, a prototypical PARP-1 inhibitor. We treated A549 lung cancer cells, H2052 and 211H mesothelioma cells, SKOV-3 and CaOV-3 ovarian cancer cells, CAPAN-1 pancreatic cancer cells, and MCF-7 breast cancer cells with this combination and measured proliferation by cell counting.

Results: A number of different cancer cell lines were rendered more sensitive to olaparib treatment when combined with BRCA2 ASO. Normal HK-2 kidney cells were not sensitized to olaparib by BRCA2 ASO, and non-tumorigenic MCF-10a cells were sensitized to a lesser degree than the tumor cell lines. Homologous recombination (HR) proficient SKOV-3 cells were depleted, and HR-deficient MCF-7 and CAPAN-1 cells were enriched, by BRCA2 ASO treatment. HR-deficient cells were depleted and HR-proficient cells were enriched by single olaparib treatment. Combined BRCA2 ASO + olaparib treatment depleted both HR-proficient and HR-deficient cells, without selectively enriching for either population.
CARTILAGE SPECIFIC DELETION OF MITOGEN INDUCIBLE GENE 6 IN MICE INCREASES ARTICULAR CARTILAGE THICKNESS IN LATE ADULTHOOD

MICHAEL PEST

Research Area:
Circulatory and Respiratory Health, Musculoskeletal and Rehabilitation

Supervisor(s):
Dr. Frank Beier

Supervisory Committee:
Drs. Peter Chidiac, Bob Giffin and Qingping Feng

First Author:
Michael Pest

Additional Authors:
Bailey Russell, Jae-Wook Jeong and Frank Beier

Abstract:
Introduction: Osteoarthritis is characterized by progressive joint degeneration. There are currently no treatments to reverse associated cartilage loss. Mitogen inducible gene 6 (Mig-6) negatively regulates epidermal growth factor (EGFR) signalling which is important in cartilage homeostasis. Loss of Mig-6 results in increased knee articular cartilage thickness (Pest et al, 2014).

Purpose: To determine 1) the role of Mig-6 in maintaining cartilage anabolism when deleted in post-natal mouse cartilage, 2) the anabolic effects of Mig-6 loss in multiple joints and at multiple ages, and 3) whether this phenotype can be rescued by deletion of EGFR ligand TGFalpha.

Materials and Methods: Selective knockout of Mig-6 in cartilage was achieved through the use of the Cre-lox system, by breeding “floxed” Mig-6 (Mig-6fl/fl) mice to either animals with Cre driven by Col2a1 promoter (Col2-Cre+/-) or to animals with a tamoxifen inducible Col2a1 driven Cre (Col2a1-CreERT2+/-). Col2-Cre mice were aged to 15 and 21 months of age to examine cartilage anabolism and formation of ectopic chondro-osseous nodules late in life. 21 month old mice were scanned by MicroCT at 50 μm/voxel resolutions to examine changes in bone morphology and ectopic nodule formation. Cre-mediated recombination in Col2-CreER mice was induced by 5 day tamoxifen injection in 3 week old mice. Mice with deletion of TGFalpha were bred to Mig-6 KO mice to evaluate the role of this EGFR ligand in the anabolic phenotype. Histological sections of knee, ankle, elbow and spine articular joints were collected and joint morphology was examined using various stains including Safranin O/fast green, toluidine blue and picrosirius red. Immunohistochemistry (IHC) was used to evaluate molecular changes in joint tissues.

Results: Anabolic increase in the cartilage thickness of the elbow and ankle was observed up to the age of 21 months in Mig-6 knockout mice (KO, Mig-6fl/fl;Col2-Cre+/-) when compared to Control mice (Mig-6fl/fl;Col2-Cre-/- or Mig-6fl/+;Col2-Cre-/-). Ectopic chondro-osseous nodules were identified only in the knee joints and spines of KO mice by MicroCT evaluation and histology. Phospho-ERK staining in these tissues was increased in KO mice compared to control, indicating increased EGFR signalling. Deletion of TGFalpha in Mig6 KO did not prevent formation of chondro-osseous nodules in the knee as late as 12 weeks of age.
THEATRE

PPARdelta PROMOTES THE PROGRESSION OF POST-TRAUMATIC OSTEOARTHRITIS

ANUSHA RATNESWARAN

Research Area:
Circulatory and Respiratory Health, Musculoskeletal and Rehabilitation

Supervisor(s):
Dr. Frank Beier

Supervisory Committee:
Drs. Dean Betts, Nica Borradaile and Trevor Birmingham

First Author:
Anusha Ratneswaran

Additional Authors:
Emily LeBlanc, Ian Welch, Nica Borradaile and Frank Beier

Abstract:
Introduction: Osteoarthritis (OA) is a degenerative joint disorder affecting the synovium, articular cartilage and underlying bone. Current findings from our laboratory indicate that activation of the nuclear receptor PPARdelta induces expression of enzymes involved in cartilage breakdown, prompting us to speculate whether inhibition of PPARdelta could be a viable treatment strategy.

Hypothesis: We hypothesize that inhibition of PPARdelta will slow the progression of OA in animal models.

Materials and Methods: Primary mouse chondrocytes and cartilage explants were treated with a pharmacological PPARdelta agonist (GW501516) to evaluate changes in gene expression (qPCR), aggregcan breakdown (Dye-binding assay) and histology (Safranin-O, immunohistochemistry) consistent with OA development. Microarrays are conducted on primary mouse chondrocytes treated with GW501516 to elucidate information on direct targets of this nuclear receptor. In order to examine the role of PPARdelta in-vivo, cartilage-specific knockout mice and wild-type littermate controls were subjected to destabilization of medial meniscus surgery (DMM) at 20 weeks of age. 8 weeks post-surgery mice were compared through classical histological and biochemical measures of OA progression including Safranin-O staining with OARSI scoring, immunohistochemistry for cartilage matrix breakdown products, and picrosirius red staining for collagen fiber structure and orientation.

Results: In vitro, PPARdelta agonism (by GW501516) results in the upregulation of expression of proteases implicated in cartilage degeneration (including MMPs and ADAMTS genes), as well as proteoglycan breakdown in an explant culture system. Dye-binding assays of medium and guanidine extracts demonstrate significantly increased quantities of aggrecan breakdown products released from treated explants. Microarray analyses identified targets of PPARdelta, such as those involved in lipid oxidation and transport. OARSI histopathological scoring and immunohistochemistry demonstrated strong protection of PPARdelta KO mice from cartilage matrix breakdown after surgical induction of OA.
**Abstract:**

Introduction: One common public fear regarding organ donation is that physicians will not take all measures to save the life of a registered donor. Showing that many physicians are registered themselves could help dispel this myth. While most physicians in surveys support organ donation, whether they are actually registered remains unknown.

Hypothesis: We hypothesize that physicians are more likely to register for deceased organ and tissue donation compared to the general public.

Materials and Methods: We conducted a population-based cross-sectional study of physicians (n=15 233) and the general public (n=10 866 752) residing in the province of Ontario, Canada as of May 2013 using multiple linked healthcare databases. Four citizens from the general public (n=60 932) were matched to each physician based on age, sex, neighborhood income quintile, and location of residence. The main outcome and measure was deceased organ and tissue donor registration in the provincial organ donor registry.

Results: A total of 6596 physicians (43.3%; 95%CI, 42.5%-44.1%) were registered, a significantly higher proportion than matched citizens (17,975 [29.5%; 95%CI, 29.1%-29.7%]) or the general public (2,596,766 [23.9%; 95% CI, 23.9%-23.9%]). Physicians were 47% more likely to be registered for organ and tissue donation than matched citizens (95%CI, 44%-50%; P<0.0001). Among physicians, factors significantly associated with higher donor registration were younger age, sex (women), living in a rural community, physician specialty (emergency medicine, internal medicine, pediatrics or psychiatry versus family medicine) and graduating from a Canadian (versus foreign) medical school.
DEVELOPMENT OF A PHOTOACOUSTIC IMAGING SYSTEM FOR INTRAOPERATIVE BREAST LUMPECTOMY CHARACTERIZATION

IVAN KOSIK

Research Area:
Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies

Supervisor(s):
Dr. Jeffrey Carson

Supervisory Committee:
Drs. Tamie Poepping and James Lacefield

First Author:
Ivan Kosik

Additional Authors:
Philip Wong, Muriel Brackstone and Jeffrey Carson

Abstract:
Introduction: Lumpectomy surgery is the recommended surgical standard for women diagnosed with early breast cancer, however, about 1 in 5 procedures will fail to completely remove all cancer and a second surgery becomes necessary. This situation, caused by a lack of rapid and specific imaging technology, strains both patients and resources.

Hypothesis: A new technology, called Photoacoustic Imaging, is able to visualize contrast based on cancer specific biomarkers, such as tissue hemoglobin and lipid concentration as well as oxygen saturation. Consequently, it exhibits superior cancer sensitivity and specificity, compared to currently utilized imaging methods, such as ultrasound and mammography.

Materials and Methods: A raster scanning 3D photoacoustic imaging system was constructed on a portable transport cart. The system was comprised of an Nd-YAG laser system tunable in the 680 – 950 nm wavelength range, a 4-axis robot, and an in-house built 16 channel ultra-broadband transducer array connected to a 50 MHz data acquisition system (DAQ). The DAQ, robot and laser were controlled using a computer with LabVIEW software and the image reconstruction was performed using Matlab. A 30 cm x 60 cm x 30 cm (WxLxH) glass tank was used to contain imaging specimens while degassed water was used as an acoustic coupling medium. Immediately following excision, preliminary imaging tests were performed on fresh lumpectomy specimens obtained in coordination with surgical staff. The specimens were suspended in a bag containing saline solution and subsequently submerged in the water tank using a specialized mounting apparatus. Photoacoustic scans were performed using 690 nm and 930 nm wavelengths.

Results: The image acquisition procedure took less than 10 minutes to complete and resulted in reconstructed 3D imaging volumes measuring 16 cm x 16 cm x 6 cm. Compared to imaging at 930 nm, images reconstructed using photoacoustic signals induced by 690 nm wavelength laser pulses showed significantly more numerous high-contrast “hot-spots”. Furthermore, 690 nm light was able to provide a higher signal-to-noise-ratio (SNR) at much deeper locations inside the lumpectomy specimens. Photoacoustic signals originating at up to 6 cm from the light entry point were easily detected during 690 nm illumination.
AUTOMATICALLY IDENTIFYING DURAL PULSATION IN ULTRASOUND VIDEO OF THE LUMBAR SPINE

JONATHAN MCLEOD

Research Area:
Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies

Supervisor(s):
Dr. Terry Peters

Supervisory Committee:
Drs. Aaron Ward, Sandrine de Ribaupierre and Louis Collins

First Author:
Jonathan McLeod

Additional Authors:
John Baxter, Golafsoun Ameri, Sugantha Ganapathy, Terry Peters and Elvis Chen

Abstract:
Introduction: Anesthesiologists increasingly rely on ultrasound imaging to guide epidural injections. However, reaching the epidural space frequently requires multiple attempts and can result in injury to the spinal cord. Dural pulsation is a subtle cue anesthesiologists can use to find safe needle trajectories. Automatically identifying dural pulsation would improve patient safety.

Hypothesis: Video processing methods can be developed that will detect and visualize dural pulsation from ultrasound imaging of the lumbar spine. Displaying this information during spine needle interventions will result in more direct needle trajectories and reduce the number of repeated attempts required to reach the epidural space.

Materials and Methods: A video processing algorithm was developed that used extended Kalman filtering to fit a periodic model to pixel intensities. The estimated frequencies and amplitudes were then used to locate the pulsating dura in the ultrasound video and a heat-map showing the strength of pulsation was displayed to the user. The software was developed to run in real-time on a commercial ultrasound system and was evaluated by retrospectively analyzing human ultrasound video and by performing mock epidural procedures in a phantom environment.

The retrospective human analysis consisted of running the software on ultrasound videos of the lumbar spine acquired from two healthy volunteers. The mock epidural procedures used a model of the lumbar spine designed for training medical students on spinal ultrasound. The dura was actuated at 60bpm using an external device to simulate dural pulsation and an anesthesiologist performed 12 simulated injections with and without the video processing for dural pulsation. During each injection the position of the needle was continuously recorded using a magnetic tracking system allowing for evaluation on the basis of needle path length, number of attempts and time. In both experiments, images were acquired from a paramedial view that is used clinically for guiding epidural injections.

Results: The human data showed good detection of the pulsating dura within approximately 5 seconds. The proposed method was more efficient and produced better visualization than were possible using naive spectral analysis. When this method was used by the anesthesiologist in the mock procedures it resulted in a reduced normalized path length (3.0 vs 5.4) p<0.05 and fewer average number of attempts (1.7 vs 2.7) p<0.05. It also resulted in an insignificant reduction in the time required per injection (12.0s vs 15.7s).
EARLY PREDICTION OF LUNG CANCER RECURRENCE AFTER STEREOTACTIC RADIOTHERAPY USING TEXTURE ANALYSIS OF AUTOMATIC GRAPH CUTS SEGMENTATIONS

SARAH MATTONEN

Research Area:
Medical Physics, Engineering and Imaging, Transplantation, Biomedical Devices, Surgical and Clinical Studies

Supervisor(s):
Drs. Aaron Ward and David Palma

Supervisory Committee:
Dr. Grace Parraga

First Author:
Sarah A. Mattonen

Additional Authors:
David A. Palma, Cornelis J. A. Haasbeek, Suresh Senan and Aaron D. Ward

Abstract:
Introduction: Stereotactic ablative radiotherapy (SABR) is becoming a standard treatment option for patients with early-stage lung cancer, achieving local control rates comparable to surgery. Following SABR, benign radiation-induced lung injury (RILI) causes radiographic changes on computed tomography (CT) imaging, which can be difficult to differentiate from a recurring tumour.

Hypothesis: Our previous work has shown the utility of CT texture features calculated within manually delineated regions of interest for recurrence prediction post-SABR. We hypothesize that CT texture features extracted within automatically derived regions of interest can predict recurrence in individual patients with the same accuracy as the manual delineations.

Materials and Methods: We analyzed 22 patients with 24 lesions (11 recurrence, 13 RILI) treated with SABR at the VU University Medical Center, Netherlands. A total of 114 follow-up CT images were analyzed with a median follow-up of 26 months. Two regions of common post-SABR changes were manually delineated on all follow-up CT images: consolidative and ground-glass opacity (GGO). Due to the fact that manual delineations of these regions are time-consuming and subject to observer variability, the consolidative regions were also automatically delineated. A OneCut graph cuts algorithm was used with the only operator input being the single line segment measuring tumour diameter, normally taken during the clinical workflow. A surrogate GGO region was approximated by automatic expansion of the consolidative regions. Within the GGO regions, first-order texture was calculated as the standard deviation of density. Four second-order texture features were also calculated based on grey-level co-occurrence matrices: energy, entropy, inertia and correlation. Classification was performed using a linear Bayes normal classifier and evaluated using cross-validation (CV) and area under the receiver operating characteristic curve (AUC). Delineation times for the manual and automatic approach were also measured on a subset of 46 images taken at 2–5 and 5–8 months post-SABR.

Results: Leave-one-out CV on images taken 2–5 months post-SABR showed robustness of the entropy texture measure, with classification error of 26% and AUC of 0.77 using the automatic segmentation; results using a fully manual segmentation were 19% and 0.80 respectively. Using our automated approach, AUCs increased to 0.82 and 0.93 at 8–14 and 14–20 months post SABR, respectively, suggesting better performance nearer to the clinical diagnosis of recurrence. The average time (ffl SD) to manually delineate the solid and GGO on each image was 266ffi314 and 292ffi187 seconds respectively, versus 15ffi15 and 5ffi2 seconds using our automatic approach.
REGULATION OF HUMAN 69-kDa CHOLINE ACETYLTRANSFERASE PROTEIN STABILITY AND ENZYME ACTIVITY BY AN N-TERMINAL PROLINE-RICH MOTIF

TREVOR MOREY

Research Area:
Neuroscience and Mental Health

Supervisor(s):
Dr. Jane Rylett

Supervisory Committee:
Drs. Brian Shilton, Lina Dagnino, Susan Meakin and John DiGuglielmo

First Author:
Trevor M. Morey

Additional Authors:
Brian H. Shilton and R. Jane Rylett

Abstract:
Introduction: Choline acetyltransferase (ChAT) synthesizes the neurotransmitter acetylcholine required for cholinergic neurotransmission. A Val18Met mutation within a conserved N-terminal proline-rich motif at residues 14PKLPVPP20 reduces ChAT protein expression and activity in patients with congenital myasthenic syndrome, a neuromuscular disorder. This motif shares homology with SH3-binding motifs that mediate SH3-dependent protein-protein interactions.

Hypothesis: The objective of this study was to determine and characterize a regulatory role for this proline-rich motif on the function of human 69-kDa ChAT. We hypothesized that ChAT protein stability and enzyme activity are regulated through this conserved N-terminal proline-rich motif.

Materials and Methods: Mouse cholinergic SN56 cells were transiently transfected to express either wild-type (WT) or mutant ChAT that contained either N-terminal truncations or Pro→Ala mutations. ChAT protein was analyzed by immunoblotting and specific activity by radioenzymatic assay. ChAT ubiquitination was assessed in cells co-expressing ChAT with HA-tagged WT or mutant ubiquitin that form specific polyubiquitin chains. Following immunoprecipitations ubiquitinated ChAT was analyzed by immunoblotting. For proteasomal inhibition cells were treated with the proteasome inhibitors MG132 or lactacystin, or DMSO control. Bacterially-expressed WT and proline-mutant ChAT were purified from E. coli BL21 cells by Ni2+ affinity purification and cation-exchange chromatography. Protein secondary structure was assessed by circular dichroism analysis using a Jasco J-810 spectropolarimeter. In vitro thermal stability was assessed by measuring loss of helicity at 222 nm from 4-95°C. Specific activity was measured by radioenzymatic assay. ChAT protein half-life was determined using a novel fluorescent strain-promoted alkyne-azide cycloaddition (SPAAC) pulse-chase protocol based on “click” chemistry whereby azide-labeled proteins are reacted with fluorescently-labeled strained cyclooctynes to form stable triazole conjugates. Following immunoprecipitations ChAT protein half-life was determined in-gel by tracking loss of fluorescently-labeled WT and P17A/P19A-ChAT during a 0-24h chase period using a ChemiDoc MP system. SPAAC pulse-chase was validated by cycloheximide-chase assay.

Results: We found that disruption of the proline-rich motif by either N-terminal truncation or Pro→Ala mutation reduces ChAT protein expression and specific activity, with P17A/P19A-ChAT yielding the greatest effects comparable to N-terminal truncation. In vitro specific activity of bacterially-expressed recombinant P17A/P19A-ChAT is impaired compared to WT-ChAT, although gross secondary structure and thermal stability was unaffected. Ubiquitination of P17A/P19A-ChAT is enhanced in SN56 cells, resulting in increased proteasomal degradation and reduced protein half-life. Both WT-ChAT and P17A/P19A-ChAT can undergo K48-dependent and K48-independent polyubiquitination and proteasomal degradation. Lastly, proteasome inhibition increases P17A/P19A-ChAT protein stability and partially restores protein half-life to that of WT-ChAT.
FUNCTIONAL CONNECTIVITY OF THE HIPPOCAMPUS TO THE THALAMOCORTICAL CIRCUITRY IN AN ANIMAL MODEL OF ABSENCE SEIZURES

SEYED REZA MOUSAVI

Research Area:
Neuroscience and Mental Health

Supervisor(s):
Drs. Stan Leung and Seyed Mirsattari

Supervisory Committee:
N/A

First Author:
Seyed Reza Mousavi

Additional Authors:
Justin Arcaro, Stan Leung and Seyed Mirsattari

Abstract:
Introduction: Absence seizures are characterized by sudden onset of generalized spike-and-wave discharges (GSWDs) originating in thalamocortical network. Recent studies suggest a potential involvement of the hippocampus in generalized seizures, which may explain the variability in the extent of cognitive deficits among patients with absence epilepsy.

Hypothesis: We hypothesize that the functional connectivity between hippocampus and thalamus, as assessed by functional magnetic resonance images (fMRI), will be increased during the continuous GSWD state, as compared to baseline, in a model of absence seizures induced by gamma-butyrolactone (GBL) injection in rats.

Materials and Methods: The dataset was provided by Dr. Tenney at Univ. Massachusetts Medical School, Worcester. Tenney et al. (Epilepsia 45:576, 2003) reported changes in the blood-oxygen level dependent signal, but not functional connectivity, in a GBL model of absence seizures on WAG/Rij rats. Eight rats were initially anesthetized with ketamine-demetomidine, which was reversed by Antisedan at the imaging time. Images were acquired by a two-segment gradient echo planar imaging (EPI) sequence (TR=1 s; TE=25 ms; FOV=3 x 3 cm; data matrix=128 x 128; number of slices=4; slice thickness=1.0 mm). Non-brain tissue was then eliminated from the whole functional data sets. Brain images were smoothed using a Gaussian filter and a band-pass filter (0.01-0.1 Hz) was applied to all voxel time courses. Correlation coefficients were calculated by cross-correlating the time course of the average fMRI signal of the dorsal hippocampus with that of other voxels within the brain. Correlation coefficients were normalized using Fisher transformation and the resulting z values were considered as connectivity measures. The correlation coefficient between fMRI signals of the hippocampus and the ventolateral/posterior thalamus were calculated at baseline (10 min before) and at 5, 20, and 50 min after GBL injection.

Results: The z values showed that the connectivity of hippocampus and thalamus increased after injection of GBL comparing to the baseline. The highest connectivity occurred at 5 min after injection of GBL decreased thereafter at 20 and 50 min time point. The differences in z values were statistically significant between baseline, 5, 20, 30 and 50 min (one-way ANOVA, with posthoc Newman-Keuls test).
RELATIONSHIPS BETWEEN BURDENSOMENESS, BELONGINGNESS, SOCIAL HOPELESSNESS AND SUICIDE IDEATION IN COMMUNITY RESIDING OLDER ADULTS

DORIAN MURARIU

Research Area:
Neuroscience and Mental Health

Supervisor(s):
Drs. Marnin Heisel and Paul Links

Supervisory Committee:
Drs. Sisira Sarma and Amardeep Thind

First Author:
Dorian Murariu

Additional Authors:
N/A

Abstract:
Introduction: In Canada and around the world older adults have high suicide rates. Prevention of suicide requires better theoretical understanding of the risk factors within this high-risk group. The present study examined key risk factors for suicide ideation through the framework of a recent theory, the Interpersonal Theory of Suicide.

Hypothesis: The Interpersonal Theory proposes that when an individual rates highly on two interpersonal constructs - perceived burdensomeness and thwarted belongingness - they are at greater risk for suicidal thoughts. Further, a sense of hopelessness in regards to one’s life circumstances may facilitate the transition from passive to active suicidal thoughts.

Materials and Methods: Secondary analyses were conducted on data collected from 173 community residing older adults recruited primarily from the Middlesex-London region for a study investigating associations between resiliency factors and suicide ideation (Heisel, M.J., PI). This study provided data for measures used in the present study to test the IPTS: passive and active suicidal thoughts (death ideation and suicide ideation, respectively), interpersonal variables (perceived burdensomeness, thwarted belongingness, social hopelessness), demographic characteristics and depression. These measures were administered during the third and fourth follow-up periods. Data from 126 individuals who participated in the third follow-up were used to conduct cross-sectional analyses using multiple linear regressions to predict death ideation and suicide ideation, and controlling for age, sex and depression; participants were primarily female (73.0%) with a mean age of 74.5 years (SD = 6.0). Data from the remaining 107 individuals who participated in the fourth follow-up were used to conduct longitudinal analyses using the same methods; participants in this reduced sample due to attrition did not differ from the baseline group. Further, data for two other interpersonal constructs - loneliness and perceived social support - were used to examine the predictive ability of the IPTS constructs beyond well-known risk factors for suicide ideation.

Results: In the cross-sectional analyses, thwarted belongingness significantly predicted death ideation, controlling for age, sex and depression; perceived burdensomeness did not. Consistent with the Interpersonal Theory, the two-way interaction of thwarted belongingness and perceived burdensomeness significantly predicted death ideation, but the three-way interaction with social hopelessness did not. Longitudinal analyses remain to be examined. Models containing interpersonal variables accounted for significantly more variance in death ideation and suicide ideation than models with only age, sex and depression as covariates. The Interpersonal Theory constructs predicted significant variability in suicide ideation above measures of loneliness and perceive social support.
HIPPOCAMPAL THETA RHYTHM MODULATES SYNAPTIC PLASTICITY AT BASAL AND APICAL DENDRITES OF CA1

CLAYTON S. H. LAW

Research Area:
Neuroscience and Mental Health

Supervisor(s):
Dr. Stan Leung

Supervisory Committee:
Drs. Donglin Bai and Susanne Schmid

First Author:
Clayton S. H. Law

Additional Authors:
L. Stan Leung

Abstract:

Introduction: Synaptic plasticity is believed to be the cellular mechanism underlying memory formation. Hippocampal theta rhythm (4-12 Hz) is an intrinsic brain oscillation associated with active behaviours in rodents. One burst of electrical stimulation delivered to the peak of theta rhythm results in long-term potentiation (LTP) at the apical dendritic synapses.

Hypothesis: Whether synaptic plasticity at the basal dendritic synapses is modulated by theta rhythm remains unknown. Furthermore, the contribution of different theta rhythm phases to synaptic plasticity has not been examined. We hypothesize that synaptic plasticity at both apical and basal dendrites is modulated by different phases of theta rhythm.

Materials and Methods: Long-Evans rats (200-350g) were urethane-anaesthetized (1.5g/kg, i.p.). Electrodes were lowered into stratum radiatum (SR) and stratum oriens (SO) of the hippocampus to stimulate apical and basal dendrites respectively. A 16-channel silicon probe was lowered into CA1 to record evoked field potentials. Current-source density (CSD) analysis was used to determine the location of excitatory sinks. The excitatory sink slopes were monitored for 30 minutes to establish a stable baseline (SEM/mean <0.05). Subsequently, a single electrical burst (5 pulses at 200Hz) was delivered to either the basal or apical dendrites during theta rhythm. Theta rhythm resembles a sine wave and can be divided into different phases: peak is 90°, trough is 270°, rising phase is 0°, and falling phase is 180°. The phase of theta rhythm where stimulation occurred was determined by comparing the time of burst onset in relation to the peaks of the digitally-filtered theta signal immediately preceding tetanus. The post-tetanus excitatory sink slopes were normalized to the baseline average to determine whether LTP has occurred.

Results: The phase of theta rhythm where stimulation occurred is significantly correlated to LTP at the basal (R²=0.28; p<0.01; N=26) and apical (R²=0.59; p<0.01; N=18) dendrites at 30-60 minutes post-tetanus. Correlation was significant at all other time intervals, except for 0-30 minutes at the apical dendrites. The optimal phase for inducing LTP at the basal and apical dendrites is 320°-20° and 334°-342° respectively, which corresponds to the rising phase (315°-45°) of theta rhythm. Stimulation during the falling phase (135°-225°) of theta rhythm is least conducive for inducing LTP, but does not result in long-term depression (LTD).
CAREER/INDUSTRY WORKSHOPS
4:00 - 5:00 p.m.
Salons A, B and Theatre

Blazing Your Own Trail for an Academic Career... and Landing that Faculty Position
4:00 - 5:00 p.m.

Non-Academic Career Perspectives – Session One
Salon B
4:00 - 5:00 p.m.

Non-Academic Career Perspectives – Session Two
Theatre
4:00 - 5:00 p.m.
“Climbing the Academic Ladder: Transitioning From Grad Student to Post Doc”
Phillip Medeiros, PhD
4:00 - 4:20 p.m.

Dr. Phil Medeiros is a post-doctoral fellow in the laboratory of Dr. Ralph DaCosta at the Princess Margaret Cancer Centre in Toronto. Supported by a Canadian Breast Cancer Foundation Doctoral Fellowship, Dr. Medeiros completed his PhD in Medical Biophysics at Schulich Medicine & Dentistry where he established a strong publication record and completed a Mitacs internship at Triphase Research and Development II Corp.

After receiving his PhD in 2013, he held a postdoctoral position with Drs. Kevin Shoemaker and Dwayne Jackson at Schulich Medicine & Dentistry then headed to Toronto for his current position. As a long-time mentor to junior graduate students and fellow post-docs, Dr. Medeiros’ talk will focus on how to search for a post-doctoral fellowship, managing your time during the postdoctoral fellowship and planning for the future.

“Don’t Feel Defeated like the Toronto Maple Leafs: Firsthand Tips on Securing an Academic Job”
Donald E. Spratt, PhD
4:20 - 4:40 p.m.

Dr. Don Spratt is a research associate in the laboratory of Dr. Gary Shaw in the Department of Biochemistry at Schulich Medicine & Dentistry. After receiving his PhD in Chemistry from the University of Waterloo in 2008, he started his postdoctoral fellowship at Schulich Medicine & Dentistry, which was supported by fellowships from CIHR, NSERC, and the Ontario Ministry of Research and Innovation. He has published 20 papers, 11 as first author, with his most recent being published in Nature Communications, PNAS, and the Journal of Biological Chemistry. He recently accepted a faculty position in the Carlson School of Chemistry and Biochemistry at Clark University in Worcester, MA beginning in August 2015. (Although he will be moving to Boston Bruin country, he will always remain a Toronto Maple Leafs fan... a true be"Leaf"er!)

Dr. Spratt’s presentation will include tips on how to make your application stand out, get past the phone/Skype interview and secure an on-site faculty interview. He will also give some insight on how to be memorable with the faculty and students during an interview.

“Academic Snakes and Ladders: My Journey from Grad School to Tenure”
Lauren Flynn, PhD
4:40 - 5:00 p.m.

Dr. Lauren Flynn is a new faculty member joint-appointed to the Departments of Anatomy and Cell Biology and Chemical and Biochemical Engineering at Schulich Medicine & Dentistry. In January 2015, Dr. Flynn was one of three Western researchers who received funding from the Canadian Foundation for Innovation (CFI). Before completing her doctorate degree in 2007, Dr. Flynn was hired to her first faculty position at Queen’s University in the Department of Chemical Engineering.

In addition to this unique story, Dr. Flynn will share her tips on how to be a successful young investigator and acquire grants in today’s funding climate and how she acquired her current faculty position at Schulich Medicine & Dentistry.
NON-ACADEMIC CAREER PERSPECTIVES – SESSION ONE

SALON B
4:00 - 5:00 P.M.

Moderator: Kyle Biggar, PhD

Speakers:

Bianca Lopes, BA, BMOS (Hons), MSc
Commercial Asset Manager, Royal Bank of Canada
Serial Entrepreneur

Dr. Les Kalman, HBSc, DDSS, DICOI
Founder/CEO, Research Driven Inc.
Dentalpreneur
Assistant Professor, Schulich School of Medicine & Dentistry

Annie Raditsis, MSc
Chemist
Former Scientist, Biogen Idec in Cambridge, MA

NON-ACADEMIC CAREER PERSPECTIVES – SESSION TWO

THEATRE
4:00 - 5:00 P.M.

Moderator: Greg Vilk, PhD

Speakers:

Jay Anthonypillai, MSc
CEO, Berkeley Biolabs
Director/Founder, Valen Scientific

Bogumil Karas, PhD
Founder/CSO, Designer Microbes Inc.
Former Scientist, Craig Center Institute

Maileen Gan, MBA
Marketing Supervisor, 3M Canada

Justin Leushner, MBA
VP Operations and Startup Services, TechAlliance Inc.
We gratefully acknowledge the following sponsors:

Trudell Medical Limited
Sustaining Innovation

CIMTEC
Centre for Imaging Technology Commercialization

NPT LLP
Chartered Accountants

RBC Bank